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(71) Applicant: **Soudal N.V.**
2300 Turnhout (BE)

(72) Inventors:

- **VAN DELM, Chris**
2300 Turnhout (BE)
- **BRUGGEMAN, Peter**
2300 Turnhout (BE)
- **BAEYENS, Wim**
2300 Turnhout (BE)

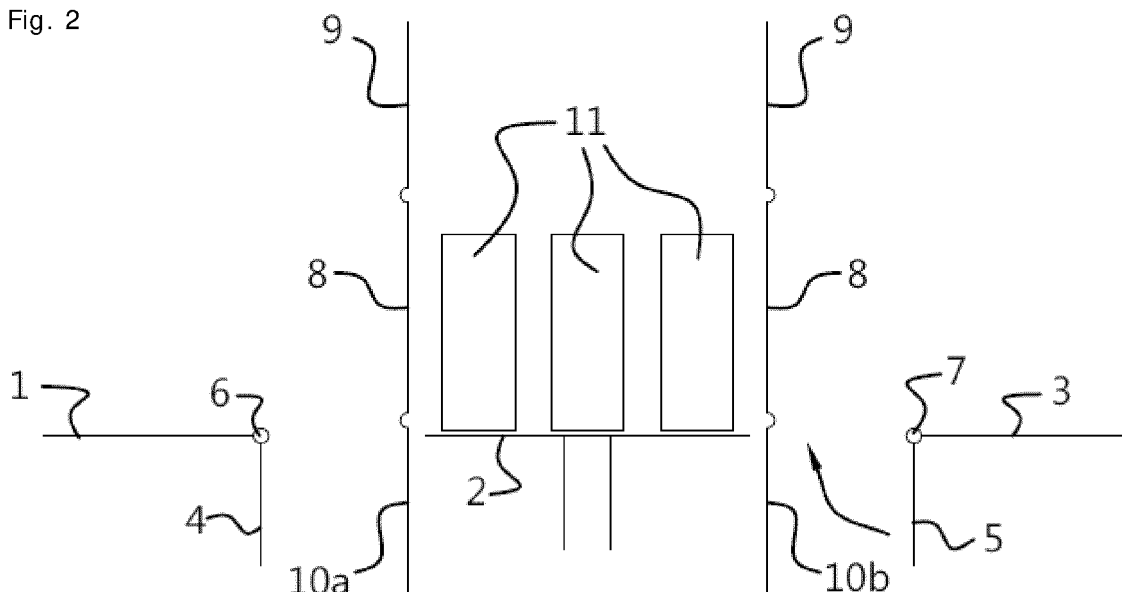
(74) Representative: **Brantsandpatents bv**
Pauline Van Pottelsberghelaan 24
9051 Ghent (BE)

(54) **METHOD AND SYSTEM FOR PACKAGING FOAM CANS**

(57) The invention relates to a method for packaging foam cans (11), comprising: supplying foam cans, counting a predetermined number of foam cans, placing the foam cans in a folding box (8), after which the folding box is folded up and glued shut, wherein the foam cans are placed in a packaging position on a folding table (1,2,3,4,5), which extends in a longitudinal direction,

wherein a folding box comprises four side walls, each side wall being provided with a flap at a top and bottom, wherein the folding box (8) is placed with an open bottom over the foam cans (11) in the packaging position, after which the flaps at the top and bottom are folded shut. The invention further relates to a system for packaging foam cans and a use.

Fig. 2



Description

TECHNICAL FIELD

[0001] The invention relates to a method for packaging foam cans.

[0002] In a second aspect, the invention also relates to a system for packaging foam cans.

[0003] In another aspect, the invention also relates to a use of a method according to the first aspect or a system according to the second aspect for packaging foam cans.

PRIOR ART

[0004] In the prior art, folding boxes are often still used for packaging a predetermined number of foam cans. The folding box is first unfolded, and folded up on a side, for instance the underside, after which the folding box is positioned so that the foam cans are placed in the folding box in a subsequent step. After placing the foam cans in the folding box, several user instructions are then added before the folding box is folded up and glued shut on the other side.

[0005] This known method has the disadvantage that the packaging of foam cans takes up a lot of time and space and that when the foam cans are placed in the folding box, protruding parts of the foam cans get caught behind raised parts of the folding box. As a result, the production process may be delayed. This is a bigger problem when different types of foam cans need to be packaged, often requiring switching between folding boxes and different user instructions.

[0006] Another disadvantage of the known method is that adding a user instructions is often forgotten or that the user instructions are even lost. This creates possible confusion for the end user who sometimes has to look up the instructions afterwards, which is not always obvious.

[0007] Yet another disadvantage is that during packaging the foam cans sometimes get stuck with the nozzle, cap or adapter on the folding box, which often results in damage to the folding box or the foam can.

[0008] US 5 044 143 describes a device for packaging flexible packages. This known device has the disadvantage that goods to be packaged must be placed in the box via an open top of a box, as a result of which protruding parts of the foam cans catch behind raised parts of the folding box.

[0009] The present invention aims to solve at least some of the above problems or drawbacks.

SUMMARY OF THE INVENTION

[0010] In a first aspect, the present invention relates to a method according to claim 1.

[0011] The great advantage is that both the unfolding of the folding box and the packing of the foam cans in the folding box are done by the same device. More spe-

cifically, the folding box is only folded up on a top and a bottom when the foam cans have been placed in the folding box. An additional advantage is that less space has to be used as a result, because a device for forming the folding box is no longer applicable. Another advantage is that packaging can be done more quickly because the folding box is only folded up after the foam cans have already been placed in the folding box. This omits the step of partially folding up the folding box, then presenting the folding box to a packaging device, which places the contents in the box and then folds it closed further.

[0012] Preferred embodiments of the method are set out in claims 2-9. A specific preferred embodiment concerns a method according to claim 2. This is in fact advantageous because the foam cans are not moved relative to each other while the folding box is folded up. This reduces the risk of an undesired reaction of the contents in the foam cans. Another advantage is that the box, which is already provided with the foam cans, is folded up without allowing the foam cans to slip out of the folding box.

[0013] Another specific preferred embodiment concerns a method according to claim 5. The transport pucks are very advantageous because the foam cans can be transported at a higher speed without the foam cans falling over. The transport pucks also ensure that there is always space between the foam cans, so that the foam cans are provided with free space all around where the foam cans can be picked up.

[0014] In a second aspect, the present invention relates to a system according to claim 7. This system has the advantage, among other things, that the packaging, in particular the folding box, is placed over the foam cans. As a result, the folding box is only folded up after the foam cans have been placed in the folding box. In addition, folding boxes that have not yet been unfolded can be supplied to one system, just like the foam cans, which reduces the size of the packaging system, because no separate system is required for already partially folding up the folding box. This saves packaging time and costs for maintenance of the packaging system. In addition, additional means of transport, for example to enable the supply of partially folded up folding boxes, are simply avoided.

[0015] Preferred embodiments of the system are described in dependent claims 8-14. A specific preferred embodiment concerns a system according to claim 8. This is very advantageous because the folding up of the two opposite flaps of the folding box is done by means of the lips, wherein the foam cans must not be tilted to prevent slipping out of the folding box. This limits the movements of the foam cans and thus also reduces the risk of a possible reaction of the contents in the foam cans. An additional advantage is that the lips always make contact with the flaps in the best possible locations to make it easier to fold up these flaps and not to cause damage to the folding box.

[0016] In a third aspect, the present invention relates

to a use according to claim 15. The use is in fact very advantageous because the folding box is folded up with the foam cans in the folding box and this without changing the orientation of the foam cans. This ensures faster and safer packaging of the foam cans.

DESCRIPTION OF THE FIGURES

[0017]

Figures 1-10 show a side view of a folding table when carrying out a method according to an embodiment of the present invention.

Figure 11 shows a side view of a transport puck according to an embodiment of the present invention.

Figure 12 shows a perspective view of a transport puck according to an embodiment of the present invention.

DETAILED DESCRIPTION

[0018] Unless otherwise defined, all terms used in the description of the invention, including technical and scientific terms, have the meaning as commonly understood by a person skilled in the art to which the invention pertains. For a better understanding of the description of the invention, the following terms are explained explicitly.

[0019] In this document, "a" and "the" refer to both the singular and the plural, unless the context presupposes otherwise. For example, "a segment" means one or more segments.

[0020] When the term "around" or "about" is used in this document with a measurable quantity, a parameter, a duration or moment, and the like, then variations are meant of approx. 20% or less, preferably approx. 10% or less, more preferably approx. 5% or less, even more preferably approx. 1% or less, and even more preferably approx. 0.1% or less than and of the quoted value, insofar as such variations are applicable in the described invention. However, it must be understood that the value of a quantity used where the term "about" or "around" is used, is itself specifically disclosed.

[0021] The terms "comprise", "comprising", "consist of", "consisting of", "provided with", "include", "including", "contain", "containing", are synonyms and are inclusive or open terms that indicate the presence of what follows, and which do not exclude or prevent the presence of other components, characteristics, elements, members, steps, as known from or disclosed in the prior art.

[0022] The term "foam can" in this text is mainly intended to mean a cylindrical container or can with an opening in the top face and a closed bottom face, the opening being closed with a valve. The foam cans are filled with an insulating foam or an adhesive foam, for example a fraction of polyol and a fraction of methylenediphenyl di-

isocyanate (MDI), further provided with a propellant gas.

[0023] In a first aspect, the invention relates to a method for packaging foam cans, comprising:

- 5 - supplying foam cans,
- counting a predetermined number of foam cans,
- packing the foam cans in a folding box, wherein the folding box is folded up and glued shut.

10 [0024] The foam cans are placed in a packaging position on a folding table, which extends in a longitudinal direction. The folding box comprises four side walls, wherein each side wall is provided with a flap on a top and a bottom. The folding box is placed with an open bottom over the foam cans in the packaging position, after which the flaps on the top and bottom are folded shut.

15 [0025] The foam cans are preferably supplied with a constant flow to a packaging device so that it is possible to obtain a full occupation of the packaging device. The foam cans can herein be supplied manually to the packaging device, preferably the foam cans are supplied by means of a conveyor belt, which has the option of presenting the foam cans one by one to the packaging device.

20 [0026] The conveyor belt is advantageous because it automatically moves the cans from a previous step in a foam can production process, for example the filling and sealing of the foam cans. In addition, the conveyor belt is very advantageous because it always moves the foam cans at the same speed, so that the foam cans are subjected to fewer shocks during transport and therefore fall over. This has an additional advantage for the safety of the foam cans during transport. If foam cans fall over, a valve that seals a foam can may be actuated or the foam can may be damaged. In both cases, a foam can can unintentionally be sprayed empty or explode.

30 [0027] In a next step, the foam cans entering the packaging device are counted. This is in fact advantageous because it makes it possible to isolate a predetermined number of foam cans. Because the foam cans are offered one by one to the packaging device, they can be easily counted, thereby reducing the chance of an incorrect count.

35 [0028] The separated foam cans are then positioned and packed, after which the packed foam cans can be stored or shipped. The foam cans are preferably packed in a folding box, so that they are provided with an additional and extra protection during transport, and whereby they can be stacked more simply and more stably.

40 [0029] The major advantage of the method is that both the unfolding of the folding box and the packaging of the foam cans in the folding box take place in the same device, in particular the packaging device. An additional advantage is that less space has to be used as a result, because a device for forming the folding box is no longer applicable. This omits the step of partially folding up the folding box, then presenting the folding box to a packag-

ing device, which places the contents in the box and then folds it closed further.

[0030] According to an embodiment, the foam cans are brought together on a collecting table before being placed on the folding table, wherein the foam cans are placed in a desired formation of one or more rows with a predetermined number of foam cans and wherein after the foam cans have been placed in the desired formation, they are pushed together with the aid of pressure plates and pushed on to the folding table. This embodiment is advantageous because, by pushing the foam cans together, the foam cans fit within the dimensions of the folding box, without the foam cans having to be positioned exactly right away. An additional advantage is that aerosol cans can already be collected by using a collection table, while foam cans are still packed in a folding box, resulting in a higher throughput speed during packaging.

[0031] According to a preferred embodiment, the foam cans are pressed together by means of pressure plates positioned on two opposite sides of the folding table, parallel to the longitudinal direction of the folding table. The folding table then moves in a first sense in the longitudinal direction and then in an opposite second sense in the longitudinal direction for folding up the flaps transversely to the longitudinal direction of the folding table.

[0032] The advantage of the pressure plates on the two opposite sides of the folding table is that the foam cans in the folding box are pressed together by means of the pressure plates, so that they cannot slide out of the folding box when the bottom flaps are being folded up. Because the foam cans are only pressed together after the folding box has been placed over the foam cans, it is sufficient to press together only two opposite sides of the box to hold the foam cans. Another advantage is that the foam cans do not move relative to each other during the folding of the folding box, which reduces the risk of undesired reactions of the content in the foam cans.

[0033] According to a preferred embodiment, an adapter, cap or nozzle is pressed onto the foam cans before the foam cans are packed in the folding box. The adapters, caps or nozzles are connected to the top of foam cans where the foam cans are fitted with a valve. The adapter or nozzle is advantageous because accidentally pressing the valves is impossible. In addition, the adapter ensures that the foam cans can be placed on many different nozzles or spraying devices. In addition, the foam cans can be used immediately after placing a nozzle and no separate nozzle needs to be provided for this.

[0034] According to a preferred embodiment, a predetermined desired amount of adapters, caps or nozzles are placed on an equal number of foam cans. Subsequently, the placed adapters, caps or nozzles are simultaneously pressed onto the foam cans.

[0035] According to a further embodiment, several adapters, caps or nozzles are pressed simultaneously

onto the foam cans by means of a single press.

[0036] According to another embodiment, a plate is slid over the adapters, caps or nozzles. The plate is preferably substantially rectangular, wherein the plate is positioned transverse to the height direction of the foam cans. Subsequently, the foam cans are moved under the plate to the pressing device. After the foam cans have been placed under the press, the plate is pushed back so that the press has a view of the adapters, caps or nozzles and can press and fix them on the foam cans.

[0037] The plate is advantageous because it prevents the adapters, caps or nozzles from falling off during the movement to the pressing device. This ensures that all adapters, caps or nozzles are present on the foam cans when they are placed under the pressing device. An additional advantage is that no adapters, caps or nozzles can fall off and block the conveyor belt.

[0038] It is particularly advantageous to press several adapters, caps or nozzles simultaneously using one press consisting of several press cylinders. This saves costs on the press. This simplifies setup and maintenance of the press. In addition, an additional advantage is that a larger quantity of foam cans can be processed at the same time.

[0039] According to a preferred embodiment, after the adapters, caps or nozzle have been pressed, foam cans are transported by means of transport pucks on a conveyor belt, wherein the adapter, cap or nozzle is placed on a conveyor belt in a predetermined orientation with respect to the transport puck. If necessary, the transport pucks can be rotated individually in a predetermined direction.

[0040] The transport pucks are very advantageous because the foam cans can be transported at a higher speed without the foam cans falling over. The transport pucks also ensure that there is always a space between the foam cans, so that the foam cans are provided with free space all around where the foam cans can be picked up. Turning in a predetermined direction is particularly advantageous in order, for example, to orient nozzles away from side walls of the folding box, so that, for example, the nozzles cannot get caught on the folding box when the folding box is placed over the foam cans.

[0041] According to a preferred embodiment, the transport pucks are provided with user instructions and/or gloves at the top in the center. The foam cans are provided with glue on the underside before they are placed on the transport pucks.

[0042] The user instructions and/or gloves are correctly oriented by means of an orientation device, so that the user instructions and/or gloves are always positioned in the same way on the transport pucks by means of a robot. Because glue has been applied to the bottom of the foam cans, the user instructions and glove will stick to the bottom of the foam cans.

[0043] This is in fact very advantageous because when the foam cans are removed from the transport pucks, the user instructions and/or gloves are provided on the un-

derside of the foam cans. As a result, the user instructions and/or gloves do not have to be placed in the packaging afterwards. The foam cans have a cavity at the bottom, so that the user instructions and/or gloves can be concealed without them coming into contact with a surface on which the foam cans are placed, such as for instance the bottom of the folding box. This ensures that the user instruction and/or gloves are not damaged.

[0044] In a second aspect, the invention relates to a system for packaging foam cans, comprising a packaging device for packaging foam cans in a folding box, a conveyor belt for supplying foam cans to the packaging device and at least one sensor for counting a predetermined number of foam cans. The packaging device comprises a folding table extending in a longitudinal direction. The folding table is slidable in the longitudinal direction, wherein the folding table is adapted to receive a predetermined number of foam cans in a predetermined pattern. The packaging device further comprises a robot provided with a robotic arm for unfolding and placing a folding box over foam cans on the folding table.

[0045] The sensor is positioned at the entrance of the packaging device. This is advantageous because it allows the sensor to simply count the foam cans when entering the packaging device. Because the folding box can only receive a limited number of foam cans, the sensor counts the foam cans supplied at the entrance until this number has been reached. This makes it possible to provide the box with the correct number of foam cans each time.

[0046] The counted foam cans are then placed on the folding table so that they can be packed. After placing the foam cans on the folding table, a folding box is placed over the foam cans. Because the folding table is slidable in a direction parallel to the longitudinal direction of the folding table, it can fold closed the flaps of the folding box transversely to this longitudinal direction without the foam cans falling out of the folding box.

[0047] The folding table is very advantageous because the folding table can receive the foam cans and fold up the folding box at the bottom with the foam cans inside the folding box. Because these two steps are combined, a lot of time and space is saved. As a result, no transport means need to be provided to transport partially folded boxes in advance to a device, which then provides them with foam cans and folds the box further.

[0048] According to a preferred embodiment, the folding table is divided in the longitudinal direction into three sub-folding tables, two outer sub-folding tables and an enclosed sub-folding table. The sub-folding tables are separated from each other by means of a lip, wherein the lips are articulately coupled to the two outer sub-folding tables. The lips face the enclosed sub-folding table, wherein the lips are suitable for folding up two flaps on a bottom side of the folding box transversely to the longitudinal direction.

[0049] The enclosed sub-folding table is suitable to receive a predetermined number of foam cans. Preferably,

the foam cans fill the enclosed sub-folding table until they abut the edge of the enclosed sub-folding table, wherein the edge is not exceeded or is exceeded by a maximum of 3 millimeters.

[0050] The lips are articulately coupled to the two outer sub-folding tables, the turning radius being transverse to the longitudinal direction of the folding table. Preferably, the lips can be hinged to above and below the plane of the folding table. More preferably, the lips can be pivoted to an angle between -90° to 90° relative to the plane of the folding table.

[0051] According to a further embodiment, the lips are controlled by means of a cylinder, whereby the angle relative to the folding table can be automatically adjusted.

[0052] The lips are very advantageous because by adjusting the angle, the flaps of the folding box can always be supported by the lips of the folding table in the most suitable locations. In this way no damage is made to the flaps or the bottom of the folding box during the folding of the flaps. When the flaps are folded shut, the flaps move inwards towards the bottom of the folding box, as a result of which the angle of the flaps relative to the folding box becomes smaller. In order to make permanent contact with the flaps at the most suitable place during folding up of these flaps, it is therefore advantageous to also move the lips towards the folding box during folding up.

[0053] Another advantage is that the two opposite flaps of the folding box are folded up by means of the lips, so that the foam cans do not have to be tilted to prevent the foam cans from sliding out of the folding box. This limits the movements of the foam cans and thus also reduces the risk of a possible reaction of the contents in the foam cans.

[0054] According to a preferred embodiment, the packaging device comprises a clamping device for clamping at least two opposite side walls of the folding box placed over the foam cans. The clamping device is slidably coupled in the longitudinal direction to the folding table, for sliding the folding box on the folding table.

[0055] According to a further embodiment, the clamping device comprises two L-shaped clamping surfaces wherein a first leg of the clamping surfaces can clamp the two opposite side walls of the folding box. A second leg of the clamping surfaces is disposed in a direction transverse to a direction of the first leg, and is adapted to contact a side wall of the folding box enclosed by the first legs.

[0056] The clamping device is very advantageous because after clamping the foam cans cannot slide out of the folding box when the folding table folds the two flaps shut. The foam cans are preferably clamped so that they can no longer shift. More preferably, the foam cans are clamped so that sliding is slowed down. By limiting the clamping, the folding box is not damaged.

[0057] The L-shaped clamping surfaces are very advantageous because, after folding closed the two opposite flaps transversely to the longitudinal direction of the

folding table, the clamping device can slide the folding box over the folding table in order to fold up two other lower flaps parallel to the longitudinal direction of the folding table.

[0058] According to a preferred embodiment, the robotic arm comprises a scissor device for unfolding the folding box. The scissor device further comprises suction cups for gripping the folding box in the closed position.

[0059] The folding boxes are placed in the packaging device in a folded up state. As a result, the folding boxes must be unfolded before they are suitable for receiving the foam cans. The scissor device is very advantageous because it can pick up the folding boxes and unfold the folding boxes by means of the scissor system, so that they can be placed over the foam cans.

[0060] The scissor device mainly comprises two plates articulated relative to each other. The plates are coupled to a robotic arm so that this robotic arm can move the scissor device in the packaging device.

[0061] According to a further embodiment, the suction cups comprise a vacuum system for creating a vacuum between contact points of the suction cups with the folding box and side walls of the folding box. This is advantageous because it allows the box to be picked up without using movable parts. An additional advantage is that the folding box can be released immediately by removing the vacuum.

[0062] According to a preferred embodiment, the system further comprises a pressing device for placing adapters, caps or nozzles on the foam cans. The pressing device comprises a pressing arm for simultaneous pressing of several adapters, caps or nozzles onto the foam cans.

[0063] The foam cans are supplied to the pressing device wherein a predetermined number of foam cans is provided with an adapter or nozzle. A robot picks up the adapter or nozzle, after which they are placed on top of the foam cans. After the adapters, caps or nozzles have been placed, they are pressed onto the predetermined number of foam cans.

[0064] According to a preferred embodiment, the conveyor belt is provided with two opposite side walls, each provided with a lip. The lips of the two opposite side walls face each other. The system further comprises transport pucks for releasable coupling with foam cans. The transport pucks are suitable to be placed between the side walls of the conveyor belt. The transport pucks further comprise a shell, wherein the conveyor pucks comprise a slot in the shell for receiving the lips of the side walls of the conveyor belt.

[0065] The transport pucks are advantageous for releasably coupling the foam cans, after which they cannot fall off the transport pucks. An additional advantage is that the lip of the conveyor belt in the slot of the transport pucks prevents transport pucks from falling over, which also prevents the foam cans from falling over on the conveyor belt. Another additional advantage is that this slot prevents the transport pucks from turning between the

guides, so that the orientation of the foam cans on the conveyor belt does not change.

[0066] Another advantage is that the foam cans can be moved or stopped more quickly on the conveyor belts.

[0067] According to a further embodiment, the transport pucks comprise a spring element and a movable core, wherein the movable core of the transport pucks is movable in height. The movable core further comprises a recess for receiving user instructions and/or gloves.

[0068] The spring element is very advantageous because it pushes the center of the transport pucks against the underside of the foam cans. As a result, the user instructions and/or gloves are pushed against the underside of the foam cans as long as they are coupled to the transport pucks. This is particularly advantageous for sticking the user instructions and/or gloves to the underside of the foam cans.

[0069] According to a preferred embodiment, the system comprises a positioning device, wherein the positioning device comprises a rotation means for rotating a foam can.

[0070] Because the adapters, caps or nozzles can be wider than the foam cans on a side, it is possible that the folding box that has to be placed over the foam cans gets caught on it. The positioning device is here very advantageous for positioning the part that protrudes beyond the foam cans, if necessary, so that the folding box cannot get stuck there.

[0071] After the foam cans have been positioned, the positioning device will move the foam cans to the folding table according to a certain grid.

[0072] According to a preferred embodiment, the system further comprises a gluing device for applying glue to a bottom side of a foam can.

[0073] The gluing device is very advantageous because it ensures that the user instructions and/or gloves stick to the underside of the foam cans after the foam cans have been placed on the transport pucks.

[0074] In a further aspect, the invention relates to the use of a method according to the first aspect or a device according to the second aspect for packaging foam cans.

[0075] In what follows, the invention is described by way of non-limiting figures illustrating the invention, and which are not intended to and should not be interpreted as limiting the scope of the invention.

[0076] The present invention will now be described in more detail with reference to figures which are not limiting.

DESCRIPTION OF THE FIGURES

[0077] Figures 1-10 show the steps of part of the method for packaging foam cans, wherein the side view of a folding table according to an embodiment of the invention can be seen in each step/figure.

[0078] After the foam cans have gone through the production process, they are ready to be put into use. The foam cans still have to be sent to points of sale or end

users. To make this possible, a predetermined number of foam cans are packed in a folding box.

[0079] The foam cans can also be fitted with an adapter, cap or nozzle, wherein the adapter makes it possible to couple the foam cans via the adapter to nozzles or spraying devices. In addition, the foam cans can be fitted with a nozzle in advance so that it can be used immediately.

[0080] The relevant adapters, caps and nozzles are fed into a positioning device, which orients the adapters, caps and nozzles so that they can be picked up and placed on the foam cans. A plurality of adapters, caps or nozzles are separated one by one in a positioning device, after which the presence of an adapter, cap or nozzle is checked by means of a sensor. The adapters or nozzles are then placed on a predetermined number of foam cans by means of a robot.

[0081] After the adapters, caps or nozzles have been placed on the foam cans, a plate, positioned transversely to the height direction of the foam cans, is slid over the adapters, caps and nozzles on the foam cans. After this, the foam cans are moved to a pressing device, which presses the adapters, caps or nozzles onto the predetermined number of foam cans. As a result, the adapters, caps or nozzles are connected to the foam cans.

[0082] After the adapters, caps or nozzles have been placed, the foam cans are moved to a packaging device, where the foam cans are counted, positioned and packed. A folding box is provided to receive a predetermined number of foam cans. These predetermined number of foam cans are separated and positioned in a predetermined direction by means of the counting device. The adapters, caps or nozzles can protrude beyond the perimeter of the foam cans on the side, so that they can possibly get stuck on the folding box.

[0083] The foam cans (11) are positioned so that the adapters, caps or nozzles are positioned with the protruding part inwards. After this, these foam cans (11) are placed on a folding table (1, 2, 3, 4, 5) as shown in Figures 1-10. The folding table (1, 2, 3, 4, 5) is divided in the longitudinal direction into three sub-folding tables (1, 2, 3), namely two outer sub-folding tables (1, 3) and an enclosed sub-folding table (2), separated from each other by a lip (4, 5). The lips (4, 5) are respectively articulately coupled in the hinge point (6, 7) to the two outer sub-folding tables (1, 3), the lips (4, 5) facing the enclosed sub-folding table (2). The foam cans are placed on the enclosed sub-folding table (2), as shown in Figure 1.

[0084] In a next step, a folding box (8) is picked up by means of a robot provided with a robotic arm. The robotic arm furthermore has a scissor device that couples the folding box to the robotic arm, wherein the scissor device unfolds the folding box, so that it can be placed over the foam cans on the folding table (not shown in the figures).

[0085] Figure 2 shows a next step in the folding process. Here, a folding box (8) is placed over the foam cans (11) on the folding table (1, 2, 3, 4, 5). The folding box (8) is then pressed together by means of pressure plates

on two opposite side walls parallel to the longitudinal direction of the folding table (1, 2, 3, 4, 5). After the folding box has been placed, lip (5) moves upwards, so that the lip (5) is always above the second flap (10b).

[0086] Next, lip (4) is limitedly pivoted upward while the folding table (1, 2, 3, 4, 5) shifts toward the second lip (5), as shown in Figure 3. Lip (4) then contacts first flap (10a) causing the first flap (10a) to fold towards lip (5). While the folding table continues to slide, the lip (4) pivots in such a way that it always makes contact with this flap (10a) at the lowest possible point. Because the folding table shifts, the second flap (10b) will move away from the folding box (8), as shown in Figure 4.

[0087] Figure 5 shows how the first flap (10a) is folded closed and the lip (4) is parallel to the plane of the folding table (1, 2, 3, 4, 5). At this point, the folding table (1, 2, 3, 4, 5) now moves in an opposite direction, more specifically towards lip (4). While moving in the new direction, the lip (5) will first pivot down to fold the second flap (10b) back towards the folding box (1, 2, 3, 4, 5). The lip (5) will pivot at a certain level so that it contacts the second flap (10b) approximately at the lowest possible point, as shown in Figure 6.

[0088] Figure 7 then shows the further folding up of the second flap (10b) towards the underside of the folding box (1, 2, 3, 4, 5). After the second flap (10b) has been folded up, the folding table (1, 2, 3, 4, 5) moves again in the opposite direction, as shown in Figure 8, so that the folding box (1, 2, 3, 4, 5) with the foam cans (11) with the flaps (10) folded up, is again on the enclosed sub-folding table (2) as shown in Figure 9.

[0089] In a next step, the clamping device shifts the folding box over the folding table (1, 2, 3, 4, 5) by means of a conveyor belt (12) to a next part of the packaging device, in which all other flaps are folded shut. Finally, the folding box (1, 2, 3, 4, 5) is automatically glued shut at the end of the packaging device.

[0090] Figures 11 and 12 show transport pucks for receiving the foam cans. The transport pucks then move the releasably coupled foam cans to the packaging device by means of a conveyor belt. The conveyor belt is provided with two side walls parallel to each other, these having a distance between each other at least equal to the diameter of the transport pucks. The side walls also have a lip, which both face each other.

[0091] The transport puck has a substantially cylindrical body with a diameter greater than the diameter of the foam cans to be received. The transport puck is provided in the shell with two slots (17, 18), both slots (17, 18) being able to receive the tabs from the conveyor belt. Specifically, the transport pucks are placed on the conveyor belt, with the lips of the side walls sliding into the slots (17, 18). The slot (18) has a substantially four-sided inner wall that allows the lips of the conveyor belt to prevent the transport pucks from rotating on their axis and thus also changing the orientation of the adapter or nozzle. Both slots also prevent the transport pucks from tipping over in the event of a sudden stop of the conveyor

belt due to the weight of the foam cans. Magnets on the transport pucks ensure that the foam cans do not fall over in the event of a sudden stop. If only slot (17) is guided in the lips, the orientation of the transport puck, and thus also the orientation of the foam can with adapter or nozzle, can change in the positioning device by clamping the transport puck between two belts which are propelled with a specific speed, whether or not different, by means of servo-controlled motors.

[0092] Furthermore, the transport puck has an opening at the top and a core that is movable in height, which is provided with a holder (16) at the top, for receiving user instructions and/or gloves. The movable core is internally provided with a spring element (14) which pushes the movable core under pressure against the top of the transport puck, whereby the holder (16) on the core protrudes through the opening of the transport puck. Furthermore, the transport puck comprises a plurality of magnets (15) in the housing, for magnetically attracting the foam can placed on the transport puck. As a result, the foam can is detachably coupled to the transport puck. Because the foam cans are attracted by the magnets (15), the movable core of the transport puck is pressed together. The spring element (14) hereby presses the user instructions and/or gloves in the holder (16) against the underside of the foam can under pressure.

[0093] Before the foam cans are placed on the transport pucks, the foam cans are provided with glue on the underside by means of a gluing device. As a result, the user instructions and/or gloves stick to the underside of the foam cans when the foam cans are disconnected from the transport pucks.

Claims

1. Method for packaging foam cans (11) comprising:

- supplying foam cans (11),
 - counting a predetermined number of foam cans (11),
 - packing the foam cans (11) in a folding box (8), wherein the folding box (8) is folded up and glued shut,
- characterized in that** the foam cans (11) are placed in a packaging position on a folding table (1, 2, 3, 4, 5), which extends in a longitudinal direction, wherein a folding box (8) comprises four side walls, each side wall being provided with a flap at a top and bottom, wherein the folding box (8) is placed with an open bottom over the foam cans (11) in the packaging position, after which the flaps at the top and bottom are folded shut.

2. Method according to claim 1, **characterized in that** the foam cans (11) are pressed together by means of pressure plates, positioned on two opposite sides

of the folding table (1, 2, 3, 4, 5), parallel to the longitudinal direction of the folding table (1, 2, 3, 4, 5), after which the folding table (1, 2, 3, 4, 5) moves in a first sense along the longitudinal direction and then in a second opposite sense along the longitudinal direction for folding up the flaps transversely to the longitudinal direction of the folding table (1, 2, 3, 4, 5).

3. Method according to claim 1 or 2, **characterized in that** an adapter, cap or nozzle is pressed onto the foam cans (11) before the foam cans (11) are packed in the folding box (8).

4. Method according to claim 3, **characterized in that** adapters, caps or nozzles are placed on a predetermined number of foam cans (11), the placed adapters, caps or nozzles subsequently being pressed simultaneously onto the foam cans (11).

5. Method according to claims 3 or 4, **characterized in that** foam cans (11) after the pressing of the adapters, caps or nozzles are transported by means of transport pucks on a conveyor belt, after which the adapters, caps or nozzles are rotated in a predetermined direction if necessary.

6. Method according to claim 5, **characterized in that** the transport pucks are provided with user instructions and/or gloves at the top in the center, and wherein the foam cans (11) are provided with glue on the underside before being placed on the transport pucks.

7. System for packaging foam cans (11) comprising a packaging device for packing foam cans (11) in a folding box (8), a conveyor belt for supplying foam cans (11) to the packaging device, at least one sensor for counting a predetermined number of foam cans (11), **characterized in that** the packaging device comprises a folding table (1, 2, 3, 4, 5) which extends in a longitudinal direction, the folding table (1, 2, 3, 4, 5) being slidable in the longitudinal direction, and wherein the folding table (1, 2, 3, 4, 5) is suitable for receiving a predetermined number of foam cans (11) in a determined pattern, the packaging device further comprising a robot provided with a robotic arm for unfolding and placing a folding box (8) over foam cans (11) on the folding table (1, 2, 3, 4, 5).

8. System according to claim 7, **characterized in that** the folding table (1, 2, 3, 4, 5) is divided in the longitudinal direction into three sub-folding tables, two outer sub-folding tables (1, 3) and an enclosed sub-folding table (2), separated from each other by means of a lip (4, 5), wherein the lips (4, 5) are articulatedly coupled to the two outer sub-folding tables (1, 3), and the lips (4, 5) facing the enclosed sub-

folding table (2), wherein the lips (4, 5) are suitable for folding up two flaps (10a, 10b) on a bottom side of the folding box (8) transversely to the longitudinal direction.

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9. System according to claim 7 or 8, **characterized in that** the packaging device comprises a clamping device for clamping at least two opposite side walls of the folding box (8) placed over the foam cans (11), wherein the clamping device is slidably coupled in the longitudinal direction to the folding table (1, 2, 3, 4, 5), for sliding the folding box (8) on the folding table (1, 2, 3, 4, 5). 10
10. System according to any of the preceding claims 7-9, **characterized in that** the robotic arm comprises a scissor device for unfolding the folding box (8), and wherein the scissor device further comprises suction cups for gripping the folding box (8) in the closed position. 15
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11. System according to any of the preceding claims 7-10, further comprising a pressing device for placing adapters, caps or nozzles on the foam cans (11), wherein the pressing device comprises a pressing arm for simultaneously pressing a plurality of adapters or nozzles onto the foam cans (11). 25
12. System according to any of the preceding claims 7-11, **characterized in that** the conveyor belt is provided with two opposite side walls, each provided with a lip, the lips of the two opposing side walls facing each other, the system further comprising transport pucks for releasably coupling with foam cans (11), wherein the conveyor pucks are adapted to be placed between the side walls of the conveyor belt, wherein the transport pucks comprise a shell and wherein the conveyor pucks comprise a slot (17, 18) in the shell for receiving the lips of the side walls of the conveyor belt. 30
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13. System according to any of the preceding claims 7-12, **characterized in that** the system comprises a positioning device, wherein the positioning device comprises a rotation means for rotating a foam can (11). 45
14. System according to any of the preceding claims 7-12, **characterized in that** the system further comprises a gluing device for applying glue to a bottom side of a foam can (11). 50
15. Use of a method according to any of claims 1-6 or a system according to any of claims 7-14 for packaging foam cans. 55

Fig. 1

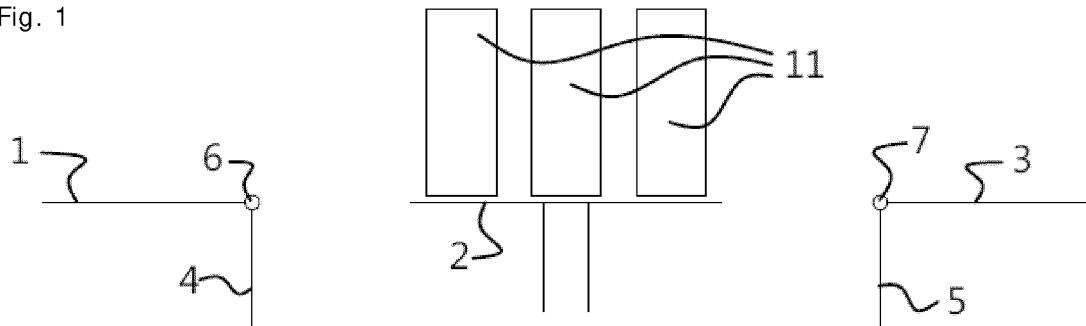


Fig. 2

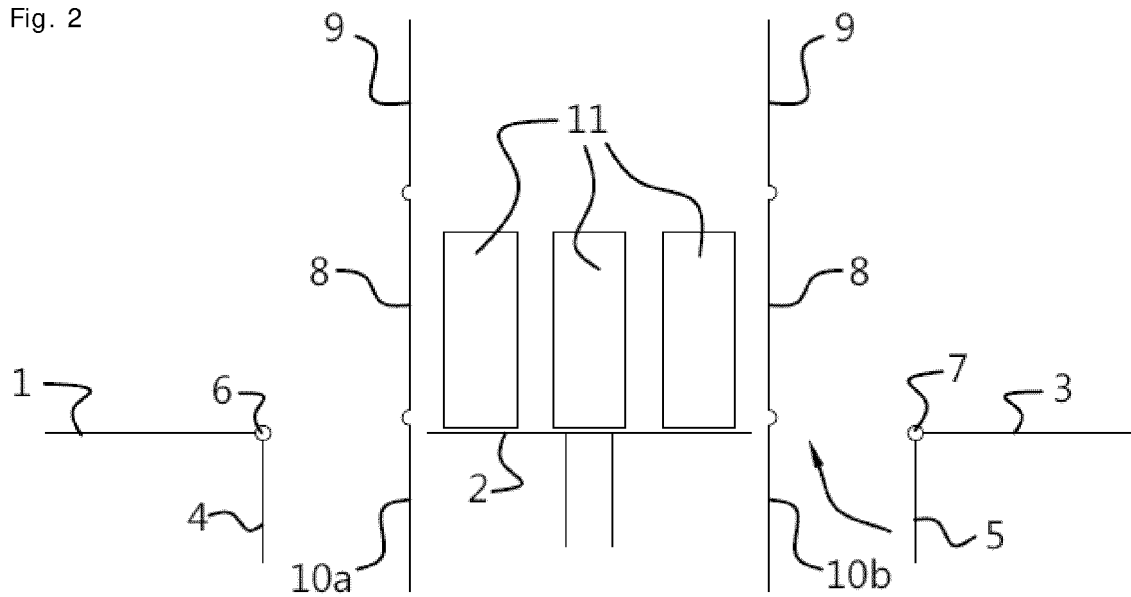


Fig. 3

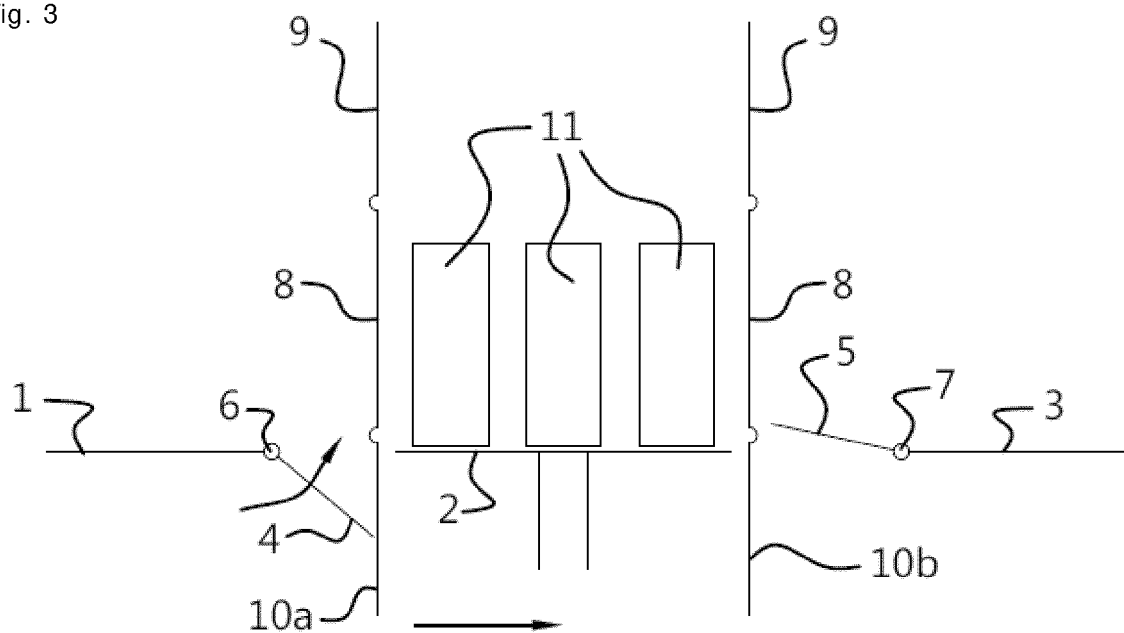


Fig. 4

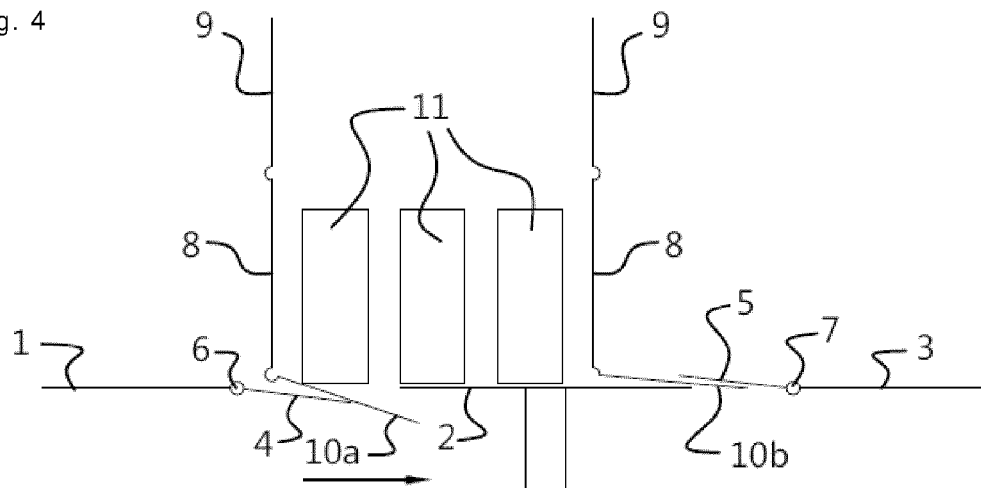


Fig. 5

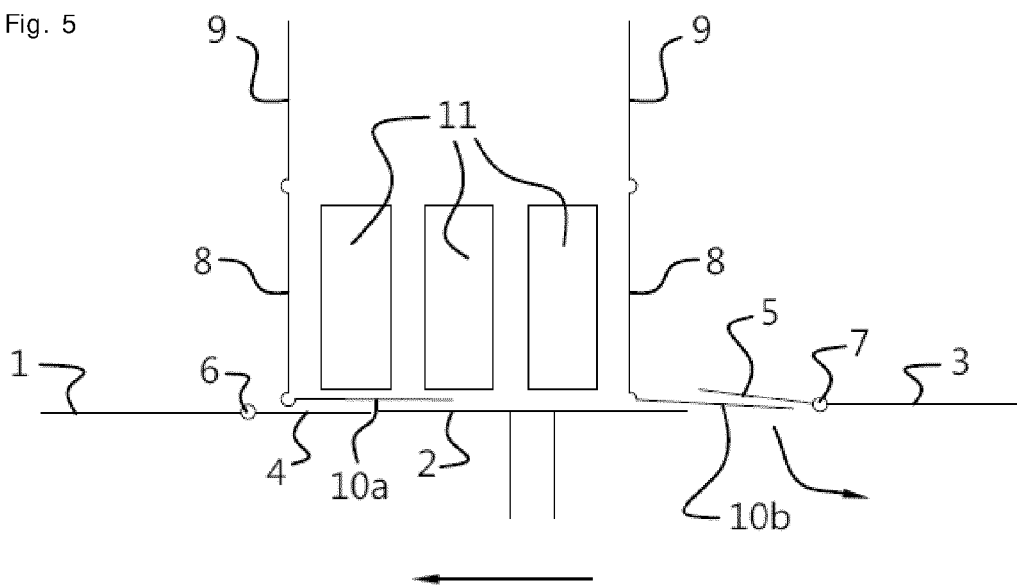


Fig. 6

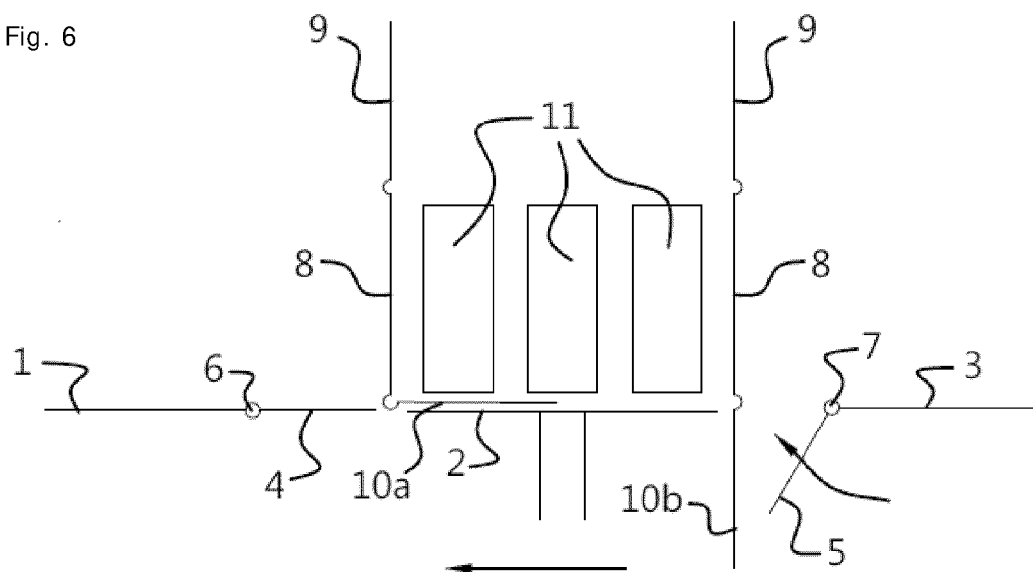


Fig. 7

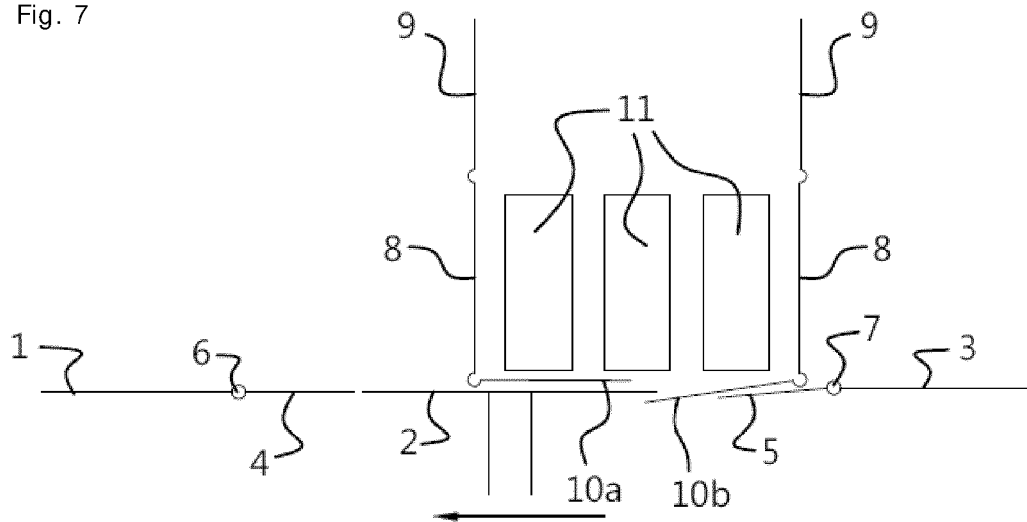


Fig. 8

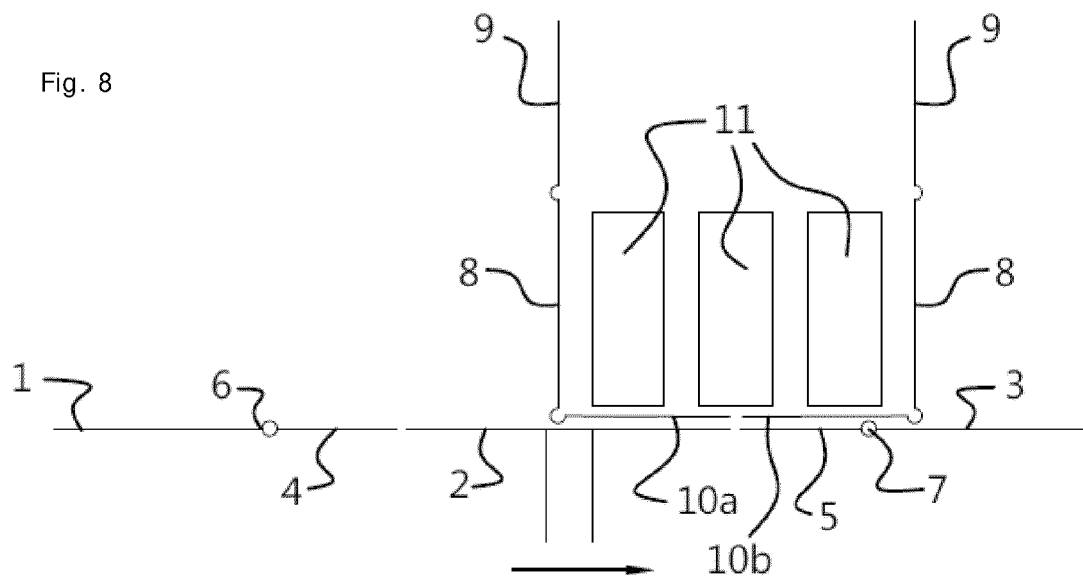


Fig. 9

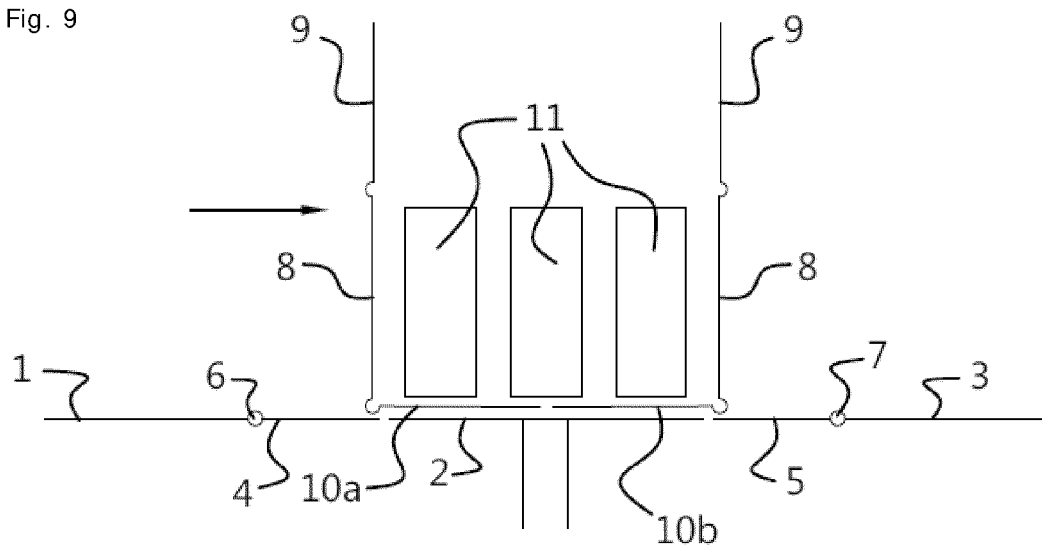


Fig. 10

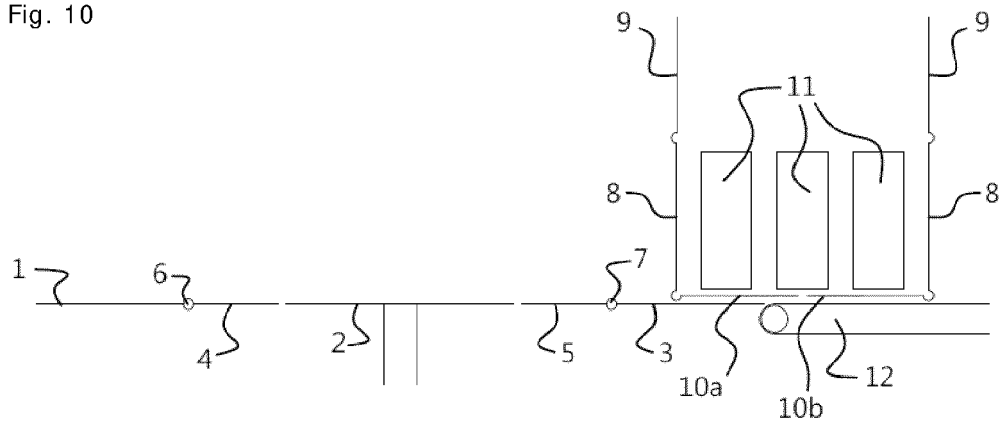


Fig. 11

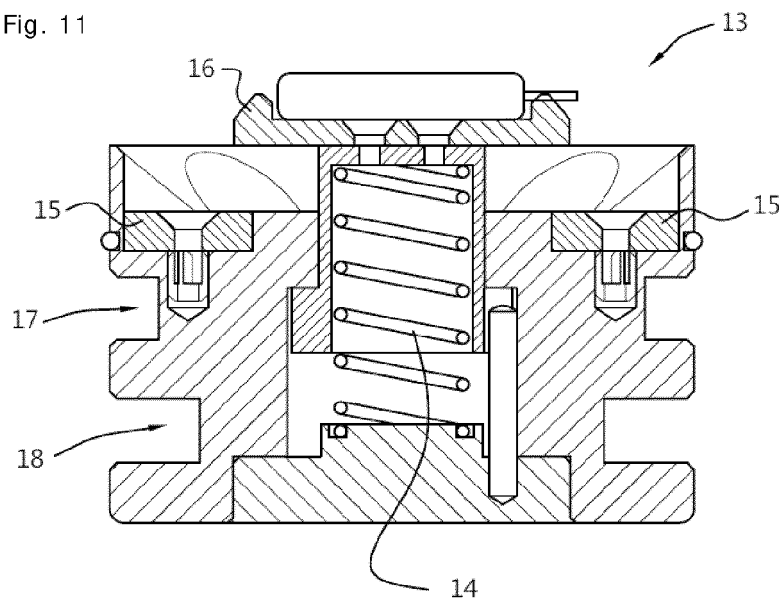
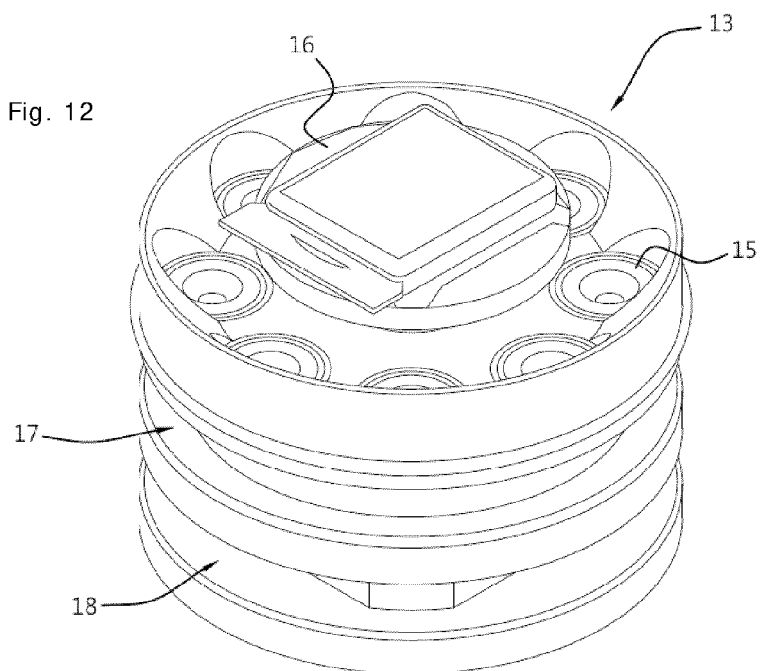


Fig. 12





EUROPEAN SEARCH REPORT

Application Number

EP 22 21 7153

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 5 044 143 A (AKO SHIGEICHI [AU] ET AL) 3 September 1991 (1991-09-03) * the whole document *	1-15	INV. B65B5/08 B65B5/10 B65B21/22
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A	EP 2 644 515 A1 (INTRION [BE]) 2 October 2013 (2013-10-02) * figures 1-4 *	1, 7	B65G47/94
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B65B B65G
Place of search	Date of completion of the search	Examiner	
Munich	23 May 2023	Ungureanu, Mirela	
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		& : member of the same patent family, corresponding document	

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 22 21 7153

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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23-05-2023

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REFERENCES CITED IN THE DESCRIPTION

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