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(54) **APPARATUS FOR AUTOMATICALLY PLACING WIRE COLLARS WITH A HANGING TAG ON BOTTLES**

(57) Method and apparatus for automatically placing a wire collar with a hanging tag (C) on a container such as a bottle (B), comprising: tag feeding means (13) for feeding single tags in sequence over a horizontal plane (XY) in a feeding direction (X) from a first tag storage area (1), towards a second area (2) comprising wire insertion means (21) for inserting the wire in a hole of the tag (C), means for forming a wire loop and for knotting (25, 26) the same, wire cutter means (27) for loosing and releasing the loop, said second area (2) being associated with a third area (3) for feeding single containers in sequence, said third area (3) comprising lifting means of each single container in vertical alignment with the formed loop in a loosened arrangement, adapted to partially fit the container (B) into the loop, whereby the release of the wire loop results in a fall of the same in engagement over the container.

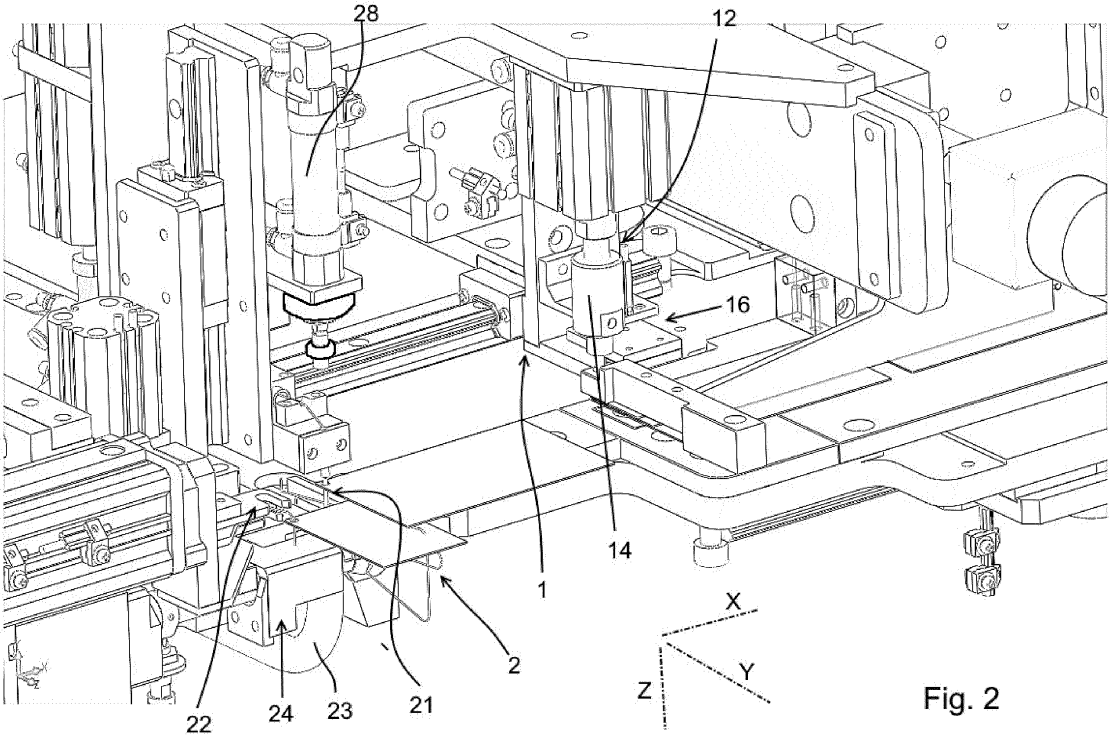


Fig. 2

EP 3 822 184 A1

Description

Technical field of the invention

[0001] The present invention relates to the field of labelling containers, in particular though not necessarily, glass bottles for wine, oil or the like. More specifically the invention relates to an apparatus for automatically placing wire collars with a hanging tag on bottles (but also more generally on other containers such as jars).

Background of the invention

[0002] It is well known to provide collars for containers such as glass bottles for oil, wine, sauces, beer, spirits, etc. as well as other jars and the like, the collar having a hanging tag bearing additional information on the product. The collar is placed by inserting it from above over the bottle neck, being sized such as to stop where the neck enlarges, leaving the tag hanging outwardly on the body of the bottle itself. The most widespread solution for especially valuable products provides that the collar comprises a wire knotted in a loop, that supports the aforesaid tag, in which a hole is formed for insertion of the wire.

[0003] Such type of collars is very often placed manually on the bottles, which is obviously time- and labour-consuming. Machines for automatically placing collars have also been envisaged, wherein the loop of continuous or (already) knotted wire, provided with a tag, is taken by a manipulation system, loosened and thus inserted from above until it is released on the bottle neck. Such type of systems may however be improved in efficiency, especially in case of wire materials that have no or reduced elasticity (non-elastic wires being in general considered more attractive or perceived as such, thus preferred in the sector of more expensive wines and oils). The manipulation system can furthermore damage the wire and this is also a negative aspect for valuable productions. A further aspect which possibly represents an even greater problem is related to poor versatility, in that known machines are normally rather rigid and can hardly, if not at all, adapt to different types of wire, bottle shape, type of label.

Summary of the invention

[0004] The present invention has the object to provide an apparatus for automatically placing wire collars with a hanging tag on bottles which allows to operate with a greater versatility, reliability and fewer or zero risk of damaging the wire, especially in case of non-elastic wire, if compared to the automatic apparatuses of the already known type.

[0005] This and other objects are attained by the apparatus for automatically placing wire collars with a hanging tag on bottles according to the present invention, the essential characteristics of which are defined by the first of the enclosed claims. Other important additional characteristics are the subject matter of the dependent claims.

Brief description of the drawings

[0006] The characteristics and advantages of the apparatus for automatically placing wire collars with a hanging tag according to the present invention will become apparent from the following description of an embodiment thereof, made for exemplary and non-limiting purposes with reference the attached drawings wherein:

- figure 1 is a general axonometric view of the apparatus;
- figure 2 is an axonometric view in greater detail of a punching and wire knotting area;
- figure 3 shows the apparatus from below in a area for feeding the tags;
- figure 4 represents a unit for knotting the wire, with parts surrounding the apparatus omitted for the sake of simplicity of illustration;
- figure 5 represents, in isolation, a tag peeling unit;
- figure 6 shows, in isolation, a tag transfer unit;
- figure 7 is, again in isolation, a wire cutting or scissor unit;
- figure 8 represents in isolation a hook unit for aligning the wire;
- figure 9 shows in isolation a clamp unit for locking the wire;
- figures 10a to 10e show the subsequent steps of the process for forming the collar and releasing it over the bottle neck carried out by the apparatus according to the present invention.

Detailed description of the invention

[0007] With reference to said figures, the apparatus according to the invention conceptually comprises three functional areas which correspond to respective consecutive steps of the process for forming the collar and placing or releasing it over the bottle neck, and particularly: a first tag storage area 1 with a relative turret-shaped magazine 11 and a punching device 12: a second area 2 for inserting the wire (or whatever cord) in the tag and simultaneously creating, by knotting the wire, a closed loop, and wherein the collar is later fitted over the bottle neck; a third area 3 for feeding and lifting the bottles or containers (onto which the collar is to be introduced) one at a time towards the previous wire knotting and collar fitting area 2.

[0008] The tags are inserted and stacked in the turret-shaped magazine 11, adjustable in length and depth, adapted to house different tag formats.

[0009] At the base of the turret 11 a slot is obtained which enables a peeling device 13 to pick up a tag C at a time and convey it to the punching device 12 according to a feeding direction X on a horizontal working plane

XY. While it is lifted the peeling device 13 (figure 5) engages the tag at the base of the stack by means of suction cups 131.

[0010] The punching device comprises a puncher 14, moved by a pneumatic system, which moves downwards and forms a hole at an angle of the tag C. A first pneumatic clamp 16, connected to a linear actuator 15, locks the punched tag and conveys it beyond the punching device and to the following area 2 always following the feeding direction X.

[0011] The area 2 for inserting the collar and knotting the wire comprises first of all a needle 21 in charge of inserting the wire F, unwound from a storage arranged at the back, into the hole of the tag. The tag is locked in position, with the hole centred on the axis of downward movement of the needle (direction Z orthogonal to the plane XY and thus vertical), by a second clamp 22 while the first clamp 16 slides backwards towards the starting position at the storage magazine 11 and related punching device 12.

[0012] At this point the needle 21 moves downwards and enters into the hole of the tag while a cylinder 28 blocks the wire to prevent it from slipping during the downward movement of the needle. The wire protrudes axially out of the free end of the needle and during this step a suction system 23, aligned with the needle 21 below the working plane, makes it possible to hold by suction a part of wire coming out of the needle, arranging the wire in a properly stretched state.

[0013] A third clamp 24 (figure 9) locks the wire and the needle 21 can move upwards again until it gets out of the tag. At this point the wire passing through the hole is free to slide only in the sense of release from the needle.

[0014] The second clamp 22 is shaped, as seen on the XY plane, as a hook (for example U-shaped) and engages the tab at the angle of the hole (with the wire F) in such a way that in the clamping position on the angle of the tag the hole itself is surrounded by the concavity of the hook, which has the open side facing outwardly with respect to the direction Y (crosswise direction, orthogonal to the longitudinal direction X). The second hook-shaped clamp 22 (which as will be clarified hereafter is actually a double clamp with two superimposed hooks) is mobile according to the aforesaid crosswise direction Y, indeed in the outward direction (i.e. of outwards displacement) with respect to the starting position being kept during the wire insertion.

[0015] By moving forward along such direction, the clamp 22 displaces the tag C of a certain distance, and it also clamps the wire dragging it until it creates a loop, closed for the moment (figure 10a), the segment length of which will be a function of the (adjustable) displacement distance of the clamp until a stop position. The amount of unwound wire will also be made us of in the knotting operation. The needle can lower back towards the starting position.

[0016] In this step, in fact, the loop is stretched such to be engaged tangentially with a twisting head 251, pivoting around an axis parallel to the feeding direction X, of a knotting device 25, forming a helical groove 251a and divided into two parts 251b, 251c with an opening a closing movement in an axial direction. A bar 26 with a hinged hook-shaped free end 261 is rotatably supported around an axis parallel to the direction Y, it is adapted to abut against the area between the head 251 and the second hook-shaped clamp 22, and thus hit the stretched wire/loop, pairing the two wire segments by moving and dragging them downwards inside the helical groove 251a of the head 251 (figure 10b).

[0017] At this point the head rotates (by a stepper motor), firstly of about 50° for firstly hooking the paired wire segments then completing a 360° turn after lifting the bar 26 to allow a coordinated approaching movement (figure 10c) and then moving away again from the clamp 22. In the last part of the rotation (about 170°) the head opens axially and receives the ends of the loop. Once the 360° rotation is over, the two axially movable parts of the head close and tighten the aforesaid ends. The eyelet previously formed around the head and resulting from its helicoidal evolution with the concurrent crosswise approaching of the clamp 22 is then closed around the ends held by the axial tightening of the head thanks to the pulling action exerted by the clamp moving away. The pulling action control and the flexion/torsion control exerted on the wire/loop through the coordinated movements of the mentioned components are actually responsible for knotting and consequently creating the closed loop which will form the collar.

[0018] The wire loop is now knotted and the collar is complete. A scissor 27 cuts the exceeding wire, in order to have an even wire length at the loop end. The second clamp 22 is still engaging the paired wire segments and divides, with an upper hook 221 which stays retracted engaging a wire segment and a lower hook 222 which moves forward (in the direction X) carrying therewith the other wire segment, loosening the loop in a triangular shape (figure 10d).

[0019] The underlying area 3 is for taking a bottle B below the loosened loop. Such area provides a carousel transportation system with features known in the bottling sector, typically a rotary table. Thereby the bottle B is taken into position and then lifted (figure 10e) to fit the neck thereof into the triangular loop.

[0020] The return sequence to the initial position of the various mentioned components makes it possible to loosen the loop and to lay by gravity the tag on the bottle neck. The bottle is free to move downwards and go back into position in the transportation system to be taken to the machine way out, provided with a collar with tag. The cycle repeats over and over for the following collars and bottles.

[0021] The entire above described operative behaviour is supplied and controlled by powered/actuating devices and control systems of the known type and/or that can be obviously implemented based on the automation

technologies known in the art.

[0022] The machine according to the invention is suitable for inserting wire tags over the necks of any type of bottles, and with a few changes in terms of setting, may be adapted to insert tags with elastic bands substantially on any type of jar container (honey, jams, preserves etc.).

[0023] The machine operation is simple, intuitive and reliable. Conveying the bottle towards the area for coupling with the collar takes place independently from, and concurrently with, the operations for forming the collar itself, with consequent high productivity.

[0024] The machine is extremely versatile, as it can be adapted, based on the customer's needs, to various types of wire, tags and bottles, with just small adaptations and adjustments. The wire may be of the non-elastic type, even rather thick, and the modes for treating it are such to form a top-quality collar, free from risks of getting damaged. It is clearly possible and even easy to adjust the movements such to generate loops of different sizes, which adapt to bottles of different shapes in a relatively tighter or looser way.

[0025] The present invention has been described herein with reference to preferred embodiments thereof. It is to be understood that there may be other embodiments that relate to the same inventive concept, within the scope of protection of the attached claims.

Claims

1. Apparatus for automatically placing a wire collar with a hanging tag (C) on a container such as a bottle (B), comprising: tag feeding means for feeding single tags in sequence over a horizontal plane (XY) in a feeding direction (X) from a first tag storage area (1), towards a second area (2) comprising wire insertion means for inserting the wire in a hole of the tag (C), means for forming a wire loop and for knotting the same, wire cutter means for loosing and releasing the loop, said second area (2) being associated with a third area (3) for feeding single containers in sequence, said third area (3) comprising lifting means of each single container in vertical alignment with the formed loop in a loosened arrangement, adapted to partially fit the container (B) into the loop, whereby the release of the wire loop results in a fall of the same in engagement over the container.

2. Apparatus according to claim 1, wherein said first storage area (1) comprises a turret-shaped magazine (11) adapted to house superimposed tags, and having at its base a slot for the extraction of single tags, in cooperation with tag peeling suction means (13).

3. Apparatus according to claim 2, wherein said first tag storage area (1) comprises comprising puncher means (12) to form a hole in each tag (C).

4. Apparatus according to any of the previous claims, wherein said tag feeding means comprise a first feeder clamp (16) movable along said feeding direction (X).

5. Apparatus according to claim 4, wherein said second wire insertion and knotting area (2) comprises a vertically reciprocating needle (21) for inserting and releasing the wire (F) in the tag hole, means (23, 24) for locking the wire below said horizontal plane (XY), a wire twisting head (251) having a helical groove (251a) and rotating around an axis parallel with said feeding direction (X), and a second clamp (22) adapted to clamp said tags (C) at a tag portion surrounding said hole, said second clamp (22) being movable in a crosswise direction (Y) orthogonal to said feeding direction (X) to stretch the wire tangentially to said twisting head (251) while forming and tightening said loop.

6. Apparatus according to claim 5, wherein said twisting head (251) is formed by two mutually movable parts (251b, 251c) adapted to become open and closed by displacing in a head axis direction, and is adapted to cooperate with a bar (26) pivoted around an axis parallel to said crosswise direction (Y) and having a hook-shaped free end (261) adapted to fall at a location between said end and said second clamp (22) to hit the stretched wire loop, pairing the two side-by-side wire segments and dragging them downwards inside the helical groove (251a) of said head (251).

7. Apparatus according to claim 5 or 6, wherein said second clamp (22) is hook-shaped such that in the clamping position at an angle of the tag around said hole the concavity of the hook surrounds the same hole and faces outwards in said crosswise direction, the second clamp (22) further comprising two superimposed hook members (221, 222), with an upper hook member (221) adapted to stay retracted engaging a wire segment and a lower hook portion (222) adapted to move forwards, in a displacement direction parallel to said feeding direction (X), so as to pool the other wire segment, loosening said loop in a triangular shape.

8. A method for automatically placing a wire collar with a hanging tag on a container such as a bottle (B), comprising: feeding single tags (C) in sequence over a horizontal plane (XY) in a feeding direction (X) to a tag punching step for forming a hole in each tag (C) and then to: a wire insertion step for inserting the wire in the hole of the tag (C); a wire looping and knotting step comprising also cutting the wire, loosing and releasing the loop, in the same step single containers (B) being fed in sequence under the loop and lifted in vertical alignment with the formed loop

in a loosened arrangement, to partially fit the container (B) into the loop, whereby the release of the wire loop results in a fall of the same in engagement over the container (B).

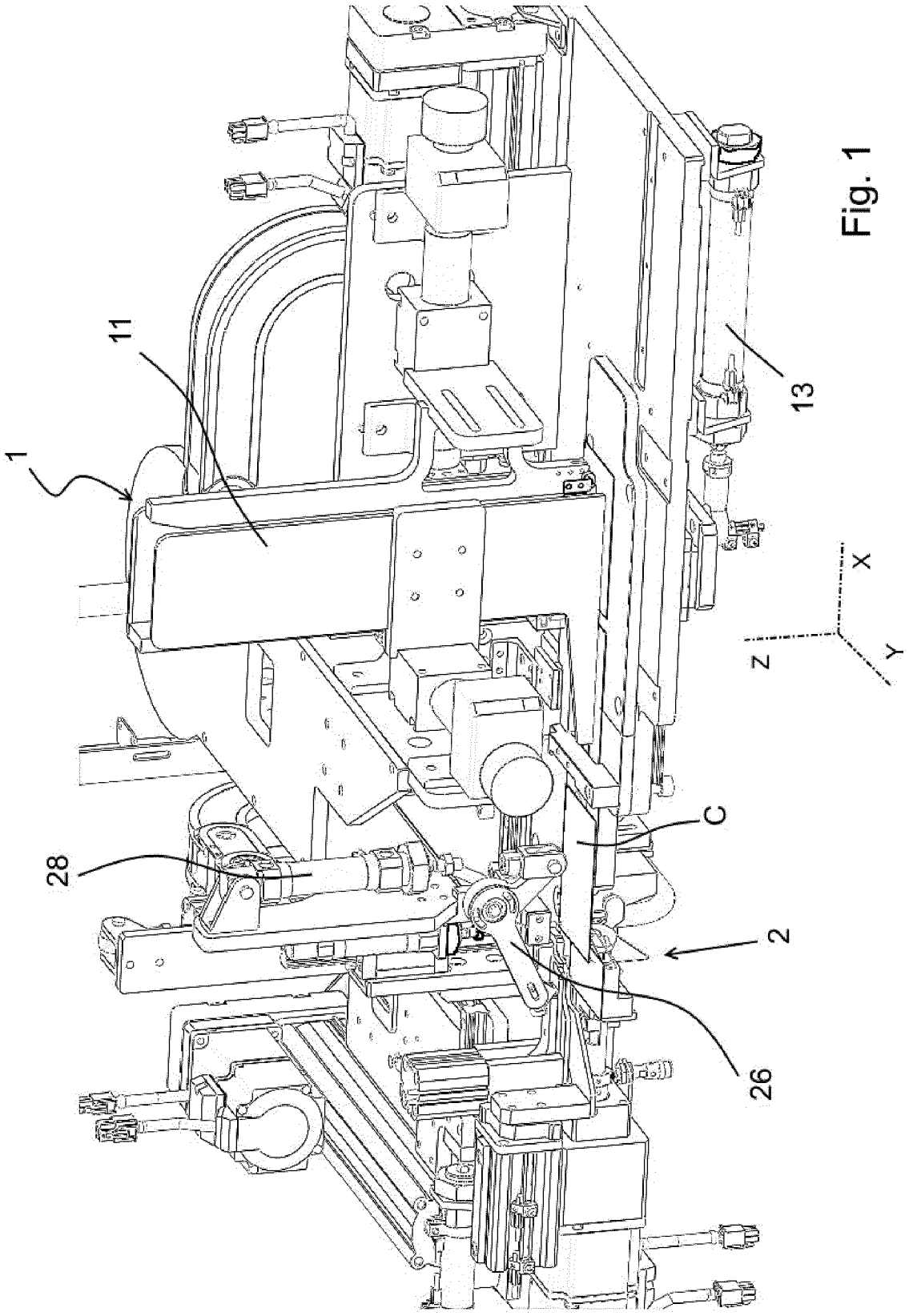


Fig. 1

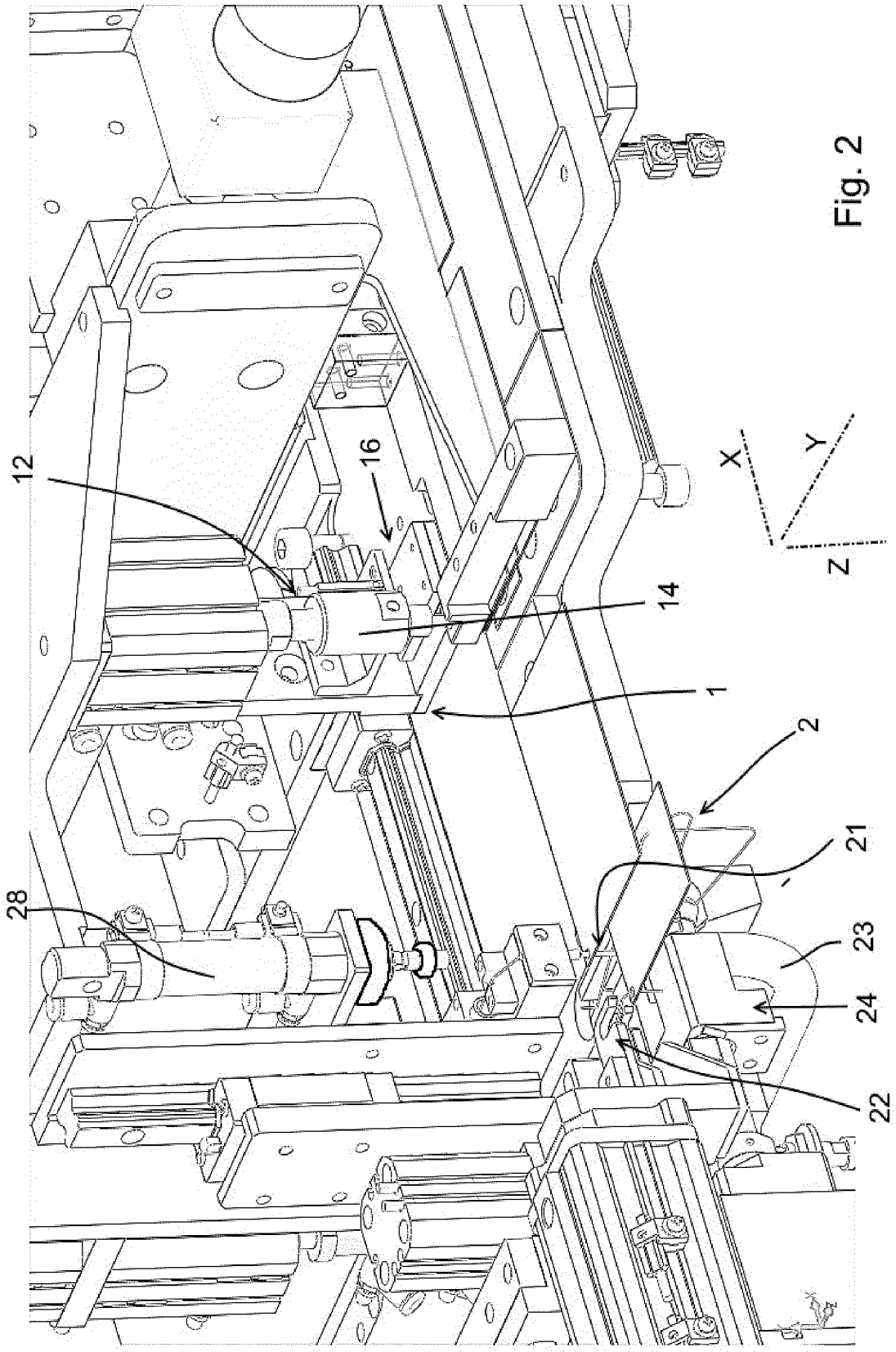
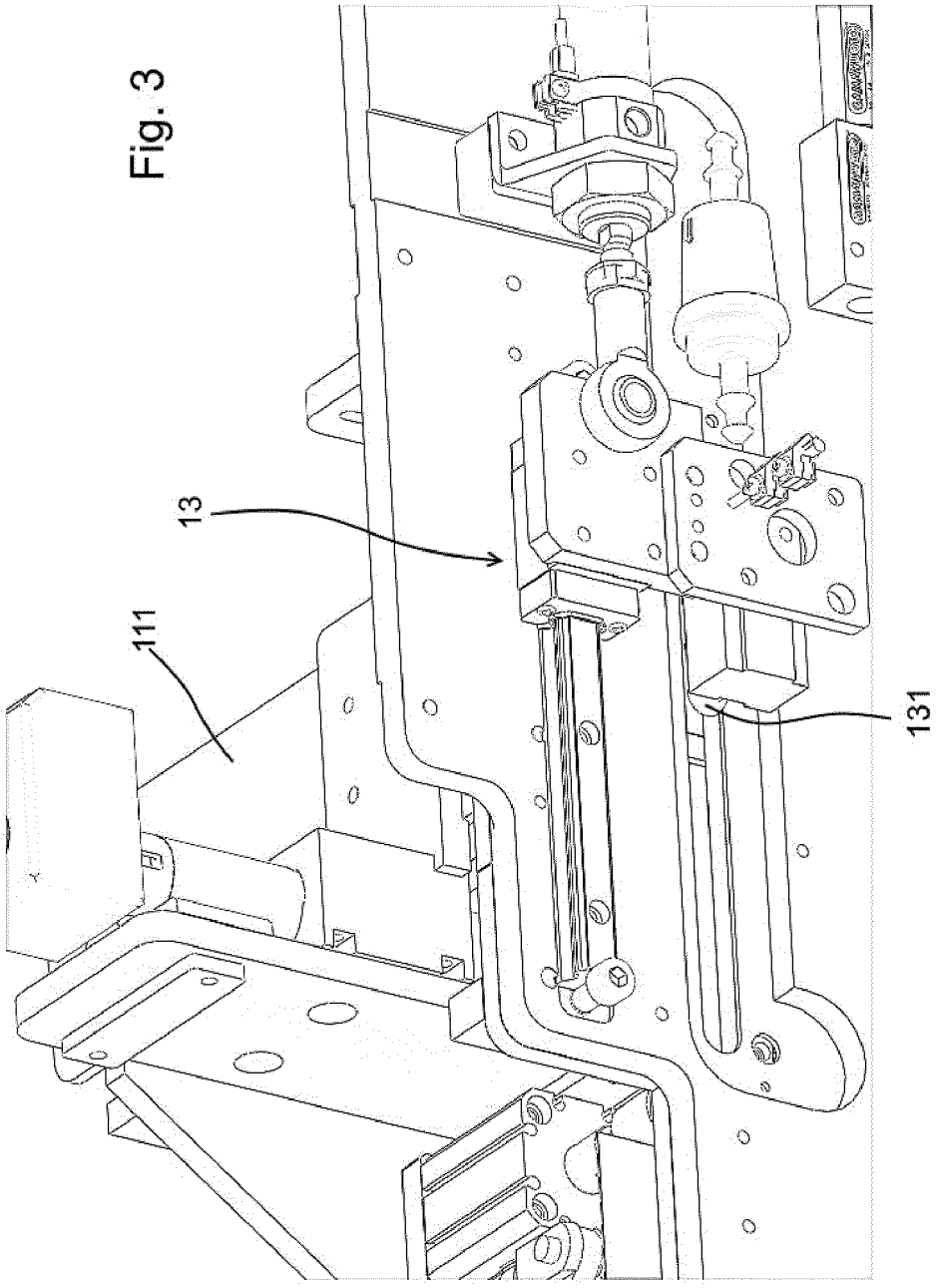


Fig. 2

Fig. 3



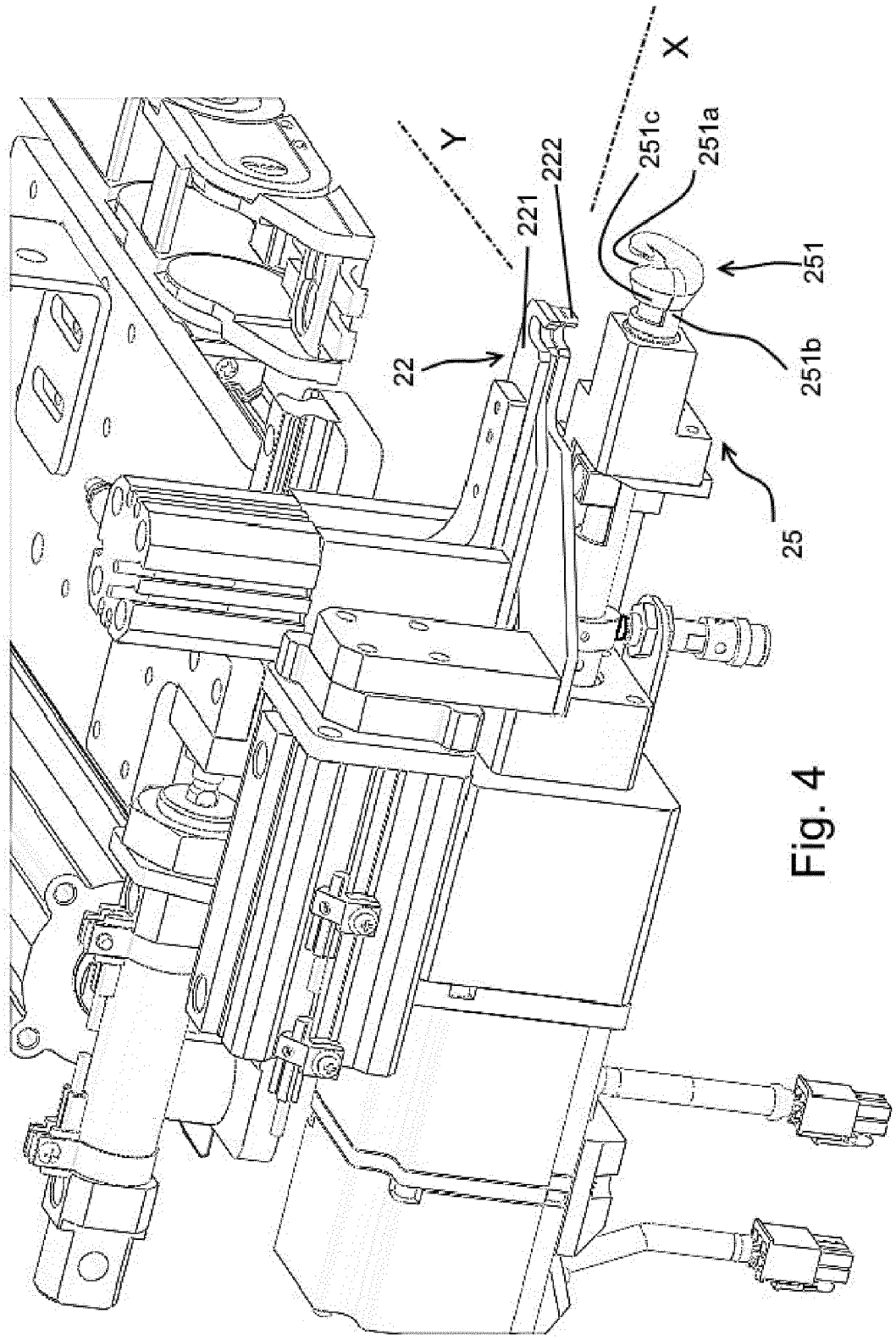


Fig. 4

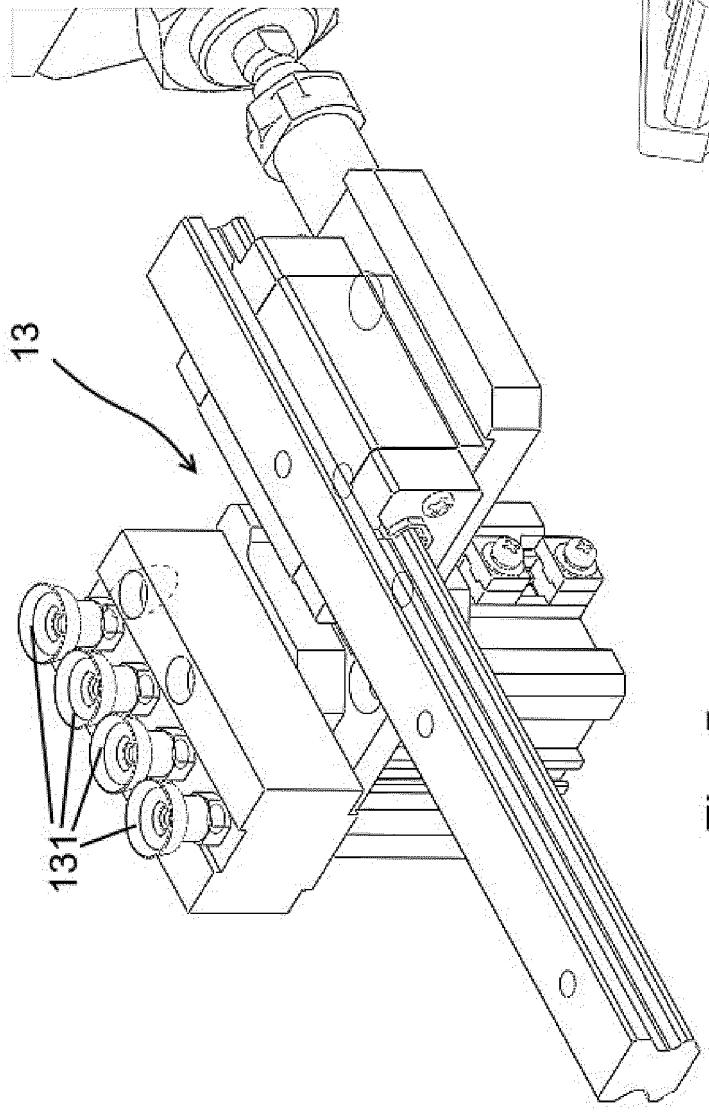


Fig. 5

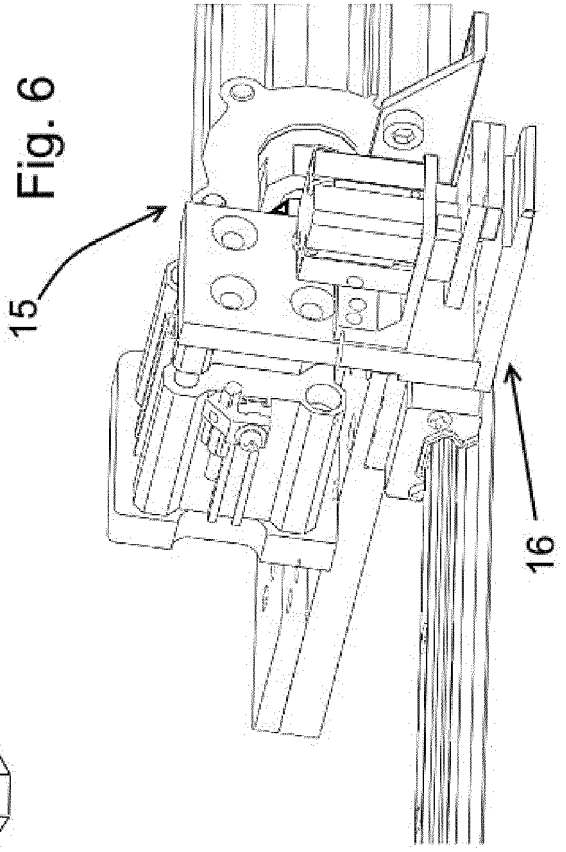


Fig. 6

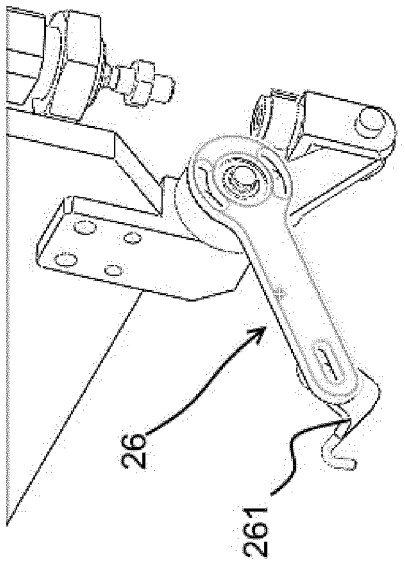


Fig. 7

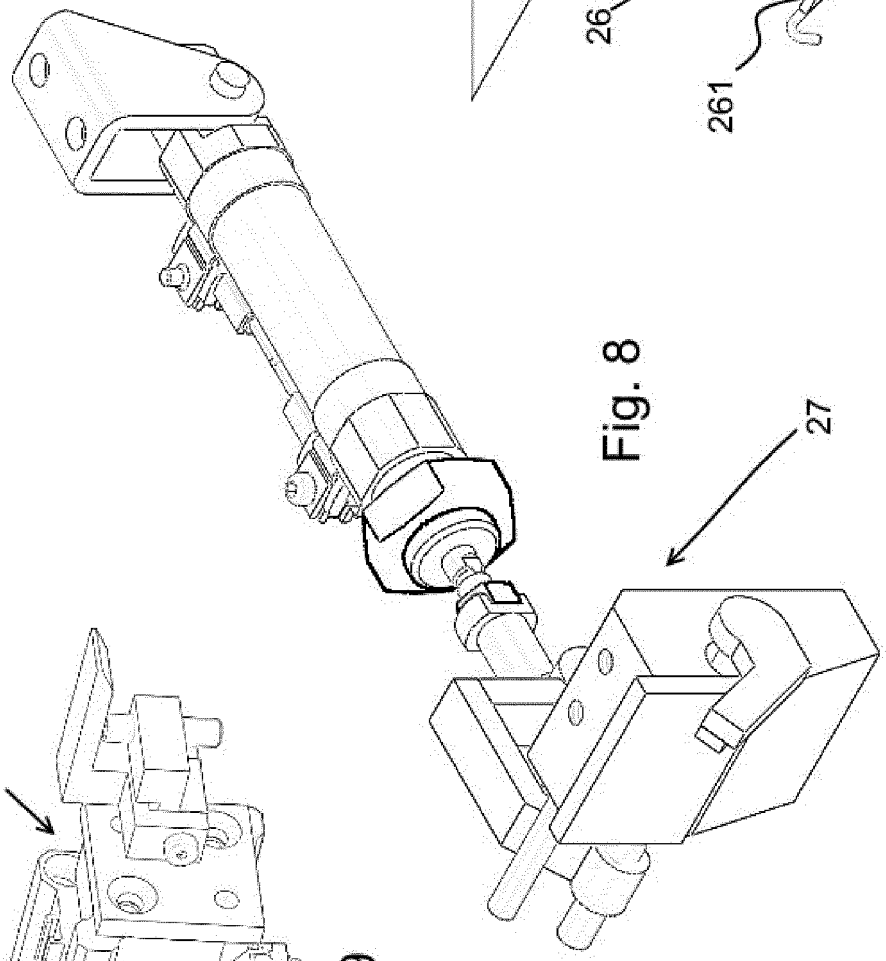


Fig. 8

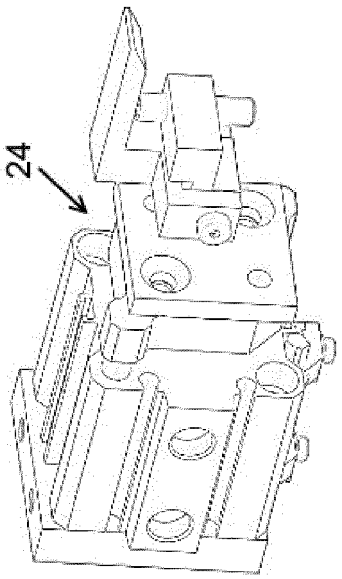


Fig. 9

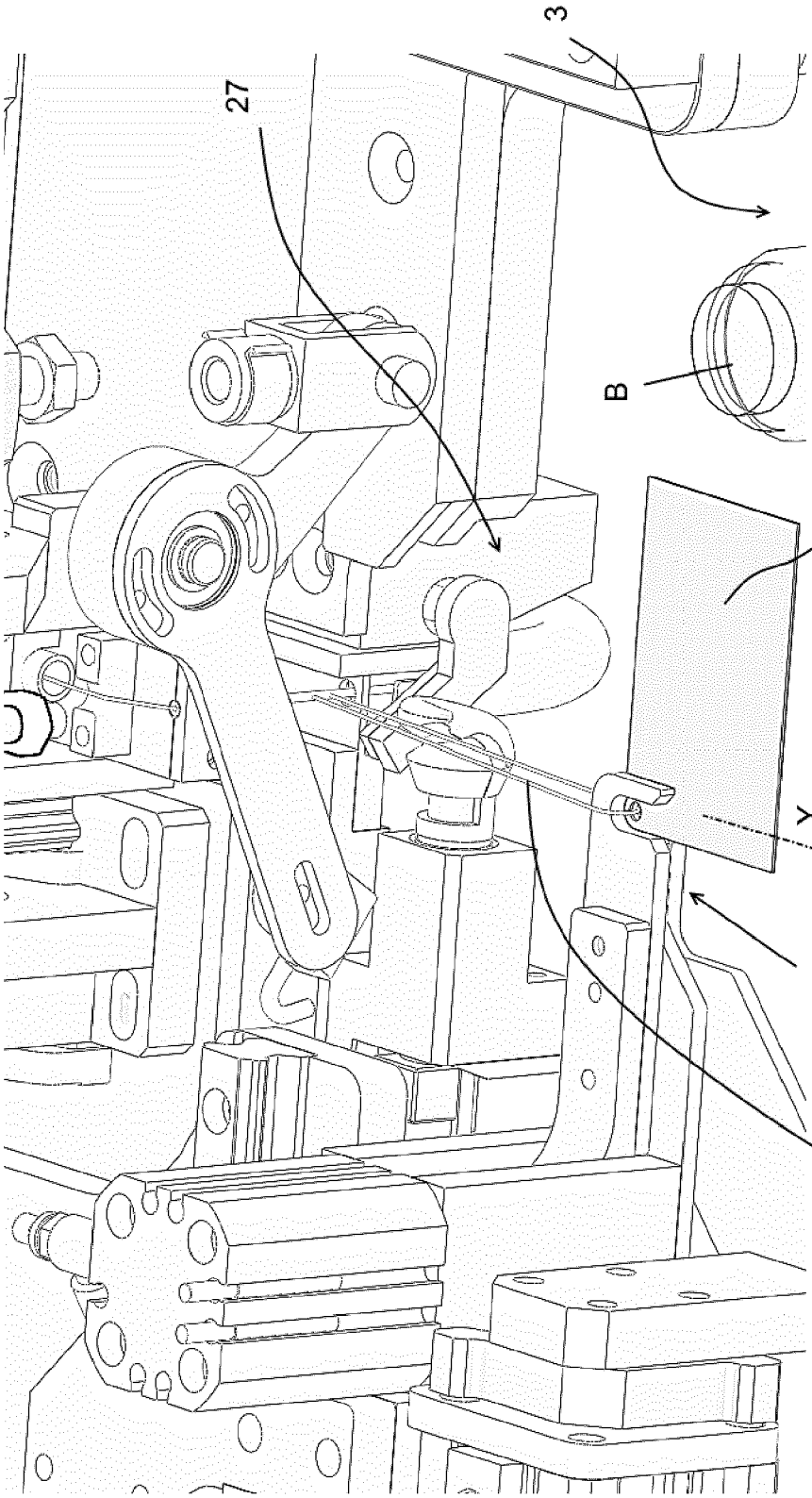


Fig. 10a

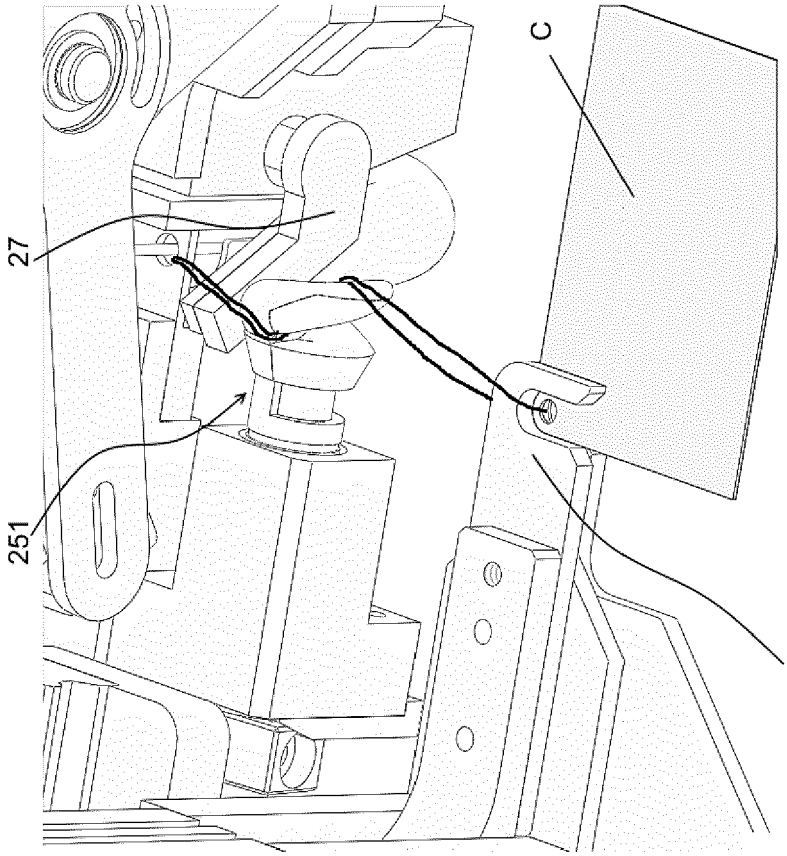


Fig. 10c

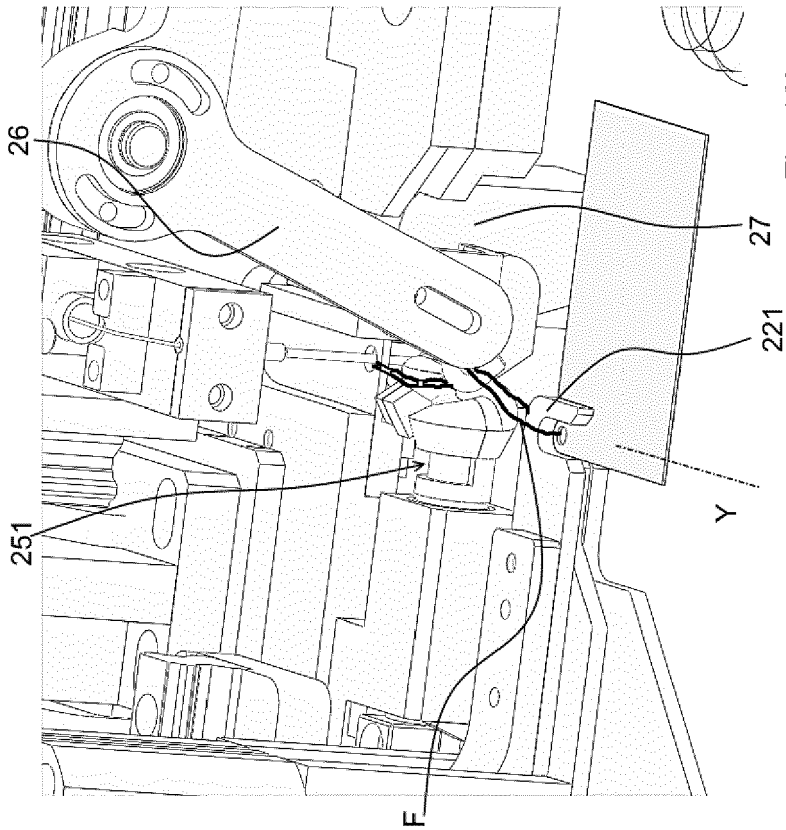


Fig. 10b

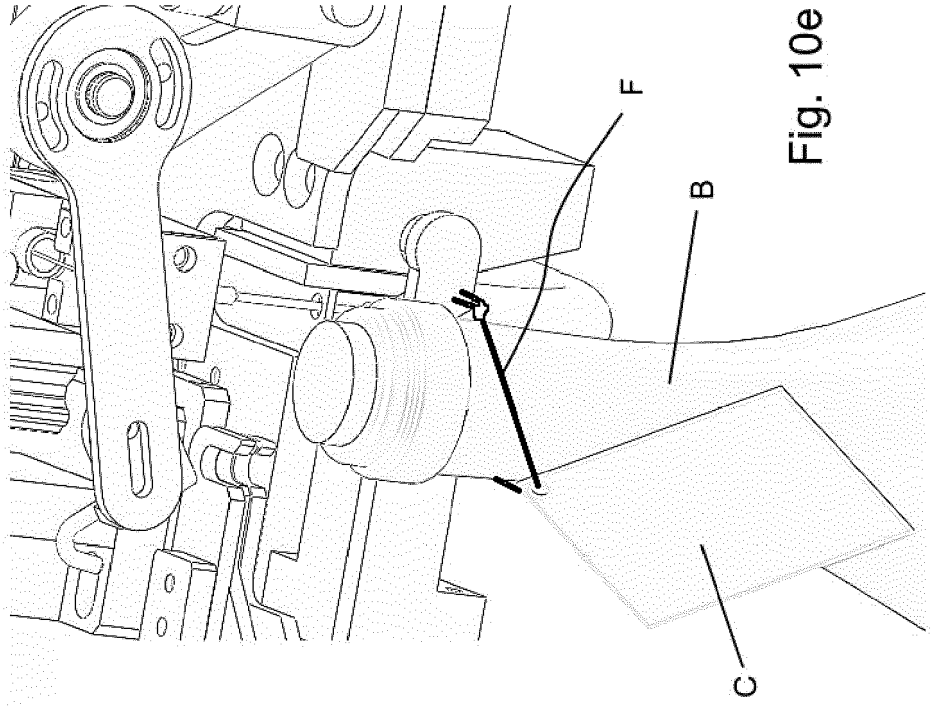


Fig. 10e

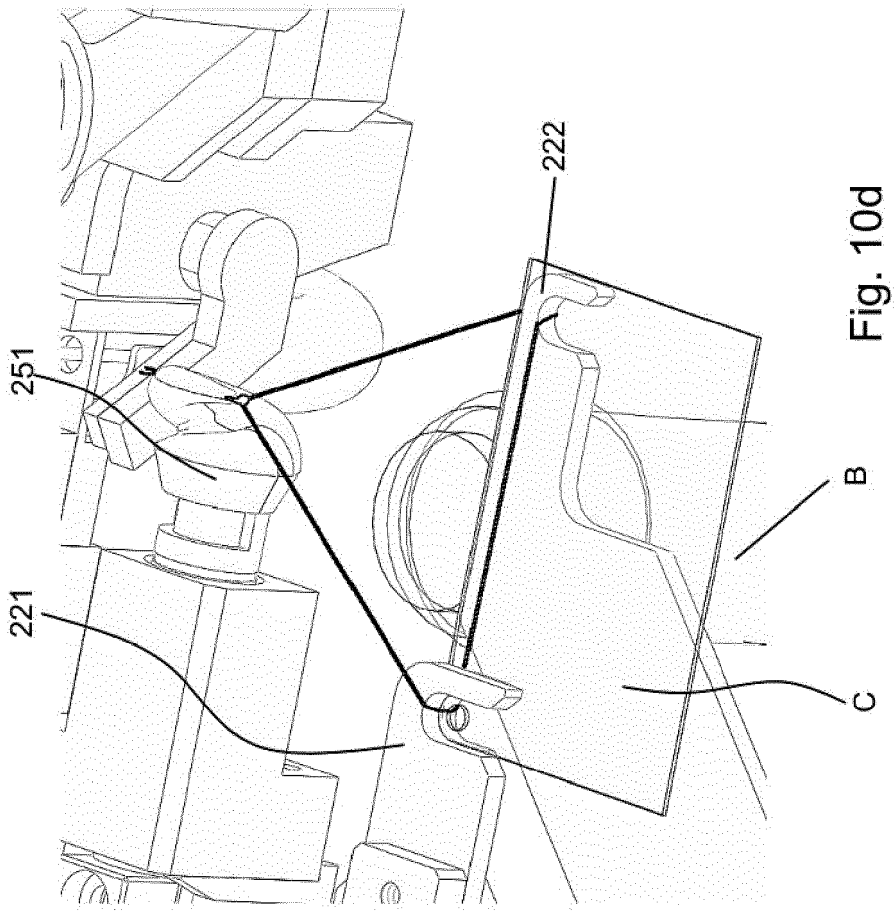


Fig. 10d

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EUROPEAN SEARCH REPORT

Application Number
EP 20 20 6771

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 275 681 A (HETTLER ALBERT [DE]) 4 January 1994 (1994-01-04)	1-4,8	INV. B65C7/00
A	* column 1, line 46 - column 2, line 2 * * column 3, line 40 - column 4, line 15 * * column 4, line 43 - line 62; figures 1-6 *	5-7	

TECHNICAL FIELDS SEARCHED (IPC)

B65C
B65B
B31D
G09F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	8 April 2021	Wartenhorst, Frank

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08-04-2021

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