{"publication\_number": "US-2014014223-A1", "abstract": "an exemplary weaving method includes placing a first section of a fill fiber between warp fibers , forming a pick , moving a base to reposition the warp fibers , and placing a second section of the fill fiber between the warp fibers .", "application\_number": "US-201213547410-A", "description": "referring to fig1 , an example weaving assembly 10 is used to weave a woven structure 14 . the weaving assembly 10 includes a wand 18 , a base 22 , and a plurality of warp fiber arms 26 . when weaving the woven structure 14 , the wand 18 positions a fill fiber 30 between warp fibers 42 . the fill fiber 30 extends from a spool 34 through a bore 38 in the wand 18 . the wand 18 , in this example , is a hollow tube . a fill fiber feed device may be included to meter the feed rate of the fill fiber with respect to the instantaneous relative velocity of the wand tip to the textile being created . the warp fibers 42 are manipulated by warp fiber arms 26 . the assembly 10 includes a positional controller 46 associated with the wand 18 , a positional controller 50 associated with the warp fiber arms 26 , and a positional controller 54 associated with the base 22 . the positional controller 46 is able to move the wand 18 relative to the warp fiber arms 26 and the base 22 . the positional controller 50 is able to move the warp fiber arms 26 relative to the wand 18 and the base 22 . the positional controller 54 is able to move the base 22 relative to the wand 18 and the warp fiber arms 26 . the positional controllers 46 , 50 , and 54 can be operated independently from each other or together . the warp fiber arms 26 may be on the positional controller 50 , attached to the fill fiber wand controller 46 , or attached to the base positional controller 54 . in this example , at least the positional controller 54 is a six - axis controller , and may be a six - axis robotic controller . that is , the positional controller 54 is able to move the base 22 relative to the warp fiber arms 26 in three dimensions and rotate around three axes . the positional controllers 46 and 50 may have similar characteristics . referring to fig2 - 8 with continuing reference to fig1 , the woven structure 14 includes multiple picks 58 . in this example , warp fibers 42 are crossed over a first section 62 of the fill fiber 30 to form one of the picks 58 a . the warp fiber arms 26 are actuated to cross the warp fibers 42 over the fill fiber 30 , which entraps the fill fiber to form the pick 58 a . the example fill fibers 30 and warp fibers 42 may be composed of several different materials including glass , graphite , polyethelene , aramid , ceramic , boron . one of the fill fibers 30 or warp fibers 42 may include hundreds or thousands of individual filaments . the individual filaments may have diameters that range from 5 to 25 microns , although boron filaments may be up to 142 microns in diameter . in this example , each of the warp fiber arms 26 holds one of the warp fibers 42 . in other examples , the warp fiber arms 26 may hold several of the warp fibers 42 . after crossing the warp fibers 42 over the fill fiber 30 , the warp fiber arms 26 hand - off the warp fiber 42 to another of the warp fiber arms 26 . the \u201c hand - off \u201d feature allows an open shed so that the warp fiber arms 26 do not interfere with the wand 18 . after the hand - off , the warp fiber arms 26 are then crossed over a second section 62 b of the fill fiber 30 to form another of the picks 58 b . the warp fiber arms 26 engage portions of the warp fibers 42 . these portions may include end fittings . the warp fiber arms 26 grab the end fittings holding the warp fibers 42 . the end fittings may be placed on a holding station to help maintain the position of the warp fibers 42 during weaving . a person having skill in this art and the benefit of this disclosure would understand how to create picks by crossing warp fibers over a fill fiber , and how to hand - off a warp fiber from one warp fiber arm to another warp fiber arm . when weaving , the wand 18 moves the fill fiber 30 past the warp fibers 42 . the wand 18 moves the fill fiber 30 back and forth to create built - up layers of picks 58 . the wand 18 is long enough to reach down through the longest warp fibers 42 during the weaving ( fig8 ). in this example , the base 22 is moved as dictated by the design of the woven structure 14 to create a bend 66 in the woven structure 14 . the base 22 is thus capable of movement relative to the warp fiber arms 26 . a boss 68 of the base 22 directly engages one end of the warp fibers 42 . the warp fibers 42 are adhesively secured to base 68 in some examples . the base 22 moves so that the pick\_formation point is at a position relative to the wand 18 , and the fill fiber 30 , appropriate for forming the bend 66 . although only one substantial bend 66 is shown , the base 22 may manipulate the pick formation points to form a woven structure having various contours . the base 22 may move the warp fibers 42 over a piece of tooling shaped to the final desired contour [ e . g ., a mandrel ] that is attached to the base 22 to facilitate forming the bend 66 . the mandrel may move separately from the base 22 . in another example , the base 22 moves the warp fibers 42 without a mandrel to free - form the bend 66 . in some examples , the warp fibers 42 are rigid enough to cantilever out from the base 22 ( or shed ) during the weaving . a binding agent such as polyvinyl alcohol is used , in some examples , to provide a degree of rigidity to the warp fibers 42 . the warp fibers 42 may have a fixed length . the fill fiber 30 , by contrast , can have length in excess of that needed to produce one component . in some examples , the warp fibers 42 are soft and not rigid enough to cantilever out from the base . in other examples , metallic or plastic fittings may be added to the free ends of flexible warp fibers 42 . the fittings may be placed in holding stations , and the warp arms move the fittings from notch to notch as appropriate as the component is build up . the fittings may take the form of a bead with a through - hole . prior to weaving , the ends of the warp fibers 42 are inserted through the holes and bonded with an adhesive . the holding station may be a fixture that has notches to hold the non - rigid warp fibers by draping the fitting over the notch and having gravity provide tension . the fittings may also take the form of mechanisms that provide tension by the action of a spring , similar to carriers that hold spools of fiber on a braiding machine . the holding station may be attached to the base or may be independent of the motion of the base . the path and manipulations of the base 22 with the positional controller 54 , the number of warp fibers 42 engaged by the warp fiber arms 26 when forming each pick , and the sequence of warp fiber arm movements may be designed and pre - planned in a software model to produce the woven structure 14 having the desired contours . a stable shape is obtained by the interplay of fiber forces and friction within the textile unit cells throughout the component . the software model may utilize as inputs : a cad definition of the surfaces of a desired component incorporating the woven structure ; a definition of the initial warp fibers &# 39 ; lengths , locations , and orientations ; and a definition of a textile repeating unit cell ( or pick ). the software calculates motions of the wand 18 , base 22 , and warp fiber arms 26 necessary to achieve desired contours in the woven structure 14 , without colliding into each other . the software model is then used as input for the positional controllers 46 , 50 , and 54 . fig9 a - 9c show an example of the manipulation and sequencing used when weaving to create the woven structure 14 . the warp fibers 42 of this example may be attached to a base having a profile matching a portion of the woven structure 14 . the fill fiber 30 is then moved through the warp fibers 42 in multiple passes . the warp fibers 42 are then turned about an axis a in a direction d to develop , for example , a flange of the woven structure 14 and the bend 66 . fig1 shows an example warp manipulation station 70 having four warp fiber arms 26 a - 26 d . two of the arms 26 a and 26 c selectively engage the warp fiber 42 a , and two of the arms 26 b and 26 d selectively engage the warp fiber 42 b . each of the arms 26 a - 26 d may have a gripper 74 in order to push and pull the respective - warp fiber 42 a or 42 b over the fill fiber 30 . in this example , after forming a pick , the arm 26 a hands - off the warp fiber 42 a to the arm 26 d , and the arm 26 c hands - off the warp fiber 42 b to the arm 26 b . by handing off and retracting , the warp arms divide the warp fibers 42 a and 42 b to open a shed area between the warp fibers 42 a and 42 b for the wand 18 . separation s 1 between arms 26 a and 26 b , and separation s 2 between arms 26 c and 26 d can be adjusted to adjust the shape of the woven structure 14 . the separations s 1 and s 2 may remain relatively consistent when forming the area shown in fig5 . the separations s 1 and s 2 may be gradually increased after each pass of the fill fiber 30 to create a flanged area of the woven structure 14 shown in fig4 . referring to fig1 , in some examples a woven structure 14 a may include multiple layers of the warp fibers 42 . the fill fiber 30 joins all three layers in this example . grippers used when weaving the woven structure 14 a selectively engage one , two , or more warp fibers . in another embodiment the warp fiber arms 26 a - 26 d may be mounted on a housing with the fill fiber wand 18 . the warp fiber arms 26 a - 26 d may have small paddle extensions that can be inserted next to the warp fibers 42 , and are under multi - axis position control with respect to the fill fiber wand 18 , to nudge and guide the warp fibers 42 into position as dictated by the software model of the component being created . features of the disclosed examples include a relatively precise and repeatable mechanized process that is conducive to high volume production of complex shape engine components . creation of textile architectures that avoid the pitfalls of traditional methods of low intralaminar and interlaminar properties is enabled . the preceding description is exemplary rather than limiting in nature . variations and modifications to the disclosed examples may become apparent to those skilled in the art that do not necessarily depart from the essence of this disclosure . thus , the scope of legal protection given to this disclosure can only be determined by studying the following claims ."}

{"publication\_number": "US-4160057-A", "abstract": "a strapping tape resistant to splitting has a width of about 1 / 8 inch to about 11 / 2 inches , preferably about 1 / 4 inch to about 3 / 4 inch , about 22 to about 52 warp elements per inch , wherein each of said warp elements has a denier of about 840 to about 3000 and the total denier of all warp elements together does not exceed about 73 , 000 / in . the strapping tape also comprises 1 to 5 weft elements per inch wherein each of the weft elements has a denier of about 50 to about 1000 . the tape is particularly useful in the packaging and material handling art for baling , reinforcing and pallet securement .", "application\_number": "US-85565677-A", "description": "the strapping tape of this invention can generally be prepared on a narrow gauge loom by essentially standard weaving methods . the warp elements pass through a series of heddles mounted on harnesses , which can be controllably raised or lowered by the loom mechanism . by means of a predetermined sequence of raising and lowering of the harnesses , and with the coordinated systematic placement of the weft yarn and beat up of the reed , the desired strapping tape is obtained . the strands can consist of either monofilament of multifilament single yarns or cords , or the strands can be produced by intertwisting two or more separate multifilament yarns to make a plied yarn . when cords of high denier yarns are employed as the strand units of the warp elements , the twist will preferably be below five turns per inch . in the manufacture of weftless tape strapping it is extremely difficult , if not impossible , to manufacture these tapes from yarns with a zero twist . however , in our invention , a zero twist will produce an excellent strapping tape as the weft holds the individual warp strands together as well as holding the warp yarns in intimate contact with each other . sometimes , however , there may be a tendency for the outermost warp of twistless yarn to bulge outward between picks . this is easily overcome by incorporating one or more warp yarns having twist , in the selvage edges of the woven tape . in so doing , economical twistless yarn can be used in the body of the tape without the tendency for bulging of the two outermost yarns . the yarns are preferably made of man - made fibers , such as polyamide , polyester , polyolefin , rayon , polyacrylonitrile , fiberglass , etc ., and are generally made to contain agents that protect the yarn from degradation by heat , ultraviolet light , oxidation and aging . natural fiber yarns , such as cotton , jute , flax , paper , etc ., as well as metallic yarns , such as the ferrous and non - ferrous metals , can also be used with this invention . the warp elements are preferably about 26 to about 52 in number and have a denier preferably in the range of about 1300 to about 2600 denier and generally have a higher denier than the denier of the weft elements . the preferred denier of the weft elements is about 400 denier . the nature of the fibrous material employed for the weft elements in the practice of this invention is not usually critical , provided that the said fibrous material possesses adequate strength and durability to keep the warp ends together and prevent splitting . suitable fibrous weft materials include cotton , rayon , wool and yarns of synthetic polymeric materials , such as those employed in the warp yarn . the warp and weft yarns may consist of spun yarns ; however , it is preferable to use continuous multifilament or monofilament yarns in order to maximize strength and minimize manufacturing cost . it should be noted that the strapping tapes within the scope of the invention can vary in their type weave in both single and multilayer construction with or without binder or stuffer yarns . for example , plain weave , twill , satin , basket , stripe broken and stripe pointed twills in single or multilayer construction and other weaves are satisfactory for use in our invention . in the manufacture of weftless strapping tapes of the prior art , individual strands of yarn must be placed together side by side in a longitudinal direction . as an example , for a 1 / 2 &# 34 ; strap , 16 ends of 4000 denier are employed . in other words , to achieve the desired strength , four ends of 1000 denier can be twisted together and then multiplied by 16 ends to achieve the desired strapping . in one embodiment of our invention , the individual longitudinal warp yarns can be consolidated into single warp elements by drawing , for example , 3 of them through the same heddle on the loom by utilizing 1000 denier instead of 3000 denier , achieving the desired strength and in many cases a greater strength than the weftless tape or the weftless strapping tape manufacturing process . similarly , one can employ 2 strands of 1300 denier instead of a single strand of 2600 denier . in another embodiment of this invention , there is provided a strapping tape fabric woven from monofilament yarns , strands or strips , which are pliable , non - splintering , tough , non - porous , have a high tensile strength and a high resistance to fatigue , abrasion and cutting . in another embodiment of this invention , there is provided a comparative light weight strapping tape , the weave of which is formed from a multiplicity of longitudinal ends from monofilament yarns , strands or strips of extruded plastic material derived from the polymerization of vinylidene chloride , either alone or with one or more polymerizable vinyl compounds , in which the molecules of the plastic material are oriented along the axis of the yarns , strands or strips . another embodiment of our invention is to weave a broad woven fabric using the desired warp and filling yarns at the desired end and pick count and then slit the broad woven fabric using a hot knife , hot wire or other cutting apparatus , into strips of strapping tape having the desired width . while the body of the broad woven fabric may be of one weave , it would be preferable to selectively weave in leno or doup ends so that one or more doup or leno ends would occur in the selvage or edges of each strapping tape after cutting . the leno or doup woven yarns would prevent unravelling and assure maximum transversal strength and therefore be resistant to splitting . strapping tapes have been manufactured heretofore , but , while some of the desirable characteristics enumerated above have been obtained , none of the prior art structures or materials have achieved all the results or combinations and characteristics that are claimed herein , nor have they achieved the desirable results to the degree obtained with the tapes disclosed herein . as an example , in comparing our woven tape with a weftless tape , our tape has a transversal strength of 41 . 0 pounds per inch in comparison to 3 . 8 pounds per inch tansversal strength for the weftless tape . therefore , the tape of our invention is 10 times stronger and more resistant to splitting than the weftless tape . in the manufacture of weftless tape , individual strands are completely submersed in an adhesive bath . in our invention , on the other hand , our tape after the weaving process may be coated on the surface only using various adhesive application techniques . there is greater flexibility and speed , depending on the drying properties of the adhesive utilized . there are many uses of this tape in various industries today . in certain applications , different types of flexibility or rigidity of the strapping tapes is required . our invention also provides an extremely strong tape with a breaking strength from 50 to 25 , 000 pounds , or more if required . by applying special adhesives , such as polyurethane , epoxy , polyester , acrylic , polyvinyl alcohol , polyvinyl acetate , low melt polyethylene or any of the vegetable or animal type of adhesives or other adhesive , it is possible to provide either a flexible or a rigid tape depending on the manufacturing technique used . this invention calls for the strapping tape to be easily tied in a knot when a flexible strapping is used and / or employing the regularly known techniques of utilizing buckles or seals generally used in the strapping industry today . many different types of weftless ribbons and tapes are known . these weftless tapes are generally formed from either natural fibers , for example , cotton , hemp , linen or silk , whereas the cord strappings are usually made out of rayon , nylon , polyester or polypropylene . canadian pat . no . 544 , 703 , issued aug . 13 , 1957 , to mr . thomas j . karrass , montreal , quebec , canada , describes a weftless tape , which has certain limitations . this tape may be quite strong longitudinally , but it has certain limitations whereby it splits fairly easily which has been a common complaint in the packaging industry . as previously explained , our tape has excellent transversal strength , and therefore is resistant to splitting . another feature of our invention is the fact that the various numbers of ends are not necessarily manufactured longitudinally parallel to each other and may be placed one on top of each other through the needle loom , which will provide it with an extremely desirable feature in the use of our strapping tape in tied knot applications . our manufacturing process provides the product with a greater resiliency and bulk in the longitudinal direction to provide a greater knot breaking strength at the knot to the breaking strength when not knotted . weftless tapes tend to be brittle or very weak at the knot and generally unsuitable for use in baling operations or when packages are placed under compression with outward tension and hand - tied with a knot . therefore , weftless tape manufacturers generally recommend the use of buckles as the preferred method of application in holding the two ends of weftless tapes together . in another embodiment of our invention , if it is desired to reduce tape elongation and eliminate slackening of the tape due to time dependent creep , in addition to using high modulus fibers , one can resort to hot stretching the individual yarns prior to weaving the tape or hot stretching the entire tape after weaving . another claim of our invention is that by utilizing a flat zero twist type of yarn a lesser number of ends are required . this is easily accomplished by using a yarn that has a breaking strength of eight to ten grams per denier or greater as compared to a lower quality type of polyester with a breaking strength of four to five grams per denier . by virtue of its greater strength , fewer strands of continuous multifilament or monofilament are required to cover the same area without the sacrifice of strength . it will be understood that the term &# 34 ; yarn &# 34 ; includes yarn produced from fibers from combination of drawing or drafting and twisting applied to prepared fiber masses , such as rovings , or the formation of yarn from filaments by the combination of cutting or breaking together with drafting and twisting . the term &# 34 ; yarn &# 34 ; is understood to include continuous strands of fibers or filaments in a form suitable for weaving which may include a monofilament , a number of fibers twisted together , a number of filaments laid together without twist or a number of filaments laid together with more or less twist . modifications of this invention will be apparent to those skilled in the art and it is intended to cover all modifications and variations coming within the scope of the claims . the terms of expression which have been employed are used as terms of description and not of limitation ; there is no intention in the use of such terms and expressions of excluding any equivalents of the features shown and described or portions thereof , but it is recognized that various modifications are possible ."}

{"publication\_number": "US-8299131-B2", "abstract": "a process of preparing a silica sol is described . the process involves reacting a fresh sol with guanidine carbonate . the reaction may be conducted in the presence of a base , and at a ph of from 8 to 12 . the process of the present invention may also include concentrating steps . the silica sol prepared by the method of the present invention has a bet surface area of greater than or equal to 100 m 2 / g , and contains from 0 . 05 to 15 % by weight of gaunidinium ions , based on the total weight of the silica gel .", "application\_number": "US-52057403-A", "description": "by an exact reaction procedure , ph control and temperature control or by specific adjustment of the residence times , a desired bet surface area can be established in the product . the process permits the preparation of a stabilized silica sol having a bet surface area of from 100 to 1200 m 2 / g and a solids concentration of , for example , from 0 . 05 to 15 % by weight . in the reaction according to the invention , fresh sol is used . this is an alkali - free sio 2 solution which is produced , for example , by removing the alkali metal cations from a water glass . the commonest method of dealkalization is treatment of dilute water glass solutions with cation exchange resins in the h + form . suitable ion exchange resins are , for example , lewatit \u00ae grades from bayer ag . preferably , water glass solutions having a silica content of less than 10 % by weight are passed over ion exchange columns containing the acidic ion exchangers . short residence times in the ion exchange zone , in which the ph of the solutions is preferably from 5 to 7 , are important for avoiding gelling of the solutions and silicification of the ion exchange resin . the preparation of these small - particled , acidic fresh sols is disclosed , for example , in u . s . pat . no . 2 , 244 , 325 and u . s . pat . no . 3 , 468 , 813 . in order to increase the shelf life , i . e . the period of storability of the acidic fresh sol , cooling in the fresh sol to temperatures of 0 - 15 \u00b0 c ., preferably of 4 - 10 \u00b0 c ., should advantageously be used . the fresh sol to be used according to the invention is preferably an aqueous system having an sio 2 content of from 4 to 8 % by weight , preferably from 5 to 7 % by weight . as a rule , fresh sols which contain sio 2 particles having a mean particle diameter , determined by means of an ultracentrifuge , of & lt ; 5 nm are used . the fresh sols used preferably have a ph of from 2 to 4 , particularly preferably from 2 to 3 . unless otherwise characterized , the stated ph values are to be understood as meaning ph values which are determined at 25 \u00b0 c . according to the invention , fresh sol is reacted with guanidine carbonate . the guanidine carbonate is preferably used in the form of an aqueous solution . the guanidine carbonate concentration of the aqueous solution is preferably from 5 to 30 % by weight . fresh sol and guanidine carbonate are preferably reacted with one another in amounts such that the weight ratio of sio 2 to guanidine carbonate is from 150 to 0 . 2 , particularly preferably from 60 to 15 . preferably , the reaction is carried out at a ph of from 8 to 12 , measured at the reaction temperature . particularly preferably , the ph during the reaction is from 8 to 10 , measured at the reaction temperature , very particularly preferably from 8 . 5 to 9 . 5 , measured at the reaction temperature . the reaction is carried out , for example , at a temperature of from 25 \u00b0 c . to 100 \u00b0 c ., preferably from 50 \u00b0 c . to 100 \u00b0 c ., particularly preferably from 80 \u00b0 c . to 100 \u00b0 c . the reaction according to the invention of fresh sol with guanidine carbonate can be carried out in the presence of a further base . this ensures that a defined ph is maintained and gelling is avoided . the base used may be , for example , potassium water glass , sodium water glass , potassium hydroxide and / or sodium hydroxide . the base used is preferably sodium water glass . commercial sodium water glass has a composition of na 2 o 3 . 34 sio2 and is usually prepared by melting quartz sand with sodium carbonate or a mixture of sodium sulfate and carbon , a transparent colorless glass being obtained , so - called piece glass . this piece glass reacts in ground form with water at elevated temperature and pressure to give colloidal , strongly alkaline solutions , which are subsequently subjected to a purification . processes in which finely divided quartz or other suitable sio 2 raw materials are digested under hydrothermal conditions with alkalis directly to give aqueous water glasses are also known . the base is preferably added in a molar ratio of sio 2 to na 2 o of from 80 to 20 , particularly preferably from 60 to 30 . the base can be metered , for example in the form of an aqueous solution , to the reactor in which the reaction of fresh sol and guanidine carbonate is carried out . it is also possible to add the base completely or partly directly to a solution of guanidine carbonate and then to react this mixture with the fresh sol . the second procedure is preferred . the process according to the invention can be carried out continuously or batchwise . a continuous procedure is preferred . in the continuous reaction procedure , preferably the fresh sol and an aqueous solution of guanidine carbonate are fed continuously to a reactor , a ph of from 8 to 12 , measured at the reaction temperature , and a temperature of from 25 \u00b0 c . to 100 \u00b0 c . being established and the average residence time being chosen so that the silica sol prepared has a bet surface area of \u2267 100 m 2 / g . specific surface areas can be determined either by the bet method ( s . brunauer , p . h . emmet and e . teller , j . am . soc ., 1938 , 60 , page 309 ) on dried sio 2 powder or directly in solution by titration according to g . w . sears ( analytical chemistry , vol . 28 , page 1981 , year 1956 ). unless stated otherwise , values for the specific surface area which were determined by the bet method are given in the present description . the reaction is preferably carried out at a temperature of from 50 \u00b0 c . to 100 \u00b0 c ., particularly preferably from 80 \u00b0 c . to 100 \u00b0 c . the residence time is substantially determined by the reaction volume and the feed and discharge streams . preferably , from 1 . 0 to 6 . 5 l / h of fresh sol and from 0 . 1 to 0 . 5 l / h of an aqueous solution of guanidine , carbonate or of an aqueous alkaline guanidine carbonate solution are added to a reactor having a reaction volume of from 0 . 5 to 1 . 0 liter . the discharge stream can be influenced in particular by evaporating a certain amount of water during the reaction , the amount of evaporated water being established by the choice of the temperature . the process according to the invention is preferably carried out in a multistage reactor cascade , in particular in a reactor cascade comprising three reaction vessels connected in series . here , all starting materials are preferably fed to the first reaction vessel . however , it is also conceivable to pass part - streams of the starting materials into the second or a further reaction vessel . what is important , however , is that at least part of the silica sol and also of guanidine carbonate is fed to the first reaction vessel . the reaction procedure in a multistage reactor cascade makes it possible to create spatially separated steady states with respect to ph , temperature , mean particle diameter , na 2 o content and sio 2 concentrations , and residence time . of particular importance is the residence time in those reactors to which fresh sol is added since it is there that the growth process to give larger particles preferentially takes place . the average residence time is preferably controlled by an evaporated amount of water or amount of water to be evaporated and by the fresh sol addition to the respective reactors , concentration simultaneously taking place as a result of the evaporation of water . the bet surface area of the silica sol obtained is determined substantially by the temperature and the residence time in the reaction vessel into which the starting materials are passed . the apparatus used in the process according to the invention preferably consists of a plurality of overflow reactors arranged in series and connected to one another , at least two of said reactors . the content of each reaction vessel is thoroughly mixed . defined amounts of distillate are removed from the reactors by suitable heat sources . the addition of the starting materials fresh sol , guanidine carbonate and optionally base to the reactors , at least to the first reactor in the direction of material flow , is effected by metering means . when the process according to the invention is carried out in a reactor cascade , it should be ensured that a ph of from 8 to 12 , measured at the reaction temperature , is established in all reaction vessels and the temperature in the first reactor is from 25 \u00b0 c . to 100 \u00b0 c . the temperature in the further reactors is preferably from 60 \u00b0 c . to 100 \u00b0 c . if a temperature of about the boiling point of the solvent used , preferably water , is established in one or more of the reaction vessels , evaporation of solvent occurs . in this way , the concentration of sio 2 in the product can be increased . this process is referred to as concentration . when the reactor cascade is started up , the steady states with respect to ph , temperature and average residence time described above and characteristic for the invention must be established . for starting up , it is not necessary to fill all reactors of the multistage apparatus with suitable initially introduced materials . it is sufficient to have or to produce a suitable initially introduced material in the first reactor . a suitable initially introduced material is , for example , an aqueous , alkaline colloidal silica sol solution having a ph of & gt ; 8 , an aqueous , alkaline colloidal silica solution which contains from 0 . 1 to 10 % by weight of guanidine carbonate and has a ph of & gt ; 8 or an aqueous , alkaline guanidine carbonate solution which contains from 0 . 1 to 10 % by weight of guanidine carbonate . although a continuous procedure is preferred , a batchwise procedure is also possible . for example , at least a part of the fresh sol and of an aqueous solution of guanidine carbonate is initially introduced into a reactor and the remainder of the fresh sol and the aqueous solution of guanidine carbonate is metered into the reaction mixture , the temperature being adjusted so that an amount of solvent which corresponds to the amount of metered fresh sol and the aqueous solution of guanidine carbonate evaporates . as already mentioned above , the concentration of sio 2 can be increased during the preparation itself by evaporating a part of the solvent . however , the actual preparation process can also be followed by a separate process for concentration . the concentration in turn can be effected , for example , thermally by evaporating down or by ultrafiltration through membranes . for example , ceramic membranes are suitable for this purpose . the invention furthermore relates to a silica sol which is obtainable by the process according to the invention . the invention also relates to a silica sol having a bet surface area of from 100 to 1200 m 2 / g , the silica sol containing from 0 . 05 to 15 % by weight of guanidinium ions , based on the total weight of the silica sol . the silica sol of the present invention has a negligibly low aluminum content , preferably less than 50 ppm . nevertheless , it is distinguished by a high stability in combination with a large bet surface area , it being possible to establish solids contents of the silica sol of up to 15 % by weight of sio 2 . the concentration of sio 2 in the silica sol according to the invention is preferably from 3 to 15 % by weight , based on the total weight of the silica sol . the silica sol preferably contains from 0 . 1 to 15 % by weight of guanidinium ions , particularly preferably from 0 . 5 to 10 % by weight . the silica sol preferably has a bet surface area of from 300 to 1200 m 2 / g , particularly preferably from 500 to 1000 m 2 / g , very particularly preferably from 700 to 1000 m 2 / g . in a particular embodiment the silica sol has a bet surface area of from 400 to 650 m 2 / g . the sio 2 particles of the silica sols according to the invention preferably have particle sizes with a broad size distribution of 3 - 300 nm . in addition to electron micrographs , other different methods , such as , for example , laser correlation spectroscopy , photon correlation spectroscopy , ultrasonic measurements or measurements using an ultracentrifuge ( sedimentation ), are suitable for the measurement of particle sizes in the nanometer range . owing to its high separating efficiency , the ultracentrifuge is particularly suitable for determining particle size distributions . the particular feature of this method of measurement is that a fractionation of the dispersion by particle size is effected before the actual measurement . in a homogeneous dispersion , it is known that the large particles settle out more rapidly than the medium - sized and small particles present . by passing laser light through the ultracentrifuge cell , a pronounced change of intensity occurs as a function of time . from this change of intensity , it is possible to calculate the change of concentration of the particles and from this the particle size distribution . the particle sizes of the sio 2 particles of the silica sols according to the invention are therefore determined by means of an ultracentrifuge . the mean diameter of the sio 2 particles of the silica sols according to the invention is preferably from 3 to 30 nm , this value likewise being determined by means of a commercial ultracentrifuge . the silica sol according to the invention preferably has a ph of from 2 to 12 , the ph particularly preferably being from 8 to 11 . the range from ph 5 to ph 6 is less preferred since silica sols in this range have only low stability . at ph values above 12 , peptization and dissolution of the particles with formation of alkali metal silicate solution then increasingly occurred . the finely divided silica sols according to the invention are as a rule partly aggregated , i . e . individual spherical sio 2 particles have agglomerated and form irregular structures , it being possible for the spherical sio 2 particle to be arranged both in a chain - like manner and in three dimensions . in a particular embodiment , the silica sols according to the invention are free of amines . fig1 shows a transmission electron micrograph of a silica sol according to the invention . the magnification is 200000 : 1 . the partial aggregation is clearly evident . the silica sols according to the invention usually have a viscosity of less than 10 mpa s at a solids content of 10 % by weight . the stated viscosity is determined by means of a h\u00f6ppler viscometer at a temperature of 20 \u00b0 c . the viscosity is preferably from 1 . 8 to 2 . 2 mpa s at a solids content of 10 % by weight . the viscosity of the silica sols depends in particular on the silica content , the particle size of the silica particles , the degree of crosslinking of the particles and the electrolyte content . the silica sol according to the invention has a molar sio 2 / n ratio of from 2 to 20 , preferably from 4 to 12 . the determination of the sio 2 / n ratio is effected by means of a customary elemental analysis . virtually all particles in contact with a liquid have a charge on their surface . the zeta potential is an important and useful indicator of the surface charge , which indicator can be used for predicting and monitoring the stability of a colloidal suspension or emulsion (\u201c zeta potential a new approach \u201d by b . b . weiner , w . w . tscharnuter and d . fairhurst , company brochure of brookhaven instruments ). the larger the zeta potential , the greater is the probability that the suspension will remain stable , since the charged particles repel one another and therefore do not agglomerate . the zeta potential can therefore be used for monitoring the stability of a colloidal suspension . the higher the zeta potential of a silica sol the higher therefore is the stability of the sol . colloidal suspensions having good stability have a zeta potential between \u2212 30 and \u2212 60 mv . colloidal suspensions having very good to extreme stabilities have zeta potentials of from \u2212 60 to \u2212 100 mv . at zeta potentials below \u2212 15 mv , the sol is unstable . in preferred embodiments , the silica sol according to the invention has has a zeta potential of from \u2212 20 to \u2212 80 mv , preferably from \u2212 30 to \u2212 60 mv . information about the structure can be obtained from ir band positions of silica sols . in particular , the position of the si \u2014 o stretching vibration band ( v si \u2014 o ) may be of interest . in preferred embodiments , the silica sol according to the invention therefore has a band position of si \u2014 o stretching vibration at a wave number of from 1113 cm \u2212 1 to 1080 cm \u2212 1 preferably from 1113 cm \u2212 1 to 1100 cm \u2212 1 , particularly preferably from 1112 cm \u2212 1 to 1104 cm \u2212 1 . in addition to the si \u2014 o stretching vibration band described above , the silica sol according to the invention has , owing to the content of guanidinium ions , an n \u2014 h deformation vibration band ( \u03b4 n \u2014 h ) at a wave number in the range from 1750 to 1640 cm \u2212 1 . the ir spectra are measured using a digilab fts 4000 fourier transformation infrared spectrometer . sufficiently precise band positions and band shapes are obtained under the following recording conditions : spectral resolution : 1 cm \u2212 1 , apodization : box car , zerofilling factor : at least 2 , number of scans : 32 . according to din specification 55350 , part 13 the measurements are carried out six times , and a relative standard deviation of less than 0 . 1 % should preferably be achieved . the samples are prepared as kbr pellets . it should be ensured that the spectra do not have an ascending baseline ( christiansen effect due to scattering by small particles ) but have maximum extinctions in the range from 0 . 7 to 1 . 3 a . the stated wave number relates to the maximum of the relevant band ( absorption maximum ). the ir band position of the silica sols according to the invention differs from silica sols not according to the invention firstly in the position of the si \u2014 o stretching vibration band and secondly in the n \u2014 h deformation vibration band of the guanidinium ions , owing to the absence of guanidinium ions in the case of silica sols not according to the invention . fig2 shows an ir spectrum of a silica sol according to the invention . fig3 shows an ir spectrum of a silica sol not according to the invention . silica sols are generally unstable to electrolyte addition , such as , for example , addition of sodium chloride , ammonium chloride and potassium fluoride . preferably , the silica sols according to the invention therefore contain no added electrolyte . the silica sols according to the invention are suitable for a number of applications . for example , the use as binder for precision casting , in the refractories sector , in the preparation of catalysts , as coating agents , in the textile sector , in the paper sector , for antislip finishes , in the construction sector and as polish for electronics may be mentioned . the silica sols according to the invention can be particularly advantageously used in paper retention . for this purpose , the silica sols are used , as a rule , as a mixture with cationic polymers . cationic polymers which may be used are all polymers which are usually used as retention aids and / or wet strength agents in papermaking . both natural polymers , for example based on carbohydrates , and synthetic polymers are suitable . cationic starch and cationic polyacrylamides , polyethylenimines , polyamidoamines and poly ( diallyldimethylammonium chloride ) may be mentioned by way of example . preferred cationic polymers are cationic starch and cationic polyacrylamides . the amount of silica sol according to the invention and cationic polymer which are used in papermaking can vary within a wide range and are dependent , inter alia , on the type of paper raw material , the presence of fillers and other conditions . the amount of silica sol used should as a rule be at least 0 . 01 kg of silica sol , calculated as sio 2 , per metric ton of dry fibers and optionally fillers . preferably , from 0 . 1 to 2 kg of silica sol , calculated as sio 2 , are used per metric ton of dry fibers and optionally fillers . the addition of the silica sol and of the cationic polymer in papermaking is effected by the customary procedure and is described , for example , in u . s . pat . no . 5 , 643 , 414 . the invention is further explained below with reference to examples , but these are not to be understood as imposing any restriction . an apparatus which consists of three glass overflow reactors arranged in series and connected to one another was used . the content of each reaction vessel is thoroughly mixed with a propeller stirrer . the reactor content is heated indirectly by means of steam . for this purpose , heating coils through which steam flows are mounted in the interior of the reaction vessel . the vapors are passed over a water condenser and are condensed and the volume of the condensate is then measured . in the first of the three overflow reactors , an aqueous solution of acidic fresh sol , prepared according to u . s . pat . no . 2 , 244 , 325 , was added by means of a feed apparatus . the feed apparatus was chosen so that the addition could also be effected into individual , selected reactors . the addition of the guanidine carbonate solution and optionally of a solution of a further base was likewise possible by means of a metering apparatus . in order to increase the shelf life , i . e . the duration of storability of fresh sol , said solution was cooled to temperatures of 4 - 10 \u00b0 c . the alkaline guanidine carbonate solution was not cooled and was used at ambient temperature . guanidine carbonate from agrolinz was used . a steady state was established in the three reaction vessels , with an average residence time of 14 min in the 1st reaction vessel , 16 min in the 2nd reaction vessel and 20 min in the 3rd reaction vessel . for this purpose , 3200 ml of fresh sol containing 5 . 6 % by weight of sio 2 per hour were added to the first reaction vessel and 260 ml of alkaline guanidine carbonate solution per hour were added likewise to the 1st reaction vessel and 1160 ml of water were evaporated in the downstream reaction vessels . the alkaline guanidine carbonate solution contained 47 . 7 g of guanidine carbonate and 9 . 3 g of aqueous naoh solution ( 45 % strength by weight ) per 945 ml of water . during the steady state , 91 \u00b0 c . was established in the 1st reaction vessel , 100 \u00b0 c . in the 2nd reaction vessel and likewise 100 \u00b0 c . in the 3rd reaction vessel . the sio 2 concentration changes from 5 . 6 % by weight in the 1st reaction vessel to 9 . 5 % by weight in the 3rd reaction vessel during the steady state . a finely divided , partly structured silica sol which had a density of 1 . 065 g / ml , a ph of 9 . 7 and a bet surface area of 480 m 2 / g was obtained . a steady state was established in the apparatus described in example 1 , with an average residence time of 14 min in the 1st reaction vessel , 16 min in the 2nd reaction vessel and 20 min in the 3rd reaction vessel , by adding 1600 ml of fresh sol containing 5 . 6 % by weight of sio 2 per hour to the first reaction vessel and 128 ml of alkaline guanidine carbonate solution per hour likewise to the 1st reaction vessel and by evaporating 390 ml of water . the alkaline guanidine carbonate solution contained 45 . 7 g of guanidine carbonate and 8 . 4 g of koh per 945 ml of water . during the steady state , 85 \u00b0 c . was established in the 1st reaction vessel , 100 \u00b0 c . in the 2nd reaction vessel and likewise 100 \u00b0 c . in the 3rd reaction vessel . the sio 2 concentration changed from 5 . 6 % by weight in the 1st reaction vessel to 6 . 1 % by weight in the 2nd reaction vessel . after an operating time of 3 hours in the steady state , a silica sol containing 6 . 1 % by weight of sio 2 and having a ph of 8 . 71 and a bet surface area of 698 m 2 / g was obtained in the discharge . in this example , an aqueous guanidine carbonate solution which contained no additional base was used . the reaction was carried out in the apparatus described in example 1 . a steady state was established , with an average residence time of 14 min in the 1st reaction vessel , 16 min in the 2nd reaction vessel and 20 min in the 3rd reaction vessel . for this purpose , 1600 ml of fresh sol containing 5 . 6 % by weight of sio 2 per hour and 128 ml of aqueous guanidine carbonate solution per hour were added to the 1st reaction vessel and 1160 ml of water were evaporated in the downstream reaction vessels . the aqueous guanidine carbonate solution contained 50 g of guanidine carbonate per 950 g of water . during the steady state , 87 \u00b0 c . was established in the 1st reaction vessel , 100 \u00b0 c . in the 2nd reaction vessel and likewise 100 \u00b0 c . in the 3rd reaction vessel . the sio 2 concentration changed from 5 . 6 % by weight in the 1st reaction vessel to 5 . 8 % by weight in the 2nd reaction vessel . a finely divided , partly structured silica sol which had a density of 1 . 031 g / ml , a ph of 8 . 46 and a bet surface area of 558 m 2 / g was obtained . 1 liter of demineralized water was initially introduced into a stirred apparatus comprising a 2 l three - necked flask and heated to 80 \u00b0 c . 3200 ml of acidic fresh sol ( 5 . 6 % by weight of sio 2 ) and 256 ml of an alkaline guanidine carbonate solution were then metered in per hour . the alkaline guanidine carbonate solution contained 47 . 5 g of guanidine carbonate and 9 . 3 g of aqueous solution of sodium hydroxide ( 45 % strength by weight ) per 925 g of demineralized water . 3456 ml of reaction solution were pumped off per hour with a pump . the average residence time was 17 minutes . the silica sol obtained had an sio 2 content of 5 . 7 % by weight , a bet surface area of 541 m 2 / g and a ph of 8 . 7 . this example shows that the silica sol according to the invention can be prepared in a batch process . 3 liters of a mixture which were obtained by mixing 5064 g of fresh sol , 3836 g of water , 171 . 5 g of solid guanidine carbonate and 90 . 2 g of sodium water glass from cognis were initially introduced into a stirred apparatus comprising a 6 l three - necked flask . the mixture was heated to 80 \u00b0 c . thereafter , 168 ml / h of the mixture described were metered in and at the same time 168 ml / h of condensate were removed from the reaction mixture . the acidic fresh sol ( 5 . 6 % by weight of sio 2 ) was prepared as described in u . s . pat . no . 2 , 244 , 325 . after 36 hours , a partly aggregated silica sol which had an sio 2 content of 12 . 35 % by weight , a bet surface area of 300 m 2 / g and a ph of 10 . 4 was obtained . an ir spectrum of the silica sol according to the invention ( kbr pellet ) was recorded ( fig2 ). a wave number of 1107 cm \u2212 1 was determined for the position of the si \u2014 o stretching vibration band on the basis of precision measurement according to din 55350 ( 6 measurements ). for comparison , an ir spectrum of a silica sol not according to the invention ( kbr pellet ), which contains no guanidinium ions , was recorded ( fig3 ), and a wave number of 1 . 114 cm \u2212 1 was determined for the position of the si \u2014 o stretching vibration band , likewise on the basis of precision measurement according to din 55350 ( 6 measurements ). the silica sol not according to the invention was prepared as follows : 11 , 72 g of 45 % strength sodium hydroxide solution and 250 g of demineralized water were initially introduced at 80 \u00b0 c . into a stirred apparatus comprising a 6 l three - necked flask . 3000 g of fresh sol comprising 5 . 6 % by weight of sio 2 ( prepared as described in u . s . pat . no . 2 , 244 , 325 ) are then added in the course of 5 min via a dropping funnel with stirring . the sio 2 / na 2 o ratio corresponded to 44 . the temperature decreases to 40 \u00b0 c . during this procedure . the mixture was heated to 60 \u00b0 c . and thermostated for 30 min and then heated to boiling point and concentrated at atmospheric pressure to an sio 2 solids content of 9 . 5 % by weight . the silica sol had a bet surface area of 535 m 2 / g and a ph of 10 . 06 ."}

{"publication\_number": "US-4277960-A", "abstract": "a program controlled multiple stream liquid application process in which longitudinal asynchronism between the application of the portions of liquid is reduced by intermittently or continuously detecting the emission of a test stream at each liquid application station , generating , in response to said detection , an electrical signal indicating the time of emission of each test stream with one or more reference times and thereby to generate a correction signal indicative of the extent of longitudinal asynchronism , and modifying the program control in response to the correction signal . a complementary apparatus is also disclosed . in a separate aspect , multiple stream liquid application apparatus includes means coupling the conveyor and the liquid applicator means so that lateral displacement of the conveyor induces a corresponding displacement of the liquid applicator means .", "application\_number": "US-11366980-A", "description": "the apparatus 10 represented schematically in fig1 comprises a conveyor in a form of a wire mesh belt 12 supported on spaced rollers , two of which are shown at 14 , 15 , and on longitudinally extending runners ( not shown ). one of the rollers is driven ( by means not shown ) so that a strip of carpet 16 may be carried longitudinally past a succession of dye application stations . in this instance , for purposes of clarity , only two stations 18 , 18a are illustrated but typically there might be of the order of six stations . each of the dye application stations , 18 , 18a includes an array of nozzles 20 extending transversely of and above the conveyor . these nozzles are supported in a nozzle board 22 and are supplied with dye liquor from a manifold 24 by way of respective solenoid flow valves 26 and flexible tubes 27 . a master control 28 ( fig3 ) includes valve control circuitry 28a programmable to open and close the control valves to thereby selectively control multiple streams issuing from the nozzles 20 in accord with the pattern desired to be produced on the travelling carpet . in a modification in accord with applicant &# 39 ; s copending application ser . no . 042 , 501 , rather than providing an individual valve for each nozzle 20 , each valve supplies a distributor connected to several nozzles in a respective group of nozzles , the arrangement being such that one or more repeats of the pattern occur across the carpet . in this case , the lengths of the fluid lines which connect the nozzles of each group to its distributor are substantially equal . it should also be appreciated that while direct valve control of the liquid stream is implied in fig1 control may be indirect , such as by way of valved control of a deflection fluid jet for each issuing liquid stream . each dye application station applies dye liquor of a particular chosen colour and the portions of dye deposited at the respective dye application stations are intended once supplied to be complementary so as to give rise to a chosen pattern on the strip of carpet . it will be appreciated that for a given longitudinal increment of the carpet , dye application to that increment by stations downstream of the first must be retarded in time with respect to application of dye to the increment by the first station , which time allows the increment to travel from one station to the next . for this reason , appropriate retard times are built in to the pattern program and the transmission of pattern data to control switches for the valves is clocked with respect to the travel of the conveyor belt 12 . however , for each particular print run , differing dye pressures , in turn determined by , inter alia , dye viscosities and the proportion of nozzles simultaneously applying dye may affect the accuracy of the retard times provided for , and pattern resolution may thereby be adversely affected . to assist in correcting for this fine longitudinal asynchronism on commencement of a print run , and then maintaining synchronism as the run proceeds , the apparatus of fig1 is modified as shown in fig2 and 3 . a dedicated test nozzle 29 , 29a for each station is mounted on a bracket 31 , 31a laterally of the respective nozzle boards and the master control is provided with a mode 35 by which the test nozzles of the successive dye application stations may be caused to emit test streams of dye liquor , comprising a regular succession of droplets . the test nozzles 29 , 29a are typically arranged outside the lateral margins of the carpet but this is not strictly necessary . disposed below each test nozzle is a two - part detector 30 , 30a which is photosensitive to the passage of the front of a test stream , which may be a single droplet from the nozzle . preferably , these detectors are uniformly displaced , preferably between 6 and 100 mm , below the nozzles , and are positioned at approximately the level of the carpet , with the test nozzles at the same height as the print nozzles 20 . once master control 28 is operative in the test mode , dye is emitted from the two test nozzles as a sequence of droplets and the fronts of the successive droplets are detected by detectors 30 , 30a . output signals generated by the detectors , which signals indicate the times of emission of the respective test streams or droplets are fed back to the control , specifically to comparators 34 forming part of the control . one of two comparisons may be made : either the time between the detection of the test streams at detectors 30 , 30a is compared with a nominal time or the time elapsed before each detection is individually compared with a respective nominal time , such nominal times being supplied by the program by way of valve control circuitry 28a and assuming no dye pressure variations . the time unit is of course dependent on conveyor movement , as sensed by a transducer 37 associated with the conveyor . output correction signals generated by comparators 34 , such signals being indicative of the extent of longitudinal asynchronism , pass to adjustment circuitry 33 for modifying the selective control of the multiple dye streams issued at nozzles 20 whereby to reduce the asynchronism . this is essentially achieved by adjusting programmed retard times applied to the valve control circuitry . the process is carried out until longitudinal synchronism is obtained at the commencement of a print run and is then automatically continued during the run to ensure minimization of asynchronism . such may arise , for example , in a longer print run as temperature changes affect dye viscosities to varying extents . in practice , a test stream in the form of a discrete droplet is emitted at the rate of between 3 and 6 per repeat of the pattern , perhaps every 15cms of carpet travel . an important advantage of the invention is the elimination of visually based manual synchronization . even for a skilled operator , this is a time consuming operation . where it is desired to changeover pattern without stopping carpet movement , the invention minimises the time taken and therefore the wastage of carpet . fig4 shows a further modification of the apparatus of fig1 by which one end of each nozzle board 22 is coupled to the conveyor belt 12 so as to largely alleviate lateral asynchronism between the respective components . the drawing shows ony one end of one nozzle board but is representative of similar arrangements found at one end of each of the nozzle boards of the other dye application stations . as shown , nozzle board 22 carries at its end a ball bushing 40 for slidably mounting the board to an upright shaft 42 . bushing 40 is necessary because the nozzle board is nominally vertically adjustable between its print and neutral modes , as detailed in applicants co - pending patent application ser . no . 042 , 501 . shaft 42 is screw threadingly engaged at its lower end with a follower block 44 which in turn carries on its inside face a wear strip 46 of a material such a polyethylene . block 44 extends about 30cm along the margin of the conveyor . wear strip 46 is slotted at 48 to slidably receive a protruding marginal formation 50 on the conveyor belt . block 46 is biased against the margin of the belt by a second , adjustably spring loaded centering device 51 . device 51 includes a shaft 52 which is also screw threadingly engaged with the follower block and is slidable by way of a ball bushing 54 within a sleeved housing 56 fastened in aperture 58 in a side plate 60 of the machine frame . a head 62 on the outer end of shaft 52 within housing 56 engages a helical compression spring 64 , the tension of which is adjustable by rotation of a screw 66 threadingly displaceable through the outer end wall of housing 56 . it will be noted that the two shafts 42 , 52 carry nuts 68 for adjustably setting their positions relative to the follower block . it will be appreciated that the coupling arrangement just described , will serve to provide edge guiding for centering the conveyor belt to accurately transmit to the nozzle board any lateral conveyor belt movement which does occur . specifically , it will be seen that lateral displacement of the conveyor belt induces , through follower block 46 and upright coupling shaft 42 a corresponding lateral displacement of the nozzle board 22 . to permit this displacement , the nozzle board is preferably coupled to its vertical displacement system by way of one or more , typically two , sliding bearings ( not shown )."}

{"publication\_number": "US-3942341-A", "abstract": "an improved additive dispensing system for sequentially dispensing a plurality of treating agents into the wash tub of an automatic fabric washing machine at predetermined times during the washing cycle . a plurality of compartments are provided for retaining the various laundry additives to be dispensed into the wash tub . a channel is in liquid flow communication between one compartment and a liquid supply means arranged for directing liquid into the channel . an aperture is provided in the bottom of the channel for effectively removing contaminating lint from the liquid prior to introduction of the liquid into the compartment .", "application\_number": "US-50187774-A", "description": "referring to fig1 the dispenser 10 for an automatic clothes washer is shown with the cover ( not shown ) removed therefrom to expose the details of construction of the present embodiment . the dispenser 10 , as shown , is generally an annularly - shaped segmented channel or trough defined by annular inner and outer walls 12 and 14 respectively . the dispenser 10 is divided into four annular compartments 16 , 18 , 20 , and 22 . the presoak agent is placed in compartment 18 through opening 28 , detergent is placed in compartment 16 through opening 26 , bleach is placed into compartment 20 through opening 30 , and rinse agent is placed in compartment 22 through opening 32 . unlike compartments 16 , 20 and 22 , compartment 18 is not designed to store a treating agent but merely provides a passageway for introducing prewash liquid treating agents directly into the washing machine tub or into a filter pan located between the tub and dispenser 10 to be effective during the first fill cycle of the machine . to this end the bottom wall portion of the compartment 18 has a large opening 33 to facilitate easy dispensing of the prewash agent . liquid being pumped from the wash tub is introducted into the dispenser 10 by a liquid flow diverter mechanism ( not shown ). the liquid for compartment 16 flows through channel 35 from inlet 35 to the compartment . liquid for compartment 22 flows through channel 39 from inlet 41 to the compartment . liquid for compartment 20 flows through channel 40 from inlet 42 to the compartment . the liquid flow diverter mechanism is sequentially controlled to selectively direct recirculation liquid into preselected inlets 37 , 41 and 42 for mixing liquid with the treating agents being held in the compartments to flush the agents into the wash tub at predetermined times in a cycle of the automatic washing machine . detergent or soap to be dispensed from compartment 16 during the wash cycle is usually in solid , granular or high viscosity water soluble form . the bottom of the compartment 16 is provided with a discharge outlet at one end thereof ( not shown ) for flushing the detergent or soap to be dispensed into the wash load . bleach stored in compartment 20 is dispensed during the wash cycle subsequent to the dispensing of the detergent in a manner that will hereinafter be described in detail . compartment 20 is defined by a bottom wall 34 and side walls , one side wall 36 being shown in fig2 . extending into compartment 20 is an outlet end 38 of a passageway or channel 40 . channel 40 is located adjacent the cover and connects the compartment 20 with the liquid inlet area 42 . at the proper time in the washing operation usually after the detergent is flushed , the machine timer controls introduction of recirculation water into liquid inlet area 42 for flow through channel 40 and into the bleach compartment 20 . provision is made to drain the compartment 20 when there has been a sufficient amount of recirculation water introduced into the compartment to dilute the concentrated bleach prior to introduction of a diluted bleach solution into the wash load . one embodiment is shown in connection with the present invention and consists of a siphon tube 44 . the siphon operates in a normal fashion wherein it has a short leg positioned within the chamber 20 and spaced above the bottom wall 34 thereof . the other leg of the siphon extends through the bottom of the wall 34 and in communication with the interior of the wash tub for dispensing the diluted bleach solution into the wash . when the diluted bleach solution reaches the top of the siphon the siphoning action starts with the diluted bleach solution being drained slowly through the siphon and into the wash load . it will be understood that this action of draining through the siphon will continue until the water entering the compartment 20 through outlet 38 terminates and then the mixture of bleach and water in the compartment will continue to flow out through the siphon until the compartment 20 is emptied . one of the difficulties with this bleach dilution and flushing arrangement is that the hole or tube diameter through which the dilute bleach solution is dispensed is necessarily quite small due to the desire to add the bleach solution to the wash slowly . it has been found that by using recirculation water that contains lint and other large contaminants there is a possibility that the hole or tube will become clogged and detrimentally affect the flushing or evacuating operation . referring to fig1 - 3 there is shown means for separating lint and other large contaminants from the recirculation water prior to introduction of the recirculation water into compartment 20 . there is provided an aperture 46 upstream of the compartment 20 and located in the bottom wall 48 of channel 40 . the aperture 46 is in communication with the interior of the washer through an opening 58 in the bottom of the dispenser and into an underlying filter pan if there is one . the aperture 46 extends across a major portion of the channel bottom wall 48 and is spaced from upstanding channel side walls 50 and 52 with the portion of the aperture adjacent each of the respective side walls being divergent in a direction away from the side wall . the spacing of the aperture from the channel side walls can be varied depending upon the desired liquid flow rate for entering into the compartment . the greater the space the higher the flow rate into the compartment 20 . the aperture may be of various dimensions with the portion of the aperture adjacent each of the channel side walls being divergent in a direction away from the side wall . in the drawings such an aperture has triangular end portions , however , they may also be curved inwardly . in the preferred embodiment the aperture 46 is located in a ramp portion 53 consisting of ascending and descending ramps 54 and 56 , respectively , which ramp portion forms a part of the channel bottom wall 48 . it will be noted that the aperture is located between the ascending and descending ramps . this ramp arrangement tends to increase the liquid flow velocity in the ramp portion 53 and enhances the lint removal from the liquid passing along the channel 40 . by this arrangement the recirculation water traveling through the channel 40 carrying with it lint and other contaminant particles encounters the aperture 46 which disrupts the liquid flow pattern such that some of the liquid with a large portion of the lint and other contaminants carried by the recirculation water passes down through aperture 46 while at the same time the other portion of the liquid which is relatively lint free passes between the divergent end portions of the aperture and the channel side walls and then into the bleach compartment 20 via channel outlet end 38 . by this relatively simple arrangement the lint may be easily and effectively removed from the recirculation water and is deposited either into the wash tub or underlying filter pan , if there is one , and does not necessitate periodic cleaning which would normally be the case should the lint be removed by a screen . the foregoing is a description of the preferred embodiment of the invention and variations may be made thereto without departing from the true spirit of the invention , as defined in the appended claims ."}

{"publication\_number": "US-5474002-A", "abstract": "an embroidering machine includes a frame for holding a work piece , a sewing machine for making an embroidery on the work piece , a controller establishing an embroidering operation by moving the frame , under the sewing machine , horizontally and vertically in a common plane based on embroidering data , and establishing calculations , before initiation of the sewing machine operation , of a single time duration required for one single complete movement of the frame based on the embroidering data and a total time duration required for the embroidering operation as a sum of the single time durations , and an indicator for indicating the total time duration .", "application\_number": "US-28118494-A", "description": "a preferred embodiment of the present invention will be described hereinunder in detail with reference to the accompanying drawings . referring first to fig1 and 4 , an embroidering machine includes , as seen from fig1 a sewing machine 1 , an x - y table 2 positioned below the sewing machine 1 , and a controller 4 having an indicator 3 for indicating an embroidering condition . the x - y table 2 is provided with a frame 5 which is expected to be moved in a plane by a driving portion having an x - motor 26a and a y - motor 26 ( b ) ( cf . fig2 ). the moving quantity and direction of the frame 5 depends on embroidering data . the sewing machine 1 is expected to be driven by a main motor 27 ( fig2 ) which is also called an upper shaft motor . when the embroidering machine is operated after inputting the embroidering data into the controller 4 and mounting a work piece ( not shown ) on the frame 5 , an embroidery with a specific pattern is made on the work piece in accordance with the embroidering data . in addition to the foregoing features , the embroidering machine according to the present invention has additional features or functions . that is to say , in the micro - processor 21 , embroidering data are converted into a time duration , a total or required operation time duration is calculated , and the remaining operation time duration is calculated . the micro - processor 21 has therein program memories and a working or temporal ram . the micro - processor 21 is connected with an input means 22 , a plurality of memories 28 , 29 and 30 each of which stores respective embroidering data , the indicator 3 , a driving means 31 for driving the main motor 27 , and a pulse distributor circuit 24 for driving the x - motor 26a and the y - motor 26b . the input means 22 is expected to bring one of the memories 28 , 29 and 30 into an accessible condition upon key - operation . the resultant embroidering data after being read indicates needle locations in the form of plane coordinates for the frame 5 . the length ratio between x - direction length and the y - direction length between two adjacent needle locations determines the pulse distribution ratio between the x - motor 26a and the y - motor 26b . in addition , the oblique side of the right - angled triangle which is defined by the x - direction length and the y - direction length defines a pitch between two adjacent needle locations , and the main motor 27 is rotated or turned on depending on the resultant pitch . the main motor 27 is provided with an encoder 27a and its pulse output is used as a criteria signal for controlling the the x - motor 26a and the y - motor 26b after being fed - back to the micro - processor 21 . at this stage , the operator can determine or limit the maximum rotational speed of the main motor 27 . this maximum rotational speed of the main motor 27 corresponds to an embroidering speed and determines an embroidering accuracy . hereinafter an operation of the foregoing structured embroidering machine will be explained with reference to fig3 and 4 . fig3 shows a flow - chart for calculating the required time duration from the initiation to the termination of operation of the embroidering machine when the embroidering data are inputted . prior to this procedure , the setting of the frame 5 is established . after this setting , in step s1 , the micro - processor 21 sets the embroidering speed , a variable t to zero which indicates the required operation time duration of the machine for making a single complete embroidery , and a variable t min to a value which indicates the minimum time duration for moving the frame 5 one complete pitch . the meaning of this value will become apparent later . in step s2 , the pitch between two adjacent needle locations is calculated and a time duration t for moving the frame 5 one complete pitch is calculated by using a rotational speed of the main motor 27 which corresponds to the resultant pitch . at this stage , the relationship among the pitch , the rotational speed of the main motor 27 , and the time duration t is explained . as apparent from the table shown below , in this machine , the rotational number of the main motor 27 is expected to be corresponded to a pitch range . \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_pitch rotational speed time duration t\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 0 \u02dc 2 . 4 mm 1000 rpm 0 . 06 sec2 . 5 \u02dc 3 . 9 mm 700 rpm 0 . 085 sec4 . 0 \u02dc 6 . 4 mm 600 rpm 0 . 1 sec6 . 5 \u02dc 8 . 9 mm 500 rpm 0 . 12 sec 8 . 0 \u02dc 12 . 7 mm 450 rpm 0 . 133 sec\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in this machine , the maximum rotational speed of the main motor 27 is variable due to the fact that , for example , the main motor 27 is requested to rotate at 800 rpm upon 2 . 4 mm movement of the frame 5 in order to avoid an unexpected breaking of the thread . under such a request , instead of 0 . 06 sec , 0 . 075 sec is used . this value is stored , in step s1 , as the minimum time duration t - min . it is to be noted that the foregoing table is stored in the memory . if the resultant time duration t in step s3 is judged to be greater than the minimum time duration t - min , such a time duration t is added to the required operation time duration t in step s5 . if the result in step s3 is that the resultant time duration t is not greater than the minimum time duration t - min , before performing step s5 , step 4 is performed for replacing the resultant time duration t in step s3 with the minimum time duration t - min . in step s6 , it is checked whether there is remaining data or not . a loop operation which is constituted by steps s2 , s3 , s4 , s5 and s6 is set to be executed so long as one or more embroidering data exists . if the result in step s6 is positive , the required operation time duration t is fixed and is indicated on the indicator 3 which is in the form of a liquid - crystal display . after such an indication , the embroidering machine operation is initiated . even while the embroidering machine is in operation , an interruption can be executed for indicating the remaining operation time duration which can be obtained by a procedure shown in fig4 . the procedure shown in fig4 is similar to that shown in fig3 and is to obtain the remaining operation time duration such that the current accumulated or required operation time duration is subtracted from the fixed required operation time duration t . the details of the flow - chart shown in fig4 are as follows . under a condition that the fixed required operation time duration t is being indicated in step s7 , if the embroidering machine operation is initiated , as in step s2 , step s8 is performed for calculating a time duration t &# 39 ; per one stitch on the basis of a pitch between the last two adjacent needle locations . the resultant time duration t &# 39 ; is compared to the minimum time duration t &# 39 ;- min in step s9 . if t &# 39 ;& gt ; t &# 39 ;- min , the control goes to step s11 . if t &# 39 ;\u2266 t &# 39 ;- min , step s10 is executed for replacing the time duration t &# 39 ; with the minimum time duration t &# 39 ;- min . step s11 corresponding to step s5 calculates an accumulated or current total required operation time duration t &# 39 ;. in step s12 , the accumulated or current total required operation time duration t &# 39 ; is subtracted from the fixed total required operation time duration t for obtaining a remaining operation time duration t &# 34 ;. in step s13 , the resultant remaining operation time duration t &# 34 ; is indicated . after such an indication , if there is a subsequent embroidering operation in step s14 , the control is returned to step s8 . as detailed above , in the embroidering machine in accordance with the present invention , the total required operation time duration can be displayed , which enables the operator to forecast how long he / she can engage in another job apart from the embroidering machine , and the indication of the remaining time duration enables the operator to know when he / she has to return to the embroidering machine . it should be apparent to one skilled in the art that the above - described embodiment is merely illustrative of but a few of the many possible specific embodiments of the present invention . numerous and various other arrangements can be readily devised by those skilled in the art without departing from the spirit and scope of the invention as defined in the following claims ."}

{"publication\_number": "US-4151729-A", "abstract": "a circular knitting machine having a program or pattern drum coaxial and underlying the needle cylinder . the pattern drum is advanced intermittently and selectively by pawls engaging ratchet wheels of different pitch on the drum , with the pawls driven with different strokes though shafts parallel with the cylinder axis and oscillated by followers riding on cams on the needle cylinder , the followers being selectively and independently displaceable by electro - mechanical units to produce intermittent operation of the pattern drum . cams on the drum act through followers mounted on shafts coaxial with the cylinder axis to oscillate operating arms for controlling radial cams for needle and jack butt manipulation , for controlling an arm with an inclined surface for displacing the cylinder to adjust the length of the loop being knit , and for controlling other instrumentalities of the machine . a yarn cutting device is mounted above the cylinder for free rotation and for lowering for driven engagement of an annular resilient friction member on the underside of the device by the cylinder through the knit fabric , thereby rotating the device to effect cutting of the knitting yarn .", "application\_number": "US-81737477-A", "description": "in the accompanying drawing , 1 generically denotes a main supporting frame or mounting for a needle cylinder 3 . in fig1 this frame 1 is mostly omitted for clearness &# 39 ; s sake . an annular element 7 is supported onto the frame by means of columns 5 , with the annular element surrounding the needle cylinder upper end area . the needle cylinder 3 is slidably assembled but rotatably coupled to a tubular shaft 9 which is mounted on the frame 1 by means of radial bearings 10 and 12 that are mounted on the shaft 9 with annular spacers 14 intermediate the shaft and bearings . the shaft 9 and supported cylinder 3 are rotatably driven through a pulley 16 mounted on the shaft 9 and around which is trained a drive belt 18 . the cylinder 3 by means of an axial bearing 20 bears on small diametrically opposed balls 22 borne by a ring 24 ( also see fig5 ) that is pivoted at 26 to the frame 1 peripherally intermediate the small balls 22 and has at its end opposite to the pivot 26 an operative extension 24a actuated in a hereinafter described manner to vary the axial position of the cylinder and thereby the length of the loop of yarn being knit . at the upper end of the needle cylinder 3 a sinker ring 28 is mounted for control of sinkers 30 , according to a conventional arrangement and sinker operating cam means are provided on a smaller ring 32 , mounted on the sinker ring 28 in a position angularly fixed and axially movable with the cylinder 3 . a program or pattern drum 34 is mounted on the frame 1 coaxial with and underlying the needle cylinder by means of a step 1b and a circular wall 10 . the drum 34 is slowly rotatable independent of the cylinder 3 and in the hereinafter indicated manner for operating a jack control system and other instrumentalities . the drum 34 has a wide outer groove or race defined by flanges 34a , 34b and designed to accommodate a plurality of radial cams in the form of superimposed plates stacked within the groove between the flanges 34a and 34b . in particular , provisions may be made for packs of cams 36 developed according to annular sectors , and engaged to one another , for instance , by a stem 38 which engages them temporarily one to the other to aid the assembly of the sector cam packs 36 within the annular groove or race of the drum 34 . the cams pack 36 is locked by means of a pair of screws 39 which pass through the upper flange 34a and are screwed to the lower flange 34b , thus locking the sector cam pack 36 . through this arrangement , the cam can be easily mounted and disassembled with respect to the drum 34 carrying them , by presenting the drum in a given accessible position , by removing the screws 39 and taking away the sector cam pack 36 , and by introducing a new pack of sector cams according to the desired arrangement , and reassemblying the screws 39 to lock the cam pack to the drum 34 . in the groove between the flanges 34a and 34b a plurality of cams can be mounted which are aligned sector by sector to define annular tracks a radial cams for hereinafter indicated controls . the pattern drum 34 is actuated with a slow rotation by a ratchet mechanism driven by the needle cylinder motion to control the working knitting cycle with the advancement or stop of the drum 34 controlled according to a program which supplies electric stoppage and start signals . for the advancement of the drum 34 , it has mounted thereon two ratchet wheels 40 and 42 having inclined teeth , the wheel 40 having much closer teeth than those on the wheel 42 . the machine program provides for the rotation by a full revolution of the drum 34 with the cams 36 , at each production of an article . three cams 44 , 46 , 48 are coupled in a rotary manner to and positioned on the tubular shaft 9 by spacers 14 . each of the cams 44 and 48 act on the roller 50a of a follower 50 , which is assembled on a shaft 52 parallel to the axis of the needle cylinder . at the upper end , each of the two shafts 52 carries an arm 54 , a pawl 56 being linked to the outer end thereof and being stressed resiliently against the lower ratchet wheel 42 having more spaced teeth . the two pawls 56 and the associated actuation cams are in such mutual relationship that at each half - revolution of the needle cylinder two successive advance movements are imparted to the ratchet wheel and thus to the drum , to obtain an averagely uniform motion . a similar arrangement with a follower 57 cooperates with the cam 46 to determine the actuation of a shaft 58 similar to the one 52 for an arm 60 actuating a pawl 62 designed to act on the ratchet wheel 70 having closer teeth . this arrangement of pawls imparts very slow angular movements to the drum 34 for the control of the follower 57 . the movements of the pattern drum caused by the pawls 50 , 56 serve to obtain movements of the instrumentalities associated with the needle cylinder 3 . the slow movement obtained with the pawls 57 , 62 serves to vary the axial position of the needle cylinder and thus to vary the length of the loops being knit . since the variation of the loop length must be very slow , recourse is had to the pawl acting on the ratchet wheel 40 having very close saw - teeth . in order to determine this axial movement of the needle cylinder for the above - indicated purpose , the cams which are the lowest in the pack or pile as shown in the drawing are used . these cams cooperate with pin followers 64a carried by an arm 64 integral to a shaft 66 , which is assembled on the frame 1 parallel to the axis of the needle cylinder . the pins 64a of the arm 64 are located on different levels to cooperate with successive superimposed cams in the several positions during a cycle of the pattern drum 34 . the shaft 66 has an arm 68 , which is provided at its end with an inclined plane profile 58a which can act on a follower 70 , slidably assembled on the frame 1 parallel to the axis of the needle cylinder 3 , to act on the end 24a of the above - described ring 24 . small angular movements of the unit 64 , 66 , 68 determine a slight axial movement of the follower 70 and thus a raising and a lowering of the ring 24 about its pivot 26 ; this determines an axial movement of the needle cylinder through the ball bearings 22 . fig1 shows a cam 72 of the drum 34 which has a very gradual profile and acts thereby in a very gradual manner on the unit 64a , 64 , 66 , 68 , 70 to determine the slow movement of the needle cylinder in the axial direction , and thereby the slow variation of the length of loops being knit . the profile of the cams acting on the follower 64a can cause increasing and decreasing changes in the length of loops . the other cams of the cam pack 36 assembled on the drum 34 serve to carry out the several controls of the cams acting on the needle and jack butts of the needle cylinder , as well as to effect picking and releasing of yarns and all the other movements which are typical of a conventional knitting operation . for the control of the radially movable cams and their action on the jack and needle butts , there are provided followers 74 , one for each of the cams formed by the drum 34 , each follower 74 being assembled on a shaft 76 parallel to the axis of the needle cylinder and assembled movably on the frame 1 . each shaft 76 carries , in a suitable position above the level of the bearing 20 , an arm 77 designed to act through an appropriate member 78 on the slide 80 , which is mounted for radial sliding , to control the exclusion of the cam 81 of the cam shell arranged around the cylinder 3 , against the counteraction of springs which tend to insert it . the different heights of the cams 36 enable the extraction , the partial insertion , the total insertion or the insertion at different levels of cams such as those 84 or the like . other cams of the drum act on followers 82 integral to arms 83 , which arms 83 act on radial extensions 85a of angularly movable cams 85 . arrangements of this type are arranged at different positions around the circumference of the needle cylinder to effect the controls of the cams in the different positions in which they are located in the needle cylinder . arrangements similar to those described serve to operate yarn guides , wherein followers 88 similar to the followers 74 are mounted on shafts 90 similar to the shafts 76 and extending to the annular element 7 to operate forks 92 for the hereinafter indicated purposes . according to the example , there are provided two forks 92 substantially diametrically opposite . a housing is formed on the annular element 7 for two rings 94 and 96 mounted one within the other and angularly movable around their center which is located on the axis of the needle cylinder , the movement of the rings being determined by the control operated by the two forks 92 . one of these forks engages a pin 96a of the outer ring 96 and the other one of the forks engages a pin 94a of the other one of the rings 94 . on each of the two rings 94 and 96 , there are provided at each of four yarn feeds corresponding cam profiles generically denoted by 98 . there are four yarn feeds around the needle cylinder in the embodiment shown . in correspondence of each feed there is provided on the ring 7 a support 100 , on which a plurality of lever members are articulated at 102 advantageously in a coaxial manner , with the members extending toward the cylinder 3 . some of the levers 104 form yarn guides 104a , while at least one of them for each feed , indicated by 106 , serves to carry a plate 108 for guiding and protecting the latches 110 of the needles 112 of the needle cylinder 3 . in order to act on the levers 104 and 106 there are provided follower pins 114 guided on the support 100 and raisable by means of the profiles 98 , to lift the levers 104 and 106 against the counteraction of springs 116 acting on the outer ends of the same levers . the springs 116 stress each of the levers 104 and 106 into active position and therewith the yarn guides 104a and the guide plates 108 , the active position being defined by the corresponding feed bearing either on the pins 114 or on the support 100 of the corresponding feed . through the control by the shafts 90 and the forks 92 there is an independent positioning of the two rings 94 and 96 and thereby the desired selection of the yarn guides as a function of the position of the raising and lowering profiles 98 . one of the two forks 92 has a lever 92a for hand operation for the control of the outer ring 96 , and also has one of its two arms 92b ( see fig4 ) longer than the other to be able to operate both rings 94 and 96 , owing to the presence of a pin 118 on the ring 94 in such a manner as to determine manually the simultaneous movement of both rings 94 and 96 . this simultaneous control serves to operate a full raising of all the levers 104 and 106 and of the guide plates 108 , when it is necessary to gain access to the upper section of the needle cylinder , as required in the use of the machine . through the control systems of the cams 38 of the drum 34 , control is obtained for the shell cams -- such as the cams 81 and 85 -- acting on the needle and jack butts , and of the yarn guides as well as the exclusion of all the yarn guides and the plates 108 from the needle working zone , at the upper end of the cylinder . control is also obtained , with the cams 72 acting on the followers 74a , of the variation of the loop length during certain working stages of the operation of the machine . an appropriate program may be used to determine the advance stages of the pattern drum 34 and thereby the stages in which occurs a switching both in the shell cams , in the yarn guides and in the axial position of the cylinder for the variation of the length of loops . in order to obtain the variation of the loops with a high graduality , though keeping the angular space required for this operation within a limited extent , there is provided the small - pitch advance system with the ratchet wheel 40 having very close teeth . for the switching of the cams for the action on the yarn guides and on the shell cams , provision is made , on the contrary , for wider movements with the ratchet wheel 42 . in any case , the jack advance movement operated for each revolution of the needle cylinder is selectively obtained for some of the program stages during the operating cycle , while for other stages of the cycle the drum 34 is kept stationary , as no switching is required . in order to exclude the drum 34 from the advance movement , the followers 50 and 57 are lifted from their respective cams 44 , 48 and 46 , so as to interrupt the reciprocating angular movements of the followers and thus the advance of the drum . for this purpose , electromagnetically operated devices are designed which are , for all the followers 50 and 57 , indicated at 122 . these devices include electromagnets and permanent magnets designed to act on respective keepers 124 which approach to the pole shoes of the magnets 122 during the radial movement towards the outside of the respective followers and which are left free or retained according to the energization conditions of the electromagnetic devices . for a safe operation ( in the event of a power failure ), the electromagnetic devices operate to retain the respective followers and thus the respective keepers 124 by action of a permanent magnet , whose action is neutralized by the energization of a winding , which in this way -- when energized -- allows the operation of the follower while in absence of power , the follower 50 is attracted and thus the interruption of the oscillation is determined . a suitable program allows to effect the actuation of the several quick - pitch or slow - pitch advance systems according to the requirements of the working cycle of an article . in this way , the periphery of the drum 34 is sufficient to obtain working programs for a working cycle . the program which acts on the electromagnets may be of the electric type ( punched tape or the like ) or of the mechanical type , for instance of the chain - type . fig6 to 24 show the operation of the needle latch guide plate 108 and the way of feeding the yarn f to the needles at any feed , so as to show how this yarn is fed without contacting any member of the respective feed , but being directly supplied to the needle which is to pick it up . in these figures , where the arrows indicate the relative movement of the needles with respect to the plate 108 and the yarn guides 104a , it is noted that during the raising of the needles 112 to reach a yarn guide 104a , a latch - opener 126 acts on the latches of the needles being raised to maintain them open . this results in the latch being open and below the plate 108 , when the needle reaches the edge thereof . the presence of the inner edge of the plate 108 prevents the latch 110 from accidentally being raised again and closing the end hook of the needle which is to pick the yarn up . the position of the yarn guide 104a with respect to the plate 108 and to the trajectory of the needles is such ( see fig7 to 10 and 12 to 24 ), that the guide in practice does not touch either the inner edge of the plate 108 or any other element connected to the respective yarn feed , arriving directly at the needle which is to pick it up and form the loop by its lowering . this avoids on one hand undesirable yarn damage and on the other hand the wear of the members which might contact the yarn . the same inner edge of the plate 108 is not particularly subjected to wear - stress , as the possible contact of the needle latch is accidental , not systematic . this results in a positive operation of the yarn feeds and a substantial simplicity of the different members connected with each of the yarn feeds , while any breakdown of the latches is avoided . when replacing the yarns by means of the operation of the yarn guides 104 , 104a to insert or remove yarns , it is necessary to cut the yarns , which is usually effected -- according to conventional arrangements -- by means of a disc - saw yarn cutter formed by a disc - like or annular element having a saw - tooth gear designed to engage the yarn to be cut and to carry it towards a cutting knife , or towards one or the other of a plurality of cutting knives provided around the circumference of the toothed disc , the latter being located in the interior of the annular path of the upper end of the needles . the annular saw , that is circular saw , must rotate substantially at the speed of the needle cylinder , so as to effect a satisfactory cutting as to the length of the yarn residual piece coming out of the knitted fabric . usually these saws are mounted on a disc , which in a simple machine as the one now being described is not provided , as there is no requirement for the operation conventionally entrusted to this disc . thus , in replacement of the disc there is provided a device , particularly shown in fig2 to 31 , which serves to cut the yarns and is caused to intervene at the moment when the yarn is to be cut . this cutting device includes a supporting arm 140 projecting from the fixed annular element 7 borne by the frame 1 , and extending to the area of the extension of the needle cylinder axis . in an end head 140a of the support 140 there is provided a housing coaxial to the needle cylinder axis for a column 142 which can slide with respect to the head 140a and is fixed against rotation . the column 142 is urged upward by a spring 144 which by pressing on the head 140a pushes upwardly a plate 146 integral to the upper end of the column 142 . at the lower end of the column 142 there is an expanded head 142a , below which there is provided an upper plate 148 and a lower plate 150 both borne by a shaft 142 internal and coaxial to the column 142 and assembled for rotation therein . the column 142 is prevented from rotating by a groove 142b , in which co - acts a dowel 154 borne by the head 140a . a disc 156 is mounted between the peripheries of the plates 148 , 150 and projects outwardly therefrom with teeth formed around its periphery . the disc 156 is designed to cooperate with one or more of the conventional stationary cutting blades 158 carried by arms 160 integral to the head 142a . the lower plate 150 has a flared underneath profile which substantially corresponds to a frustumcone portion of the inner profile of a ring 3b assembled in the interior of the upper end of the needle cylinder along which the fabric being formed is produced . the profile of the plate 150 has an annular groove or race for an annular resilient friction element 162 of rubber or the like , which can bear , upon lowering of the plate 150 , on the inner frustum - cone surface of the ring 3b of the needle cylinder 3 with the fabric m under formation being inbetween ( in particular see fig2 ). on the upper plate 148 there is provided protecting piece 148a which rotates with the unit 148 , 150 , 152 . when the plate 150 is located in a position partly raised from the needle cylinder 3 , as shown in fig2 in full line , the disc 156 is stationary together with the unit 150 , 152 . when the plates 148 and 150 are lowered to a position indicated at 150x in fig2 the annular friction element 162 engages the ring 3b of the needle cylinder 3 and is rotated thereby . in the lowered position 150x of the plate 150 , the disc 156 reaches the active position for the cutting of the yarn together with one or the other of the knives 158 , which have been lowered , together with the lower plate 150 , with the column 142 in the hereinafter described manner . thus , yarn is cut when , by action of the program , a lowering of the plate 150 is determined from the position shown in full lines in fig2 to the position 150x indicated in dash lines in the figure . in order to effect the movement of the column 142 from the raised position to the lowered position , a small lever 166 is provided on the head 140a of the arm . this lever 166 is pivoted on a pin 168 , with respect to which the lever can be bent laterally outward as well as pivoted as clearly shown by the comparison between fig2 and 30 . a small spring 170 tends to press the small lever 166 to the position shown in fig2 , that is towards and against the column 142 . this column has a notch 172 , which corresponds to a cut - out 174 of the head 140a and to the side of the lever 166 , which is urged against the column 142 by the small spring 170 . a tie - rod 176 with a spring 176a acts on the lever 166 and also the operator can act to separate the lever from the column 142 against the action of the spring 170 . when the device is under the working conditions shown in fig2 to 29 , the lever 166 is located in the notch 172 of the column 142 , and in the raised position of the plate 150 , as shown in fig2 , the spring 144 tends to raise the unit 142 , 148 towards the top , against the counteraction of the lever 166 which is located between a side of the notch 172 and the upper edge of the cut - out 174 . the device is thus ready for the operation of the yarn cutter by lowering of the plate 150 and rotation of the saw 156 by operation of the tie - rod 176 , either directly by the program by means of an electromagnetic servomotor or the like , or by means of a cam of the drum 34 ( which may be a cam combined to the yarn guide control system ) in such a manner as to act on the lever 166 through the spring 166a to lower the column 142 , overcoming the action of the spring 144 . the elastic tension 176a causes the annular element 162 to contact by pressure the ring 3b of the needle cylinder , and thereby the plate 150 and then the disc 156 of the saw are rotated by the needle cylinder by frictional action , and the yarn cut effected with the temporary rotational actuation of the disc 156 in cooperation with the stationary knife blade 158 . upon ceasing by the returning of the tie - rod 176a , the same spring 144 returns the unit of the column 142 and of the plate 150 into the raised position shown in fig3 . the disc 150 , accordingly , is rotated only when the yarn is being cut . the protecting piece 148a of the portion 148 is engaged by the yarn , which is thus tensioned by the action which is exerted thereon by the annular groove in the piece 148a . when it is necessary to gain access to the upper section of the needle cylinder , that is when all the yarn guides and all the plates 108 are raised , or for any other requirements it must be possible to raise the plate 150 and the disc 148 , it is necessary only to act on the lever 166 in the direction of the arrow f5 of fig3 in such a manner as to separate the lever 166 against the action of the spring 170 from the notch 172 of the column 142 . under these conditions , the column 142 is no longer retained by the lever 166 , and thus the spring 144 causes it to fully rise to the position in which the head 142a of the column 142 strikes against the head 140a of the arm 140 . to lower the unit the head 146 , is lowered in the direction of the arrow f6 of fig3 , to bring the notch 172 in correspondence with the lever 166 , and trip the latter , through the spring 170 , into the notch 172 to lock the device again in the arrangement for controlled movement between an inoperative position adjacent the needle cylinder ( solid lines in fig2 ) and an operative position ( dash lines in fig2 ) engaging the cylinder to effect yarn cutting . it is intended that the drawing only shows an embodiment given just as a practical illustration of the invention , said invention being in conditions as to be varied in the forms and arrangements without however , departing from the scope of the concept characterizing the same invention ."}

{"publication\_number": "US-6817152-B2", "abstract": "the invention relates to a coated fiber mat of improved tear strength upon dividing pieces of the coated mat and the coating which comprises a cured , non - woven , fiber glass mat containing a polysiloxane wherein the fibers are fixedly distributed in a formaldehyde type binder containing a binder modifier which is a crosslinked styrene / acrylic polymer , and to a process for the preparation of the mat .", "application\_number": "US-66575003-A", "description": "the preferred cured fiber mat of the present invention comprises by weight from about 68 to about 92 % fiber containing from about 0 . 01 to about 10 % polysiloxane and from about 8 to about 32 % formaldehyde type binder containing between about 0 . 05 and about 15 % of a 0 . 05 to about 10 % crosslinked styrenelacrylic polymer modifier . the formaldehyde type binder base is a thermosetting resin of formaldehyde in combination with urea , phenol , resorcinol , melamine or mixtures thereof . of these , the formaldehyde / urea binder base is preferred . the binder base contains a binder modifying amount of a styrene / acrylic resin containing a polyfunctional component which crosslinks with the copolymer resin during curing of the mat . the styrene component of the resin can be unsubstituted or substituted on a ring carbon atom with lower alkyl , vinyl , allyl , chloro or phenyl ; however , from the standpoint of economics ; notwithstanding the reduced flammability and high thermal stability of some of these substituted types , unsubstituted styrene is most desired . the styrene / acrylic resin , which includes both acrylic and methacrylic moieties and mixtures thereof , contains a minor amount , e . g . between about 0 . 05 to 10 wt . %, preferably between about 0 . 1 and about 5 wt . %, of a crosslinking agent which may be a nitrogen containing crosslinking agent , such as a polyfunctional amine , amide or acrylonitrile , or may be any other polyfunctional crosslinking agent such as for example a di - or tri - olefinically unsaturated hydrocarbon or other conventional crosslinker reactive with the styrene / acrylic copolymer . of the above polymer compositions , those providing self - crosslinkable characteristics are preferred . the ( meth ) acrylic polymer is generally a mixture of ( meth ) acrylates and additionally may contain ( meth ) acrylonitriles , ( meth ) acrylic acid and / or ( meth ) acrylamides as comonomers . one advantage of the present modified binder is that it allows for curing at a lower temperature than would otherwise be required for a mat containing siloxane / formaldehyde type binder alone . it is believed that this benefit is attributable to the crosslinking of the modifier . another advantage is a degree of flexibility contributed by the styrene comonomer . the fibers of the present mat can be fibers of glass , wood pulp or particles , polyethylene , polypropylene , polyester , nylon , orlon \u00ae\* or mixtures of these fibers depending on the end use of the product . more specifically , for roofing shingles , acoustical boards , bur and other asphaltic composites at least a major portion of glass fibers are employed and unmixed glass fibers are most desired . for facers or underlayment used in different articles of building construction , eg . dvider panels , other synthetic fibers or wood chips fixed in a mat can be utilized . the above definition is supported on page 477 of hackh &# 39 ; s chemical dictionary , 4 th ed ., published by mcgraw - hill book company ( see attached ). the mat fibers generally have an average length of from about 3 to abut 140 mm and an average diameter of from about 5 to about 25 micrometers . short and long fibers can be mixed to form a mat web of increased fiber entanglement . the polysiloxane component of the mat is most preferably employed at a concentration of between about 0 . 05 and about 5 % with respect to the modified binder and is a polysiloxane having repeating units of \u2014[ si \u2014 o ]\u2014. the siloxane polymer can be modified with various substituents which include linear , branched or aromatic end - groups optionally containing oxygen , sulfur and / or nitrogen . generally the present polysiloxanes are classified as polyalkyl -, polyaryl -, polyalkylaryl - and polyether - siloxanes . the polysiloxanes found to be most useful in the present invention are those having a weight average molecular weight of at least 600 . the polysiloxanes listed in following table 1 are representative . the modified binder of the present invention alters the interfacial effect between the mat and a surface coating which promotes fiber \u201c pull out \u201d during force applied to prevent immediate fiber breaking or tearing which occurs during separation of portions of the coated mat when the modifier is omitted . it is believed that the increased tear strength of the composite is due to an interfacial interaction between the coating and the mat containing the present modified binder which dissipates the force applied for separation . the accompanying drawing - fig1 is a plain view of the composite . the accompanying drawing fig1 is a top plan view illustrating the separation of a composite which comprises a glass fiber mat having an asphalt coating which penetrates the mat . the portions of the coated mat being separated are indicated by 2 and 4 with fibers 11 bridging the separated area and resisting disunion before total separation occurs . for the manufacture of roofing shingles or bur , a polysiloxane containing fiberglass mat with a urea / formaldehyde binder and the present crosslinked polymer modifier is preferred . the dried , cured mat may be covered on one or both sides with a conventionally thick coating of a standard asphalt or asphalt compound to produce a composite roofing product which can be cut to any size or shape or used as undivided bur sheeting and packaged in pallets or rolls for shipment and subsequent installation . in the case of bur roofing , however , coating or mopping of the mat with a hot surface coating of asphalt is generally delayed until a course of sheeting is installed on the roof . the asphalt employed for coating may additionally contain an antifungal , antibacterial , uv inhibitor and / or coloring agent at the option user . the roof covering herein disclosed is a product of conventional weight and somewhat increased flexibility which meets and exceeds the requirements of astm d - 3462 testing . the significantly improved tear strength of the present product results in savings in packaging and transportation of the product as well as durability of the product when installed . having thus generally described the invention , reference is now had to the following examples which illustrate particular and preferred embodiments but which are not to be construed as limiting to the scope of the invention as set forth in the appended claims . testing tear strength of 3 \u00d7 2 . 5 inch samples of shingles employing glass fiber mats with urea / formaldehyde ( uf ) modified binder . tear test d - 1922 , as referenced in astm d - 3462 ( jul . 10 , 1997 version ), was used to determine the tear strength of various glass fiber mats coated on both sides with a 25 mil coating of asphalt conventionally used in roofing materials . in summary , the test measures the force in grams required to tear apart the coated mat specimen using a pendulum device . acting by gravity , the pendulum swings through an arc tearing the specimen from a precut slit . the test specimen is held at one end by the pendulum and on the opposite end by a stationary member . the loss in energy by the pendulum is indicated by a scale and pointer which registers in the force required to tear apart the specimen . to a wet web of 25 - 100 mm long glass fibers , derived from drainage of a white water slurry , was added at room temperature , a standard urea / formaldehyde binder containing 1 wt . % styrene / acrylate / acrylonitrile polymer modifier ( i . e . acronal s 886 s , supplied by basf ) to provide a fiber to modified binder weight ratio of about 80 : 20 . the web containing fibers and modified binder is then sprayed with an aqueous solution of poly ( dimethylsiloxane ), supplied by chem - trends as product rctw b9296 ) to provide a polysiloxane concentration of from 0 . 25 to 5 % with respect to uf , as noted in the following table . the resulting webs were then dried and cured at about 300 \u00b0 c . for a period of 10 seconds to produce cured , non - woven mats , after which the mats were coated on both sides at 215 \u00b0 c . with filled asphalt ( comprising 32 % w / w asphalt and 68 % w / w limestone filler ) using a two - roller coater . the styrene / butadiene latex , employed in the examples was supplied by dow chemical co . and the urea / formaldehyde binder was obtained from leste co . the results of these tests are as reported in following table 2 . it will be understood that many modifications in procedure and substitutions in the compositions of examples 2 - 6 , including substitution of the polysiloxane , binder and binder modifier , as well as fibers or fiber mixtures , can be made without departing from the scope of the present invention and that these examples merely represent preferred embodiments of the invention ."}

{"publication\_number": "US-2012210600-A1", "abstract": "an antiskid overshoe suitable for being reversibly secured to a shoe . the antiskid overshoe includes a net made of a textile material . the net includes cords produced by knitting , the cords combining to define meshes of the net suitable for forming cleats . both ends of the net arc encapsulated in a strap , each defining a closed loop , through which an elastic cord passes , the elastic cord further passing through the meshes defined at the two side edges of the net .", "application\_number": "US-201013503666-A", "description": "in fig1 the antiskid overshoe in accordance with the invention has thus been illustrated set in place on a shoe . it will be noted that the shoe in this instance is a totally conventional shoe , in this instance a sports shoe , exactly as permitted by the inventive overshoe . in accordance with the invention , this overshoe basically consists of a net 1 made of a textile material and defining a certain number of meshes 10 , the meshes 10 being intended to form cleats , suitable for providing the requisite adhesion on a slippery surface and in particular on snow . thus , the meshes 10 form so many projections , the typical height of which relative to the sole of the shoe is roughly between 3 and 8 turn . in accordance with the invention , this net 1 is formed by knitting cords 16 , in turn obtained by knitting . in accordance with the invention , the operation of knitting the cords 16 , and the net 1 itself , is performed simultaneously , for example , on knitting machines of the muller type or the like , and to be more specific on a gwm double bed square section knitting machine or on a rd3 / mt3 single bed round section knitting machine . the cords 16 are produced , as already stated , by knitting and each comprise a plurality of strands , for example , from one to ten . the required diameter of each cord 16 , and therefore , consequently the height of the cleats , is obtained by knitting and tightening the strands to each other . these cords 16 are made of polyester or polyamide . a combination is sought of high mechanical strength , good adhesion properties , and to advantage a certain abrasion resistance . during the knitting operation , meshes 10 are formed , of substantially standardised dimensions , for example 40 \u00d7 40 mm which , when the net in question is set in place on the shoe , have a square or diamond shape . the front 12 and rear 11 ends respectively of the net are each encapsulated in a front 3 and rear 4 strap respectively , the straps 3 , 4 being sewn edge to edge to prevent delamination of the net 1 , in other words to ensure the stability of the net 1 over time . these straps 3 , 4 are , for example , made of polypropylene or polyester and each define a loop 7 and 6 respectively , for passing through an elastic cord 2 , which continues its way in the meshes 14 and 15 respectively on both side edges of the net 1 . in so doing , the elastic cord 2 , because of its elasticity , secures the overshoe to the shoe . in the interests of optimising this securement , and in particular when the overshoe is intended to be set in place on a sports shoe for sport on snow or mud for example , the securement is optimised by means of a strap or loop 8 , one end of which is secured to one of the side strands of the elastic cord 2 , and the other end of which is wound around the other side strand of the cord 2 , and is pulled down onto the strap and secured reversibly thereto , for example , by means of a loop and hook system 9 ( such as velcro \u00ae for example ). in accordance with one advantageous feature of the invention , the net is also provided with clasps or clips 13 , arranged , for example , in junction zones of the cords 16 forming the meshes 10 , this location not , however , being mandatory . these clasps or clips 13 , of metal , for example ( stainless steel or galvanised steel ), are intended to partially penetrate into a hard material , such as ice , in order to optimise the antiskid properties of the overshoe . lastly , and in order to facilitate setting the overshoe in place on the shoe , the rear strap 4 is provided with a loop - forming tab 5 , allowing one of the user &# 39 ; s fingers to pass through so as to promote the insertion of the overshoe on the shoe . it is easily understood that because of the very considerable lightness of the overshoe , it does not affect walking or running , something which was not achievable with known prior art devices . incidentally , the cleats defined by the meshes of the net promote the adhesion of the shoe thus covered with the overshoe , and particularly on snow , with no need to provide specific components or devices as described in the prior art such as detachable cleats . lastly , it is easy to understand how extremely straightforward it is to set the inventive overshoe in place , since the shoe has merely to be inserted into the rear zone of the overshoe , defining in the zone where the rear strap engages with the net , a housing provided to this end , and by means of the elastic cords and the tab 5 , the rear part of the overshoe is positioned correctly on the shoe . although embodiments have been described herein , it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the spirit and scope of the principles of this disclosure . more particularly , various variations and modifications are possible in the component parts and / or arrangements of the subject combination arrangement within the scope of the disclosure , the drawings and the appended claims . in addition to variations and modifications in the component parts and / or arrangements , alternative uses will also be apparent to those skilled in the art ."}

{"publication\_number": "US-4621586-A", "abstract": "a workpiece holding device for use with automatic sewing machines includes registration and holding elements that securely hold a number of pieces of work relative to each other while allowing the same to be automatically sewn together . one of the holding elements moves from its respective holding position to a remote position as the pieces are being joined together .", "application\_number": "US-73116985-A", "description": "referring to fig1 a sewing machine 10 having a post type of bed 12 with a workpiece holding device 14 resting thereon is generally illustrated . the workpiece holding device 14 is illustrated in an open condition prior to receiving a workpiece . it is to be noted that the workpiece holding device extends out over the end of the bed 12 so as to easily facilitate the loading of a workpiece . as will be explained in detail hereinafter , a workpiece is loaded into the device 14 and thereafter positively held in place by its various holding elements . the thus held workpiece is positioned underneath a reciprocating sewing needle of the sewing machine 10 by a positioning apparatus 16 . the positioning apparatus 16 is preferably driven by electrical motors under the control of a digital control system . an example of such a positioning apparatus may be found in u . s . pat . no . 4 , 312 , 282 . it is to be noted that the workpiece holding device 14 is detachably connected to a movable carriage 18 of the positioning apparatus . the connection to the movable carriage 18 must be such as to essentially create a flat level relationship of the workpiece device with respect to the bed 12 of the sewing machine . referring now to fig2 the workpiece holding device 14 is illustrated in further detail . in particular , the device is seen to comprise a base plate 20 which attaches to the movable carriage 18 of the positioning apparatus in fig1 . a workpiece registration plate 22 is attached to the base plate 20 and extends outwardly therefrom . the registration plate 22 is seen to include an island 24 with a series of raised projections thereon . an outer peripheral portion 26 of the registration plate extends around the island 24 and is spaced therefrom . a first holding member 28 , having substantially the same peripheral shape as the outer peripheral portion 26 is pivotally mounted above the outer peripheral portion of the registration plate . in this regard , the first holding member 28 includes a rearwardly located mounting block 30 having threaded screws 32 and 34 which attach the mounting block 30 to a pivotal member 36 . referring to fig3 the pivotal member 36 is illustrated in detail relative to a dotted outline of the mounting block 30 and the rear portion of the holding member 28 . the pivotal member 36 is seen to include a set of threadable holes 38 and 40 which receive the threaded screws 32 and 34 . the pivotal member 36 is itself pivotally mounted on an axis member 42 which extends through a pair of stationary mounts , such as 44 , to either side of a rear portion of the pivotal member . the stationary mounts are part of a mounting structure 48 which is fixedly attached to the base plate 20 by one or more threaded screws such as 46 . the mounting structure 48 has a pair of upwardly extending mounts 50 and 52 in fig2 which allow a rear portion of a pneumatic actuator 54 to be rotatably mounted to an axial member 56 . the pneumatic actuator 54 furthermore has an extension 58 rotatably attached to an axial member 60 which is in turn connected to a yoke portion of the pivotal member 36 . a tensioned spring 61 is connected between the axial members 56 and 60 . the extension 58 of the pneumatic actuator 54 moves outwardly against the bias of the spring 61 so as to pivot the holding member 28 downwardly . the spring 61 returns the holding member 28 to an up position when air pressure is released from the pneumatic actuator 54 . it is to be noted that the clamping member 28 is restrained from moving laterally during the aforementioned pivotal movements by a pair of guide blocks such as 62 located to either side of the mounting block 30 . when the holding member 28 has moved downwardly into place over the outer peripheral portion 26 , a second holding member 64 is thereafter moved into place in a manner which will now be described . the holding member 64 includes a rearwardly attached arm 66 which is rotatably attached to a post 68 via a pivot pin 70 as is illustrated in fig4 . the post 68 is itself rotatable within a base 72 attached to the base plate 20 in the manner illustrated in fig5 . it is hence to be appreciated that the holding member 64 may be pivoted up or down about the pivot pin 70 . the holding member 64 may also be rotated about an axis through the post 68 so as to move toward or away from the registration plate 22 and the holding member 28 . the means for pivoting the holding member 64 about the pivot pin 70 comprises a pneumatic actuator 74 fixedly attached to the rear portion of the arm 66 as is shown in fig4 and 5 . referring to fig5 the pneumatic actuator 74 is seen to have an extension 76 that extends through a hole in the arm 66 so as to contact a back plate 78 attached to the base plate 20 . the end of the extension 76 must freely move on the surface of the back plate 78 so as to accommodate the rotation of the arm 66 about the axis through the rotatable post 68 . the extension 76 is illustrated in a downward , fully extended position in fig5 . this results in the holding member 64 being in a downward position relative to the registration plate 22 . it is to be noted that the holding member 64 is moved to an upward position by exhausting the air from the pneumatic actuator 74 so as to thereby allow a tensioned spring 80 to pull the arm 66 upwardly . it is furthermore to be noted that the upward position of the holding member 64 as defined by the pneumatic actuator 74 is substantially lower than the upward position of the holding member 28 . this is because the holding member 64 need only be pivoted upwardly to a position wherein it is above any portion of the registration plate 22 inclusive of the raised projections on the island 24 . at this point , the holding member may be pivoted outwardly without interfering with any portion of the registration plate 22 . the holding member 64 is caused to rotate both inwardly and outwardly relative to the registration plate 22 by the action of a pneumatic actuator 82 . referring to fig4 an extension 84 of the pneumatic actuator 82 is connected through a ball joint 86 to the arm 66 . the ball joint allows for both the rotation of the arm 66 by the actuator 82 as well as the up and down action of the arm 66 by the actuator 74 in combination with the spring 80 . the rear of the pneumatic actuator 82 is pivotally connected to a support 88 which is in turn rotatably connected to a mount 89 . it is to be noted that a contact switch 90 having a contact 91 is normally in contact with the arm 66 when the pneumatic actuator 82 is in a retracted position . this represents a closed switch conditon indicating that the pneumatic actuator has yet to rotate the holding member 64 outwardly . refer now to fig6 and 7 wherein the movement of the holding members 28 and 64 can be observed . the holding member 64 is depicted in an outward remote position in fig6 and in an inward position in fig7 . it is hence to be appreciated that the switch 90 will be in a open state in fig6 and in a closed state in fig7 . the sequential operation of the pneumatic actuators 54 , 74 and 82 in moving the holding members 28 and 64 will now be described . referring first to fig6 the pneumatic actuator 54 has been extended so as to cause the holding member 28 to move downwardly into position over the outer peripheral portion of the registration plate 22 . at this time , a substantial open area exists between the island 24 of the registration plate and the thus positioned holding member 28 . the holding member 64 is furthermore in the remote position due to the retracted state of the pneumatic actuator 74 and the extended state of the pneumatic actuator 82 . the pneumatic actuator 82 is first retracted so as to rotate the arm 66 and hence the holding member 64 about the axis through the post 68 . this brings the holding member into a position above the space between the island 24 and the holding member 28 as is shown in fig7 . the pneumatic actuator 74 is now extended so as to pivot the holding member 64 downwardly . it is to be appreciated that the action of each pneumatic actuator can be reversed in a sequence which first moves the holding member 64 upwardly and then outwardly to the remote position and thereafter pivots the holding member 28 upwardly . in each sequence , the pneumatic actuators are preferably activated by appropriate control signals from the automatic sewing machine . it is to be appreciated that the registration plate 22 and holding members 28 and 64 form a complete set of clamps for a workpiece . each has an interchangable connection with respect to a portion of the workpiece holding device . in this regard , the registration plate 22 has a set of slots such as 96 in fig6 and 7 which allow the registration plate to be easily registered and fastened to the base plate 22 . on the other hand , the holding member 28 is threadably fastened to the mounting block 30 via a screw 98 which threadably engages a centering piece 100 that fits within a recess of the mounting block 30 as is seen in fig3 . finally the holding member 64 attaches to the arm 66 via a set of screws 102 and 104 which threadably engage a centering block 106 located within a recess in the arm 66 . referring now to fig8 a number of individual pieces of a workpiece are illustrated in exploded fashion relative to the registration plate 22 and the holding members 28 and 64 . the pieces comprise various portions of a shoe and are specifically denoted as a shoe upper body 108 , a pair of integrally formed plastic eyelets 110 , 112 and an eyelet coverpiece 114 . the particular join and sew operation to be accomplished is that of stitching through the eyelet coverpiece 114 , the eyelets 110 and 112 , and the shoe upper body 108 . the process of registering and thereafter sewing these particular pieces of a shoe are the subject of commonly assigned u . s . patent application ser . no . 731 , 446 , entitled &# 34 ; automatic join and sew process for shoes &# 34 ; filed on even date herewith in the name of hans binder . referring now to fig9 the shoe upper body 108 is being brought into initial registration with a front registration element 116 located on the island 24 of the registration plate 22 . the inner periphery of the shoe upper body 108 registers first with the outer periphery of the front registration element 116 and thereafter with the edges of members 118 , 120 and 122 which rise upwardly from the island 24 . it is to be noted that the heel portion of the shoe upper body 108 has been previously joined in a separate shoe making operation . this is normally considered advantageous in the shoe making art . the thus joined heel portion will not present a problem to any further sewing of the shoe upper body 108 since the heel portion lies completely below the the post - bed 12 of the sewing machine . referring now to fig1 , the shoe upper body 108 has now been completely registered on the registration plate 22 . in particular the inner periphery of the shoe upper body 108 has been brought into complete registration with both the periphery of the front registration element 116 as well as the edges of members 118 , 120 , and 122 which rise upwardly from the island 24 . the holding member 28 has moreover been pivoted downwardly over the thus registered shoe upper body 108 . the plastic eyelet pieces 110 and 112 are now positioned over the shoe upper 108 . specifically , the two end loops of the eyelet piece 110 are positioned over a pair of registration elements 124 and 126 whereas the two end loops of the eyelet piece 112 are positioned over a pair of registration elements 128 and 130 . members 118 , 120 and 122 rising upwardly from the island 24 define individual channels wherein the separate loops of each eyelet piece can be positioned therein . after having thus positioned the eyelet pieces 110 and 112 relative to the shoe upper body 108 , it now remains to position the eyelet cover piece 114 thereover . in this regard , the eyelet cover piece 114 is placed into a space defined by the inner periphery of the holding element 28 and the out edges of the members 118 , 120 , 122 , and the front registration member 116 . this provides a complete inner and outer edge alignment for the thus inserted eyelet coverpiece 114 . it is to be appreciated that the portion of each eyelet piece that is now covered by the eyelet cover piece 114 defines a rather irregular shape of appreciable thickness . the underlying eyelet pieces 110 and 112 would quite possibly produce an undersirable wrinkling of the eyelet cover piece 114 when successive stitches are formed in the coverpiece . the eyelet cover piece might also shift laterally during sewing . the above possible lateral shifting and / or wrinkling of the coverpiece is completely dispensed with by bringing the holding member 64 into position over the eyelet coverpiece 114 as is illustrated in fig1 . referring briefly back to fig7 it is to be noted that the inner periphery of the thus positioned holding member 64 will fit closely around the outer periphery of the island 24 and the various members rising upwardly therefrom . the outer periphery of the thus positioned holding member 64 will however be appreciably spaced from the inner periphery of the holding member 28 as is illustrated in fig1 . the end 132 of the holding member 64 will moreover terminate at a spaced distance from the inner periphery of the holding member 28 . this allows the sewing needle to proceed along a sewing path ( indicated by a dotted line ) beginning at a point 134 and ending at a point 136 without interference with the holding member 64 . in accordance with the invention , the holding member 64 is released at a predetermined point upstream of the point 136 . the release is preferably timed to occur in such a manner that the holding member 64 will be sufficiently displaced upwardly by the pneumatic actuator 74 and outwardly by the pneumatic actuator 82 so as to allow the sewing needle to proceed past the point 136 without any interruption in the continuous sewing of the pieces . this is preferably accomplished by providing a command within the control system of the automatic sewing machine that would authorize release of the holding member a predetermined number of stitches from the stitch point 136 . such a command would preferably reside in the pattern data stored within the pattern memory of the control system . the air to the pneumatic actuator 74 is released in response to the imbedded command causing the holding member 64 to pivot upwardly to an upward position . the actuator 82 is thereafter extended causing the holding member to move outwardly . it is to be noted that the sewing needle will only proceed beyond stitch point 136 if an open switch signal indication has been received from the switch 90 . this will occur at such time as the pneumatic actuator 82 begins to extend thereby moving the holding member 64 from the upward position established by the release of pneumatic actuator 74 . when such an open switch signal is present , the automatic control will cause the sewing needle to pursue an inner stitch path close to the periphery of the island 24 . this will form a line of stitches on the eyelet cover piece 114 parallel to that of the first line of stitches . it is to be appreciated that the first line of stitches has adequately tacked down the eyelet cover piece 114 so that the stitching of the second line of stitches does not provide any undesired wrinkling of the eyelet coverpiece . the covered portions of the eyelet pieces 110 and 112 are moreover now firmly held in place by the first line of stitches which are themselves formed by holding down the eyelet pieces by the holding member 64 . it is to be appreciated that a workpiece holding device has been disclosed for use with an automatic sewing machine . the scope of this invention is not limited to the particular elements of the disclosed workpiece holding device ."}

{"publication\_number": "US-4825912-A", "abstract": "a loom for weaving contoured cloth has a shed forming part for forming a warp yarn shed , a rapier apparatus for inserting successive lengths of weft yarn through the shed , a beating up apparatus for beating up the weft yarns into a woven fabric , a contoured rotatably driven mandrell positioned downstream , relative to the direction of the warp yarn movement , for receiving the woven fabric and drawing it from the beating up apparatus , the mandrel having at least a part thereof with a spheroidal shape for giving a spheroidal shape to the fabric passed around the mandrel , nip rollers pressing the woven fabric against the mandrel for causing said mandrel to draw the woven fabric from the beating up apparatus and shape the fabric according to the contour of the mandrel , a fabric guide having a contour along the mandrel corresponding to the contour of said mandrel and guiding the fabric into engagement with the mandrel , and warp yarn path length extenders positioned along the path of the fabric from the beating up apparatus to the fabric guide for increasing the lengths of the paths of the warp yarns of the fabric which are directed onto the portions of the spheroidally contoured part of the mandrel which are larger than the smallest diameter portion of the spheroidally contoured part , sufficient for causing substantially all the length of each of the respective weft yarns to reach the mandrel at the same time .", "application\_number": "US-7767287-A", "description": "one embodiment of the spherically contoured fabric product which it is desired to produce is shown in fig1 a and 1b , and it consists of a spherically contoured piece of fabric preferably made of a difficult to weave yarn , such as low or medium modulus carbon yarn , which is to serve as an annular spherical shim for use in a rocket nozzle . the product , in its finished form as shown in fig1 a , is constituted by a section of a sphere , shown in broken lines , which is defined between two parallel planes which extend perpendicularly to the vertical axis of the sphere . as will be appreciated , the shim is designed to lie against the inside of a concave spherical part of the rocket nozzle to shim up a further part which fits into the spherical portion against which the shim rests . thus , the configuration of the exterior of the shim is part of the surface of a sphere . as can be seen from the right - hand sectional portion , the cross section of the fabric will be circularly curved . the product is made up from the developed shape as shown in fig1 b , and it will be appreciated that the cross section of the developed shape will be the same as that shown in the right - hand part of fig1 a , and when the shape lies convex side down on a surface , the shape will be slightly convexly curved upwardly . it is this developed shape which is produced from the improved rapier - type loom according to the present invention . as can be seen from the drawings , the outermost warp yarn f of the developed shape will be at a radius r from the center of the shape , and the intermediate warp yarns f i will be at radii r i . the weft yarns will extend substantially radially across the warp yarns , as shown schematically at the portion f in fig1 b . the manner in which this particular shape of fabric is obtained from the loom will be described in greater detail hereinafter . as pointed out above , the fabric is produced on an improved loom , which is variously known in the art as a shuttleless loom , a needle - type loom , or a rapier - type loom . a conventional loom of this type is shown somewhat schematically in fig2 a and 2b , and generally consists of a frame 10 which carries the remainder of the loom parts . warp yarns or threads 11 are supplied from a creel 12 which contains a number of spools 12a on which the individual warp yarns 11 are wound , and they are supplied past a guide bar means 13 to a conventional shedding mechanism , which includes the conventional harnesses 14 which carry the heddles 15 to which the individual warp yarns are fed in an alternating pattern according to the weave desired . the up and down movement of the harnesses 14 is provided by the harness driving means 16 shown schematically , in a conventional fashion . within the shed is the lay 17 on which the needle guide 18 is provided , the lay being driven in a conventional manner by a lay driving means 19 in order to beat up the weft yarns which are carried across the shed by a needle . in the particular type of apparatus which has been in current use for the production of fabric from the kevlar yarn , there is a pair of press rolls 20 at the downstream end of the shed where the weft yarns are beat up , and the thus woven fabric extends around a driven mandrel 21 over an idler roller 22 immediately above the mandrel 21 , and is held against the mandrel by a nip roller 23 so as to be drawn off the loom by rotation of the mandrel . from the nip roller , the fabric is wound up on a fabric take - up roll 24 . the loom of course has all of the conventional mechanisms for its complete operation , all of which are conventional and well known to those skilled in the art . they do not form any part of the present invention and are accordingly not described . the needle or rapier 25 is sufficiently long to extend entirely across the shed , and has a yarn gripping means 26 for gripping the weft yarn from a weft yarn supply 27 and drawing it across the shed on the return stroke of the needle . the individual weft yarns are then cut from the yarn supply by a cutting means ( not shown ). the needle 26 is guided back and forth in the raceway 28 , being driven by a conventional needle driving means 29 . contoured fabric of kevlar has been successfully produced on a loom of this type , one example of such a contoured fabric being shown in fig3 . the mandrel 31 corresponding to the mandrel 21 of fig2 a is provided with a contoured surface having cylindrical portions 36 of different diameters joined by conical - shaped portions 35 . the profile , as shown in fig3 corresponds to the profile of a machine which it is desired to wrap with the kevlar fabric in order to prevent any parts of the machine which may come loose during high speed operation from being thrown through the casing of the machine and away from the machine . the fabric coming from the shedding mechanism of the loom of fig2 a and 2b is drawn around the idler roll 22 , and then drawn around the mandrel 31 of fig3 at which point it is given the shape , in cross section , as shown in fig3 . however , as can be seen from the contour shown in fig3 while the conical transition portions 35 between most of the cylindrical portions 36 are relatively small and inclined only slightly to the cylindrical portions , at the right - hand end , there is a rather substantial size conical portion . it has been found in practice that at this portion of the fabric , the weft yarns tend to lag somewhat behind the portions of the weft which are carried by the warp yarns to the cylindrical portion 36 of the mandrel . this is because they must move a longer distance from the position at which the weft yarn is laid into the shed to the surface of the mandrel , as compared with the warp yarns which reach the cylindrical portion 36 of the mandrel immediately adjacent the large conical portion , and also because the warp yarns carrying these portions of the weft fibers to the conical portion of the mandrel are moving more slowly than the warp yarns moving to the cylindrical portion of the mandrel . this condition is illustrated schematically in fig4 a and 4b , which are respectively plan views and an end elevation view of a double ended conical mandrel with a cylindrical portion in the center thereof . it will first be seen that the warp yarns 39 will have to move through a longer path l 2 from the shed to the conical surface 35 of the mandrel than will the warp yarns 28 moving a distance l 1 to the cylindrical portion 36 of the mandrel . it will be further understood that the warp yarns generally indicated at 38 will proceed in the direction of the movement of the fabric from the point at which the weft yarn is inserted into the shed to the cylindrical portion of the mandrel at a speed v 1 corresponding to the circumferential speed of the surface of the cylindrical portion 36 of the mandrel , whereas the warp yarns 39 will proceed at a somewhat slower speed v 2 , which progressively decreases the further outwardly from the cylindrical surface 36 the respective warp yarns 39 lie in the fabric . this is because along the conical portion 35 of the mandrel , the circumferential speed of the surface progressively decreases toward the narrower end of the conical portion . as a result , the portions 37a of the weft yarns carried by the warp yarns 39 will progress toward the mandrel at successively lower speeds , as compared to the speeds at which portions 37b are being carried by warp yarns 38 , the further toward the end of the mandrel the warp yarns 39 are positioned . the slowest warp yarn , i . e . the outermost warp yarn at the edge of the fabric , will , of course , move at the lowest speed , thus causing the greatest retardation of the weft yarn . as a result , when the fabric has moved around the mandrel 31 to the position where it moves over the nip roller 23 , the weft yarns on the outer edges of the fabric are no longer perpendicular to the direction of the length of the fabric , but rather are at an angle to the perpendicular , which angle increases the further the fabric moves along the direction of the length of the fabric . the same condition will exist if a difficult to weave yarn such as a carbon yarn material is woven instead of the kevlar . this may be acceptable for a piece of fabric to be used for wrapping around a generally cylindrical shape with conical portions joining portions of the cylindrical shape . however , if the portion of the fabric shaped on the conical portion 35 of the mandrel were to be cut from the remainder of the fabric into a narrow strip , the weft yarns would lie at angles other than perpendicular to the warp yarns , and this would cause distortion of the fabric if it were used for being shaped into , for example , a conical or spherical shape . the warp yarns in any such piece of fabric would be substantially concentric to an axis of the cone or sphere , much like latitudinal lines on a globe . the weft yarns , on the other hand , would be distorted , and rather than lie along lines similar to longitudinal lines of a globe , would run along a shape somewhat similar to a spiral across the surface of the shaped fabric . this would be unacceptable for the purposes for which a spherically shaped piece of cloth is to be used , namely shims for rocket parts , or forms for use as a parabolic antenna or a radar dome since yarn orientation is required . the first modification to the apparatus of fig2 a - 2b for producing the spherically shaped fabric according to the present invention comprises providing a mandrel with sperhical surface portions thereon . as shown in fig5 a preferred mandrel 40 has two spherical portions 41 and 42 the same shape as the section of the sphere shown in fig1 a , the spherical portions constituting the peripheral surfaces of the mandrel , with the larger diameter ends of the spherical portions abutting each other and the smaller diameter ends at the outer ends of the mandrel . however , merely providing such a mandrel and a guide member which is contoured to guide the fabric into close contact with this thus shaped mandrel will not result in the desired fabric with the weft yarns in the proper positions along the longitudinal lines of the basic sphere . shown in fig6 is the mandrel 40 and a guide member 44 in the form of a cylindrical bar bent in the shape of the contour of the mandrel for guiding the fabric against the mandrel 40 . however , as will be apparent from fig6 the mere provision of such a guide bar 44 will not overcome the above - described problems of weft yarn distortion due to the varying speed and distance of the different warp yarns moving from the shed to the mandrel . as is clear from fig6 the warp yarns moving to the largest diameter portion of the mandrel at the center of the length of the mandrel will move only a distance l 1 , and since the radius r mo of the mandrel at this point is large , the velocity of the warp yarns at this point will be a maximum , i . e . a velocity v 1 . the warp yarns at the edge of the fabric will move along a slightly downwardly inclined path to the smaller diameter end of the mandrel where the radius is only r mi . because the peripheral velocity of the mandrel at this point will be much smaller than at the radius r mo , the speed v 2 of the warp yarns on the downwardly inclined path will be somewhat less than the speed v 1 of the warp yarns moving through the distance l 1 , and the net result will be that because of the longer path and the slower velocity , the portions 37a of the weft yarns at the edge of the fabric will be lagging behind the portion 37b at the center of the fabric , as shown schematically in the figure . the warp yarns moving toward the intermediate diameter portions r m will travel along an intermediate length path and at an intermediate velocity and will lag an intermediate amount . the resulting weft yarns in the fabric wound on the mandrel for shaping will thus not lie perpendicular to the warp yarns , but will be at an angle thereto , and this distortion will continue into the finished fabric which is removed over a nip means 45 downstream of the guidebar 44 . the present invention provides the means for overcoming this problem , and this means consists of a warp yarn path length extending means generally indicated at 50 in fig7 a and 7b . this means 50 in the preferred embodiment is a series of profiled members in the form of curved barrs 51 - 54 . the bars are curved to have a profile similar to that of the profile of the mandrel 40 , and the first bar is positioned so that the profile projects in one direction transversely to the path of the fabric , in this embodiment upwardly of the path of the fabric , and the next curved bar 52 having a similar profile projecting in the opposite direction transversely to the path of the fabric , i . e . downwardly from the path of the fabric . the third curved bar projects in the one direction , i . e . upwardly , and the fouth curved bar projects in the other direction , i . e . downwardly . the fabric moving from the shed to the mandrel is diverted back and forth across the normal path of the fabric over each of the bars until it reaches the guidebar 44 . the maximum point of projection of the contour of the bar is at the position corresponding to the center of the longitudinal length of the mandrel 40 , and the lowest point on the profile of the bars corresponds to the position of the ends of the mandrel and lies along the path of the fabric . it will be seen that the warp yarn or yarns which lie along the center of the fabric will be diverted by the first bar 51 out of the normal direct path from the position of the shed to the guide bar 44 a maximum distance d max above the path , and then diverted by the second bar 52 out of the normal direct path a distance d max below the normal path of the fabric . these central warp yarns are then directed by d max above and below the normal path again . the warp yarns at the opposite edges of the fabric , on the other hand , will simply be guided along the ends of the bars in the normal path of the fabric . the profiles of the bars and the number of bars is determined so that the combination of the normal shorter path length l 1 for the mid - fabric warp yarns and their incresed velocity v 1 will be completely compensated for , so that the portions of the weft yarns carried by these warp yarns will reach the mandrel 40 at the same time as the end portions of the weft yarns held by the warp yarns at the side edges of the fabric . as shown in fig7 b , this will mean that by the time the weft yarns have reached the guide bar 44 , they will not only not have the ends lagging the center , but in fact the ends will have moved foward of the center and the curvature of the weft yarns will correspond to the profile of the mandrel 40 . thus , when the fabric is guided over the guide 44 onto the mandrel 40 , the weft yarns will lie along lines corresponding to longitudinal lines on the spherical shape of the mandrel portions 41 and 42 . as a result , the finished fabric when it is taken off over the nip roller 45 will have a spherical shape , yet the warp yarns and the weft yarns will be in the proper longitudinal and latitudinal relationship in relation to the spherical shape of the fabric . in view of the configuration of mandrel portions 41 and 42 , in essence two liked spheroidal portions are produced . accordingly , cutting means 46 is positioned adjacent to the longitudinal center of mandrel 40 for dividing the fabric coming off said mandrel 40 into individual spheroidal portions . in addition to providing the warp yarn path length extending means 50 , the modified loom of the present invention has a special nip roller means for nipping the fabric against the spherical mandrel in the form of a plurality of nip pressure rollers 60 at a position generally corresponding to the position of the nip roller 23 of the loom of fig2 a and 2b . these rollers are positioned along the contour of the mandrel in side - by - side positions and press against the mandrel with a pressure sufficient to cause the mandrel to draw the fabric around the mandrel similarly to the nip roller 23 of the conventional loom . the rollers 60 can be mounted on arms 61 extending upwardly from a support 62 , and can , if desired , be spring - loaded against the mandrel . it is also an aspect of the present invention to provide the spheroidally contoured fabric , specifically a spherically contoured fabric , with a construction which has the desirable property that the yarn density is more uniform throughout the fabric . as pointed out above , if the warp yarns supplied to the loom for making the spherically shaped fabric are uniformly spaced across the width of the fabric , these warp yarns in the finished fabric will be in the positions corresponding to latitudinal lines on a sphere , and will be at equal distances from each other across the surface of the sphere . the weft yarns , on the other hand , will correspond to longitudinal lines on the sphere and will converge toward the poles of the sphere . as a result , the density of the fabric , i . e . the number of yarns per unit area , will increase toward the poles . to change this property , the present invention provides means in the form of the heddles 15 and associated warp yarn guiding means for causing the warp yarns toward the center of the width of the fabric , i . e . toward the larger diameter part of the finished spherically contoured fabric , to be closer together than at the edges of the fabric . as a result , as shown in fig8 the fibers 70 lying along the latitudinal lines will be closer together toward the larger diameter part , and become progressively further apart the closer to the small diameter part they lie . by properly spacing the warp fibers in the loom , the number of fibers 70 and 71 per unit area of the fabric can be made substantially uniform . although the invention has been described by way of example with respect to only a single embodiment , it will be understood that various changes and modifications may be made without departing from the scope and spirit of the invention , and it is intended that such changes and modifications be included within the scope of the appended claims ."}

{"publication\_number": "US-5092370-A", "abstract": "a split heddle for controlling a yarn is particularly useful in automated seaming machines . the heddle is comprised of two blade like members . each member has an aperture which is intersected on one side by a slot and on the other side by a groove . the members are superimposed with the apertures in alignment and the grooves opposite the slots . the unit is secured by laser , spot or sonic welding . after insertion of the yarn in the aperture , the heddle is rotated 180 \u00b0 with respect to the yarn and the yarn is / are captured in the channel formed by the opposed grooves .", "application\_number": "US-67135191-A", "description": "the preferred embodiment will be described with reference to the drawings and like elements are identified by the same numeral throughout . with reference to fig1 the split heddle 20 of the present invention is comprised of two blade or strip members 30 and 40 which are bonded together at their respective ends 31 and 41 . the blades 30 and 40 may be of the same or different length . in the preferred embodiment , blade 30 is slightly longer than blade 40 . in the preferred embodiment , the blade 30 has an overall length , from end to end , of approximately 5 . 5 inches and the blade 40 has an overall end to end length of approximately 5 . 375 inches . as noted previously with respect to fig1 the heddle 20 is comprised of individual elongate blade members or strips , 30 and 40 , which have been superimposed , aligned and bonded . each blade has an aperture , 32 or 42 , through its first end , 31 or 41 . while it is preferable that the apertures 32 and 42 be in direct alignment , this is not critical to the invention . the respective heddle members 30 and 40 need only be in sufficient alignment to permit the oppositely facing arcuate grooves or channel portions 35 and 45 to be in sufficient alignment for a channel to be formed across the heddle . the reason for this alignment will become more evident upon reading the description hereinafter . the preferred material for blades 30 and 40 is stainless steel . the preferred method of bonding is laser welding , however , spot - welding and sonic welding are alternative bonding methods . in order to more fully understand the invention , each blade 30 and 40 , will be described individually . for this purpose , reference will be made to fig2 through 5 . referring first to fig2 strip 30 has a first end 31 having two apertures 32 and 34 which are generally on the longitudinal centerline . aperture 32 has a diameter of approximately 0 . 065 inches . aperture 34 has a diameter of approximately 0 . 128 inches . the aperture 34 is intersected on one side by a horizontal slot 33 which extends through to the edge of the blade member 30 . slot 33 has a width of approximately , 0 . 078 inches . the aperture 34 is also in communication with the arcuate groove or channel portion 35 . the groove 35 is on the centerline with the slot 33 and the aperture 34 . this may be seen clearly with reference to fig2 . groove 35 is concave with respect to the plane of the blade 30 as shown in fig2 ; this is evident from fig3 . groove 35 has a radius of approximately 0 . 009 inches . the blade 30 has an overall average thickness of approximately 0 . 018 inches with the thickness at the groove 35 , as illustrated by the numeral 38 in fig3 being approximately 0 . 054 inches . the blade 40 will be described with reference to fig4 and 5 . the first end 41 of blade 40 is essentially a mirror image of end 31 of blade 30 . all of the elements of end 41 correspond with the like element of end 31 . however , it should be noted with respect to the groove 45 , that it will be convex with respect to the plane of the blade 40 . this may be clearly seen with reference to fig1 . blade 40 differs from blade 30 as described hereinafter . as stated previously , the overall length of blade 40 is approximately 0 . 125 inches less than that of blade 30 . this may be seen with reference to fig6 . the aperture 47 in end 46 of blade 40 will be positioned opposite the aperture 37 . aperture 47 is intersected by horizontal slot 48 which extends through the end 46 . slot 48 is approximately 0 . 040 inches wide . the differential length is believed to make it easier to separate and move the blades during yarn insertion . with reference to fig1 it can be seen that the grooves 35 and 45 are facing in opposite directions and they cooperate to effectively close the apertures 34 and 44 , fig3 and 4 and define a horizontal channel 68 across the heddle 20 , fig1 and 11 . groove 35 fits through slot 43 and groove 45 fits through slot 33 . as a result of their convex - concave configurations the grooves 35 and 45 each form one half of the horizontal channel 68 across the heddle . channel 68 has a diameter of approximately 0 . 033 inches but may be dimensioned to accommodate the yarns that are to be controlled . with reference to fig6 the heddle 20 is assembled with lead lines 22 and 24 . the two blade members 30 and 40 are assembled together , such as by sonic or spot welding at the respective ends 31 and 41 . the lead line 22 passes through apertures 32 and 42 . the lead line 24 passes through apertures 37 and 47 . as known by those skilled in the art , the lead lines 22 and 24 provide a means of controlling the heddle during weaving . other control means may be used . due to the existence of slot 48 in the end 46 , blade 40 may be separated from blade 30 and moved to the side , as indicated by arrow 60 , by passing lead 24 through the slot 48 . this movement of blade 40 provides a separation between the blades 30 and 40 so that a yarn may be passed between the blades and into the apertures 34 and 44 . this positioning of a yarn 70 in the apertures 34 and 44 is shown in fig7 . at this point in time , the yarn 70 extends over groove 35 which is convex with respect to the frontal plane of the figure and behind groove 45 which is concave with respect to the frontal plane of the figure . after a rotation of approximately 90 \u00b0, the yarn 70 will be within the apertures 34 and 44 , see fig8 . by continuing the rotation through 180 \u00b0, the yarn 70 will be positioned so that it now extends in a straight line and rests within the cross channel 68 formed by the opposed grooves 35 and 45 , see fig9 . at this point in time , the yarn 70 is captured by the heddle and will be retained in that position regardless of slight variations or curvatures in members 30 and 40 and / or slight variations with respect to precise alignment of the ends 31 and 41 and / or the arcuate portions 35 and 45 . fig1 illustrates the position of yarn 70 relative to channel 68 prior to rotation and fig1 illustrates the position of yarn 70 in the channel 68 after rotation through 180 \u00b0. if desired , the second blade may be shorter and the aperture 47 and the slot 48 may be eliminated . since there is virtually no space between the blade members 30 and 40 , they will be in very close contact . since the channel 68 is closed , a yarn will not slip between the blades 30 and 40 , even if the lead line 24 does not pass through the aperture 47 . as can be seen from the foregoing , a simplified heddle construction with improved yarn control reliability has been disclosed ."}

{"publication\_number": "US-7007348-B2", "abstract": "the machine for making a non - woven material aerologically has a forming and conveying surface permeable to air , a dispersion chamber surmounting said surface and means , particularly vacuum means located under said forming and conveying surface of the non - woven material , which are capable not only of producing an air flow inside the dispersion chamber that allows the fibers inside the chamber to disperse and projects them onto the forming and conveying surface , but also create a vacuum in one zone \u2014 called the vacuum zone \u2014 of the forming and conveying surface of the non - woven material that extends under the dispersion chamber and downstream from it , with the vacuum speed decreasing between the upstream and downstream parts of said zone . the wall downstream from the vacuum chamber is a plate , and the lower edge of said downstream wall delimits , along with the upper end of the forming and conveying surface of the non - woven material , a space for passage whose height is greater than the thickness of the non - woven material coming out of the dispersion chamber .", "application\_number": "US-81465804-A", "description": "in a way that is known , a machine for airlaying non - woven material has a conveyor using a porous conveyor belt 1 that is mounted under tension on drive rollers . when operating , the upper end 1 a of this conveyor belt 1 , which in the examples illustrated is approximately horizontal , is driven at a constant predetermined speed in the direction of conveyance indicated by arrow f . this upper end 1 a of the conveyor belt 1 forms a surface permeable to air that makes it possible both to form and to transport the non - woven material . this machine also has a chamber 2 for dispersion of the fibers , which surmounts the upper end 1 a of the conveyor belt 1 and which extends over the whole width of this upper end 1 a . this dispersion chamber 2 has an upstream wall 3 and a downstream wall 4 , which extend transversely in the direction f in which the conveyor belt 1 moves , and two longitudinal walls connecting the two walls upstream 3 and downstream 4 , which longitudinal walls extend parallel to the direction of movement f . the lower edges of the upstream walls 3 and longitudinal walls ( not shown ) are flush with the upper end 1 a of the conveyor belt 1 , and are potentially equipped with a gasket 5 supported on said upper end 1 a . under the upper end 1 a , there is a vacuum tank which is capable of producing an air flow 7 inside the dispersion chamber 2 symbolized by arrows that makes it possible to disperse the fibers ( not shown ) inside said chamber 2 and project them onto the upper end 1 a . the cylinder 8 , called the dispersing cylinder , supplies the dispersion chamber 2 with fibers . potentially , an injection of air through the upper opening in the dispersion chamber may help disperse the fibers . the tank 6 ( or vacuum box ) extends , under the upper end 1 a , over a vacuum zone 9 , which zone 9 occupies , in width , at least the width of the dispersion chamber 2 and in length , a distance d that is longer than the length l of the dispersion chamber 2 . the vacuum conditions used in the tank 6 are such that the vacuum speed , measured in the tank 6 , in the downstream part 9 a of the vacuum zone 9 is lower than the vacuum speed in the upstream part 9 b of the vacuum zone 9 . in the examples that will be described below , the vacuum tank 6 is a multi - stage tank , having a first stage 10 which extends under a section called the primary section of the vacuum zone 9 , and this primary section 9 c extends , in length , over a distance 1 which is less than the length l of the vacuum zone 9 surmounted by the dispersion chamber 2 . in other words , referring to fig5 , this primary section 9 c extends from approximately the lower edge 11 of the wall 3 upstream from the dispersion chamber 2 ( or slightly downstream from it ) to a distance d perpendicular to the lower edge 12 of the wall downstream 4 from the dispersion chamber 2 . in this primary section 9 c of the vacuum zone 9 , the vacuum speed v 1 is generated at the first stage 10 and is uniform over the whole length 1 of said stage 10 . in the first embodiment , illustrated in fig1 , the vacuum tank 6 has a second stage 13 that covers the second section 9 d of the vacuum zone , which goes beyond the primary section 9 c described above . in this second stage 13 of the tank 6 , the conditions used are such that the vacuum speed gradually decreases over the whole length of the second section 9 d from its input to its output , as illustrated in fig1 by the continued decrease in arrows v 2 , symbolizing the vacuum speed in said secondary section 9 d . in the second example illustrated in fig2 , the secondary section 9 d is divided into five subsections 9 d 1 , 9 d 2 , 9 d 3 , 9 d 4 , 9 d 5 , from upstream to downstream of said secondary section 9 d . in each subsection , the vacuum speed v 3 is constant . this speed v 3 decreases from one section to another from the upstream to the downstream part of said secondary section 9 d . one stage 14 to 18 of the vacuum tank 6 corresponds to each subsection 9 d 1 to 9 d 5 . the third example illustrated in fig3 shows the five stages 14 to 18 of the vacuum tank 6 that correspond to secondary vacuum section 9 d and hence to five subsections 9 d 1 , to 9 d 5 . in each subsection , the vacuum speed v 4 is not constant , but gradually decreases over the length of each stage 14 to 18 from the upstream to the downstream part of each subsection , as can be clearly seen by examining fig3 . the fourth example of embodiment , which is illustrated in fig4 , is a combination of the second and third examples described above , with the vacuum speed v 5 gradually decreasing in certain stages 14 , 16 and 18 , while it stays constant in certain others 15 , 17 . the operation of the machine in this invention will now be described more specifically in relation to the example illustrated by fig5 . in fig5 , the vacuum tank 6 has three stages , namely the first stage 10 , which corresponds to the primary section 9 c of the vacuum zone 9 , and two successive second stages 14 and 15 , which correspond to subsections 9 d 1 and 9 d 2 of the secondary section 9 d of the vacuum zone 9 . this number of stages is not exclusive , and can be higher , as in the example shown in fig2 , but it may also be two . the fibers that are fed to the interior of the dispersion chamber 2 , on the periphery of the dispersing cylinder 8 are detached from the fittings 8 a of this cylinder by the action of the air flow produced inside the dispersion chamber 2 and potentially by other means . the fibers are ejected individually inside the dispersion chamber 2 , are dispersed by the air flow over the whole horizontal section of said chamber 2 and are projected over the upper end 1 a of the conveyor belt 1 . due to the accumulation of fibers on the upper end 1 a when the conveyor belt 1 moves , a non - woven material 13 is formed that is taken to the outside of the dispersion chamber 2 , passing at right angles to the wall 4 downstream from said chamber 2 , which in the example illustrated is a plate . the spacing between the lower edge 12 of said downstream wall 4 and the upper end 1 a is set so that it is greater than the thickness of the non - woven material formed in the dispersion chamber 2 , which is where it is when it comes out of said chamber 2 . this space e is a function of the grams per square meter of the non - woven material . it is from 5 to 50 mm , preferably from 20 to 40 mm , for example 30 mm . the air flow that moves the fibers inside the dispersion chamber 2 is produced particularly by the vacuum tank 6 , more specifically by the vacuum generated by the part of the vacuum section 9 that is at right angles to the dispersion chamber 2 . other additional means could be used , for example an injection of air at the upper part of the dispersion chamber 2 , to help detach the fibers from the cylinder 8 . given that the vacuum speed v 1 generated at the first stage 10 of the vacuum tank 6 is the highest , the fibers in the dispersion chamber 2 have a tendency to concentrate on the upper end 1 a of the primary vacuum section 9 c , so that the non - woven material 13 is quasi - formed in its final configuration when it comes out of the first stage 10 of the vacuum tank 6 . beyond that , the non - woven material is taken over in some way by the second stage 14 of the vacuum tank 6 in which the vacuum speed v 2 is lower than the speed v 1 of the first stage . this takeover occurs when the non - woven material 13 is still inside the dispersion chamber 2 over the distance d , right when the non - woven material 13 has come out of the dispersion chamber 2 . this takeover , which continues in the second stage 14 of the vacuum tank 6 , does not allow any disturbances caused by the non - woven material passing under the lower edge 12 of the downstream rise 4 of the dispersion chamber 2 , since approximately the same system is observed for the air flow on both sides of this downstream rise 4 . due to the vacuum produced beyond the dispersion chamber under the upper end la , no parasitic air flows are seen entering into the vacuum chamber in the space left free between the non - woven material 13 and the lower edge 12 of the downstream rise 4 or at least no lifting detrimental to the fibers is seen . in the embodiment shown in fig5 , there is a compressive roller 20 which is perpendicular to the partition 21 that separates the two successive stages 14 , 15 of the secondary section 9 a . this compressive roller 20 is mounted transversely above the upper end 1 a of the conveyor belt 1 , and is applied to the non - woven material 13 . the distance t between the vertical going through the lower edge 12 of the downstream wall 4 and the vertical tangent to the rear of the roller 20 is preferably relatively small , preferably from 10 to 30 mm . in one preferred example of embodiment , the dispersion chamber 2 has a length l on the order of 60 mm , the length of the main section 9 c is on the order of 50 mm and the length of the first stage 9 d 1 of the secondary section is on the order of 80 mm . the distance t is on the order of 20 mm for a roller 20 having a diameter on the order of 100 mm . this is also true when the lower edge of the downstream wall is not the edge of a fixed plate but a revolving element , for example a perforated transverse cylinder which compresses the non - woven material coming out of the dispersion chamber 2 . when it comes out of subsection 9 d 1 , from secondary section 9 d of the vacuum zone 9 , the non - woven material is then taken over by the vacuum produced by the next second stage 15 of the vacuum tank 6 , whose vacuum speed v 3 is less than the vacuum speed v 2 of the second stage 14 . potentially , this takeover may be done successively with the other second stages 16 to 18 until there is no longer any vacuum at all beyond the tank 6 . this gradual reduction ( in stages in this example ) in the vacuum in the secondary zone 9 d allows the fibers of the non - woven material 13 to relax gradually due to the effect of said vacuum . this is what makes it possible to obtain the results wanted , namely the production of a very homogeneous non - woven material under good industrial conditions at high speed . it is understood that the different parameters , which consist of the choice of vacuum speeds v 1 , v 2 , . . . , the length d of the vacuum zone compared to the length l of the dispersion chamber , the distance d , the number of stages of the vacuum tank , the option of keeping the vacuum speed constant or having it decrease in all or some of the second stages \u2014 all these parameters are determined individually , depending on the other operating conditions , which are the type and length of the fibers , the grams per square meter desired for the non - woven material and the speed f at which the conveyor belt moves . in one embodiment , which is not exhaustive , the vacuum speed v 1 in the primary section 9 c of the vacuum zone 9 was around 30 to 90 m / s . preferably , the vacuum speeds of the five second stages found in the secondary section 9 d of the vacuum zone 9 were respectively equal to or on the order of 0 . 8 v , 0 . 6 v , 0 . 4 v and 0 . 2 v , it being known that v is the speed of the first stage the furthest upstream and had a value itself less than v 1 , for example 0 . 8 v 1 . to do this , the first stage at speed v 1 of the vacuum tank was equipped with its own fan , while a second fan for the five second stages made it possible to obtain this decreasing vacuum speed using perforated sheets of metal . however , this invention is not limited to the embodiments which have been described as non - exhaustive examples . in particular , it would be possible to have , transversely above the upper end 1 a of the conveyor belt 1 , other compression rollers designed to accompany the movement of the fibers of the non - woven material , which compression rollers would be located advantageously at right angles to the interface between two successive subsections , or even at right angles to the interface between the primary section 9 c and the secondary section 9 d of the vacuum zone . all suitable means may be used to obtain the vacuum speeds in the vacuum tank , whether from a single fan or a plurality of fans , and from additional elements that could reduce the vacuum speed , potentially in a gradual way , from the upstream to the downstream part of the vacuum zone ."}

{"publication\_number": "US-2008253826-A1", "abstract": "an edgeless mop utilizing a relatively narrow diameter , knit tubular material to form the strands of a mop head wherein the tubular material incorporates an arrangement of elongate depressed channels and raised profile segments extending along its surface in the length direction . this construction increases the overall fluid retaining or sorbency capacity of the mop even while lowering the overall mass of the mop head .", "application\_number": "US-14402608-A", "description": "reference will now be made to the various drawings wherein to the extent possible , like reference numerals are utilized to designate like components throughout the various views . in fig1 , there is illustrated a circular knitting machine 10 such as will be well known to those of skill in the art . by way of example only , and not limitation , one knitting machine 10 which has been identified as suitable for practice of the present invention is a model st3ah / za high speed , single feed , circular knit machine having a cylinder size of 1 . 5 inches in diameter and 48 needle slots available manufactured by lamb knitting machine corporation having a place of business in chicopee , mass . usa . according to one contemplated practice , in operation a pair of yarns 12 , 12 a is delivered from spools 13 , 13 a to the knitting machine 10 for formation of a tubular knit structure 14 . the yarn 12 is preferably a 150 denier singles textured polyester having either an \u201c s \u201d or \u201c z \u201d twist construction . the yarn 12 a is preferably a 150 denier two ply textured polyester wherein one ply has an \u201c s \u201d twist and the other ply has a \u201c z \u201d twist . thus , the two yarn system incorporates yarn orientations with a combination of opposing twists . this balance in twist permits the knit structure to avoid undue curling when subjected to laundering operations . of course , the particular yarn system selected may be varied as desired by the user . the tubular knit structure 14 which is formed according to the potentially preferred practice of the invention includes an arrangement of elongate channel depressions 20 running along the length of the tubular knit structure 14 ( fig5 ). the depressions 20 are disposed between raised profile surface protrusions 24 across the surface of the tubular knit structure 14 such that an undulating or corrugated surface profile is provided wherein the elongate channels and surface protrusions extend in alternating substantially parallel relation . according to a potentially preferred practice , the illustrated arrangement of channel depressions 20 and raised profile protrusions 24 is achieved by using a modified needle arrangement in the knitting equipment to create a space between courses formed during the knitting process . according to one exemplary practice , the circular knit machine as described above is modified to incorporate a needle arrangement with four needles in and two needles out in an arrangement which is repeated eight times around the circumference of the cylinder . this produces a profiled surface with eight cooperating channel depressions 20 and eight raised profile protrusions 24 . of course this number may be greater or lower as desired but will preferably be at least four and will more preferably be about 6 or greater . according to one potentially preferred practice the machinery is set up to produce a tubular knit structure with fourteen courses per inch ( relaxed state ) and a weight of about 6 . 1 grams per linear yard ( relaxed state ). the resulting construction is a modified jersey knit utilizing thirty - two active needles for knitting . it is contemplated that the tubular knit structure as described will form the fluid retaining strands of a mop head 30 attached to a handle 40 to form a mop 50 as illustrated in fig2 . as best illustrated through simultaneous reference to fig2 - 4 , the mop head 30 is formed from a skein of the tubular knit material 14 . as previously indicated , such a structure may be formed by winding an extended length of the tubular knit material multiple times around a pair of spaced - apart bars and then removing the formed structure from those spaced - apart bars . as illustrated , the resultant skein structure has an arrangement of folds 32 at either end of the skein structure . as will be appreciated , the folds 32 are formed at the location where the tubular knit material is wrapped around the opposing bars during the winding operation . of course , it is also contemplated that a similar structure may be formed by hand coiling or other techniques as may be desired . moreover , while it may be desirable to use a single long piece of tubular knit material 14 folded upon itself multiple times to form the mop head , it is also contemplated that two or more shorter lengths may be used if desired . thus , it is to be understood that by the term \u201c skein \u201d is meant any structure in which one or more lengths of elongate material are folded upon themselves such that the folds define an edge boundary with discrete strand elements extending away from the edge boundary . according to the illustrated and potentially preferred practice , the skein structure forming the mop head 30 is fitted into a containment sleeve element 34 of fabric or the like which is then seamed in place so as to hold the strands of tubular knit material 14 in adjacent relation to one another at a central location . moreover , the ends of the tubular knit material where the winding begins and concludes are also held in hidden relation beneath the containment sleeve element 34 . finally , strips of material 36 are seamed in transverse relation to the strands of tubular knit material 14 at positions inboard of the folds 32 so as to maintain a desired adjacent relation of the strand elements at each end of the mop head 30 . the mop head 30 may thereafter be washed and dried prior to attachment to the handle 40 . as previously indicated , the adjustment of the circular knitting machine 10 to produce the tubular knit material 14 with interspersed elongate channel depressions 20 and raised profile protrusions 24 yields substantially improved moisture retention capacity even when lower weights of material are utilized . this moisture retention capacity is referred to as \u201c sorbent capacity \u201d and may be made up of moisture retention resulting from absorption and / or adsorption at the strands of tubular knit material . in this regard , it is contemplated that the benefits of the present invention will be applicable to both hydrophilic as well as hydrophobic materials of construction although polyester which is hydrophobic may be particularly preferred . in order to evaluate the relative performance of a mop head formed according to the present invention , exemplary mop heads formed with fluid retaining strands having elongate channel depressions and raised profile protrusions were weighed in a dry state and were thereafter immersed in water until fully saturated and then weighed in a wet state once dripping had substantially ceased . the contoured surface mop heads were formed according to the potentially preferred practice as described above on a 1 . 5 inch diameter circular knitting head with an arrangement of four needles in and two needles out repeated eight times around the circumference . mop heads of similar construction but incorporating flat surface tubular strands of knit material formed on the same knitting head but with all needles in were tested according to the same procedure . each of the structures was also tested to measure sorbency in a wet state wherein the wet mop was immersed after wringing excess moisture from the mop head following initial saturation . the results are set forth in table i below : as can be seen , the mop structure of the present invention exhibited substantially greater intrinsic sorbent capacity in both the wet and dry states relative the prior structure using flat tube fluid containment strands . while the present invention has been illustrated and described in relation to certain exemplary and potentially preferred embodiments and practices , it is to be understood that such embodiments and practices are illustrative only and that the present invention in no event to be limited thereto . rather , it is contemplated the modifications and variations will no doubt occur to those of skill in the art upon reading the above description and / or through practice of the invention . it is therefore contemplated and intended that the present invention shall extend to all such modifications and variations which may incorporate the broad concepts of the present invention within the full spirit and scope thereof ."}

{"publication\_number": "US-4660261-A", "abstract": "the invention relates to a process for giving relief in several directions to a textile cloth , characterized in that it consists : in known manner , in winding this cloth on a support tube , then in withdrawing said tube , thereafter in compressing the roll longitudinally along the axis of said support , finally , in fixing the roll thus compressed . the invention is more particularly applicable to fabric for home furnishings or clothes .", "application\_number": "US-70932985-A", "description": "the manner in which the invention may be carried out and the advantages following therefrom will be more readily understood on reading the following examples given by way of indicative but non - limiting example . on a hollow plastic tube or an inflated elastic tube with an outer diameter of 40 mm . there are wound fifty meters of a warp and weft fabric , 160 cm wide , made of polyester yarns , taffeta weave , weighing 65 grams / linear meter . this winding is effected under a normal tension for this type of operation . a roll 10 of average hardness is thus obtained ( see fig1 a ). once the winding is terminated , a second tube 20 made of stainless steel , with an outer diameter of 30 mm , is placed in the first tube ( see fig1 b ), then the first tube is withdrawn ( see fig1 c ). sliding rings 30 ( see fig1 d ) are introduced on each end of this second tube . these sliding rings are then brought as close as possible to each other , and they abut on the edges of the roll , thus compressing the latter in the longitudinal direction along the generatrix of the second mandrel . this type of compression is known to those skilled in the art , for example , as disclosed in u . s . pat . no . 3 , 325 , 871 ( the disclosure of which is herein incorporated by reference ) in which compression is accomplished without withdrawal of the first support tube . when maximum compression of the roll is obtained , the sliding rings are blocked by cotter pins . the roll thus compressed is then placed for thirty minutes in a saturating vapour over at 140 \u00b0 c . after cooling and unwinding , a fabric is obtained which presents a series of elements in relief in all directions , which resemble diamonds or diamond tips . the dimensions of these figures and deformations increase from the interior of the roll towards the outside thereof , as a function of the increase in diameter of the roll . new and original effects are thus obtained by this geometry which varies from the beginning of the piece of the end . the previous example is repeated , replacing the first support tube by a rigid tube 1 made of sheet steel , as shown in fig1 . this sheet is split along a generatrix 2 . this tube this split has an outer circumference of one meter . once the fifty meters of the same fabric have been wound , a rigid plate is placed on each end of this tube , said rigid plate being pierced with a hole whose diameter ( 32 cm ) corresponds to the outer diameter of the tube . this roll is then compressed on its two edges . the compression thus given provokes reduction of the diameter of the support tube and longitudinal crushing of the wraps . setting is effected under the same conditions as in example 1 , i . e . in a wet oven at 140 \u00b0 c . due to the large radius of curvature of the initial support tube , the pattern obtained presents larger dimensions than in example 1 . on the other hand , from the beginning of the piece to the end , the pattern obtained is substantially homogeneous . a roll is made under the same conditions as in example 2 . once the roll is obtained , the support tube split along its generatrix is removed and this roll is disposed in quincunx around five parallel rigid spindles fixed on a plate . this initial roll is disposed freely in s form around these bars which are enveloped , two by the interior of the roll and three by the outside thereof in double thickness . the deformation is set under the same condition as in example 1 . the patterns obtained are substantially homogeneous from the beginning of the cloth to the end and are formed by a succession of small , then medium , and finally large patterns , the ensemble being repeated homogeneously from the beginning of the piece to the end . a roll is made under the same conditions as in example 2 . after the rigid split support tube 1 has been withdrawn , as shown in fig2 the roll 3 obtained is disposed in sinusoidal manner around twelve parallel bars 4 , 5 disposed in quincunx on either side of a circle having a radius of 120 cm . these bars are alternately placed outside , then inside this circle . the outer bars 5 are enveloped by the interior of the roll , while the inner bars 4 are enveloped by the outside of this roll . this type of arrangement is known to those skilled in the art , for example , as disclosed in u . s . pat . nos . 2 , 971 , 241 and 2 , 869 , 976 ( the disclosures of which are herein incorporated by reference ) in which the sinusoidal roll is obtained without withdrawal of the support tube . the stack in ring form thus obtained is then compressed longitudinally . the deformation is set under the same conditions as in example 1 . not only patterns which are homogeneous from the beginning of the piece to the end are obtained , but also , and especially , fine and regular patterns and a regular lengthwise crimp of the fabric which gives it an additional , original bulk . as has already been stated hereinabove , the cloths treated according to the invention are advantageously made of synthetic fibers , i . e . thermoplastic fibers , so as to present a permanent effect . these cloths with raised patterns may therefore be successfully used for clothes , home furnishings , decoration , particularly for making wall coverings ."}

{"publication\_number": "US-4533126-A", "abstract": "a three piece snubber is provided with two frictional surfaces , a low frictional surface and a high frictional surface and said snubber is held between a frame of an automatic washer and a suspended mass such that small movements between the frame and the mass causes movement between the parts of the snubber at the low friction area and large movement between the frame and the mass results in movement of the snubber as a whole with the high friction area contacting a support pad and resulting in the desired snubbing action .", "application\_number": "US-44678282-A", "description": "in fig1 reference numeral 10 indicates generally a washing machine of the automatic type including a frame 12 carrying vertical panels 14 forming the sides , front and back of the cabinet for the washing machine 10 . a hinged lid 16 is provided in the usual manner to provide access to the interior of the washing machine . the washing machine 10 has a console 18 including a timer dial 20 and a program selector 22 . internally of the machine 10 there is disclosed an imperforate fluid retaining tub 24 which is supported within the washing machine cabinet by means of a base support plate 26 . a plurality of suspension rods 28 having resilient spherical end portions 30 and 32 are positioned about the tub 24 to suspend the base plate 26 and thus the tub 24 within the interior of the cabinet for the washing machine . thus , the frame 12 and cabinet 14 comprise a fixed suspending mass and the tub 21 comprises a suspended mass . a perforate washing receptacle or basket 34 is positioned concentrically within the tub 24 . centrally of the perforate washing basket 34 is a vertical agitator 36 . an electric motor 38 drives a pump 40 as well as the other movable parts of the assembly by means of a transmission 42 . a snubber is shown generally at 44 and is shown in greater detail in fig2 , 4 and 5 . fig2 shows the location of the snubber 44 as it is mounted in the cabinet of the washing machine . a top panel 46 of the washer is shown in a raised position which provides visual access to the snubber 44 . a mounting bracket 48 is secured by appropriate means such as bolts 50 to the side and back panels 14 of the cabinet . a spring member 52 has a first end 54 ( fig3 and 4 ) captured by a head 56 of a bolt 58 . the bolt extends upwardly through an opening 60 in the mounting plate 48 and is secured in place by a nut 62 . a second end 64 of the spring 52 is captured in the mounting plate 48 by means of the spring extending through an opening 66 in the bracket 48 and being captured in a detent 68 . in this manner , the spring is held stationary relative to the bracket 48 and the washer cabinet . a bight 70 is formed in the spring midway of its length which is used to capture and retain an upper portion 72 of the snubber 44 . as best seen in fig4 the upper portion 72 comprises an upstanding cylindrical top section 74 , which is captured in the bight 70 of the spring 52 , a central flange section 76 and a bottom snap tab section 78 . the snap tab section 78 comprises a plurality of downwardly depending fingers 80 which have a radially outwardly extending flange 82 with a horizontal surface area 84 above the flange and an inwardly and downwardly sloped outer wall 86 thereby presenting a smaller bottom wall 88 below the flange than the upper wall 84 . adjacent fingers 80 are separated by a space 90 which allows for radial movement of the finger ends 80 . the upper snubber portion 72 may be constructed of a material such as acetal or other equivalent material so that the fingers 80 are resilient and normally retain their original configuration . the central flange area 76 of the upper portion 72 comprises a wide stepped flange 92 having a flat bottom surface 94 and a stepped upper surface 96 providing a resting surface for the bight 70 of the spring 52 . the top sectiion 74 of the upper snubber portion 72 is generally cylindrical , but has a radial extension 98 ( fig5 ) in one quadrant which can be formed as a tangential extension of the otherwise cylindrical wall and which operates as a key to lock the upper snubber portion in a fixed rotational position relative to the spring 52 to prevent movement and generation of noise between the spring 52 and the upper snubber 72 . as seen in fig5 the top section 74 of the upper snubber portion 72 is hollowed out as at 100 with supporting ribs 101 which retain the upper portion 74 in its normal shape . the hollow or relieved portion 100 is provided to assist in the molding and manufacturing of the upper snubber 72 and to reduce material costs . referring to fig4 a lower snubber portion 102 is a generally cylindrical piece having a stepped cylindrical passage 104 therethrough such that an upper end 106 of the passage 104 is of a first diameter and a lower end 108 is of a larger diameter . the lower snubber portion 102 has a flat bottom wall 110 and a top wall 112 with an annular channel 114 and the wall 112 . a snubber pad or ring 116 is provided which is sized to be received in the annular channel 114 of the lower snubber portion and extends slightly above the top wall 112 . the snubber ring 116 is constructed of virgin teflon or other equivalent material which presents a low friction surface . the lower snubber portion 102 may be constructed of talc filled polypropylene or other equivalent material which presents a high friction surface . the snubber 44 thus consists of the three pieces , the upper snubber portion 72 , the snubber ring 116 and the lower snubber portion 102 in assembly . the snubber ring 116 is inserted and retained in the channel 114 of the lower snubber portion 102 and the upper snubber portion 72 is assembled with the lower snubber portion 102 by inserting the fingers 80 of the snap tabs 78 into the upper end 106 of cylindrical passage 104 causing the fingers to be urged radially inwardly by camming action of the angled walls 86 . as the flanged area 82 of the snap tab 78 moves into the enlarged lower end 108 of cylindrical passage 104 , the fingers 80 resume their normal position such that the upper snubber 72 is captured by the lower snubber 102 in an axial direction . the upper end 106 of cylindrical passage 104 is of a diameter sufficiently large to allow the upper snubber portion 72 to move radially or laterally with respect to the lower snubber to some limited degree . the bottom surface 94 of the upper snubber portion 72 rests on the snubber ring 116 . with the snubber assembly 44 captured by the bight 70 of the spring 52 , the bottom wall 110 of the lower snubber portion 102 rests on a plate 118 which is secured to a tub ring 120 by appropriate fastening means such as friction snaps shown at 122 . the plate may be manufactured of steel with a porcelain coating . during operation of the washing machine , the basket 34 , agitator 26 and other portions of the machine mechanism move relative to the cabinet of the washer . the suspension mounting absorbs some of the movement of these parts . however it has been found that a snubber is useful in further reducing movement between the cabinet and the tub . past snubbers have occasionally resulted in a squeaking noise when there were small movements between the snubber and the plate , especially if wash liquid or other contaminants were introduced between the snubber and the plate . the present invention overcomes these problems in the following manner . during relatively small movements of the tub with respect to the cabinet , a condition which caused the squeaks with the prior snubbers , the present snubber , because of its three part construction , allows for such movement without producing noise . the upper snubber portion is free to make small movements with respect to the lower snubber by riding on the snubber ring 116 . the relatively low friction between the snubber ring 116 and the bottom wall 94 of the upper snubber 72 prevents generation of any noise . as movement between the tub and the cabinet increases , the fingers 80 of the upper snubber 72 are urged into contact with the lower snubber 102 thereby causing the snubber assembly 44 to move as a unit . the force of the spring 52 downwardly on the snubber assembly 44 provides enough friction between the bottom wall 110 of the lower snubber 102 and the plate 118 so as to provide a sufficient snubbing action . fig4 shows the upper snubber portion 72 displaced to the right such that the fingers 80 are about to contact the walls of cylindrical passage 106 . as the fingers contact the lower snubber portion , the assembly moves as a unit in the normal fashion of one piece snubbers to reduce the movement between the tub and the frame . the flange 92 of the upper snubber portion 72 provides an additional feature of shielding the snubber ring 116 so that washing machine contaminents such as soap or water do not get between the snubber ring and the bottom surface 94 of the upper snubber portion . the contaminents would cause a change in frictional characteristics of the materials and could cause generation of noise . thus , there is provided a three piece snubber 44 wherein an upper snubber portion 72 snaps into a lower snubber portion 102 such that the snubber pad 116 attached to the lower snubber portion 102 allows low friction movement of the upper snubber portion 72 when there is limited excursion , but the construction causes the snubber portions to move as one snubber having a large coefficient of friction when the excursions are large . as is apparent from the foregoing specification , the invention is susceptible of being embodied with various alterations and modifications which may differ particularly from those that have been described in the preceding specification and description . it should be understood that we wish to embody within the scope of the patent warranted hereon all such modifications as reasonably and properly come within the scope of our contribution to the art ."}

{"publication\_number": "US-4111007-A", "abstract": "a yarn changing device for use in a flat - bed knitting machine having a carriage . the yarn changing device provides a relatively simple but effective arrangement for repetitive , alternating selection of any one of three or more yarns for knitting operation upon such successive reciprocation of the machine carriage .", "application\_number": "US-85197277-A", "description": "fig1 and 2 illustrate a hand - operated , flat - bed knitting machine employing a yarn changing device according to the present invention . the knitting machine comprises a first machine unit 1 to which a second machine unit or ribbing attachment 2 is removably attached with a right and a left fastening device generally designated by 3 , thereby to constitute a so - called v - bed knitting machine . the first machine unit 1 , however , may be independently used as a single bed machine . the machine is removably fixed on a working table 81 by a conventional clamping device generally designated by 82 . the first machine unit 1 includes a needle bed 1a having conventional movable latch needles 1b and fixed sinker elements 1c appropriately disposed for an operative relationship therewith . a carriage 6 having a conventional cam machanism ( not shown ) is mounted for reciprocating sliding movement on the needle bed 1a for knitting actuation of the needles 1b . a known needle selection control device 83 including a perforated punch card 84 is provided on the machine unit 1 and a pair of needle selecting means ( not shown ) controllable by the control device 83 is provided on the carriage 6 . this arrangement permits a pattern to be knitted in accordance with the patterning program provided on the card 84 . the second machine unit 2 also includes a needle bed 2a having similarly arranged needles 2b and sinker elements 2c . a carriage 7 also having a conventional cam mechanism ( not shown ) is mounted for sliding movement on the needle bed 2a . the carriages 6 and 7 are removably connected by a connecting arm 10 and for manual operation by the machine operator ( not shown ). a handle 85 is provided on the carriage 6 for the convenience of manual manipulation by the machine operator . in normal operation , the carriages 6 and 7 move together , and are hereinafter referred to as the &# 34 ; combined carriage &# 34 ;. a conventional take - up device generally designated by 4 is removably mounted at the rear side of the first machine unit 1 . the take - up device 4 includes two separate assemblies 64 each having a pair of yarn brakes 86 and a pair of take - up springs 87 to enable four different yarns m1 , m2 , m3 , and m4 to be used in knitting . the respective yarns m1 to m4 are thus supplied from a yarn supply 88 to knitting needles 1b and 2b through the take - up device 4 and a yarn carrier 9 provided on the connecting arm 10 . the take - up device 4 is adapted to take up possible slack of the yarns m1 to m4 between the yarn brakes 86 and the knitting needles 1b and 2b . the yarn carrier 9 has the general shape of a flattened inverted triangle . both end portions 9b and 9c of this triangle are folded together such as shown in fig1 and 13 to define an eye 8 to allow a yarn to be fed therethrough to the knitting needles 1b and 2b . a spacing 89 as shown in fig2 exists between the folded portions and permits yarns m1 to m4 to be passed therethrough when changing the yarn to be fed through the eye 8 of the yarn carrier 9 . the yarn carrier 9 is fixed on the connecting arm 10 which includes a longitudinal cutout 90 which is open at the left end thereof . as shown in fig1 , the arm 10 has the general shape of a flattened mirrored c in its plan view . the yarn carrier 9 is disposed such that the eye 8 and the folded portions thereof are arranged substantially within the range of the cutout 90 of the arm 10 , as viewed in its plan view as in fig1 , to thereby enable the yarns m1 to m4 to be guided into and out of the eye 8 through the cutout 90 of the arm . the yarn changing device 5 embodying the present invention is provided at the left end portion of the machine . the yarn changing device 5 has a generally u - shaped construction , and includes four yarn guides 17 at the free end portion of one of the two arms of the u . the device 5 is removably fastened at the left end of the machine such that the yarn guides 17 are positioned substantially above the left end of the machine and the combined carriage comes inside the u without being disturbed by the yarn changing device 5 when it is moved to the left end of the machine . as shown in fig1 - 5 , the yarn changing device 5 further includes a support bracket 13 providing the other arm and the bridging portion of the u . the bracket 13 has a suitable fastening means at the end of the arm for removably fastening the yarn changing device 5 to the machine . the fastening means of this embodiment includes a clamping member 15 cooperative with the end 13a of the bracket 13 to clamp to a portion of the machine frame of the machine unit 1 . the clamping member 15 is manually operated by means of a manually operable dial 14 . the yarn changing device 5 further includes a housing supported on the support bracket 13 . the housing includes a base member 16 fastened to the bracket 13 and a cover 62 mounted on the base member 16 . the base member 16 has the general shape of a plate and includes a left side portion 16a of a laterally elongated rectangle , a central offset portion 16b , and a right side portion 16c having the shape of a rectangle , all as shown in fig3 . a plurality of grooves 21 open at both ends are formed in parallel with each other with spaces therebetween on the right side portion 16c . the respective grooves 21 slidably accommodate the respective yarn guides 17 . additionally , a guide groove 26 parallel with the grooves 21 is provided on the left side of the leftmost groove 21 . each end of the groove 26 is enclosed by an upstanding member formed on the periphery of the base member . an additional groove 27 is provided on the right side of the rightmost groove 21 and connects directly to , and is formed as part of the rightmost groove 21 . as shown in fig4 each of the yarn guides 17 includes a key 30 having an inverted u section defining a hollow 34 which is closed at the front ( left side in fig5 ) and rear ends thereof . the key 30 is provided at the rear end with a hook 31 directed obliquely downwardly for engagement with a yarn . the hook 31 is fastened to the key 30 by a suitable means such as screw means . a nipple 33 is provided on the central portion of the upper surface of the key 20 . another projection 32 is provided on the front portion of the same surface . a lug 28 is disposed on a substantially central portion of each yarn guide 17 and extends into the hollow 34 of each key 30 from the bottom of each groove 21 . each such lug 28 is adapted to limit the slidable movement of the respective yarn guide 17 within the respective groove 21 on the base member 16 . a compression spring 35 is interposed in the hollow 34 of each key 30 between the inner face adjacent one end of the hollow 34 and the lug 28 to urge the key 30 , and , accordingly , the yarn guide 17 , to the frontmost position . as shown in fig5 a lug 63 depends from the inner wall of the cover 62 to a position adjacent the upper surface of each key 30 to prevent undesired floating of the yarn guide during sliding movement thereof . the yarn changing device 5 further includes actuating means responsive to movement of the combined carriage for selectively actuating the yarn guides 17 for movement to the rearmost position against the urging of the springs 35 . the actuating means includes a lever 12 pivoted by a pivot 42 on the base member 16 . the lever 12 is urged by a spring 43 to a position as shown in fig3 in which it obliquely crosses the passage of an actuating element 11 mounted on the carriage 6 so that the lever 12 is engaged by the actuating element 11 and pivoted around the pivot 42 in the counterclockwise and clockwise direction , respectively , when the combined carriage is moved to and from the leftmost extreme end of the machine . the lever 12 also includes a row of teeth 41 arranged in a circle around the pivot 42 . another toothed gear 45 having its teeth engaged with the teeth 41 of the lever 12 is also pivotally mounted on the base member 16 by a pivot 44 and has a crank member 37 integrally attached thereto . a generally l - shaped slider or actuator 25 is mounted for operation by a crank member 34 . the slider 25 includes a first arm 25a which is received in the guide groove 26 of the base member 16 for slidable movement therealong . the slider 25 further includes an extension 36 which extends leftwardly from a rear portion of the first arm 25a thereof . the extension 36 has a cam groove thereon which runs perpendicularly to the guide groove 26 on the base member 16 and is defined by a pair of walls arranged in parallel and including a bent edge portion 36a of and a wall 36b mounted on the extension 36 . a crank pin 46 mounted on the crank member 37 is slidably fitted in the cam groove of the extension 36 for clockwise pivotal movement of the crank member 37 around the pivot 44 to cause the slider 25 to be moved rearwardly with the first arm 25a thereof being guided along and by the guide groove 26 of the base member 16 . counterclockwise pivotal motion of the crank member 37 , however , causes no movement of the slider 25 because the crank pin 46 is brought out of the cam groove defined by the walls 36a and 36b on the extension 36 of the slider 25 . in operation , movement of the combined carriage to the left extreme end of its stroke causes the lever 12 to be driven by the actuating element 11 and to be pivoted counterclockwise around the pivot 42 . this pivotal movement of the lever 12 causes the crank member 37 to pivot clockwise around the pivot 44 due to the engagement of teeth of the lever 12 and the gear 45 . as a result the slider 25 is moved in the rearward direction . when the actuating element 11 subsequently moves clear of the lever 12 , the spring 43 restores the lever 12 and the crank member 44 to their original positions . at the same time another spring 40 provided between the slider 25 and the base member 16 restores the slider 25 to its original position as shown in fig3 . when the carriage is moved in the rightward direction from the left extreme end of its stroke , the lever 12 is also engaged and pivoted clockwise by the actuating element 11 . in this case , however , the pivotal movement is through a smaller angle and effects a counterclockise pivotal motion of the crank member 37 which , as previously described , does not cause any rearward movement of the slider 25 . the slider 25 further includes a second arm 25b disposed perpendicularly to the first arm 25a and extending over and transverse to the aforementioned yarn guides 17 as shown in fig3 to 5 . the second arm 25b of the slider 25 includes a leg 38 depending from the right extreme end thereof , with the lowermost end slidably fitted in the guide groove 27 . underlying the second arm 25b is an actuator member 39 which has both ends thereof slidably inserted in holdes 48 and 49 shown in fig4 formed in the first arm 25a and the leg 38 , respectively . the actuator member 39 is supported for translatable movement transversely to the yarn guides 17 and is normally urged by a tension spring 50 to bring an abutment 51 shown in fig4 into contact with the first arm 25a . the actuator member 39 is further provided along the lower edge thereof with teeth 47 extending downwardly for engagement with the front projections 32 on the yarn guides 17 . when the actuator member 39 is in its &# 34 ; home &# 34 ; or starting position , its teeth 47 are disposed in the rear of and in alignment with the front projections 32 on the yarn guides 17 which are then positioned in their original or most advanced positions , hereinafter referred to as the &# 34 ; first inoperative positions .&# 34 ; when the teeth 47 in the rear of the actuator member 39 engage with the front projections 32 to hold the yarn guides 17 against the urging of the respective springs 35 in the fully retracted positions , the yarn guides 17 are then in the positions hereinafter referred to as &# 34 ; second inoperative positions .&# 34 ; it should be observed that when the slider 25 is moved in the rearward direction , the yarn guides 17 in the second inoperative position are actuated and moved rearwardly by the actuator member 39 on the slider 25 . in fig3 the first and second yarn guides 17 from the left are shown in the first inoperative positions in which the forward ends of the keys 30 thereof are projected forwardly through window openings 62b formed in the cover 62 . accordingly , either or both of those yarn guides 17 in the first inoperative positions can be manually manipulated for movement in the rearward direction to the second inoperative positions as represented by the position of the third yarn guide 17 from the left in fig3 . in order to allow each yarn guide 17 to be moved from the first to the second inoperative position without being disturbed by the teeth 47 of the actuator member 39 , each yarn guide 17 has on its front projection 32 a camming surface 32a disposed to engage with a tooth 47 of and to translatingly displace the actuator member 39 in the rightward direction . thus , manual manipulation of a yarn guide 17 from the first to the second inoperative position causes the actuator member 39 to be translatingly displaced against the urging of the spring 50 to bring its teeth 47 out of alignment with any projection 32 . in the event another yarn guide 17 is then being held in the second inoperative position by the actuator member 39 , such translation of the actuator member 39 will cause that yarn guide 17 to be released from the actuator member 39 so that the yarn guide 17 is permitted to be restored to the first inoperative position by the urge of the associated spring 35 . thus , movement of one yarn guide 17 from the first to the second inoperative position may result restoration of another yarn guide 17 from the second to the first inoperative position . upon a rearward movement of the slider 25 of the actuating means , the yarn guides 17 are moved or retracted to the rearmost position . in order to perform a yarn changing operation , as will be hereinafter described in detail , the yarn guide 17 is required to remain in such a rearmost position even after the slider 25 is restored to its &# 34 ; home &# 34 ; position . thus , the yarn changing device 5 further includes locking means for releaseably locking the yarn guides 17 in an advanced position , hereinafter referred to as the &# 34 ; operative position .&# 34 ; the locking means includes a locking member 53 provided for each of the yarn guides 17 . as shown in fig6 to 9 , each locking member 53 is provided with a groove 55 on the reverse side of the rear end portion thereof . each groove 55 is defined by two walls 55a and 55b disposed perpendicularly to each other and a projection 55c and is opened toward the right and rear side edges of the locking member 53 . an upwardly oblique surface 56 is formed on the left of and adjacent to each groove 55 on the same side . the locking member 53 has an abutment 57 also provided centrally on the reverse side thereof . the locking member 53 is supported at the front end thereof horizontally and vertically , pivotally by a pivot 58 on the base member 16 . a spring 39 wound around the pivot 58 urges the locking member 53 to a position in which the abutment 57 is contacted by the key 30 of the guide 19 and the rear portion thereof is contacted by the upper surface of the key 30 . in other words the spring 39 urges the locking member 53 to its original or &# 34 ; home &# 34 ; position as indicated by the full line in fig6 . adjacent to the pivots 58 the base member 16 is provided with slots 22 each for receiving therein an abutment 57 of the locking member 53 to permit a pivotal motion of the locking member 53 around the pivot 58 . in operation , as the yarn guide 17 is retracted , the nipple 33 on the yarn guide 17 first engages with the right side edge of the locking member 53 to cause the latter to pivot counterclockwise against the urging of the spring 59 as shown by the alternate long and short dashed line in fig6 . then , as the yarn guide 17 is moved beyond the operative position to the rearmost position , the nipple 33 meets with the right side entrance of the groove 55 and is disengaged from the right side edge of the locking member 53 so that the locking member 53 is pivoted clockwise by the urging of the spring 59 to bring the projection 55c thereof into engagement with the nipple 33 of the key 30 . upon restoration of the slider 25 to its original position , the yarn guide 17 is advanced by the spring 35 to a position in which the nipple 33 is abutted by the wall 55a . during this movement , the nipple 33 is released from the projection 55c of the locking member 53 so that the locking member 53 is further pivoted clockwise to a position in which the nipple 33 is abutted by another wall 55b . in this manner , the locking member 53 is moved to a locking position in which both of the walls 55a and 55b are engaged by the nipple 33 of the yarn guide 17 as seen from fig7 and 8 . at the same time the yarn guide 17 is locked or held by the locking member 53 against the urge of the spring 35 . subsequently , when the slider 25 is moved again , the tooth 47 pushes the front projection 32 to move the yarn guide 17 locked in the operative position toward the rearmost position . at this time , the nipple 33 disengages from the wall 55 and the spring 59 further pivots the locking member 53 clockwise from the locking position so that the oblique surface 56 is brought into alignment with the nipple 33 as shown by dotted lines in fig7 . then , when the slider 25 returns to the original position , the compression spring 35 drives the guide 17 to move to its original position . at this time the projection 33 comes in contact with the oblique surface 56 to push the blocking member 53 upwardly and to thereby pivot the locking member 53 upwardly with respect to the pivot 58 to permit the yarn guide 19 to return to its original position . see fig9 . in the event a second yarn guide 17 is positioned in the second inoperative position at the commencement of the second movement of the slider 25 , the second yarn guide 17 will be similarly caused to be locked in the operative position after the return of the slider to its original position . in this manner a yarn guide 17 related to a desired yarn to be fed in a subsequent course of knitting may be selectively , manually moved from the first to the second inoperative position , and to then be brought into the operative position in response to a subsequent carriage movement towards the left extreme end of the machine . moreover , with this arrangement , the fact that there is or maybe an unselected third yarn guide associated with another , unselected yarn will not prevent the first and second yarns from alternately being brought into the operative position . additionally , it will be seen that it is possible with this arrangement to further select any one of the presently unselected yarn guides , regardless of the currently selected yarn guides . means are also provided for manually translating the actuator memer 39 in the rightward direction against the urging of the spring 50 to permit any yarn guide 17 to be released to return from the second to the first inoperative position . these means include a clearer bar 60 formed as a leaf spring , the rear end of which is attached to the cover 52 . the clearer bar 60 has a button 61 at its front end and is disposed for alignment with and to be urged to engage with the left end of the actuator member 39 . the button 61 is projected outwardly from the cover 62 through an opening 62d formed therein to permit manual manipulation and operation by the machine operator . in such a case in which more than two yarn guides 17 are moved to the second inoperative position , it is seen that the button 61 may be pushed rightwardly to permit those yarn guides 17 to be released therefrom . as has been already described , each yarn guide 17 has three stable positions , namely the first and second inoperative positions and the operative position . the cover 62 of the housing has four openings 62c in the rear wall thereof through which the yarn guides 17 are projected rearwardly to permit the hooks 31 of the yarn guides 17 in any of the stable positions to be engaged with the respective yarns m 1 to m 4 . the yarn guide 17 in the first or second inoperative position has its hook 31 positioned next to the cover 62 . however , when the yarn guide 17 is in the operative position , its hook 31 is disposed under a guide rod 29 as shown in fig2 and 5 . the guide rod 29 is fixed at the left end portion thereof on the base member 16 and extends rightwardly in parallel with the moving direction of the carriage . on its right end the guide rod 29 has an extension 29a which is directed substantially in the vertical direction . the guide rod 29 is adapted to engage with a knitting yarn to force the yarn forwardly against the tension exerted by a take - up spring 87 of the take - up device 4 to bring the yarn into alignment with the hook 31 of the yarn guide 17 in the operative position and to thereby permit the yarn to be caught by and released from the hook 31 of the yarn guide 17 during a yarn changing operation as will be further described . in the above described embodiment of the yarn changing device 5 , a yarn guide 17 is constructed as having a hook 31 which is adapted to releaseably hold a knitting yarn . the yarn which is to be fed through the eye 8 of the yarn carrier 9 onto knitting needles is thus permitted to run from the take - up device 4 directly to the yarn carrier 9 , as is represented by the yarn m 1 in fig1 and 10 , so that the associated yarn guide 17 , as the rightmost one in fig1 , is free from that yarn in use . a general description will now be given of the yarn changing operation for the yarn changing device 5 having yarn guides 17 such as just described . when the carriage is moved leftwardly to pass over the device 5 , all the yarns held by the device 5 are guided into the eye 8 through the spacing 89 of the yarn carrier 9 . subsequently , when the carriage c is moved rightwardly to pass over the device 5 , only one of the yarns namely , the particular one to be used for knitting in the course of the rightward and subsequent leftward movement of the carriage , is released from the device 5 and left in the eye 8 . the unselected yarns are guided out of the eye 8 through the spacing 89 . whether or not a given yarn is left in the eye 8 depends upon the positions of the various yarns in the course of the rightward movement of the carriage as it passes over the yarn changing device 5 . for example , a yarn which is positioned at the front side of the tip end of the right end portion 9c of the yarn carrier 9 is guided out through the spacing 89 . however , a yarn which is positioned at the rear side of the tip end of the right end portion 9c , is left in the eye 8 . thus , the right end portion 9c is adapted to classify a yarn to be used or active from yarns to be unused or inactive in the succeeding knitting course . different stages of the yarn changing operation will now be described with reference to fig1 to 12 in which the carriage is represented by the connecting arm 10 for clarity of the drawings . in fig1 , four yarns m1 to m4 corresponding to the first to fourth yarn guides 17 counted from the right are used . assume now that the third and fourth yarn guides 17 are in the first inoperative position , that the second yarn guide 17 is in the second inoperative position , that the first yarn guide 17 is in the operative position , that the yarns m2 to m4 are caught by the associated yarn guides 17 and that the yarn m1 is released from the hook 31 of the associated yarn guide 17 to be fed through the eye 8 to the knitting needles . in such a situation , when the carriage ( i . e . the connecting arm 10 ) is moved to the left ( i . e . in the direction of the arrow 65 ), the yarn m1 is engaged by the extension 29a of the guide rod 29 ( see also fig2 ) to be advancingly guided to the horizontal portion 29b of the guide rod 29 against the tension provided by the associated take - up spring 87 . subsequently , the actuating element 11 on the carriage is engaged with the lever 12 on the yarn changing device 5 to pivot the lever 12 in the counterclockwise direction . as a result , the second yarn guide 17 is retracted up to the rearmost position to place the hook 31 associated therewith under the guide rod 29 . at the same time , the first yarn guide 17 is also retracted up to the rearmost position . then , the yarn m1 is guided by the guide rod 29 and is caught by the hook 31 of the first yarn guide 17 ( fig1 ). by this point in time , all of the remaining yarns m2 to m4 have been guided into the eye 8 through the spacing 89 of the yarn carrier 9 . it is seen that after the actuating element 11 has been disengaged from the lever 12 as the carriage continues to move to the left , the first yarn guide 17 advances to the second inoperative position due to the urging of the spring 35 and the yarn m1 is caught by the hook 31 ( fig1 ). then , when the carriage direction is reversed for sliding movement in the rightward direction , the engagement of the actuating element 11 with the lever 12 does not effect any shifting movement of yarn guides 17 as previously described so that all the yarn guides 17 remain in their respective positions . thus , the yarn m2 which is associated with the yarn guide 17 now in the operative position is brought in the rear of the tip of the right end portion 9c of the yarn carrier 9 , and is released from the hook 31 of the associated yarn guide 17 to remain in the eye 8 of the yarn carrier 9 in order to be fed onto knitting needles during further carriage operation . meanwhile , the yarn m1 associated with the yarn guide 17 now in the second inoperative position as well as the other yarns m3 and m4 associated with the yarn guides in the first inoperative position are brought in front of the tip end of the right end portion 9c of the yarn carrier 9 to be guided out of the eye 8 thereof and to remain in the hooks 31 of the associated yarn guides 17 . reference will now be made to fig1 which shows another embodiment of the yarn changing device having an indicating means to facilitate identification by the machine operator of the position of each yarn guide . yarn guides 117 having slightly modified shapes from those previously discussed are each provided with an upstanding lug or pointer 72 near the rear projection 33 on the central upper surface thereof . see fig6 . it is seen that this arrangement allows each pointer 72 to extend upwardly to reach within a corresponding slot 73 formed in the cover 162 to provide a visual indication of the yarn guide positions to the machine operator . in a preferred embodiment , the top surface of each pointer 72 is color coded to facilitate identication . additionally , for example , marks representing the three stable positions for each yarn guides 117 , i . e . the first and second inoperative positions and the operative position , are put on the upper surface of the cover 162 near the respective slots 73 and a transparent upper plate 74 covering the slots 73 is fastened onto the upper surface of the cover 162 . the marks may be printed or embossed on the upper plate 74 . fig1 and 16 illustrate a further embodiment of the yarn changing device which is designed for electric control by a control circuit means . in these figures , the housing includes a base member 216 and a cover 262 but is more elongated at a portion thereof forward of the slider 25 in the sliding direction of the yarn guides 17 as compared to the previous embodiments to provide a space 75 . the space 75 accommodates electromagnets or solenoids 76 corresponding to the respective yarn guides 217 . each solenoid 76 is provided with a bobbin 77 with a square hole for receiving a front portion of the similarly elongated yarn guide 217 and a coil 78 wound around the bobbin 77 . a plate member 79 made of ferromagnetic material having the same length as of the solenoid 76 is embedded in a frontal portion of each yarn guide 217 . the plate member 79 projects forwardly from the solenoid 76 ( see the right side plate member 79 in fig1 ) when the yarn guide 217 is in the first inoperative position . when the yarn guide 217 is in the second inoperative position , it is in alignment with the solenoid 76 ( see the left side plate member 279 in fig1 ). when the solenoid 76 associated with a yarn guide 217 in the first inoperative position is energized , the plate member 79 on the yarn guide 217 is moved backwardly by the solenoid 76 so that the yarn guide 217 is moved to the second inoperative position where it is retained . thus , a given yarn guide 217 may be selectively moved from the first to the second inoperative position by means of an electric current supplied to the associated solenoid . in the embodiments thus described , all of the yarn guides are formed as having hooks for releasably catching the yarns . it will be understood , however , that they may be constructed each to have a round hole or eye unreleasably holding the yarn such as in the yarn changing device disclosed in swiss pat . no . 387 , 858 ."}

{"publication\_number": "US-2006265959-A1", "abstract": "a clothes dryer door assembly with a viewing window is adapted to be reversibly mounted to a clothes dryer cabinet and has an inner door assembly supporting an inner window and an outer door assembly supporting an outer window . the inner door assembly removably carries a hinge and the outer door assembly is removably secured with the inner door assembly . in order to reverse the door , the outer door assembly is removed from the inner door assembly and rotated 180 degrees . the hinge is removed from the inner door assembly and re - positioned 180 degrees on the inner door assembly . the outer door assembly is then reattached to the inner door assembly . this reversing of the door assembly of the present invention does not require complete disassembly of either of the inner or outer door assemblies .", "application\_number": "US-43104906-A", "description": "fig1 and 2 show perspective and side sectional views of an exemplary clothes dryer 10 that may benefit from the present invention . the clothes dryer includes a cabinet or a main housing 12 having a front panel 14 , a rear panel 16 , a pair of side panels 18 and 20 spaced apart from each other by the front and rear panels , and a top cover 24 . within the housing 12 is a drum or container 26 mounted for rotation around a substantially horizontal axis . a motor 44 rotates the drum 26 about the horizontal axis through , for example , a pulley 40 and a belt 42 . the drum 26 is generally cylindrical in shape , has an imperforate outer cylindrical wall 28 , and is closed at its front by a bulkhead wall or bearing 30 defining an opening 32 into the drum 26 . clothing articles and other fabrics are loaded into the drum 26 through the opening 32 . a plurality of tumbling ribs ( not shown ) are provided within the drum 26 to lift the articles and then allow them to tumble back to the bottom of the drum as the drum rotates . the drum 26 includes a rear wall 34 rotatably supported within the main housing 12 by a suitable fixed bearing 35 . the rear wall 34 includes a plurality of holes ( not shown ) that receive hot air that has been heated by a heater such as electrical heating elements 38 in the heater housing 22 . the housing 22 receives ambient air via an inlet 36 . although the exemplary clothes dryer 10 shown in fig1 is an electric dryer , it could just as well be a gas dryer having a gas burner . the heated air is drawn from the drum 26 by a blower fan 48 which is also driven by the motor 44 . the air passes through a screen filter 46 which traps any lint particles . as the air passes through the screen filter 46 , it enters a trap duct 50 and is passed out of the clothes dryer through an exhaust duct 52 . after the clothing articles have been dried , they are removed from the drum 26 via the opening 32 . the dryer has a control panel 54 with touch and or dial controls 56 whereby a user can control the operation of the dryer . clothes are inserted into , and removed from , the drum 26 through opening 32 . opening 32 is shown closed by a window or port - hole like door 60 . door 60 has a handle 62 for pivotally opening the door about hinge 64 . in accordance with the present invention , the assembly of the door 60 is now described with respect to fig3 through 9 . in fig3 , the door assembly 60 is shown to comprise an inner door assembly 66 and an outer door assembly 68 . the inner door assembly 66 comprises an inner door frame support 70 . the inner door frame support is made from a steel or stainless steel material . the inner door frame support 70 is shown in perspective view in fig9 with the inner window 82 . backed onto the inner door frame support 70 is a gasket 72 which forms a seal with a clothes dryer cabinet 12 when the door 60 is closed . the inner door frame support 70 comprises a first peripheral flange 74 that has two horizontally disposed or alternate hinge seat portions 76 . the peripheral flange 74 comprises a circular flange that has a first collar 78 depending rearwardly therefrom . the collar 78 defines a recessed window seat portion 80 in the form of a lip portion . the recessed seat portion 80 surrounds a first central opening 81 in the inner door frame support 70 . the inner door assembly 66 further comprises an inner window 82 . the inner window 82 comprises a flat glass piece which is circular in shape and has a truncated or cropped lower edge portion 86 . in alternative embodiments , the glass may be a molded glass . the peripheral edge of the glass is surrounded by a gasket 88 . the window 82 is adapted to be seated within the recessed seat portion 80 of the inner door frame support 70 so as to extend across the first central opening 81 . the inner door assembly 66 further comprises a mask frame 90 that is secured with the inner door frame support 70 to secure the window 82 in place in the window seat portion 80 . the mask frame 90 is illustrated as a separate part in fig7 and has a collar 92 that depends rearwardly from two arcuate peripheral flanges 93 . the arcuate flanges 93 are adapted to overlay the peripheral flange 74 of the inner door frame support 70 and the mask collar 92 is adapted to overlay the collar 78 of the inner door frame support 70 . the purpose of the mask frame 90 is two fold . its first purpose is to mask from view the structure of the inner door frame support 70 . the mask frame 90 has a lower portion 94 that also masks from view the lower portion 96 of the inner door frame support 70 . it should be understood that the lower portion 94 of the inner door support frame 70 below collar 78 overlays the lint filter trap 50 between the front panel 14 and the bulk head wall 30 of the dryer when door 60 is closed ( see fig2 ). the second purpose of the mask frame 90 is to hold the window 82 in place in the recessed seat portion 80 . the mask frame 90 defines a second central opening 98 . the mask frame 90 has two cut out slots 100 between the flanges 93 . these cut out slots 100 are positioned adjacent to the horizontally disposed hinged seat portions 76 when the inner door assembly 66 is assembled . from fig7 , it can be seen that the collar 92 of mask frame 90 extends rearwardly from the peripheral flanges 93 . the collar 92 comprises an inner surface 106 and an outer surface 108 . the outer surface 108 is positioned to face towards the first collar 78 of the inner door frame support 70 . the mask frame 90 further comprises rearwardly extending rib spacers 104 that are attached to the outer surface 108 of the collar 92 . these spacers 104 have a tip 110 with a cut out section 102 . the tip 110 together with the cut out section 102 of the ribs 104 act to secure the inner window 82 within the recessed seat portion 80 of the inner door frame support 70 when the mask frame 90 is secured to the inner door frame support 70 . in fig6 , it can also be seen that the spacer or ribs 104 have a tip portion 110 with its cut out slot 102 that surrounds and engages the gasket 88 of the inner window 82 . referring to fig7 , the peripheral flanges 93 of the mask frame 90 each comprise a plurality of barb like connectors 112 . as better seen in fig8 , the barb like connector 112 has a hook portion 114 that passes through an opening 117 in the first peripheral flange 74 of the inner door frame support 70 . as the barb connector 112 passes through opening 117 , the hook portion 114 is compressed and then springs open to lock the peripheral flanges 93 relative to the peripheral flange 74 . in this way the barb connectors 112 in co - operation with the openings 117 act to assemble the mask frame 90 relative to the inner door frame support 70 with the window 82 sandwiched between the mask frame 90 and the inner door support frame 70 . as shown in fig7 , the rear face of the flanges 93 have spacers 255 with pass through apertures 250 . spacers 255 together with barb connectors 112 maintain the relative positioning of the mask frame 90 and the inner door frame support 70 . hence the connectors 112 and the openings 117 co - operate to assemble the inner door assembly 66 without the use of any fasteners . referring to fig6 the distance the recesses of the collars 78 and 92 rearwardly extend is greater at the lower portion 202 of the door than at the upper portion 200 of the door . this results in the recessed window seat portion 80 sloping downwardly and rearwardly to present a lower seat portion 206 thereof that is more recessed than the upper seat portion 208 . as a result the inner window 82 seated in the recessed seat portion 80 slopes downwardly and rearwardly towards the interior of the dryer cabinet . the lower seat portion 80 extends over the lint trap 46 ( as best seen in fig2 ). this results in a door effectively covering the opening for the filter 46 in the trap duct 50 while at the same time optimizing volume within the dryer drum . referring to fig3 , and 9 , the inner door assembly 66 further comprises hinge 64 and retainer 116 . the hinge structure 64 is secured to the inner door frame support 70 by fasteners 218 that pass through openings in the hinge structure 64 and into corresponding openings in the seat portions 76 of the inner door support frame 70 . the hinge structure 64 is secured in one of the horizontally disposed hinged seat portions 76 of the inner door frame support 70 . the hinge structure 64 has a first hinge element 118 ( fig3 ) that extends from the inner door assembly 66 for securement with the front panel 14 and / or bulk head 30 of the dryer adjacent the opening 32 . as shown in fig5 and 9 , the hinge structure 64 has a second hinge element 120 that is adapted to engage the inner window 82 at the gasket 88 to secure the window 82 in the recessed seat portion 80 . the hinge element 120 of the hinge structure 64 extends rearwardly between the collar 78 of the inner door frame support 70 and collar 92 of the mask frame 90 . in a similar manner the retainer 116 is removably mounted by fasteners 122 in the other one of the horizontally disposed hinged seat portions 76 of the inner door support frame . the retainer 116 comprises a cover 124 and a retainer portion 126 . the retainer portion 126 is adapted to engage the gasket 88 of the inner window 82 to positively hold the window 82 in the recessed seat portion 80 . in the detailed description the hinge 64 , retainer 116 and mask frame 90 act to hold the window 82 in place on the inner door frame support 70 . it should be understood that either the mask frame 90 or the hinge 64 and retainer 116 may be used mutually exclusive of each other to secure the window 82 in place on the inner door frame . referring to fig3 , the door assembly 60 further includes an outer door assembly 68 . the outer door assembly 68 comprises an outer window 130 . the outer window 130 comprises a concave circular shaped central portion surrounded by a peripheral ring like flange 134 . the flange 134 extends substantially around the circular concave center portion except for the cut out section 136 . cut out section 136 is located adjacent the hinge element structure 64 . the outer window 130 comprises a plastic and preferably comprises a transparent polycarbonate material . the outer door assembly 68 further comprises a cover 140 that has a peripheral flange 142 comprising a ring flange with a central opening 144 . the cover 140 has a depending rim 146 that depends from its peripheral flange 142 . the peripheral flange 142 is further provided with an outer handle portion shown as 62 . the outer door assembly 68 further comprises a structural handle portion 148 that is mounted by two fasteners 156 passing through apertures 150 in the outer window 130 , apertures 152 in the handle portion 148 and into receiving studs ( not shown ) in the reverse face of the outer handle portion 62 . the fasteners 156 effectively secure the outer window 130 to the cover 140 and thereby complete the assembly of the outer door assembly 68 . the outer window 130 provides further structural support for the door assembly 60 . the peripheral ring like flange 134 of the outer window 130 is nested in the ring like peripheral flange 142 and the rim 146 of the cover 140 . the flange 134 is substantially coextensive with the peripheral flange 142 of the cover 140 except for the cut out portion 136 that is provided to allow the cover flange 142 to overlay the hinge structure 64 . to complete the assembly of the door 60 the inner door 66 is secured to the outer door 68 by a plurality of fasteners 160 that pass through aligned apertures 250 in the peripheral flange 74 of the inner door frame support 70 , the peripheral flanges 93 of the mask frame 90 , the peripheral flange 134 of the outer window 130 and into receiving studs ( not shown ) found on the rear surface of the peripheral flange 142 of the cover member 140 . additionally latches or spacers 170 ( see fig3 and 5 ) are provided to mount and orientate the hinge element 164 and the retainer portion 126 and cover 124 in the respective horizontally disposed seat portion 76 . referring to fig4 , the front cover 140 covers the appearance of the door such that the central opening 144 of the front cover and the central opening 98 of the mask frame 90 are covered by the concave shaped circular central portion of the outer window 130 . disposed horizontally opposite to the handle 62 on the rim 146 of the cover 140 are two slotted openings 162 . openings 162 permit for the first hinge element 118 to extend from the door assembly 60 for connection with the clothes dryer cabinet . the construction of the clothes dryer door assembly 60 allows for a the mask frame 90 to be secured to the inner door frame support 70 so as to hold the inner window 82 in place without having to utilize additional fasteners other than the hinge 64 and the retainer 126 to hold the window 82 in place . further , the door structure of the present invention is adapted for reversibility or for rotation of the outer door assembly 68 relative to the inner door assembly 66 . the door assembly 60 is adapted to be mounted in alternate positions on the front panel 14 of the clothes dryer cabinet 12 so that the door assembly 60 can be configured to open either from the left or ride side . as shown in fig1 the door assembly 60 opens from the left side of the dryer 10 . if one were to reverse the opening of the door this can be done by removing the door assembly 60 at the hinge structure 64 from the clothes dryer cabinet 12 . next , the fasteners 160 are removed so that the outer door assembly 68 is removed from the inner door assembly 66 . thereafter the hinge structure 66 and the retainer 116 are removed by removing fasteners 218 and 122 . the hinge 64 and the retainer 116 are then rotated 180 degrees from their initial position into the other or alternate horizontally disposed seat portion 76 . then the hinge structure 64 and the spacer 126 are reattached by fasteners 218 and 122 . the outer door assembly 68 is then rotated 180 degrees relative to the inner door assembly 66 . the fasteners 160 are reinserted to secure the outer door assembly 68 to the inner door assembly 66 . this is facilitated by the apertures 250 , through which the fasteners 160 pass , being aligned symmetrical to each other about the horizontal axis extending through the door assembly 60 . this symmetrical or mirroring arrangement facilitates placement of the outer door assembly 68 relative to the inner door assembly 66 at 180 degrees disposed from its previous position . the hinge structure 64 is then reattached to the dryer housing 12 to complete the reversing of the door relative to the dryer 10 . rotation of the outer door assembly 68 relative to the inner door assembly 66 permits for the dryer to be changed between left and right opening doors without completely disassembling each of the inner door assembly 66 and the outer door assembly 68 while at the same time maintaining the lower portions 94 and 96 of the inner drum support 70 and the mask frame 90 in the same orientation adjacent the lint trap duct 50 . while the invention has been described in terms of various specific embodiments , those skilled in the art will recognize that the invention can be practiced with modifications within the spirit and scope of the present invention disclosed herein ."}

{"publication\_number": "US-5626719-A", "abstract": "a process for increasing the resistance of the cut edges of liquid packaging board to penetration by hot hydrogen peroxide , comprising adding to an aqueous pulp slurry at a neutral to alkaline ph , either separately or in preblended form an aqueous emulsion of a cellulose - reactive size , a non - cellulose - reactive size selected from the group consisting of waxes , bis - stearamides , and fatty acid derivatives , and a thermosetting resin that is capable of covalent bonding to cellulose fibre and self - cross - linking .", "application\_number": "US-47862895-A", "description": "the thermosetting resin that may be usefully employed in this invention , which are capable of covalent bonding to cellulose fibre and self - cross - linking are normally cationic and are reactive under conventional paper - making conditions of ph , temperature , and moisture . among the preferred thermosetting resins as indicated above , the reaction products of epichlorohydrin with poly ( diallylamine ), especially include the poly ( n - alkyldiallylamines ). more preferred thermosetting resins are the reaction products of epichlorohydrin with polyaminoamide where the polyaminoamide is derived by reaction of a dicarboxylic acid and a polyalkyleneamine ; the reaction products of epichlorohydrin with a polyalkyleneamine ; and the reaction products of epichlorohydrin with poly ( diallylamine ), especially a poly ( n - alkyldiallylamine ). the more preferred thermosetting resins are the products of the reaction of epichlorohydrin with polyaminoamides , most preferably those polyaminoamides derived by reacting adipic acid with diethylenetriamine . examples of preferred resins are available from hercules incorporated under the registered trade mark kymenk \u00ae as kymene 557h , kymene 367 and kymene 260 . the thermosetting resins are prepared conventionally in aqueous solutions . the reactive sizes and non - reactive sizes are hydrophobic solids that are normally made into stable dispersions in water prior to use in the paper making process . any conventional cationic , anionic or non - ionic dispersing agents and stabilizers such as sodium lignosulphonate , starch , cationic starch , anionic starch , amphoteric starch , water - soluble cellulose ethers , polyacrylamides , polyvinyl alcohol , polyvinyl pyrrolidone , polyamides etc ., or mixtures thereof , may be used to make these stable dispersions in water . any conventional mechanical process may be used in the preparation of these dispersions . the preparation of stable dispersions of reactive and non - reactive sizes , including the choice of conventional stabilizers and dispersing agents , falls within the competence of those skilled in the art . the preferred stabilizer is a cationic starch and the preferred dispersing agent is sodium lignosulphonate . any conventional cellulose - reactive paper sizing agent , including , for example , alkenyl succinic anhydride , as well as ketene dimers , may be usefully employed in this invention . the preferred alkyl ketene dimers used as sizing agents according to the invention , are dimers having the formula : wherein r is an alkyl radical , which may be saturated or unsaturated , having from 6 to 24 carbon atoms , preferably more than 10 carbon atoms and most preferably from 14 to 16 carbon atoms ; a cycloalkyl radical having at least 6 carbon atoms , or a comparable aryl , aralkyl or alkaryl radical . these kd &# 39 ; s are well known , for instance from u . s . pat . no . 2 , 785 , 067 , the disclosure of which is incorporated herein by reference . suitable kd &# 39 ; s include decyl , dodecyl , tetradecyl , hexadecyl , octadecyl , aicosyl , docosyl , tetracosyl cyclohexyl , phenyl , benzyl and naphthyl ketene dimers , as well as kd &# 39 ; s prepared from palmitoleic acid , oleic acid , ricinoleic acid , lincleic acid , myristoleic acid and eleostearic acid . the kd may be a single species or may contain a mixture of species . the most preferred ketene dimers are alkyl ketene dimers prepared from c14 - c22 linear saturated natural fatty acids . any non - reactive size from the general classes of waxes , bis - stearamide , rosin derivatives and fatty acid derivatives may be usefully employed in this invention . the preferred non - reactive sizes are bis - stearamide and fatty acid esters . the most preferred non - reactive sizes are fatty acid esters , especially glycerol triesters of natural fatty acids ( glycerides ), having softening points above the temperature of the hydrogen peroxide sterilizing solution ). if the non - cellulose - reactive size is a wax , it is preferably in the form of an aqueous dispersion of a fused wax or a wax solution blended with an amino polyamide - epichlorohydrin resin , as disclosed in british patent specification 1 , 402 , 196 , the disclosure of which is incorporated herein by reference . the dispersions of the present invention may include also other additives used commercially in the art of paper making such as promoter resins for ketene dimers , biocides etc . the actual amount of solids present in these dispersions may vary from 3 to about 50 % by weight , preferably from about 4 to 40 % and most preferably from about 5 to 35 %. the dispersion of the reactive size , the dispersion of the non - reactive size and the solution of the thermosetting resin may be added separately to the paper making stock at any convenient points in the paper machine systems . it would normally be advantageous to add these chemicals to the paper stock just prior to the formation of the paper sheet . it is necessary to ensure that all three chemicals mix thoroughly with the paper stock before sheet formation . the two size dispersions may be premixed before addition to the paper stock , or they may be dispersed separately in solutions of the thermosetting resin , and these may be added to the paper stock separately or premixed before addition . a process for making a premixed sizing emulsion according to the invention also comprises melting and blending together a cellulose - reactive size and a non - cellulose - reactive size and dispersing the blend in an aqueous solution of a thermosetting resin . preferably the cellulose - reactive size is present in an amount of from about 0 . 01 to about 0 . 48 percent based on the dry weight of the pulp , and the non - cellulose - reactive size is present in an amount of from about 0 . 01 to about 2 . 0 percent based on the dry weight of the pulp . more preferably the amount of reactive size added to the paper stock is from 0 . 02 to 0 . 24 percent , and most preferably from 0 . 03 to 0 . 12 percent . more preferably the amount of non - reactive size added to the paper stock is from 0 . 06 to 1 . 2 percent , and most preferably from 0 . 12 to 0 . 60 percent . the amount of thermosetting resin added to the paper stock is from 0 . 03 to 0 . 60 percent , more preferably from 0 . 04 to 0 . 48 percent , and most preferably from 0 . 1 to 0 . 36 percent . all these percentages are on a dry basis ( db ), which is the dry weight of chemical based on the dry weight of paper . the following examples illustrate the invention . all parts and percentages are by weight unless otherwise specified . test paper ( 160 g / m ) was prepared using a pilot paper machine , the sizing additives being added separately but simultaneously . the sizing additives were added as starch stabilized dispersions and the thermosetting resins as aqueous solutions . a stock that is relatively difficult to size was chosen , comprising 25 % hardwood ( bleached birch sulphate ) 25 % softwood ( bleached pine sulphate ) and 50 % bleached ctmp , representing current commercial practice . the degree of sizing was measured by a 1 minute cobb test , a hot water test and / or an edge penetration test . the cobb test using water is an internationally recognized test . the &# 34 ; hot water test &# 34 ; is carried out by floating a &# 34 ; boot &# 34 ; of the test paper , wire side in contact with the water at 60 \u00b0 c . results are quoted for the time in seconds to see penestration by first drop or for the percentage of surface wet after 600 seconds . edge penetration is determined by coating each side of paper samples ( 60 \u00d7 40 mm cut in both md and cd directions ) with a water resistant barrier , weighing and immersing the samples in the penetrant to a depth of 10 mm ( 5 - 20 mm ) and then blotting and reweighing the samples after a given time . for lactic acid edge penetration determinations a 1 % lactic acid solution is used as the penetrant and the samples left immersed for 24 hours before testing . for paroxide the samples are immersed in 30 % hydrogen peroxide solution at 70 \u00b0 c . for 10 minutes . example 1 illustrates the beneficial effect of cationic resins on sizing against hot penetrants when used in conjunction with a reactive size or a reactive / non - reactive combination . lactic acid resistance is also improved . \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ edge penetration testsizing systems hydrogen lactic hot water cobbreactive size non - reactive size thermosetting resin peroxide acid test test ( 0 . 12 % db ) ( 0 . 24 % db ) ( 0 . 16 % db ) ( g / m . sup . 2 ) ( g / m . sup . 2 ) ( secs ) g / m . sup . 2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_kd -- -- 4 . 2 1 . 8 rp \* 20 . 3 -- nr1 -- 8 . 9 4 . 6 &# 34 ; 45 . 0 -- bis - stearamide . check mark . 8 . 4 4 . 2 &# 34 ; rp \*-- -- -- 3 . 6 2 . 8 &# 34 ; &# 34 ; kd nr1 -- 7 . 3 2 . 2 18kd bis - stearamide -- 6 . 8 1 . 6 13kd -- . check mark . 3 . 5 2 . 9 38 -- nr1 . check mark . 3 . 6 2 . 5 rp \*-- bis - stearamide . check mark . 3 . 0 2 . 4 &# 34 ; kd nr1 . check mark . 2 . 1 0 . 5 9 17 . 0kd bis - stearamide . check mark . 2 . 2 1 . 1 33 19 . 8\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \* rp = rapid penetration example 2 illustrates that a thereosettable cationic resin is necessary to obtain improvement in peroxide &# 34 ; edgewick &# 34 ;. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ edge penetrationsizing systems testreactive cationic hydrogen lactic cobbsize resin peroxide acid test ( 0 . 12 % db ) ( 0 . 24 % db ) ( g / m . sup . 2 ) ( g / m . sup . 2 ) g / m . sup . 2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_kd cationic starch \*\* 2 . 7 1 . 0 21 . 2 -- cationic starch 7 . 3 4 . 3 p \* kd polyamine - epi 1 . 5 0 . 7 19 . 6 -- resin 3 . 1 2 . 3 p \* kd polyallyl - epi 1 . 2 0 . 7 19 . 9kd resin 2 . 9 2 . 2 p \* kd polyamide - epi 1 . 6 0 . 8 19 . 2 -- resin ( low 2 . 8 2 . 0 p \* molecular wt . ) kd polyamide - epi 1 . 3 0 . 6 19 . 3 -- resin ( high 2 . 9 2 . 4 p \* molecular wt . ) kd dicyandiamide - 3 . 3 2 . 2 21 . 8 -- formaldehyde 7 . 4 3 . 99 p \* resin \*\* kd polyethylene 4 . 1 0 . 9 23 . 3 -- imine \*\* 7 . 3 3 . 1 p \* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \* p = penetration \*\* -- = nonthermosetting resins table 1 and table 2 of example 3 that follow illustrate the beneficial effect of non - reactive sizes on lactic acid edgewick resistance and the beneficial effect of higher melting point non - reactive sizes on hot hydrogen peroxide edge penetration . the kd size is alkyl ketene dimer prepared from mixed c16 / c18 fatty acids . the thermosetting resin is an epichlorohydrin adduct of a polyaminoamide . table 1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_sizing systems edge non - thermo - penetrationreactive reactive setting hydrogen lacticsize size resin peroxide acid ( 0 . 06 % db ) ( 0 . 54 % db ) ( 0 . 2 % db ) ( g / m . sup . 2 ) ( g / m . sup . 2 ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_kd -- -- 4 . 2 1 . 9kd -- . check mark . 3 . 7 2 . 4kd nr . sup . 1 \* . check mark . 3 . 7 0 . 6kd nr . sup . 2 \* . check mark . 2 . 9 0 . 6 softening point \* nr . sup . 1 glycerol triester of mixed c16 - c18 55 \u00b0 c . fatty acid \* nr . sup . 2 glycerol triester of c22 fatty acid 80 \u00b0 c . \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ table 2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hot water testsizing system ( penetration cobbreactive size non - reactive size after 600 secs ) test ( 0 . 05 % db ) ( 0 . 25 % db ) (%) ( g / m . sup . 2 ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_kd nr . sup . 1 \* 80 23kd nr . sup . 2 \* 0 26kd nr . sup . 3 \* 78 25kd nr . sup . 4 \* 60 36kd -- 0 23 softening point \* nr . sup . 1 glycerol triester of mixed c16 - c18 55 \u00b0 c . fatty acid \* nr . sup . 2 glycerol triester of c22 fatty acid 80 \u00b0 c . \* nr . sup . 3 glycerol triester of c18 fatty acid 65 \u00b0 c . \* nr . sup . 4 hydrogenated castor oil 85 \u00b0 c . \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_"}

{"publication\_number": "US-4517052-A", "abstract": "a portion of the spent cooking liquor from a pulping process is diverted from the washing step directly to the machine chest of a paper machine for pre - sizing the paper made on the paper machine . the preferred pulping process is an unbleached kraft or sulfate process and the preferred raw material for the pulping process is pine or softwood chips . moreover , the preferred point in the washing step for diverting the black liquor is near or at the final washing stage .", "application\_number": "US-55937983-A", "description": "referring now to fig1 of the drawing , there is illustrated schematically a process by which a portion of the black liquor from an unbleached pulping process may be diverted directly to the machine chest of a paper machine for pre - sizing the paper made on the paper machine . the digester is indicated schematically at 10 . wood chips or other source of cellulosic material is charged into the digester 10 and fresh cooking liquor is introduced from a storage tank 11 . digestion is carried out under such conditions of temperature and pressure as are normally employed in a typical pulping process . the character of the cooking liquor employed depends upon the type of pulping process . in the kraft process , the primary cooking chemicals are sodium hydroxide and sodium sulfide . after digestion has been completed , the contents of the digester are blown into a blow tank 12 and passed through a screen 13 where knots and the like are removed . after being screened , the pulp is directed to a washer 14 which is preferably of the multiple stage type . during the washing step , the pulp is washed free of spent cooking liquor ( black liquor ) and directed to a pulp storage tank 15 , while the waste liquor is conducted to a condenser 16 for treatment and recovery . however , in the present invention , a part of the black liquor is diverted from the washer 14 directly to the machine chest 17 . referring once again to fig1 under normal conditions , the pulp from the washers is directed to a pulp storage tank 15 and refiner 18 before entering the machine chest 17 . in the present invention the pulp takes the same path . meanwhile , in like manner , the waste liquor from the washers 14 in both a conventional pulping process and the present invention is directed to a recovery stage including condenser 16 and other recovery steps . in general , the black liquor after being condensed is passed to an evaporator 19 and a separator 20 before being further evaporated at 21 . in the separator 20 , different fractions of the black liquor are isolated using solvent or distillation processes to produce useful chemical products . after the second evaporator 21 , the remainder of the black liquor is burned in a recovery furnace 22 to recover available heat , and the residue from the furnace 22 is finally clarified at 23 . generally , upon clarification , a top fraction may be obtained which is chemically treated before being recycled back to the digester 20 for use as make - up cooking liquor and the dregs from the clarifier are disposed of at a landfill . fig2 shows in more detail a schematic version of the washing step where a portion of the black liquor filtrate is diverted to the machine chest to pre - size the pulp before it goes to the paper machine ( pm ). a three stage counter current washing process is illustrated with pulp coming from screen 13 being directed to a first stage 24 of washer 14 . the pulp in first stage 24 is washed with filtrate taken from the second stage 25 and pulp at the second stage 25 is washed with filtrate taken from the third stage 26 . the strong filtrate from first stage 24 constitutes the spent pulping liquor that is directed to condensor 16 and beyond for black liquor recovery , and the pulp at the third stage 26 is washed with dilution water added as wash water at 27 . meanwhile , the washed pulp from the third stage of washer 14 is conducted to a pulp storage tank 15 before being refined at 18 and added to the machine chest 17 of the paper machine ( pm ). this is the normal process used with a conventional counter current washing step in the manufacture of pulp . however , in accordance with the present invention , some of the weak black liquor filtrate 28 from the third stage 26 of washer 14 is diverted at 29 and added directly to the machine chest to pre - size the pulp . the black liquor filtrate diverted is made up by adding an equal amount of water to the shower at 27 of the third stage washer 26 . the flow of black liquor filtrate diverted at 29 can be controlled either manually or automatically by a suitable valve 30 in the line between the weak filtrate tank 28 and the input 29 to machine chest 17 . the flow may be made to depend upon the sizing demand of the paper machine or on other variables as desired . it will be understood that the apparatus used in the process described hereinbefore , and schematically illustrated , will include the necessary auxiliary equipment such as pumps , valves , vents , motors and the like to enable the various procedures to be carried out . further , in order to validate the efficacy of the present invention , the following example demonstrates the results obtained by practicing the present invention . to confirm the presence of sizing components associated with the residual black liquor in the pulp mat taken from a washer drum , handsheets were formed with laboratory washed pulp containing no black liquor and laboratory washed pulp with black liquor added back to its original level in the pulp mat ( about 85 % weight - on - weight of wet mat ). the laboratory washed pulp was obtained by washing and filtering both pine and hardwood pulps with tap water . each handsheet was formed with 5 gm . of pulp , 1 . 6 % sulfuric acid on o . d . ( oven dried ) pulp and 0 . 5 % alum on o . d . pulp . the final ph of 5 . 5 was achieved by addition of sulfuric acid or sodium hydroxide . the wet handsheets were pressed and dried at 240 degrees f . handsheets were then conditioned at 50 % rh and 73 degrees f . for 24 hours prior to testing . internal sizing was measured using a 10 % formic acid solution for the hercules size test . the solutions were added to the smooth side of the handsheets . in the handsheets containing either 100 % hardwood or pine , the internal sizing was significantly higher in the washed pulp containing black liquor as shown in table i . the rosin content of the pine black liquor ( 0 . 14 %) was seven times higher than the cg rosin content of the hardwood black liquor ( 0 . 02 %). the gc rosin content of the laboratory washed pine and hardwood pulps was 0 . 01 % and 0 . 02 %, or substantially equivalent . table i\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_effect of black liquor on internal sizing conditionsinternal size tests 100 % hardwood 100 % pine\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_washed pulp ( tap water ) 7 51hercules ( sec . ) washed pulp ( black liquor ) 53 1275hercules ( sec . ) black liquor 0 . 02 0 . 14 ( gc rosin %) washed pulp 0 . 02 0 . 01 ( gc rosin %) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ while only a single embodiment of the present invention has been described in detail , it will be understood that other embodiments or modifications for other pulping processes are within the scope of the invention as defined in the appended claims . the apparatus and procedures specified for the various steps are to be understood as being merely illustrative and not restrictive ."}

{"publication\_number": "US-5231742-A", "abstract": "an apparatus and method for twining or weaving . the apparatus includes a plurality of elongated loom fingers and a loom . each of the loom fingers is elongated , has first and second symmetrical tapered ends , and has an elongated groove running the entire length thereof . the loom includes : a first support that includes at least one plate - like member having a plurality of through holes therein which loosely support the loom fingers in a substantially parallel manner ; a second support that has a finger engagement surface which , in the assembled form , is adopted to engage one of the ends of each loom finger being used ; and structure for detachably supporting the plate - like member altitudinally with respect to the second support . in operation , to disengage the loom fingers , the plate - like member is moved relative to the second support and , then , the plate - like member is moved toward the end of the loom fingers which had previously been in contact with the finger engagement surface .", "application\_number": "US-89552192-A", "description": "with reference to fig1 - 3 , loom 11 includes a base 13 , two loom finger positioning end plates 15 1 - 2 , intermediate loom finger positioning plates 17 1 - 4 , and a plurality of loom fingers 19 1 , 2 , 3 ... n . loom 11 also includes loom finger and hook storage tray 21 . base 13 includes a bottom portion 23 , and integral curved side portions 25 and 27 . bottom portion 23 has a flat exterior surface 29 and an interior loom finger support surface 31 . side portions 25 and 27 terminate in opposing parallel faces 33 and 35 which have , respectively , facing longitudinal , parallel grooves 37 and 39 . the exterior curved surfaces 41 and 42 are continuous with bottom surface 29 ; the interior surfaces 15 43 and 44 , with surface 31 . each plate 15 has a top surface 45 , a bottom surface 47 , and a plurality of loom finger receiving through openings 49 . each plate 15 also includes opposite and parallel tongues 51 and 53 which are designed to be slidably received in grooves 37 and 39 of base 13 , as illustrated . similarly , each plate 17 has a top surface 55 , a bottom surface 57 , a plurality of loom finger receiving perimeter through openings 59 , and a plurality of loom finger receiving center through openings 61 . each plate 17 also has a pair of opposite and parallel tongues ( not illustrated ) which are also slidably received in grooves 37 and 39 . when assembled with base 13 , surfaces 45 and 55 lie in substantially the same plane which is continuous with curved surfaces 41 and 42 . the distance between surfaces 45 , 55 and 47 , 57 and the diameter of openings 49 , 59 and 61 are chosen such that plates 15 and 17 support a plurality of loom fingers 19 in substantially parallel fashion , without binding such loom fingers in their respective openings . with reference of fig1 and 4 - 6 , it will also be seen that each plate 15 1 - 2 has a tongue 65 , and a notch 67 . similarly , each plate 17 1 - 4 has a pair of tongues 69 and a pair of notches 71 . each tongue 65 , 69 may have one or more dimples ( not shown ) for , in the assembled position , mating with depressions ( also not shown ) in the mating notches 67 , 71 , to form a unitary plate structure . however , as those skilled in the art will appreciate , the tongue and notch locking arrangement is optional and may be replaced with an alternate mechanism for holding plates 15 and 17 together , or dispensed with altogether . also with reference to fig1 and 6 it can be seen that the pattern of openings 49 and openings 59 is a closed loop . the pattern formed by openings 61 is a straight line . as is also evident with reference to fig4 , and 6 , the number of plates held by base 13 can be varied to form the desired hole pattern ( e . g . circle , oval , partial oval , semi - circle , or straight line ) and the desired size . as should also be apparent to those skilled in the art , a single unitary plate having the desired hole pattern or patterns could be used instead of a plurality of plates 15 1 - 2 and 17 1 - 4 . further , long plates could be used to link two or more base members 13 . as is evident from fig2 and 3 , each loom finger 19 has symmetrical ends 73 1 and 73 2 , symmetrical tapered portions 75 1 , 75 2 and an elongated groove 77 running the entire length thereof , which results in a c - shaped cross - section . as is also evident from fig2 and 3 , each loom finger is slidably received in a through opening ( 49 , 59 or 61 , as the case may be ) in plates 15 and / or 17 , with one of its ends 73 2 in contact with surface 31 . each loom finger 19 is formed of wood , plastic or metal . as an optional feature , loom 11 may also be provided with a storage tray 21 for loom fingers 19 and one or more hooks ( such as illustrated in fig8 ). tray 21 includes an elongated channel portion 81 , having curved exterior sides 83 and 85 , a top end portion 87 and a bottom end portion 89 . exterior surfaces 83 and 85 and the bottom surface ( not shown ) are shaped and dimensioned to be slidable received within the channel formed by interior support surface 31 and surfaces 43 and 44 . bottom end portion 89 includes a continuous lip 91 which , when tray 79 is received within base 13 , abuts one of the end faces of base 13 . channel portion 81 has the same length as base 13 so when tray 79 is received in base 13 , the exposed face ( not shown ) of top end portion 87 is flush with other of the end faces of base 13 . top end portion 87 also includes a handle 93 which can be used for carrying or hanging up loom 11 . base 13 , tray 79 and plates 15 1 - 2 and 17 1 - 4 are , preferably , made of plastic . however , other materials such as wood or aluminum , or combinations thereof , could also be used . in operation , with plates 15 and 17 assembled with base 13 as illustrated in fig2 and 3 , the desired plurality of loom fingers 19 1 , 2 , 3 , 4 ... are slidably received in openings 49 , 59 and / or 61 . for each loom finger 19 , one of its symmetrical ends 73 2 touches and is supported by surface 31 . while only four loom fingers 19 are illustrated , it will be appreciated that , for instance , an elongated straight line of loom fingers can be formed utilizing all of openings 61 . alternately , a closed oval can be formed utilizing all of openings 49 and 59 . with the loom fingers 19 1 , 2 , 3 , 4 positioned as illustrated in fig3 the weft can be applied with any conventional soft weaving material such as knits , bias fabrics , twines and yarns , in any conventional manner . however , it is preferred to use closed loop material made from fabric which has some elasticity , such as closed loops made from t - shirt type material . with reference to fig7 a , 7b , 7c and 7d , the preferred and what is believed to be a unique weaving technique is illustrated . as illustrated in fig7 a and 7b the closed loop weft 101 1 is simultaneously wrapped around opposite sides of each loom finger 19 1 , 2 . when the user reaches the end of a row , weft 101 1 is double turned around loom finger 193 , as illustrated in fig7 c . weaving or twining of weft 101 1 can proceed from left - to - right and then back ( i . e ., from right - to - left ), which encourages the user to use opposite hands . alternately , the position of loom 11 can be rotated 180 \u00b0, as illustrated in fig7 c . the ending of weft 101 1 is illustrated in fig7 d , as is the starting of a second weft 1012 . the first loop of the second weft 101 2 always goes on the same loom finger 19 3 as the previous weft 101 1 ended on . this procedure eliminates two of the major chores of conventional weaving : knotting and burying ends . after the weft weaving or twining has been completed , it and loom fingers 19 1 - n can easily be removed from loom 11 . removal of a completed weft from apparatus such as disclosed in bacheller , u . s . pat . no . 2 , 065 , 498 , is likely to be slow as the weaving has to be carefully worked off the fixed loom fingers of the comb loom . even if carefully worked off , this causes distortion of the weaving . in contrast , with loom 11 of the present invention , plates 15 and / or 17 are slidably removed from base 13 and then quickly pushed off loom fingers 19 by placing the ends 732 , which were in contact with surface 31 , onto a flat surface and then pushing plates 15 and / or 17 toward such flat surface , whereby the tapered end portions 752 of loom fingers 19 are only loosely received in openings 49 , 59 and / or 61 and can be easily removed from plates 15 and / or 17 . with reference to fig8 after removal of loom fingers 19 1 - n from plates 15 and / or 17 , warp thread 103 or other suitable material is inserted in the weft formation by attaching such warp to a conventional hook 105 which is passed through channels 77 of loom fingers 19 . preferably the hook portion 107 of hook 105 faces the inside of channel 77 . after the warp has been added , each loom finger 19 can quickly and easily be removed on an individual basis , rather than trying to remove all loom fingers simultaneously , as required by bacheller , u . s . pat . no . 2 , 065 , 498 . the ability to quickly and easily remove loom fingers 19 ( together with the weft formation thereon ) from plates 15 and / or 17 provides an additional unique advantage of permitting weaving from the center out . for instance , as schematically illustrated in fig9 a and 9b , a diamond pattern is easily created , by first weaving a triangle as illustrated in fig9 a . loom fingers 19 1 , 2 , 3 , 4 , 5 , 6 , 7 are then separated from plates 17 in the manner set forth above , plates 17 reassembled with base 13 and loom fingers 19 1 , 2 , 3 , 4 , 5 , 6 , 7 reinserted such that opposite ends 73 1 now engage surface 31 of base 13 . weaving or twining of the other half of the diamond , such as illustrated by phantom lines 109 may now proceed with , for instance , the same type and color material . the foregoing is in contrast with conventional weaving techniques where , to weave a diamond or other shape , one has to weave the background first . for many people , particularly novice weavers , this is conceptually difficult . with reference to fig1 , 11 and 12 , alternate loom embodiment 111 is illustrated . loom 111 includes a base 113 , a top 115 , a master plate 117 , and an intermediate and reversible tray 119 . for purpose of illustration the width and breadth of loom 111 are reduced in scale . wall thickness is also not to scale . base 113 includes a bottom 121 , having an exterior surface 123 and a parallel interior surface 125 , and a plurality of through loom finger receiving openings 127 . openings 127 are evenly spaced along a line which bisects bottom 121 . base 113 also includes a continuous side having an interior surface 131 , an exterior surface 133 and a continuous lip 135 . top portion 115 includes : a top 139 , having exterior surface 141 and interior surface 143 ; and a continuous side 145 , which includes interior surface 147 , exterior surface 149 , and continuous shoulder 151 . as illustrated in fig1 , when assembled with base 113 , lip 135 seals against shoulder 151 ; surfaces 133 and 149 form a continuous exterior side surface ; and surfaces 131 and 147 form a smooth continuous interior side surface . as best illustrated in fig1 , top 139 includes a plurality of loom finger receiving through openings 155 , with three in the middle and the rest evenly distributed around four concentric circles . the three middle openings , together with opposing pairs on each of the concentric circles form a straight line of eleven openings . reversible tray 119 includes a bottom 157 , having interior surface 159 and exterior surface 161 ; and a continuous side 162 , having interior surface 163 , exterior surface 165 and continuous top edge 167 . tray 119 is dimensioned such that it fits , without too much lateral play , within both the interior of base 113 ( as illustrated in fig1 and 12 ) or , alternatively , within the interior of top portion 115 . when received in top portion 115 , exterior surface 161 is in contact with interior surface 143 . master plate 117 includes a top surface 169 , a bottom surface 171 , a continuous edge 173 , and a plurality of loom finger receiving openings 175 . the pattern of openings 175 matches that of openings 155 ; eleven in a straight line in the middle , the rest evenly distributed around four concentric circles . in operation , with loom 111 assembled as illustrated in fig1 and 12 , with plate 117 resting on top edge 167 . a plurality of loom fingers 19 1 - n is then placed in openings 155 and matching openings 175 in the desired pattern , with the loom finger ends 73 2 resting on surface 159 of tray 119 . a straight line of up to eleven loom fingers is one pattern option ; a continuous circle using the openings in the outermost concentric circle is another . after the weft is twined on loom fingers 19 1 - n , top portion 115 of loom 111 is separated from base 113 . because of the lateral forces placed on loom fingers 19 1 - n by the weft , loom fingers 19 1 - n , top 115 and plate 117 are held together . tray 119 is then removed from base 113 and placed on a flat surface with edge 167 in contact with such flat surface . the ends 73 2 of loom fingers 191 - n are then placed in contact with surface 161 and plate 117 and top 115 pushed in a downward direction to move such loom fingers 19 1 - n upward to the point where the tapered portions 75 2 are loosely received in openings 155 and 175 and can easily be removed therefrom . if the user is a beginner , loom 111 can be flipped over so that the five hole pattern of openings 127 is exposed . internally , the positions of tray 119 and plate 117 are reversed . tray 119 is also flipped over , such that interior surface 159 faces one of surfaces 169 , 171 of plate 117 . the center five openings 175 of plate 117 match the straight line pattern of holes 127 in base 113 . the operation of twining , removing the loom fingers from the loom , inserting the warp and then removing the loom fingers 19 1 - 5 is the same as described above . a third embodiment of the invention is illustrated in fig1 and 14 . loom 181 includes a base 183 , a loom finger positioning plate 185 , a ring member 187 and a plurality of loom fingers 19 1 - n . base 183 includes a bottom portion 189 and a donut shaped side portion 191 . bottom portion has a flat exterior support surface 193 and a flat interior support surface 195 . side portion 191 includes an interior cylindrical surface 197 . ring 187 has an exterior cylindrical surface 199 , a bottom surface 201 and an annular notch 203 . ring 187 and base 183 are made of suitable materials , such as plastic and wood , with cylindrical surface 199 dimensioned to be slidably and rotatably received within cylindrical surface 197 , without either binding or undue slop . plate 185 , which serves the same function as plates 15 and / or 17 , includes a top surface 207 , a parallel bottom surface 209 and a plurality of loom finger receiving through holes 211 1 - 5 and 213 1 - n . plate 185 also includes a cylindrical edge 215 which is dimensioned to slidably fit within notch 203 in ring 187 . openings 211 and 213 all have the same diameter . openings 211 are , however , each provided with a raised cylindrical collar 217 to make the line defined by these openings more visible to the user , particularly the visually impaired user . as with the embodiment of fig1 - 3 , the distance between surfaces 207 and 209 and the diameter of openings 211 and 213 is such that , when assembled , loom fingers 19 are held in substantially parallel fashion . top surface 207 is also inscribed with a pattern of circular lines 219 1 - 4 and straight lines 221 1 - 6 to identify potential loom finger patterns for the user . in operation , the embodiment of fig1 and 14 is the same as that of the embodiment of fig1 - 3 . the pattern of openings 211 and 213 permits the formation of both rectangular and cylindrical woven articles . the use of ring 187 permits plate 185 to be rotated relative to base 183 for the convenience of the user , without undue wobbling of plate 185 relative to base 183 . whereas the drawings and accompanying description have shown and described the preferred embodiment of the present invention , it should be apparent to those skilled in the art that various changes may be made in the form of the invention without affecting the scope thereof ."}

{"publication\_number": "US-2002112509-A1", "abstract": "sliding - tongue compound needle comprising a needle equipped with a hook and with a sliding tongue straddling the needle and equipped with an end and with a shoulder , the bottom of the sliding tongue being longitudinally slotted in its distal region comprising the end and the shoulder so as to allow the end to be parted , the sliding tongue being movable relative to the needle to close and open the hook of the needle and to carry a stitch by its shoulder . this needle has means for the vertical guidance of the sliding tongue as it moves relative to the needle so that the sliding tongue moves in a non - rectilinear path .", "application\_number": "US-7962202-A", "description": "the shape of the needle and of the sliding tongue will first of all be described in relation to fig1 to 3 . the compound needle consists of a needle 1 and of a sliding tongue 2 straddling the needle 1 in a way similar to the sliding tongue of the sliding - tongue needle described in document ep - a - 0 881 315 . for that purpose , the sliding tongue 2 has a profile in the shape of an inverted u , but over just part of its length for reasons which will become apparent later . the needle 1 is equipped , in the conventional way , with a hook 3 . in the embodiment depicted , the needle 1 is equipped with a butt 4 for driving it via the cams of a cam carriage . the needle could , however , be driven by a drive bolt . approximately at its middle , the needle is equipped with an arm 5 extending forward , above the needle proper , parallel to the longitudinal axis of the needle , that is to say to the direction of travel of this needle in its needle bed . the needle 1 and the arm 5 form a fork 6 , the internal sides 7 and 8 of which have a nonrectilinear contour in the form of a cam . the side 7 in the form of a cam extends beyond the fork 6 where it has a depression 9 followed by a ramp 10 rising up forward . forward of this ramp 10 , the needle tapers , in a known way , in a downward ramp 11 as far as the hook 3 . the sliding tongue 2 has , at the front , an end 12 situated in front of a shoulder 13 and is equipped at the rear with a butt 14 for driving it . the bottom of the sliding tongue 2 is eliminated at two points , on the one hand in its distal part , forward of a point 15 situated slightly to the rear of the shoulder 13 and , on the other hand , in its rear half 16 , between the butt 14 and a point 17 situated approximately mid - way along the sliding tongue . viewed from above , the distal part of the sliding tongue is depicted in fig3 . the interruption of the u - shaped profile of the sliding tongue forms a slot 18 which narrows at the end of the sliding tongue to form the end 12 , at the end of which the sides of the slot 18 meet . the two sides of the slot 18 may be parted from one another elastically . the interruption 16 of the bottom of the sliding tongue forms a cut - out of a width corresponding to the thickness of the needle . this cut - out has , passing through it , the arm 5 of the needle which extends above the sliding tongue proper , that is to say above the region 29 of the sliding tongue in which the bottom of the sliding tongue is uninterrupted . this region 29 externally , at the front , has a ramp 19 ending in a nose 20 and , at the rear , a small boss 21 . internally , the bottom of the sliding tongue has a first boss 22 in its front part and a second boss 23 at the rear . between these bosses , the bottom of the sliding tongue has a slight depression . at the rear , at the height of the butt 14 , the sliding tongue 2 has two bearing points 33 and 34 collaborating respectively with the upper side 35 and lower side 36 of the bottom of the needle to prevent inadvertent rocking of the sliding tongue . these bearing points may furthermore be used to induce an additional movement of the sliding tongue relative to the needle , for example to retract its butt 14 relative to a cam of the cam carriage or to obtain a finer and more precise movement of its end 12 . in this case , at least one of the sides 35 , 36 of the needle body is nonrectilinear , that is to say is in the form of a cam . the bearing point 33 is formed by a boss in the bottom of the sliding tongue and the bearing point 34 is formed , for example , by the upsetting of material of the walls of the sliding tongue . as regards the interior profile of the fork 6 of the needle , this has , starting from the end of the arm 5 , a disengagement ramp 32 followed by a boss 24 followed by a slight depression and a second , not very pronounced , boss 25 and , on the needle proper , a tall part 26 of constant height between the depression 9 and a ramp 27 ending at a depression 28 . as can be seen in fig1 when the needle is assembled , the region 29 of the sliding tongue lies in the fork 6 of the needle , which provides nonrectilinear guidance of the sliding tongue 2 as it moves . in fig1 the sliding tongue is depicted in its rearmost position on the needle . in this position , the boss 24 of the arm 5 of the needle rests against the nose 20 of the sliding tongue and this has the effect of positioning the end 12 of the sliding tongue in a lowered position of minimal height relative to the needle . in this position , the two sides of the end 12 are parted by the needle 1 and so the end 12 and the depression situated behind this end are at all points below the upper edge of the needle . the complete movement of the sliding tongue on the needle will now be described in relation to fig4 to 11 which depict eight successive positions of the sliding tongue relative to the needle starting from the position depicted in fig1 which is the same position as the one depicted in fig4 . the sequence depicted illustrates the transferring of a stitch . in the position depicted in fig4 the sliding tongue 2 is positioned in the fork 6 by its nose 20 and its boss 22 . the end 12 of the sliding tongue , which is open , is situated below the upper edge of the needle 1 . the two sides of the end 12 rest on the sides of the needle on two millings 30 which reduce the thickness of the needle and therefore the opening of the end 12 so as not to exceed the width of the sliding tongue . the stitch 31 that is to be transferred is carried by the needle 1 so that it exerts no pressure on the sliding tongue 2 which is supported cantilever fashion , and avoids slowing of the sliding tongue . the end 12 is at that moment at a height h1 relative to the lower edge of the needle , that is to say relative to the bottom of the slot of the needle bed in which the needle slides . this level h1 is the minimum level of the end 12 in the path of the sliding tongue . as the sliding tongue 2 advances , its boss 22 rises up the ramp 27 of the needle to arrive on the tall part 26 ( fig5 ). toward the top , the sliding tongue is retained and guided by the boss 24 of the arm 5 of the needle . this rise of the sliding tongue is just enough for the depression at the rear of the end 12 of the sliding tongue to come slightly above the level of the needle . during this rise of the sliding tongue , the end 12 closes again and the stitch 31 is carried along by the shoulder 13 of the sliding tongue . the level h2 reached by the end 12 of the sliding tongue is the highest level relative to the needle reached by the sliding tongue in its movement . the sliding tongue 2 continues its advance , resting on the top part of constant level 26 of the needle , that is to say maintaining the level h2 , as depicted in fig6 . the boss 22 of the sliding tongue then leaves the part 26 of the needle so that the end 12 of the sliding tongue drops towards the hook 3 of the needle , as depicted in fig7 . continuing its fall , the sliding tongue 2 caps the hook 3 of the needle with its end 12 , as depicted in fig8 . this movement corresponds to the closure movement of a conventional latch needle by its latch . with the sliding tongue continuing to move , its boss 22 arrives against the ramp 10 of the needle so that the sliding tongue 2 and its end 12 begin a rising movement ( fig9 ) which continues until the end 12 reaches a level h4 ( fig1 ). this rising movement has the purpose of preventing the hook 3 of the needle from catching on filaments of the stitch 31 present on the sliding tongue . once the hook 3 has passed , the boss 22 of the sliding tongue 2 falls back down along the ramp 11 of the needle and leaves it while the boss 23 takes over on the face 26 of the needle and the end 12 reaches a low level h5 and maintains this level to the end of its travel . this fall has the effect of avoiding deformation of the stitch 31 in tension ( fig1 ). in the position depicted in fig1 , the stitch 31 can be grasped by an opposed needle ( transfer ) or by a sliding tongue ( stitch transfer between neighbouring needles ) as described in patent ep 0 881 315 , that is to say by introducing this needle or this sliding tongue into the end 12 . in alternative forms of embodiment , the sliding tongue could completely straddle the needle and could be equipped with two or more butts . the sliding tongue could , at the rear , have a single bearing point , for example the bearing point 34 ( fig2 ). multiple variations and modifications are possible in the embodiments of the invention described here . although certain illustrative embodiments of the invention have been shown and described here , a wide range of modifications , changes , and substitutions is contemplated in the foregoing disclosure . in some instances , some features of the present invention may be employed without a corresponding use of the other features . accordingly , it is appropriate that the foregoing description be construed broadly and understood as being given by way of illustration and example only , the spirit and scope of the invention being limited only by the appended claims ."}

{"publication\_number": "US-6490890-B1", "abstract": "a knitted textile articles and a preform forming a panty , pantyhose or similar article such as a footie . the preform includes a tubular knit body and a longitudinal segment extending the length of the tubular body . the longitudinal segment includes partially omitted courses which produces a unique shape suitable as a preform for subsequently forming other useful textile articles . in the preferred embodiment , the longitudinal segment further includes elastic yarn , which aids in forming the shape of the preform . also , in the preferred embodiment , elastic end bands are formed during knitting to each end of , the knitted article . these end bands then become a part of the final textile article .", "application\_number": "US-60871200-A", "description": "in the following description , like reference characters designate like or corresponding parts throughout the several views . also in the following description , it is to be understood that such terms as \u201c forward ,\u201d \u201c rearward ,\u201d \u201c left ,\u201d \u201c right ,\u201d \u201c upwardly ,\u201d \u201c downwardly ,\u201d and the like are words of convenience and are not to be construed as limiting terms . referring now to the drawings in general and fig1 in particular , it will be understood that the illustrations are for the purpose of describing a preferred embodiment of the invention and are not intended to limit the invention thereto . as best seen in fig1 a panty , pantyhose or similar article , generally designated 10 , is shown constructed according to the present invention . the textile article 10 includes a knitted preform 12 including a tubular knitted body 14 and a longitudinal segment having partially omitted courses 16 . end bands 20 , 22 form the leg openings and leggings 30 are attached to the leg openings . the knitted preform 12 of the present invention is best seen in fig2 . in the preferred embodiment , the knitted preform 12 is a jersey knit . the longitudinal section 16 is formed by partially omitted some of the yam courses . the longitudinal section 16 thus contains less fabric than the remainder of the tubular knit body 14 , thereby forming the asymmetric knitted preform 12 . in the preferred embodiment , the longitudinal section 16 preferably comprises between about 25 and 33 % of the tubular knit body 14 . the actual amount depends on the panty or footie size being formed . a schematic of the successive dropping of courses that is used to form the longitudinal section 16 is shown in fig6 . in the preferred embodiment , the longitudinal section 16 is formed by successively stopping knitting on needles and knitting is performed only on every fourth course as shown in fig7 . in order to better accommodate the shape of the human body , the longitudinal 16 may be knit in a contoured pattern of staggered ends , such as that shown in fig8 . the contoured pattern is formed by stopping knitting on successive courses at different points . the pattern can be then be repeated or altered as desired to yield the proper garment contour or fit . in the preferred embodiment , the knitted preform 12 is knitted from nylon and an elastic yarn , such as spandex or dorlastan ( manufactured by bayer corp ., bushy park s . c .) and has a ratio of elastic to nylon ends of about 3 : 1 . referring back to fig7 the elastic end is preferably knit on every fourth needle . thus , three courses of nylon are knit , followed by a course of elastic yarn , which is knit while being kept under partial tension . as best seen in fig3 the fabric at each of the end bands 20 , 22 is doubled back and knit into the tubular knit body 14 , thereby forming an elastic leg or foot band . the width of the doubled back portion is between \u215b and \u00bd inch and preferably about \u00bc inch . a garment , such as a panty or a pair of pantyhose 10 ( such as shown in fig1 ), may be made from the knitted preform 12 of the present invention according to the sequence shown in fig4 . a finished knitted preform 12 of the preferred embodiment is shown in fig4 a . fig4 b shows a longitudinal cut 24 made in the tubular knit body 14 . the hole created by the longitudinal cut 24 forms the waist of the garment . a waistband 26 , shown in fig4 c , is sewn onto the edge formed by the longitudinal cut 24 . as such , the longitudinal cut 24 does not extend the entire length of the tubular body 14 and is positioned to ensure a proper fit of the garment . the end bands 20 , 22 form the leg holes for the garment and the longitudinal section 16 forms the crotch . as shown in fig4 d , pantyhose 10 are finished by attaching legs 30 to the knitted preform 10 at end bands 20 , 22 . fig5 illustrate how a footie is formed from the knitted preform 12 . the knitted preform 12 for a footie , shown in fig5 a , may be much smaller than the preform for a panty shown in fig4 a . first , a longitudinal cut 32 is made through the longitudinal section 16 of the tubular knit body 14 as seen in fig5 b . the longitudinal cut 32 extends through end bands 20 , 22 , creating two ends on each end band . end bands 20 and 22 are joined at 34 to complete the footie 36 as shown in fig5 c . in operation , the preform for making a panty or a pair of pantyhose is made on a single cylinder fine gauge knitting machine . starting at one end of the product the yarns start knitting on each of the feeds like a normal make up using the dial bitts and form a double elastic band or using the needles and make a double elastic band . after the band is complete , the feeds start knitting on only a portion of the needles and the yarn of each feed comes out and is trimmed . the amount of needles that knit is determined by the size of the panty and crotch area . this area may be changed during the knitting of the product to form a crotch that is wider in the back than front or any shape to fit the specific item being produced . it may vary to any amount of needles according to whatever amount of coverage you wish in the crotch . the feeds that are knitting on only a portion of the needles may knit plain or pattern with textured nylon or any type of yam . the feeds that are knitting on all the needles in the cylinder may have a covered spandex , cotton or any other type of yarn . after knitting , the garment is slit on a line that is created by the machine while the product is being knit . this slit line may be in the center of the area that forms the panty or it may be off center if more fabric is needed for the back or front . after slitting , elastic is sewn around the area to form the elastic for the waistband . this creates a panty without seams with the elastic for the legs already in place . in operation , the preform for making a footie is made on a single cylinder fine gauge knitting machine . starting at one end of the product the yams start knitting on each of the four feeds like a normal make - up and then every other needle stops knitting and stays at the low position to hold the yarn it picked up and not to pick up any more yarn . one feed includes covered spandex and the other feeds have textured nylon . in this way , the starting end of the fabric is held by the needles in the low position until the desired amount of fabric is knit . then the needles that are in the low position start knitting normally for one revolution of the cylinder and this knits the starting end of the fabric back into the regular fabric and forms a double fabric to make an elastic band . after the band is complete , three of the four feeds start knitting on only a portion of the needles and the yarn of each feed comes out and is trimmed . the amount of needles that knit is determined by the size of the footie that is being produced . it may vary from 300 to 350 or whatever amount of coverage you wish for the footie . the three feeds that knit are knitting only on the needles that are knitting plain knit with textured nylon yarn . the one feed that is knitting on all the needles in the cylinder includes a double covered spandex yarn and may knit a 1x1 tuck or in some styles may knit plain . if the feed that is knitting on all needles is making a 1x1 tuck then it may be using the 1x1 tuck only on the needles that are not knitting on the other three feeds . knitting this way helps insure that the stitches will not run when the garment is slit . after knitting , the garment is slit on the center of the side that not much fabric is produced on . it is then seamed on a sewing machine at the ends of the double elastic bands . this forms a footie without a seam in the bottom and does not use a machine with reciprocation . certain modifications and improvements will occur to those skilled in the art upon a reading of the foregoing description . it should be understood that all such modifications and improvements have been deleted herein for the sake of conciseness and readability but are properly within the scope of the following claims ."}

{"publication\_number": "US-7325420-B2", "abstract": "the present invention is directed to a knitted net , and more specifically to an expandable knitted net . in one form , the net comprises a plurality of fill yarns with an elastomeric performance , which allows the net to expand in the cross - direction . in another form , the present invention is directed to a netting , and more specifically to a knitted netting comprising a plurality of chain yarns with dissimilar elongation performance oriented in a first direction , and a plurality of fill yarns oriented in a second direction , wherein the yarns oriented in the second direction secure the yarns oriented in the first direction in position within the netting .", "application\_number": "US-70411407-A", "description": "while the present invention is susceptible of embodiment in various forms , there will hereinafter be described , presently preferred embodiments , with the understanding that the present disclosure is to be considered as an exemplification of the invention , and is not intended to limit the invention to the specific embodiments disclosed herein . in accordance with the present invention , the expandable knit is formed on a raschel knitting machine . the machine comprises a plurality of latch needles , a plurality of lapping belts , a yarn laying - in comb and a plurality of guide bars having needle guides thereon . the latch needles are mounted in the machine to carry out a reciprocating motion in a given plane while the lapping belts are spaced from the needles on one side of the plane , i . e ., on a downstream side , for guiding pattern yarns to the needles . in addition , the laying - in comb is mounted on the same side of the plane of the latch needles as the lapping belts and carries out an orbital motion perpendicularly of the plane of the latch needles to penetrate between the pattern yarns . the guide bars with the needle guides serve to lay - in stitch yarns and are mounted on an opposite side of the plane of the latch needles from the lapping belts , i . e . on the upstream side , and oscillate at an angle to the pattern yarns . fig1 , is representative of a raschel machine , whereby it is provided with a comb plate 1 in which a plurality of latch needles 3 are mounted for reciprocating motion along their axes 2 in a vertical plane , as viewed . as shown , the needles 3 are disposed on a bar 4 which is movable up and down . in addition , the machine includes a plurality of lapping belts or guide bars 5 spaced from the needles 3 on one side , i . e . the downstream side , of the plane of the needles 3 for guiding pattern yarns to the needles 3 . a yarn laying - in comb 6 is also mounted on the same side of the plane 2 of the latch needles 3 in order to carry out an orbital motion perpendicularly of the plane 2 while penetrating between the pattern yarns . as indicated in chain - dotted line 7 , the orbital motion is a combined stroke and oscillating motion . the comb 6 is provided with a plurality of parallel sinkers 8 each of which carries a guide rod 9 and which has a deflecting edge 10 at the forward end extending towards the plane 2 . in addition , each sinker 8 has a yarn catch 11 at a lower region of the deflecting edge 10 below the guide rod 9 . a trace comb 12 is also mounted over the comb plate 1 in known manner . the machine also has a plurality of guide bars 13 which have needle guides thereon for directing stitch yarns to the latch needles 3 . as shown , the guide bars 13 are mounted on the side of the plane 2 of the latch needles 3 opposite the lapping belts 5 , i . e ., on the upstream side . suitable means are also provided for oscillating the guide bars 13 at an angle to the pattern yarns . as shown in fig1 , the lapping belts 5 are positioned at an acute angle downstream of the plane 2 . a yarn guide 14 is also disposed between the belts 5 and the guide bars 13 for deflecting the pattern yarns upon laying - in of the stitch yarns . this yarn guide 14 is used for laying the pattern yarns in the needle lanes ( not shown ). the yarn guide 14 may be coupled to the guide bars 13 so as to move therewith or may be provided with an independent drive ( not shown ). the netting of the present invention is knitted on such a machine , wherein in one form a plurality of chain yarns are orientated in a first direction and a plurality of elastomeric fill yarns are orientated in a second direction . elastomeric fill yarns may be utilized in entirety or in part throughout the net . further , the elastic fill yarns may be of varying degrees of elasticity . it is also in the purview that the net comprise zones , wherein a zone is characterized by its degree of elasticity or complete lack thereof . the chain yarns are interconnected with fill yarns orientated in a second direction on a raschel machine forming a net , wherein the net exhibits the ability to expand in the cross - direction . in another form of the invention , the netting of the present invention is knitted on such a machine , wherein at least three chain yarns of a first elongation performance are orientated in a first direction and at least two chain yarns of a second elongation performance orientated in said first direction . the chain yarns of a first elongation performance are arranged into two zones , wherein each zone is located proximal to an outer edge . chain yarns of a said second elongation performance are arranged into a separate zone and the zone is located distal to the outer edges or intermediate the two proximal zones . the chain yarns are interconnected with fill yarns orientated in a second direction on a raschel machine forming a net , wherein the net exhibits differential elongation . referring to fig2 therein is a diagrammatic representation of the knitted net of the present invention in a relaxed state . in one form , the net of fig2 comprises three zones , wherein zone one ( z 1 ) has a greater elasticity performance than zone two ( z 2 ) and zone three ( z 3 ) has a greater elasticity performance than zone two ( z 2 ). upon stretching , the net exhibits differential expansion in the cross - direction . it &# 39 ; s in the purview of the present invention that the yarns of one zone may comprise similar or dissimilar yarns than that of a second zone . further still , the yarns of one zone may comprise similar or dissimilar topical or internal additives than yarns of a second zone . in another form , the net comprises at least three zones , wherein zone one ( z 1 ) has a greater elongation performance than zone two ( z 2 ) and zone three ( z 3 ) has a greater elongation performance than zone two ( z 2 ). preferably , the zones located most proximal to the outer edges have an elongation performance at least 110 % greater , more preferably 120 % greater , and most preferably 130 % greater than the zone ( s ) located distal to the outer edges . fig3 shows the netting once it is stretched . due to the elasticity of the fill yarns , the net is able to expand in the cross - direction , easily conforming to the shape of a rolled bale and folding over the edges of the bale so as to prevent the bale from becoming disheveled along the ends . fig4 demonstrates how the expandable net fits around the bale to keep it compact and neat . it is within the purview of the present invention that the chain yarns of one zone may comprise similar or dissimilar chain yarns than those of a second zone . further still , the chain yarns of one zone may comprise similar or dissimilar topical or internal additives than those of a second zone . it &# 39 ; s also in the purview of the present invention that the fill yarns of one zone may comprise similar or dissimilar fill yarns than that of a second zone . further still , the fill yarns of one zone may comprise similar or dissimilar topical or internal additives than fill yarns of a second zone . fig3 shows the necking that occurs once the netting is stretched . due to the increase in elongation of the yarns located along the outer edges , the final net construct is capable of wrapping over the edges of the bale so as to prevent the bale from becoming disheveled along the ends . fig4 demonstrates how the differentially elongated net fits around the bale to keep it compact and neat . subsequent to formation , the knitted net material may optionally be subjected to various chemical and / or mechanical post - treatments . the net material is then collected and packaged in a continuous form , such as in a roll form , or alternatively , the net material may comprise a series of weak points whereby desired lengths of twine material may be detracted from the remainder of the continuous packaged form . from the foregoing , it will be observed that numerous modifications and variations can be affected without departing from the true spirit and scope of the novel concept of the present invention . it is to be understood that no limitation with respect to the specific embodiments illustrated herein is intended or should be inferred . the disclosure is intended to cover , by the appended claims , all such modifications as fall within the scope of the claims ."}

{"publication\_number": "US-4309245-A", "abstract": "a process is disclosed for producing a non - woven boron nitride fiber felt . boron nitride fibers are blended with a lesser amount of boron oxide fibers and a nondissolving , anhydrous liquid medium to form a homogeneous slurry . the slurry is deposited on the moving screen of a fourdrinier machine where the liquid content is gradually reduced until sufficient fiber to fiber contact is made to provide internal cohesiveness , to form a felt . the felt may be further treated by heating it in an anhydrous gas atmosphere at a sufficient temperature to soften the boron oxide binder to fuse the bn fibers together , and then converting the interstitial boron oxide into boron nitride . the resulting boron nitride - bonded boron nitride felt may be used as an electric cell separator in a lithium sulfide battery .", "application\_number": "US-13490380-A", "description": "referring now to fig1 the starting point in the boron nitride felt manufacturing process , is the production of the constituent boron nitride and boron oxide fibers indicated by reference numeral 11 . the particular mechanism by which the fibers are produced is not critical to the practice of the present invention . preferably both the fully nitrided bn fibers and the boron oxide ( b 2 o 3 ) fibers should have a maximum diameter of about 10 microns , with 3 - 7 microns being the optimum diameter range , and lengths of from about 0 . 1 inch to 1 . 0 foot . a particularly suitable method for producing these fibers is disclosed in a co - pending u . s . patent application ser . no . 134 , 905 , filed on even date herewith , by the same inventors for process for manufacturing boron nitride fiber batts using a spinner , the teachings of which are incorporated herein by reference . in this process molten b 2 o 3 is centrifugally extruded into strands which are attenuated into staple b 2 o 3 fibers by an annular stream of gases . the fibers are compacted into bundles for ease of handling . the b 2 o 3 within the fiber bundles can be converted into bn by heating them in an anhydrous ammonia atmosphere for a sufficient time , a procedure described in more detail in u . s . pat . no . 3 , 429 , 722 , and hereby incorporated by reference . referring again to fig1 the bn fibers 35 are introduced into a blending apparatus 38 in which an agitating member 39 blends them with a smaller amount of pure boron oxide fibers 40 , preferably in a ratio of 50 - 99 % by weight of bn fibers and 1 - 50 % by weight of b 2 o 3 fibers and a nonaqueous liquid medium 41 to produce a homogeneous suspension of the fibers within the fluid , commonly known as a slurry . the medium 41 used is one which does not have a dissolving effect on either of the fibers , and in which there are no traces of water . fluids such as , for example , kerosene , propanol , benzene and various liquid fluorocarbons known by the broad term freon ( a trademark of the e . i . dupont de nemours company ) may be used as the medium . freon tf ( ccl 2 f -- cclf 2 ) has been proven to be the preferred liquid for this operation . typically , after blending , the percentage of solids suspended within the freon medium is in the range of from 0 . 01 % to 1 . 0 % by weight . a pipeline or conduit 43 conveys the slurry to a fourdrinier machine 45 , an apparatus well known in the papermaking art . referring now to fig2 the pipeline 43 delivers the slurry to a headbox 47 of the fourdrinier machine 45 . the headbox 47 has the same width as a screen 51 so that the slurry flows onto the continuous screen 51 in a uniformly thick layer . the screen is supported and driven in an endless loop by rollers 53 , which are driven by an external source ( not shown ). for best results the speed of the screen should be in the range of from 1 . 0 to 100 feet per minute . the flow rate of the slurry within the headbox ( controlled by a variable speed pump , not shown ) must be adjusted , depending on such factors as , for example , the concentrations of the fibers within slurry , the depth of the slurry , and the speed of the screen , to insure that the fibers are traveling at about the same speed as the screen at the point of impact thereon . this allows a portion of the fibers within the slurry to orient themselves in a direction transverse to the movement of the screen , to enhance the tensile strength of the resultant fiber mat in this direction . too great a differential between the speeds of the fibers and the speed of the screen causes all the fibers to align themselves in the direction of the screen movement , resulting in a reduction in transverse tensile strength . located beneath the porous screen 51 are a succession of vacuum boxes 54 whose function is to draw the liquid ( freon ) carrier from the slurry to reduce its liquid content . by the time the slurry has reached the right - hand or forwardmost end 55 of the screen , the percentage of solids within the slurry has increased from the initial 0 . 01 - 1 . 0 % to a final value of about 100 %. as the fluid content decreases , fiber to fiber contact increases . what remains is a homogeneous mat of intertwined boron nitride fibers with interstitially located boron oxide binder fibers . thus , the slurry gradually and successively dries into an internally cohesive felt . the amount of suction provided by the vacuum boxes generally is about - 1 . 0 atmosphere , and six such vacuum boxes typically are needed for adequate drying . a heating element of some type may be used in conjunction with the vacuum boxes to improve drying of the slurry through evaporation . however , if evaporation is used as an adjunct , an adequate recovery system must be used to prevent needless waste of the liquid , especially with a fluid as expensive as freon . each of the vacuum boxes 54 delivers its recovered liquid to a central reservoir 56 , so the liquid can be reused . the resulting felt 58 , in the form emerging from the fourdrinier machine , can be fashioned by any well - known technique into a variety of shapes and sizes suitable for specific applications . however , if additional internal strength is required for a particular purpose , the felt can be heated in an anhydrous gas selected from the group consisting of inert gases , nitrogen , ammonia , air , and mixtures thereof to a temperature above the 460 \u00b0 c . melting temperature of the boron oxide binder for a time sufficient to fuse at least some of the boron oxide to the bn fibers . this operation is indicated in fig1 by reference numeral 59 . generally , the heating temperature is from about 460 \u00b0 to about 1 , 400 \u00b0 c . such a treatment generally improves the tensile strength of the felt from an initial value in the range of 0 . 01 to 1 . 0 psi to a final value of 11 to 30 psi . since the felt , even with the additional heating and fusing step , is a boron oxide - bonded boron nitride material , the boron oxide binder may deteriorate if exposed to certain corrosive environments , most notably the lithium chloride or potassium chloride electrolyte of a lithium sulfide battery . therefore the felt must undergo additional treatment to be acceptable for use as a battery cell separator . in particular the felt must undergo a final nitriding and stabilization phase 61 ( see fig1 ) to convert the interstitial boron oxide binder material into boron nitride . in the case of the preferred embodiment , using a slurry containing 50 - 99 % ( by weight ) of fully nitrided boron nitride fibers with 1 - 50 % ( by weight ) of boron oxide fibers , the felt is heated at a final nitriding temperature from about 200 \u00b0 c . to 900 \u00b0 c . for about 2 to 72 hours to convert essentially all of the boron oxide into boron nitride . the flow of nh 3 through the reaction chamber is maintained at 0 . 01 to 3 . 3 liter / min / gram of b 2 o 3 fiber in the mat . for stabilization purposes , and to enhance the corrosion resistance of the finished mat , as disclosed more fully in the above referenced u . s . pat . no . 3 , 429 , 722 patent , the fully nitrided mat can be heated in an inert atmosphere at a temperature which may be below , but which is usually above , the final nitriding temperature . for example , heating in a dry nitrogen ( n 2 ) atmosphere at a temperature in the range from 1600 \u00b0 to 2300 \u00b0 c . will adequately stabilize the fibers and increase their corrosion resistance . although in the preferred embodiment fully nitrided boron nitride fibers are blended with additional boron oxide binder into a slurry , the bn fibers alternatively could be only partially nitrided , and the remaining nitride conversion could occur later during the above - mentioned final nitriding and stabilization phase , with appropriate adjustments to the operating temperatures and time durations . with this in mind , the present process also can be practiced using the following types of fibers within the slurry : fully nitrided boron nitride fibers and unreacted boron oxide fibers ; partially nitrided boron nitride fibers and boron oxide fibers ; combinations of the above with or without fillers . although the foregoing disclosure illustrates the advantages and features of the novel manufacturing process in accordance with the present invention , it may be obvious to those skilled in the art to effect various modifications or changes to the present invention , without departing from the spirit thereof . the scope of the present invention is to be determined by the following claims ."}

{"publication\_number": "US-5829275-A", "abstract": "a monitoring arrangement for the filter of a washing machine is disclosed wherein the user is warned of the clogged filter when an actual clogging condition occurs . control elements that are normally used in washing machines , such as an analog pressure switch and an electronic control circuit , are utilized . the control parameter for detecting clogging is the variation of the water pressure before and after the priming of the drain pump or the recirculator pump of the machine .", "application\_number": "US-83425797-A", "description": "with reference to fig1 a first embodiment of the present invention is illustrated . a clothes washing machine of a traditional type comprises a wash tub 10 , a filter 11 for the wash water , a drain pump 12 for the wash water , a pressure switch 13 , preferably of the analog type , for controlling the level of the water in the wash tub , and a control circuit 14 , preferably of the electronic type , for governing the operational functions of the machine . the component parts of the machine which are utilized in the implementation of the present invention are the analog - type pressure switch 13 and the drain pump 12 . the parameter that is used to detect the clogged filter condition and , therefore , to alert the user of the need for the filter to be cleaned , is the pressure variation in the pressure switch 13 between an instant in which the drain pump is at a standstill , i . e ., not operating , and a subsequent instant in which the drain pump is primed and attempting to pump water . as illustrated in fig2 when the pump 12 is at a standstill , the pressure ( a ) in the water circuit of the machine is static and stabilized . when the pump 12 starts priming and then pumping , the pressure drops sharply ( b ) and , after a short period during which it oscillates , keeps decreasing until the water discharge operation is concluded . the illustrated curve occurs when the filter 11 is normally clean . in the case of a clogged filter 11 ( fig3 ), on the contrary , the pressure ( b &# 39 ;) drops only slightly when the drain pump starts priming and then pumping , while the subsequent oscillations may even give rise to pressure peaks that are higher than the static pressure prevailing when the pump 12 is not operating . such characteristics , as graphically illustrated , have been verified experimentally and are indicative of water flow through the filter 11 and the resistance thereto as a result of filter 11 clogging . the pressure reading , or sensing , and resultant comparison , is preferably made in the last water discharge phase of a complete washing cycle , although it will be appreciated that it may be arranged to occur in any water discharge phase carried out by the machine . after the wash tub 10 has been filled with water for the last rinse operation , the drum holding the washload is driven to rotate at slow speed for a period of approximately 4 minutes . this is followed by a pause ( e . g ., of 20 seconds ), during which the pressure in the water circuit of the machine is allowed to stabilize at the level ( a ) indicated in fig2 . the drain pump 12 then starts to prime and pump and , as usual , the machine is emptied before the final spin - extraction phase is started . the reading of the pressure in the water circuit of the machine is carried out for a very short initial time ( for instance , 7 / 10ths of a second ) after the priming , i . e ., actuation , of the drain pump 12 and the variation in the values of water pressure delivered by the analog pressure switch 13 is analyzed with the following logic sequence : a ) reading of the pressure after 20 seconds of pause ; b ) reading of the maximum pressure drop at the priming of the drain pump 12 . if the pressure after the priming of the drain pump 12 has a lower value than that of the stabilized pressure in the 20 seconds preceding the discharge operation , then the filter 11 may be considered as being clean ( fig2 ). if the pressure after the priming of the drain pump 12 has a value which is equal or even higher than that of the stabilized pressure in the 20 seconds preceding the discharge operation , then the filter 11 may be considered as being clogged ( fig3 ). in this case , the electronic control circuit 14 of the machine would therefore deliver a signal , which may be of any known type , i . e ., acoustical , optical , combined acoustical and optical , etc ., to correspondingly alert the user . with reference to fig4 a second embodiment of the present invention will now be described with reference to a recirculating - type clothes washing machine comprising , in addition to the earlier noted components , a circuit 15 for recirculating the water in the wash tub 10 of the machine during a wash cycle , another filter 16 , and a recirculation pump 17 included in said water recirculating circuit . in this particular case , the reading of the pressure variation is made through the recirculation pump 17 , since it is the effectiveness of the washing process that is monitored over the effectiveness of the water discharge operation , as discussed above with regard to fig1 - 3 . in fact , the filter 16 included in the water recirculating circuit 15 has a filtering surface which is reduced with respect to the filter 11 installed in the drain system of the machine , wherein the filter 16 is more quickly prone to clogging . the manner in which the readings and the related comparisons are made here is substantially similar to the one described above . after the tub 10 has been filled with water for the last rinse operation , the drum holding the washload is driven to rotate at slow speed for a period of approximately 4 minutes . then , the machine is stopped ( e . g ., for a period of 20 seconds ). after that , the recirculation pump 17 is started again and allowed to operate for approximately 10 seconds , while the variation in the pressure is observed for an initial time of approximately 1 second for due comparison with the value of the static pressure prevailing in the preceding pause period . if the pressure drop ( d ) at the priming or actuation of the recirculation pump ( see fig5 ) has a value which is equal to or even higher by 10 % than that of the stabilized pressure ( a ) prevailing in the pause period , then the filter 16 may be considered as being clean . if the pressure drop ( d &# 39 ;) at the priming of the recirculation pump 17 ( see fig6 ) has a value which is lower by 10 % than that of the stabilized pressure ( a ) prevailing in the preceding pause period , then the filter 16 may be considered as being clogged , so that , as this has been described in connection with the first embodiment , an appropriate signal would be delivered to alert the user of the need to clean the filter 16 . it can be readily noticed , therefore , that the invention enables the user to be automatically and timely informed of the filter 11 , 16 being clogged and requiring cleaning without any need arising for additional component parts to be used in the machine to achieve such an aim , but making on the contrary simple use , albeit in a rational and innovative manner , of some of the component parts which normally exist in the same machine . various further improvements and variants are of course possible , i . e ., may be implemented without departing from the scope of the present invention . for example , by making use of the existing analog pressure switch 13 and the existing control circuit 14 of the clothes washing machine , it is possible for the user to be given also an indication of a possible obstruction of the drain pump 12 , as well as the recirculation pump 17 . in fact , by applying the same afore described concept , it is , for instance , possible for the drain pump 12 to be stopped for approximately 20 seconds in any one of the operating phases of the machine and the stabilized pressure detected after such a pause to be compared with the pressure detected after approximately 15 seconds from the moment in which the drain pump 12 is restarted . should the pressure detected after the drain pump 12 has been restarted be lower than the pressure detected after the pause , the drain pump 12 may be considered to be operating correctly . should , on the contrary , the pressure detected after the drain pump 12 has been restarted be equal to or even higher than the pressure detected after the pause , the drain pump 12 has to be considered as obstructed . it should be evident that this disclosure is by way of example , and the various changes may be made by adding , modifying or eliminating details without departing from the fair scope of the teaching contained in this disclosure . the invention is , therefore , not limited to particular details of this disclosure except to the extent that the following claims are necessarily so limited ."}

{"publication\_number": "US-2011305644-A1", "abstract": "the present invention relates to a wool care composition comprising pyrethroid insecticide , a copolymer and a solvent wherein the said copolymer binds with the solvent and pyrethroid insecticide . this composition can be an improved aerosol spray formulation for treating of pure or blended woollen clothing and textile , fur and feather lined garments and other keratinous items for protection or insect proofing from various types of insect pests both clothes moths and carpet beetles during their storage , transport and use . wool care aerosol solution can be sprayed with pressurized container having either a propellant as ready - to - use aerosol or manually operated sprayers . the aerosol spray composition may also contain fragrance and solvent . the other components in the composition are at least one copolymer / emulsifier and / or dispersant .", "application\_number": "US-200913146554-A", "description": "the present relates to a wool care composition comprising a pyrethroid insecticide ( 0 . 01 - 0 . 5 % v / v ); at least a copolymer ( 10 - 25 % v / v ); a solvent ( 70 - 85 % v / v ); and optionally a fragrance or a mixture of fragrances ( 1 - 5 % v / v ). the copolymer in the composition of the present invention , binds with the solvent and pyrethroid insecticide to enable prolonged storage of wool for at least 60 months . in an embodiment of the present invention , the composition comprises a pyrethroid insecticide ( 0 . 01 - 0 . 5 % v / v ); a copolymer ( 10 - 25 % v / v ); and a solvent ( 70 - 85 % v / v ); wherein said copolymer binds with the solvent and pyrethroid insecticide to enable prolonged storage of wool for at least 60 months . in another embodiment of the present invention , the pyrethroid insecticide is a class of synthetic pyrethroid selected from deltamethrin and permethrin . the copolymer used in the composition is acrylic acid and butyl acrylate . further in another embodiment , the copolymer of acrylic acid and butyl acrylate is in the ratio of 1 : 3 v / v . in another embodiment , the solvent used in the composition of the present invention is selected from a group consisting of isopropyl alcohol , mineral turpentine oil ( mto ) and white spirit , preferably , mineral turpentine oil . in yet another embodiment , the fragrance used in the composition is selected from alpha amyl cinnamic aldehyde , dimetol , terpeneol , citronellol , cedarwood oil , lemon oil , benzyl salicylatde , tonalid , ethyl vanillin , cyclamen aldehyde , sandal wood oil and creosote . the composition of the present invention can be formulated as a solution , with or without propellant . in one embodiment , the wool care composition of the present invention further comprises of 20 - 30 % v / v of at least a propellant , which forms another embodiment of the invention . this propellant is selected from a group consisting of c3 - c5 alkanes or a mixture thereof . in a preferred embodiment , the propellant comprises of propane ( 6 - 12 % w / v ), n - butane ( 50 - 55 % w / v ) and isobutane ( 25 - 39 % w / v ). in another preferred embodiment of the present invention , a wool care composition comprises pyrethroid insecticide ( 0 . 01 - 0 . 5 % v / v ), a copolymer mixture comprising acrylic acid and butyl acrylate ( 10 - 25 % v / v ); and mineral turpentine oil as solvent ( 70 - 85 % v / v ), wherein said acrylic acid and butyl acrylate binds with said mineral turpentine oil and pyrethroid insecticide to enable prolonged storage of wool for at least 60 months . the pyrethroid insecticide is preferably deltamethrin or permethrin . the present invention provides a wool care aerosol spray solution composition , an effective amount of which can be sprayed , to kill various species of wool pests . highly effective - insecticide , synthetic pyrethroid ( s ) is used as an agent for control of the wool insects and pests in this solute composition . the wool care aerosol spray solution incorporates emulsifier / copolymers and odours / fragrances which are then dissolved with 70 - 85 % v / v of isopropyl alcohol or mineral turpentine oil ( mto ) or white spirit , to which is added a synthetic pyrethroid insecticide such as permethrin , cypermethrin , fenvalerate , deltamethrin , lambda - cyhalothrin or any mixture these insecticides , preferably deltamethrin or permethrin in the range of 0 . 01 - 0 . 5 % v / v . the solution of the above chemical solution composition can be uniformly sprayed on to woollen items for providing protection from various species of insects and pests . co polymer used binds the mineral turpentine oil / white spirit due to the higher viscosity and has the synergic effect of maintaining the concentration of the insecticide in the solution and remains ready for use even after prolonged storage . the copolymer forms a thin film that binds the insecticide and solvent mto and spread evenly over the garment surface retaining the insecticide for longer period . thus the woollen garments remained protected for about 60 months of unattended storage after the spray of this insecticide . the copolymer prevents deep penetration because of its high viscosity into the woollen fabric making available the insecticide at the very surface of the fabric , allowing no ingress to wool insects and pests . odours / fragrances are advantageously selected in such a way that they enhance the repellent activity of the composition against the insect pests and at the same time it make more acceptable to the user as having pleasant smell . the propellant is advantageously selected in such a way that it provides the desired pressure for uniform delivery of the wool care aerosol spray solution while spraying on the woollen items . preferred propellants according to the invention are alkanes containing 3 to 5 carbon atoms , such as propane , n - butane , iso - butane , n - pentane and iso - pentane , n - butane and propane are particularly preferred for ready to use aerosol can . the present invention relates to an improved aerosol spray composition for high effective protection ( insect proofing ) of pure or blended woollen item , fur and feather lined garments , and other keratinous items from various species of insect pests , more specifically but without implying any limitation thereto . one aspect of the present invention relates to providing an aerosol spray solution composition which can be applied easily on the woollen items , fur and feathers lined garments and other keratinous goods at industry commercial and domestic stores for at least two years and thereto , to protect such items , during their storage , use and transport . while various embodiments and / or individual features of the present invention have been illustrated and described , it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention . as will be also be apparent to the skilled practitioner , all combinations of the embodiments and features taught in the foregoing disclosure are possible and can result in preferred executions of the present disclosure . ( disclaimer ) the following example is put forth so as to provide those of ordinary skill in the art with a complete disclosure and the description of how to make and use the present invention , and are not intended to limit the scope of what the inventors regard as their invention nor are they intended to represent that the experiments below are all and only experiments performed . first , a co - polymer solution is prepared by mixing 10 ml of acrylic acid in 30 ml of butyl acrylate . then 15 ml of this co - polymer solution was mixed 65 - 70 ml of isopropanol or mineral turpentine oil or white spirit . to this 80 - 85 ml solution , 3 - 5 ml of odours fragrances and 5 - 10 ml of synthetic pyrethroid insecticide were added which was then thoroughly mixed with stirrer . this insecticide spray solution was poured into a hand sprayer for spraying on woollen fabrics / garments or in ready to use aerosol container . the preparations according to the invention are produced and made up in the conventional manner known to the person skilled in the art . initially , therefore , insecticide , emulsifiers ( copolymers ) and odours / fragrances are thoroughly mixed with solvent . this mixture is then poured into aerosol cans in liquid form . after the valve has been applied , the propellant is finally added as the last component in the case of ready to use aerosol spray . laboratory evaluation of this insecticidal solution was carried out as per the international standardization method ( iso 3998 ) by releasing 15 larvae of each species on treated wool fabric pieces of 4 cm diameter size for 14 days in a petri dish with a perforated lid . it was observed that tile larvae of tile said insect pests did not cause any damage to tile fabric during this period . in , another laboratory evaluation test , 10 mated female adults of each insect species were released in a 0 . 25 litre glass jar on a 5 cm diameter treated wool fabric pieces which substantially covered the bottom of the jar and mouth was covered with a muslin cloth held by a rubber band . cent percent adults of the insect pests died within 24 hours of exposure and no fabric damage was observed after six weeks on treated fabrics as laid eggs of pest were killed before larval emergence . the storage stability studies showed that treated fabric / garments with tills insecticidal spray protect them from insect / pest damage up to 60 months in stores . it is to be understood that the spray formulation of the present invention is susceptible to modifications , adaptations and changes by those skilled in the field of the present invention . such modifications , adaptations and changes are intended to be covered within the scope of present invention which is set forth by the following claims . laboratory evaluation of this wool care spray solution was carried out as per the international standardization method ( iso 3998 ) by releasing 15 larvae of each species on treated wool fabric pieces of 4 cm diameter size for 14 days in a petri dish with perforated lid . it was observed that the larvae of the two common and serious insect pests did not cause any damage to the wool fabric after spraying with wool care solution up to 24 months of storage as shown below in the table 1 & amp ; 2 . a test fabric is considered satisfactorily insect proofed if all four test specimens have no holes or surface damage ( cropping ) visible to unaided eyes and the mean weight loss for test specimens and the weight loss for single specimens are less that 15 mg and 20 mg respectively . another laboratory evaluation test was also carried out to determine the pests &# 39 ; repelling or killing efficacy of wool care spray solution by releasing 10 mated female adults of each insect species in a 0 . 25 litre glass jar on a 5 cm diameter wool fabric pieces sprayed with wool care solution . the bottom of the jar was substantially covered with the treated fabric piece and mouth was covered with a muslin cloth held by a rubber band to force the adult pests to come in contact with the treated fabric . it was observed that the adult pest remain away from the treated fabric . all adults of the insect pests died within 24 hours of exposure and no fabric damage was observed after six weeks on treated fabrics as laid eggs of pest were also killed before larval emergence . the storage stability studies showed that treated fabric / garments with this wool care solution spray protect them from insect / pest damage up to 60 moths in stores . \u201c wool care \u201d aerosol spray solution can be sprayed on woollen uniforms , blankets , jerseys , rugs , carpets , upholstery items and other woollen items before their storage or during their packing for transportation either with a ready to use aerosol container having a propellant or with manually operated sprayer . for treatment with wool care aerosol spray , the woollen items can be spread on a cloth line or on the ground , and then gently spray the solution in fine aerosol drops from a distance of 15 - 30 cms on the exteriors of woollen items . spray of wool care solution should be light without drenching them or run off . the previously described versions of the subject matter and its equivalent thereof have many advantages , including those which are described below i . the present invention discloses binding of the copolymer to mineral turpentine oil / white spirit due to its high viscosity , resulting in a synergistic effect thereby maintaining the concentration of the insecticide in the solution permitting it to be used as a ready - to - use even after prolonged storage . ii . the present invention further relates to formation of a thin film of copolymer that binds the insecticide and solvent mineral turpentine oil ( mto ), thereby spreading evenly over the garment surface retaining the insecticide for longer period , protecting for about 60 months of unattended storage after the spray of the insecticide . ( refer to example 2 \u2014 bioefficacy tests of wool care solution ) iii . the present invention further discloses that the high viscosity of copolymer prevents deep penetration of the spray solution into the woollen fabric , thereby enabling availability of the insecticide at the very surface of the fabric , allowing no ingress to wool insects and pests . iv . the present invention also discloses that the selection of propellant is advantageous in such a way that it provides the desired pressure for uniform delivery of the wool care aerosol spray solution while spraying on the woollen items . although the subject matter has been described in considerable detail with reference to certain preferred embodiments thereof , other embodiments are possible . as such , the spirit and scope of the appended claims should not be limited to the description of the preferred embodiment contained therein ."}

{"publication\_number": "US-2006019570-A1", "abstract": "a multicomponent spunbonded nonwoven is provided which is composed of at least two polymers which form interfaces toward one another , which are produced by at least one spinning machine having uniform spinning nozzle apertures , and which are hydrodynamically drawn , lapped in a sheet - like manner , and bonded , the multicomponent spunbonded nonwoven being composed of different filaments which contain at least two polymers , or it being composed of a mixture of multicomponent filaments and monocomponent filaments which each contain only one of the polymers , the multicomponent filament being composed of at least two elementary filaments and the titer of the individual filaments varying by the number of elementary filaments contained in the filaments .", "application\_number": "US-18532205-A", "description": "the present invention will now be explained in greater detail on the basis of the exemplary embodiments that follow . the examples described below use two extruders which supply the spinning pumps upstream from the spinning packs with polymers via heated tubes with symmetrical geometry ( length and diameter ). due to this arrangement , the same quantity of polymers , which have the same quantity ratio throughout ( e . g ., polyethylene terephthalate / polyamide 6 pet / pa6 = 70 / 30 ), arrives initially at all spinning pumps . the throughput and the quantity ratio of the polymers called up by the spinning pumps are variable , but not completely free , since the spinning positions communicate with one another via the tubing feed . although this arrangement is not obligatory , additional degrees of freedom could only be ensured via modifications of the spinning machine , resulting in greater freedoms in product design . the subsequently described examples refer to bi - component filaments , made of pet and pa6 , at the constant volume ratio pet / pa6 = 70 / 30 , having varying filament numbers per spinning pack , and varying segment numbers per filament type per spinning pack . extension of the machine freedoms ( number of extruders , geometry of the tubes . . . ) in the above - described sense and other polymer pairs results in an expansion of the examples described in the following . under almost constant conditions with regard to the spinning and drawing conditions and under adapted storage conditions , with the object of the best possible conformity with regard to the mass per unit area of the fabrics having a uniform titer , samples are produced and split and bonded via fluid jet bonding as described in ep 0 814 188 b1 . the object was to determine to what extent which physical textile properties of comparable fabrics are dependent on the titer of the filaments . the results are shown in the table of fig1 , wherein : on the filament , \u201c split titer \u201d refers to the titer after fluid jet bonding and split up of the segments ; \u201c cn / tex \u201d refers to the tensile strength of the individual filament , drawn , but not split ; \u201c elongation \u201d refers to elongation of the individual filament , drawn , but not split ; and on the fabric , \u201c look \u201d refers to the evaluation of the look by grades ( 15 = best ); \u201c feel \u201d refers to the feel evaluation by grades ( 15 = best ); \u201c a \u201d refers to side a ; \u201c b \u201d refers to side b ; \u201c i \u201d refers to longitudinal ; \u201c q \u201d refers to transversal ; \u201c wrk \u201d refers to tear growth resistance [ n ], normalized here to 1 g / m 2 mass per unit area ; \u201c hzk \u201d refers to ultimate tensile strength [ n / 5 cm ], normalized to 1 g / m 2 ; \u201c elongation \u201d refers to the breaking elongation ( i + q )/ 2 ; \u201c module ( 5 % spec )\u201d refers to the force at 5 % elongation ( i + q )/ 2 ; and \u201c abrasion \u201d refers to abrasion resistance with evaluation of the look ( internally , 1 = best ) 1 ) the tensile strength and the elongation of the unsplit filaments vary in a normal range , a dependency on the titer after splitting is indiscernible ; 2 ) the split degree seems to be able to be subdivided into two ranges , namely smaller or greater than 0 . 2 decitex ; 3 ) the mass per unit areas vary from 100 g / m 2 to 117 g / m 2 , the respective values , however , have been normalized to 1 g mass per unit area ; 4 ) a direct dependency on the titer can be shown for the normalized tear growth resistance ; this was qualitatively anticipated , but it cannot be quantitatively assessed ; 5 ) a downward trend with a decreasing titer can also be shown for the normalized ultimate tensile strength , which was not anticipated since the materials and their modules are the same and the total cross - sectional area , which results from the sum of the individual filament cross - sectional areas , is also identical with equal or normalized mass per unit area . 6 ) the finer the titer , the better the bonding / interlacing via fluid jet bonding , as evidenced by the abrasion resistance ; and 7 ) the trend of increasing abrasion resistance or pilling resistance with a decreasing titer may also be gathered from the surface roughness after dyeing ( see fig2 ). it should be pointed out that the fabrics are solely bonded via fluid jet bonding ( in the sense of felting ), i . e ., without any chemical or thermal bond . also in fig1 , \* indicates that the \u201c split titer \u201d ( titer after splitting ) shown here is the averaged titer from both segment types . if the approximate same density of the two polymers is the underlying factor ( pet approximately 1 . 38 , pa6 approximately 1 . 13 g / m 3 ), a volume ratio of pet / pa \u2154 : \u2153 proves that the titer of the polyester segment must be twice as large as that of the polyamide segment . based on this and analog test series , an \u201c optimized compromise of the properties \u201d for industrial size production of microfilament fabrics has been provided which allows a preferably fine look , feel , and surface resistances without having to accept a decrease in , for example , the tear growth resistance or the ultimate tensile strength which are not able to meet the minimum requirements such as are required by the european clothing association committee ( ecla ). ep 0 814 188 b1 describes a manufacturing method in which multicomponent filaments of different configurations are mentioned , but not the manufacture of fabrics made of multifilaments of different configuration within these fabrics . this further \u201c degree of freedom \u201d of the method may result in product advantages for many applications , some of which are subsequently described as examples . in - line isotropically distributed reinforcement in the center of the fabric for increasing the tear growth resistance : the middle two layers are run as homofilaments with 70 % pet and 30 % pa , the number of spinning nozzles for pet and for pa6 having a ratio of 70 : 30 , and the two monofilament layers having a titer of 2 - 2 . 6 decitex in the center of the fabric , and the other , in this case five layers with a pet / pa6 ratio of likewise 70 / 30 , having a starting titer of 2 . 4 decitex and thus an average titer of 0 . 15 decitex after splitting of the sixteen segments . using this procedure , the fabrics have a typical microfiber look and a typical microfiber feel on both sides . while fabrics having a uniform titer of 0 . 15 decitex are sufficient to meet ecla requirements for shirts , pajamas , t - shirts and the like with regard to tear growth resistance , this procedure also makes it possible to meet ecla requirements for more tear growth - resistant garments such as trousers and jackets , as well as textile upper material for shoes without having to increase the mass per unit area . the middle four layers are run as pie 8 ( polyiminoethylene ) and the other four outer layers are run as pie 16 with 70 % pet and 30 % pa . all filaments have a starting titer of 2 . 4 decitex and therefore obtain an average titer of 0 . 3 decitex and 0 . 15 decitex , respectively , after splitting of the 8 and 16 segments . this procedure gives the fabrics a typical microfiber look and a typical microfiber feel on both sides . this procedure makes it possible to increase the tear growth resistance only slightly where it must be increased only gradually due to statistical fluctuations in the product or , for example , for garments in which , due to the high insulation capability typical for microfiber products , a lower mass per unit area is desired without being allowed to fall below certain minimum requirements , above all with regard to the tear growth resistance ( e . g ., light summer garments ). in skin or leather , the collagen strands of lower lying layers of the tissue become ever finer from the bottom up . at least in the early years , nature ensures that the mechanical resistance and the youthful smoothness of the skin may be achieved simultaneously . this is to be emulated in tests with titer gradients across the thickness of the fabric from one side to the other : four layers of pie 8 are laid down , followed by four layers of pie 16 , and four layers of pie 32 , each having a starting titer of approximately 2 . 5 decitex before splitting and a pet / pa6 ratio of 70 / 30 and symmetrical fluid jet bonding on both sides . using this procedure , demands on a fabric for an automated finish may be met . while a preferably fine titer is desired for a preferably fine and scratch - free finish , the increase in the titer in part of the layers was able to ensure the tear growth resistance necessary for making up . due to the fact that the product is not manufactured symmetrically but rather with a titer gradient , it may be achieved that the side of the coarser titer may be glued to the finishing disc and removed again without the microfibers tearing off in the process and the repeatedly reusable adhesive surface being exceedingly contaminated by torn off fibers , while the side having the very fine titer of only 0 . 05 decitex produces optimum finishing results as illustrated in fig3 . two layers of homofilaments are laid down , followed by two layers of the same , two layers of pie 8 , two layers of pie 16 , and four layers of pie 32 , each having a starting titer of approximately 2 . 5 decitex before splitting and a pet / pa6 ratio of 70 / 30 and symmetrical fluid jet bonding on both sides . this product is subsequently steeped using solved polyurethane , the polyurethane is coagulated , the product is dyed , the finishing side is polished , and the product is dyed again in order to obtain a high - quality suede - like material . this design is based on natural leather . excellent one - sided synthetic leather qualities with regard to look and feel may be achieved hereby , which simultaneously have excellent mechanical properties , which may be used for upper material for shoes , upholstered furniture , or also for car seats , without requiring a backing by a supporting , non - bulging fabric customary today ."}

{"publication\_number": "US-5783505-A", "abstract": "compostable and biodegradable compositions of a blend of natural cellulosic and thermoplastic biodegradable fibers are disclosed . typically the compositions include cotton and cellulose acetate . a process for the manufacture of a nonwoven composition which comprises a compostable blend of natural cellulosic fibers such as cotton and thermoplastic biodegradable fibers such as cellulose acetate ; the blend is then carded to obtain the nonwoven composition .", "application\_number": "US-58276796-A", "description": "in a preferred embodiment selected for illustrating the improvements of the present invention , scoured and bleached commodity cotton fibers ( cotton incorporated ) were selected having a moisture content of about 5 . 2 %, a micronaire value of about 5 . 4 , and an upper - half - mean fiber length of about 2 . 44 cm . the fibers were scoured to remove their natural wax surface coating , to provide an improved bonding surface to the binder fibers . alternatively , the fibers may be left unscoured . cellulose acetate staple fibers ( hoechst celanese corporation ) having comparable denier and fiber lengths to those of the cotton fibers ( a degree of substitution of 2 . 5 , an acetyl value of 55 %, and a moisture content of 5 . 0 %) were also selected for use . because modified cellulosic fibers are thermoplastic , they have easy wettability , good liquid transport and high moisture uptake . a major advantage is that acetate is made from renewable sources , such as wood pulp and cotton linters , contributing to good compostable / biodegradable characteristics . another advantage is that cellulose acetate is a thermoplastic fiber having a softening temperature of about 180 \u00b0 c . as a consequence , when cellulose acetate is used as a binder fiber processed by thermal calendering , a cotton / cellulose acetate product can be produced that eliminates the use of any non - biodegradable synthetic fiber or chemical binder . each of the fiber components was prepared by separate processing through an opener . the two types of fibers were then blended , e . g ., in a ratio of 75 / 25 cotton / cellulose acetate , by hand mixing . the fibrous blend , composed of a total of 50 grams , was then carded to form a multi - layered web using a modified hollingsworth card . the resulting carded web had a basis weight of 160 g / m 2 . alternatively , the fibrous blend may be carded to form a single - layered web , having a basis weight of 5 to 100 g / m 2 , such as 5 - 20 g / m 2 , or up to 200 g / m 2 if desired , as is known in the industry . the fibers of the carded webs were then thermally bonded to each other using a ramisch kleinewefers 600 - mm ( 23 . 6 - inch ) wide five roll calender . the effect of varying the processing variables of temperature , feed speed , and nip roll pressure on the effectiveness of bonding is important and the operational parameters used should be selected to give reasonably optimum conditions . as an example , and for the illustrative embodiment being described , the feed roll speed and nip roll pressure were fixed at constant values of 10 m / min and 100 kn / m , respectively . the thermally bonded nonwoven fabrics , produced under different processing conditions , were then evaluated . determinations of tensile strength were performed on a united tensile tester , according to test method astm d1117 - 80 (&# 34 ; tensile testing of nonwoven fabrics &# 34 ;). the tensile tests were replicated five times and an average value was obtained in both machine and cross - machine directions . the prepared materials were tested for biodegradability / compostability of the textile fibers . the two standard test methods used for this were aatcc ( american association of textile chemists and colorists ) 30 - 1988 (&# 34 ; antifungal activity , assessment on textile materials : mildew and rot resistance of textile materials &# 34 ;) and astm d5209 - 91 (&# 34 ; standard test method for determining the aerobic biodegradation of plastic materials in the presence of municipal sewage sludge &# 34 ;). an aatcc soil burial test ( according to standard aatcc 30 - 1988 ) was performed by first preparing a soil bed , by mixing garden and potting soils in a ratio of approximately 1 : 1 . the moisture content of the soil mixture was controlled ( in the range of 20 - 30 %) by adding distilled water , as needed . five 1 &# 34 ;\u00d7 7 &# 34 ; replicated samples ( each of 100 % cotton , 50 / 50 cotton / cellulose acetate blend , and 100 % cellulose acetate fabric ) were prepared and placed within the soil bed . the incubation temperature was held by a garden lamp to a range of 25 \u00b0- 30 \u00b0 c . each week , the moisture content was readjusted by spraying with water , and the fabric samples were examined visually . although the cotton samples were only visually examined in this soil bed test , the biodegradability of the cellulose acetate fabric was later evaluated quantitatively , with strength tests . after two weeks , the 100 % greige cotton fabric indicated degradation by showing holes in the fabric . there was total degradation , or fabric disappearance , after six weeks in the soil bed . the 50 / 50 cotton / cellulose acetate blend began to show degradation after four weeks . after six weeks , only the cellulose acetate fibers remained intact . for the 100 % cellulose acetate fabric , no visual degradation was observed for up to 12 weeks . however , the white cellulose acetate fabric was severely contaminated by the soil even after rinsing the fabric with distilled water . since the cotton and the blend fabric could not be recovered after 12 weeks in the soil bed , only the cellulose acetate fabric was evaluated for strength retention . the breaking load values for the untreated and the treated cellulose acetate fabric were 18 . 68 kg and 13 . 64 kg , respectively . this evidences microbial attack on the cellulose acetate fabric , on the basis of a 27 % strength loss . weight loss measurement was not possible due to soil contamination , which might otherwise have led to a weight gain . an astm aerobic sludge test ( according to standard astm d5209 - 91 ) was performed by connecting a series of erlenmeyer flasks to one another ( with flexible tubing ) in such a way as to provide carbon dioxide scrubbing , bioreactor and carbon dioxide trapping stages . a controlled volumetric flow rate of air was continuously provided through the series of sealed flasks . the carbon dioxide scrubbing component was comprised of three flasks in series . the first flask contained 700 ml of 10n sodium hydroxide solution and the second flask contained 700 ml of 0 . 025n barium hydroxide solution . the third flask remained empty and was included to prevent accidental overflow into the bioreactors that followed . plural bioreactors were connected in parallel . each bioreactor contained a 1 % inoculum prepared from sludge and medium stock solution . one flask included cotton fiber as a known biodegradable control against which the cellulose acetate was to be compared . a flask without a fiber sample acted as a check against carbon dioxide generation by the sludge alone . all of the bioreactors were placed on magnetic stirrers to provide proper oxygen and mixing . the bioreactors were then followed by carbon dioxide trapping units comprised of a series of 125 ml flasks , each containing 100 ml of 0 . 025n barium hydroxide . sludge containing , activated microorganisms were obtained from the kawahee wastewater plant , knoxville , tenn . enough supernatant ( 15 ml for each bioreactor ) was taken out to be used for preparing the 1 % inoculum . a 1 % inoculum , composed of medium stock solution , sludge inoculum and high quality water , was prepared for each 2 - l bioreactor . a 13 . 5 ml medium stock solute was prepared , and was composed of magnesium sulfate , calcium chloride , ammonium sulfate , a phosphate buffer ( made of potassium phosphate dibasic , potassium phosphate monobasic , sodium phosphate dibasic and ammonium chloride ) and ferric chloride . fibers in an amount equal to 500 mg ( for each bioreactor ) were chopped to approximately 5 mm in length . when the ba ( oh ) 2 solution in the trapping flasks began absorbing evolved co 2 , the precipitation of barium carbonate was observed . every few days , the co 2 absorbing flasks nearest each bioreactor were removed for titration with an hcl solution . the amount of co 2 evolved from the control sludge bioreactor was subtracted from that generated in the bioreactors containing fibrous materials . the actual amount of co 2 evolved was calculated from the amount of hcl solution used in titration , and the amount , molecular weight and carbon content of fibers in each bioreactor . the test was continued until co 2 evolution reached a plateau . throughout the experiment , the temperature was controlled to 25 \u00b0 c . \u00b1 5 \u00b0 c . insoluble or solid matter , and biomass that remained in the bioreactors was filtered using astm 40 - 60 crucible holders or 0 . 2 \u03bcm cellulose acetate membrane filters . a small amount of solution was removed to measure initial and final ph and total organic carbon ( toc ) content . total organic carbon contents were obtained with a dohrmann carbon analyzer , in which the concentration of oxidizable carbon matter ( such as soluble or insoluble organic carbons ) was measured . the astm aerobic sludge tests were conducted in three separate experiments . in a first experiment , 100 % cotton and 100 % cellulose acetate fibers were evaluated to confirm their biodegradability . in second and third experiments , blends of fibers with different blend ratios were tested for comparative and for possible synergistic actions between the enzymes responsible for microbial degradation of cotton and cellulose acetate fibers . to investigate the biodegradation of cotton and cellulose acetate fibers , visual observations were made throughout the experiment for qualitative analysis . after two days , the cotton fibers began to dissolve . after 10 days , no fiber structure was observed . there was , however , significant carbon dioxide evolution . after 14 days , the solution in the standard bioreactor containing cotton fibers became clear of any solid matter . a growth of algae was observed after two months . the above results confirmed the activity of microorganisms in the test procedures , and were comparable to the results from the soil burial test ( which had indicated severe degradation of the cotton fibers after two weeks ). there was a breakdown and dissolving of the cellulose acetate fibers after 20 days . a growth of algae was observed after three months . throughout the experiment , the blank bioreactor did not show any visual change in terms of its color , clarity or sign of algae growth . the cumulative percentage of carbon dioxide evolution over time is shown in fig1 . for the cotton fiber alone , a total of 26 . 1 % carbon dioxide was evolved after 114 days . most of this carbon dioxide was produced within 20 days , a period of time comparable to essentially total degradation in the soil burial test . even though one of the criteria for the standard procedure is more than 70 % carbon dioxide evolution for positive control materials such as soluble cellulose and starch , a high percentage of co 2 evolution from cotton fibers could not be obtained . this is attributed to the high degree of polymerization , high crystallinity and / or orientation values in cotton cellulose . although the biodegradability of cellulose - including cotton fabrics has been intensively studied , most studies have been based on the weight or strength loss of cotton fabrics . cotton fibers easily disintegrate from microbial attack , resulting in 100 % weight or strength loss within 20 days . however , a 100 % co 2 evolution of cotton fibers could not be obtained , mainly because of the large amount of crystalline microfibrils present . crystalline cellulose is highly resistant to enzymatic attack due to limited action of the cellulase , especially endo - glucanase . in addition , since co 2 evolution is an indication of mineralization of the polymeric chains , the amounts of oligomers and soluble cellobiose ( which are also degraded products ) should be considered . another possible mechanism in the biodegradation of cotton fibers is the limited activity of \u03b2 - glucosidases , which are responsible for cellobiose elimination and rate of biodegradation . therefore , complete conversion of cotton fibers to glucose can not be obtained , due in part to the large amount of cellobiose accumulation which inhibits the activities of both exo - and endo - glucanases . the total percentage of carbon dioxide evolved from the cellulose acetate fibers was 4 . 93 % over 114 days . this was approximately one fifth of that evolved from the cotton fibers . cellulose acetate fiber does not degrade as rapidly as cotton . however , it is clear that there is microbial activity - producing esterase enzymes that contribute to its degradation . the final results of ph change , total carbon dioxide evolved , total organic carbon change and weight loss ( or remaining solid matters ) are shown in table 1 and were significant . table 1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_summary of biodeqradation ofcotton and cellulose acetate fibers ( ca ) sample ( 500 mg ) cotton cellulose acetate\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_total carbon source 222 mg 246 mgph ( from 7 . 9 ) 6 . 50 6 . 80total co . sub . 2 evolved 26 . 1 % 4 . 93 % toc content 19 . 8 ppm 1 . 866 ppmremaining biomass / fibers 96 mg 470 mg\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ there was an increased acidification of the solutions . this is attributed to the increase in the amount of h + ion generated by carbonic acid , h 2 co 3 , which is made from co 2 in dissolved water , and / or by the increase in the amount of degraded fragments such as lactic acid and acetic acid . in addition , the increase in total organic carbon both from the cotton and cellulose acetate bioreactors could be an indication of the increase in carbon content in solution solely from the test samples as carbon sources for microorganisms . no cotton fiber remained in the bioreactors , resulting in 100 % weight loss . a large amount of algae was filtered out . for the cellulose acetate fibers , weight loss could not be measured due to the difficulty in separating solid cellulose acetate fractions and algae . this result is contrary to previously postulated values , which expected a microbial resistance for cellulose acetate fabrics with a degree of substitution above 1 . 0 . such differences are attributed to the fact that prior studies were carried out on the basis of weight loss of the cellulose acetate substrates . to investigate the biodegradation of 50 / 50 cotton / cellulose acetate fibers , similar visual observations were made for the cotton and cellulose acetate bioreactors . in the case of the bioreactor containing the 50 / 50 blend fibers , the solution began to clear of yellow fibrous material after 9 days . the cumulative percentage of carbon dioxide evolution over time is shown in fig2 . for the cotton and cellulose acetate fibers , total values of 27 . 04 % and 9 . 18 % of carbon dioxide , respectively , were evolved after 45 days . this data provides further confirmation of the biodegradability of cotton and cellulose acetate fibers , and also demonstrates the reproducible microbial activity of the test method . final results in ph and total organic carbon changes , and in the amount of biomass and remaining materials , are shown in table 2 . table 2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_summary of biodegradation of cotton , cellulose acetate and 50 / 50 cotton / cellulose acetate blend fibers 50 / 50 cotton / cellulose cellulosesample ( 500 mg ) cotton acetate acetate\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_total carbon source 222 mg 234 mg 246 mgph ( from 7 . 8 ) 6 . 48 6 . 35 6 . 71total co . sub . 2 evolved 27 . 04 % 46 . 5 % 9 . 18 % toc content 6 . 760 ppm 6 . 770 ppm 3 . 910 ppmremaining 204 . 8 mg 245 . 2 mg 465 . 2 mgbiomass / fibers\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in this segment of the experiment , 0 . 2 \u03bcm membrane filters were used for the complete filtration of microorganisms in the bioreactors . this resulted in an increase in the amount of biomass and remaining materials , and a decrease in the total organic carbon changes . the total carbon dioxide evolution for the cotton / cellulose acetate blend was 46 . 5 % over 45 days . this unexpected value was much greater than that of the 100 % cotton fibers . in addition , the rate of degradation was significantly greater than that of the cotton fibers alone . this surprising result suggests a synergistic effect of esterase and cellulase enzymes , as well as the reduction of the cellobiose cumulation by increased activity of glucosidases . it is believed that greater amounts of esterases and cellulases are induced in the presence of the two fibers . to investigate the biodegradation of 75 / 25 and 25 / 75 cotton / cellulose acetate fibers , and to understand the synergistic effect of esterase and cellulase enzymes , cotton / cellulose acetate fibers with different blend ratios ( 75 / 25 and 25 / 75 ) were tested against 50 / 50 cotton / cellulose acetate fibers as a positive control . since the molecular weight and chemical structure of cotton and cellulose acetate fibers are similar , the carbon content of each bioreactor ( containing 500 mg of fibers ) covered essentially the same range . therefore , the carbon source available for microbial activity was the same irrespective of the blend ratio . the cumulative percentage of carbon dioxide evolution over time is shown in fig3 and the final analysis of the resulting system is shown in table 3 . table 3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_summary of biodegradation of 75 / 25 , 50 / 50 and 25 / 75 cotton cellulose acetate blend fibers 75 / 25 50 / 50 25 / 75 cotton / cotton / cotton / cellulose cellulose cellulosesample ( 500 mg ) acetate acetate acetate\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_total carbon source 228 mg 234 mg 240 mgph ( from 7 . 8 ) 6 . 38 6 . 52 6 . 51total co . sub . 2 evolved 55 . 49 % 41 . 66 % 30 . 53 % toc content 6 . 794 ppm 6 . 693 ppm 6 . 038 ppmremaining 217 . 5 mg 271 . 1 mg 316 . 7 mgbiomass / fibers\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for the 50 / 50 cotton / cellulose acetate blends , a total of 41 . 7 % of carbon dioxide was evolved after 40 days . also , the ph and total organic carbon changes , and the biomass and remaining material showed similar trends as those observed in the second test of the 50 / 50 blend fibers . the level of carbon dioxide produced varied in relation to the cotton content in the blend . the amount of carbon dioxide evolved was 55 . 5 %, 41 . 7 % and 30 . 5 %, respectively , for the 75 / 25 , 50 / 50 and 25 / 75 cotton / cellulose acetate blends . also , the ph and total organic carbon changes were greater in the solution from the bioreactor of high cotton content . in particular , the amount of carbon dioxide evolved from the bioreactors containing the fiber blends , regardless of the different blend ratios , was greater than that of the individual fibers . this confirmed the synergistic effect of esterase and cellulase enzymes . moreover , the greater carbon dioxide evolution and the faster rate of biodegradation of blends of fibers with a higher cotton content suggest that cellulase enzymes were favorably induced over esterase . thus , cotton / cellulose acetate fiber blends in various ratios such as 75 / 25 , 50 / 50 , and 25 / 75 are shown above to have a synergistic effect in terms of biodegradability and compostability . in addition , fiber blends of 85 / 15 ( cotton / cellulose acetate ) have been made . it is conceived that cotton / cellulose acetate blends with a ratio as high as 95 / 5 or as low as 5 / 95 will show synergistic effects . further , in accordance with the present invention , and to optimize the properties of the nonwoven fabrics previously described , a softening agent was used to pre - treat the cellulose acetate fibers . acetone , a common solvent for cellulose acetate that is easily vaporized at room temperature and which does not affect cotton fibers , was used in the gaseous state on the carded webs , as a pretreatment prior to calendering . the acetone was poured into containers for receiving the webs on a perforated rack , above the liquid reservoir of acetone . there was no liquid / fabric contact . the containers were then covered by an air tight , removable top , and the webs were allowed to condition in the saturated acetone vapor atmosphere . after the webs were subjected to a saturated vapor atmosphere of acetone , the webs were removed from the acetone vapor and immediately calendered . in the solvent - assisted calendering procedure , the bonding temperature was found to be lower than the softening temperature of solvent - untreated cellulose acetate fibers . alternatively , treatment of the webs with acetone or other plasticizer or softening agent may be performed by immersing the carded web in the solvent . it is not necessary that the webs be saturated with the solvent , so long as treatment with the solvent is for a time sufficient to soften the surface of the thermoplastic component throughout the entire portion of the web which is exposed to the solvent . in order to illustrate the above improvements , carded webs of 75 / 25 cotton / cellulose acetate fibers were thermally bonded at selected temperatures . to observe thermal conditions on the bonding properties of cellulose acetate to cotton fibers , the carded webs were first calendered without a solvent treatment at bonding temperatures in a range of 170 \u00b0 to 240 \u00b0 c . tensile tests were then performed , and the results of these tests are shown in fig4 . fabric strengths in the machine direction ( md ) increased with temperature , as expected . however , there was a sharp rise in strengths for temperatures at about 230 \u00b0 c . except for the higher temperatures , the strengths in the machine direction did not exceed 10 mn / tex below bonding temperatures of 20 \u00b0 c . above the softening temperatures of the cellulose acetate fibers ( i . e ., 180 \u00b0- 205 \u00b0 c . results for the strengths in the cross direction showed a similar trend as those for the strengths in the machine direction . generally , there was an increase in strength with temperature , especially at bonding temperatures above 200 \u00b0 c . the tensile behavior of the thermally bonded nonwovens with solvent pretreatment , in the machine direction , is shown in fig5 . the solvent pretreatments were carried out at saturation times in the range of 30 minutes to 2 hours , with 30 minute intervals . three combinations of bonding temperatures ( 100 \u00b0, 170 \u00b0 and 180 \u00b0 c .) were selected , which were lower than the softening temperatures of cellulose acetate . higher temperatures and longer pretreatment times resulted in greater fabric strengths . the solvent pretreatment provided remarkable enhancement in tensile properties ( md strengths ) compared with non - treatment . most fabrics bonded at 170 \u00b0 c . and 180 \u00b0 c . following solvent pretreatments , resulted in strengths in the machine direction exceeding 10 mn / tex . this is similar to the results obtained from nonwovens bonded at 230 \u00b0 c . without a solvent treatment . even nonwovens bonded at 100 \u00b0 c . showed increased strengths with longer solvent pretreatment times . increases in pretreatment times allow reduction in calendering temperatures and increased calendering speeds . however , increased calender speeds generally require higher calender temperatures because of heat transfer dynamics . typical calendering speeds in industry are between about 10 to 100 m / min , for example 10 to 50 m / min . the remarkable strength enhancement occurred with nonwovens exposed to the acetone vapor for thirty minutes . this result probably means that surface softening is sufficient to activate a mechanism that raises the strength of the calendered fabric by a factor close to three , while doing so at reduced temperatures . another possible explanation arises from the mechanism of fiber - solvent interactions , in which solvents lower the softening or glass transition temperatures of fibers . therefore , the short saturation pretreatment time was sufficient to modify the cellulose acetate fiber on the surface or in the amorphous regions , which changed the effective softening temperature of the cellulose acetate . that alone would explain the enhanced bonding at temperatures lower than the original softening temperatures of the cellulose acetate fibers . the above result can be extremely beneficial from an energy standpoint and from the knowledge that cotton fibers become brittle and weak when processed at temperatures significantly above 200 \u00b0 c . it is preferred that the time between solvent pre - treatment and calendering be kept to a minimum . ideally , calendering should be virtually immediately following the softening . however , since this is often impractical , it is preferred that calendering be performed on softened portions of the pre - treated web within 10 seconds of removal from the softener solvent . it is preferred that the travel of the carded web during softening and during calendering be at a constant speed , preferably the same speed for softening and for calendering . however , if desired , the travel of the web during softening and calendering may be at different rates of speed . the embodiments of the invention illustrated above with cotton and with cellulose acetate can be performed using any natural cellulosic material and any thermoplastic biodegradable polymer , such as the ones listed above . tests summarized in tables 1 - 3 can be performed on any combination of fibers of natural cellulosic material and thermoplastic biodegradable polymer to verify the synergistic activity of the two fibers in terms of biodegradability and compostability . specifically , table 1 and table 2 show that total co 2 evolved from cotton alone is about 27 % and for cellulose acetate alone is between about 5 and 9 %. therefore , if there were no synergism from the combination of the two fibers , one would expect the total co 2 evolved from a combination of the fibers to be equal to ( 27 %\u00d7% cotton )+( 9 %\u00d7% cellulose acetate ), which is between 9 and 27 %. however , the value shown in tables 2 and 3 indicate total co 2 evolved from a combination of cotton and cellulose acetate to be between 30 . 53 % and 55 . 49 %, indicating synergy . when in the blends shown above ( in the tables ), cotton is partially or totally replaced by rayon , satisfactory compostable compositions will be obtained . likewise , when the cellulose acetate is partially or totally replaced by starch fibers , satisfactory compostable compositions will be obtained . thus , in order to determine synergy of biodegradability or compostability from the combination of a natural cellulosic fiber and a thermoplastic biodegradable polymeric fiber , one can determine the total co 2 evolved for each fiber individually and the total co 2 evolved for a blend of the two fibers . if the total co 2 evolved for the blend is higher than would be expected from the individual values of total co 2 evolved , the two fibers have a synergistic activity for biodegradability and compostability . accordingly , various blends of natural cellulosic fibers and thermoplastic biodegradable fibers are produced , in ratios of 95 / 5 , 90 / 10 , 85 / 15 , 75 / 25 , 50 / 50 , 25 / 75 , 15 / 85 , 10 / 90 and 5 / 95 . the natural cellulosic fibers in the blends are selected from cotton , jute , flax , ramie , hemp , kenaf , abaca , sisal , kapok , bagasse , eucalyptus , and rayon . the thermoplastic biodegradable fibers in the blends are selected from cellulose acetate , cellulose acetate butyrate , cellulose acetate propionate , triacetate cellulose , polylactic acid , starch , polyvinyl alcohol , chitosan , and phbv . the blends are subjected to the tests described above and are found to be more biodegradable and compostable than are compositions containing only a natural cellulosic fiber or a thermoplastic biodegradable fiber . fibrous blends of natural cellulosic and thermoplastic biodegradable fibers which blends comprise more than one type of natural cellulosic fibers , such as cotton and ramie or sisal and hemp , and / or more than one type of thermoplastic biodegradable fibers , such as cellulose acetate and polyvinyl alcohol or cellulose acetate butyrate and polylactic acid , are also expected to exhibit biodegradability and compostability . additional information relevant to the present invention can be found in the references listed below , which references are expressly incorporated herein , in their entirety , by reference . as will be apparent to those skilled in the art , in light of the foregoing disclosure , many modifications , alterations , and substitutions are possible in the practice of this invention without departing from the spirit or scope thereof . 1 . abrams , e ., microbiological deterioration of cellulose during the first 72 hours of attack , textile research journal , 20 , 71 - 86 ( 1950 ). 2 . beguin , p 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fabrics ,&# 34 ; m . lewin and s . b . sello , eds ., marcel dekker , inc ., new york , 1983 , pp . 1 - 49 ."}

{"publication\_number": "US-7212879-B2", "abstract": "an embroidering machine includes a base , an embroidery needle moved reciprocally along a path , an embroidery frame on which a work piece to be embroidered is held , a movable frame provided indirectly or directly on the base and mounting thereon the embroidery frame , the movable frame being driven to transverses the path of the reciprocal movement of the embroidery needle , a wireless affixed to the embroidery frame , the wireless tag storing therein frame information relating to the embroidery frame which is to be selected depending on the work piece to be embroidered , and a receiving device for reading the frame information stored in the wireless tag , the receiving device being provided on the base in immovable manner .", "application\_number": "US-21746305-A", "description": "according to embodiments of the present invention , receiving means is provided on leg portions disposed to face each other on the sides of a base , and / or a throat plate having a needle - piercing hole into which an embroidery needle is inserted . according to the embodiments of the present invention , if an embroidery frame is in the form of a cap frame or a cylindrical frame , the receiving means provided on the throat plate reads frame information , and , if the embroidery frame is in the form of a flat frame , the receiving means provided on the leg portion reads the frame information . according to the embodiments of the present invention , the frame information stored in a wireless tag is an id , ( i . e ., code ), of the embroidery frame . by using the id , ( i . e ., code ), as a key , the embroidering machine identifies a shape or a size of the embroidery frame with reference to a detailed information database related to the embroidery frame . the embroidering machine receives the frame information corresponding to the id by providing the wireless tag on the embroidery frame , and by reading the id with reference to a frame information database . on this occasion , the frame information database may be provided either in the embroidering machine , or in an external device such as a memorizing device connected to plural embroidering machines through networks , and can be accessed with a server device which transmits embroidery data to the plural embroidering machines . a first embodiment of the present invention is explained with reference to the attached drawings . with reference to fig1 , an embroidering machine em includes a base 1 , plural embroidery needles 2 each of which moves reciprocally along a vertical path , an embroidery frame 3 on which a work piece to be embroidered is held , a movable frame 4 which is assembled on the base 1 in movable fashion so as to be driven to traverse the path of the reciprocal movement of each of the embroidery needles 2 . the embroidery frame 3 is attached to the movable frame 4 . the embroidering machine em further includes a known frame operating mechanism 5 which is , for example , in the form of a layered structure of x direction operating mechanism and y direction operating mechanism , a bobbin holder 7 , a needle selecting mechanism 8 which is disclosed in , for example , in jp53 ( 1978 )- 43336b or jp55 ( 1980 )- 8626b , a known sewing mechanism 10 , and a throat plate 14 . the frame operating mechanism 5 allows the frame 4 to move in x and / or y directions in a horizontal plane on an embroidery board 13 mounted on the base 1 . the bobbin holder 7 is normally provided with plural bobbins 6 . the needle selecting mechanism 8 selects one of the plural needles 2 and place the resulting or selected needle 2 at a position just above a needle - piercing hole 9 of a throat plate 14 . the sewing mechanism 10 drives the selected needle 2 to reciprocate vertically to make embroideries on the work piece . during the reciprocal movement of the needle 2 , the needle passes through the needle - piercing hole 9 of the throat plate 14 . the embroidery frame 3 is applied or adhered thereon with a wireless tag 20 storing embroidery frame information . antennas 21 a and 21 b for receiving the embroidery frame information stored in the wireless tag 20 are provided on leg portions 1 a and 1 b , respectively , which are disposed to face each other on the sides of the base 1 . an antenna 21 c for receiving the embroidery frame information stored in the wireless tag 20 is also provided on the throat plate 14 . two types of the three receiving means 21 a , 21 b , and 21 c are provided at such predetermined positions make it possible to read the information of the wireless tag 20 affixed to the embroidery frame 3 , regardless of a shape or a size of the embroidery frame 3 . preferably , each of the receiving means 21 a , 21 b , and 21 c transmits a predetermined radio or electromagnetic wave to recognize or read the id of the embroidery frame 3 of wireless tag 20 . with the structure of the embroidering machine em , each of threads wound around respective spools 6 is routed to the corresponding needle 2 by way of a tension 11 , a hole of a thread guiding plate 12 , and a hole of a thread take up lever . the needle selecting mechanism 8 selects and moves one of the plural needles 2 to a position just above the needle - piercing hole 9 of the throat plate 14 . then , the sewing mechanism 10 brings the selected needle 2 into vertical movement in reciprocal mode to make one or more pieces of embroidery on the work piece s is well known . with reference to fig2 , the embroidering machine em further includes a controller 15 which controls , on the basis of the embroidery data transmitted from a server device pc through a network , the frame operating mechanism 5 , the needle selecting mechanism 8 , and the sewing mechanism 10 . with reference to fig3 , there is schematically illustrated how the embroidery frame information is fed to the embroidering machine em . a series set of switch 16 and reading means 17 is interposed between the controller 15 and each of the antennas 21 a and 21 b and the antenna 21 c . by bringing the switch 16 into one position ( the other position ), the embroidery frame information received by the antennas 21 a and 21 b ( the antenna 21 c ) is transmitted to the controller 15 or in some cases to the server device pc through the controller 15 . with reference to fig4 , the embroidering machine em and an embroidery frame information database db constitute an embroidery frame information matching system . as previously described , the embroidering machine em is equipped with the receiving means 21 a , 21 b , and 21 c for receiving the embroidery information , for example , the embroidering frame id stored in the wireless tag 20 which is affixed to the embroidery frames 3 a , 3 b , and 3 c . the embroidery information database db can be directly or indirectly accessed with the embroidery frame information matching system through the network n . as shown in table 1 , the database db stores detailed embroidery frame information corresponding to the embroidery frame id ( i . e ., code ). the controller 15 includes the matching means 15 a for obtaining the detailed embroidery frame information by matching the database db on the basis of the embroidery frame id received by the receiving means 21 a , 21 b , and 21 c . with the structure of the embroidering machine according to another embodiment of the present invention , the embroidery frame information matching system may include one or more multi needle automatic thread change - type embroidering machines em , the server device pc , the database db , and the matching means 15 a . the server device pc in this case is connected to one or more embroidering machine em through the network , the database db can be provided either inside or outside the server device pc , and the matching means 15 a is provided in the server device pc and obtains thread information relative to the thread information database db on the basis of the thread id received by the receiving means 21 a , 21 b , and 21 c . fig5 illustrates an example of a position on which the wireless tag 20 is affixed . referring to fig1 and 5 , when the embroidery frame 3 is in the form of a flat frame 3 a , the flat frame 3 a is assembled , via a movable frame 4 a , to the frame operating mechanism 5 . the movable frame 4 a includes assembling portions extended in y direction , the flat frame 3 a is provided with ear portions on its side portion with which the assembling portion of the movable frame 4 a is detachably engaged , and the wireless tag 20 is affixed to at least one of the ear portions . when the flat frame 3 a is used , the resultant shorter or even minimum receiving distance make it possible for the receiving means 21 a and 21 b provided on the leg portions 1 a and 1 b of the frame to receive the information of the wireless tag 20 successfully . fig6 illustrates another example of a position on which the wireless tag 20 is affixed . with reference to fig1 and 6 , when the cap frame 3 b is used as the embroidery frame to be assembled to the frame operating structure 5 through a movable frame 4 b , the movable frame 4 b for the cap frame 3 b is shorter than the movable frame 4 a for the flat frame 3 a ( ref . fig1 ) in a x direction , and includes the assembling portion provided on its center portion in the x direction , and the cap frame 3 b is provided with an engaging potion on its end portion with which the assembling portion of the movable frame 4 b is detachably engaged . the wireless tag 20 is affixed to the cap frame 3 b on an extending portion of the fat frame 3 b which holds a hat and extends in a y direction . when the cap frame 3 b is used , the frame information of the wireless tag 20 is preferably received by the receiving means 21 c provided on the throat plate 14 positioned on the center of the embroidery board 13 because the receiving distance is reduced . a basic embroidery operation of the aforementioned embroidering machine em will be explained with reference to fig1 \u2013 7 . prior to the basic embroidery operation , the plural bobbins 6 are mounted on the bobbin holder 7 , the embroidery frame 3 is assembled to the frame operating mechanism 5 through the movable frame 4 , and the controller 15 of the embroidering machine em is turned on . in step s 1 , the embroidery data transmitted from the server device pc is read and stored in the controller 15 . the controller 15 controls the needle selecting mechanism 8 on the basis of the embroidery data , which refer to as embroidery design data . in step s 2 , identification of the thread is performed so as to identify , for example , a color of the thread , which is supplied to each needle 2 . in step s 3 , if a thread color indicated by the embroidery data is not available , a color change setting is performed so as to use the thread of the approximating most to that indicated . in step s 4 , identification of the embroidery frame 3 is performed . referring particularly to fig8 , the embroidery frame id ( i . e ., frame code ) from the wireless tag 20 is received by at least one of the receiving means 21 a , 21 b , and 21 c in step s 41 , the controller 15 obtains the detailed frame information shown in table 1 from the database db through the matching means 15 a in step s 42 , and the frame data is set into the controller 15 in step s 43 . in step s 5 , positioning of the embroidery frame 3 relative to the base 1 is performed and a position of the embroidery frame 3 is detected . in step s 6 , a judgment is made whether a start key of the controller 15 is turned on or not . if the result is true , the control goes to step s 7 . otherwise , the control goes to step s 9 and if its result is to continue the job the control goes to step s 5 . in step s 7 , the controller 15 compares the position of the embroidery frame 3 with the embroidery data on the basis of obtained embroidery frame information to judge whether or not the embroidery data ( i . e ., an embroidery design ) fits or falls into a selected embroidery frame 3 . if the result is true , the control goes to step s 8 . otherwise , the control goes to step s 9 to display a predetermined indication or warning and thereafter goes to step s 5 for re - performing the positioning of the embroidery frame 3 . the present invention can be applied to multi needle thread change - type embroidering machines , in particular , to multi needle automatic thread change - type embroidering machines and further to an embroidering machine system created by connecting such embroidering machines in parallel . the present invention can also be applied to various knitting machines or knitting machine systems which rely on an automatic change of threads . according to the present invention , the receiving means for reading the embroidery information is provided on a stationary portion , which need not necessarily be replaced or changed corresponding to the embroidery frame . in other words , the receiving means is provided on the base ( i . e ., the embroidering machine body ). thus , the information related to the embroidery frame can be obtained at a low cost . because the frame information is read by using a radio transmission , the receiving means need not necessarily be provided on the movable frame to which the embroidery frame is directly attached , but can be provided on the embroidering machine body , and the wiring for transmitting the frame information from the receiving means is thereby simplified . moreover , it is not necessary for a user of the embroidering machine to input the embroidery frame information , and the losses caused by input errors made by a user can be prevented . by adding the frame type information to the database , the embroidering machine according to the present invention can also without difficulty be made to correspond to diversifying frame types . the receiving means which reads the embroidery information such as the embroidery frame id can also be used for obtaining other information such as thread information , by standardizing an id format related to , for example , the frame type , and to the thread type . the principles , preferred embodiment and mode of operation of the present invention have been described in the foregoing specification . however , the invention which is intended to be protected is not to be construed as limited to the particular embodiments disclosed . further , the embodiments described herein are to be regarded as illustrative rather than restrictive . variations and changes may be made by others , and equivalents employed , without departing from the sprit of the present invention . accordingly , it is expressly intended that all such variations , changes and equivalents which fall within the spirit and scope of the present invention as defined in the claims , be embraced thereby ."}

{"publication\_number": "US-2007062427-A1", "abstract": "a cutting apparatus which is comprised of a main body including a hook section for hooking thereon a sewn material , a fixed blade fixed to a predetermined position of the main body , a cutting blade that cuts the sewn material by moving toward the fixed blade , and a drive device that moves the main body between a predetermined retracted position that does not interferer with sewing operation and a predetermined cutting position for cutting the sewn material . in sewing the sewn material , the main body is held at the retracted position , and in cutting the sewn material , the main body is caused to move from the retracted position to the cutting position by the drive device . the hook section is provided in the main body and at such a position as to hook thereon the sewn material as the main body moves to the cutting position . in cutting the sewn material , the cutting blade moves toward the fixed blade in response to driving operation of the drive device . the cutting apparatus is disposed a predetermined distance away from the sewing position .", "application\_number": "US-47085706-A", "description": "the present invention will now be described in detail with reference to the drawings showing a preferred embodiment thereof . fig1 is a front view showing an external appearance of part of an embroidering sewing machine in accordance with an embodiment of the present invention . fig2 is a left side view of the embroidering sewing machine taken from a left side of the machine shown in fig1 . construction of the embroidering sewing machine will be described below with primary reference to fig1 to 2 . whereas a plurality of machine heads h are disposed at predetermined intervals on a front surface ( i . e ., a surface closer to a reader of fig1 and a right side surface in fig2 ) of a machine frame m of the actual embroidering sewing machine , only one of the machine heads h is shown in the figures to facilitate understanding of the following description . in addition to such machine heads h , a support member 1 is fixed , via bolts or the like , to a predetermined position of the front surface of the machine frame m . as seen mainly from fig2 , opposite end portions of the support member 1 which are fixed to the front surface of the machine frame m are formed into a shape having an arm section extending in a horizontal direction toward the front surface of the embroidering sewing machine ( right side as viewed in fig2 ). further , a bobbin shaft 2 is fixed to a distal end of the arm section . bobbin 3 having a string material a ( elongated sewn material ), such as a tape or cord , wound thereon is detachably attached to the bobbin shaft 2 in such a manner that the bobbin 3 can be prevented from falling and can freely rotate . support plate 4 is fixed to the support member 1 in such a manner that it projects toward a position above the bobbin 3 . proximal end portion of the support plate 4 is rotatably supported by a motor shaft of a drive motor 5 fixed to the support member 1 . driving pulley 6 is fixed to the motor shaft of the drive motor 5 fixed to the support member 1 . the driving pulley 6 and the support member 1 inhibit the movement of the support plate 4 along the axis of the drive motor 5 . driven pulley 7 is rotatably provided on a distal end portion of the support plate 4 , and a round belt 8 is wound on and operatively connect the driven pulley 7 and driving pulley 6 . the driven pulley 7 is fixed to one end of a shaft 9 rotatably supported on a distal end portion of the support plate 4 , and a rotary pulley 10 is fixed to the other end of the shaft 9 . the rotary pulley 10 is held in abutment against the string material a wound on the bobbin 3 . thus , as the driving pulley 6 rotates by being driven by the drive motor 5 , the rotation of the driving pulley 6 is transmitted via the round belt 8 to the driven pulley 7 , which rotates the rotary pulley 10 fixed to the same shaft 9 as the driven pulley 7 . namely , the rotational force produced from the drive motor 5 is sequentially transmitted to the driving pulley 6 , round belt 8 , driven pulley 7 , shaft 9 and rotary pulley 10 in response to driving operation of the drive motor 5 , so that , ultimately , the bobbin 3 can be rotated by the thus - transmitted rotational force . since the support plate 4 is pivotally supported on the motor shaft of the drive motor 5 , the distal end portion of the support plate 4 is caused to pivot in a clockwise direction ( downward as viewed in fig2 ) under its own weight at that part as the amount of the string material a wound on the bobbin 3 decreases with consumption of the string material a in accordance with a progression of the sewing operation . thus , even if the amount of the string material a wound on the bobbin 3 decreases , the rotary pulley 10 and the string material a wound on the bobbin 3 are kept in abutment against each other , so that the bobbin 3 can be reliably rotated . it should be noted that a biasing means for biasing the support plate 4 in a clockwise direction ( downward as viewed in fig2 ) may be provided on the support plate 4 so that the rotary pulley 10 can be more reliably abutted against the string material a wound on the bobbin 3 . also , a non - slip member such as rubber may be provided on a surface of the rotary pulley 10 so that the bobbin 3 can be reliably rotated in accordance with rotation of the rotary pulley 10 . guide member 11 for guiding the string material paid out from the bobbin 3 downward is provided below the bobbin 3 . the guide member 11 is fixed to a guide base 12 which is fixed , via bolts or the like , to a part of the support member 1 below the arm section thereof to which the bobbin shaft 2 is fixed and extending horizontally toward the front surface of the embroidering sewing machine ( right side as viewed in fig2 ). cover 13 can be fixedly mounted on a front surface of the guide member 11 , and the string material a is guided downward via a space formed by the guide member 11 and the cover 13 . rod 14 is provided below the guide member 11 , and both ends of the rod 14 are fixed to respective lower end portions of a pair of pivot arms 15 and 16 which are pivotally supported at respective predetermined right and left position sandwiching in the machine head h therebetween . the pivot arm 15 disposed on the left side as viewed in fig1 is pivotally supported at its substantially middle portion by the guide base 12 , and the pivot arm 16 disposed on the right side as viewed in fig1 is pivotally supported at its substantially middle portion by the guide member 11 . the pivot arms 15 and 16 are caused to pivot , by tension applied to or acting on the string material a as the string material a is sewn , about the substantially central part thereof supported by the guide base 12 or the guide member 11 as the rod 14 is moved toward the front surface of the embroidering sewing machine ( right side as viewed in fig2 ). magnet 17 is fixed to an upper end portion of the pivot arm 15 disposed on the left side . in the guide base 12 , a bracket 19 is fixed in such a manner that a surface of part of the bracket 19 faces the magnet 17 fixed to the pivot arm 15 , and a magnetic sensor 18 can be attached to the surface of the part of the bracket 19 . thus , the magnetic sensor 18 can be disposed at a position opposed to the magnet 17 fixed to the pivot arm 15 , and hence the magnetic sensor 18 and the magnet 17 disposed in opposed relation to each other can detect the pivotal movement of the pivot arm 15 ( and the pivot arm 16 which operate in the same manner ). cover 20 is attached to the bracket 19 . also , as shown in fig1 or 2 , a bracket 22 is fixed to the guide member 11 in such a manner that it covers part of the cover 13 , and the bracket 22 is provided with a timer 21 and a switch 23 for controlling the driving operation of the drive motor 5 . the timer 21 is a well - known analog timer and intended to provide predetermined control in accordance with the time set by a dial operating element 21 a provided on a distal end portion of the timer 21 . in the present embodiment , control is performed such that the timer 21 starts measuring time at a time point when the magnetic sensor 18 detects the pivotal movement of the pivot arms 15 and 16 , and the driving motor 5 is caused to operate for the time set by the dial operating element 21 a . the switch 23 is intended to make a setting as to whether to interrupt a drive signal from the timer 21 to the drive motor 5 so as to inhibit the drive motor 5 from operating even if the pivot arms 15 and 16 pivot when the string material a is placed so as to be sewn , for example , before the start of sewing . holder 25 is fixed via a bracket 29 to a front surface ( i . e ., a surface closer to the reader of fig1 and a right side surface in fig2 ) of the machine head h , and a flexible first tube 26 for passing therethrough the string material a is fixed to the holder 25 . further , a second tube ( e . g ., spiral tube ) 27 , more flexible than the first tube 26 , is connected to the distal end of the first tube 26 . the second tube 27 is fixed at its distal end to a holder arm 28 that is in turn fixed to a later - described rotary bush 37 ( see fig3 ). with this arrangement , the string material a guided downward by the guide member 11 can always be guided in a state of abutment against a back side ( left side as viewed in fig2 ) of the rod 14 , through the two tubes 26 and 27 , to a right position ( sewing position , i . e ., drop position of the sewing needle 29 or position of sewing by the sewing needle 29 ) corresponding to the tip of the sewing needle 29 ( see fig3 ) via a later - described guide 46 ( see fig3 ). now , the construction of the machine head h will be described in detail with primary reference to fig3 . fig3 is a partly - sectional side view of the machine head h . the machine head h is a conventional machine head , and a needle bar 30 with the sewing needle 29 fixed to its lower end is vertically - movably provided on the machine head h . guide pipe 31 is fixed to a bottom plate of the machine head h , and a fabric - holder driving pipe 32 is provided within the guide pipe 31 in such a manner that it is vertically movable along and pivotable about the axis of the guide pipe 31 . the needle bar 30 is passed through the fabric - holder driving pipe 32 for vertical movement . engaging ring 33 is fixed to and along the outer periphery of an upper end portion of the fabric - holder driving pipe 32 , and a stroke arm 35 , vertically movable via a motor 34 , is held in engagement with the engaging ring 33 . fabric holder 36 is fixed to a lower end portion of the fabric - holder driving pipe 32 . the rotary bush 37 is provided along the outer periphery of the guide pipe 31 in such a manner that it is rotatable about the axis of the needle bar 30 . timing pulley section 38 is formed on the outer periphery of an upper end portion of the rotary bush 37 . the timing pulley section 38 is operatively connected , via a timing belt 41 , with a driving pulley 40 that is rotatable via a motor 39 . with such arrangements , the rotary bush 37 can be rotated by activation of the motor 39 . engagement member 42 is fixed to the rotary bush 37 and extends downward therefrom , and the engaging member 42 has , at its distal end , an engagement section 42 a engaged in a groove 36 a formed vertically in the outer periphery of the fabric holder 36 . thus , the fabric holder 36 is vertically movable along and rotatable about the axis of the needle bar 30 together with the rotary bush 37 . interlocking member 43 is provided along the outer periphery of the rotary bush 37 in such a manner that it is vertically movable and rotatable together with the rotary bush 37 . ring 44 vertically movable via a not - shown drive source is provided in a groove formed in the outer periphery of the interlocking member 43 . further , a guide lever 45 ( e . g . zigzag swing lever ) is rotatably provided on the outer peripheral surface of the rotary bush 37 . the guide lever 45 is connected with the interlocking member 43 so as to pivot in response to the vertical movement of the interlocking member 43 , and a pipe - shaped guide 46 for guiding the string material a to the sewing position of the sewing needle 28 is fixed to the lower end of the guide lever 45 . referring next to fig4 to 9 , a description will be given of a cutting apparatus s for cutting the string material a in the embroidering sewing machine constructed as described above . fig4 is a front view of a cutting apparatus lying at a retracted position . fig5 is a left side view of the cutting apparatus taken from a left side of the apparatus shown in fig4 . fig6 is a front view of the cutting apparatus lying at a cutting position . fig7 is a left side view of the cutting apparatus taken from a left side of the apparatus shown in fig6 . in the machine frame m , the cutting apparatus s is disposed at a predetermined position on the right side of the machine head h appearing in fig1 . here , the retracted position is a position which does not interfere with sewing of the string material a , and the cutting position is a position at which the string material a used for sewing is cut . as seen from fig4 to 9 , a bracket 47 is fixed to the machine frame m via bolts or the like , and a base member 49 is fixed to the bracket 47 via a spacer 48 . pneumatically - driven rotary actuator 50 is fixed to the base member 49 in such a manner that a rotary shaft 51 of the actuator 50 passes through the base member 49 . drive lever 52 is fixed to the rotary shaft 51 , and also , a flat - shaped knife base 53 is pivotally supported on the drive lever 52 . torsion spring , not shown , is provided between the driver lever 52 and the knife base 53 . by inserting opposite end portions of the torsion spring into holes , not shown , formed in the drive lever 52 and the knife base 53 , for fitting therein predetermined ends of the torsion spring , the torsion spring and the drive lever 52 and the knife base 53 are connected to each other . thus , when the drive lever 52 is caused to pivot by activation of the rotary actuator 50 , the knife base 53 is rotated at the same time via the torsion spring . the knife base 53 normally lies at the retracted position which does not interfere with sewing of the string material a as shown in fig4 and 5 , and when it is necessary to cut the string material a , the knife base 53 is caused to pivot to the cutting position for cutting the string material a as shown in fig6 and 7 . stopper 54 against which the knife base 53 having pivoted to the retracted position or cutting position abuts is provided at a predetermined position on the base member 49 so that the knife base 53 can be positioned at each of these positions . on the other hand , a pair of stoppers 61 and 62 which limit the pivotal movement range of the drive lever 52 is provided on the knife base 53 . further , a hook section 53 a is formed on a distal end portion of the knife base 53 , and a cutting concave section 53 b tapered from the hook section 53 a is formed like a slit . accordingly , a plate 63 having a groove section 63 a into which the hook section 53 a is fitted when the knife base 53 is caused to pivot is fixedly mounted on a well - known machine table below the cutting apparatus s . fig8 is a sectional view of the cutting apparatus s taken along line i - i in fig7 . fig9 is a right side view of a lower part of the cutting apparatus taken from a right side of the apparatus shown in fig8 . as seen from fig8 and 9 , a fixed knife 55 is fixed to and a pivotable knife 56 is pivotally supported on the fixed base 53 . the pivotable knife 56 is supported at its substantially middle portion by a support pin 57 in such a manner that it is pivotable and movable along the axis of the support pin 57 . coil spring 58 which biases the pivotable knife 56 in such a direction as to come into contact with the fixed knife 55 is provided on the support pin 57 . one end of the pivotable knife 56 is connected to a distal end portion of the drive lever 52 via a connecting plate 59 . the pivotable knife 56 has a cutting edge thereof normally lying at such a pivot position flush as to be flush with a lower end portion of the cutting concave section 53 b of the knife base 53 . the fixed knife 55 has a cutting edge thereof provided at such a pivot position as to be flush with an upper end portion of the cutting concave section 53 b of the knife base 53 . when the knife base 53 is caused to pivot to the cutting position , the fixed knife 55 and the pivotable knife 56 cut the string material a having been hooked on the hook section 53 a of the knife base 53 and guided into the cutting concave section 53 b . guide member 60 is disposed in contact with a side of the pivotable knife 56 . the guide member 60 biases the cutting edge of the pivotable knife 56 toward the fixed knife 55 and thereby cuts the string material a in a reliable manner . the following paragraphs describe how the embroidering sewing machine constructed as described above operates to sew the string material a to a not - shown fabric , not shown , by lock stitching . first , the string material a wound on the bobbin 3 is paid out and guided to the sewing position of the sewing needle 29 via the guide member 11 , back side of the rod 14 , first tube 26 , second tube 27 , and guide 46 , as explained above . then , control is performed , on the basis of embroidery data , such that the not - shown fabric is moved in x - and y - axis directions and the needle bar 30 is vertically driven to perform the well - known lock stitching by the sewing needle 29 in conjunction with a not - shown rotary hook . during that time , the fabric holder 36 is driven vertically , in predetermined timing relative to the vertical movement of the needle bar 30 , to perform the fabric holding function , as well known in the art . further , the ring 44 is driven vertically , in predetermined timing relative to the vertical movement of the needle bar 30 , in response to which the interlocking member 43 is vertically moved to cause the guide lever 45 to pivot . as a consequence , the string material a , having been guided to the sewing position of the sewing needle 29 by the guide 46 fixed to the lower end of the guide lever 45 , is swung to the left and right of the sewing position , for example , per vertical reciprocation ( i . e ., per stitch ) of the needle bar 30 . in this way , the string material a can be sequentially sewn onto the fabric by so - called \u201c zigzag switching \u201d. during that time , the rotary bush 37 is rotated by the motor 39 via the driving pulley 40 , timing belt 41 , and timing pulley 38 , in response to which the guide 46 is controlled to be positioned forward in a direction of relative movement of the machine head h based on the movement of the fabric . in this way , the string material a can be appropriately guided to the sewing position of the sewing needle 29 . if the rotary bush 37 is rotated 360 degrees or more , the second tube 27 might get undesirably entwined around the machine head h ; thus , it is necessary that the embroidery data be made so as not to rotate the rotary bush 37 360 degrees or more . as the string material a is sequentially sewn onto the fabric in the above - described manner , the rod 14 is pulled forward by the string material a , and in accordance with the movement of the rod 14 , the pivot arms 15 and 16 are caused to pivot . when the pivot arm 15 is caused to pivot , the magnetic sensor 18 detects this pivotal movement , and the drive motor 5 is operated to rotate the bobbin 3 for a period of time set by the timer 21 based on the detected pivotal movement , so that the string material a is paid out from the bobbin 3 . after that , when the pivot arms 15 and 16 have pivoted again as the string material a is sequentially sewn onto the fabric , the same operation as the above described one is performed to cause the bobbin 3 to rotate to pay out the string material a . thus , in sewing the string material a onto the fabric , by repeating the rotation and termination of the rotation of the bobbin 3 in accordance with the tension of the string material a , it is possible to smoothly and appropriately pay out the string material a to the sewing position of the sewing needle 29 . the following paragraphs describe how the string material a is cut by the cutting apparatus s after sewing of the string material a is completed . fig1 is a left side view of the cutting apparatus which has cut the string material a . fig1 is a conceptual diagram explanatory of a sewing end point to which the string material a is to be moved at the end of sewing . fig1 is a conceptual diagram explanatory of how the string material a is hooked on the hook section 53 a of the knife base 53 . after sewing of the string material a onto the fabric is completed , the fabric with the string material a sewn thereon is displaced in the x - and y - axis directions ( typically , an embroidery frame holding the fabric is displaced ) in such a manner that the final position on the fabric at which the string material a is finally sewn is displaced from the sewing position of the sewing needle 29 to a sewing end point e shown in fig1 . it goes without saying that during the movement of the fabric , the vertical movement of the needle bar 30 is suspended , and the well - known stitching by the sewing needle 29 and the not - shown rotary hook is inhibited from being performed . as the fabric is moved , the string material a is paid out from the bobbin 3 by an amount corresponding to the displaced amount of the fabric . the sewing end point e is set at such a predetermined position that part of the string material a newly paid out from the bobbin 3 goes over the groove 63 a of the plate 63 . in a state in which part of the string material a is positioned above the groove 63 a of the plate 63 , the rotary actuator 50 of the cutting apparatus s is activated to pivot the drive lever 52 in a clockwise direction ( see fig5 ). when the drive lever 52 is caused to pivot , the knife base 53 is also caused to pivot via the not - shown torsion spring together with the drive lever 52 , causing the knife base 53 to pivot from the \u201c retracted position \u201d in which the knife base 52 lies in a horizontal position as shown in fig5 to the \u201c cutting position \u201d in which the knife base 52 lies in a vertical position as shown in fig7 . when the knife base 53 is caused to pivot from the retracted position to the cutting position , the hook section 53 a of the knife base 53 hooks thereon the string material a positioned above the groove 63 a of the plate 63 , and the hooked string material a is guided to the cutting concave section 53 b by further pivotal movement of the knife base 53 . the state of the string material a when the knife base 53 has pivoted to the cutting position as described above is as shown in fig3 . even after the knife base 53 has been caused to pivot to the cutting position ( see fig7 ), the rotary actuator 50 is continuously operated to further pivot the drive lever 52 . however , since the knife base 53 is abutted against the stopper 54 at the cutting position , the pivotal movement of the knife base 53 is terminated to inhibit further pivotal movement thereof . while the pivotal movement of the knife base 53 is terminated , only the drive lever 52 is caused to further pivot , causing the pivotable knife 56 to start pivoting via the connecting plate 59 . as shown in fig9 , the pivotable knife 56 is caused to pivot counterclockwise about the support pin 57 in response to vertical movement of the connecting plate 59 in accordance with the pivotal movement of the drive lever 52 . the drive lever 52 is caused to pivot to the position indicated in fig1 at which it is abutted against the lower stopper 61 . since the pivotable knife 56 is caused to pivot to the position indicated in fig1 in accordance with the pivotal movement of the drive lever 52 , the string material a guided to the cutting concave section 53 b is cut in a state in which it is sandwiched between the pivotable knife 56 and the fixed knife 55 . it should be noted that in cutting the string material a , an upper thread , not shown , extending from the fabric to the sewing needle 29 is cut at the same time . after the string material a ( and the upper thread ) is cut , the rotary actuator 50 is rotated backward to pivot the drive lever 52 in a counterclockwise direction . until the drive lever 52 is caused to pivot from the position indicated in fig1 to the position indicated in fig7 , i . e ., until the drive lever 52 shifts from the state in which it is held in abutment against the lower stopper 61 to the state in which it is held in abutment against the upper stopper 62 , only the drive lever 52 is caused to pivot by a torsion spring , not shown . as a consequence , the pivotable knife 56 is caused to pivot to its original position . after that , the rotary actuator 50 is activated to pivot the drive lever 52 and the knife base 53 at the same time , so that the knife base 53 is caused to pivot from the cutting position indicated in fig7 to the retracted position indicated in fig5 . in the embodiment of the embroidering sewing machine , as described above , the knife base 53 is caused to pivot from the retracted position to the cutting position , so that the string material a is hooked on the hook section 53 a of the knife base 53 and guided to the cutting concave section 53 b so as to be cut . thus , the single rotary actuator 50 can drive the cutting apparatus s to move from the retracted position to the cutting position and cause the string material a to be hooked on the hook section 53 a . also , the rotary actuator 50 also causes the pivotable knife 56 to pivot . thus , the cost of the cutting apparatus s can be reduced , and the cutting apparatus s can be made compact . further , the cutting apparatus s is disposed away from the sewing needle 29 , and in cutting the string material s , the fabric is moved to newly pull out so that predetermined amount of the string material s ( and the upper thread ) can be newly pulled out . thus , in sewing the string material a again , the user does not have to take the trouble to pull out the string material a of the guide 46 ( and the upper thread remaining at the tip of the sewing needle 29 ). in a variation example of the above described embodiment , as shown in fig1 to 15 , the knife base 53 may be provided with a retaining member 100 which retains an end portion of the string material a having been cut . fig1 is a perspective view showing a lower part of the cutting apparatus s in which the knife base 53 s provided with the retaining member 100 . fig1 is a left side view of the lower part of the cutting apparatus s in fig1 where the string material a is hooked on the hook section 53 a . fig1 is a left side view of the lower part of the cutting apparatus s in fig1 where the string material s has been cut by pivotal movement of the pivotable knife 56 . as shown in fig1 , the retaining member 100 is supported by the support pin 57 in such a manner that it is pivotable together with the movable knife 56 , and has a distal end portion 100 a lies at such a position as to overlap the cutting concave section 53 b of the knife base 53 . when the movable knife 56 is caused to pivot to the cutting position , the distal end portion 100 a of the retaining member 100 pivots upward away from a lower surface of the cutting concave section 53 b in response to the upward pivotal movement of the movable knife 56 , and therefore , the pivotable knife 56 is abutted against an upper surface 53 b \u2032 of the cutting concave section 53 b . the end portion of the string material a is retained between the retaining member 100 and the upper surface 53 b \u2032 ( see fig1 ). it should be noted that , if the knife base 53 is provided with the retaining member 100 , the knife base 53 may be positioned at the cutting position even after cutting of the string material a and caused to pivot to the retracted position when sewing is started again . it should be noted that in the above described embodiment and variation , the position at which the cutting apparatus s is disposed may be set at any position insofar as a sufficient amount of the string material a enough to perform sewing again can be pulled out of the guide 46 ( and the upper thread remaining at the tip of the sewing needle 29 ) after the string material a is cut . the pneumatically driven rotary actuator 50 may be another type of actuator such as a pulse motor . there may be provided a bearing member which supports a distal end portion of the rotary shaft 51 of the rotary actuator 50 . although in the above described embodiment , the pivotable knife 56 is pivotally supported on the knife base 53 , the present invention is , of course , not so limited , but the pivotable knife 56 may be configured to be slidable and may cut the string material a by sliding ."}

{"publication\_number": "US-5494509-A", "abstract": "a paper coating composition is provided having a clay - containing pigment system , a binder , a polysaccharide thickener , and at least 0 . 005 % to 2 %, based upon the weight of the polymer , of a blocking agent that serves to prevent more than 25 % of the polysaccharide thickener from being adsorbed onto the clay pigment surface . this coating is applied to raw paper for producing a high quality paper with smooth and substantially free of indentations surfaces for good ink to paper transfer .", "application\_number": "US-14309493-A", "description": "the paper coating industry is always seeking improved productivity . it is known that nonionic polysaccharides like hydroxyethylcellulose ( hec ), when used in a clay based paper coating give improved results regarding coating holdout and required dosage when compared to conventional thickeners like carboxymethylcellulose ( cmc ) and polyacrylates . this performance is due to its influence on the structure of the paper coating because the adsorption of the nonionic cellulosic causes ( partial ) flocculation of the clay particles at high paper coating , solids content . beyond these advantages , hydrophobically modified hydroxyethylcellulose ( hmhec ), like natrosol \u00ae plus grade 330 polymer from the aqualon company , a division of hercules incorporated , provides high thickening efficiency with higher pseudoplasticity in high solids content coating compositions due to association between the hydrophobes in the hmhec and other ingredients present in the paper coating , e . g ., the binder . during blade coating , a hydrophobically modified cellulosic allows lower blade pressures , which can result in reduced water loss to the paper stock , web breaking and streaking , particularly at high speed , as described in u . s . pat . no . 4 , 994 , 112 . also , the associative character of the thickener gives a faster immobilization of the paper coating after the blade due to quick structure reformation and thus a better coating holdout , resulting in improved optical and printability properties of the coated paper . however , the degree of thickener adsorption must be limited , as over - flocculation can occur , initially resulting in a so called &# 34 ; pigment shock &# 34 ; that is caused by the bridging flocculation of clay particles by the co - binder molecular . this is often the case when nonionic polysaccharides are involved , especially in combination when european kaolin clays are involved , which are known for their strong adsorbing character . as well as the undesired pigment shock , over flocculation causes poor water retention and high blade load , thus poor runnability of the coating systems . in cases where the thickener has an associative character ( hmhec ), a too high level of adsorption has an even more detrimental effect . the benefit of the associative character is diminished when an insufficient amount of thickener is present in the water phase of the coating color due to a high level of adsorption of that thickener onto the pigment . it is known from the literature that , in addition to nonionic polysaccharides like hec and hmhec , hydrophilic nonionic polymers such as poly ( vinyl alcohol ) ( pvoh ) and polyethylene oxide ( peo ) adsorb in substantial amounts onto clay surfaces . this is particularly the case when european kaolin clays are involved . equilibrium adsorption experiments for individual polymers in an aqueous suspension of clay particles have indicated that pvoh is adsorbed to a greater extent than hec . when the pvoh is present in a binary mixture with a cellulosic polymer , the amount of adsorbed cellulosic is diminished in comparison to the amount adsorbed when no competing polymeric species is present . for cases in which one polymer is permitted to reach an equilibrium between its presence in the water phase and on the clay surface , prior to the addition of a second polymer , the displacement of the first polymer by the second is dependent upon the particular nature of both polymers being present . it was found that pvoh is able to displace hec and hmhec significantly from the clay . this happens whether the thickeners are added as dry powders , as solutions or as fluid suspensions in aqueous or non - aqueous media . this indicates that pvoh is preferentially adsorbed onto the clay surface and the strength of attachment is greater than for hec and thus prevents adsorption of the hec onto the clay surface . application of the present invention provides a means of preventing or minimizing the pigment shock by using so called blockers such as described above in combination with thickeners which have strong adsorbing tendencies towards clays . the molecular weight of the blockers should be low to prevent them from causing flocculation of the clay particles themselves . this blocking also forces the thickener to remain largely in the aqueous phase of the coating composition , making it better able to fill its desired function in the papermaking operation . an optimal balance of co - binder adsorbed on the pigment surface and dissolved in the liquid phase is required to give the paper coating its preferred theology . the present invention enables one to control flocculation of those paper coatings , leading to substantial improvement of coating process performance in terms of pigment shock , dynamic water retention , coating holdout and coating rheology , particularly at high shear rates . in addition to blocking , the blockers might contribute their own beneficial properties to the coating property balance ; pva , for example , is known for its positive influence on the brightness of the coated paper and its positive effect on the boosting of optical brightening agents ( oba ). as to the materials , the pigment portion is generally an aqueous dispersion of coating grade clays such as kaolin clays . in conjunction with the clays there may also be added one or more of the following : titanium dioxide , calcium carbonate , barium sulfate , talc , zinc sulfate , aluminum sulfate , calcium oxide reaction products and other similarly used materials . suitable thickeners for this invention are water soluble alkylhydroxyalkyl cellulose or hydroxyalkyl cellulose or a combination thereof as well as their hydrophobically modified analogues , the hydrophobically modified derivates being the most effective . a preferred hydrophobically modified cellulosic is natrosol \u00ae plus , a hydrophobically modified hydroxyethylcellulose , produced by the aqualon company , a division of hercules incorporated . depending upon the needs of the paper manufacturer , it may be desirable to use one or more hydrophobically modified polysaccharides in combination with hec or cmc . as to the blocker , low molecular weight polyols may be used , like pvoh , peo , polypropylene glycol ( ppg ), polyvinyl pyrrolidone , lower molecular weight water soluble alkylhydroxyalkyl cellulosics and nonionic polyacrylamide and salts of polyacrylic acid and polymethyacrylic acid are also effective . in order to obtain the full advantage of blocking , the blocker should not exceed a certain molecular weight , as it may function as a flocculant itself at higher molecular weight . for that reason , the optimum molecular weight for peo is in the range of 1000 - 50 , 000 . the optimum range for pva is in the range of 5000 - 50 , 000 . for the practice of the invention , the pva can be 70 - 90 , preferably 85 - 90 and most preferably 87 - 89 mol . % hydrolyzed . in preparing the coating material , an aqueous slurry of the pigment is prepared by admixing the clay and other additives in a water system . ph is preferably in the alkaline range , between about 7 . 2 - 12 . the pigment slurry is generally prepared as a dispersion of solids in the range of about 40 - 80 % by weight , the higher range being preferred as in the range 60 - 70 % solids for reasons including economy of handling . the blocker can be added before or together with the thickener , as a powder , a fluid suspension or as a solution . in order to prevent or minimize pigment shock , it is important that the blocker reaches the pigment surface in a dissolved state before the thickener . depending upon factors like pigment composition , type and molecular weight of the blocker and the type of thickener , the blocker is used in weight portion of from 0 . 005 - 2 % on the weight of pigment solids ( clay and other pigments ). proportions outside of this range are considered either inoperative below the lower range or uneconomic above the upper range . this example illustrates the effect of several cellulosic co - binders on the pigment shock related to the percentage co - binder being adsorbed onto the clay surface . pigment slurries containing 60 % solids were prepared based on formulation 1 . the data in table 1 show that application of nonionic hydroxyl - rich water soluble polysaccharides can result in severe pigment shock , being related to the amount of adsorbed polysaccharide . pigment shock was quantified by measuring the maximum torque onto the stirrer upon addition of a 7 . 5 % thickener solution in water onto the slurry . the relative torque values are used to indicate whether or not the blocker is effective by controlling the flocculation . four hours after preparation , the brookfield rvt viscosity was measured at 100 rpm and 25 \u00b0 c . the amount of adsorbed thickener was established by determination of the thickener amount being present in the water phase after centrifuging the system 24 hours later for 2 hours at 30 , 000 g . analyses were done according to the anthrone colorimetric method as described in hercules bulletin vc 507 . \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_formulation 1 parts by weight ( based on dry or 100 % ingredient active materials ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_sps 100dispex n40 0 . 25naoh 0 . 1co - binder variable\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sps pigment , kaolin clay , ecci dispex n40 clay dispersant , allied colloids table 1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ viscosity torque adsorbedco - binder amount \* ( mpa \u00b7 s ) ( mnm ) (%) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_natrosol \u00ae 250 lr 0 . 3 1200 & gt ;& gt ; 100 99natrosol plus \u00ae 0 . 3 1500 & gt ;& gt ; 100 100grade 330cmhec 37l 0 . 8 1300 35 39blanose 7l2c 1 . 0 1200 22 9\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ natrosol \u00ae 250 lr hydroxyethylcellulose , aqualon bv natrosol plus \u00ae grade 330 hydrophobically modified hydroxyethylcellulose , aqualon bv cmhec 37l carboxymethylhydroxyethylcellulose , aqualon blanose 7l2c carboxymethylcellulose , aqualon france sa \* amount of thickener is expressed as parts on 100 parts of pigment this example illustrates that pvoh acts as a blocker by preferential adsorption in a pigment system which includes a strongly adsorbing kaolin clay . by using the formulation and procedure as described in example 1 , table 2 shows that both intensity and duration of the pigment shock caused by strong adsorption of hmhec onto sps clay can be significantly reduced by using pvoh , indicating that the degree of flocculation is controlled . natrosol plus \u00ae grade 330 was used at a level of 0 . 35 parts on 100 parts clay . table 2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_poly ( vinyl mw torque t1 t2alcohol ) ( min .) amount ( mnm ) ( s ) ( min . ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_none ( control & gt ;& gt ; 100 130 & gt ; 10airvol 203 10 , 000 0 . 1 & gt ; 100 50 6airvol 203 10 , 000 0 . 5 92 1 3poly ( vinyl 13 , 000 0 . 1 & gt ; 100 7alcohol ) poly ( vinyl 13 , 000 0 . 5 95 3alcohol ) polyviol m13 / 140 49 , 000 0 . 1 & gt ; 100 & gt ; 10polyviol m13 / 140 49 , 000 0 . 5 & gt ; 100 & gt ; 10polyviol w25 / 140 79 , 000 0 . 1 & gt ;& gt ; 100 & gt ; 10polyviol w25 / 140 79 , 000 0 . 5 & gt ;& gt ; 100 & gt ; 10\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ airvol 203 air products poly ( vinyl alcohol ) aldrich chemicals , pva being 87 - 89 mol . % hydrolyzed polyviol m13 / 140 wacker polyviol m25 / 140 wacker t1 expresses the time at which the maximum torque has been measured , calculated from the moment of co - binder / blocker addition . t2 gives the time it takes before the viscosity curve has leveled off , indicating that the system has reached its equilibrium . these data clearly show that optimum results are found in the lower mw ranges . by using the formulation and procedure mentioned in example 2 and replacing sps by a less strongly adsorbing kaolin clay like db plate , the use of pva as blocker is even more pronounced . see data in table 3 . table 3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_poly ( vinyl mw torque t1 t2alcohol ) ( min .) amount ( mnm ) ( s ) ( min . ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_none ( control 39 25 2airvol 203 10 , 000 0 . 1 10 1 & lt ; 1airvol 203 10 , 000 0 . 5 8 1 & lt ; 1poly ( vinyl alcohol ) 49 , 000 0 . 1 27 1 & lt ; 1poly ( vinyl alcohol ) 49 , 000 0 . 5 14 1 & lt ; 1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sps has been replaced by db plate , a kaolin clay delivered by euroclay , at the same dosage . this example shows that pvoh diminishes the amount of hmhec being adsorbed onto kaolin clay , using the formulation and procedure as described in example 1 . polyviol m13 / 140 was used as a blocker at several dosages , preventing natrosol plus \u00ae grade 330 from adsorption onto db plate . table 4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ thickener beingpoly ( vinyl alcohol ) adsorbed ( pph )\* (%) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_0 . 0 control 790 . 1 410 . 3 200 . 5 8\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \* amount of poly ( vinyl alcohol ) is expressed as parts on 100 parts of pigment . the effect of peo on the adsorption level of hmhec is shown in this example , using the same set - up as in example 4 , except that polyviol m13 / 140 was replaced by lutrol e4000 , a peo produced by basf , having an average molecular weight of 4000 . table 5\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ thickener beingpoly ( vinyl alcohol ) adsorbed ( pph )\* (%) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_0 . 0 control 790 . 1 260 . 3 240 . 5 19\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \* amount of poly ( vinyl alcohol ) is expressed as parts on 100 parts of pigment . this example illustrates that peo is able to reduce or prevent pigment shock by preferential adsorption onto kaolin clay . referring to the formulation and procedure as described in example 1 , table 6 shows that the intensity of the pigment shock caused by strong adsorption of hmhec onto db plate can be significantly reduced by using peo . natrosol plus \u00ae hmhec grade 330 was used at a level of 0 . 35 parts on 100 parts of clay . after this , dl 945 , a styrene butadiene latex produced by dow chemical co ., was added as the binder to the pigment slurry , prior to the addition of the thickener / blocker combination . this was done at a binder level of 10 parts on 100 parts db plate , based on dry material . table 6\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ peo level torquemw peo ( pph )\* ( mnm ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -- 0 . 0 control 234000 0 . 1 124000 0 . 5 86000 0 . 1 116000 0 . 1 78000 0 . 5 715000 0 . 1 11\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \* amount of peo is expressed as parts on 100 parts of pigment . this example illustrates that the blocking principle is also very effective with peo in combination with a strongly adsorbing clay by using the description of example 6 , except that db plate has been replaced by sps clay . table 7\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ peo level torquemw peo ( pph )\* ( mnm ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -- 0 . 0 control 1004000 0 . 5 13\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \* amount of peo is expressed as parts on 100 parts of pigment . this example illustrates that the blocking principle is effective in controlling the flocculation caused by polymer adsorption . paper coatings at a solids content of 60 % were prepared , based on formulation 2 . thickener dosage was adjusted to end up at a viscosity of 1000 mpa . s ( see table 8 ). clc coater trial results reveal that the addition of pvoh led to reduced blade pressure , despite a higher hercules viscosity . the reduction is explained as a result of an improved dynamic water retention due to controlled flocculation . this improvement is already indicated by the s . d . warren retention time results ( see table 8 ). \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_formulation 2components parts ( w / w ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_delaminated clay 50american clay no . 2 50dispersant 0 . 15sb latex 7nopcote 104 1foamaster vf 0 . 1thickener varied\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ table 8\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_thickener . sup . ( 1 ) dose . sup . ( 2 ) hercules . sup . ( 3 ) wrt . sup . ( 4 ) bp . sup . i ( 5 ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_hmhec / pvoh , 100 / 0 0 . 38 81 . 5 7 27 . 0 / 32 . 0hmhec // pvoh , 0 . 43 87 . 5 8 25 . 0 / 28 . 075 / 25\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ . sup . ( 1 ) hmhec natrosol plus \u00ae grade 330 ex aqualon bv pvoh airvol 803 ex air products . sup . ( 2 ) parts per 100 parts of pigment . . sup . ( 3 ) hercules high shear viscosity ( mpa \u00b7 s ). . sup . ( 4 ) s . d . warren water retention time ( s ). . sup . ( 5 ) blade pressure index , which indicates the amount of blade runin required to give the target coat weight , 7 . 4 g / m . sup . 2 . the lower bpi values on the left side were measured at 920 m / min ., while the values on the right side were measured at 1220 m / min . this example illustrates that the blocking principle is also applicable to hydrophobically modified ethylhydroxyethyl cellulose ( hmehec ), using the same set up as mentioned in example 6 , except that natrosol plus \u00ae grad 330 polymer is replaced by bermocoll ehm 100 polymer , an hmehec produced by berol nobel . table 9\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ thickener being amount \*\*\* torque t1 \*\*\*\* t2 . sup . a adsorbedblocker ( pph ) ( mnm ) ( s ) ( min .) (%) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_none 19 35 2 75 ( control ) airvol 203 \* 0 . 1 8 1 & lt ; 1 22airvol 203 0 . 5 6 1 & lt ; 1 0lutrol e 0 . 1 7 1 & lt ; 14000 \*\* lutrol e 4000 0 . 5 5 1 & lt ; 1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \* airvol 203 air products ( pva ) \*\* lutrol e 4000 hasf ( peo ) \*\*\* amount of blocker is calculated on the amount of clay \*\*\*\* t1 expresses the time at which the maximum torque has been measured , calculated from the moment of thickener addition . sup . a t2 gives the time it takes before the viscosity curves have levelled off , indicating that the system has reached its equilibrium . this example shows that the blocking principle is also very effective with alkylaryl ethoxylates . referring to the formulation and procedure in example 6 , table 10 visualizes that the intensity of the pigment shock caused by strong adsorption of hmhec onto db plate can be significantly reduced by antarox co 970 polymer , a nonylphenol ethoxylate ( 50 eo units ) produced by gaf . table 10\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ amount torque t1 t2blocker ( pph ) ( mnm ) ( s ) ( min . ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_none ( control ) & gt ;& gt ; 100 130 & gt ; 10antarox co 970 0 . 5 81 1 5\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_"}

{"publication\_number": "US-8602229-B2", "abstract": "a portable clothesline assembly is provided for facilitating hanging of clothes at a selectable location . the assembly includes a first stand , a second stand , and a scissor arm having a first end coupled to the first stand and a second end coupled to the second stand . a first boom arm coupled to the first stand and a second boom arm coupled to the second stand . a line is coupled to and extends between the first boom arm and the second boom arm .", "application\_number": "US-201213356948-A", "description": "with reference now to the drawings , and in particular to fig1 through 6 thereof , a new clothesline device embodying the principles and concepts of an embodiment of the disclosure and generally designated by the reference numeral 10 will be described . as best illustrated in fig1 through 6 , the portable clothesline assembly 10 generally comprises a collapsible first stand 12 , a collapsible second stand 14 , and a line 16 extending between the first stand 12 and the second stand 14 . the first stand 12 includes a plurality of legs 18 coupled to a telescopic mast 20 . the legs 18 of the first stand 12 have upper ends 22 pivotally coupled to an upper mast head 24 coupled to the mast 20 of the first stand 12 . the first stand 12 further includes a pair of brace arms 26 . each brace arm 26 of the first stand 12 has a first end 28 pivotally coupled to an associated one of the legs 18 of the first stand 12 . the first stand 12 includes a lower mast head 30 coupled to the mast 20 of the first stand 12 . each brace arm 26 of the first stand 12 has a second end 32 coupled to the lower mast head 30 of the first stand 12 . the lower mast head 30 is slidable on the mast 20 of the first stand 12 . the second stand 14 also has a plurality of legs 34 coupled to a telescopic mast 36 . the legs 34 of the second stand 14 have upper ends 38 pivotally coupled to an upper mast head 40 coupled to the mast 36 of the second stand 14 . the second stand 14 includes a pair of brace arms 42 . each brace arm 42 of the second stand 14 has a first end 44 pivotally coupled to an associated one of the legs 34 of the second stand 14 . the second stand 14 also includes a lower mast head 46 coupled to the mast 36 of the second stand 14 . each brace arm 42 of the second stand 14 also has a second end 48 coupled to the lower mast head 46 of the second stand 14 . the lower mast head 46 is slidable on the mast 36 of the second stand 14 . a scissor arm 50 has a first end 52 coupled to the first stand 12 and a second end 54 coupled to the second stand 14 . a first boom arm 56 is coupled to the first stand 12 . the first boom arm 56 has a pair of pivotal end sections 58 whereby the first boom arm 56 is pivotable between an extended position 60 and a collapsed position 62 . similarly , a second boom arm 64 is coupled to the second stand 14 . the second boom arm 64 has a pair of pivotal end sections 66 whereby the second boom arm 64 is pivotable between an extended position 68 and a collapsed position 70 . a plurality of spaced holes 72 is positioned in the first boom arm 56 . a plurality of spaced apertures 74 is positioned in the second boom arm 64 . the line 16 is coupled to and extends between the first boom arm 56 and the second boom arm 64 . the line 16 passes through the holes 72 and the apertures 74 to extend between the first boom arm 56 and the second boom arm 64 multiple times . rollers 76 may be positioned in each of the holes 72 and apertures 74 to facilitate movement and tightening of the line 16 . a pair of spaced hooks 78 is coupled to the mast 20 of the first stand 12 . a medial portion 80 of the line 16 is wrapped around and extends between the spaced hooks 78 . a pair of cleats 82 is coupled to the first boom arm 56 . each cleat 82 is coupled to the first boom arm 56 on opposite sides adjacent to the mast 20 of the first stand 12 . the line 16 is selectively engaged to each cleat 82 whereby the line 16 extends tautly between the first boom arm 56 and the second boom arm 64 . in use , the first stand 12 and the second stand 14 are expanded and moved away from each other to expand the scissor arm 50 . the first boom arm 56 and second boom arm 64 are pivoted upwardly and held in position either mechanically or by tension in the line 16 . the line 16 is held in tension by insertion into the cleats 82 . excess portions of line 16 may be wrapped around the hooks 78 . with respect to the above description then , it is to be realized that the optimum dimensional relationships for the parts of an embodiment enabled by the disclosure , to include variations in size , materials , shape , form , function and manner of operation , assembly and use , are deemed readily apparent and obvious to one skilled in the art , and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by an embodiment of the disclosure . therefore , the foregoing is considered as illustrative only of the principles of the disclosure . further , since numerous modifications and changes will readily occur to those skilled in the art , it is not desired to limit the disclosure to the exact construction and operation shown and described , and accordingly , all suitable modifications and equivalents may be resorted to , falling within the scope of the disclosure ."}

{"publication\_number": "US-4457245-A", "abstract": "an apparatus and method for implementing bobbin winding in place in a looptaker of a sewing machine . when a presser foot lift lever is manipulated to elevate a presser foot , and the sewing machine motor is activated , a series of two or three endwise reciprocations of the sewing machine is effected to bring an upper thread to the lower thread carrying bobbin , after which further endwise reciprocation of the sewing needle is held in abeyance while actuation of the sewing machine motor is continued , to provide the least disturbance of upper thread passage to the lower thread bobbin . no other bobbin winding signaling steps are required .", "application\_number": "US-52590983-A", "description": "this invention is in the field of sewing machines ; more particularly , it is concerned with a simplified arrangement for implementing bobbin winding in place in a looptaker of a sewing machine . in a prior art family lock stitch sewing machine having the capability to wind a lower thread bobbin in place in the sewing machine looptaker , several steps were required after the need for lower thread was perceived , including , firstly , raise the presser foot to release the tension from the tension discs so as to allow thread to run freely from the upper large thread supply through the needle eye to the lower thread bobbin . secondly , it is necessary to open the bed slide plate to expose the bobbin winding mechanism and actuate the bobbin winding latch to the winding position . thirdly , a blindstitch pattern was selected in which several stitches are skipped and three stitches are made in a continuous sequence . in this way , a three stitch sequence could be provided in which an upper thread was brought down to the sewing machine looptaker in order to load an upper thread on the bobbin , as is taught in the u . s . pat . no . 3 , 693 , 566 , of ketterer which was issued on sept . 26 , 1972 . fourthly , a single pattern repeat symbol must also be selected which will provide that only a single blind stitch sequence would be implemented , so that a repeated up and down motion of the needle which might impede a smooth flow of thread from the spool to the bobbin might be avoided . fifthly , a thread ending from the sewing needle eye must be drawn underneath the elevated presser foot and wrapped around the thumb retaining screw for the presser foot , in order to provide a sufficient tautness to the trailing thread end for a loop to be thrown that might be picked up by the loop taker . it would be advantageous to simplify the above process insofar as possible . many of the above steps , however , are not readily eliminated since the thread tension must be released , the bobbin winding mechanism must be armed and , steps must be taken to insure that a thread loop is provided for the loop taker . what is required is an apparatus and / or method which will simplify bobbin winding . advantageously , this method should be implemented as economically as possible . the above requirements are attained in a sewing machine having a switch actuated by elevation of the sewing machine presser bar , a means for counting endwise reciprocations of the sewing machine needle bar , and a circuit responsive to a selected number of endwise reciprocations of the needle bar to actuate a basting mechanism to halt such continued endwise reciprocation . such a device is readily implemented in an electronically controlled sewing machine , by using an arm shaft position sensor as a stitch completion indicator , which indications are counted up in a counter that is reset by a presser foot up switch to initiate a stitch count . when a selected number of stitches has been implemented with the presser foot elevated , a basting mechanism on the needle bar may be actuated by a solenoid activated by way of the counter , or by a bight linear motor of the sewing machine in a basting arrangement where basting is implemented by overthrow of the needle bar gate beyond the range of stitch positions . thus , the selection of a blind stitch pattern and a single pattern repeat is no longer necessary , equivalent steps having been implemented by raising the presser foot . with the above and additional objects and advantages in view , as will hereinafter appear , this invention will now be described with reference to the accompanying drawing of a preferred embodiment in which : fig1 is a perspective view of a sewing machine implementing the present invention in which the frame is shown in phantom to provide the inner details of the sewing machine ; fig2 is a detached front elevation of a latch mechanism attached to the needle bar of the sewing machine of fig1 ; fig3 represents a perspective view of a basting stitch initiated by needle bar overthrow illustrating the needle bar latch being driven into the disconnected position ; and fig4 is a block diagram of the circuit incorporated in the sewing machine of fig1 to implement the invention . referring to fig1 there is disclosed a sewing machine 10 having a frame shown in phantom and including a bed 12 from one end of which there rises a standard 14 to support a bracket arm 16 in overhanging relationship to the bed , the bracket arm terminating in head 18 . supported in the bed 12 is a motor 20 the electric leads 21 of which may be connected to a source of power in a manner well known in the sewing machine art , so as to selectively actuate the sewing machine 10 . the motor 20 is connected by means of pulley 22 and timing belt 23 to a drive pulley 24 for a drive shaft 25 connected by gearing 29 to a sewing machine feed system 26 which terminates in feed dog 27 . the feed system 26 may , typically , be provided with a slide block and slide arrangement 28 providing a means to vary the extent and direction of the feed by the feed dog 27 . selective rotation of the slide block and slide arrangement 28 to vary feed is provided through a lever 30 connected to the slide block and slide arrangement and having the other end thereof connected by link 32 to a feed linear motor 34 which may be directed by an electronic control to position the slide block and slide arrangement 28 in a selected discrete position . a typical feed system which might be implemented in the bed 12 of the sewing machine 10 is one similar to that disclosed in the u . s . pat . no . 3 , 527 , 183 , which issued on sept . 8 , 1970 to szostak , and which is hereby incorporated by reference herein . also supported within the bed 12 is a looptaker 40 which is driven by way of bevel gear connection 42 to the drive shaft 25 . supported within the looptaker 40 is a bobbin 44 . a wind lever 46 is provided which may be shifted in a counterclockwise direction to allow entry of the bobbin 44 into the looptaker 40 , or may be shifted to a central position to retain the bobbin 44 therein . the wind lever 46 may also be shifted to an extreme clockwise position , as viewed in fig1 in which a cam 48 situated on the end of a shaft 50 to which the wind lever 46 is attached , urges a bracket 52 upwardly to bring post 53 , which is situated centrally of the looptaker 40 , into engagement with the bobbin 44 to initiate rotation thereof for the purpose of winding upper thread on the bobbin to provide a source of lower thread for a lock stitch . further particulars on a specific desirable arrangement for replenishing bobbin thread may be had by reference to the u . s . pat . no . 3 , 693 , 566 , issued on sept . 26 , 1972 to ketterer , which patent is hereby incorporated by reference herein . a bed slide plate 54 is provided on bed 12 , which slide plate may be slid away from the looptaker 40 and wind lever 46 in order to expose the same for initiation of the bobbin winding process or for any required maintenance of the mechanisms in that area . the bed slide plate 54 is provided with a window 55 by which the status of the lower thread supply on the bobbin 44 may be monitored . supported within the bracket arm 16 is a horizontal arm shaft 58 which is connected to the motor 20 by a handwheel pulley combination 60 , and in which the belt 23 is engaged with the pulley portion thereof . an idler pulley 61 is provided so that an efficient motion transmitting arrangement may be maintained between the electric motor 20 and drive shaft 25 and horizontal arm shaft 58 . the horizontal arm shaft 58 supports thereon a portion of a pulse generator 62 which is connected by leads 63 to an electronic control arrangement 66 also supported in the bracket arm 16 . the pulse generator 62 provides a signal synchronized to the operations of the sewing machine 10 , and provides a synchronization signal to the electronic control arrangement 66 so as to allow the electronic control arrangement to , for example , initiate operation of the feed linear motor 34 at the proper time in the sewing cycle to vary the extent and direction of the feeding motion implemented by the feed dog 27 . the bracket arm 16 includes a control panel 68 supporting therein pattern selection buttons 70 which are also connected to the electronic control arrangement 66 in order to provide for the transfer of specific pattern information from the electronic control arrangement to the linear motors of the sewing machine . more specific information on a particular electronic control arrangement 66 may be had by reference to u . s . pat . nos . 3 , 847 , 100 and 3 , 872 , 808 , issued on nov . 12 , 1974 and mar . 25 , 1975 , respectively , and assigned to the assignee of this invention , which patents are hereby incorporated by reference herein . in the head end 18 , the arm shaft 58 terminates in a crank 72 which is connected by link 73 to a latch mechanism 100 on a needle bar 74 supported for endwise reciprocation in a needle bar gate 76 carried for oscillation in the head 18 ( see also fig2 and 3 ). the needle bar 74 terminates in a sewing needle 75 , which sewing needle cooperates with the looptaker 40 supported in the bed 12 of the sewing machine 10 in the formation of lock stitches . the needle bar gate 76 is urged into selective oscillation by the connections of a driving arm 78 thereto , which driving arm is operatively connected to a bight linear motor 80 operating under the control of the electronic control arrangement 66 to influence selective oscillations of the needle bar gate and selective lateral motion of the needle bar 74 and sewing needle 75 affixed thereto . supported in the head 18 behind the needle bar 74 , is a presser bar 82 which is visible in fig1 having a presser foot 83 affixed to the lower end thereof as is usual in the sewing machine art . the presser bar 82 has affixed thereto a presser bar guide bracket 84 , which guide bracket is fashioned with a rearwardly directed arm 85 designed for engagement with a cam surface 87 of a presser bar lift lever 86 , so that the presser foot 83 affixed to the end of the presser bar 82 might be elevated out of contact with work material supported on the sewing machine bed 12 . behind the presser bar 82 , the sewing machine frame supports a switch 90 having leads 91 connected to the electronic control arrangement 66 . switch 90 includes an actuating arm 92 which extends over the rear arm 85 of the presser bar guide bracket 84 , so that elevation of the presser bar 82 by the presser bar lift lever 86 will actuate the switch 90 , for example , to a closed position from an open position . thus , information is provided to the electronic control arrangement 66 that the presser bar 82 has been elevated . supported on the back of the bracket arm 16 is a thread post 17 , on which post is supported an upper thread spool 19 . thread from the thread spool 19 extends to pivot 77 on the back of head 18 and from there to the tension discs of a conventional tension 79 supported in the top front of the head . in the usual fashion in sewing machines , the thread thereafter passes to a conventional sewing machine take up ( not shown ) and then to the eye ( not shown ) of the sewing needle 75 . referring now to fig2 there is shown the connection between the link 73 of fig1 and the needle bar 74 , which is implemented by the latch mechanism 100 affixed to the needle bar 74 in its upper portion ( see fig2 and 3 ). a rectangular collar 102 having a downwardly extending tang 103 which is received in the bifurcated portion 98 of a driving stud 97 , contains a threaded hole which receives a screw 105 having an elongated head portion . the link 73 is shown connected in fig1 to the driving stud 97 . the screw 105 extends through the threaded hole in the rectangular collar 102 and firmly attaches the collar to the needle bar 74 . located on the front side of the rectangular collar 102 and supported on eccentric collar 109 , held positioned to the rectangular collar by a screw 110 , is a latch lever 111 . the latch lever 111 has a forwardly extending ear 112 spaced from the eccentric collar 109 and a rearwardly extending lug having a latch surface 113 located a sufficient distance from the eccentric collar 109 to crimp the lower edge of the bifurcated portion 98 of the driving stud 97 when the bifurcated portion is in intimate contact with the lower surface of the rectangular collar 102 . adjustments for proper clearance between the latch surface 113 and bifurcated portion 98 are provided for by rotation of the eccentric collar 109 on which latch lever 111 is supported and tightening of the screw 110 to hold the eccentric collar 109 in the selected adjusted position . also supported by eccentric collar 109 and biased on the rectangular collar 102 is a torsion spring 115 . the torsion spring 115 biases the latch lever 111 in counterclockwise direction , as viewed in fig2 thereby to engage the rearwardly extending latch surface 113 onto the bifurcated portion 98 of the driving stud 97 . opposite the screw 105 of the rectangular collar 102 is a post 117 extending from the collar 102 , which post 117 contains a peripherial groove 118 on its end . the peripheral groove 118 receives one end of a needle bar elevating spring 119 , the other end of which is supported on the sewing machine frame . the spring 119 serves to elevate the needle bar 74 whenever the latch surface 113 is disengaged from the bifurcated portion 98 of the driving link 97 . the needle bar gate 76 has attached thereto by screws 127 to the front thereof a latch release abutment member 128 which extends around the gate to the inside thereof adjacent the forwardly extending ear 112 of the latch lever 111 . as explained in the u . s . pat . no . 3 , 782 , 311 , issued on jan . 1 , 1974 to adams et al , and assigned to the assignee of this invention , and incorporated herein by reference thereto , movement of the gate 76 on its support bearings will cause the latch release abutment member 128 to have a portion thereof strike the forwardly extending ear 112 of the latch lever 111 and separate the latch surface 113 of the rearwardly extending lug from the lower edge of the bifurcated portion 98 of the driving stud 97 , thus permitting the needle bar elevating spring 119 to draw the needle bar 74 into an elevated position . in order to have the needle bar gate 76 move to the position just described so as to disconnect the needle bar 74 from the driving stud 97 , the driving arm 78 must move to the right as viewed in fig3 and beyond the normal range of jogging motion for the sewing needle 75 . a fuller explanation of the manner in which this is implemented may be had by reference to the u . s . pat . no . 4 , 327 , 654 , issued on may 4 , 1982 , to odermann et al , and assigned to the assignee of the present application , and is hereby incorporated by reference herein . referring now to fig4 there is shown a block diagram for the electronic control arrangement 66 and other components in the sewing machine 10 shown in fig1 in order to enable the practice of the applicant &# 39 ; s invention . the electronic control arrangement 66 is implemented by those elements within the dotted line 66 . thus , the selection panel 68 communicates with a pattern address table 130 of the electronic control arrangement to determine the initial pattern address for the pattern information stored in a pattern rom ( read only memory ) 132 . the pattern address table 130 presents the pattern address to a pattern address register 134 which presents its information to the pattern rom 132 for transfer of bight and feed information therefrom along lines 136 , 138 to bight servo circuits 140 and feed servo circuits 142 , respectively . the information from the bight servo circuits 140 and the feed servo circuits 142 are transferred to the bight linear actuator 80 and feed linear actuator 34 , respectively , along lines 144 and 146 , respectively . with each stitch of the sewing machine 10 , the pulse generator 62 passes a signal along line 148 to the pattern address register 134 , to update the pattern address register so that the succeeding stitch information of the pattern would be released from the pattern rom 132 to the bight and feed servo circuits 140 , 142 . the output from the pulse generator 62 is also applied to a counter 150 , which counter is ineffective unless initiated by closing of the switch 90 , which closing is implemented by elevation of the presser bar 82 by means of the presser bar lift lever 86 . when the presser bar 82 is elevated by the presser bar lift lever 86 , the switch 90 is closed and the counter 150 is reset to initiate count . when the motor 20 of the sewing machine 10 is activated , the arm shaft 58 revolves and pulse generator 62 generates pulses which are counted by the counter 150 . after a count of , for example , three stitches is reached , a signal passes along the line 152 to or 154 . a signal on line 152 will cause an output on line 156 from the or 154 to the bight servo circuits 140 to initiate an overthrow of the bight linear actuator 80 according to the teachings in the above referenced u . s . pat . no . 4 , 327 , 654 , so that the latch release abutment member 128 will strike the forwardly extending ear 112 of the latch lever 111 to cause separation of the latch surface 113 from the bifurcated portion 98 of the driving stud 97 . line 158 is provided extending from pattern rom 132 to or 154 so that needle bar release might be implemented at other times , for example , while basting or implementing a blindstitch . thus elevation of the presser bar lift lever 86 to close the switch 90 by deflecting the actuating arm 92 thereof by means of the rear arm 85 of the presser bar guide bracket 84 , and operation of the motor 20 for a selected number of stitches , by way of example , three , will effect a disengagement of the latch lever 111 from the driving stud 97 so as to inhibit further endwise reciprocation of the needle bar 74 . with the above described modification to the sewing machine 10 , bobbin winding might be initiated by ( 1 ) raising the presser bar 82 to an elevated position by rotating the presser bar lift lever 86 , ( 2 ) opening the bed slide plate 54 and rotating the wind lever 46 to its most counterclockwise position , and ( 3 ) directing the needle thread from the eye of the sewing needle to beneath the presser foot and around the presser foot retaining thumb screw . the sewing motor 20 may then be activated to initiate the endwise reciprocation of the needle bar 74 to insure that the upper thread is directed onto the bobbin 44 as taught in the above referenced u . s . pat . no . 3 , 693 , 566 . thereafter , endwise reciprocation of the needle bar 74 is held in abeyance . thus , implementation of the bobbin winding has been simplified ."}

{"publication\_number": "US-6301750-B1", "abstract": "this invention relates to a silver compression method and device . by using the compression method of this invention , the loaded sliver is reduced without requiring the use of spindles and thus allow for easier handling in the next process .", "application\_number": "US-60444500-A", "description": "this sliver compression method has a special characteristic of having two types of processes . one process is the compressing process which occurs by pressing the loaded sliver from above while vacuuming the air out of the compression box in which the loaded sliver is accommodated , and the second process is the steaming process which is accomplished by blowing the steam onto the loaded sliver after the sliver has been compressed . the sliver compression device compresses the sliver loaded freely without restrictions on the plate - like sliver tray . this device consists of a compression box to store the above mentioned loaded sliver , a pressing mechanism to compress the loaded sliver from above , and a steam blower to blow steam onto the loaded sliver while retaining the loaded sliver &# 39 ; s stable and compressed condition . this device is equipped with steam holes on the sliver tray and has a special characteristic that allows steam to be blown onto the loaded sliver from the bottom panel through the aforementioned steam holes . this invention has the following characteristic ( s ): compressing loaded sliver accommodated ( in a non - restricted condition ) on the entire external circumference to solve the above mentioned problem . it has two processes ; the compression process from above occurs while at the same time vacuuming the compression box in which the sliver is accommodated , and second the steaming process which blows steam onto the loaded sliver while retaining the compression . when vacuuming the compression box in which the loaded sliver is accommodated , the air in the fiber of the loaded sliver and the air inside the chamber of the compression box will be extracted . by this process , extracting the air inside the loaded sliver , the sliver &# 39 ; s overall volume will be reduced . while this vacuuming of air occurs , the inside of the compression box remains close to airtight , and the loaded sliver will be compressed from above to reduce its volume . then steam will be blown onto the loaded sliver . once the loaded sliver is compressed and shaped to reduce the volume inside the airtight box , then high temperature steam will be blown onto the loaded sliver . the steam will reach every fiber of the sliver and the moisture will penetrate the fibers enabling the fibers to retain the shape of the compressed sliver . this process will provide both the necessary moisture needed for the next process and also maintain a high density in the sliver . the following is a detailed description of the invention by showing the attached examples . first , the structure of sliver compression device of this invention , and then each individual process of compressing sliver s 1 on the sliver tray t 2 using this device will be explained . fig1 is a front view of the sliver compression device . compression box b in fig1 is airtight and has both an entrance 3 ( see fig3 ) and an exit 4 ( see fig7 ) with side panels designated as side panel 1 and side panel 2 . there are two doors which move upward and downward , they are designated as door 5 and door 6 , and these doors are located outside of each side panel . a bottom panel 7 is installed at the bottom of the box b for the loaded sliver s 1 to be transferred onto . a compressing board 8 is installed to both lift and / or lower the inside of the box b so that the loaded sliver s 1 , which was transferred to the bottom panel 7 as mentioned above , will be compressed from upward by the action of the cylinder 9 . an exhaust air pipe 12 is connected to the top panel 11 of the box b to let the air inside of box b out and an exhaust air pipe 12 is connected to the vacuum pump 13 . between the exhaust air pipe 12 and the chamber 14 inside of the box b , a shutter 16 is installed to maintain the vacuum condition inside the chamber 14 . also , as shown in fig2 a square plate - like sliver tray t 1 is below and located beneath the entire sliver area except for its outer edges , and steam holes 17 . the bottom panel 7 of the box b , where the sliver tray t 1 will be loaded , also has a number of steam holes 18 from the top to the bottom . the steam 21 coming out of steam source 19 will go through a steam pipe 22 and will be supplied to the steam holes 18 . number 23 in fig1 shows an opening / closing valve on the steam pipe 22 . a conveyor 24 brings in the sliver and another conveyor 25 carries out the sliver and these conveyers are installed at both the entrance and the exit of the compression box b . both conveyors 24 and 25 are roller conveyors and the height of the rollers is approximately the same height as the bottom panel 7 of the compression box b so that the loaded sliver s 1 can be easily brought into and carried out of the aforementioned compression box b . each process of how the loaded sliver s 1 is compressed by the above mentioned device a can be explained as follows . as shown in fig3 while the door 5 is raised to keep the entrance 3 to the chamber 14 open , the loaded sliver s 1 will be transferred to the chamber 14 from the conveyor 24 . after this transfer is complete , the door 5 will be lowered to close the entrance 3 . ( see fig4 .) next , the shutter 16 , which closes the exhaust pipe 15 , will be opened so that the chamber 14 in the compression box b will have a clear path to let the air out by means of the operation of the vacuum pump 13 . at the same time , the cylinder 9 will lower the compressor board 8 gradually to compress the loaded sliver s 1 from above . ( see fig5 .) during this procedure , because part of the air held inside the loaded sliver s 1 will be released into the chamber 14 and because the air inside of the chamber 14 in box b will be vacuumed , the chamber 14 will become close to a vacuum condition . after the above mentioned procedures have occurred , the shutter 16 above the compression box b will close the exhaust pipe 15 and maintain the chamber 14 at close - to - vacuum condition ( see fig6 .). by maintaining the chamber 14 at close to vacuum condition , and by opening the opening / closing valve 23 for the steamer ( steam source ) 19 , and allowing the steam from the steamer 19 to go through the steam pipe 22 to reach the steam holes 18 on the bottom panel 7 of the compression box b , steam will then go through the steam holes 17 on the sliver tray t 1 and will be blown inside the compression box onto the loaded sliver s 1 . ( see fig6 .) each fiber of the accumulated sliver si , which is compressed to keep the volume down in the close - to - vacuum condition inside the compression box b , will be thoroughly exposed directly to high temperature steam . the steam moisture will penetrate through the sliver fiber and the compulsory form made by the aforementioned compression will retain its shape by steam heat setting effect . the steam will be used to set and compress the sliver into a fixed stable form . this is the same mechanism by which the steam will further stabilize the strand ( s ) of yam . the effect of this steam stabilization is the same effect as if ironing the fabric flat . due to close - to - vacuum condition inside of the chamber 14 the steam blown into the chamber from the bottom of the loaded sliver s 1 will penetrate the sliver s 1 , and forcibly shape the entire loaded sliver s 1 into a smaller compressed shape . raise the compression board 8 and raise the shutter 6 on the exit side of compression box b at the same time to let the formed and compressed loaded sliver s 1 out of chamber 14 and onto the conveyor 25 . ( see fig7 .) by repeating each process mentioned above , the loaded sliver on the sliver tray sitting freely without restrictions on its entire circumference will be continuously compressed and formed . also , the loaded sliver in the conical truncated shape on the sliver tray t 2 will be compressed and formed in the same manner . this invention allows sliver , loaded and sitting freely without restrictions around it on the sliver tray , to be compressed in the vacuum compression box , and then to be shaped by blowing steam inside onto the sliver to achieve a steam setting on the fibers ( which the sliver consists of ). a low density sliver pile that contains high amounts of air will be reduced by vacuuming and will be turned into a high density sliver pile and the part of the moisture included in the steam will penetrate through the entire high density sliver pile . this will result in the loaded sliver not only eliminating a risk of collapsing during the transportation to the next process , but also preventing various other problems from occurring . it should reduce the required space needed to store the loaded sliver . it would also supply a part of the moisture in the sliver fiber required for the next process . here is an example . there is a 3 - storied factory with the spinning room on the 1 st floor and the sliver rooms on 2 nd and 3 rd floors . the sliver in the upper floored sliver room is supplied through the resin tube to the spinning machine installed in the spinning room on the 1 st floor . this system does not require roving and has an advantage of having a capability of air conditioning each room separately . in the past the sliver usually requires a designated time to be humidified in the humidifying silver room , a manufacturer by employing this invention can reduce the processing time required because the moisture in the steam will be supplied to the sliver during the process when the steam is being blown onto the sliver . the invention as disclosed herein is subject to various modifications and variations as will be seen by those of ordinary skill in the art . the invention is therefore not limited solely to the method and apparatus specifically described , but is intended to have the scope as set forth in the following claims ."}

{"publication\_number": "US-7117612-B2", "abstract": "the combination washer / dryer and method for operating a combination washer / dryer . the washer / dryer has a containment drum which receives wash water , and includes a perforated clothes drum which rotates within the containment drum . a heat plenum is provided in heat transfer relationship with the containment drum , and a source of heat coupled to the heat plenum supplies heat for water in the containment drum . during a drying cycle , hot air from the heat source supplied from the fire box to the containment drum for heating wash water during a washing cycle , and for supplying hot air during a drying cycle . a drying air plenum is connected to receive drying air from the source of heat , delivering the drying air to the top of the containment drum , where it enters the rotating basket . an exhaust plenum discharges hot air laden with moisture from the containment drum through a lint filter .", "application\_number": "US-9458005-A", "description": "referring now to fig1 , a perspective view of a washer / dryer in accordance with a preferred embodiment of the invention is shown . a housing 10 encloses a containment drum 11 which is open through the housing 10 and sealed by a door 14 . the containment drum 11 includes a rotating perforated basket 40 inside of a water plenum used for both washing and drying functions of fabrics which are loaded through the door 14 . exhaust fan 15 provides a negative pressure to draw the moist drying air from containment drum 11 , and expelling the drying air through the exhaust 13 during the drying cycle . a washing agent container 16 receives washing detergent , bleach , and other washing agents through door 17 , and as in a conventional washer , hose 18 carries the contents of the washing agent container 16 to the containment drum 11 . the plurality of water jets 20 are cyclically operated by controller 12 to wash the contents of each compartment of the washing agent container 16 through the outlet hose 18 . jet 21 periodically flushes the washing agent container 16 . controller 12 provides commands to a motor drive for rotating the basket within containment drum 11 in both washing and drying cycles to produce the washing / drying cycle of fig8 . additionally , the controller 12 commands an on - board heater to generate heat at the appropriate times during the washing and drying cycles . temperature sensors within the exhaust 13 and containment drum 11 provide feedback to the controller 12 so that temperatures are maintained at predetermined levels which can sanitize the washing load , and which establish optimum drying temperatures while avoiding excessive temperatures which can damage clothing . fig2 is a perspective view of the washer / dryer with the housing 10 removed . the containment drum 11 is supported in a frame 29 . frame 29 is supported via spring 26 to a base 25 . vibrational forces produced by the rotating basket 40 within containment drum 11 are dampened by shock absorber 27 . additionally , a front face plate 30 of the containment drum supports the sealed door 14 . the burner assembly 22 is supported on a burner support 23 fixed to the base 25 . the burner assembly 22 includes burner tubes 21 which supply heat to the containment drum 11 during the washing and drying cycles . fig3 is a rear perspective view of the containment drum 11 . the shaft 33 for supporting and driving the rotating basket is coupled to a motor ( not shown ) operated under control of controller 12 . the containment drum 11 has a drain 34 which is coupled via a flexible coupling 35 to a motor operated valve 36 . the motor operated valve 36 is also under control of the controller 12 for discharging wash water at the end of a wash cycle , rinse cycle and spin dry cycle . also shown is flushing port 38 connected to a water supply valve ( not shown ) which operates under control of controller 12 for periodically providing a jet of water for ejecting the lint washed from the lint screen through the s shaped trap formed by drain 34 , flexible coupling 35 and valve 36 . the exhaust fan 15 is shown with the exhaust outlet 13 removed . a drip channel 42 collects water during the spin cycle of the washer / dryer and returns the water back to the water plenum containing the rotating clothes basket . fig4 \u2013 6 are sectional views illustrating the washing agent dispenser compartment 16 with respect to the containment drum 11 and rotating basket 40 . a water inlet 24 supplies water through a solenoid valve under control of the controller 12 to the dispenser compartment 16 which drains due to gravity to the containment drum 11 through outlet 18 . the various washing agents are placed in each of the removable compartments 41 a , 41 b , 41 c , 41 d , and 41 e . rotation of the door 17 to pivot along the lower edge allows access to the washing agent compartments 41 a , 41 b , 41 c , 41 d , and 41 e . each individual washing agent compartment is arranged below the jets 20 a , 20 b , 20 c , 20 d , and 20 e . the controller 12 controls a plurality of solenoid valves connected to the various jets 20 to rinse the compartments 41 a \u2013 41 e at the appropriate time where washing agents are dispensed through outlet 18 into the containment drum 11 . the operation of the combination washer / dryer is now described with respect to fig7 and 8 . referring now to fig7 , a sectional view of the washer / dryer is shown . the containment drum 11 includes the rotating perforated basket 40 holding the wash load . during the washing cycle , the water level is established within a water plenum 46 in the containment drum as shown . the water plenum 46 is joined at an opening 49 at the top of the water plenum with the hot air supply plenum 47 . an opening in the bottom of the water supply plenum 46 is joined with an exhaust plenum 48 . during washing , the illustrated water level is confined in the water plenum 46 and the lower portion of the exhaust plenum 48 . burner assembly 22 is in heat transfer relationship with water plenum 46 within the containment drum 11 . the burner 22 is operated cyclically under control of the controller 21 to heat water within the water plenum 46 and lower portion of exhaust plenum 48 to a predetermined programmed temperature level , including a sanitizing level as set forth by various regulatory bodies . a temperature sensor 43 provides temperature feedback information to controller 12 so that the correct temperature is established for the washing solution . the rotating basket 40 reciprocates as is common in most side loading washing machines for a period of time to efficiently clean the load . once the wash time has timed out in controller 12 , the water is drained from the water plenum 46 through the drain 34 , and the washer / dryer enters the first spin drying mode . as will be clearer with respect to fig8 , the rinse cycle re - establishes the water to a predetermined programmed level . once the wash load is rinsed , the water is again drained , and the washer / dryer enters the final spin drying mode under the control of the controller 12 . the basket 40 is rotated at a multiplicity of speeds , coming to rest between each level of rotational velocity so as to prevent the wash load from adhering to the circumference of the clothes basket 40 . the centrifugally wrung wash load has approximately 50 % of the moisture removed from the wash load . during the centrifugal drying of the wash load , moisture spun from the clothes basket 40 may collect in channel 42 where it is returned by gravity to the water plenum 46 and to the drain 34 . the drying cycle utilizes heat from burner 22 under control of the controller 12 to dry the moisture laden wash load . the hot air supply plenum 47 is formed between the outside wall 28 of the containment drum 11 and a wall 44 of the water plenum 46 . hot air from the burner 22 rises through the hot air supply plenum 47 and enters the perforated clothes basket 40 at the top of the hot air supply plenum 47 through an opening 49 in the top of water supply plenum 46 . the hot moisture laden drying air is then withdrawn through the bottom of the clothes basket 40 through exhaust plenum 48 . the exhaust plenum 48 extends vertically from lower opening in water plenum 46 substantially diametrically opposite the end of the hot air supply plenum 47 . fan 15 applies a negative pressure to the opposite end of the exhaust plenum 48 drawing moisture laden air from the perforated clothes basket 40 through the exhaust plenum 48 . the temperature of the drying air is monitored by sensor 45 which is connected to the controller 12 and is disposed at the top of the hot air supply plenum . the drying air temperature is regulated by controller 12 which cycles burner 22 in response to the measured air temperature so as not to exceed a predetermined programmed limit which will damage the wash load 7 . since the initial conditions for drying including the moisture content of the load are fairly constant between loads , controller 12 may enter a drying routine with a drying temperature profile at its maximum drying efficiency and below a level which will damage the wash load . a feature of the embodiment in accordance with fig7 includes a lint trap having a filter 51 supported on a tray 50 which can be removed via handle 52 from the exhaust plenum for periodic inspection . additionally , prior to starting the wash cycle , a water jet 59 may be operated by controller 12 to direct water on the filter forcing lint from the underside of filter 51 . the lint collects in a water pool at the bottom of water compartment 46 . drain valve 36 is opened by controller 12 and a solenoid operates water valve connected to nozzle 38 is opened forcing the lint load and water to be ejected through drain 36 . the washer / dryer in accordance with fig7 maybe advantageously operated to provide for a wash / drying cycle under control of controller 12 as shown in fig8 where the wash / dry cycle for the washer / dryer is illustrated with respect to the clothes basket 40 rpm . the temperature for drying may be optimized for the finished wash load . since the moisture content is at a known predetermined level , the drying temperature can be safely raised to a higher level than was previously utilized without incurring unacceptable risks of a fire or damage to a wash load . the sequence of washing and drying begins by activating jet 59 for 5 \u2013 10 seconds thereby forcing any lint collected on the lint filter 51 into the water plenum 46 and into the drain 34 . the drain valve 36 is opened by controller 12 , and the ejection nozzle 38 supplies a high velocity stream of water for 5 \u2013 8 seconds flushing any collected residue through the drain 34 . following the cleansing of the lint filter 51 and operation of the drain valve , the containment compartment water plenum 46 is filled with wash water to the level shown in fig7 by controller 12 to a predetermined programmed level . the controller 12 then enters a heating mode and enables burner assembly 22 to heat the water in water compartment 46 until the desired temperature is reached . a wash cycle is entered and the basket is alternately rotated in each direction for a period of time selected by the user through controller 12 . following the wash cycle , the drain valve 36 is opened and water drains from the water compartment 46 . the machine may then enter a spin cycle to centrifugally force water from the clothes into the drain 34 . a rinse cycle commences for a period of time set in controller 12 . the water plenum 46 is refilled and the water is heated to an appropriately selected temperature set by controller 12 . the clothes basket 40 is then rotated in alternate directions for the duration of the rinse cycle . following the rinse cycle , the drain valve 36 is reopened to drain the rinse water . the spin cycle centrifugally removes 50 % of the moisture in the load by initially rotating the clothes basket 40 at about 450 rpm . in order to prevent caking of the laundry load along the surface of the rotating basket 40 , a first pause is entered in the spin cycle for 5 \u2013 10 seconds , wherein , in the preferred embodiment , the clothes basket 40 stops rotating . at this time , the clothes will drop from the exterior surface of the clothes basket 40 due to the force of gravity . the clothes basket is then operated at a second rpm , at least as high as the initial rpm of 450 rpm , but preferably at a higher rpm of about 750 rpm , to continue centrifugally drying the clothes . the spin cycle is again paused , to permit the clothing to drop from the surface of the clothes basket 40 preventing caking of the clothes to the surface of clothes basket and clumping together in a compact mass . following a second pause of 5 \u2013 10 seconds , the clothes basket is rotated through multiple steps to a final spin rpm . the final spin interval , being longer than the first two spin intervals , lasts approximately 4 \u2013 5 minutes . the foregoing sequence produces a load of an approximate known moisture content . the beginning of the final heated drying cycle therefore represents moisture conditions which are predetermined and constant from load - to - load . accordingly , from the known starting point of moisture content , it is possible to select a final optimum drying temperature profile to minimize the time for drying , while maintaining a safe temperature margin for the wash load . the heated drying cycle begins by actuating valve 36 by closing the drain . the drying cycle may be of the reversing type , wherein the clothes basket 40 is rotated in alternate directions for a predetermined period of time . following a drying cycle of 30 \u2013 60 minutes , a cool down cycle is begun wherein the temperature profile of the load is decreased for 3 \u2013 5 minutes to reduce the possibilities of spontaneous combustion of line lints . the completion of the drying cycle is signaled by the controller 12 to the facilities operator . from the beginning to end , operator intervention was unnecessary , and personnel involved in the laundry facility are permitted to engage in other tasks . since the complete washing / drying cycle is automated , maximum throughput efficiency for the facility may be obtained . the foregoing description of the invention illustrates and describes the present invention . additionally , the disclosure shows and describes only the preferred embodiments of the invention in the context of a combination washer / dryer having common heat source , but , as mentioned above , it is to be understood that the invention is capable of use in various other combinations , modifications , and environments and is capable of changes or modifications within the scope of the inventive concept as expressed herein , commensurate with the above teachings and / or the skill or knowledge of the relevant art . the embodiments described hereinabove are further intended to explain best modes known of practicing the invention and to enable others skilled in the art to utilize the invention in such , or other , embodiments and with the various modifications required by the particular applications or uses of the invention . accordingly , the description is not intended to limit the invention to the form or application disclosed herein . also , it is intended that the appended claims be construed to include alternative embodiments ."}

{"publication\_number": "US-7331089-B2", "abstract": "a method and apparatus is described for use in dry forming a fabric by at least two non - woven fabrics . the upper run of the transfer wire is used as a forming wire . a forming head is disposed above the transfer wire . an airlaid non - woven fabric is formed on the transfer wire . this non - woven fabric is carried with the transfer wire onto the top side of the first non - woven fabric . the first non - woven fabric is formed on a preceding forming wire and transferred by the transfer wire to a subsequent conveying wire . this subsequent conveying wire can also be a forming wire so further non - woven fabric can be formed before the fabric is consolidated , e . g . by hydroentanglement or latex bonding / fibre bonding .", "application\_number": "US-55524705-A", "description": "in different figures of the drawing , identical or corresponding elements will be designated with the same reference . no specific explanation will be given to each single part of the figures of the drawing . in the figures , only the most important parts of the apparatus are illustrated . in order to be functional , an apparatus requires a plurality of elements , e . g . controls , motors , supporting frames etc . however , such additional machine components also constituting part of the invention can be selected by the skilled in the art in the light of the description of the different embodiments for apparatuses according to the invention . fig1 shows an apparatus for dry forming a fabric 1 which is formed by at least two non - woven fabrics 2 , 3 . the apparatus includes a transfer unit 4 that includes a transfer wire 5 running about a number of reversing rollers 6 . the transfer wire 5 has hereby an upper run 7 , a lower run 8 , a downwards oriented run 9 and an upwards oriented run 10 , as the transfer wire 5 is led around in the direction indicated by an arrow 11 . within the enclosure of the transfer wire 5 , a vacuum is provided . thus there is provided a suction box 12 exerting suction towards the upper run 7 . above the suction box 12 there is provided a forming head 13 carrying fibres 14 at the upper side of the upper run 7 for forming the non - woven fabric 3 which will be termed the second non - woven fabric in the following . the non - woven fabric 2 will now be designated the first non - woven fabric 2 . it 2 is formed on a forming wire 15 situated upstream of the transfer wire . the forming wire 15 is passed around reversing wheels 16 , of which only one is illustrated . at an upper run 17 of the forming wire is formed the first non - woven fabric 2 . in the embodiment illustrated in fig1 , the non - woven fabric 2 is formed by two forming heads 18 , 19 . the forming heads 18 , 19 may be identical or different and may be used for moving identical or different fibres and / or fibre mixtures 20 and 21 , respectively , down on the upper run 17 of the forming wire 15 for forming the first non - woven fabric 2 . within the forming wire , there is provided a suction box 22 for each forming head for forming a vacuum that holds the first non - woven fabric 2 against the forming wire 15 . the forming wire 15 is conveyed in the direction indicated by an arrow 23 . downstream of the forming heads 18 , 19 , as seen in the conveying direction of the forming wire 15 , a compacter 24 is provided , including a roller 25 which is disposed above the non - woven fabric , and a roller 26 disposed below the forming wire 15 . hereby , the first non - woven fabric 2 is compacted . after the compacting , the transfer wire 5 is used in a traditional way to transfer the first non - woven fabric 2 from the forming wire 15 to a subsequent conveying wire 27 . the first non - woven fabric 2 will thus be sucked against the second non - woven fabric 3 formed by airlaying of the forming head 13 , as this second non - woven fabric is formed on the top side 28 of the upper run 7 and is moved downwards via the downwards directed run 9 and is sucked on to the underside 29 of the lower run . upon this second non - woven fabric , the first non - woven fabric 2 is sucked against the underside of the lower run 8 of the transfer wire due to the vacuum existing within the transfer wire 5 across the length of the lower run 8 . the fabric 1 , which is formed by the combinations of the non - woven fabrics 2 , 3 , are conveyed through an embosser 30 that includes a roller 31 disposed above the lower run 8 of the transfer wire 5 and a roller 32 placed at the underside of the lower run 8 . after passing through the embosser 30 , the fabric is laid off on the top side of the conveying wire 27 . the conveying wire is moved up in a reversing wheel 33 , of which only one is illustrated in fig1 . the conveying wire 27 is moved in direction of the arrow 34 . hereby the fabric 1 , which is placed on an upper run 35 of the conveying wire 27 , will be conveyed to a further treating unit 36 which in the shown embodiment is illustrated as an oven . a first embodiment of the apparatus as illustrated in fig1 may e . g . be used with fibres which can contain binder fibres , e . g . polyester fibres , bicomponent fibres , or other binder fibres . by passing through the oven 36 fixation of the fabric 1 is thus provided . in fig2 is illustrated a second embodiment of the apparatus according to the invention . in this embodiment , the transfer unit 4 is used for formation of the second non - woven fabric 3 and for transferring the first non - woven fabric 2 which is formed on the forming wire 15 disposed upstream . the conveying wire 27 in the shown embodiment moves the fabric formed of the first and second non - woven fabrics 2 , 3 to a further treating unit 37 . in the shown embodiment , the treating unit is an arrangement for applying latex 38 which is sprayed on the fabric 1 using nozzles 39 . after applying latex , the fabric is moved according to the arrow 40 to a further treating unit which e . g . can be an oven . fig3 also includes the transfer unit 4 over which the forming head 13 is disposed for forming the second non - woven fabric 3 . in the third embodiment is also formed a first non - woven fabric 2 on the forming wire 15 which is disposed upstream in relation to the transfer unit 4 . in this third embodiment of the apparatus , the fabric is conveyed on the top side of the conveying wire 27 to a treatment unit 41 . the treatment unit 41 is a hydroentanglement unit which fixes the fabric . it is constituted by a principle known per se , embodying a row of water jet nozzles 42 , which are disposed above the upper run 35 of the conveying wire 27 , providing downwards directed water jets 43 . below the upper run 37 of the conveying wire , other water jet nozzles 44 are provided that each forms an upwards directed water jet 45 . the hydroentanglement unit 41 is shown schematically and will in practice look otherwise , but it is arranged so that fixation of the fabric 1 is achieved by a hydroentanglement known per se . after the treatment unit 41 , the fabric is conveyed further one according to the arrow 46 to a possible subsequent treatment . in the fourth embodiment illustrated in fig4 , the transfer unit 4 is used for forming the second non - woven fabric 3 of the fibres of the forming head 13 . in this embodiment , over the forming wire 15 there is provided a card 47 for forming the first non - woven fabric 2 \u2032. the first non - woven fabric 2 \u2032 and the second non - woven fabric 3 are transferring against the lower run 8 of the transfer unit 4 to the upper run 35 of the conveying wire 27 for formation of a fabric 1 \u2032. a second card 48 is provided above the upper run 35 of the transport wire 27 , laying a third non - woven fabric 49 upon the first and second non - woven fabrics 2 \u2032, 3 for forming a fabric 1 \u2033 which is composed by the first , second and third non - woven fabrics 2 \u2032, 3 , 49 , respectively . the fabric 1 \u2033 thus formed is then carried on according to the arrow 50 for subsequent treatment . of the fourth embodiment illustrated in fig4 , it may be said that the conveying wire 27 also constitutes a forming wire . in the above are explained different embodiments which are not to be regarded as limiting for the invention , but only for illustrating possible embodiments . thus it will be possible to combine the above illustrated embodiments . according to the invention there may thus be performed a variation by using several succeeding transfer wires . it is also possible that above the first forming wire there may be provided a forming head , or more than two forming heads may be provided . with the apparatus it will be possible to produce the different non - woven fabrics 2 , 2 \u2032, 3 , 49 with identical or different identities and with different types of fibres and / or fibre mixtures . it will thus also be possible to add fibres with different properties in the different forming heads / cards in order to adapt the properties of the finished product . furthermore , it will also be possible to add superabsorbers in the fibre mixture for increasing the absorbing ability in the formed product ."}

{"publication\_number": "US-2002174564-A1", "abstract": "a method of programming and controlling an automatic cycle of a clothes dryer provides that , after positioning of a selection dial , a motor associated with the selection dial is rapidly moved to a predetermined location at a constant speed , while the time to do so is measured . with the rotational velocity being known , the exact , initially setting position of the dial is determined in advance .", "application\_number": "US-86445001-A", "description": "a clothes dryer 1 of the current invention is shown in fig1 and generally includes an outer cabinet 10 , having an opening leading to a rotatable drum 14 and a door 18 for closing the opening . disposed on the upper surface of the outer cabinet is a control panel 22 for establishing a desired operational sequence for programming the clothes dryer 1 of the invention . [ 0017 ] fig2 depicts a close - up view of control panel 22 and includes a plurality of buttons and other elements for controlling clothes dryer 1 . although control panel 22 is described below in a specific arrangement , it should be understood that the particular arrangement is only exemplary , as a wide range of layouts would suffice . accordingly , disposed on the left side of control panel 22 is a temperature selector 40 , which includes buttons for determining the heat output of the clothes dryer 1 . in the most preferred embodiment , temperature selector 40 includes an air fluff button 42 , a delicate button 44 , a medium button 46 and a regular button 48 . next to temperature selector 40 is a moisture monitor 55 for displaying the current moisture state of articles contained within clothes dryer 1 . moisture monitor 55 is shown as including a set of leds 58 for indicating the specific moisture level . because the leds 58 are vertically arranged , individual leds 58 a - f can be illuminated to indicate a current moisture level . for example , a low moisture level can be signified by illuminating only led 58 a , while a higher moisture level can be shown by illuminating led 58 d alone or leds 58 a , 58 b , 58 c and 58 d simultaneously . proximate to moisture monitor 55 is a signal controller 62 . signal controller 62 is provided to selectively regulate the operation of a buzzer ( not shown ), and includes an off button 64 and an on button 66 . the selection of on button 66 causes the buzzer to sound upon completion of the drying operation , while selection of off button 64 prevents the buzzer from sounding upon completion of the drying operation . additionally , control panel 22 includes a start button 70 for commencing operation of clothes dryer 1 . finally , control panel 22 includes a control dial 100 for programming clothes dryer 1 . disposed on the periphery of the center surface of dial 100 is a location pointer 101 which indicates an established setting for dial 100 . annularly disposed about the periphery of dial 100 is indicia 103 which illustrates the various settings . specifically , indicia 103 includes a first sense dry zone 105 , a second sense dry zone 110 and a time - dry zone 113 , each defining a portion of indicia 103 and designed to indicate the mode of dryer operation , i . e . a sense dry mode , or a time dry mode . sense dry zones 105 and 110 each include a more dry setting 120 a , 120 b and a less dry setting 125 a , 125 b with continuous levels therebetween . first sense dry zone 105 also includes a press care setting 128 . each zone 103 , 105 and 113 includes a cool down sequence at the end of the desired cycle , although not specifically labeled in each zone 103 , 105 and 113 . a plurality of time increments 130 are defined by indicia 103 in time - dry zone 113 . finally , disposed between each of zones 105 , 110 and 113 are off positions 132 a - c . depending upon the operational state of clothes dryer 1 , dial 100 , and hence location pointer 101 , will reference the appropriate indicia 103 . with reference to fig1 clothes dryer 1 also includes a control circuit generally indicated at 200 . specifically a cpu 210 is provided with a timer 215 , and a dryness level determination circuit 220 . a motor 225 is provided to drive timer 215 upon direction from cpu 210 . a moisture sensor 230 is provided as an additional input to cpu 210 . moisture sensor 230 may be any conventional moisture sensor known in the art , such as the moisture sensor described in u . s . pat . no . 4 , 477 , 982 , to cotton , which is hereby incorporated in its entirety by reference . a series of drum and heater controls are collectively represented at 240 which , when directed by cpu 210 through timer 215 , operate a drum rotation motor ( not shown ) and a heating element ( not shown ) in response to a drying profile set by the elements on control panel 22 and the output from cpu 210 . after wet articles are placed within drum 14 , a user selects an operation in a generally conventional manner . first , temperature selector 42 is used to chose a desired operating temperature for clothes dryer 1 . while selection regular button 48 uses the highest temperature setting and results in the fastest drying time , the \u201c regular \u201d setting may be too hot for some articles . therefore , additional temperature levels are provided . before pressing start button 70 and beginning operation of clothes dryer 1 , the user rotates dial 100 from off setting 132 into time - dry zone 113 , first sense dry zone 105 or second sense dry zone 110 . if dial 100 is rotated such that location pointer 101 is in time - dry zone 113 , clothes dryer 1 is in time - dry mode , and simply operates until the time indicated by time increment 130 expires . cpu 210 directs motor 225 to rotate dial 100 at a relatively slow speed through a reduced duty cycle coinciding to time increments 130 , and operates the heater at the temperature chosen via temperature selector 42 . rotation of drum 14 continues until location pointer 101 reaches off setting 132 c . if desired , moisture sensor 230 could be designed to operate during the time - dry mode to display to the user the current moisture level via moisture monitor 55 , even though the sense dry mode was not selected . the present invention is particularly directed to the operation of clothes dryer 1 in one of sense dry zones 105 or 110 . second sense dry zone 110 is provided for automatic operation of clothes dryer 1 in most situations . however , first sense dry zone 105 is generally provided for use with permanent press articles or when the user wants wrinkles prevented . the two sense dry zones 105 and 110 operate in substantially the same manner , as commonly known in the art , with their differences not forming part of the present invention . first sense dry zone 105 directs a \u201c wrinkle - free \u201d cycle and therefore , includes press care setting 128 and operates at a lower temperature with an extended period of no added heat , i . e . an air fluff mode , than the cycle directed by second sense dry zone 110 so as to extend tumbling to limit creasing of articles . because operation of clothes dryer 1 is substantially the same for first sense dry zone 105 and second sense dry zone 110 in accordance with the invention , only one description follows , making specific reference to first sense dry zone 105 . with reference to the drawings and particularly fig3 just as when time - dry zone 113 is used , when a sense dry mode of clothes dryer 1 is called for , the user places the wet articles inside drum 14 , chooses a drying temperature with temperature selector 40 ( step 300 ), selects signal on or off ( 302 ), and indicates the desired , final dryness level by rotating dial 100 until location pointer 101 points to the desired level ( step 304 ). specifically , the desired setting may be either more dry setting 120 , less dry setting 125 or somewhere between . after start button 70 is pressed ( step 306 ), cpu 210 through timer 215 begins tumbling of drum 14 ( step 308 ). in a preferred embodiment , cpu 210 measures the current moisture level within drum 14 via moisture sensor 230 upon commencing tumbling of drum 14 ( step 310 ). timer 215 is then activated by cpu 210 ( step 316 ) to rotate dial 100 to determine its position or setting ( step 318 ). specifically , dial 100 is rotated at a relatively fast rate , e . g . 8 \u00b0/ minute , as opposed to the slower speed of 2 \u00b0/ minute . although in a preferred embodiment , dial 100 rotates at the same speed internally and externally , it is contemplated to rotate dial 100 at the slower speed externally , while moving four times as fast internally , as to maintain a substantially constant rotation as viewed by the user . more specifically , timer 215 rotates dial 100 at a constant known rate from its initial position to less dry setting 125 ( step 320 ). because the rotational velocity is known , cpu 210 calculates the arc length traveled by dial 100 during this period . by multiplying the preset rotational velocity by the rotation duration of timer 215 , the arc length traversed can be calculated ( step 324 ). for example , if dial 100 is set in close proximity to less dry setting 125 , the rotation period will be substantially less than if dial 100 were set closer to more dry setting 120 . cpu 210 converts this distance value into a dryness level , to be compared to the result from moisture sensor 230 by dryness level determination circuit 220 . at step 328 , timer 215 is stopped , which halts rotation of dial 100 until later in the cycle . as indicated above , motor 225 rotates dial 100 at a different rate when in a sensor - dry zone 105 or 110 as compared to time - dry zone 113 . this allows for a greater degree of selection and flexibility in the layout of indicia 103 in the sensor dry zones 105 and 110 . by advancing dial 100 at a faster rate , in effect , more gradations are possible in the sensor - dry zone . in a preferred embodiment , motor 225 rotates dial 100 at a rate of 8 \u00b0 per minute when in sensor - dry zone 105 or 110 and advances dial 100 at a rate of 2 \u00b0 per minute when in time dry zone 113 . preferably , this is accomplished by advancing dial 100 for 15 seconds out of every 60 seconds . the heater is then energized ( step 330 ) and clothes dryer 1 operates with dial 100 in less dry selection 125 until the final dryness level is reached ( step 332 ). by continually monitoring the output from moisture sensor 230 , and comparing the output to the desired , final dryness level , dryness level determination circuit 220 causes cpu 210 to advance to the next step when the final dryness level is reached . essentially , the rotational movement of dial 100 is halted until the desired dryness level is achieved by cycling between steps 328 - 332 . when the final desired dryness level is achieved , cpu 210 , through timer 215 , restarts timer 215 at the slower speed ( step 333 ), and de - energizes the heater , but permits the continuation of tumbling of drum 14 ( step 334 ). once the heater is de - energized , clothes dryer 1 enters cool - down mode ( step 338 ). if on button 66 of signal controller 62 is depressed ( step 340 ), cpu 210 sounds the buzzer or other notification device to alert the user of the completion of the drying cycle ( step 342 ). if , however , off button 64 is depressed , cpu 210 does not actuate the buzzer and proceeds to the next step . finally , cpu 210 and drum and heater controls 240 stop tumbling of drum 14 and shuts down clothes dryer 1 ( step 344 ). the particular arrangement of cpu 210 within dryer 1 is designed to prevent excessive heating of articles contained in drum 14 if a dry condition is realized at the initiation of a drying cycle . if dyer 1 is started with an already dry load ( or no load at all ) therein , this will be detected by moisture sensor 230 in step 310 . because this reading will be below any desired dryness level calculated in step 324 , when cpu 210 progresses to step 332 , cpu 210 will quickly move through steps 330 - 334 and almost immediately stop the heater . therefore , in the event that an already dry load is placed within drum 14 , the heater will only remain energized for a short duration . with this arrangement , the actual operator established setting between more dry and less dry in either of sense dry zone 105 or 110 is determined by cpu 210 well in advance of reaching a less dry status for the clothes . although not shown , cpu 210 could be used to control a visual numeric or other type of read - out ( not shown ) provided on control panel 22 or elsewhere , to indicate to the user the amount of time to an end of cycle . therefore , although described with reference to preferred embodiments , it should readily understood that various changes and / or modifications could be made to the invention without departing from the spirit thereof . for example , selection element 100 need not be a dial , as one of ordinary skill in the art would recognize that using a slidable element would be within the scope of this invention . additionally , indicia 103 may include a variety of additional dryer cycles , or simply a single sense dry zone . in any event , the invention is only intended to be limited by the scope of the following claims ."}

{"publication\_number": "US-2007282053-A1", "abstract": "a process to coat a shear thickening fluid onto a material which comprises emulsifying dispersions of a shear thickening fluid dissolved in a miscible carrier fluid or a partially miscible carrier fluid to form an emulsion and applying said emulsion to the material , the invention also relates to a suspoemulsion containing a shear thickening fluid which has been emulsified in a volatile solvent . the invention further relates to a method coating a material . the invention further relates to a method of a coating a material with the suspoemulsion .", "application\_number": "US-75838407-A", "description": "the emulsification process of water and stf was found to require a pretreatment of the highly viscous fluid and certain amount of energy that can be achieved from an ultrasonic bath , horn sonication , or heavy duty blending . stfs are known in the art and are disclosed in wagner et al , u . s . ser . no . 11 / 260 , 742 and wagner et . al ., pct application no . us06 / 04581 filed feb . 9 , 2006 which are again incorporated by reference in their entirety . the stabilization process was aided by a surfactant . surfactants are disclosed in the following references which are incorporated by reference in their entirety : ( kirk - othmer encyclopedia of chemical technology \u201c surfactants \u201d, by tharwat tadros copyright \u00a9 2006 by john wiley & amp ; sons , inc ., doi : 10 . 1002 / 0471238961 . 1921180612251414 . a01 . pub2 , article online posting date : jul . 14 , 2006 ) and flick , ernest w ., \u201c industrial surfactants \u201d 2 nd edition , \u00a9 1993 , publisher , william andrew publishing / noyes ( flick , \u201c industrial surfactants \u201d). the preferred surfactants are those that have a suitable hydophilic / lyophilic balance ( hlb ), preferably from 8 to 18 and more preferably typically around 15 . ( kirk - othmer encyclopedia of chemical technology , \u201c emulsions \u201d by edward kostansek , rohm and haas co ., copyright \u00a9 2003 by john wiley & amp ; sons , inc . all rights reserved . doi : 10 . 1002 / 0471238961 . 0513211206180902 . a01 . pub2 , article online posting date : jul . 18 , 2003 these include , but are not limited to pluronic \u2122 l64 and others from the pluronic \u2122 family of similar or higher hlb ( basf ), triton - x705 or others from the triton \u2122 family with similar hlb ( dow ). other nonionic , anionic , cationic or zwitterionic surfactant suitable for forming aqueous emulsions of insoluble oils may be used depending upon the specific stf carrier fluid composition . similarly , nonionic , anionic , or cationic polymers may also be employed , again depending on the specific stf carrier fluid composition . stability can also be achieved through the use of particles , commonly known as a pickering emulsion . these particles may be the same as those comprising the stf , or may be specifically chosen to stabilize the oil - water interface . other \u201c surfactants can be chosen from among those recommended by standard industrial practice handbooks , such as flick \u201c industrial surfactants \u201d. in the case of a water like system , the surfactant would have an hlb of about 8 to about 20 , preferably around 15 . in the case of an oil like system , the surfactant would have an hlb of about 3 to about 8 , ( see kirk - othmer encyclopedia of chemical technology , \u201c emulsions \u201d by edward kostansek , rohm and haas co ., copyright \u00a9 2003 by john wiley & amp ; sons , inc .. doi : 10 . 1002 / 0471238961 . 0513211206180902 . a01 . pub2 , article online posting date : jul . 18 , 2003 water like , would include water and aqueous soluble solvents such as alcohols . the materials that can be used are conventional body armor or ballistic material . conventional body armor materials are typically comprised of many layers of polyaramid poly ( phenylene diamine terephthalamide ) fabric , sold by dupont under the registered name of kevlar \u00ae, with optional ceramic tile inserts . one type of material would include reactive polymeric materials that cure or crosslink to form solids . reactive polymers include polyurethanes that cure through the chemical reaction of components polyols and isocyanates ), epoxies that cure through the addition of a catalyst , and uv curable resins . a preferred second material of this type would be from the class of elastomeric or elastomeric gel materials , such as silicone rubber ( cross - linked pdms ) or silicone gels and the like , which can be relatively low viscosity liquids prior to cross - linking , whereafter they form resilient materials with good rebound characteristics . a variety of elastomers exist to provide a wide range of properties such as chemical and solvent resistance , temperature resistance , and hardness ( durometer ). these materials could be mixed with shear thickening fluids at room temperature to disperse the shear thickening fluids adequately and to achieve the desired composite morphology or shear thickening fluid droplet size . the liquid - like second material could subsequently be cured , or the curing could be accelerated through heating or the addition of additional components that catalyze the reaction and transform the second material into a solid . curing could be accomplished by uv . further , the liquid could be gelled by physical and or chemical crosslinking of polymers or by the addition of structure forming agents , such as fumed silica . another type of materials would include melt processable polymers or thermoplastic elastomers ( tpe ). melt processable polymers include but are not limited to polyolefins such as polyethylene and polypropylene , nylon , polymethylmethacrylate , polyvinylchloride , polyethylene , polyesters such as but not limited to terephthalate ( pet ), polycarbonate and the like . thermoplastic elastomers would include such as materials as those sold under the trade names santoprene \u2122 ( exxon mobil chemical ), hytrel \u00ae ( dupont company ), and engage \u2122 from dupont - dow elastomers . in this instance , increased temperature is used to liquefy a polymeric material . at the processing conditions required to achieve the desired melt flow properties of the polymer second material , the shear thickening fluid would be compounded with the polymer melt to achieve the desired level of mixing and microstructure . the temperature would subsequently be reduced to generate the solid polymer - shear thickening fluid composite . the pre - treatment of the stf involved dissolving the stf in a co - solvent such as but not limited to alcohol , alkanes , such as heptane and hexane , or toluene . any soluble or partially material that does not adversely affect the stf properties can be employed . this boiling point of this co - solvent needs to be lower than the boiling point of the solvent component of the stf , which in this case , is a silicone oil . the amount of co - solvent should also be minimized , but sufficient to enable the stf to be emulsified . a preferred amount of co - solvent is around 10 % by volume in order to avoid any significant processing issues and to ease the evaporation of the co - solvent . as a specific example , 150 ml of stf ( 50 % 450 nm silica particles ( shokubai , kep - 50 , nissan chemical ) dispersed in polytrimethicone ( ptm - 20 , isp , inc .) and 15 ml of heptane ( reagent grade , fischer scientific ) were mixed by hand - shaking the container for 1 minute and subsequently , placing the container on a roll - mixer for 10 minutes . in a separate stock solution container , 0 . 5 g of a surfactant ( pluronic l64 , basf ) was dissolved in 1000 ml of deionized water . to ensure that the surfactant fully dissolved in the water , the stock solution was placed in the ultrasonic bath for 1 hour under heating to 35 \u00b0 c . 585 ml of the water / surfactant mixture was then added to the stf / heptane mixture . this mixture was then placed in an ultrasonic bath at approximately 35 \u00b0 c . for 1 hour . the mixture was then hand - shaken for 1 minute after sonication . the result is shown in fig1 as a uniform , white , low viscosity fluid with water as the continuous phase . the emulsion as prepared appears uniform for approximately 5 - 10 minutes , where upon a dense layer appears to form at the bottom , while a clear layer of water forms at the top . these phases continue to grow at the expense of the emulsion . some emulsion is still evident after 24 hours . upon shaking or stirring , the emulsion can be regenerated . as a specific application of the above mixture , the emulsion as prepared was placed in a dip coating pan for stf - fabric manufacturing . a standard procedure , previously published was followed . ( egres , et al ., stab performance of shear thickening fluid ( stf )- fabric composites for body armor applications , proceedings of sampe 2005 : new horizons for materials and processing technologies . long beach , calif . 1 - 5 may 2005 ). the fabric used was a 15 \u2033\u00d7 15 \u2033 sheet of twaron ( 1011 - 123 . 0 - 1002 , provided by barrday , inc .). the fabric was submerged in the emulsion for 1 minute and then drawn through a set of 2 rubber nip - rollers to remove excess fluid . the sheet was then hung - dried for 30 minutes upon which it was further dried in an oven at 80 \u00b0 c . for 30 minutes . the final weight addition of stf to the fabric was 24 %. the stf - twaron composite was then cut into four 7 . 5 \u2033\u00d7 7 . 5 \u2033 pieces which were stacked for quasistatic ( qs ) spike resistance testing . four untreated sheet were also tested for comparison . an intron 4201 was used to measure load . an nij - standard spike was used as the impactor and pushed into the fabric sample at 5 mm / min . backing material is a multilayer foam and witness paper support , the details of which is outlined in nij standard 0115 . 0 . fig2 illustrates load vs . displacement of the treated twaron and untreated twaron . these preliminary results show that the stf - water emulsion has efficacy in successfully impregnating fabrics for spike resistance . all the references described above are incorporated by reference in its entirety for all useful purposes . while there is shown and described certain specific structures embodying the invention , it will be manifest to those skilled in the art that various modifications and rearrangements of the parts may be made without departing from the spirit and scope of the underlying inventive concept and that the same is not limited to the particular forms herein shown and described ."}

{"publication\_number": "US-6796116-B2", "abstract": "an open - end spinning device with an opening device for opening continuously supplied sliver material by means of a rapidly running opening cylinder , which opening device is arranged in front of a sliver spreading device with cooperating pairs of spreading cylinders . the spreading cylinders comprise flanges that engage into recesses of the opposing spreading cylinder . the spacing between the particular cooperating spreading cylinders can be periodically varied . an unobjectionable opening process with a low speed of the opening cylinder and with a widened opening cylinder can be achieved with the sliver spreading device of the invention which process is associated with a high - precision dosing and high yarn uniformity .", "application\_number": "US-19982402-A", "description": "referring now to the accompanying drawings and initially to fig1 sliver 1 is drawn off out of can 2 at the spinning location shown in fig1 travels via deflection roller 3 of deflection device 4 and is supplied by guide 5 to sliver spreading device 6 . the spacing between the axis of deflection roller 3 and can 2 is somewhat more than the sliver length of one coiled rotation of the sliver stored within the can . sliver 1 hangs freely on this stretch and false twists occurring in an isolated manner in sliver 1 can rotate themselves out . sliver 1 runs through three pairs of cylinders formed by spreading cylinders 7 , 8 , 9 , 10 , 11 , 12 and is fed in a spread state in the form of a thin sliver fleece 13 to opening device 14 . feed trough 15 presses spread sliver 1 against draw - in cylinder 16 and forms with draw - in cylinder 16 a clamping position that retains the end of sliver 1 , the so - called sliver tuft . opening cylinder 17 combs out the sliver tuft and opens the sliver to the individual fibers . opening cylinder 17 thereby rotates in the direction of arrow 18 . the fibers are taken by takeoff cylinder 19 standing under a vacuum and combined to a narrow , small sliver . the direction of rotation of takeoff cylinder 19 is indicated by arrow 20 . takeoff cylinder 19 and clamping roller 21 form a clamping line through which the small sliver is run . air spinning device 22 generates an air vortex that serves for sliver formation . such air spinning devices are known , e . g ., from german patent publication de 196 10 960 . sliver 23 passes draw - off device 24 and is transported to a winding head not shown for reasons of simplicity . sliver spreading device 6 of fig2 is enlarged relative to fig1 and is shown in more detail . sliver 1 is deflected through guide 5 and drawn into the first cylinder pair formed by spreading cylinders 7 , 8 and is spread thereby to become thinner as a result of the spreading . sliver 1 subsequently travels through spreading cylinders 9 , 10 of the second spreading cylinder pair and finally through spreading cylinders 11 , 12 of the third spreading cylinder pair and is supplied as a thin sliver 1 spread over the entire working width to draw - in cylinder 16 that forms a clamping line with feed trough 15 . a rapidly running opening cylinder 17 combs the fibers out of the end of sliver 1 , which end is designated as sliver tuft 25 , and opens sliver 1 thereby into individual fibers . lower spreading cylinders 8 , 10 , 12 are connected to gears 26 , 27 , 28 such that they rotate in unison with one another . intermediate gears 29 , 30 establish a drive connection between gears 26 , 27 , 28 of lower spreading cylinders 8 , 10 , 12 . intermediate gear 30 is connected to belt disk 31 such that it rotates in unison with it , which belt disk is driven by drive belt 32 via belt disk 33 . belt disk 33 is connected in turn to draw - in cylinder 16 such that it rotates in unison with it . belt disk 33 is driven by motor 35 via drive belt 34 . the translation between draw - in cylinder 16 and lower spreading cylinders 8 , 10 , 12 is selected in such a manner that the circumferential speed of draw - in cylinder 16 is equal to that of spreading cylinders 8 , 10 , 12 . shaft 36 of upper spreading cylinder 9 is fastened to one arm of angle lever 37 . angle lever 37 can pivot about shaft 38 , that is stationary relative to housing 40 , and comprises bolt 39 fastened to the other arm . bolt 39 engages into oblong hole 41 of coupling rod 42 . in the same manner , upper spreading cylinders 7 , 11 are pivotably supported on angle levers 43 , 44 . bolts 45 , 46 of angle levers 43 , 44 also each engage into an oblong hole of coupling rods 47 , 48 . coupling rod 42 is pivotably inserted by its end onto bolt 45 and coupling rod 48 in the same manner onto bolt 39 so that the three angle levers 37 , 43 , 44 are articulated to each other and can pivot in common . upper spreading cylinders 7 , 9 , 11 can be raised off of lower spreading cylinders 8 , 10 , 12 by pivoting angle levers 37 , 43 , 44 counterclockwise in order , e . g ., to be able to insert new slivers . spiral springs 52 , 53 , 54 are suspended on bolts 45 , 39 , 46 of angle levers 43 , 37 , 44 and on bolts 49 , 50 , 51 , that are fastened on coupling rods 47 , 42 , 48 . if coupling rods 42 , 47 , 48 are drawn manually to the right in the view of fig2 after the insertion of slivers , the oblong holes in coupling rods 42 , 47 , 48 shift relative to bolts 39 , 45 , 46 , and bolts 39 , 45 , 46 and therewith angle levers 37 , 43 , 44 are loaded with a tractive force by means of spiral springs 52 , 53 , 54 . under the action of this tractive force , angle levers 37 , 43 , 44 pivot clockwise until upper spreading cylinders 7 , 9 , 11 have reached an end position . in this end position coupling rods 42 , 47 , 48 are fixed by locking lever 55 . locking lever 55 can pivot about bolt 49 and has a nose 56 which engages in a hooking manner on housing 40 . in order to manually raise upper spreading cylinders 7 , 9 , 11 , lever knob 57 is grasped and locking lever 55 is pivoted upward , as a consequence of which nose 56 is lifted out of housing 40 and the fixation of coupling rods 42 , 47 , 48 is cancelled . angle levers 37 , 43 , 44 are pivoted counterclockwise and upper spreading cylinders 7 , 9 , 11 are raised by a subsequent moving of lever knob 57 to the left in the view of fig2 . if a sliver thickening or sliver rotation travels into a spreading cylinder pair the upper spreading cylinders 7 , 9 , 11 can yield upwards . the deflection takes place counter to the tensile stress applied by the particular spiral springs 52 , 53 , 54 in the framework of the play limited by the dimensions of the oblong holes of coupling rods 42 , 27 , 48 . fig3 shows a section through the second spreading cylinder pair of sliver spreading device 6 shown in fig2 . the grooves and flanges of the two spreading cylinders 9 , 10 mesh into each other and form an intermediate space having a zigzag form . the spacing of spreading cylinders 9 , 10 is dimensioned in such a manner that a sliver 1 of 7 ktex can be drawn into the intermediate space without raising upper spreading cylinder 9 . shaft 58 of lower spreading cylinder 10 is supported on housing 40 and is driven via gear 27 . spreading cylinder 10 comprises lateral edges 59 , 60 on which upper spreading cylinder 9 rests with its edges 61 , 62 . upper spreading cylinder 9 is rotatably supported on shaft 63 . shaft 63 is permanently connected to angle lever 37 . spiral spring 53 attacks bolt 39 fastened to the upper lever arm of angle lever 37 . the working width of the cylinder pairs is adapted to the working width of draw - in cylinder 16 . sliver 1 is already extensively spread over the width of spreading cylinders 9 , 10 in the view of fig3 . after the spreading by the third spreading cylinder pair , sliver 1 can be presented to draw - in cylinder 16 in a form spread over the entire working width thereof . fig4 shows the intermediate space between spreading cylinders 9 , 10 in an enlarged view . flanges 64 of lower spreading cylinder 10 engage into grooves 65 of upper spreading cylinder 9 and flanges 66 of upper spreading cylinder 9 engage into grooves 67 of lower spreading cylinder 10 . sliver 1 runs in a zigzag manner in the intermediate space between the two spreading cylinders 9 , 10 and is subjected to a tensile stress upon running into the cylinder pair in the area between flanges 64 and flanges 66 , which causes it to be spread . the spreading process of sliver 68 can be completed in a more protective manner with the embodiment shown in fig5 . to this end , the surface of upper spreading cylinder 69 and the surface of lower spreading cylinder 70 have an approximately sinusoidal shape , viewed in the axial direction . fig6 shows an alternative embodiment of the subject matter of the invention . sliver 71 is conducted through a spreading cylinder pair in which the upper spreading cylinder 72 as well as the lower spreading cylinder 73 comprise disks 74 , 75 that are fastened to a shaft 76 , 77 and whose circumferential surfaces form flanges 99 , 100 . recesses 97 , 98 are formed between disks 74 , 75 . this design of spreading cylinders 72 , 73 can be manufactured simply and economically . fig7 shows a side view of sliver spreading device 78 with upper spreading cylinders 79 , 81 that move up and down and lower , stationary spreading cylinders 80 , 82 . the opening device with draw - in cylinder 16 is described above in conjunction with fig2 . sliver 1 passes guide 5 and deflection cylinder 83 before it is fed to the first spreading cylinder pair formed by upper spreading cylinder 79 and lower spreading cylinder 80 . before it is presented to draw - in cylinder 16 , the sliver 1 travels through a second spreading cylinder pair formed by upper spreading cylinder 81 and lower spreading cylinder 82 . the height of the stationarily supported , lower spreading cylinders 80 , 82 is selected in such a manner that sliver 1 can run above spreading cylinders 80 , 82 when it is tautly drawn between deflection cylinder 83 and draw - in cylinder 16 . shafts 84 , 85 of spreading cylinders 79 , 81 are fastened to angle lever 86 . the two lower spreading cylinders 80 , 82 are stationarily mounted on housing 87 . the mounting corresponds to the mounting of spreading cylinders 8 , 10 , 12 shown in fig2 . angle lever 86 and pivot lever 88 shown in dotted lines are connected to shaft 89 in such a manner that they rotate in unison with it and can pivot together about the axis of rotation of shaft 89 . one end of pivot lever 88 can be moved back and forth by connecting rod 90 . the other end of connecting rod 90 engages crank disk 91 driven by motor 92 . the speed of crank disk 91 is between 500 rpm and 1 , 500 rpm . the crank drive is designed as a buffer element in such a manner that when sliver thickenings or sliver twists occur , no blockage occurs . upper spreading cylinders 79 , 81 move periodically up and down as a function of the speed of crank disk 91 . the spreading action exerted on sliver 1 is significantly reinforced by the high - frequency movement . the lower spreading cylinders 80 , 82 are put in rotation by drive belt 93 via intermediate gear 94 and gears 95 , 96 . drive belt 93 also drives deflection cylinder 83 . the translation ratios are selected so that deflection cylinder 83 as well as spreading cylinders 79 , 80 , 81 , 82 and draw - in cylinder 16 have the same circumferential speed . sliver 1 is separated out of the grooves upon each upward movement of upper spreading cylinders 79 , 81 in the particular spreading cylinder pair . the new contact position between sliver material and the flanges is usually shifted somewhat laterally during the downward movement of spreading cylinders 79 , 81 . sliver 1 is spread as a result not only more effectively but also more uniformly . it will therefore be readily understood by those persons skilled in the art that the present invention is susceptible of broad utility and application . many embodiments and adaptations of the present invention other than those herein described , as well as many variations , modifications and equivalent arrangements , will be apparent from or reasonably suggested by the present invention and the foregoing description thereof , without departing from the substance or scope of the present invention . accordingly , while the present invention has been described herein in detail in relation to its preferred embodiment , it is to be understood that this disclosure is only illustrative and exemplary of the present invention and is made merely for purposes of providing a full and enabling disclosure of the invention . the foregoing disclosure is not intended or to be construed to limit the present invention or otherwise to exclude any such other embodiments , adaptations , variations , modifications and equivalent arrangements , the present invention being limited only by the claims appended hereto and the equivalents thereof ."}

{"publication\_number": "US-5088426-A", "abstract": "a sewing machine for automatic thread taking - up and threading comprising a guide groove for guiding a needle thread to a threading preparatory position in the vicinity of a needle bar via a thread taking - up preparatory position intersecting a thread take - up moving area , a sewing machine motor driver for extracting the needle thread along the thread take - up moving area and for instructing a thread take - up to catch the needle thread , a pulse motor driver for threading the needle thread to an eye of a needle , a threading switch for generating signals , and an electronic control circuit for controlling the pulse motor driver and the sewing machine driver at prescribed timings in response to the signals from the threading switch . in the sewing machine , an operator has only to prepare a needle thread along the guide groove and push the threading switch . the electronic control circuit then controls the pulse motor driver and the sewing machine driver for the thread taking - up operation and the threading operation , respectively . any operator can operate the sewing machine with easiness because the thread take - up operation and the threading operation are automatically performed without complicated cam mechanism or linkage mechanism . in addition , the sewing machine is easy to manufacture and the timing of operations can easily be adjusted .", "application\_number": "US-59283290-A", "description": "sewing machines for automatic thread taking - up and threading embodying the present invention are described in detail with reference to the attached drawings . fig2 is a perspective view showing a head 1 of the sewing machine for automatic thread taking - up and threading seen from the side of a face plate 3 . on the top face of the head 1 an arm spool pin 5 and a top thread holder 9 are provided . a bobbin 7 is put on the arm spool pin 5 , and a needle thread w from the bobbin 7 is held by the top thread holder 9 and led to the front of the head 1 . a guide groove 11 beginning directly before the top thread holder 9 intersects the top face , extends downward in the front face of the head 1 , passes under the face plate 3 , and ends at the rear of the face plate 3 . on both sides of the guide groove 11 on the front face of the head 1 , a start switch sw1 and a threading switch sw2 are attached . the start switch sw1 at a lower position instructs the start of sewing operating . the threading switch sw2 at a higher position instructs thread taking - up operating by a thread take - up and threading operating to an eye of a needle , both of which are explained later . as shown in fig3 a front view , the guide groove 11 passes between a pair of tension discs 15 of a tension member 13 , obliquely intersects approximately middle portion of a thread guide 17 above a thread take - up spring 19 , and goes around a needle - bar thread guide 23 provided under a needle bar 21 . further , the guide groove 11 passes under the front portion of the face plate 3 and ends at a terminal 25 at the rear of the face plate 3 . a thread cutter 27 is attached to the terminal 25 of the guide groove 11 . inside of the head 1 a thread take - up 30 is provided in the front portion of the guide groove 11 so as to swing vertically in front of the thread guide 17 . the thread take - up 30 comprises a claw 31 bent upward for catching the needle thread w , a cover rod 32 provided over the claw 31 , and a pressing cover 33 fixed to the cover rod 32 . the claw 31 and the pressing cover 33 form a thread holding hole 34 . seen from the face plate 3 , the thread holding hole 34 is a slightly curved narrow hole , as shown in fig4 c . the pressing cover 33 is almost u - shaped in cross section seen from the top and surrounds the thread guide 17 , as shown in fig4 b . a front panel 35 , a rear panel 36 , and a connecting panel 37 compose the pressing cover 33 . the front panel 35 is positioned in front of the thread guide 17 and the rear panel 36 is behind the thread guide 17 . the connecting panel 37 connects the front panel 35 and the rear panel 36 . the claw 31 contacts with the front panel 36 at its tip and is slightly curved toward the thread guide 17 , as shown in fig3 . a notch 38 is formed in the rear panel 36 , as shown in fig4 c , such that the tip of the claw 31 projects beyond the pressing cover 33 through the notch 38 . as shown in fig5 a base 43 of the thread take - up 30 is rotatably mounted on an auxiliary shaft 41 . the auxiliary shaft 41 is parallel with an arm shaft 40 . the base 43 has a cam slot 42 through it extending from adjacent the auxiliary shaft 41 . a crank pin 45 of a thread take - up crank 44 fixed to the arm shaft 40 is movable in the cam slot 42 . the cam slot 42 has three portions ; an arc portion 46 in the middle , a linear portion 47 at one end near the auxiliary shaft 41 , and a short arc portion 48 at the other end . the arc portion 46 has a curvature approximately equal to that of the partial circle made by the rotation of the crank pin 45 . the curvature of the short arc portion 48 is smaller than that of the arc portion 46 . by the engagement of the cam slot 42 with the crank pin 45 , the thread take - up 30 moves as indicated by the arrow in fig5 when the arm shaft 41 is rotated . the relative positions of the cam slot 42 and the crank pin 45 are adjusted such that the thread take - up 30 goes down below a lower end portion 50 of the thread guide 17 , as shown by a dashed line in fig4 a . at the lower end portion 50 of the thread guide 17 a thread receiver 52 is positioned , as shown in fig4 a . the thread receiver 52 has a dent 51 in its lower portion . a press roller 53 disposed in the dent 51 is brought close to or apart from the thread receiver 52 by a cam mechanism ( not shown ) during the sewing operating , thus adjusting the tension of the needle thread w . a guide member 55 is interposed between the thread take - up 30 and the thread receiver 52 so as to cover a thread take - up spring 19 and a portion of the thread guide 17 . as shown in fig3 a lower end of a threading member shaft 60 is positioned near the curved portion of the guide groove 11 at the bottom of the face plate 3 . the threading member shaft 60 is parallel to the needle bar 21 . the following is an explanation of the threading member shaft 60 . fig6 shows the inside of the face plate 3 . a frame body 61 supports the needle bar 21 and the threading member shaft 60 . the threading member shaft 60 is vertically movable along an axis parallel to that of the needle bar 21 and is also rotatable about that axis . the threading member shaft 60 is connected to a thread positioning member 64 and a threading member 65 . the thread positioning member 64 strings the needle thread w in front of the eye 63 of a needle 62 by the cooperating of a guide mechanism and a linkage mechanism ( to be described later ), when the threading member shaft 60 is vertically moves and rotated . the threading member 65 introduces the strung needle thread w into the eye 63 . as shown in fig7 a , the thread positioning member 64 is composed of a first positioning part 66 provided near the needle - bar thread guide 23 , a second positioning part 67 provided behind the first positioning part 66 , a third positioning part 68 provided behind the second positioning part 67 and a thread end keeping member 70 provided above and behind the three thread tension parts 66 , 67 and 68 . the thread tension parts 66 , 67 and 68 are almost at the same height . a thread holding protrusion 71 projects from the lower portion of the first positioning part 66 toward the needle bar 21 . a pressing protrusion 72 is formed at the lower portion of the second positioning part 67 , is positioned slightly above the thread holding protrusion 71 of the first positioning part 66 , and projects forward beyond the first positioning part 66 . in addition , a thread pressing piece 73 on the third thread tension portion 68 is at the same height of the thread pressing protrusion 72 of the second positioning part 67 and extends forward . preferably , the first and the second thread tension part 66 and 67 are integrally molded and have an approximate square cross section , as shown in fig7 b . a part of the second positioning part 67 , which is in communication with the thread pressing protrusion 72 , extends in parallel to the first positioning part 66 with an appropriate space 74 therebetween . both the first positioning part 66 and the second positioning part 67 are directly fixed to a u - shaped metal fitting 75 , which is rotatable about the threading member shaft 60 . the third positioning part 68 is positioned at a free end of a rotating arm 77 , whose other end is fixed to the threading member shaft 60 via a rotation stop pin 76 . the thread end keeping member 70 comprises a press plate 80 for pushing up the guided needle thread w and a press disc 82 freely movable on a support 81 extending upward from the press plate 80 . the press disc 82 is forced downward by a spring 83 attached around the support 81 . on the press plate 80 , a receiving groove 84 is formed in a tangential direction with respect to the support 81 and in the vicinity thereof as shown . the thread end keeping member 70 is rotatably supported by the third thread tension member 68 via a support shaft 80b which projects downward from an arm 80a integrally formed as part of the press plate 80 . the end portion of the upper and longer leg of the u - shaped metal fitting 75 is loosely engaged with a deformed pin 85 having a larger - diameter portion in its longitudinally middle portion . the thread end keeping member 70 is connected to the u - shaped metal fitting 75 via a connecting lever 86 which is loosely engaged with the deformed pin 85 and the support 81 at its respective ends . the support 81 is slidable in a guide slot 88 formed in the bottom face of a slidable guide 87 . the slidable guide 87 freely rotates around the threading member shaft 60 , and is prevented from moving vertically because of locating snap rings e positioned on and under the slidable guide 87 . a vertical guide member 89 having a u - shaped cross section with a longitudinal groove 89a is fixed to the slidable guide 87 , as shown in fig6 . a pin 61a projects horizontally from the bottom of the frame body 61 into the groove 89a . the guide member 89 and the slidable guide 87 thus integrally slide up and down the pin 61a . consequently , the slidable guide 87 vertically moves the threading member shaft 60 via the guide member 89 and horizontally moves the support 81 via the guide slot 88 in its underside . the threading member 65 at the rear end of rotating arm 77 comprises a threading hook 90 and a pair of hook guards 91 . seen from the top , the threading hook 90 extends to the right and bends to the front in its middle portion , as shown in fig8 . the pair of hook guards 91 are positioned on opposite sides of the threading hook 90 and are bent along the curve of the threading hook 90 . as shown in fig9 each of the hook guards 91 has a leading notch 93 in its end for leading the needle thread w towards a downward projection 92 of the threading hook 90 . the thread positioning member 64 and the threading member 65 having the aforementioned construction operate at their predetermined positions in exact timing with each other when the threading member shaft 60 moves vertically and rotates in a manner to be described shortly . as best seen with reference to fig6 once again , a guide member 95 is slidably provided on the upper portion of the threading member shaft 60 . the guide member 95 has a cam notch 96 in the form of an elongated slot formed obliquely therein . one end of an engagement pin 97 penetrating the threading member shaft 60 is engaged with the cam notch 96 . the threading member shaft 60 is biased upward by a spring 98 linking the top board of the guide member 95 and the engagement pin 97 . therefore , the engagement pin 97 normally abuts the lowest end of the cam notch 96 . the guide member 95 is connected to the top of the frame body 61 via a spring 99 , thus also being biased upward . the top of the guide member 95 is pushed by a press board 101 provided at the upper end of a rack 100 . the rack 100 is moved up and down in parallel to the threading member shaft 60 by a pulse motor 105 via gears 102 , 103 and 104 . when the rack 100 descends , the threading member shaft 60 goes down together with the guide member 95 until the left end ( as fig6 is viewed ) of the engagement pin 97 abuts an abutting member 106 fixed at a predetermined position on the needle bar 21 . the position of the abutting member 106 is determined by the position of the eye 63 of the needle 62 . specifically , when the threading member shaft 60 is stopped by the abutting member 106 , the threading hook 90 is as high as the eye 63 . subsequently , when the rack 100 further descends , the threading member shaft 60 is rotated because the engagement pin 97 moves in the cam notch 96 . in accordance with the aforementioned movement of the threading member shaft 60 , the thread positioning member 64 and the threading member 65 operate as follows . when the threading member shaft 60 rotates clockwise , the thread positioning member 64 , the threading member 65 , and other components shift from the condition shown in fig1 a to that in fig1 b . specifically , the rotating arm 77 is rotated clockwise together with the threading member shaft 60 , the press plate 80 is pushed leftward , and the support 81 slides leftward in the guide cavity 88 . in addition , the u - shaped metal fitting 75 , which is pulled by the connecting lever 86 , rotates counterclockwise . as a result , the thread positioning member 64 is stretched and the distance between the first and second thread tension parts 66 and 67 and the thread end keeping member 70 becomes largest , as shown in fig1 b . as a result , the threading hook 90 is inserted through the eye 63 of the needle 62 . subsequently , the threading member shaft 60 is rotated counterclockwise and the thread positioning member 64 is contracted again , as shown in fig1 c , pulling the thread w . the introduction of the needle thread w to the thread positioning member 64 along the guide groove 11 will now be explained with particular reference to fig2 , 7a and 10a . by operating the presser - foot lever 110 provided on the head 1 behind the needle bar 21 on the head 1 , the presser foot 112 is raised and the tension member 13 is opened . the free end of the needle thread w is then pulled from the bobbin 7 , passed through the top thread holder 9 , and is lead in the guide groove 11 from the front face to the rear face of the head 1 . the needle thread w further is passed between the tension discs 15 of the tension member 13 , the thread take - up spring 19 , and the needle - bar thread guide 23 . the needle thread w further passes over the thread holding protrusion 71 of the first positioning part 66 , under the thread pressing protrusion 72 of the second positioning part 67 , and under the thread pressing piece 73 of the third positioning part 68 . after that , the needle thread w is inserted between the press plate 80 and the press disc 82 of the thread end keeping member 70 , and is cut by the thread cutter 27 . by the foregoing operation , the needle thread w is thus positioned with respect to the thread positioning member 64 , in the manner shown in fig1 a . since the needle thread w reaches the terminal 25 of the guide groove 11 , the needle thread w is securely held by the thread end keeping member 70 such that the needle thread w is in contact with the lower end of the support 81 . the needle thread w is slightly slackened off in the guide groove 11 . the control system of the sewing machine for automatic thread taking - up and threading will now be described with particular reference to fig1 . the control system comprising cpu , rom , ram , and the like is mainly composed of an electronic control circuit 120 for controlling the thread taking - up operating , the threading operating , and the sewing operating . to the electronic control circuit 120 , the start switch sw1 and the threading switch sw2 are connected at its input side , and a sewing machine motor 125 and the pulse motor 105 are connected at its output side via a sewing machine motor driver 122 and a pulse motor driver 124 . an np1 sensor 130 and an np2 sensor 132 are also connected to the electronic control circuit 120 . the np1 sensor 130 sends out a detection signal when the needle bar 21 is at its highest position ( hereafter referred to as np1 ) as determined from the phase angle of the arm shaft 40 . the np2 sensor 132 sends out a detection signal when the thread take - up 30 is at its highest position ( hereafter referred to as np2 ), also determined from the phase angle of the arm shaft 40 . furthermore , to the electronic control circuit 120 , a presser - foot upper position sensor 134 and a threading confirmation sensor 136 are connected . the presser - foot upper position sensor 134 sends out a detection signal when the presser foot 112 is raised using the presser - foot lever 110 , in other words , when the tension member 13 is opened . the threading confirmation sensor 136 attached on the top of the guide member 95 sends out a detection signal when the upper end of the threading member shaft 60 projects beyond a predetermined position . fig1 is a flow chart showing control procedure executed by the electronic control circuit 120 . as described above , the needle thread w as pulled from the bobbin 7 is led to a predetermined position along the guide groove 11 . when it is first turned on , the sewing machine is initialized and its motors , including the pulse motor 105 , are set to &# 34 ; 0 &# 34 ; at step s1 . subsequently , the threading switch sw2 is pressed by an operator to begin the fully automatic threading operation of this invention . when it is determined at step s2 that the threading switch sw2 is on , it is asked at the next step s3 whether the start switch sw1 is off or not . when the answer is affirmative , the electronic control circuit 120 proceeds to step s4 , where it is asked whether the presser foot 112 is in its upper position and the tension member 13 is opened . when the start switch sw1 is on or when the presser foot 112 is not raised , the procedure goes back to step s2 . the threading switch sw2 must be pressed again when the answer at step s3 or step s4 is negative , because the threading switch sw2 momentarily operates . when the start switch sw1 is off and the presser foot 112 is in its upper position , the sewing machine motor 125 is driven at step s5 . when the sewing machine motor 125 is driven , the needle thread w is taken up by the thread take - up 30 , as shown in fig1 a through 13c . when the thread take - up 30 is swung downward , the needle thread w crossing almost the middle portion of the thread guide 17 is caught by the pressing cover 33 provided at the end of the thread take - up 30 . the needle thread w abuts the under sides of the front panel 35 and the notch 38 of the rear panel 36 . as the thread take - up 30 is further swung downward , the thread take - up 30 pulls the needle thread w along the thread guide 17 . at this time , the needle thread w continues to be pulled only from the bobbin 7 , because the free end of the needle thread w is gripped by the thread end keeping member 70 and the tension member 13 is opened . the thread take - up 30 continues to move downward until it is below the lower end portion 50 of the thread guide 17 . after that , the thread guide 17 does not prevent the needle thread w from slipping from between the front panel 35 and the rear panel 36 and entering the thread holding hole 34 . in addition , the thread take - up spring 19 leaps up . consequently , the needle thread w is pulled up , is slipped from the notch 38 of the pressing cover 33 , and enters the dent 51 of the thread receiver 52 and the thread holding hole 34 . the needle thread w never goes up beyond the lower end portion 50 even when the thread take - up 30 swings up , because the deepest portion of the thread holding hole 34 is above the lower end portion 50 . the needle thread w is thus taken by the thread take - up 30 . although the needle thread w is caught by the thread take - up 30 after the thread take - up 30 once swings down , the control logic asks at step s6 for confirmation of whether or not the arm shaft 60 rotated once or more such that the needle thread w never fails to be taken regardless of the initial position of the thread take - up 30 . after the sewing machine motor 125 rotates once or more the phase angle of the arm shaft 40 is np1 . then , it is determined at step s7 whether or not the np1 sensor 130 output a detection signal . if the answer at step s7 is affirmative , the sewing machine motor 125 is stopped at step s8 . while the arm shaft 40 is rotated by the sewing machine motor 125 , the needle bar 21 is driven vertically together with a needle bar connecting stud 144 by a needle - bar crank 142 connected to the end of the crank pin 45 via a connecting board 140 , as shown in fig6 . as can be seen from the drawing figure , the crank pin 45 passes through the base 43 of the thread take - up 30 . when the sewing machine motor 125 is stopped in response to the detection signal from the np1 sensor 130 , the needle bar 21 is placed in the vicinity of its highest position . accordingly , when the needle thread w is threaded through the eye 63 of the needle 62 when the presser foot 112 is raised , the presser foot 112 does not interfere with the thread positioning member 64 and the threading member 65 . subsequently , the pulse motor 105 is rotated forward at step s9 , the rack 100 is lowered , and the needle thread w is threaded through the eye 63 of the needle 62 , in the manner shown in fig1 a through 10c and fig1 a through 14c . as described above , when the pulse motor 105 rotates forward , the threading member shaft 60 is lowered . after the threading hook 90 is just beside the eye 63 , further lowering of the threading member shaft 60 is stopped and it is rotated . consequently , the thread positioning member 64 is stretched out and the first and the second thread tension parts 66 and 67 are positioned to the right of the needle 62 as fig1 b is viewed . under this condition , the needle thread w is mainly pulled from its upstream side and is strung across in front of the eye 63 of the needle 62 because the free end of the needle thread w is pinched and held by the thread end keeping member 70 . the needle thread w is led to the under side of the first thread tension member 66 through the space 74 and is positioned near the eye 63 . at the same time , the threading member 65 is also rotated causing the threading hook 90 to pass through the eye 63 to the position of fig1 a . the needle thread w is guided by the leading notches 93 so as to be caught behind the projection 92 . when the needle thread w is caught by the threading hook 90 through the eye 63 , the threading confirmation sensor 136 sends out a signal at step s10 . after the threading confirmation sensor 136 turns on , a timer is set at step s11 and the pulse motor 105 is rotated forward until a predetermined time elapses , at step s12 . the pulse motor 105 is rotated such that the needle thread w is securely held by the threading hook 90 , because the needle thread w fails to be caught by the threading hook 90 in some cases . after the predetermined time , the number of pulses , c , required for the forward rotation of the pulse motor 105 is stored in a specified memory location in the electronic control circuit 120 for later retrieval . then the pulse motor 105 is rotated in reverse at step s13 . as the threading member shaft 60 is rotated , the thread positioning member 64 is contracted again , the threading member 65 is also rotated , and the threading hook 90 is withdrawn from the eye 63 , as depicted in fig1 c . as the threading member shaft 60 is further rotated , the engagement pin 97 abuts the lower end of the cam notch 96 and the rotation of the threading member shaft 60 is stopped . the threading member shaft 60 is then raised in combination with the guide member 95 . as depicted in fig1 b and 14c , the needle thread w caught by the threading hook 90 is pulled through the eye 63 . at this time , the free end of the needle thread w is released from the support 81 and slips away from between the press plate 80 and press disc 82 along the receiving groove 84 , as shown in fig1 c . at step s14 of the control logic , the pulse motor 105 is rotated in reverse the same number of pulses , c , previously stored in memory . the pulse motor 105 is then stopped at step s15 . in the manner described above , according to this invention the needle thread w is automatically taken up by the needle take - up 30 and subsequently threaded through the eye 63 of the needle 62 by an operator simply pressing the threading switch sw1 once . it should be noted that in this embodiment , the thread taking - up operating is executed before the threading operating to prevent the needle thread w from coming out of the eye 63 during the thread taking - up operating . the threading operating can be executed before the thread taking - up operating , however , in the following second embodiment of the present invention . the structure of a sewing machine for automatic thread taking - up and threading according to the second embodiment is substantially the same as that of the first embodiment described above . therefore , in the interest of simplicity , similar members to that of the first embodiment are given similar numbers in the drawings and the description which follows . as best seen in fig1 and 16a through 16b , an elastic wire 250 is wound around the cylindrical portion of a rotating arm 77 to hold it thereon at one end while its other free end is positioned to penetrate the leading notches 93 of the hook guards 91 . the elastic wire 250 is further positioned to abut the rear face of the projection 92 of the threading hook 290 in its normal position . as shown in fig1 a through 16c , when the projection 92 penetrates the eye 63 , the elastic wire 250 is forced back by the rear face of the needle 62 . as a result , the needle thread w strung before the eye 63 is easily caught by the projection 92 . moreover , when the projection 92 is drawn back , the elastic wire 250 moves forward to abut the rear face of the projection 92 once again as a result of its elasticity , as shown in fig1 b . thus , the needle tread w is firmly held in its position behind the projection 292 by the elastic wire 250 as it is pulled through the eye 263 . as in the first embodiment , the free end of the needle thread w is from the thread end keeping member ( not shown ) while being pulled through the eye 63 . although the needle tread w may pulled up subsequently because a threading member shaft ( not shown ) is raised , the elastic wire 250 presses the needle thread w into the rear face of the projection 92 and the needle thread w is thereby securely held by the projection 92 . consequently , when the thread taking - up operating is performed , the needle thread w never comes out of the eye 263 . fig1 is a flow chart of a control procedure for the second embodiment . when the threading switch sw2 is pressed at step s21 , a pulse motor ( not shown ) is driven and the eye 63 of the needle 62 is threaded at step s22 . subsequently , a sewing machine motor ( not shown ) is driven and the needle thread w is caught by the thread take - up at step s23 . as will be appreciated from the logic of the flowchart , the thread taking - up operation may be performed either before or after the threading operating in the second embodiment at the discretion of the operator . as shown in fig1 , when the threading switch sw2 is pressed once within a predetermined time period at step s21a , the thread taking - up operating is performed at step s22a ; and , when the threading switch sw2 is pressed twice within the same predetermined time period , the threading operating is performed at step s23a . the following is an explanation of a sewing machine for automatic thread taking - up and threading according to a the third embodiment of this invention which is provided with a detachment mechanism for detaching a needle bar 21 from an arm shaft during the threading operating . as shown in fig1 a , a needle bar connecting stud 544 of the third embodiment has a through hole 562 with a larger diameter than that of the needle bar 21 and an engagement cavity 564 with an appropriate width at its front face . the needle bar connecting stud 544 is movable on the needle bar 21 . on the other hand , an abutting member 506 is fixed to the needle bar 21 . an engagement protrusion 566 is rotatably connected to a support member 568 attached to the front face of the abutting member 506 . when the engagement protrusion 566 engages with the engagement cavity 564 of the needle bar connecting stud 544 , the needle bar 21 is vertically moved in response to the rotation of an arm shaft ( not shown ) as in a usual sewing machine . a pin 570 is provided almost at the longitudinally middle portion of the engagement protrusion 566 . a torsion spring 572 , one end of which is fixed to the support member 568 , abuts the upper right portion of the pin 570 . the engagement protrusion 566 is thus forced to engage with the needle bar connecting stud 544 . the needle bar 21 is detached from the needle bar connecting stud 544 when the pin 570 of the engagement protrusion 566 is pressed from behind by a pressing member 575 . the pressing member 575 is provided with a abutting portion 577 at the upper side of its end and moved by an electromagnetic solenoid 580 driven and controlled by an electronic control circuit 520 . when the electromagnetic solenoid 580 is excited , a pressing member 575 moves to the right as depicted in fig1 b and pushes up the pin 570 of the engagement protrusion 566 . the engagement protrusion 566 is rotated counterclockwise and is moved up along an abutting portion 577 . as a result , the needle bar 21 is detached from the needle bar connecting stud 544 and kept in an upper position . after that , the needle bar 21 is not lowered from the upper position even when an engagement pin ( not shown ) of a threading member shaft ( not shown ) presses down an abutting member ( not shown ). in the third embodiment , the threading operating and the thread taking - up operating are performed at the same time because of the detachment of the needle bar 21 . fig2 is a flow chart of a control procedure for the third embodiment . at step s31 , it is asked whether the threading switch sw2 is pushed . when the answer is affirmative , the electromagnetic solenoid 580 is subsequently excited and the needle bar 21 is detached from the needle bar connecting stud 544 , at step s32 . at the next step , s33 , drive signals are sent to a pulse motor ( not shown ) and a sewing machine motor ( not shown ) at the same time such that the needle thread w is threaded to the eye of the needle and simultaneously taken up by the thread take - up . after it is confirmed that the arm shaft 540 has been rotated once or more and the pulse motor has executed the prescribed forward rotation and backward rotation , the electromagnetic solenoid is stopped being excited at step s34 . after this procedure , the pressing member 575 is withdrawn , and the needle bar 21 falls by its own weight and the engagement protrusion 566 is engaged with the engagement cavity 564 . under this condition , the sewing operating can be commenced . as described above , in the first , second and third embodiments the thread taking - up operating and the threading operating are executed simply by pushing the threading switch sw2 . since the operator does not have to touch several switches , he can easily deal with the sewing machine . in addition , in response to the signal from the threading switch sw2 , the electric control circuit 120 controls the thread taking - up operating and the threading operating in a prescribed way . the operator does not have to be experienced in these operations . especially in the first and the third embodiments , the operator presses the threading switch sw2 only once , and after that he does not have to touch the needle thread w nor the sewing machine body . therefore , he may begin other operations , for example , preparation of cloth to be sewn , right after pressing the threading switch sw2 . further , in the third embodiment , since the needle bar 21 is detached from the needle bar connecting stud 544 , the needle bar 21 does not go down when the thread is caught by the thread take - up . accordingly , cloth to be sewn may be placed under the presser foot while the needle thread w is being caught by the thread take - up and being threaded to the eye of the needle after the threading switch sw2 is pressed . in each embodiment , the needle thread is caught by the thread take - up and threaded to the needle according to the timings of drive signals from the electric control circuit to the pulse motor 105 , sewing machine motor 125 and the electromagnetic solenoid 180 . complicated cam mechanism and linkage mechanism are not required . further , the timings can be adjusted without difficulty . the threading switch sw2 in each embodiment is provided at the upper left side of the guide groove 11 on the face plate 3 . after drawing the needle thread w from the bobbin 7 , the operator can move the presser foot lever 110 with his right hand and at the same time press the threading switch sw2 with his left hand . he is unlikely to mistake the threading switch sw2 for the start switch sw1 . the sewing machine motor 125 for thread taking - up , the pulse motor 105 for threading , and the electromagnetic solenoid 180 for detaching the needle bar are all driven by electricity and therefore can share a power source . the sewing machine can be made as small as possible . briefly , in each embodiment the operator can hardly operate wrongly and does not have to be experienced in the thread taking - up operating and the threading operating , because he has only to introduce the needle thread w along the guide groove and to press the threading switch sw2 with one hand . although three embodiments have been described , the position of the threading switch sw2 is not limited to that described in the embodiments and the threading switch sw2 can be provided at any appropriate position in the sewing machine body or peripheral units . the mechanisms for the thread taking - up operating and for the threading operating are not limited to those in the embodiments ; the needle thread w may be caught by either the thread take - up 30 or the thread receiver 52 . on the other hand , the needle thread w does not have to be automatically threaded to the eye of the needle . as disclosed in japan published unexamined patent application no . h1 - 113092 , an operator may give a needle thread to a threading hook penetrating an eye of a needle . in the above two modifications , the thread taking - up operating and the threading operating are automatically or semiautomatically executed by pushing the threading switch sw2 . the operator does not have to continue to press the threading switch sw2 and therefore can freely use both hands to do other manual operations while the needle thread is taken up and threaded to the needle . moreover , the mechanism for the thread taking - up operating and the threading operating does not have to be a button - shaped switch to be pressed , but may be , for example , a lever . in such case , the sewing machine of the second embodiment may be constructed such that a lever is shifted rightward to take up the needle thread by the thread take - up and be shifted leftward to thread the needle . in the first embodiment , the needle thread w is prevented from slipping out of the eye of the needle , because the thread taking - up operating is executed before the threading operating . however , since the elastic wire 250 shown in the second embodiment keeps the needle thread w at an appropriate position , the thread taking - up operating can be performed after the needle threading operating . the elastic wire 250 of the second embodiment holds the end of the thread w below the thread take - up until the needle thread w is caught by the thread take - up . therefore , another holding member for holding the needle thread w until the needle thread w being securely taken by the thread take - up may be provided below the thread take - up . consequently , when a holding member is interposed between the tread take - up 30 and the needle bar thread guide , the thread taking - up operating and the needle threading operating may be executed in a desired order . the needle bar detachment mechanism is explained as an example . other types of the needle bar detachment mechanism can be adopted . although several embodiments of the present invention have been disclosed and explained , the invention is not to be limited to these embodiments but includes all embodiments and modifications within the scope and spirit of the invention . for example , the needle threading operating may be executed using air pressure as an operating force if desired ."}

{"publication\_number": "US-2003178089-A1", "abstract": "the invention relates to an improvement in the art of loom and weaving room conditioning , in which the necessary moisture required by the yarn to perform best in the loom is metered exactly and directly on the yarn , whereby yarn breakage is reduced and weaving air room humidity can be lowered , thereby improving human comfort . lint and dust generated by the weaving process are removed at their source so air contamination is lowered , improving hygienic conditions and reducing air filtration requirements . heat generated by the weaving process is partly removed by water - cooling the lubricating oil , thereby reducing the weaving room heat load . large peripherally located air conditioning units are replaced by smaller units , distributed over or under the roof of the room , each serving the area of 4 - 24 looms .", "application\_number": "US-10416402-A", "description": "as seen above , warp yarn moistening by humid air requires more time than available in modern weaving machines . almost immediate water adsorption by the fibers can be achieved by several alternative means , such as : water aerosol in saturated air ( fog ), micro foam , by screen - printing water gels on the warp , and others . in this application , the preferred water vehicle is a cool water aerosol in saturated air ( fog ), made up in - situ for every loom . see fig2 . said fog is generated within a fogger , an especially designed device [ 8 ], to be described below . fog is generated dispersing ( atomizing ) water into very tiny droplets ( about 10 microns ) into an air stream . a part of those water droplets evaporates , another part aggregates into larger drops , and the remaining fine droplets are incorporated into a stable and cool fog . both those droplets and the fibers , of which yarns are made up , have huge specific surfaces . for this reason , a strong reciprocal attraction results , and adsorption of the droplets by the fibers is almost instantaneous . water can be atomized by several known devices , such as water and compressed air nozzles , high - pressure water nozzles , ultrasound dispersers , high - speed rotors , etc . for practical reasons in this application , nozzles powered by compressed air are preferred . inside fogger [ 8 ] in fig3 the nozzle [ 13 ] powered by compressed air entering through valve [ 14 ], aspires water from the bottom of the fogger through tube and water filter [ 16 ]. the primary fog emerging from the nozzle at high velocity creates a vacuum , thereby inducing a strong flow of secondary air , entering the fogger through air filter [ 17 ]. the raw fog is guided by the tube [ 19 ] towards the water level at the bottom , where the coarser drops are retained . the stable fog rises at low speed towards exit [ 20 ]. alternatively , for practical reasons , the vertical airflow fogger described may be designed to operate on the same principle but with horizontal fog flow . in some applications , a higher fog flow rate may be convenient . in those instances , a booster fan will be installed between air filter [ 17 ] and nozzle [ 13 ]. a tube leads the fog generated to the plenum [ 9 ], from which it is blown towards the incoming warp [ 1 ]. a flexible sheet [ 11 ] prevents the fog from being carried away by air currents . the sensor [ 12 ] measures the electrical resistance of the yarn , sends an electrical signal to a moisture controller . said controller translates said signal into moisture content and adjusts automatically the amount of fog blown on the warp . thereby , the desired moisture level , determined by the set point , is maintained on the warp . frequently filling yarn does not require any moistening . if required , an adequate amount of fog is conducted from the fogger [ 8 ] by a tube [ 53 ] towards the creel where the filling yarn bobbins are located . for details , see the description of the filling yarn lint removal . as already stated , lint and dust fall out is heavier in the shed [ 3 ] area between the warp yarn break detectors [ 2 ] and the heddles [ 4 ]. in this area , the alternating movements of the warp yarn and of the heddles produce strong air displacements . additionally , heat generated by the weaving process induces an ascending airflow . the resulting turbulences carry the lint and dust , detached by abrasion from the yarn , in several directions . usual methods , as mentioned in \u201c background \u201d, do a very poor solids removal job . air contamination is heavy and makes intensive air filtration necessary . cleaning aids , such as traveling cleaners , are a must . in spite of those efforts , lint and dust accumulate on the weaving machines , the ac ducts , the walls , and the ceiling . f . m . shofner ( u . s . pat . nos . 5 , 910 , 598 and 5 , 676 , 177 ) has dealt with this situation . he correctly concluded that the approach should be modular , and that the solids removal should be from close to their sources . in the various embodiments in those patents , the devices described for the removal of said solids by air flow are located at distances between 100 - 300 mm from the warp yarns in the shed area . others tried to enclose the whole loom or several specific areas . those approaches resulted unpractical for two reasons : on one hand , the machine and the process are very complex and require frequent overseeing and repair . any hindrance to easy and quick access is not welcome . on the other hand , to carry lint and dust , air speed has to be high . places within the enclosure where air speed is low accumulate solids very fast . for this reason , said approaches failed , such as sulzer &# 39 ; s multished weaving machine . in order to overcome the drawbacks described above , in the present invention , the following embodiments are preferred . in the shed area between the break detectors and the heddles , where solids generation is highest , lint and dust will be removed by the vacuuming device [ 22 ], while the cover [ 23 ] will prevent them from being carried away by air turbulences . see fig4 and 5 . both , the vacuuming device and the cover , will be installed in such a way as to be in contact with the warp yarns . the cover [ 23 ] will be automatically removed during loom stops , in such a way as to allow access for repairs . to accelerate the separation of loose lint and dust from the yarn , some kind of mechanical action may be applied on the warp , such as air jets , brushing , vibration etc . in this invention , air jets are preferred . the cover and the vacuuming device will be at least as wide as the incoming warp . its length ( in the direction of the warp ) will be between 100 and 400 mm , according to loom and product characteristics . the vacuuming device &# 39 ; s [ 22 ] flat upper surface [ 22 a ] will be in contact with the lower share of warp yarns . it will have between 1 and 4 narrow slots [ 24 ] over its whole width , through which air will be suctioned at high velocity into chamber [ 22 b ]. this chamber will be shaped in such a way as to assure an even airflow and to prevent lint and dust accumulation . said air will enter the vacuum plenum [ 25 ] through slot [ 25 a ]. air will be withdrawn from the plenum by an air - recycling device , to be described later . the width of the loom and of the vacuuming device may range between 1000 and 4000 mm . if no special measures are taken , relevant differences in air velocity and vacuum within the plenum will occur . to assure uniform vacuum within plenum [ 25 ], any of the following embodiments will be applied : shaping the plenum conically . ( 2 ) dividing the plenum into independent sections , each between 400 - 800 mm wide . ( 3 ) reversing airflow direction within the plenum frequently ( from left - right to right - left ), thereby compensating the differences ( 4 ). any combination of ( 1 ), ( 2 ) and ( 3 ). the preferred embodiment is ( 3 ), reversing the airflow automatically in periods of less than 30 seconds . the cover [ 23 ] will be in close contact with the upper share of warp yarns . any of the following three alternatives will be applied : a clear plastic cover [ 26 ], when solids fall out is moderate . ( 2 ) a plenum [ 27 ] with a perforated plate [ 28 ], through which air is blown at low velocity on the warp . ( 3 ) a plenum [ 27 ] with 1 to 4 narrow slots [ 28 ], through which air is blown at high velocity on the warp . said slots are placed over slots [ 24 ] of the vacuuming device [ 22 ]. this alternative is indicated when fall out is heavy . an adequate under pressure will be maintained within the area enclosed by cover [ 23 ] and device [ 22 ]. air incoming from the room will have a higher velocity than solids within the enclosure . solids fall out within the yarn break detector area is lesser . if convenient , a vacuuming plenum [ 21 ] will be installed ( fig4 ). the plate [ 21 a ] will guide the solids to the aspiration slot , part of said plenum [ 21 ]. the methods and the devices will be similar to those described above for the shed , adapted to a lesser fall out and to the specific weaving machine design . a cover , not shown in the drawing , attached to the shed cover [ 23 ], may also be included . filling yarn is fed from one or more bobbins , located in a creel , to one or more devices , called pre - feeders or yarn accumulators , which in turn feed the yarn tensionless to the insertion device ( air jets , projectile , gripper ). two or more bobbins are tied end to beginning , in such a way as to assure continued feeding . one or more pre - feeding devices will feed yarn into the weaving machine . the yarn leaving the bobbin at high speed ( about 1500 - 2500 m / min ) abrades against the bobbin &# 39 ; s surface , thereby loosening fibers protruding from the yarn surface . centrifugal forces disperse them into the surrounding area . to lessen said abrasion and to improve the yarn strength and smoothness , an adequate quantity of fog will be supplied into this area ( see \u201c filling yarn moistening \u201d). to prevent solids from escaping into the room , said creel will be loosely enclosed and a slight under - pressure will be maintained within , thereby preventing room contamination . said creels and pre - feeder are arranged in many different ways . for this reason , the moistening ( see above ) and the lint removal device will have to be adapted adequately to the weaving machine model . [ 0102 ] fig6 a shows a typical arrangement [ 45 ], as seen from above . the pre - feeder [ 47 ] draws yarn from bobbin [ 46 ] ( and later from its standby , shown also as [ 46 ]), through an opening [ 49 ] in a ( usually ) clear plastic division [ 48 ]. seen from the front ( fig6 b ), stripes of clear and flexible plastic [ 52 ], attached to the roof [ 50 ] and extending to the bottom [ 51 ] enclose the remaining three sides of the creel . said stripes are about 100 mm wide . this arrangement allows visual control and easy replacement of empty bobbins . an adequate amount of fog is conducted by a tube from the fogger and fed through the opening [ 53 ] into the creel enclosure . an adequate amount of air is removed through opening [ 54 ] and carried by a tube to the air filter , to be described later . room air will enter the creel area through the stripes curtain [ 52 ] at higher speed than the speed of the loose fibers projected by the yarn . solids removal in each loom will be handled independently , including air filtration . carrying air over long distances has high energy and materials costs . air ducts are expensive and , when replacing looms , frequently they do not fit into the new lay out . depending on existing in - plant infrastructure , any of the following alternatives may prove to be of advantage : ( 1 ) a known porous [ 31 ] filter , as shown in fig7 . contaminated air [ 32 ], returning from the devices described above , will enter the filter [ 33 ] impelled by the blower [ 34 ]. part of the filtered air is bled by valve [ 36 ] into the room , in order to maintain the under - pressure mentioned above . solids will be removed periodically by hand . ( 2 ) should a central vacuum system be available , said solids will be periodically vacuumed off from filter [ 31 ]. ( 3 ) a wet filter , usually known as air scrubber , is the preferred embodiment in this invention . its solids retention is high , filtered air emerges cool and humid , and solids are carried away by water . pipes and pumps are more economical than ducts and blowers . water will be recycled by an adequate external filtering device , such as a known rotary filter . should a dye house be on the same premises , said water can be used untreated for de - sizing and scouring operations . as shown in fig8 air carrying lint and dust [ 32 ] is sprayed with water by nozzle [ 39 ]. thereafter , said airflow enters through tube [ 36 ] tangentially into the cylindrical body [ 41 ]. water and solids accumulate at the bottom and are periodically discharged by valve [ 43 ] into an adequate piping system . clean and moist air raises at low speed to the top of [ 41 ], passes through filter into blower [ 42 ] and back to the cover [ 22 ]. water valve [ 40 ] and blower [ 42 ] are shut off automatically when the loom stops . in fig9 the solids removal sub - system is represented schematically . contaminated air is returned from the shed vacuuming device [ 22 ], the yarn break detector area [ 21 ], and the filling yarn area [ 45 ] through tubes [ 54 ], [ 31 a ], and [ 32 ]. individual flow rates will be controlled by valves [ 37 ]. the adequate amount of air will be bled by valve [ 36 ], in order to adjust the correct under - pressure between cover [ 23 ] and vacuuming device [ 22 ]. in high - speed looms , the main friction points and bearings are lubricated either by a central oil pump or , more frequently , by independent oil sinks and dispersing devices . as already stated , power consumed by the loom is totally converted into heat , and most of it transmitted to the oil . observations and measurements made on gripper looms showed that between 40 - 65 % of the total heat is absorbed by the oil and then dissipated into the room air . [ 0120 ] fig1 shows three independent oil sinks [ 55 ] and their usual oil level . their number may vary between 2 and 8 , depending on model and manufacturer . overflowing oil is conducted through an adequate piping system [ 56 ] to an auxiliary sink [ 57 ]. the pump [ 58 ] impulses the oil from said sink through the heat exchanger [ 59 ] and the piping system [ 63 ] back to the sinks [ 55 ]. the heat exchanger will be of the plate type . temperature is controlled by devices [ 62 ] for oil and [ 60 ] for water , adjusting the water flow rate in such a way as to maintain a set oil temperature . cooling water may be cooled by conventional means and recycled or , when a dye house is on the same location , may be used there untreated . with yarn moistening and lint and dust removal accomplished , and the room heat - load reduced ( by means described above ) on every loom , the room conditioning system &# 39 ; s requirements will be related mainly to human comfort . the now usual 70 - 80 % room humidity can be reduced to 40 - 50 %, thereby improving operator comfort . additionally , no air moistening provisions will be necessary within the ac system . the very low solids content in air returned to ac system reduces filtration requirements . the three items above reduce the air turn over requirements to half . airflow will be inverted , from vertical downwards to vertical upwards , thereby minimizing turbulences . underground ducts are no longer necessary , thereby , investment costs are reduced , and layout flexibility is increased . decentralization of ac equipments , by replacing a few large units by many smaller and simpler units , further reduces energy consumed by air transport , as distances to and from ac are shortened . said small units , each serving the area of 4 - 16 weaving machines , will be located over or under the roof . the cooling ( compressor , cooling tower ) installation may be common ( central ) or part of each unit . [ 0132 ] fig1 shows the outlay of the room air conditioning system schematically . the weaving machines [ 65 ] are located at floor level [ 66 ]. the operator comfort area in the aisles extends between floor level and its limit [ 67 ], about 3 meters above the floor . therein , temperature and humidity will be held at set point +/\u2212 5 % ( centigrade ). the buffer area extends from level [ 67 ] to the roof [ 68 ]. temperature at roof level will be less than 15 \u00b0 c . higher than in the comfort area . it reduces the external heat load . room air is returned to the ac unit ( of the fan & amp ; coil type ) by ducts with openings located over the looms at a level about 0 . 5 meters above [ 67 ]. said air is cleaned by filter [ 71 ], propelled by fan [ 72 ] through a coil heat exchanger [ 73 ], and then distributed by ducts on the aisles . air diffusers will be shaped in such a way as to direct the conditioned air to the floor . provisions will be made as to reduce secondary air induction to a minimum . fresh air from the outside can be incorporated by [ 70 ] when convenient . an equivalent amount of the warmest air in the room will exit through chimneys [ 75 ], located near the roof . while specific embodiments of the invention have been described and illustrated herein , many changes and modifications in the invention may be made by those skilled in the art ; modifications and changes that are covered by the invention if they come within the scope of the appended claims ."}

{"publication\_number": "US-2014000497-A1", "abstract": "a tufting machine which has improved production rates such that it is capable of being used to produce larger samples of tufted products or is capable of being used for production runs of tufted products , but still retains sufficient flexibility for changes in yarn and construction of the tufted product to be made relatively easily is disclosed .", "application\_number": "US-201113206610-A", "description": "fig1 and 2 of the annexed drawings illustrate a tufted pile forming machine 10 for producing tufted pile products such as carpet , rugs or the like . the machine 10 has a supporting frame structure 11 including longitudinally extending rigid i - beams forming a base structure 12 and similar i - beams forming an upper structure 13 . opposed end walls 14 and 15 formed by steel plate material is provided and define an operative tufted pile forming zone 16 therebetween . at one end 17 , a service area 18 is provided by a beam structure 19 . at the end 17 , the end wall 15 has a central opening 20 to allow the upper tufting needle head 21 to project into the service area 18 ( fig2 ). similarly , the opening 20 also allows the lower looper head 22 to project into the service area 18 ( fig2 ) for reasons explained hereafter . the frame structure 11 is made as rigid as possible as any out of alignment or deflections makes it difficult for the needles of the tufting needle head 21 to cooperate correctly with a looper member or hook and cutting knife of the lower looper head 22 . within the tufted pile forming zone 16 a support shaft 23 is provided to support and carry a roll of primary backing material web 24 . the backing material web 24 is passed via a roller 25 and a spiked roller 26 to horizontally pass through the zone 16 . the spiked roller 26 is driven by suitable drive means 27 to incrementally move the backing material web 24 in desired steps through the horizontal region in the zone 16 . suitable rollers arid collection means are provided on the opposite side of the zone 16 to maintain the web 24 taut in a transverse direction in the horizontal region of the zone 16 . gripper and stretcher devices 28 are provided to grip lateral edges 29 , 30 of the web 24 in the horizontal region of the zone 16 to maintain the web 24 taut in the longitudinal direction during an operational run of the needle head 21 to produce tufted pile on the web 24 . the lower looper head 22 is supported to move on spaced . bearing tracks 31 extending in the longitudinal direction of the machine 10 and transverse to the movement direction of the backing material web 24 through the tufted pile forming zone 16 . the bearing tracks 31 extend from the zone 16 into the service zone 18 . the lower looper head 22 is moved by a driven toothed wheel ( not shown ) carried by the head 22 operatively engaging with a toothed belt 32 . alternatively other drive means including a rack and pinion drive could be used . similarly , the upper needle head 21 is supported on bearing tracks ( not shown ) running parallel to the bearing tracks 31 and moved via a driven toothed wheel ( not shown ) engaging with a toothed belt 33 . alternatively a driven pinion wheel with teeth might engage with an elongated rack with cooperating teeth . similar to the drive means for the upper needle head 21 , alternative drive means could also be used . each of the upper needle head 21 and the lower looper head 22 are driven independently of one another but during a tufted pile forming operation , the drive means are synchronized to ensure the needles properly co - operate with the looper members or hook and knife members during the lulled pile formation ( looped or cut loop ). fig3 partially shows the upper needle head 21 including part of the needle actuation mechanism 34 , described in greater detail with reference to subsequent drawings . the mechanism 34 includes a support frame 35 that , in operation is reciprocated in a vertical direction by the actuation mechanism 34 . the support frame 35 has a lower bar 36 that is disposed generally transverse to the longitudinal direction of the machine 10 and preferably parallel to the movement direction of the hacking material web 24 through the tufted pile forming zone 16 . a modular needle bar 37 is provided such that it can be secured by fastener members 38 to the lower bar 36 of the support frame 35 . a plurality of modular needle sub assembly members 39 , each comprising an upper support plate 40 and a plurality of downwardly depending needles 41 , are separately mounted to the needle bar 37 by fasteners 42 . the structure is such that the needle bar 37 can be removed easily and replaced with a separate needle bar 37 of a desired configuration , when it is desired to produce a tufted pile of a different construction . similar , each of the sub assembly members 39 can also be selectably removed and replaced , if desired . such changes would occur in the service area 18 where access to the parts is easily achieved . the structure , when assembled to the machine 10 provides an inline array of needles 41 extending , in use , parallel to the movement of the backing material web 24 in the zone 16 . in use , each of the needles 41 is fed , as described hereafter with a single length of yarn for producing the desired tufted pile . referring now to fig4 , a looper member sub assembly 43 is illustrated , partially exploded with some parts omitted for the sake of clarity . a looper member assembly with knives for cutting the yarn to produce cut pile is described with reference to later drawings . the looper member sub assembly 43 includes means 45 for operatively moving the loom members 46 into a cooperating position with the needles 41 during production of a looped tufted pile . the looper members 46 are themselves generally of a conventional design . the looper member sub assembly 43 includes a support bar 47 formed in modular form to which a plurality of looper member elements 48 are connected via fasteners ( not shown ) through apertures 49 . each element 48 includes a support plate 50 and a plurality of inline looper members 46 such that when assembled the looper members 46 are formed in a line and , in use , are positioned to cooperate with the needles 41 . that is , there is one looper member 46 for each needle 41 . the sub assembly 43 further includes a support clamp 51 comprising a first bar member 52 connected to the means 45 for operatively moving the looper members 46 and a second clamp bar 53 to clamp the support bar 47 between the clamp bar 53 and the bar member 52 by fastener means ( not shown ) passing through apertures 54 . the support bar 47 includes elongate recesses 55 to be positioned about the fastener means ( not shown ) to allow the position of the support bar 47 to be physically adjusted relative to the support clamp 51 . any adjustments or replacement of the looper member sub assembly would normally be carried out in the service area 18 where access is easily attained . fig5 , 6 , 7 and 8 illustrate in perspective view , various features of the upper needle head 21 and needle actuation mechanism 34 for moving the needles 41 upwardly and downwardly to provide the motion required for forming tufted pile on the backing material web 24 . the upper needle head 21 comprises an outer support box 56 that , in use , is mounted to move on bearing rails in a longitudinal direction of the machine 10 transverse to the backing material web 24 in the zone 16 . within the outer support box 56 , an inner support box 57 is mounted on vertical bearing rails 58 and associated bearings 59 such that the inner support box 57 can be selectably moved upwardly or downwardly in a generally vertical direction . a shaft 60 driven by a drive motor ( not shown ) is provided to selectably raise or lower the inner support box 57 as may be desired . the support frame 35 carrying the needle bar 37 is mounted to spaced vertical rails 61 slidably mounted in bearings 62 mounted to the upright side walls 63 of the inner support box 57 . upper ends of the vertical rails 61 are pivotally mounted at 64 to pivot arms 65 . a pair of pivoting balance arms 66 , 67 are pivoted centrally at 68 to the inner support box 57 , each having one end pivotally mounted at 74 to the upper free ends of the pivot arms 65 . the free ends of the balance arms 66 , 67 each carry a balance weight 69 . the needle actuation mechanism 34 further includes a connecting arm 70 pivoted at 71 to the support frame 35 carrying the modular needle bar 37 . the upper end 71 of the connecting arm 70 includes selectably adjustable crank arm ( not shown ) to selectably vary the length of the crank arm to thereby vary selectably the up and down length of movement of the connecting arm 70 and thereby the up and down length of stroke of movement of the needle head 37 . the mechanism further includes balance weights 73 such that the balance weights 69 , 73 damp out any vibrations caused by the crank arm mechanism during the needle bar 37 in a reciprocating vertical movement . as described earlier , the inner support box 57 in fig5 is lowered by actuation of the adjusting shaft 60 to provide a shorter needle stroke with the needle bar 37 in an upper most position ready to start a downward pile forming movement . in fig6 , the needle bar 37 is also in a lowered position for a short needle stroke but the needles 41 are at their lower most position after a pile forming movement stroke has been completed , the crank arm being partially seen in this view . the adjusting shaft 60 ( not seen in fig7 ) has raised the inner support box 57 to provide a longer needle stroke and the needle bar 37 is shown in an upper most position similar to fig5 ). in fig8 , the adjusting shaft 60 has also raised the inner support box 57 to provide a longer needle stroke and the needle bar 37 is shown in a lower most position similar to fig6 ). fig9 is a view of the upper needle head 21 and the yam feed mechanism 77 to each of the needles 41 , only two yarn flow paths 78 being illustrated for the sake of clarity . yarn is fed from a yarn spool supply ( not shown ) via the path 78 , through an aperture 79 in an upper guide plate 80 . a single aperture 79 is provided for each yarn supplied to a needle 41 . driven cooperating nip rollers 81 draw a uniform length of yam from the yarn spool supply which in this embodiment , provides a uniform length of yarn to all needles 41 . the yarn travels through apertures in individual intermediate guide plates 82 , 83 , through apertures 84 in a lower guide plate 85 to the needles 41 in the modular needle bar 37 . fig1 is a view similar to fig9 except in this case , the individual lengths of yarn are supplied from the yam spools ( not shown ) through individual adjustable feed mechanism 86 each driven by an individual drive motor 87 . each individual feed mechanism 86 is capable of delivering a selected length of yarn to individual needles 41 in the modular needle bar 37 such that tufted pile of differing heights can be formed with each reciprocation of the bar 37 . the adjustable feed mechanisms 86 may be as described and illustrated in u . s . pat . no . 7 , 478 , 605 and this disclosure is incorporated into the present description by this reference thereto . fig1 and 12 illustrate a preferred alternative embodiment for the lower looper member head 22 in which cutting knives 87 are provided in the modular head 22 for each looper member 46 . this arrangement can replace the looper head sub assembly 43 when it is desired to produce cut pile with the machine 10 . an actuating mechanism 88 is provided for the head 22 . fig1 , 14 and 15 are partial perspective views illustrating operation of the gripper and stretching devices 28 intended to grip and stretch the edge zones 29 , 30 of the backing material web in the zone 16 ( see fig1 , 2 ). the mechanism comprises an upper plate 89 with a series of holes 90 formed therein . a lower plate 91 is pivoted about a pivot axis 92 to the upper plate 89 and includes a plurality of spikes 93 formed thereon facing towards the upper plate 89 . the plates 89 and 91 have two relative positions , a first ( fig1 ) where the plates are splayed relative to one another freeing the edge zone 29 , 30 of the web 24 , and a second ( fig1 ) closed or gripping position where the plates 89 , 91 are adjacent one another with the spikes 93 passing through the web 24 and into the boles 90 in the upper plate 89 . movement to the closed or gripping position ( fig1 ) is achieved by actuator means operating along line 94 to pivot the lower plate 91 about the pivot axis 92 either towards the closed gripping position ( fig1 ) or away from this position to the open position ( fig1 ). when the device 28 is gripping the web 24 , actuators 95 can stretch the web 24 as shown in fig1 . preferably position sensing or control devices ( not shown ) are utilized to ensure the edge of the web 24 is always stretched to the same position to ensure the pile forming stitches start and finish at the same position . the position sensing or control device might include control means controlling the actuators 95 to ensure they move to the same position each operative actuation . in possible alternative arrangements two spaced gripper and stretching devices 28 might be provided or alternatively larger gripping plates 89 , 91 might be utilized with spaced actuators 95 at opposed end regions of the plates 89 , 91 . operation of the machine 10 is generally as follows . the upper needle head 21 and the lower looper head 22 arc driven from one side of the web 24 to the other while each of the needles 41 are repeatedly reciprocated to form tufted pile across the web 24 . while this occurs , the devices 28 have been engaged to grip the edges 29 , 30 and to stretch the web 24 . on the completion of each run , the yarn lengths are withdrawn from the backing web 24 ( cut pile ) or for loop pile cut by a mechanism 95 shown in greater detail in fig1 and 17 and the devices 28 release the edges 29 , 30 of the web 24 . fig1 and 17 show a yarn cutting mechanism 95 mounted to a lower zone of the needle head 21 . the mechanism 95 includes a frame 96 defining a guide track 97 generally parallel to the array of needles 41 . a cutter blade 98 is mounted on a cutter head 99 and moved along the guide track 97 by an actuator or drive motor 100 to cut yarn lengths supplied to the needles 41 at the end of a stitching run . this would normally be required only at the end of a stitching run to produce loop pile . at the end of a stitching run of the heads 21 , 22 , the heads 21 , 22 are driven back to the starting side of the backing material web 24 and the web 24 is indexed on to allow the process to be repeated . conveniently the machine includes a register marking device 101 shown in fig1 to 21 to mark a position line on the backing material web , preferably adjacent the last row of yarn stitches formed on the backing material web 24 . the register marking device 101 comprises a pivotal frame 102 with a forward support bar 103 . the frame 102 is pivotal via actuating means not shown to move the support bar 103 from an operative position generally as shown to a slightly elevated non - operative position . the device 101 includes a marker device 104 such as a marker pen or similar supported from the support bar 103 and adapted to apply a marker such as a marker line 105 to the backing material web 24 . spaced from the marker device 104 approximately the distance of the array of needles 41 and also mounted to the support bar 103 is a position sensing means 106 which may be a camera device or similar . the position sensing means 106 has a sufficient field of vision in the direction of the array of needles 41 so as to have the capability of sensing a marker line 105 previously applied to the web 24 , in use , the marker device 104 and position sensing means 106 are located just forward of the array of needles 41 . fig1 shows the needle bead 21 at a start of stitching position with the marker device 104 in a down position to apply the marker line 105 to the web 24 . in this drawing , the needle head is about to commence a first stitching run comprised of a plurality of stitched rows , one for each needle 41 in the array . the marker line 105 is positioned a precise distance to the left on the drawing ) of the left hand most needle 41 in the array of needles 41 . fig1 shows the needle head 21 in a similar position to fig1 but after the needle head has formed at least one previous group 108 of stitching rows . as shown in fig2 the needle head 21 has been moved back to a start position and the web 24 has been indexed on with the position sensing means 106 sensing the marker line 105 previously formed and in response thereto the needle head 21 , or the array of needles 41 in the head , or the web 24 is adjusted in position correctly align the needles 41 with the last stitching rows in the last group 108 so that there are no gaps or over stitching when a new group of stitching rows is formed . fig2 shows the needle head 21 at an end of a stitching run where the needle array is raised and the support bar 103 is raised allowing the backing material web 24 to be indexed to the right in the drawing . in this position the position sensing device 106 and the marker device 104 are in a raised inoperative position so that needle head 21 can be moved back to a start position ( fig1 ). as can be recognized , because multiple needles are simultaneously producing stitches of yarn to form tufted pile , the process is reasonably quick . moreover the machine does permit any size ( width ) of tufted pile product , limited only by the support means for the backing material web 24 . the structures described in the foregoing allows relatively easy adjustment of the yarns used , the height of the pile formed , variability in the height of the pile formed , and variability in the colour patterns of the tufted pile product that can be produced ."}

{"publication\_number": "US-5170534-A", "abstract": "an apparatus for treating a fiber bale having a soiled surface . the apparatus includes a cleaning device arranged for engaging a bale surface to remove soiled material therefrom and a displacing arrangement for effecting a relative motion between the fiber bale and the cleaning device .", "application\_number": "US-62814390-A", "description": "turning to fig1 there is illustrated therein a cleaning roll 2 which is provided with a clothing 2a and which works on a vertical face 1a over a fiber bale 1 . with the cleaning roll 2 there is associated a stripping roll 3 which is provided with a clothing 3a and which serves for removing impurities , such as soiled fiber from the cleaning roll 2 . the points of the clothings 2 and 3 are arranged at a small distance from one another . the cleaning roll 2 rotates in the direction of arrow a with a circumferential speed of approximately 12 . 5 m / min to 125 m / min and has a diameter of , for example , 200 mm . the stripping roll 3 is rotated in the direction of the arrow b and has a circumferential speed of approximately 345 m / min to 520 m / min and has a diameter of , for example , 110 mm . with the stripping roll 3 a collecting and suction removal device 4 is associated to carry away soiled fiber taken from the fiber bale by the cleaning roll 2 . turning to fig2 the cleaning roll 2 is working on the upper , horizontal surface 1b of the fiber bale 1 and is associated with a hold - down device 5 which presses against the surface 1b . the cleaning device generally designated at 2 &# 39 ; moves in the working direction indicated by the arrow c . turning to fig3 a , the cleaning roll 2 is movable vertically in the direction of arrows d and e relative to the vertical lateral bale face 1a . as shown in fig3 b , the cleaning roll 2 is movable in a horizontal direction as indicated by the arrows f and g relative to the lateral vertical bale face 1a . turning to fig4 the cleaning device 2 &# 39 ;, including the cleaning roll 2 , the stripping roll 3 and the collecting and suction removal device 4 is mounted at the end of a rotatable and swingable arm 6a of a multi - axis robot 6 which is movable on rails 7a , 7b in the direction of arrows i , h along the fiber bale 1 . between the robot arms 6a , 6b and 6c there are provided articulations 6d , 6e and 6f so that the cleaning roll 2 may gain access to the surfaces 1a , 1b , 1c and 1d of the fiber bale 1 . turning to fig5 a , the fiber bale 1 is movable by and between conveyor belts 8 , 9 , 10 and 11 in the direction of the arrow k . between the pair formed of belts 8 and 9 and the pair formed of belts 10 and 11 there is provided a clearance 12 about which a circular track 13 is arranged as shown in fig5 b . on the track 13 carriages for two robots 6 &# 39 ; and 6 &# 39 ;&# 39 ; may move through 180 \u00b0 perpendicularly to the bale feed direction k . in this manner all four sides of the bale 1 are being cleaned . the joint 6d of at least one of the robots 6 &# 39 ;, 6 &# 39 ;&# 39 ; is rotatable through 90 \u00b0 in the working direction k so that the front and rear faces of the fiber bale may also be cleaned . in fig6 a multi - axis robot 6 is shown whose motions in the various axial directions are controlled by robot actuators associated with drive motors . the drive motor 6g is electrically connected with a control device 14 to which a path control device 14 &# 39 ; and the drive motor for the carriage 6h are also connected . on the carriage 6h there is further mounted a camera 15 , such as ccd ( charge coupled device ) which optically scans the surface of the bale 1 . the camera 15 is connected by an electronic image evaluating device 16 and a signal converter 17 with the control device 14 . in fig7 a there is shown a bale opener 18 which may be , for example , a blendomat bdt model manufactured by trutzschler gmbh & amp ; co . kg , monchengladbach , federal republic of germany . the bale opener 18 which may travel in the direction of the arrows l and m , has a carriage 19 and a tower 20 mounted on the carriage 19 . a cantilever construction 21 which is mounted on the tower 20 and which is vertically movable relative thereto as indicated by the arrows q , r houses the bale opening ( fiber tuft - removing ) device proper . a cleaning invention according to the device and designated at 2 &# 34 ; , including the cleaning roll 2 , the stripping roll 3 and the collecting and suction removal device 4 , is mounted laterally to the cantilever 21 by means of an arm 22 . the arm 22 and thus the cleaning device 2 &# 34 ; are movable horizontally in the direction of the arrows 0 , p so that the cleaning roll 2 -- whose length is less than the width of the surface 1b of the fiber bale 1 -- may work on the entire surface 1b . the arm 22 is pivotal about a rotary bearing 23 , so that the cleaning roll 2 may be disengaged from the bale 1 and thus the opening ( detaching ) rolls of the bale opener 18 may work on the fiber bale 1 . as shown in fig7 c , the cantilever 21 of the bale opener 18 may move the cleaning roll 2 vertically in the directions q and r to perform strokes along the end face 1c of the fiber bale 1 . reverting to fig7 a and also referring to fig7 b and 7d , there is further shown therein a fork inverter 24 having a carriage 24a movable in the direction of arrows s , t on rails 7c , 7d . on the carriage 24a there is mounted a tower 24b which is rotatable in the direction of the arrows u , v and which has a lateral cantilever structure 24c which is movable vertically in the direction of the arrows w and x . laterally of the cantilever 24c there is provided an abutment element 26 mounted on a shaft 25 rotatable in the direction of arrows y , z and having two grippers 27a and 27b which are movable in the direction of the arrows a &# 39 ;, b &# 39 ; and , respectively , c &# 39 ; and d &# 39 ;. the bales 1 may be rotated by the fork inverter 24 such that all 6 surfaces 1a - if may be cleaned by the cleaning device 2 &# 34 ;. as it may be observed particularly in fig4 and 7b , the cleaning roll 2 is substantially shorter than that dimension of the bale surface which is parallel to the longitudinal axis of rotation of the cleaning roll 2 . the robot 6 acting in the direction h , i according to fig4 and the mechanism acting in the direction o , p according to fig7 a - 7d move the cleaning roll 2 parallel to its longitudinal axis for covering the entire bale surface in that direction . it will be understood that the above description of the present invention is susceptible to various modifications , changes and adaptations , and the same are intended to be comprehended within the meaning and range of equivalents of the appended claims ."}

{"publication\_number": "US-2014182800-A1", "abstract": "the invention provides a method of improving dewatering efficiency , increasing sheet wet web strength , increasing sheet wet strength and enhancing filler retention in a papermaking process the method improves the efficiency of drainage aids or wet web strength aids or wet strength aid by coating at least some of the filler particles with a natural gum and with a material that prevents the filler materials form adhering to those additives . the drainage additive or wet web strength additive or wet strength aid holds the cellulose fibers together tightly and is not wasted on the filler particles .", "application\_number": "US-201213731311-A", "description": "the following definitions are provided to determine how terms used in this application , and in particular how the claims , are to be construed . the organization of the definitions is for convenience only and is not intended to limit any of the definitions to any particular category . \u201c acam \u201d means a copolymer constructed out of polymerized acrylic acid monomeric units and polymerized acrylamide monomeric units and may or may not include other monomeric units . \u201c coagulant \u201d means a composition of matter having a higher charge density and lower molecular weight than a flocculant , which when added to a liquid containing finely divided suspended particles , destabilizes and aggregates the solids through the mechanism of ionic charge neutralization . \u201c dadmac \u201d means monomeric units of diallyldimethylammonium chloride , dadmac can be present in a homopolymer or in a copolymer comprising other monomeric units . \u201c flocculant \u201d means a composition of matter having a low charge density and a high molecular weight ( in excess of 1 , 000 , 000 ) which when added to a liquid containing finely divided suspended particles , destabilizes and aggregates the solids through the mechanism of interparticle bridging . \u201c flocculating agent \u201d means a composition of matter which when added to a liquid destabilizes , and aggregates colloidal and finely divided suspended particles in the liquid , flocculants and coagulants can be flocculating agents . \u201c gcc \u201d means ground calcium carbonate filler particles , which are manufactured by grinding naturally occurring calcium carbonate rock . \u201c gpam \u201d means glyoxalated polyacrylamide , which is a polymer made from polymerized acrylamide monomers ( which may or may not be a copolymer comprising one or more other monomers as well ) and in which acrylamide polymeric units have been reacted with glyoxal groups , representative examples of gpam are described in us published patent application 2009 / 0165978 . \u201c natural gum \u201d means a polysaccharide characterized as being originally of natural origin and which when placed in a solution imposes a large viscosity increase in said solution even when in a small concentration , natural gum includes a number of plant resins and includes but is not limited to seaweed polyelectrolytes such as agar , alginic acid , sodium alginate , carrageenan , botanical polyelectrolytes such as gum arabic from acacia tree sap , gum ghatti from anogeissus tree sap , gum tragacanth from astragalus shrub sap , karaya gum from anogeissus tree sap , gum tragacanth from astragalus shrub sap , kararya gum from sterculia tree sap , uncharged botanicals such as guar gum from guar beans , locust bean gum from carob tree seeds , beta - glucan from oat and barley bran , chicle gum from chicle trees , dammar gum from dipterocarpaceae tree sap , glucommannan from koniac plants , mastic gum from mastic trees , psyllium seed husks from plantago plants , spruce gum from spruce trees , tara gum from tara tree seeds , and bacterial fermentation products such as gellan gum and xantham gum , \u201c natural gum \u201d also includes natural gum derivatives . \u201c natural gum derivative \u201d means a natural gum polysaccharide which has undergone some measure of chemical substitution of one or more of the subgroups ( e . g . carboxymethyl , hydroxypropyl ) in one , some or all of the monomer units in the polysaccharide backbone , the substitute constituents typically comprise one or more of sulfate , carboxylic acid ( found in carragenan , alginate , pectin ), carboxylic ester , pyruvic acid ( found in pectin , xanthan gum , zooglan , and methylan ), carboxymethyl , hydroxypropyl , methyl , methylethyl , hydroxyethyl , hydroxyethylmethyl and the like . \u201c pcc \u201d means precipitated calcium carbonate filler particles , which are synthetically produced . \u201c polysaccharide \u201d means a polymeric carbohydrate having a plurality of repeating units comprised of simple sugars , the c \u2014 o \u2014 c linkage formed between two such joined simple sugar units in a polysaccharide chain is called a glycosidic linkage , and continued condensation of monosaccharide units will result in polysaccharides , common polysaccharides are amylose and cellulose , both made up of glucose monomers , polysaccharides can have a straight chain or branched polymer backbone including one or more sugar monomers , common sugar monomers in polysaccharides include glucose , galactose , arabinose , mannose , fructose , rahmnose , and xylose . \u201c preflocculation \u201d means the modification of filler particles through treatment with coagulants and / or flocculants prior to their addition to the paper stock , in such an amount that actual flocculation does not occur , preflocculation is not conducted in the presence of the paper stock , typically after preflocculation , more of the same or a different kind of coagulant and / or flocculant is subsequently added to the preflocculated filler particles to initiate actual flocculation . in the event that the above definitions or a description stated elsewhere in this application is inconsistent with a meaning ( explicit or implicit ) which is commonly used , in a dictionary , or stated in a source incorporated by reference into this application , the application and the claim terms in particular are understood to be construed according to the definition or description in this application , and not according to the common definition , dictionary definition , or the definition that was incorporated by reference , in light of the above , in the event that a term can only be understood if it is construed by a dictionary , if the term is defined by the kirk - othmer encyclopedia of chemical technology , 5th edition , ( 2005 ), ( published by wiley , john & amp ; sons , inc .) this definition shall control how the term is to be defined in the claims . in at least one embodiment of the invention is a method of making paper which comprises filler . in at least one embodiment of the invention the method of papermaking comprises the steps of adding at least one natural gum to filler particles and / or to paper mat containing filler particles . in at least one embodiment also added to the filler particles and / or to paper mat is a wet web strength additive or drainage aid or wet strength aid to the paper mat . in at least one embodiment the wet web strength additive comprises gpam . the combination of a wet web strength additive with a natural gum results in a surprising synergy which increases the strength of the resulting paper by more than the sum of either of the two added alone . this inventive combination also solves some of the problems inherent in using wet web strength additives in papermaking as well as in using natural gums . it has been known for some time that adding wet web strength additives or drainage aid or wet strength aid to paper mat increases the wet web strength of the resulting paper or enhances drainage or improves machine speed and runnability or enhance sheet wet strength . some examples of wet strength aids , wet web strength additives and drainage aids are described in u . s . pat . nos . 7 , 125 , 469 , 7 , 615 , 135 and 7 , 641 , 776 . unfortunately it is not practical to add large amounts of wet strength aids or wet web strength additives or drainage aids to compensate for the weakness due to large amounts of filler in paper mat . one reason is because those additives are expensive and using large amounts of additives would result in production costs that are commercially non - viable . in addition , adding too much additive negatively affects the process of papermaking and inhibits the operability of various forms of papermaking equipment . furthermore cellulose fibers can only adsorb a limited amount of wet strength aid or wet web strength additive or drainage aid . this imposes a limit on how much additive can be used . one reason why this is so is because wet strength aid or wet web strength additive or drainage aid tend to neutralize the anionic fiber / filler charges and when these charges are neutralized further adsorption of those additives is inhibited . adding filler to the paper mat also reduces the effectiveness of the wet strength aid or wet web strength additive or drainage aid . those additives have a tendency to coat the filler particles . the more filler particles present , the more additive coats the filler particles , and therefore there is less wet strength aid or wet web strength additive or drainage available to bind the cellulose fibers together . because there is a maximum amount of wet strength aid or wet web strength additive or drainage that can be added , more filler has always meant less effective strength additive . this effect is more acute with pcc than gcc because pcc &# 39 ; s higher surface area becomes more coated with the additives than gcc . u . s . pat . no . 5 , 458 , 679 describes treating filler particles with polysaccharides . however it fails to describe how using the polysaccharides to alter the viscosity of the filler particles would enhance the strength properties of the resulting paper . details regarding the viscosity imparting effects of natural gums can be found in the scientific article : alternan and highly branched limit dextrans : low - viscosity polysaccharides as potential new food ingredients , by gregory l . cote et al ., in : spanier a . m . et al . ( ed ) chemistry of novel foods , carol stream , ill . : allured publishing corp , pgs , 95 - 110 ( 1997 ) which discusses such natural gums as alternan and gum arabic ( in particular fig2 and 3 ). in at least one embodiment the viscosity of the filler containing composition ( which will later be added to paper mat ) is increased by between 10 - 100 % by the presence of natural gums with the filler particles . in at least one embodiment of the invention at least some of the filler particles are pre - treated with a pre - treating composition comprising at least one natural gum to at least partially prevent the adherence of wet strength aid or wet web strength additive or drainage aid to the filler particles . the pre - treatment may involve entirely coating some or all of one or more filler particles with the natural gum . in the alternative , the pre - treatment contemplates applying the natural gum to only a portion of one or more of the filler particles , or completely coating some filler particles and applying the natural gum to only a portion of some other particles . the natural gum may be applied to the filler particles , before , after , or simultaneous to one or more steps of the other filler pre - treatment ( s ). in at least one embodiment , in addition to contacting the filler particles with natural gums , the filler particles are also treated according at least one of the methods and compositions described in u . s . patent application ser . no . 12 / 323 , 976 titled method of increasing filler content in papermaking . in at least one embodiment , the treating composition of matter is any one of or combination of the compositions of matter described in u . s . pat . no . 6 , 592 , 718 . in particular , any of the acam / dadmac copolymer compositions described in detail therein are suitable as the treating composition of matter . an example of an acam / dadmac copolymer composition is product # nalco - 4690 from nalco company of naperville , ill . ( hereinafter referred to as 4690 ). the treating composition of matter can be a coagulant . the coagulants encompassed in this invention are well known and commercially available . they may be inorganic or organic . representative inorganic coagulants include alum , sodium aluminate , polyaluminum chlorides or pacs ( which are also known as aluminum chlorohydroxide , aluminum hydroxide chloride , and polyaluminum hydroxychloride ), sulfated polyaluminum chlorides , polyaluminum silica sulfate , ferric sulfate , ferric chloride , and the like and blends thereof . some organic coagulants suitable as a treating composition of matter are formed by condensation polymerization . examples of polymers of this type include epichlorohydrin - dimethylamine ( epi - dma ), and epi - dma ammonia crosslinked polymers . additional coagulants suitable as a treating composition of matter include polymers of ethylene dichloride and ammonia , or ethylene dichloride and dimethylamine , with or without the addition of ammonia , condensation polymers of multifunctional amines such as diethylenetriamine , tetraethylenepentamine , hexamethylenediamine and the like with ethylenedichloride and polymers made by condensation reactions such as melamine formaldehyde resins . additional coagulants suitable as a treating composition of matter include cationically charged vinyl addition polymers such as polymers , copolymers , and terpolymers of ( meth ) acrylamide , diallyl - n , n - disubstituted ammonium halide , dimethylaminoethyl methacrylate and its quaternary ammonium salts , dimethylaminoethyl acrylate and its quaternary ammonium salts , methacrylamidopropyltrimethylammonium chloride , diallylmethyl ( beta - propionamido ) ammonium chloride , ( beta - methacryloyloxyethyl ) trimethyl ammonium methylsulfate , quaternized polyvinyllactam , vinylamine , and acrylamide or methacrylamide that has been reacted to produce the mannich or quaternary mannich derivatives . preferable quaternary ammonium salts may be produced using methyl chloride , dimethyl sulfate , or benzyl chloride . the terpolymers may include anionic monomers such as acrylic acid or 2 - acrylamido 2 - methylpropane sulfonic acid as long as the overall charge on the polymer is cationic . the molecular weights of these polymers , both vinyl addition and condensation , range from as low as several hundred to as high as several million . preferably , the molecular weight range should be from about 20 , 000 to about 1 , 000 , 000 . in at least one embodiment , the pre - treatment is preformed by a combination of one , some , or all of any of the compositions of matter described as suitable compositions of matter for pre - treating the filler particles . while pre - treating filler particles is known in the art , prior art methods of pre - treating filler particles are not directed towards affecting the adhesion of the wet strength aid or wet web strength additive or drainage aid to the filler particles . in fact , many prior art pre - treatments increase the adhesion of the strength additive to the filler particles . for example , u . s . pat . no . 7 , 211 , 608 describes a method of pre - treating filler particles with hydrophobic polymers . this pre - treatment however does nothing to the adhesion between the strength additive and the filler particles and merely repels water to counterbalance an excess of water absorbed by the strength additive . in contrast , the invention decreases the interactions between the wet strength aid or wet web strength additive or drainage aid and the filler particles and results in an unexpectedly huge increase in paper strength , sheet dewatering and machine runability . in at least one embodiment , in addition to contacting the filler particles with natural gums , the filler particles are also preflocculated according at least one of the utilizing the methods and compositions described in u . s . pat . no . 8 , 172 , 983 . in at least one embodiment the method of preparing a stable dispersion of flocculated filler particles having a specific particle size distribution for use in papermaking processes comprises the steps of a ) providing an aqueous dispersion of filler particles ; b ) adding at least one natural gum to the dispersion , c ) adding a first flocculating agent to the dispersion in an amount sufficient to mix uniformly in the dispersion without causing significant flocculation of the filler particles ; d ) adding a second flocculating agent to the dispersion in an amount sufficient to initiate flocculation of the filler particles in the presence of the first flocculating agent ; and e ) optionally shearing the flocculated dispersion to provide a dispersion of filler flocs having the desired particle size . at least some of the fillers encompassed by this invention are well known and commercially available . they include any inorganic or organic particle or pigment used to increase the opacity or brightness , reduce the porosity , or reduce the cost of the paper or paperboard sheet . the most common fillers are calcium carbonate and clay . however , talc , titanium dioxide , alumina trihydrate , barium sulfate , and magnesium hydroxide are also suitable fillers . calcium carbonate includes ground calcium carbonate ( gcc ) in a dry or dispersed slurry form , chalk , precipitated calcium carbonate ( pcc ) of any morphology , and precipitated calcium carbonate in a dispersed slurry form . the dispersed slurry forms of gcc or pcc are typically produced using polyacrylic acid polymer dispersants or sodium polyphosphate dispersants . each of these dispersants imparts a significant anionic charge to the calcium carbonate particles . kaolin clay slurries also are dispersed using polyacrylic acid polymers or sodium polyphosphate . in at least one embodiment , the wet strength aids , wet web strength additives , dry strength additives or drainage aids encompassed by the invention include any one of the compositions of matter described in u . s . pat . no . 4 , 605 , 702 and us patent application 2005 / 0161181 a1 and in particular the various glyoxylated acrylamide / dadmac copolymer compositions described therein . an example of a glyoxylated acrylamide / dadmac copolymer composition is product # nalco 63700 ( made by nalco company , naperville , ill .). another example of is amine - containing polymers including allylamine / acrylamide copolymers and polyvinylamines ; one more example is polyamide - polyamine - epichlorohydrin ( pae ) in at least one embodiment , the fillers used are pcc , gcc , and / or kaolin clay . in at least one embodiment , the fillers used are pcc , gcc , and / or kaolin clay with polyacrylic acid polymer dispersants or their blends . the ratio of wet strength additive or wet web strength aid or drainage additive relative to solid paper mat can be 3 kg of additive per ton of paper mat . in at least one embodiment the method of making paper products from pulp comprises the steps of forming an aqueous cellulosic papermaking furnish , adding an aqueous dispersion of filler slurry combined with the addition of natural gums and wet web strength agent , wet strength agent dry strength agent or draining aids to the furnish , draining the furnish to form a sheet and drying the sheet . the steps of forming the papermaking furnish , draining and drying may be carried out in any conventional manner generally known to those skilled in the art . in at least one embodiment the method of making paper products from pulp comprises the steps of forming an aqueous cellulosic papermaking furnish , pretreating the filler slurry according at least one of the methods and compositions described in u . s . patent application ser . no . 12 / 323 , 976 , or preflocculated according at least one of the methods and compositions described in u . s . pat . no . 8 , 172 , 983 , combined with the addition of natural gums and wet web strength agent , wet strength agent , dry strength agent or draining aids to the furnish , draining the furnish to form a sheet and drying the sheet . the steps of forming the papermaking furnish , draining and drying may be carried out in any conventional manner generally known to those skilled in the art . the foregoing may be better understood by reference to the following examples , which are presented for purposes of illustration and are not intended to limit the scope of the invention . unless otherwise stated , the following is the general procedure used for all handsheet studies . a filler stock was prepared using albacar ho pcc as filler . the fiber stock was a 75 / 25 hwk / swk blend . sheet basis weight was maintained at around 80 g / m 2 . six replicate handsheets were produced for each experimental condition . the thin stock for each bulk handsheet was mixed in a dynamic drainage jar at 800 rpm . for the basesheets , the desired amount of pcc , natural gum / gpam , cationic starch , alkenyl succinic anhydride , and a cationic flocculant were added in 15 - second intervals . after mixing , the basesheet was formed in a handsheet mold using an 80 - mesh screen . once formed the sheets were pressed in a static press at 0 . 565 mpa for 5 minutes and then dried in a drum drier at 210 \u00b0 f . for one minute . sheet strength measurements were conducted at 50 % relative humidity at 23 \u00b0 c . tsi means tensile strength index measured in n \u00b7 m / g . abl , is the measurement of abrasion loss , which was measured according to tappi test method . t476 which is a measure of surface strength . abl is measured in units of mg / 1000 revs . the lower the abrasion loss , the stronger the surface is . this study was designed to show the strength performance of the natural gum when it is used to treat the filler before addition to the fiber slurry and a strength aid is added to the wet end . table 1 summarizes the experimental design and measured results . the results of this example demonstrate that the combination of a natural gum ( whose representative example is xanthan but is assumed to apply to many or all natural gums ) with a strength additive ( whose representative example is gpam but is assumed to apply to many or all natural gums ) results in an unexpected synergistic effect . when both are applied to the furnish the effect was better than if either were added alone . adding gpam alone in the wet end produced almost no beneficial effect . adding xanthan alone in the wet end produced a small benefit . the combination of gpam with xantham however produced a large effect far out of proportion to the individual contributions of either . this large effect demonstrates a novel unexpected synergy results from their combination . this study was designed to show the performance of the natural gum and the strength aid independently of the feed point of the natural gum . table 2 summarizes the conditions and results . tsi means tensile strength index measured in n \u00b7 m / g . abl in in the final column is the measurement of abrasion loss . abl was measured according to leon test method t476 which is a measure of surface strength . tsi is measured in terms of mg / 1000 revs . the lower the abrasions loss , the stronger the surface is . true ash is a measure of how much of the added filler actually end up in the resulting paper sheet . this example demonstrates that for paper sheets having similar true ash levels , the natural gum - strength additive synergy manifests if the natural gum is added in either to the filler before it contacts the paper material or within the wet end of the papermaking process . the following study was designed to compare the performance of two distinct natural gums , namely , xanthan gum and guar gum . a strength aid is immediately added in each case when a natural gum is added in the wet end . table 3 summarizes the experimental design and results . the results of this example show that the synergy displayed by xanthan is representative of a property that is shared by many or all natural gums . this study was designed to map the performance of the natural gum - strength aid as a function of both chemistries . table 4 summarizes the experimental design and results . this study was designed to show the performance of guar gum addition to the stock followed by a strength aid . table 5 summarizes the experimental design and results . a person of ordinary skill in the art will recognize that all of the previously described methods are also applicable to paper mat comprising other non cellulose based fibrous materials , paper mats comprising a mixture of cellulose based and non - cellulose based fibrous materials , and / or synthetic fibrous based materials . while this invention may be embodied in many different forms , there described in detail herein specific preferred embodiments of the invention . the present disclosure is an exemplification of the principles of the invention and is not intended to limit the invention to the particular embodiments illustrated . all patents , patent applications , scientific papers , and any other referenced materials mentioned herein are incorporated by reference in their entirety . furthermore , the invention encompasses any possible combination of some or all of the various embodiments described herein and / or incorporated herein . in addition the invention encompasses any possible combination that also specifically excludes any one or more of the various embodiments described herein and / or incorporated herein . the above disclosure is intended to be illustrative and not exhaustive . this description will suggest many variations and alternatives to one of ordinary skill in this art . the compositions and methods disclosed herein may comprise , consist of or consist essentially of the listed components , or steps . as used herein the term \u201c comprising \u201d means \u201c including , but not limited to \u201d. as used herein the term \u201c consisting essentially of \u201d refers to a composition or method that includes the disclosed components or steps , and any other components or steps that do not materially affect the novel and basic characteristics of the compositions or methods . for example , compositions that consist essentially of listed ingredients do not contain additional ingredients that would affect the properties of those compositions . those familiar with the art may recognize other equivalents to the specific embodiments described herein which equivalents are also intended to be encompassed by the claims . all ranges and parameters disclosed herein are understood to encompass any and all subranges subsumed therein , and every number between the endpoints . for example , a stated range of \u201c 1 to 10 \u201d should be considered to include any and all subranges between ( and inclusive of ) the minimum value of 1 and the maximum value of 10 ; that is , all subranges beginning with a minimum value of 1 or more , ( e . g . 1 to 6 . 1 ), and ending with a maximum value of 10 or less , ( e . g . 2 . 3 to 9 . 4 , 3 to 8 , 4 to 7 ), and finally to each number 1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 , 9 , and 10 contained within the range . all numeric values are herein assumed to be modified by the term \u201c about ,\u201d whether or not explicitly indicated . the term \u201c about \u201d generally refers to a range of numbers that one of skill in the art would consider equivalent to the recited value having the same function or result ). in many instances , the term \u201c about \u201d may include numbers that are rounded to the nearest significant figure . weight percent , percent by weight , % by weight , wt %, and the like are synonyms that refer to the concentration of a substance as the weight of that substance divided by the weight of the composition and multiplied by 100 . as used in this specification and the appended claims , the singular forms \u201c a ,\u201d \u201c an ,\u201d and \u201c the \u201d include plural referents unless the content clearly dictates otherwise . thus , for example , reference to a composition containing \u201c a compound \u201d includes a mixture of two or more compounds . as used in this specification and the appended claims , the term \u201c or \u201d is generally employed in its sense including \u201c and / or \u201d unless the content clearly dictates otherwise . this completes the description of the preferred and alternate embodiments of the invention . those skilled in the art may recognize other equivalents to the specific embodiment described herein which equivalents are intended to be encompassed by the claims attached hereto ."}

{"publication\_number": "US-6134752-A", "abstract": "a pneumatically energized loading mechanism for a drafting device is proposed for loading the upper rolls of the device . this mechanism possesses pneumatic cylinders which subject the upper rolls to a force , which acts from a holder plate for the securement of the cylinder . the support is effected by a stop plate , which acts in unison with holder plate . the cylinder possesses a guide surface positioning the cylinder on the support . the cylinder exhibits a piston with a circular cross - section and is comprised of plastic . the cylinder is affixed to the holder by a securement means . by the support of the cylinder on the holder , the securement means need accept no force engendered by the piston . the cylinder simultaneously forms a passage for a current bus which serves as the power cutoff of the drafting device when fiber windup difficulties arise .", "application\_number": "US-25599499-A", "description": "reference will now be made in detail to the presently preferred embodiments of the invention , one or more examples of which are illustrated in the drawings . each example is provided by way of explanation of the invention , and not meant as a limitation of the invention . for example , features illustrated or described as part of one embodiment can be used on another embodiment to yield a still further embodiment . it is intended that the present application include such modifications and variations . fig1 shows , in a sectioned schematic example , the loading mechanism installed on a loading arm for the upper rolls of a drafting zone . the loading arm 55 possesses two holders 4 ( see also fig2 ). only one such holder can be seen in fig1 . the drafting zone has three upper rolls ( 5 ), which lie upon corresponding lower rolls 51 and are secured with bearings in the base supports 50 of the structural framing . in a conventional manner , axle extensions of the upper rolls of the drafting zone are carried in bearings ( 52 ) and are loaded by a loading means , being thereby pressed against the lower rolls . for this purpose , the loading arm 55 is equipped with the two arms , of which one exerts the loadings for one side of the upper rolls 5 and the other serves the same purpose for the extended opposite ends of the corresponding upper rolls . each of these loading arms is equipped with two holders 4 , between which holders , the loading mechanisms 1 are carried ( see fig2 ). the section in fig1 is so devised , that it runs through the loading mechanisms 1 of the one side of the drafting zone . experience dictates that the spatial intervals of the upper rolls to one another on a drafting zone must be designed to be adjustable , since , in accord with the characteristics of the fiber material to be drafted , different separating distances are required . for this purpose , the base supports 50 in the drafting zone are slidingly movable at right angles to the axes of the upper and lower rolls . accordingly , the loading mechanism of the corresponding upper rolls must accommodate this movement . for this purpose , the loading mechanisms in accord with the invention are also installed slidably on the holder 4 of the loading arms 55 . principally , the exit roll 57 of the drafting zone need not be moved , since , at this point , the fiber band leaves the drafting zone . on the lower roll 51 of the exit pair of rolls , there is , in addition , a turn - around roll 58 installed , which changes the direction of the fiber band as it leaves the drafting zone . for the sake of simplicity , the loading mechanisms 1 of the present invention are all of the same construction . the pressing force on the upper rolls is controlled by the pressure of the pressure - medium , which is communicated to the loading mechanisms 1 by means of the pressure lines 22 . by means of this pressure of the pressure - medium , the pressing force for each upper roll can be regulated individually . it is recommended to subject the exit roll 57 and the turn - around roll 58 to the same pressure . however , to achieve different forces with the same pressure for the turn - around roll and exit roll in this present embodiment , the piston area of the loading mechanism 1 for the turn - around roll 58 is less than that of the exit roll 57 , so that a smaller force is exercised on the said turn - around roll 58 . this preferred arrangement is reached , in that , in the cylinder space of the normal loading mechanism , which cylinder space is common for upper rolls , a bushing 203 is inserted that diminishes the inside diameter and accordingly , a smaller piston is used , which correspondingly produces less force . this arrangement may also be preferred for the loading mechanisms of the remaining upper rolls of a machine , so that in spite of one single pressure of the pressure - medium , different pressing forces can still be exerted against different upper rolls . the loading arm 55 is set in bearings 550 , which furnish a centerpoint of rotation , so that said loading arm 55 can be opened , whereby the drafting zone is made accessible . in the closed position , a securing hook 56 locks in the loading arm 55 , so that the force can be brought to bear on the upper rolls 5 . fig2 shows a profile section through a loading mechanism 1 in accord with the invention seen at a 90 \u00b0 rotation to the plane of fig1 . the section is taken midway through the upper roll and the loading mechanism . the loading mechanism is comprised of a cylinder 2 in which a piston 3 is placed . this assembly is subjected to force from a pressure medium in the cylinder space 21 , which force is then transmitted through a piston rod 31 to the end bearing block 52 of the upper roll 5 . on the other end ( not shown ), the upper roll has , an opposite end bearing block , which is likewise loaded by a loading mechanism . the cylinder 2 is designed in two parts , wherein the upper part forms the cylinder space 21 and the lower part the guide 23 for the piston rod 31 . the piston 3 is sealed off from the inner wall of the cylinder 2 by a piston ring 32 , which is designed as a lip type seal . the inner wall of the cylinder 2 is appropriately lubricated in the zone of the cylinder space 21 , so that a smooth slide of the piston ring 32 is made possible . the piston rod 31 and the piston 3 are bound to one another by means of a compression fit . the upper , that is , the part of the cylinder 2 remote from the upper roll 5 , is affixed to the lower part of the cylinder 2 by means of fastening elements 25 ( see fig3 ). the fastening of the loading mechanism 1 onto the loading arm 55 is done by clamps on the left and right holders 4 . for this purpose , the cylinder 2 possesses stop plates 200 with which the cylinder 2 abuts the two holders 4 of the loading arms 55 . at the same time , the cylinder 2 is drawn against the stop plates 200 with securement means 20 . these securement means , working together with the cylinder on the oppositely situated side , bring about a clamping retention . for this purpose , a fastening plate 40 is set against the holder 4 onto which the securement means 20 fasten . the securement means 20 threadedly engage themselves in the tapped bushings 250 , which have been placed in the cylinder 2 . in the case of a preferred cylinder 2 , which is comprised of injection molded plastic , the tapped bushings 250 are preset as inserts in the original plastic mold . in this way , an assured fastening becomes possible . opposite the piston 3 , on the cylinder 2 is located a pipe connection fixture 222 for a pressure medium line . in addition , on cylinder 2 is found a support member 26 , which connects to the upper roll 5 . this support member 26 is comprised of a spring steel shaped plate . into a longitudinal opening of the spring steel shaped plate , penetrates a protruding pin 520 of the bearing assembly of the upper roll 5 . upon the swinging away of the loading arm 55 , along with the loading mechanism 1 of the upper roll 5 , this support member 26 is also lifted away . advantageous for the loading mechanism 1 , is the inclusion of a holding plate 27 on the cylinder 2 for the securement of a lip 270 for the cleaning of the upper roll . this cleaning lip 270 also accompanies the said loading arm 55 when the latter is swung away . the holder 27 possesses a longitudinal opening into which a projection of the cleaning lip is inserted . fig3 depicts , schematically , a section through a loading mechanism , which is in accord with the invention , wherein the section is made at 90 \u00b0 to the axis of the upper roll 5 , and lies in the plane in which the fastening elements 25 are found . against the holder plate 4 lies the fastening plate 40 , which is pulled up against the cylinder 2 by the securement means 20 ( see fig2 ). the securement means 20 , which are threaded bolts , bind the lower part and the upper part of the cylinder 2 together and securement means 20 are threadedly seated in the tapped bushings 250 , which have been co - molded as inserts in the injection molding of the cylinder 2 . with its side proximal to the upper roll , the cylinder 2 lies above the stop plate 200 on the holder 4 . the piston pressure applied to the upper roll is , by the just described arrangement , backed up by the holder 4 . for the sliding movement of the cylinder 2 , the securement means 20 ( see fig2 ) are loosened , whereby the fastening plate 40 , together with the cylinder 2 , can be slidingly moved on its guide surface along the holder 4 . fig4 shows a loading mechanism designed in accord with the invention in which the two parts of the cylinder 2 are bound to one another by a clip arrangement . this arrangement is possible because the cylinder 2 with its stop plate 200 supportingly abuts on that side of the holder 4 , which is remote from the upper roll 5 . to this end , the holder 4 possesses a stop plate 400 , so that the force arising from piston 3 and transmitted to the bearing 52 acts through that portion of the cylinder 2 that contains the cylinder space 21 directly on the holder 4 . the connection between the portion of the cylinder 2 , which contains the cylinder space 21 , and the portion containing the guide 23 for the piston rod 31 , needs , under this arrangement , to accept no forces . the corresponding path of the force in fig2 and 3 is taken over by the threaded bolts 25 . in fig2 and 3 , the cylinder 2 is secured against slipping by the fastening plate 40 and the securement means 20 on the holder 4 . the securement means 20 likewise accepts here , no force which arises on the bearing 52 from the backup of the piston 3 . in the area of the holding plate 27 in fig4 a sufficient spatial interval 401 is provided between the holding plate 4 and the cylinder 2 , so that the clip connection 25 is not overstressed . the cylinder 2 lies with its guide surface 201 slidably placed on the holder 4 , so that upon adjustment of the spatial interval of the axes , the loading mechanism may be pushed along the holder 4 . simultaneously , the guide surface in the axial direction of the upper roll takes over the positioning of the cylinder 2 in relation to the holder 4 , and thereby also in relation to the upper roll 5 . on its upper side , the fastening plate 40 has an opening through which penetrates a pipe fitting 222 on the cylinder 2 , in order to supply the cylinder space 21 with a pressurized medium . the cut - off device 7 serves to control the textile machine , that is , to send such a signal for control to be activated . upon the installation of the loading mechanism 1 on a drafting zone , the device provides recognition of the position of the piston 31 , in order , with the help of this signal , to shut down the drafting . at the same time , the loading on the upper roll 5 of the drafting zone is removed . during the operation of drafting , there can be a repetitive occurrence of the so - called winding build - up on the upper rolls , wherein fibers wrap themselves around the upper roll 5 . this leads to a critical operational situation , because the bearings of the upper and lower rolls are immensely overloaded . furthermore , the outer surfaces of the upper rolls can suffer damage since the windings are wound extremely tightly around the upper rolls . these windings can be loosened only with great difficulty . the cut - off device 7 generates a signal , that shuts down the drafting , so that no further fibers can come into the drafting zone and at the same time , the loading on the upper rolls is relieved , so that the winding cannot further consolidate . in the case of a loading mechanism designed in accord with the invention , the relieving of the loading on the upper rolls is made ( very easily ) possible , because the pressure is taken off the upper roll 5 by means of air release from the cylinder space 21 . the cut - off device 7 is comprised essentially of a switch 71 , which can assume two positions . in one position , the switch 71 lies on a contact plate 70 . in the other position , the switch finds itself between contact plate 70 and cylinder 2 . the switch 71 is designed as an electrically conductive plate , which , by means of a sliding fit , is movably affixed to the piston rod . upon movement of the piston rod 31 , the switch slides along the piston rod . if the loading mechanism 1 set upon the bearing 52 is without pressure in the cylinder space 21 , then the piston rod slides in the direction away from the bearing 52 , whereby the switch 71 impacts against the contact plate 70 as the piston rod upwardly slides . if now , for starting operation , the loading mechanism is supplied with pressure in the cylinder space 21 , then the piston rod 31 moves in the direction of the bearing 52 of the upper roll 5 and with this motion , takes the switch 71 with it . the switch 71 then lies on the cylinder 2 . the cylinder 2 is comprised of a non - conducting plastic material , so that no electrical connection establishes itself between the bearing 52 and the electrical current bus 73 . the contact plate 70 has no electrical connection to the piston rod 31 , but does stand electrically in communication with the contact rod 72 . this rod 72 is electrically conducting and connected to the current bus 73 . a spring has been arranged with the contact rod 72 , which presses contact rod 72 onto the current bus 73 . by these means , assurance is provided that the loading mechanism 1 can be slidingly pushed into positions on the holder 4 without the difficulty of renewing an electrical contact . further , assurance is provided that tolerances in the positioning of the bus 73 on the holder 4 have no influence on the electrical contact . the current bus 73 installed in cylinder 2 is electrically insulated , since the cylinder 2 is molded of plastic , which is not electrically conductive . fig1 shows the current bus 73 in its position on the holder 4 . it is designed as a two part component and fastened to the holder 4 and insulated therefrom by means of insulators 41 . in the area of the loading mechanism assigned to the exit roll 57 , the current bus 73 makes , in the corresponding insulator 41 , a sharp bend . the loading mechanism 1 for the exit roll 57 and turn - around roll 58 are not slidingly moved , so that the sharp bend does not interfere . the current bus is connected with the control ( not shown ) of the of the textile machine by means of an ( again not shown ) electrical connection . in the case of a windup on one of the upper rolls , the upper roll 5 is pressed away from its lower roll against the pressure of the piston 3 . the piston moves itself then , with its piston rod in a direction away from said upper roll 5 . since the said switch 71 first moves itself with the piston rod 31 , it impacts the contact plate 70 , whereby the switch 71 completes the circuit and an electrical connection between the textile machine and the electrical connection ( not shown ) of the current bus 73 is established . favorable dimensions for the invented loading mechanism 1 orient themselves to the diameter of the corresponding upper rolls 5 of the drafting zone on which the loading mechanism is to be installed . in order to install the upper rolls with the minimum possible spatial intervals between one another , the cylinder has a length l at 90 \u00b0 to the axis of the upper roll , which corresponds to the diameter of the upper roll . an offset projection added to this diameter of up to 10 mm is preferred . by this means , a plurality of cylinders can be arranged in one plane along a loading arm 55 . an axial displacement , as is established by the current state of the technology , ( de 38 14 340 a1 ) is not necessary . the bearings of the upper rolls need not be greater in axial direction than the breadth of the loading mechanism . the use of compressed air as a fluid for pressurizing the piston of the loading mechanism is particularly advantageous in comparison to liquid pressure media . the range of possible applications for this loading mechanism 1 is especially great , if it is so designed that it can be operated with compressed air not exceeding 7 bar . loading mechanisms of theis type are available practically universally in the production centers of the textile industry . the installation of a piston 3 , which has a circular base of diameter less than that of the upper roll and is engaged with compressed air less then 7 bar gauge , allows the achievement of sufficient force with simultaneously , favorable dimensioning of the loading mechanism . in this matter , values appearing between 75 and 85 % of the diameter of the upper roll are particularly to be preferred . it will be appreciated by those skilled in the art that various modifications and variations can be made in the present invention without departing from the scope of the invention . it is intended that the present invention include such modifications and variations as come within the scope of the appended claims and their equivalents ."}

{"publication\_number": "US-2017268178-A1", "abstract": "a process for manufacturing tissue including providing a first pulp mix , delivering a wet - end additive to the first pulp mix at a first point in the process , forming a tissue web comprising the first pulp mix after the first point in the process , monitoring the tissue web for breaks and preventing delivery of the wet - end additive to the first pulp mix at the first point in response to detecting a break in the monitoring step . in an exemplary embodiment , a switching valve is used to control delivery of the wet - end additive to the first pulp mix .", "application\_number": "US-201715614156-A", "description": "the present invention is directed to a soft tissue made with a combination of a wet end added ionic surfactant and a wet end added nonionic surfactant . the tissue may be made up of a number of layers , including exterior layers and an interior layer . in at least one exemplary embodiment , pulp mixes for each tissue layer are prepared individually . fig1 shows a three layer tissue , generally designated by reference number 1 , according to an exemplary embodiment of the present invention . the tissue 1 has external layers 2 and 4 as well as an internal , core layer 3 . external layer 2 is composed primarily of hardwood fibers 20 whereas external layer 4 and core layer 3 are composed of a combination of hardwood fibers 20 and softwood fibers 21 . the internal core layer 3 includes an ionic surfactant functioning as a debonder 5 and a non - ionic surfactant functioning as a softener 6 . as explained in further detail below , external layers 2 and 4 also include non - ionic surfactant that migrated from the internal core layer 3 during formation of the tissue 1 . external layer 2 further includes a dry strength additive 7 . external layer 4 further includes both a dry strength additive 7 and a temporary wet strength additive 8 . pulp mixes for exterior layers of the tissue are prepared with a blend of primarily hardwood fibers . for example , the pulp mix for at least one exterior layer is a blend containing about 70 percent or greater hardwood fibers relative to the total percentage of fibers that make up the blend . as a further example , the pulp mix for at least one exterior layer is a blend containing about 90 - 100 percent hardwood fibers relative to the total percentage of fibers that make up the blend . pulp mixes for the interior layer of the tissue are prepared with a blend of primarily softwood fibers . for example , the pulp mix for the interior layer is a blend containing about 70 percent or greater softwood fibers relative to the total percentage of fibers that make up the blend . as a further example , the pulp mix for the interior layer is a blend containing about 90 - 100 percent softwood fibers relative to the total percentage of fibers that make up the blend . as known in the art , pulp mixes are subjected to a dilution stage in which water is added to the mixes so as to form a slurry . after the dilution stage but prior to reaching the headbox , each of the pulp mixes are dewatered to obtain a thick stock of about 95 % water . in an exemplary embodiment of the invention , wet end additives are introduced into the thick stock pulp mixes of at least the interior layer . in an exemplary embodiment , a non - ionic surfactant and an ionic surfactant are added to the pulp mix for the interior layer . suitable non - ionic surfactants have a hydrophilic - lipophilic balance of less than 10 , and preferably less than or equal to 8 . 5 . an exemplary non - ionic surfactant is an ethoxylated vegetable oil or a combination of two or more ethoxylated vegetable oils . other exemplary non - ionic surfactants include ethylene oxide , propylene oxide adducts of fatty alcohols , alkylglycoside esters , and alkylethoxylated esters . suitable ionic surfactants include but are not limited to quaternary amines and cationic phospholipids . an exemplary ionic surfactant is 1 , 2 - di ( heptadecyl )- 3 - methyl - 4 , 5 - dihydroimidazol - 3 - ium methyl sulfate . other exemplary ionic surfactants include ( 2 - hydroxyethyl ) methylbis [ 2 -[( 1 - oxooctadecyl ) oxy ] ethyl ] ammonium methyl sulfate , fatty dialkyl amine quaternary salts , mono fatty alkyl tertiary amine salts , unsaturated fatty alkyl amine salts , linear alkyl sulfonates , alkyl - benzene sulfonates and trimethyl - 3 -[( 1 - oxooctadecyl ) amino ] propylammonium methyl sulfate . in an exemplary embodiment , the ionic surfactant may function as a debonder while the non - ionic surfactant functions as a softener . typically , the debonder operates by breaking bonds between fibers to provide flexibility , however an unwanted side effect is that the overall strength of the tissue can be reduced by excessive exposure to debonder . typical debonders are quaternary amine compounds such as trimethyl cocoammonium chloride , trymethyloleylammonium chloride , dimethyldi ( hydrogenated - tallow ) ammonium chloride and trimethylstearylammonium chloride . after being added to the interior layer , the non - ionic surfactant ( functioning as a softener ) migrates through the other layers of the tissue while the ionic surfactant ( functioning as a debonder ) stays relatively fixed within the interior layer . since the debonder remains substantially within the interior layer of the tissue , softer hardwood fibers ( that may have lacked sufficient tensile strength if treated with a debonder ) can be used for the exterior layers . further , because only the interior of the tissue is treated , less debonder is required as compared to when the whole tissue is treated with debonder . in an exemplary embodiment , the ratio of ionic surfactant to non - ionic surfactant added to the pulp mix for the interior layer of the tissue is between 1 : 4 and 1 : 90 parts by weight and preferably about 1 : 8 parts by weight . in particular , when the ionic surfactant is a quaternary amine debonder , reducing the concentration relative to the amount of non - ionic surfactant can lead to an improved tissue . excess debonder , particularly when introduced as a wet end additive , can weaken the tissue , while an insufficient amount of debonder may not provide the tissue with sufficient flexibility . because of the migration of the non - ionic surfactant to the exterior layers of the tissue , the ratio of ionic surfactant to non - ionic surfactant in the core layer may be significantly lower in the actual tissue compared to the pulp mix . in an exemplary embodiment , a dry strength additive is added to the thick stock mix for at least one of the exterior layers . the dry strength additive may be , for example , amphoteric starch , added in a range of about 1 to 40 kg / ton . in another exemplary embodiment , a wet strength additive is added to the thick stock mix for at least one of the exterior layers . the wet strength additive may be , for example , glyoxalated polyacrylamide , commonly known as gpam , added in a range of about 0 . 25 to 5 kg / ton . in a further exemplary embodiment , both a dry strength additive , preferably amphoteric starch and a wet strength additive , preferably gpam are added to one of the exterior layers . without being bound by theory , it is believed that the combination of both amphoteric starch and gpam in a single layer when added as wet end additives provides a synergistic effect with regard to strength of the finished tissue . other exemplary temporary wet - strength agents include aldehyde functionalized cationic starch , aldehyde functionalized polyacrylamides , acrolein co - polymers and cis - hydroxyl polysachharide ( guar gum and locust bean gum ) used in combination with any of the above mentioned compounds . in addition to amphoteric starch , suitable dry strength additives may include but are not limited to glyoxalated polyacrylamide , cationic starch , carboxy methyl cellulose , guar gum , locust bean gum , cationic polyacrylamide , polyvinyl alcohol , anionic polyacrylamide or a combination thereof . fig4 is a block diagram of a system for manufacturing tissue , generally designated by reference number 100 , according to an exemplary embodiment of the present invention . the system 100 includes an first exterior layer fan pump 102 , a core layer fan pump 104 , a second exterior layer fan pump 106 , a headbox 108 , a forming section 110 , a drying section 112 and a calendar section 114 . the first and second exterior layer fan pumps 102 , 106 deliver the pulp mixes of the first and second external layers 2 , 4 to the headbox 108 , and the core layer fan pump 104 delivers the pulp mix of the core layer 3 to the headbox 108 . as is known in the art , the headbox delivers a wet web of pulp onto a forming wire within the forming section 110 . the wet web is laid on the forming wire with the core layer 3 disposed between the first and second external layers 2 , 4 . after formation in the forming section 110 , the partially dewatered web is transferred to the drying section 112 , within the drying the section 112 , the tissue of the present invention may be dried using conventional through air drying processes . in an exemplary embodiment , the tissue of the present invention is dried to a humidity of about 7 to 20 % using a through air drier manufactured by metso corporation , of helsinki , finland . in another exemplary embodiment of the invention , two or more through air drying stages are used in series . without being bound by theory , it is believed that the use of multiple drying stages improves uniformity in the tissue , thus reducing tears . in an exemplary embodiment , the tissue of the present invention is patterned during the through air drying process . such patterning can be achieved through the use of a tad fabric , such as a g - weave ( prolux 003 ) or m - weave ( prolux 005 ) tad fabric . after the through air drying stage , the tissue of the present invention may be further dried in a second phase using a yankee drying drum . in an exemplary embodiment , a creping adhesive is applied to the drum prior to the tissue contacting the drum . a creping blade is then used to remove the tissue from the yankee drying drum . the tissue may then be calendered in a subsequent stage within the calendar section 114 . according to an exemplary embodiment , calendaring may be accomplished using a number of calendar rolls ( not shown ) that deliver a calendering pressure in the range of 0 - 100 pounds per linear inch ( pli ). in general , increased calendering pressure is associated with reduced caliper and a smoother tissue surface . according to an exemplary embodiment of the invention , a ceramic coated creping blade is used to remove the tissue from the yankee drying drum . ceramic coated creping blades result in reduced adhesive build up and aid in achieving higher run speeds . without being bound by theory , it is believed that the ceramic coating of the creping blades provides a less adhesive surface than metal creping blades and is more resistant to edge wear that can lead to localized spots of adhesive accumulation . the ceramic creping blades allow for a greater amount of creping adhesive to be used which in turn provides improved sheet integrity and faster run speeds . in addition to the use of wet end additives , the tissue of the present invention may also be treated with topical or surface deposited additives . examples of surface deposited additives include softeners for increasing fiber softness and skin lotions . examples of topical softeners include but are not limited to quaternary ammonium compounds , including , but not limited to , the dialkyldimethylammonium salts ( e . g . ditallowdimethylammonium chloride , ditallowdimethylammonium methyl sulfate , di ( hydrogenated tallow ) dimethyl ammonium chloride , etc .). another class of chemical softening agents include the well - known organo - reactive polydimethyl siloxane ingredients , including amino functional polydimethyl siloxane . zinc stearate , aluminum stearate , sodium stearate , calcium stearate , magnesium stearate , spermaceti , and steryl oil . the below discussed values for softness ( i . e ., hand feel ( hf )), caliper and tensile strength of the inventive tissue were determined using the following test procedures : softness of a tissue sheet was determined using a tissue softness analyzer ( tsa ), available from emtec electronic gmbh of leipzig , germany . a punch was used to cut out three 100 cm 2 round samples from the sheet . one of the samples was loaded into the tsa with the yankee side facing up . the sample was clamped in place and the tpii algorithm was selected from the list of available softness testing algorithms displayed by the tsa . after inputting parameters for the sample , the tsa measurement program was run . the test process was repeated for the remaining samples and the results for all the samples were averaged . a thwing - albert progage 100 thickness tester , manufactured by thwing albert of west berlin , n . j . was used for the caliper test . eight 100 mm \u00d7 100 mm square samples were cut from a base sheet . each sample was folded over on itself , with the rougher layer , typically corresponding air layer facing itself . the samples were then tested individually and the results were averaged to obtain a caliper result for the base sheet . an instron 3343 tensile tester , manufactured by instron of norwood , mass ., with a 100n load cell and 25 . 4 mm rubber coated jaw faces was used for tensile strength measurement . prior to measurement , the instron 3343 tensile tester was calibrated . after calibration , 8 strips , each one inch by eight inches , were provided as samples for testing . one of the sample strips was placed in between the upper jaw faces and clamp , and then between the lower jaw faces and clamp . a tensile test was run on the sample strip . the test procedure was repeated until all the samples were tested . the values obtained for the eight sample strips were averaged to determine the tensile strength of the tissue . tissue according to exemplary embodiments of the present invention has an improved softness as compared to conventional tissue . specifically , the tissue of the present invention may have a softness or hand feel ( hf ) of at least 90 . in another exemplary embodiment , the tissue of the present invention may have a softness of at least 95 . in another exemplary embodiment , the tissue has a bulk softness of less than 10 ts7 ( as tested by a tsa ). in an exemplary embodiment , the tissue of the present invention also has a basis weight for each ply of less than 22 grams per square meter . for such a soft , thin tissue the initial processing conditions may be defined so as to have a moisture content between 1 . 5 to 5 %. in another exemplary embodiment , the tissue of the present invention has a basis weight for each ply of at least 17 grams per square meter , more preferably at least 20 grams per square meter and most preferably at least 22 grams per square meter . tissue according to exemplary embodiments of the present invention has a good tensile strength in combination with improved softness and / or a lower basis weight or caliper as compared to conventional tissue . without being bound by theory , it is believed that the process of the present invention allows the tissue to retain more strength , while still having superior softness without the need to increase the thickness or weight of the tissue . specifically , the tissue of the present invention may have improved softness and / or strength while having a caliper of less than 650 microns . tissue according to exemplary embodiments of the present invention has a combination of improved softness with a high degree of uniformity of surface features . fig2 shows a micrograph of the surface of a tissue according to an exemplary embodiment of the invention without a topical additive and fig3 shows a micrograph of the surface of a conventional through air dried tissue with a flattened surface texture . the tissue of fig2 has a high degree of uniformity in its surface profile , with regularly spaced features , whereas the tissue of fig3 has flattened regions and a nonuniform profile . the tissue of the present invention may also be calendered or treated with a topical softening agent to alter the surface profile . in exemplary embodiments , the surface profile can be made smoother by calendering or through the use of a topical softening agent . the surface profile may also be made rougher via microtexturing . through air dried tissue was produced with a three layer headbox and a 005 albany tad fabric . the flow to each layer of the headbox was about 33 % of the total sheet . the three layers of the finished tissue from top to bottom were labeled as air , core and dry . the air layer is the outer layer that is placed on the tad fabric , the dry layer is the outer layer that is closest to the surface of the yankee dryer and the core is the center section of the tissue . the tissue was produced with 45 % eucalyptus fiber in the air layer , 50 % eucalyptus fiber in the core layer and 100 % eucalyptus fiber in the dry layer . headbox ph was controlled to 7 . 0 by addition of a caustic to the thick stock before the fan pumps for all samples . roll size was about 10 , 000 meters long . the number of sheet - breaks per roll was determined by detecting the number of breaks in the sheet per every 10 , 000 meters of linear ( md - machine direction ) sheet run . the tissue according to example 1 was produced with addition of a temporary wet strength additive , hercobond 1194 ( ashland , 500 hercules road , wilmington del ., 19808 ) to the air layer , a dry strength additive , redibond 2038 ( corn products , 10 finderne avenue , bridgewater , n . j . 08807 ) split 75 % to the air layer , 25 % to the dry layer , and a softener / debonder , t526 ( eka chemicals inc ., 1775 west oak commons court , marietta , ga ., 30062 ) added in combination to the core layer . the t526 is a softener / debonder combination with a quaternary amine concentration below 20 %. example 2 was produced with the same conditions as example 1 , but chemical addition rates were changed . specifically , the amount of dry strength additive ( redibond 2038 ) was increased from 5 . 0 kg / ton to 10 . 0 kg / ton and the amount of softener / debonder ( t526 ) was increased from 2 . 0 kg / ton to 3 . 6 kg / ton . example 3 was produced with the same conditions as example 1 except with t526 added to the dry layer . example 4 was produced with the same conditions as example 1 except for the addition of a debonder having a high quaternary amine concentration (& gt ; 20 %) to the core layer . the debonder was f509ha ( manufactured by eka chemicals inc ., 1775 west oak commons court , marietta , ga ., 30062 ). comparative example 1 was produced with the same conditions as example 1 except that wet end additives were not used table 1 shows performance data and chemical dose information for the tad basesheet of examples 1 - 4 and comparative example 1 . the basis weight ( bw ) of each example was about 20 . 7 gsm . examples 1 and 2 had a much higher hand - feel ( hf ) with lower lint value and improved machine efficiency compared to comparative example 1 . of note , these improved parameters were achieved while maintaining the same sheet md / cd tensile range for both examples 1 and 2 as in comparative example 1 . the wet end chemical additives of example 1 significantly improved product softness . example 2 is a further improvement over example 1 with a reduced lint value . this improvement in example 2 was achieved by increasing the redibond 2038 and t526 dose . softness as determined by the tsa was significantly reduced when softener / debonder was added to the dry layer ( example 3 ) and when a tissue debonder having a higher quaternary amine concentration was added to the core layer ( example 4 ). the preferred option is to add a combination of softener / debonder to core layer which allows the softener to migrate to surface layers and adjust chemical bonding in the dry layer to control product lint level ( example 1 ). the tissue of the present invention also exhibits an improved surface profile that provides for improved product consistency and fewer defects that may otherwise cause sheet breaks . specifically , the roughness of tissue can be characterized using two values , pa ( average primary amplitude ) and wc ( average peak to valley waviness ). pa is a commonly used roughness parameter and is computed as the average distance between each roughness profile point and the meanline . wc is computed as the average peak height plus the average valley depth ( both taken as positive values ) relative to the meanline . as described in more detail below , the tissue of the present invention is measured to have pa and wc values that are both low and relatively uniform compared to conventional tad tissue products . the below discussed values for pa and wc of the inventive tissue were determined using the following test procedures : ten samples of each tissue to be tested were prepared , with each sample being a 10 cm by 10 cm strip . each sample was mounted and held in place with weights . each sample was placed into a marsurf gd 120 profilometer , available from mahr federal instruments of gottingen , germany , and oriented in the cd direction . a 5 \u03bcm tip was used for the profilometer . twenty scans were run on the profilometer per sample ( ten in the forwards direction and ten in the backwards direction ). the reverse scans were performed by turning the sample 180 degrees prior to scanning . each scan covered a 30 mm length . the collected surface profile data was then transferred to a computer running omnisurf analysis software , available from digital metrology solutions , inc . of columbus , ind ., usa . the roughness profile setting for the omnisurf software was set with a short filter low range of 25 microns and a short filter high range of 0 . 8 mm . the waviness profile setting of the omnisurf software was set to a low range of 0 . 8 mm . for each sample , values for pa ( average primary amplitude ) and wc ( average peak to valley waviness ) were calculated by the omni surf software . the calculated values of pa and wc for all twenty scans were averaged to obtain pa and wc values for each tissue sample . the standard deviation of the individual sample pa and wc values were also calculated . two plies were produced , with each ply being equivalent to the three - layer structure formed in example 1 . the two plies were then embossed together to form a finished tissue product . two plies were produced and embossed together as in example 5 , except that wet end additives were not used . table 2 shows the pa and pa standard deviation of several commercial products , example 5 , and comparative example 2 and 3 . tables 1 and 2 show the improved surface roughness characteristics of the inventive tissue as compared to commercially available products as well as similar tissue products that were not produced with wet end additives . specifically , the tissue according to various exemplary embodiments of the present invention has an average wc value of 140 or less , and more preferably 135 or less , with a wc standard deviation ( i . e ., waviness uniformity ) of 27 or less . further , the tissue according to various exemplary embodiments of the present invention has an average pa value of 50 or less , with a wc standard deviation ( i . e ., amplitude uniformity ) of 8 or less . as known in the art , the tissue web is subjected to a converting process at or near the end of the web forming line to improve the characteristics of the web and / or to convert the web into finished products . on the converting line , the tissue web may be unwound , printed , embossed and rewound . according to an exemplary embodiment of the invention , the paper web on the converting lines may be treated with corona discharge before the embossing section . this treatment may be applied to the top ply and / or bottom ply . nano cellulose fibers ( ncf ), nano crystalline cellulose ( ncc ), micro - fibrillated cellulose ( mcf ) and other shaped natural and synthetic fibers may be blown on to the paper web using a blower system immediately after corona treatment . this enables the nano - fibers to adsorb on to the paper web through electro - static interactions . as discussed , according to an exemplary embodiment of the invention , a debonder is added to at least the interior layer as a wet end additive . the debonder provides flexibility to the finished tissue product . however , the debonder also reduces the strength of the tissue web , which at times may result in sheet breaks during the manufacturing process . the relative softness of the tissue web results in inefficiencies in the rewind process that must be performed in order to correct a sheet break . accordingly , as shown in fig4 , in an exemplary embodiment of the present invention , a switching valve 120 is used to control delivery of the debonder as a wet - end additive to the interior layer . in particular , when a sheet break is detected using , for example , conventional sheet break detection sensors , the switching valve 120 may be controlled to prevent further delivery of the debonder . this results in less flexibility and increased strength at the portion of the tissue web to be rewound , thereby allowing for a more efficient rewind process . once the rewind process is completed , the switching valve may be opened to continue delivery of the debonder . in addition to the use of a sheet break detection sensor , the switching valve 120 may also be controlled during turn up , the process whereby the tissue web is one transferred from on roll to another . the turn up process can result in higher stresses on the tissue web that normal operation , thus increasing the chance of sheet breaks . the switching valve 120 is turned off prior to turn up , thus increasing the strength of the tissue web . after the tissue web has begun winding on a new roll , the switching valve 120 is turned on again . the resulting roll of basesheet material thus has a section of higher strength tissue web at the center of the roll and may have a section of higher strength tissue on the outside of the roll . during finishing , the exterior section of higher strength tissue is removed and recycled . the interior section of higher strength tissue is not used to make a finished tissue . thus , only the portion of the roll of basesheet tissue containing debonder is used to make finished tissue . now that embodiments of the present invention have been shown and described in detail , various modifications and improvements thereon will become readily apparent to those skilled in the art . accordingly , the spirit and scope of the present invention is to be construed broadly and not limited by the foregoing specification ."}

{"publication\_number": "US-4165599-A", "abstract": "filaments or yarn are twisted by means of an arrangement provided with three at least partly hollow shafts rotating at equal or different rotating speeds and in the same or different sense , while the fibrous material is guided so as to pass alternately through the hollow shafts when taken off from a supply package and to carriers fixed to these shafts , to be thereby twisted and taken off by a take - up device .", "application\_number": "US-88060578-A", "description": "with reference to fig1 a frame is provided , from which the left side wall 42 and the right side wall 43 are shown . a bearing 8 and a bushing 14 in the left side wall 42 are supporting a left outer shaft 20 , a similar bearing 9 and bushing 15 in the right side wall 43 are supporting a right outer shaft 22 . a pulley 33 is fixed on the left shaft 20 and another pulley 34 is fixed on the right shaft 22 . both these outer shafts 20 and 22 receive a rotating motion from an electric motor 39 , on the shaft 71 of which a pulley 38 is fixed , driving over a belt 68 another pulley 37 fixed on a shaft 32 supported by the frame by bearings 56 , 58 and bushings 57 , 59 . further pulleys 35 and 36 are fixed on the shaft 32 transmitting over belts 40 and 41 the rotating motion to pulleys 33 and 34 respectively . a stable trough 46 is furthermore fixed to the frame , supporting on the left end a bushing 13 and a bearing 7 for the left over shaft 20 , on the right end a transmission gear case 24 , which in turn supports a bushing 12 and a bearing 6 for the right outer shaft 22 and a bushing 11 and a bearing 5 for the middle shaft 21 . the trough is covered by a removable cover 48 . an additional bushing 10 and bearing 4 for the middle shaft 21 are supported by a not shown part of the frame or trough 46 . a toothed wheel 26 is fixed on shaft 22 meshing with another toothed wheel 27 on a shaft 30 supported rotatably by the walls of the gear case 24 , on which shaft 30 another toothed wheel 28 is fixed , engaging with a pinion 29 on an intermediate shaft 31 supported by one side wall of the gear case 24 and by an auxiliary partition wall 60 in the gear case 24 . the pinion 29 meshes with a toothed wheel 25 on the middle shaft 21 , so that to this middle shaft 21 a rotating motion is imparted in a sense opposite to that of both outer shafts 20 and 22 . an extension of shaft 22 engages a recess of shaft 21 where a bearing 23 for this extension is provided . each of the shafts 20 , 21 and 22 supports a carrier 17 , 19 and 18 respectively , each with a guiding roll 53 , 55 and 54 respectively on said carrier 17 , 19 and 18 for guiding the filament or yarn 16 . similar guiding rolls 49 , 50 , 51 are situated at places , where the hollow parts of shafts 20 , 21 , 22 are communicating with the ambient space . a removable hollow support 3 for a supply package 1 of fibrous material is situated within the trough 46 , resting with one end on the stable bushing 10 of the bearing 4 of the middle shaft 21 , with the other end on not shown supporting means in the trough . the supply package 1 is wound on a tube 2 , which is slipped on on the support 3 . a filament brake 44 is on the external end of the support 3 opposite to the middle shaft 21 and a take - up device 45 for the filament near the end of shaft 22 . the described arrangement operates as follows : after starting the electric motor 39 , all three shafts 20 , 21 , 22 start to rotate , whereby the middle shaft 21 rotates in an opposite sense to the rotation of shafts 20 and 22 . the fibrous material 16 is wound off from the supply package 1 and enters via the filament brake 44 the hollow support 3 of the package and the hollow of the middle shaft 21 , passes over roll 50 and a roll 55 on the carrier 19 on the middle shaft 21 to a galette 52 in front of the left outer shaft 20 , through its hollow , over roll 49 in this hollow to roll 53 on the carrier 17 on shaft 20 , to roll 54 on the carrier 18 of shaft 22 , to roll 51 within this shaft 22 and to the take - up device 45 . in the course of this passage the filament or yarn is twisted several times , depending on the rotating speeds of shafts 20 , 21 , 22 . generally two twists are imparted by the middle shaft 21 , one twist by each shaft 20 and 22 per revolution of these shafts . instead of belt drives , it is of course possible to use toothed wheels or any other suitable kind of drives . the arrangement according to fig2 operates similarly to that shown in fig1 the main difference being that all shafts 20 , 21 , 22 are rotating in the same sense . similar elements bear the same reference numbers as in fig1 . the trough 46 has here a somewhat different shape , with an inclined stationary tube 63 fixed to the gear case 24 and engaging with its other end freely into the hollow part of shaft 20 . guiding rolls 64 and 65 are near both extremities of this tube 63 . the transmissions in this gear case 24 are accomplished by pulleys 26 , 27 , 28 , 25 and belts 61 , 62 , the pulleys 27 and 28 being fixed on a shaft 30 , pulley 26 on shaft 20 , pulley 25 on shaft 21 . balloon control rings 47 are rectifying the course of the processed fibrous material 16 . the processed fibrous material 16 is taken off from the supply package 1 , passes through the filament brake 44 , through the hollow support 3 of the supply package 1 , over roll 50 to roll 55 on the carrier 19 fixed on shaft 21 , to the eyelet 67 , galette 52 , roll 66 opening in wall 69 , roll 64 in tube 63 , roll 65 / hollow of shaft 20 , roll 49 , roll 53 on the carrier fixed to shaft 20 , roll 54 on carrier fixed to shaft 22 , roll 51 , hollow of shaft 22 to the take - up device 45 . the operation of this arrangement is substantially the same as that shown in fig1 ."}

{"publication\_number": "US-4913869-A", "abstract": "an improvement in the conventional wet - spinning process for producing acrylic fibers increases the spinning performance and / or productivity of the process and comprises imparting a plurality of stretches to the fibers as they are being dried on the heat rolls of the drying train employed in the process .", "application\_number": "US-28914288-A", "description": "the improvement of the present invention is accomplished by modifying the rolls of the drying roll train of the convention wet - spinning process for producing acrylic filaments so that at least two pair of successive heated rolls in the train are operated at peripheral speeds such that a stretch is imparted to the filaments between each pair of rolls . a drying roll train which may suitably be used to practice the improvement of the present invention is shown in the accompanying figure , wherein drying rolls 1 - 48 are arranged serpentinely in series . filaments 50 are passed over each roll with a partial wrap in the manner shown in the figure . each roll is of a conventional design , i . e ., is hollow , made of stainless steel , and has a outside diameter of about 14 inches ( 35 . 6 cm ), and a length of 42 inches ( 106 . 7 cm ). a fluid , such as chilled water or steam , may be circulated through each of the rolls in a conventional manner for purposes of controlling the surface temperature of the rolls . typically , rolls 1 , 2 and 3 are cold rolls ( not heated or cooled ), rolls 4 - 44 are heated rolls and rolls 45 - 48 are cooled rolls . a separate stretch may be imparted to filaments 50 between any pair of successive heated rolls , for example , between rolls 12 and 13 and rolls 16 and 17 . preferably , at least four stretches and , most preferably , 5 to 10 stretches ( e . g . 6 or 8 stretches ) are imparted to filaments 50 in the drying roll train . the stretches are imparted to filaments 50 by operating the rolls at appropriate selected peripheral speeds . for example , by operating rolls ( 1 - 12 ) at a given speed ( s 1 ), rolls ( 13 - 16 ) at a higher given speed ( s 2 ) and rolls ( 17 - 48 ) at a given speed ( s 3 ) higher than ( s 2 ), a stretch is imparted to filaments 50 between rolls 12 and 13 and between rolls 16 and 17 . the amount of each individual stretch may be same or different from the other individual stretches . from the drying roll train the filaments may be further processed in a conventional manner , that is , collected in tow form or crimped , annealed with steam , cut to staple length and baled . the following examples are given to further illustrate the invention . in the examples percentages are weight percentages unless otherwise specified . in this example , acrylic filaments were produced in accordance with the improvement of the present invention using conventional wet - spinning equipment . a copolymer comprising 92 . 5 % acrylonitrile and 7 . 5 % vinylacetate was dissolved in dmac in an amount sufficient to provide a 25 % copolymer solution ( dope ). the dope , at a temperature of 105 \u00b0 c ., was extruded through 24 spinnerets , each having 100 , 000 round orifices of a 2 . 5 mils ( 0 . 06 mm ) diameter . each spinneret was immersed in an aqueous dmac coagulation bath having a dmac concentration of 51 % with water being added during spinning to maintain this concentration . the temperature of the bath was maintained at about 34 \u00b0 c . each resulting filament bundle ( tow ) was withdrawn from the bath washed with water to remove dmac and wet - stretched 4 . 62 times in 90 \u00b0 c . water . a finish was then applied to each tow . the tows were then passed through a drying roll train having the configuration shown in the figure . rolls 1 - 3 were unheated , rolls 4 - 44 were heated to a surface temperature of 160 \u00b0 c . by means of steam and rolls 45 - 48 were cooled to a surface temperature of 55 \u00b0 c . by means of chilled water . a stretch of 1 . 05 times was imparted to the filaments between rolls 12 and 13 , 16 and 17 , 20 and 21 , 24 and 25 , 28 and 29 , 32 and 33 , 36 and 37 , and 40 and 41 for a total stretch on the drying train of 1 . 52 times . the peripheral speed of roll 48 was 54 rpm which corresponds to a filament speed of 196 fpm ( 60 mpm ) or to a production rate of 1430 lb / hr . ( 649 kg / hr ). the filaments were then crimped , annealed and cut to staple having a denier of 1 . 2 . the spinning performance of the process was excellent . when the process was repeated except that a single stretch was taken on the drying roll train ( 1 . 217 stretch between rolls 40 and 41 ) and the wet stretch was increased to 4 . 92 times to provide the same total stretch as before , the spinning performance was unacceptable . attempts to improve spinning performance by changing the wet - stretch and drying roll stretch while maintaining the same dpf ( i . e . 1 . 2 ) were unsuccessful . in a further related experiment , the above process was again repeated , except in this instance the processing speed was increased from 54 rpm to 65 rpm , thereby increasing the production rate to 1721 lbs / hr ( 781 kg / hr ). no noticeable reduction in spinning performance was observed . in still further related experiments , the process was again repeated , except the processing speed , spinnerets type ( hole diameter and number of holes ), wet - stretch and the drying roll stretches were selected to provide staple having in one instance , a denier of 1 . 5 ; in another instance , a denier of 3 . 0 ; and in yet another instance , a denier of 5 . 0 . in each instance spinning performance was excellent . in yet further related experiments , the process was again repeated , except less drying roll stretches were taken . in one instance , two stretches ( 1 . 23x each ) were taken ; in another instance four stretches ( 1 . 11x each ) were taken ; and in yet another instance , six stretches ( 1 . 072x each ) were taken . while two stretches provides an improvement in spinning performance over a single stretch , the spinning performance was not as good as when four or more stretches were taken ."}

{"publication\_number": "US-5122577-A", "abstract": "polycationic wet - strength materials such as kymene are chemically modified to provide unsaturated hydrocarbon substituents . the modified kymene is cross - linked onto and into latex particles to provide improved wet - strength agents for use in paper treatments . thus , kymene is reacted , for example , with acrylic acid and cross - linked with styrene / butadiene to provide a polycationic latex wet - strength agent .", "application\_number": "US-51660290-A", "description": "the polyamide / polyamine / epichlorohydrin wet - strength resins used in the practice are fully described by carr , doane , hamerstrand and hofreiter , in an article appearing in the journal of applied polymer science vol . 17 , pp 721 - 735 ( 1973 ). such resins are available as kymene ( e . g ., kymene 557 ) from hercules , inc . a commercial synthesis of such resins from adipic acid , diethylene triamine and epichlorohydrin is described in the carr et al publication , ibid ., and is u . s . pat . no . 2 , 926 , 154 ( feb . 23 , 1960 ) to g . i . keim . reference can be made to these publications for further details regarding the preparation of polyamide / polyamine / epichlorohydrin resins of the type employed to prepare the polycationic latexes herein . in the practice of this invention , the aforesaid resin is reacted in such a way as to introduce a polymerizable hydrocarbon moiety into the resin &# 39 ; s structure . such moiety can be co - polymerized with other polymerizable latex - forming monomers or oligomers to form a latex incorporating the resin . the resulting latex is polycationic , by virtue of the presence of the resin &# 39 ; s polycationic substituents . while not intending to be bound by theory , it is reasonable to speculate that the overall reaction involves the following , wherein m - x is a reactant comprising a reactive group x which can be , for example , carboxylate ( preferred ), amine , alkyl halide , chlorohydrin , epoxide , xanthate , acid anhydride , or the like , and wherein m contains at least one -- c \u2550 c -- bond , typically a c 2 - c 16 unsaturated hydrocarbyl group , preferably c 2 - c 6 . examples include : acrylate , methacrylate , vinyl benzoate or other vinyl groups , unsaturated fatty acids and derivatives thereof , and the like . the reaction is speculated to occur at the 4 - membered ring of kymene ( i . e ., schematically illustrated by the following ) or at the secondary amine : ## str5 ## wherein a , b , c and d are each integers typically in the range of 20 - 500 and r is as disclosed hereinabove . alternatively , the oh moieties and / or the residual secondary amine of kymene are available as reaction sites . as an example , acryloyl chloride could react with kymene to produce the structure below : ## str6 ## and glycidyl methacrylate could react with kymene to produce the structure below : ## str7 ## whatever the mechanism of reaction , the unsaturated hydrocarbon moiety is thus attached to the kymene and is available to react with various latex - forming monomers or oligomers , thereby incorporating the kymene into and onto the resulting latex particles . to illustrate the reaction further , kymene can be reacted with a member selected from the group consisting of vinyl benzoic acid , itaconic acid , oleic acid , linoleic acid , 3 - bromopropyl acrylate , dimethylaminopropyl acrylate , acrylolyl chloride , itaconic anhydride , the methyl ester of acrylic acid , and mixtures thereof , and the reaction product co - polymerized with a member selected from the group consisting of styrene , 1 , 3 - butadiene , isoprene , propylene , ethylene , methyl acrylate , vinyl acetate , methyl methacrylate , t - butyl methacrylate , and mixtures thereof , to provide polycationic latexes . while the examples disclosed hereinafter provide more specific details , the following general principles for carrying out the reactions herein are provided for assistance to the formulator . the reactions are conveniently carried out in water . the reaction temperatures can be in the range of about 30 \u00b0 c . to about 100 \u00b0 c ., but a 60 \u00b0 c . reaction temperature is convenient . reaction times can vary according to the temperature selected but reaction at 60 \u00b0 c . for 40 hours is convenient for laboratory syntheses . an emulsifier , e . g ., oleyl ethoxylate as volpo - 20 ( croda , inc . ), can be used in the reaction mixture , and some of this may be co - polymerized into the latex . in any event , the presence of the emulsifier results in a desirably fine suspension of the latex particles in the reaction medium . on a laboratory scale , it is convenient to use sufficient materials to provide a solids content of the final latex suspension in the range from about 10 % to about 25 % ( wt .). the resulting suspension can be used directly to treat paper , or the like . the following examples illustrate the preparation of the polycationic latexes , but are not intended to be limiting thereof . \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_example ikymeme / acrylic acid / styrene / butadiene latexreagents amount ( grams ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_volpo - 20 0 . 322v - 50 \* 0 . 072kymene \*\* 0 . 722acrylic acid 0 . 14styrene 2 . 861 , 3 - butadiene 4 . 29distilled water as reaction medium 50 mls\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \* v - 50 initiator is 2 , 2 &# 39 ; azobis ( 2amidopropane ) dihydrochloride available from wako , usa . \*\* as 5 . 5 g . of 13 % solution . the water reaction medium is sparged for 30 minutes with argon prior to use . a 250 ml glass reaction bottle equipped with a magnetic stir bar is flushed with nitrogen for 5 minutes . the kymene , volpo - 20 , v - 50 initiator and distilled water are placed in the reaction bottle , which is sealed with a rubber gasket and two - holed bottle cap . the mixture is argon sparged for 30 minutes . the acrylic acid is added using a syringe and the styrene is added using a syringe . the reaction bottle is placed in an ice bath . the 1 , 3 - butadiene is condensed in dry ice . using a double - ended syringe and argon pressure , the 1 , 3 - butadiene is added to the reaction vessel . a rubber septum is wired in place over the bottle cap and the reaction bottle is placed in an oil bath at 60 \u00b0 c . for 40 hours , with slow stirring . at the end of this time , the reaction product is pulled and strained through a fine wire sieve to provide a suspension of a captioned latex at a solid content of 13 . 5 %. the reaction of example i is repeated under the same conditions , but using 0 . 722 g of kymene and 0 . 358 g of acrylic acid . the reaction product is a 12 . 8 % polycationic latex suspension . the reaction of example i is repeated , but with the amount of kymene increased to 1 . 44 g ( 11 . 1 g or 13 % solution ). the reaction product is a 11 . 5 % solids suspension of polycationic latex . in an alternative mode , the kymene level can be decreased to 2 . 77 g of a 13 % ( wt .) kymene solution to provide a polycationic latex suspension ( 13 . 6 % wt . solids ). following the procedure of example i , a polycationic latex is prepared , but with the substitution of methacrylic acid ( 0 . 14 g ) for the acrylic acid used in example i , and with the use of 0 . 722 g of kymene . the reaction is allowed to proceed for 26 hours at 60 \u00b0 c . the reaction product is an aqueous suspension of a polycationic latex . following the procedure of example 1 , a polycationic latex is prepared , but with the substitution of 0 . 14 g of glycidyl methacrylate for the acrylic acid used in example i . the reaction product is an aqueous suspension of the polycationic latex . 2 . 65 g ( 2 . 50 g dry wt . ) unrefined northern softwood kraft ( nsk ) pulp is dispersed in 500 ml tap water at ambient ph ( ca . 7 . 5 ). 5 . 0 % ( 0 . 984 g ) of the polycationic latex of example i is added to the pulp slurry and stirred for 30 minutes . the handsheet is made on a standard deckle box using tap water at ambient ph ( ca . 7 . 5 ) and dried on a drum dryer at 110 \u00b0- 115 \u00b0 c . the applicability of a polycationic latex as a wet - strength additive for a continuous papermaking process is as follows . approximately 220 kg ( dry weight ) of refined northern softwood kraft pulp is dispersed in water at the consistency of about 2 . 5 % and kept in a stirred holding tank . about 400 liters of cationic latex prepared according to example i are added to the pulp to achieve the wet - end deposition of the binder . the latex - treated pulp is then fed to a pilot scale paper machine ( equipped with normal papermaking process components , such as headbox , forming wire , and continuous dryer ) at a rate of about 80 l / min . the paper machine is operated at the production speed of 200 m / min . the latex content of the final paper products can be measured by x - ray fluorescence analysis . the analysis is done by brominating the unsaturated double bonds of a styrene - butadiene rubber component of the latex and then measuring the x - ray fluorescence intensity . the estimated latex add - on level for the sample measured by this method is on the order of 11 - 12 %. the wet strength of the latex - containing paper product produced by a continuous pilot paper machine can be determined by measuring the tensile strength required to tear a one - inch - wide strip of paper product after the sample is soaked in water . the following example illustrates the preparation of paper - type sheets comprising a polycationic wet - strength agent and a polyanionic absorbent gelling material . two separate slurries are prepared comprising 1 . 06 g ( 1 . 0 g dry wt .) 40 % wt . unrefined nsk pulp in 250 ml distilled water , adjusted to ph 8 . 5 ( 0 . 1 n sodium hydroxide ). the polycationic latex of example i ( 0 . 652 g ) is added to each of the two nsk / water slurries and stirred for 30 minutes . 0 . 5 g of commercial sanwet ( acrylate - starch graft ) absorbent gelling material is prepared as a fine powder . each separate slurry is formed on the deckle box in distilled water at ph 8 . 5 and placed on a transfer fabric in the following order : top layer nsk sheet ; middle layer powdered sanwet ; bottom layer nsk sheet . the layered sheet is transferred via a vacuum slit to a transfer sheet to form the finished paper handsheet . the finished handsheet is passed over a high vacuum twice and a second transfer sheet is placed on top of the finished sheet . the resulting sheet is passed over a drum dryer ( 155 \u00b0 c .) 10 - 12 times , until dry . the procedure of example i is repeated , but the styrene / butadiene monomer mixture is replaced by the following : styrene / isoprene ( 1 : 1 wt . ); isoprene ; and ethylene , respectively ."}

{"publication\_number": "US-5108827-A", "abstract": "the present invention provides a thermally - bonded nonwoven fabric that is made from a web which comprises from 100 to 5 percent by weight of multiconstitutent fibers . the multiconstituent fibers are composed of highly dispersed blends of at least two different immiscible thermoplastic polymers and have a dominant continuous polymer phase with at least one noncontinuous phase dispersed therein . the noncontinuous phase exists as an elongated fibrillar polymer domain oriented generally in the direction of the fiber axis . no single polymer domain cross - section of said noncontinuous phase or phases is larger than 0 . 1 % of the cross - sectional area of said fiber . the polymer of the noncontinuous phase or phases has a polymer melt temperature at least 30 \u00b0 c . below the pmt of the continuous phase . the fiber is configured such that the noncontinuous phase or phases occupy a substantial portion of the fiber surface . in addition to such fabrics , laminates -- made by combining nonwoven fabrics made from the materials and processes as described herein with films , paper , tissue , woven fabrics , or nonwoven fabrics such as meltblowns -- are also contemplated . the fabric according to the invention readily bonds to other materials of the sorts mentioned , and is therefore suitable for use in filtration media , medical and clean room garments , csr wrap , absorbent article backsheets , and other barrier structures .", "application\_number": "US-34474489-A", "description": "biconstituent or multiconstituent fibers that may be used to make fabrics according to the present invention are those which are spun from an intimately - mixed blend of different polymers in which at least two of the polymers in the blend are immiscible . the choice of polymers is limited to those that are thermoplastic ( including many elastomers ) and that have a melt temperature below 350 \u00b0 c ., preferably below 275 \u00b0 c . examples of polymers that can be used are : lldpe ( made with c 3 - c 10 alpha - 1 - olefin copolymers or 4 - methyl - 1 - pentene ) the biconstituent or multiconstituent fibers that make up a significant portion of the webs to be thermally bonded according to the present invention must exhibit a high degree of dispersion . in principle , the mean of the cross - sectional areas of the noncontinuous phase or phases is less than 1 / 1000th of the cross - sectional area of the fiber . factors which determine the level of dispersion and phase morphology of the dispersed phase or phases in blend fibers are discussed in detail by d . r . paul in &# 34 ; polymer blends &# 34 ;, volume 2 , chapter 16 . briefly , the dispersed - phase morphology of the blend fiber is dependent upon the relative rheologies of the blend components , the interfacial tension between the two or more phases , the polymer volume ratio , and the three stages of the blend melt preparation and processing : melt dispersion , extrusion , and extrudate draw - down prior to solidification . in general , the largest domains in the blend will exist when the polymer ratio is near 1 . 0 ; at this point the polymers are nearly co - continuous . the domain size of the discontinuous phase will decrease as the ratio deviates from 1 . 0 , given that the quantity of work ` mixered ` into the blend and the melt - spinning conditions remain constant . thermal bonding work on fabrics made from biconstituent polyethylene / polypropylene staple fibers has demonstrated weak bonding at calender temperatures at and just above the melting point of the lower melting polyethylene constituent . one of the problems with biconstituents in general in thermal bonding can be that the lower melting component is distributed throughout the fiber matrix rather than being concentrated at the surface where it can be active in bonding . therefore fibers according to the present invention are often preferably fibers with increased surface - to - volume ratios , with the ultimate being a ribbon - shaped fiber . high surface / volume fibers make more of the lower melting component available for bonding , which ultimately results in higher tensile strength fabrics and laminates . fig1 is a tem photomicrograph of a ruo 4 - stained polyethylene / polypropylene fiber cross - section , enlarged 25 , 000 times . the dark domains are polyethylene ( pe ); the lighter domains are the continuous polypropylene ( pp ) phase . the photograph demonstrates how well the pe phase is dispersed in the pp phase . it is interesting to note how the pe phases become circumferentially elongated at the fiber surface . fibers used to make fabric in accordance with the present invention may be processed as follows : two or more polymers , selected to meet the melting point differential that characterizes the present invention , are combined and blended to form a dispersion . the dispersion is then emitter melt - spun into fibers , which may be formed into webs for instance by carding , airlaying , or wetlaying , or melt - spun directly into fibrous webs by a spunbonding process . the webs are then thermally - bonded to transform them into strong soft biconstituent - fiber nonwoven fabrics . the specific fabric characteristics will be dependent on the choice of precursor fiber and processing conditions . said nonwoven fabrics may then be laminated into structures having a variety of desirable end - use characteristics . appropriate combinations of polymers combined to make the fibers used in accordance with the present invention are intimately blended before being melt - spun into fibers or fibrous webs . a high degree of mixing is necessary in order to prepare blends that will satisfy the degree of dispersion criteria that characterizes the fibers used according to the present invention . among the commercially available mixers that can be used are the barmag 3dd three - dimensional dynamic mixer supplied by barmag ag of west germany and the rapra ctm cavity - transfer mixer supplied by the rubber and plastics research association of great britain . an example of an immiscible blend according to the present invention is a supermixed blend of linear low density polyethylene with polypropylene . thermally - bonded nonwoven fabrics according to the present invention exhibit advantages over similar homofilament - based nonwovens . a few of those advantages are higher tensile strength / basis weight ratio , and higher tear resistance / basis weight ratio . many of these advantages are made possible by the fact that the lower melting component of the fibers used according to the present invention effects bonding at conditions that do not cause ` relaxation ` or loss of molecular orientation of the higher melting component . typically , fiber used for thermally - bonded coverstock is not highly oriented . highly oriented polypropylene , for example , is difficult to bond thermally without loss of molecular orientation in the individual filament . in addition , fabrics made from highly drawn polypropylene are harsh and possess poor ` hand `. the filaments described by the present invention can be highly drawn to impart high tenacities and then thermally bonded into a nonwoven fabric with essentially no loss of individual filament tenacity . the retention of individual filament tenacity improves the strength properties of the fabric . selection of the appropriate polymer ( polyethylene for example ) as the bonding constituent yields a fabric with greater softness than its homofilament counterpart . the process for manufacturing the webs to be thermally or sonically bonded according to the present invention can be any of the known commercial processes for making nonwoven fabrics , including processes that use mechanical , electrical , pneumatic , or hydrodynamic means for assembling fibers into a web , for example carding , wetlaying , carding / hydroentangling , wetlaying / hydroentangling , and spunbonding . biconstituent staple fiber was prepared by dry blending 40 % by weight of an ethylene / 1 - octene linear low density polyethylene [ lldpe ] having a melt index of 26 . 5 and a density of 0 . 940 grams / cc with 60 % by weight of controlled rheology polypropylene [ pp ] having a melt flow rate of 26 . the dry blend [ pp / lldpe ] was fed into a single - screw extrusion system equipped with a barmag 3dd intensive mixer . filaments were extruded and drawn to a final denier per filament of approximately 2 . 0 . line speeds and cold draw ratios were adjusted to produce two filament samples , one having 2x cold draw and another having 3 . 5x draw . refer to table i , samples 8319 - 2 and 8319 - 3 , respectively . one gram samples of each fiber type were formed into a web using a lab - scale carding device . the carded webs were then bonded on a beloit - wheeler lab top calender using a 16 %- diamond - bond pattern and a nip pressure of approximately 400 pli . strip tensile strengths were determined for samples bonded over a range of temperatures . carded webs made from hercules t - 185 polypropylene fiber served as a control . the biconstituent - based fabrics demonstrate superior tensile properties over the polypropylene homofilament - based fabric ( see tables ii , iii , and iv , and fig2 ). both polypropylene and pp / lldpe dry blend samples were ( separately ) fed into a single - screw extrusion system equipped with a barmag 3dd intensive mixer . filaments were extruded and drawn to a final denier per filament of approximately 2 . 0 . line speeds and cold draw ratios were adjusted to produce filament samples having 2x draw . refer to table i , samples 8319 - 1a and 8319 - 2 , respectively . each fiber sample was separately carded and thermally bonded on a 36 - inch - wide semicommercial line . physical properties were then determined for the fabric samples . data in table v . the biconstituent fiber - based fabrics exhibited superior strip and grab tensiles , energies at yield ( tea ), and tear values . staple biconstituent fiber containing 1 % by weight of a substituted - sorbitol nucleating agent was prepared from dry blends of pp / lldpe that was fed into a single - screw extrusion system equipped with a barmag 3dd intensive mixer . filaments were extruded and drawn to a final denier per filament of approximately 2 . 0 . line speeds and cold draw ratios were adjusted to produce filament samples having 3 . 5x draw . refer to table i , sample 8319 - 7 . the fiber was carded and thermally bonded on a 36 - inch - wide semicommercial line . data in table vi . the strip and grab tensiles , energies at yield , and tear values were superior to a similar fiber sample without nucleating agent . biconstituent fiber 8342 was prepared from a dry blend of 40 % by weight of an ethylene / 1 - octene copolymer [ lldpe ] having a melt index of 50 and a density of 0 . 925 g / cc with 60 % by weight of controlled rheology polypropylene [ pp ] having a melt flow of 35 . multiconstituent fiber 8343 was prepared from a dry blend of 40 % by weight lldpe having a melt index of 50 and a density of 0 . 925 g / cc with 55 % by weight of controlled rheology pp having a melt flow of 35 and with 5 % by weight of ethylene / acrylic acid copolymer [ eaa ] composed of low density polyethylene having a melt index of 300 and an acrylic acid content of 20 %. melt blends were then separately prepared and extruded and pelletized using a single screw extruder equipped with a 6 row rapra cavity - transfer mixer ( ctm ) and a strand die cutter . the polymer - blend pellets were then separately re - extruded into filaments and melt - drawn to a final denier per filament of 1 . 9 and 2 . 7 , respectively . one gram samples of each fiber type were formed into webs , bonded , and tested as described in example 1 . filament and fabric tensile properties are indicated in table vii . to demonstrate the ability of multiconstituent fabric to form a fabric / film laminate , five - inch - wide fabric samples of a thermally bonded multiconstituent fiber - based nonwoven fabrics were ` heat sealed ` to polyethylene film . laminate samples were prepared by heat - sealing a sandwich structure composed of carded fabric ( 8326 - 02 and 8326 - 03 ) ( bottom )/ polyethylene film ( middle )/ cover fabric ( 8326 - 02 ) ( top ). the cover fabric was used to insulate the low melting film from the sealing die . fabric and film dimensions were 5 &# 34 ;\u00d7 12 &# 34 ;. time , pressure , and die - temperature conditions were chosen that insured optimum adhesion of the fabric to the film while maintaining the film integrity . the heat sealer used was a hut - theller precision instruments west , model eb ( petaluma , calif .). multiple heat - sealed samples were prepared by sealing across the width of the laminate sample . the die dimensions were flat , 3 / 8 &# 34 ;\u00d7 5 &# 34 ;, or 1 . 875 square inches . peel strengths were determined relative to a homofil fabric laminate control . peel strengths are indicative of the level of adhesion between the fabric and film layers of the laminate . peel strengths were determined using an instron model 4201 tensile tester . strips 1 - inch wide were cut from each sealed sample . the fabric was placed in the upper grip of the tensile tester and the film in the lower grip . a gauge length of 3 - inches and a cross - head speed of 5 - inches / minute were used . peel strength properties are indicated in table viii . the level of adhesion was greater for the laminate which contained the multiconstituent fiber . examples 6 and 7 relate to breathable liquid barrier laminates with textile - like hand . such laminates are suitable for use but not limited to use as medical and industrial garments , csr wrap , surgical drape , and housewrap . the laminates are prepared from a layer or layers of microfibrous ( for example meltblown ) polymer , such as polypropylene , sandwiched between two layers of nonwoven fabric containing multiconstituent fiber according to the present invention . the discontinuous polymer phase of the multiconstituent fiber occupies a portion of the surface of the fiber such that both polymers of the blend are available for thermal or sonic bonding and / or lamination . the fabric can be bonded prior to lamination or can be directly deposited on either side of the microfibrous layer just prior to lamination . the microfibrous layer can be composed of meltblown fibers , wet laid pulps , or webs prepared by other known means . the microfibrous layer can be formed prior to the lamination or extruded or formed directly onto the multiconstituent nonwoven fabric prior to lamination . the microfibrous layer must be composed of a polymer which adheres to either the continuous or discontinuous polymer component of the multiconstituent fiber upon thermal or sonic lamination . thus for instance , high melt flow isotactic polypropylene could be meltblown into a microfibrous web and then laminated to a fabric made from a polymer - blend fiber having polypropylene as one of the polymer constituents . lamination can be with known calendering or sonic bonding technology . bond pattern and processing conditions can be tailored to impart the desired combination of strength , barrier , drape , and textile aesthetics . samples of flat - calendered ` sandwich - type ` laminates were prepared from a polypropylene meltblown web weighing 20 grams per square meter and having a nominal filament diameter of 5 microns and two outer nonwoven layers composed of a multiconstituent fiber - based nonwoven fabric like that described in example 1 and identified as sample no . 8326 - 03 in table v . the three webs were simultaneously unwound from a backstand and fed continuously into a heated calender nip . the lamination was effected using a 22 &# 34 ; lab calender equipped with a heated smooth rubber roll and a heated smooth steel roll . the samples were prepared at varied calender roll surface temperatures , ranging from 318 \u00b0 f . to 306 \u00b0 f . for the steel roll and from 300 \u00b0 f . to 284 \u00b0 f ., for the rubber roll . nip pressure was held constant at 150 pounds per linear inch ( pli ), and line speed was held constant at 22 feet per minute . physical properties were determined for the resulting laminate samples and are identified as sample numbers 8331 - 1a through 8331 - 1f in table ix . it is apparent from these data ( 8331 - 1a through 8331 - 1f ) that a breathable liquid - barrier laminate can be obtained with excellent fabric tenacity . a helically - bonded ` sandwich - type ` laminate was prepared by a procedure similar to that described in example 6 , but wherein the smooth rolls were replaced with steel rolls engraved with a diagonal line pattern such that the angle between the crisscross bond lines of the diagonal bonds opening in the machine direction ( md ) measures 120 degrees , each line measuring 60 degrees off the md axis and such that the raised bonding surfaces of each roll are flat and approximately 1 mm wide , separated by a recessed area measuring approximately 1 . 5 mm wide . a laminate fabric was produced at 22 fpm , 150 pli , at a calender roll surface temperature of 290 \u00b0 f . to 294 \u00b0 f . physical properties were determined for the fabric which is identified as sample number 8331 - 04 in table ix . it is apparent from a comparison of the thickness , tensile , and barrier properties of this fabric with those in the same table which have been flat - calendered that significantly different properties can be obtained for laminates composed of identical starting materials . thickness is greatly increased over the flat - calendered samples . the loft of a fibrous web contributes to its ability to filter airborne or liquidborne particles efficiently . air permeability is equivalent to breathability , a property associated with comfort in disposable garments . air permeability combined with liquid barrier properties defines a fabric which can be used as a protective garment in a medical or industrial end use . in addition , the range of properties exhibited by these laminates demonstrate the flexibility of multiconstituent fabrics in laminate applications . by use of the isotactic polypropylene / linear low density polyethylene polymer blend fiber - based fabric described in table v ( sample no . 8326 - 04c ), laminates were prepared that demonstrate the flexible bonding character of these novel substrates . film and meltblown fabric were acquired whose polymer compositions matched either that of the continuous phase or that of the noncontinuous phase of the polymer - blend fiber . the grades of each polymer were selected that suited the respective substrate manufacturing processes , and are therefore not the identical polymers used in the manufacture of the multiconstituent fiber . ` sandwich - type ` laminates were prepared using the procedure described in example 7 . physical property data appears in table x . it is apparent from examination of this data that laminates exhibiting excellent tensile and barrier properties can be prepared by bonding the multiconstituent fiber - based fabric to substrates composed of a polymer selected from the same polymer groups represented in the multiconstituent fiber . from the above description and specific examples of the invention , many variation in the webs , composites , useful products , and processes of this invention will be apparent to those skilled in the relevant arts . such variations are within the scope of the present invention as measure by the apended claims . table i\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_biconstituent filament propertiespolyblend cold denier filament elongationfiber draw per tenacity at breakdb # description ratio filament ( g / den ) (%) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_8319 - 1ahimont z30s pp 2 . 2 2 . 10 3 . 12 51 (. 10 ) (. 12 ) ( 9 . 4 ) 8319 - 1bhimont z30s pp 3 . 5 1 . 95 4 . 72 27 (. 10 ) (. 39 ) ( 3 . 7 ) 8319 - 240 / 60 pe ( a )/ pp 2 1 . 96 2 . 04 95 (. 11 ) (. 09 ) ( 40 ) 8319 - 340 / 60 pe ( a )/ pp 3 . 5 1 . 98 3 . 29 33 (. 11 ) (. 39 ) ( 7 ) 8319 - 440 / 60 pe ( b )/ pp 2 2 . 00 2 . 39 128 (. 10 ) (. 11 ) ( 32 ) 8319 - 540 / 60 pe ( b )/ pp 3 . 5 1 . 99 3 . 98 39 (. 12 ) (. 20 ) ( 4 . 8 ) 8319 - 6pe ( a )/ pp + . 5 % na 2 1 . 96 1 . 85 59 (. 12 ) (. 08 ) ( 18 . 6 ) 8319 - 7pe ( a )/ pp + . 5 % na 3 . 5 1 . 94 3 . 75 35 (. 10 ) (. 17 ) ( 5 . 3 ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ # denotes standard deviation , where n = 10 . pe ( a ) dow aspun ( r ) 6811 , octene1 / ethylene copolymer , mi = 26 pe ( b ) dow aspun ( r ) 6815 , octene1 / ethylene copolymer , mi = 12 pp himont z30s controlled rheology grade polypropylene , mf = 26 na milad 5l7110 nucleating agent . 10 % conc . in lldpe table ii\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_lab top fabric properties of biconstituentbased thermal bond fabrics ( fiber : 40 / 60 pe / pp , 8319 - 2 , 2 \u00d7 draw , table i ) calendersurfacetemperature strip teadata emb . sm . tensile ( in / g / book # f . f . ( g / in ) sd % e in2 ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_8324 - 1 240 244 819 87 11 1162 250 254 1263 55 17 2243 255 259 1811 86 15 3174 260 264 1594 48 19 3025 265 269 1817 185 20 3476 270 274 2058 184 22 4517 275 279 2292 100 23 4848 280 284 2829 141 21 5549 289 285 3571 177 28 82110 294 290 3938 215 27 80411 299 295 3747 355 32 93012 305 300 3360 272 27 686\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ table iii\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ( fiber : 40 / 60 pe / pp , 8319 - 3 , 3 . 5 \u00d7 draw , table i ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_8324 - 13 240 245 469 53 6 4914 245 249 625 42 9 7815 250 254 765 52 9 10016 255 259 977 58 9 12317 260 264 1115 216 10 15318 265 269 1067 185 7 12819 270 274 1351 186 9 16420 275 279 1368 93 8 15821 280 284 1568 147 7 18222 289 285 1868 121 12 24723 294 290 3230 173 11 38124 299 295 4228 181 14 55925 305 300 2704 211 26 644\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ table iv\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ( fiber : hercules t - 185 ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_8324 - 26 270 265 834 29 20 19627 280 275 1611 103 33 57328 290 285 2705 51 73 175729 300 295 2809 361 54 128930 310 305 2136 95 14 232\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ notes : all samples produced at 500 pli , 22 fpm , 18 % bond area table v\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_physical properties of selected staple biconstituents\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ strip tensiles fiber sample fiber calender md \* cd \* identification denier surface \u00b0 f . b . w . loft ( 1 osy ) ( 1 osy ) databook # ( table i ) ( dpf ) e / s ( gsy ) ( mils ) ( g / in ) % e tea ( g / in ) % \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ e tea 78326 - 02 pp fiber 8319 - 1 2 270 / 300 28 . 8 15 . 9 1124 35 164 288 39 788326 - 03 fiber 8319 - 2 , 2 \u00d7 1 . 95 270 / 295 32 . 6 13 . 4 2098 24 415 501 59 2568326 - 04c same as above 1 . 95 300 / 300 31 . 6 13 . 3 1972 14 207 704 40 255\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ elmendorf grab tensiles tear md cd md cd soft . databook # ( lbs ) % e ( lbs ) % e ( g ) ( g ) ( psu ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 8326 - 02 4 . 8 16 2 . 1 33 109 144 1 . 7 8326 - 03 10 . 5 24 4 . 6 58 138 200 0 . 9 8326 - 04c 9 . 2 15 6 . 1 46 72 149 - 0 . 8\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ table vi\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_physical properties of selected staple biconstituents\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ strip tensiles fiber sample fiber calender md \* cd \* identification denier surface \u00b0 f . b . w . loft ( 1 osy ) ( 1 osy ) databook # ( table i ) ( dpf ) e / s ( gsy ) ( mils ) ( g / in ) % e tea ( g / in ) % \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ e tea 18326 - 05 fiber 8319 - 3 1 . 98 270 / 290 30 . 5 12 . 9 1293 29 173 343 43 938326 - 07 fiber 8319 - 6 1 . 93 270 / 290 31 14 . 1 1728 27 262 464 36 131\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ elmendorf grab tensiles tear md cd md cd soft . databook # ( lbs ) % e ( lbs ) % e ( g ) ( g ) ( psu ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 8326 - 05 6 . 1 15 2 . 7 32 122 178 0 . 4 8326 - 07 8 . 2 18 4 40 178 228 0 . 7\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ table vii\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_filament and fabric propertiesof selected multiconstituent fibersfilament fabricproperties ( 1 ) properties ( 2 ) fabric te - tough - teasample nacity elong . ness tensile elong . ( in / g / no . ( 1 ) ( dpf ) ( gpd ) (%) ( gpd ) ( g / in ) (%) in2 ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_8342 - 1 1 . 9 1 . 52 420 4 . 5 2808 74 993std ( 0 . 16 ) ( 61 ) ( 1 . 0 ) ( 251 ) ( 17 ) dev . 8343 - 1 2 . 7 1 . 0 405 2 . 7 3276 30 727std ( 0 . 21 ) ( 124 ) ( 0 . 8 ) ( 377 ) ( 6 ) dev . \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ std dev : n = 10 ( 1 ) 83421 fabric : melt blend fiber composed of 40 : 60 wt % pe : pp 83431 fabric : melt blend fiber composed of 40 : 55 : 5 wt . % pe : pp : eaa ( 2 ) fabric properties normalized to 1 . 0 ounce / yd2 basis weight table viii\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_heat seal peel strengthfor biconstituent - film laminate peel peel strength elongation strengthsample pk load at pk teano . ( g / in ) (%) ( in / g / in2 ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_8350 - 1a 559 24 1758350 - 1b 443 27 86\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ die geometry : 3 / 8 &# 34 ; \u00d7 5 &# 34 ;, flat time : 500 msec temp : top 245 f . ; lower 245 f . pressure : 550 psi table ix\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_pe / pp biconstituent laminates physical properties\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ model 549 lamination strip tensiles ( 2 ) sample description b . w . thick . temp . md cddb # ( 1 ) ( gsy ) ( mils ) ( f .) ( g / in ) % e tea ( g / in ) % \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ e tea 08331 - 1afc bicon ./ ppmb / bicon . 106 11 . 7 318 / 300 9078 15 1306 3940 6 2508331 - 1b &# 34 ; 102 9 . 2 316 / 297 9340 15 1078 4286 8 2668331 - 1c &# 34 ; 90 8 . 5 313 / 294 9508 16 984 3871 8 2118331 - 1d &# 34 ; 93 8 . 6 310 / 290 7963 11 674 4002 6 1948331 - 1e &# 34 ; 89 8 . 3 308 / 287 9189 14 855 4320 8 2248331 - 1f &# 34 ; 96 9 . 2 306 / 284 8440 14 1016 3796 18 3068331 - 04helic . bic ./ ppmb / bic . 86 23 . 6 290 / 294 5863 15 625 3211 17 353\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ elmendorf gurley hydro - tear porosity static mason md cd ( sec ) head jar db # ( g / in ) ( g / in ) ( 20 oz ) ( 5 oz ) ( cm ) ( sec ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 8331 - 1a 360 770 56 275 24 . 1 10 8331 - 1b 325 575 93 & gt ; 5 min . 25 . 6 70 8331 - 1c 290 490 120 & gt ; 5 min . 22 . 5 39 8331 - 1d 260 580 66 & gt ; 5 min . 22 26 8331 - 1e 310 520 65 & gt ; 5 min . 19 . 6 33 8331 - 1f 320 600 29 & gt ; 5 min . 18 . 9 28 8331 - 04 330 460 inst . 7 13 . 2 3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ notes : ( 1 ) fc flat calendered helic . crisscross bond pattern from helical rolls ppmb polypropylene melt blown ( 20 gsm ) bicon . polyethylene / polypropylene biconstituent fiber based fabric 832603 ( 2 ) tensiles corrected to 3 osy unit weight table x\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_physical properties of polyethylene / polypropylenebiconstituent fabric laminates\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ calender unit ( 3 ) grab tensilessample temp . ( 2 ) wt . caliper md el . cd el . no . description ( 1 ) ( f .) ( gsy ) ( mils ) ( lbs ) (%) ( lbs ) (%) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_8333 - 05 bicon / pe film / bicon 252 / 263 76 . 6 28 . 1 22 27 11 . 7 388333 - 06 bicon / pp film / bicon 287 / 288 70 . 9 26 . 4 22 . 7 30 11 . 1 428333 - 04 bicon / pe - mb / bicon 268 / 260 93 . 6 26 . 8 23 . 1 24 10 . 2 348331 - 04 bicon / pp - mb / bicon 290 / 294 86 . 3 27 . 2 25 . 3 25 10 . 8 36\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ( 4 ) elm . gurley ( 5 ) hydro - tear mullen porosity mason static sample md cd burst ( 5 oz ) ( 20 oz ) jar head no . ( g ) ( g ) ( psi ) ( sec ) ( sec ) ( cm ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 8333 - 05 400 540 21 nr 53 . 3 3 . 16 18 . 4 8333 - 06 330 430 19 nr 98 163 23 . 7 8333 - 04 350 400 20 1 . 57 nr inst . 16 . 1 8331 - 04 320 380 19 7 . 1 nr 3 13 . 2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ notes : all pe is 1octene , linear low density polyethylene , unless otherwise stated ( 1 ) bicon -- biconstituent fiberbased fabric ( 832604 carded thermalbond , 40 : 60 , pe : pp ), 1 osy pe film -- low density polyethylene film obtained from edison plastic , 1 mil . ppfilm -- polypropylene film obtained from edison plastic , 1 mil pemb -- polyethylene meltblown fabric , 20 gsm ( 2 ) calender -- helical steel / helical steel , nip pressure = 350 pli , line speed = 12 . 5 fpm ( 3 ) fabric caliper measured using a 551m caliper tester ( 4 ) nr -- no reading , process either too fast or too slow for accurate measurement ( 5 ) inst -- instantaneous"}

{"publication\_number": "US-4618512-A", "abstract": "synthetic - cellulosic blended fabric is padded with a solution of nitrogen rich n - methylol crosslinking agent , acid catalyst , antimony oxide and a halogen containing alcohol ; dried at about 140 \u00b0- 190 \u00b0 f . and then cured at about 250 \u00b0- 400 \u00b0 f . for sufficient time to impart smooth - dry and flame retardant properties to the fabric . aqueous polyethylene or silicone emulsion softeners can be added to the padding solution if desired . dibromoneopentyl glycol makes an exemplary halogen containing alcohol . the process can be varied to first pad with antimony oxide , dry , and then repad with a solution of : nitrogen rich n - methylol crosslinking agent , acid catalyst , and a halogen containing alcohol , dry again and cure , at the above specified temperatures .", "application\_number": "US-74990585-A", "description": "in order to produce flame retardant cellulose - blend fabrics with smooth dry properties , a finish which contains crosslinking agents or combination of crosslinking agents , a halogenated alcohol or polyol which is co - reactive with crosslinking agents , antimony oxide and auxiliaries such as softeners , catalysts for solvents is used . the role of these crosslinking agents is fourfold . first , the crosslinking agent reacts with the cellulose compound in the blended fabric to impart required resiliency . second , it functions as a binding agent to help in the retention of antimony oxide used in the finish . third , it reacts chemically with the halogenated alcohol used in this finish to bind the alcohol into the cotton substrate and finally it imparts nitrogen to the fabric , thus increasing overall flame resistance . from a chemical point of view , the unique characteristic of this finish is the interaction between the cellulose fiber , crosslinking agent and halogenated alcohol to produce a chemical matrix in which all three components are chemically bound together . in this finish it is advantageous to use agents such as dimethylol dihydroxyethyleneurea ( dmdheu ), trimethylol melamine ( tmm ) or trimethylol acetylenediureine ( macd ) because they possess several reactive sites . the methylolmelamines and methylolacetylenediureine ( macd ) possess added nitrogen content . representative structures of these agents are listed . ## str1 ## the second major component in this finish is the halogenated alcohol . the specific compound selected for this purpose was dibromoneopentyl glycol ( dbg ). this material contains two bromine atoms and two reactive alcohol sites and only five carbon atoms . as such , it contains 61 % bromine . ## str2 ## the reaction between the cellulose components in the blended fabric crosslinking agent , and alcohol ( roh ) can be represented in the following manner recognizing that a given crosslinking reaction can occur at any two of the reaction sites . ## str3 ## the third major component in the finish is antimony oxide . its retention on a blended fabric is achieved primarily by means of the trapping and polymer forming action of the crosslinking agent . also included in some of the finishes are softeners such as polyethylene or silicone , but these materials do not appear to make a significant difference in overall antimony retention after one or 25 launderings , although polyethylene should be beneficial for this purpose . some comments should be made as to the mode of effectiveness of this finish . first , to be a useful fr - dp finish , the chemical agents used to produce desired properties must be retained through a number of launderings . in the preferred embodiment the properties after 25 launderings are reported because this demonstrates performance after what would be extended usage . properties focused on are retention of elements that impart flame retardancy such as halogen , antimony and nitrogen contents , tests designed to show flame retardancy such as oxygen index ( oi ) or standard vertical flame test and measurement of smooth dry performance such as dp rating . in the case of oxygen index ( oi ), untreated cellulose - blended fabrics have an oi of 0 . 18 . flame retardant treatments increase the oxygen index and it is generally recognized oi of 0 . 25 or higher is required if a fabric is to pass a standard vertical flame test . this latter test is a test used to measure whether or not a fabric is flame retardant . while an untreated cellulose - blend will be consumed entirely once ignited , a fr fabric must self - extinguish with a char length of not more than five inches if it is to be deemed flame retardant . in the case of dp ratings , untreated cellulose have dp ratings of 1 . 0 usually and increasing smooth dry ratings up to 5 . 0 reflect increasing fabric smoothness . while most commercial fabrics with only dp finishes approach a rating of 4 . 0 , with a combination finish which would have a heavy chemical loading , a rating of 3 . 0 or higher would be deemed commercially acceptable . in this invention , it is necessary to apply a chemical finish to a cellulose - containing substrate ( fabric ), dry and cure said fabric and wash to remove unreacted reagents . in the examples given in this application , both one step and two step treatments are reported . the two step treatments were developed because with certain combinations of reagents , particularly in cases in which high levels of antimony oxide are employed , an instability arose because of interaction of reagents . in these cases the particular sequence employed with this invention is to pad the fabric first with an aqueous dispersion containing antimony oxide and a softener ( optional ingredient in treatment , examples of softeners were polyethylene and silicones ). subsequent to padding , the fabric is padded with a solution containing crosslinking agent or agents , catalyst and dibromoneopentylglycol . because the glycol is only soluble in water to a limited extent , it is necessary to use a solvent system containing equal amounts of ethanol - water . other solvent systems could likewise be used as long as said systems would dissolve required chemical reagents . while this particular invention is found to be most effective with the dibromoneopentyl glycol , other halogen - containing alcohols could likewise be used in this system . the major advantages of this process over others based on halogen and antimony are twofold . first , no large quantity of surface polymers are required because all agents are nonpolymeric compounds , which should have good penetration into the synthetic blended cellulose . as such , this finish should avoid long term stiffness associated with many antimony - halogen finishes . second , the halogenated compound being bound via a covalent chemical bond to the cellulose - containing substrate should possess better retention characteristics than that exhibited by distinct halogen compounds which are merely adsorbed or trapped on the synthetic blended cellulosic surface . the utility of this invention is described in the following examples : a pad bath ( bath a ) was prepared that contained 10 % antimony oxide ( colloidal ), 0 . 1 % wetting agent ( ethoxylated alcohol ) and the remainder water . a 50 % cotton - 50 % polyester blend lacoste knit was padded with pad bath a . the fabrics were then dried for 7 minutes at 140 \u00b0 f . a second formulation ( bath d ) was prepared that contained 10 % trimethylol melamine , 7 % dimethylol dihydroxyethyleneurea , 20 % dibromoneopentyl glycol , 0 . 8 % zinc nitrate hexahydrate and 0 . 1 % wetting agent ( ethoxylated alcohol ) dissolved in equal portions of alcohol - water . the fabric from the first step ( antimony oxide treatment ) was then padded in this formulation , dried for 7 minutes at 140 \u00b0 f ., and cured for 4 minutes at 320 \u00b0 f . the fabric was then laundered 25 times and tested for various properties . the results , as given in table i show that the blend fabrics possessed acceptable smooth dry and flame retardant characteristics after 25 launderings . a pad bath ( bath b ) was prepared that contained 10 % antimony oxide ( colloidal ), 0 . 5 % polyethylene softener , and 0 . 1 % wetting agent ( ethoxylated alcohol ) and the remainder water . the aqueous polyethylene emulsion softener used in this formulation was velvetol oe , produced by quaker chemical , conshohocken , pa . a 50 % cotton - 50 % polyester blend lacoste knit was padded with pad bath b . the fabric was then dried for 7 minutes at 140 \u00b0 f . then the fabric was padded with pad bath d as in example 1 , then dried , cured , and laundered as in example 1 . tests results for the various properties of this fabric are given in table i . the results show that satisfactory fr - dp blend fabric durable to laundering was prepared by this process . a pad bath ( bath c ) was prepared that contained 10 % antimony oxide ( colloidal ), 1 . 0 % silicone softener , 0 . 1 % wetting agent ( ethoxylated alcohol ) and the remainder water . the aqueous based silicone softener used in this formulation was dow corning 1111 , produced by dow corning corp ., midland , mich . a 50 % cotton - 50 % polyester blend lactose knit was padded with bath c . the fabric was dried for 7 minutes at 140 \u00b0 f . then , the fabric was padded with bath d as in example 1 , and then dried , cured , and laundered 25 times as in example 1 . test values for various properties of fabric are given in table i . these results show that this process produces a blend fabric with acceptable smooth dry and flame retardant characteristics after 25 launderings . a 50 % cotton - 50 % polyester blend lacoste knit was padded with pad bath a ( from example 1 ). the fabric was then dried for 7 minutes at 140 \u00b0 f . a second formulation ( bath e ) was prepared that contained 8 % trimethylol melamine , 7 % dimethylol dihydroxyethyleneurea , 20 % dibromoneopentyl glycol , 0 . 7 % zinc nitrate hexahydrate , and 0 . 1 % wetting agent ( ethoxylated alcohol ) dissolved in solvent prepared from equal quantities of ethanol and water . the fabrics from the first step ( antimony oxide treatment ) were then padded with pad bath e , dried for 7 minutes at 140 \u00b0 f ., and cured for 4 minutes at 320 \u00b0 f . this fabric was then laundered 25 times and tested for various properties . the results , as given in table i show the blend fabric possessed acceptable smooth dry and flame retardant characteristics after 25 launderings . a 50 % cotton - 50 % polyester blend lacoste knit was padded with pad bath b ( as in example 2 ). the fabric was dried for 7 minutes at 140 \u00b0 f . then the fabric was padded with pad bath e as in example 4 , then dried , cured , and laundered as in example 4 . test data for the various properties of this fabric are given in table i . the results show that acceptable fr - dp blend fabric durable to laundering was prepared by this process . a 50 % cellulosic - 50 % polyester blend lacoste knit was padded with bath c as in example 3 . this fabric was then dried for 7 minutes at 140 \u00b0 f . then , the fabric was padded with bath e as in example 4 , and then dried , cured , and laundered 25 times as in example 4 . tests for various properties of these fabrics are given in table i . these results show that this process produced blend fabric with acceptable smooth dry and flame retardant characteristics after 25 launderings . a padding solution was prepared that contained 10 % dimethylol dihydroxyethyleneurea , 10 % dimethylol dihydroxyethyleneurea , 10 % trimethylol melamine , 0 . 9 % zinc nitrate hexahydrate , 5 % antimony oxide , 20 % dibromoneopentyl glycol and 0 . 1 % wetting agent dissolved in equal portions of alcohol - water to make 100 %. a series of cotton - glass fiber plain jersey blends and a 100 % cotton control were padded with this formulation , dried 5 min at 175 \u00b0 f . and cured for 4 min at 320 \u00b0 c . the fabrics were then laundered and line dried . the glass fiber - cotton fabrics were core yarn fabrics in which the cores were 100 d , 198 d and 298 d glass fiber so that the overall blend levels contained 14 %, 27 % and 38 % glass fiber after line drying , the blend fabrics had dp ratings of 4 . 1 and oxygen index valves of 43 . 5 , 39 . 9 and 44 . 7 respectively . by comparison , cotton fabric with this same treatment had an o . i . of 36 . 9 . these results demonstrate that smooth - dry , flame retardant cotton - glass fiber fabrics were produced using this finishing system . moreover , the higher o . i . values of the blends shows that use of a flame retardant synthetic contributes to the level of flame retardancy of the blend after finishing . table i\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_properties of fabrics finished with smoothdry and flame retardant finish after 25 launderings vert flame test % % % examplefabric dp rating char length , in . oi br sb n\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_1 50 % cotton - 3 . 4 3 . 29 . 254 3 . 74 1 . 80 2 . 9150 % polyesterlacoste knit2 50 % cotton - 3 . 7 3 . 38 . 260 3 . 68 1 . 77 3 . 0150 % polyesterlacoste knit3 50 % cotton - 4 . 0 3 . 50 . 268 3 . 23 2 . 01 2 . 9050 % polyesterlacoste knit4 50 % cotton - 3 . 5 3 . 21 . 247 3 . 55 2 . 24 2 . 6050 % polyesterlacoste knit5 50 % cotton - 3 . 8 4 . 88 . 258 3 . 38 1 . 73 2 . 6450 % polyesterlacoste knit6 50 % cotton - 4 . 0 4 . 38 . 245 2 . 93 2 . 29 2 . 4850 % polyesterlacoste knit\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_"}

{"publication\_number": "US-8336144-B2", "abstract": "a method of washing fabric articles in a tunnel washer includes moving the fabric articles from the intake of the washer to the discharge of the washer through first and second sectors that are a pre - wash zone . in the pre - wash zone , liquid is counter flowed in the wash interior along a flow path that is generally opposite the direction of travel of the fabric articles . the fabric articles are transferred to a main wash zone , and a washing chemical is added to the main wash zone . at about the same time , counter flow is reduced or stopped . the main wash zone can be heated as an option . after a period of time counter flow is resumed or increased . in the wash zone , this is considered an intermediate rinse . after the wash zone , the increased counter flow after chemical treatment amounts to a pre - rinse . this pre - rinse ensures that the fabric articles are substantially free of soil or the majority of any soil and substantially free of chemicals when they are transferred to an extractor for final removal of excess water . a final rinse is conducted during extraction of excess water .", "application\_number": "US-201113052898-A", "description": "fig1 - 3 shows a schematic diagram of the textile washing apparatus of the present invention , designated generally by the numeral 10 . textile washing apparatus 10 provides a tunnel washer 11 having an inlet end portion 12 and an outlet end portion 13 . in fig1 , tunnel washer 11 provides a number of modules 14 - 18 . these modules 14 - 18 can include a first module 14 and a second module 15 which can be pre - wash modules . the plurality of modules 14 - 18 can also include modules 16 , 17 and 18 which are main wash and pre - rinse modules . the total number of modules 14 - 18 can be more or less than the five ( 5 ) shown in fig1 . fig2 shows an alternate arrangement that employs a tunnel washer 11 having eight ( 8 ) modules 14 - 18 and 35 - 37 . fig3 shows an alternate arrangement that employs a tunnel washer 11 having ten ( 10 ) modules 14 - 18 and 35 - 39 . in fig2 , the modules 14 , 15 can be pre - wash modules . in fig3 , modules 14 , 15 , 16 can be pre - wash modules . in fig2 , the modules 16 , 17 , 18 and 35 , 36 , 37 can be main wash and pre - rinse modules . in fig3 , the modules 17 , 18 and 35 , 36 , 37 , 38 , 39 can be main wash and pre - rinse modules . instead of a two ( 2 ) or three ( 3 ) module pre - wash section ( see fig1 , 2 , 3 ), a single module 14 could be provided as an alternate option for the pre - wash section . inlet end portion 12 can provide a hopper 19 that enables the intake of textiles or fabric articles to be washed . such fabric articles , textiles , goods to be washed can include clothing , linens , towels , and the like . an extractor 20 is positioned next to the outlet end portion 13 of tunnel washer 11 . flow lines 21 , 25 , 26 , 27 , 27 a are provided for adding water and / or chemicals to tunnel washer 11 as will be described more fully hereinafter . when the fabric articles , goods , linens are initially transferred into the main wash modules 16 , 17 , 18 , a counter flow of wash liquor into these modules 16 , 17 , 18 is reduced , preferably stopped allowing for a standing bath . chemicals are then added as indicated by arrows 26 , 27 to the modules 16 , 17 and / or 18 . in fig2 , chemicals are added as indicated by arrows 26 , 27 , 27 a to the modules 16 , 17 , 18 , 35 , 36 and / or 37 . in fig3 , chemicals are added to the modules 16 - 18 and 35 - 39 as indicated by the arrows 26 , 27 , 27 a . in fig1 - 3 , these chemicals separate the soil from the goods , linens , textiles and suspend the soil in the wash liquor . during this step of the method of the present invention , the wash liquor temperature can be elevated if needed to facilitate the release of soil from the goods , fabric articles or linens and activate the chemicals . once the maximum soil has been released from the textiles or fabric articles , there is no more work for the chemicals to perform . at this time , the process can be described as chemical equilibrium . the flow of water is stopped for a time period sufficient to release soil from the goods such as for example between about 20 seconds and one hundred twenty ( 120 ) seconds . however , this time interval can be between about ten ( 10 ) and three hundred ( 300 ) seconds . after this time interval of having no counter flow , water by counter flow is commenced to remove the suspended soil . this rinsing can be termed pre - rinse . a final rinse is then performed in a centrifugal extractor or mechanical press 20 . the process of the present invention uses fresh water that can be supplied through an atomizing nozzle for example while the goods are being extracted using the extractor 20 . the process of the present invention uses fresh water in the extractor that can be supplied through an atomizing nozzle for example while the goods are being extracted at high speed ( e . g . between about 200 and 1 , 000 g &# 39 ; s ) using the extractor 20 . flow line 21 transmits water to hopper 19 as indicated by arrow 22 . flow line 21 also carries water to pre - wash module 15 as indicated by arrow 23 . arrow 24 indicates a flow of water from module 14 to module 15 as part of the pre - wash . in fig1 , flow line 25 adds water for counter flow pre - rinse to module 18 . such water added via flow line 25 to module 18 flows in counter flow fashion from module 18 to module 17 to module 16 ( see arrow 25 a ). arrows 26 and indicate chemical addition to modules 16 and 17 respectively . chemicals to be added to modules 16 and 17 can include for example detergent , alkalaii , and / or oxidizing agents . in fig2 , flow line 25 adds water for counter flow pre - rinse to module 37 . such water added via flow line 25 to module 37 flows in counter flow fashion from module 38 to module 37 , then 36 , then 35 , then 18 , then to module 17 ( see arrow 25 b ). in fig3 , flow line 25 adds water for counter flow pre - rinse to module 38 . such water added via flow line 25 to module 38 flows in counter flow fashion from module 38 to module 37 , module 36 , module 35 , module 18 , and module ( see arrow 25 c ). in fig1 , textiles or fabric articles that are pre - washed , washed , and then pre - rinsed in tunnel washer 11 are transferred from module 18 to extractor 20 as indicated schematically by arrow 28 . in fig2 , the textiles or fabric articles that are pre - washed , washed , and then pre - rinsed in tunnel washer 11 are transferred from module 37 to extractor 20 as indicated schematically by arrow 28 . in fig3 , textiles or fabric articles that are pre - washed , washed , intermediately rinsed and then pre - rinsed in tunnel washer 11 are transferred from module 39 to extractor 20 as indicated schematically by arrow 28 . the method of the present invention thus conducts rinsing in two zones . rinsing is first conducted in the tunnel washer 11 in a pre - rinse zone which occurs after the main wash . in fig1 , pre - wash zones can be 14 , 5 . the pre - rinse zone and main wash zone can be modules 16 , 17 , 18 . in fig2 , the pre - wash zone can be modules 14 and 15 while the main wash and pre - rinse zones can be modules 16 , 17 , 18 , 35 , 36 and 37 . in fig3 , the pre - wash zone can be modules 14 and 15 while the main wash and pre - rinse zones can be modules 16 , 17 , 18 , 35 , 36 , 37 , 38 and 39 . the second rinse zone is the final rinse , which is conducted in the extractor 20 or other mechanical water removal machine such as a mechanical press . because the free soil has already been removed in the pre - rinse zone at modules 16 , 17 , 18 of fig1 ( or 16 - 18 , 35 - 37 of fig2 or 16 - 18 , 35 - 39 of fig3 ) as part of the method of the present invention , the spray rinse while extracting will not redeposit soil on the linen thereby reducing or eliminating graying of the goods . with the present invention it is not necessary to centrifuge ( and drain at a low speed ) the soil laden water before the final extract at 20 . with the present invention , the process time is thus reduced . the amount of fresh water required compared with conventional processes is reduced . the spray rinse and the centrifugal extractor 20 or mechanical press is more effective than the current practice of draining the free water from the linen and then refilling the extractor 20 . an additional benefit of the pre - rinse concept of the present invention is to permit the mechanical press or extractor to have more time extracting the free water . this result follows because the effect of the pre - rinse is to remove most of the suspended soil . the amount of fresh water required for final rinse is thus greatly reduced . the time for rinsing is reduced , allowing this saved cycle time for water removal . the method of the present invention preserves the washing effectiveness of current counter flow washers 11 to wash heavy soil classifications because the amount of soil dilution is the same even though there are fewer zones or stages or modules . the present invention provides a higher effective rinsing provided by the spray rinse 30 and the centrifugal extractor 20 because of the pre - rinse that is conducted in the modules 16 , 17 , 18 as discussed above . fig4 - 10 show an alternate embodiment of the apparatus of the present invention , designated generally by the numeral 40 . the textile washing apparatus 40 of the alternate embodiment can provide the same tunnel washer 11 of the preferred embodiment having the modules 14 - 18 , 35 - 39 provided in any one of the embodiments of fig1 , 2 or 3 . fig4 shows the embodiment of fig1 having a specially configured starch spray arrangement . in fig4 , a starch tank 41 contains starch that is to be injected into the linen , fabric articles , or clothing contained in extractor 20 . starch for the table linen , clothing , fabric articles is pumped in the first phase of the cycle through a spray nozzle 60 ( see fig8 - 10 ). controlled flow metering can be achieved for example using an inverter controlled flow metering device . the precise amount of starch is thus injected into the linen , fabric articles , clothing or the like while in extractor 20 . excess starch can be removed in a separate tank indicated as starch recovery tank 52 in fig4 . flow line 53 enables recovered starch in tank 52 to be transferred to starch tank 41 . starch tank 41 contains starch that is to be pumped via flow line 42 to nozzle 60 and then to extractor 20 . fresh water tank 43 can also be used to pipe fresh water to extractor 20 , flowing through valve 45 to nozzle 60 . valves 44 , 45 and 46 are provided for controlling the flow of either starch or fresh water or a combination thereof to nozzle 60 as shown in fig4 . flow line 49 is a flow line that carries extracted water to tank 51 as it is purged from the fabric articles , clothing or linens contained in extractor 20 . starch can be recovered via flow lines 49 , 50 to starch recovery tank 52 . valves 44 , 47 are provided for valving the flow of starch from tank 41 to extractor 20 via flow line 42 . valve 48 enables tank 41 to be emptied for cleaning or adding new starch . in fig8 - 10 , starch spray nozzle 60 is shown in more detail . the spray nozzle 60 can provide an elongated section of conduit or pipe 61 . spray nozzle 60 has an influent end 62 and a discharge end portion 63 . conduit 61 provides an open ended bore 64 for conveying starch from flow line 42 to nozzle 60 . influent end 62 provides a connection 80 for attaching conduit 61 to flow line 42 . fig5 - 7 illustrate the spray pattern 76 that strikes the wall of drum 57 of extractor 20 as emitted by nozzle 60 . in fig6 and 7 , extractor 20 provides a drum 57 that provides a chamber 55 having an inlet 56 . clothes , textiles , linens to be sprayed are discharged from tunnel washer 11 via chute 79 into the chamber 55 of extractor 20 . the extractor 20 is preferably movable between a loading and discharging position . the loading position is shown in fig5 and 6 . in the loading position , clothes transfer from the tunnel washer 11 to the chamber 55 via chute 79 . pumps 54 can be used to aid in the transfer of water from tank 43 or starch from tank 41 into chamber 55 via nozzle 60 . the spray nozzle 60 produces a spray pattern 76 that extends substantially across the cylindrical wall 58 of drum 57 as shown in fig6 and 7 . drum 57 thus provides an inlet 56 for enabling clothing , textiles , or other fabric articles to be added to the drum 57 interior 55 and a rear circular wall 59 . notice in fig6 and 7 that the spray pattern 76 extends generally from inlet 56 to circular wall 59 , thus extending substantially across cylindric wall 58 as shown in fig6 and 7 . arrow 77 in fig7 illustrates the width of spray pattern 76 which can be about 16 degrees as an example along cylindrical drum wall 58 . a mounting plate 65 can be provided having one or more openings 66 for attaching ( for example , bolting ) spray nozzle 60 to extractor 20 or to a frame that supports extractor 20 . the discharge end portion 63 of spray nozzle 60 provides a nozzle tip 67 . the nozzle tip 67 provides a nozzle outlet 70 formed by side plates 71 , 72 , upper plate 73 and lower plate 74 . atomizing water nozzle 68 , 69 are provided next to nozzle outlet 70 . the atomizing water nozzle 68 is mounted to upper plate 73 . the atomizing water nozzle 69 is mounted to lower plate 74 as shown in fig8 - 10 . spray nozzle 60 can be equipped with aerating or atomizing nozzles 68 , 69 to control the consistency of the starch in the nozzle 60 , thus preventing starch build - up which might eventually plug of the nozzle 60 . as part of the method of the present invention , all starch flow lines 42 , 60 can be purged with hot water from fresh water tank via flow line 75 . the following is a list of parts and materials suitable for use in the present invention . all measurements disclosed herein are at standard temperature and pressure , at sea level on earth , unless indicated otherwise . all materials used or intended to be used in a human being are biocompatible , unless indicated otherwise . the foregoing embodiments are presented by way of example only ; the scope of the present invention is to be limited only by the following claims ."}

{"publication\_number": "US-4448046-A", "abstract": "in an electromagnetically operated , jacquard control arrangement , each controllable element is provided with an electromagnet cooperating with an anchor . an actuating current switch can energize the electromagnet arrangement . a swingably mounted control element provides a movable contact point on a lever arm for moving controllable elements . a swingable synchronization arrangement is driven back and forth by a continually rotating main shaft which can also turn the control element in one direction over a predetermined working angle . a return spring , in dependence upon the activation condition of the electromagnet , can swing back the control element . at the beginning of each working cycle the anchor is positioned proximate the poles of the electromagnet . the anchor is attached to the control element . the anchor of the control element may be carried by the synchronization arrangement . the switching arrangement is provided with a timing device which maintains the activation of the electromagnet commencing at the beginning of a work cycle over the major portion of the work cycle .", "application\_number": "US-44595082-A", "description": "referring to fig1 and 3 , an electromagnetically controlled jacquard arrangement has a common shaft 1 whose ends are journalled in housing walls 2 and 3 ( fig3 ). a synchronization means 4 is non - rotatably mounted to shaft 1 , final control elements 5 being rotatably mounted on the shaft . synchronization arrangement 4 comprises a contact rod 6 mounted parallel to the axis of shaft 1 to act as a coupling element . the ends of rod 6 are perpendicularly connected to said shaft 1 via lever arms 7 and 8 ( fig1 and 3 ). arms 7 and 8 are affixed by keying or otherwise to shaft 1 on opposite sides of control elements 5 . arms 7 and 8 are plate - like levers each having a dog - leg to the right , as viewed in fig1 . on the outside of wall 2 , keyed to the end of shaft 1 is lever arm 9 formed from a plate having a tear - shaped plan ( i . e . tapered with a rounded free end ). its outer free end is pivotably connected to one end of push rod 10 whose other end runs in a cam track 11 on cam plate 12 which is connected to main shaft 14 , both continually rotating in the direction of arrow 13 . cam track 11 comprises a constant displacement sector a , a falling transition sector b , a longer constant displacement sector c and a final rising transition sector d . as a consequence the synchronization arrangement 4 is angularly reciprocated between the positions shown in full line and phantom through angle \u03b1 . lever 9 and shaft 1 rock through angle \u03b1 in synchronism with the rotation of main shaft 14 . each of the control members 5 comprises lever arm 15 rotatably mounted on and extending radially from shaft 1 . the outer end of lever 15 terminates in a pair of generally transverse fingers forming a contact location 16 for operating controlled element 17 . the element 17 moves from the full - line position to that indicated by the phantom lines when lever 15 of control element 5 moves into the position indicated in fig2 . in the illustrated embodiment , element 17 is shown as a dropper peg , one of many parallel pegs , used to affect the operation of a thread guide ( not shown ) in a conventional manner . one such arrangement is described in u . s . pat . no . 4 , 285 , 217 . dropper peg 17 is slidably held in an aperture in the lower shelf of a double - shelf peg bar 18 . the upper end of peg 17 is connected to contact location 16 via a harness cord 19 . the controllable element 17 is biased downwardly by compression spring 20 which at the same time operates as a return spring for control element 5 . helical spring 20 spans the upper end of peg 17 and the inside surface of the upper shelf of peg bar 18 , encircling harness cord 19 . cord 19 emerges through an aperture atop bar 18 . bar 18 runs parallel to the thread guide bar ( not shown ) and carries a plurality of pegs , springs and cords ; the pegs comprising an independent set of controlled members for influencing the manner in which thread is layed . as described further hereinafter a corresponding control element , such as element 5 , is provided for each peg 17 . extending at an acute angle with respect to lever 15 on control element 5 is a substantially radially extending coupling arm 21 on which magnetically permeable anchor 22 of electromagnet 23 is attached with a certain measure of play . for this purpose , the anchor has a c - shaped cross - section allowing it to embrace loosely , coupling arm 21 . a plug 24 perpendicularly and centrally affixed to arm 21 is loosely journalled through a central aperture in anchor 22 , plug 24 terminating in a head beyond anchor 22 to loosely secure it . anchor 22 is positioned substantially half - way between the axis of rotation 1 of control member 5 and the contact point of arm 21 with synchronization bar 6 . in this respect it is desirable to attach anchor 22 on coupling arm 21 between the swinging axis of shaft 1 and the contact point of synchronization element 6 so that a mechanical advantage is obtained . therefore resetting springs 20 may be comparatively weak and still will be able to pull anchor 22 back against the residual forces , after cessation of the activation of electromagnet 23 . this also leads to a more compact construction form . it is advantageous to permit anchor 22 some mechanical play at its mounting on final control element 5 . in particular , one is concerned about the turning and sliding play . this play provides anchor 22 with a certain mobility relative to final control member 5 wherein construction tolerances can be compensated out . electromagnet 23 has a coil 26 magnetically coupled to poles 25 whose outer ends may be considered a pair of potential terminals of a magnetic circuit . accordingly , magnetically permeable members , such as anchor 22 , brought next to poles 25 can be held thereby . in the full - line position of synchronization arrangement 4 , ( fig1 ) synchronization bar 6 brings anchor 22 substantially in front of poles 25 of the electromagnet . if coil 26 carries sufficient magnetizing current , anchor 22 , and thus control element 5 , will be held in the illustrated position during a working cycle even if synchronization arrangement 4 moves back into the position illustrated in phantom in fig1 . if there is no activating current , the force of the return spring 20 will cause control element 5 to remain in contact with synchronization bar 6 and move with it into the position illustrated in fig2 . since in the foregoing construction anchor 22 is unified with final control element 5 , fewer parts are needed . furthermore , no extraordinary finishing tolerance between anchor 22 and control element 5 need be considered . both features lead to a structural economy of the arrangement . since cooperative action between anchor 22 and a striking surface is no longer required , this segment can no longer be the subject of abrasion or responsible for generation of noise . furthermore , the abrasion on the coupling point between synchronization rod 6 and control arm 21 as well as the noise produced due to impact therebetween is substantially reduced since elements for setting control element 5 only come in contact with the control element preferably when it is held fast by the anchor at the reversal point of its movement . the unity of construction of anchor 22 and final control element 5 is possible because the control element is not held fast mechanically by the anchor but rather electrically in consequence of the relatively long activation time of electromagnet 23 , provided in a manner described hereinafter . a current source is applied to terminals u which have serially connected between them coil 26 and the switching contacts of control switch 27 . switch 27 can be a relay , semiconductor switch or other device which closes in response to a high signal being applied to its input line s1 . by means of activation current switch 27 , electromagnet 23 can be brought into circuit with current source u . switching arrangement 27 is preferably electronically equipped and is displaced into the operative position by means of activating signal s1 . signal s1 is taken from the output of and gate 28 whose inputs comprise a switching signal s2 and , at another input , cycle signal s3 . the switching signal s2 is provided at the output of a holding means 29 which may be a latch or other storage device for holding pattern signals . storage device 29 may have a plurality of output lines ( one such line illustrated herein ) cooperating with a plurality of and gates , such as gate 28 . it will be appreciated that these gates control a plurality of electromagnetic devices such as : switch 27 , electromagnet 23 and anchor 22 . the pattern signals stored by device 29 are derived from control signal s4 from program device 30 via a storage loading arrangement 31 when the latter receives the corresponding loading signal s5 . program device 30 may be a memory device already provided with the pattern to be produced by the jacquard arrangement . loading arrangement 31 can be an appropriate processor for sequentially addressing device 30 and loading its data into storage device 29 sequentially . for the formation of the cycle signal s3 , there is provided a proximity sensor 32 which may be magnetically influenced by a projection on trigger disc 33 affixed to and rotating with main shaft 14 . cycle signal s3 is generated over the major circumferential portion e and is suppressed during the smaller circumferential portion f . in the switching member 34 , the falling edge ( fig4 ) of cycle signal s3 provides a loading signal in the form of a relatively short pulse , after a small delay . in one embodiment switching member 34 can be a delay circuit capacitively coupled to a one - shot multivibrator , although other circuit arrangements are possible . referring to fig3 it illustrates that the setting members 5 comprise a plurality of parallel , coaxial discs which are separated from each other by annular separators 35 . there is further shown in a row , a plurality of electromagnets 23 , 23 &# 39 ; and 23 &# 34 ; to each of which is provided a switching means 36 comprising a group of switching arrangements 27 , 27 &# 39 ; and 27 &# 34 ;. the individual switching arrangements are actuated by signals s1 , s1 &# 39 ;, and s1 &# 34 ;. switched contacts of switches 27 , 27 &# 39 ; and 27 &# 34 ; are serially connected with electromagnets 23 , 23 &# 39 ; and 23 &# 34 ;, respectively , across potential u . it will be understood that in practical embodiments the apparatus of fig3 will have more than three control elements 5 . in operation , main shaft 14 ( fig1 ) rotates once for each working cycle . such a working cycle may be considered through the time diagram of fig4 in which the modes of operation will be perceived presently . the diagram comprises an entire working cycle wherein the starting point is shown at time point t o . prior to time t o during the active portion of the previous cycle , push rod 10 travels constant - displacement track c so that arm 8 and rod 6 are in the positions illustrated in phantom in fig1 at which position they have no effect on whether control element 5 approaches near or reaches electromagnet 23 . in this prior cycle , before time t 1 , control element 5 may be positioned as shown either in fig1 or fig2 . in this preferred embodiment , cycle signal generator 32 , which generates cycle signal s 3 from the beginning of the previous work cycle , provides shortly before its end at time t 1 , a low signal . this low signal is applied to one input of and gate 28 causing it to produce a low signal for at least the length of interruption 37 . thus signal s 3 insures that independently of the working speed of the control arrangement , switch 27 is open so that although electromagnet 23 can , if desired , be activated for a sufficiently long time , almost to the end of the working cycle , nevertheless an interruption of the magnetizing current does occur so that at the commencement of a new working cycle a new decision may be made to retain or free anchor 22 . in the event that at time t 1 anchor 22 was not yet released from electromagnet 23 , the interruption of current positively releases anchor 22 . accordingly , spring 20 drives cord 19 and lever arm 15 downwardly , resulting in the released condition of fig2 . next , sector d of cam plate 12 commences so that angle \u03b1 increases as shown during interruption interval 37 of fig4 . the cycle signal s3 generated by the generator 32 terminates shortly before the end of the prior work cycle at time point t 1 , recommencing at time t o . in the thus formed cycle signal pause 37 , the falling edge of cycle signal s3 triggers switching member 34 to produce eventually , loading signal s5 . in consequence thereof , processor 31 calls from program means 30 the latest control signals s4 and delivers them to storage member 29 which holds these value to generate switching signal s2 . where this has a value 1 the actuating signal s1 is generated with value 1 prior to time point t o . on the other hand , if the switching signal s2 has the value 0 as is shown in phantom in fig4 the actuating signal s1 has value 0 . the control signals of the program indicate the desired patterning . the storage time of the storage element 29 may be chosen as desired so that the activation of the electromagnets 23 is maintained for a sufficient amount of time . it is advantageous to use storage charging arrangements in which a new control signal is provided to the storage member 24 during the cycle signal breaks 37 . this means that the activating signal depends upon the end of the cycle signal of the old switching signal and the beginning of the new cycle signal of the new switching signal . thus it is possible to readily reload the storage element 29 . it is particularly advantageous to employ the falling edge of the cycle signal s 3 , if desired , under the interposition of the timing means , for the control of the storage charging arrangement . a linking switch 28 in the presence of a switching signal s 2 during the presence of the cycle signal s 3 gives an activating signal s 1 to the activating current switching arrangement 27 . in particular , the linkage switch is an and gate into whose inputs the switching signal s 2 and the cycle signal s 3 are led and from whose output the activation signal s 1 is given . it is particularly advantageous to cause synchronization arrangement 4 to be driven by cam plate 12 ( which comprises a constant path section a between an increasing d and a decreasing b path section ) so that anchor 22 is brought against pole 25 of electromagnet 23 by the beginning t o of the new work cycle and is held there for a predetermined waiting period . if electromagnet 23 is activated during this time , then control element 5 is held fast . on the other hand , if the electromagnet is not activated then the control element is eventually freed . the displacements of segment a through d of cam track 11 determines the swing angle of the synchronization arrangement 4 . the path segments have a defined position with respect to cycle signal s 3 since cam 12 and trigger disc 33 are both mounted on the same shaft 14 . during the constant path segment a , the entire arrangement takes up the position shown in the fully aligned position shown in fig1 . where the actuating signal s 1 has a value of 1 at the beginning of the working cycle , anchor 22 is held fast to electromagnet 23 even when the synchronization arrangement is in the phantom position of fig1 . on the other hand , if , at this point in time , electromagnet 23 is not activated , control element 5 will move with the synchronization arrangement into the position shown in fig2 . in a practical embodiment it has been proposed that the constant path portion a may have a length of 40 \u00b0, the constant path segment c , a length of 190 \u00b0 and the rising and lowering segments b and d , a length of 65 \u00b0. thereafter , descending segment b occurs followed by constant segment c which has a greater length than the first constant path segment a between the increasing and decreasing path segments . this constant path segment c defines the other end position of element 4 during the major portion of the work cycle . the actuating signal can also be generated in other ways from a control signal from the program means 30 . it is only important that if at the beginning of the work cycle the electromagnet 23 is instructed into the activated situation , that the actuating signal insures that this activated condition is also maintained during the major portion of the working cycle . the above described jacquard arrangement is particularly suitable for use with warp knitting machines in which the individual control elements 5 are located above their appropriate controlled elements 17 . it will also be noted that the mutual displacement of the time diagram of fig4 is not harmful as long as the path segment a overlaps with the beginning of the activating signal s 1 . it is also possible for the pause 37 to be smaller or the switching signal pass directly to the switching arrangement 27 . it is particularly desirable to provide the program means in the form of a computer . it will be understood that various changes in the details , materials , arrangement of parts and operating conditions which have been herein described and illustrated in order to explain the nature of the invention may be made by those skilled in the art within the principles and scope of instant invention ."}

{"publication\_number": "US-6159341-A", "abstract": "a wire section for forming a multi - ply fiber web . the wire section includes a first belt which advances a first fiber ply toward a couch roll defining a combining section . a twin - wire zone of the wire section includes first and second wires between which a second fiber ply is initially formed in a gap former . the second wire separates from the first wire and then the first wire supporting the second fiber ply meets the first belt supporting the first fiber ply at the couch roll of the combining section to form the multi - ply fiber web . the twin - wire part is arranged upstream of the combining section along the running direction of the first belt . the second fiber ply runs on the first wire into the combining section at an angle less than 90 \u00b0 with respect to the belt entering the combining section . the path of the wires from the forming roll to the combining section is disclosed . a suction box or arrangement holds the second fiber ply to the first wire when the first and second wires separate . dewatering foils press on the wires moving through the twin - wire zone .", "application\_number": "US-98798197-A", "description": "fig1 shows a first embodiment of a wire section 9 according to the invention , which is used for forming multi - ply fiber webs , in particular paper or board webs . the wire section 9 is therefore predominantly intended for papermaking machines . the wire section comprises a fourdrinier unit 6 , having an approximately horizontally guided belt ( preferably a web or a felt ) 12 , with a running direction shown by an arrow 14 . on the belt 12 , a first fiber ply ( not illustrated ) is formed by a headbox or flowbox 8 followed by a plurality of dewatering elements 7 . as explained below , the first fiber ply is combined with a second fiber ply to form a two - ply fiber web . a twin - wire part 20 , shown enlarged in fig2 is arranged above the belt 12 and forms the second fiber web or ply . the twin - wire part 20 has a first endless loop belt or wire 22 and a second endless loop belt or wire 24 , which are guided to move parallel through a twin - wire zone in order to form the second fiber ply . in the region of the beginning of the twin - wire zone , the two wires 22 , 24 form an entry gap 28 . a headbox 26 indicated schematically at the entry gap 28 injects a fibrous suspension for the second fiber ply into the entry gap 28 . alternatively , a multi - layer headbox can also be provided . this type of arrangement causes the twin - wire part 20 to be a so - called &# 34 ; gap former &# 34 ;. a forming roll 30 is provided in the region of the entry gap 28 and in the loop of the second wire 24 , which is a bottom wire . a wire guide roll 32 is provided in the loop of the first wire 22 , which is a top wire . the forming roll 30 has an open roll cover , i . e ., it is provided with cutouts , and it is preferably not an evacuated roll . alternatively , the forming roll 30 may be evacuated . the wires 22 , 24 run together over an upper section of the forming roll 30 and between the roll 30 and the opposite wire guide roll 32 . the wires wrap around the forming roll 30 over an angle which is preferably smaller than 90 \u00b0. directly adjoining the forming roll 30 is a web dewatering section 39 in the form of a so - called d part . in the region of the top wire 22 , the d - part includes an either evacuated or non - evacuated suction box 36 which supports a series of stationary forming foils or strips 34 which are oriented so that their free ends contact and press against the top wire . the suction box 36 is combined with a suction separator . the first stationary foil 34 of the suction box 36 is arranged directly in the outlet region of the forming roll 30 . the forming foils 34 of the box 36 together form a running surface that is slightly convexly curved in the running direction of the wires 22 , 24 . on the side of the bottom wire 24 , opposite the foils 34 of the box 36 , a number of movable , preferably pneumatically loaded foils or strips or ledges 33 may be arranged . the movable foils or strips 33 have free ends or edges that are oriented to press against the bottom wire 24 . the stationary foils 34 and the movable foils 33 of the forming board 38 are arranged to alternate along the wire running direction . there are water receiving containers 37 and 31 , respectively , associated with the foils 34 and 33 . in the outlet region of the d part 39 , the bottom wire 24 is separated from the second fiber ply by a suction separator 62 . the bottom wire is led back to the forming roll 30 over a plurality of guide rolls 40 . the top wire 22 with the formed second fiber ply carried on it is led directly from the outlet region of the d part to a couch roll 42 . the diameter d of the couch roll 42 is relatively large , e . g . as large as or only slightly smaller than the diameter d of the forming roll 30 . the couch roll 42 is arranged such that the couch roll 42 dips into the belt , or such that the roll is slightly wrapped around by the belt 12 . the top wire 22 carrying the second fiber ply runs from the d part 39 , oriented at an angle 44 of less than 90 \u00b0, preferably in the range of 70 \u00b0 to 80 \u00b0, and shown herein at about 75 \u00b0 with respect to the orientation of the belt there the belt 12 and onto the couch roll 42 . the first and the second fiber webs are couched together between the top wire 22 and the belt 12 by means of the couch roll 42 . the top wire 22 is separated from the multi - ply fiber web in the outlet region of the couch roll 42 . the multi - ply fiber web that is combined in this way to consist of the first and the second fiber plies is separated from the top wire 22 by a further suction separator 63 and thereafter runs further together with the belt 12 , for example over a suction box 64 and a wire suction roll 65 ( fig1 ). the web is thereafter removed from the belt 12 in a known way , by a felt belt 66 and a pickup roll 67 , and is fed to a following unit of the machine , e . g . a press section . the top wire 22 is led back to the wire guide roll 32 located opposite the forming roll 30 by wrapping over wire guide rolls 46 . thus , for the purpose of initial dewatering , the twin - wire part 20 has a forming roll 30 followed by a so - called d part 39 for further dewatering . the twin - wire part 20 is therefore a so - called &# 34 ; roll - blade former &# 34 ;. in this embodiment , the twin - wire part 20 is arranged upstream of the couch roll 42 along the running direction 14 of the belt 12 . arrangement upstream of the couch roll 42 means that the forming or wire section from the headbox 26 and including the last forming unit ( d part 39 ) is arranged upstream of the couch roll 42 . that the wire guide rolls 46 for return travel of the empty top wire 22 are to some extent placed downstream of the couch roll 42 as viewed on the path of the belt 12 , as shown in fig2 is intended to be irrelevant in the present context . this arrangement causes the two wires 22 , 24 of the twin - wire part 20 and the belt 12 to have substantially the same running direction . therefore , the second fiber ply in the twin - wire former 20 is deflected only slightly before being couched . this enables extraordinarily high speeds of the entire wire section 9 to be achieved . this arrangement of the forming roll 30 and the downstream d part 39 in the twin - wire part 20 produces a side of the second fiber ply that is richer in fines on the side facing away from the top wire 22 , and that is the side of the second ply that is couched together with the top side of the first fiber ply . other arrangements of forming foils are also possible instead of the d part 39 . for example , a suction box may also be provided on the bottom wire . also , the forming roll 30 could also be evacuated . however , it has been found that extraordinarily high speeds with an excellent quality of the multi - ply fiber web formed can be achieved as a result of the combination of a non - evacuated open forming roll 30 with a d part 39 . fig3 illustrates a second embodiment 50 of a twin - wire part according to the invention . the same reference numbers are used for elements which have the same function as corresponding elements of the twin - wire part 20 . the twin - wire part 50 again has an approximately horizontally aligned belt 12 , on which a first , preformed fiber ply leads to the twin - wire part 50 in the direction 14 . the twin - wire part 50 has a top wire 22 and a bottom wire 24 . the twin - wire part 50 has a forming roll 52 , which is wrapped around by the top wire 22 . a wire guide roll 54 is provided on the bottom wire 24 in the region of the entry gap 28 and the bottom wire 24 runs from the wire guide roll 54 onto the forming roll 52 . the forming roll 52 has an arcuate suction section 56 , which is arranged approximately in the region over which the top wire 22 and the bottom wire 24 together wrap around the forming roll 52 . a series of forming foils 58 are provided on the bottom wire 24 opposite the forming roll 52 and their free ends press on the wire 24 . these foils 58 are movable . each foil 58 is pneumatically pressed , i . e ., compliantly , against the bottom wire 24 with an individually adjustable force . the top wire 22 and the bottom wire 24 , together with the second fiber ply that is arranged between them but is not illustrated , run obliquely upward from the forming roll 52 and wrap around a deflection roll 60 . from the deflection roll 60 , the top wire 22 , with the second fiber web ply lying upon it , runs to the couch roll 42 . in order to lift the second ply off the bottom wire 24 , a suction separator 62 is arranged on the side of the top wire , just downstream of the outlet region of the deflection roll 60 . the web is carried on the underside of the upper wire 22 . from the suction separator 62 , the top wire 22 , together with the fiber ply lying upon it , runs onto the couch roll 42 at an angle 44 of about 75 \u00b0 in relation to the orientation of the belt 12 as the belt enters and passes by the combining section at the couch roll 42 . at the belt 12 , the first fiber ply on the belt 12 meets the second fiber ply on the wire 22 . a catching container 41 is located underneath the bottom wire for receiving spray water . one of these containers may also be provided in the embodiment of fig2 . the twin - wire part 50 differs from the twin - wire part 20 illustrated in fig2 first by the arrangement of the forming elements , i . e ., forming roll 52 and forming foils 58 , and secondly by the deflection roll 60 , which is provided between the forming roll 52 and the couch roll 42 . the deflection roll 60 can either be an evacuated or a non - evacuated forming roll . in this embodiment also , the second fiber ply is deflected only slightly before running into the couch roll 42 . this is because , in contrast with the twin - wire part 20 , the forming roll 52 of the twin - wire part 50 is wrapped around by the wires 22 , 24 only over a relatively small angular section of about 45 \u00b0, whereas the forming roll 30 of the twin - wire part 20 is wrapped around by the wires 22 , 24 over an angle of about 90 \u00b0. the twin - wire parts 20 and 50 have in common that their twin - wire zones are both arranged upstream of the couch roll 42 in the running direction 14 of the belt 12 . as a result , the second fiber ply must be deflected only slightly , proceeding from the headbox 26 as far as the couch roll 42 . this applies especially as the running direction 14 of the belt 12 and that of the wires 22 , 24 in their forming region , i . e ., their twin - wire zones , are substantially identical . in other words , the outflow directions of the two headboxes 8 and 26 in fig1 are at least approximately identical . this means , coupled with the compact construction of the twin - wire part , enables the distance a between the couch roll 42 and the wire suction roll 65 to be made smaller than previously . this means that a small overall length of the wire part 9 can be achieved . the slight deflection of the second fiber ply in the twin - wire parts 20 and 50 enables very high operating speeds to be achieved with the wire sections 9 according to the invention , without a risk of the web lifting off . at the same high speed , the lower deflection allows higher moisture contents directly upstream of the couching stage , which achieves an improved ply bond strength . since both twin - wire parts 20 , 50 are upstream of the couch roll 42 in the running direction 14 of the belt 12 , the jointly couched multi - ply fiber layer following the couch roll 42 is not influenced by the operation of the twin - wire part 20 , 50 . in particular , condensate droplets do not drop from the twin - wire part 20 , 50 onto the finished multi - ply fiber layer . in any case , such droplets would impinge on the preformed first fiber ply . but , this would not significantly impair the web formation . the twin - wire parts 20 , 50 are preferably used for forming a white liner on the first fiber ply or for increasing the basis weight . although the present invention has been described in relation to particular embodiments thereof , many other variations and modifications and other uses will become apparent to those skilled in the art . it is preferred , therefore , that the present invention be limited not by the specific disclosure herein , but only by the appended claims ."}

{"publication\_number": "US-4305431-A", "abstract": "in hand looms a plurality of moveable parts of the loom are interconnected by means of the different loom parts . an improved attachment of tying up strings wherein the tying up string consists of a crochetted string shaped as a continuous series of loops , which are used for effecting the interconnection of said loom parts either alone , in pairs , and / or with or without separate fitting members thereby eliminating manual tying work .", "application\_number": "US-17774380-A", "description": "fig1 and 2 show in a schematic side view and a fragmentary frontal view respectively a hand loom and its conventional tying up system . the loom includes a stand 1 which carries a sley 2 , a warp beam 3 and a cloth beam 4 . the stand furthermore carries the heald 5 , which carries pulleys 6 , which -- commonly via shaft carriers 11 ( see fig2 )-- via tying up strings 10 carry the shafts 7 , 7 &# 39 ;, which form the suspension for the healds 12 . the movement of the shafts is controlled by treadles 8 , which by aid of tying up strings 10 -- commonly via lambs 9 -- are connected to the lower shaft 7 &# 39 ;. in fig2 is shown the connections between the tying up strings and the different loom components -- such as heald bar 5 , shaft carriers 11 , shafts 7 , 7 &# 39 ;, lambs 9 and treadles 8 -- to which these strings are connected in conventional manner by means of manually tied knots 13 , which therefore on one hand has a tendency of sliding and on the other hand means extensive manual work when setting up the hand loom . in fig3 is schematically shown in exaggerated scale a tying up string of the type included in the invention and which is the most vital part of the system according to the invention . as can be seen in this figure the string 100 consists of two threads 104 , 105 which are brought along -- side each other and which -- preferably in a hosiery machine -- have been crochetted together in such a manner that they form a single series of loops 101 , which are separated -- and interconnected by means of intermediate short &# 34 ; ribs &# 34 ;. in the figure is shown only one complete loop 101 but it is to be understood that the string forms a continuous series of essentially similar and equally large loops 101 . fig4 shows schematically in perspective the tying up between a shaft carrier 11 and upper shafts 7 and the figure shows different methods of attachment . the shaft carrier 11 is connected to a not shown pulley via a centrally located tying up string 100 which extends through a hole 106 in the shaft carrier . a fitting member formed as a stop element 102 is inserted through the loop situated nearest to the shaft carrier on the side thereof opposite the pulley and this stop element is larger than the hole 106 and it will thereby prevent the tying up string from being pulled back through the hole . at both ends of the shaft carrier there are attached other tying up strings 100 which are connected to the shafts 7 . the strings are at the ends of the shaft carrier preferably attached thereto as shown in fig5 wherein the series of loops 101b is slipped through the outmost loop 101a of the string , forming a running noose , which can be arranged about the end of the shaft carrier in the groove therein . the tying up string 100 is furthermore attached to the bottom side of the upper shaft 7 by being slipped through a hole 106 and fixed to the shaft by having a loop 101 hooked to a hooking member 103 . in fig6 is shown in bigger scale a stop element 102 of the type shown in fig4 . this stop element is designed essentially as a &# 34 ; dog &# 39 ; s bone &# 34 ; i . e . it incorporates a rod shaped intermediate portion having a cross - sectional size which is less than the opening of a loop 101 . at the ends of the rod shaped member there are provided enlarged material portions the cross sectional side of which is bigger than the intermediate portion and essentially equal to or even somewhat bigger than the opening of the loop . it is hereby possible to insert the stop element in any desired loop by pressing it into the loop possibly under use of the flexibility of the thread for stretching the loop during the inserting of the stop element . when the stop element has been put in place it will efficiently prevent the string from unintentionally being pulled out of the hole 106 and as the force in the string will be mainly perpendicular to the longitudinal direction of the stop element the stop element will not be pulled out of the loop . in fig7 is shown an embodiment of a hook member 103 of the type intimated in fig5 . the hook member comprises a base member which can be fixed to the loom component , to which the tying up string in question shall be attached . on the base member there is arranged a hook , which preferably is somewhat elastic and intended to be hooked by a loop 101 . by using a suitable design of the hook member together with the fact that the string in its service position is subjected to a pulling force acting in the direction away from the hook member 103 the tying up string will be reliably retained against undesired unhooking from the hooking member . in this manner it is very easy to attach the tying up strings exactly in their desired positions without the problems which are usual at hand tying . it is also easy to unhook the connections when this is desired e . g . for replacement of worn out strings . according to the system of the invention the entire tying up work will thus be simplified and reduced to a considerable extent . the material in the tying up string 100 is a wear - resistant , somewhat flexible , preferably synthetic material . it is of no importance if this material is slippery as there can exist no sliding in the crochetted loops , whereby the sliding problems usual at the synthetic tying up strings provided with hand - tied knots are entirely eliminated . the invention has been described in connection with the most essential tying up operations , which will arise at a hand loom but it is to be understood that other tying up cases present at hand looms or the like can be favourably incorporated in the system according to the invention . it is of course furthermore evident that the invention is not limited to the part solutions shown in the accompanying drawings and described with reference thereto but modifications are possible within the scope of the appended claims ."}

{"publication\_number": "US-4501710-A", "abstract": "this is an improved apparatus and process for stretching a tow of filaments by the tension caused by driven rolls dragging the tow across drag rolls . the improvement comprises continuously controlling at least one undriven or drag roll proportional to the sensed variation in a ratio of speed between at least one driven roll and at least one drag roll .", "application\_number": "US-27044381-A", "description": "in fig1 the yarn tow 1 passes first through nip roll stand 2 having nip rolls 4 and slidably mounted nip roll 5 mounted in bracket 6 . the degree of pressure on the yarn tow by the nip roll stand is adjusted by adjusting the position of nip roll 5 in bracket 6 upwardly or downwardly . speed control device such as eddy current brake 3 controls the speed of the nip rolls 4 by means of the pulley 7 on eddy current brake 3 and pulleys 9 and 9 &# 39 ; on nip rolls 4 connected by belts 8 and 10 as shown . yarn tow 1 then passes across guide cylinder 11 and drag roll 11 &# 39 ; to a series of drag rolls 12 then to a series of driven rolls 13 which are driven by means of electric motor 21 shown in fig2 . jack shaft 14 is also connected to electric motor 21 shown in fig2 by means of belts 15 and in turn drives crimper feed rolls 16 and crimper nip rolls 17 by means of belts 15 &# 39 ;. yarn tow 1 then passes into crimper box 18 and exits as shown , stretched and crimped , ready for further processing . in fig2 like numbers indicate identical elements . nip roll stand 2 has nip rolls 4 and adjustable nip roll 5 mounted in bracket 6 . yarn tow passes from nip roll stand 2 across guide roll 11 and drag rolls 11 &# 39 ; and 12 to driven rolls 13 , driven by electric motor 21 through gear box 20 . the combination pulleys 19 &# 39 ; drive the chains 19 connected to sprockets 19a , and also drive belts 15 which drive jack shaft 14 and belts 15 &# 39 ; to drive gears under cover 28 . feed rolls 16 and crimper nip rolls 17 are driven by the system under cover 28 and not shown except in the references incorporated by reference into this patent application . feed rolls 16 and crimper nip rolls 17 feed yarn tow to crimper box 18 . driven rolls 13 are mounted on shafts 23 in bearings 24 on a stand 22 . guide roll 11 and drag rolls 11 &# 39 ;, 12 are mounted in frame 25 . guide roll 11 is mounted on shaft 29 and drag rolls 11 , 12 are mounted on shafts 26 . each drag roll 12 has a lockable brake 27 described in detail in the incorporated brandi patent . the improvement of this invention can be seen in fig1 . it begins with the revolutions per minute speed sensors 29 and 31 sensing the speed of the last set of driven rolls 13 and one of the nip rolls 4 as shown . this speed is communicated through electric line connections 32 and 33 to controller 30 which senses the variation in a set ratio of speed between the driven roll and the nip roll . this controller then communicates through line 34 to eddy current brake 3 to continuously proportionally control the speed of nip rolls 4 by variation in the voltage to eddy current brake 3 which acts as a brake on rolls 4 through pulleys , 7 , 9 and 9 &# 39 ; and belts 8 and 10 . using the apparatus and process of this invention to prepare 448 , 000 pounds of a predominantly amine terminated y - cross sectional yarn nylon , the following table shows the uniformity achieved by this invention compared to use of the prior art uncontrolled apparatus to prepare 437 , 000 pounds under similar operating conditions . &# 34 ; c . o . v .&# 34 ; means &# 34 ; coefficient of variation &# 34 ;, which is defined as the standard deviation between samples times 100 divided by the arithmetic mean . table\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ this invention prior art\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_denier avg . 17 . 3 17 . 4 c . o . v . 2 . 8 % 3 . 3 % number of samples 46 49elongation \* avg . 74 . 5 77 c . o . v . 7 . 1 % 9 . 3 % number of samples 48 51tenacity \* avg . 4 . 0 gpd 4 . 0 gpd c . o . v . 5 . 9 % 7 . 3 % number of samples 48 51crimps / inch avg . 10 . 0 cpi 9 . 9 cpi c . o . v . 7 . 3 % 10 . 8 % number of samples 107 115\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \* astm d 225669 crimps per inch for the above table were determined visually with a magnifier . the table shows significant improvement in the uniformity of denier , elongation , breaking strength ( i . e ., tenacity ) and crimps per inch ."}

{"publication\_number": "US-5529808-A", "abstract": "a glass fiber reinforced polymer which excels in mechanical properties and is suitable for use in a large - sized structural members , formed from a dispersion liquid by dispersing reinforcement glass fibers and particulate thermoplastic resin in a surfactant - containing aqueous medium in which bubbles of air are dispersed , forming a sheet - like web on a porous support plate , and applying heat and pressure to form a sheet . the reinforcement glass fibers include a silane coupling agent while the matrix resin has functional groups bonded to the silane coupling agent . the concentration of said functional groups is higher in the regions adjacent the surfaces of said reinforcement glass fibers than in regions farther removed therefrom , and said concentration progressively decreases in the direction away from said reinforcement glass fibers .", "application\_number": "US-29035494-A", "description": "turning now to the reinforcement glass fibers used in accordance with this invention , in order that the glass fibers provide sufficient strengthening effect without reduction of fluidity during forming of the stampable material , the mean length of the glass fibers preferably ranges from about 6 to 50 mm . the improvement of reinforcement effect is insufficient when the glass fibers are too short , whereas excessive length of the glass fibers impairs the fluidity of the material during the process of forming of the stampable material . in order that an appreciable reinforcement effect is attained , it is preferred that the mean diameter of the glass fibers ranges from about 5 to 30 \u03bcm . the glass fibers are present in the stampable material such that the ratio of the weight of the glass fibers to the weight of the thermoplastic resin falls within the range from 20 / 80 to 70 / 30 . when the content or weight ratio of the glass fibers is too small , the reinforcement effect is correspondingly small , whereas , when the weight ratio is excessively large , it becomes difficult or even impossible to impregnate the glass fibers uniformly with the thermoplastic resin , so that the mechanical properties of the stampable material are impaired due to voidage in the stampable material . according to the present invention , it is essential that the surfaces of the glass fibers be provided with a silane coupling agent and , as required , also with sizing agent to be defined hereinafter . the silane coupling agent serves to provide excellent wettability and reactivity between the glass fibers and the thermoplastic resin containing functional groups , while the sizing agent serves to control the degree of separation or opening of the glass fibers . various types of silane coupling agents can be used , such as the vinyl silane type , aminosilane type , epoxysilane type , methacrylsilane type , chlorosilane type and mercaptosilane type , among which agents of the aminosilane type or epoxysilane type are very suitably used . the provision of the glass fibers with the silane coupling agent can be conducted in various known ways such as the &# 34 ; dry &# 34 ; method in which an aqueous solution of the silane coupling agent is applied to the glass fibers while the glass fibers are agitated . another method called the &# 34 ; spray method &# 34 ; may be used , in which an aqueous solution of silane coupling agent is sprayed on glass fibers heated to a high temperature , and dipped in an aqueous solution of a silane coupling agent . the amount of the silane coupling agent preferably ranges from about 0 . 001 to 0 . 3 wt %, more preferably from about 0 . 005 to 0 . 2 wt %, of the weight of the glass fibers . improvement of mechanical properties of the stampable product is not appreciable when the amount of the silane coupling agent is below about 0 . 001 wt %, while silane coupling agent in excess of about 0 . 3 wt % causes a saturation of improvement of mechanical properties while impairing the operability of the glass fibers when the latter are dispersed . the glass fibers may be used as independent filaments or in the form of a fiber bundle in which the glass fiber filaments are bundled into fibers . it is also possible to use the glass fibers in the form of a mixture of discrete filaments or as fiber bundles . the degree of opening of the fibers can be controlled by suitably adjusting the kind and quantity of any sizing agent that may be added . when the glass fibers are present in the form of fiber bundles , it is necessary that sizing agent are present , which are fibers that are soluble or materially insoluble in the surfactant - containing aqueous medium . they prevent the bundle of fibers from opening during the manufacturing process . examples of sizing agent suitably used in the practice of the invention are agents of the epoxy - type , urethane - type , polyolefin - type and melamine - type . suitable ratios of the sizing agent to the glass fibers preferably range from about 0 . 1 to 1 . 5 wt % and more preferably from about 0 . 2 to 1 . 3 wt %. when the content of the sizing agent is less than about 0 . 1 wt %, the fibers tend to open into discrete filaments in the course of the process . conversely , use of the sizing agent in excess of about 1 . 5 wt % may reduce wettability and bondability between the silane coupling agent and the thermoplastic resin ( thermoplastic resin b or c ) containing the functional groups . some types of reinforcement glass fibers which tend to be opened into filaments have to be treated with water - soluble sizing agent . examples of such sizing agent are agents of the polyethylene oxide type and polyvinyl alcohol type . the amount of the sizing agent to the glass fibers preferably ranges from about 0 . 03 to 0 . 3 wt %, more preferably from about 0 . 05 to 0 . 2 wt %. when the amount of the sizing agent is below about 0 . 03 wt %, the fibers tend to open before they are put into the aqueous medium , thus impairing operability . conversely , use of the sizing agent in excess of about 0 . 3 wt % hampers opening of the fibers in the manufacturing process . the use of fiber bundles as the reinforcement glass fibers enhances fluidity of the matrix resin , thus contributing to improvement of formability of the stampable material . when the bundle includes too many filaments , however , the mechanical strength of the stampable material may be reduced due to reduction of the total outer surface area of the whole glass fibers . a description will now be given of the various thermoplastic resins . examples of the thermoplastic resin a , containing essentially no significant amount of functional groups bondable to the silane coupling agent of the glass fibers , in the present invention include polyethylene , polypropylene , polystyrene , polyvinyl chloride , polyethylene terephthalate , polycarbonate , polyamide or polyacetal , or a copolymer , a graft compound and / or blend of the resins listed above , e . g ., an ethylene - vinyl chloride copolymer , ethylene - vinyl acetate copolymer or ethylene - butadiene - acrylonitrile copolymer . among these resin materials , polypropylene is most suitable . a thermoplastic resin having functional groups bondable to the silane coupling agent , i . e ., a thermoplastic resin b or c , may be prepared by denaturing the above - listed resin materials of the resin a with a suitable compound such as an acid or epoxy compound . when polypropylene is used as the thermoplastic resin , maleic acid , maleic anhydride or an acrylate can suitably used as the denaturing agent . a denaturing agent which provides an acid anhydride group or a carboxyl group as the functional group is most suitable . it is also possible to use a material obtained by further denaturing an acid - denatured resin or material which provides , as the functional group , a hydroxyl group through saponification after polymerization with vinyl acetate . it is also possible to use a material which provides , as the functional group , an amino group through denaturing with acrylamide , methacrylamide or the like . the functional group also may be of aziridine type , epoxy type or silane type . the bond between the silane coupling agent and the functional group may be a hydrogen bond or a covalent bond . any type of bond which contributes to improvement of bondability between the matrix resin and the reinforcement glass fibers treated with the silane coupling agent can be employed . preferably , the number of the functional group ranges from about 3 . 0 \u00d7 10 17 to 6 . 0 \u00d7 10 19 , more preferably from about 1 . 2 \u00d7 10 18 to 3 . 0 \u00d7 10 19 , in terms of the number of the functional group to the weight in grams of the matrix resin . when the number of the functional groups is below about 3 . 0 \u00d7 10 17 , the improvement of mechanical properties of the stampable material is not remarkable , because of insufficiency of bonding between the surfaces of the glass fibers and the silane coupling agent . conversely , when the number of the functional group exceeds about 6 . 0 \u00d7 10 19 , the effect of improving the bonding between the glass fibers and the coupling agent is saturated and suffers disadvantage from the viewpoint of cost , as well as undesirable coloring of the stampable material and impairment of mechanical properties due to embrittlement of the matrix resin . according to the present invention , the functional groups are distributed with such a gradient or local concentration that the concentration of the functional groups is highest at the regions contacting the reinforcement glass fibers and progressively decreases toward the inside of the matrix resin , thus contributing to further improvement of mechanical properties . the term &# 34 ; local concentration &# 34 ; of the functional groups means a configuration wherein the thermoplastic resin b or c , containing the functional group in its molecule is selectively present in the regions near the surfaces of the reinforcement glass fibers . one of the methods for realizing such a local concentration of the functional group is to use , as the component of the web , a particle composite including the particles of the thermoplastic resin a free of the functional group and the thermoplastic resin b having the functional groups and fused to the surfaces of the particles of the thermoplastic resin a . another method is to spray an emulsion of the thermoplastic resin c having functional groups onto a web formed by using the thermoplastic resin a . it is also possible to use these two procedures in combination . particles of thermoplastic resin ( thermoplastic resin a ) may be used for producing a web by the so - called papermaking - type method . the resin composite obtained by fusing thermoplastic resin b to the surfaces of the particles of thermoplastic resin a must be also particulate . the particles of thermoplastic resin a may be particles after polymerization , or particles obtained by dissolving resin pellets in a solvent and then precipitating the resin ( chemical grinding ), or particles obtained by mechanical grinding . the particle size of the resin composite is preferably about 50 to 2000 \u03bcm . if the particle size is excessively large , the degree of impregnation of glass fibers with the resin is decreased . if the particle size is too small , the pressure loss in the dehydration process in the production of a web , which will be further described below , is increased , thereby sometimes causing production difficulty . an example of previously fusing thermoplastic resin b to the particles of thermoplastic resin a comprises mixing in a henschel mixer or the like . in this case , mixing and agitation are performed at a temperature above the melting point or softening point of thermoplastic resin b , and lower than the melting point or softening point of thermoplastic resin a . the melting point or softening point of thermoplastic resin b may be lower than the melting point or softening point of thermoplastic resin a . this coats resin b on the outer surfaces of resin particles a . the amount of the thermoplastic resin b fused and coated may be adjusted so that the mean number of the functional groups in the matrix resin is finally within the range of about 3 . 0 \u00d7 10 17 to 6 . 0 \u00d7 10 19 ( number of functional groups / weight of thermoplastic resin in grams ). the amount of the thermoplastic resin b fused and coated is preferably controlled so that the ratio [( weight of thermoplastic resin b )/( weight of thermoplastic resin a )]\u00d7 100 is within the range of about 0 . 1 to 5 . 0 % by weight . with a ratio of less than about 0 . 1 % by weight , there are difficulties in uniformly fusing to the surfaces of glass fibers . with a ratio of more than about 5 . 0 % by weight , the thickness of thermoplastic resin b fused to the glass fiber surfaces is increased , thereby decreasing the strength due to deterioration of the mechanical properties of the matrix resin . thermoplastic resin c in an emulsion impregnated in a web is further described below . in a resin emulsion , a high - molecular weight substance is stably dispersed in an aqueous medium . the particle size of the emulsion is limited to about 2 \u03bcm or less , preferably about 1 \u03bcm or less , in order to fuse resin c uniformly to the glass fibers . with a particle size over about 2 \u03bcm , the resin c is nonuniformly fused to the glass fibers , thereby causing insufficient improvement of wettability and adhesion , and difficulties in unevenly distributing many functional groups on the glass fiber surfaces . thus , the characteristics and effects of the present invention are not then most effectively realized . examples of the method of impregnating the emulsion in a web include either coating by a curtain coater or spraying using a spray , or others . the amount of emulsion added is preferably controlled so that the value of the ratio [( weight of resin in emulsion )/( weight of glass fibers )]\u00d7 100 is about 0 . 1 to 2 % by weight , more preferably about 0 . 3 to 1 . 5 % by weight . with a value of less than about 0 . 1 % by weight , wettability and adhesion become insufficient and strength is not sufficiently improved . with a ratio of more than about 2 % by weight , the amount of thermoplastic resin c unevenly distributed on the surfaces of the glass fibers is increased , thereby deteriorating the mechanical properties of the product . the weight average molecular weight of thermoplastic resin a having no functional group in its molecule is preferably within the range of about 30 , 000 to 500 , 000 . with a weight average molecular weight of less than about 30 , 000 , although the melt viscosity is low , and wettability is high , the mechanical properties of the resulting product as a stampable material are poor because of brittleness . with a weight average molecular weight of more than about 500 , 000 , the melt viscosity is high , and the fluidity in molding of a stampable material is decreased . the degree of impregnation of the thermoplastic resin in the glass fibers is also decreased , thereby deteriorating the mechanical properties of the product , as in the case of mixing with excess glass fibers . the weight average molecular weight of resin a is more preferably within the range of about 50 , 000 to 200 , 000 . thermoplastic resin a and thermoplastic resins b and c , both of the latter of which contain functional groups in their molecules , are preferably the same type of resin when used together . if they are different types of resins , they preferably nevertheless have compatibility with each other . when compatibility between thermoplastic resin a and thermoplastic resins b and c is poor , the mechanical properties of the matrix resin as a mixture of these resins deteriorate , thereby deteriorating the mechanical properties of the product . the weight average molecular weights of thermoplastic resins b and c are preferably within the range of about 5000 to 150 , 000 . with a weight average molecular weight of less than about 5000 , the mixture becomes brittle , and the mechanical properties of the stampable material thus deteriorate , as described above . with a weight average molecular weight of more than about 150 , 000 , the fluidity in molding of the stampable material is decreased . however , when the amounts of thermoplastic resins b and c mixed are very small , the effects of the molecular weights are of less importance . the content of functional groups in thermoplastic resins b and c is preferably within the range of about 3 . 0 \u00d7 10 19 to 1 . 2 \u00d7 10 21 , more preferably about 6 . 0 \u00d7 10 19 to 6 . 0 \u00d7 10 20 ( number of functional groups / weight in a gram of thermoplastic resin b or c ). with a content of less than about 3 . 0 \u00d7 10 19 , the amount of brittle thermoplastic resin b or c mixed is inevitably increased , thereby deteriorating the mechanical properties of the product . with a content of more than 1 . 2 \u00d7 10 21 , the amount of thermoplastic resin b or c mixed is inevitably decreased , and thus functional groups are not sufficiently dispersed on the glass fiber surfaces , thereby causing insufficient improvement of mechanical properties . each of these thermoplastic resins may comprise a plurality of thermoplastic resins having different molecular weights , types of functional groups and contents of functional groups . an important method of producing a stampable material in accordance with this invention is described in detail below . glass fiber chopped strands and particles of a reactive thermoplastic resin , or particles of a resin composite obtained by previously fusing thermoplastic resin b to the surfaces of particles of thermoplastic resin a , are dispersed in an aqueous solution of a surfactant in which small air bubbles are dispersed . the dispersion is dehydrated through a porous supporting material to obtain a web in which the particles of the thermoplastic resin are uniformly mixed and dispersed with the glass fibers . the thickness of the thus - obtained web is generally about 1 to 10 mm . if desired or required , the web is then impregnated with an emulsion of thermoplastic resin c . after the web is dried , the resin is melted by heating the web at about the melting point or softening point of the thermoplastic resin , followed by pressing between cooling boards , to obtain a dense solidified stampable material . the heating temperature of the web must be controlled to be lower than the decomposition temperature of the thermoplastic resin . when the thermoplastic resin is polypropylene , the heating temperature is preferably about 170 \u00b0 to 230 \u00b0 c ., more preferably about 190 \u00b0 to 210 \u00b0 c . with a heating temperature higher than about 230 \u00b0 c ., coloring and deterioration of mechanical properties tend to occur due to decomposition of polypropylene . the pressure applied in pressing the web between the cooling boards is preferably about 3 to 500 kgf / cm 2 , for densifying the web . excess pressure may bring about breakage of the glass fibers . the stampable material can contain additives and a coloring agent such as an antioxidant , a weathering stabilizer , a metal deactivator , a copper inhibitor , a flame retardant , carbon black and so on . these additives and coloring agent can be contained in the stampable material , for example , by previously mixing in the thermoplastic resin , adding at the same time thermoplastic resins a and b mixed and fused , or adding by spraying in the process of production . after the stampable material has been heated at a temperature higher than the melting point or softening point of the thermoplastic resin and lower than the decomposition temperature thereof , the material is placed on a mold and then pressed for shaping . when the thermoplastic resin is polypropylene , the heating temperature is preferably about 170 \u00b0 to 230 \u00b0 c . the mold temperature may be lower than the solidification point of the thermoplastic resin . from the viewpoints of handling properties and productivity , the mold temperature is generally about room temperature to 60 \u00b0 c . although the molding pressure depends upon the product shape , the pressure is generally about 50 to 500 kgf / cm 2 . although the present invention may be applied to a stampable material formed by the so - called &# 34 ; papermaking &# 34 ; method , as described above , the scope of the present invention is not limited to this specific method , and can be applied to any process for impregnation of a glass fiber mat with a thermoplastic resin . the present invention is described in detail below with reference to examples . thermoplastic resin a : polypropylene ( white particles , average particle size of 800 \u03bcm , weight average molecular weight of 150000 , melting point of 165 \u00b0 c .). thermoplastic resin b : maleic anhydride - modified polypropylene [ yellow , average particle size of 2 mm , amount of maleic anhydride modification of 10 . 0 % by weight ( the mean number of acid anhydride group is 6 . 0 \u00d7 10 20 per gram of resin b , the number of carboxyl group derived from acid anhydride is calculated as an acid anhydride group ), weight average molecular weight of 12000 , melting point of 142 \u00b0 c .]. 96 . 5 parts by weight of particles of thermoplastic resin a and 3 . 5 parts by weight of particles of thermoplastic resin b were charged in a henschel mixer ( produced by mitsui - miike kogyo , 201 ), and mixed and agitated by an agitating element at a peripheral speed of 25 m / s at a temperature of 142 \u00b0 c . at highest for 30 minutes to obtain a resin particle composite with an average particle size of 800 \u03bcm in which thermoplastic resin b was fused as a film on the particles of thermoplastic resin a . 33 . 75 g of the resin particle composite ( the total number of acid anhydride groups is 2 . 1 \u00d7 10 19 per gram of the resin composite ) and 22 . 50 g of glass fiber chopped strands ( containing 0 . 06 % by weight of aminosilane coupling agent ) having an average fiber length of 13 mm and average fiber diameter of 10 \u03bcm were agitated in 10 liters of 0 . 8 % by weight of surfactant aqueous solution , and bubbled to prepare a dispersion . the thus - prepared dispersion was poured into a paper machine having a paper area of 250 \u00d7 250 mm , and deaerated under suction to produce a web having a weight of 900 g / m 2 . the web was then dried at 130 \u00b0 c . for 90 minutes . three webs having a weight of 900 g / m 2 were further produced by the same method as that described above . the four webs were laminated , pre - heated at 210 \u00b0 c . and then placed between cooling boards at 25 \u00b0 c . the webs were then pressed under a pressure of 5 kgf / cm3 to obtain a solidified dense glass - fiber - reinforced thermoplastic resin composite material ( stampable material ). a bending test specimen was cut from the central portion of the stampable material in accordance with jis k7055 . the bending strength was measured by bending tests of three specimens . the results obtained are shown in table 1 . the thus - obtained stampable material was cut at an angle to the orientation axis of the reinforcing glass fibers to obtain a thin film . the thin film was used for measuring the concentration of functional groups in the matrix resin from the absorption ( 1785 cm - 1 ) arising from acid anhydride groups and the absorption ( 1710 cm - 1 ) arising from carboxyl groups ( by comparison with the absorption at 840 cm - 1 of c -- h out - of - plane deformation vibration ) by using a microscopic ir ( fourier - transform infrared spectrophotometer micro ftir - 100 model , produced by nihon bunko - kogyo ). the measurement range was a square of about 25 \u03bcm ( about 10 \u03bcm in terms of the vertical distance from the glass fiber surface ). the concentration of functional groups was measured at intervals of 10 \u03bcm in the vertical direction from the matrix resin in proximity to the glass fiber surface . the results obtained are shown in table 2 . a stampable material was obtained by the same method as that employed in example 1 - 1 except that the process of fusing thermoplastic resin b to the particles of thermoplastic resin a was omitted , and 33 . 75 g of particles of thermoplastic resin a was used in place of the resin composite . resin a had no significant content of functional groups bondable to glass fiber silane bonding agents . the bending strength , bending modulus and concentration of functional groups were measured by the same methods as those employed in example 1 - 1 . the obtained results are shown in tables 1 and 2 . the bending strength of this comparative example is shown by the lone black dots in fig1 and 2 . a stampable material was obtained by the same method as that employed in example 1 - 1 except that the following resin was used as thermoplastic resin b : thermoplastic resin b : maleic anhydride - modified polypropylene [ yellow , average particle size of 2 mm , the amount of maleic anhydride modification 5 . 0 % by weight ( the mean number of acid anhydride group is 3 . 0 \u00d7 10 20 per gram of resin b , the number of carboxyl group derived from acid anhydride is calculated as an acid anhydride group ), weight average molecular weight of 27000 , melting point of 151 \u00b0 c .]. the bending strength , bending modulus and concentration of functional groups were measured by the same methods as those employed in example 1 - 1 . the color of the sheet surface was also observed . the obtained results are shown in tables 1 and 2 . a stampable material was obtained by the same method as that employed in example 1 - 2 except that the process of fusing thermoplastic resin b to the particles of thermoplastic resin a was omitted , and 32 . 57 g of particles of thermoplastic resin a and 1 . 18 g of particles of thermoplastic resin b were used in place of the resin composite . the bending strength , bending modulus and concentration of functional groups were measured by the same method as that employed in example 1 - 2 . the color of the sheet surface was also observed . the obtained results are shown in tables 1 and 2 . in this comparative example , the step of fusing the thermoplastic resin b onto the particles of the thermoplastic resin a was omitted but these two kinds of thermoplastic resins were molten and kneaded by a twin screw extruder at a kneading temperature of 200 \u00b0 c . and for a residential time of 1 minute . the kneaded material was then crushed and pulverized into mixture resin particles having a mean particle size of 1 \u03bcm . stamping material was formed in the same method a example 2 - 1 , except for the above - described preparatory steps , an samples of thus - formed stamping material were subjected to the measurement of bending strength , bending modulus and average number of functional groups conducted under the same conditions as example 1 - 2 , as well as to observation of the sheet color . the results are shown in tables 1 and 2 . a stampable material was obtained by the same method as that employed in example 1 - 1 except that the following resin was used as thermoplastic resin b : thermoplastic resin b : maleic acid - modified polypropylene [ yellow , average particle size of 2 mm , the amount of maleic acid modification of 5 . 0 % by weight ( number of carboxyl group is 5 . 1 \u00d7 10 20 per gram of resin b ), weight average molecular weight of 27000 , melting point of 151 \u00b0 c .]. the bending strength , bending modulus and concentration of functional groups were measured by the same method as that employed in example 1 - 1 . the color of the sheet surface was also observed . the obtained results are shown in tables 1 and 2 . table 1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bending strength bending modulus ( kgf / mm . sup . 2 ) ( kgf / mm . sup . 2 ) standard standard color of sheetno . average deviation average deviation surface\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_example 1 - 1 16 . 20 0 . 21 640 20 uniform light yellowexample 1 - 2 15 . 51 0 . 16 610 13 uniform light yellowexample 1 - 3 15 . 03 0 . 18 600 12 uniform light yellowcomparative example 1 - 1 7 . 14 0 . 45 400 30 whitecomparative example 1 - 2 11 . 50 1 . 31 520 50 yellow spotscomparative example 1 - 3 13 . 95 0 . 23 560 25 uniform light yellow\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ table 2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_distance from glass mean number of functional groups near glass fiber \u00d7 10 . sup . 18 ( number / gram ) fiber surface comparative comparative comparative ( \u03bcm ) example 1 - 1 example 1 - 2 example 1 - 3 example 1 - 1 example 1 - 2 example 1 - 3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 0 - 10 509 284 487 0 0 910 - 20 365 210 321 0 2 1020 - 30 211 83 190 0 21 1530 - 40 32 19 31 0 105 540 - 50 24 16 19 0 210 31average number of 21 11 18 0 10 11functional groups ofmatrix resin in allstampable material \* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \* mean number of functional groups in matrix resin forming stampable material it was found from this example that the obtained stampable material had a concentration of functional groups which was high at the glass fiber surface and gradually decreased in the matrix resin . it was also found that the stampable material had a high bending strength and bending modulus and small variations thereof . the obtained sheet exhibited significant improvement in mechanical properties , less coloring caused by addition of thermoplastic resin b , uniform hue and good appearance , as compared with comparative examples in which particles of thermoplastic resin a and functional group - containing thermoplastic resin b were simply mixed . in addition , mechanical properties were superior to those obtained with the comparative examples which were prepared by melting and kneading the thermoplastic resin a and the functional group - containing thermoplastic resin b in advance . thermoplastic resin a : polypropylene ( white particles , average particle size of 800 \u03bcm , weight average molecular weight of 150 , 000 , melting point of 165 \u00b0 c .). thermoplastic resin c : emulsion of maleic anhydride - modified polypropylene ( 0 . 5 % of effective component , yellow solid content , average particle size of 0 . 8 \u03bcm , an amount of maleic anhydride modification of 10 . 0 % by weight ( the mean number of acid anhydride group is 6 . 0 \u00d7 10 20 per gram of resin b , the number of carboxyl group derived from acid anhydride is calculated as an acid anhydride group ), weight average molecular weight of 12000 , softening point of 142 \u00b0 c .]. 33 . 75 g of thermoplastic resin a and 22 . 50 g ( the amount of the glass fibers contained in a stampable material of 40 % by weight ) of glass fiber chopped strands ( containing 0 . 06 % by weight of aminosilane coupling agent ) having an average fiber length of 13 mm and an average fiber diameter of 10 \u03bcm were agitated in 10 liters of 0 . 8 % by weight of surfactant aqueous solution , and bubbled to prepare a dispersion . the thus - prepared dispersion was poured into a web - making machine having a web area of 250 \u00d7 250 mm , and deaerated under suction to produce a web having a weight of 900 g / m 2 . the web was then impregnated with 67 . 50 g of emulsion of thermoplastic resin c by spraying [ the yield of thermoplastic resin c , contained in the emulsion and present in the web , was 100 % and the total number of the functional groups was 3 . 7 \u00d7 10 18 per gram of the matrix resin . the web was then dried at 130 \u00b0 c . for 90 minutes . three webs having a weight of 900 g / m 2 were further produced by the same method as that described above . the four webs were laminated , pre - heated at 210 \u00b0 c . and then placed between cooling boards at 25 \u00b0 c . the webs were then pressed at 5 kgf / cm 3 to obtain a solidified dense stampable material . the bending strength , bending modulus , sheet hue and concentration of functional groups were measured by the same methods as those employed in example 1 - 1 . the results obtained are shown in tables 3 and 4 . a stampable material was obtained by the same method as that employed in example 2 - 1 except that the following resin was used as an emulsion of thermoplastic resin c . thermoplastic resin c : emulsion of maleic acid - modified polypropylene [ 0 . 5 % of effective component , yellow solid content , average particle size of 0 . 2 \u03bcm , the amount of maleic acid modification of 5 . 0 % by weight ( number of carboxyl groups was 5 . 1 \u00d7 10 20 per gram of resin c ), weight average molecular weight of 27000 , softening point of 151 \u00b0 c .]. the bending strength , bending modulus , sheet hue and concentration of functional groups were measured by the same methods as those employed in example 2 - 1 . the results are shown in tables 3 and 4 . a stampable material was obtained by the same method as that employed in example 2 - 2 except that thermoplastic resin c was used as a single resin , not an emulsion , and mixed in an amount of 0 . 34 g ( corresponding to the mixing amount of thermoplastic resin c of examples 2 - 2 ) with thermoplastic resin a . the bending strength , bending modulus , sheet hue and concentration of functional groups were measured by the same methods as those employed in example 2 - 2 . the results are shown in tables 3 and 4 . a stampable material was obtained by the same method as that employed in example 2 - 2 except that an emulsion of thermoplastic resin c having an average particle size of 3 . 0 \u03bcm was used . the bending strength , bending modulus , and sheet hue were measured by the same methods as those employed in example 2 - 2 . the results are shown in table 3 . table 3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bending strength bending modulus ( kgf / mm . sup . 2 ) ( kgf / mm . sup . 2 ) standard standard color of sheetno . average deviation average deviation surface\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_example 2 - 1 13 . 18 0 . 21 600 20 uniform light yellowexample 2 - 2 15 . 43 0 . 19 630 21 uniform light yellowcomparative example 2 - 1 11 . 97 1 . 45 540 58 yellow spotscomparative example 2 - 2 11 . 50 0 . 28 480 28 uniform light yellow\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ table 4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mean number of functional groups near glass fiberdistance from glass fiber surface surface \u00d7 10 . sup . 18 ( number / g )( \u03bcm ) example 2 - 1 example 2 - 2 comparative example 2 - 1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 0 - 10 491 407 010 - 20 402 281 020 - 30 113 53 5030 - 40 24 8 23140 - 50 21 4 102average number of functional groups 4 3 4in matrix resin\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ it was factually established by this example that the obtained stampable material had a concentration of functional groups which was higher at the glass fiber surface and gradually decreased with distance away from the glass fiber surface and into the matrix resin . it was also established that the resulting stampable material had high bending strength and bending modulus and small variations thereof . the stampable sheet exhibited significant improvement in mechanical properties , less coloring caused by addition of thermoplastic resin c , uniform hue and good appearance , as compared with the associated comparative examples in which particles of thermoplastic resin a and functional group - containing thermoplastic resin c were simply mixed . when the particle size of the emulsion was excessively large , the mechanical properties were only slightly improved . thermoplastic resin a : polypropylene ( weight average molecular weight of 150 , 000 , melting point of 165 \u00b0 c .) thermoplastic resin b : maleic anhydride - modified polypropylene [ maleic anhydride modification of 10 . 0 wt % ( the mean number of acid anhydride group is 6 . 0 \u00d7 10 20 per gram of resin b , the number of carboxyl group derived from acid anhydride is calculated as an acid anhydride group ), weight average molecular weight of 32 , 000 , melting point of 142 \u00b0 c .] thermoplastic resin c : an emulsion of the same resin as thermoplastic resin b except that the average particle size was 0 . 8 \u03bcm , and the effective ingredient was 5 . 0 % by weight . 96 . 8 parts by weight of particles of thermoplastic resin a and 3 . 2 parts by weight of particles of thermoplastic resin b were charged in a henschel mixer , and mixed and agitated at a temperature of 142 \u00b0 c . to obtain a resin particle composite having an average particle size of 800 \u03bcm in which thermoplastic resin b was fused in a film to the surfaces of particles of thermoplastic resin a . 30 . 00 g of the resin particle composite and 22 . 50 g ( the stampable material contained 40 % by weight of glass fibers ) of glass fiber chopped strands ( containing 0 . 06 % by weight of aminosilane coupling agent ) having an average fiber length of 13 mm and an average fiber diameter of 10 \u03bcm were agitated in 10 liters of 0 . 8 % by weight surfactant aqueous solution , and bubbled to prepare a dispersion . the thus - prepared dispersion was poured into a web - making machine having a web area of 250 \u00d7 250 mm , and deaerated under suction to produce a web having a weight of 900 g / m . sup . 2 . the web was then impregnated with 15 . 00 g of emulsion of thermoplastic resin c by spraying [ the yield of thermoplastic resin c , contained in the emulsion and present in the web , was 100 % and the total number of functional groups ( acid anhydride groups + carboxyl groups ) contained in the matrix resin was 2 . 0 \u00d7 10 19 per gram ]. the web was then dried at 130 \u00b0 c . for 90 minutes . three webs having a weight of 900 g / m 2 were further produced by the same method as that described above . the four webs were laminated , pre - heated at 210 \u00b0 c . and then placed between cooling boards at 25 \u00b0 c . the webs were then pressed under a pressure of 5 kgf / cm3 to obtain a solidified dense glass - fiber - reinforced thermoplastic resin composite material ( stampable material ). bending strength and number of functional groups were measured by the same method as example 1 - 1 . the number of functional groups was calculated on the basis of the above result , and is shown in table 5 . table 5\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_distance from glassfiber surface ( \u03bcm ) 0 - 10 10 - 20 20 - 30 30 - 40 40 - 50\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_average number of 575 326 283 31 22functional groups \u00d7 10 . sup . 18 ( number / g ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ it was found that the concentration of functional groups in the matrix resin was high at the glass fiber surface , and that the concentration of functional groups in a portion in proximity to the glass fibers was 10 times or more the mean number of functional groups ( 2 . 0 \u00d7 10 18 per gram ) of the matrix resin . it was also confirmed that the concentration of functional groups gradually decreased in the matrix resin with increased distance from the glass fiber surface . stampable materials were also produced by the same method as that described above except that the amounts of thermoplastic resin b and thermoplastic resin c were changed with the same ratio so that the mean number of functional groups [ acid anhydride groups ] contained in the matrix resin was within the range of 3 . 0 \u00d7 10 17 to 1 . 2 \u00d7 10 20 ( number of functional groups / weight of thermoplastic resin in grams ). the stampable materials were evaluated by the same method as that described above . the relationship between the mean number of the functional groups contained in the matrix resin and bending strength was examined . the results are summarized in fig1 . a stampable material was produced by the same method as that employed in example 3 except that glass fiber chopped strands not treated with aminosilane coupling agent were used as reinforcing glass fibers , and evaluated by the same method . the results are shown by triangles in fig1 . fig1 also shows the results of an example ( black dot ) in which no functional group was added . the following two glass fibers were prepared as glass fiber chopped strands : glass fiber chopped strands a ( the same as the glass fibers used in example 3 ): an average length of 13 mm , an average fiber diameter of 10 \u03bcm , 0 . 06 % by weight aminosilane coupling agent , 0 . 05 % by weight ethylene oxide sizing agent , the number of the fibers collected being 5000 / bundle . glass fiber chopped strands b : an average length of 13 mm , an average fiber diameter of 10 \u03bcm , 0 . 1 % by weight aminosilane coupling agent , 1 . 0 % by weight urethane sizing agent , the number of the fibers collected being 70 / bundle . although glass fiber chopped strands a were opened into single fibers in the paper forming process , glass fiber chopped stands b maintained their initial bundle form . a stampable material was produced by the same method as that employed in example 3 except that 11 . 25 g of glass fiber chopped strands a and 11 . 25 g of glass fiber chopped strands b were used in place of the reinforcing glass fibers used in a case wherein the mean number of the functional groups was 2 . 0 \u00d7 10 19 per gram of the matrix resin . the thus - produced stampable material was subjected to the bending test . the results of bending strength and bending modulus , and the state of split glass fibers are shown in table 6 . a stampable material was produced by the same method as that employed in example 3 except that 22 . 5 g of glass fiber chopped strands b was used in place of the reinforcing glass fibers used in a case wherein the mean number of the functional groups was 2 . 0 \u00d7 10 19 per group of the matrix resin . the thus - produced stampable material was subjected to the bending test . the results of bending strength and bending modulus , and the open state of glass fibers are shown in table 6 . table 6\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bending bending strength modulus open state ofno . ( kgf / mm . sup . 2 ) ( kgf / mm . sup . 2 ) glass fibers\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_example 3 19 . 2 685 all fibers were opened . example 3 - 1 17 . 6 625 about half fibers were collected . example 3 - 2 16 . 0 580 all fibers were collected . \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ even when the degree of opening of the glass fibers was changed , the stampable material of the present invention exhibited excellent mechanical properties . the use of the glass fibers collected improved the fluidity of the stampable material , i . e ., the moldability thereof , with increases in the ratio of glass fibers . thermoplastic resin a : polypropylene ( a weight average molecular weight of 150 , 000 , a melting point of 165 \u00b0 c .) thermoplastic resin b : hydroxyl group - modified polypropylene [ number of hydroxyl groups was 4 . 1 \u00d7 10 20 per gram of the resin b , a weight average molecular weight of 45 , 000 , a melting point of 152 \u00b0 c .] thermoplastic resin c : emulsion of maleic anhydride - modified polypropylene [ maleic anhydride modification of 10 . 0 wt % ( the mean number of acid anhydride group is 6 . 0 \u00d7 10 20 per gram of resin b , the number of carboxyl group derived from acid anhydride is calculated as an acid anhydride group ), number of carboxyl groups was 1 . 2 \u00d7 10 20 per gram of resin c , a weight average molecular weight of 32 , 000 , a melting point of 142 \u00b0 c ., an average particle size of about 0 . 8 \u03bcm , 5 . 0 wt % effective ingredient ]. 94 . 7 parts by weight of particles of thermoplastic resin a and 5 . 3 parts by weight of particles of thermoplastic resin b were charged into a henschel mixer and mixed and agitated at a temperature of 152 \u00b0 c . to obtain a resin particle composite having an average particle size of 800 \u03bcm in which thermoplastic resin b was fused in a film to particles of thermoplastic resin a . 30 . 00 g of the resin particle composite and 22 . 50 g ( the stampable material contained 40 % by weight of glass fibers ) of glass fiber chopped strands ( containing 0 . 08 % by weight of epoxysilane coupling agent ) having an average fiber length of 13 mm and average fiber diameter of 10 \u03bcm were agitated in 10 l of 0 . 8 % by weight of surfactant aqueous solution and bubbled to prepare a dispersion . the thus - prepared dispersion was poured into a web - making machine having a web area of 250 \u00d7 250 mm , and deaerated under suction to produce a web having a weight of 900 g / m 2 . the web was then impregnated with 15 . 00 g of emulsion of thermoplastic resin c by spraying [ the yield of thermoplastic resin c , contained in the emulsion and present in the web , was 100 % and the total number of functional groups was 2 . 2 \u00d7 10 19 per gram of the matrix resin ]. the web was then dried at 130 \u00b0 c . for 90 minutes . three webs having a weight of 900 g / m 2 were further produced by the same method as that described . the four webs are laminated , pre - heated at 210 \u00b0 c . and then placed between cooling boards at 25 \u00b0 c . the webs were then pressed under a pressure of 5 kgf / cm3 to obtain a solidified dense glass - fiber - reinforced thermoplastic resin composite material ( stampable material ). a bending test specimen was cut from the central portion of the stampable material in accordance with jis k7055 . the bending strength was measured by bending tests of three specimens . stampable materials were also produced by the same method as that described above except that the amounts of thermoplastic resin b and thermoplastic resin c were changed with the same ratio so that the total number of functional groups [ hydroxy groups + acid anhydride groups ] was 3 . 0 \u00d7 10 17 to 1 . 2 \u00d7 10 20 per gram of the matrix resin . the stampable materials were evaluated by the same method as that described above . the relation between the mean number of the functional groups contained in the matrix resin and bending strength was examined . the obtained results are summarized in fig2 . a stampable material was produced by the same method as that employed in example 4 except that glass fiber chopped strands which were not treated with epoxysilane coupling agent were used as reinforcing glass fibers , and evaluated by the same method . the results are shown in fig2 . fig2 also shows the results of an example in which no functional group was added . when functional groups which can combine with the silane coupling agent are present by adding thermoplastic resin b and thermoplastic resin c to the matrix resin , the bending strength is significantly improved . however , when the amount of the thermoplastic resins added is too small or excessive , the bending strength is only slightly improved . the combination of thermoplastic resins a , b and c , as shown in examples , can attain high bending strength . the bending strength is maximum in the presence of glass fibers treated with the silane coupling agent at the mean number of the functional groups contained in the matrix resin within the range of about 3 . 0 \u00d7 10 17 to 6 . 0 \u00d7 10 19 per gram of matrix resin , particularly within the range of about 3 . 0 \u00d7 10 18 to 4 . 0 \u00d7 10 19 per gram of the matrix resin . stampable materials were produced by the same method as that employed in example 3 except that the weight of the glass fibers contained in the sampling material of the case where the mean number of the functional groups was 2 . 0 \u00d7 10 19 per gram of the matrix resin was changed within the range of 5 to 80 % by weight . the relation between the weight of the glass fibers contained in a stampable material and bending strength was examined . the results are shown in fig3 . only thermoplastic resin a was used as a matrix resin , and neither thermoplastic resins b nor c were used . the relation between the weight of the glass fibers contained in the obtained stampable material and bending strength was examined . the results are shown in fig3 . the results show that high bending strength appears when the ratio by weight of the glass fibers contained in the stampable material of the present invention is about 20 to 70 % by weight . the stampable material of the present invention had excellent fluidity and caused no problem in molding various automotive products , such as bumper beams , and so on . the present invention provides a stampable material and a method of producing the same having excellent bending strength and mechanical properties . thus the present invention can advantageously be applied to many advantageous structural components required to have high strength and rigidity , e . g ., automotive members such as a bumper beams , etc ."}

{"publication\_number": "US-4905692-A", "abstract": "a fabric for medical and orthopedic applications which may be cut by severence to desired shapes without significant raveling . this is a continuation - in - part of more , ser . no . 06 / 846 , 467 , filed mar , 28 , 1986 , now abandoned which is a continuation of more , ser . no . 569 , 582 , filed jan . 10 , 1984 , which is now abandoned .", "application\_number": "US-11775887-A", "description": "in accordance with this invention it has been found that a ribbed plaited knit fabric having spandex as the plaited yarn possesses elastic deformation in both the length and width directions thereof and the ability to be precisely severed without significant raveling . further and other advantages will become apparent from a reading of the following description given with reference to the various figures of drawing . fig1 of the drawings illustrates the fabric 1 in accordance with this invention . as illustrated in fig1 the fabric extends along its length in the y direction and across its width in the x direction . as generally utilized in knitting terminology the y direction is generally referred to as the warp direction while the x direction is referred to as the weft direction . the fabric which is intended for medical and orthopedic support situations is elastically deformable in both the length and width directions and preferably may be extended from about 50 to 120 % in both directions . the fabric may be produced to have a modulus of elasticity within desired ranges by selection of appropriate spandex and tensioning . the fabric is plaited with spandex such that the spandex only exists within the central area of the fabric with the plaiting yarns coming in contact with the skin of a patient on which it is utilized . the fabric in accordance with this invention has utilization wherein limbs may be wrapped so as to provide support in the two directions of elongation and may be severed to fit a particular area of the body . additionally , the fabric may be knitted in tubular form so as to form a surgical weight hose . the fabric may be utilized for wrapping of limbs after surgery to prevent pooling of blood . additionally , stocking or wrappings of the fabric in accordance with this invention may be utilized under tubular orthopedic plaster of paris casts . previously , two sizes of stocking were required under plaster of paris casts in order to conform to the shape of a limb . however , with the dual stretch characteristics , the fabric of this invention may be utilized to conform to a tapering limb . the medical utilization of the fabric of this invention includes the coverage of burned skin to both support and isolate the burned area from the surrounding environment . due to the characteristics of this fabric whereby it does not ravel upon severence it may be utilized about portions of the body where surgery is to be performed with incision made through the fabric and into the patient . under such circumstances the elasticity of the fabric maintains the configuration of the body portion , while also preventing excessive swelling . the use of such fabric during orthoscopic surgery of the knee is an example . additionally , the fabric of this invention may be utilized to isolate portions of the body during surgery due to its ability to conform to limbs . an example is the isolation of the foot area during surgery to the leg . also , the fabric of this invention may be combined with a water impermeable lining material to aid in the isolation of such body portions . the fabric of this invention is particularly adaptable for utilization where significant movement is required , such as bandages about the knee , ankle and elbow . the two direction stretch properties permit such utilization for orthopedic support while also allowing movement . fig2 of the drawings illustrates the knit of the fabric of this invention , wherein the knitted pattern 3 is plaited with one yarn 5 being a polyurethane , preferably spandex and with the yarn 7 being a synthetic fiber , preferably polypropylene . a knit yarn feeder 50 is illustrated in fig3 for producing this result . the term &# 34 ; spandex &# 34 ; as utilized within this specification is utilized in its common generic context , meaning an elastomeric polyurethane which may be any of the fabrics sold under the trademark lycra . generally , spandex may be of 120 to about 800 denier . the knit fabric is ribbed preferably of a 1 \u00d7 1 rib . it is preferred to utilize a single stitch rib due to enhanced elasticity of such a fabric . the preferred knitting yarn is continuous filament polypropylene . preferably the polypropylene is a single ply comprising from about 20 to 40 filaments . the polypropylene may be from about 100 to 200 denier depending on the particular desired applications . the elastic characteristics in the width direction imparted to this fabric is due in part to the single - stitch rib construction as well as to the spandex plaited yarn . the spandex , however , is entirely responsible for the stretch and elongation characteristics in the length direction . to a large extent , the ability of the fabric to be severed without raveling is attributable to the presence of spandex . the fabric , if knitted without spandex , ravels to some extent , but surprising when spandex is utilized the fabric itself does not ravel . this is a surprising and unexpected advantage of this invention . as many terms are utilized within this description which are particular to the knitting art , such terms have the common meanings thereof as are described in dubied knitting manual , edward dubied and cie sa , neuchatel , switzerland , copyright 1967 , which is herewith incorporated by reference . as many variations will become apparent from a reading of the above description such variations are included within the spirit and scope of this invention as defined by the following appended claims ."}

{"publication\_number": "US-4437935-A", "abstract": "a security device is integrally combined with the fibres of the paper in a paper - making process . a carrier web of water - dispersible fibres carrying the security element is brought into contact with the paper stock during the paper - making process . the carrier web becomes rapidly dispersed upon contact with the wet stock leaving the security element firmly attached to the paper fibres in the stock . in one embodiment , the security element comprises a plastic diffraction grating structure . in a further embodiment , the carrier web comprises an open porous structure for enhancing intermixing with the paper stock .", "application\_number": "US-26985081-A", "description": "one method of providing a security feature to a paper for authenticating purposes and to prevent copying consists of the use of a carrier web ( 10 ) such as shown in fig1 . the security element ( 11 ) is first attached to a carrier web ( 10 ) which can be formed in an open and porous manner . the resulting carrier web ( 10 ) containing the security device ( 11 ) is inserted into the paper forming area prior to the actual formation of the paper ( 12 ) as shown in fig2 in such a manner that the exact location of the security device ( 11 ) can be precisely controlled in all directions . when the paper containing security device ( 11 ) needs to be authenticated as genuine , such as currency or other valuable documents , the security device ( 11 ) can comprise a diffraction grating structure . security device when in the form of diffraction grating structure will present different colors or patterns to the viewer depending upon the angle of incident light . the carrier web ( 10 ) which can be made in an open and porous fashion so that it will readily allow the formation of paper wround it , is used for handling and attaching security device ( 11 ) to surrounding base paper ( 12 ) which is formed in a conventional paper making process . security device ( 11 ) is attached to carrier paper web ( 10 ) by pressing security device ( 11 ) onto the surface of carrier paper web ( 10 ) with sufficient heat to activate a heat seal fibre or applying a non - water soluble adhesive between security device ( 11 ) and carrier web ( 10 ). the registration of carrier paper web ( 10 ) to a predetermined position on the surface of base paper web ( 12 ) insures that security device ( 11 ) will be at a predetermined position when brought into contact with bse paper web ( 12 ). this is an important feature of the invention , since security device ( 11 ) must quite often be found at a specific location on the surface of the paper . the attachment between security device ( 11 ), carrier paper web . ( 10 ) and base paper web ( 12 ) is shown in fig1 immediately before and fig3 shortly after contact . the water contained within base paper web ( 12 ) immediately causes the fibres comprising carrier paper web ( 10 ) to disintegrate such that security device ( 11 ) simultaneously attaches to the fibres which comprise base paper web ( 12 ) as shown in fig4 . fig5 shows one method for arranging security device ( 11 ) within a base paper ( 12 ). carrier web ( 10 ), having security device ( 11 ) attached in a manner similar to that shown in fig1 is fabricated from an open , porous web having a density of less than 0 . 6 grams per cubic centimeter . this is indicated in fig5 by spaced fots 19 which represent the carrier paper fibres . base paper ( 12 ) having a less porous web density of 0 . 6 - 0 . 9 gms / cc similar to that of banknote paper , is represented by dots 20 which characterize the base paper fibres . the method of placing carrier web ( 10 ) on base web ( 12 ) is similar to that for the water dispersible carrier web ( 10 ) of fig9 . however carrier web ( 10 ) of fig5 is not water dispersible . upon insertion into base web ( 12 ), fibres 20 in base web ( 12 ) deposit upon fibres ( 19 ) in carrier web ( 10 ) and become intimately formed therewith during the remaining stages of the paper making process . in order for security device ( 11 ) to remain near the surface of base web ( 12 ), exposed for ( 21 ) of security device ( 11 ) is coated with a hydrophobic material , such as silane , so that base web fibres 20 do not attach to surface 21 . fig6 shows base paper web ( 12 ) with security device ( 11 ) integrally formed therein after carrier paper web ( 10 ) has become dispersed . the integral relationship between security device ( 11 ) and base paper web ( 12 ) is shown in fig5 wherein the surface of security device ( 11 ) is coextensive with that of paper base web ( 12 ). however , if desired , security device ( 11 ) can be placed closer to or intentionally raised above the surface of the base paper web ( 12 ). as shown in fig7 security device ( 11 ) attached to carrier web ( 10 ) is placed within base fiber slurry ( 13 ) immediately before slice 16 on fourdrinier section of a paper machine . due to porous nature of carrier web ( 10 ), fibre slurry 13 drains through carrier web ( 10 ) depositing paper fibres above the carrier so that the carrier web ( 10 ) and attached security device ( 11 ) become embedded within the paper as in fig5 . fig8 shows security device ( 11 ) within carrier web ( 10 ) having porous web fibres 19 that allow base paper fibres 20 to diffuse above and below carrier web ( 10 ) to deposit security devices ( 11 ) between two layers of paper web ( 12 ). this is accomplished by the apparatus shown in fig7 and 10 . although the earlier embodiments show carrier paper web ( 10 ) localized in the direction of base paper web ( 12 ), in some security applications , as in the case of in a localized currency , for example , it is beneficial to have security devices localized across the plane of base paper ( 12 ). this is accomplished as shown in fig9 by having a plurality of spaced security devices ( 11 ), moving in the direction of base web ( 12 ) indicated by the directional arrow . for purposes of illustration carrier paper web ( 10 ) is shown as a single item . however , in practice it is more convenient for carrier paper web ( 10 ) to comprise a continuous roll coextensive with base paper web ( 12 ) and carrying an adhesive layer on security device ( 11 ). security device ( 11 ) is described as comprising diffraction grating structure made from a thin plastic film . other types of security inserts can also be employed , such as decalomania , printed patterns , and colored fibres of both paper , metal and plastic material if so desired . after carrier paper web ( 10 ) has become dispersed tinin base paper web ( 12 ), security device ( 11 ) becomes integrally formed within base paper web ( 12 ). the use of a carrier paper web ( 12 ) to support security device ( 11 ) in the manner depicted in fig1 allows very small security devices , such as microfilm , to be handled in a convenient manner and to be accurately positioned along base paper web ( 12 ) for identifying purposes , as described earlier . fig1 contains paper making cylinder mold 9 supporting base paper web ( 12 ) from slurry 13 into which carrier web ( 10 ) containing security devices ( 11 ) is continuously fed . carrier web ( 10 ) is made from porous fibres 19 , fig5 so that base paper fibres 20 can readily diffuse through to position security devices ( 11 ) within base paper ( 12 ). when carrier web ( 10 ) is fabricated from a water dispersible paper , as described for the embodiment of fig4 carrier web ( 10 ) then becomes dispersed leaving security devices ( 11 ) embedded within base paper web ( 12 ). when base paper web ( 12 ) is used for currency , either one or several security devices ( 11 ) can be used to identify the currency as genuine . the use of one security device ( 11 ) within a currency bill 8 is shown in fig9 ."}

{"publication\_number": "US-4465108-A", "abstract": "improved means are provided in a loom dobby for taking - up play in the control unit . the surfaces of the fixed and mobile blades which limit the stroke of the rocker arms in this unit are positioned perpendicular to the line joining the points of contact between the dobby hooks and knives to the mean points of contact between said blades and the rocker arms . moreover , said surfaces are concave in the fixed blades and convex in the mobile blades . the linkage which cause the mobile knives to oscillate are in the form of false articulated parallelograms .", "application\_number": "US-40536982-A", "description": "dobbies are mechanical apparatus by means of which the shed is formed in looms starting from a predetermined fabric design which is transferred in the form of code onto a punched tape , which when read by means of needles controls rocker levers which govern the movement of the heald frames . fig1 of the accompanying drawings represents a diagram of a known hattersley dobby . this diagram shows a reading unit a and a control unit b . the purpose of the reading unit a is to read a punched paper tape c , and comprises reading needles 1 , thrust rods 2 oscillating under the control of the needles 1 , pressure bars 3 for engaging and thrusting the rods 2 selected by the needles 1 , and control rockers 4 controlled by the rods 2 . the purpose of the control unit b is to determine the movements of the heald frames under the control of the reading unit a , and comprises vertical control rods 5 controlled by horizontal needles 6 subjected to the action of the rockers 4 and of return springs 7 in order to establish and remove the engagement with lifting blades 9 by way of upper end hook portions 8 . it also comprises hooks 10 pivoted at 10 &# 39 ; to the ends of rocker levers 11 which in their turn are pivoted at 11 &# 39 ; to the centre of transmission levers 12 which operate lever systems 13 for controlling the heald frames . the vertical rods 5 engage with the hooks 10 in order to raise them and lower them in accordance with commands received from the rockers 4 of the reading unit a . the hooks 10 engage with fixed knives 14 and mobile knives 15 in order to control the rocker levers 11 . engagement with the fixed knives 14 occurs when the rods 5 raise the hooks under the control of the lifting blades 9 with which the hook portions 8 cooperate . engagement with the mobile knives 15 occurs when the rods 5 do not exert positive force on the hooks . the movements impressed by the rocker levers 11 and transmission levers 12 on the lever systems 13 and thus on the heald frames , leading to the formation of the shed , derive from the combination of these engagements and the law governing the movement of the mobile knives 15 . it should be noted that in reality the fixed knives 14 have only their axes fixed , in the sense that they undergo oscillations about this latter for the purpose of facilitating their engagement with the hooks . in contrast , besides undergoing a similar oscillation about their axes ( again to facilitate engagement with the hooks ), the mobile knives move such that their axes travel along trajectories in the form of circular arcs c . it should also be noted that the hooks as a rule are lowered under the positive control of hook lowering plates 16 which ensure disengagement of the hooks from the fixed knives and facilitate their engagement with the mobile knives . in a dobby of this type , the movements of the rocker levers 11 are limited outwards by fixed blades 17 and inwards by mobile blades 18 , as clearly illustrated in fig2 . this is a control system which is difficult to effect because it is extremely easy for even considerable play to arise as a consequence of the complex trajectories along which the points 10 &# 39 ; at which the ends of the hooks 10 are pivoted to the rocker levers 11 move . in order to prevent or at least effectively limit this play ( and thus attain greater constructional precision , improved operation and greatly reduced noise of the dobby ), the present invention provides for positioning those surfaces 17 &# 39 ; of the fixed blades 17 which engage the ends of the rocker levers 11 perpendicular to the lines 19 joining the points of the contact 20 between the hooks 10 and fixed knives 14 to the mean points of contact 21 between said ends 11 &# 39 ; of the rocker levers 11 and said fixed blades 17 . furthermore , according to the invention said surfaces 17 &# 39 ; have concave profiles defined by circular arcs having their centre at the point of contact 20 between the hooks 10 and fixed knives 14 . the engagement between the rocker levers 11 and mobile blades 18 also occurs according to the invention by specially positioning those surfaces 18 &# 39 ; of the blades which engage the parts 11 &# 34 ; of the rocker levers 10 . the surfaces 18 are in fact disposed perpendicular to the lines 22 joining the points of contact 23 between the hooks 10 and mobile blades 15 to the mean points of contact 24 between the ends 11 &# 34 ; of the rocker levers 11 and the mobile blades 18 . furthermore according to the invention , those surfaces 18 &# 39 ; of the blades 18 which are designed to make contact with the parts 11 &# 34 ; of the rocker levers 11 have convex profiles defined by circular arcs having their centre at the points of contract 23 between the hooks 10 and mobile knives 15 . the invention also provides for at least one of the contact surfaces between the hooks 10 and knives 14 and 15 to be of convex profile . fig3 shows the embodiment in which said convex surface is provided at 25 and 26 on the hooks 10 , whereas the knives 14 and 15 have corresponding flat surfaces 27 and 28 for engagement with the hooks . in contrast , fig2 shows the alternative embodiment in which the convex surface is provided at 29 and 30 on the knives 14 and 15 , whereas the corresponding surfaces 31 and 32 of the hooks 10 are flat . fig3 and 4 show the small radius r chosen for the surfaces 25 , 26 , 29 and 30 in order to advantageously attain the objects of the invention . the left hand side of fig2 shows the articulated parallelogram linkage for causing the mobile knives 15 to undergo oscillation about their axes in order to obtain a small degree of play at the moment of their engagement with or disengagement from the hooks 10 , and to eliminate this play when engagement is established . said linkages comprise 132 fixed onto abutting aligned shafts 33 , 34 , levers 35 fixed onto the knives 15 and connecting rods 36 which connect the levers 132 and 35 together . according to the invention , the linkages which form the parallelogram ( with its vertices on the axes of the knives 15 , on the pivoting points of the connecting rods 36 and on the axis of the pin 37 about which the mobile knives move ) have in reality a false parallelogram configuration which without requiring any additional members or devices enables a supplementary movement of the knives to be obtained , leading to a more effective take - up of play during the operating stage than ordinary regular parallelogram linkages would allow . the invention also includes other different embodiments which fall within the scope of the inventive idea ."}

{"publication\_number": "US-6464836-B2", "abstract": "a cylinder former having a variable hydraulic pulse whilst drainage , for use in papermaking comprising a drainage means comprising a cylinder mould and a contoured member adjacent the cylinder mould having a plurality of hills and valleys which force entrained liquid through the fiber suspension forming on the cylinder mould so as to improve sheet formation . a baffle is provided in the discharge portion of the former to prevent stock build - up therein .", "application\_number": "US-27319899-A", "description": "fig1 shows a cross sectional view of a preferred embodiment of the former . former 10 includes a cylinder mould 12 which is coupled with a drainage outlet 14 which includes a fan pump ( unseen ) which sends the stock to the former and receives the entrained liquid from the cylinder mould 12 . the general generic operation of the former 10 is along the lines of those previously discussed . a paper stock inlet 16 is provided and may comprise a series of shear hoses in the cross machine direction which feeds paper stock 20 from a distributor ( unseen ). the paper stock 20 fed through shear hoses 17 is subject to an explosion chamber 18 . the former 10 further comprises a baffle 24 and a seal 26 to prevent the water drained through mould 12 from entering the forming zone 32 . when paper stock 20 encounters baffle 24 and seal 26 , the water 28 is separated from paper stock 20 to form a fiber suspension 30 . fiber suspension 30 is then passed to a forming zone 32 ( fig2 ) which further comprises an adjustable contoured section lip 34 adjacent to the cylinder mould surface 12 . adjustable contoured section lip 34 has one hinged side 36 to allow for adjustment of distances from the cylinder mould 12 and the other side an adjustable sliding mechanism 38 for rush / drag adjustment producing a paper web with md / cd ratio control similar to a fourdrinier paper machine . in this regard , the sliding mechanism 38 allows the contour section lip 34 to be adjusted in an angular basis from the pivot point 36 , by doing this operation the contour section lip 34 will be adjusted at various distances from the cylinder mould 12 because of the radial distances from the hinge point 36 and the seal mechanism 38 as well as the angular movements of the contour section lip 34 . the distance from the contour section lip 34 to the cylinder former 12 will change ( increase ) because of the radial distance from the hinge point 36 . this operation will allow to control in a very precise manner the rush drag ratio and drainage of the stock , controlling the hydraulic pulses . also , adjusting the contour section 34 provides control over the ratio between the fiber suspension velocity and the cylinder mould 12 velocity . this allows one to control the amount of water remaining in the fiber suspension 30 . the drain water 28 will flow through the cylinder mould 12 , and out of the cylinder mould 12 towards a baffle 39 located on the discharge side . baffle 39 is curved and extends in the cross - machine direction substantially co - extensive with the width of the cylinder mould 12 . drain water 28 will follow the cylinder mould 12 rotation , as shown by the arrows in fig3 . the excess water will exit at the port between the baffle 39 and the seal 26 - 24 . this process avoids the stock from build up at the bottom of the former eliminating the possibility of any plug or cylinder mould 12 jam by providing a scouring effect . turning now more specifically to fig2 it shows forming zone 32 in greater detail . at any given position on the adjustable contoured section lip 34 , the fiber suspension 30 is subject to continuous hydraulic pulses forcing the water to pass in and out of the mould 12 through the series of hills and valleys . the remaining water is drained from the contour section 34 to a flat section 40 to form a sheet of paper 42 . this flat section can also be a curved lip which follows the shape of the cylinder . in fig1 a felt 44 is then pressed by means of a couch roll 46 into a contact with the cylinder mould 12 at approximately the top position . by doing this the layer of fibers forming the sheet of paper 42 that has formed on the wire screen is transferred to the felt 44 which moves away from the forming screen with it . fig3 shows in detail the dilution zone 48 where fiber dispersions takes place and the drainage zone 49 where shear effect in boundary layers is generated . the combination of these two processes will produce a sheet of paper well - formed , free of flocks and will allow higher stock loading per former . the principle of operation of the improved former is that in the area between the contoured section lip 34 and the cylinder mould 12 , the large distances b 1 , b 2 , . . . b n therebetween is in continuous reduction as well as to the distances a 1 , a 2 , . . . a n as shown in fig4 a and 4 b . the pressure differential forces water 28 back to the cylinder mould 12 and forces fiber suspension 30 through the system as shown in fig4 b . the shape of the adjustable contoured section lip is designed in such a manner that flow separation at the boundary layers between the adjustable contoured section lip 34 is minimized or otherwise eliminated . equation to find x every 5 degrees increments x = [ c 2 \* ( 1 - cos \ue89e ( \u03b8 \* \u03c0 180 ) ) ] equation yt evaluated yt = \ue89e 1 . 4845 \u00b7 t \u00b7 sqrt [ . 437 \* c \* ( 1 - cos \ue8a0 ( \u03b8 \* \u03c0 / 180 ) ) - \ue89e 8 . 79 \* 10 - 2 \* c 2 \* ( 1 - cos \ue8a0 ( \u03b8 \* \u03c0 / 180 ) ) 2 + \ue89e 3 . 55375 \* 10 - 2 \* c 3 \* ( 1 - cos \ue8a0 ( \u03b8 \* \u03c0 / 180 ) ) 3 - \ue89e 6 . 34375 \* 10 - 3 \* c 4 \* ( 1 - cos \ue8a0 ( \u03b8 \* \u03c0 / 180 ) ) 4 ] yc = \ue89e [ m p 2 \* [ 2 \* p \* [ c 2 \* ( 1 - cos \ue8a0 ( \u03b8 \* \u03c0 180 ) ) ] - \ue89e [ c 2 \* ( 1 - cos \ue89e \u03b8 \* \u03c0 180 ) ) ] 2 ] xc value is calculated as follows xc = [ c 2 \* ( 1 - cos \ue89e ( \u03b8 \* \u03c0 180 ) ) ] - yt \* sin \ue89e ( \u03b8 ) one section of the contour lip profile is the result of plotting xc vs . y 1 the stream line that defines the contour lip is depending on the specific speed of the application and is as follows : \u03c8 = u \* y = q \* \u03b8 2 \ue89e \ue89e \u03c0 y = u \* [ c 2 \* ( 1 - cos \ue8a0 ( \u03b8 \* \u03c0 180 ) ) ] \* sin \ue8a0 ( \u03b8 \* \u03c0 180 ) accordingly , sheet formation occurs as a result of the gentle pulsation of the stock slurry and the gradual removal of water as the water / fiber mixture moves towards the discharge lip near the top of the cylinder mould 12 . the process decreases the speed of the filtration , thus uniformly distributing fines across the thickness of the newly formed sheet . the advantages of the improved former results in paper having an md / cd ratio similar to an fourdrinier machine . there is also an increase in the basis weight capacity over that of prior formers ; improvement in the paper formation at any capacity thus improving quality ; increase in production capacity ; in addition to a lower capital investment in comparison to prior art formers . the operation of the above embodiment may be enhanced by the use of an alternative embodiment shown in fig5 which further comprises a forming wire 50 , vacuum flat boxes 52 , pick up roll 54 and transfer felt 56 . the water remaining in the fiber sheet 58 is further drained by way of vacuum boxes 52 , to reach a desired dryness . after the formed sheet 58 is fed over vacuum boxes 52 , the felt 56 is fed through pick up roll 54 which will remove the formed sheet 58 for further processing . the alternative embodiment has the benefit of being able to increase the load of the former 10 without loss of paper quality or additional energy consumption . an second alternate embodiment is shown in fig6 . the former 10 further comprises a mixing roll 60 near the baffle 24 and at a point where a high consistency stock flows from the stock inlet 16 . this rotating mixing roll 60 disperses the stock and so that the former 10 may use high consistency stock ( 2 to 4 %) from the distributor . the mixing roll 60 disperses the fibers reusing the water that is presently inside the cylinder mould . the additional benefit of this embodiment is the reduction of the energy and size of the fan pump used to feed stock to the former 10 . thus by the present invention its advantages will be realized and although preferred embodiments have been disclosed and described in detail herein , its scope should not be limited thereby rather its scope should be determined by that of the appended claims ."}

{"publication\_number": "US-4773236-A", "abstract": "a device for the control of a flat - bed knitting machine for needle selection and / or the determination of the position of the carriages on the needle beds is provided with a pulse generator device having magnetically controllable resistors in the form of double differential magnetoresistors and being fixed on a first machine element , and with a magnetically conductive pulse generator board device being fixed on a second machine element . the two machine elements are movable in relation to each other and the magnetoresistors generate separate and phase - shifted in respect to each other pulse sequences during the relative movement to the pulse generator board device . so that in a device a control , especially of the needle selection , can take place at considerably higher speed a determination of direction , and if needed , an adjustment to the speed of the carriage being possible at the same time , it has been provided that the pulse generator board device has a first pulse generator board arranged along a needle bed , the tooth / grove gauge of which is finer that the finest needle gauge in the needle bed , that a pulse generator , fixed on the carriage , is associated with the first pulse generator board , the magnetoresistors of which are distant by approximately \u03bb 1 / 4 , and that at predetermined intervals several successive first rectangular control pulses are derived from the first pulse sequences phase - shifted by \u03bb 1 / 4 by detecting the crossover and comparing the normalized pulse sequences .", "application\_number": "US-9460787-A", "description": "fig1 shows a flat - bed knitting machine 11 with a v - shaped needle bed , in which only the area of the front needle bed 12 , which is fixed and disposed on a machine element 13 , is shown . the needle bed 12 is provided with longitudinally extending channels 14 in which the needles 16 are movable back and forth in the customary way with respect to the vertical longitudinal central plane 17 of the flat - bed knitting machine 11 . the needle gauge can be optionally chosen . yarn is supplied to the needles 16 via yarn guides 19 which are fastened to rails 18 extending parallel to the needle bed 12 and which are movable back and forth . along the needle bed 12 a carriage 21 is guided movably back and forth which , in addition to corresponding cam parts , supports a needle selection system 22 which , in the exemplary embodiment shown , can press the base 23 of a needle jack 24 into the needle channel 14 in the needle bed 12 for the subsequent actuation or non - actuation of the respective needle 16 by cam elements . the carriage 21 is guided by means of a guide roller arrangement 26 on a guide rail 27 fastened on the machine element 13 along the needle bed 12 . the flat - bed knitting machine 11 is provided with a control device 31 , the pulse generator device 32 of which is fixed to the carriage and the pulse generator board or control board device 33 of which is fixed in place on the machine element 13 by a board support 34 . the pulse generator board device 33 extends across the entire length of the neddle bed 12 and is swept during the movement of the carriage 21 at a short distance by the pulse generator device 32 . fig2 and 3 show in a schematic bottom and top view the pulse generator device 32 and the pulse generator board device 33 . the pulse generator device 32 has three pulse generators 36 , 37 and 38 mounted on gimbals on a support 39 and adjustably fixed . each of the pulse generators 36 , 37 and 38 , identical in the exemplary embodiment shown , has magnetically controllable resistors in the form of double differential magnetoresistors 41 , which can be bought commercially in this model with a permanent magnet , as magnetoresistor differential sensors . the pulse generator board devive 33 has three equally long pulse generator or control boards 46 , 47 , 48 arranged parallel and next to each other and designed as a soft iron element or made permanently magnetic and which are provided in different ways with teeth or grooves . the first pulse generator board 46 is swept or sensed by the first pulse generator 36 , the second pulse generator board 47 by the second pulse generator 37 and the third pulse generator board 48 by the third pulse generator 38 . in the course of the sweep of the pulse generator board 46 , 47 or 48 by the associated pulse generator 36 , 37 , or 38 the change in magnetic field strength , depending on whether a tooth or a groove of the pulse generator board is located opposite the pulse generator , is measured because the magnetic resistance in the magnetoresistors 41 change depending on the changing magnetic field strength , as described below in connection with fig4 . at this point it should be noted that , as in the front needle bed 12 , a corresponding pulse generator and pulse generator board device can also be provided at the not shown rear needle bed of the flat - bed knitting machine 11 , but that it is customarily sufficient to equip these devices on the rear needle bed only with a control device in the form of a first pulse generator and a first pulse generator board . the basic operation of the control units 36 / 46 and 37 / 47 of the control device 31 is now described by means of fig4 and 5 . in partial fig4 . 1 a gauge or period of the pulse generator board 46 or 47 , i . e . a tooth or ridge 51 and an adjacent groove 52 , are shown . when the pulse generator 36 or 37 sweeps the pulse generator board 46 or 47 , the sinusoidal pulse per period or gauge shown in partial fig4 . 2 , i . e . a total pulse sequence of a fp , is generated by one pair of the differential magnetoresistors of the pulse generator . the quality of the sinusoidal shape of this pulse sequence a fp depends on the groove / ridge ratio of the pulse generator board . the second pair of the differential magnetoresistors of the pulse generator 36 or 37 is disposed spatially displaced with respect to the first pair of the magnetoresistors of the same pulse generator 36 or 37 by a quarter of the period \u03bb of the pulse sequence or by a quarter of the groove / ridge gauge of the pulse generator board 46 or 47 , so that the result is the sinusoidal pulse sequence b . sub . fp , phase - shifted by \u03bb / 4 or 3 / 4\u03bb , 5 / 4 \u03bb in accordance with partial fig4 . 3 . in accordance with fig5 these signals are fed to a normalization and pulse - forming device 53 . in this device 53 the pulse sequences a fp and b fp , are normalized into pulse sequences a and b , because they might have differing amplitudes , as is shown in partial fig4 . 4 and 4 . 5 . these normalized sinusoidal impulse sequences a and b are then transformed in the device 53 into a total of four rectangular pulses a , b , c and d in accordance with the partial fig4 . 6 to 4 . 9 . the criteria for transformation are firstly the cross - overs of the pulse sequence a ( rectangular pulse sequence a ) and pulse sequence b ( rectangular pulse sequence b ), then the times when the normalized pulse sequences a and b are of equal size ( rectangular pulse sequence c ) and when the two normalized pulse sequences a and b are opposed and of the same size ( reactangular pulse sequence d ). these four rectangular pulse sequences a - d , phase - shifted with respect to each other , are now transformed per period \u03bb into eight shorter rectangular control pulse sequences i to viii , one single pulse of which occurs per period and of which all pulses occur per period immediately in sequence , i . e . without overlapping , filling the period \u03bb . in other words , within each gauge of the pulse generator board 46 or 47 , consisting of ridge 51 and groove 52 , eight pulses i to viii are generated , as shown in partial fig4 . 10 to 4 . 17 . the specific difference between the two control units 36 / 46 and 37 / 47 lies in the gauge of the pulse generator boards 46 and 47 . the pulse generator board 46 has a so - called 16 - gauge , i . e . per unit of length , for instance an inch , the board is provided with sixteen groove / ridge gauges . this 16 - gauge is at least equal to , however in most cases finer than the needle gauge in the needle bed 12 . this pulse generator board 46 and the pulse generator 36 associated with it are used in connection with flat - bed knitting machines 11 having standard needle gauge . the groove / ridge gauge of the second pulse generator board 47 is equipped with a more coarse gauge , namely in the present case with a 15 - gauge as shown in fig3 . this means that the groove / ridge sequence of the pulse generator board 47 is displaced within the given unit of length , for example an inch , against that of the pulse generator board 46 and overlaps differently . this is therefore also true for the pulses generated during the sweep by the respective pulse generators 36 and 37 and the eight pulses i to viii derived therefrom which take up in a defined way respectively a certain different position to each other . this results in a vernier - like disposition of the two pulse generator boards 46 and 47 or the eight pulses i to viii derived therefrom . while it is possible to detect the direction of lift of the first pulse generator 36 and thereby of the carriage 21 from the time sequence of those eight pulses i to viii derived from the control unit 36 / 46 , it is also possible , by means of the vernier - like relation of the respective eight pulses i to viii generated by the control unit 36 / 46 to those generated by the control unit 37 / 47 , to make an exact determination of the position within the common multiple of the carriage 21 equipped with the pulse generators 36 , 27 atop of the needle bed 12 equipped with the pulse generator boards 46 , 47 . this exact determination can be easily made within each groove / ridge gauge of the pulse generator boards 46 , 47 and thus within each needle gauge in the needle bed 12 , since the pulse generator boards 46 , 47 have an exactly defined spatial position in relation to the needle bed 12 . however , in this type of positional determination of the carriage 21 the individual gauge sectors , i . e . the plurality of the repetition sectors with a length of , for example , one inch ( or two inches ), must be counted . to simplify the latter , the above mentioned third control unit 38 / 48 has been provided , consisting of the pulse generator 38 , which can be identical to the pulse generators 36 and 37 , and of the pulse generator board 48 . this unit 38 / 48 is used for the generation of reference marks to show within which of the sectors of , for example , the unit of length of one inch the carriage 21 is atop the needle bed 12 . for this purpose the pulse generator board 48 is only provided with a groove 57 at individual discrete places , while the ridge 56 is made continuous . the choice of the discrete values is detemined by those locations where those pulses i to viii derived from the first unit 36 / 46 have a certain differentiable and measurable concrete relation to each other with those rectangular control pulses i - viii derived from the second unit 37 / 47 . for example , this can be specified by one of the pulses of the second unit 37 / 47 coinciding with another of the pulses of the first unit 36 / 46 or by the appearance of a certain pulse of the second unit 37 / 47 during the change of another pulse of the first unit 36 / 46 . in this manner it is possible to determine , for example , five to ten discrete values w which can be reasonably differentiated and to such positions or points in time is assigned a reference mark , i . e . a change from the ridge 56 to the groove 57 in the third pulse generator board 48 . however , these possible discrete values are distributed over the plurality of the repetition sectors , within which , with the aid of the first and second units , a positional determination along the needle bed 12 is possible . this means that reference marks are provided , distributed over the needle bed , which can indicate a certain position , so that counting of the successive repetition sectors can either be considerably reduced to the number respectively provided between two reference marks or , if counting is continued , can serve as a check only . the reference marks are distributed along the needle bed such that under all possible operational conditions at least one of these reference marks on the pulse generator board is crossed by the associated pulse generator disposed on the carriage device . the third unit 38 / 48 functions in the customary way , i . e . signals generated by the third pulse generator 38 are used directly or simply by reforming into a rectangular pulse . the calculated association and fixing of the reference marks takes place in the evaluation and calculation unit 58 in accordance with fig5 with which the third control unit 38 / 48 is also connected , if required via the pulse - forming device 53 . it is possible with the aid of these reference marks w to position the carriage at the beginning of the knitting operation at the exact needle position of the desired start position by moving the carriage to the reference mark next following and from there being able to move it to the associated needle where knitting is to start by means of the positional determination by the vernier - like disposition of the first and second pulse generator boards 46 and 47 . in the process of operation the reference marks are used during the respective passing of the carriage 21 to check by means of the vernier association and the association of the reference mark thereto and to a certain needle number whether work proceeds accurately or whether errors , for example in the pulse generator system , are present . during assembly of a flat - bed knitting machine 11 the needle beds 12 and the device 33 of the three pulse generator boards 46 to 48 is disposed such that at a per se random point along the respective needle bed 12 one of the reference marks of the pulse generator board 48 , formed by a groove 57 , has a fixed association point . this fixed reference point or , this fixed needle channel may be located at an end , however preferably in a central area , of the respective needle bed . this definite association is performed mechanically such that the device 33 with the pulse generator boards 46 to 48 fixedly arranged with each other is pinned to the corresponding needle bed in such a way that one edge of the groove 57 or , of the reference mark is flush with an edge of the corresponding needle channel 14 in the needle bed 12 . a corresponding association between pulse generator device 33 and needle bed 12 takes place in the respective machines during use of the same needle gauge always at the same place , a corresponding association in connection with each needle gauge for gauges of , for example between 21 / 2 and 12 , is newly determined in a corresponding manner . in other words , although a particular association to one of the reference marks of the pulse generator board device 33 is selected for needle beds of differing gauges , the respective pulse generator boards 46 to 48 or , their fixed disposition and association with each other remain . thus one and the same pulse generator device can be used for flat - bed knitting machines with needle beds of different gauge . the use of a needle bed 12 of a certain gauge and its fixed association with a reference mark of the pulse generator board device 33 is fed to the evaluation and calculation unit 58 and is referenced there with the gauge of the pulse generator board 46 . by means of the corresponding evaluation in the evaluation and calculation unit 58 and by means of its correspondingly changed control of the control device 31 it is possible to consider any gauges in the needle beds with correspondingly equal tooth gauge of the individual pulse generator boards 46 to 48 and to control the machine correspondingly . the high resolution of the pulses emitted by the first unit 36 / 46 results not only in a needle - correct control of the needle selection unit even at high speeds , but also makes possible an adaptation of the control to different carriage speeds . since the time needed for the creation of a magnetic field for a selection is known , the control of the respective selection system for a certain needle can be made , so to speak , during the forward motion , depending on the speed with which the carriage moves . in other words if , with a slowly moving carriage the third pulse of the eight rectangular control pulses is designated to control the selection system , with a faster moving carriage for example the second or first pulse of these eight rectangular control pulses will be so designated . this means that , depending on the carriage speed , a moving ahead of the rectangular control pulse responsible for the control takes place . furthermore the castoff times of the needles or needle jack are changed . preferably the vernier - like disposition firstly is of relevance , if the flat - bed knitting machine is switched on or switched on again to check whether the position has been changed , and secondly for the determination of the reference marks . it is to be understood that the exemplary embodiment described above has been shown only by way of example and that further embodiments and improvements are possible within the scope of the invention ."}

{"publication\_number": "US-7392558-B2", "abstract": "the present invention relates to a method and an apparatus for cleaning flat fabrics , especially sails for sailboats , in which at least one cleaning solution is applied to the flat fabric in a washing apparatus . according to the invention , it is provided that the flat fabric is moved forward continuously in its spread - out state through several cleaning stations arranged along a horizontal , planar conveyance track , without tumbling or serpentine back - and - forth bending .", "application\_number": "US-92559004-A", "description": "the cleaning apparatuses shown in the drawings are structured in a modular fashion and comprise several sequentially arranged cleaning , rinsing , supplemental treatment , and drying stations that can be exchanged or arranged in different order depending on the application . they constitute a horizontal conveyance track for the sail fabric to be cleaned , beginning with input table 1 and ending with output 2 , to which a receptacle 3 is adjoined in which the cleaned fabric is stored temporarily . in the embodiment according to fig1 , a conveyance mechanism 4 is provided between input table 1 and output 2 in the form of two endlessly rotating conveyance belts positioned at each edge that is not shown in detail in the drawing . they move sail fabric 5 , which is to be cleaned , continuously forward through all stations . input table 1 forms a pre - cleaning station 6 , at which coarse dirt can be removed , perhaps by hand , or treated and rinsed off using cleaning chemicals . at the downstream end of input table 1 , the sail fabric runs through two rollers 7 that roll against one another and are driven in opposite directions . even before the sail fabric reaches the first automatic cleaning station , it is wetted at a wetting station 8 using rinsing water that is fed by rinsing water from a rinsing station arranged later in sequence than the washing stations . the residues of rinsing water and coarse dirt yet remaining on the fabric are removed by means of a suction station , so that they are not conveyed into the first actual washing station . suction station 9 can comprise a sink running perpendicular to the direction of forward motion , to which a partial vacuum is applied . the sail fabric moved forward by conveyance mechanism 4 then proceeds to pre - washing station 10 . as shown in fig1 , pre - washing station 10 comprises a washing trough 11 extending perpendicular to the direction of forward motion , which is limited at its base by a washing trough support 12 . roller pairs 13 and 14 running adjacent to one another are positioned at an input area and an output area in washing trough 11 , with the sail fabric being passed and conveyed between them . roller pairs 13 and 14 each encompass brush rollers that are driven in opposite directions by means of a drive mechanism 15 in such a way that a brush roller is driven on each side of the sail fabric against the direction of forward movement of the sail fabric , so that it brushes across the sail in the opposite direction and scrubs dirt off of it . a suction device 16 is positioned at the output of pre - washing station 10 which likewise extends perpendicularly across the track of fabric to be moved forward . suction device 16 can also have strippers , separator rolls , and other suitable means to remove residual water . thereafter , main washing station 17 , which is structured similarly in principle to the previously described pre - washing station 10 , is positioned later in sequence than pre - washing station 10 . it likewise encompasses two roller pairs 13 and 14 that are driven by a drive mechanism 15 . another suction device 16 is then positioned later in sequence than main washing station 17 . main washing station 17 is connected to pre - washing station 10 via a recycling mechanism 18 that is not shown in detail in the drawing . in the simplest case , it can consist of a line and a blocking valve and can have a feed pump , if necessary . recycling mechanism 18 serves to recycle the washwater used in main washing station 17 back to pre - washing station 10 , at which the washwater already used at the main washing station is used again . main washing station 17 itself is supplied with fresh water via a fresh water feed 19 and with cleaning solution or chemicals via a cleaning solution dosing mechanism 20 . obviously , pre - washing station 10 can likewise have a corresponding fresh water feed and cleaning solution dosing mechanism in order to add additional fresh water and / or cleaning chemicals . suction device 16 positioned after pre - washing station 10 and / or after main washing station 17 encompasses advantageously in each case a rinsing water feed in order to rinse the sail fabric following the washing stations . suction device 16 thus forms a rinsing station at the same time . advantageously , the suction station is provided on one hand with a pressurized rinsing device and on the other hand with a suction device . after passing the main washing station , the continuously fed sail fabric is moved forward to processing station 21 . this is structured similarly in principle to the previously described pre - washing and main washing stations . however , at processing station 21 there is no washwater in the washing trough , but rather a processing bath consisting of suitable processing substances . as shown in the figure , processing station 21 , too , encompasses the previously described arrangement of roller pairs 13 and 14 with the corresponding drive mechanism . following processing station 21 , additional supplemental treatment stations 22 and 23 are provided that in turn in their structure correspond in principle to previously described washing stations 10 and 17 and have roller pairs as well as a drive mechanism . a supplemental finishing bath is held ready at supplemental treatment station 23 . instead of a bath , the supplemental treatment substances can obviously also be sprayed on . finally , after supplemental treatment station 23 , the sail fabric passes through setting station 24 , at which the supplemental substances applied previously are set . setting station 24 can in principle be structured in the same way as the washing stations previously described and can keep a setting bath ready . alternatively , the setting substance can be sprayed on . at the output end of station 24 , a pair of water extraction rollers 25 are provided that serve to remove residual moisture and form the entrance to drying station 26 . water extraction rollers 25 , which are likewise arranged perpendicular to the direction of forward motion , run adjacent to one another and are advantageously pressed against one another so that the fabric fed through them is squeezed , so to speak , in order to remove water that remains on it . drying station 26 encompasses a heatable support surface 27 , later in sequence than water extraction rollers 25 , over which the sail fabric is guided . the heatable surface causes evaporation of moisture that still remains on the sail fabric . a pressing roller 28 ensures that the sail fabric in fact runs across heated support surface 27 . a fan 29 is positioned later in sequence than support 27 , by means of which the last residual moisture can be removed . following drying station 26 , the sail fabric moves into storage receptacle 3 . an alternative embodiment of a cleaning apparatus is shown in fig2 . the basic difference vis - \u00e0 - vis the previously described embodiment is the design of the conveyor track at the cleaning stations , in particular the provision of a basically totally level conveyor track without washing troughs . similar to the previously described embodiment , a sloping input table 1 is provided at the upstream end of the washing apparatus , over which a sail to be cleaned is fed to a first conveyance roller pair 7 a and 7 b . the pair of conveyance rollers 7 a and 7 b run in opposite directions in relation to one another , so that the sail fabric is moved forward between rollers 7 a and 7 b , with their rotational axes extending basically horizontally and perpendicular to the direction of forward motion of the sail fabric . a first washing station positioned later in sequence than conveyance roller pair 7 a and 7 b is designed as a pre - washing station 10 and encompasses two cleaning rollers 13 , 14 that can be driven in opposite directions so that the sail fabric can pass through rollers 13 and 14 . cleaning rollers 13 and 14 are designed as brushes and extend with their rotational axes parallel to one another basically horizontally and perpendicular to the direction of forward motion of the sail . as shown in fig2 , lower cleaning roller 13 b is positioned in a cleaning solution receptacle or container 31 , so that its lower half is wetted by the cleaning solution in cleaning solution container 31 , so that cleaning roller 13 b applies the cleaning solution to the sail fabric passing between the cleaning rollers . in addition or alternatively , cleaning rollers 13 a and 13 b can have integrated cleaning solution spray nozzles by aid of which the cleaning solution is sprayed onto the sail fabric as it passes through the rollers . furthermore , cleaning solution spray nozzles 32 can also be provided separate from cleaning brush rollers 13 a and 13 b to spray the cleaning solution onto brush rollers 13 a , 13 b and / or directly onto the sail fabric as it passes through the brush rollers . similar to the previously described embodiment , a main washing station 17 , a follow - up cleaning and rinsing station 33 , a processing and supplemental treatment station 21 and finally a setting station 24 are positioned after pre - washing station 10 , all of which have the same fundamental structure as pre - washing station 10 , with a roller pair 13 a and 13 b running adjacent to one another , a cleaning solution or supplemental substance or setting substance container 31 , and corresponding spray nozzles 32 . conveyance roller pairs 7 a and 7 b running adjacent to one another , which in principle can correspond to the conveyance roller pair provided at the end of input table 1 , are provided between each of the sequentially arranged washing stations and supplemental treatment and setting stations . as shown in fig2 , cleaning rollers 13 a and 13 b and conveyance rollers 7 a and 7 b of the respective stations are all arranged horizontally , parallel to one another , and perpendicular to the direction of forward motion of the washing apparatus . they constitute a basically level conveyor track for the sail that is to be cleaned , that is , they all lie symmetrically at a similar distance above and / or below a common horizontal plane . the gaps for passage between the roller pairs lie in a common plane . between the roller pairs 7 a , 7 b and 13 a , 13 b , level support surfaces 34 are provided that will support the sail fabric between the roller pairs . support surfaces 34 are arranged horizontally and together form a level , horizontal conveyance surface in the form of a table . as shown in fig2 , a recycling mechanism 18 , for recycling the cleaning solution used in each station back to the station located prior to it , is provided between main washing station 17 and pre - washing station 10 , as well as between follow - up cleaning or rinsing station 33 and main washing station 17 . these recycling mechanisms 18 can operate based on the principle of gravity . in the embodiment shown in the drawing , they comprise sloping recycling tracks 35 arranged to slope down to the respective washing station positioned earlier . another conveyance roller pair 7 a , 7 b , that can be designed as water extraction rollers to remove residual moisture , is provided following the output end of setting station 24 . in the embodiment shown in fig2 , a drying station 26 is also provided following washing apparatus 30 that encompasses a heatable , steeply sloping support 27 , positioned after the aforementioned rollers 7 a , 7 b , over which the sail fabric is passed . heatable support 27 causes evaporation of moisture that still remains on the sail fabric . pressing rollers 28 ensure that the sail fabric in fact runs across heated support surface 27 . a fan can be positioned later in sequence than support 27 , by means of which the last residual moisture can be removed . following drying station 26 , the sail fabric moves into storage receptacle 3 . the described continuously running cleaning apparatus with recycling of the cleaning water against the direction of flow of the fabric possesses great advantages in terms of water and energy consumption . in addition , the conveyance of the fabric in its spread - out state is gentle on the fabric and preserves it against creasing . a preferred application of the cleaning apparatus is for the cleaning of sails . potentially , however , other large - surface flat fabrics such as tablecloths , curtains , and bed sheets can also be cleaned using the described cleaning apparatus ."}

{"publication\_number": "US-6976511-B2", "abstract": "a yarn processing system includes a weft yarn feeding device with a control unit and a power loom which consumes weft yarn . in operation , a run - signal is generated by the power loom that initializes the start - up of the weaving operation . a start - signal that is derived from the run - signal is transmitted to the feeding device . the start - signal is generated externally of the feeding device . the drive motor of the feeding device is driven at a predetermined speed , after receiving the external start - signal in order to prevent an undesired reduction of the size of a yarn store by the initial consumption demand of the start - up of the weaving operation of the power loom . a signal transmitting connection is provided in the yarn processing system between the power loom and a control unit of the feeding device for transmitting the start - signal . on start - up of the power loom , the drive motor of the feeding device is operated at a predetermined speed by the control device independent from the size of the yarn store in the feeding device .", "application\_number": "US-25700103-A", "description": "a yarn processing system s in fig1 comprises a power loom l , e . g . a water jet power or an air jet power loom , into which a weft yarn y is inserted originating from a storage bobbin 1 . the weft yarn is inserted into a weaving shed 2 and is woven into the fabric by components 3 carrying out a weaving operation ( e . g . a shed forming mechanism , a weaving reed , a warp yarn mechanism , and the like ). the power loom l includes a drive system 4 driving a main shaft 6 , and a drive sub - unit 5 for driving the components carrying out the weaving operation upon generation of a run - signal . the power loom l , furthermore , comprises an insertion arrangement e , e . g . a main nozzle 7 ( and not shown , relay nozzles along the weft path through the weaving shed 2 ) which insertion arrangement pulls off the weft yarn y from a weft yarn feeding device f . the control device c of the power loom l is associated to a control panel of the power loom l and includes a first switch 8 by which the drive system 4 can be switched on , and a second switch 9 , by which the run - signal can be generated . an electric contact switch 10 is unified with the second switch 9 which contact switch 10 upon actuation of the switch 9 generates the run - signal which e . g . by means of the sub - unit 5 will initiate the weaving operation . at least one yarn feeding device f is functionally associated to the power loom l . the feeding device f shown in fig1 is a measuring feeding device which is designed to measure the respectively inserted length of the weft yarn . an electric drive motor m for a winding element 12 is provided in a housing 11 of the feeding device . the winding element 12 winds yarn withdrawn from the storage bobbin 1 into windings on a storage body 12 . those windings form a yarn store 13 from which yarn store the insertion arrangement e intermittently will pull off the weft yarn . the yarn feeding device f comprises an on - board or an associated control device c 1 for the drive motor m . a speed adjusting device 14 may be provided at the control device c 1 . a power line 15 supplies electric power . a monitoring device 16 for the size of the yarn store 13 is provided in the yarn feeding device f . the monitoring device 16 includes at least one or expediently several sensors which transmit control signals to the control device c 1 depending from the detected size of the yarn store 13 . furthermore , a stopping device 17 having an engageable and disengageable control element 18 is provided in the feeding device f for measuring the respective weft yarn length . the monitoring device 16 may comprise sensors , which either measure the number of wound on and pulled off windings and / or which detect an operation disturbance , e . g . a yarn breakage , respectively . a signal transmitting connection 19 is provided between the electric contact switch 10 and the control device c 1 of the yarn feeding device f for transmitting a start signal x to the control device c 1 . the start signal x is derived from the run - signal of the power loom l . furthermore , a signal transmitting connection 20 may be provided from the power loom l to the control device c 1 or the stopping device 17 to transmit so - called trig signals t to the control device c 1 . the trig - signals t are generated in dependence from the rotation of the main shaft 6 of the power loom l at a predetermined rotational angle position ( e . g . by means of an encoder ) to initiate the adjustment of the stop element 18 from the shown stop position into a retracted release position . the stop or control element 18 is adjusted by the control device c 1 from the release position into the stop position shortly before a number of windings withdrawn from the yarn store 13 is reached which corresponds to the desired weft yarn length . a computerised control system having a serial data communication may be provided which also can be used for the transmission of the start - signal x . in the yarn processing system s in fig2 the power loom l e . g . is a gripper power loom comprising a bringer gripper 21 and a taker gripper 22 , both constituting the insertion arrangement of the power loom . since the grippers 21 , 22 automatically measure the withdrawn weft yarn length , the feeding device f does not need to have a stopping device for the weft yarn y . a yarn brake 25 , instead , co - operates with the storage body 12 for the yarn store 13 . the withdrawn yarn runs through a withdrawal eyelet 26 downstream of the yarn brake 25 and towards the power loom l . in this case the connection 19 \u2032 transmitting the start - signal x from the electric contact switch 10 of the switch 9 is shown as a wireless connection . the start - signal x is transmitted by means of an emitter 23 in a wireless fashion , e . g . in the form of a radio signal , to a receiver 24 of the control device c 1 of the feeding device f . moreover , the structure of the system in fig2 broadly corresponds to the structure of the system shown in fig1 . in the yarn processing system s in fig1 or fig2 , respectively , the yarn feeding device f is switched on prior to a start of operation . also the switch 8 in the power loom is actuated . a control routine may be stored in the control device c 1 of the feeding device by which the drive motor m first will adjust a predetermined basic size of the yarn store 13 . then the drive motor is stopped . upon actuation of the switch 8 the drive system of the power loom is activated . components of the power loom responsive for weaving operations do not yet move . subsequently the switch 9 is actuated which then generates the run - signal . the components of the power loom rapidly run to full action . a high start - up yarn consumption occurs rapidly . first when the main shaft 6 has rotated over a predetermined rotational angle a trig signal t for the stopping device 17 is emitted for the first time . the stop element 18 is retracted into the release position . the yarn consumption starts now . with the actuation of the switch 9 , however , the start - signal x was transmitted to the control device c 1 . in response to the start - signal x the control device c 1 switches on the drive motor substantially in synchronism with the beginning weaving operation and accelerates the drive motor to the predetermined speed , e . g . as adjusted at 14 . new yarn y already is wound on prior to the first actuation of the stopping device 17 . either with the later occurrence of first control signals from the monitoring device 16 and / or after expiration of a pre - set time duration , the drive motor control routine depending on the yarn store size will then overtake the regulation of the yarn store size for the subsequent course of the weaving operation . similarly in the yarn processing system s in fig2 the drive motor m is switched on by the start - signal x and is initially brought to the predetermined speed . this will be explained with the help of fig3 . in the upper part of the diagram in fig3 the vertical axis represents the speed v or the number of revolutions , respectively , of the drive motor m and the drive systems 4 , 5 of the power loom l . both horizontal axes show the time or the rotational angle of the main shaft 6 , respectively . in the lower part of the diagram the yarn store size ( number w of windings ) is shown on the vertical axis . at point in time t 1 the switch 8 is actuated . the curve 27 represents the now running drive system 4 in the power loom . at point in time t 2 the switch 9 is actuated , and the run - signal and the start - signal x are generated . the curve 28 represents the running of the components of the power loom carrying out the weaving operation . the curve 29 represents the acceleration phase of the drive motor m of the feeding device . the first trig - signal is emitted at point in time t 3 . first at point in time t 4 the start - up yarn consumption occurring until then would have decreased the yarn store 13 so far that the monitoring device 16 would normally respond and cause a control signal to start the drive motor . if the drive motor would be switched on first at point in time t 4 and depending on the yarn store size and would then be accelerated to maximum speed following the dotted curve 31 , the yarn store could not be sufficiently replenished to cover the high start - up yarn consumption of the power loom . according to the invention , the drive motor already is started at point in time t 2 by the start - signal x and is accelerated to a predetermined speed vd which may be lower than the maximum limited speed vmax . first at point in time t 5 the yarn store size depending control routine takes over to then regulate the speed of the drive motor m in conformity with the curve 30 . in fig3 alternatives are indicated , namely that the start - signal x for the drive motor m is generated at point in time t 2 \u2032 in advance of or at point in time t 2 \u2033 delayed with respect to the run - signal in order to drive the drive motor in accordance with the dotted curve 29 \u2032 or 29 \u2033, respectively . the lower half of the diagram of fig3 shows that the size of the yarn store 13 allowably varies between a maximum value wmax and a minimum value wmin first , and according to the curve 32 e . g . remains close to the maximum value . shortly after the point in time t 2 , i . e . after switching on the drive motor m due to the transmitted start signal x , the size of the yarn store 13 increases to then again decrease due to the high run - up yarn consumption , before the yarn store size will oscillate and finally will remain close to the maximum size . if the drive motor m would not have been switched on at time t 2 ( or with an advance or a delay at t 2 \u2032 or t 2 \u2033, respectively ), then curve 32 would continue along the dotted curve 33 and the yarn store would run empty due to the high start - up yarn consumption . since the drive motor m of the feeding device f is switched on with the start - signal upon start up of the weaving operation and is accelerated to the predetermined speed ( to maximum allowable speed or to a speed close to the maximum allowable speed ) winding on of new yarn material will start early such that in the dynamic run - up phase a floating balance condition will result between the high start - up consumption of the power loom and the already present windings plus newly wound on windings in the yarn store 13 . by this balance condition it is avoided that the yarn store size will decrease drastically and / or that the yarn store even will be emptied . herewith it is to be considered that the starting behaviour of the components carrying out the weaving operation in the power loom and the acceleration behaviour of the drive motor m do not allow an abrupt start of the full weaving capacity or abrupt acceleration to maximum speed , but that between both run - up procedures an intended dynamic co - operation occurs which reliably avoids drastic or critical decreases of the yarn store size . fig4 and 5 exemplarily indicate yarn store size depending control routines as conventional in yarn feeding devices , for clarity reasons , however , without the measures of fig3 . in fig4 the yarn store size ( number w of windings ) is shown on the vertical axis , while the horizontal axis is the time axis . maximum and minimum yarn store sizes are predetermined which should not be exceeded ( for too long a time ) . a predetermined reference size 34 of the yarn store is determined and provided for a microprocessor of the control device cl . counting or registering sensors ( not shown ) count the number of windings contained in the yarn store 13 so that the control device c 1 can control the drive motor such that the yarn store size e . g . follows a curve 35 which may oscillate about the reference size or may be raised or lowered somewhat upon demand , respectively . the dotted curve 37 indicates that the yarn store is emptied and will become emptied at a point in time t 6 , meaning that then the yarn feeding device would have to be stopped . the dotted line 36 indicates that the yarn store is overfilled and would become overfilled at a point in time t 7 , meaning that the yarn feeding device would have to be stopped . it is even possible to control the size of the yarn store without the reference sensor only by counting and calculating the wound on and the wound off windings and to control the drive motor accordingly . the yarn store size depending control routine as explained is replaced or overruled during run - up of the weaving operation by the earlier acceleration of the drive motor m , as shown in fig3 , in order to reliably cover the high run - up consumption of the power loom and to avoid operation disturbances ( curves 36 or 37 , respectively ). in fig5 the yarn feeding device f e . g . is operating with a maximum size sensor 38 and a minimum size sensor 39 which generate control signals for the control device c 1 in order to e . g . guide the development of the yarn store size along the curve 40 . in this case the control device c 1 includes an intelligent logic registering the excess of the maximum and minimum store sizes , which optionally considers the time durations of such excesses and which controls the drive motor such that the yarn store size remains below the maximum size and follows the curve 40 \u2032. the dotted curve 41 represents a not allowed overfilling which results in a stop of the yarn feeding device at point in time t 9 . the dotted curve 32 indicates an emptying of the yarn store resulting in a stop of the feeding device in point in time t 8 . the sensor 38 , 39 could be combined with the reference sensor 34 of fig4 . also the control routine of fig5 will be replaced or overruled during run - up of the weaving operation , as shown in fig3 , by an advanced start of the drive motor m with the start - signal x in order to cope with the high run - up yarn consumption of the power loom . fig6 shows the electric contact switch 10 which is actuated by the switch 9 , e . g . a push button , in order to generate the run - signal and to start the components of the power loom carrying out the weaving operation , analogously to fig1 and 2 . the contact switch 10 e . g . operates with a closure stroke h 1 until the run - signal is emitted . furthermore , a parallel switch 10 \u2032 is provided which is actuated by the switch 9 , as soon as the contact switch 10 , e . g . by means of a relay , is closed . the parallel switch 10 \u2032 operates by a closure stroke h 2 which is smaller than the closure stroke h 1 of the contact switch 10 , or the contact switch 10 \u2032 reaches its closing position earlier . upon actuation of the switch 9 the parallel switch 10 \u2032 is closed in advance to the contact switch 10 such that the start - signal x is produced with a timewise advance in relation to the run - signal for the power loom e , e . g . at point in time t 2 \u2032 in fig3 . by matching of both closure strokes h 1 and h 2 the magnitude of the advance may be set or varied or respectively . at least one closure stroke h 1 and / or h 2 may be adjusted ( arrows 43 , 44 ) e . g . by means of a manual actuator 45 . in this way the timing or the advance or the delay of the start - signal x can be adjusted or varied respectively . alternatively the advance or the delay of the start signal x could be adjusted at the feeding device f . for this purpose fig1 shows an arrangement 46 at the control device c 1 , by which arrangement 46 , e . g . with the emission of the start - signal x at the same time as the run - signal , the start - signal x for the drive motor m is generated with advance or with delay or is output further with an advance or a delay , respectively . at a yarn feeding device not having a stopping device or at a yarn feeding device having a stopping device such adjustments can be carried out by an operator after observation of the control behaviour of the feeding device in the run - up phase upon demand . for this case , e . g . several time steps may be predetermined . as a further alternative , the suitable timing by which the start signal x will switch on the drive motor m in the run - up phase could be adjusted by a self - learning program routine even automatically . the control device c 1 measures ( in fig1 in the measuring feeding device f ) the time duration between the occurrences of the run - signal and of the first trig - signal t which time duration depends from the condition of certain mechanical components in the power loom l . on the basis of the measured time duration , e . g . a delay time is automatically set with the help of several stepwise increasing time gaps , namely a delay time between the point in time of the run signal and the point time at which the start - signal x has to activate the drive motor m ( or at which the start - signal x is considered by the control device c 1 ). the same delay time automatically will be actualised for each new run - up phase . a practical value for the delay time e . g . may lie between 50 ms and 100 ms . it always is intended to switch on the drive motor m by the start - signal x just early enough prior to the first trig - signal t in order to avoid emptying of the yarn store due to the run - up yarn consumption , but also to exclude that the time duration between the consideration of the start - signal x and the first trig - signal t becomes so large that an overfilling of the yarn store cannot be excluded . basically the point in time at which the drive motor m is activated by the start - signal x , is adjusted such that both critical conditions \u201c emptying or overfilling \u201d of the yarn store are avoided and that the mentioned floating transition from the run - up phase into the normal operation can be achieved in an optimum fashion ."}

{"publication\_number": "US-5054173-A", "abstract": "a method and apparatus for the intense crimping of a multifilament yarn in a stuffer box is disclosed , and wherein a false twist is imparted to the advancing yarn at a location upstream of the stuffer box , and with the intensity of the false twist being periodically or aperiodically varied .", "application\_number": "US-51721190-A", "description": "referring more particularly to the drawings , fig1 illustrates freshly spun manmade filament yarns 1 . 1 , 1 . 2 and 1 . 3 which are withdrawn by a common feed system 2 and combined to form a multicomponent yarn 1 . the yarn 1 then advances to a false twist nozzle 4 , which will be described below . after having passed through the false twist nozzle , the yarn can be withdrawn by a further feed system , for example , a draw roll 3 . in any event , the yarn passes through a yarn treatment chamber 5 after leaving the false twist nozzle 4 . the yarn treatment chamber 5 comprises an inlet portion 6 , in which vapor jets are guided at a high velocity into the yarn passageway , and a stuffer box portion 7 , in which the yarn is formed to a yarn plug 8 . the yarn plug 8 is removed from the stuffer box portion by a feed system 10 , and lateral slots 9 are provided in the wall of the stuffer box portion 7 to discharge the vapor . the yarn plug 8 is deposited on a perforated cooling drum 11 and withdrawn therefrom and simultaneously drawn out again to a yarn by a godet 12 , as is described in more detail , for example , in de - ps 26 32 082 and u . s . pat . no . 4 , 724 , 588 . subsequently , the yarn is wound by a takeup system 13 to form a package 14 . as aforesaid , the yarn inlet portion 6 , is supplied with a treatment fluid . to this end , a fluid generator 23 is provided as well as a heating system 24 , a fluid supply duct 25 and an annular duct 26 , from which tap channels 27 proceed to terminate in the yarn passageway . prior to its entry into the inlet portion 6 of the chamber 5 , an alternating false twist is imparted to the yarn 1 , i . e ., it is false twisted with alternating s and z twists by the false twist nozzle 4 . the latter possesses a left - hand twist component 15 and a right - hand twist component 16 , which are shown respectively in fig2 and 3 . in the illustrated embodiment , two pairs of air channels 17 and 18 terminate in the yarn passageway 28 of the twist nozzle . the air channels 17 and 18 terminate each tangentially in the yarn passageway 28 , it being possible that the exiting air jets are also tangent to the direction of the yarn . the air channels 17 are directed into the yarn duct such that a left - hand twist , i . e ., an s twist is imparted . the air channels 18 are directed into the yarn duct such that they impart a right - hand twist , i . e ., a z twist . compressed air is supplied to the air channels 17 and 18 via a two - way valve 19 in such a manner that the air channels 17 temporarily receive the compressed air , and likewise the air channels 18 . the two - way valve 19 is switched by actuating means , such as , for example , magnets 21 , which are energized by a preferably adjustable frequency transmitter 22 . the frequency may be as high as 20 hz and preferably ranges between about 0 . 5 to 10 hz . it has been found that this twist insertion method intensifies the stuffer box crimping such that differences of the several components 1 . 1 , 1 . 2 , 1 . 3 no longer appear . it suffices to impart to the yarn an increasing and decreasing false twist in one direction , for example , by operating only one of the false twist nozzles 15 or 16 . in this stance , the intenstity of the twist may vary in a range between zero and a given maximum value in one twist direction . however , a more intensive treatment is accomplished by alternating the twist in both directions in the manner described above . in the drawings and specification , there has been set forth a preferred embodiment of the invention , and although specific terms are employed , they are used in a generic and descriptive sense only and not for purposes of limitation ."}

{"publication\_number": "US-4188901-A", "abstract": "a low bobbin thread detection system for sewing machines . a light source transmits a beam of light through a pair of passageways contained in the bobbin case and toward a photodetector enclosed in a shield to shelter it from stray light . the light shield contains a pair of spaced apertures whose axes are in optical alignment with the light source and the bobbin case passageways . the thread carrying bobbin lies intermediate the passageways and does not permit the transmission of light from the first to the second passageway while thread remains thereon . when sufficient thread has been consumed from the bobbin , light may pass from the light source to the photodetector . light which is directed at the shield surrounding the photodetector from any angle other than that coincident with the optical axis formed by the two apertures is blocked from impinging on the photodetector and will not falsely trigger a low bobbin thread alarm .", "application\_number": "US-639679-A", "description": "this disclosure relates to sewing machines in general and more particularly to sewing machines in which it is desirable to have a means for automatically advising the operator of the impending depletion of bobbin thread . typical low bobbin thread detection systems which operate from a photodetector sensor are known in the prior art and have frequently been of limited reliability due to the effect of stray light producing erroneous triggering of the low bobbin thread warning alarm . most attempts to eliminate the effect of stray light from such sources as room lighting and sewing machine - mounted work - guiding lights have been limited to enclosing the loop taker cavity in which the light sensitive photodetector resides with an opaque bed slide and spraying the cavity with a flat black paint treatment to reduce internal reflections from reaching the photodetector . another problem with some prior known low bobbin thread detector systems which utilize photodetectors is that the photodetector may not be conveniently aligned relative to the optical path during the manufacturing process . still another problem is that some photodetector systems resort to complex electronic filter circuits to reduce the effects of stray light impinging on the photodetector . still other prior known low bobbin thread detection systems have required the use of a specially designed bobbin which necessitated the production and stocking of more than one type of bobbin by sewing machine manufacturers . one object of this invention is to provide a low bobbin thread detection system for sewing machines which is immune to stray light in the vicinity of the photodetector . another object is to provide a low bobbin thread detection system which may be easily assembled from a minimum number of components . still another object is to provide a system which may be used with bobbins of conventional design . the above and other objects of this invention are carried out by mounting a light source on one side of the bobbin case and providing an optical path which passes through both the bobbin case and the bobbin contained therein . a photodetector is mounted on the side of the loop taker distant from the light source and along the optical axis of the path which passes through the bobbin case so that the photodetector and light source may be optically aligned one with the other . surrounding the photodetector is an opaque shield which has two walls with each wall having an aperture spaced apart one from the other through which light may pass . the optical axes of the apertures are aligned one with the other and with the optical axis of the path passing between the bobbin case and the light source . when a sufficient quantity of thread is removed from the bobbin during the sewing process to permit light to traverse the optical path between the light source and the photodetector , an electronic circuit to which the photodetector is connected is activated , which operates a signalling device to warn the sewing machine operator of the impending depletion of bobbin thread . the photodetector is immune to false triggering due to stray light by virtue of the opaque shield which surrounds it . the photodetector will only be activated by light which enters along an optical path coincident with the optical axes of the two spaced apertures in the shield and the photodetector . all other light is blocked from impinging on the photodetector . the above and other objects of this invention will become evident from a full and complete understanding of the preferred embodiment which is hereinafter set forth in such detail as to enable those skilled in the art to readily understand the function , operation , construction , and advantages of it when read in conjunction with the accompanying drawings in which : fig1 is a front view partially in section of a portion of a sewing machine having a low bobbin thread detection system constructed in accordance with the teachings of this invention ; fig2 is a top sectional view taken along line 2 -- 2 of fig1 showing the optical path connecting the components of the low bobbin thread detection system ; fig3 is a perspective view of the light shield which surrounds the photodetector ; fig . 4 is an electronic schematic diagram of a preferred embodiment of a circuit which may be used to activate a low bobbin thread warning device ; and fig5 is an electronic schematic diagram of an alternate circuit which may be used to turn on a low bobbin thread warning device . referring to the drawings , fig1 shows a portion of a sewing machine having a bed 10 and a sewing head 12 overhanging the bed 10 . the bed 10 contains a cavity 14 in which a loop taker 16 is rotatably carried on one extremity of a shaft 18 having a vertical axis . fastened to the extremity of the shaft 18 opposite the loop taker 16 is a bevel gear 20 which is driven by a second bevel gear 22 fastened to a drive shaft , a fragment of which is shown at 24 . the loop taker 16 rotates in timed synchronization to the reciprocation of a needle bar 26 which is reciprocatorily carried in the sewing head 12 . fastened to the needle bar 26 is a needle 28 which is driven in endwise reciprocatory motion through a fabric supported on the sewing machine bed 10 . the fabric may be moved along a line of feed on the bed 10 by the compound motion of a feed dog , a fragment of which appears at 30 , which acts against the thrust of a presser foot 32 which is fastened to a presser bar 34 by a presser clamp 36 . the feed dog 30 is driven in timed relation to the motion of the needle bar 26 by a mechanism which need not be understood for a full and complete understanding of the present invention . preferably a slide plate 38 encloses a portion of the cavity 14 . a throat plate ( not shown ) encloses the remainder of the cavity 14 and supports the fabric against the thrust of the needle 28 . the loop taker 16 contains a cavity 40 in which is supported a bobbin case 42 whose periphery is defined by a wall 44 . the bobbin case 42 is restrained from partaking of motion with the loop taker by means which are well known in the prior art . see for example , the u . s . patent application no . 4 , 117 , of w . herron et al ., which was filed on jan . 17 , 1979 , the teachings of which are incorporated herein by reference . contained within a cavity 46 in the bobbin case 42 is a bobbin 48 which may be filled with a quantity of thread for concatenation with thread carried by the needle 28 during the well known process of forming lockstitches . the bobbin 48 is freely rotatable within the bobbin case 42 in response to the withdrawal of thread therefrom during the sewing process . it will be readily appreciated by one skilled in the art of sewing that it is inconvenient to exhaust the supply of bobbin thread while in the middle of a sewing project . inasmuch as the bobbin is located within the sewing machine bed 10 over which is draped the garment or fabric being sewn , it will be appreciated that it is difficult to readily observe the quantity of thread remaining on the bobbin while carrying out the sewing process . to the end of alleviating the problems attendant with observing the quantity of bobbin thread , a mechanism which will signal the sewing machine operator to the approaching exhaustion of bobbin thread will find particular utility in minimizing the inconvenience of running out of bobbin thread during a sewing project . the low bobbin thread detection system disclosed herein is carried out by placing a light source consisting ( as but one example ) of an electrically operated bulb 50 and a collimating lens 52 on one side of the loop taker 16 and a light sensitive photodetector 54 on the opposite side of the loop taker 16 distant from the light source ,. fig2 best shows that a first horizontal passageway 56 and a second horizontal passageway 58 are formed in the wall 44 of the bobbin case 42 so that the optical axes of the of the passageways 56 and 58 form an optical path which permits light radiated from the bulb 50 to pass through the bobbin case 42 and impinge on the photo - detector 54 . it may be seen from fig2 that the optical axis formed by the passageways 56 and 58 are arranged in an optical alignment which traverses exteriorly of a central core 60 which is arranged between a pair of end flanges 59 and 61 at the center of the bobbin 48 so that when thread is wrapped around the core 60 , light will not pass from the passageway 56 to the passageway 58 . however , upon the consumption of a quantity of bobbin thread sufficient to expose the passageway 58 to transmission of light from the passageway 56 , light will be allowed to pass therethrough and will illuminate the photodetector 54 . the position of the passageways 56 and 58 relative to the core 60 is chosen so that when light traverses the path from the passageway 56 to the passageway 58 , a sufficient quantity of bobbin thread will remain on the core 60 to permit the operator to discover the impending depletion of thread before fully exhausting the supply of bobbin thread . stray light which may be present in the vicinity of the photodetector 54 is precluded from impinging thereon and hence providing an erroneous indication of the impending exhaustion of bobbin thread by enclosing the photodetector 54 within a photodetector shielding means shown generally at 62 in fig2 . it will best be appreciated from a review of fig3 that preferably the shield 62 has an outside wall 64 and an inside wall 66 , the inside wall 66 being spaced between the outside wall 64 and the photodetector 54 . preferably , the photo - detector 54 is mounted a distance behind the inside wall 66 . preferably , there are formed through the outside wall 64 and the inside wall 66 a pair of spaced apertures , the outside wall 64 containing a first aperture 68 and the inside wall 66 containing a second aperture 70 . the cross sectional area of the apertures is chosen so that a sufficient quantity of light will impinge on the photo - detector 54 from the light source to cause the activation of a low bobbin thread signalling means . the apertures 68 and 70 have optical axes which are aligned so that they are coincident with the optical axis of the light source and the optical axis of the photodetector 54 . preferably the shield 62 is mounted on a board 72 to which are also fastened the electronic components which control a signalling means for warning the sewing machine operator of the impending depletion of bobbin thread . the board 72 is fastened to the sewing machine bed 10 by a fastener such as the screw 74 which passes through an elongated slot 76 and which constitute a means for aligning the photodetector 54 relative to the optical axes of the passageways 56 and 58 and the light source , by loosening the screw 74 and rotating the board 72 until the proper alignment is obtained . it will be apparent from a review of fig1 and 2 that stray light from either the light source 50 or a source external to the loop taker cavity 14 is precluded from impinging on the photodetector 54 since it would be required to enter the shield 62 by passing through both the first aperture 68 and the second aperture 70 . light which enters the first aperture 68 from any direction other than that which is coincident with the optical axes of the passageways 56 and 58 will strike the inside wall 66 and will not pass through the second aperture 70 to reach the photodetector 54 . fig4 shows a preferred embodiment of an electronic circuit which comprises a photodetector analyzing means for triggering a signalling means responsive to the state of the photodetector 54 . an operational amplifier 78 is used as a comparator to compare the voltage across the parallel combination of a resistor 80 and a capacitor 82 to a reference voltage on a line 84 . when the photodetector 54 is illuminated by light from the bulb 50 , its electrical resistance decreases , causing the voltage across the parallel combination of the resistor 80 and the capacitor 82 to increase . when the voltage across the resistor 80 and the capacitor 82 exceeds the reference voltage on the linke 84 , the operational amplifier 78 is triggered and turns on the low bobbin thread signalling means shown preferably as a light emitting diode 86 . a resistor 88 is placed in series with the diode 86 to limit the current drawn thereby . it is to be understood that the capacitor 82 acts as a filter to preclude the triggering of the operational amplifier 78 by noise produced by the bulb 50 , machine vibrations , electrical transients , and the like . with the electrical configuration shown in fig4 the signalling means 86 will flash each time that the optical path between the bulb 50 and the photodetector 54 is interrupted , as for example , when the bobbin 48 is drawn into the optical path between the aperture 56 and the aperture 58 during the removal of bobbin thread therefrom during the sewing process . fig5 shows an alternate embodiment of an electronic circuit which may be used to operate a signalling means in response to the depletion of bobbin thread . a resistor 90 and a resistor 92 operate to provide a positive triggering point to the operational amplifier 78 so that when the signalling means 86 is first operated by light impinging on the photodetector 54 , the operational amplifier will continue to operate the signalling means 86 irrespective of whether the photodetector 54 is being illuminated by the bulb 50 . the signalling means 86 will be extinguished when the bobbin is refilled with thread . it will be apparent from the foregoing description that the photodetector 54 will be illuminated only when a sufficient quantity of thread has been withdrawn from the bobbin 48 so that an optical path free of any intermediate impediment exists between the passageway 56 and the passageway 58 . illumination of the photodetector 54 will thereafter result in operation of the signalling means 82 by the photodetector analyzing means , thereby mitgating the possibility of the complete exhaustion of bobbin thread by the sewing machine operator while engaged in a sewing project . from the above detailed description of a preferred embodiment of the invention it will be seen that a novel low bobbin thread detection system is provided which is relatively immune to false indications from stray light leaking into the loop taker cavity . the components of the system are easily constructed and aligned , and provide the sewing machine operator with a positive warning of the impending exhaustion of bobbin thread . while the invention has been described in its preferred embodiment , it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the spirit and scope of the invention as set forth in the appended claims ."}

{"publication\_number": "US-4254641-A", "abstract": "a spin brake and brake release mechanism for an automatic washer or other spinning drive mechanism has a pair of brake shoes applied by a spring but released by a rotating cam mechanism . the brake operating mechanism rotates with the spin basket . the brake drum is connected to the stationary parts of the machine . as the release cam rotates , it acts against cam follower areas of the brake shoes to release the shoes from the drum .", "application\_number": "US-3911779-A", "description": "an automatic laundry appliance is generally illustrated in fig1 at 10 as comprising a tub 19 which has a perforate clothes container or spin basket 21 contained in the tub 19 and an agitator 22 vertically disposed within the spin basket 21 and mounted for oscillatory movement with respect thereto . the basket 21 is mounted for spinning movement during centrifugal extraction of water from the clothes within the basket 21 . the tub 19 , the spin basket 21 and the agitator 22 and a drive mechanism 23 for the appliance are contained in a cabinet 11 . the cabinet 11 has a top 12 having a hinged lid 13 which is opened to afford access to a clothes - receiving opening 24 which is defined by a tub ring 20 extending about the tub and over a corresponding opening in the spin basket 21 . the appliance 10 also has a suitable control means including a timer dial 16 connected to a timer 15 which is mounted on a control panel portion 14 of the cabinet 11 . suitable wiring connects the timer 14 to the drive mechanism 23 and to other electrical components of the appliance to control operation of a wash cycle including a wash portion and a spin portion . the timer dial 16 and the timer 15 may be mounted in any desired location and are shown in the present location for illustrative purposes only . all components inside the cabinet 11 are supported by struts 17 , having a suspension system 18 connected thereto to minimize vibration . referring to fig2 the drive mechanism 23 also operates a liquid pump 43 having hoses 43a connected thereto . the drive mechanism 23 , and other components such as the transmission housing 32 and the motor housing 42 are suspended from a mounting plate 25 by mounting means such as a bolt and sleeve arrangement 36 . the tub 19 is also mounted to the mounting plate 25 by means of bolts such as 26 . a grommet 41 maintains a watertight relation between the tub 19 and an agitator shaft encasement column 40 . a brake mechanism 35 operates in association with an agitator shaft 30 and a spin tube 33 , and is mounted to the mounting plate 25 . the brake mechanism 35 is shown in greater detail in fig3 , 6 , 7 and 8 . the agitator 22 is attached to the agitator shaft 30 by threaded attachment means 31 and the spin basket 21 is attached to the spin tube 33 by a drive block and nut attachment means 34 . as shown in greater detail in fig3 a seal between the spin tube 33 and the agitator encasement column 40 is provided by a bearing 112 and a pair of seals 111 and 110 . the seals 110 and 111 have lips 110d and 111d respectively on an inner surface thereof to form a lip seal between the rotatable spin tube 33 and stationary encasement column 40 . a reinforcement member 29 is disposed between the agitator encasement column 40 and the base plate 25 and is rigidly affixed to the column and the plate . a circular dish - like member 70 is attached to the underside of the reinforcement member 29 and extends downwardly therefrom . thus , the dish 70 , the reinforcement member 29 , the agitator encasement column 40 and the mounting plate 25 are all stationary with respect to the agitator shaft 30 and spin tube 33 . oscillatory motion is imparted to the agitator 22 by the agitator shaft 30 during a wash portion of a cycle of operation as follows . a drive motor contained in the motor housing 42 has a drive shaft 120 ( fig4 ) which rotates a worm gear 85 disposed beneath a main drive gear 83 in the transmission housing 32 . referring again to fig3 the worm gear engages teeth 84 on a lower surface of the drive gear 83 to rotate the gear 83 about a vertical jack shaft 80 . the jack shaft 80 is parallel to the agitator shaft 30 . the agitator shaft 30 is received in a receptacle 44 in the housing 32 and rotates on a bearing 45 and a bearing surface 46 . an eccentric 95 is integrally formed on an upper surface of the main drive gear 83 . as best shown in fig3 and 4 , a rack 92 has a first end which is carried in mating relationship with the eccentric 95 and a second end which surrounds the agitator shaft 30 . the second end has teeth 94 thereon which engage teeth on a circumference of a pinion 52 ( fig3 ). the pinion 52 is freely rotatable about the agitator shaft 30 , and a clutch means 37 selectively engages the pinion with the shaft 30 for co - rotation therewith . the rack 92 is moved in reciprocating motion by the eccentric 95 in a plane normal to the agitator shaft 30 , so that the reciprocating motion is transferred to the shaft 30 through pinion 52 and clutch 37 , oscillating the agitator 22 . during this portion of the cycle of operation , the spin basket 21 is maintained stationary relative to the cabinet 11 as described below . after the wash portion of the operation cyle has ended the clutch means 37 is disengaged so that the agitator shaft 30 is no longer drivingly connected to the drive gear 83 . disengagement of the clutch means 37 requires one complete rotation of the main gear 83 , and a delay mechanism 91 is mounted on a bearing plate 97 on the main gear 83 to provide such a delay . the delay mechanism 91 rotates on the eccentric 95 in a channel 90 in a bottom surface of a spin gear 81 . the spin gear 81 is also mounted on the jack shaft 80 and is rotated with main drive gear 83 when the delay mechanism 91 is in engagement . all elements are maintained in adjacent relationship on the jack shaft 80 by means of a bearing washer 78 held in place by a snap ring 79 . the spin gear 81 has teeth 82 on a circumference thereof which engage teeth 108 on a circumference of a spin collar 107 which surrounds the agitator 30 . the spin collar 107 is in co - rotational relation with a clutch or drive means 200 including a clutch member 55 . the spin collar 107 has a vertical fluted end 60a on an upper portion interfitted with three drive lugs 60b ( only one shown ) of a central hub portion of the clutch member 55 . an internal spring wire ring 60c in a groove in the collar 107 maintains the interfitted relationship of the collar and clutch member . a snap ring 125 is mounted on the agitator shaft 30 immediately above the fluted end 60a . a pair of bearing washers 66 and a thrust washer 61 rest on the snap ring 121 and also surround the agitator shaft 30 , but are freely rotatable with respect thereto . the bottom of the spin tube 33 rests on an upper one of the bearing washers 66 . the interior of the clutch member 55 is shown in detail in fig5 . a strip of glass filled teflon frictional material 56 is in frictional engagement with an inner surface 55a of a vertical wall of the clutch member 55 and is attached to a clutch band 57 which also extends around the interior of the clutch member 55 . the clutch band 57 has two inwardly projecting ends 62 which abut a pair of caps 67 to receive ends of a biasing spring 68 to bias band 57 and material 56 against the interior wall 55a . a rotatable cam member 64 , mounted coaxially with the agitator shaft and freely rotatable with respect thereto , has a lower arm 63 which extends into the interior of the clutch member 55 ( see fig3 ). the clutch 200 is of the constant torque variety and operates as follows . band 57 is rotated through frictional engagement with the rotating clutch member 55 until the end 62 of the band 57 contacts the lower arm 63 of cam member 64 . the torque resulting from the resistance of the cam member 64 , and its associated drive train members to be hereinafter described , increases as the clutch member 55 is driven against cam arm 63 . as the torque increases the bias spring 68 is compressed , thereby shortening the diameter of the band 57 and reducing the frictional force exerted by frictional material 56 on the inner wall 55a of clutch member 55 . when the torque exceeds the frictional force the material 56 and band 57 will slip relative to the inner wall 55a of clutch member 55 . therefore , only so much torque as is required to cause slippage between the frictional material and clutch member 55 is transmitted to the drive train beyond cam 64 . at the beginning of the spin cycle , the torque required to rotate the arm 63 is at a maximum and slippage occurs as the engagement of the end 62 and arm 63 begins to drive the basket 21 . as the basket 21 begins to rotate faster , the torque needed to rotate the basket becomes less , so that the frictional force provided by the spring 68 provides a torque equal to that required to rotate the basket 21 and the frictional material 56 and band 57 rotate with the clutch member 55 . referring to fig3 and 7 , the cam member 64 has a cam 65 of generally oblong shape integrally mounted on the top thereof with two opposite camming surface portions 65a and 65b and two parallel surface portions 65c . the cam surface portions 65a and 65b are of the same shape and as shown on surface 65a increase in radial distance from the spin tube 33 from point 69a to point 69b . as shown in fig3 the cam 65 extends upwardly between two brake members 72 and 73 . as shown in fig3 and 7 , the brake members 72 and 73 are disposed in adjacent horizontal planes , normal to the agitator shaft 30 . the brake members 72 and 73 each have vertically disposed outer shoes 104 and 105 respectively . the shoes each have attached thereto identical strips of frictional material 71 . the brake members 72 and 73 can be pivotally moved to place the material 71 in frictional engagement with a vertical interior surface 70a of the dish 70 . the brake members 72 and 73 pivot about a common pivot 106 . each brake member has an identical cap 114 at an end thereof which receives an end of a biasing spring 113 . the spring 113 normally maintains the shoes 104 and 105 in frictional engagement with the vertical surface 70a . referring now to fig7 the brake member 72 has a cam follower arm 116 and the brake member 73 has a cam follower arm 115 each of which abut the cam 65 . when the cam 65 is rotated to the position shown in fig7 the radial distance from spin tube 33 to the surface portions 65a and 65b increases and moves the arms 115 and 116 outwardly from the tube . this pivots the brake members 72 and 73 about the pivot 106 so that the shoes 104 and 105 are moved away from the wall 70a , disengaging the frictional strips 71 from the wall . when the cam 65 is rotated in an opposite direction so that the arms 115 and 116 abut the parallel surfaces 65c , the arms 115 and 116 are free to move closer together and are forced to do so by the biasing spring 113 , so that the frictional material engages the inner wall 70a . as shown in fig6 a plate 74 is disposed generally above the brake members 72 and 73 and parallel thereto . the pivot 106 extends upwardly into the plate 74 . the plate 74 is rigidly attached along the flange 76 , such as by welding , to the spin tube 33 , so that the plate 74 and spin tube 33 are co - rotational . the plate 74 has downwardly extending tabs 75 which limit the inward movement of the brake members 72 and 73 . limiting the inward movement of the brake members 72 and 73 also limits the rotational movement of the cam 65 , because the arms 115 and 116 prevent rotation of the cam 65 beyond a distance necessary to move the brake members 72 and 73 into contact with the tabs 75 . operation of the brake mechanism is as follows . during an agitate portion of the wash cycle rotation of the worm 85 in one direction rotates main drive gear 83 so that the delay means 91 does not engage the spin gear 81 . thus , the spin gear 81 , the spin collar 107 , the clutch member 55 , the expandable band 57 and the cam member 64 remain stationary . the parallel surface portions 65c of the cam surface 65 are adjacent the brake cam follower arms 115 and 116 so that the bias spring 113 maintains the shoes 104 and 105 are frictional material 71 against the wall 70a of the stationary dish 70 . through pivot 106 and plate 74 , the spin tube 33 and thus the spin basket 21 are held stationary . when , at the beginning of the spin portion of the cycle the direction of rotation of the motor and thus worm 85 is reversed under the control of timer 15 , the delay means 91 engages the spin gear 81 so that the spin gear 81 rotates on the jack shaft 80 . the teeth 82 on the spin gear 81 engage the teeth 108 to rotate the spin collar 107 , which in turn rotates the clutch member 55 . rotation of the clutch member 55 drives the band 57 in rotation through frictional material 56 . as the band rotates , the end 62 thereof moves into engagement with the arm 63 on the cam member 64 . the cam member 64 and the cam 65 mounted thereon are rotated by the band 57 . the cam 65 rotates only a distance sufficient to move the brake arms 115 and 116 about the pivot 106 so that the brake members 72 and 73 abut the tabs 75 on the plate 74 . the shoes 104 and 105 and frictional strips 71 are thus moved away from the dish 70 so that the spin basket 21 is free to rotate . the cam , fixed in the position shown in fig7 continues to be rotated by the end 62 of the band 57 . the brake members 72 and 73 and the plate 74 are in co - rotatable relation when the cam 65 is in such a position . because the members 72 and 73 engage the tabs 75 , and the pivot 106 extends through both brake members and the plate 74 , the entire brake member - plate combination is rotated , causing the spin tube 33 which is attached to the plate 74 and the spin basket 21 to rotate . in accordance with such operation , a drive train from the worm 85 to the spin basket 21 is completed comprising the main gear 83 , the delay mechanism 91 , the spin gear 81 , the spin collar 107 , the clutch member 55 , the friction material 56 and band 57 , the cam member arm 63 , the cam member 64 , the cam 65 , the brake arms 115 and 116 , the brake members 72 and 73 , the plate 74 and the spin tube 33 . when the rotation of the main gear 83 slows or ceases rotation for any reason , such as a power shut - off due to an automatically opening switch activated by opening the washer lid 13 , end 62 of the clutch band 57 separates from cam arm 63 . the spring 113 then forces the brake arms 115 and 116 together again , rotating the cam 65 back into a position so that the parallel faces 65c are adjacent the brake arms 115 and 116 . the shoes 104 and 105 and frictional strips 71 move against the dish inner wall 70a , thereby stopping rotation of the brake member - plate combination , so that the rotation of the spin tube 33 and spin basket 21 is also stopped . an alternative form of the preferred embodiment of the clutch and brake mechanism is shown in fig9 and 10 . the mechanism is basically the same as that previously described and the same reference numerals and therefore used for similar parts . the only modifications to the previously described mechanism are the addition of rollers to the cam follower arms 115 and 116 to provide less friction with the cam surfaces 65a and 65b which in this embodiment are metal . the rollers 122 are rotatably mounted on pins 123 . the pins 123 are supported between the arms 115 and 116 and folded over tabs 121 respectively . further , as shown in fig1 , the cam 165 is made of steel and set into the cam member 64 . the shape of the cam surfaces on cam 165 are the same as those of cam 65 . thus , the cam follower arms 115 and 116 have rollers 122 riding on metal cam 165 to provide a more frictionless cam to cam follower interface . although changes and modifications of the present invention may be apparent to those skilled in the art , it should be understood we wish to include within the patent warranted hereon all such changes and modifications as may reasonably and properly be included within the scope of our contribution to the art ."}

{"publication\_number": "US-2010000195-A1", "abstract": "a unique formulation for yarn from a novel combination of fibers of polyester and silver which is made by a special manufacturing process including proprietary individual steps . the formed yarn product is durable and useful and can be used to make various fabrics and / or materials and , most particularly , to make final products that possess highly advanced characteristics , particularly fire retardant properties and antimicrobial properties .", "application\_number": "US-45906809-A", "description": "the present invention provides a unique composition for a yarn composition made from a blend of polyester and silver , as well as a novel sequence of processing steps for the manufacturing thereof . this preferred embodiment describes herein is only a single example of the unique construction for yarn combining this above - described blend . this disclosure illustrates only a example of a novel type of processing that can be utilized for the manufacturing of such yarn . it should be appreciate that other similar steps can be included in other similar methods and still come within the general overall contemplated concept of the present disclosure herein for the method of producing yarn shown herein as well as for the composition of the yard so produced . usually the blend from which the yarn of the present invention is made will include polyester fiber staple which can be purchased in fiber lengths of approximately 30 to 60 millimeters in length . this specific length is preferred but other lengths somewhat outside of the range defined above will also provide usable . the choice of fiber length can be carefully chosen in order to be able to produce fine count yarn if required for a specific application . silver stock fiber is then purchased in longer fiber lengths which is then cut to be complementary to the length chosen for the polyester staple . as such , normally the various component fibers used for form the yarn of this invention will include fibers all having approximately the same length , but this requirement can vary significantly depending upon the application and use for the finally formed yarn . the polyester fiber staple used in the present invention will preferably comprise a commercially available trevira brand 350 cs 100 polyester fiber that has high flame retardancy characteristics . this fibrous material is readily available and is extremely beneficial because it can be used in those applications that require advanced levels of fire retardancy such as hospitals . in the preferred configuration of the present invention , the polyester trevira brand fibers , otherwise known collectively as polyester staple , will comprise approximately 94 % of the initial mixture of fibers used to ultimately form the yarn . these trevira polyester fibers will preferably be chosen specifically due to the better flame retardant characteristics thereof . a silver staple component will then be added to an extent such as to comprise approximately 6 % of the overall physical mixture of fibers . as such , the preferred overall ratio of polyester trevira staple to silver staple in the initial mixture of fibrous components will be 94 % to 6 %, respectively . the proper initial proportions of polyester staple and silver staple are initially physically placed within a container or large vat and are mixed to a limited extend . this physical mixing preferably is performed manually utilizing a hand tool such as a large wooden spatula , but it should be appreciated that any other means for physically mixing the fiber components together initially can be used . it should be understood that such physical mixing of the fibers has physical limitations due to the fibrous nature of the components and , thus , only a moderately thorough physical mixture can be achieved at this time in the process . once this moderate mixing of the initial fibrous components within the vat has been completed , the entire content of the vat is then sprayed with a clear translucent liquid ceramic material which comprises a first type of ceramic material . this first ceramic material is quite similar to a paint without a pigment since it is both clear and translucent . this liquid ceramic spraying step coats all portions of the mixture of the fibrous materials throughout the container or vat . these fibrous materials which are now coated with the clear translucent liquid first ceramic spray will then physically be mixed again preferably manually with a wooden spatula in a similar manner as performed previously in order to further mix both the fibers with the liquid first ceramic material sprayed into the vat . the next step in this process is to initiate the blending of this fiber mixture by opening of the fibers . forming a homogeneous mixture of such fibrous material is only possible after the fibrous material is made substantially opened such as by carding thereof . individual batches of any size but preferably 20 pounds to 100 pound of the fiber mixture are removed from the vat and placed into the blending chamber of a textile carding machine . the carding machine for the present invention , preferably , is a wolf carding machine which uses a type of card having special coarse teeth for the purpose of very gently and slowly opening and blending this mixture of different fibers , some of which can be very delicate , especially the silver staple . this type of carding machine is utilized specifically to open such fibers in order that they can be homogeneously blended together . this opening and homogeneous blending occurs very slowly with the use of such a coarse card in the carding machine and , thus , requires a longer period of time with a number of individual passes of the batches of fibrous material used for effectively opening and blending the , mixture . as many as two individual carding steps may be required over a time period of as long as one to two hours may be needed in order to achieve full and complete homogeneous opening and blending of the fibrous mixture . this considerably long length of time is required due to the fact that a card that is being used for this carding process uses very coarse or open teeth as opposed to a fine toothed card which is normally utilized for other carding processes and achieves mixing and blending faster but treats the blended material more roughly . in the present invention it is important to appreciate that such a fine toothed card can not be utilized because such a card could cause clogging or agglomerating of the silver fibers together which would prevent the thorough mixing thereof homogeneously throughout the overall fibrous mixture . the wolf carding machine described in this invention is commonly used for carding other materials such as wool . by modifying the configuration of the teeth to be more coarse , it can be converted such it can be used to provide a slower carding process as needed for the present unique combination of polyester staple and silver staple . once carding of the mixture in the vat is finalized , then all the fibers will be opened and the final mixture will be completely homogeneous . it is then possible to spin the blended fiber into yarn by a process of sequential steps . at first the blended homogeneous fiber material is formed into a sliver form which is somewhat tighter than the initial final carded mixture . the consistency of the fibrous mixture is then made further tighter by placing it into a roving form . this roving is then wound onto roving spools or bobbins and it moves into a spinning frame to facilitate spinning directly into the final yarn form . the final spinning step takes the blended fiber which has been formed into sliver and roving and spins it into yarn . at this stage the yarn needs to be lubricated to facilitate weaving characteristics thereof for forming of fabrics and material and to facilitate winding thereof onto cones . for this purpose a paraffin and ceramic wax mixture is applied onto the spinning yarn as it is wound onto the cones . the paraffin component of the wax mixture lubricates the yarn to enhance knitting characteristics thereof to facilitate use thereof in forming woven materials and products . the paraffin also facilitates the winding of the yarn upon cones . the ceramic component of this ceramic and paraffin coating is chosen to be a second ceramic material which is chosen to be a different type of ceramic as compared to the first ceramic material . the first ceramic material and the second ceramic material are specifically chosen such that when mixed together and heated , these two different types of ceramic material can chemically react to form platelets which will encapsulate the finally formed yarn for enhancing the structural integrity thereof . the next step in the process to form the yarn is to steam heat the yarn or heat scour it within a heating chamber at a temperature of approximately 180 degrees fahrenheit which will molecularly bond the first ceramic material to the second ceramic material together in the foil of tiny platelets encapsulating the yarn for stabilizing thereof . as such , the final yarn product is significantly strengthened by the combination of the heat treating of the first and second ceramic materials and is simultaneously lubricated by the paraffin component of the final coating step . in this manner the process of the present invention imparts an anti - microbial characteristic to any products made from the yarn while also maintaining the highly desirable elevated levels of fire and flame retardancy not known or available heretofore in combination with one another in a yarn material . while particular embodiments of this invention have been described above , it will be apparent that many changes may be made in the form , arrangement , sequencing and positioning of the various elements of the combination of element subject to this patent application . in consideration thereof , it should be understood that preferred embodiments of this invention disclosed herein are intended to be illustrative only and not intended to limit the scope of the invention ."}

{"publication\_number": "US-5059281-A", "abstract": "a batch process and mechanism for cooking fibrous paper pulb including a digester wherein the pulp is cooked under elevated temperatures and pressures for a predetermined time , a discharge line leading from the lower end of the digester to a blow tank , a valve in the discharge line and cycling means connected to the valve cyclically opening and closing the valve while the contents are emptied from the digester .", "application\_number": "US-41207989-A", "description": "referring now more specifically to the drawings , fig2 illustrates a digester 10 of the prior art which , during a cooking operation , is loaded with chips through a top opening 10a and sealed . the cooking process is begun by admitting cooking liquor through suitable lines , not shown , and elevating the temperature and pressure by heating means , not shown . the elevated temperature and pressure , often with liquor recirculation , are maintained until the desired degree of delignification has been achieved . after completion of the cooking process , the contents of the digester is blown downwardly through opening 11 at the bottom of the digester . the blow line is schematically illustrated by arrow 12 , and leads to an atmospheric blow tank . while the contents may be blown by the release of pressure causing the heated liquor to flash into steam to apply a downward pressure to the top surface of the chips , as in conventional blow methods , additional fluid under pressure may be added through line 13 to force the contents of the digester downwardly . this fluid may be in the form of pressurized steam , pressurized air or other non - condensible gas , or fluids such as washer filtrate , spent liquors and the like . the fluid may be other fluid nascent to the digester system . it has been found that , by keeping the blow valve open , initially plug flow is experienced through the blow line ; however , after a short period of time into the blow cycle , the stock exiting the digester becomes slushy and foamy , indicating a break through due to gradual vortex formation as illustrated by the diagrammatic vortex line 14 . the consistency of the stock flowing from the blow line varies significantly , and the problems relating to sulfur - containing gaseous emissions are experienced . the blow may or may not be complete . within the digester 10 , the vortex is believed to be formed by the force resulting from the horizontal and vertical force components experienced during continued blow of the stock contents . the horizontal forces &# 34 ; a &# 34 ; occurring in the digester are indicated by the vector identified by numeral 15 at the upper end of the digester , and at the lower end of the digester by the vector identified by numeral 16 in fig2 . the horizontal forces shown at &# 34 ; a &# 34 ; are due to the centrifugal action which tends to react perpendicular to the side wall . the vertical forces &# 34 ; b &# 34 ; occur due to gravity and overpressure , and act axial in the digester , parallel to the side wall . the vertical force component &# 34 ; b &# 34 ; is identified by numeral 17 in the vector diagram at the top of the digester and by numeral 18 in the vector diagram at the bottom of the digester shown in fig2 . the resultant force &# 34 ; r &# 34 ;, which is the result of combined forces &# 34 ; a &# 34 ; and &# 34 ; b &# 34 ;, is felt by the stock as an outward and downward force , and tends to generate a vortex . the resultant force &# 34 ; r &# 34 ; is identified by numeral 19 in the vector diagram at the top of the digester and by numeral 20 in the vector diagram at the bottom of the digester shown in fig2 . the initial condition of the resultant force acts to peel off the stock and carry it toward the blow line ; however , as the vortex continues to form and intensify , the vortex penetrates the center of the body of the stock . this opens a path to the blow line for the fluid used to force out the digester contents . entrainment of blow fluid in digester contents occurs , resulting in large consistency variations in the pulp entering the blow tank , causing a large volume of liquor and blow fluid to pass to the blow tank . a larger amount of displacement fluid is needed for the blow , and an increase in blow cycle time results . it has been discovered , as illustrated in the arrangement of fig1 that the intermittent closure and subsequent reopening of a blow valve will cause a rapid decay of the vortex being generated , and will result in true plug flow at all times that pulp is discharged from the digester as illustrated in fig1 the digester 10 has a blow opening 11 to which is connected a blow line illustrated by the arrow 12 , and a line 22 connected to a blow tank 24 . a blow valve 23 is in the line 22 and is maintained closed during the cooking cycle . a control apparatus 25 is connected to the valve , and is capable of controllably cycling the valve 23 to open and closed positions . for aiding in the blow , a fluid pressure supply 13 may be connected to the upper end of the digester and is supplied by a motive force apparatus , such as a pump or compressor 27 , so that the blow fluid may be pressurized . within the digester is shown a vortex pattern 28 , which initially generates slowly during the open period of the valve and is believed to be caused by forces on the stock illustrated by the vector diagrams 29 and 30 . force &# 34 ; a &# 34 ; of the diagram is the horizontal force , and force &# 34 ; b &# 34 ; of the diagram is the vertical force , with force &# 34 ; r &# 34 ; being the resultant thereof . it has been discovered that , upon the initial opening of the valve 23 , plug flow is experienced through the blow line , until vortex generation causes complete break through , interrupting the plug flow . however , closure of the blow valve will cause a rapid decay of the force &# 34 ; a &# 34 ;, and will cause a modest , instantaneous reduction of force &# 34 ; b &# 34 ;. as the resultant force &# 34 ; r &# 34 ; decays , it sweeps toward the component force &# 34 ; b &# 34 ;. in the lower portions of the digester , this results in the fiber impinged on the side wall sections of the lower cone portion to be swept toward the opening 11 and discharged a plug flow when the valve 23 again opens . this theoretical , working hypothesis represents what i believe to be an explanation , oversimplified , of the cause - and - effect phenomena of why pulping digesters experience many of the undesirable results when blown in accordance with accepted prior practice , such as how air is entrained in the stock as it enters the blow tank . it also explains how the step of cyclically closing and opening the valve has been found to be a means for inhibiting the undesirable effects previously experienced . with cyclic opening and closing of the valve 23 , the vortex effect is minimized , or essentially eliminated , so that plug flow occurs in the discharge of the cooked pulp to the blow tank , through out the entire blow cycle . various employment concepts of the method and apparatus shown in fig1 have been utilized . in one arrangement , the cycle has been to open and close the blow valve 23 for one minute intervals , with the valve first being opened for one minute , and then closed for one minute . the cycle thus includes equal periods of opening time and closed time until the digester is emptied . the actual time required for opening or closing the valve may vary depending on the type of valve and actuator used . another arrangement which has been found to be successful is to open the valve for initial blowing until one - third of the digester is emptied , and to thereafter close the valve for a period . the valve is again opened until one - half of the remaining two - thirds is blown , at which time the valve is again closed . the final one - third volume of the digester is blown after opening the valve for a third time . in still another advantageous method for practicing the present invention , the blow valve is gradually opened until it reaches a fully - open state at which time operation of the actuator for the valve is reversed to begin gradually closing the valve . upon reaching the fully - closed position , the actuator is again immediately reversed to begin opening the valve . in this manner , flow from the digester to the blow pit remains essentially continuous throughout the blowing cycle . as a modification to this process , the valve may be maintained in its open position for a period of time before closing commences . the time period in which the valve can be maintained open will vary depending upon the type of valve used , the actuator used , the condition of the contents in the digester , and the structure of the blow line , the digester , and other related equipment . in this regard , the optimal cycle vary from digester to digester , and may include equal periods of open and closed time , open times longer than closed times , closed times longer than open times , and equal or different cycle times from the open to the closed and from the closed to the open positions . however , in optimizing the present invention for various digesting systems , the goal is to control the flow from the digester such that vortex formation in the digester is eliminated or minimized , so that break through to the outlet by the vortex does not occur . the concept of the present invention will apply whether the pressure for blowing the digester , which is applied at the top of the digester , is derived from the pressurized cooking liquor or other fluid , or from steam injected into the digester or by pressurized air or other gas added to the top of the digester . fig3 illustrates the improved uniformity of pulp consistency which has been found to result from the present invention , as compared to conventional blow techniques . the graph shown therein has been plotted from test runs , and the line 31 show an intermittent blow according to the present invention . the vertical lines 33 and 34 show the stop - start process where the valve is closed and reopened . the consistency measurement from a conventional blow wherein the blow valve remains open through out the entire blow is plotted by the broken line identified by numeral 32 . the chart illustrates that consistency variations when the blow valve is cycled open and closed are much less than the variations experienced when the digester is blown by conventional techniques . thus , it will be seen that i have provided an improved method and apparatus for improving the overall performance of digesters , and particularly for improved blow - down of the digester which achieves the objectives above set forth ."}