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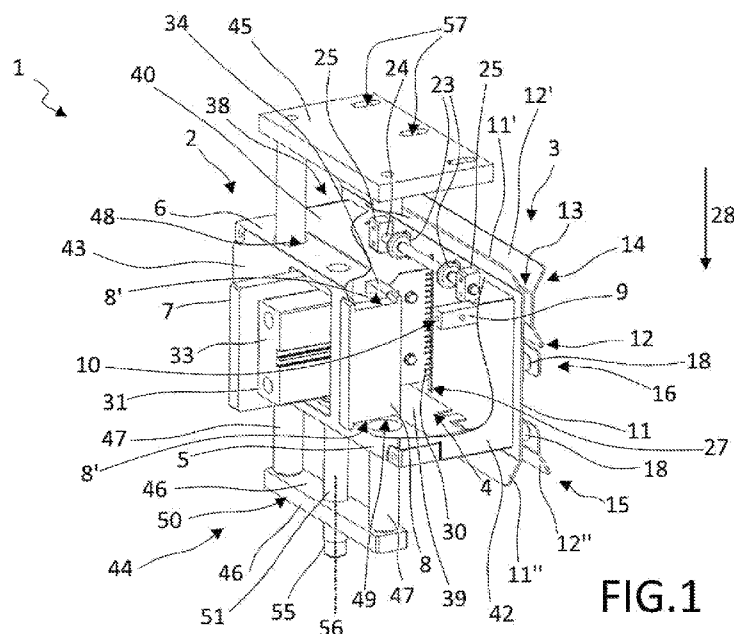


FIG.1

(57) Abstract: Piercing group (1) configured to make a piercing along a plastic tubular label (A), wherein said piercing group (1) comprises a frame (2), a guiding group (3) configured to guide a tubular label (A) advancing along a direction (28) through said piercing group (1), a perforating device (4) configured to make a perforation passing through said tubular label (A), said guiding group (3) and said perforating device (4) being operatively connected to said frame (2), wherein said guiding group (3) comprises at least a first plate element (11) which faces said perforating device (4) and has at least an elongated passing through opening (27) through which said perforating device (4) is configured to pass to perform a perforation along said tubular label (A) provided in said guiding group (3).

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PIERCING GROUP FOR PACKAGING LABELS

* * *

The present invention relates to a piercing group for packaging labels.

In particular, the present invention relates to a piercing group for tubular type labels,
5 used to make a packaging in the form of a band to be wrapped around plastic containers or
bottles. Such tubular labels, known in the field as “stretch sleeve”, are used in extensible plastic
material, such as polyethylene, and can be advantageously applied to as individual components,
bottles or plastic barrel, thus acting as so-called “primary” labels, as for two or more containers,
bottles or barrel leaning against each other, defining a sort of packaging or deformable barrier
10 for firmly holding them in place.

As a rule, the tubular labels are deformed and enlarged before being fitted around the
respective containers, in such a way that by releasing them they exert on the containers
themselves a tightening action due to their spring back.

The tubular labels, in fact, are obtained starting from a tubular element which is cut to
15 size in the form of an annular band.

The use of labelling machines suitable for making and applying other tubular labels
around individual containers, as well as around two or more of these containers provided against
each other, to obtain “multi-product” packages is also known.

The labelling machines are automatic or semi-automatic type and comprise, mainly, a
20 transport system for the containers to be labelled or packed along a production line, a supply
line for tubular labels, a forming group, to adapt the size of the individual tubular labels to that
of the container to be labelled or of the group of containers to be packed, as well as a mechanical
system for picking up and fitting the tubular labels from time to time around each container or
each group of containers, depending on the application.

25 The tubular label fitted on a group of two or more containers sided to each other provides
a tubular packaging that is robust, compact and easy to be transported for an end user.

The tubular label, in fact, has a high resistance that ensures the robustness and stability
of the packaging, keeping the individual containers correctly placed against each other.

Generally, to break the tubular label of a single container, for example during the disposal
30 operations of the container itself, or of a group of containers, for example for their separate
display on a supermarket shelf, use of sharp tools such as scissors, cutters, knives or the like
which, however, can damage the labelled container or the packed containers or their packages

- labels is required.

Even the possible manual breakage of the tubular plastic label can cause damage to the products or their labels that are subject to the band packaging.

It is pointed out that the damage to the label applied to the container, or even the damage to the container itself, is particularly disadvantageous for the management of a distribution/sales place where the containers themselves are sold individually or held together, through the aforementioned tubular packaging. In fact, damaged containers, partially or completely deprived of their labelling, following the improper breakage of the tubular packaging, are left on the sales shelf resulting in an economic loss for the seller.

GB 1219729 A, EP 1035039 A2 and GB 551569 A documents describe piercing groups comprising a piercing device configured to perform the piercing of a packaging material along a direction orthogonal to the feeding direction of the packaging material with respect to the piercing device.

There is a need in the field to improve the state of the art in the field of labelling of containers and, moreover, to overcome the drawbacks indicated above regarding the opening of a label or packaging in the form of a tubular label.

The purpose of the present invention is, therefore, to allow in a simple, reliable, efficient and economical way a practical opening of a tubular label, according to a technical solution which can be easily integrated into a known line or labelling apparatus, without requiring complex and costly modifications to existing labelling machines for its implementation.

A specific object of the present invention is a piercing configured to make a piercing along a plastic tubular label, wherein said piercing group comprises a frame, a guiding group configured to guide a tubular label advancing along a direction through said piercing group, a perforating device configured to make a piercing passing through said tubular label, said guiding group and said perforating device being operatively connected to said frame, wherein said guiding group comprises at least a first plate element which faces said perforating device and at least one second plate element fixedly connected to said at least one plate element so as to delimit an interspace configured to allow the tubular label (A) to pass through said guiding group, said guiding group comprising an inlet portion configured to introduce the tubular label into the guiding group, an outlet portion configured to let the tubular label to exit from the guiding group, and a central portion, interposed between the inlet portion and the outlet portion, the direction developing from the inlet portion towards the outlet portion, wherein the first plate element

presents at least one elongated passing through opening through which said perforating device is configured to pass to perform a piercing along said tubular label placed in said guiding group, the elongated passing through opening being provided along at least the central portion and extending parallel to the direction.

5 According to another aspect of the invention, said perforating device can be configured to make said perforation passing through a portion of said tubular label when said tubular label is placed into said interspace along said central portion.

10 According to a further aspect of the invention, said perforating device can comprise a perforating comb operable between a retracted position, away from said at least one first plate element, and an extracted position wherein at least one portion of said perforating comb is introduced into said interspace through said elongated passing through opening, wherein optionally said perforating comb is operatively connected to a linear actuator which in turn is connected to said frame so as to position said perforating comb in front of said elongated passing through opening, wherein said perforating comb more optionally comprises a plurality of
15 needles or punches aligned in succession to each other.

 According to an additional aspect of the invention, the perforating device can comprise a contrast plate configured to act as a contrast for said perforating comb when moved into said interspace, wherein said contrast plate is connected to said at least one second plate element at said central portion, said contrast plate facing said elongated passing through opening.

20 According to another aspect of the invention, the perforating device can be a laser device configured to emit a laser configured to drill said tubular label.

 According to a further aspect of the invention, the guiding group can comprise abutment elements at least partially protruding into said interspace and being configured to abut and to guide the tubular label into the guiding group and to maintain the tubular label tensioned at
25 least at a portion subjected to perforation by the perforating device.

 According to an additional aspect of the invention, said guiding group can comprise first rolling group or bearings, configured to promote the sliding of said tubular label along said guiding group, which are fitted on a first shaft connected to said at least one second plate element by means of respective fixed supports, wherein said first bearings at least partially protrude in
30 said interspace through shaped openings which are provided passing through said at least one second plate element.

 According to another aspect of the invention, said guiding group can comprises second

rolling groups or bearings configured to promote the sliding of said tubular label along said guiding group, fitted on a second shaft connected to said at least one first plate element by means of respective fixed supports, wherein said second bearings at least partially protrudes in said interspace through respective shaped openings which are provided passing through said at least a first plate element.

According to a further aspect of the invention, the piercing group can comprise a bearing structure, configured as a frame, to which said frame is slidingly connected, said bearing structure comprising at least an upper crossbar comprising at least a passing through seat suitable to define at least a connection point for said perforating group.

According to an additional aspect of the invention, the piercing group can comprise a bearing structure, to which such frame is connected in a sliding manner, said bearing structure comprising two columns connected at respective ends of a crossbar, wherein said crossbar is engaged in a slidable manner along said columns and said perforating device is connected to said crossbar.

According to another aspect of the invention, said bearing structure can comprise two columns connected to said upper crossbar and said lower crossbar at respective ends, wherein said first crossbar and said second crossbar of said frame are slidingly connected to said columns.

According to a further aspect of the invention, the piercing group can comprise a screw device, in turn comprising at least a screw operatively connected to said lower crossbar of said structure and to said second crossbar of said frame, so that by rotating said screw the sliding of said frame along said bearing structure is determined.

According to an additional aspect of the invention, the piercing group can comprise a casing operatively connected to said frame to protect said piercing device, wherein said casing is box-shaped.

Still a specific object of the present invention is an apparatus configured to perform a perforation of a tubular label configured to be positioned around at least one container or a bottle, comprising an piercing group as above disclosed, and a shaping group comprising a mandrel configured to tension said tubular label, said mandrel being positionable in said interspace, away from said at least said first plate element and said second plate element to allow said tubular label to pass.

According to another aspect of the invention, said mandrel can be configured as an elongated plate element and has a slot the dimensions of which are at least equal or higher to

those of said elongated passing through opening, wherein said slot faces on said elongated passing through opening with said mandrel provided in said interspace.

The advantages provided by the piercing group for tubular labels according to the invention are evident.

5 In fact, the piercing group according to the invention allows according to a simple, reliable, efficient and economic manner to obtain a piercing along a tubular label, as so much applicable to a single container as “primary” label as a number of containers as packaging, in order to facilitate their practical opening.

10 In addition, the piercing group according to the invention is easily to be implemented in labelling machine of the known type.

Furthermore, the piercing group according to the invention it is able to perform a predetermined perforation along a band-shaped tubular label, to promote manual breakage of such label without requiring the use of any cutting tool.

15 In particular, the piercing group according to the invention has selectively operable perforation elements suitable for carrying out a predetermined perforation along a portion of the tubular label such as to weaken its structure only locally without compromising the overall resistance of the tubular label itself.

20 The present invention will be now described, by way of illustration and not by way of limitation, according to its preferred embodiments, by particularly referring to the Figures of the annexed drawings, wherein:

Figure 1 shows rear perspective view, in partial section, of a preferred embodiment of a piercing group according to the invention;

Figure 2 shows a front perspective view of the piercing group of Figure 1;

Figure 3 shows a front view of the piercing group of Figure 1;

25 Figure 4 shows a rear view of the piercing group of Figure 1;

Figure 5 shows a top view of the piercing group of Figure 1;

Figure 6 shows a bottom view of the piercing group of Figure 1;

Figures 7 and 8 show detailed side views of the configurations taken by the piercing group of Figure 1, during its operation;

30 Figure 9 illustrates a multi-product packaging comprising a tubular label provided with a perforation made by means of a piercing group according to the present invention;

Figure 10 shows a rear perspective view, in partial section, of a detail of the piercing

group of Figure 1;

Figure 11 shows an exploded perspective view of the piercing group of Figure 1 and of a conforming mandrel associable with the piercing group;

Figure 12 shows a perspective view exploded from above of the piercing group of Figure

5 1;

Figure 13 shows an exploded perspective view of a further version of a piercing group according to the present invention.

In the Figures the same reference numerals will be used for similar elements.

10 In the following description, the directional terminology, such as "right", "left", "front", "rear", "base", "top", "above", "bottom", "side", etc., is used with reference to specific portions of the invention, regardless of the orientation that the same can assume in the various Figures of the attached drawings. Since components and/or elements and/or embodiments of the present invention can be positioned and/or operated in various different orientations, the directional terminology is used purely for illustrative and non-limiting purposes.

15 With reference to Figure 1, it can be observed that a preferred embodiment of a piercing group 1 according to the present invention comprises a frame 2, to which a guiding group 3 is operatively connected, for guiding a tubular label A through the assembly of incision 1 advancing along a direction 28, and a perforating device 4, to perform a hole passing through the tubular label A (shown in Figures 7-9), with the latter arranged inside the guiding group 3.

20 The frame 2 comprises a first crossbar 5, at least a second crossbar 6 parallel to each other, at least a first vertical wall 7 and at least a second vertical wall 8 interposed between the first crossbar 5 and the second crossbar 6 and connected to them to form a support frame.

The first vertical wall 7 and the second vertical wall 8 are preferably configured as prismatic elements, parallel to each other.

25 The first vertical wall 7 and the second vertical wall 8 can have respective shaped end portions 7' (shown in Fig. 12) and 8' which can be coupled, for example by shape coupling and/or by screws or similar, with the first crossbar 5 and the second crossbar 6.

Preferably, the perforating device 4 is connected to the frame 2 and, in particular, it is connected to the first vertical wall 7.

30 The connection between the perforating device 4 and the first vertical wall 7 can be of the bolted type to allow, if necessary, the removal of the perforating device 4 for its possible replacement or for performing the maintenance.

The frame 2 comprises connection elements 9 through which the guiding group 3 is connected to the frame 2.

According to the attached Figures, with reference in particular to Figures 1, 4, 11 and 12, the connecting elements 9 can preferably be configured as prismatic bodies bearing at the opposite ends a threaded seat 10 engageable by a corresponding threaded connection element - screw or similar.

It is observed that the connecting elements 9 act as spacers to maintain the guiding group 3 at a predefined installation distance with respect to the frame 2 and the perforating device 4.

The piercing group 1 can comprise at least four connecting elements 9 each connected at a respective vertex of the frame 2. More specifically, a corresponding connecting element 9 is connected at each end of the first crossbar 5 and of the second crossbar 6.

In fact, each among the connection elements 9 extends orthogonally from the frame 2, defining connection points to constrain the guiding group 3 to the frame 2 itself.

The guiding group 3 comprises at least a first plate element 11 and at least a second plate element 12 connected to each other in a spaced position.

The at least one first plate element 11 faces the perforating device 4. The at least one second plate element 12, instead, faces the outside of the piercing group 1.

With reference also to what is illustrated in the attached Figures 7 and 8, the at least a first plate element 11 and the at least a second plate element 12 define an interspace 13 between them for the passage of the tubular label A to be perforated.

The guiding group 3 has an inlet portion 14, through which the tubular label A is introduced into the guiding group 3, an outlet portion 15, for the exit of the tubular label A from the guiding group 3 and at least a central portion 16, delimited between the input portion 14 and the output portion 15.

The direction 28, for the advancement of the tubular label A along the guiding group 3, develops from the inlet portion 14 towards the outlet portion 15.

At the input portion 14, the at least a first plate element 11 and the at least a second plate element 12 can have respective upper end portions 11', 12' mutually inclined to the outside. In fact, the inlet portion 14 has a divergent conformation, wherein the inclined ends 11', 12' promote the sliding of the tubular label A towards the inside of the guiding group 3. The inlet portion 14, therefore, edgeless which edges could cause jamming or damaging to the tubular label A.

At the outlet portion 15, the at least a first plate element 11 and the at least a second plate element 12 can have respective lower end portions 11'', 12'' inclined, oriented diverging from each other.

5 The lower end portions 11'' and 12'' pursue the same advantages above described in relation to the upper end portions 11' and 12'. In particular, the lower portions 11'' and 12'' promote the release of the tubular label A from the guiding group 3 avoiding damage or jamming of the same.

The at least a first plate element 11 and the at least a second plate element 12 are connected to each other through a bolted connection or similar.

10 For this purpose, the first plate element 11 and the second plate element 12 comprise holes 17 (shown in Figure 2) which are engageable by screws or the like, not illustrated in detail in the attached figures.

It should be noted that the screws suitable for mutually connecting the at least a first plate element 11 and the at least a second plate element 12 can also be used to connect these
15 elements to the connecting elements 9 which protrude from the frame 2.

In particular, as illustrated in the attached Figures, the first plate element 11 and the second plate element 12 are fixedly connected to each other and to the frame 2.

The guiding group 3 comprises spacer elements 18 interposed between the at least a first plate element 11 and the at least a second plate element 12, at the holes 17.

20 The spacer elements 18 can be engaged by the same screws used to connect the at least a first plate element 11 to the at least a second plate element 12, according to a solution wherein the number of holes for mutually connecting the individual elements of the piercing group 1 is optimized.

The spacer elements 18 keep the at least a first plate element 11 and the at least a second
25 plate element 12 separate from each other. The thickness of the spacer elements 18 defines the width of the interspace 13.

The mutual connection between the at least a first plate element 11 and the at least a second plate element 12 preferably takes place at the perimeter portions of these elements, to maintain a free passage inside the cavity 13 for the tubular label A.

30 It is observed that the at least a first plate element 11 and/or the at least a second plate element 12 can have at least an inclined section such as to define an interspace 13 with a variable section along at least one among the inlet portion 14, the central portion 16 and the outlet

portion 15.

With reference to what is illustrated in Figures 7 and 8, the interspace 13 has, at the inlet portion 14, a width smaller than that at the outlet portion 15. In fact, at the inlet portion 14 a more stable guide of the tubular label A is granted, to facilitate its perforation at the central
5 portion 16 of the guiding group 3.

The guiding group 3 comprises abutment elements which protrude at least partially into the interspace 13 and are configured to abut and guide the tubular label A inside the guiding group 3 and to maintain the tubular label A under tension at least at the portion subjected to perforation by the perforating device4.

10 According to a preferred embodiment, the guiding group 3 comprises abutment elements comprising rolling groups or bearings 19 arranged at the inlet portion 14 to facilitate sliding of the tubular label A inside the guiding group 3.

More in detail, the guiding group 3 can comprise a first shaft 20 connected to the at least a second plate element 12 through respective fixed supports 21.

15 The first shaft 20 is connected to the at least a second plate element 12, at the inlet portion 14, externally to the interspace 13.

At least two first bearings 19 are fitted along the first shaft 20 which protrude at least partially into the interspace 13 through shaped openings 22 made to pass through the at least a second plate element 12 itself.

20 The guiding group 3 can comprise second bearings 23 operatively connected to the at least one first plate element 11 in a similar manner to that previously described with reference to bearings 19.

The second bearings 23, in fact, are fitted along a second shaft 24 connected to the at least a first plate element 11 through respective fixed supports 25, externally to the interspace
25 13.

The second bearings 23 protrude at least partially into the interspace 13, through respective shaped openings 26, provided passing through the at least a first plate element 11.

The presence of abutment elements along the guiding group 3 allows to guide the tubular label A during its advancement inside the interspace 13 and to prevent it from jamming along
30 the guiding group 3 following the perforation action performed by the perforating device4.

The abutment elements, according to a preferred embodiment, are configured as rolling elements 19, 23 although it is understood that alternative embodiments are possible, not shown

in the attached figures, wherein the abutment elements are configured as a pair of ribs or raised elements which at least partially protrude into the interspace 13 starting from at least one among the at least one first plate element 11 or the at least one second plate element 12 or both to perform the same functions previously described in relation to the rolling elements 19, 23.

The at least one first plate element 11 has at least one elongated through opening 27 (shown in Figures 10 and 12) - for example a slot - through which the perforating device 4 can face to pierce and perforate a portion of the tubular label A positioned inside the guiding group 3.

The elongated passing through opening 27 has a development parallel to the direction 28 of advancement of the tubular label A along the guiding group 3.

It is also noted that the elongated through opening 27 develops at least along the central portion 16 of the guiding group 3.

In particular, with reference to what is illustrated in the attached Figures, it should be noted that the elongated through opening 27 extends along the at least one first plate element 11 developing parallel to direction 28.

As said, the piercing group 1 comprises a perforating device 4 operatively connected to the frame 2.

According to a preferred embodiment of the invention, illustrated in the attached Figures, the perforating device 4 can comprise a perforating comb 29 carrying a plurality of needles or punches 30 aligned with each other.

The needles 30 are arranged along the perforating comb 29 separated from each other by a predefined distance. The size of the needles or punches 30, their number and position along the perforating comb 29 determines the conformation of the perforation obtained along the tubular label A.

The perforating comb 29 or, more generally, the perforating device 4, by piercing the tubular label A, determine a locally weakened area, with a predetermined width.

As shown in Figure 9, the perforation B along the tubular label A performs the function of a pre-cut suitable to locally weaken the tubular label A, to promote its breakage by a user without the need to use cutting tools. It should be noted that the hole B to be made along the tubular label A is configured in such a way as not to compromise the overall resistance of the tubular label A and the packaging obtainable with the same.

It should be noted that the perforation B provided by the piercing group 1 is imperceptible or substantially imperceptible to the view in such a way as not to alter the aesthetic characteristics of the tubular label A itself, with reference to any decorations made along it.

5 According to a preferred embodiment, the perforating device 4 comprises a linear actuator 31 to which the perforating comb 29 is operatively connected, through a support 32.

By way of example, the perforating comb 29 can be connected to the support 32 through a bolted connection to allow its removal when it is necessary to carry out its maintenance or replacement.

10 The linear actuator 31 is a component known in the field, comprising a fixed portion 33 and a mobile portion 34 which can be moved mutually. More in detail, the fixed portion 33 can be connected fixed to the first vertical wall 7 and the mobile portion 34, on the other hand, can be actuated alternately towards or away from the fixed portion 33, along a linear direction.

More precisely, the mobile portion 34 can be operated, alternatively, between a position
15 wherein it is attached to the fixed portion 33 and the needles 30 of the perforating comb 29 are in a retracted position, i.e. they are located outside the interspace 13 proximal to the fixed portion 33, and a position distal to the fixed portion 33, wherein the needles 30 of the perforating comb 29 are in an extracted position, wherein they extend beyond the at least a first element plate 11 engaging the interspace 13.

20 In fact, the perforating comb 29 during its operation through the at least one plate element 11, engaging the interspace 13 determines the perforation of the tubular label A present therein.

It should be noted that during the movement of the perforating comb 29 away from the at least one first plate element 11, the latter acts as an abutment for the tubular label A, retaining
25 it inside the interspace 13 to keep it intact and to avoid that the needles 30 can entangle with the same, tearing it during its sliding inside the interspace 13.

The support 32 keeps the perforating comb 29 aligned with the elongated passing through opening 27 during the cyclic movement of the perforating comb 29 itself.

The piercing group 1 can comprise a contrast plate 35, to contrast the perforating comb
30 29 during its advancement inside the interspace 13, connected to the at least a second plate element 12, inside the interspace 13.

The contrast plate 35 is positioned along the at least one second plate element 12 at the

central portion 16. More in detail, it can be observed that the contrast plate 35 is frontally arranged with respect to the elongated passing through opening 27 provided along the at least one first plate element 11.

5 The contrast plate 35 faces the elongated passing through opening 27 and has a vertical groove 36 substantially aligned with the elongated passing through opening 27 itself. The vertical groove 36 is adapted to house, at least partially, the needles 30 of the perforating comb 29.

The contrast plate 35 can act as support for the tubular label A during the perforation action of the perforating comb 29. The contrast plate 35 therefore keeps the tubular label A in position, promoting a correct and efficient perforating action by the perforating comb 29.

10 In fact, the perforating comb 29 during its advancement through the elongated passing through opening 27 intercepts the tubular label A, until the needles 30 are brought into at least partial engagement with the groove 36.

The linear actuator 31, preferably, is a pneumatic actuator suitable for moving the perforating comb 29 between the retracted position and the extracted position, and vice versa.

15 According to further embodiments of the present invention, the linear actuator 31 could comprise an electric motor, an electromechanical or hydraulic drive, without any limitation.

According to a preferred embodiment, the first vertical wall 7 can comprise a pair of horizontal slots 37, parallel to each other, to make the connection between the linear actuator 31 and the vertical wall 7 itself. Such a coupling allows to adjust the position of the linear
20 actuator 31 relative to the first vertical wall 7, along a vertical direction.

The engraving unit 1 can comprise a casing 38, to protect the perforating device 4. The casing 38 acts as a protective barrier to guarantee the safety of an operator who, in fact, cannot come into direct contact with the perforating comb 29 itself.

25 The casing 38 can be connected to the frame 2 and to the connecting elements 9. Preferably, the casing 38 has a box-like shape.

More in detail, it can be observed that the casing 38 has a lower wall 39, an upper wall 40, parallel to the lower wall 39, a first side wall 41 and a second side wall 42. The casing 38 also comprises a rear plate 43.

30 The casing 38 is closed frontally by the at least a first plate element 11 with which the casing 38 itself is associated.

According to a preferred embodiment, the first side wall 41 and the second side wall 42 can be connected to respective connection elements 9 in a removable way.

In practice, the first side wall 41 and the second side wall 42 can be removed from the casing 38 to promote the access to its interior, whether it is necessary to check the condition of the perforating comb 29 or perform maintenance on it.

Similarly, any of the rear plate 43, the lower wall 39 or the upper wall 40 can be removed
5 from the casing 38 for the same purposes indicated above.

With reference to the embodiment illustrated in the Figures, the piercing group 1 can comprise a bearing structure 44 to which the frame 2 and, consequently, the guiding group 3, are slidably connected for the purposes which will be described below.

The bearing structure 44 is configured as a frame or substantially a frame and comprises
10 an upper crossbar 45, a lower crossbar 46, parallel to each other and at least a pair of columns 47 connected to the respective ends of the upper crossbar 45 and the lower crossbar 46.

The frame 2 is operatively associated with the bearing structure 44, resulting in sliding engagement along the columns 47. In this regard, the first crossbar 5 and the second crossbar 6 each have respective circular through openings 48 and 49 engaged by the columns 47. In fact,
15 the frame 2 is slidably movable along the bearing structure 44.

The piercing unit 1 comprises a screw device 50, for adjusting the position of the frame 2 along the bearing structure 44.

The screw device 50 comprises a screw 51 provided with a shaped end portion 52, which is rotatably held in a complementary seat 53 made in the first crossbar 5 of the frame 2.

20 The screw 51 is engaged in a threaded seat 54 made in the lower crossbar 46 of the bearing structure 44.

The screw 51 has an end portion 55, opposite the shaped end 52, which protrudes outside the frame 2, beyond the lower crossbar 46.

The end portion 55 acts as a gripping portion to drive the screw 51 in rotation around an
25 axis of rotation 56. The actuation in rotation of the screw 51 determines the roto-translation of the shaped end 52 and, consequently, the translation of the entire frame 2 along the bearing structure 44.

By changing the position of the frame 2 with respect to the bearing structure 44 it is possible to adjust the position of the perforating unit 4 with respect to the bearing structure 44
30 itself. This aspect is particularly interesting if the incision group 1 is installed close to a conforming group of a labelling machine.

The bearing structure 44 allows the connection of the piercing unit 1 on board a labelling

machine.

In fact, it can be observed that the upper crossbar 45 of the bearing structure 44 can include through seats 57 which define the connection points for the piercing group 1 and a labelling machine.

5 The screw device 50 allows adjustment of the position of the perforating device 4 relative to the connection point of the piercing unit 1 and a labelling machine.

According to a further version of the present invention, the piercing group 1 can include a laser device instead of the perforating device 4.

10 According to this version, the piercing group 1 does not include the linear actuator 31 since it is not necessary to operate the laser device with alternating motion towards and away from the guide unit 3. The laser device, in fact, can emit a laser radiation able to perforate the material of the tubular label A that passes along the guiding group 3, according to a solution designed to pursue the same advantageous purposes previously described.

15 The piercing group 1 can be positioned along a line or labelling machine in various positions along the path made by the tubular label A inside the machine. For example, it can be installed at any point along the path taken by the tubular label A, between a warehouse or a reel-holding group, configured to support the tubular label A wrapped around a respective reel and a conforming group.

20 According to an aspect of the present invention, the piercing group 1 can be arranged at a conforming group of a labelling machine to perform the perforation of the tubular label A close to the conforming group itself.

With reference to Figure 11, the piercing group 1 of Figures 1-10 and a conforming group 59 of a labelling machine are shown in exploded view.

25 According to a preferred embodiment, the shaping group 59 comprises a mandrel 60. The mandrel 60 is adapted to support the tubular label A, introduced inside the interspace 13 during the perforation phase, and to deform it, widening it, in order to be able to then arrange around the products to be packaged.

30 The mandrel 60 has an upper portion 61, which can be positioned along the interspace 13 to support the tubular label A during the perforation phases, and a lower portion 62 capable of deforming, widening the tubular label A itself.

The upper portion 61, or more generally the mandrel 60, is shaped like an elongated plate-like element, the width of which is less than the width of the guide assembly 3, to be

positioned along the interspace.

The upper portion 61 has an end 63 equipped with a pointed profile, to promote the positioning of the tubular label A on the mandrel 60.

5 The upper portion 61 also includes a slot 64 positioned along the mandrel 60 to face the elongated through opening 27, with the upper portion 61 of the mandrel 60 positioned in the interspace 13.

The slot 64 can have a length configured so as not to hinder the action of the perforating unit 4, where such length is optionally at least equal to or greater than the elongated passing through opening 27.

10 The upper portion 61 can be positioned in the interspace 13 in a position spaced from the at least a first plate element 11 and from the at least a second plate element 12, to define a passageway for the tubular label A.

In this regard, it should be noted that the tubular label A during passage along the guiding group 3 is fitted onto the mandrel 60 which supports it, keeping it tensioned.

15 The lower portion 62 of the mandrel 60 comprises shaped partitions 65, which develop along the mandrel 60.

The shaped partitions 65 are orthogonal to the sheet-like surface of the mandrel 60 and have a growing profile along the direction of advancement 28 of the tubular label A along the shaping group 59, to deform the tubular label A itself, widening it.

20 The shaping unit 59 then comprises a central gripping portion 66, interposed between the upper portion 61 and the lower portion 62, suitable for defining a coupling point for the connection of the shaping unit 59 to a labelling machine of known type, not shown in the attached figures.

25 The piercing group 1 according to the present invention is able to achieve the intended purposes, being able to perform a predetermined perforation along a portion of a tubular label A. This perforation is a localized weakening suitable for promoting the breakage of the tubular label A itself, without damaging the products retained by the same.

30 The engraving group 1 can be easily implemented in a line or labelling machine, substantially at any point between the area downstream of the reels from which the tubular label A is obtained and the conforming group, in the context of an extremely use solution flexible.

Furthermore, the engraving unit 1 can be easily connected to a line or to an existing

labelling machine by providing suitable connection points made along the bearing structure 44 of the frame 2 to which the perforating unit 4 is operatively connected.

5 The perforating unit 4 performs a predetermined perforation along the tubular label A, such as to promote localized breakage without altering overall the aesthetic and resistance features.

Figure 13 illustrates a further version of the piercing group 100 according to the present invention. Compared to the previous version, the piercing group 100 differs in its overall simpler structure, comprising a reduced number of components.

10 To indicate the components corresponding to those described in relation to the previous embodiment, the same reference numbers will be used, increasing them by one hundred units.

In particular, the piercing group 100 has a frame 102 and a bearing structure 144 simplified with respect to those described in relation to the previous embodiment.

15 It is pointed out that in the attached Figure 13, in addition to the piercing group 100, a shaping group 59 of an optional labelling machine is shown, which has the same features or substantially the same features indicated in the above description, to which reference is made.

The characteristics of the piercing group 100 which differentiate the embodiment illustrated in the attached Figure 13 from the previous version will be briefly described below.

20 The piercing group 100 comprises a frame 102, to which a guiding group 103 is operatively connected, to guide a tubular label A through the piercing group 100 advancing along a direction 128, and a perforating device 104, to perform a perforation passing through the tubular label A, with the latter placed inside the guiding group 3.

The configuration of the guiding group 103 is the same as that described in relation to the guiding group 3, to which reference is made.

25 The perforating device 104 can comprise a perforating comb or a laser device according to what is described with respect to the previous embodiment.

The frame 102 comprises a crossbar 106 and at least a first vertical wall 107 connected to the crossbar 106 itself.

The perforating device 104 is connected to the at least one wall 107 according to similar methods to those described in the previous embodiment.

30 The frame 102 comprises connection elements 109, similar to those described with regard to the piercing group 1, to which reference is made, for the connection of a first plate element 111 of the guiding group 103 to the frame 102.

The guiding group 103 comprises, as said, a first plate element 111 and a second plate element 112 rigidly connected to each other, i.e. they cannot approach or move away from each other.

5 The first plate element 111 delimits an elongated passing through opening 127, which extends along a direction parallel to the direction 128 of advancement of the tubular label A to be perforated, similarly to what was described for the previous version.

The guide assembly 103 further comprises abutment elements which protrude into the interspace delimited between the first plate element 111 and the second plate element 112 and are configured to abut and guide the tubular label A inside of the guiding group 103 and to keep
10 the tubular label A tensioned at least in correspondence with the portion subjected to perforation by the perforating device 4.

According to a preferred embodiment, the guiding group 103 comprises abutment elements comprising rolling groups or bearings 123 and a shaft 124 connected to the first plate element 111 by means of fixed supports 125, wherein the bearings 123 face the inside of the
15 interspace delimited by the guiding group 103 through shaped openings 126.

It is understood that alternative versions of the reference elements already described in relation to the previous embodiment to which reference is made are possible.

The perforating group 104 is connected to the frame 102 by means of a bearing structure 144 which includes two columns 147 to which the crossbar 106 is slidably connected. The at least
20 one wall 107, to which the perforating device 104 is connected, consequently, can be moved in a sliding manner relative to the first plate element 111 along the direction 128.

The attached Figure 13 does not show the mechanism for adjusting the position of the perforating device 104 along the bearing structure 144, although it is understood that similar considerations apply to those set out above in relation to the movement of the perforating
25 device 104 along the columns 47.

The piercing group 100 comprises a casing 138 to protect the perforating device 104.

The casing 138 is connected to the at least one wall 107 or to the perforating device 104 and has a lower wall 139, an upper wall 140, parallel to the lower wall 139, a first side wall 141, a second side wall 142 and a rear plate 143. Furthermore, the casing 138 is closed on the front
30 by the first plate element 111 on which the casing 138 itself faces.

The piercing group 100 allows to pursue the same advantages described in relation to the previous embodiment, showing a simple, compact and easily implementable structure along

any position of a labelling line, also as replacement of the piercing group previously installed in a labelling line without requiring complex changes to the layout of the line itself.

In the foregoing the preferred embodiments have been described and variants of the present invention have been suggested, but it is to be understood that those skilled in the art
5 will be able to make modifications and changes without thereby departing from the relative scope of protection, as defined by the claims attached.

CLAIMS

1. Piercing group (1, 100) configured to make a piercing along a plastic tubular label (A), wherein said piercing group (1, 100) comprises a frame (2, 102), a guiding group (3, 103) configured to guide a tubular label (A) advancing along a direction (28, 128) through said piercing group (1, 100), a perforating device (4, 104) configured to make a perforation passing through said tubular label (A), said guiding group (3, 103) and said perforating device (4, 104) being operatively connected to said frame (2, 102), wherein said guiding group (3, 103) comprises at least a first plate element (11, 111) which faces said perforating device (4, 104) and at least one second plate element (12, 112) fixedly connected to said at least one plate element (11, 111) so as to delimit an interspace (13) configured to allow said tubular label (A) to pass through said guiding group (3, 103), said guiding group (3, 103) comprising an inlet portion (14) configured to introduce said tubular label (A) into said guiding group (3, 103), an outlet portion (15) configured to let said tubular label (A) to exit from said guiding group (3, 103), and a central portion (16), interposed between said inlet portion (14) and said outlet portion (15), said direction (28, 128) developing from said inlet portion (14) towards said outlet portion (15), wherein said at least one plate element (11, 111) presents at least one elongated passing through opening (27, 127) through which said perforating device (4, 104) is configured to pass to perform a piercing along said tubular label (A) placed in said guiding group (3, 103), said elongated passing through opening (27, 127) being provided along at least said central portion (16) and extending parallel to said direction (28, 128).

2. Piercing group (1, 100) according to claim 1, wherein said perforating device (4, 104) is configured to make said perforation passing through a portion of said tubular label (A) when said tubular label (A) is placed into said interspace (13) along said central portion (16) .

3. Piercing group (1, 100) according to claim 1 or 2, wherein said perforating device (4, 104) comprises a perforating comb (29) drivable between a retracted position, away from said at least one first plate element (11, 111), and an extracted position wherein at least one portion of said perforating comb (29) is introduced into said interspace (13) through said elongated passing through opening (27, 127), wherein optionally said perforating comb (29) is operatively connected to a linear actuator (31) which in turn is connected to said frame (2, 102) so as to position said perforating comb (29) in front of said elongated passing through opening (27, 127), wherein said perforating comb (29) more optionally comprises a plurality of needles or punches (30) aligned in succession to each other.

4. Piercing group (1, 100) according to claim 3, comprising a contrast plate (35) configured to act as a contrast for said perforating comb (29) when moved into said interspace (13), wherein said contrast plate (35) is connected to said at least one second plate element (12, 112) at said central portion (15), said contrast plate (35) facing said elongated passing through opening (27, 127).

5. Piercing group (1, 100) according to claim 1 or 2, wherein said perforating device (4, 104) is a laser device configured to emit a laser configured to perforate said tubular label (A).

6. Piercing group (1, 100) according to any one of the preceding claims, wherein said guiding group (3, 103) comprises abutment elements at least partially protruding into said interspace (13) and being configured to abut and to guide said tubular label (A) into said guiding group (3, 103) and to maintain said tubular label (A) tensioned at least at a portion subjected to perforation by said perforating device (4, 104).

7. Piercing group (1, 100) according to claim from 1 to 5, wherein said guiding group (3) comprises first rolling group or bearings (19), configured to promote the sliding of said tubular label (A) along said guiding group (3), which are fitted on a first shaft (20) connected to said at least one second plate element (12) by means of respective fixed supports (21), wherein said first bearings (19) at least partially protrude in said interspace (13) through shaped openings (22) which are provided passing through said at least one second plate element (12).

8. Piercing group (1, 100) according to any one of the claims from 1 to 4 or 7, or according to claim 5, when depending on claim 1, wherein said guiding group (3, 103) comprises second rolling groups or bearings (23, 123) configured to promote the sliding of said tubular label (A) along said guiding group (3, 103), fitted on a second shaft (24, 124) connected to said at least one first plate element (11, 111) by means of respective fixed supports (25, 125), wherein said second bearings (23, 123) at least partially protrudes in said interspace (13) through respective shaped openings (26, 126) which are provided passing through said at least one first plate element (11, 111).

9. Piercing group (1) according to one of the previous claims, comprising a bearing structure (44), configured as a frame, to which said frame (2) is slidably connected, said bearing structure (44) comprising at least an upper crossbar (45) comprising at least a passing through seat (57) suitable to define at least a connection point for said piercing group (1).

10. Piercing group (100) according to any one of the preceding claims 1 to 8, comprising a bearing structure (144), to which such frame (102) is connected in a sliding manner, said

bearing structure (144) comprising two columns (147) connected at respective ends of a crossbar (106), wherein said crossbar (106) is engaged in a slidable manner along said columns (147) and said perforating device (104) is connected to said crossbar (106).

5 11. Piercing group (1) according to claim 9, wherein said bearing structure (44) comprises two columns (47) connected to said upper crossbar (45) and said lower crossbar (46) at respective ends, wherein said first crossbar (5) and said second crossbar (6) of said frame (2) are slidably connected to said columns (47).

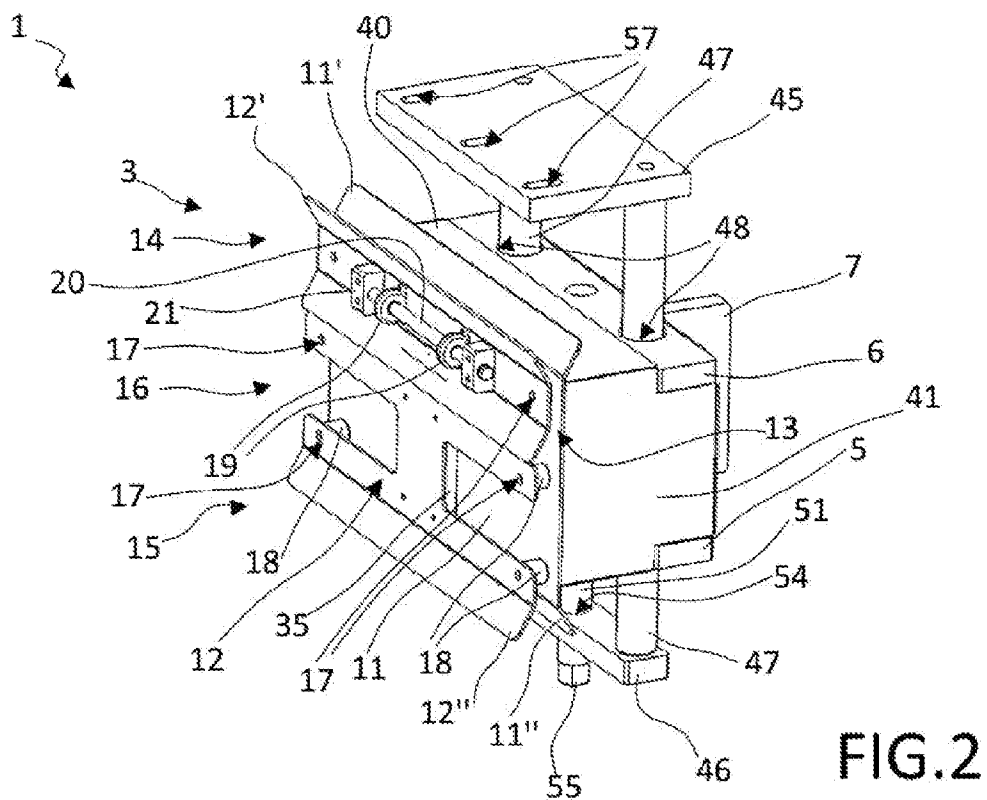
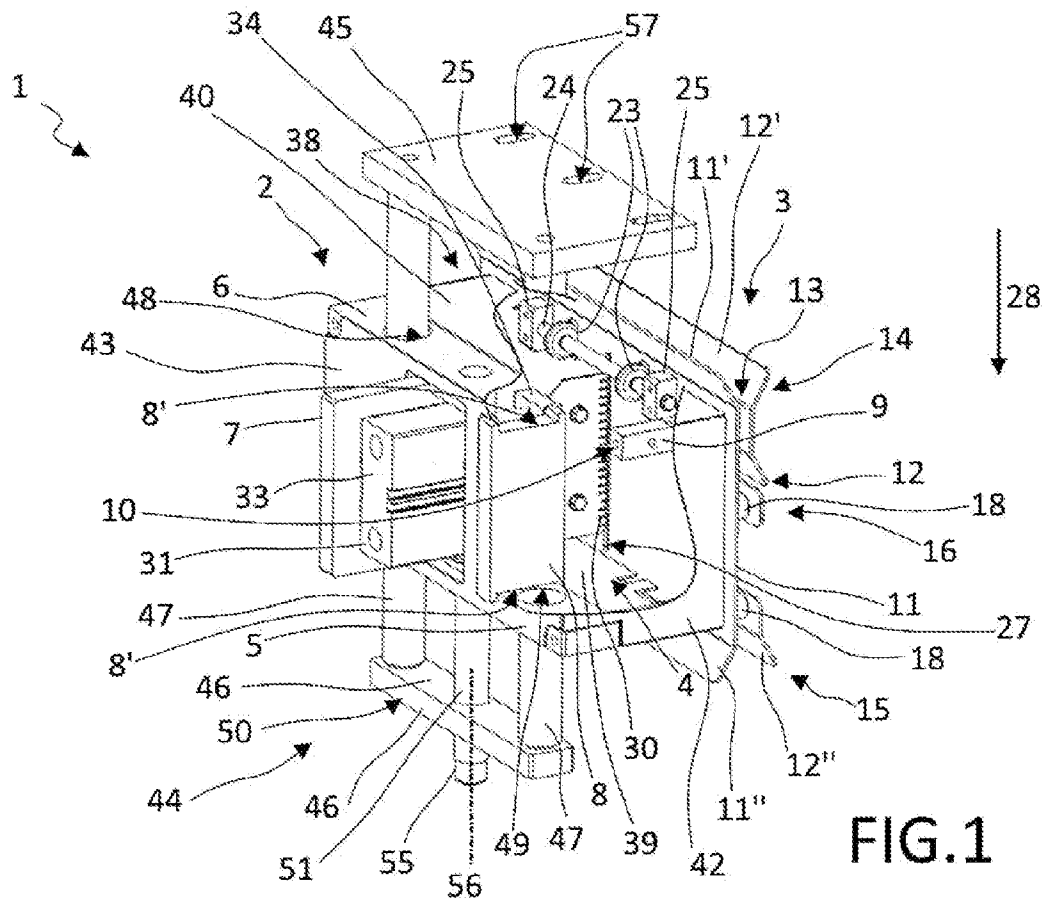
10 12. Piercing group (1) according to claim 9 or 10, comprising a screw device (50), in turn comprising at least a screw (51) operatively connected to said lower crossbar (46) of said structure (44) and to said second crossbar (6) of said frame (2), so that by rotating said screw (51) the sliding of said frame (2) along said bearing structure (44) is determined.

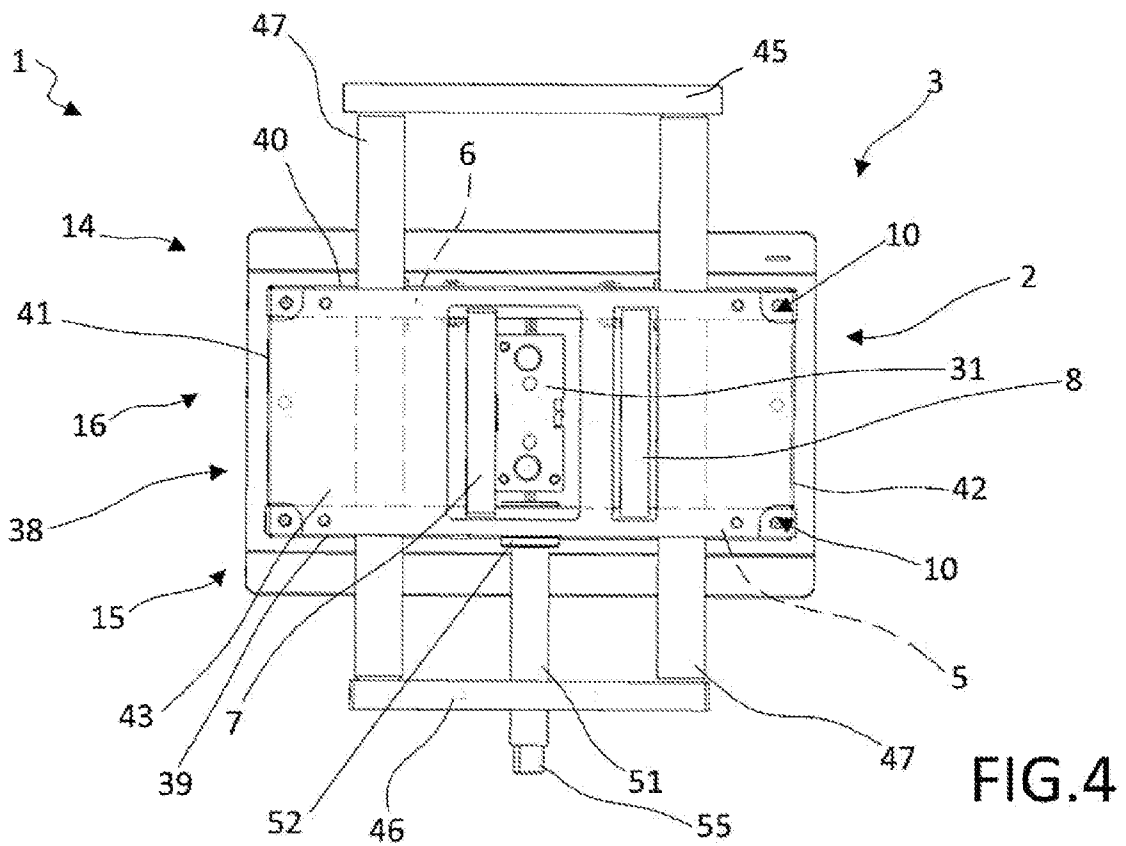
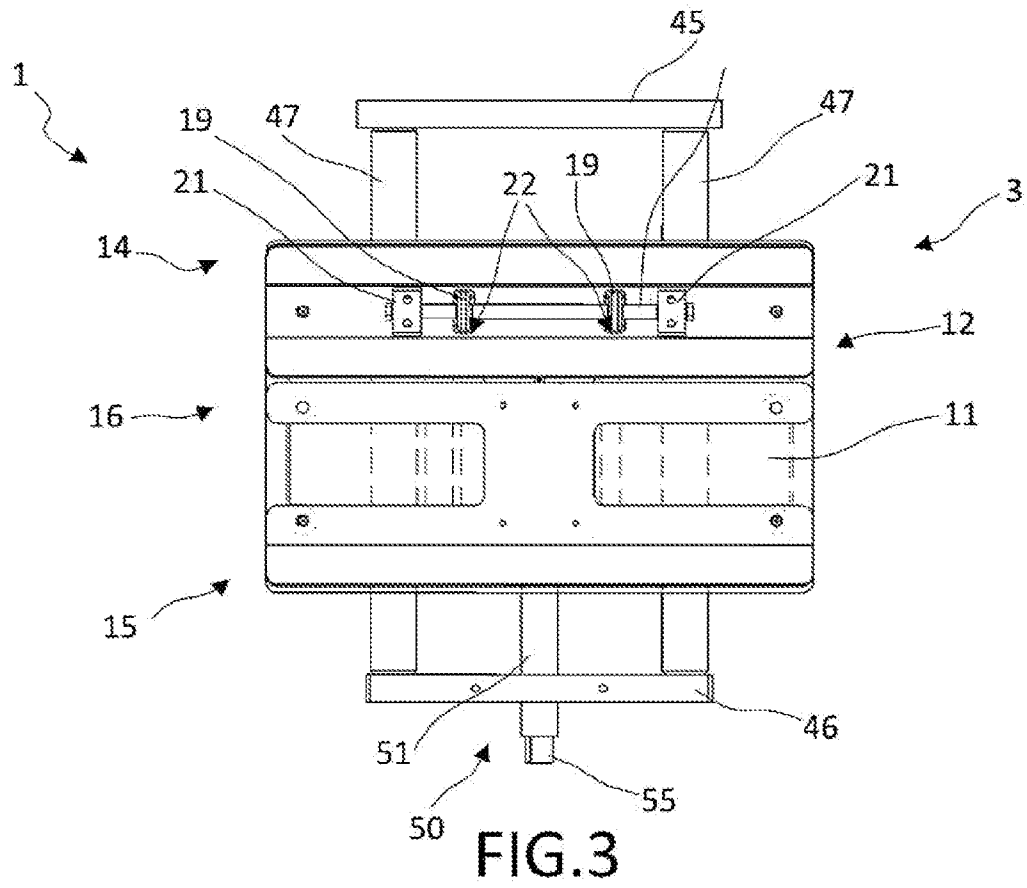
13. Piercing group (1) according to one of the previous claims, comprising a casing (38) operatively connected to said frame (2) to protect said perforating device (4), wherein said casing (38) is box-shaped.

15 14. Apparatus configured to perform a piercing of a tubular label (A) configured to be positioned around at least one container or a bottle, comprising an piercing group (1, 100) according to claim 1 or according to any of the claims 2 to 13, when depending on claims 1, and a shaping group (59) comprising a mandrel (60) configured to tension said tubular label (A), said mandrel (60) can be positioned in said interspace (13), away from said at least said first plate element (11, 111) and said second plate element (12) to allow said tubular label (A) to pass.

20 15. Apparatus according to claim 14, wherein said mandrel (60) is configured as an elongated plate element and has a slot (64) the dimensions of which are at least equal or higher to those of said elongated passing through opening (27, 127), wherein said slot (64) faces on said elongated passing through opening (27, 127) with said mandrel (60) provided in said interspace (13).

25





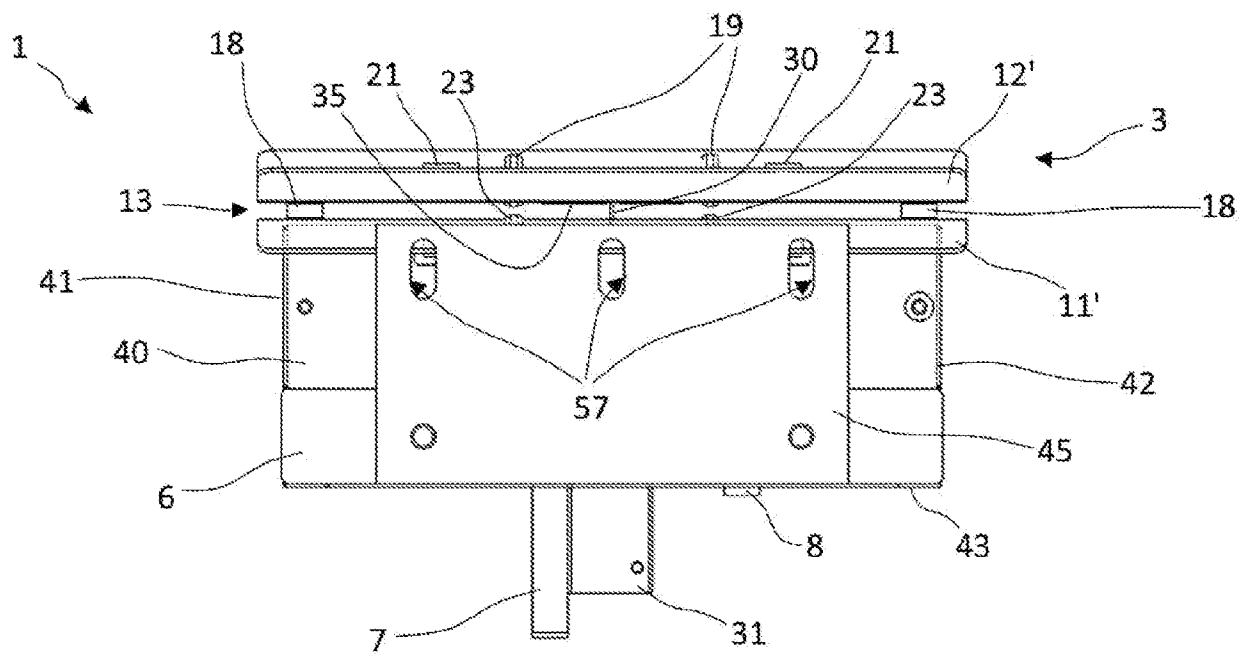


FIG. 5

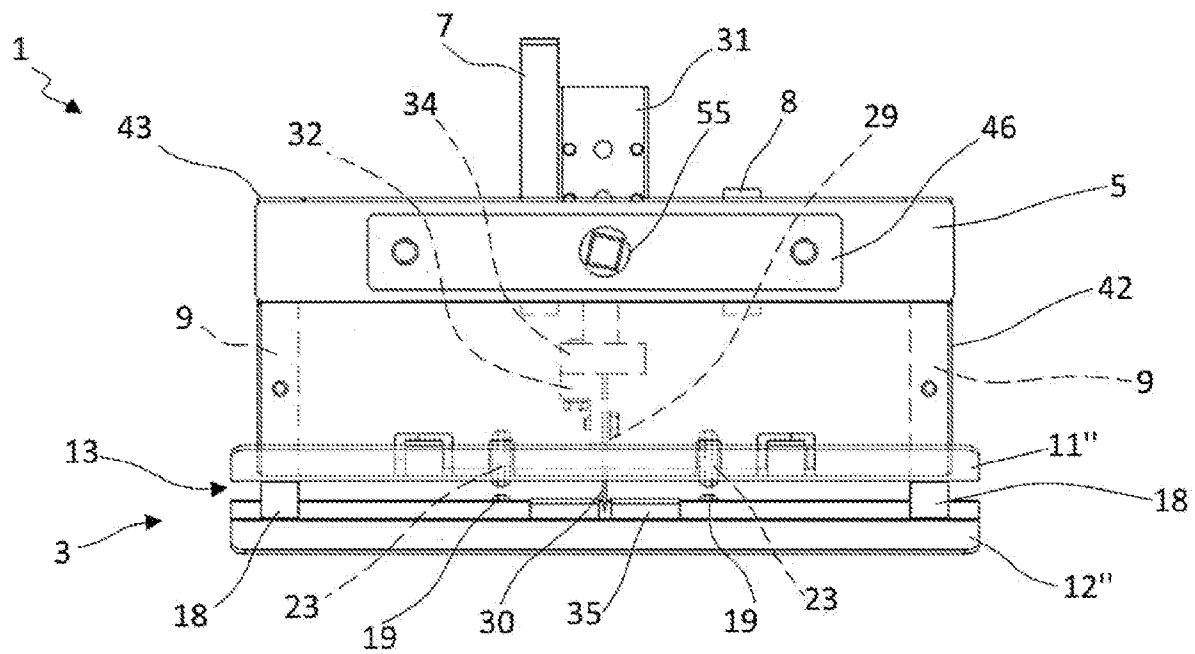


FIG. 6

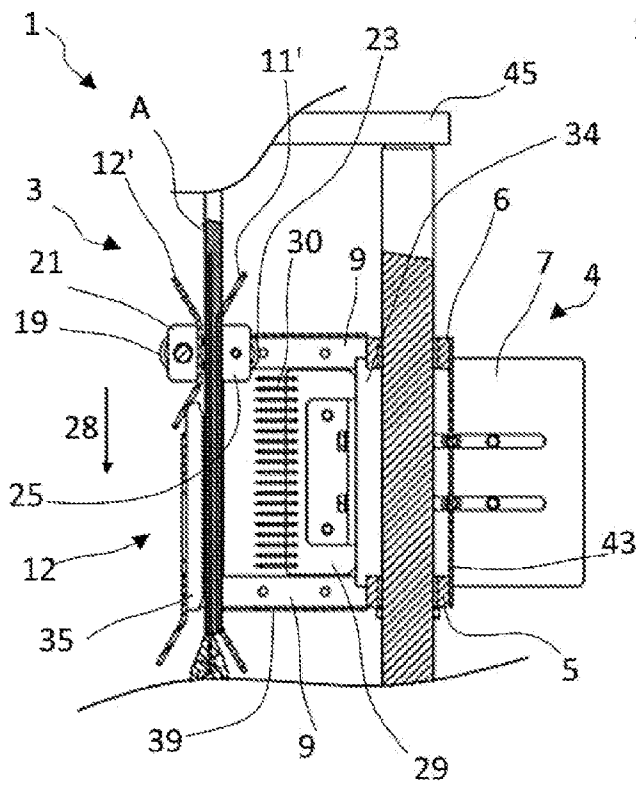


FIG. 7

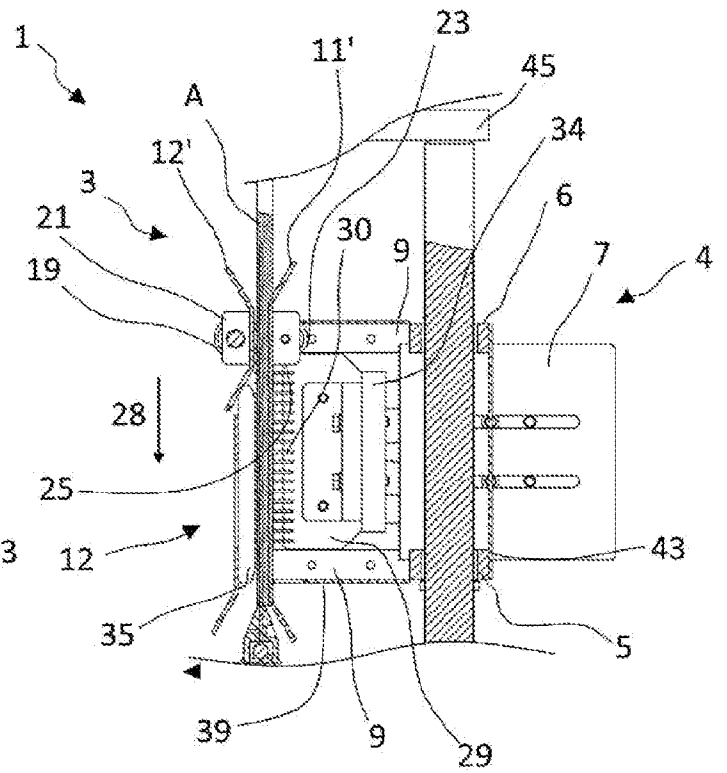


FIG. 8

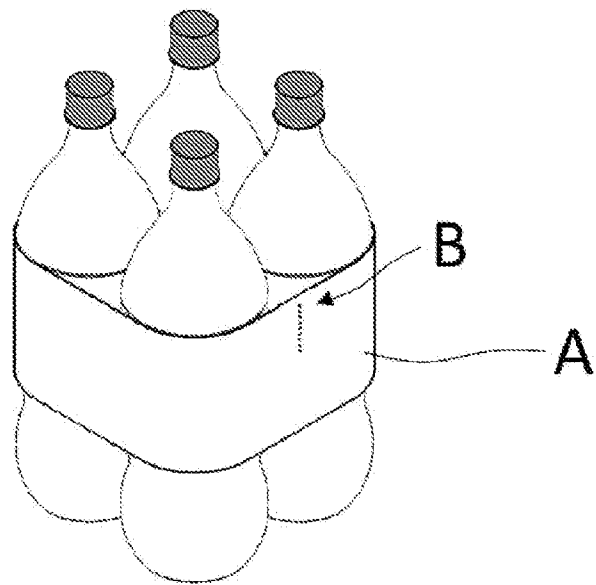


FIG. 9

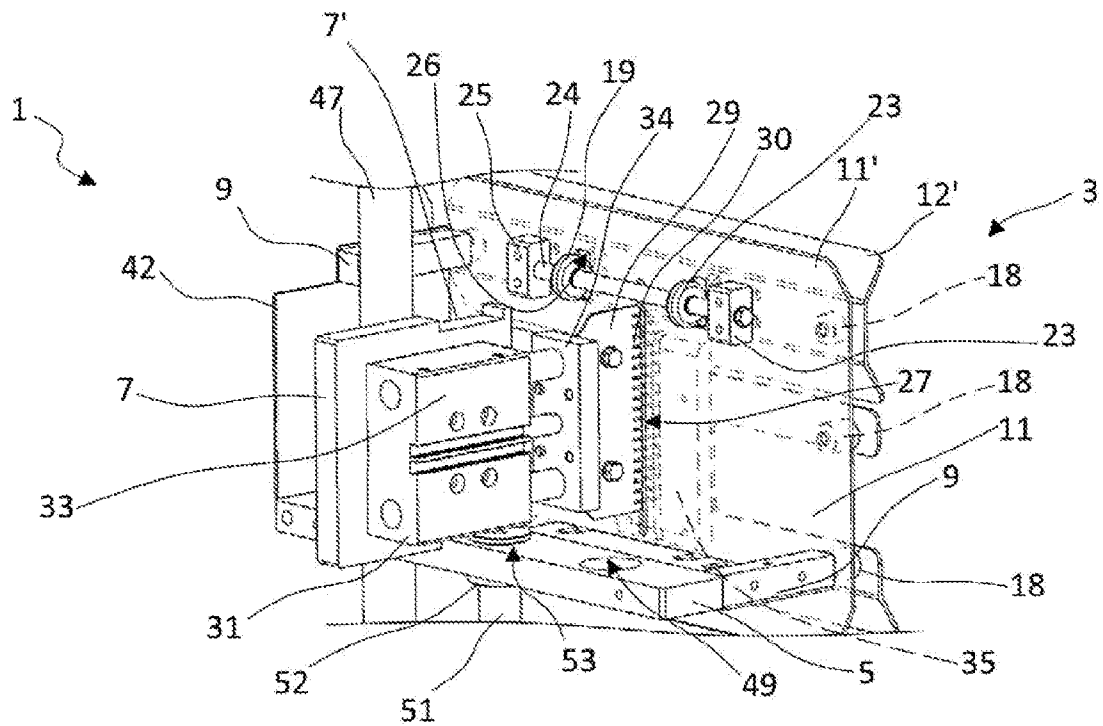


FIG.10

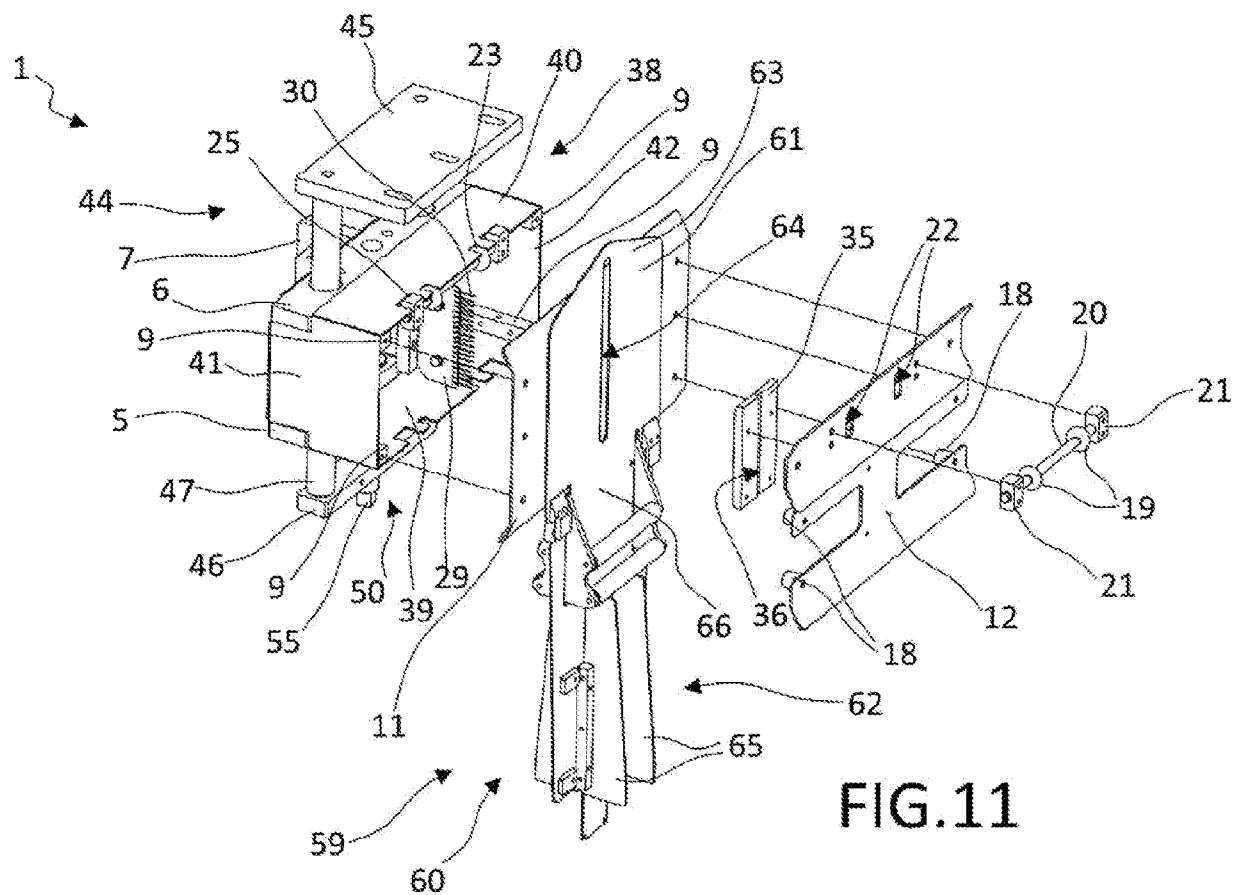


FIG.11

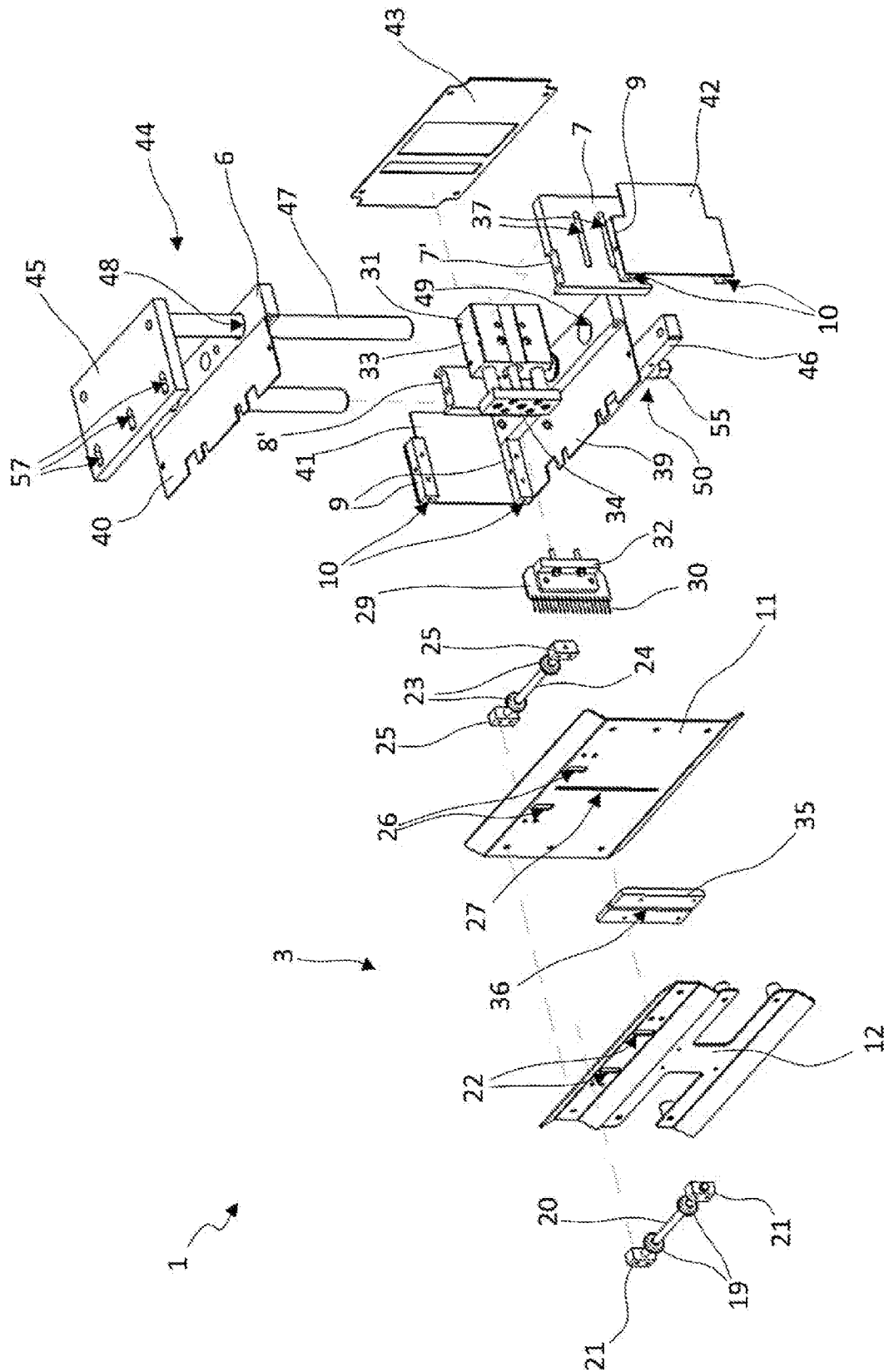
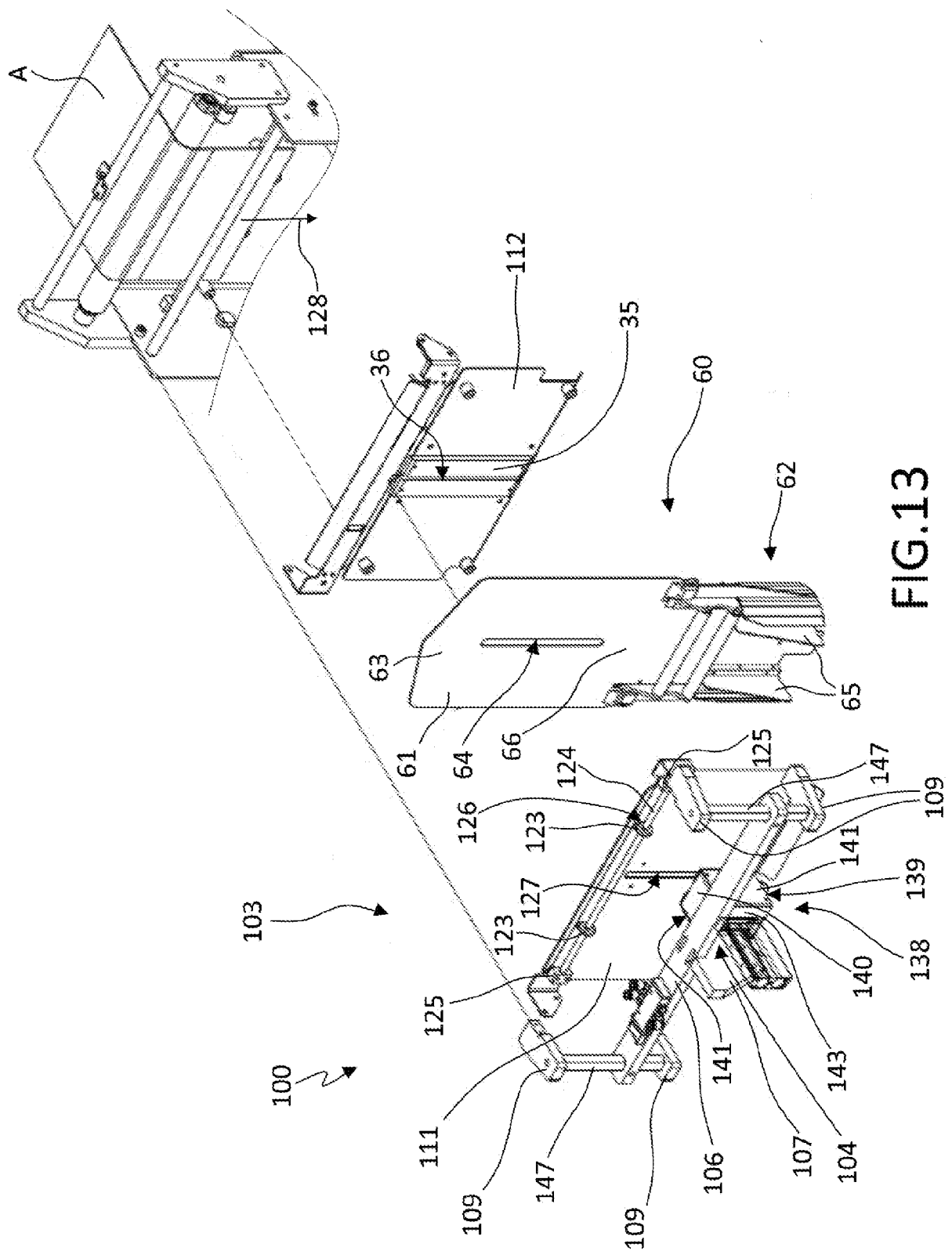


FIG.12



INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2020/053267

A. CLASSIFICATION OF SUBJECT MATTER INV. B31D1/02 B65B61/02 B31F1/18 B26F1/18 ADD. B65C3/06		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) B31D B65B B67C B26F B26D B65C		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	the whole document	3-5,14
A	-----	15
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Y	the whole document	3-5

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☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 16 July 2020		Date of mailing of the international search report 27/07/2020
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Johne, Olaf

INTERNATIONAL SEARCH REPORT

International application No
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International application No

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