Feb. 18, 1958 E. R. NEEDHAM ET AL 2,823,575

SLIP-FREE FISH NETTING

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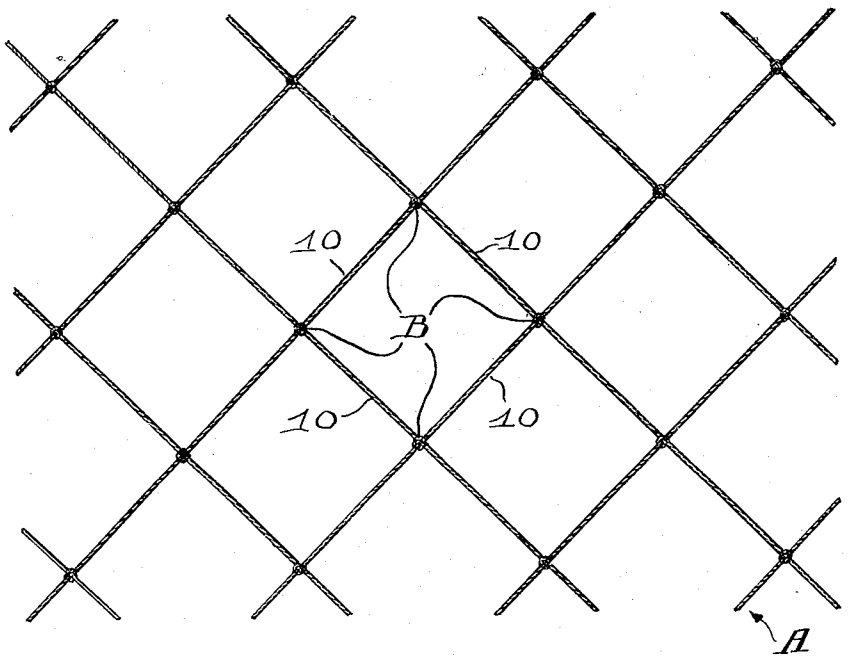

Fig. 1

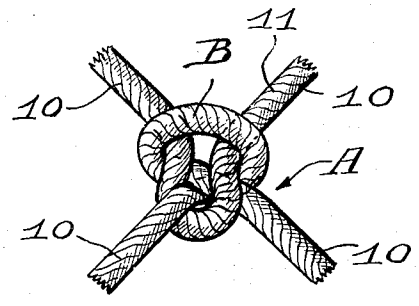

Fig. 2

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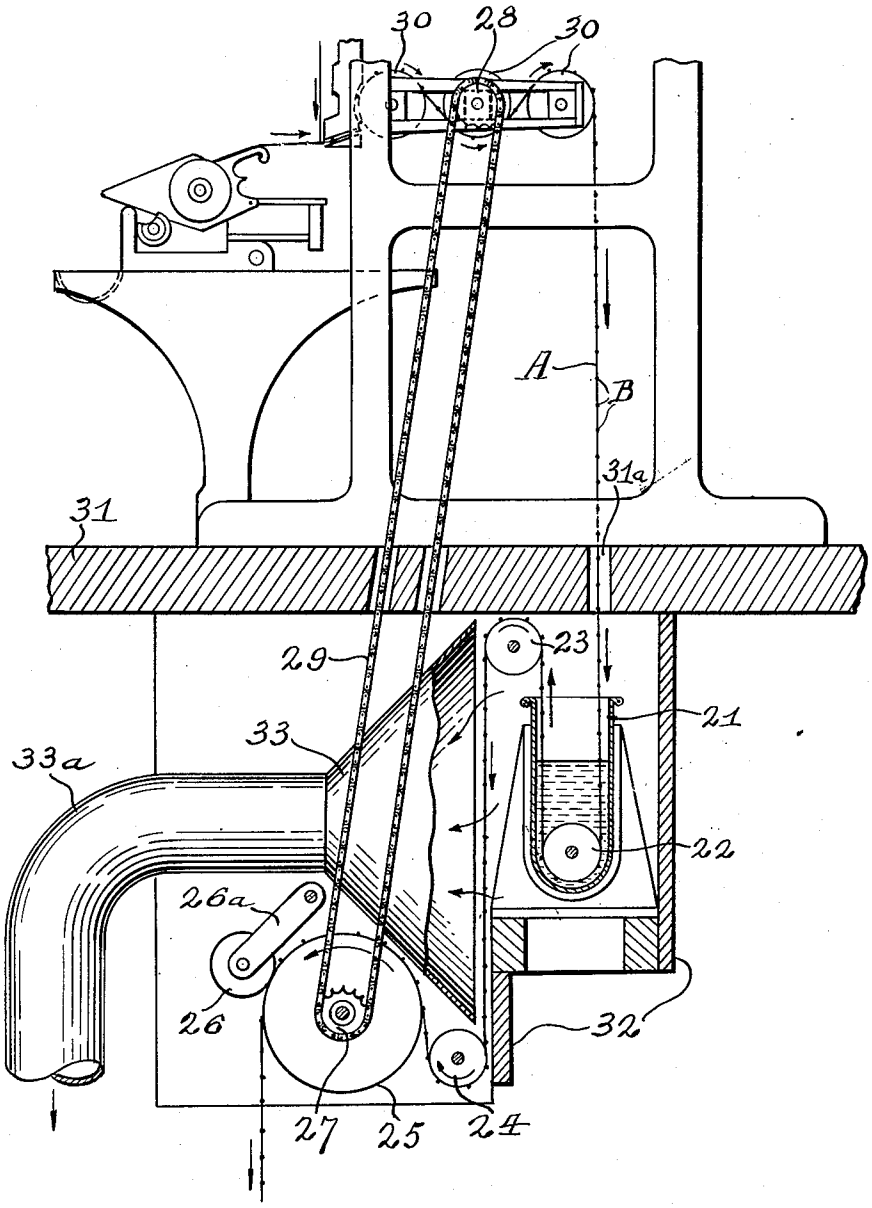

Fig. 3

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SLIP-FREE FISH NETTING

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2 Claims. (Cl. 87—1)

This invention relates to fish netting, and more particularly, it relates to setting the netting to prevent "slip-mesh." This is a problem encountered specially in making fish netting from yarns of synthetic linear polymers, for example, nylon.

So the invention actually relates to fish netting made from yarn comprising filaments of a synthetic linear condensation polymer of the type disclosed in U. S. Patent 2,071,250. The invention will be described by referring specifically to nylon yarns, i. e. yarns comprising filaments of synthetic linear polyamides as disclosed in U. S. Patents 2,130,948 and 2,071,253. Since, however, yarns made from other synthetic linear polymers falling within the scope of Patents 2,071,250 and 2,071,251 are subject to the characteristics of nylon as far as the "slip-mesh" problem is concerned, and since they may also be advantageously processed by the use of the present invention, the description in terms of nylon is exemplary and the applicant intends to include other equivalent linear synthetic condensation polymers within the scope of the invention. Two of these materials are known as "Dacron" and "Orlon." Nylon is the preferred synthetic linear polymer.

The problem of "slip-mesh" is one which has been plaguing the manufacturers of netting from synthetic linear polymers. One method which has been satisfactory in overcoming this problem is by subjecting the netting to wet heat while keeping it under tension from the time it is knitted. This process is admirable for some purposes but has the disadvantage of changing the mesh size and also affecting other characteristics of the yarn.

Coating processes have also been suggested for various types of textile fabrics in which a thick solution of a resinous material has been applied to the fabric and appears on the surface of the yarns as a perceptible coating. With netting, this has the disadvantage of changing its hand and increasing its weight. Moreover, the applicants are not aware that the necessary attributes have been disclosed for applying this expedient to fish netting, as for example, means for keeping the netting under tension from the time it is knitted and so on.

Applicants' development

The applicants have now been able to overcome the problem of "slip-mesh" and the disadvantages of prior art methods of attempting to do so.

According to the invention, fish netting is made as follows. The netting is formed on a netting loom from a twine of a synthetic linear polymer, preferably nylon so that evenly spaced apart knots are intervened by precise lengths of twine. The netting is advanced through the loom during its formation and it is kept under tension after formation sufficiently to maintain the knots tight. Then the netting is advanced from the loom while still under tension through an impregnating bath containing an alcohol solution of from about .5 to about 3% of an alcohol-soluble nylon. The netting is moved from the impregnating bath while still kept under tension and the solvent removed. This leaves the nylon impregnated in the twine of the netting so that when the tension is relaxed the form of the knots is permanently retained.

It is believed that the nylon forms within the twine and about the knots a skeleton formation which is elastic in nature and which tends to come back to its original form.

The solvent is selected from the group consisting of methyl and isopropyl alcohols. Water may be added up to about 15% of the total solution.

This process can conveniently be carried out on an apparatus having the following features. It includes a bath for containing a treating solution. Means is provided for conveying the netting under tension from the knitting machine through the bath, then through a solvent recovery zone while still under tension and thence to storage.

A phase of the invention is the impregnating solution. This is a solution of an alcohol-soluble nylon in an amount from about one-half percent to about three percent in solution in an alcohol selected from the group consisting of methyl and isopropyl alcohols. This solution may optionally contain water. The alcohol should be present in an amount from about eighty-five percent to about ninety-five and a half percent with the water present up to about fifteen percent. The solution may contain an alcohol-soluble dye, preferably of green or brown so as to impart a characteristic color to the netting. The water is usually added after the nylon has been dissolved in the alcohol.

The invention will be understood more completely by reference to the accompanying drawings which illustrate a preferred form of netting made according to the present invention and a convenient form of apparatus in which the invention may be carried out, and in which:

Figure 1 is a view of a piece of fish netting according to the invention.

Figure 2 is an enlarged view of a portion of the netting shown in Figure 1, illustrating particularly regions including knots.

Figure 3 is a side elevation partly in section through apparatus in which the netting is being treated.

Referring more particularly to the drawings, the netting treated according to the invention is illustrated diagrammatically in Figures 1 and 2. The netting is generally designated as A. The knots are shown as B. The knots are intervened by substantially precise and even lengths of twine **10**. The netting, including the knots, is impregnated and the material of the netting slightly coated with alcohol-soluble nylon deposited from a solution. It will be understood, however, that in practice the coating is so thin as to be substantially imperceptible.

The coating is applied preferably by passing the netting through an apparatus such as that shown in Figure 3. In this apparatus **21** is a tank containing the treating solution. **22** is a roller in the tank about which the netting passes. **24** is a roller below the tank about which the netting passes on its way from the tank. **25** is a larger roller whose function is to hold the netting and pull it through the tank. **26** is a roller mounted on pivoted arms **26***a*. The roller **26** presses the netting against the roller **25**. **27** is a sprocket or chain wheel mounted on a shaft extending axially from the roller **25**. The wheel **27** is driven by a chain **29** from a sprocket **28** which is mounted on the middle mesh size rollers **30** forming an integral part of the net-making machine. **33** is a fume hood connected to a suction fan to draw off solvent fumes. The fume hood **33** is connected by a conduit **33***a* with a solvent recovery apparatus. Panelling **32** encloses the installation.

Operation

The netting is knitted on the netting loom and passes

to the mesh size rollers **30**. Normally, the netting would, after passing over the mesh size rollers **30**, pass through the floor **31** by the opening **31***a* into storage where it would remain until required.

But, according to the invention, instead of going to storage, the netting A passes through the floor opening **31***a* as usual, and then enters the tank **21** passing around the roller **22** beneath the level of the treating solution. Thence, it passes around the rollers **23** and **24**, at which position the fume hood **33** removes the solvent and, as an incident thereto, dries the netting.

The netting then passes around the draw roller **25** which is driven from the mesh size rollers **30** by means of the chain wheels **27** and **28** and the chain **29**. The press or nip roller **26** keeps the netting in close contact with the draw roller **25**. From there the finished netting goes to storage.

From the time it is woven on the net-making machine, which is not shown, to the time it is dried and finished, the netting is held under continual tension between the mesh size rollers **30** and the draw roller **25**. This keeps the knots tight until the impregnating material has set to hold them in shape.

By this treatment the netting becomes impregnated with a thin nylon solution. The netting is kept under tension during the impregnation and afterwards until the nylon has had time to set about and within the fibers sufficiently for it to hold the knots in shape and to prevent "slip-mesh." It should be understood that the netting must not be allowed to relax from the time the knots are made until the nylon is set.

While the process is effective in setting the knots, the characteristics of the nylon are not altered, as they are for example when a heating process is used.

The impregnating solution is made from an alcohol-soluble form of nylon. One suitable form of this material is referred to as "F. M. 6501" in the catalogue "Du Pont Nylon Molding Powder," copyright 1948, Serial No. A–7257. The alcohol-soluble nylon is put into solution from .5 to 3% by weight, preferably about 1% in methyl or isopropyl alcohol which preferably contains water up to about 15%. The amount of nylon in the solution is computed on the total liquid.

The nylon may be dissolved by heating the alcohol to about 150° F. and agitating thoroughly.

The nylon stays in the solution and unlike solutions having a high concentration of nylon, an anti-gelling constituent for example, furfural need not be added, but can be added if desired.

The netting is passed through the tank of solution which is kept by preference around room temperature, say about 70° F. As indicated the netting must be kept under tension until impregnated and until the impregnating medium has time to dry sufficiently to hold the knots in shape.

The netting picks up approximately 100% of its own weight of the solution using a one percent (1%) solution. When dry the netting has been found to have acquired an additional weight in the neighborhood of 1%. The fact that the treatment is an impregnation rather than a coating has been shown by including a small amount of a tracer dye in the solution. After the treatment the dye appears throughout the yarn.

Variation of the amount of nylon within the limits stated may be employed to vary the hand of the netting. The higher the concentration of the nylon in the solution the harder the hand and vice versa.

The process is applicable to treating netting made from nylon yarn of any size. It may run for example from yarn of about 140/2 to yarn of 210/30/3 or 210/100/3. In fact the coarser the yarn the better since it picks up more of the impregnating solution.

The process may be applied to double or single knot netting although usually the double knot netting does not need treatment.

The process may be applied to netting made from nylon yarn or from other yarns having similar characteristics as for example "Dacron," "Orlon," etc. So the process can be said to be applicable generally to synthetic linear condensation polymers.

The process may be applied to any knitted or woven fabric, but is particularly applicable to single knotted fish netting wherein it is surprising that it is effective to secure the knots owing to the very thin solution employed. It is the applicants' belief that the nylon impregnation sets up within the interstices of the fibers a skeleton structural formation which is elastic but keeps the form of the knots.

Another advantage of the applicants' method is that heating the netting is not required. This eliminates shrinkage of the nylon and thus mesh-size difficulties. Also, larger twines for example those above 210/3 are hard to heat-set because the outside of the twine fuses before the inside gets hot, unless a very slow treatment is given.

In the process the netting is preferably advanced through the impregnating bath at a speed of about 5 to 6 meshes per minute. This results in an immersion time for each knot ranging from about 15 to about 45 seconds. This is usually sufficient to give the solution long enough to penetrate the twine. Drying time is preferably from about 2 to about 5 minutes during which the netting must be kept under tension.

During the process and when the ends are tied into the machine a drop of the impregnating solution can be applied to each knot to prevent it from coming loose.

The solution may also be used by fishermen to mend their nets, by applying it by hand or in a bath to the netting, particularly at the knots.

We claim:

1. Fish netting, comprising, essentially uncoated twine of a synthetic linear polymer knotted with tight single knots, the knots being substantially evenly spaced apart and intervened by precise lengths of twine and the knots being set to retain substantially the form and relationship to the twine that were given when knotted, the elastic memory of the twine material being intact and tending to cause loosening and slipping of the knots, the twine being impregnated with a water-insoluble synthetic resin by being passed through a solution containing from about .5 to 3% of said resin to subdue the tendency of the knots to slip, and said synthetic resin being present in the netting in an amount in the neighborhood of about 1% of the twine material by weight.

2. Fish netting, according to claim 1, wherein said twine is impregnated with an alcohol-soluble nylon resin.

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