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(54) APPARATUS FOR CLOSING A FOLDED PACKAGE WITHOUT THE USE OF GLUING MEANS AND THE RELATED METHOD FOR CLOSING A FOLDED PACKAGE

(57) Apparatus (80) for closing a folded package (4) without the use of gluing means, comprising means (84) for retaining the package (4) in a folded configuration, the package (4) comprising at least one rear flap (8) and at least one front flap (12), superimposed onto the rear flap (8), on the opposite side of a containment volume (16) delimited by the package (4), wherein the retaining means (84) comprise at least one lateral bracket (88) that interfaces with the front flap (12) and at least one locking device (76) of said rear flap (8), so as to maintain said front (12) and rear (8) flaps locked in a position of mutual contact, at least one pusher (92) having an actuation stroke adapted to move a closing tab (44) of the front flap (12), hinged along a closing line (52), towards the rear flap (8) so as to interlock said closing tab (44) within a notch (40) on the rear flap (8), said pusher (92) being provided with a front protrusion (96) that is forward of a front wall (100). The actuation stroke of the pusher (92) is of the linear type and parallel to a longitudinal extension axis (L-L) of the pusher (92). The front protrusion (96) is provided with a movable partition (108) capable of passing from a closed configuration, wherein it is adhered to said front protrusion (96), to an open configuration, wherein it moves away from the front protrusion (96) so as to protrude transversely with respect to the front protrusion (96), along a sectional plane perpendicular to said longitudinal extension axis (L-L) of the pusher (92).

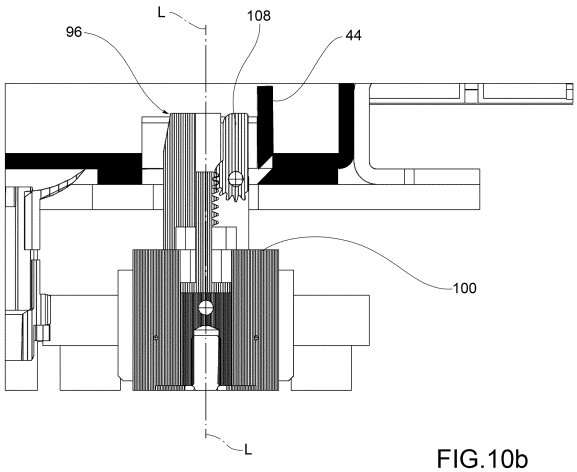

FIG.10b

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Description

FIELD OF APPLICATION

[0001] The present invention relates to an apparatus for closing a folded package without the use of gluing means, and the related method for closing a folded package.

PRIOR ART

[0002] In the prior art, there are automatic machines for the packaging of products (primary packaging) in cartons (secondary packaging - wraparound and RSC) which may use two carton closure systems, i.e., a hot-glue closure system and/or adhesive tape.

[0003] Both technologies result in the plant having high production and maintenance costs for the operation of these two systems.

[0004] Furthermore, the use of glue and/or adhesive tape renders the cardboard packaging partially recyclable. In fact, before the carton may be sent to the recycling process, a step of removing the glue or adhesive tape is required.

[0005] Currently, there are wrap-around cardboard packages with interlocking closure systems that are devoid of glue and/or tape, and that are designed to be closed only by means of a manual closure process, wherein the automation thereof may entail complicated closure systems that are per se very expensive and which do not ensure effectiveness, efficiency, and repeatability under all of the essential operating conditions for an industrial process.

[0006] Moreover, such solutions are unable to ensure the sealing of the closure over time, or in any case do not ensure the same sealing performance that may be obtained with the aid of glue and/or adhesive tape.

[0007] In other words, known solutions of folded and closed packaging without the aid of glues and/or adhesive tape are difficult to automate on production lines, and must be closed manually: this limitation involves considerable increases in production time and costs. Furthermore, the known solutions without glue and/or adhesive tape do not ensure the same closing performance as those solutions that instead make use thereof.

[0008] Thus, the technological constraint to be overcome is to find a closure embodiment that may be automated and resistant in the same way as a closure using glue or adhesive tape, a method and a system that allow for the effective and efficient automation thereof, and that is at the same time simple and economical. A solution according to the preamble of claim 1 is known from US 2937486 A.

DISCLOSURE OF THE INVENTION

[0009] The need to solve the drawbacks and limitations mentioned with reference to the prior art is therefore felt.

[0010] In other words, there is a need to make a package, for example a wraparound type carton, using closures that do not use hot glue or adhesive tape, which may be automated in the process of forming and closing the package. The closed packaging must also have the same features of resistance to opening as classic hot glue or adhesive tape systems.

[0011] There is also a need to provide an automated apparatus capable of automatically forming and closing a wraparound carton using a specially made interlocking closure system. The process of forming and closing the package must also ensure the same performance in speed, efficiency and strength as the known hot glue or tape closure systems.

[0012] Such need is satisfied by an apparatus for closing a folded package according to claim 1 and by a method for closing a folded package according to claim 10.

DESCRIPTION OF THE DRAWINGS

[0013] Further features and advantages of the present invention will become more apparent from the following detailed description of preferred, non-limiting embodiments thereof, wherein:

Figure 1 is a partial perspective view of a package that has been closed according to one possible embodiment of the present invention;

Figures 2-13 are perspective views from different angles, or at least partially sectional views, of a closing apparatus according to the present invention, according to a possible closing sequence of a package;

Figures 14 show perspective, lateral, and sectional views of a pusher according to one possible embodiment of the present invention.

[0014] Elements or parts of elements common to the embodiments described hereinafter will be indicated with the same numerical references.

DETAILED DESCRIPTION

[0015] With reference to the aforesaid figures, the reference numeral 4 globally indicates an overall schematic view of a package according to the present invention.

[0016] For the purposes of the present invention, the size or shape of the package to be closed is not relevant.

[0017] Furthermore, for the purposes of the present invention, the material of the packaging is not relevant. In other words, the invention may be applied to packaging obtained from suitably shaped and folded dies starting from sheets of cardboard but also from other materials, such as, for example, plastics materials.

[0018] The package 4 comprises at least one rear flap 8 and at least one front flap 12 which may be folded onto

the rear flap 8 in such a way that, in a folded configuration, it is superimposed upon the rear flap 8 on the opposite side of a containment volume 16 delimited by the package 4.

[0019] The rear flap 8 comprises at least one pair of rear strips 20, partially cut out from a rear window 24 and mutually facing each other along a separation line 28 and hinged with respect to hinge lines 32 opposite said separation line 28.

[0020] The rear strips 20 are flanked, at a closing side 36, by a notch 40 that is contiguous to said hinge lines 32, so as to delimit said rear window 24.

[0021] The front flap 12 comprises at least one closing tab 44, cut out from a front window 48 and hinged with respect to a closing line 52 arranged in proximity to said notch 40, in the folded configuration.

[0022] The front window 48 is at least partially aligned and superimposed onto the rear window 24 in a folded configuration.

[0023] In order to obtain a stable closure of the package, the closing tab 44 is inserted in an interlocking manner into said notch 40.

[0024] The closing tab 44 has a height 56 which is greater than the height 58 of the corresponding notch 40, said heights being measured parallel to the closing line 52: this arrangement helps to ensure that the closing tab 44 is locked within the relative notch 40.

[0025] The rear strips 20 are parallel and contiguous with each other so as to close said rear window 24: in this way, on the one hand, they contribute to locking the closing tab 44 in the interlocking position and, on the other hand, by closing the rear window 24, they prevent access to and/or being viewed from the outside of the containment volume 16 of the package 4.

[0026] In turn, the closing tab 44 influences the rear strips 20 in the closing position of the rear window 24.

[0027] Preferably, the hinge lines 32 of the rear strips 20 are perpendicular to the closing line 52 of the closing tab 44.

[0028] According to one possible embodiment, the rear strips 20, at the notch 40, i.e., on the closing side 36, have guide chamfers 60, diverging from the separation line 28 towards the same notch 40.

[0029] Said guide chamfers 60 help to facilitate the return of the rear strips 20 in closing the rear window 24 under the thrust of the closing tab 44.

[0030] According to one possible embodiment, the closing tab 44, at the closing line 52, has opening chamfers 64, diverging from the hinge line 32 toward the front window 48. Said opening chamfers 64 facilitate the insertion of the closing tabs 44 into the rear window 24 and the notch 40.

[0031] According to one possible embodiment, the front flap 12 comprises at least one front through hole 72, so as to allow access to a portion of the underlying rear flap 8 in a folded configuration, for inserting a locking device 76 (better described below) on the side of the front flap 12 and selectively locking the rear flap 8 in abutment against the front flap 12 during the step of closing the package 4 through the closing tab 44.

[0032] Preferably, but not necessarily, said front hole 72 is arranged in proximity to the front window 48, so as not to intercept the rear window 24, in a folded configuration.

[0033] An apparatus 80 for closing a folded package 4 without the use of gluing means will now be described.

[0034] In particular, the apparatus 80 comprises means 84 for retaining the package 4 in a folded configuration, i.e., having at least one rear flap 8 and at least one front flap 12, superimposed onto the rear flap 8, on the opposite side of the containment volume 16 delimited by said package.

[0035] The retaining means 84 comprise at least one side bracket 88, which interfaces with the front flap 12, and at least one locking device 76 of said rear flap 8, so as to keep said front 12 and rear 8 flaps locked in the position of mutual contact.

[0036] According to one possible embodiment, the locking device 76 of said rear flap comprises at least one suction cup that abuts against a portion of the rear flap 8.

[0037] The apparatus 80 further comprises at least one pusher 92 having an actuation stroke adapted to move the closing tab 44 of the front flap 12, hinged along the closing line 52, towards the rear flap 8 so as to interlock said closing tab 44 in the notch 40 on the rear flap 8.

[0038] According to one possible embodiment, said suction cup 76 is arranged in proximity to said pusher 92: in this way, the possible deformation of the grooves 8,12 during the actuation stroke of the pusher 92 is avoided or otherwise limited.

[0039] The actuation stroke of the pusher 92 is preferably straight and parallel to a longitudinal extension axis L-L of the pusher 92. Such stroke is also perpendicular to the front and rear flaps 8,12 of the package.

[0040] According to one possible embodiment, said pusher 92 is provided with a front protrusion 96 that is forward of a front wall 100; in other words, the front protrusion 96 protrudes from the front wall 100 so as to intercept the flaps 8,12 before intercepting the front wall 100.

[0041] According to one possible embodiment, the front protrusion 96 is tapered away from the front wall 100. For example, the front protrusion has a pair of opposing and converging slopes 102.

[0042] Preferably, said slopes comprise knurls or grooves 106 that facilitate the closure of the rear flaps 20 during a retraction stroke of the pusher 92.

[0043] According to the invention, the front protrusion 96 is provided with a movable partition 108 capable of passing from a closed configuration, wherein it is adhered to said front protrusion 96, to an open configuration, wherein it moves away with respect to the front protrusion 96 so as to protrude transversely with respect to the front protrusion 96, along a section plane perpendicular to said longitudinal extension axis L-L of the

pusher 92.

[0044] In this way, in an open configuration, the movable partition 108 may interfere with the closing tab 44, facilitating the rotation thereof in opening about the closing line 52.

[0045] The movable partition 108 may be constructed in various ways. For example, a retractable plunger or a partition hinged to the front protrusion 96 and actuated by a rack-and-pinion mechanism may be provided. Electrical, magnetic, pneumatic, or hydraulic actuators are also possible.

[0046] According to one possible embodiment, said pusher 92 is provided with a compressed air supply channel (not shown) which opens in proximity to said front wall 100 and, preferably, at said movable partition 108.

[0047] In this way, the compressed air may assist the mechanical thrust action exerted by the pusher 92 and by the mobile partition 108.

[0048] The compressed air supply channel is preferably obtained inside the pusher 92 and/or the mobile partition 108.

[0049] The operation of a closing apparatus and the relative closing method according to the present invention will now be described.

[0050] In particular, the closing method firstly provides, during an initial step or step 0, for the arrival at the closing apparatus 80 of an already preformed carton or package 4 to be subjected to the step of closing the joint (see Figure 2).

In particular, during such initial step, the front flap 12 and the rear flap 8 are folded and superimposing each other so as to at least partially align the front window 48 and the rear window 12 therebetween.

[0051] During the subsequent step 1 (Figures 3-4), the closing apparatus 80 advances in a direction perpendicular to the direction of travel of the package 4 until it comes into contact with the carton.

[0052] The lateral brackets 88 hold the package 4 in place and the locking device 76, such as the suction cups, comes into contact with the rear flap 8 (through the front holes 72 in the front flap 12) in such a way as to hold it taut and prevent it from closing inwards during the process of closing the joint.

[0053] Therefore, in step 1, said front and rear flaps 12,8 are kept in a folded configuration, and the rear flap 8, together with the entire package 4, is locked in place.

[0054] In the subsequent step 2 (Figures 5-6), the closing apparatus 80 actuates the pushers 92. Preferably, said pushers 92 advance longitudinally along the respective longitudinal extension axes L-L thereof.

[0055] In this way the front protrusion 96 is pushed so as to widely open the rear strips 20 before then pushing the closing tab 44.

[0056] Subsequently, in the following step 3 (Figures 7-8), the movable partition 108 is actuated, which protrudes with respect to the front protrusion 96: in this way the separation line 28 of the rear strips 20 is completely wide open and the closing tab 44 enters within the slot that was created as a result of the opening of said rear strips 20.

[0057] The closing tab 44 then enters completely inside the carton and is interlocked into the notch 40 of the rear flap 8, which is specially formed so as to accommodate the thickness of the closing tab 44.

[0058] Such position persists even after the repositioning of the movable partition 108 in a closed configuration; it should be noted that the closing tab 44 also remains in position within the notch 40 by virtue of the containment action of the rear strips 20, which are partially closed.

[0059] In particular, in the subsequent step 4 (Figures 9-10a-10b), the movable partition 108 closes, the pusher 92 then retracts, and the rear strips 20 return to the initial starting position, exiting the bulk of the carton 4 (step 5, Figures 11-12). During such step, the knurls or grooves 106 facilitate the closing movement of the rear strips 20 during the retraction of the pusher 92.

[0060] During the return movement of the pusher 92, the rear window 24 closes again due to the elastic recoil of the rear strips 20 of the rear flap 8, and the closing tab 44 present in the front flap 12 remains interlocked therein. In this way the carton is sealed at the same points where hot glue would have been applied. At this point the lateral brackets 88 loosen the grip on the carton 4 and the suction pads 76 cease to function.

[0061] During the last step 6 (Figures 13), the carriage containing the apparatus 80 for locking the carton and for closing the closing tab 44 retracts, thereby allowing the closed carton 4 to advance along the process in such a way that it makes room for a new package 4 that is ready to be closed using the same method.

[0062] As may be appreciated from that which has been described, the present invention overcomes the drawbacks of the prior art.

[0063] In particular, the present invention, compared to current solutions using tape or hot-melt closures, has a plurality of technical and economic advantages that are listed below.

[0064] First of all, there is a lower plant production cost insofar as the module of the plant used for the application of glue and/or adhesive tape, with all of the associated maintenance problems, is completely absent.

[0065] In addition, there is a considerable saving on the cost of purchasing the glue and/or the adhesive tape.

[0066] Furthermore, there is an annual energy saving regarding the cost of the energy necessary for the operation and heating of the glue to be applied.

[0067] In addition, greater plant efficiency is achieved by eliminating stoppages due to malfunctions in the glue and/or tape application apparatus.

[0068] For the same reason, there are lower maintenance costs insofar as the checks and maintenance of the glue and/or tape application system are eliminated. Obviously, also transport due to the provision of glue and/or tape is eliminated.

[0069] Advantageously, insofar as the packaging is

completely free of glue and/or tape, it is possible to obtain 100% recycling of the packaging without polluting elements.

[0070] At the same time, the performance ensured by the present invention in terms of closure, durability and reliability of said closure is entirely comparable to, or higher than, that which may be obtained from known solutions involving the use of glue and/or adhesive tape.

[0071] Advantageously, the pusher equipped with a movable partition is able to penetrate inside the containment volume of the package without the risk of damaging the objects contained therein.

[0072] A person skilled in the art, for the purpose of satisfying contingent and specific needs, may make numerous modifications and variations to the solutions described above.

[0073] The scope of protection of the invention is defined by the following claims.

LIST OF REFERENCES:

[0074]

4: package
8: rear flap
12: front flap
16: containment volume
20: rear strips
24: rear window
28: separation line
32: hinge lines
36: closing side
40: notch
44: closing tab
48: front window
52: closing line
56: height
58: notch height
60: guide chamfers
64: opening chamfers
72: front hole
76: locking device
80: apparatus
84: retaining means
88: lateral bracket
92: pusher
96: front protrusion
100: front wall
102: slopes
106: knurls or grooves
108: movable partition
L-L: longitudinal extension axis of the pusher 92

Claims

1. Apparatus (80) for closing a folded package (4) without the use of gluing means, comprising:

- means for retaining (84) the package (4) in a folded configuration, the package (4) comprising at least one rear flap (8) and at least one front flap (12), superimposed on the rear flap (8), on the side opposite to a containment volume (16) delimited by the package (4),
- the retaining means (84) comprising at least one lateral bracket (88) which interfaces with the front flap (12) and at least one locking device (76) for said rear flap (8), so as to keep said front (12) and rear (8) flaps locked in a position of mutual contact,
- at least one pusher (92) having an actuation stroke adapted to move a closing tab (44) of the front flap (12), hinged along a closing line (52), towards the rear flap (8) so as to interlock said closing tab (44) within a notch (40) on the rear flap (8),
- said pusher (92) being provided with a front protrusion (96) that is forward of a front wall (100) of the pusher (92),

wherein the actuation stroke of the pusher (92) is of the linear type and parallel to a longitudinal extension axis (L-L) of the pusher (92),

characterized in that the front protrusion (96) is provided with a movable partition (108) capable of passing from a closed configuration, wherein it is adhered to said front protrusion (96), to an open configuration, wherein it moves away with respect to the front protrusion (96) so as to protrude transversely with respect to the front protrusion (96), along a section plane perpendicular to said longitudinal extension axis (L-L) of the pusher (92).

2. Apparatus (80) according to claim 1, wherein the front protrusion (96) is tapered away from the front wall (100) .

3. Apparatus (80) according to claim 1 or 2, wherein the front protrusion has a pair of slopes (102) that are opposite each other and converging on the side opposite the front wall (100).

4. Apparatus (80) according to claim 3, wherein said slopes (102) comprise knurls or grooves (106).

5. Apparatus (80) according to claim 1, 2, 3, or 4, wherein the movable partition (108) is hinged to the front protrusion (96) and actuated by means of a rack-and-pinion mechanism.

6. Apparatus (80) according to claim 1, 2, 3, 4 or 5, wherein the movable partition (108) is actuated by electrical, magnetic, pneumatic, or hydraulic means.

7. Apparatus (80) according to any one of claims 1 to 6, wherein said pusher (92) is provided with a compressed air supply channel which opens in proximity to said front wall (100) of the pusher (92) and/or the movable partition 108.

8. Apparatus (80) according to any one of claims 1 to 7, wherein the locking device (76) of said rear flap (8) comprises at least one suction cup which abuts against a portion of the rear flap (8).

9. Apparatus (80) according to claim 8, wherein said suction cup is arranged in proximity to said pusher (92).

10. Method for closing a folded package (4) without the use of gluing means, comprising the steps of:

- providing a closing apparatus (80) according to claim 1,
- folding and superimposing the front flap (12) and the rear flap (8) with each other, so as to at least partially align the front window (48) and the rear window (24) with each other,
- maintaining said front (12) and rear flaps (8) in a folded configuration, and locking the rear flap (8) in position,
- pushing the rear strips (20) first at least partially towards the containment volume (16) of the package (4) by means of said pusher (92) in the closed movable partition (108) configuration,
- opening said movable partition (108) so as to push the closing tab (44) and to interlock it within the notch (40), so that the closing tab (44) overhangs the rear strips (20) towards the containment volume (16) of the package (4), and, when the pushing force is no longer applied, the closing tab (44) influences the rear strips (20) to at least partially close the rear window (24) of the rear flap (8).

11. Method for closing a folded package (4) without the use of gluing means according to claim 10, wherein the actuation stroke of the pusher (92) is straight and parallel to a longitudinal extension axis (L-L) of the pusher (92), as well as perpendicular to the front and rear flaps (8,12) of the package (4).

12. Method for closing a folded package (4) without the use of gluing means according to claim 10 or 11, wherein said closing apparatus is a closing apparatus (80) according to any one of claims 2 to 9.

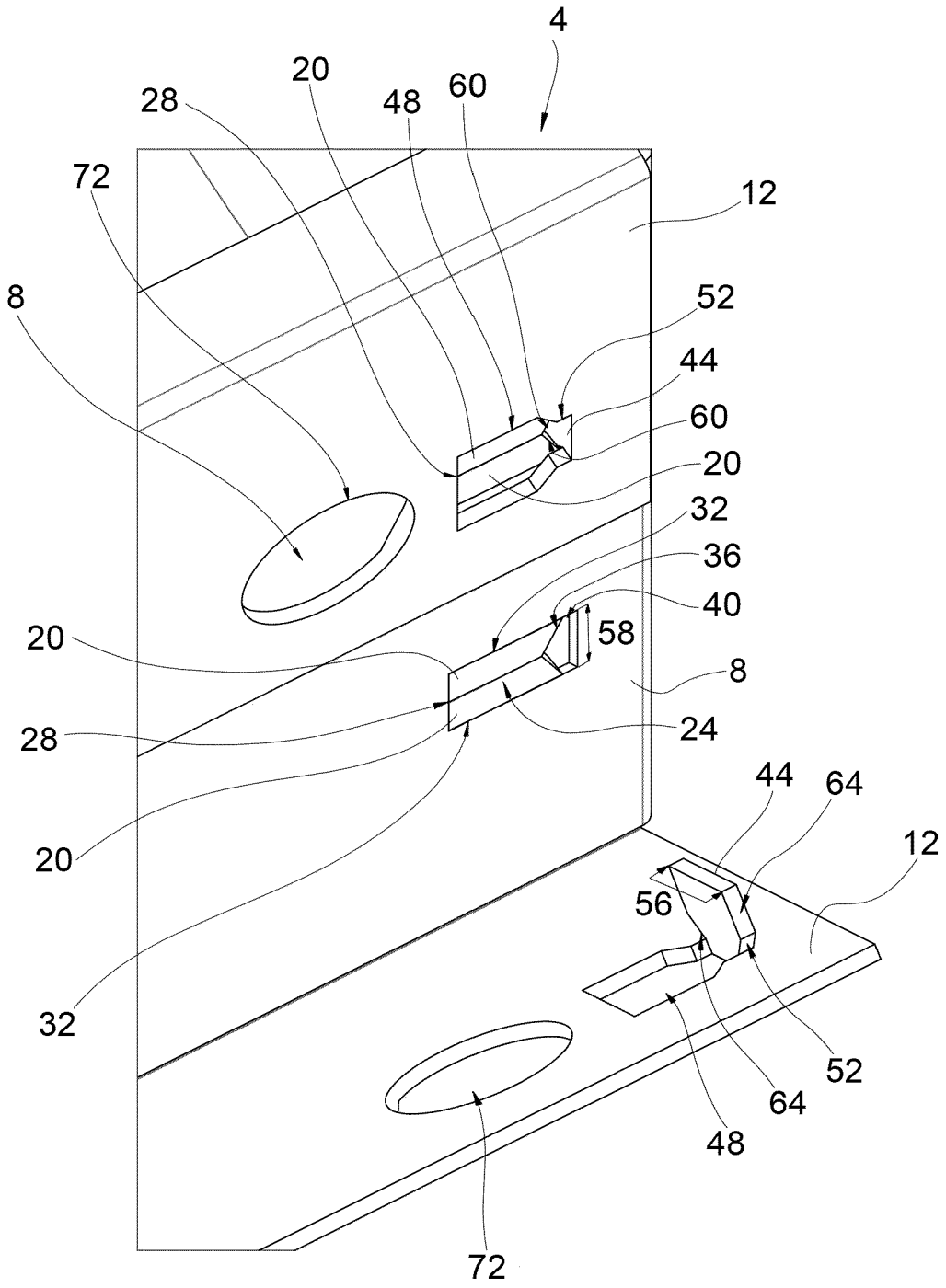
4
20
28
48
60
72
12
8
52
44
60
20
32
36
40
58
20
8
28
24
44
64
12
56
20
32
52
64
48
72

FIG.1

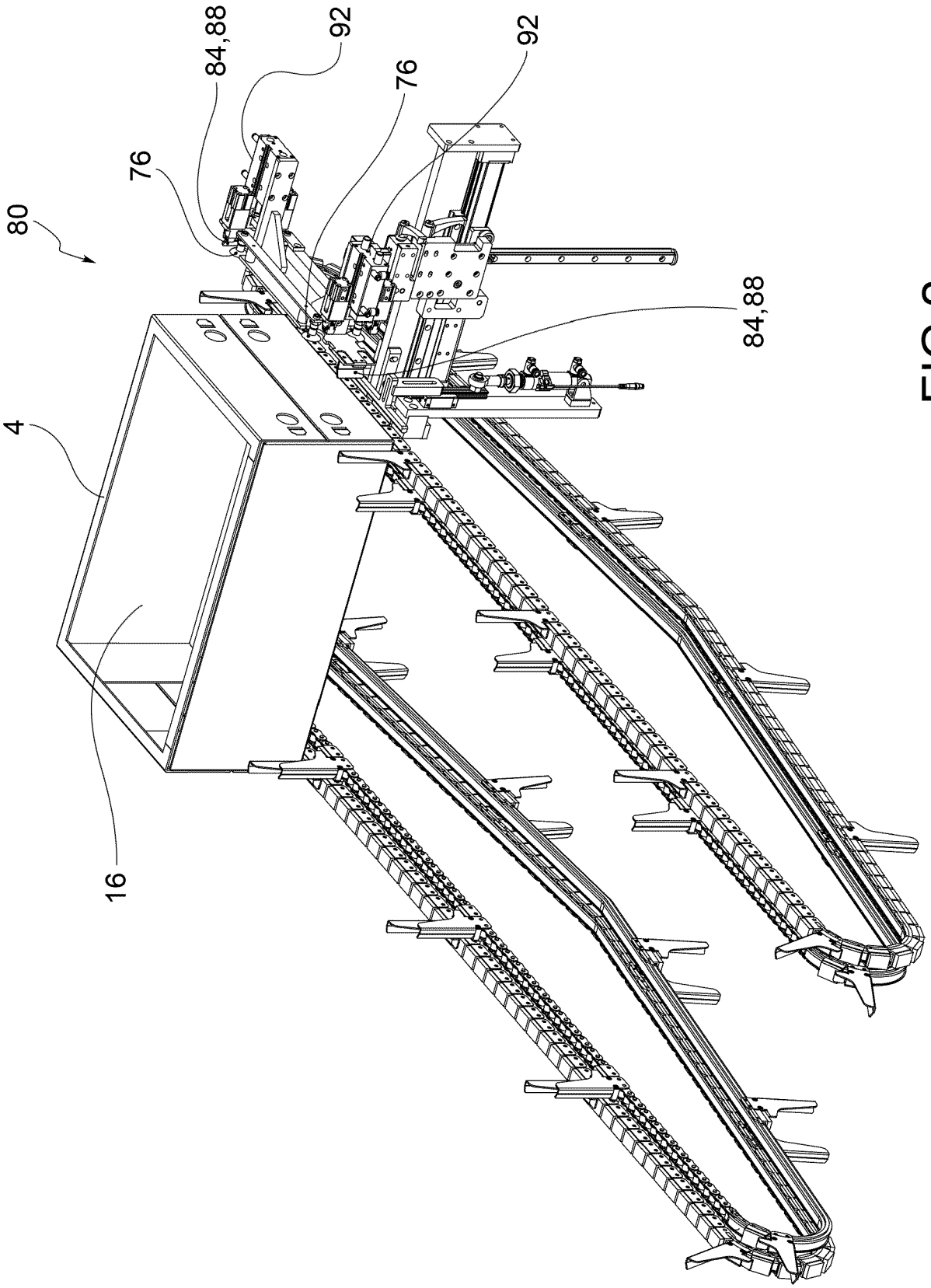

FIG.2

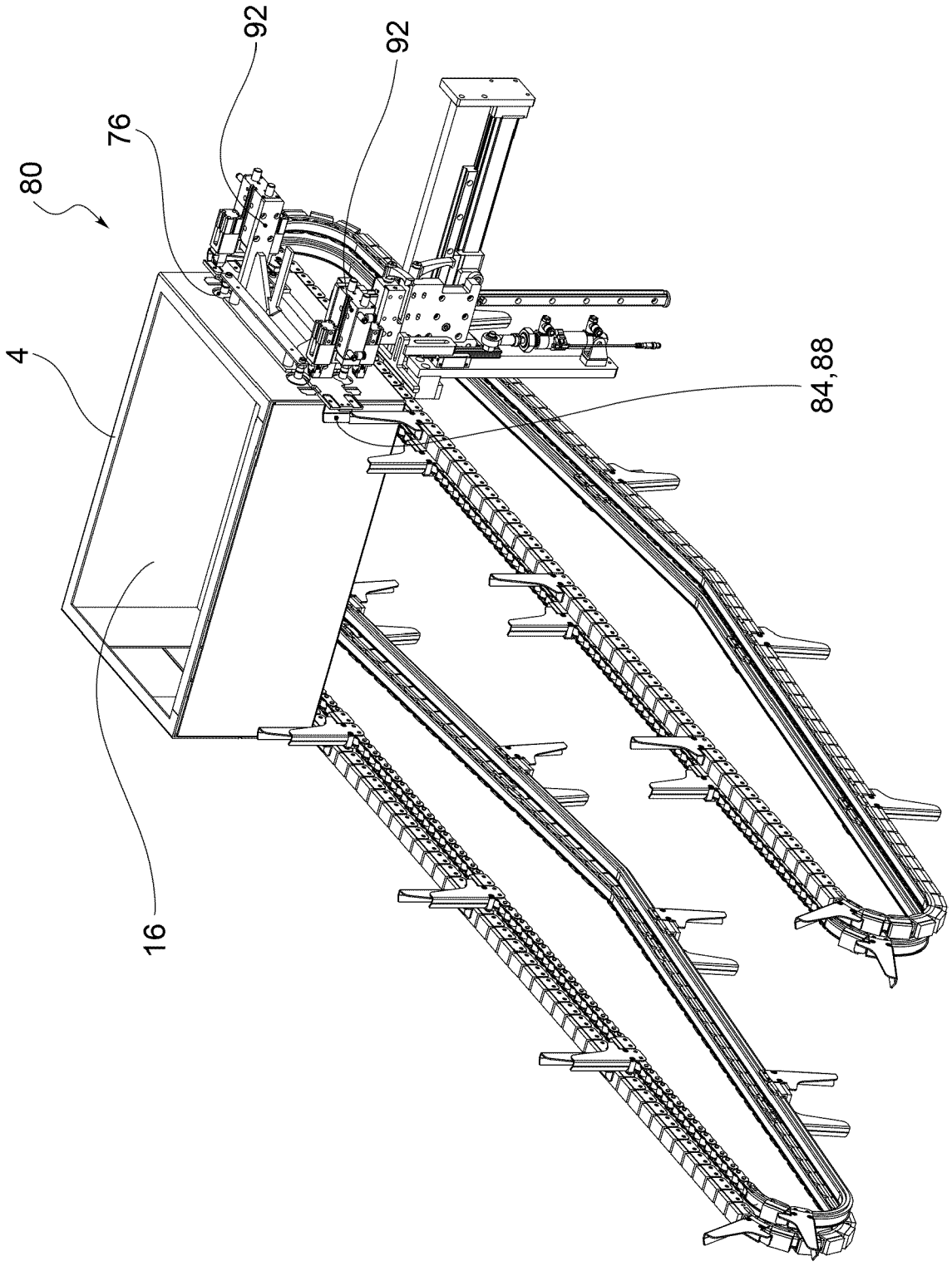

FIG.3

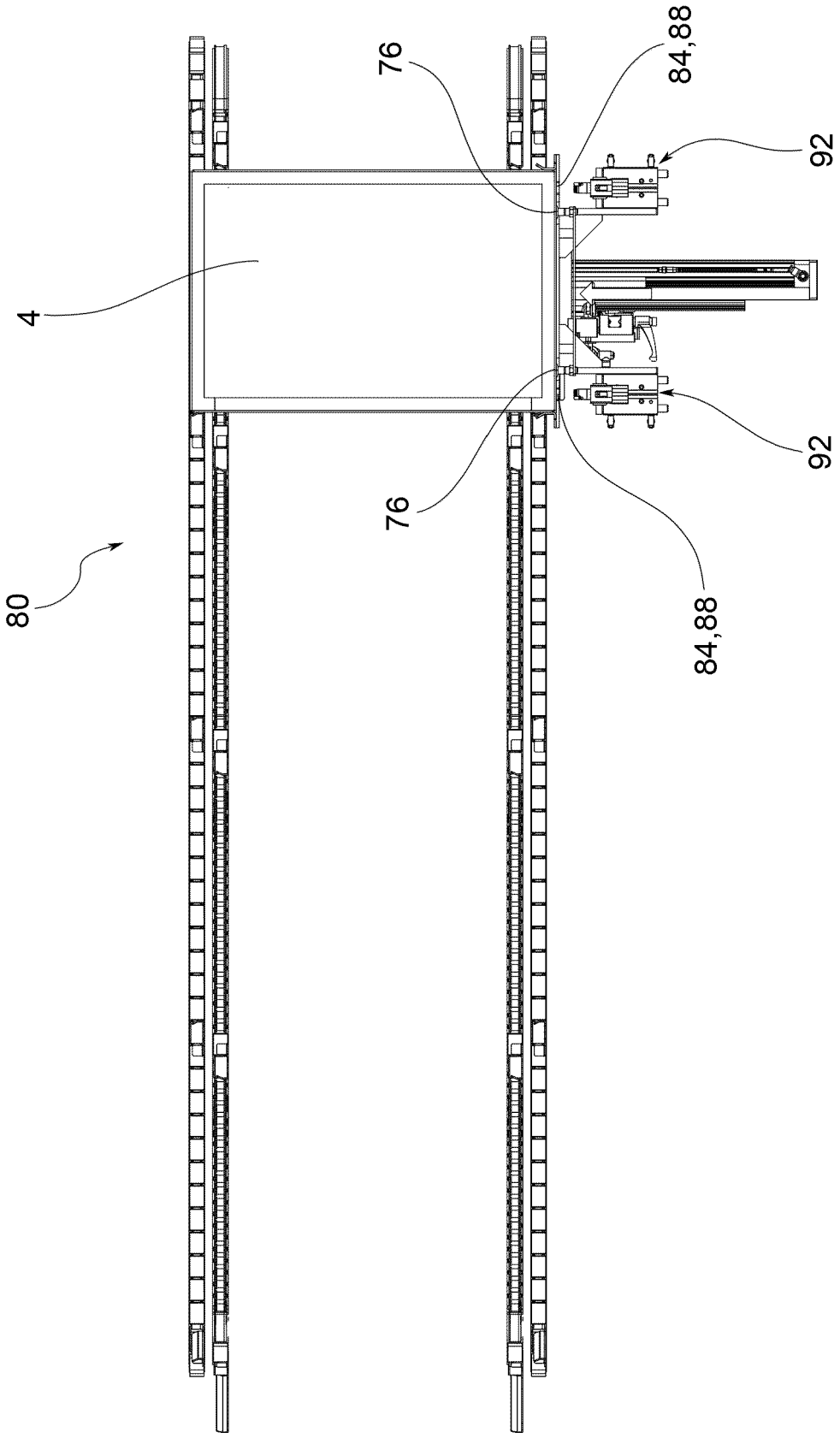

FIG.4

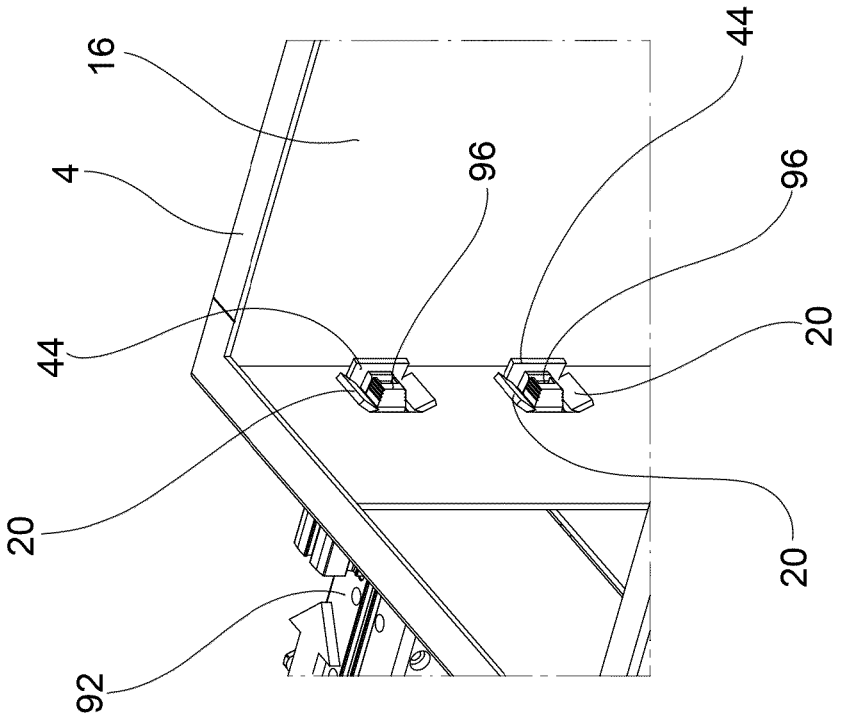

FIG.6

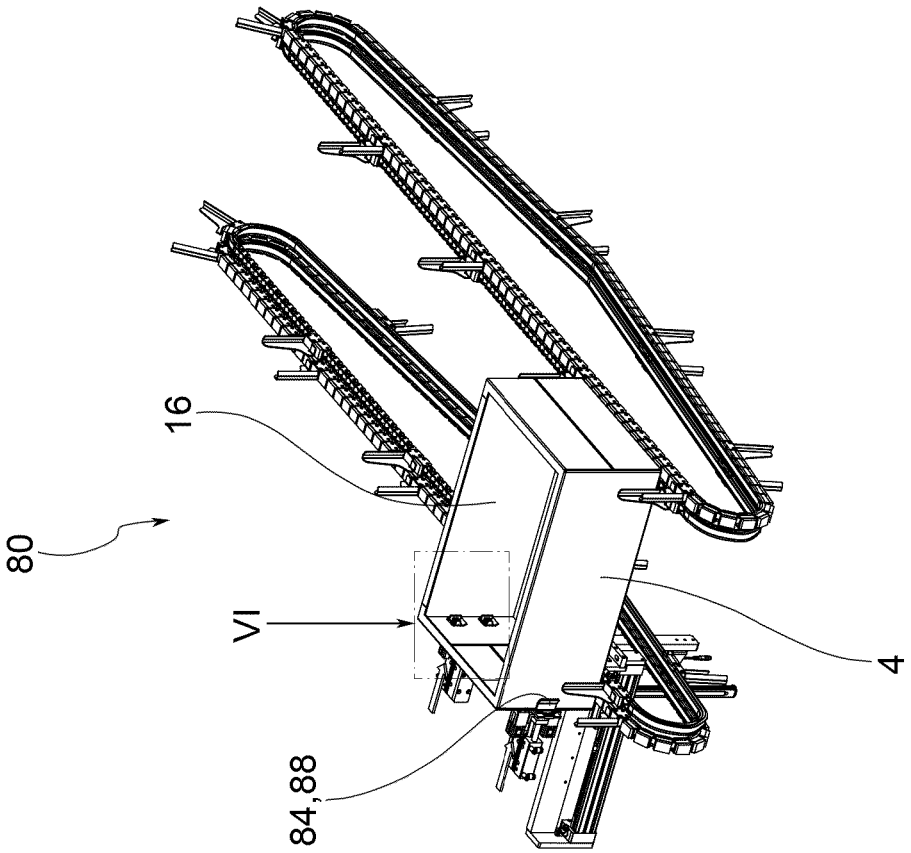

FIG.5

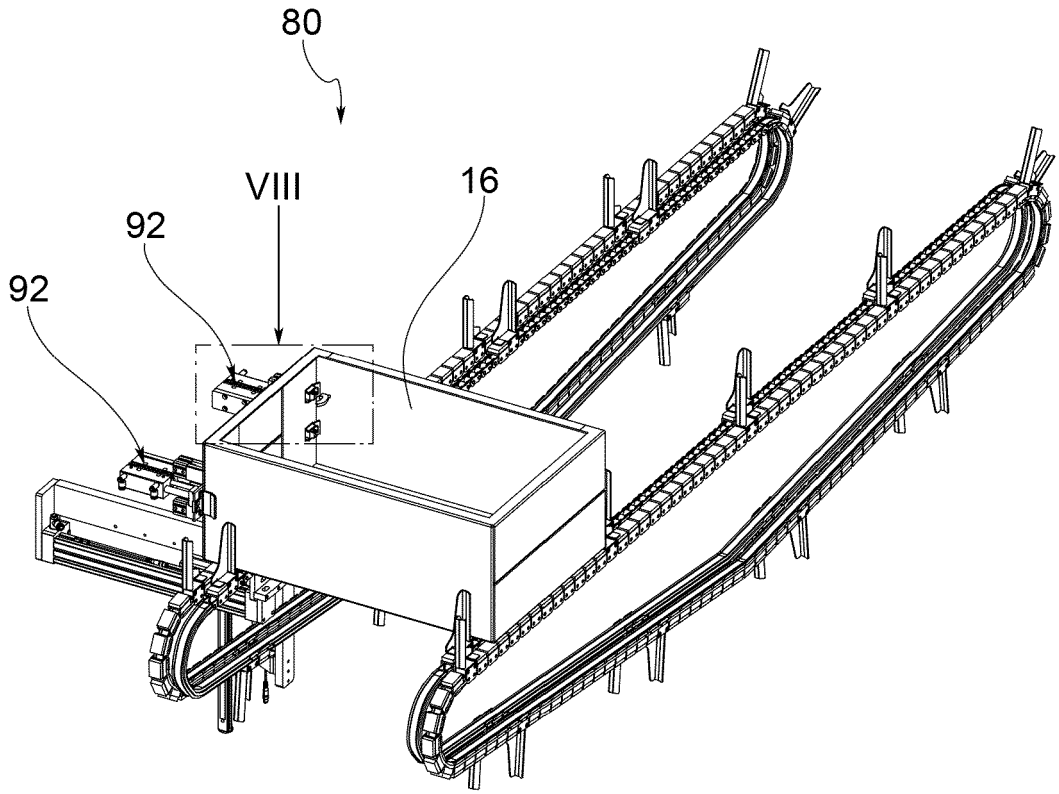

FIG.7

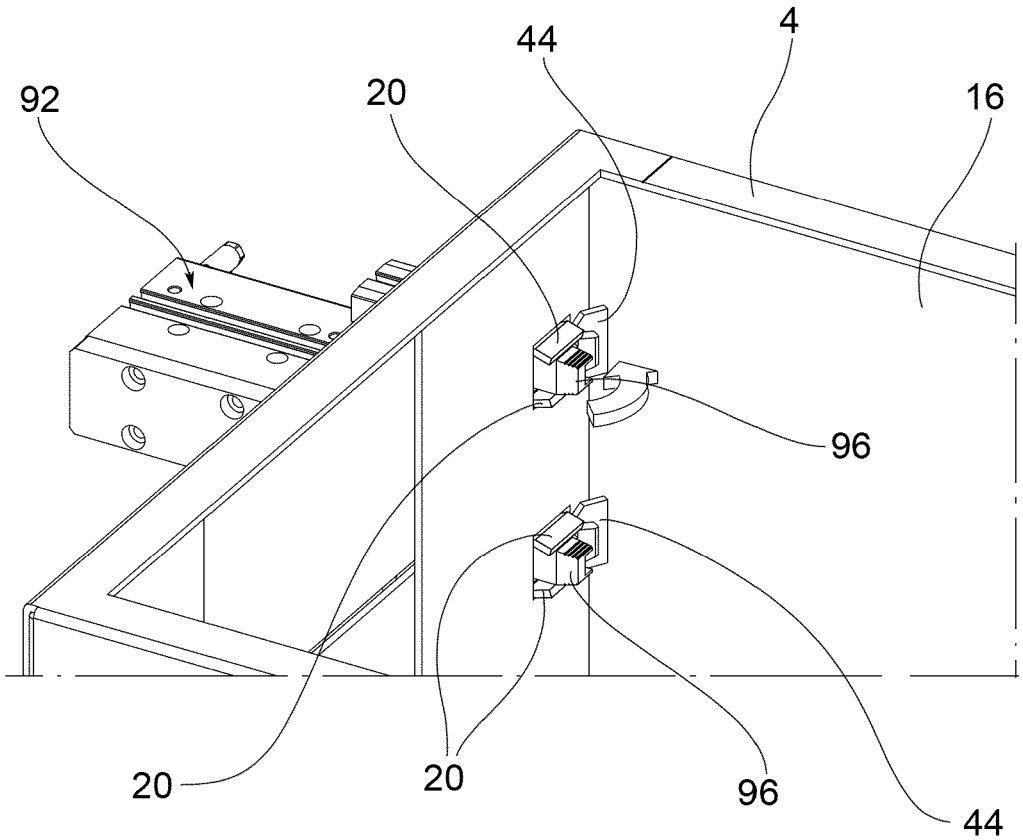

FIG.8

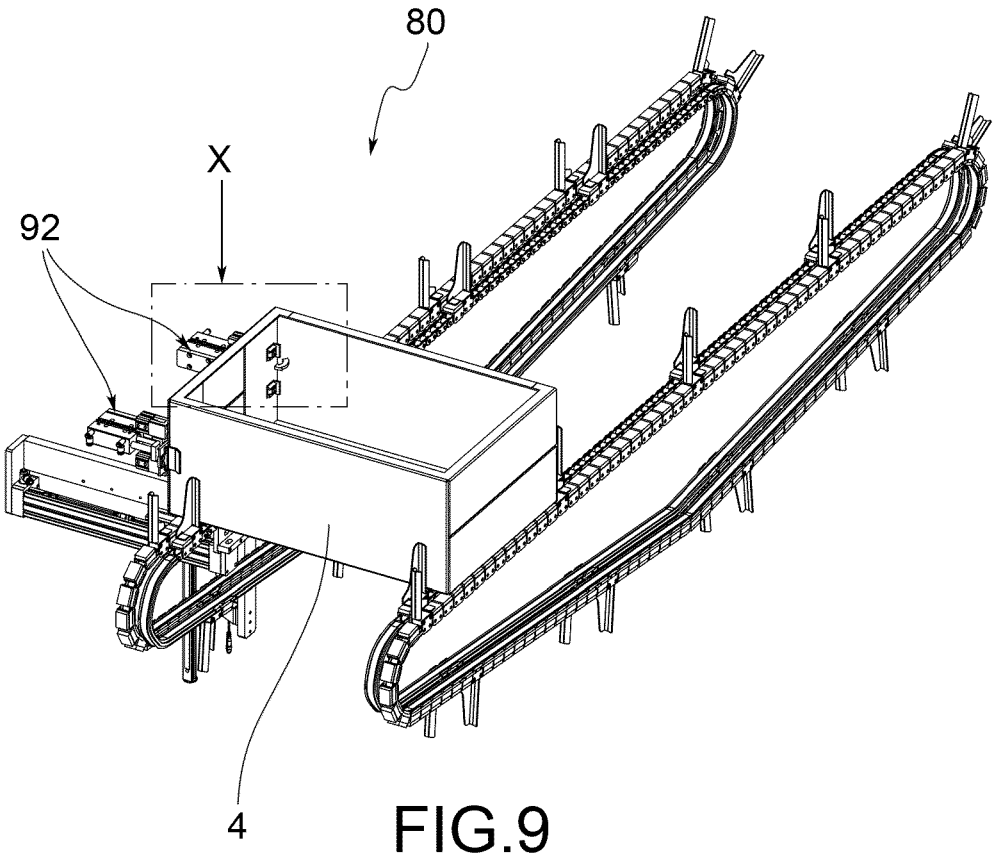

FIG.9

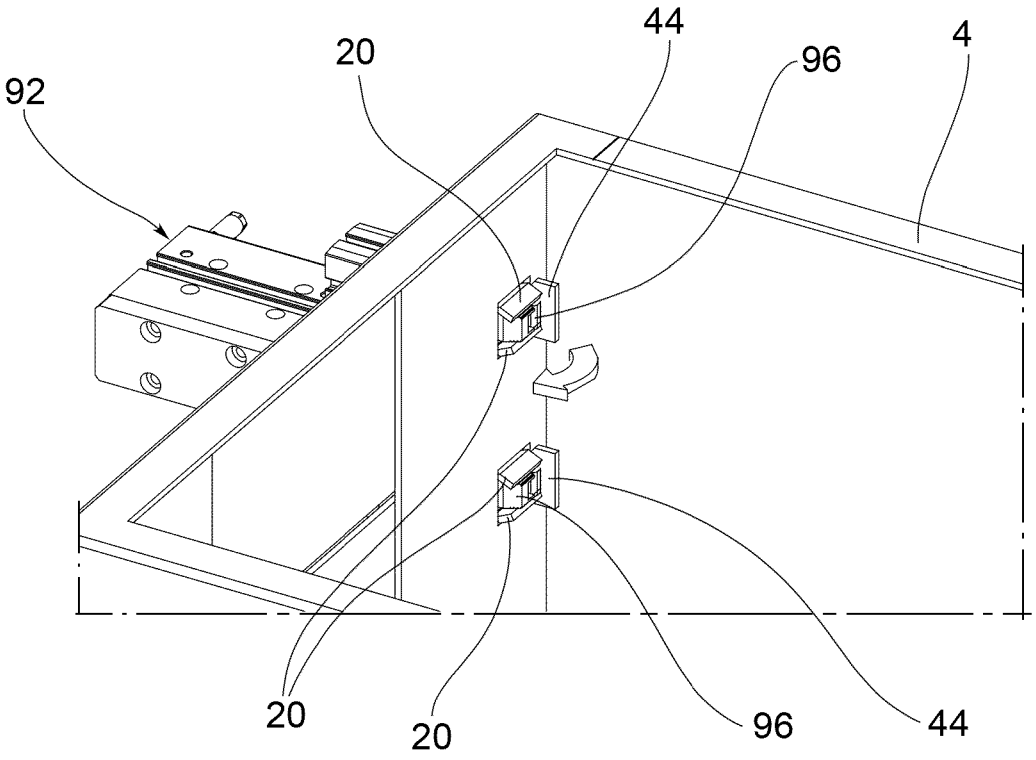

FIG.10a

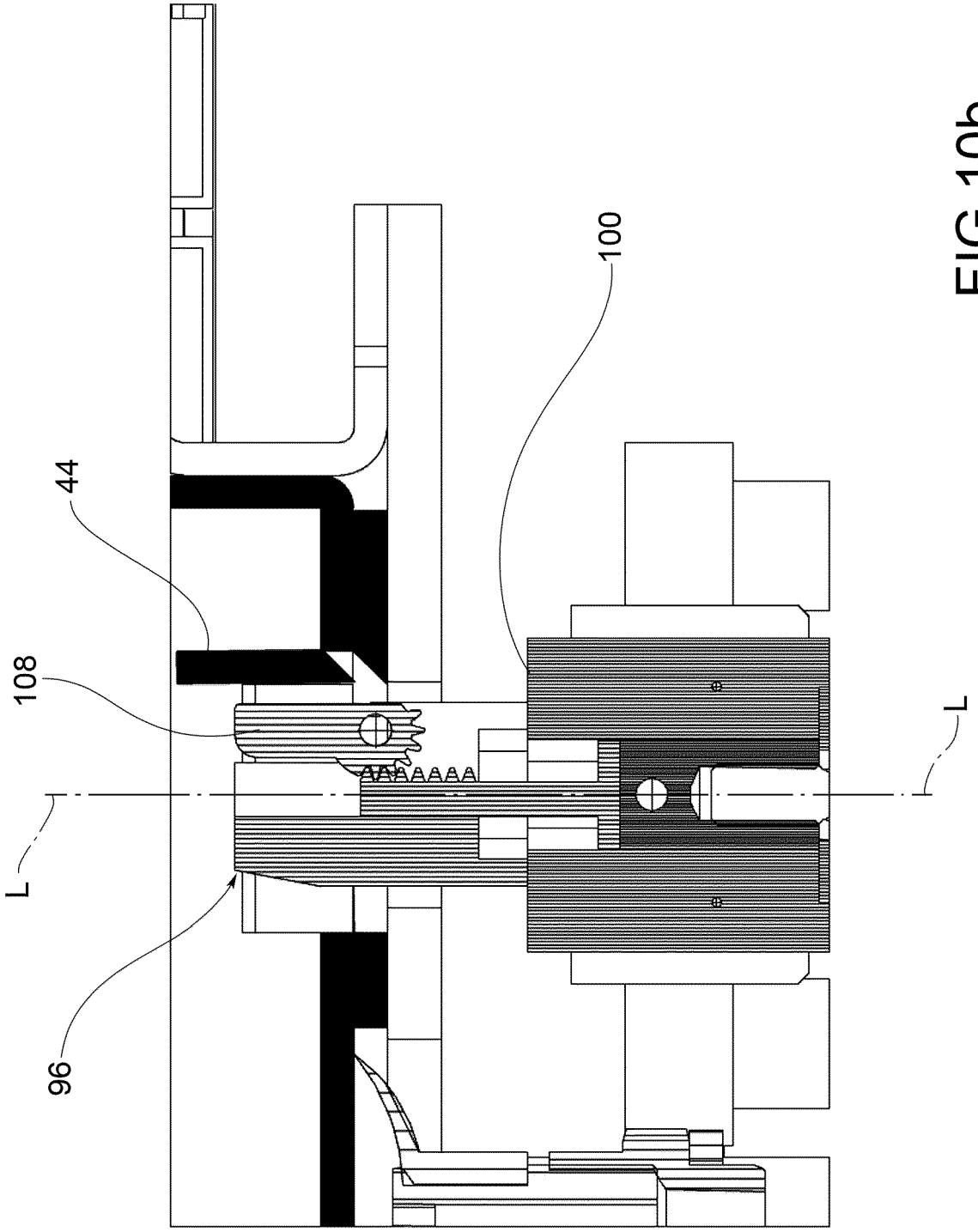

FIG.10b

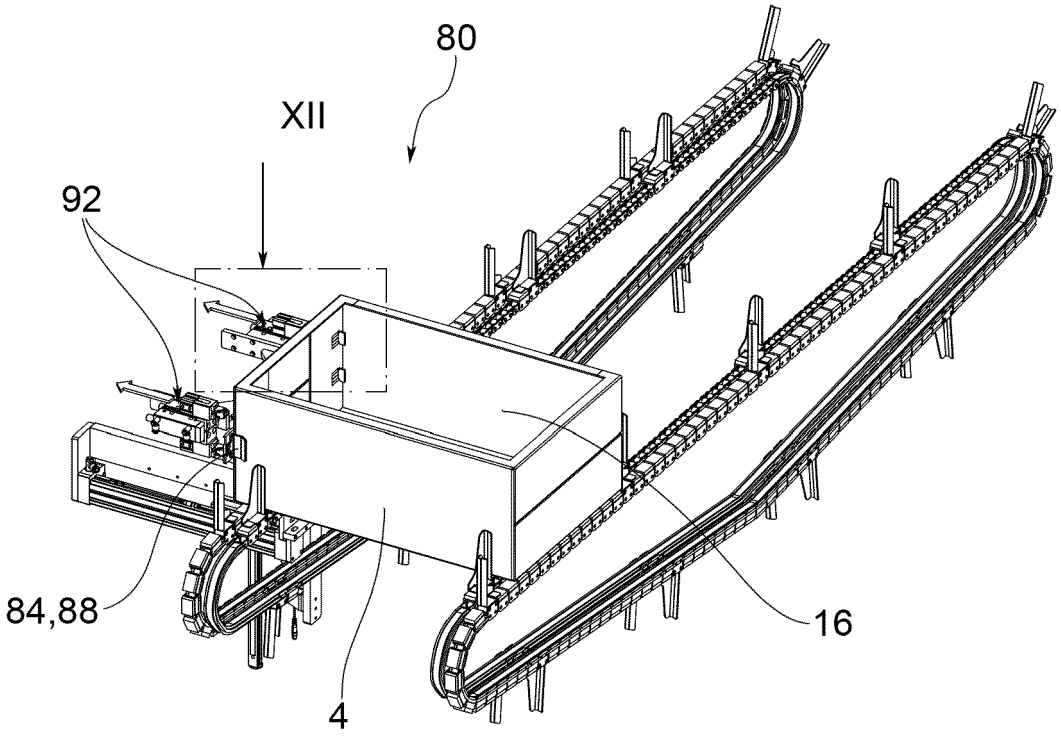

FIG.11

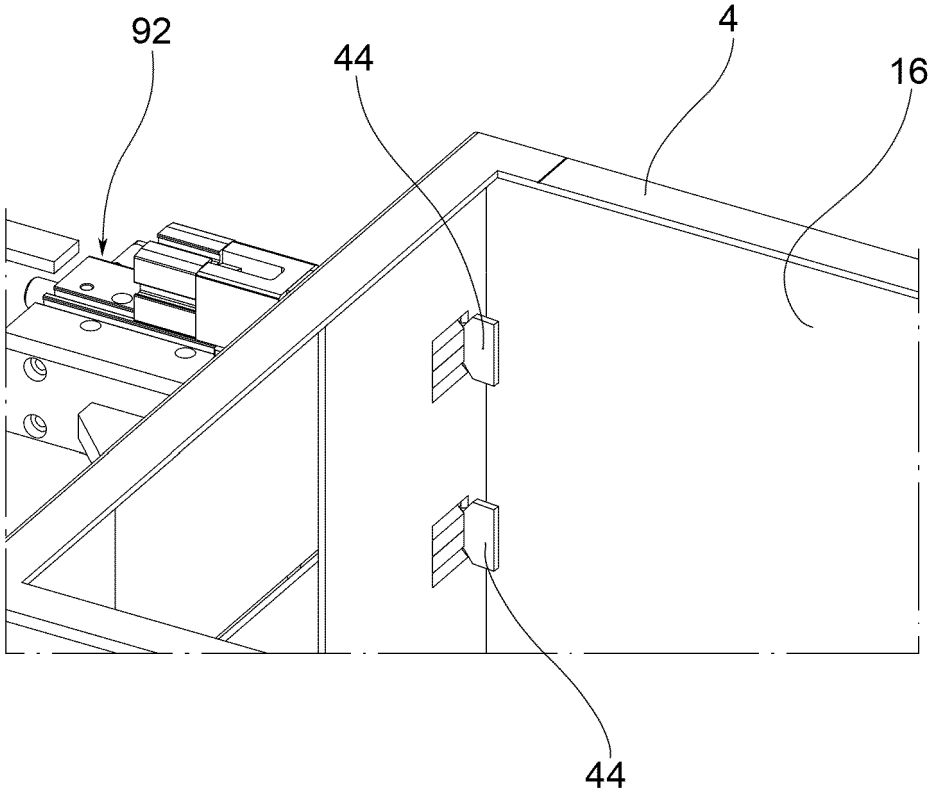

FIG.12

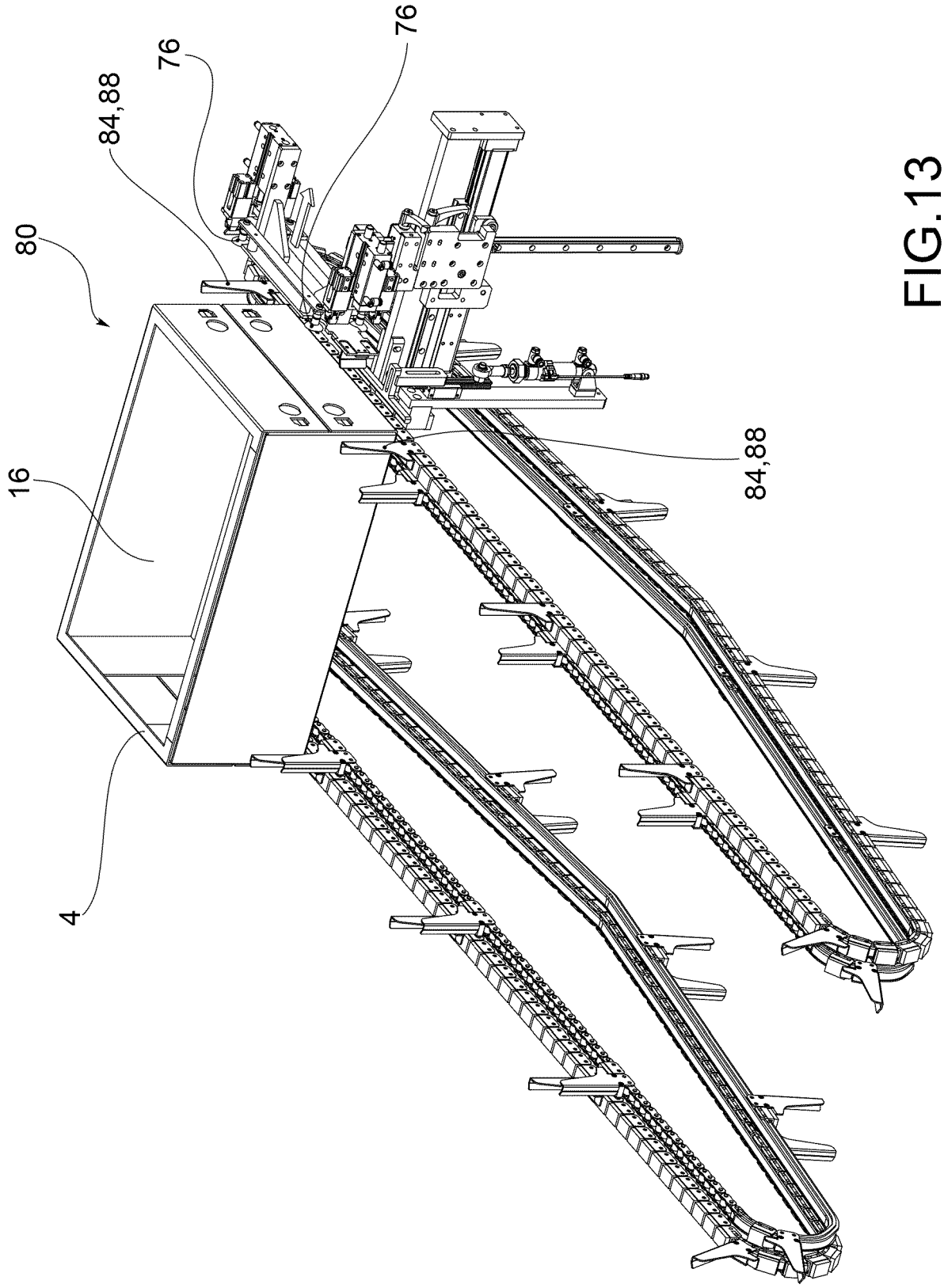

FIG.13

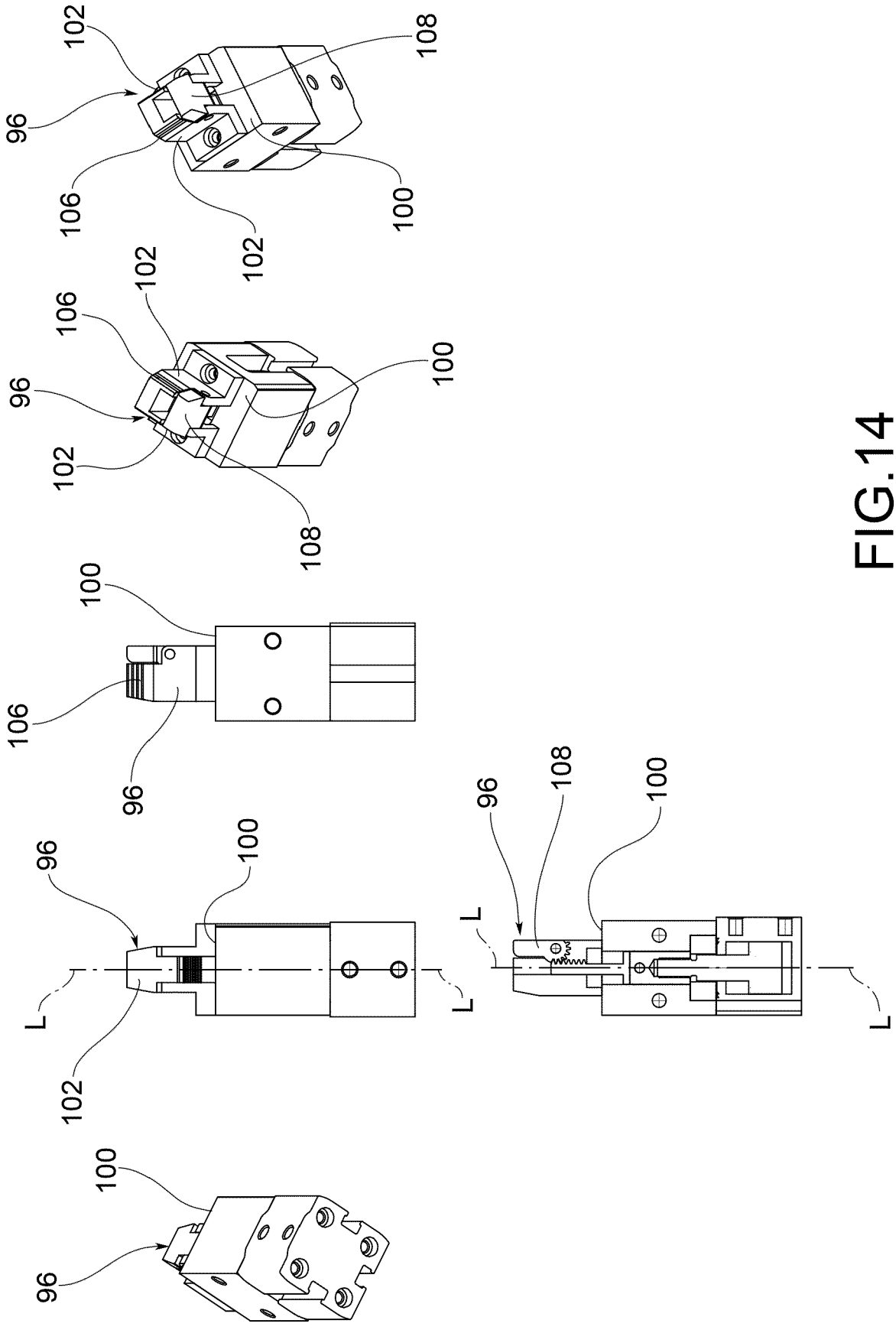
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FIG.14

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EUROPEAN SEARCH REPORT

Application Number
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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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B31B
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B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 February 2025	Zeiler, Johannes

CATEGORY OF CITED DOCUMENTS

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