



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.03.2020 Bulletin 2020/12

(51) Int Cl.:
B65B 61/16 (2006.01) **B65B 7/06** (2006.01)
B65B 61/20 (2006.01) **B65C 1/04** (2006.01)

(21) Application number: **19196410.5**

(22) Date of filing: **10.09.2019**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(72) Inventors:
• **Rapparini, Gino**
40138 Bologna (IT)
• **Cristiani, Massimiliano**
40138 Bologna (IT)

(74) Representative: **Grünecker Patent- und Rechtsanwälte PartG mbB**
Leopoldstraße 4
80802 München (DE)

(30) Priority: **14.09.2018 IT 201800008621**

(71) Applicant: **ICA S.p.A.**
40138 Bologna (IT)

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

(57) A system is provided for making packages (1000) comprising a bag (100) 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 the first portion (201) extends along the first face (101) and the second portion (202) extends along the second face (102). A method for making such packages is also presented.

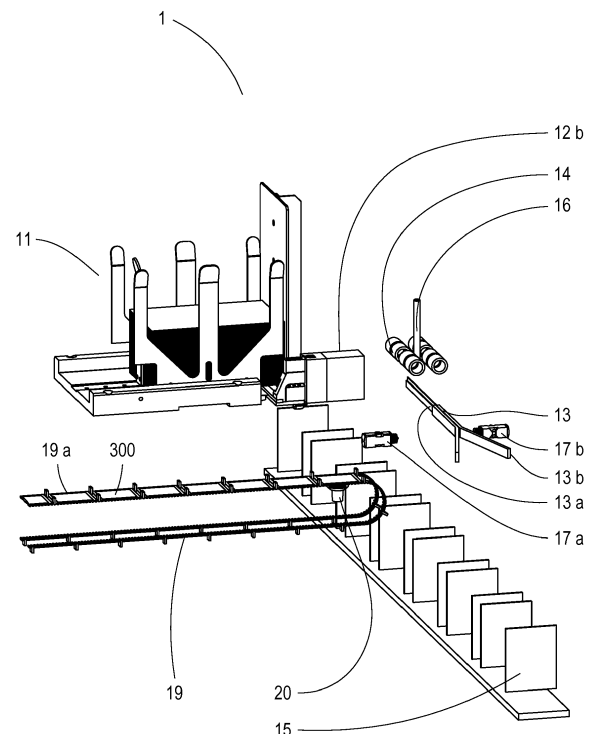


Fig. 9

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 of flexible material are known on the market, for example packages for food products such as flour, mixes for pizza, mixes for desserts, sugar and so on. These packages generally comprise a bag of flexible material with a flat bottom that allows the package to stand upright when resting on the flat bottom, and an upper end opposite to the flat bottom. The upper end can for example correspond to a sealed area so as to close the package. The upper end can also define the opening of the package. The bag of flexible material generally comprises a first face, i.e. a front face, a second face, i.e. a back face, opposite to the first face, and right and left side faces that connect the first face to the second face.

[0003] 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.

[0004] 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 "cardboard strip".

[0005] 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. 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.

[0006] However, applying this element to bags of flexible material is complex.

[0007] An example of a cardboard strip application system on a package can be found in CH 378 776 A. However, this system is complex and does not guarantee a fast and precise application of the cardboard strip to the package.

[0008] The object of the present invention is 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 to bags.

SUMMARY

[0009] 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 comprising:

a storage device 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; housings for housing the bags, wherein the housings are movable so as to be able to bring one of the bags into a position at the supporting and folding element 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.

[0010] 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 housings 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. Alternatively or in addition, the housings for housing the bags can also be adjustable in height so that this distance can be adjusted. The housings for housing the bags can advantageously be placed on a conveyor belt, for example a looped conveyor belt. The system according to the present invention can be coupled to a filling and forming machine which supplies in output bags of flexible material that are filled and closed. This machine can be coupled to the system according to the present invention so that the bags exiting the machine are supplied in the housings of the system according to the present invention. According to a further embodiment of the invention, a system is provided wherein the gripping means comprise a first gripping element, for example a suction cup, for extracting at least a portion of the flat element from the storage and a second gripping element, for example a gripper, to grasp the flat element extracted by the first gripping element and bring it to the predetermined position. The cooperation of two gripping elements is advantageous because it allows the extraction of the foldable flat element from the stack housed in the storage and its positioning in the predetermined position to be achieved effectively and precisely. The use of a suction cup as a first gripping element is advantageous because it allows effectively removing at least a portion of the foldable flat element of the stack so as to expose its edge so that it can be grasped by the second gripping element. The use of one or more grippers as a second gripping element is advantageous because the grippers ensure a secure grip, i.e. minimise the risk of accidental falling of the foldable flat element, and at the same time, they can be moved automatically and quickly with extreme precision so as to position the foldable flat element in the predetermined position.

[0011] According to a further embodiment of the invention, a system is provided wherein the supporting and folding element comprises a flat rod or a flat bar. The rod can have a flat shape and be placed so that the flat faces of the rod are oriented vertically so that the flat element is folded when it is in contact with the thickness of the flat rod. This facilitates folding. According to alternative embodiments of the invention, the supporting and folding element can comprise two parallel flat rods or two parallel flat bars. The two flat rods or flat bars can be arranged at the same height or at different heights. The use of two parallel flat rods or two parallel flat bars is advantageous because it is possible to slide the upper end of the bags between the two flat rods or the two flat bars so as to keep it straight and extended, especially in cases where the material of the bags is a material that deforms in the

upper end of the bags, for example following the sealing carried out to close the bags.

[0012] According to a further embodiment of the invention, a system is provided further comprising locking means for locking the flat element in contact with the supporting and folding element. In this way the probability that the flat element can accidentally fall when it is folded around the supporting and folding element is minimised. The locking means can comprise a vertically movable rod so as to come into contact from above with the flat element located above the supporting and folding element. Advantageously, the lower end of the rod comprises a recess or has a shape that is complementary to the shape of the supporting and folding element so as to be able to effectively lock the foldable flat element between the rod and the supporting and folding element.

[0013] According to a further embodiment of the 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.

[0014] According to a further embodiment of the invention, a system is provided further comprising glue application means configured to apply glue to the bag when the bag is placed in one of the housings 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. Moreover, the glue applied to the flat element extracted from the storage can be used to apply a container, for example an envelope, which can be interposed between the folded element and 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.

[0015] According to a further embodiment of the invention, a system is further provided comprising means for applying a container, for example an envelope, to the flat element extracted from the storage. This embodiment advantageously allows obtaining packages comprising not only the bag of flexible material and the folded element, but also a container, for example an envelope, fixed and interposed between the bag of flexible material and the folded element.

[0016] According to a further embodiment of the invention, a system is provided wherein the means for applying a container to the flat element comprise transport means, for example a conveyor belt with housing for containers, wherein the transport means are placed below the storage. In this way it is possible to effectively supply the containers to be applied to the foldable flat element in the desired position. According to one embodiment of the invention, the conveyor belt can comprise two parallel side-by-side belts which define the housings for the containers but which nevertheless maintain a free space between the two belts. The free space between the two belts can be advantageously used to pass thrusting means that thrust the container housed between the two belts towards the foldable flat element to which it is to be applied. The transport means can also comprise a catenary or the like.

[0017] According to a further embodiment of the invention, a system is provided further comprising a supporting and thrusting element configured to transport a container towards the flat element extracted from the storage and thrust it against the flat element. This allows the container to be effectively fixed to the foldable flat element. Before contacting the container, the flat element can be glued to the surface of the flat element and/or to the surface of the container.

[0018] According to a further embodiment of the invention, a system is provided further comprising a counter-thrusting element configured to counteract the pressure exerted by the supporting and thrusting element. In this way it is possible to effectively prevent the foldable flat element from being damaged and/or dropped when the container is applied thereto by means of the supporting and thrusting element. The supporting and thrusting element can act directly on the container, thrusting it against the lower surface of the foldable flat element. The counter-thrusting element can therefore act on the upper surface of the foldable flat element.

[0019] According to a further embodiment of the 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, the method comprising the following steps:

providing a foldable flat element at and above a supporting and folding element;

providing a bag of flexible material at and below the supporting and folding element;

folding the foldable flat element around the supporting and folding element along a folding line so as to divide the foldable flat element into a first portion and a second portion and so that the first portion adheres to the first face of the bag and the second portion adheres to the second face of the bag.

[0020] According to a further embodiment of the invention, a method is further provided comprising the following step:

removing the supporting and folding element from the folded element.

[0021] The supporting and folding element can be removed by moving the package obtained.

[0022] According to a further embodiment of the invention, a method is further provided comprising the following step:

applying glue to the first and/or second face of the bag in order to fix the folded element to the bag.

[0023] According to a further embodiment of the invention, a method is further provided comprising the following step:

applying glue to the foldable flat element before folding the foldable flat element around the supporting and folding element to be able to fix the folded element to the bag.

[0024] The glue applied to the foldable flat element can be used not only to fix the folded element to the bag, but also to fix one or more containers, for example envelopes, so as to interpose them between the folded element and the bag.

[0025] According to a further embodiment of the invention, a method is further provided comprising the following step:

fixing a container, for example an envelope, to the foldable flat element before folding the foldable flat element around the supporting and folding element.

[0026] In this way packages are obtained comprising not only the bag of flexible material and the folded element, but also a container, for example an envelope, interposed between the bag and the folded element.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] 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.

Figure 1 schematically shows a package which can be made with a system and/or a method based on the present invention;

Figure 2 schematically shows a further package which can be made with a system and/or a method based on the present invention;

Figure 3 schematically shows a system according to an embodiment of the present invention;

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

Figure 5 schematically shows a further detail of the system in a further step of the manufacturing method of a package;

Figure 6 schematically shows a further step of the manufacturing method of a package;

Figure 7 schematically shows a further step of the manufacturing method of a package;

Figure 7bis schematically shows an enlargement of a detail of figure 7;

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

Figure 9 schematically shows a system according to a further embodiment of the present invention;

Figure 10 schematically shows a package which can be made with a system and/or a method based on the present invention;

Figure 11 schematically shows a further package which can be made with a system and/or a method based on the present invention;

Figure 12 schematically shows a system according to an embodiment of the present invention in a step of the manufacturing method of a package;

Figure 13 schematically shows a further step of the manufacturing method of a package;

Figure 14 schematically shows a further step of the manufacturing method of a package;

Figure 15 schematically shows a further step of the manufacturing method of a package;

Figure 16 schematically shows a further step of the manufacturing method of a package.

DETAILED DESCRIPTION

[0028] The present invention is described hereinbelow by making reference to particular embodiments, as illus-

trated 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.

[0029] Figure 1 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.

[0030] 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 also comprises a flat bottom 104 that allows the bag to stand upright 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 sealed area that closes the bag 100. 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.

[0031] 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.

[0032] Figure 2 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 1, the package 1000 of figure 2 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. 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 1, 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 2, 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] Figure 3 schematically shows a system 1 according to one embodiment of the present invention. The system 1 can be used to make a package 1000 like the one shown in figure 1 or in figure 2.

[0035] The system 1 comprises a storage device 11 adapted 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. The storage device 11 can be adapted to house flat elements of different sizes. For example, the storage device 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.

[0036] The system 1 further comprises gripping means for extracting one of the foldable flat elements housed in the storage device 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 device 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 device 11. In this way, as will be better seen with reference to figure 5, 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. 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 device 11. The movement in the vertical direction can allow adjusting the height of the foldable element within the system 1. 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 system 1. According to alternative embodiments of the present invention, the gripping element 12b is movable only in the horizontal direction and the possible vertical movement of the foldable element, in particular downwards, can be achieved by means of the locking means 16, described in detail with reference to figure 7.

[0037] The system 1 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.

[0038] The system 1 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.

[0039] The system 1 further comprises the housings 15 for housing the bags to which the folded element 200 is to be applied. The housings 15 are movable. For example, the housings 15 can be placed on a conveyor belt, for example a looped conveyor belt, 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.

[0040] The filled and resealed bags 100 can be supplied by a forming and filling machine known from the state of the art. The bags exiting this machine can be supplied in the housings 15 of the system 1 according to the present invention. For example, the forming and filling machine can be coupled to the system 1 according to the present invention so that the filled and sealed bags exiting the forming and filling machine are fed into the housings 15 of the system 1 according to the present invention.

[0041] Figure 3 also shows that the system 1 can comprise glue application means, for example one or more glue applicators 17a, 17b and 17c, such as glue guns or the like.

[0042] Figure 4 schematically shows a detail of the system 1 in a step of the manufacturing method of a package. In particular, figure 4 shows in detail the storage device

11 which has been filled with a stack of foldable flat elements 200'. As shown in the figure, the foldable flat elements 200' stacked in the storage device 11 comprise a folding line 203. This line can thus be made on the foldable flat elements 200' before stacking them in the storage device 11. The folding line could for example be a dotted line or a compressed and therefore easily foldable area of the foldable flat elements 200'. The presence of this folding line 203 makes it possible to facilitate subsequent operations. However, the presence of this line is not necessary and the foldable flat elements 200' may not even be provided. The side walls of the storage device 11 can be movable so as to be able to house stacks of foldable flat elements 200' of various sizes and shapes.

[0043] Figure 5 schematically shows a further detail of the system in a further step of the manufacturing method of a package. In particular, the figure shows that the suction cup 12a has contacted the lower side of the lower foldable flat element 200' of the stack and, lowering itself, has detached at least a portion of this foldable flat element 200' from the stack so as to expose its edge so that it can be grasped by the second gripping element 12b.

[0044] Figure 6 schematically shows a further step of the manufacturing method of a package. The second gripping element 12b has gripped the exposed edge of the foldable flat element 200' so as to be able to extract the foldable flat element 200' completely from the stack housed in the storage device 11. The figure also shows that some filled and sealed bags 100 are housed and transported in the housings 15. In particular, the first bag 100 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. 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 bags 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 bags 100, the upper end 103 of the bags carried by the housings 15 is always on the same side of the bar 13a. Furthermore, figure 6 shows that two opposite glue applicators 17a and 17b are configured so as to apply glue to both faces 101 and 102 of the bags 100 transported in the housings 15. Alternatively, or in addition, the system can comprise a glue applicator 17c configured to apply glue to the lower surface of the foldable flat element 200' extracted from the storage device 11.

[0045] Figure 7 schematically shows a further step of the manufacturing method of a package. The second gripping element 12b has dragged 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 system 1 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 7bis, 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.

[0046] Figure 8 schematically shows a further step of the manufacturing method of a package. 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. 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. 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 the applicator 17c configured to apply glue to the lower surface of the foldable flat element 200' when it is extracted from the storage device 11.

[0047] The further movement of the housings 15 allows removing the package 1000 from the supporting and folding element 13.

[0048] 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). Alternatively, or in addition, the housings 15 can also be adjustable in height so as to select the distance D based on the vertical position of the bags 100 housed in the housings 15.

[0049] Through holes such as the hole 204 shown in figure 2 can be made directly on the packages, therefore made as obtained in figure 8. 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 device 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.

[0050] 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.

[0051] Figure 9 schematically shows a system according to a further embodiment of the present invention. In particular, the embodiment of figure 9 can be used to obtain packages 1000 such as those shown in figures 10 or 11.

[0052] The system 1 shown in figure 9, unlike that shown in figures 3 to 8, further comprises the means for applying a further container 300 interposed between the bag 100 and the folded element 200 to the package 1000.

[0053] Figure 10 schematically shows a package 1000 of this type. In particular, the package 1000 comprises a bag 100, a folded element 200 and a container 300, for example an envelope, interposed between the bag 100 and the folded element 200. The container 300 is interposed between the first portion 201 of the folded element and the first face 101 of the bag 100. The container 300 is shown with a dashed line in the figure since it is located below the first portion 201. However, the container 300 is outside the bag 100. It is possible to store products inside this container 300 that accompany the main product contained in the bag 100 of flexible material. For example, if flour is contained in the bag 100 of flexible material, it may be advantageous to provide yeast in the additional container 300. If a mix for desserts is contained in the bag 100 of flexible material, it may be advantageous to provide decorative items for desserts in the additional container 300. The additional container 300 can also be used for gadgets or in any case for any type of product wished to accompany the product contained in the bag 100 of flexible material but which, for whatever reason, is not initially placed in contact or mixed with the product contained in the bag 100 of flexible material.

[0054] Figure 11 schematically shows a further package 1000 which also comprises a container 300, for example an envelope, between the bag 100 and the folded element 200. Unlike the package 1000 of figure 10, the package 1000 of figure 11 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. 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 10, 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.

[0055] Alternatively and/or in addition to the euro hole similar to that shown with the reference number 204 in

figure 11, 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.

[0056] Figure 9 shows that the system 1 comprises a conveyor belt 19 with housings 19a to house the containers 300 to be applied to the packages. In particular, the containers 300 are applied to the foldable flat elements 200' before they are folded and applied to the bags 100. The conveyor belt 19 is therefore below the storage device 11. The conveyor belt 19 shown in the figure comprises two parallel side-by-side belts which define the housings 19a for the containers but which nevertheless maintain a free space between the two belts. The free space between the two belts is used to pass the thrusting means 20 that thrust the container 300 housed between the two belts towards the foldable flat element 200' to which it is to be applied. According to alternative embodiments of the invention, the thrusting means 20 could be replaced by other pick and place type instruments, for example one or more suction cups which grasp the container from above and bring it below the foldable flat element 200' with a 180° rotation. The conveyor belt 19 could also be replaced by other transport means, for example a catenary or the like.

[0057] Figure 12 schematically shows a further step of the manufacturing method of the package. The foldable flat element 200' is transported from the second gripping element 12b to a position outside the storage device 11, in particular between the storage device 11 and the supporting and folding element 13. The conveyor belt 19 is located below this position. In particular, one of the containers 300 housed on the conveyor belt 19 is located below this position.

[0058] As shown in figure 13, glue 503 is applied to the lower face of the foldable flat element 200'. The glue 503 can be applied by means of the applicator 17c, for example a glue gun or the like. As described above, the applicator 17c can be configured to apply not only the glue 503 to fix the container 300 to the foldable flat element 200', but also to apply additional glue to the foldable flat element 200' so as to be able to fix the folded element 200 obtained by folding the foldable element 200' along the folding line 203 to the bag 100. The glue can be applied while the foldable flat element 200' is removed from the storage device 11. Alternatively, the glue can be applied while keeping the foldable flat element 200' stationary between the storage device 11 and the position at the supporting and folding element 13.

[0059] Figure 14 shows that a supporting and thrusting

element 20, for example a suction cup or a pusher movable in a vertical direction, is used to bring the container 300 from the housing onto the conveyor belt 19 until it comes into contact with the foldable flat element 200'. Advantageously, a counter-thrusting element 21 keeps the foldable flat element 200' fixed against the thrust of the element 20 so as to be able to effectively fix the container 300 to the foldable flat element 200' without undesirably displacing the foldable flat element 200' and/or without damaging the foldable flat element 200'. According to alternative embodiments of the invention, the supporting and thrusting element can comprise various known devices from pick and place technology. For example, the supporting and thrusting element could comprise a suction cup that takes the container from above and performs a 180° rotation to then apply the container to the foldable flat element.

[0060] The subsequent steps shown in figures 15 and 16 are similar to the steps described with reference to figures 7 and 8. In particular, the foldable flat element 200' with the container 300 attached is transported to the supporting and folding element 13 where it is folded and applied to the bag 100 as described with reference to figures 7 and 8.

[0061] 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.

[0062] For example, even if configurations have been shown with only one container 300 interposed between the folded element and the bag, it is possible to realise configurations with more than one container interposed between the folded element and the bag. For example, it is possible to realise configurations with a first container between the first portion of the folded element and the first face of the bag and a second container between the second portion of the folded element and the second face of the bag. It is also possible to realise configurations wherein more than one container, for example two, three or four, are arranged between the first portion of the folded element and the first face of the bag, or between the second portion of the folded element and the second face of the bag, or on both sides.

[0063] 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.

[0064] Finally, those fields known by experts in the field were not described to avoid excessively and uselessly overshadowing the invention described.

[0065] 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.

[0066] Accordingly, the invention is not limited to the embodiments described above, but is only limited by the scope of protection of the appended claims.

REFERENCE SIGNS

[0067]

- 1: system
- 11: storage
- 12a: suction cup
- 12b: grippers
- 13: supporting and folding element
- 13a: flat bar
- 13b: side end upstream
- 14: folding means
- 15: housings for bags 100
- 16: locking means
- 17a, 17b, 17c: glue applicators
- 19: container 300 conveyor belt
- 19a: container 300 housings
- 20: supporting and thrusting element
- 21: counter-thrusting element
- 100: bag
- 101: first face of the bag
- 102: second face of the bag
- 103: upper end of the bag
- 104: flat bottom of the bag
- 105: left side face of the bag
- 106: right side face of the bag
- 200: folded element or "cardboard strip"
- 201: first portion of the folded element
- 202: second portion of the folded element
- 203: folding line
- 204: through hole
- 200': foldable flat element
- 300: container
- 503: portion of glue
- 1000: package

Claims

1. A system (1) for realising packages (1000) comprising a bag (100) 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 system (1) comprising:

- a storage device (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 device (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);
housings (15) for housing said bags (100), wherein said housings (15) are movable so as to be able to bring one of said bags (100) into a position in correspondence with said supporting and folding element (13) 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).
- 2. The system according to claim 1, wherein said gripping means (12) comprise a first gripping element (12a), for example a suction cup, for extracting at least a portion of said flat element (200') from said storage device (11) and/or a second gripping element (12b), for example a gripper, for grasping the flat element (200') extracted from the first gripping element (12a) and bringing it into said predetermined position.
- 3. The system according to any one of the preceding claims, wherein said supporting and folding element (13) comprises a rod or a flat bar (13a).
- 4. The system according to any one of the preceding claims, further comprising locking means (16) for locking said flat element (200') in contact with said supporting and folding element (13).
- 5. The system according to any one of the preceding claims, 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).

- 6. The system according to any one of the preceding claims, further comprising glue application means (17a, 17b, 17c) configured to apply glue to said bag (100) when said bag (100) is placed in one of said housings (15) and/or to said flat element (200') extracted from said storage device (11).
- 7. The system according to any one of the preceding claims, further comprising means for applying a container (300), for example an envelope, to said flat element (200') extracted from said storage device (11).
- 8. The system according to claim 7, wherein said means for applying a container (300) to said flat element (200') comprise transport means for containers (300), for example a conveyor belt (19) with housings (19a), wherein said transport means are located below said storage device (11).
- 9. The system according to one of the claims 7 or 8, further comprising a supporting and thrusting element (20) configured to transport a container (300) towards said flat element (200') extracted from said storage device (11) and thrust it against said flat element (200').
- 10. The system according to claim 9, further comprising a counter-thrusting element (21) configured to counteract the pressure exerted by said supporting and thrusting element (20).
- 11. A method for making packages (1000) comprising a bag (100) 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:
 - providing a foldable flat element (200') in correspondence with and above a supporting and folding element (13);
 - providing a bag (100) of flexible material in correspondence with and below said supporting and folding element (13);
 - folding said foldable flat element (200') around said supporting and folding element (13) along a folding line (203) so as to divide said foldable flat element (200') into a first portion (201) and a second portion (202) and so that said first portion (201) adheres to the first face (101) of said bag (100) and said second portion (202) adheres to the second face (102) of said bag (100).

12. The method according to claim 11, further comprising the following step:
removing the supporting and folding element (13) from said folded element (200).
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13. The method according to any one of claims 11 or 12, further comprising the following step:
applying glue to the first (101) and/or to the second (102) face of said bag (100) in order to fix said folded element (200) to said bag (100).
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14. The method according to any one of claims 11 to 13, further comprising the following step:
applying glue to said foldable flat element (200') before folding said foldable flat element (200') around said supporting and folding element (13) to be able to fix said folded element (200) to said bag (100).
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15. The method according to any one of claims 11 to 14, further comprising the following step:
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fixing a container (300), for example an envelope, to said foldable flat element (200') before folding said foldable flat element (200') around said supporting and folding element (13).
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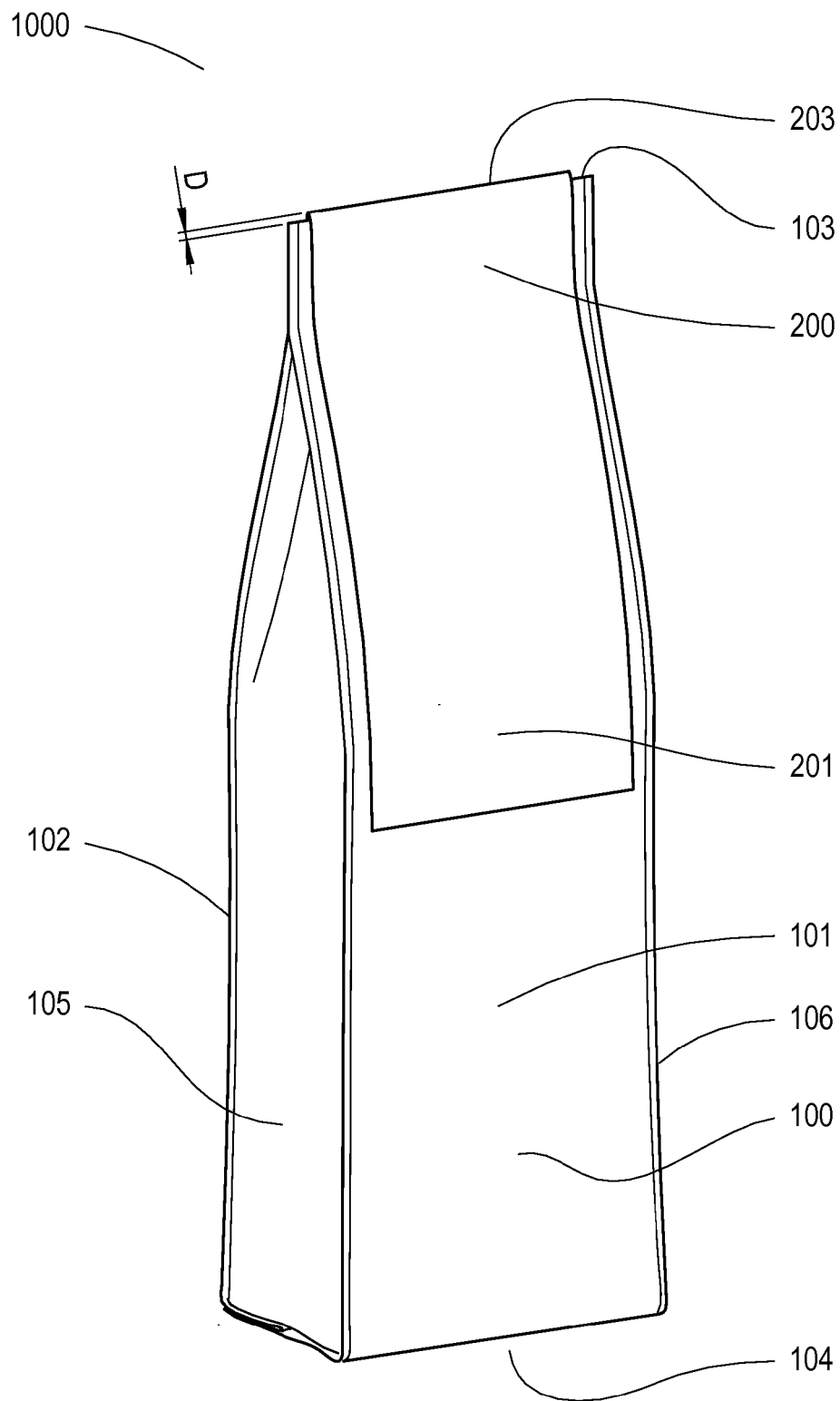


Fig. 1

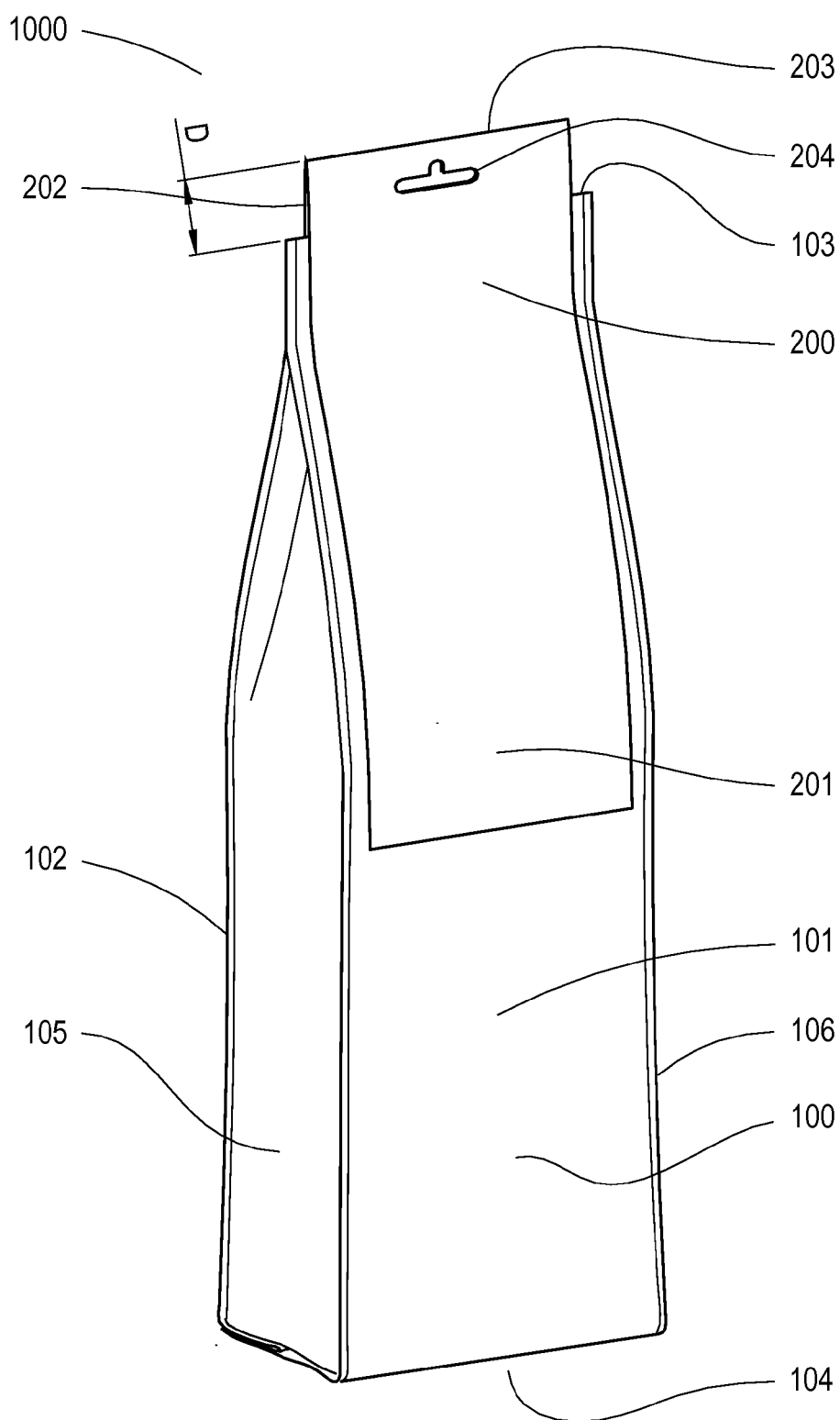


Fig. 2

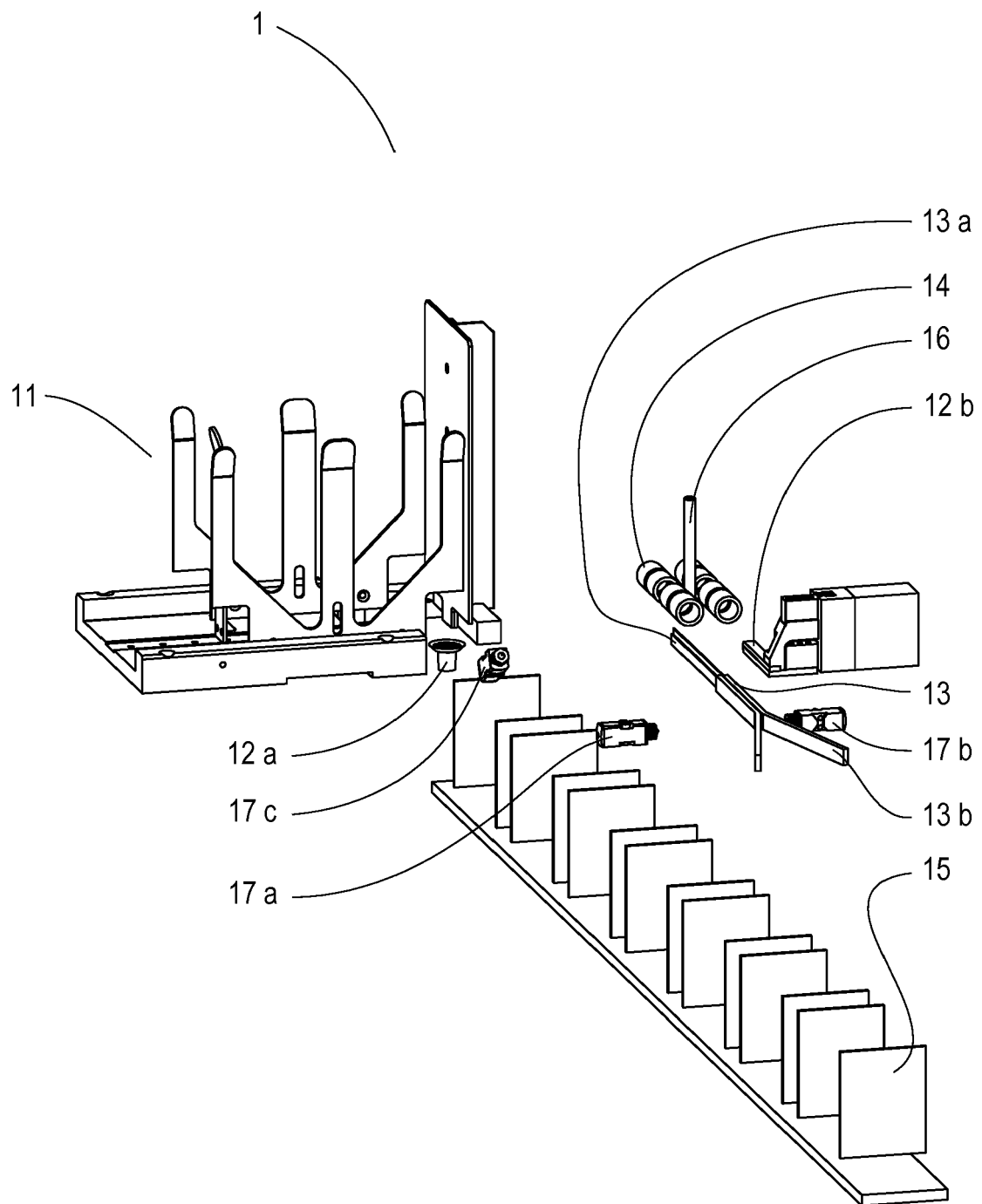


Fig. 3

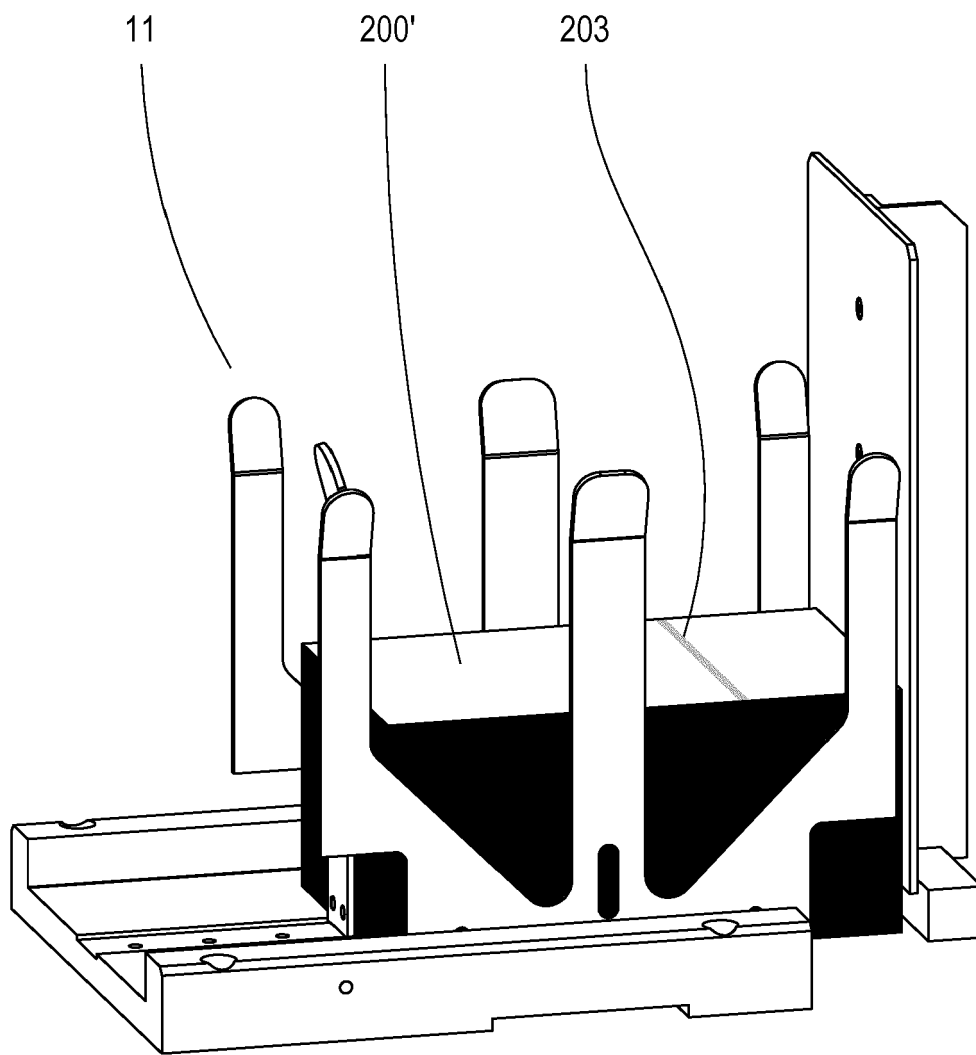


Fig. 4

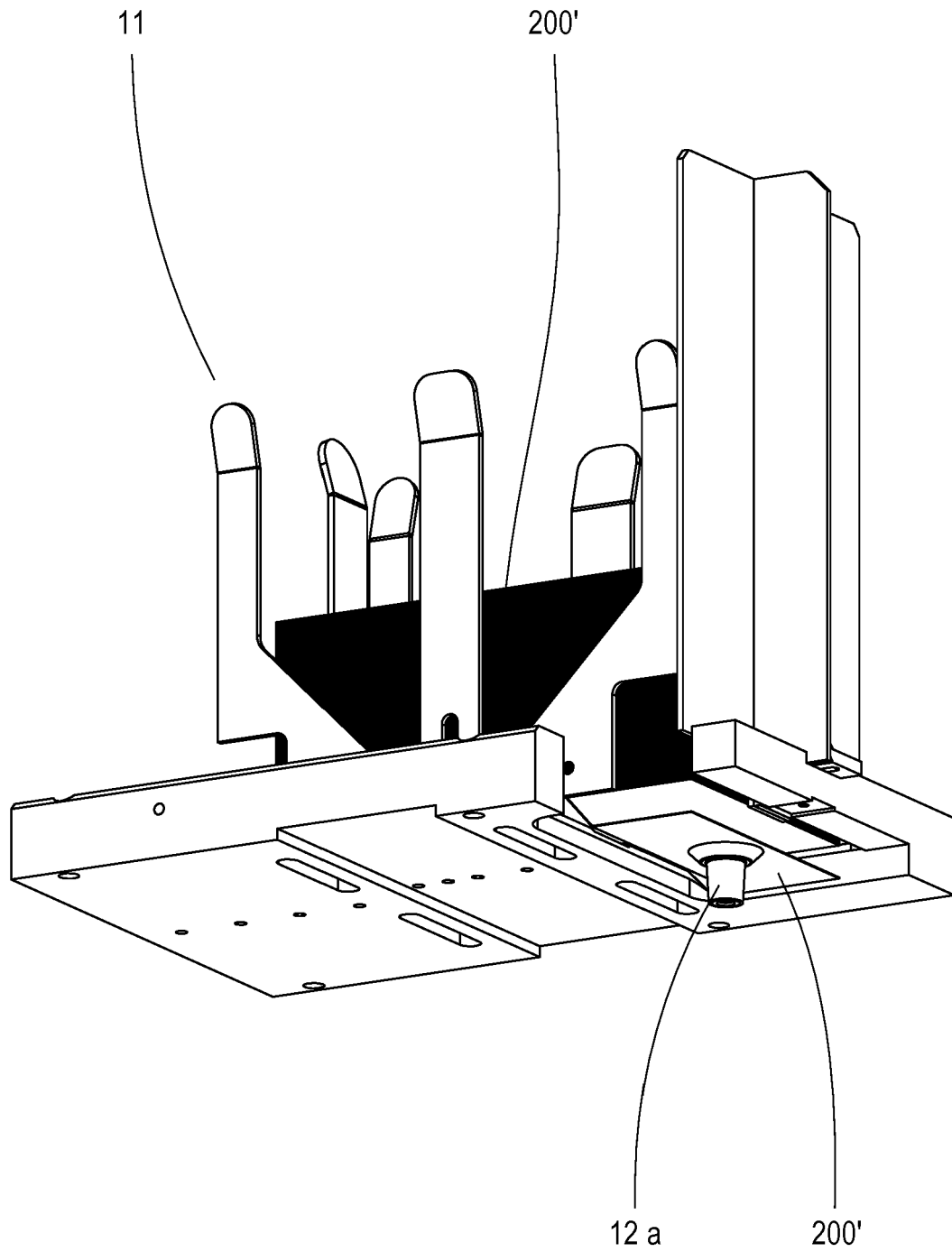


Fig. 5

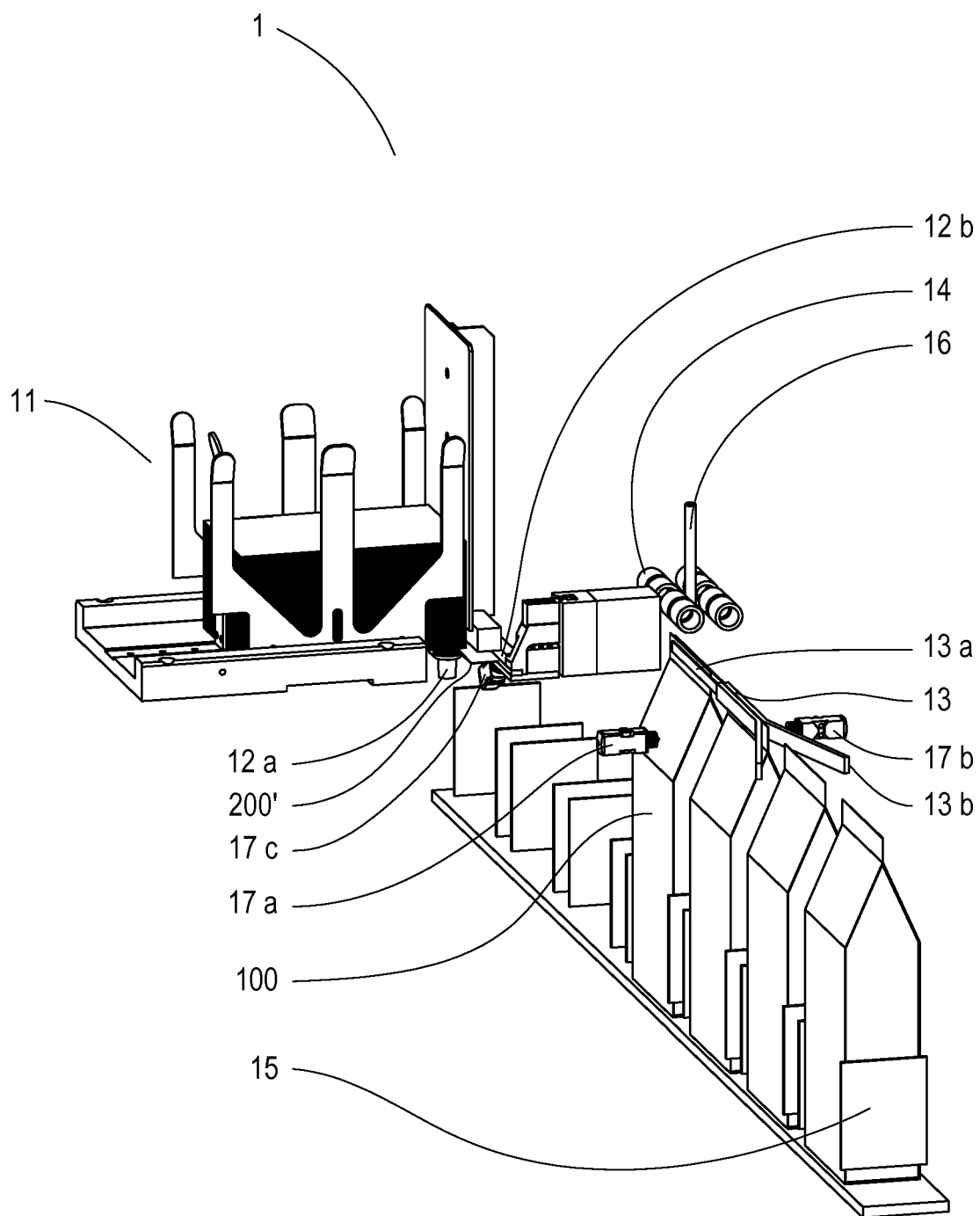


Fig. 6

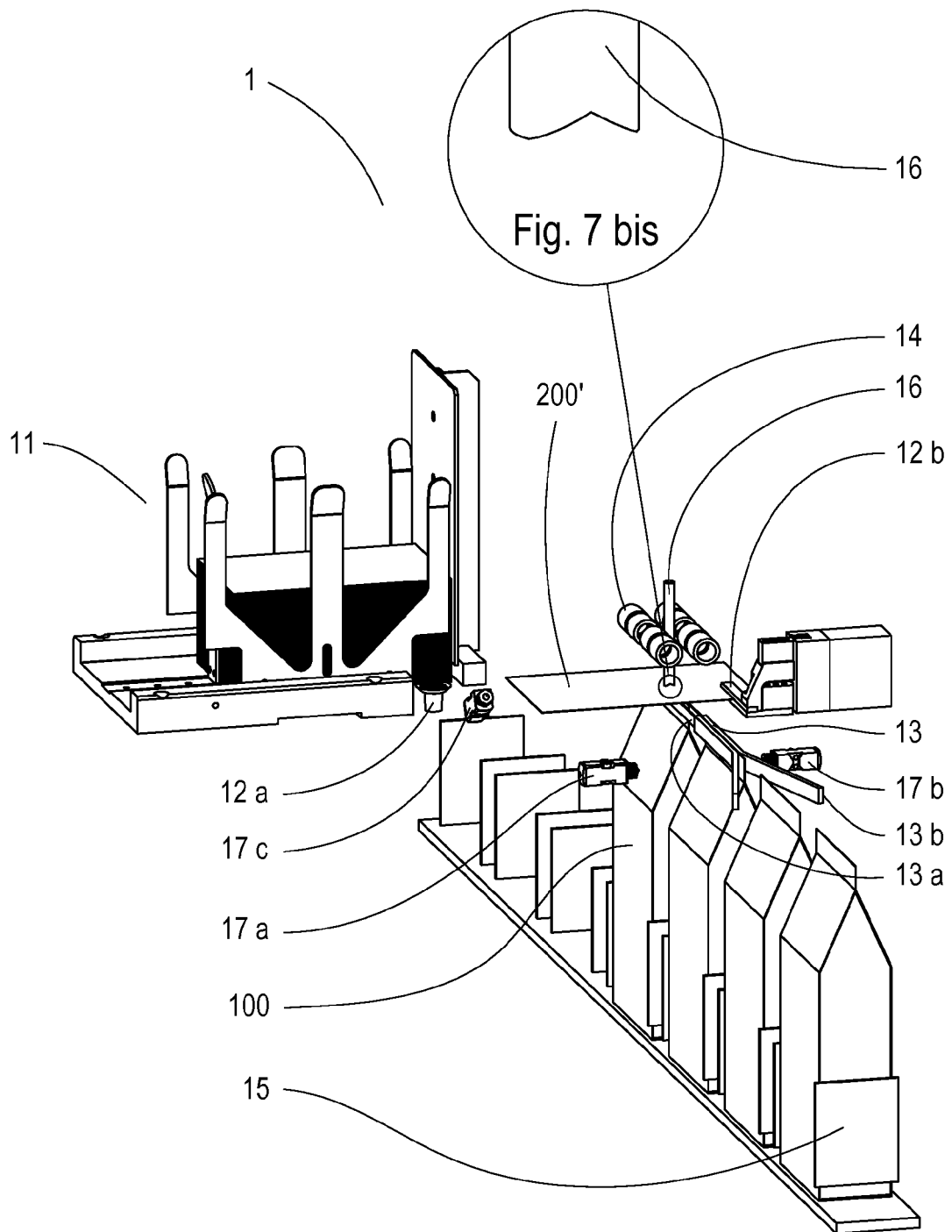


Fig. 7

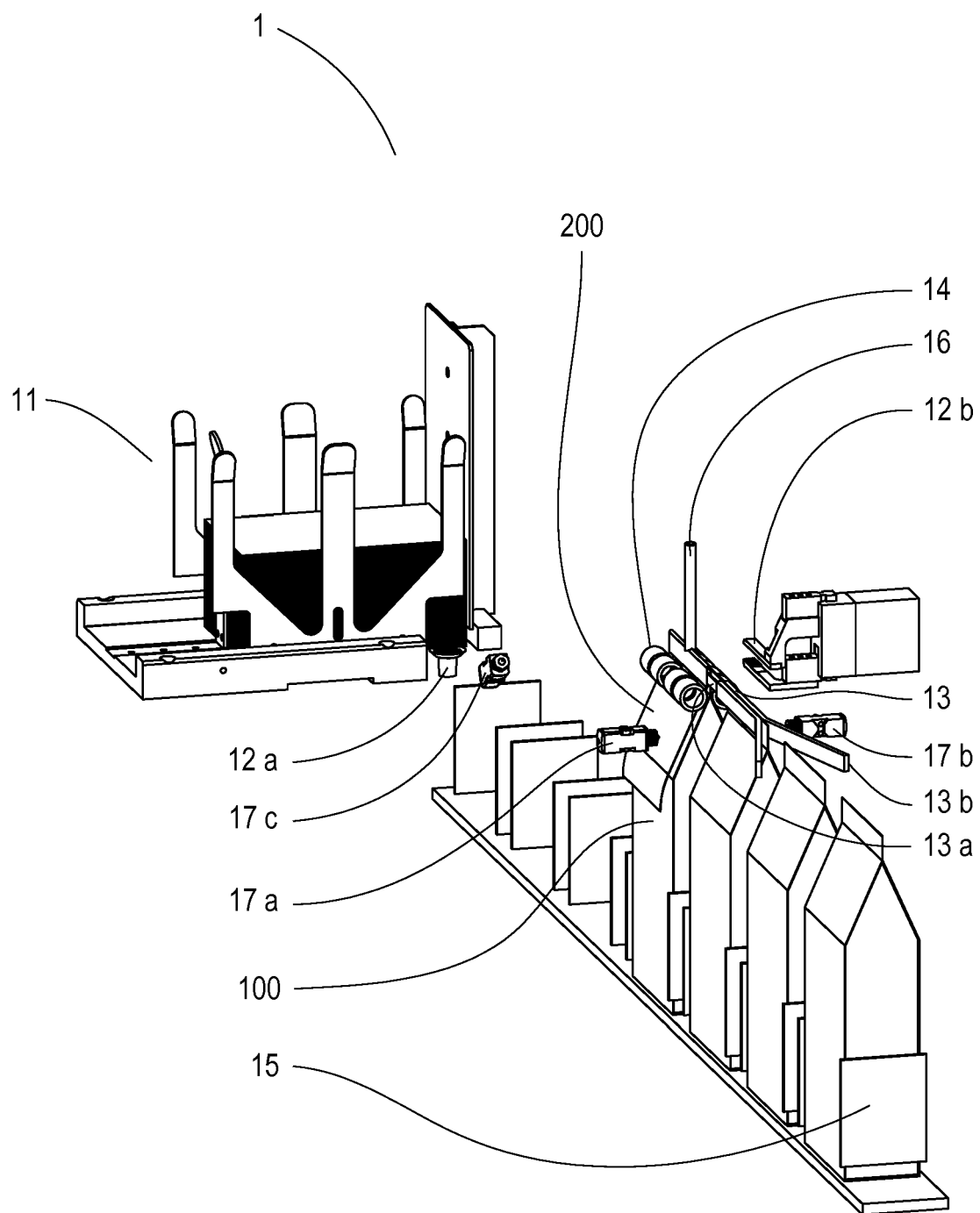


Fig. 8

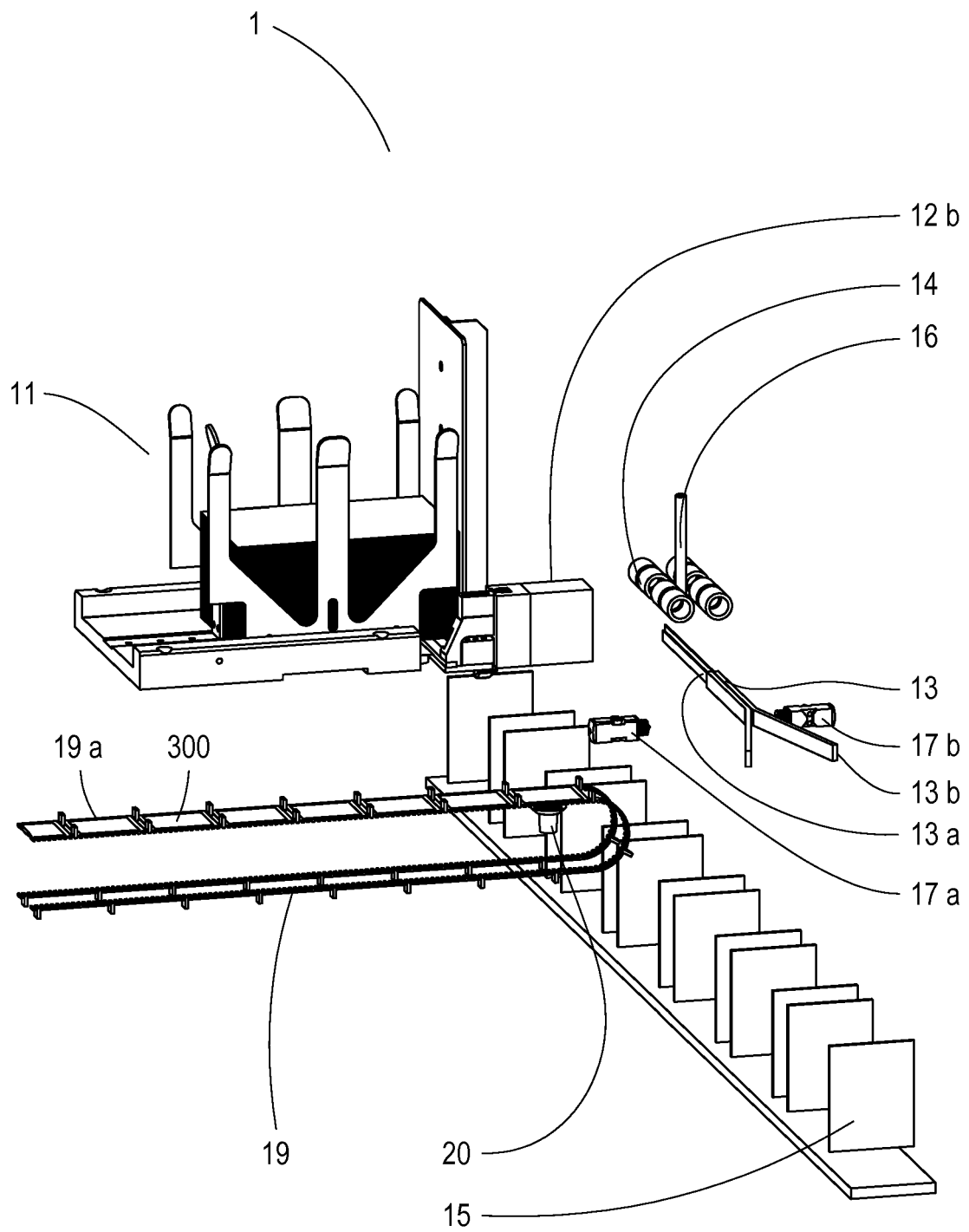


Fig. 9

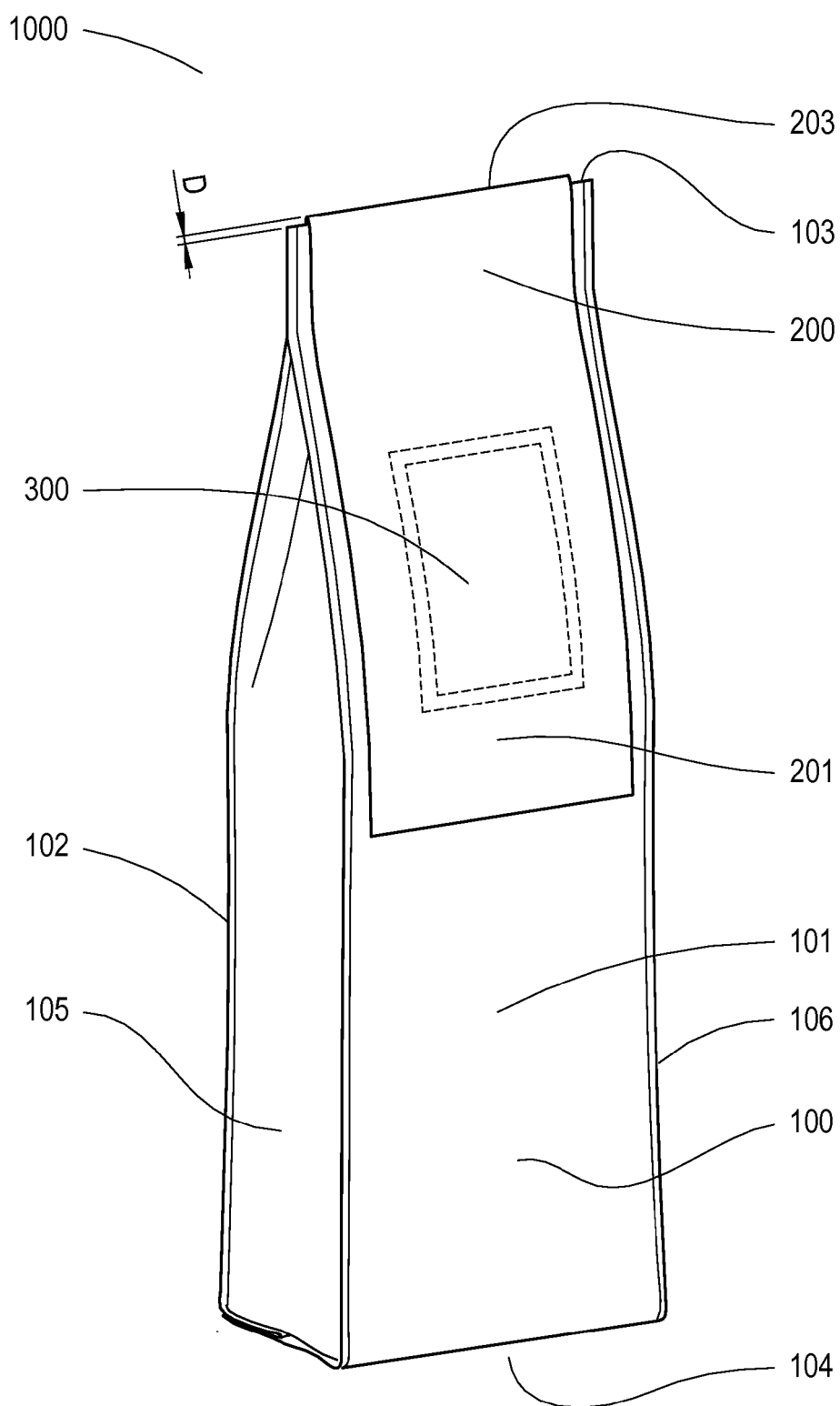


Fig. 10

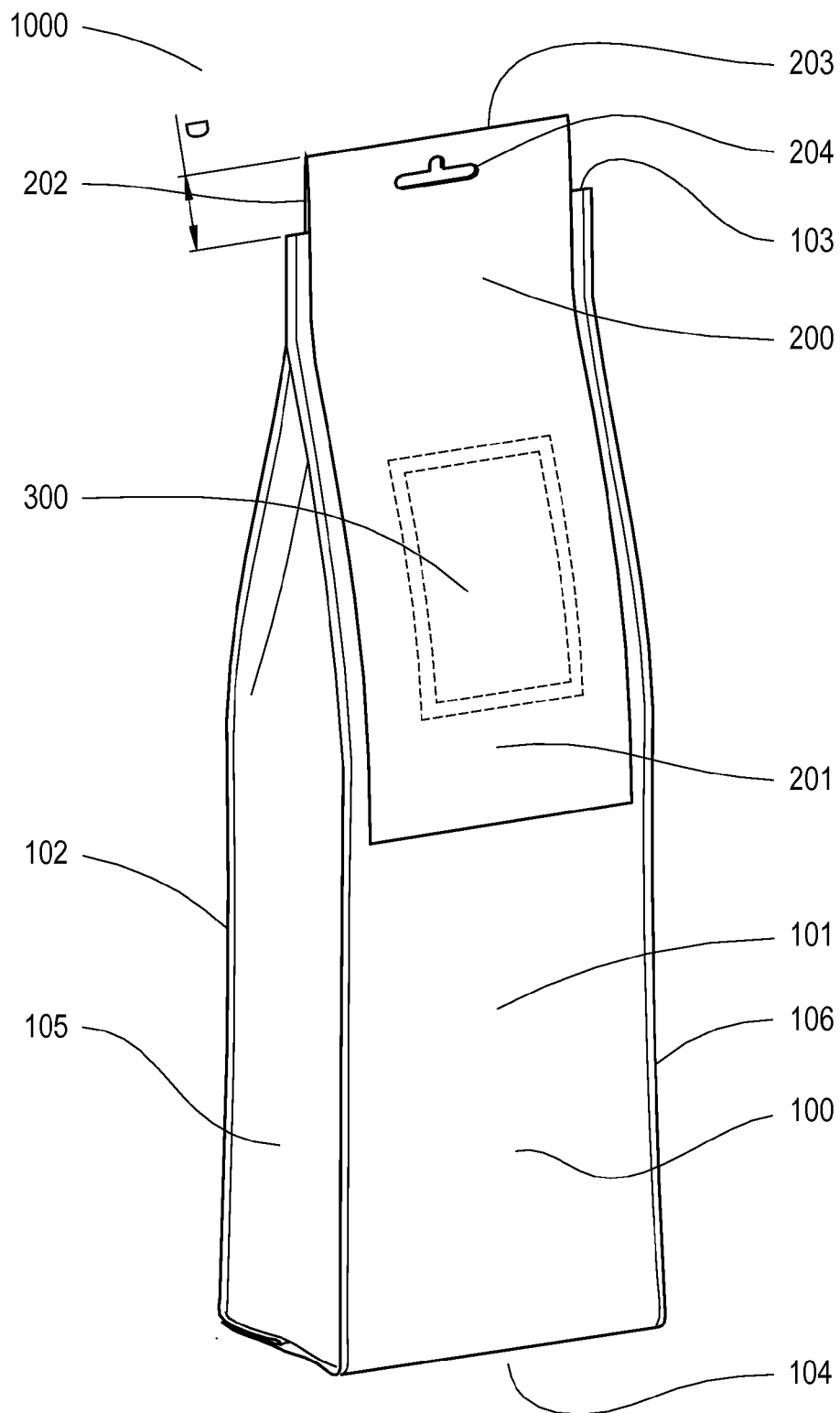


Fig. 11

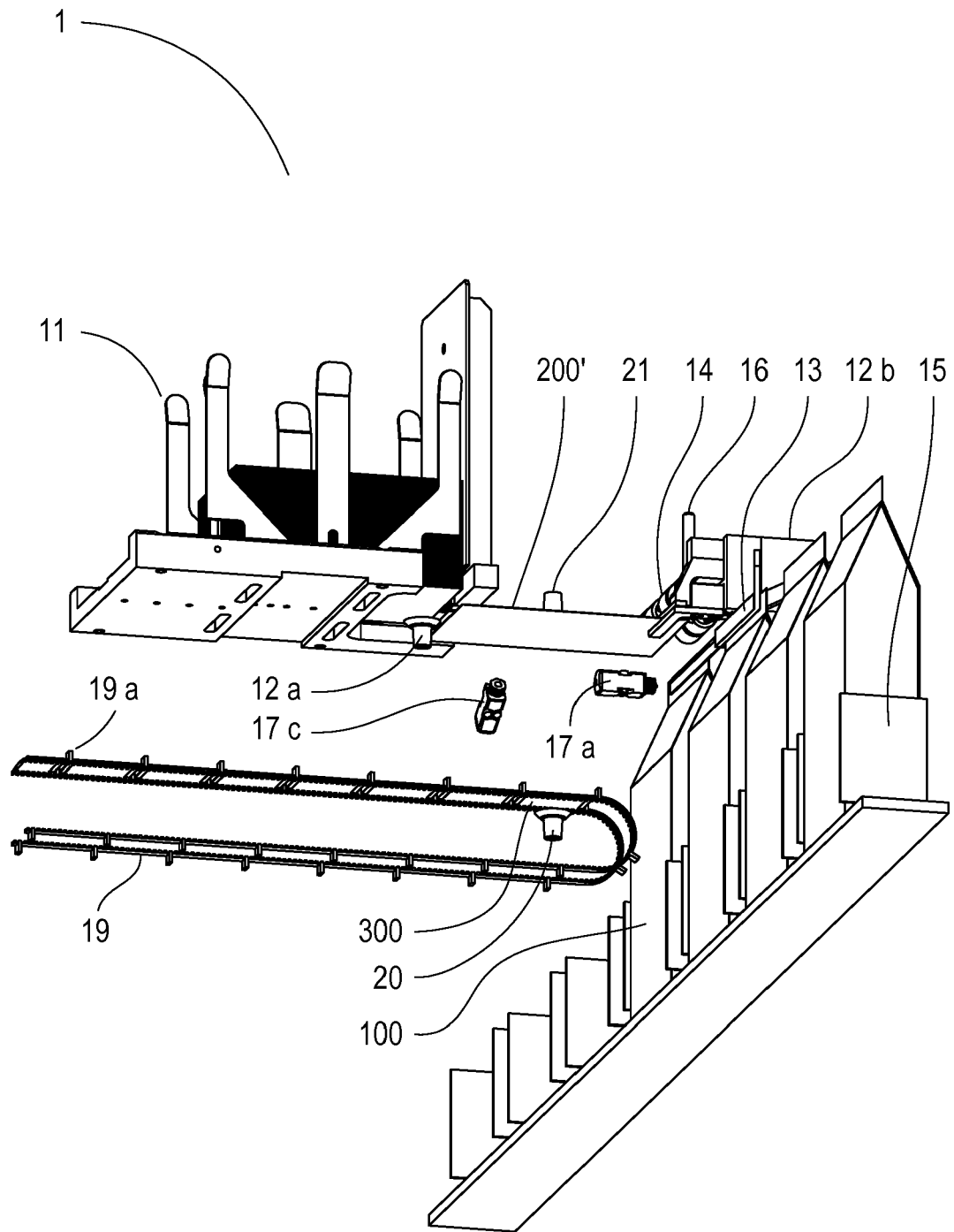


Fig. 12

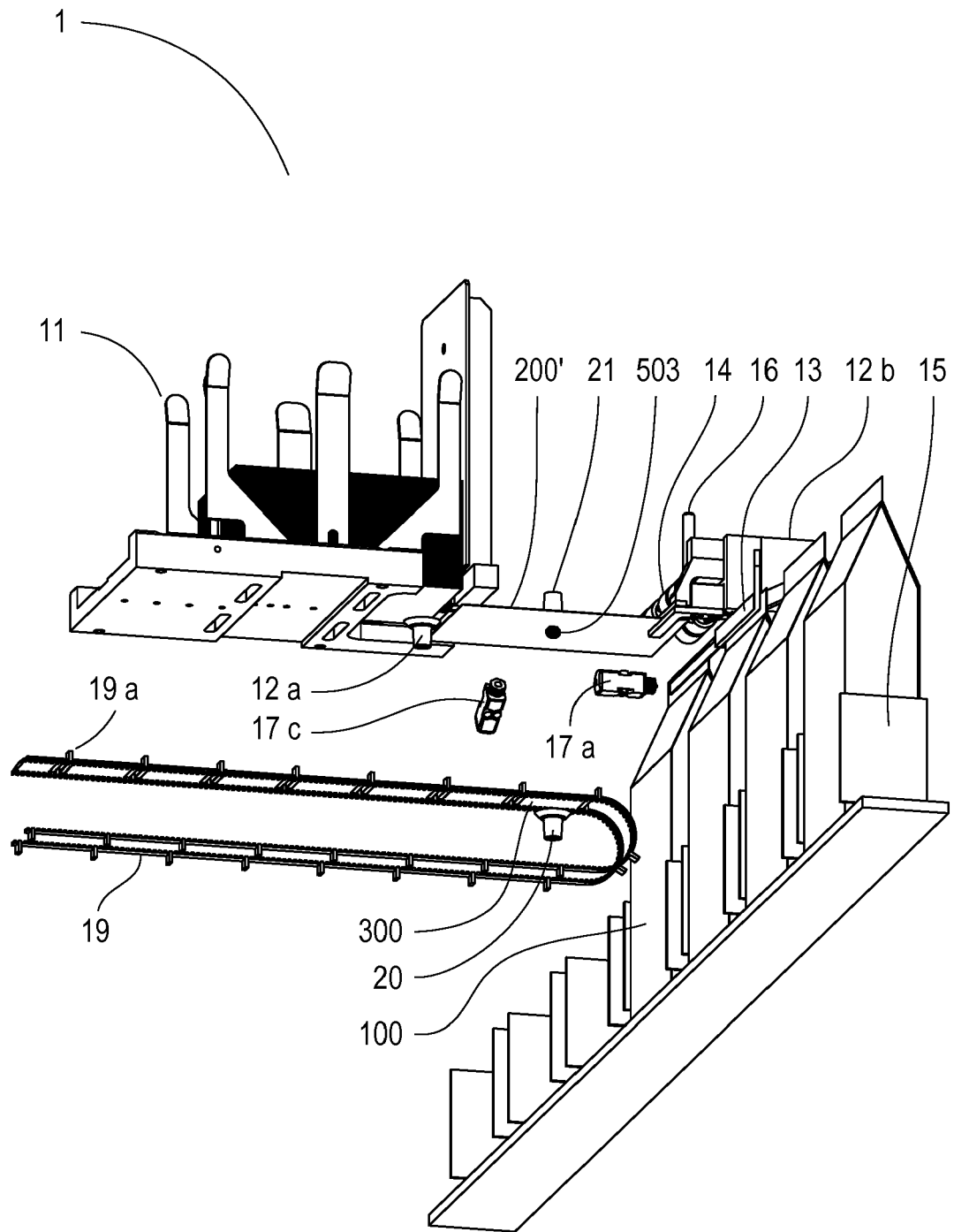


Fig. 13

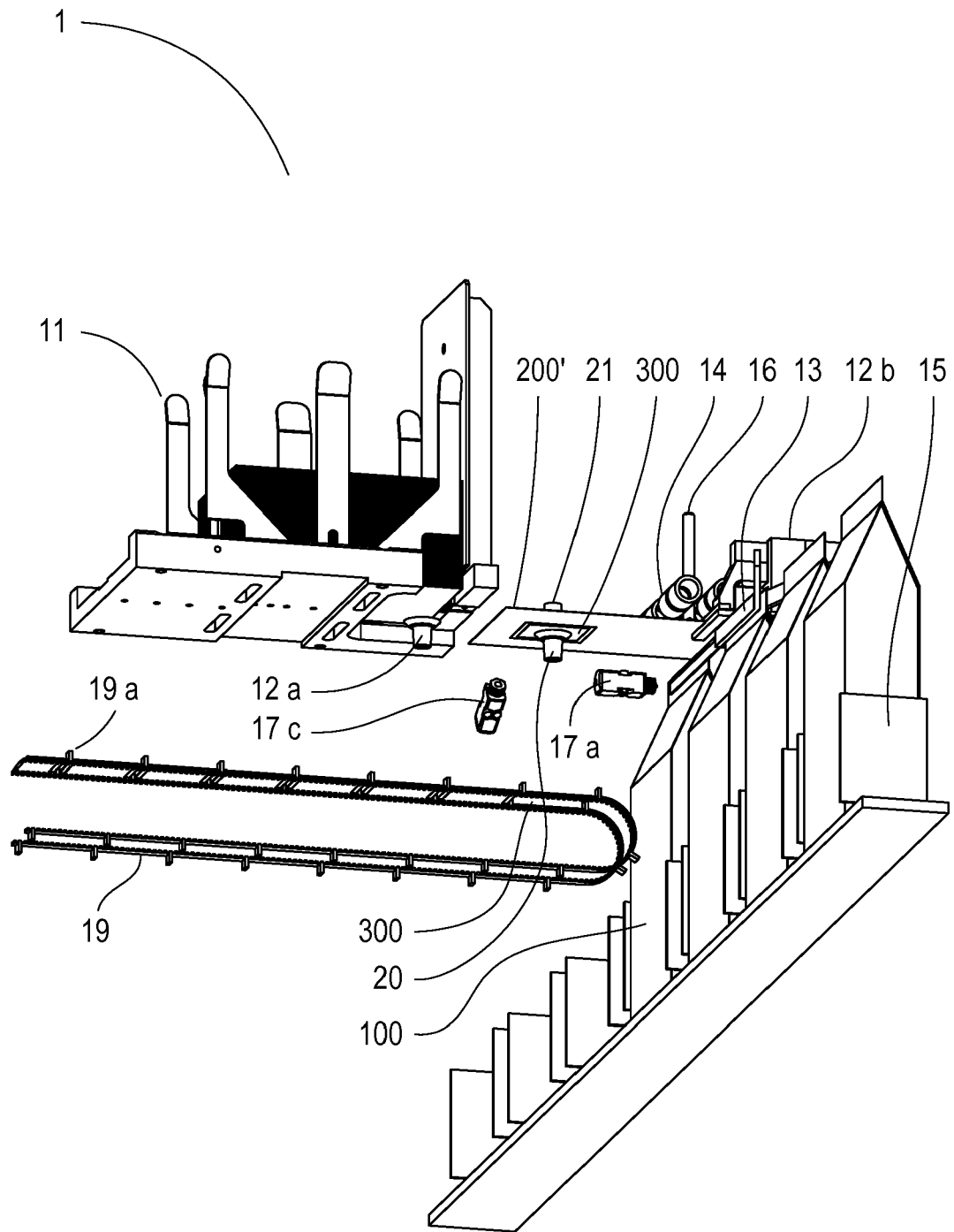


Fig. 14

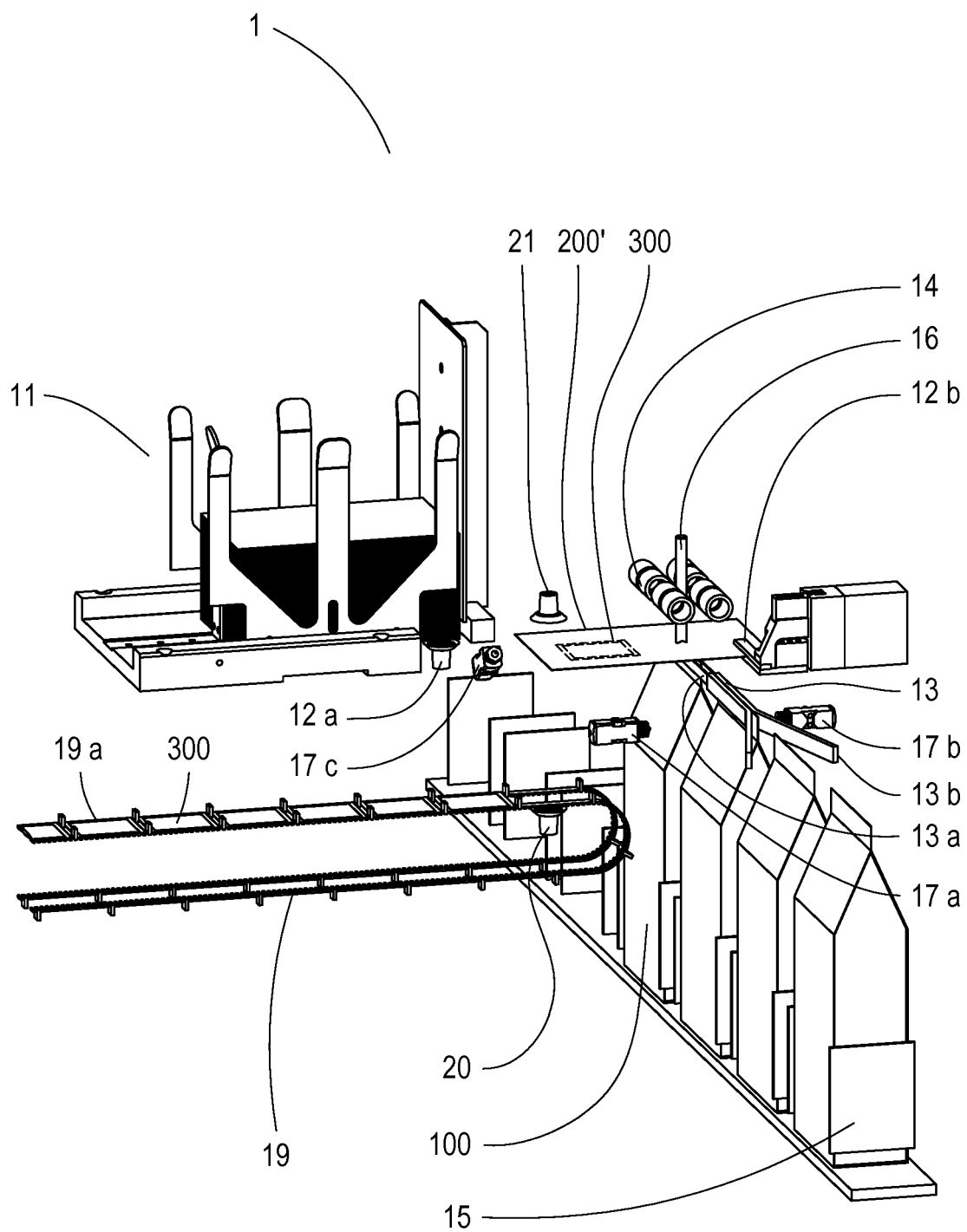


Fig. 15

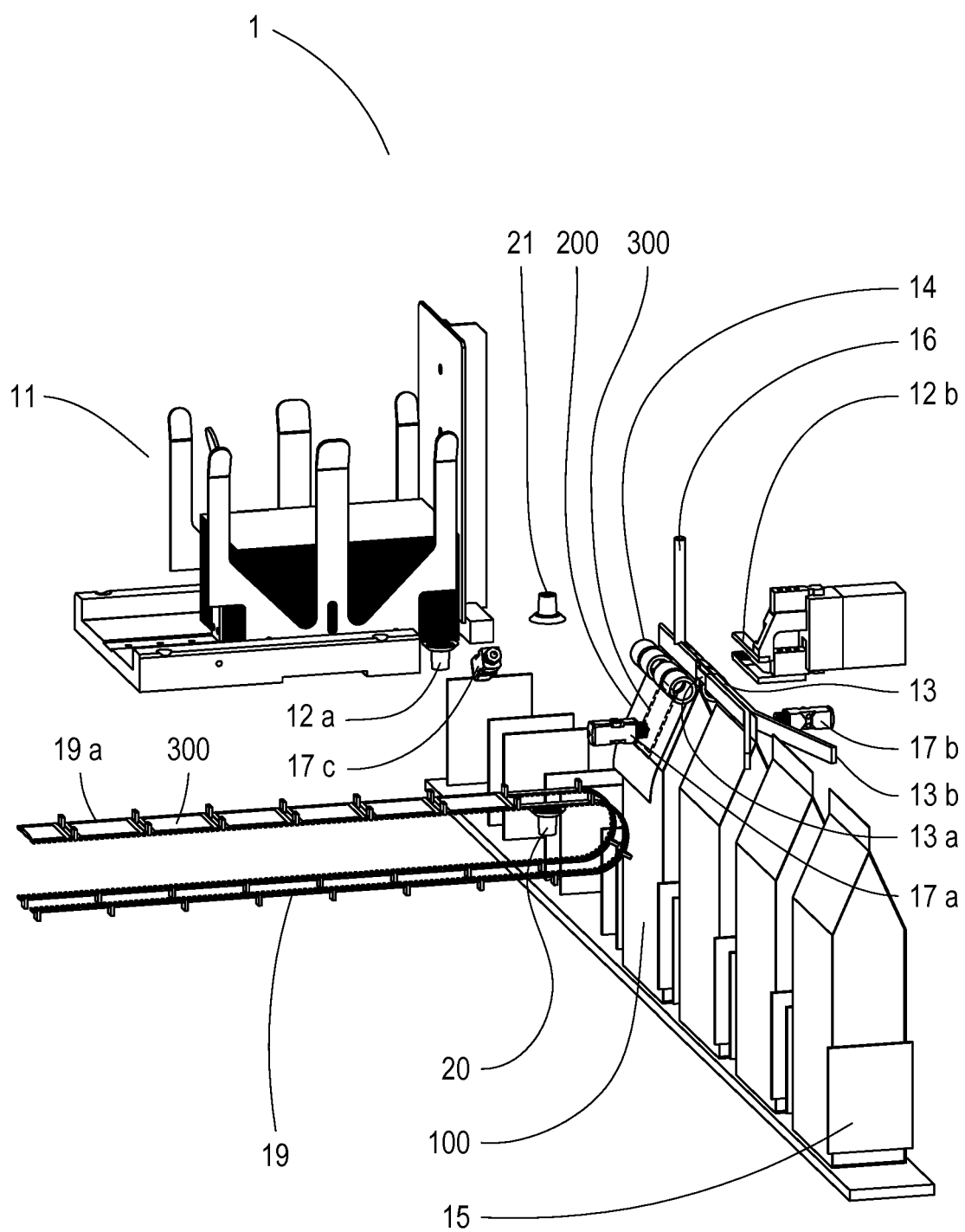


Fig. 16



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