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Inventor(s)

CANALICCHIO; Christian et al.

MAGAZINE UNIT, PACKAGING APPARATUS AND METHOD FOR COMBINING ARTICLE GROUPINGS

Abstract

The invention relates to a magazine unit (1) for consumable material (20), comprising at least two receiving units (2) for consumable material (20), at least one removal position (AP) and at least one filling position (BP), wherein the receiving units (2) are configured to be movable between the removal position (AP) and the filling position (BP). The invention also relates to a packaging apparatus (15) and to a method for combining article groupings (33) with a packaging means (21).

Inventors: CANALICCHIO; Christian (Bad Endorf, DE), FELLER; Simon (Biberg, DE), SPINDLER; Herbert (Niedermoosen, DE), STADLER; Thomas (Kolbermoor, DE), SCHATNER; Philipp (Feldkirchen-Westerham, DE), LUBER; Johann (Bad Feilnbach, DE)

Applicant: Krones Aktiengesellschaft (Neutraubling, DE)

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Background/Summary

CLAIM OF PRIORITY [0001] The present application claims priority to International Application PCT/EP2023/055566, filed Mar. 6, 2023, which in turn claims priority to German Application DE 10 2022 110 258.0, filed Apr. 27, 2022, which are incorporated by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to a magazine unit for consumable material, a packaging apparatus for combining article groupings with packaging and to a method for creating article groupings.

[0003] The present invention is in particular concerned with a magazine unit for storing consumable material, for example for storing a plurality of flat elements for use as packaging in a packaging apparatus.

BACKGROUND OF THE INVENTION

[0004] Magazines for storing consumable material, in particular in the form of packaging, are known from the prior art.

[0005] German patent application DE 10 2006 038 656 A1 discloses a magazine apparatus for adjacent, flat elements or blanks, which are arranged vertically at an angle in a single row on a single magazine for removal. A retaining device is provided in front of a removal apparatus in the feed direction.

[0006] Furthermore, German patent application DE 101 47 360 A1 discloses a packaging device with a magazine for flat elements, which magazine stores the flat elements lying on top of one another or standing obliquely in a single stack.

[0007] If the consumable material is provided stacked on top of one another, it is difficult to refill the stack during ongoing production operation. Manual refilling of such a stack generally requires a machine stop for safety reasons since manual intervention during ongoing production operation should be excluded. Automatic or machine-assisted refilling also requires a certain amount of additional effort if ongoing production operation is not to be interrupted or stopped.

[0008] As a rule, several stacks arranged next to one another are therefore provided in a magazine, and the removal from the different stacks must be controlled accordingly.

[0009] When refilling the magazine, care must also be taken to ensure that the refill process and the normal removal process do not collide with one another.

[0010] The primary object of the invention is to provide a solution that allows simple and safe refilling of consumable material into a magazine.

SUMMARY OF THE INVENTION

[0011] The above object is achieved by a magazine unit, a packaging apparatus and a method for creating article groupings, which comprise the features of the independent claims. Further advantageous embodiments are described by the corresponding dependent claims.

[0012] The invention relates to a magazine unit for consumable material, which magazine unit comprises at least two receiving units for consumable material as well as at least one removal position and at least two filling positions. It is provided that the receiving units are configured to be movable between the removal position and, in each instance, one of the filling positions.

[0013] Each receiving unit may provide specific apparatuses for receiving the consumable material. For example, the receiving unit can comprise a frame arrangement, within which frame arrangement the consumable material is arranged, for example in stacks.

[0014] Centering elements, alignment elements or similar can be provided, which make exact positioning and/or alignment of the consumable material within the receiving unit possible or assist

therewith.

[0015] The consumable material can, for example, be packaging or a packaging blank, such as, for example, those used in the beverage industry to combine several beverage containers into a sales unit or packaging unit. For example, it can be so-called outer packaging made of cardboard or so-called upper grip cardboard packaging. This refers in particular to packaging which comprise several grouped articles or grouped containers at least on the top side and possibly also on the lateral surface side and/or bottom side, wherein the articles or containers can additionally be held in place by suitable holder and/or be fixed in the upper grip cardboard packaging, for example by respective locking mechanisms.

[0016] Alternatively, the packaging or packaging blank may also be formed by outer packaging in the form of outer cardboard packaging, strapping, or similar, which can also be provided in such a magazine unit.

[0017] However, the magazine unit can also be used in any other context where consumable material or form parts need to be provided. For example, such a magazine unit can be used to store and provide form parts, which form parts are needed when a product is changed, in order to adapt the particular machine equipment to the new products. When consumable material is mentioned below, it can alternatively be replaced by format parts.

[0018] A particularly preferred embodiment of such a magazine unit comprises two receiving units for consumable material, a removal position and two filling positions, wherein the removal position is arranged between the two filling positions. The invention is described below with reference to such a magazine unit, wherein this description can be transferred analogously to magazine units with further receiving units and removal positions as well as filling positions.

[0019] In particular, it is provided that the receiving units are each configured to be movable between the removal position and one of the two filling positions.

[0020] For example, the magazine unit can be in a first work mode, in which first work mode the first receiving unit is arranged in the first filling position and the second receiving unit is arranged in the removal position. Furthermore, the magazine unit can be in a second work mode, in which second work mode the first receiving unit is arranged in the removal position and the second receiving unit is arranged in the second filling position.

[0021] Preferably, the removal position and the two filling positions are arranged in a straight line, wherein the removal position is arranged in the middle between the two filling positions. The two receiving units are configured to be movable in the straight line.

[0022] The two receiving units can be configured to be movable together. In particular, the two receiving units can be coupled to one another and assigned to a common drive.

[0023] For example, the two receiving units can be arranged on a carriage, which carriage is arranged in particular on a carriage guide, which carriage guide extends over the removal position and both filling positions. The carriage can be arranged on the carriage guide via guide elements, in particular guide rollers or similar, and can be moved in a first movement direction and counter to the first movement direction in a second movement direction.

[0024] The magazine unit can, for example, be transferred from the first work mode to the second work mode by moving the two receiving units in the first movement direction and from the second work mode to the first work mode by moving the two receiving units in the second movement direction.

[0025] An alternative embodiment may provide that each of the receiving units is configured to be movable independently. In particular, each of the receiving units can be arranged on its own carriage and have an independent drive. The two carriages can use a common rail system or each carriage can be assigned its own rail system. For example, the carriages can have different track widths and, in particular, one carriage can be arranged on an inner carriage guide and the other carriage can be arranged on an outer carriage guide or similar.

[0026] A further embodiment can provide that the receiving units are each configured to be

individually movable perpendicularly (or approximately perpendicularly) to the first movement direction or the second movement direction. For example, the receiving units on the corresponding or common carriage can additionally each be guided in rails, which rails are configured to be orthogonal to the carriage guide. This additional movement component can improve the accessibility of the receiving unit arranged in the filling position, and thus further facilitate the filling, which is described in more detail below.

[0027] It can be provided that each of the receiving units is assigned a lifting device. This allows the consumable material arranged within the receiving unit to be raised accordingly so that the consumable material unit to be removed is always located at the same removal position and, in particular, at the same removal height. This facilitates removal by appropriate removal apparatuses since no corresponding control is required to adapt the removal position of the removal apparatus to the supply of consumable material within the receiving unit, for example by correcting the movement sequence accordingly.

[0028] In particular, it can be provided that a base plate of the receiving unit is raised via the lifting device, on which base plate the consumable material is arranged so that the uppermost consumable material to be removed is always located at a defined height within the receiving unit. For this purpose, the controls of the removal apparatus and of the lifting unit are preferably communicatively connected, wherein a corresponding signal is sent to the lifting device during or after each removal process, and a corresponding height adjustment is thus actuated.

[0029] Preferably, the lifting devices are also arranged on the carriage(s) or assigned to other movement devices of the receiving units and can thus be moved together with their corresponding receiving unit in the first movement direction or the second movement direction.

[0030] The magazine unit can furthermore be equipped with protective mechanisms; for example, at least one protective element can be arranged between the receiving units. For example, a protective wall or similar can be arranged between the receiving units, which prevents intervention from one receiving unit in the other receiving unit.

[0031] Furthermore, parallel to such an inner protective wall, further protective walls, which limit the receiving units to the outside, or similar can be provided.

[0032] The protective elements can also be arranged on the carriage(s) or assigned to other movement devices of the receiving units so that they can be moved together with their corresponding receiving unit in the first movement direction or the second movement direction.

[0033] The protective elements prevent any lateral intervention in the removal position from the filling positions. In particular, it can be provided that the protective elements are significantly higher than the receiving apparatus holding the consumable material.

[0034] One embodiment of the magazine unit provides that the filling positions are freely accessible so that the receiving unit located in a filling position can be filled with consumable material during ongoing production operation.

[0035] Furthermore, it can be provided that the removal position is equipped with a protective element on the outside, for example that the removal position is closed by a suitable closure element such as a door or similar. The protective element in particular serves to prevent any manual intervention during ongoing production operation in the receiving unit arranged in the removal position.

[0036] For example, the closure element can be equipped with appropriate safety devices, which can effectively prevent any intervention in the removal position during ongoing production operation. For example, the closure element can be equipped with a contact switch, which can be triggered by physical contact or in a contactless manner. If the closure element is opened during ongoing production operation, the machine preferably stops immediately.

[0037] Further protective mechanisms may be provided; for example, a light curtain may be provided, which is only activated when the magazine unit is transferred from one work mode to the other work mode. In this case, the moving machine components pose a danger. If a user were to

intervene in one of the corresponding regions during this time, the light curtain would be interrupted. This interruption would trigger an immediate stop of the movement of the receiving units within the magazine unit via a correspondingly coupled control unit.

[0038] Furthermore, protective elements can be provided, which are closed when the receiving units are moving, in order to prevent a user from intervening in moving components of the magazine unit during this movement period.

[0039] In an ongoing production operation, it is provided that consumable material is only ever removed from the receiving unit, which receiving unit is currently in the removal position. Meanwhile, the other receiving unit, which is in one of the two filling positions, can be refilled with consumable material.

[0040] As soon as the consumable material from the receiving unit located in the removal position has been used up, the other receiving unit can be moved to the removal position via the corresponding movement in the first movement direction or in the second movement direction, which other receiving unit has been refilled with consumable material in the meantime.

[0041] It is thus not necessary to stop the machine to refill consumable material. The time required to change the magazine is minimized since only a small displacement movement is necessary, the path length of which is defined in particular by the width of the receiving units and accordingly by a width of the consumable material.

[0042] The filling of the receiving unit arranged in a filling position can take place manually or in an automated manner. For automated filling, an appropriately trained robot can be provided, for example.

[0043] Particularly preferably, automated filling can be carried out by a driverless transport system, which is equipped with a robot and comprises a receiving device for consumable material. The robot removes the consumable material from the receiving apparatus of the driverless transport system and fills it into the receiving unit of the magazine unit, which receiving unit is in a filling position. If the receiving apparatus of the driverless transport system is empty, the transport system automatically fetches additional consumable material from a storage area, wherein the storage area does not have to be arranged in the immediate vicinity of the magazine unit.

[0044] In principle, the control of driverless transport systems can be assumed to be known so that a more detailed explanation in connection with the present invention can be dispensed with.

[0045] If, from the point of view of a person skilled in the art, a meaningful combination with one another is possible, some or all of these aforementioned variations or embodiment variants of the magazine unit according to the invention for consumable material can also be selectively combined with one another in order to achieve the above-formulated object at least partially and/or to achieve the desired effects of the invention.

[0046] The invention furthermore relates to a packaging apparatus comprising a packaging module for combining article groupings with a packaging blank, which packaging is provided as consumable material in an above-described magazine unit.

[0047] Such a packaging apparatus is used in particular for producing packaging units. A packaging unit is formed by at least two articles, which are combined with at least one packaging blank.

[0048] The articles to be combined are preferably containers filled with a fluid content, for example bottles or cans, in particular beverage containers. However, the bottles or cans or similar containers can also be filled, for example, with fluid or pasty cosmetics such as shampoo or similar. However, the packaging apparatus can also be used to combine several articles made of a solid material or similar into a packaging unit via a packaging blank.

[0049] One embodiment of the packaging apparatus comprises a first transport device, via which the articles are fed to a dividing module in an unordered mass flow or in an ordered mass flow or in another suitable arrangement in the transport direction.

[0050] In the dividing module, article groupings or article groups of at least two articles are formed. The article groups each contain a defined number of articles, which articles are in

particular arranged in a defined arrangement within the article group. The number and arrangement of the articles within the article group in particular corresponds to the number and arrangement of the articles within the packaging unit to be formed.

[0051] The article groups are fed to a packaging module via a second transport device. The packaging module is configured to arrange at least one packaging blank on each article group. In particular, the packaging module in the exemplary embodiment shown is configured to attach an upper grip cardboard packaging to the article group and thus combine the articles into a packaging unit.

[0052] The packaging module is assigned at least one magazine unit, as already described in detail, in which magazine unit is provided upper grip cardboard packaging as consumable material.

[0053] The packaging module comprises a transport device, via which the article groups are transported in the transport direction through the packaging module. It is preferably provided that the removal position of the magazine unit and the two filling positions are arranged in a straight line parallel to the transport direction, wherein the receiving units of the magazine unit are configured to be movable together in the straight line.

[0054] Furthermore, the packaging module comprises at least one applicator for the packaging blank. In particular, this can be an applicator configured to remove at least one upper grip cardboard packaging from a magazine unit assigned to the packaging module, and to fasten it to the articles of the article group by pressing it on from above, forming a packaging unit. This can in particular take place while the article groups are continuously moved through the packaging module. In particular, the applicator removes the particular at least one upper grip cardboard packaging from the middle removal position of the magazine unit.

[0055] It is particularly preferred that only the packaging blank in the middle removal position are accessible to the applicator. Preferably, the two filling positions are closed off or protected from the machine room of the packaging module by a housing or similar. The fact that there is no open connection between the filling positions and moving components of the packaging module represents an important safety aspect when filling the magazine unit with consumable material.

[0056] What was stated above also applies here: If, from the point of view of a person skilled in the art, a meaningful combination with one another is possible, some or all of these aforementioned variations or embodiment variants of the packaging apparatus according to the invention can also be selectively combined with one another in order to achieve the above-formulated object at least partially and/or to achieve the desired effect of the invention.

[0057] The invention also relates to a method for loading an above-described magazine unit with consumable material or to a method for using a magazine unit loaded with consumable material. It is provided in the method that the particular consumable material is removed from the receiving unit arranged in the removal position, while, for filling or refilling the magazine unit, consumable material is filled into the receiving unit, which receiving unit is in a filling position.

[0058] In particular, it is provided that the magazine unit can be moved in an oscillating manner between a first work mode and a second work mode in order to arrange the receiving units alternately in a removal position and one of the two filling positions. In the first work mode, the first receiving unit is arranged in the first filling position and is being filled with packaging material, while, in the second work mode, the second receiving unit is arranged in the second filling position and is being filled with packaging material.

[0059] Furthermore, a method for combining article groupings with a packaging blank is described, which packaging blank is provided as consumable material in a magazine unit.

[0060] The packaging blank is removed from the receiving unit of the magazine unit arranged in the removal position. For filling or refilling the magazine unit, packaging blanks are filled into the receiving unit, which receiving unit is in a filling position.

[0061] By using the magazine unit according to the invention, the consumable material is always provided at a defined position. The removal can thus be carried out, for example, by a two-axis

robot.

[0062] Through the lifting mechanism for each receiving unit, in particular the above-described lifting devices, the return travel time of the base plate in the Z direction can be optimized. In particular, the base plate is preferably returned to a lower starting position without any loss of time and immediately after the corresponding receiving unit has been arranged in a filling position. If it is not possible to completely fill the receiving unit, for example due to a lack of consumable material, due to an operator error or similar, the base plate of the receiving unit arranged in the filling position can already be adjusted in height in the Z direction.

[0063] In this way, when the receiving unit is transferred to the removal position, the consumable material arranged at the top is already in the removal position or at the removal height for subsequent handling, for example for removal by an applicator or similar. As a result, after the correspondingly only partially filled receiving unit has been transferred to the removal position, the applicator or removal robot or similar can continue to work without any loss of time.

[0064] Furthermore, from the operator side, the accessibility of a transport device of a handling module equipped with a magazine unit is significantly improved by the smaller depth of the magazine unit, in particular the accessibility of the transport device of a packaging module described above. Nevertheless or additionally, there is still sufficient space for storing further machine components within the machine equipped with a magazine unit, for example for storing safety elements, change tables for tools, format part bearings, etc. The installation space between the particular transport device and the magazine unit can in particular be used for this purpose.

[0065] The space requirement of such a magazine unit only slightly increases the necessary space or footprint of a packaging apparatus or other apparatus transverse to the running direction of the articles to be processed.

[0066] The loss of time when transferring the magazine unit between the first work mode and the second work mode in order to exchange an empty receiving unit for a filled receiving unit in the removal region is very minor.

[0067] It should also be pointed out here that some or all of these aforementioned variations or embodiment variants of the method according to the invention can also be selectively combined with one another in order to achieve the above-formulated object at least partially and/or to achieve the desired effect of the invention, provided that this is meaningful from the point of view of a person skilled in the art.

[0068] It should be expressly mentioned at this point that all aspects and embodiment variants which have been explained in connection with the magazine unit according to the invention and the packaging apparatus can also relate to, or be, partial aspects of the method according to the invention. Therefore, if the description or the claim definitions pertaining to the device according to the invention make mention of certain aspects and/or correlations and/or effects, this applies equally to the method according to the invention. The same applies vice versa so that all aspects and embodiment variants which have been explained in connection with the method according to the invention can also relate to, or be, partial aspects of the magazine unit according to the invention and the packaging apparatus. Therefore, if the description or the claim definitions pertaining to the method according to the invention make mention of certain aspects and/or correlations and/or effects, this applies equally to the magazine unit and packaging apparatus according to the invention.

[0069] The following explanations again combine some aspects of the invention previously explained in different embodiment variants, clarify some aspects, but should not be considered in conflict with the statements already made, but in conjunction; in case of doubt, possibly as more specific variants and/or modifications.

[0070] Thus, as already mentioned several times above, the magazine unit according to the invention can form an important component of the packaging apparatus described above. This magazine unit can be operated in different work modes. Normally, the magazine unit comprises at

least two receiving units for consumable material.

[0071] Furthermore, the individual magazine unit can have at least one removal position and at least two filling positions. Preferably, the removal position can be arranged between the two filling positions, provided that exactly two filling positions are available. Furthermore, it can be provided that the receiving units are configured to be movable between the removal position and the two filling positions.

[0072] The receiving units can in particular be arranged next to one another on a carriage or the like, which can be arranged on a carriage guide via suitable guide elements. The carriage can thus be moved in a first movement direction and counter to the first movement direction in a second movement direction. The guide elements can, for example, be configured as guide rollers or similar, which can run on rails adapted thereto. The carriage guide extends at least over the removal position and both filling positions.

[0073] In this case, the removal position and the two filling positions can in particular be arranged in a straight line, wherein the receiving units can be configured to be movable together in the straight line.

[0074] In a first work mode, the first receiving unit can be in the first filling position, while the second receiving unit can be arranged in the removal position.

[0075] By moving the carriage along the carriage guide in the first movement direction, the magazine unit is transferred to a second work mode, in which second work mode the first receiving unit is arranged in the removal position and the second receiving unit is arranged in the second filling position.

[0076] By moving the carriage along the carriage guide in the second movement direction, the magazine unit can subsequently be returned to the first work mode.

[0077] In an ongoing production operation, it is preferably provided that consumable material is only ever removed from the receiving unit that is in the removal position. Meanwhile, the other receiving unit, which is in one of the two filling positions, can be refilled with consumable material.

[0078] As soon as the consumable material from the receiving unit located in the removal position has been used up, the other receiving unit, which has been filled in the meantime, can be brought back to the removal position by moving the carriage in the corresponding movement direction.

[0079] In the manner described, it is not necessary to stop the machine to refill consumable material. The time required to change the receiving units within the magazine unit is minimized since only a small displacement movement is necessary, the path length of which is in particular defined by the width of the receiving units, the width of which in turn is determined by a width of the consumable material.

[0080] Each receiving unit may provide or have specific receiving apparatuses for receiving the consumable material. For example, the receiving unit can comprise a frame arrangement, within which frame arrangement the consumable material is arranged, for example in stacks. Centering elements, alignment elements or similar can be provided, which make exact positioning and/or alignment of the consumable material within the receiving unit possible or assist therewith.

[0081] Preferably, at least one protective element, for example in the form of a protective wall, can be arranged between the receiving units. In addition to this so-called inner protective element, each receiving unit can comprise a further, outer protective element in parallel, which can also be configured as a protective wall or similar protective device. The protective elements are also sensibly arranged on the carriage and are thus configured to be movable together with the receiving units.

[0082] Furthermore, each of the receiving units can be assigned a lifting device, via which lifting device the consumable material arranged within the receiving units can be raised accordingly so that the consumable material unit to be removed is always located at the same removal position. In particular, each lifting device raises a base plate, on which the consumable material is arranged.

[0083] The lifting devices are preferably also arranged on the carriage and are thus moved accordingly together with the receiving units in the first movement direction or the second movement direction.

[0084] A further embodiment can provide that the receiving units are each configured to be individually movable perpendicularly to the first movement direction. The receiving units on the carriage can thus each be guided in further rails, which rails can be orthogonal to the carriage guide. This additional movement component can improve the accessibility of the receiving unit arranged in the filling position and can thus make filling even easier.

[0085] The consumable material can, for example, be packaging blanks such as those used in the beverage industry to combine several beverage containers into a sales unit or packaging unit. For example, it can be upper grip cardboard packaging. Alternatively, the packaging may also be formed by outer packaging in the form of outer cardboard packaging, strapping or similar.

[0086] The filling of the receiving units arranged in a filling position can take place manually or in an automated manner. For automated filling, an appropriately trained robot can be provided, for example. Particularly preferably, automated filling can be carried out by a driverless transport system or similar, which is equipped with a robot and comprises a receiving device for consumable material. The robot removes the consumable material from a receiving apparatus of the driverless transport system and fills it into the receiving unit of the magazine unit, which receiving unit is in a filling position. If the receiving apparatus of the driverless transport system is empty, the transport system automatically fetches additional consumable material from a storage area, which does not have to be arranged in the immediate vicinity of the magazine unit.

[0087] The control of driverless transport systems is known so that a more detailed explanation in connection with the present invention can be dispensed with.

[0088] In the magazine unit described here, both receiving units can be arranged on a common carriage. Alternatively, in an alternative embodiment, it can be provided that the receiving units are configured to be movable individually. In this case, it can be provided that the receiving units are each arranged on their own carriages, which use a common rail system, or each carriage is assigned its own rail system.

[0089] The packaging units formed here are each in particular formed by at least two articles, which are combined with at least one packaging blank. The articles to be combined are preferably containers filled with a fluid content, for example bottles or cans, in particular beverage containers. However, the bottles or cans or similar containers can also be filled, for example, with fluid or pasty cosmetics such as shampoo or similar.

[0090] The packaging can, for example, be upper grip cardboard packaging. Alternatively, the packaging may also be formed by outer packaging in the form of outer cardboard packaging, strapping, or similar, within which the articles are arranged accordingly.

[0091] The packaging apparatus comprises a first transport device, via which articles are fed to a dividing module in an unordered mass flow or in an ordered mass flow or in another suitable arrangement in a defined transport direction. In the dividing module, article groupings or article groups of at least two articles are formed. The article groups each contain a defined number of articles, which articles are in particular arranged in a defined arrangement and alignment within the article group. The number and arrangement of the articles within the article group in particular corresponds to the number and arrangement of the articles within the packaging unit to be formed.

[0092] The article groups can, for example, be fed to a packaging module via a second transport device. The packaging module is preferably configured to arrange at least one packaging blank on each article group. In particular, the packaging module is configured and accordingly equipped to attach an upper grip cardboard packaging to the article group and thus combine the articles into a packaging unit.

[0093] The packaging module is assigned at least one magazine unit, as already described in detail above, in which magazine unit is provided upper grip cardboard packaging as consumable material,

in particular as a packaging blank.

[0094] The packaging module, as described here, generally comprises a transport device, via which the article groups are transported in a defined transport direction through the packaging module. As already mentioned above, it can be provided that the removal position of the magazine unit and the two filling positions are arranged in a straight line parallel to the transport device, wherein the receiving units of the magazine unit are configured to be movable together in alignment.

[0095] Furthermore, the packaging module can be equipped with at least one applicator, which is configured to remove at least one upper grip cardboard packaging from a magazine unit assigned to the packaging module, and to fasten it to the articles of the article group by pressing it on from above, forming a packaging unit. This can in particular take place while the article groups are continuously moved through the packaging module.

[0096] In particular, the applicator removes the particular at least one upper grip cardboard packaging from the middle removal position of the magazine unit.

[0097] It can particularly preferable be additionally provided that only the packaging blank in the middle removal position is accessible to the applicator. In contrast, the two filling positions can be closed off or protected from the machine room of the packaging module by a housing or similar. The fact that there is no open connection between the filling positions and moving components of the packaging module represents an important safety aspect when filling the magazine unit with consumable material.

[0098] However, it is sensible or necessary that the filling positions are freely accessible from the outside so that the receiving unit located in a filling position can be filled with consumable material during ongoing production operation of the packaging module.

[0099] In contrast, the removal position is closed to the outside by a door or other suitable closure element. The door allows access to the removal position, for example for maintenance purposes. Such a door in particular forms a protective device, which is configured to prevent any manual intervention during ongoing production operation in the receiving unit arranged in the removal position. For example, the door can be equipped with appropriate safety devices, which can prevent any intervention in the removal position during ongoing production operation. For example, the door can be equipped with a contact switch. If the door is opened during ongoing production operation, the machine in particular stops immediately.

[0100] Further protective mechanisms may be provided, for example in the form of a light curtain, which is only activated when the magazine unit is transferred from one work mode to the other work mode. In this case, the moving machine components pose a danger in the filling regions open to the outside. If a user were to intervene in one of the filling regions during this time, the light curtain would be interrupted. This interruption would trigger an immediate stop of the movement of the receiving units within the magazine unit via a correspondingly coupled control unit of the packaging apparatus, the packaging module, or the magazine unit.

[0101] The protective elements already described above prevent any lateral intervention in the removal position from the filling positions. In particular, it can be provided that the protective elements are significantly higher than the receiving apparatus holding the consumable material.

[0102] Further protective elements can be provided, which can be closed when the receiving units are moving, in order to prevent a user from intervening in moving components of the magazine unit during this period.

Description

BRIEF DESCRIPTION OF THE FIGURES

[0103] Exemplary embodiments of the invention and their advantages are explained in more detail below with reference to the accompanying figures. The proportions of the individual elements

relative to one another in the figures do not always correspond to the actual proportions, since some forms are simplified, while other forms are shown enlarged in relation to other elements for better illustration.

[0104] FIGS. **1** and **2** each show a magazine unit in different work modes in a side view.

[0105] FIGS. **3** to **6** show further representations of the magazine unit according to FIG. **1**.

[0106] FIG. **7** schematically shows the structure of a packaging apparatus.

[0107] FIG. **8** shows a plan view of a packaging module.

[0108] FIG. **9** shows a rear view of the packaging module according to FIG. **8**.

[0109] FIGS. **10** and **11** each show a front view of the packaging module according to FIG. **8**.

DETAILED DESCRIPTION OF THE INVENTION

[0110] Identical reference numerals are used for identical elements of the invention or those having the same effect. Furthermore, for the sake of clarity, only reference signs are shown in the individual figures, which are required for the description of the corresponding figure. The embodiments shown are merely examples of how the magazine unit or packaging apparatus according to the invention or the method according to the invention can be configured, and are non-limiting.

[0111] FIGS. **1** and **2** each show a magazine unit **1** in different work modes AM**1**, AM**2** in a side view. FIGS. **3** to **6** show further views of the magazine unit **1** according to FIG. **1**; in particular, FIGS. **3** and **4** show perspective views, FIG. **5** shows a plan view and FIG. **6** shows a front view.

[0112] The magazine unit **1** comprises at least two receiving units **2** for consumable material **20**; in particular, the magazine unit **1** comprises two receiving units **2-1** and **2-2**.

[0113] Furthermore, the magazine unit **1** comprises at least one removal position AP and at least two filling positions BP. Preferably, the removal position AP is arranged between the two filling positions BP**1** and BP**2**.

[0114] Furthermore, it is provided that the receiving units **2-1** and **2-2** are configured to be movable between the removal position AP and the two filling positions BP**1**, BP**2**.

[0115] The receiving units **2-1**, **2-2** are in particular arranged next to one another on a carriage **3**, which is arranged on a carriage guide **5** via guide elements **4**. The carriage **3** can thus be moved in a first movement direction BR**1** and counter to the first movement direction BR**1** in a second movement direction BR**2**. The guide elements **4** can, for example, be configured as guide rollers or similar.

[0116] The carriage guide **5** extends over the removal position AP and both filling positions BP**1**, BP**2**.

[0117] In particular, the removal position AP and the two filling positions BP**1**, BP**2** are thus arranged in a straight line and the receiving units **2-1**, **2-2** are configured to be movable together in the straight line.

[0118] In a first work mode AM**1** shown in FIG. **1**, the first receiving unit **2-1** is arranged in the first filling position BP**1** and the second receiving unit **2-2** is arranged in the removal position AP.

[0119] By moving the carriage **3** along the carriage guide **5** in the first movement direction BR**1**, the magazine unit **1** is transferred to a second work mode AM**2** according to FIG. **2**, in which second work mode AM**2** the first receiving unit **2-1** is arranged in the removal position AP and the second receiving unit **2-2** is arranged in the second filling position BP**2**.

[0120] By moving the carriage **3** along the carriage guide **5** in the second movement direction BR**2**, the magazine unit **1** can subsequently be returned to the first work mode AM**1** according to FIG. **1**.

[0121] In an ongoing production operation, it is provided that consumable material **20** is only ever removed from the receiving unit **2**, which receiving unit **2** is in the removal position AP in each instance.

[0122] Meanwhile, the other receiving unit **2**, which is in one of the two filling positions BP**1** or BP**2**, can be refilled with consumable material **20**.

[0123] As soon as the consumable material **20** from the receiving unit **2** located in the removal

position AP has been used up, the other receiving unit **2**, which has been filled in the meantime, can be brought back to the removal position AP by moving the carriage **3** in the corresponding movement direction BR1 or BR2.

[0124] It is thus not necessary to stop the machine to refill consumable material **20**. The time required to change the receiving units **2** within the magazine unit **1** is minimized since only a small displacement movement is necessary, the path length of which is in particular defined by the width of the receiving units **2**, the width of which in turn is determined by a width of the consumable material.

[0125] The view in FIG. **1** also shows an example of a drive **6** for the carriage **3**.

[0126] Each receiving unit **2** may provide specific receiving apparatuses **11** for receiving the consumable material **20**. For example, the receiving unit **2** can comprise a frame arrangement **12**, within which frame arrangement **12** the consumable material **20** is arranged, for example in stacks. Centering elements, alignment elements or similar can be provided, which make exact positioning and/or alignment of the consumable material **20** within the receiving unit **2** possible or assist therewith.

[0127] Furthermore, it is shown that at least one protective element **7**, for example a protective wall **8**, is arranged between the receiving units **2**. In addition to this so-called inner protective element **7**, each receiving unit **2** can comprise a further, outer protective element **9** in parallel, which is also configured as a protective wall **10**.

[0128] The protective elements **7**, **9** are also arranged on the carriage **3** and are thus configured to be movable together with the receiving units **2**.

[0129] Furthermore, each of the receiving units **2** can be assigned a lifting device **13**, **13-1**, **13-2**, via which lifting device **13** the consumable material **20** arranged within the receiving units **2-1**, **2-2** can be raised accordingly so that the consumable material unit to be removed is always located at the same removal position E. In particular, each lifting device **13** raises a base plate **14**, on which the consumable material **20** is arranged.

[0130] The lifting devices **13** are also arranged on the carriage **3** and are thus moved accordingly together with the receiving units **2** in the first movement direction BR1 or the second movement direction BR2.

[0131] A further embodiment (not shown) can provide that the receiving units **2** are each configured to be individually movable perpendicularly to the first movement direction BR1. For example, the receiving units **2** on the carriage **3** can thus each be guided in further rails, which rails are orthogonal to the carriage guide **5**. This additional movement component can improve the accessibility of the receiving unit **2** arranged in the filling position BP and can thus make filling even easier.

[0132] The consumable material **20** can, for example, be a packaging blank **21** such as those used in the beverage industry to combine several beverage containers into a sales unit or packaging unit. For example, it can be upper grip cardboard packaging **22** (cf. FIG. **3**). Alternatively, the packaging blank **21** may also be formed by outer packaging in the form of outer cardboard packaging, strapping or similar.

[0133] The filling of the receiving units **2** arranged in a filling position BP can take place manually or in an automated manner. For automated filling, an appropriately trained robot can be provided, for example. Particularly preferably, automated filling can be carried out by a driverless transport system or similar, which is equipped with a robot and comprises a receiving device for consumable material. The robot removes the consumable material from a receiving apparatus of the driverless transport system and fills it into the receiving unit of the magazine unit, which receiving unit is in a filling position. If the receiving apparatus of the driverless transport system is empty, the transport system automatically fetches additional consumable material from a storage area, which does not have to be arranged in the immediate vicinity of the magazine unit. The control of driverless transport systems is known so that a more detailed explanation in connection with the present

invention can be dispensed with.

[0134] In the magazine unit **1** shown in FIGS. **1** to **6**, both receiving units **2** are arranged on a common carriage **3**. Alternatively, in an embodiment (not shown), it can be provided that the receiving units **2** are configured to be movable individually. In this case, it can be provided that the receiving units **2** are each arranged on their own carriages, which use a common rail system, or each carriage is assigned its own rail system.

[0135] FIG. **7** schematically shows the structure of the packaging apparatus **15** for producing packaging units **30**. A packaging unit **30** is formed in particular by at least two articles **31**, which are combined with at least one packaging blank **21**.

[0136] The articles **31** to be combined are preferably containers filled with a fluid content, for example bottles or cans **32**, in particular beverage containers. However, the bottles or cans **32** or similar containers can also be filled, for example, with fluid or pasty cosmetics such as shampoo or similar.

[0137] The packaging blank **21** can, for example, be upper grip cardboard packaging **22**.

Alternatively, the packaging blank **21** can also be formed by outer packaging in the form of outer cardboard packaging, strapping, or similar, within which the articles **31** are arranged accordingly.

[0138] The packaging apparatus **15** comprises a first transport device **16**, via which articles **31** are fed to a dividing module **17** in an unordered mass flow or in an ordered mass flow or in another suitable arrangement in the transport direction TR. In the dividing module **17**, article groupings or article groups **33** of at least two articles **31** are formed. The article groups **33** each contain a defined number of articles **31**, which articles **31** are in particular arranged in a defined arrangement within the article group **33**. The number and arrangement of the articles **31** within the article group **33** in particular corresponds to the number and arrangement of the articles **31** within the packaging unit **30** to be formed.

[0139] The article groups **33** are fed to a packaging module **19** via a second transport device **18**. The packaging module **19** is configured to arrange at least one packaging blank **21** on each article group **33**. In particular, the packaging module **19** in the exemplary embodiment shown is configured to attach an upper grip cardboard packaging **22** to the article group **33** and thus combine the articles **31** into a packaging unit **30**.

[0140] The packaging module **19** is assigned at least one magazine unit **1**, as already described in connection with FIGS. **1** to **6**, in which magazine unit **1** is provided upper grip cardboard packaging **22** as consumable material **20**, in particular packaging blank **21**.

[0141] FIG. **8** shows a plan view of a packaging module **19** with a magazine unit **1**.

[0142] The packaging module **19** comprises a transport device **40**, via which the article groups (not shown) are transported in the transport direction TR through the packaging module **19**.

[0143] It is preferably provided that the removal position AP of the magazine unit **1** and the two filling positions BP1, BP2 are arranged in a straight line parallel to the transport device **40**, wherein the receiving units **2** of the magazine unit **1** are configured to be movable together in the straight line.

[0144] Furthermore, the packaging module **19** comprises at least one applicator **41**, which is configured to remove at least one upper grip cardboard packaging **22** from a magazine unit **1** assigned to the packaging module **19**, and to fasten it to the articles **31** of the article group **33** by pressing it on from above, forming a packaging unit (not shown, cf. FIG. **7**). This can in particular take place while the article groups **33** are continuously moved through the packaging module **19**.

[0145] In particular, the applicator **41** removes the particular at least one upper grip cardboard packaging **22** from the middle removal position AP of the magazine unit **1**.

[0146] It is particularly preferred that only the packaging blank **21** in the middle removal position AP are accessible to the applicator **41**. According to the embodiment shown, the two filling positions BP1, BP2 are closed off or protected from the machine room of the packaging module **19** by a housing **35** or similar. The fact that there is no open connection between the filling positions

BP1, BP2 and moving components of the packaging module **19** represents an important safety aspect when filling the magazine unit **1** with consumable material **20**.

[0147] FIG. **9** shows a rear view of the packaging module **19**, FIGS. **10** and **11** each show a front view of the packaging module **19**, wherein the magazine unit **1** according to FIG. **10** is in the first work mode AM1 and the magazine unit **1** according to FIG. **11** is in the second work mode AM2.

[0148] FIGS. **9** to **11** each show only the magazine unit **1** within the packaging module **19**; further machine components, such as the applicator, have been omitted for reasons of clarity.

[0149] FIG. **9** shows a view through the packaging module **19** onto the magazine unit **1**, while FIGS. **10** and **11** show views from the front onto the packaging module **19** and the magazine unit **1**. In particular, FIG. **10** shows the packaging module **19** with the magazine unit **1** in the first work mode AM1, and FIG. **11** shows the packaging module **19** with the magazine unit **1** in the second work mode AM2.

[0150] The transfer of the magazine unit **1** from the first work mode AM1 to the second work mode AM2 has been described in detail in connection with FIGS. **1** and **2** so that a repeated description can be dispensed with.

[0151] When comparing FIG. **9** with FIGS. **10** and **11**, it can be seen that the filling positions BP1, BP2 are each separated by a housing **35** from the interior of the packaging module **19**, in which the transport device **40** and the applicator **41** are arranged (cf. FIG. **8**), while the receiving unit **2**, which is loaded with consumable material **20** and located in the removal position AP, is accessible to the machine components of the packaging module **19**, in particular the applicator.

[0152] In contrast, it is provided that the filling positions BP1, BP2 are freely accessible from the outside (see FIGS. **10** and **11**) so that the receiving unit **2** located in a filling position BP1 or BP2 can be filled with consumable material **20** during ongoing production operation of the packaging module **19**.

[0153] In contrast, the removal position AP is closed to the outside by a door **36** or other suitable closure element. The door **36** allows access to the removal position AP, for example for maintenance purposes.

[0154] The door **36** in particular forms a protective device, which is configured to prevent any manual intervention during ongoing production operation in the receiving unit **2** arranged in the removal position AP.

[0155] For example, the door **36** is equipped with appropriate safety devices, which prevent any intervention in the removal position AP during ongoing production operation. For example, the door **36** can be equipped with a contact switch. If the door **36** is opened during ongoing production operation, the machine stops immediately.

[0156] Further protective mechanisms may be provided; for example, a light curtain **37** (shown in FIG. **11** by dashed lines) may be provided, which is only activated when the magazine unit **1** is transferred from one work mode AM1 or AM2 to the other work mode AM2 or AM1. In this case, the moving machine components pose a danger in the filling regions BP open to the outside. If a user were to intervene in one of the filling regions BP during this time, the light curtain **37** would be interrupted. This interruption would trigger an immediate stop of the movement of the receiving units **2** within the magazine unit **1** via a correspondingly coupled control unit (not shown) of the packaging apparatus **15**, the packaging module **19**, or the magazine unit **1**.

[0157] The protective elements **7** and **9** described in connection with FIGS. **1** to **6** prevent any lateral intervention in the removal position AP from the filling positions BP. In particular, it can be provided that the protective elements **7**, **9** are significantly higher than the receiving apparatus **11** holding the consumable material **20**.

[0158] Furthermore, protective elements (not shown) can be provided, which are closed when the receiving units **2** are moving, in order to prevent a user from intervening in moving components of the magazine unit **1** during this period.

[0159] The embodiments, examples and variants of the preceding paragraphs, the claims or the

following description and the figures, including their various views or respective individual features, may be used independently of one another or in any combination. Features described in connection with an embodiment are applicable for all embodiments provided the features are not incompatible.

[0160] Even if in the context of the figures reference is generally made to “schematic” representations and views, this in no way means that the figure representations and their description are to be of subordinate importance with regard to the disclosure of the invention. A person skilled in the art is certainly able to derive sufficient information from the schematically and abstractly drawn representations that will make it easier for a person skilled in the art to understand the invention without being confused in any way by the drawn and possibly not exactly true-to-scale proportions of the articles and/or parts of the magazine unit, the packaging apparatus etc. or other drawn elements. The figures allow a person skilled in the art as reader to get a better understanding of the inventive idea, which has been formulated more generally and/or more abstractly in the claims and in the general part of the description, on the basis of the more specifically explained implementations of the method according to the invention and the more specifically explained mode of operation of the device according to the invention.

[0161] The invention has been described with reference to a preferred embodiment. However, it is conceivable for a person skilled in the art that modifications or changes can be made to the invention without departing from the scope of protection of the following claims.

LIST OF REFERENCE SIGNS

[0162] **1** magazine unit [0163] **2, 2-1, 2-2** receiving unit [0164] **3** carriage [0165] **4** guide elements [0166] **5** carriage guide [0167] **6** drive [0168] **7** inner protective element [0169] **8** protective wall [0170] **9** outer protective element [0171] **10** protective wall [0172] **11** receiving apparatus [0173] **12** frame arrangement [0174] **13, 13-1, 13-2** lifting device [0175] **14** base plate [0176] **15** packaging apparatus [0177] **16** first transport device [0178] **17** dividing module [0179] **18** second transport device [0180] **19** packaging module [0181] **20** consumable material [0182] **21** packaging blank [0183] **22** upper grip cardboard packaging [0184] **30** packaging unit [0185] **31** articles [0186] **32** cans [0187] **33** article group [0188] **35** housing [0189] **36** door [0190] **37** light curtain [0191] **40** transport device [0192] **41** applicator [0193] AP removal position [0194] AM1 first work mode [0195] AM2 second work mode [0196] BP, BP1, BP2 filling position [0197] BR1 first movement direction [0198] BR2 second movement direction [0199] E removal position [0200] TR transport direction

Claims

1. A magazine unit (**1**) for consumable material (**20**), comprising: at least two receiving units (**2**) for consumable material (**20**), at least one removal position (AP) and at least two filling positions (BP), and wherein each of the at least two receiving units (**2**) is configured to be movable between the at least one removal position (AP) and at least one of the at least two filling positions (BP).
2. The magazine unit (**1**) of claim 1, comprising two receiving units (**2**) for consumable material (**20**), a single removal position (AP) and two filling positions (BP), wherein the removal position (AP) is arranged between the two filling positions (BP).
3. The magazine unit (**1**) of claim 2, wherein, in a first work mode (AM1), a first receiving unit (**2**) is arranged in the first filling position (BP) and a second receiving unit (**2**) is arranged in the removal position (AP), and wherein, in a second work mode (AM2), the first receiving unit (**2**) is arranged in the removal position (AP) and the second receiving unit (**2**) is arranged in the second filling position (BP).
4. The magazine unit (**1**) of claim 2, wherein the removal position (AP) and the two filling positions (BP) are arranged in a straight line, wherein the receiving units (**2**) are configured to be movable together in the straight line.

5. The magazine unit (1) claim 2, wherein the two receiving units (2) are arranged on a carriage (3), which is assigned to a carriage guide (5), which carriage guide (5) extends over the removal position (AP) and both filling positions (BP).
6. The magazine unit (1) of claim 1, wherein each receiving unit (2) is assigned a lifting device (13).
7. The magazine unit (1) of claim 1, wherein at least one protective element (7) is arranged between the at least two receiving units (2).
8. A packaging apparatus (15) comprising: a packaging module (19) for creating article groupings (33) with packaging (21), and a magazine unit (1) storing the packaging (21) that is provided as consumable material (20), wherein the magazine unit (1) comprises at least two receiving units (2) for consumable material (20), at least one removal position (AP) and at least two filling positions (BP), wherein each of the at least two receiving units (2) is configured to be movable between the at least one removal position (AP) and one of the at least two filling positions (BP).
9. The packaging apparatus (15) of claim 8, wherein the packaging module (19) further comprises a transport device (40) configured to move the article groupings (33) in a transport direction (TR), wherein the at least one removal position (AP) and the at least two filling positions (BP) are arranged in a straight line parallel to the transport device (40), wherein the receiving units (2) are configured to be movable in the straight line.
10. The packaging apparatus (15) claim 9, wherein the at least one removal position (AP) and the at least two filling positions (BP) are arranged parallel to the transport device (40).
11. The packaging apparatus (15) wherein at least one protective device (36) is assigned to the at least one removal position (AP), wherein the protective device (36) is configured to prevent any manual intervention during ongoing production operation in the receiving unit (2) arranged in the removal position (AP).
12. A method for combining article groupings (33) with packaging (21), the method comprising: providing packaging (21) a consumable material (20) in a magazine unit (1), wherein the magazine unit (1) comprises at least two receiving units (2) for consumable material (20), at least one removal position (AP) and at least two filling positions (BP), configuring each of the at least two receiving units (2) to be movable between the at least one removal position (AP) and one of the at least two filling positions (BP), removing the packaging (21) from one of the at least two receiving unit (2) arranged in the removal position (AP).
13. The method of claim 12, further comprising filling or refilling the magazine unit (1) by placing packaging (21) into one of the at least two receiving unit (2) when that receiving unit (2) is in a filling position (BP).
14. The method claim 13, wherein the magazine unit (1) comprises two receiving units (2) for consumable material (20), a single removal position (AP) and two filling positions (BP), wherein the removal position (AP) is arranged between the two filling positions (BP), and wherein the magazine unit (1) can be moved back-and-forth between a first work mode (AM1) and a second work mode (AM2).
15. The method of claim 14, wherein, in the first work mode (AM1), a first receiving unit (2) is arranged in a first filling position (BP) and is being filled with consumable material (20), and wherein, in the second work mode (AM2), a second receiving unit (2) is arranged in a second filling position (BP) and is being filled with consumable material (20).
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