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(71) Applicant: **IPI S.R.L.**
06132 S. Sisto (IT)

(72) Inventor: **Locchi, Pierluigi**
06132 Pila (PG) (IT)

(74) Representative: **Marietti, Andrea**
Marietti, Gislon e Trupiano S.r.l.
Via Larga, 16
20122 Milano (IT)

(54) **A method for packing and filling containers for pourable products**

(57) Method for packaging and filling a container for pourable products by means of folding and sealing a blank, comprising the steps of:
a) folding said blank in the form of a tube;
b) sealing, at least in part, said blank in the form of a tube;
c) filling said blank in the form of a tube with said pourable product;
d) closing and sealing said blank in the form of a tube to form said container;

characterized in that the step b) of the method comprises the step e) to seal said blank along at least one distinct direction (Y) with respect to the axis X of said blank in the form of a tube, leaving at least one end portion of said blank open.

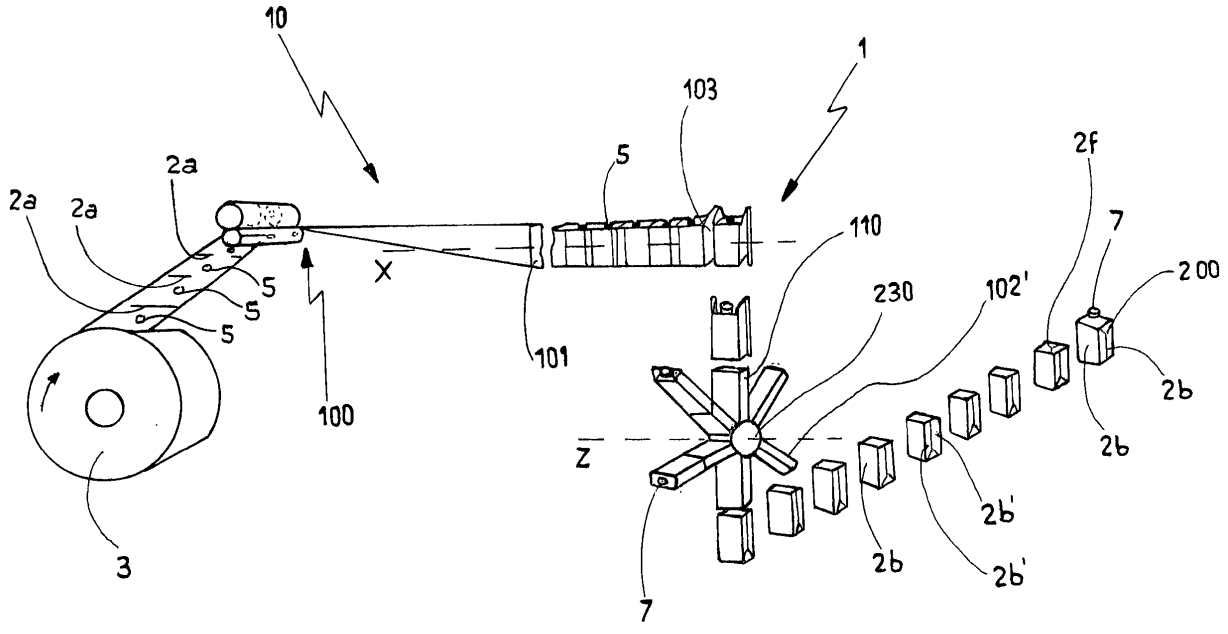

Fig.1

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Description

[0001] The present invention relates to a method for packaging and filling containers for pourable products, and to a device for forming said containers for pourable products. In particular, the method of the present invention can be used to produce containers, substantially in the form of a parallelepiped and which are opened by tearing an appropriate portion of the container. These containers can be provided with a cap applied from the outside or a weakened line to facilitate cutting by the user using scissors or the like. Moreover, the method of the present invention can also be applied to produce containers, substantially in the form of a parallelepiped, provided with opening/closing means, such as screw caps, or other similar means, inserted from the inner side of the container in an opening produced in the end portion of the container. In practice, during the process to produce the container, starting from an appropriately folded and perforated blank, the flange of the cap is sealed along the perimeter portion of said opening, so as to guarantee the seal of the inside of the container when it is completely closed.

[0002] These containers are suitable to contain food products, such as wine, yogurt, milk, fruit juices or the like. Moreover, these containers can also be used to contain semi-solid products, such as yogurt containing pieces of fruit, and food products, such as peeled tomatoes, vegetables, pulses or similar products.

[0003] There is known the existence of methods for packaging and filling containers of the aforesaid type, and relative apparatus that implement the method.

[0004] For example, EP 1683722 describes a method for producing a container for pourable products, by folding and sealing a blank wound in a reel with other similar blanks, comprising the steps of: folding said blank in the form of a tube; sealing, at least in part, said blank in the form of a tube; filling said blank with said pourable product; and closing and sealing said blank to form said container. In practice, the step to seal the blank in the form of a tube takes place in two distinct steps: first through a seal parallel to the axis of the tube which is obtained during folding of the blank, then through a transverse seal, which closes one of the two end portions of the container. Filling of the container with pourable product takes place subsequent to the step to fold the blank in the form of a tube and sealing thereof, and takes place from above, through the only open portion of the blank. The step to close the blank takes place by means of a second transverse seal of the blank in the form of a tube.

[0005] Although this method of producing a blank allows a high production speed to be achieved, and consequently a considerably decrease in the unit production costs, it is nonetheless not without drawbacks. In fact, this method does not allow the containers to be filled with semi-solid products, such as peeled tomatoes or the like, as the transverse seal can be compromised by the presence of these products along the region of the seal. Moreover, this method does not allow the production of containers provided with an opening to receive the dosing cap from the inner side, as filling could only take place after insertion of the cap. Although theoretically possible, this operation would considerably delay the entire production process.

[0006] Production of a container having a cap inserted from the inner side of the container in an opening produced in one of the end portions of the container is made possible for a particular type of containers known as "gable top".

[0007] In particular, the patent application US2003/0046897, by the applicant SHIKOKU KAKOKI, describes a method for packaging and filling containers for pourable products, of the type known with the name "gable-top", which comprises the step of appropriately folding a blank in the form of a tube, sealing the blank in the form of a tube along a direction parallel to the axis of the tube, erecting said blank, substantially in the form of a parallelepiped, and inserting the cap in the opening produced in the blank from the inner side thereof. The method also comprises the step to seal the flange of the cap to the perimeter portion of the opening and the base portion to the side portions of the container to allow filling, and finally the step to seal the end portion, opposite the base portion, bearing the cap sealed in the opening. It must be observed that, here and hereinafter, inner side of the blank is intended as the surface of the blank that comes into contact with the pourable product once the container is erected and filled with the pourable product, while end, or base, portion is intended as the face of the container on which this generally rests or on which the dosing cap is positioned.

[0008] Furthermore, it must be stated that blank in the form of a tube is intended as a blank that is folded on itself so that it has, substantially, a side casing and two bases, wherein the axis X of the tube is disposed parallel to the casing. The cross section of the tube can take different forms according to how the blank is folded. In fact, in the case of folding the blank along a folding line disposed symmetrically to the blank, orthogonal to the axis of the tube, the section of the blank has a square edge on the folding line thereof, while if this folding line is absent, the form of the tube is approximately that of a cylinder. However, notwithstanding the method of folding the blank to obtain the form of a tube, the casing is never completely closed and, therefore, the cross section of the tube is an open geometrical figure.

[0009] However, in this type of container the step to position the cap in the opening takes place along two distinct directions, for example, substantially orthogonal with each other, for geometrical reasons linked to the actual form of the gable-top container, and in particular of the end portion. In this way, the production times of the container are limited by this operation to position the cap in the opening, as this is somewhat laborious and determines a substantial increase in the production time of each container. Moreover, this operation must be im-

plemented with a certain degree of precision which, at the speed required for production of these containers, can cause frequent production rejects.

[0010] Furthermore, the presence of a seal, in the end portion with the cap, means that caps of limited dimensions must be used. Naturally, this restricts the field of possible alternatives, both aesthetic and functional, that can potentially be applied to containers of the aforesaid type, i.e. having an opening that can receive, from the inner side of the blank, or of the container, a cap with a sealing flange.

[0011] In the light of these prior art problems it is therefore the object of the present invention to allow the production of containers for pourable products, starting from a blank folded in the form of a tube, suitable for semi-solid products, such as peeled tomatoes, vegetables, pulses, yogurt containing pieces of fruit and the like.

[0012] A further object of the present invention is to produce a method for producing containers for pourable products that are adaptable to any nature of product, i.e. in liquid or semi-liquid form, and capable of allowing the production of several varieties of containers, both those without a cap, and those with a dosing cap that can be inserted either from the inner side or from the outer side.

[0013] Moreover, the object of the present invention is to speed up processes to position and insert the cap in openings produced in containers for pourable products of the type comprising a cap inserted from the inner side of the container.

[0014] Finally, the object of the present invention is to facilitate operations to erect the container and position and insert the cap in the container, only partly erected, so as to prevent the occurrence of frequent production rejects.

[0015] Yet another object of the present invention is to provide a method capable of speeding up the processes for packaging and filling pourable products in containers provided with a dosing cap, at the same time favouring an increase in the ratio between the volume of the container and that of the product contained therein, and also allowing greater flexibility in the choice of cap to employ.

[0016] These and other objects are attainable by the present method for packaging and filling a container for pourable products by means of folding and sealing a blank, comprising the steps of:

a) folding said blank in the form of a tube;
b) sealing, at least in part, said blank in the form of a tube;
c) filling said blank in the form of a tube with said pourable product;
d) closing and sealing said blank in the form of a tube to form said container;

characterized in that the step b) of the method comprises the step e) to seal said blank along at least one distinct direction (Y) with respect to the axis X of said blank in the form of a tube, leaving at least one end portion of said blank open.

[0017] According to a preferred embodiment of the method, sealing during the step e) of the method takes place along two distinct directions (Y, Y') with respect to the axis X of said blank in the form of a tube, leaving only one end portion of said blank open.

[0018] Moreover, the step e) of the method is followed by the step m) of erecting said blank in the form of a tube by means of the step g) of inserting a mandrel in said blank to erect it.

[0019] Moreover, the step d) of the method can be followed by the step z) of positioning at least one dosing cap on at least one of the end portions of said container, at the end of the step d), and therefore from the outside of said formed container.

[0020] According to a specific feature of the method, the axis X of said blank is rectilinear and said seal/s Y and/or Y' is/are orthogonal with respect to said axis X, although a curvilinear axis, or having another form, and sealing lines distinct from each other and from the axis X, also with a non-rectilinear form, also fall within the scope of protection of the present invention.

[0021] In the case in which the blank is provided with at least one opening to receive a closing cap, the method, at least after the step a), comprises the step f) to insert and seal said cap in said opening from the inner side of said blank. In this way, before sealing or filling said erected blank the cap is inserted in the opening. Preferably, the step f) of the method is subsequent to said step e) to seal said blank and preceded by the step h) to position said cap in said at least one opening passing through said at least one open end portion of said blank in the form of a tube. In this way, when the seal is made along two directions (Y, Y') orthogonal to the axis X of said blank in the form of a tube, the step i) to position said cap takes place passing through the only end portion still open after the step to seal said blank in the form of a tube, between the two sealing lines Y and Y'.

[0022] In the case in which said opening is disposed on the end portion opposite said open end portion of said blank in the form of a tube, the direction of positioning and the direction of insertion of the cap in the opening coincide, and are both rectilinear.

[0023] According to the invention the step i) to position said cap takes place during said step g) to insert said mandrel in said blank, for example positioning the cap on the end of said mandrel. In this way the entire packaging process of the container for pourable products is speeded up, as both erection of the container and positioning and insertion of the cap in the opening produced in the upper end portion of the blank are simultaneous.

[0024] Moreover, the step f) of the method comprises the step t) to seal the flange of said cap to the perimeter portion of the opening, once the cap is inserted in the relative opening. This operation can take place either when the container is picked up from the mandrel, i.e. inside a specific pocket employed for this step to seal the flange of the cap to the opening of the container, or di-

rectly on the mandrel, if it is capable of generating, at the flange of the cap, sufficient heat to seal the cap to the opening of the container. In the latter case, the mandrel can be aided by specific counteracting means disposed on the outer side of the end portion of the container in which the cap is disposed.

[0025] Moreover, the step c) to fill the container takes place from the open end portion of said erected blank, keeping the blank overturned, i.e. with the cap positioned downwards. This takes place both for blanks without openings to receive a cap from the inner side and for blanks provided with this opening.

[0026] According to an alternative embodiment of the method, and for blanks provided with at least one opening to receive the dosing cap from the inside, the step c) to fill said container can take place through said at least one opening to receive said cap, with the cap sealed along the perimeter portion of said opening, but not yet closed. In this case, this filling step c) is preceded by the further step n) to seal the open end portion of said blank, at least partly erected.

[0027] Subsequently, the step d) to close and seal said erected blank takes place, respectively, either through a step to seal the open end portion of said container, in the case in which filling takes place through the open end portion, or by closing said cap, in the case in which filling takes place through said opening to receive said cap.

[0028] Moreover, the step to fill said blank is preceded by the step o) to sterilize the inside of the container before filling it with pourable product. Sterilization of the inner side of the container can take place by sprinkling with hydrogen peroxide or with equivalent methods.

[0029] According to a further aspect of the invention the step a) to fold said blank in the form of a tube can take place, either along a folding line of said container, for example produced along an axis of symmetry of said blank, which, for example, in the case of a blank provided with an opening, divides it in half, or about the plane defined by an end portion of said blank in which said opening is produced. In this second method of implementing the fold of the blank in the form of a tube, the subsequent step to erect the blank is facilitated. It is understood that even in the case of container without an opening, folding can take place either along an axis of symmetry of the blank or about the plane defined by an end portion of said blank.

[0030] Finally, again according to the method of the present invention, the blanks can be wound continuously in a reel before being unwound, during the step a) of the method, and folded in the form of a tube. In this case, once the blank is in the form of a tube, and sealed along two directions orthogonal to the axis of the tube, it is cut along the sealed portions Y and Y' to separate it from the subsequent blank.

[0031] A further object of the present invention is to produce a forming device for a container for pourable products, by means of folding and sealing a blank with at least one opening to receive from the inner side a dosing cap, which comprises means for folding and sealing said blank to form said container, means to erect said blank and means to position and insert said cap in said at least one opening, characterized in that said means to erect said blank in the form of a tube and said means to position/insert said cap in said at least one opening coincide. Furthermore, said means to erect said blank and to position/insert said cap comprise at least one mandrel on the end of which there is disposed a cap, centred with respect to said at least one opening produced in the end portion of the blank.

[0032] Furthermore, said forming device comprises means to seal the flange of said cap to the perimeter portion of the opening. These means are disposed on the upper portion of said mandrel and are chosen from an induction heater, an ultrasonic heater or the like, provided they are able to heat the flange of said cap when it is inserted in the opening.

[0033] Moreover, said means to seal said cap comprise counteracting means disposed on the outer side of said container, at the level of said at least one opening, and also house said means to seal said flange. In this way both on the inner side of the partly erected blank and on the outer side, the flange of the cap and the perimeter portion of the opening are subjected to heating at high temperatures, causing the reciprocal sealing thereof.

[0034] This type of device can be used in an apparatus for packaging and filling containers for pourable products of the type comprising at least one opening capable of receiving, from the inner side of the container, a dosing cap.

[0035] There will now be described, purely by way of a non-limiting example, a particular embodiment of the present invention with reference to the appended figures, wherein:

Figure 1 is a perspective schematic view of the apparatus implementing the method according to the invention;

Figure 2 is a schematic top view of the apparatus in Figure 1;

Figure 3 is a schematic side view of the apparatus in Figure 1;

Figure 4 is a schematic front view of the apparatus in Figure 1;

Figure 5 is a perspective view of a blank provided with an opening to receive a dosing cap;

Figure 6 is a perspective schematic view of the step to fold the blank in Figure 5 in the form of a tube, about the axis of symmetry S;

Figure 7 is a perspective schematic view of the step to seal the blank folded in the form of a tube;

Figure 8 is a perspective schematic view of the step to erect the blank;

Figure 9 is a perspective schematic view of the step to erect the blank and position the dosing cap;

Figure 10 is a perspective schematic view of the step to insert the cap in the opening of the blank;

Figure 11 is a sectional view of the step to seal the flange of the cap to the perimeter portion of the opening.

Figure 12 is a schematic view of the process to seal the cap to the portion of the opening of the blank;

Figure 13 is a perspective schematic view of the steps to insert the erected blank in a pocket, sterilization, filling and closing of said container;

Figure 14 is a perspective schematic view of a second blank provided with an opening to receive a dosing cap, without a folding line along the axis of symmetry of said blank;

Figure 15 is a perspective schematic view of the step to fold the blank in Figure 14 in the form of a tube, about a plane II;

Figure 16 is a perspective schematic view of the step to seal a blank folded about the plane II.

Figure 17 is a perspective view of the apparatus that implements the method according to the invention, in which the blank has no openings;

Figure 18 is a perspective view of a blank with no opening;

Figure 19 is a perspective schematic view of the step to fold the blank in Figure 18 in the form of a tube, about a plane II;

Figure 20 is a perspective schematic view of the step to seal the blank in Figure 18, folded in the form of a tube;

Figure 21 is a perspective schematic view of the step to erect the blank;

Figure 22 is a perspective schematic view of the steps to insert the erected blank in a pocket, sterilization, filling and closing of said container;

Figure 23 is a perspective schematic view of the step to seal a cap to the outside of the container.

[0036] With particular reference to these figures the number 10 indicates the generic apparatus for packaging and filling containers for pourable products.

[0037] The apparatus 10 (figures 1 to 4) for packaging and filling a container 200 for pourable products, comprises a device 1 for forming a blank 2 provided with an opening 5 to receive, from the inner side 6 a cap 7. This device 1 comprises means 100 to fold a blank 2 in the form of a tube, starting from a reel 3 of blanks 2 joined continuously along the edges 2a, means 101 to seal, at least partly, said blank 2 in the form of a tube, and means 102 to erect the blank 2, once it has been folded in the form of a tube.

[0038] As will be apparent to those skilled in the art, it must be observed that although an apparatus 10 suitable to form containers 200, starting from a blank 2 having an opening 5 is described herein, the same apparatus 10 is also capable of producing containers without this opening, starting from a blank 210 of the type shown in Figure 18.

[0039] The blank 2, substantially rectangular in form, comprises four side portions 2b and two end portions 2c and 2f, the first 2c of which is provided with an opening 5 to receive, from the inner side 6 of the blank 2, a cap 7, while the second 2f is divided into two half-portions 2f', which will be sealed together during the step to close the container 200, as will also be more apparent from the description below. In this way the flange 7a of the cap 7, when it is inserted in the opening 5, is located in the perimeter portion 5a of the opening, to which it is sealed. According to a preferred embodiment of the method, the opening 5 is disposed along the axis of symmetry S of said blank 2, at the centre of the end portion 2c of said blank 2. Two of the four side portions 2b are divided into two half-portions 2b', which are sealed together, two by two, during the step to seal the blank in the form of a tube, as will be apparent from the description below.

[0040] It must be observed that, although the preferred embodiment of the invention described here provides for a device and relative method in which the blank 2 is unwound from a reel of blanks, the invention can also be applied to single blanks 2, pre-cut and suitably folded, without departing from the scope of protection of the present invention.

[0041] The means 100 to fold the blank 2 in the form of a tube, which are known per se and therefore not described, allow a blank 2 in the form of a tube to be obtained, i.e. with the four side portions 2b folded about the folding line F, which coincides with the axis of symmetry S of the blank. The axis X of said tube is thus placed between the two side portions 2b and the four side half-portions 2b', parallel to the folding line F. Each blank 2 is sealed by the means 101 along two directions Y and Y' orthogonal with, respect to the axis of the tube X, at the two edges 2a of the blank 2. In this way the only open portion of said blank 2 not yet erected, is the end portion 2f, opposite the one in which said opening 5 is produced. The apparatus 10 also comprises means 103 to cut each blank at the sealed regions Y and Y'. In this way each blank 2 is separated from the subsequent one, and ready to be erected, sterilized and filled with the pourable product 104. It is understood that, in the case in which the blanks are not unwound from a reel 3, but pre-cut and processed individually, said step to cut the blanks takes place prior to the step to fold the blank 2 in the form of a tube.

[0042] The aforesaid means 102 to erect said blank 2 in the form of a tube comprise a plurality of mandrels 102', disposed in a star 230, and each of which can be inserted in a blank 2, passing through the respective end portion 2f of the blank 2 during rotation about the axis Z of the star 230 of mandrels 102'. Moreover, in order to guarantee perfect insertion of the mandrel 102' in the blank 2, through the end portion 2f, the device 10 is provided with means 300 to spread the blank 2 at the portion 2f of the container. These means are chosen from a pair of suction cups, or suction elements, capable of holding the two portions 2b by suction, drawing them away from each other and thereby spreading the previously sealed blank 2.

[0043] Moreover, the apparatus 10 comprises means 110 to position/insert said cap 7, for example of the screw type, in the opening 5. These means 110 coincide with those to erect said blank 2 in the form of a tube. In practice, on the end 111 of each mandrel 102' there is positioned a cap 7, centred with respect to the opening 5, so that when the mandrel 102' is completely inserted in the blank 2, the cap 7 is completely inserted in the opening 5.

[0044] Moreover, again according to the preferred embodiment of the invention, each mandrel 102' comprises means 130 to seal the flange 7a of said cap 7, to the perimeter portion 5a of the opening 5.

[0045] These means 130 to seal said flange 7a, are chosen from an induction heater, an ultrasonic heater or the like, and can also be disposed at the level of further counteracting means 131 positioned on the outer side 40 of said container 200, at said at least one opening 5. In this way during rotation of each mandrel 102' about the axis Z of the star 230 of mandrels 102', the steps to erect the blank 2, to position and insert the cap 7 in the opening 5 and to seal the flange 7a of the cap 7 to the perimeter portion 5a of the opening 5 take place.

[0046] For example, these counteracting means 131 can comprise a further star of mandrels (not shown) which rotates in the opposite direction to the first star 230 of mandrels 102', synchronized therewith, and wherein each mandrel is suitably shaped to push the end portion 2c of each blank 2 against the respective mandrel 102' which makes it rotate.

[0047] Alternatively, the step to seal the flange 7a of the cap 7 to the perimeter portion 5a of the opening 5 can also take place after the blank 2 has been removed from the respective mandrel 102', and inserted overturned in a pocket 150, with the cap disposed downwards.

[0048] The apparatus 10 also comprises means 107 (Figure 4) to sterilize the inside of the container 200, for example, by sprinkling with hydrogen peroxide or the like, and means 108 to fill the container 200 from the open end portion 2f of the blank 2. These means 107 and 108 act when the blank has been removed from its mandrel 102' and is overturned and inserted in a pocket 150, as described above.

[0049] Finally, the apparatus 10 comprises means 109 to fold and appropriately seal the end portion 2f of the blank 2, thereby closing and sealing the container 200. In this way, the container has a cap 7 on the upper end portion 2c, without it being crossed by sealing lines that limit the dimensions of the cap 7 to be chosen. Therefore it is possible to fit a cap 7 of large dimensions, for example with a diameter of 36 mm, also on containers for pourable products of 33 cc, considerably decreasing the volume of each container in relation to the increase in the volume of pourable product that the cap 7 can contain, and facilitating pouring of the liquid out of the container.

[0050] Moreover, the apparatus 10 is capable of packaging and filling containers of different dimensions; in fact, by increasing/decreasing the width of the reel 3 a container 200 of greater/lesser height is obtained, or by increasing/decreasing the distance between the two seals Y and Y' a container with a base 2f of greater/lesser dimensions is obtained.

[0051] The packaging and filling apparatus 10 can implement the method of the present invention. In fact, this method for packaging and filling a container 200 for pourable products, by means of folding and sealing a blank (2; 210), with or without an opening 5 to receive a cap from the inner side, comprises the steps of:

a) folding said blank (2; 210) in the form of a tube (Figure 6 and Figure 18);
b) sealing, at least in part, said blank (2; 210) in the form of a tube (Figure 7 and Figure 20);
c) filling said erected blank (2; 210) with said pourable product (Figure 13 and Figure 22); and
d) closing and sealing (Figure 13 and Figure 22) said erected blank (2; 210) to form said container 200.

[0052] It must be specified that the blank 210 (Figure 17) is substantially identical to the one described previously in Figure 5. This comprises four side portions 210b and two end portions 210c and 210f, while the second 210f is divided into two half-portions 210f', which will be sealed together during the step to close the container 200. Moreover, as for the blank 2 with an opening 5, two of the four side portions 210b are divided into two half-portions 21 0b', which will be sealed together, two by two, during the step to seal the blank in the form of a tube, as will be apparent from the description below.

[0053] According to a first embodiment of the method, the step b) of the method comprises the step e) to seal said blank (2; 210) along a distinct direction (Y) with respect to the axis X of said blank (2; 210) in the form of a tube, leaving at least one end portion of said blank open.

[0054] According to a further embodiment of the method, sealing during the step e) of the method takes place along two distinct directions (Y, Y') with respect to the axis X of said blank (2; 210) in the form of a tube, leaving only one end portion (2f; 210f) of said blank (2, 210) open, through which filling can take place. Moreover, the step e) of the method is followed by the step m) to erect said blank (2; 210) in the form of a tube by means of the step g) to insert a mandrel 102' in said blank (2; 210) to erect it.

[0055] Moreover, in the case of a blank 210, i.e. without an opening 5, the step d) of the method can be followed by the step z) to position at least one dosing cap 70 on the end 210c of said container 200, after the step d). This operation therefore takes place from the outside of the container 200. As is apparent from the description above, filling of the blank 210 takes place subsequently to the step e) to seal it along two distinct directions (Y, Y') with respect to the axis X and, therefore, unlike other prior art methods, it is impossible for pieces of food product, such as fruit, vegetables, pulses and the like, to be situated along one of the transverse sealing lines and compromise the integrity of the container 200.

[0056] According to a specific feature of the method,

the axis X of said blank (2; 210) is rectilinear and the seals Y and Y' are orthogonal with respect to said axis X, although a curvilinear axis X, or having another form, and sealing lines distinct from one another and with respect to the axis X, also with a non-rectilinear form, still fall within the scope of protection of the present invention.

[0057] In the case of a blank 2 with an opening 5 to receive a dosing cap 7 from the inner side 6 of the blank 2, the step a) of the method is followed by the step f) to insert and seal said cap 7 in said opening 5 from the inner side 6 of said blank 2. In practice the cap 7 can be inserted even before erecting or sealing said blank 2, during the initial step to fold said blank 2 in the form of a tube.

[0058] Moreover, the step f) of the method is subsequent to said step e) to seal said blank 2 and is preceded by the step i) to position said cap 7 in said opening 5 passing through the open end portion 2f of said blank 2 in the form of a tube.

[0059] In this way the step i) to position said cap 7 takes place passing through the only end portion 2f still open after the step to seal said blank 2 in the form of a tube. In the case in which the opening 5 to receive the cap 7 is disposed on the end portion 2c opposite said open end portion 2f of said blank 2 in the form of a tube, then the direction of positioning and the direction of insertion coincide and are both rectilinear.

[0060] According to the invention, the step i) to position said cap takes place during said step g) to insert said mandrel 102' in said blank 2, for example positioning the cap 7 on the end of said mandrel 102'.

[0061] Moreover, the step f) of the method comprises the step t) to seal the flange 7a of said cap 7 to the perimeter portion 5a of the opening 5, once the cap 7 has been inserted in the relative opening 5. This operation can take place either when the partially erected blank 2 is picked up from the mandrel 102' and transferred inside a specific pocket 150 employed for this step to seal the flange 7a of the cap 7 to the perimeter portion 5a of the opening 5 of the blank, or directly on the mandrel 102', if it is capable of generating, at the flange 7a of the cap 7, sufficient heat to seal the cap 7 to the opening 5 of the container. In the latter case, the mandrel 102' can be provided with specific counteracting means 131 disposed on the outer side 40 of the end portion 2c of the container in which the cap 7 is disposed.

[0062] Furthermore, the step c) to fill the container 200, deriving from the blank 2 or 210 takes place from the open end portion 2f of said blank 2, keeping it overturned in the case of container with cap 7.

[0063] According to an alternative embodiment of the method, the step c) to fill said container 200, starting from the blank 2, can also take place through the opening 5 to receive said cap 7, with the cap inserted and sealed along the perimeter portion 5a of the opening 5, but not yet closed. In this case, the filling step d) is preceded by the further step n) to seal the open end portion 2f of said blank 2.

[0064] Subsequently, the step d) to close and seal said blank (2; 210), partially erected, takes place, according to the type of filling and of initial blank 2 or 210, either through a step to seal the open end portion (2f; 210f) of said container 200, i.e. when filling takes place from the open end portion (2f; 210f), or through closing of said cap 7, i.e. when filling takes place through the opening 5 to receive said cap 7.

[0065] Moreover, the step d) to fill said generic blank (2; 210), in the case of filling with a food product, is preceded by the step o) to sterilize the inside of the container 200 before filling it with a pourable product. Sterilization of the inner side 6 of the container 200 can take place by sprinkling wit hydrogen peroxide or similar methods.

[0066] According to a further aspect of the invention, the step a) to fold said blank (2; 210) can take place either along a folding line F of said container, for example produced along the axis of symmetry S of said blank (2; 210) which, in the case of a blank 2 with an opening 5 divides said opening 5 to receive said cap 7 in half, or about the plane n, defined by the end portion (2c; 210c) of said blank (2; 210).

[0067] The latter method of producing the fold in the form of a tube of the blank facilitates the subsequent step to erect the blank (2; 210) besides obviously decreasing the strains to which the container 200 is subjected during the forming operations. In fact, in this way it is not necessary to employ said means to spread the opening positioned on the portion (2f; 210f) to facilitate insertion of the mandrel 102'.

[0068] Finally, again according to the method of the present invention, the blanks (2; 210) can be wound continuously in a reel 3, for example connected along the edges (2a; 210) , before being unwound, during the step a) of the method, and folded in the form of a tube. In this case, once the blank (2; 210) is in the form of a tube, and sealed along two directions Y and Y' orthogonal to the axis of the tube, it is cut along the same sealed portions Y and Y' to be separated from the subsequent blank.

[0069] Alternatively, each blank 2 can be pre-cut and ready to be folded in the form of a tube during the subsequent step a) of the method.

Claims

1. Method for packaging and filling a container for pourable products by folding and sealing a blank, comprising the steps of:

    a) folding said blank in the form of a tube;
    b) sealing, at least in part, said blank in the form of a tube;
    c) filling said blank in the form of a tube with said pourable product;
    d) closing and sealing said blank in the form of a tube to form said container;

    characterized in that the step b) of the method com-

prises the step e) to seal said blank along at least one distinct direction (Y) with respect to the axis X of said blank in the form of a tube, leaving at least one end portion of said blank open.

2. Method as claimed in claim 1, **characterized in that** sealing during the step e) of the method takes place along two distinct directions (Y, Y') with respect to the axis of said blank in the form of a tube, leaving only one end portion of said blank open.

3. Method as claimed in claim 1 or 2, **characterized in that** the step e) of the method is followed by the step m) to erect said blank in the form of a tube.

4. Method as claimed in claim 3, **characterized in that** said step m) of the method comprises the step g) to insert a mandrel in said blank to erect it.

5. Method as claimed in claim 4, **characterized in that** the step d) of the method is followed by the step z) to position at least one dosing cap on at least one of the end portions of said container.

6. Method as claimed in any one of the previous claims, **characterized in that** the axis X of said blank is rectilinear and said seal/s Y and/or Y' is/are orthogonal with respect to said axis X.

7. Method as claimed in any one of the previous claims, **characterized in that** the axis X of said blank is curvilinear.

8. Method as claimed in one or more of the previous claims, wherein said blank is provided with at least one opening to receive a closing cap, **characterized in that** at least after the step a) the method comprises the step f) to insert and seal said cap in said opening from the inner side of said blank.

9. Method as claimed in claim 8, **characterized in that** the step f) of the method is subsequent to said step e) to seal said blank.

10. Method as claimed in claim 9, **characterized in that** the step f) of the method is preceded by the step i) to position said cap in said at least one opening passing through said at least one open end portion of said blank in the form of a tube.

11. Method as claimed in claims 8 to 10, **characterized in that** the direction of positioning and the direction of insertion of said cap in said at least one opening are rectilinear.

12. Method as claimed in claims 8 to 11, wherein said at least one opening is disposed on the end portion opposite said open end portion of said blank in the form of a tube, **characterized in that** said direction of positioning and said direction of insertion coincide.

13. Method as claimed in claim 12, **characterized in that** said step i) to position said cap takes place during said step g) to insert said mandrel in said blank.

14. Method as claimed in claims 8 to 13, wherein said cap comprises a flange which can be coupled to the perimeter portion of said at least one opening, **characterized in that** the step f) of the method comprises the step t) to seal the flange of said cap to the perimeter portion of said at least one opening.

15. Method as claimed in any one of claims 8 to 14, **characterized in that** the step a) to fold said blank can take place along a folding line of said container passing through said at least one opening of said blank or about the plane defined by the end portion of said blank in which said opening is produced.

16. Method as claimed in one or more of claims 2 to 15, **characterized in that** said filling step c) takes place from the open end portion of said erected blank.

17. Method as claimed in any one of claims 8 to 15, **characterized in that** the step c) to fill said blank takes place through said at least one opening to receive said cap, still open, and **in that** it is preceded by a further step n) to seal said open portion of said blank.

18. Method as claimed in claim 16 or 17, **characterized in that** the step d) to close and seal said erected blank takes place respectively either during the step to seal the open portion of said container, or during closing of said cap.

19. Method as claimed in any one of the previous claims, **characterized in that** the step c) to fill said open blank is preceded by the step o) to sterilize the inner side of said blank.

20. Method as claimed in claim 19, **characterized in that** step to sterilize the inner side of said blank can take place by sprinkling the inner surface with hydrogen peroxide or the like.

21. Method as claimed in any one of the previous claims, **characterized in that** the step a) of the method is preceded by the step to wind each blank continuously in a reel; and **in that** it comprises, subsequent to the step b) of the method, the step s) to cut each blank in the form of a tube along said sealed portion Y to separate one blank from the other.

22. Device for forming a container for pourable products, by means of folding and sealing a blank having at least one opening suitable to receive, from the inner

side and at the perimeter portion thereof, the flange of a cap, comprising means to fold said blank in the form of a tube, means to seal, at least partly, said blank in the form of a tube, means to erect said blank in the form of a tube, and means to position and insert and seal said cap in said at least one opening, **characterized in that** said means to erect said blank in the form of a tube and said means to position/insert and seal said cap in said at least one opening coincide.

23. Device as claimed in claim 22, **characterized in that** said means to erect said blank and to position/insert and seal said cap comprise at least one mandrel.

24. Device as claimed in claim 23, **characterized in that** said cap is disposed on the end portion of said at least one mandrel, centred with respect to said at least one opening.

25. Device as claimed in claim 23 and 24, **characterized in that** said mandrel comprises means to seal said flange of said cap to the perimeter portion of said at least one opening.

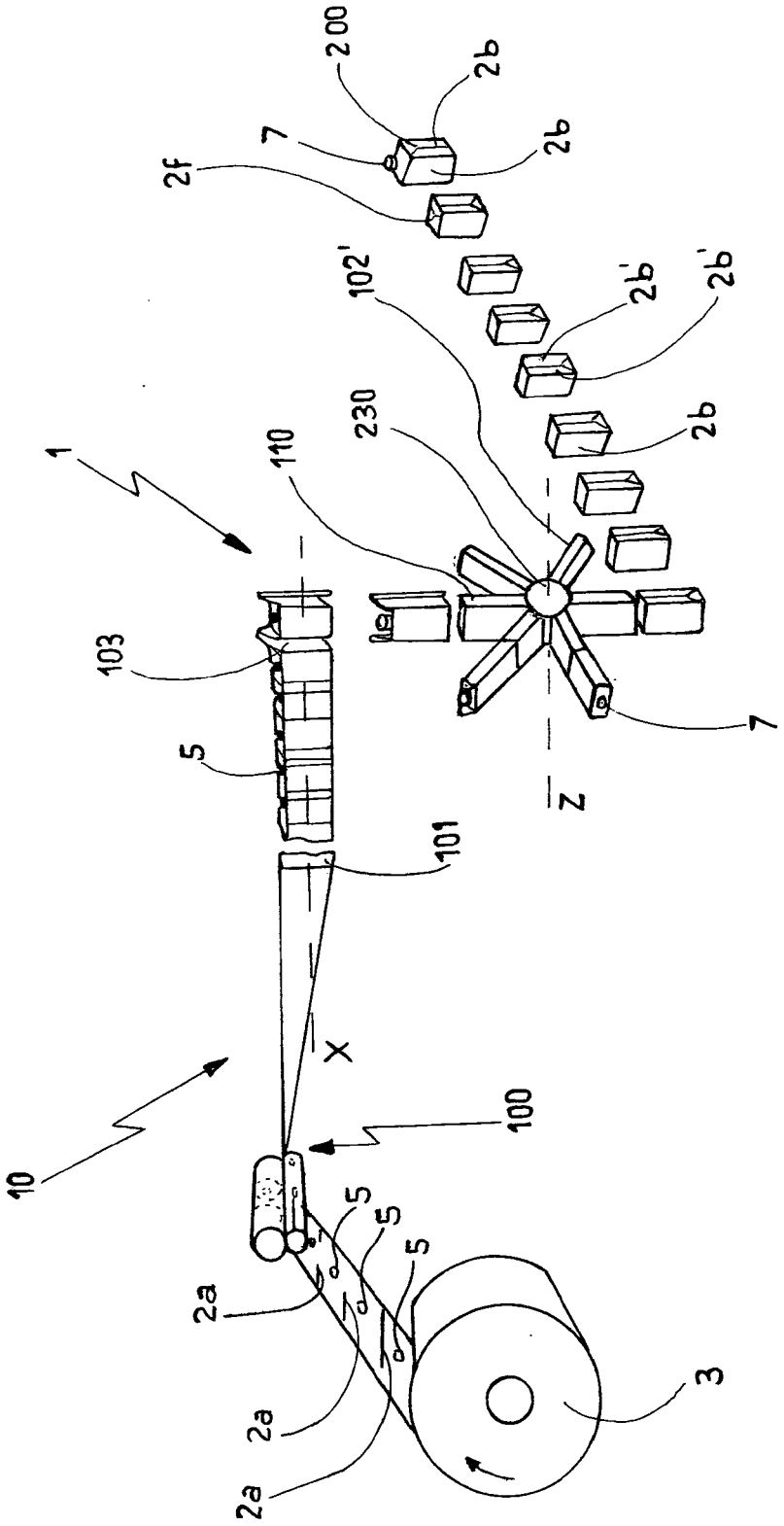
26. Device as claimed in claim 25, **characterized in that** said means to seal said flange are chosen from an induction heater, an ultrasonic heater or the like.

27. Device as claimed in claim 26, **characterized in that** said means to seal said flange comprise counteracting means disposed on the outer side of said container, at the level of said at least one opening.

28. Device as claimed in claims 25 to 27, **characterized in that** said means to seal said flange are also disposed at the level of said counteracting means.

29. Device as claimed in any one of claims 22 to 28, **characterized in that** said means to seal said blank act along a direction substantially orthogonal with respect to the direction of the axis of said blank in the form of a tube.

30. Use of a forming device as claimed in claims 22 to 29, in an apparatus for packaging and filling containers for pourable products.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2b
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102'
2b'
2b'
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2b
110
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5
7
Z
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100
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5
2a
2a
2a
3

Fig.1

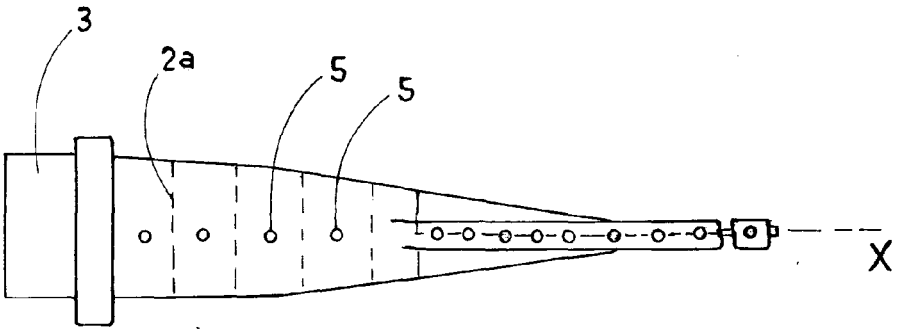
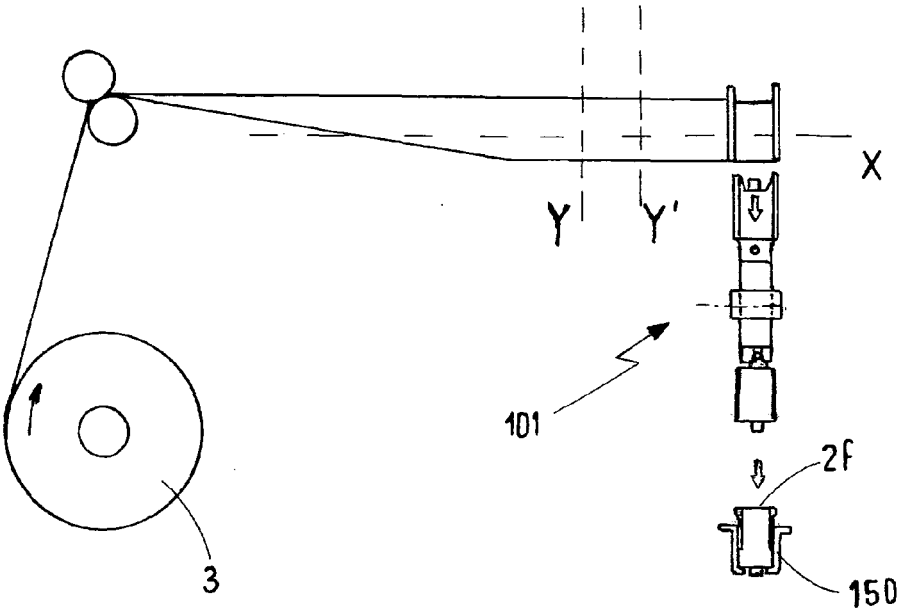


Fig. 2



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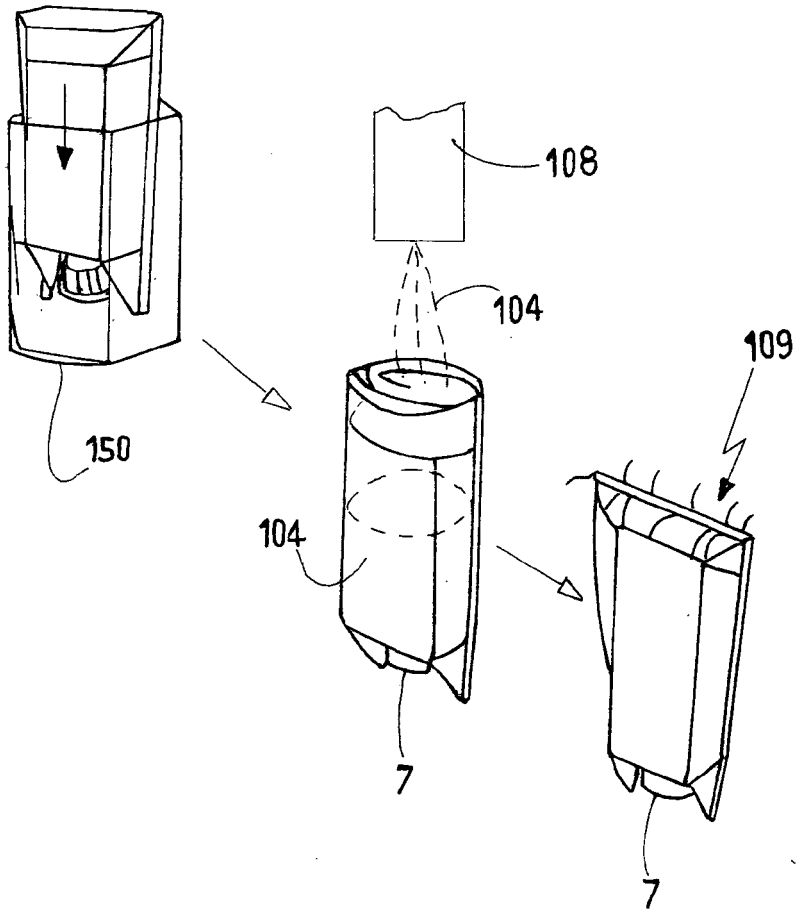


Fig.13

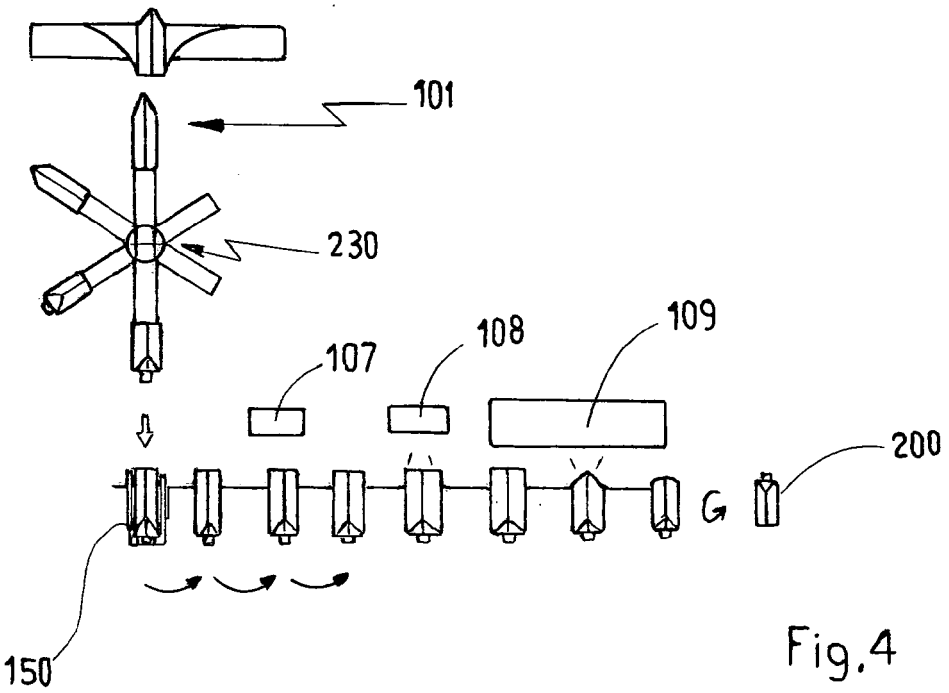
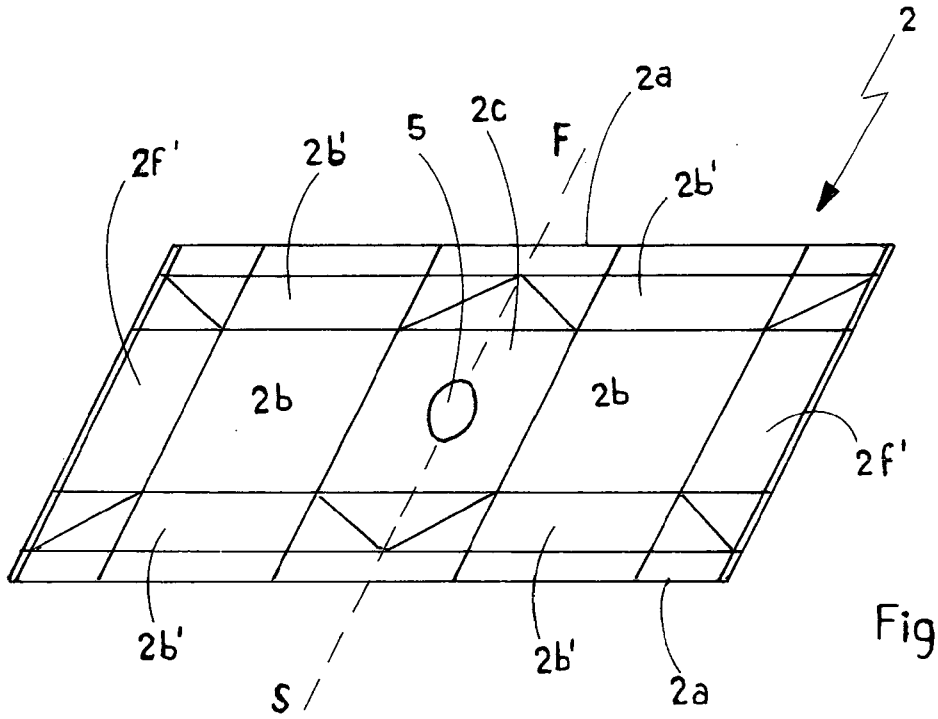


Fig.4



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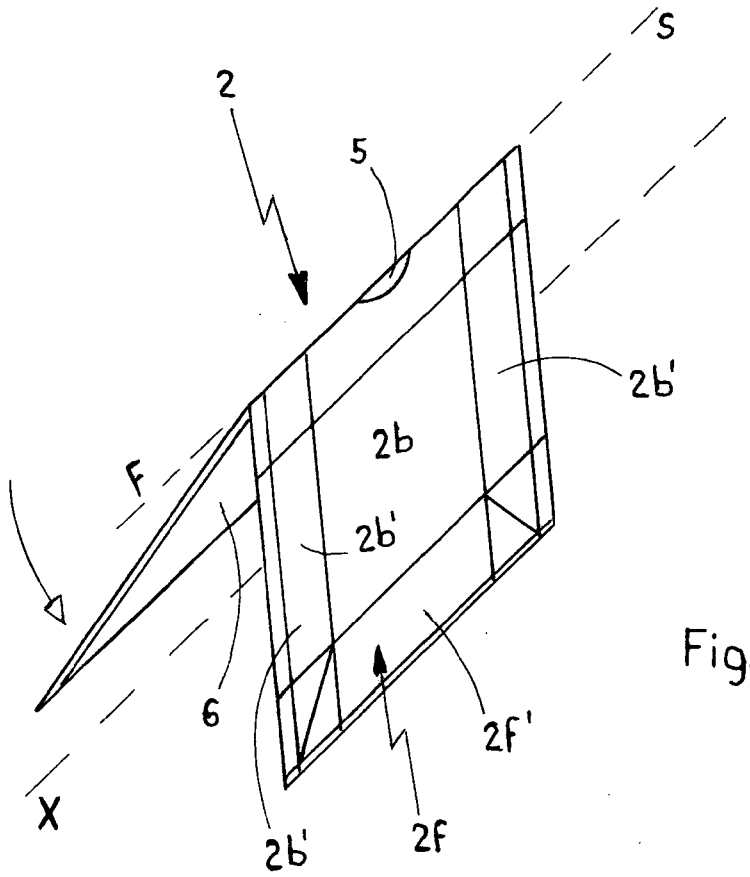


Fig.6

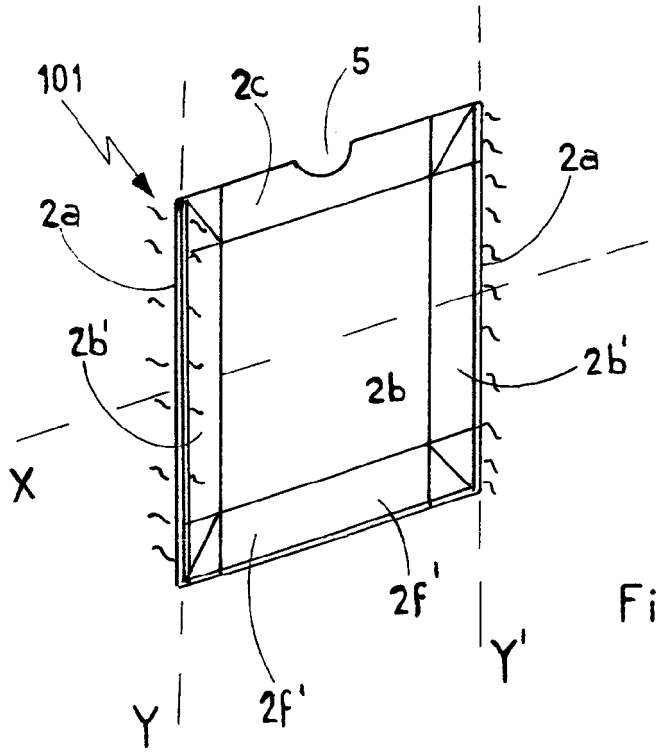


Fig.7

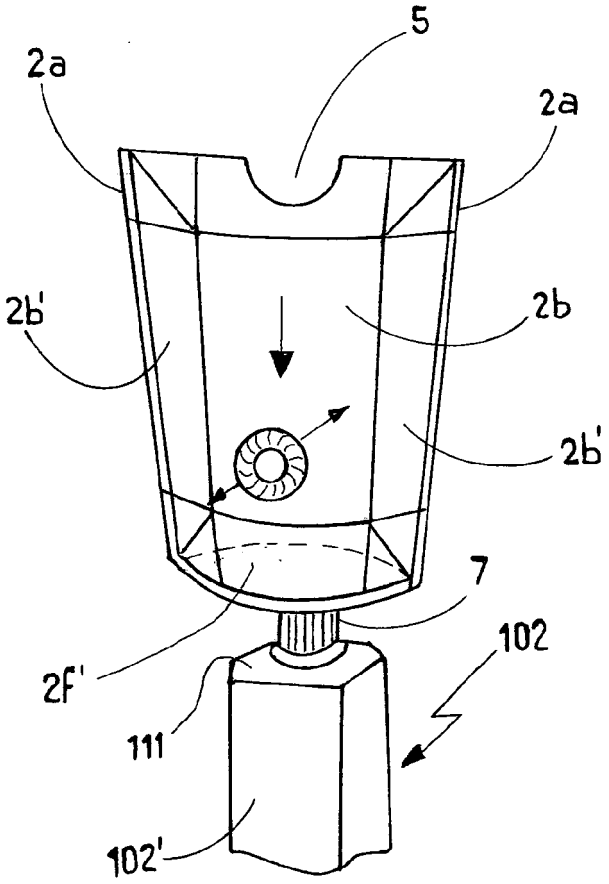


Fig.8

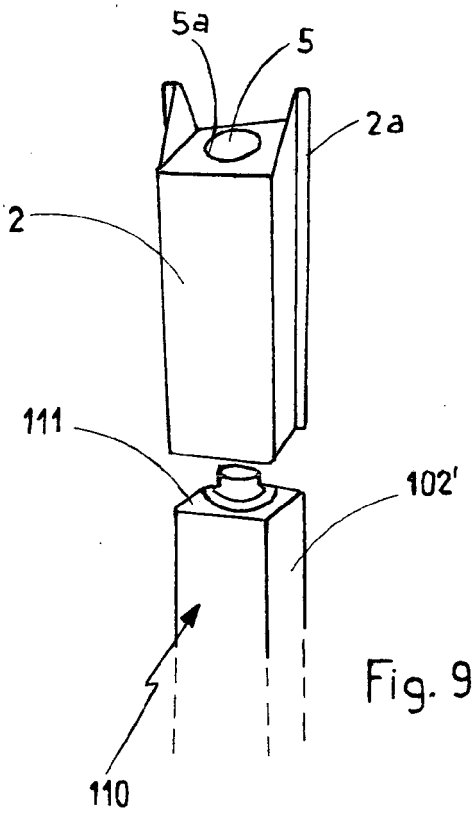


Fig. 9

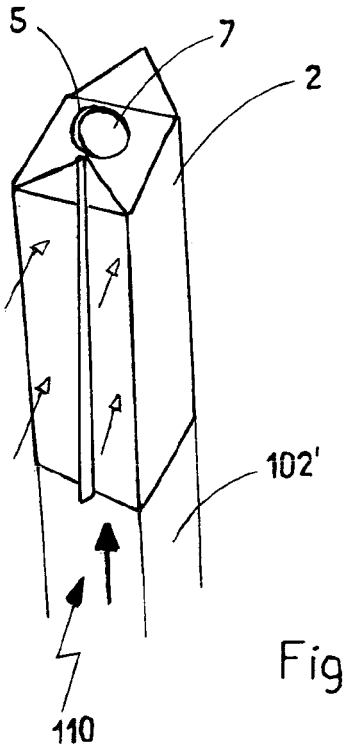


Fig.10

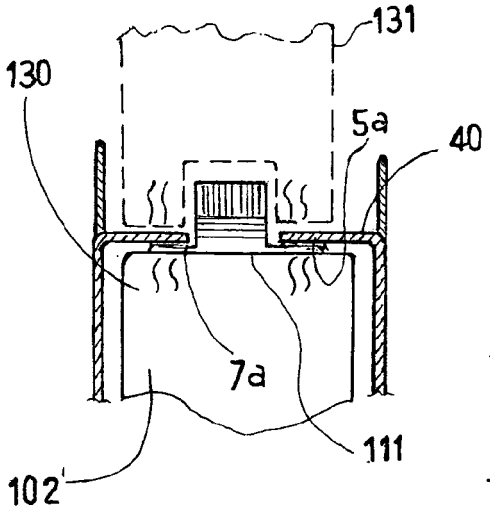


Fig.11

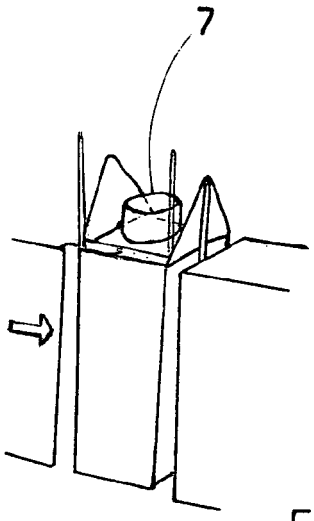


Fig.12

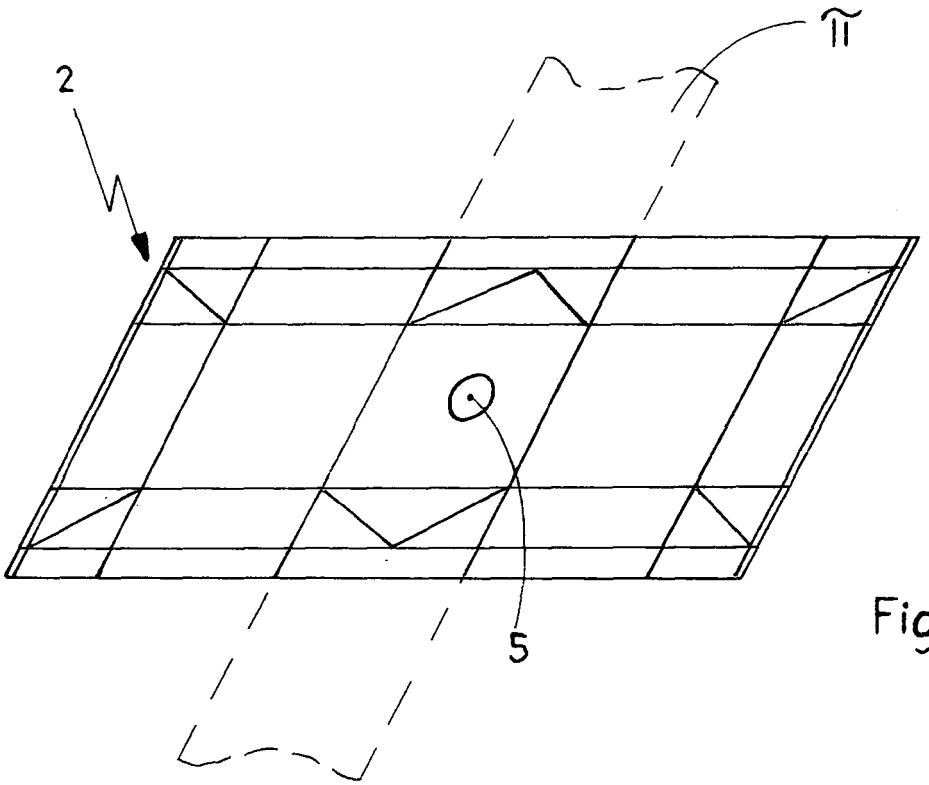
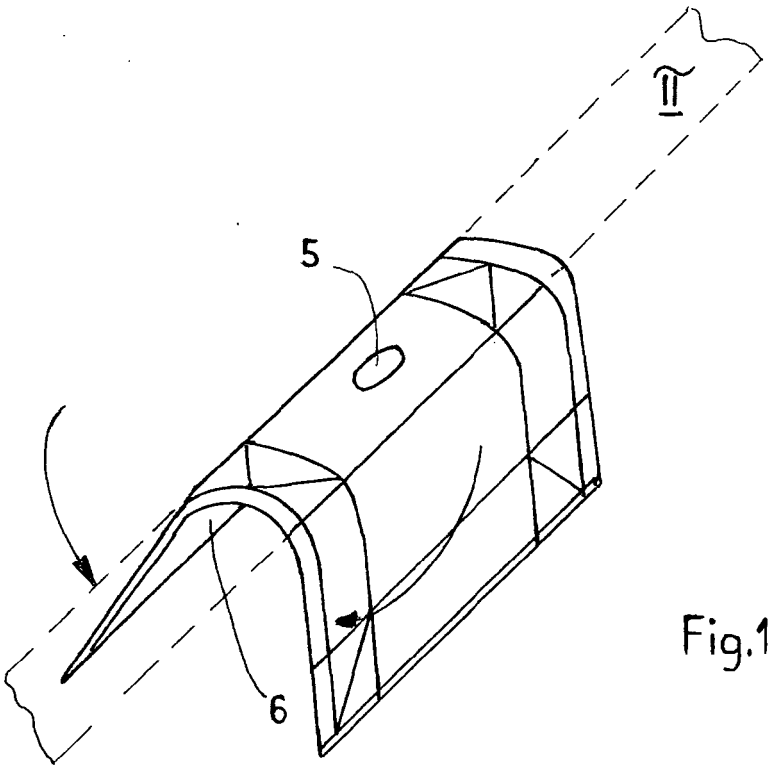


Fig.14



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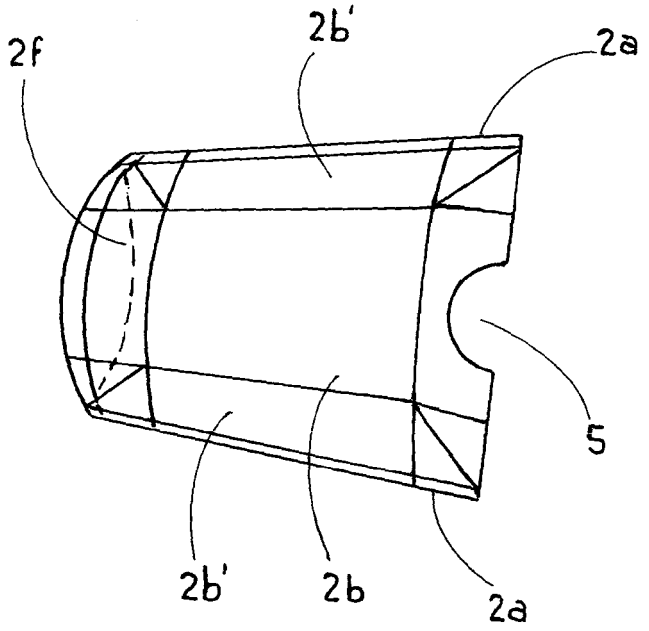


Fig.16

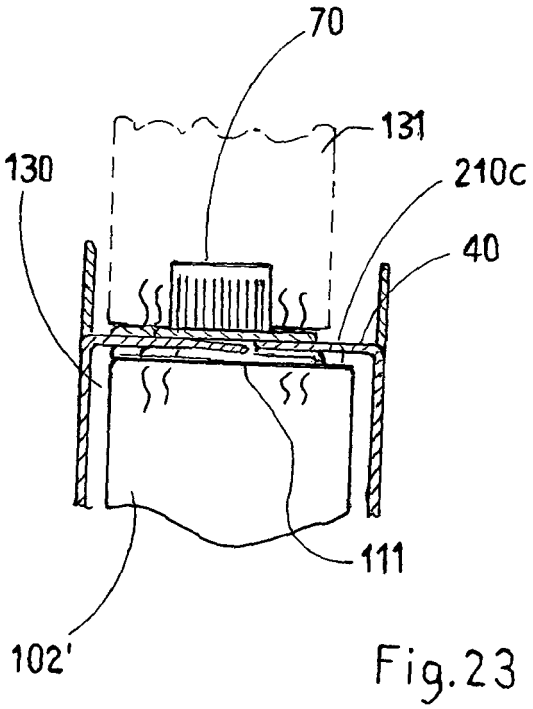
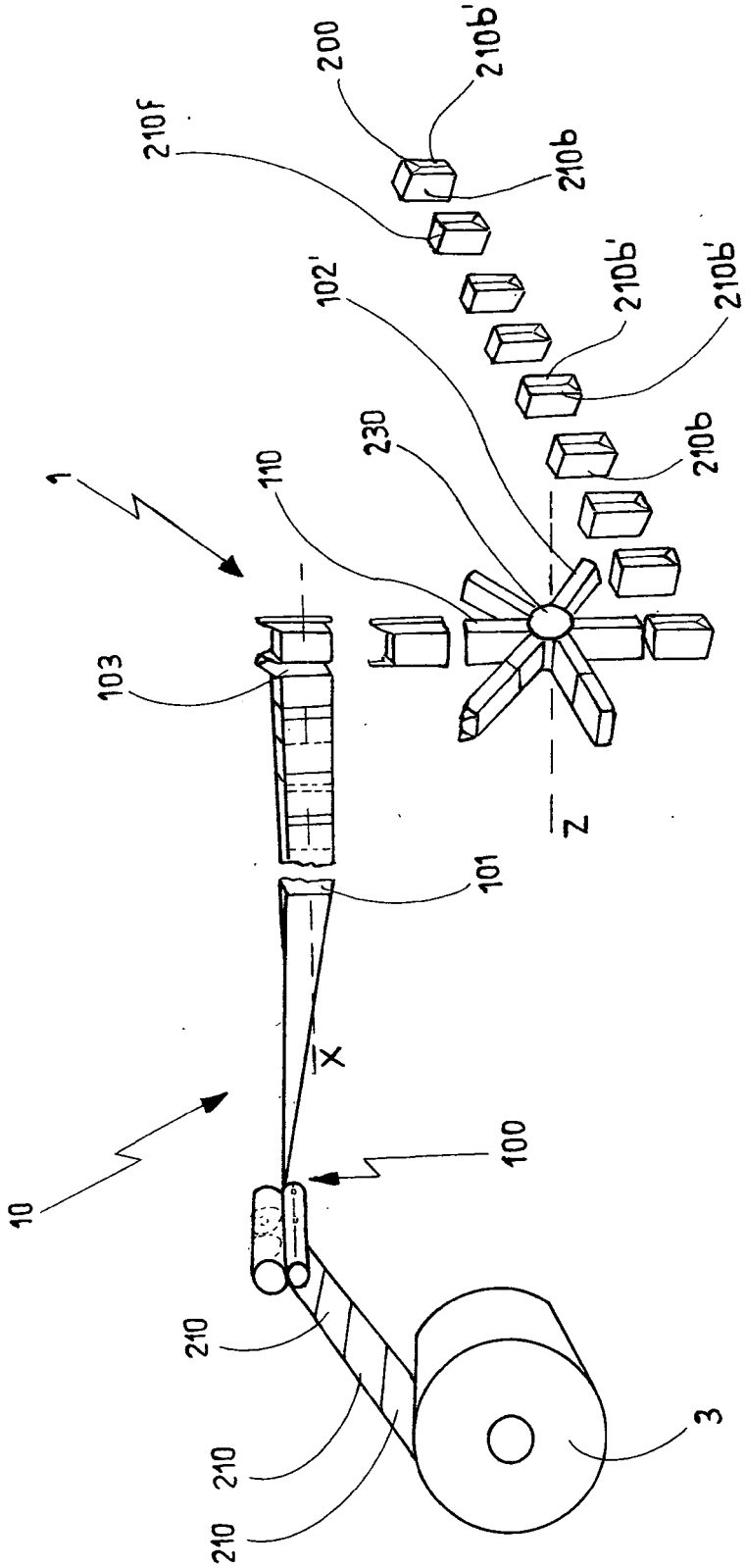


Fig.23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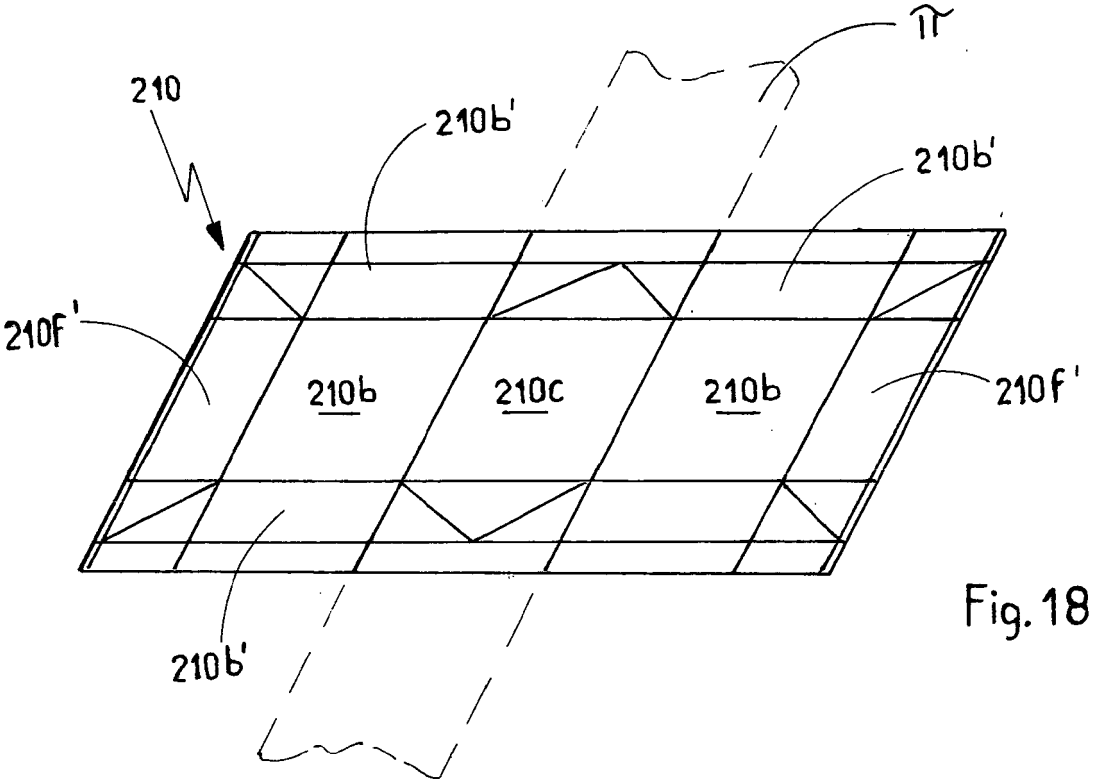
3

Fig.17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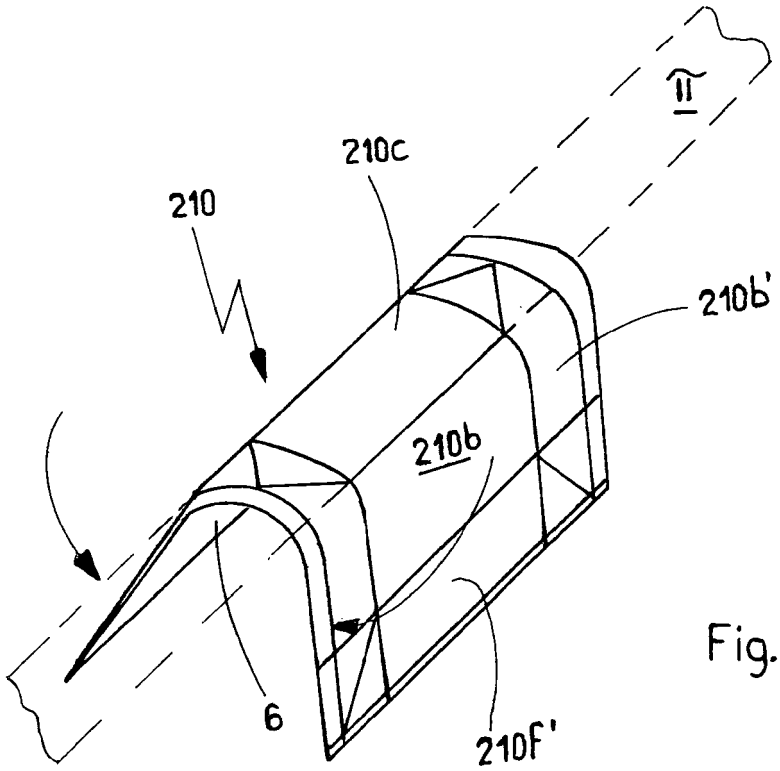
210b'
210f'
210b
210c
210b
210f'
210b'

Fig. 18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210b'
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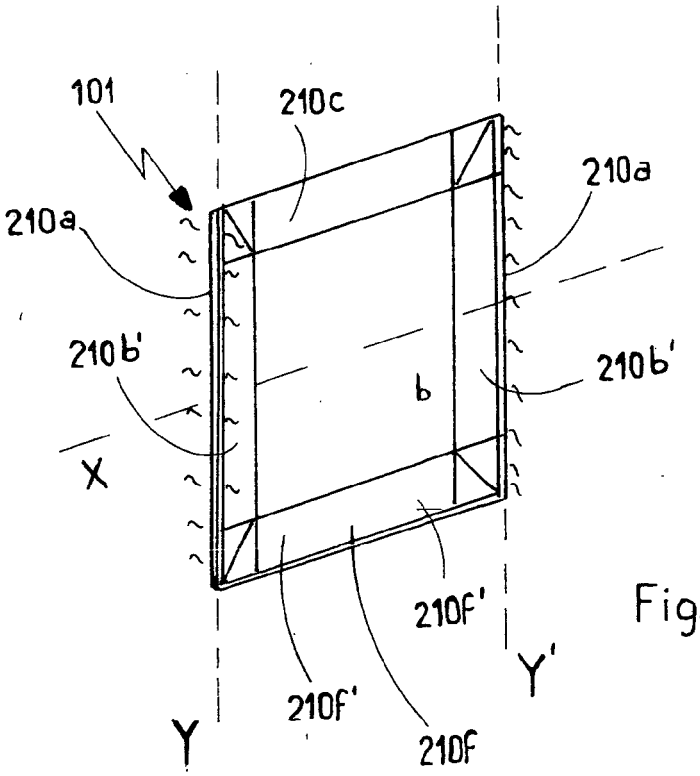
6
210f'

Fig. 19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Y
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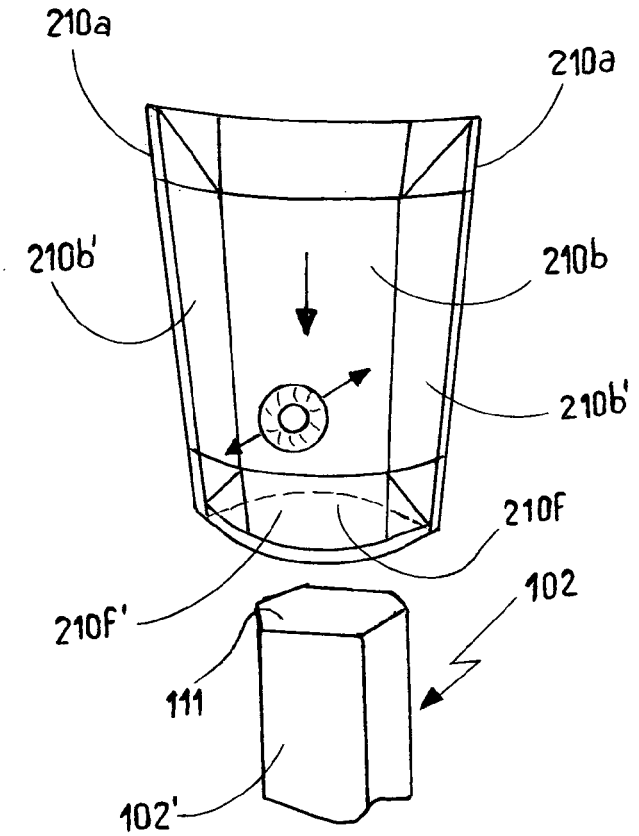
Fig.20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102
111
102'

Fig. 21

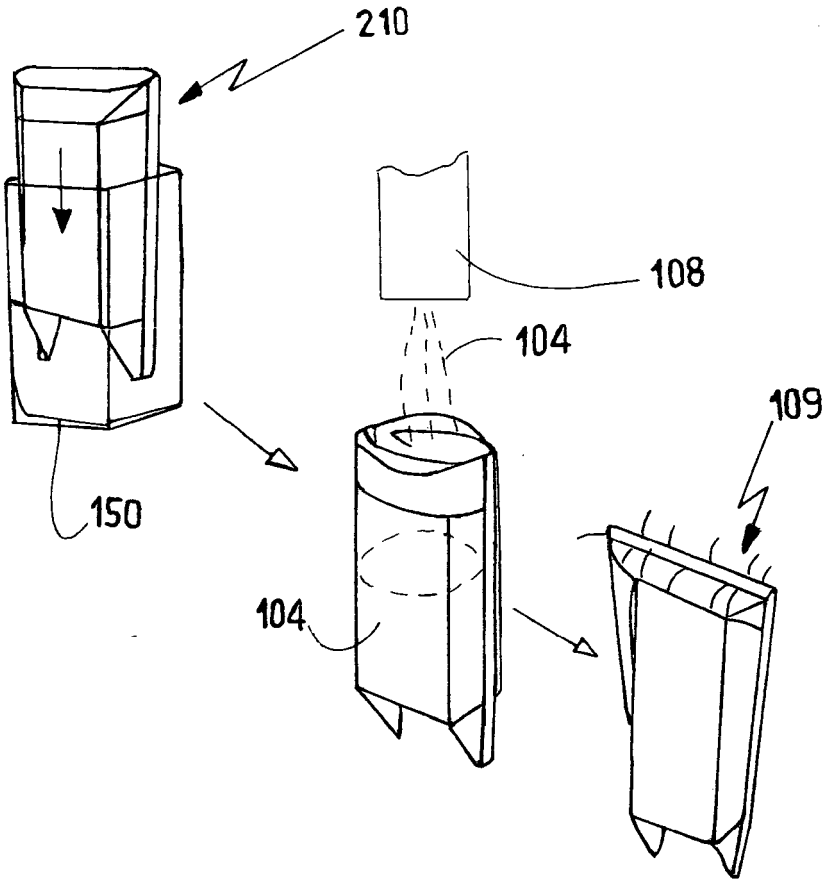

Fig. 22

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 42 5224

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	WO 00/20194 A (TETRA LAVAL HOLDINGS & FINANCE [CH]; MOGARD JENS [US]) 13 April 2000 (2000-04-13) * page 1, line 5 - page 2, line 24; claims 1-10; figures *	1-21	B65B9/08
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A	* figure 11 *	2-21	
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-/--

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
The Hague	12 September 2007	Vigilante, Marco

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
O : non-written disclosure
P : intermediate document

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

& : member of the same patent family, corresponding document

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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 42 5224

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
The Hague	12 September 2007	Vigilante, Marco

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& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

European Patent Office

Application Number
EP 07 42 5224

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-21

European Patent Office

LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 07 42 5224

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-21

Method for packaging pourable product into a folded and sealed blank.

---

2. claims: 22-30

Device for positioning and sealing a cap onto a blank

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 42 5224

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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12-09-2007

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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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