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(54) **SYSTEM AND METHOD FOR FORMING PACKAGES**

(57) The present invention comprises a system (1) for producing packages (1000) comprising a bag (100) of flexible material comprising a first face (101) and a second face (102) and an element (200) folded along a folding line (203). The system (1) comprises a first station (130) comprising closing means (132) configured so as to close said bag (100), a second station (140) comprising application means (11, 12a, 12b, 13, 14) configured so as to apply said folded element (200) to said bag (100), and transport means (160) configured so as to transport said bag (100) from said first station (130) to said second station (140). In such system the transport means (160) are configured so as to grasp said bag (100), at said first station (130) before the closure of said bag (100) by means of said closing means (132) is finished, and to transport it from said first station (130) to said second station (140) continuing to grasp it.

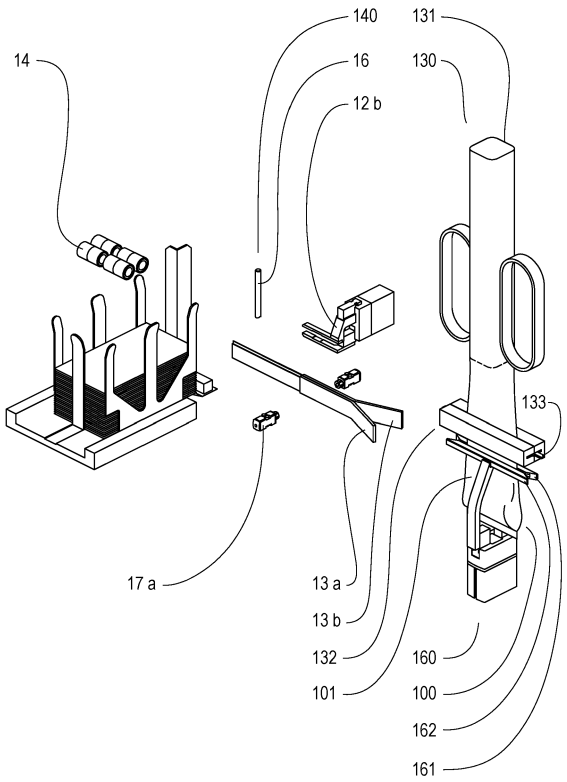

Fig. 5

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Description

TECHNICAL FIELD

[0001] The present invention relates to the field of packages, for example packages for food products, such as flour or the like. More particularly, the present invention relates to the field of packages comprising a bag of flexible material and an element folded along a folding line and placed outside the bag, for example to report information on the product contained in the packages. Even more particularly, the present invention relates to a system and a method for making such packages.

BACKGROUND

[0002] Various packages are known on the market, for example packages for food products such as flour, mixes for pizza, mixes for desserts, sugar and so on. Generally these packages comprise a bag of flexible material inside which the contents of the package are contained.

[0003] The bag of flexible material of such packages can alternatively have a two-dimensional bottom, and therefore flat, which allows the package to stand up by placing it on the flat bottom or a one-dimensional bottom that therefore does not allow the package to stand up on its own. Furthermore, such bags have an upper end that is opposite said bottom. The upper end can for example correspond to a welded area so as to close the bag of the package. The upper end can also define the opening of the package.

[0004] The bag of flexible material generally comprises a first face, i.e. a front face, a second face, i.e. a back face, opposite the first face, and right and left side faces that connect the first face to the second face. However, especially in bags with a one-dimensional body, the front face is often fixed directly to the rear face without the presence of any side face.

[0005] It is also known to supply these packages with an element folded along a folding line and placed outside the bag, above the upper end of the bag. The folded element is divided by the folding line into a first portion and a second portion. The folded element is placed on the bag so that the folding line is parallel to the upper end of the bag and so that the first portion of the folded element extends along the first face of the bag and the second portion extends along the second face.

[0006] In Italy, this folded element is also known as the "cavaliere", or knight, since from a side view of the package, the first portion and the second portion divided by the folding line can schematically represent the legs of a knight straddling the bag. In German this element can be called "Kartonreiter", see for example DE 38 32 275 A1, or "Kartonstreifen". In English it can be called "header card" or "cardboard strip".

[0007] This element is particularly advantageous because it allows reporting information on the product contained in the packaging to which it is applied, for example information on the manufacturer of the product contained therein, on the ingredients of the product contained therein, the expiry date and so on. Furthermore, it is possible to display captivating images, trademarks or logos on this element to attract consumer attention.

[0008] Instead of printing this information directly onto the faces of the bag, whose flexible material may not be a good support for printing, it is possible to print it easily and effectively on this folded element which is generally made of paper, card or cardboard, and is then applied to the bag in order to realise the final package. The bag could also not present any information or words and all this information could be reported on the folded element. In this way a neutral reel could advantageously be used for all the products and the necessary information transferred to the folded element.

[0009] However, the application of this element to bags made of flexible material is very complex, especially for packages with a one-dimensional bottom, and it is normally performed manually by grasping a portion of the bag and inserting it into a machine that directly applies the folded element to the upper portion of the bag.

[0010] The object of the present invention is therefore to provide a system and a method for making this type of package effectively and quickly, in particular for effectively and quickly applying the folded element both to bags with a two-dimensional bottom and to bags with a one-dimensional bottom.

SUMMARY

[0011] In the present invention the term bag means any packaging made of flexible material intended to contain various items: for example an envelope or a small bag.

[0012] According to one embodiment of the present invention, a system is provided for making packages comprising a bag of flexible material comprising a first face and a second face and an element folded along a folding line, wherein the folding line is parallel to the upper end of the bag and divides the folded element into a first portion and a second portion so that the first portion extends along the first face and the second portion extends along the second face. The system comprises: a first station comprising closing means configured so as to close the bag, a second station comprising application means configured so as to apply the folded element to the bag, and transport means configured so as to transport the bag from the first station to the second station. The transport means are configured so as to grasp the bag at the first station before the closure of the bag by means of the closing means is finished, and to transport it from the first station to the second station continuing to grasp it. This solution is particularly advantageous as it allows the bag to be supplied to the second station, in which the folded element is applied to the bag, already closed and grasped by the transport means. Therefore, this system can be used both in the case of bags having

a two-dimensional bottom and bags having a one-dimensional bottom. Furthermore, thanks to grasping the bag, it will be possible to supply the bag to the second station with extreme precision so as to allow a perfect application of the folded element to the bag to be obtained. In the present invention, the expression "before the closure of the bag by means of the closing means is finished" means that the bag closing means are moved away from the bag when the bag has been closed by means of the closing means. Therefore, in particular, in the event that the closing is performed by means of a pair of welding surfaces, it means that the bag is grasped by the transport means at the first station before the welding surfaces are moved away from the first and from the second face of the bag. Therefore, the aforesaid expression means that the transport means grasp the bag after the bag itself has been closed by means of the welding surfaces but before the welding surfaces are moved away from the first and from the second face of the bag or it may even mean that the transport means grasp the bag at the first station before the bag is closed by means of a welder, i. e. before the welding surfaces are moved towards the bag, or simultaneously. This substantially means that the transport means are configured so as to grasp the bag at the first station before the closing operation is finished, meaning that any movement of the closing means away from the bag is part of the closing operation. For example, the bag can be grasped at the first station by the transport means when such bag is still grasped by the closing means, regardless of whether the bag itself has already been closed due to the action of the closing means or not. The expression "grasp at the first station" means that the transport means did not hold the bag before it arrived at the first station which comprises the closing means and they grasp it when the bag is at the first station that comprises the closing means.

[0013] According to a further embodiment, the present invention provides a system in which the closing means of the first station comprise a welder having a pair of welding surfaces configured so as to close the bag positioned between them by means of welding, wherein the welding surfaces are configured so as to be moved away from the bag only after the transport means grasp the bag. This solution is particularly advantageous as it allows a welder to be used both for performing the closure of the bag and for supplying the bag to the transport means in a predetermined specific position, which enables the bag to be supplied to the second station with extreme precision. Preferably, the transport means are configured to grasp the bag after the welding surfaces have been placed in contact with the bag.

[0014] According to a further embodiment of the present invention a system is provided in which the transport means comprise a pair of gripping elements having a pair of opposite surfaces configured so as to be able to grasp the first and the second face of the bag and transport the bag from the first station to the second station. This solution makes it possible to have extremely simple but at the same time extremely effective transport means, thanks to the presence of a simple pair of opposite surfaces allowing bags of any type to be supplied (having alternatively a two-dimensional or one-dimensional bottom) to the second station with high precision.

[0015] According to a further embodiment of the present invention, a system is provided in which the first station further comprises a bag formation system, preferably a forming tube, even more preferably a vertical forming tube, configured so as to form the bag starting from a strip of flexible material and cutting means configured so as to separate the bag from the bag formation system preferably after the bag has been filled and, even more preferably, after the bag has been filled by means of the closing means and wherein the transport means are preferably configured so as to grasp the bag before the cutting means separate the bag from the bag formation system. This solution is advantageous as it enables a known system to be installed, such as a forming tube that allows already filled bags to be supplied to the first station. Therefore, thanks to the presence of the closing means, it will be possible to realise the closure of the bag and, thanks to the transport means, transport it into the second station. According to the preferred embodiment, the transport means are configured so as to grasp the bag at the first station when it has already been filled and still attached to the tube generated by the bag formation system allowing the bag to be grasped without suffering any particular conditions, such as tension of the material, which could arise with the cutting. Alternatively, the transport means can be configured so as to grasp the bag after the filled bag has been separated from the tube by means of the cutting means but before the closing means are separated from the surfaces of the bag so as to allow the bag to be grasped precisely. The cutting means can be represented by any cutting system known in the state of the art that allows the separation of the bag from the tube, such as for example a knife, a laser, etc. In the case of forming bags by means of a vertical forming tube, the transport means can be configured so as to grasp the bag at the first station after the bag has been filled by means of the forming tube.

[0016] According to a further embodiment of the present invention, a system is provided wherein said transport means are configured so as to move the bag along a first direction and along a second direction perpendicular to the first direction, wherein one from among the first direction and the second direction is a direction coinciding with the axis of the bag. The axis of the bag means an axis passing through the upper end and the lower end of the bag and positioned centrally with respect to the side edges of the first and of the second face. This solution is advantageous as it enables a more compact system to be obtained thanks to the movement along two perpendicular directions to one another: one direction will be the one that joins the first station to the second station and another direction will be a direction parallel to or coinciding with the bag formation system. Therefore,

the spatial extension of the system will be effectively reduced.

[0017] According to a further embodiment of the present invention a system is provided in which the application means of the second station comprise: a storage for housing a stack of foldable flat elements, gripping means for extracting one of the flat elements from the storage and bringing it to a predetermined position, a supporting and folding element positioned so that it can be put in contact with the flat element after the flat element is placed in the predetermined position, folding means for folding the flat element around the supporting and folding element along the folding line so as to form the folded element. The transport means are configured so as to position the bag in a predetermined position so that when the flat element is folded around the supporting and folding element by the folding means, the folded element is also fixed to the bag. This system can be made in a compact way, realising a minimum footprint. Moreover, the system allows the packages to be made quickly and precisely. Folding the flat element around a supporting element and simultaneously fixing the element thus obtained by means of folding the bag carried by the transport means at the supporting and folding element allows the fold to be accurately made along the folding line and to speed up the time fixing the folded element to the bag. The storage can be configured to house stacks of foldable flat elements of different sizes and shapes. The gripping means can be configured so as to extract the lower foldable flat element in the stack housed in the storage. The supporting and folding element can be adjustable in height so as to be able to adjust the vertical distance between the folding line and the upper end of the bag.

[0018] According to an embodiment of the present invention, a system is provided wherein the folding means comprise a plurality of rollers adapted to slide along the flat element so as to fold it around the supporting and folding element along the folding line and fix it to the bag. The rollers can be vertically movable so that when they are moved downwards they fold the foldable element around the supporting and folding element. Moreover, the sliding of the rollers along the flat element not only folds it, but also allows effectively fixing the folded element to the bag, for example by means of glue interposed between the folded element and the bag. The plurality of rollers can comprise one or more pairs of opposed rollers, so that the action of the rollers is exerted symmetrically on both portions of the folded element and therefore on both faces of the bag.

[0019] According to a further embodiment of the present invention, a system is provided wherein the plurality of rollers of the folding means is configured so as to be able to grasp the folded element allowing the bag to be supported by the plurality of rollers by means of the folded element. This solution is particularly advantageous as it allows the rollers of the folding means to be used for a double purpose: in the first place that of applying the folded element to the bag and in the second place that of transporting the package formed by the bag and the folded element from the second station to the outside of the system. Outside of the system means a system of slides that allow the outflow of the packages or alternatively a storage chamber at which all the packages that have left the system are stored. In a preferred form of this embodiment, the transport means are configured so as to release the bag after the bag is supported by the plurality of rollers.

[0020] According to a further embodiment of the present invention, a system is provided further comprising glue application means configured to apply glue to the bag when the bag is placed in the second station and/or to the flat element extracted from the storage. The glue application means could be glue applicators, such as glue guns or the like. The system could have a single glue application means configured to apply glue to the flat element extracted from the storage. The glue applied to the flat element extracted from the storage can be used to fix the folded element to the bag. The glue can be applied while the foldable flat element is removed from the storage. Alternatively, the glue can be applied while keeping the foldable flat element stationary between the storage and the position at the supporting and folding element. The system could also have glue application means configured to apply glue to the faces of the bag so as to fix the folded element to the bag. These glue application means could be placed so as to apply glue to the faces of the bag when it is carried in the housings of the system according to the present invention before reaching the position at the supporting and folding element. The glue application to the bags can take place both with moving bags and with stationary bags in a predetermined position.

[0021] According to a further embodiment of the present invention, a method is provided for making packages comprising a bag of flexible material comprising a first face and a second face and an element folded along a folding line, wherein the folding line is parallel to the upper end of the bag and divides the folded element into a first portion and a second portion so that the first portion extends along the first face and the second portion extends along the second face. Wherein the method comprises the following steps:

a) closing a bag in a first station;
b) transporting the bag from the first station to a second station, in which the folded element is applied to the bag, by means of transport means;

wherein the transport means grasp the bag at the first station before the closure of the bag is finished in the first station and transport the bag from the first station to the second station after the bag has been closed. This solution is particularly advantageous as it allows the bag to be supplied to the second station, in which the folded element is applied to the bag, already closed and grasped by the transport means. Therefore, this method can be

used both in the case of bags having a two-dimensional bottom and bags having a one-dimensional bottom. Furthermore, thanks to grasping the bag, it will be possible to supply the bag to the second station with extreme precision so as to allow a perfect application of the folded element to the bag to be obtained. In the present invention, the expression "before the closure of the bag by means of the closing means is finished" means that the bag closing means are moved away from the bag itself. Therefore, in particular, in the event that the closing is performed by means of a pair of welding surfaces, it means that the welding surfaces are moved away from the first and from the second face of the bag. Therefore, the above expression means that the transport means grasp the bag after the bag itself has been closed but before the surfaces of the welder are moved away from the first and from the second face of the bag. This substantially means that the transport means can be configured so as to grasp the bag when such bag is still grasped by the closing means. The expression "grasp at the first station" means that the transport means did not hold the bag before it arrived at the first station where the closing is performed and they grasp it when the bag is at the first station where the closing is performed. For example, the transport means can grasp the bag after it has been filled.

[0022] According to an embodiment of the present invention a method is provided in which step a) is performed by means of a welder, in which the welder is moved away from the bag only after the transport means grasp the bag. This solution is particularly advantageous as it allows a welder to be used both for performing the closure of the bag and for supplying the bag to the transport means in a predetermined specific position, which enables the bag to be supplied to the second station with extreme precision.

[0023] According to a further embodiment of the present invention a method is provided wherein the folded element is applied to the bag by means of folding means comprising a plurality of rollers. The rollers can be vertically movable so that when they are moved downwards they fold the foldable element around the supporting and folding element. Moreover, the sliding of the rollers along the flat element not only folds it, but also allows effectively fixing the folded element to the bag, for example by means of glue interposed between the folded element and the bag. The plurality of rollers can comprise one or more pairs of opposed rollers, so that the action of the rollers is exerted symmetrically on both portions of the folded element and therefore on both faces of the bag.

[0024] According to a further embodiment of the present invention, a method is provided in which the transport means release the grip on the bag after the folded element is applied to the bag and after the folded element is grasped by the plurality of rollers of the folding means. This solution is particularly advantageous as it allows the rollers of the folding means to be used for a double purpose: in the first place that of applying the folded element to the bag and in the second place that of transporting the package formed by the bag and the folded element from the second station to the outside of the system. Outside of the system means a system of slides that allow the outflow of the packages or alternatively a storage chamber at which all the packages that have left the system are stored.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The present invention is described with reference to the accompanying drawings in which the same reference numbers and/or marks indicate the same parts and/or similar parts and/or corresponding parts of the system.

Figures 1 a and 1 b schematically show two packages with a flat bottom that can be made with a system and/or method based on the present invention;

Figures 2a and 2b schematically show two packages with a linear bottom which can be made with a system and/or a method based on the present invention;

Figure 3 schematically shows an application station of a folded element according to an embodiment of the present invention;

Figure 4 schematically shows a system according to an embodiment of the present invention in a first step of the manufacturing method of a package;

Figure 5 schematically shows the system in a closing step of the bag in the process for making a package;

Figures 6a and 6b schematically show the system in a bag transport step of the process of making a package, in a subsequent step to the one represented in Figure 5, according to a first form of the present embodiment in which the bag is conveyed directly along a horizontal direction;

Figures 7a and 7b schematically show the system in a bag transport step of the process of making a package, in a subsequent step to the one represented in Figure 5, according to a second form of the present embodiment in which the bag is first conveyed along a vertical direction and then along a horizontal direction;

Figure 8 schematically shows the application station in a further step of the manufacturing method of a package;

Figure 9 schematically shows the application station in a further step of the manufacturing method of a package;

Figure 9b schematically shows an enlargement of a detail of figure 8;

Figure 10 schematically shows a detail of the application step of the folded element to the bag in a further step of the manufacturing method of a package;

Figure 11 schematically shows a detail of the release step of the package in a further step of the manufacturing method of a package;

DETAILED DESCRIPTION

[0026] The present invention is described hereinbelow by making reference to particular embodiments, as illustrated in the accompanying drawings. However, the present invention is not limited to the particular embodiments described in the following detailed description and depicted in the drawings, rather the embodiments described simply exemplify the various aspects of the present invention, the scope of which is defined by the claims. Further modifications and variations of the present invention will be apparent to those skilled in art.

[0027] Figure 1 a schematically shows a package 1000 which can be made with a system and/or a method based on the present invention. The package 1000 comprises a bag 100 and a folded element 200.

[0028] The bag 100 is made of flexible material, for example material compatible with food products that can be stored in the bag 100. The bag 100 comprises a first face 101, in the front in the figure, and a second face 102 opposite to the first face 101 and therefore in the back in the figure. The bag 100 further comprises a flat bottom 104, which therefore extends along a two-dimensional portion, which allows the bag to stand resting on the flat bottom 104. The bag also comprises an upper end 103 opposite the flat bottom 104. The upper end 103 is also the upper end of a welded area that closes the bag 100.

[0029] In practice, the first face 101 and the second face 102 meet and are adjacent to the upper end 103 in such a way that the bag is closed. The bag then comprises a left side face 105 and a right side face 106. The side faces 105 and 106 laterally connect the first face 101 to the second face 102. The bag 100 can be of various sizes. For example, the bag 100 could be a bag to hold 1 kg of flour or sugar. Within the scope of the present invention, however, the bag 100 can also be much smaller or much larger.

[0030] The folded element 200 (also called "cardboard strip" in English) is folded along the folding line 203 which is parallel to the upper end 103 of the bag 100. In particular, as shown in the figure, there is a distance D between the folding line 203 and the upper end 103. This distance can be chosen at will and can also be substantially eliminated as shown in figure 1. The folding line 203 divides the folded element 200 into a first portion 201, visible in the figure, and a second portion 202 placed in the back of the package and therefore not visible in the figure. The first portion 201 extends along the first face 101 of the bag 100. The second portion 202 extends along the second face 102.

[0031] Figure 1b shows a further package 1000 which can be made with a system and/or a method according to the present invention. Unlike the package 1000 of figure 1a, the package 1000 of figure 1b further comprises the through hole 204, in this case a euro hole to be able to hang the package. The through hole 204 is made exclusively in the folded element 200.

[0032] In particular, the hole 204 is formed in the first portion 201 and in the second portion 202 of the folded element 200 so as to be a through hole. For this purpose, as seen from the comparison with figure 1a, the distance D between the upper end of the bag 103 and the folding line 203 of the folded element 200 is increased so as to have a portion of folded element 200 inside which the bag 100 is not sufficiently large enough to be able to make the through hole 204 without damaging the bag 100. This configuration is particularly advantageous because it allows having the package 1000 with the through hole 204 without however affecting the bag 100 and thus reducing the chances that the bag 100 accidentally opens, is damaged or that the product inside it accidentally comes into contact with the environment outside the bag 100.

[0033] Alternatively and/or in addition to the euro hole similar to that shown with the reference number 204 in figure 1b, the folded element 200 could comprise further through holes, for example through holes which form a handle to be able to grasp the package 1000 through these through holes. Also in this case it is particularly advantageous that the through holes are made exclusively in the folded element 200 without affecting the bag 100. To do this, it is necessary to choose the appropriate distance D between the upper end 103 of the bag 100 and the folding line 203 so that the folded element 200 has sufficient space above the upper end 103 of the bag 100 to be able to make the desired through holes in this space.

[0034] Figures 2a and 2b show analogous packages to those shown in Figures 1a and 1b, respectively. The substantial difference with the packages shown in Figures 1a and 1b lies in the shape of the bottom of the package which, in this case, is a one-dimensional bottom, typical of envelope-shaped bags. Therefore, the packages shown in Figures 2a and 2b are packages that are not able to stand up alone when resting on a flat surface.

[0035] Figure 3 schematically shows an application station 140 according to an embodiment of the present invention; The application station 140 can be used to assemble a folded element 200 to a bag 100 forming a package 1000 such as the one shown in Figures 1a, 1b, 2a, 2b.

[0036] The application station 140 comprises a storage 11 able to house a plurality of foldable flat elements, in particular adapted to house a stack of such foldable flat elements. The foldable flat elements are the elements with which the folded element 200 is made. Such elements can therefore be, for example, sheets of paper, card or cardboard. These elements can be rectangular.

[0037] The storage 11 can be adapted to house flat elements of different sizes. For example, the storage 11 can have movable side walls so as to be able to define different housings of different sizes in order to be able to house stacks of foldable elements of different sizes.

[0038] The application station 140 further comprises gripping means for extracting one of the foldable flat elements housed in the storage 11 and bringing it to a

predetermined position. In particular, in the example shown in the figure, the gripping means comprise a first gripping element 12a and a second gripping element 12b. The first gripping element 12a is a suction cup placed below the storage 11. The suction cup 12a is movable in a vertical direction so as to be able to contact the lower foldable element of the stack of foldable elements housed in the storage 11.

[0039] In this way, by means of the suction cup 12a it is possible to extract from the stack at least a portion of the lower foldable element of the stack. In particular, it is possible to detach at least one edge of the lower foldable element of the stack so as to be able to grasp this edge by means of the second gripping element 12b.

[0040] In the example shown in the figure, the second gripping element 12b comprises a gripper. The gripping element 12b can be movable both in the vertical direction and in the horizontal direction. The movement in the horizontal direction allows the foldable element to be completely withdrawn from the stack housed in the storage 11. The movement in the vertical direction can allow adjusting the height of the foldable element within the system 1.

[0041] In this way, the action of the first gripping element 12a and of the second gripping element 12b allows bringing the foldable element into a predetermined position within the application station 140.

[0042] The application system 140 further comprises a supporting and folding element 13. In the example shown in the figure, this element comprises a flat bar 13a placed so that the side of the thickness of the bar faces upwards. The supporting and folding element 13 is placed so that it can be brought into contact with the foldable flat element placed in the predetermined position by the gripping means 12, in which the foldable element is placed above the supporting and folding element 13.

[0043] The application station 140 also comprises folding means 14 for folding the flat element around the supporting and folding element 13. In the example shown in the figure, the folding means 14 comprise a series of rollers that can be moved in a vertical direction, the operation of which will be explained below.

[0044] Figure 3 also shows that the system 140 can comprise glue application means, for example one or more glue applicators 17a and 17b, such as glue guns or the like.

[0045] Furthermore, as shown in the figure, upstream of the application station 140 described in Figure 3, a movement system 150 can be installed, comprising housings 151, which are movable, for housing the bags to which the folded element 200 is to be applied and conveying such bags from a bag forming station 130 to the application station 140, in which, as mentioned, the bags 100 are coupled to the folded element 200.

[0046] For example, the housings 151 can be placed on a conveyor belt, for example an looped conveyor belt (not shown in the figure), so as to be able to move the bags to which the folded element 200 is to be applied. Each of the bags can then be brought into a position at the supporting and folding element 13 so that when the foldable flat element is folded around the supporting and folding element 13 by the folding means 14, the folded element 200 thus obtained is also fixed to the bag.

[0047] It is clear that the movement system 150 comprising the housings 151, represented in Figure 3, is preferable in the particular case in which the bags have a flat bottom 104 which extends two-dimensionally (such as those shown in Figure 1a and 1b) so as to allow the bottom of the bag 100 to be rested thereon and to be transported by the housings 151 placed on a conveyor belt. In fact, in the event in which there are envelope-shaped bags, therefore having a one-dimensional bottom such as the one shown in Figure 2a and 2b, it would be very difficult to adopt the movement system 150 represented in Figure 3.

[0048] Therefore, the object of the present invention is that of providing a movement system that is able to move the envelope-shaped bags, therefore having a one-dimensional bottom such as the one shown in Figure 2a and 2b, from the bag forming station 130 to the application station 140.

[0049] On this point, as shown in Figure 4, in the case of bags comprising a one-dimensional bottom, it is preferable to adopt the transport means 160 according to an embodiment of the present invention. Such transport means can also be used, as will be explained in detail, for bags comprising a flat bottom 104, but are particularly preferable in the case of envelope-shaped bags.

[0050] Figure 4 shows a system 1 according to one embodiment of the present invention. The system comprises a bag forming station 130, transport means 160 and the application station 140 previously described. In the system 1 the bag forming station 130, hereinafter more simply referred to as "first station 130", allows the bags to be made. The application station 140, hereinafter more simply referred to as "second station 140" allows the folded element 200 to be applied to the bags 100. The transport means 160 allow the bags to be transported from the bag forming station 130 to the application station 140.

[0051] As will be shown in the figure, and as will be explained in detail below, the movement system with transport means 160 shown in Figure 4 is substantially different from the one described in Figure 3. In fact, while the movement system 150 described in Figure 3 allows the bags 100 to be rested in the housings 151, the movement system with the transport means 160 shown in Figure 4 allows the bags 100 to be grasped at the outlet from the first station 130 and carried into the second station 140.

[0052] The first station 130 is configured so as to supply the filled and closed bags 100. This process, as shown in the figure, is preferably performed by means of a bag formation system 131, which in the particular example shown in the figure, is represented by a vertical forming tube 131 known in the state of the art. The forming tube

131 allows a strip of flexible material to be wound onto such forming tube and to form a tube from which the packages can be obtained and to fill them by means of supplying the contents of the bag through an internal portion of such vertical forming tube 131.

[0053] As mentioned, the bags obtained may be of any kind, such as those shown in Figures 1a, 1b, 2a, 2b. In fact, even if a bag having a one-dimensional bottom is shown, it is also possible to make bags having a flat bottom 104.

[0054] As shown in Figure 4, the transport means 160 comprise a pair of gripping elements 161 and 162 configured so as to be able to grasp a bag placed between such elements and release it at a later time. Therefore, the gripping elements 161, 162 can be moved away from one another so as to release the bag 100 placed between them and moved towards one another so as to grasp a bag 100 placed between them.

[0055] The gripping elements 161, 162 can be simply represented by two bars having two surfaces opposite one another so that such surfaces can come into contact with a first face 101 and a second face 102 of the bag 100 and therefore allow the bag 100 to be grasped.

[0056] Furthermore, to allow the movement of the bag 100 from the first station 130 to the second station 140, the pair of gripping elements 161, 162 is movable along a direction that joins the first station 130 to the second station 140. However, according to a preferred embodiment that will be explained with reference to Figures 7a and 7b, the transport means 160 are also movable along a direction coinciding with the axis of the forming tube 131. This characteristic is not essential but is advantageous in the case in which a more compact system 1 is desired, as can be clearly seen in the description below.

[0057] The transport means 160 grasp the bag when it is at the first station 130. For example, the transport means grasp the bag when it has already been filled but is still attached to the tube from which it is formed. Alternatively, the transport means grasp the bag when it has already been filled and has already been separated from the tube from which it is formed.

[0058] Moving on now to Figure 5, as can be seen in detail, the gripping elements 161, 162 grasp an upper portion of the bag 100 which is still connected to the tube. The distance between the position in which the bag is grasped by the gripping elements 161 and 162 and the upper edge of the bag, once it is separated from the tube, is preferably less than 40 mm. However, in many cases values less than 60 mm are also acceptable.

[0059] The first station 130 further comprises a welder 132 comprising a pair of welding bars configured so as to weld the closure of the bag 100 placed between them by means of welding.

[0060] For the purposes of the present invention it is very important for the gripping elements 161, 162 to grasp the bag 100 before the welder 132, and in particular the welding bars of the welder 132, release the grip from the first and the second face 101, 102 of the bag 100 moving away from such faces. This is because, thanks to the fact that the bag 100 is held between the welding bars of the welder 132, it is possible to allow the transport means 160 to grasp the bag 100 by means of the gripping elements 161, 162 in a predetermined position and with extreme precision. This implies that the bag 100 can be grasped by means of the gripping elements 161, 162 before it is closed or after it has been closed but before the welding bars of the welder 132 have moved away from the bag 100. However, according to the present invention, it will be preferable to grasp the bag 100 by means of the gripping elements 161, 162 after it has been closed but before the welder 132 releases the bag.

[0061] After welding, cutting means 133 will separate the bag 100, which has been closed, from the tube formed by the forming tube 131. The cutting means 133 can be represented by any cutting system known in the state of the art which allows the separation of the bag 100 from the tube, such as for example a knife, a laser, etc. In the particular example represented in the figure, the cutting means 133 are inserted into the welding bars of the welder 132 so as to have a single and compact element that enables the package to be closed and separated from the tube.

[0062] Figures 6a and 6b show the steps that allow the separation between the bag 10 and the tube according to a first embodiment in which the bag 100, once separated from the tube, is transported along a single horizontal direction (perpendicular to the axis of the bag) from the first station 130 to the second station 140.

[0063] In this particular case, it will therefore be sufficient to move the bag along a direction that coincides with the direction that joins the first station 130 to the second station 140. In particular, Figure 6a shows the bag 100 straight after it has been separated from the tube whereas Figure 6b shows a subsequent state in which the bag 100 is conveyed towards the second station 140 by means of the gripping elements 161, 162.

[0064] Alternatively, as shown in Figures 7a and 7b, in a second embodiment, the transport means 160 translate the bag 100 separated from the tube of the forming tube 131 along a direction coinciding with the axis of the forming tube 131 so that the bag 100 positioned between the gripping elements 161, 162 can be moved away from the forming tube 131 along a vertical direction. In particular, Figure 7a shows the bag 100 straight after it has been separated from the tube and moved away along a vertical direction whereas Figure 7b shows a subsequent state in which the bag 100 is then conveyed towards the second station 140 along a horizontal direction (perpendicular to the axis of the bag 100) by means of the gripping elements 161, 162.

[0065] Therefore, in this second embodiment, the transport means 160 comprise, for example, a system of pneumatic pistons that allow a lowering and a raising of the gripping elements 161, 162 of the transport means 160 and a sliding system that will allow the gripping elements 161, 162 to be conveyed towards the second sta-

tion 140.

[0066] Figure 8 schematically shows a further step of the manufacturing method of a package 1000. The figure shows that the bag 100, filled and closed, has reached a position at the supporting and folding element 13, in particular below the bar 13a. Even more particularly, the upper end 103 of the bag 100 is placed at the bar 13a. In this particular embodiment described in the figure, the upper end 103 of the bag 100 is placed below the supporting and folding element 13 to allow a euro hole, described in Figures 1b and 2b to be made by means of a through hole. However, it is clear that the upper end 103 of the bag 100 can be placed above the supporting and folding element 13 according to requirements.

[0067] As can be seen in the figure, the side end 13b of the supporting and folding element 13 upstream in the direction of advancement of the bags 100 can act as a guide for the bag 100 by acting on the upper end 103 of the bag. For example, the side end 13b of the supporting and folding element 13 can be slightly inclined so that, following the downstream movement of the bag 100, transported by the transport means 160, the upper end 103 of the bags transported is always on the same side of the bar 13a.

[0068] Furthermore, figure 8 shows that two opposite glue applicators 17a and 17b are configured so as to apply glue to both faces 101 and 102 of the bag 100 transported.

[0069] Figure 9 schematically shows a further step of the manufacturing method of a package 1000. The second gripping element 12b drags the foldable flat element 200' over the supporting and folding element 13, in particular above the bar 13a. Moreover, it can be seen that the second station 140 further comprises locking means 16 for locking the foldable flat element 200' in contact with the supporting and folding element 13. In particular, the locking element 16 comprises a bar which is movable in a vertical direction so as to push the foldable flat element 200' downwards until it contacts the supporting and folding element 13. As can be seen better in the enlargement of figure 9bis, the lower end of the bar 16 has a recessed shape so as to be able to better lock the foldable flat element 200' in contact with the supporting and folding element 13.

[0070] Figure 10 schematically shows a further step of the manufacturing method of a package 1000. The folding means 14 are lowered so as to fold the foldable flat element 200' around the supporting and folding element 13 and fix it to the bag 100.

[0071] In particular, in the example shown in the figure, the folding means 14 comprise two series of rollers that can be moved in a vertical direction so that when they are moved downwards they fold the foldable flat element 200' around the supporting and folding element 13 so as to form the folded element 200.

[0072] Moreover, the rollers slide along the sides of the folded element 200 so as to make it adhere and then fix it to the bag 100. The fixing of the folded element 200 to the bag 100 can take place by means of the glue applied to the faces 101 and 102 of the bag by the applicators 17a and 17b. Alternatively, the fixing of the folded element 200 to the bag 100 can take place by means of the glue applied to the lower face of the foldable element 200' by means of another possible applicator configured to apply glue to the lower surface of the foldable flat element 200' when it is extracted from the storage 11.

[0073] According to one embodiment of the invention, the supporting and folding element 13 is adjustable in height so as to be able to select the desired distance D between the folding line 203 and the upper end 103 of the bag (see figures 1 and 2).

[0074] Alternatively, or additionally, as mentioned, also the gripping elements 161, 162 can be adjustable in height so as to select the distance D based on the vertical position of the bags 100 grasped by the gripping elements 161, 162.

[0075] Through holes such as the hole 204 shown in figures 1b and 2b can be made directly on the packages, therefore made as obtained in figure 10. Alternatively, the through holes can be made by providing the foldable flat elements 200' with suitably positioned pairs of holes so that the holes of the pairs fit together when the foldable flat element 200' is folded along the folding line 203. In other words, the foldable flat elements 200' stacked in the storage 11 can already be provided with these pairs of holes wherein the two holes of each pair are suitably positioned in relation to the folding line 203 so that, following the folding along this line, a through hole is obtained.

[0076] Furthermore, according to embodiments of the present invention, the system could further comprise a station for applying rivets to the package so as to fix the folded element to the bag not only by means of glue, but also by means of rivets. This can be done for aesthetic reasons, i.e. because the rivets evoke a fixing system of the past or in any case carried out by hand.

[0077] As shown in Figure 10 and as previously described, the rollers of the folding means 14 are configured so as to allow the adhesion of the folded element 200 to the bag 100.

[0078] However, according to a preferred embodiment of the present invention, the rollers are also configured to allow the folded element 200 to be grasped between them and the package 1000 comprising the bag 100 and the folded element 200 to be supported by grasping the folded element. For this purpose, the rollers positioned in the front position of the package 1000 are moved towards the rollers positioned in the rear portion of the package 1000 so as to allow the folded element to be grasped.

[0079] Therefore, after the rollers have grasped the folded element 200 between them, the gripping elements 161, 162 of the transport means 160 can be moved away from one another and can return "empty" to the first station 130, ready to receive a new bag 100 and to re-start the whole process described herein.

[0080] The further movement of the rollers of the fold-

ing means 14 therefore allows removing the package 1000 from the supporting and folding element 13.

[0081] As shown in Figure 11, the rollers of the folding means 14 can be used to lead the package 1000 towards an outlet of the system. In fact, the temporal space during which the transport means 160 return to the first station, grasp a new bag 100 and lead it to the inside of the second station 140, may be used by the rollers of the folding means 14 for leading the package 1000 towards an outlet of the system 1 and then returning to the second station 140, ready for coupling a new folded element 200 to a new bag 100.

[0082] Therefore, the folding means 14 can be used as a second movement system, wherein the second movement system grasps the package 1000 before the gripping elements 161, 162 of the transport means 160 release such package 1000.

[0083] As it will have been possible to read in the present description, the bag 100 and then the package 1000 are always kept grasped by external elements in an interval that goes from an instant before the closing sealing of the bag is completed to the outlet of the package 1000 from the system 1.

[0084] Although the present invention was described with reference to the embodiments described above, it is apparent to an expert in the field that it is possible to make several modifications, variants and improvements to the present invention in light of the above teaching and within the scope of the appended claims, without departing from the object and the scope of protection of the invention.

[0085] For example, even if it has been described that the transport means 160 are configured so as to bring the bag 100 from the first station 130 to the second station 140 without making any intermediate stops, in which the gripping elements 161, 162 of the transport means 160 continuously grasp the bag 100, it is also possible that the transport means 160 comprise a plurality of pairs of gripping elements able to pass the bag to one another and configured so that a pair of gripping elements upstream release the bag 100 only after a pair of gripping elements downstream has grasped the bag.

[0086] Even if in the figures a forming tube 131 has been shown as a bag formation system, it is clear that the system used can be any other system adapted to fold the film for forming bags known in the state of the art.

[0087] The dimensions of the packages and therefore of the relative bags and of the corresponding folded elements can be various, for example to be able to contain from a few grams up to a few kg of product. The dimensions and geometric configurations of the folded element can also be varied. In particular, the portions of the first face and/or the second face of the bag covered by the first portion and/or the second portion, respectively, of the folded element can have various dimensions with both symmetrical and asymmetrical configurations possible.

[0088] Finally, those fields known by experts in the field were not described to avoid excessively and uselessly overshadowing the invention described.

[0089] For example, the system can be equipped with control systems that are programmed to coordinate the movement of the various system components. Moreover, the system can be equipped with sensors, for example photocells or the like, which detect the position of the elements used by the system, for example the position of the bags and/or of the foldable flat elements and/or of the containers so as to be able to control the movement of system components based on this detection.

[0090] Accordingly, the invention is not limited to the embodiments described above, but is only limited by the scope of protection of the appended claims.

Claims

1. A system (1) for producing packages (1000) comprising a bag (100) made of flexible material comprising a first face (101) and a second face (102), and a folded element (200) folded along a folding line (203), wherein the folding line (203) is parallel to the upper end (103) of said bag (100) and divides the folded element (200) into a first portion (201) and a second portion (202) so that said first portion (201) extends along said first face (101) and said second portion (202) extends along said second face (102), said system (1) comprising:

   a first station (130) comprising closing means (132) configured so as to close said bag (100),
   a second station (140) comprising application means (11, 12a, 12b, 13, 14) configured so as to apply said folded element (200) to said bag (100),
   transport means (160) configured so as to transport said bag (100) from said first station (130) to said second station (140);
   said system being **characterised in that**
   said transport means (160) are configured so as to grasp said bag (100) at said first station (130) before the closure of said bag (100) by means of said closing means (132) is completed, and to transport said bag from said first station (130) to said second station (140) while keeping said bag (100) grasped.

2. The system (1) according to claim 1, wherein said closing means (132) of said first station (130) comprise a welder (132) having a pair of welding surfaces configured so as to close said bag (100) positioned between them by means of welding, wherein said welding surfaces are configured to as to be distanced from said bag (100) only after said transport means (160) grasp said bag (100) at said first station (130).

3. The system (1) according to any one of the preceding

claims, wherein said transport means (160) comprise a pair of gripping elements (161, 162) having a pair of opposite surfaces configured so as to be able to grasp said first and second face (101, 102) of said bag (100) and to transport said bag (100) from said first station (130) to said second station (140).

4. The system (1) according to any one of the preceding claims, wherein said first station (130) further comprises a bag formation system, preferably a vertical forming tube (131), configured so as to form said bag (100) starting from a strip of flexible material and cutting means (133) configured so as to separate said bag (100) from said bag formation system (131) preferably after said bag (100) has been closed by means of said closing means (132); wherein said transport means (160) are preferably configured so as to grasp said bag (100) after said bag (100) has been filled by means of said forming tube (131) and, even more preferably, wherein said transport means (160) are configured so as to grasp said bag (100) before said cutting means (133) separate said bag (100) from said bag formation system (131).

5. The system (1) according to any one of the preceding claims, wherein said transport means (160) are configured so as to move said bag (100) along a first direction and along a second direction perpendicular to said first direction, wherein one from among said first direction and said second direction is a direction coinciding with the axis of said bag (100).

6. The system (1) according to any one of the preceding claims, wherein said application means (11, 12a, 12b, 13, 14) of said second station comprise:

a storage (11) for housing a stack of foldable flat elements (200');
gripping means (12a, 12b) for extracting one of said flat elements (200') from said storage (11) and bringing it to a predetermined position;
a supporting and folding element (13) positioned so that it can be put in contact with said flat element (200') after said flat element (200') is placed in said predetermined position;
folding means (14) for folding said flat element (200') around said supporting and folding element (13) along said folding line (203) so as to form said folded element (200);
wherein said transport means (160) are configured so as to be able to position said bag (100) in a predetermined position so that when said flat element (200') is folded around said supporting and folding element (13) by said folding means (14) said folded element (200) is also fixed to said bag (100).

7. The system (1) according to claim 6, wherein said folding means (14) comprise a plurality of rollers adapted to slide along said flat element (200') so as to fold it around said supporting and folding element (13) along said folding line (203) and fix it to said bag (100).

8. The system (1) according to claim 7, wherein said plurality of rollers of said folding means (14) is configured so as to grasp said folded element (200) allowing said bag (100) to be supported by said plurality of rollers by means of said folded element (200).

9. The system according to any one of claims 6 to 8, further comprising glue application means (17a, 17b) configured to apply glue to said bag (100) when said bag (100) is placed in said second station and/or to said flat element (200') extracted from said storage (11).

10. A method for producing packages (1000) comprising a bag (100) made of flexible material comprising a first face (101) and a second face (102) and a folded element (200) folded along a folding line (203), wherein the folding line (203) is parallel to the upper end (103) of the bag (100) and divides the folded element (200) into a first portion (201) and a second portion (202) so that said first portion (201) extends along said first face (101) and said second portion (202) extends along said second face (102), said method comprising the following steps:

a) closing a bag (100) in a first station (130);
b) transporting said bag (100) from said first station (130) to a second station (140), in which said folded element (200) is applied to said bag (100), by means of transport means (160);
said method being **characterised in that**
said transport means (160) grasp said bag (100) at said first station (130) before the closure of said bag (100) is finished in said first station (130) and transport said bag (100) from said first station (130) to said second station (140) after said bag (100) has been closed.

11. The method according to claim 10, wherein said step a) is performed by means of a welder (132), wherein said welder (132) is moved away from said bag (100) only after said transport means (160) grasp said bag (100).

12. The method according to any one of claims 10 or 11, wherein said folded element (200) is applied to said bag by means of folding means (14) comprising a plurality of rollers.

13. The method according to claim 12, wherein said transport means (160) release the grip on said bag

(100) after said folded element (200) is applied to said bag (100) and after said folded element (200) is grasped by said plurality of rollers of said folding means (14).

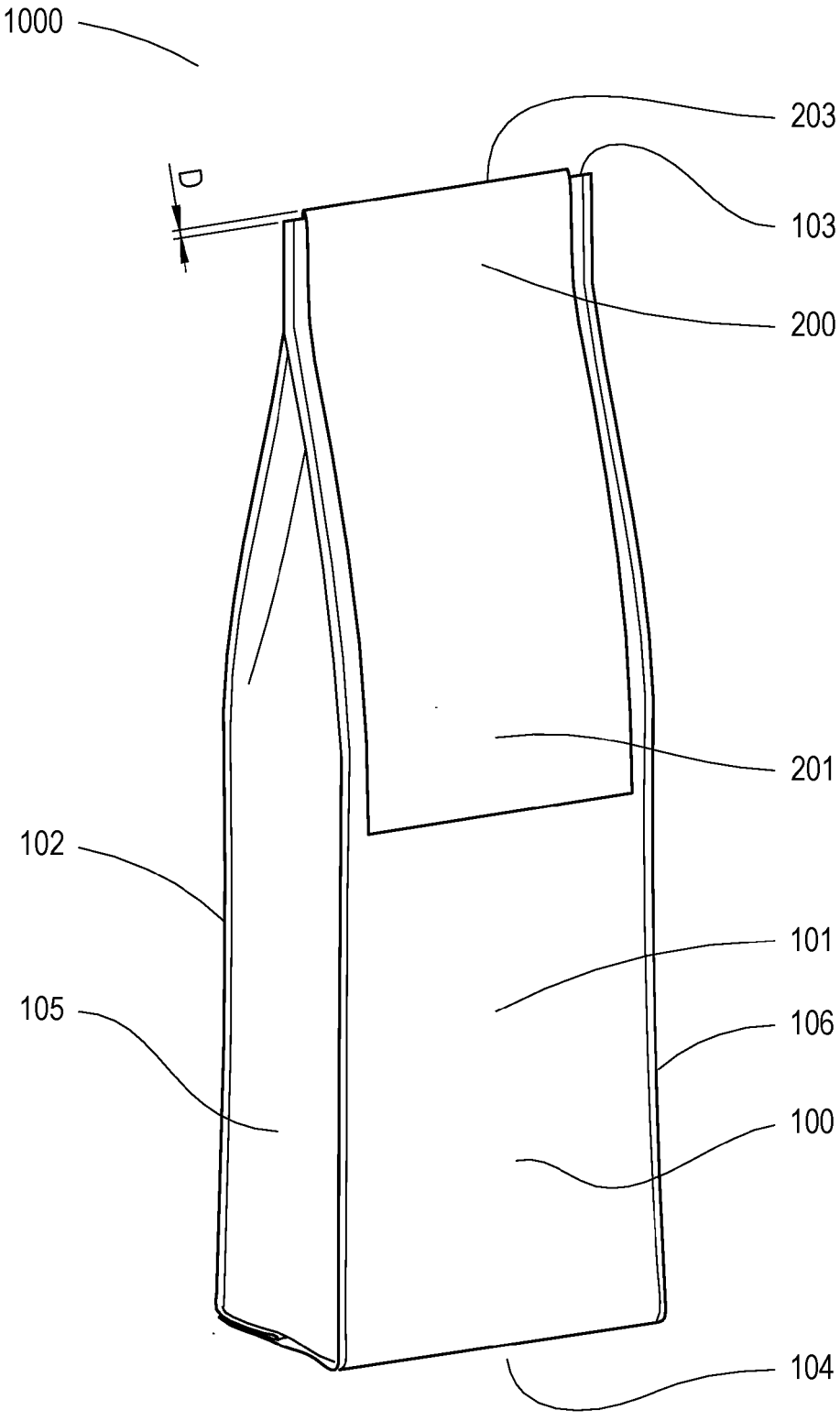

Fig. 1a

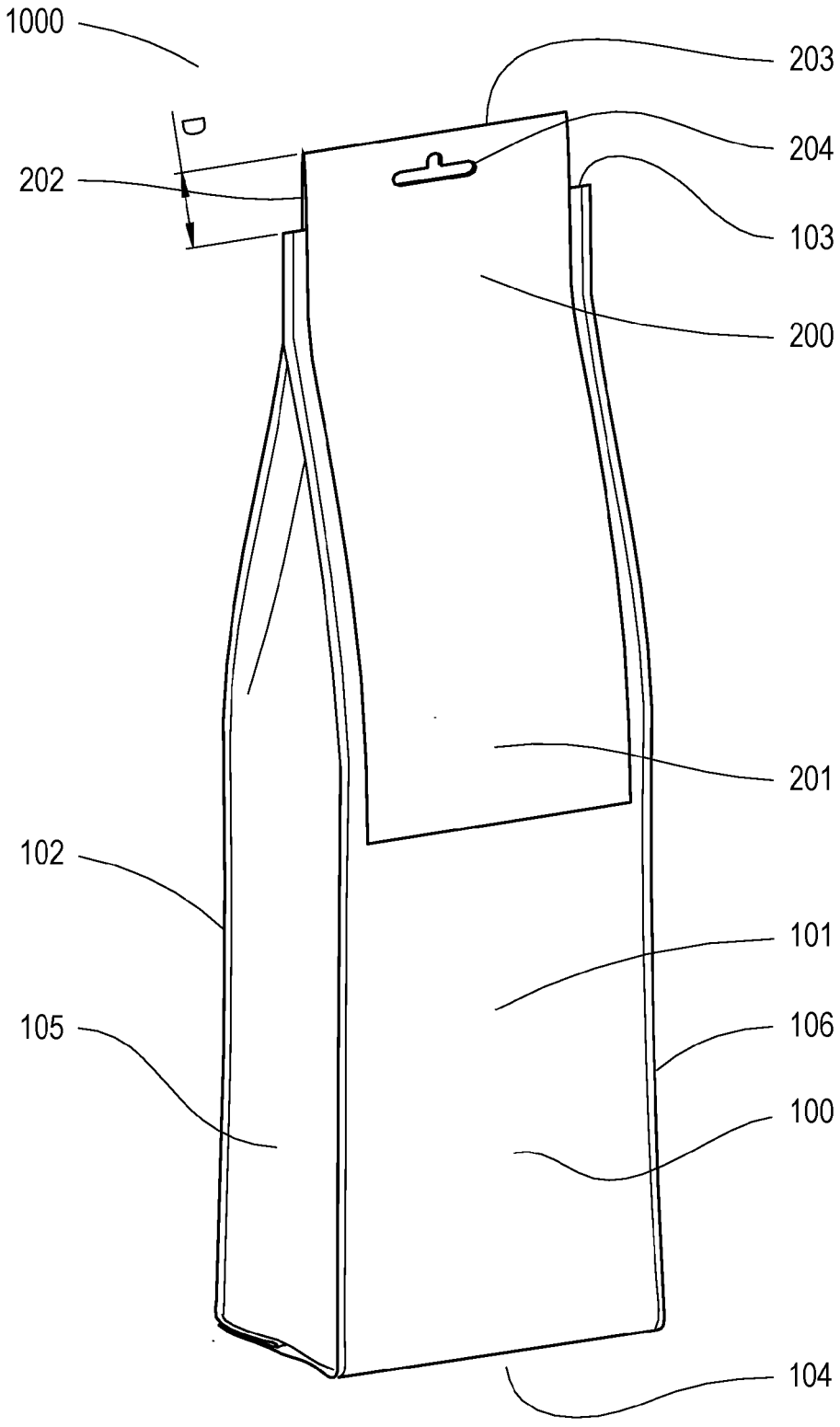

Fig. 1b

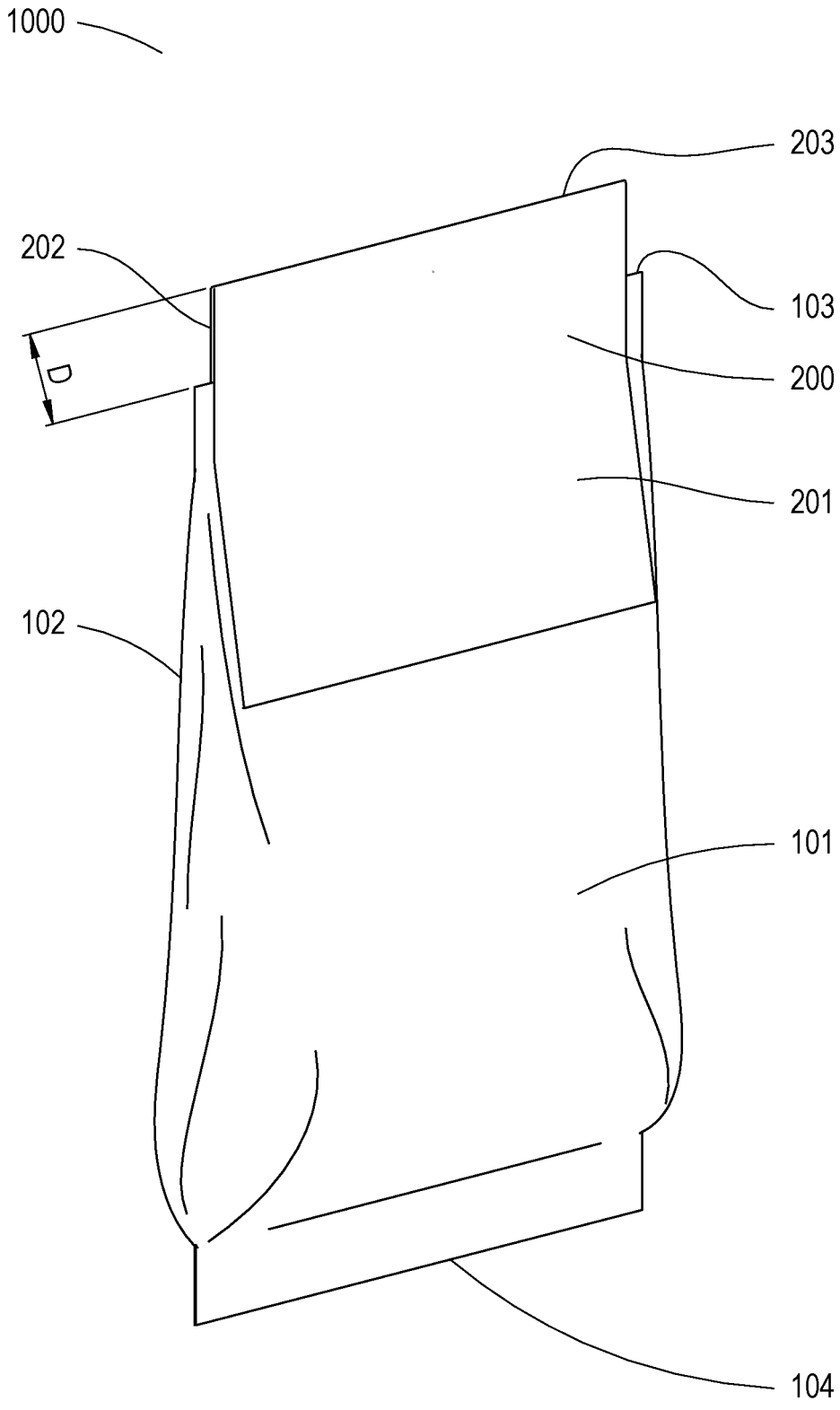

Fig. 2a

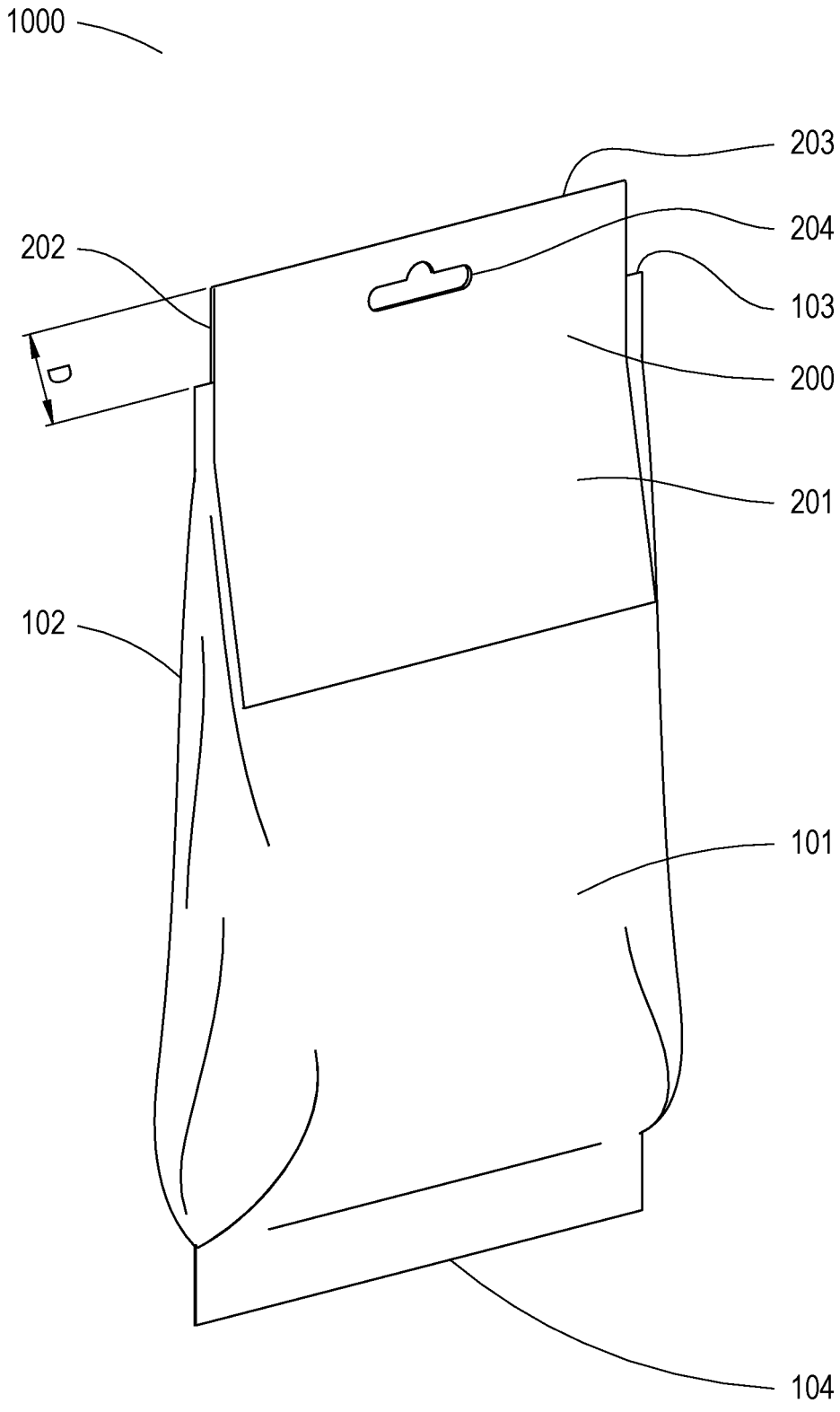

Fig. 2b

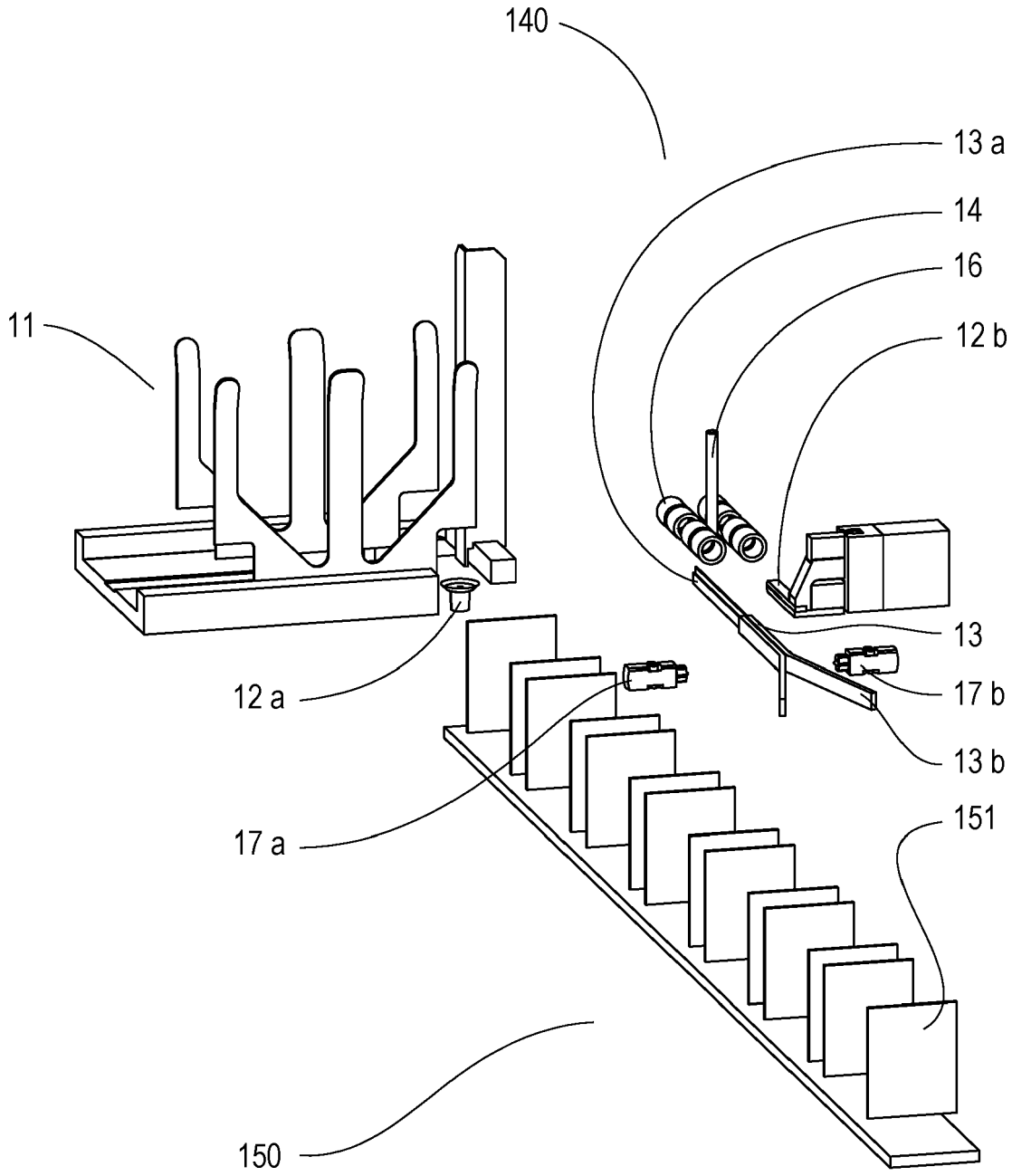

Fig. 3

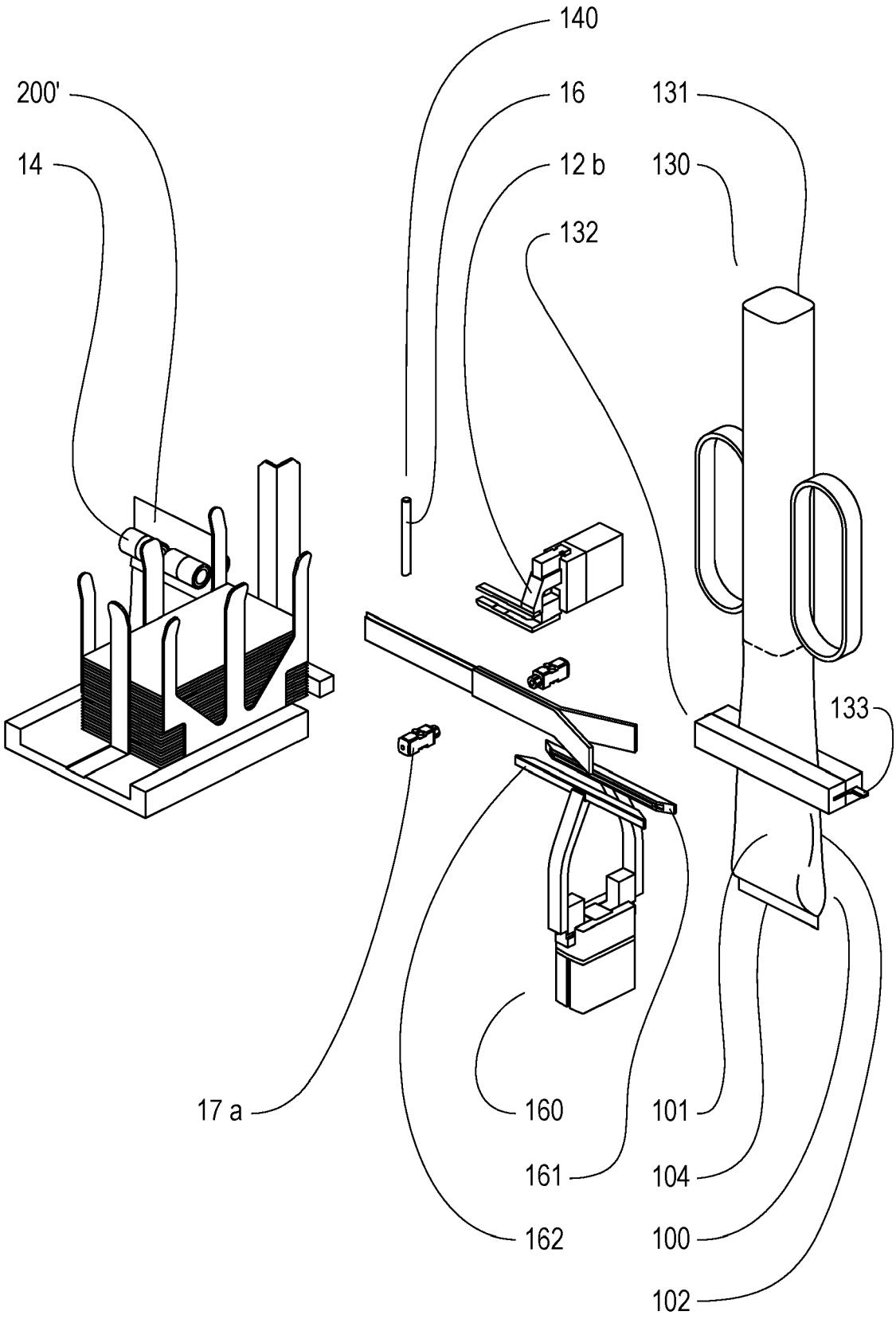

Fig. 4

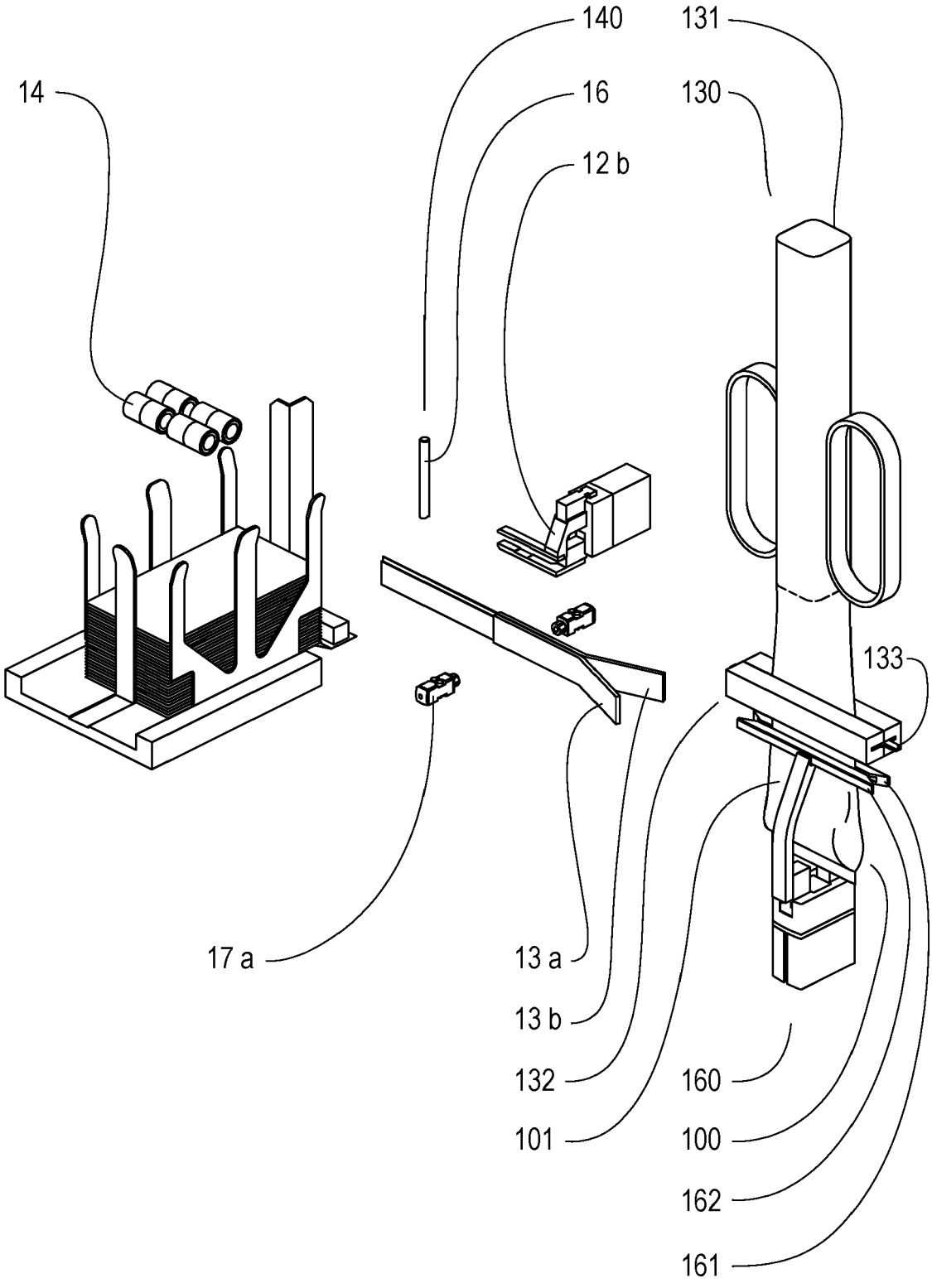

Fig. 5

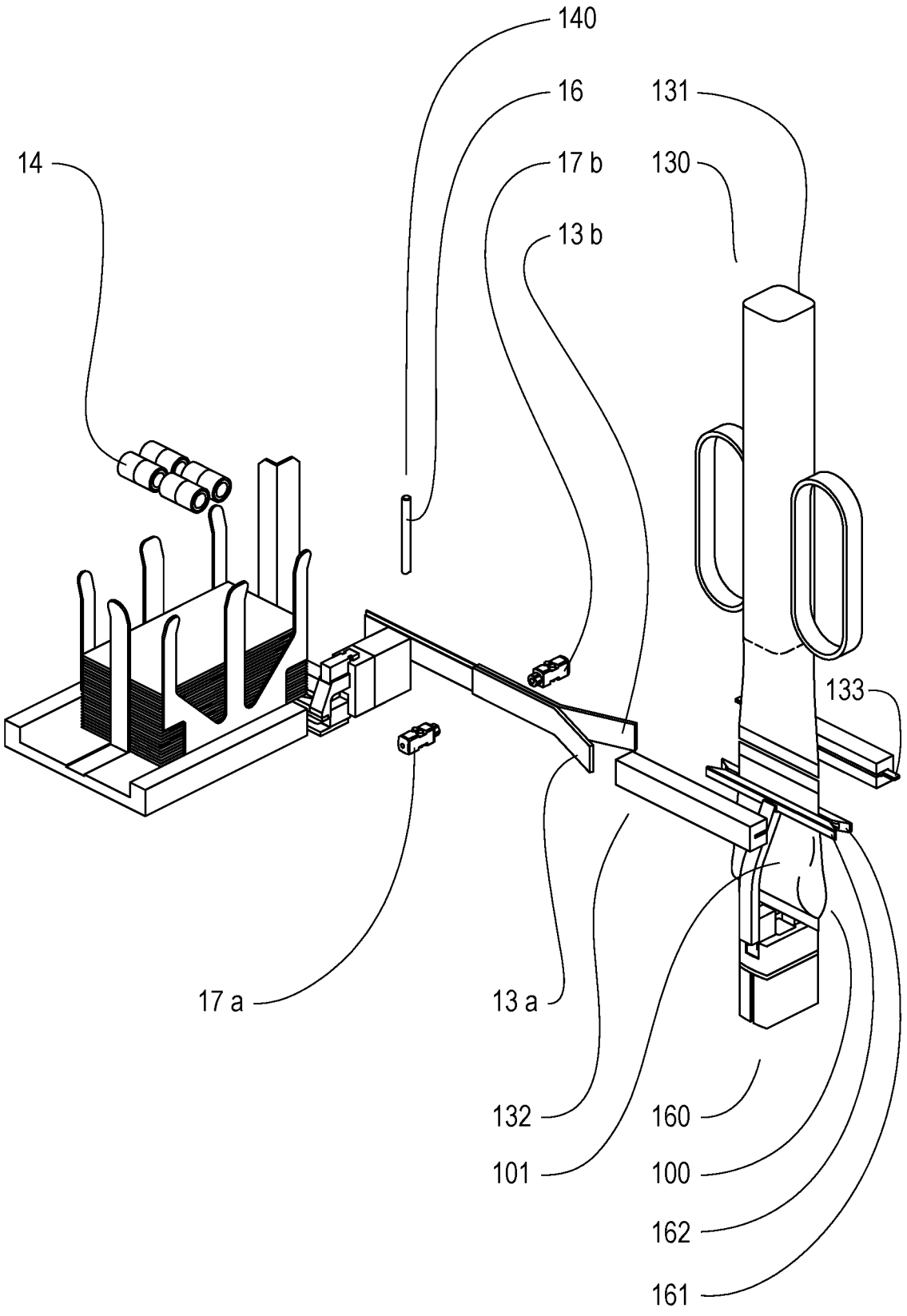

Fig. 6a

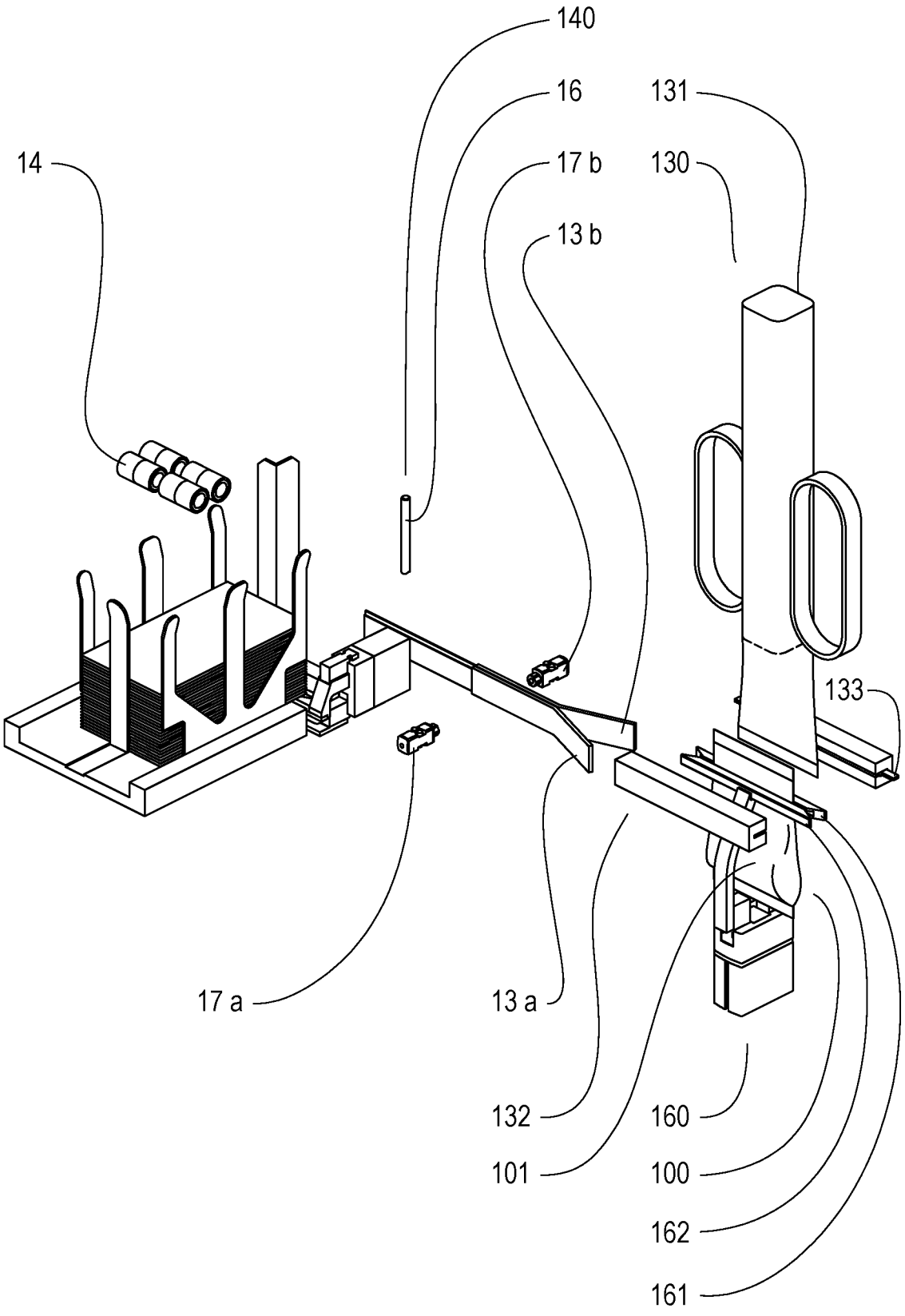

Fig. 6b

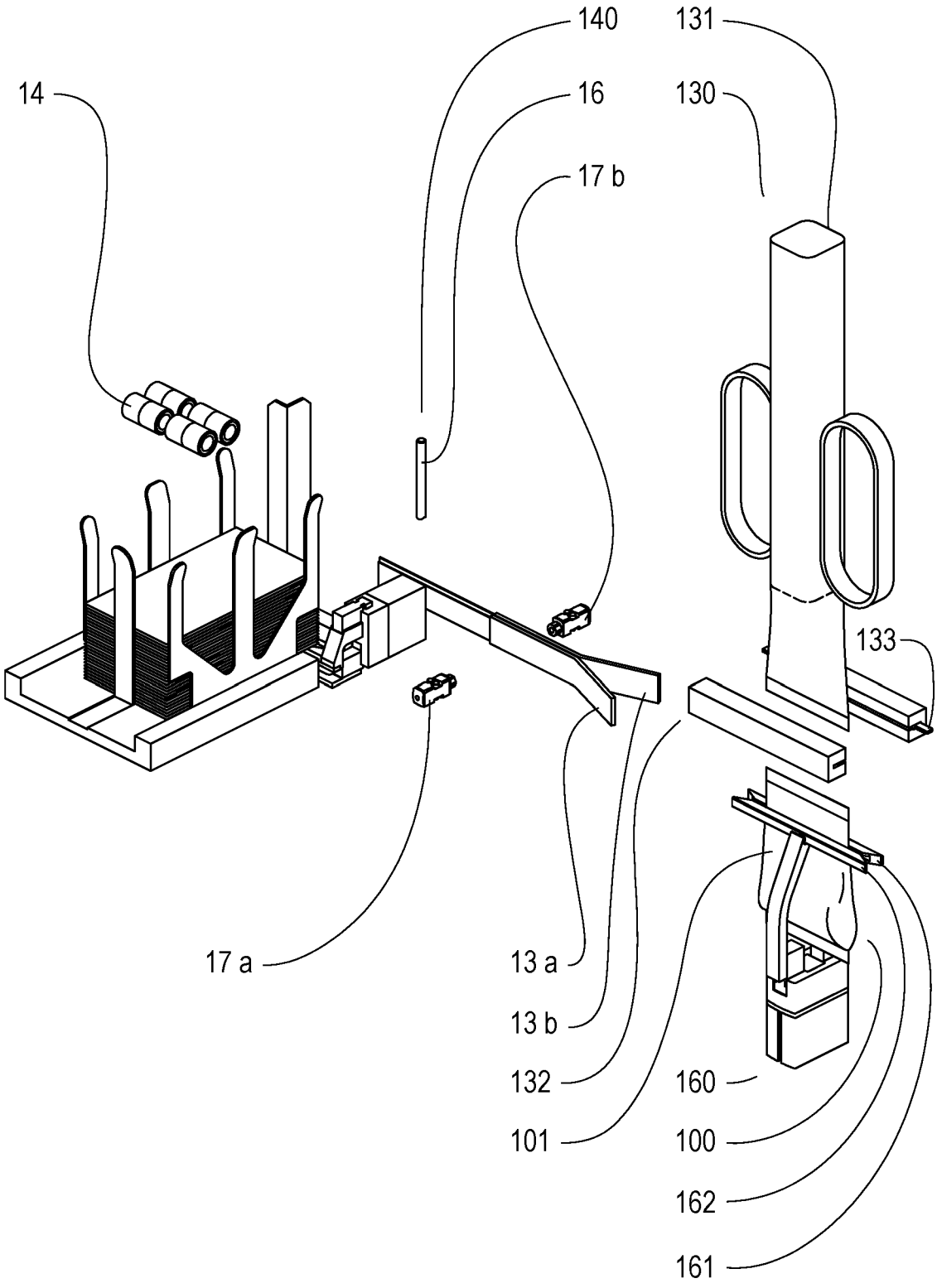

Fig. 7a

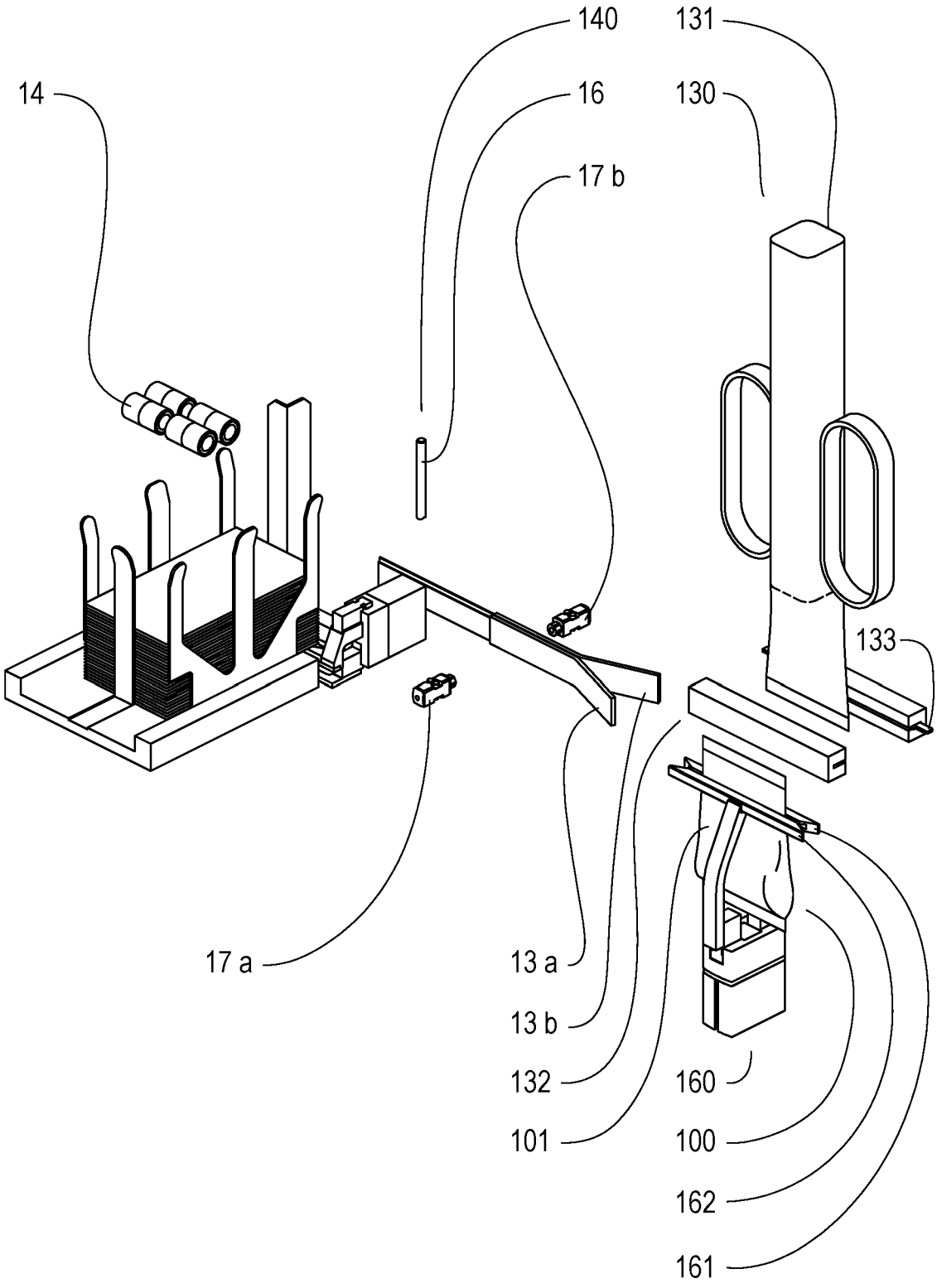

Fig. 7b

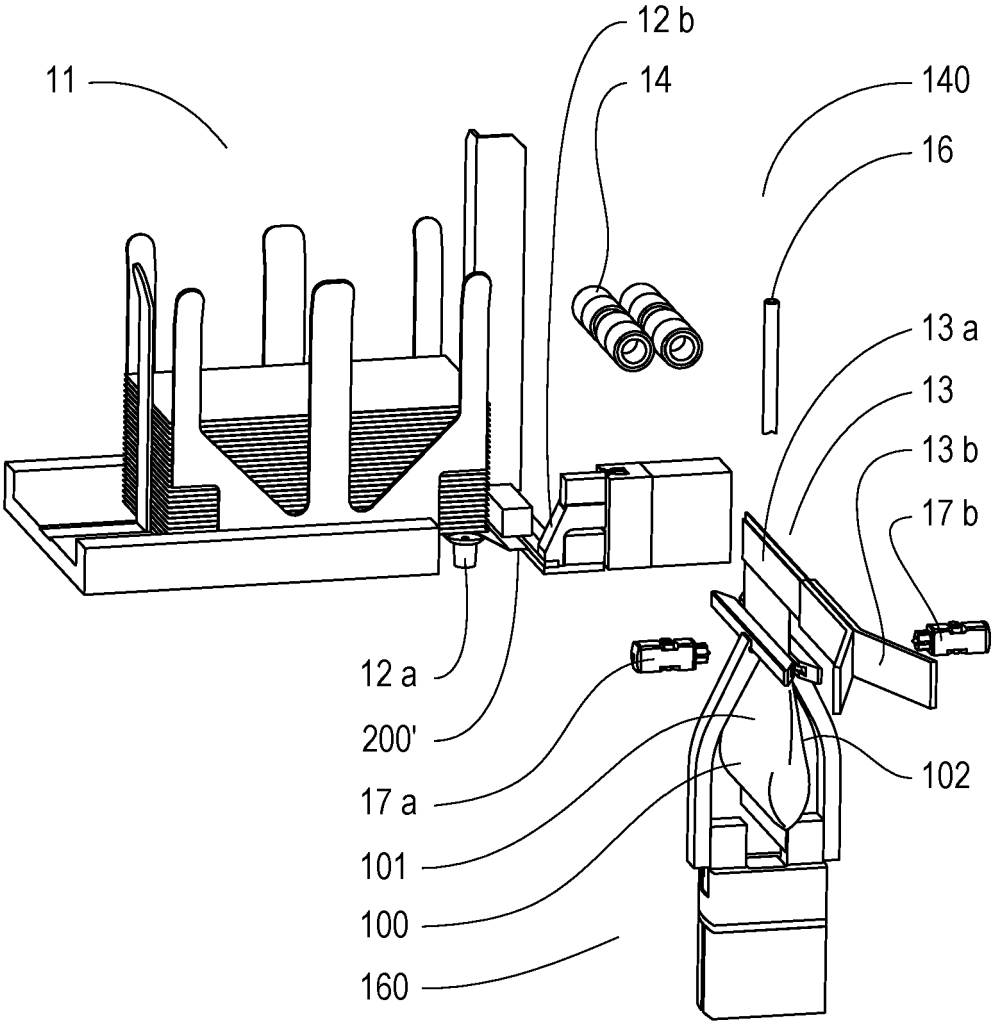

Fig. 8

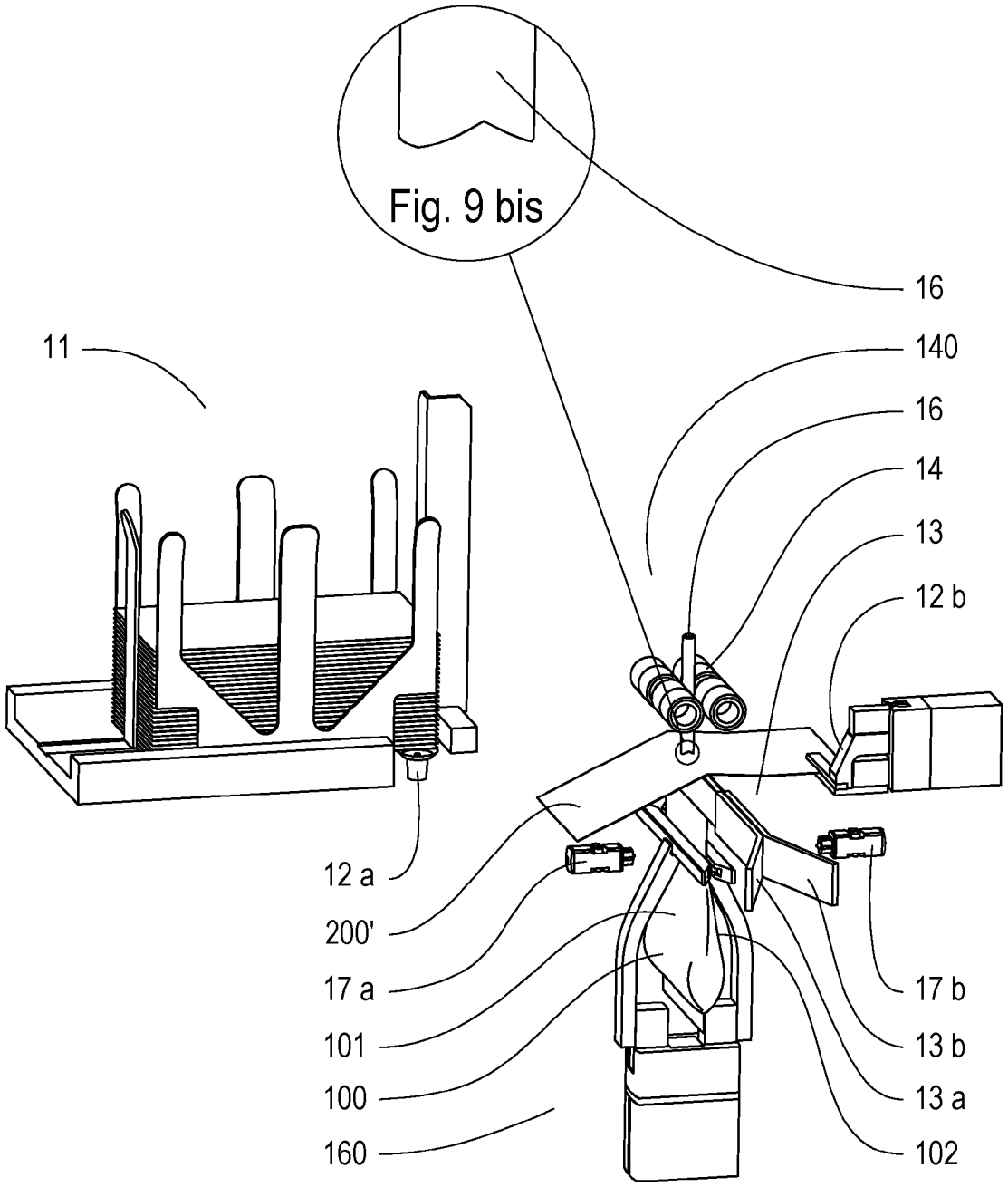
Fig. 9 bis
16
11
140
16
14
13
12 b
12 a
200'
17 a
101
100
160
17 b
13 b
13 a
102

Fig. 9

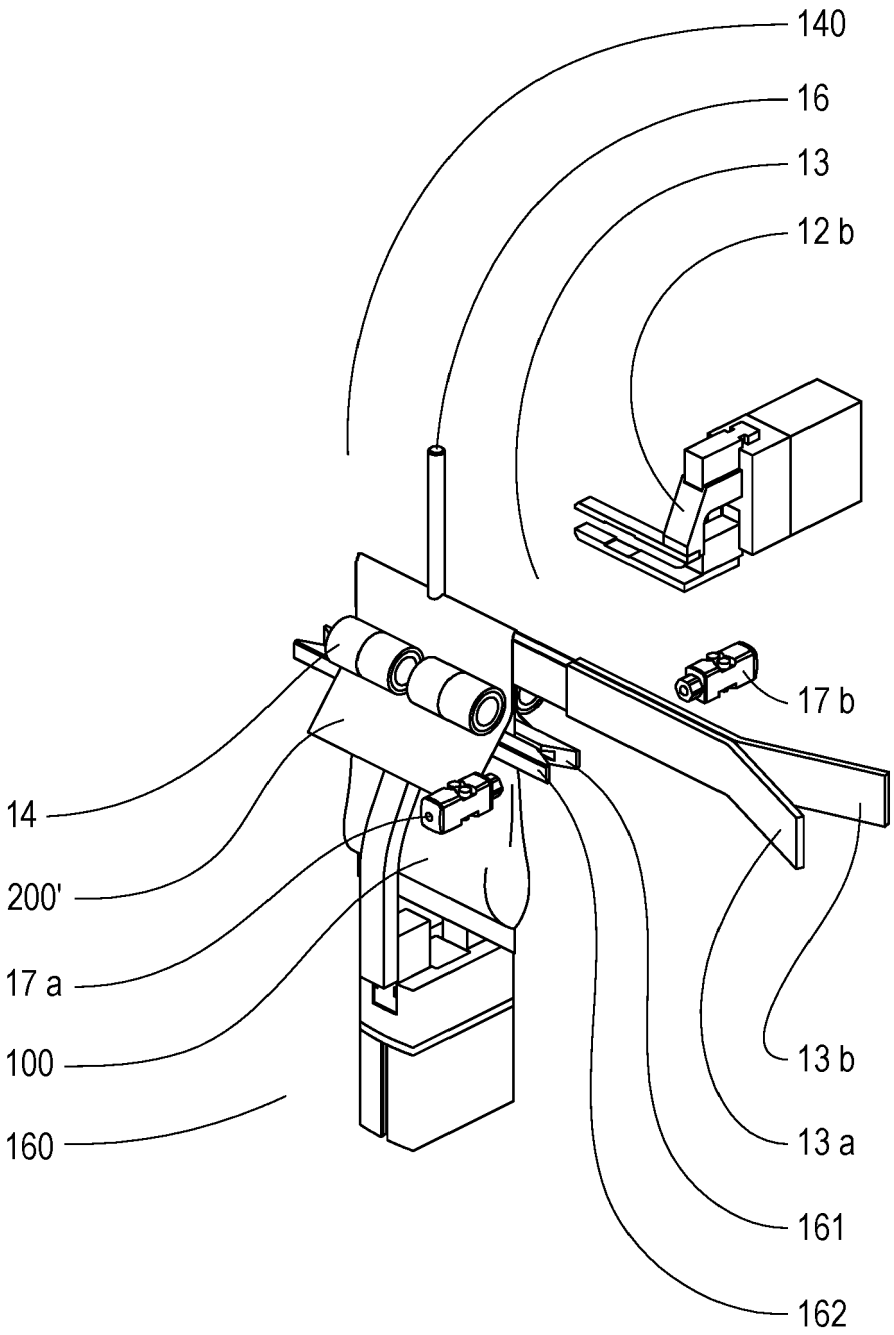

Fig. 10

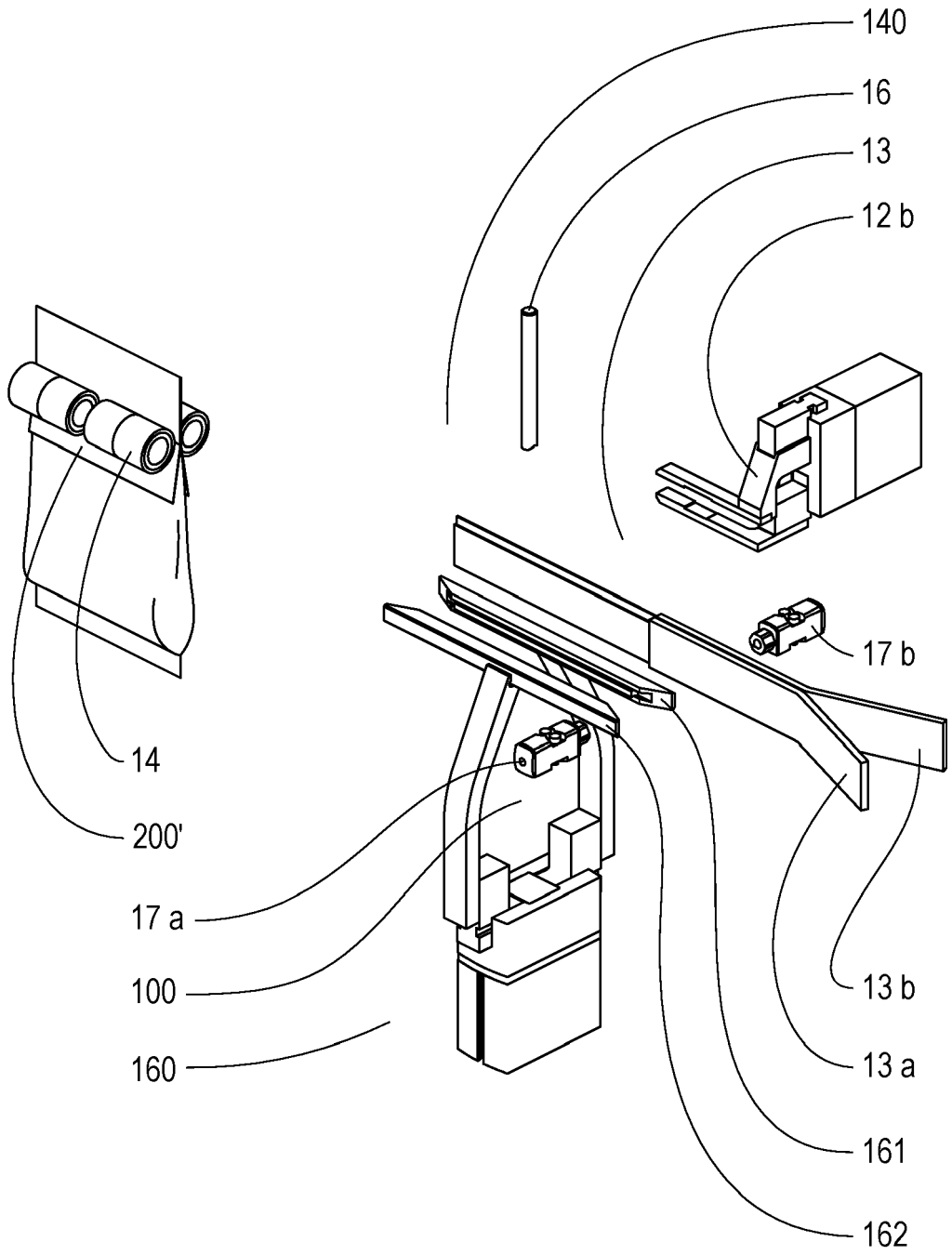

Fig.11

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EUROPEAN SEARCH REPORT

Application Number
EP 20 15 2462

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	31 March 2020	Dick, Birgit

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 20 15 2462

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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31-03-2020

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

REFERENCES CITED IN THE DESCRIPTION

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