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(54) **PLANT AND METHOD FOR LAYING BOTTLES IN A TÊTE-BÊCHE ARRANGEMENT**

ANLAGE UND VERFAHREN ZUM LEGEN VON FLASCHEN IN ENTGEGENGESETZTER ANORDNUNG

INSTALLATION ET PROCÉDÉ DE POSE DE BOUTEILLES DANS UN AGENCEMENT TÊTE-BÊCHE

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EP 3 552 978 B1

Description

Application field

[0001] The object of the present invention is a plant and a method for laying bottles in a tête-bêche (head-to-tail) arrangement.

[0002] "Bottle" means in particular a container for liquids, mostly made of glass, of any shape, in particular of a cylindrical shape which narrows upwards into the so-called neck.

[0003] Generally speaking, "plant for laying bottles in a tête-bêche arrangement" means a plant suitable to lay bottles within a container. Such a container may be destined for packing bottles, and be constituted for example by a box or crate, or be a container for the temporary storage of bottles, intended to be subsequently transferred.

[0004] In particular, the plant and the method according to the invention are applicable to laying bottles containing wine or sparkling wine, but may be applied to laying bottles containing any type of liquid, food and non-food.

State of the art

[0005] In the wine sector in particular, there is a need to lay in a container (for packing or temporary) some types of wine in a horizontal position. Thus, in order to optimize the space within the packing box/crate or also to make the product more visible at the point of sale or to keep the content in an optimal state (i.e. to avoid the so-called cork taste in the case of wine), the bottles must be positioned with an arrangement called in jargon "tête-bêche".

[0006] A "tête-bêche" (head-to-tail) arrangement is generally understood to mean the arrangement of two things of the same kind, so that the upper part of one is facing or alongside the lower part of the other. In other words, arranging bottles in a "tête-bêche" manner means arranging the bottles side by side to each other horizontally, alternately reversing the neck-bottom orientation, as shown in Figure 1 where some bottles B are shown arranged inside a box S.

[0007] Generally, for laying bottles in a tête-bêche manner, laying systems with a gripper device mounted on a Cartesian axis movement structure are used. Such a movable gripper device is in turn equipped with a plurality of mechanical clamps suitable to grip the bottles by the neck. These mechanical clamps, placed side by side to each other, are rotatable in parallel planes. Operatively, the movable gripper device is carried on a bottle conveyor line to receive the bottles in a vertical position. Each mechanical clamp grips a bottle arranged vertically by the neck. The movable gripper device lifts the mechanical clamp with the attached bottles. During lifting, each mechanical clamp is rotated so that the relative bottle is brought into a horizontal position. Each clamp is configured to impart on the relative bottle a movement of rotation in the direction opposite to the adjacent clamps. In this way, once the rotation is complete, the bottles are arranged horizontally in a tête-bêche arrangement. At this point, the movable gripper device may transport the bottles in a laying line into containers and lay in one or more containers (e.g. boxes/packing crates) the bottles already in the tête-bêche arrangement.

[0008] An example of a bottle laying plant described above is shown in Figure 2, where A indicates the movable gripper device, E the single, orientable mechanical clamp, C the bottle transport line and D the line for laying in containers.

[0009] The laying plant described above, while fully performing its function, nevertheless has a number of limitations.

[0010] A first limitation is linked to the constructive complexity of the movable gripper device. Such device must, in effect, be able to carry out all the steps of handling and laying the bottles: from gripping the bottles to laying them in the box. Such mechanical complexity increases the cost and weight of the same movable device.

[0011] A second limitation is linked to the fact that, in the interest of containing the construction complexity, each movable gripper device is configured to act specifically on only one specific bottle format. One of the main parameters that identify a bottle format for the purpose of handling a bottle is the cross section of the bottle body, identifiable by its maximum dimension, which in particular corresponds to the maximum bottle diameter in the case of a substantially circular cross section. The fact that the movable gripper device is configured for a specific bottle format has a negative effect on the operative flexibility of the laying plant. In effect, when changing the bottle format, it is necessary to replace the movable gripper device, resulting in machine stops and operator interventions. The creation of a gripper device capable of adapting to bottle format changes would, in effect, impart further constructive complications, which would be excessively onerous in terms of increasing the cost and weight of the movable device.

[0012] From an operative point of view, the weight of the gripper device complicates replacement operations if this becomes necessary, for example, for changing the bottle format or for maintenance.

[0013] Finally, the use of the aforesaid gripper device extends the operating cycle times of the laying plant. The laying plant remains in effect in stand-by during the execution of each single cycle of operations of gripping, rotating and laying the bottles. This leads to the introduction of long downtimes.

[0014] There is, therefore, a need for a bottle laying plant with a tête-bêche arrangement that overcomes all or at least part of the limitations set out above in the solutions of the prior art (s. e.g. US 3 878 665), and in particular that allows flexible management of bottle format changes, significantly reducing the need to replace the movable gripper device, without, however, increasing the

mechanical complexity of the movable gripper device.

Presentation of the invention

[0015] Therefore, the object of the present invention is to eliminate all or part of the drawbacks of the prior art mentioned above, by providing a plant for laying bottles in a tête-bêche arrangement which allows bottle format changes to be flexibly managed, significantly reducing the need to replace the movable gripper device, without however leading to an increase in the mechanical complexity of the movable gripper device.

[0016] A further object of the present invention is to provide a plant for laying bottles in a tête-bêche arrangement that is easily manageable from an operative point of view.

[0017] A further object of the present invention is to provide a plant for laying bottles in a tête-bêche arrangement that is simple and economical to implement.

Brief description of the drawings

[0018] The technical features of the invention, according to the aforesaid objects, are clearly apparent from the content of the claims provided below and the advantages thereof will become more apparent in the following detailed description, made with reference to the accompanying drawings, which represent one or more purely illustrative and non-limiting embodiments thereof, wherein:

- Figure 1 shows an example of bottles placed in a container, consisting in particular of a packing box, in a tête-bêche arrangement;
- Figure 2 shows an example of a traditional plant for laying bottles in a tête-bêche arrangement;
- Figure 3 shows a detail of a movable gripper device usable in a traditional plant for laying bottles in a tête-bêche arrangement;
- Figure 4 shows a collective perspective view from above of a plant for laying bottles in a tête-bêche arrangement according to a preferred embodiment of the invention;
- Figure 5 shows a perspective view from above of a part of the plant illustrated in Figure 4, relating to a bottle receiving device integrated with a system for positioning bottles in tête-bêche configuration, illustrated with bottle handling means in the initial bottle pick-up position;
- Figure 6 shows an orthogonal view from above of the plant part of Figure 5;
- Figure 7 shows a cross-sectional view of the plant part of Figure 6 according to the cross-sectional plane VII-VII indicated therein;
- Figure 8 shows a cross-sectional view of the plant part of Figure 6 according to the cross-sectional plane VIII-VIII shown therein;
- Figure 9 shows a perspective view from above of the plant part of Figure 5, illustrated with bottle handling means in the final tête-bêche bottle preparation position;
- Figure 10 shows an orthogonal view from above of the plant part of Figure 9;
- Figure 11 shows a cross-sectional view of the plant part of Figure 10 according to the cross-sectional plane XI-XI indicated therein;
- Figure 12 shows a perspective view from above of a component of the plant part illustrated in Figures 5 and 9, relating to a bottle receiving device;
- Figure 13 shows an orthogonal view from above of the bottle receiving device in Figure 12;
- Figure 14 shows a cross-sectional view of the bottle receiving device in Figure 13 according to the cross-sectional plane XIV-XIV indicated therein;
- Figure 15 shows a perspective view from above of some further components of the plant part illustrated in Figures 5 and 9, relating to a support structure and the support and movement means of the bottle handling means;
- Figure 16 shows an orthogonal view from above of the components illustrated in Figure 15;
- Figure 17 shows a cross-sectional view of the components illustrated in Figure 16 according to the cross-sectional plane XVII-XVII indicated therein;
- Figure 18 shows a cross-sectional view of the components illustrated in Figure 15 according to the cross-sectional plane XVIII-XVIII indicated therein;
- Figure 19 shows a cross-sectional view of the components illustrated in Figure 18 according to the cross-sectional plane XIX-XIX indicated in Figure 18;
- Figure 20 shows a perspective view of a single element of the bottle handling means, illustrated in the initial bottle pick-up position;
- Figure 21 shows a cross-sectional view of the element shown in Figure 20 according to a cross-sectional plane XXI indicated therein;
- Figure 22 shows a perspective view of the individual element of the bottle handling means of Figure 20, illustrated in the final tête-bêche bottle preparation position;
- Figure 23 shows a cross-sectional view of the element shown in Figure 22 according to a cross-sectional plane XXII indicated therein;
- Figure 24 shows a perspective view from above of a component of the plant illustrated in Figure 4, relating to a movable bottle gripper head of a movable bottle transferring device;
- Figure 25 shows a perspective view of the movable bottle gripper head of Figure 24, with some parts removed to better illustrate others; and
- Figure 26 shows a cross-sectional view of the movable bottle gripper head illustrated in Figure 24 according to a cross-sectional plane XXVI indicated therein.

Detailed description

[0019] With reference to the accompanying drawings a plant for laying bottles according to the invention has been collectively indicated at 1.

[0020] For sake of simplicity, the laying method according to the invention will be described after the laying plant 1, making reference in particular to the latter.

[0021] Here and in the description and claims that follow, reference will be made to the laying plant 1 in the condition of use. It is in this sense that any references to a lower or upper position, or to a horizontal or vertical orientation, are therefore to be understood.

[0022] The plant 1 for laying bottles in a tête-bêche arrangement according to the invention is generally suitable to lay bottles inside a container. Such a container may be destined for packing bottles, and be constituted for example by a box or crate, or be a container for the temporary storage of bottles, intended to be subsequently transferred.

[0023] According to a general embodiment of the invention, the plant for laying bottles in a tête-bêche arrangement 1 comprises:

- a device 10 for receiving bottles in input in vertical position, connectible to a bottle transport line;
- a line for laying bottles 20 in containers;
- a system 30 for positioning in tête-bêche configuration one or more groups of bottles received by the aforesaid receiving device 10; and
- a device 40 for transferring one or more groups of bottles in the tête-bêche configuration from the aforesaid positioning system to the aforesaid laying line 20.

[0024] As shown in the accompanying Figures, the bottle positioning system 30 is structurally and functionally distinct from the bottle transferring device 40.

[0025] In other words, according to the present invention, the movable device for gripping bottles present in the solutions of the prior art has been divided into two distinct systems/devices, i.e. the bottle positioning system 30 and the bottle transferring device 40.

[0026] Due to the invention, the bottle handling operations necessary to lay the bottles in a tête-bêche configuration are completely separate and distinct from the operations of transferring the bottles into the laying line. Handling operations and transfer operations are in effect carried out by operatively separate and autonomous systems/devices.

[0027] More specifically, the bottle positioning system 30 may thus be structured and sized in such a way as to carry out only the operations aimed at laying the bottles in a tête-bêche configuration, since the execution of the operations of transferring these bottles to the laying line 20 is completely entrusted to the bottle transferring device 40. Conversely, the bottle transferring device 40 may be structured and sized in such a way as to perform only the operations of transferring bottles (already in the tête-bêche configuration) to the laying line 20, since the execution of the operations aimed at laying bottles in the tête-bêche configuration is completely entrusted to the aforementioned positioning system 30.

[0028] A first advantage of such an operative separation is that it is possible to simplify the mechanical structure of the bottle transferring device 40, since it is no longer required for this device to impart the relative rotation movements among the bottles handled thereby. In effect, the bottle transferring device 40 is called to engage in gripping groups of bottles already arranged in the tête-bêche configuration. Once the bottles have been engaged, the bottle transferring device 40 may be limited to transferring them in bulk to the laying line 20 in containers. At most, the transfer device 40 may be configured to separate (divide) two distinct groups of bottles by means of a simple relative movement of translation.

[0029] Moreover, due to the fact that the transfer device 40 does not have to impart relative rotation movements among the bottles, it is possible to structure this device 40 in such a way that it may be adapted to different bottle formats (in particular, according to the maximum size/diameter of the bottle), for example by equipping it with means suitable to vary the distance provided between the components for gripping the bottles. It is also possible to use - as bottle grippers - vacuum suction cups instead of more complex mechanical clamps.

[0030] Finally, again due to the fact that the bottle transferring device 40 is not required to change the relative orientation of the bottles in order to lay them in a tête-bêche configuration, but rather only to transfer bottles already arranged in this configuration from one point of the plant 1 to another, it is possible to significantly simplify the relative support and movement structure. In particular, as will be seen later, as a support and movement structure, it is possible to adopt a robotic arm, instead of a more cumbersome system of Cartesian axes.

[0031] A second advantage of the aforesaid operative separation is that it is also possible to simplify the mechanical structure of the system 30 for positioning bottles in a tête-bêche configuration.

[0032] In effect, unlike prior art solutions, the bottle positioning system 30 is no longer required to orient bottles in a tête-bêche configuration operating suspended in the air and in movement, but rather it may carry out such manipulations operating in a "static" configuration, i.e. without requiring the system 30 as a whole to move with respect to the relative support structure. This makes it possible to structure this system 30 in such a way that it may be adapted to different bottle formats, for example by equipping it with means suitable to vary the distance provided between the components for handling the bottles. The fact that the handling of the bottles in the tête-bêche configuration is not linked to transferring also makes it possible to use - as bottle gripping elements - vacuum suction cups instead of more complex mechanical clamps. Finally, it is possible to significantly simplify

also the support structure of the bottle positioning system 30.

[0033] Due to the invention, the laying plant 1 may be structured to flexibly manage bottle format changes, significantly reducing the need to replace the movable device for gripping and handling bottles, without, however, increasing the mechanical complexity of the bottle transferring device.

[0034] A third advantage of the aforesaid operative separation is that it is possible to reduce downtime in the operative cycle of the laying plant. In effect, as will be explained below, the operations of positioning bottles in tête-bêche configuration may continue even at the same time as transferring bottles into the laying line.

[0035] In general, the line 20 for laying in containers is suitable for presenting in sequence the containers within which the bottles are to be laid in a tête-bêche arrangement. As already mentioned, the containers may be packing containers (such as boxes or crates) or temporary containers. In this sense, the laying line 20 in the plant 1 may be completely traditional and is therefore well known to a person skilled in the art. It will therefore not be described in detail.

[0036] In particular, in the accompanying figures, the line 20 for laying in containers has been illustrated as a bottle packaging line. This illustration should be understood as purely illustrative and non-limiting.

[0037] According to a preferred embodiment of the invention illustrated in the accompanying figures, the aforesaid system 30 for positioning bottles in a tête-bêche configuration is associated to the device 10 for receiving bottles.

[0038] The aforesaid bottle transferring device 40 comprises:

- a movable bottle gripper head 41; and
- means 45 for moving the aforesaid movable bottle gripper head 41 in space.

[0039] Preferably, the aforesaid movement means consist of a robotic arm 45. Alternatively, it is possible to provide that the aforesaid movement means are made up of a system of Cartesian axes.

[0040] Advantageously, as illustrated in particular in Figures 5 to 11, the aforesaid system 30 for positioning bottles in a tête-bêche configuration may be structurally integrated into the bottle receiving device 10.

[0041] As already mentioned above, the bottle positioning system 30 - since it does not perform the function of transferring bottles to the laying line - does not require a dedicated support structure, which is sized to withstand the vibrations and stresses generated by the movement of large weights suspended in the air. Therefore, the bottle positioning system 30 may use the support structure of other parts of the plant, in particular of the bottle receiving device 10.

[0042] In particular, as illustrated in Figure 5, this support structure may be constituted by a support frame (such as a framework with a plurality of support legs on the ground) that defines a horizontal support surface on the top thereof.

[0043] According to the preferred embodiment of the invention illustrated in particular in Figures 12, 13 and 14, the aforesaid device 10 for receiving bottles comprises:

- two separate bottle storage lanes 11; 12, which extend parallel to each other along a bottle feed direction X and are transversely separated from each other to define a free space 17; and
- a bottle diverter 13 suitable to distribute the bottles between the two storage lanes 11, 12.

[0044] The aforesaid system 30 for positioning bottles in the tête-bêche configuration is positioned in the free space 17 between the aforesaid two bottle storage lanes 11, 12 and is suitable to act on bottles in said two storage lanes 11, 12.

[0045] Due to this configuration, the bottles arrive in the proximity of the positioning system 30, already arranged so as to be able to be picked up. This avoids therefore the need to move the bottle positioning system towards the bottles.

[0046] More specifically, the bottle receiving device 10 comprises upstream of the diverter 13 a conveyor belt 14 (or another equivalent device) suitable to impart on the bottles a translational movement along the aforesaid feed direction X from an inlet portion 15 to the diverter 13.

[0047] Operatively, the aforesaid bottle receiving device 10 is fed by a traditional bottle transport line (not illustrated) that connects the laying plant 1 to a bottling plant (not illustrated).

[0048] On the bottle receiving device 10 it is possible to define a center line M-M, substantially parallel to or corresponding to the bottle feed direction X set by the aforesaid conveyor belt 1. The two bottle storage lanes 11 and 12 extend parallel to this bottle feed direction X on opposite sides relative to this center line M-M so as to define the aforesaid free space 17, wherein is arranged the aforesaid bottle positioning system 30.

[0049] In particular, each bottle storage lane 11 and 12 is supported by a longitudinal appendage 11a and 12a of a main support structure 14a of the conveyor belt 14.

[0050] Advantageously, each storage lane 11, 12 is equipped on the outside with a longitudinal bottle containment barrier 11b, 12b, while there are no barriers on the inside facing the free space 17, to allow the bottle positioning system 30 to freely access the bottles stored therein.

[0051] Advantageously, each storage lane 11, 12 is equipped with limit stop means 16, which are suitable to limit the bottle storage area within a predefined longitudinal segment of the lane. These limit stop means 16 are adjustable. As will be clear from the description below, the longitudinal extension of the bottle storage area is

chosen according to how much the operating area of intervention of the bottle positioning system 30 extends longitudinally within the aforesaid free space 17.

[0052] Operatively, the bottles B moved by the conveyor belt 14 reach the diverter 13 which directs them by sorting them into the two storage lanes 11, 12. Advantageously, the bottles move along the storage lanes 11, 12 by the pushing imparted by the bottles that progressively enter the lanes. For this purpose, preferably, the storage lanes 11, 12 are equipped with a smooth bottom (to avoid friction) or rollers.

[0053] Specifically, the diverter 13 is defined by:

- a fixed V-shaped sorter element 13a, with vertex 13b aligned with the center line M-M, and
- two adjustable walls 13c and 13d, which are placed side by side (at variable distance) to the two branches of the fixed sorter 13a to define two conveying lanes 13e, 13f of the bottles to the two storage lanes 11, 12. The position of the adjustable walls 13c, 13d is chosen according to the bottle format.

[0054] Preferably, as shown in Figures 5 to 11, the aforesaid system 30 for positioning bottles in a tête-bêche configuration comprises a plurality of bottle handling devices 31, 32.

[0055] Each bottle handling device 31, 32 is suitable to pick up a single bottle vertically from one of the two storage lanes 11, 12 of the bottle receiving device 10 (see figures 5 to 8) and position it horizontally in the space between the two storage lanes 11, 12 with the bottom-neck extension axis Y arranged transversely to the aforesaid bottle feed direction X and with neck-bottom orientation reversed relative to the orientation received by the bottles positioned by the two handling devices 32 adjacent thereto (see figures 9 to 11). In this way, the set of aforesaid handling devices 31, 32 arranges horizontally one or more groups of bottles placed side by side to each other in a tête-bêche configuration.

[0056] Advantageously, as illustrated in particular in Figures 6, 7 and 8, the aforesaid handling devices 31, 32 are organized into two distinct operating groups.

[0057] More specifically, the handling devices 31 of a first group are suitable to take bottles from a first 11 of the aforesaid two storage lanes 11 and lay them horizontally with a first neck-bottom orientation, while the handling devices 32 of a second group are suitable to take bottles from the other storage lane 12 and lay them horizontally with a second neck-bottom orientation, inverted relative to the first.

[0058] The handling devices 31, 32 of the two operating groups are arranged in alternating sequence in a direction parallel to the aforesaid bottle feed direction X.

[0059] Preferably, each handling device 31, 32 may be positioned adjustably relative to the other handling devices 31, 32 in the longitudinal direction (parallel to the feed direction X) and/or in the transverse direction (orthogonally to the feed direction X) relative to the feed direction X in order to adapt the positioning of the bottles in tête-bêche configuration to the different formats of the bottles that may be handled by the plant 1.

[0060] Advantageously, each handling device 31, 32 is movable transversely relative to the feed direction X in order to adjust the gripping distance on the bottles B arranged in the relative storage lane 11, 12.

[0061] Preferably, as provided in the embodiment illustrated in the accompanying Figures, the handling devices 31 or 32 belonging to the same operating group are movable all together transversely.

[0062] According to the preferred embodiment illustrated in particular in Figures 6, 8, 10, 11, 15 and 16, the aforesaid handling devices 31 and 32 are aligned on two separate rows F1 and F2, parallel to the aforesaid feed direction X, one for each operating group.

[0063] Advantageously, the number of handling devices 31 and 32 in each row F1 and F2 may be chosen at the design stage according to the working time of the plant 1.

[0064] Advantageously, the handling devices 31 and 32 may be divided into modular sets, which are arranged in series along the feed axis X and are suitable to act on the bottles present in the two storage lanes independently. Each modular set comprises handling devices arranged on the two rows F1 and F2, and therefore suitable to act on both storage lanes 11, 12.

[0065] More specifically, the handling devices 31 or 32 of each row F1 or F2 are associated with a relative support frame 310a, 320a, which is movable transversely to the feed direction X within the space between the two storage lanes 11, 12. In particular, each support frame 310a, 320a may be constituted by a carriage which is guided slidably by guides 340 arranged transversely to the feed direction X.

[0066] According to the embodiment shown in the accompanying Figures, the handling devices 31 or 32 in each row are kinematically associated to a worm screw 310 or 320, which is in turn associated to the respective support frame 310a or 320a and extends parallel to said feed direction X.

[0067] Operatively, the rotation of the worm screw 310 or 320 (for example by means of the relative electronically controlled motors M1 and M2) determines the axial sliding of the devices 31 or 32 associated thereto and thus their axial distribution along the worm screw 310 or 320, so as to vary the axial (longitudinal) pitch of the bottles in tête-bêche configuration.

[0068] The worm screws may be replaced by any other device suitable for the purpose, such as a rack and pinion system or a lever system.

[0069] Preferably, the handling devices 31 or 32 of each row F1 or F2 are kinematically interconnected to each other also by spacing means 311 or 312 suitable to ensure a regular spacing between the devices 31 or 32 of a same row as their axial positioning varies along the relative worm screw 310 or 320.

[0070] Preferably, as illustrated in particular in Figures

15 to 19, the aforesaid spacing means 311 and 312 consist of a kinematic chain with articulated rods, which connects the handling devices 31 or 32 of a same row F1 or F2 in sequence to each other and to some reference points.

[0071] Advantageously, the two support frames 310a, 320a of the two operating groups of handling devices 31, 32 are movable transversely to the feed direction X within the free space 17 between the two storage lanes 11, 12 in a coordinated manner using common handling means 331, 332.

[0072] Operatively, this transverse sliding may be aimed both at adjusting the gripping distance on the bottles B placed in the relative storage lane 11, 12, and at varying the transverse pitch of the bottles in tête-bêche configuration.

[0073] In particular, as illustrated in the accompanying Figures, and in particular in Figures 15 to 19, each worm screw 310 or 320 is associated to a respective support frame 310a or 320a, slidably guided by guides 340 arranged transversely to the feed direction X. In turn, each of the two support frames 310a and 320a is kinematically associated to a worm screw 331 and 332, arranged with its axis transverse to the feed direction X. The two worm screws 331 and 332 have opposite threads (one clockwise and the other counterclockwise) and are joined together centrally. Operatively, the rotation of one of the two worm screws 332 (e.g. by means of the associated electronically controlled motor M3) is transmitted to the other worm screw 331 and collectively determines the axial sliding of the two support frames 310a and 320a in opposite directions (due to the inverted threading of the two screws), thus allowing the two support frames 310a and 320a to be brought closer together or further apart in a coordinated manner in a transverse direction.

[0074] Preferably, as illustrated in particular in Figures 20 to 23, each bottle handling device 31, 32 of the aforesaid bottle positioning system 30 comprises a bottle gripper element 33, which is movable, preferably by rotation, between:

- a bottle pick-up position, wherein the gripper element 33 is positioned vertically near the relative bottle storage lane 11, 12 to pick up a bottle by gripping it (see Figures 5, 8, 20, 21), and
- a bottle orientation position, wherein the gripper element 33 is positioned horizontally to position a bottle taken from its storage lane 11, 12 horizontally in the space between the two storage lanes 11, 12 (see Figures 9, 11, 22, 23).

[0075] According to the embodiment shown in the accompanying Figures, each bottle handling device 31, 32 comprises:

- a support frame 35, to which the gripper element 33 is rotationally associated;
- a kinematic coupling base 36 to the respective worm screw 310 or 320, to which the support frame 35 is attached; and
- an actuator 37, suitable to push the gripper element 33 to cause the rotation thereof relative to the frame 35.

[0076] In particular, the support frame 35 consists of an L-profile with a first horizontal portion 35a for fixing to the base 36 and a second vertical portion 35b for pivoting the gripper element 33. The frame 35 is associated to the actuator 37 (preferably consisting of a pneumatic cylinder).

[0077] Preferably, as illustrated in the accompanying Figures, each bottle gripping element 33 is suitable to grip a bottle with at least one vacuum suction cup 34.

[0078] The use of vacuum suction cups as gripping elements is made possible in that the handling devices 31 and 32 are called upon to orient the bottles in a static operating condition, i.e. in an operating condition not associated with a simultaneous movement of the entire handling device.

[0079] As already mentioned above, according to a preferred embodiment illustrated in the accompanying figures, the device for transferring bottles 40 comprises:

- a movable bottle gripper head 41; and
- means 45 for moving in space the aforesaid movable bottle gripper head 41.

[0080] Advantageously, as illustrated in particular in Figures 24, 25 and 26, the aforesaid movable bottle gripper head 41 comprises a plurality of gripper elements 42, each of which is suitable to grip a bottle B.

[0081] More specifically, the aforesaid gripper elements 42 are distributed on two parallel rows L1 and L2 to grip one or more groups of bottles B already arranged in tête-bêche configuration.

[0082] Advantageously, each bottle gripping element 42 is suitable to grip a bottle by means of at least one vacuum suction cup 43.

[0083] The use of vacuum suction cups as gripper elements in the movable bottle gripper head 41 is made possible in that this movable head 41 is not required to change the relative orientation of the bottles to arrange them in tête-bêche configuration, but only to transfer bottles already arranged in such configuration from one point to another of the plant 1.

[0084] Advantageously, the gripper elements 42 of each row L1 and L2 are movable in relation to each other so as to adjust the pitch and thus adapt them to the bottle format. This may be achieved in a constructively simple way due to the fact that vacuum suction cups, and not mechanical clamps, may be used as gripper elements.

[0085] Preferably, as shown schematically in Figure 4, the laying plant 1 is automated and comprises an electronic control unit 100 which is programmed to control at least the bottle positioning system 30 and the bottle transferring device 40 so that, while the bottle transferring de-

vice 40 is transferring one or more groups of bottles B in the tête-bêche configuration towards the laying line 20 picked up by the bottle positioning system 30, the bottle positioning system 30 is preparing one or more groups of bottles in the tête-bêche configuration.

[0086] As shown above, this reduces downtime in the operating cycle of plant 1.

[0087] The method of laying bottles in a tête-bêche arrangement according to the invention will now be described.

[0088] This laying method is implemented by means of a laying plant 1 comprising:

- a device 10 for receiving bottles in input in vertical position, connectible to a bottle transport line; and
- a line for laying bottles 20 in containers.

[0089] Preferably, the laying method is implemented by means of a laying plant 1 according to the present invention, and in particular as described above.

[0090] More specifically, the method according to the invention comprises the following operative steps:

- a) positioning in the tête-bêche configuration one or more groups of bottles B received by the aforesaid receiving device 10; and
- b) transferring one or more groups of bottles in the tête-bêche configuration in the bottle laying line 20,

[0091] According to the invention, the aforesaid step a) of positioning bottles is implemented by a system 30 to position one or more groups of bottles in tête-bêche configuration, while the aforesaid step b) is implemented by a device 40 to transfer one or more groups of bottles in tête-bêche configuration into the line for laying in containers.

[0092] The bottle positioning system 30 is structurally and functionally separate from the bottle transferring device 40.

[0093] Preferably, the bottle positioning step a) is carried out at the same time as the execution of the transferring step b) on at least one group of bottles different from that on which said transferring step b) is being performed.

[0094] The advantages offered by the invention already highlighted above when describing the laying plant 1 also apply to the laying method and will not be repeated here for brevity of description.

[0095] The invention allows many advantages already partly described to be obtained.

[0096] The plant for laying bottles in a tête-bêche arrangement according to the invention allows flexible management of bottle format changes, significantly reducing the need to replace the bottle transferring device in the laying line, without, however, increasing the mechanical complexity of such bottle transferring device.

[0097] The bottle laying system according to the invention is moreover easy to manage from an operative point of view.

[0098] Finally, the bottle laying plant according to the invention is simple and economical to implement.

[0099] The laying plant 1 may be structured to flexibly manage bottle format changes, significantly reducing the need to replace the movable device for gripping and handling bottles, without, however, increasing the mechanical complexity of the bottle transferring device.

[0100] The invention thus conceived therefore achieves the foregoing objects.

[0101] Obviously, in its practical implementation, it may also be assumed to take on embodiments and configurations other than those described above without departing from the present scope of protection.

[0102] Moreover, all details may be replaced by technically equivalent elements, and the dimensions, shapes and materials used may be of any kind according to the needs.

Claims

1. Plant for laying bottles in a tête-bêche arrangement comprising:

- a device (10) for receiving bottles in input in vertical position, connectable to a bottle transport line;
- a line (20) for laying bottles in containers;
- a system (30) for positioning in the tête-bêche arrangement one or more groups of bottles received by said receiving device (10); and
- a device (40) for transferring one or more groups of bottles in the tête-bêche arrangement from said positioning system to said laying line,

wherein said bottle positioning system (30) is structurally and functionally separate from said bottle transferring device (40)

wherein said system (30) for positioning bottles in the tête-bêche arrangement is structurally incorporated in said bottle receiving device (10),

wherein said bottle receiving device (10) comprises:

- two separate bottle storage lanes (11; 12), which extend parallel to each other along a bottle feed direction (X) and are transversely separated from each other to define a free space (17); and
- a bottle diverter (13) suitable to distribute the bottles between the two storage lanes (11, 12),

and wherein said system (30) for positioning bottles in the tête-bêche arrangement is located in the free space (17) between said two bottle storage lanes (11, 12) and is suitable to operate on bottles present in said two storage lanes (11, 12),

characterized in that said system (30) for position-

ing bottles in the tête-bêche arrangement comprises a plurality of bottle handling devices (31, 32), each of which is suitable to pick up a single bottle in vertical position from one of the two storage lanes (11, 12) and to position it horizontally in the free space (17) between the two storage lanes (11, 12) with the bottle bottom-neck axis of extension (Y) placed transversely to said bottle feed direction (X) and with a neck-bottom orientation inverted relative to the orientation received by the bottles positioned by two handling devices (32) adjacent thereto, so that the set of said handling devices (31, 32) arrange horizontally one or more groups of bottles placed side by side to each other in the tête-bêche arrangement,
and **in that** said handling devices (31, 32) are organized into two separate operating groups, wherein the handling devices (31) of a first group are suitable to pick up bottles from a first (11) of said two storage lanes and position them horizontally with a first neck-bottom orientation, while the handling devices (32) of a second group are suitable to pick up bottles from the other storage lane (12) and position them horizontally with a second neck-bottom orientation, inverted relative to the first, the devices (31, 32) of said two operating groups being arranged in alternating sequence along a direction parallel to said bottle feed direction (X),
and wherein each handling device (31, 32) is positionable in an adjustable manner relative to the other handling devices (31, 32) in the longitudinal direction and/or in a direction transverse to said feed direction (X) so as to adapt the positioning of the bottles in the tête-bêche arrangement to the different sizes of bottles that may be processed by the plant (1).

2. Plant according to claim 1, wherein said system (30) for positioning bottles in the tête-bêche arrangement is associated with said device (10) for receiving bottles and wherein said bottle transferring device (40) comprises a movable, bottle gripper head (41) and means (45) for moving in space said movable bottle gripper head (41), preferably said movement means consisting of a robotic arm (45).

3. Plant according to claim 1 or 2, wherein each handling device (31, 32) is movable transversely relative to said feed direction (X) in order to adjust the gripping distance on the bottles (B) placed in the relative storage lane (11, 12), preferably the handling devices (31 or 32) of an operating group being movable all together transversely.

4. Plant according to claim 1, 2 or 3, wherein the handling devices (31; 32) are aligned on two separate rows, parallel to said feed direction (X), one for each operating group, and wherein the handling devices (31, 32) of each row are associated to a support frame (310a, 320a) movable transversely to said feed direction (X) within the space comprised between the two storage lanes (11, 12).

5. Plant according to claim 4, wherein the handling devices (31, 32) of each row are kinematically associated to a worm screw (310; 320), which is in turn associated to the respective support frame (310a, 320a) and extends parallel to said feed direction (X) and wherein the rotation of said worm screw (310, 320) determines the axial sliding of the devices (31, 32) associated thereto and thus their axial distribution along the worm screw (310; 320) to change the axial pitch of the bottles in the tête-bêche arrangement.

6. Plant according to claim 5, wherein the devices (31, 32) of each row are kinematically interconnected to each other also by spacing means (311; 312) suitable to ensure a regular spacing between the devices (31 or 32) to vary their axial positioning along the relative worm screw (310; 320), preferably said spacing means (311; 312) being constituted by a kinematic chain with articulated rods.

7. Plant according to one or more of claims 4 to 6, wherein the two support frames (310a, 320a) of the two operating groups are movable transversely to said feed direction (X) in a coordinated manner by shared movement means (331, 332).

8. Plant according to one or more of claims 1 to 7, wherein each bottle handling device (31, 32) of said bottle positioning system (30) comprises a bottle gripper element (33), which is movable, preferably by rotation, between a bottle pick-up position, wherein said gripper element (33) is positioned vertically near the relative bottle storage lane (11, 12) to pick up a bottle by gripping it, and a bottle orientation position, wherein said gripper (33) is positioned horizontally to position horizontally in the space between the two storage lanes (11, 12) a bottle picked up from the relative storage lane (11, 12).

9. Plant according to claim 8, wherein each bottle gripper element (33) is suitable to exert a gripping action on a bottle by means of at least one vacuum suction cup (34).

10. Plant according to one or more of claims 2 to 9, wherein the movable bottle gripper head (41) of said bottle transferring device (40) comprises a plurality of gripper elements (42), each of which is suitable to grip a bottle, and wherein said gripper elements (42) are distributed on two parallel rows to grip one or more groups of bottles arranged in the tête-bêche arrangement.

11. Plant according to claim 10, wherein said gripper el-

ements (42) of each row are movable relative to each other so as to adjust the pitch and thus adapt them to the bottle format.

12. Plant according to claim 10 or 11, wherein each bottle gripper element (42) is suitable to exert the gripping action on a bottle by means of at least one vacuum suction cup (43).

13. Plant according to one or more of the preceding claims, wherein said laying plant (1) is automated and comprises an electronic control unit (100) which is programmed to control at least said bottle positioning system (30) and said bottle transferring device (40) so that, while the bottle transferring device (40) is transferring one or more groups of bottles in the tête-bêche arrangement towards said laying line (20) picked up by said bottle positioning system (30), the bottle positioning system (30) is preparing one or more groups of bottles in the tête-bêche arrangement.

14. Method of laying bottles in a tête-bêche arrangement, implemented by means of a laying plant (1) comprising: - a device (10) for receiving bottles in input in vertical position, connectable to a bottle transport line; and - a line for laying bottles (20) in containers,
said method comprises the following operating steps:

- a) positioning in the tête-bêche arrangement one or more groups of bottles received by said receiving device (10); and
- b) transferring one or more groups of bottles in the tête-bêche arrangement to said bottle laying line (20), wherein said bottle positioning step a) is implemented by a system (30) for positioning in the tête-bêche arrangement one or more groups of bottles and said step b) is implemented by a device (40) for transferring one or more groups of bottles in the tête-bêche arrangement to said laying line (20), wherein said bottle positioning system (30) is structurally and functionally separate from said bottle transferring device (40),

wherein said laying method is implemented by means of a laying plant (1) according to one or more of the claims from 1 to 13.

15. Laying method according to claim 14, wherein said bottle positioning step a) is carried out at the same time as the execution of said transferring step b) on at least one group of bottles different from that on which said transferring step b) is being performed.

Patentansprüche

1. Anlage zum Legen von Flaschen in einer Tête-Bêche-Anordnung, umfassend:

- eine Vorrichtung (10) zum Aufnehmen von eingegebenen Flaschen in vertikaler Position, die mit einer Flaschentransportstraße verbindbar ist;
- eine Straße (20) zum Legen von Flaschen (20) in Behälter;
- ein System (30) zum Positionieren einer oder mehrerer Gruppen von Flaschen, die von der Aufnahmevorrichtung (10) aufgenommen werden, in der Tête-Bêche-Anordnung; und
- eine Vorrichtung (40) zum Fördern einer oder mehrerer Gruppen von Flaschen in der Tête-Bêche-Anordnung von dem Positionierungssystem zu der Legestraße;

wobei das Flaschenpositionierungssystem (30) strukturell und funktionell von der Flaschenfördervorrichtung (40) getrennt ist,
wobei das System (30) zum Positionieren von Flaschen in der Tête-Bêche-Anordnung strukturell in die Flaschenaufnahmevorrichtung (10) integriert ist,
wobei die Flaschenaufnahmevorrichtung (10) umfasst:

- zwei separate Flaschenlagerbahnen bzw. -gassen (11; 12), die sich parallel zueinander entlang einer Flaschenvorschubrichtung (X) erstrecken und quer voneinander getrennt sind, um einen freien Raum (17) zu definieren; und
- eine Flaschenumlenkvorrichtung (13), die geeignet ist, die Flaschen zwischen den beiden Lagerbahnen (11, 12) zu verteilen,

und wobei sich das System (30) zum Positionieren von Flaschen in der Tête-Bêche-Anordnung in dem freien Raum (17) zwischen den beiden Flaschenlagerbahnen (11, 12) befindet und geeignet ist, an bzw. mit Flaschen zu arbeiten, die in den beiden Lagerbahnen (11, 12) befinden,
dadurch gekennzeichnet, dass das System (30) zum Positionieren von Flaschen in der Tête-Bêche-Anordnung eine Mehrzahl von Flaschenhandhabungsvorrichtungen (31, 32) umfasst, von denen jede geeignet ist, eine einzelne Flasche in vertikaler Position von einer der beiden Lagerbahnen (11, 12) aufzunehmen und sie horizontal in dem freien Raum (17) zwischen den beiden Lagerbahnen (11, 12) zu positionieren, wobei die Flaschenboden-Hals-Verlängerungsachse (Y) quer zu der Flaschenvorschubrichtung (X) platziert ist und eine Hals-Boden-Ausrichtung relativ zu der Ausrichtung invertiert ist, die von den Flaschen empfangen bzw. eingenommen wird, die von zwei Handhabungsvorrichtungen

(32) angrenzend bzw. benachbart dazu positioniert werden, so dass der Satz von Handhabungsvorrichtungen (31, 32) horizontal eine oder mehrere Gruppen von Flaschen anordnet, die Seite an Seite in der Tête-Bêche-Anordnung platziert werden,
und dadurch, dass die Handhabungsvorrichtungen (31, 32) in zwei separaten Betriebsgruppen organisiert sind, wobei die Handhabungsvorrichtungen (31) einer ersten Gruppe geeignet sind, Flaschen von einer ersten (11) der beiden Lagerbahnen aufzunehmen und diese horizontal mit einer ersten Hals-Boden-Ausrichtung zu positionieren, während die Handhabungsvorrichtungen (32) einer zweiten Gruppe geeignet sind, Flaschen von der anderen Lagerbahn (12) aufzunehmen und diese horizontal mit einer zweiten Hals-Boden-Ausrichtung zu positionieren, die relativ zu der ersten invertiert ist, wobei die Vorrichtungen (31, 32) der beiden Betriebsgruppen in alternierender Reihenfolge entlang einer Richtung parallel zu der Flaschenvorschubrichtung (X) angeordnet sind,
und wobei jede Handhabungsvorrichtung (31, 32) auf einstellbare Weise relativ zu den anderen Handhabungsvorrichtungen (31, 32) in der Längsrichtung und/oder in einer Richtung quer zu der Vorschubrichtung (X) positionierbar ist, um die Positionierung der Flaschen in der Tête-Bêche-Anordnung auf unterschiedliche Größen von Flaschen anzupassen, die von der Anlage (1) verarbeitet werden können.

2. Anlage nach Anspruch 1, wobei das System (30) zum Positionieren von Flaschen in der Tête-Bêche-Anordnung der Vorrichtung (10) zum Aufnehmen von Flaschen zugeordnet ist, und wobei die Flaschenfördervorrichtung (40) einen beweglichen Flaschengreiferkopf (41) und Mittel (45) zum Bewegen des beweglichen Flaschengreiferkopfs (41) im Raum umfasst, wobei vorzugsweise der Bewegungsmittel aus einem Roboterarm (45) bestehen.

3. Anlage nach Anspruch 1 oder 2, wobei jede Handhabungsvorrichtung (31, 32) quer relativ zu der Vorschubrichtung (X) beweglich ist, um den Greifabstand an den Flaschen (B) einzustellen, die in der relativen Lagerbahn (11, 12) platziert werden, wobei vorzugsweise die Handhabungsvorrichtungen (31 oder 32) einer Betriebsgruppe alle zusammen quer beweglich sind.

4. Anlage nach Anspruch 1, 2 oder 3, wobei die Handhabungsvorrichtungen (31; 32) auf zwei separaten Reihen parallel zu der Vorschubrichtung (X) ausgerichtet sind, und zwar eine für jede Betriebsgruppe, und wobei die Handhabungsvorrichtungen (31, 32) jeder Reihe einem Stütz- bzw. Trägerrahmen (310a, 320a) zugeordnet sind, der quer zu der Vorschubrichtung (X) innerhalb des zwischen den beiden Lagerbahnen (11, 12) enthaltenen Raums beweglich ist.

5. Anlage nach Anspruch 4, wobei die Handhabungsvorrichtungen (31, 32) jeder Reihe kinematisch einer Schneckenschraube (310; 320) zugeordnet sind, die wiederum dem jeweiligen Trägerrahmen (310a, 320a) zugeordnet ist und sich parallel zu der Vorschubrichtung (X) erstreckt, und wobei die Drehung der Schneckenschraube (310, 320) das axiale Gleiten der zugeordneten Vorrichtungen (31, 32) und somit deren axiale Verteilung entlang der Schneckenschraube (310; 320) bestimmt, um den axialen Abstand der Flaschen in der Tête-Bêche-Anordnung zu ändern.

6. Anlage nach Anspruch 5, wobei die Vorrichtungen (31, 32) jeder Reihe auch durch Abstandsmittel (311; 312) kinematisch miteinander verbunden sind, die geeignet sind, einen regelmäßigen Abstand zwischen den Vorrichtungen (31 oder 32) sicherzustellen, um ihre axiale Positionierung entlang der relativen Schneckenschraube (310; 320) zu variieren, wobei vorzugsweise die Abstandsmittel (311; 312) aus einer kinematischen Kette mit Gelenkstangen bestehen.

7. Anlage nach einem oder mehreren der Ansprüche 4 bis 6, wobei die zwei Trägerrahmen (310a, 320a) der beiden Betriebsgruppen durch gemeinsame Bewegungsmittel (331, 332) auf koordinierte Weise quer zu der Vorschubrichtung (X) beweglich sind.

8. Anlage nach einem oder mehreren der Ansprüche 1 bis 7, wobei jede Flaschenhandhabungsvorrichtung (31, 32) des Flaschenpositionierungssystems (30) ein Flaschengreiferelement (33) umfasst, das vorzugsweise durch Drehung zwischen einer Flaschenaufnahmeposition, in der das Greiferelement (33) vertikal nahe der relativen Flaschenlagerbahn (11, 12) positioniert ist, um eine Flasche durch Greifen aufzunehmen, und eine Flaschenausrichtungsposition beweglich ist, in der der Greifer (33) horizontal positioniert ist, um horizontal in dem Raum zwischen den beiden Lagerbahnen (11, 12) eine Flasche zu positionieren, die von der jeweiligen Lagerbahn (11, 12) aufgenommen wird.

9. Anlage nach Anspruch 8, wobei jedes Flaschengreiferelement (33) geeignet ist, eine Greifwirkung auf eine Flasche mittels zumindest eines Vakuumsaugbechers (34) auszuüben.

10. Anlage nach einem oder mehreren der Ansprüche 2 bis 9, wobei der bewegliche Flaschengreiferkopf (41) der Flaschenfördervorrichtung (40) eine Mehrzahl von Greiferelementen (42) umfasst, von denen jedes geeignet ist, eine Flasche zu greifen, und wobei die Greiferelemente (42) auf zwei parallele Rei-

hen verteilt sind, um eine oder mehrere Gruppen von Flaschen zu greifen, die in der Tête-Bêche-Anordnung angeordnet sind.

11. Anlage nach Anspruch 10, wobei die Greiferelemente (42) jeder Reihe relativ zueinander beweglich sind, um den Abstand einzustellen und sie somit an das Flaschenformat anzupassen.

12. Anlage nach Anspruch 10 oder 11, wobei jedes Flaschengreiferelement (42) geeignet ist, die Greifwirkung auf eine Flasche mittels zumindest eines Vakuumsaugbechers (43) auszuüben.

13. Anlage nach einem oder mehreren der vorhergehenden Ansprüche, wobei die Legeanlage (1) automatisiert ist und eine elektronische Steuer- bzw. Regeleinheit (100) umfasst, die dahingehend programmiert ist, zumindest das Flaschenpositionierungssystem (30) und die Flaschenfördervorrichtung (40) zu steuern bzw. zu regeln, so dass, während die Flaschenfördervorrichtung (40) eine oder mehrere Gruppen von Flaschen in der Tête-Bêche-Anordnung in Richtung der von dem Flaschenpositionierungssystem (30) aufgenommenen Legestraße (20) befördert, das Flaschenpositionierungssystem (30) eine oder mehrere Flaschengruppen in der Tête-Bêche-Anordnung vorbereitet.

14. Verfahren zum Legen von Flaschen in einer Tête-Bêche-Anordnung, implementiert mittels einer Legeanlage (1), umfassend: - eine Vorrichtung (10) zum Aufnehmen von eingegebenen Flaschen in vertikaler Position, die mit einer Flaschentransportstraße verbindbar ist; und - eine Straße zum Legen von Flaschen (20) in Behälter,
wobei das Verfahren die folgenden Betriebsschritte umfasst:

- a) Positionieren, in der Tête-Bêche-Anordnung, einer oder mehrerer Gruppen von Flaschen, die von der Aufnahmevorrichtung (10) aufgenommen werden; und
- b) Befördern einer oder mehrerer Gruppen von Flaschen in der Tête-Bêche-Anordnung zu der Flaschenlegestraße (20),

wobei der Flaschenpositionierungsschritt a) durch ein System (30) zum Positionieren in der Tête-Bêche-Anordnung einer oder mehrerer Gruppen von Falschen implementiert wird und der Schritt b) wird durch eine Vorrichtung (40) zum Befördern einer oder mehrerer Gruppen von Flaschen in der Tête-Bêche-Anordnung zu der Legestraße (20) implementiert wird, wobei das Flaschenpositionierungssystem (30) strukturell und funktionell von der Flaschenfördervorrichtung (40) getrennt ist,
wobei das Legeverfahren mittels einer Legeanlage (1) nach einem oder mehreren der Ansprüche 1 bis 13 implementiert wird.

15. Legeverfahren nach Anspruch 14, wobei der Flaschenpositionierungsschritt a) zur gleichen Zeit wie die Ausführung des Beförderungsschritts b) an zumindest einer Gruppe von Flaschen durchgeführt wird, die sich von derjenigen unterscheidet, an welcher der Beförderungsschritt b) durchgeführt wird.

Revendications

1. Installation de pose de bouteilles dans un agencement tête-bêche comprenant :

- un dispositif (10) pour recevoir des bouteilles en entrée en position verticale, pouvant être raccordé à une ligne de transport de bouteilles ;
- une ligne (20) pour poser des bouteilles dans des contenants ;
- un système (30) pour positionner dans l'agencement tête-bêche un ou plusieurs groupes de bouteilles reçues par ledit dispositif (10) de réception ; et
- un dispositif (40) pour transférer un ou plusieurs groupes de bouteilles dans l'agencement tête-bêche dudit système de positionnement à ladite ligne de pose,

dans laquelle ledit système (30) de positionnement de bouteilles est structurellement et fonctionnellement séparé dudit dispositif (40) de transfert de bouteilles
dans laquelle ledit système (30) pour positionner des bouteilles dans l'agencement tête-bêche est structurellement incorporé dans ledit dispositif (10) de réception de bouteilles,
dans laquelle ledit dispositif (10) de réception de bouteilles comprend :

- deux voies de stockage (11 ; 12) de bouteilles séparées, qui s'étendent parallèlement l'une à l'autre suivant une direction d'apport (X) de bouteilles et sont séparées transversalement l'une de l'autre pour définir un espace libre (17) ; et
- un déflecteur (13) de bouteilles approprié pour répartir les bouteilles entre les deux voies de stockage (11, 12),

et dans laquelle ledit système (30) pour positionner des bouteilles dans l'agencement tête-bêche est situé dans l'espace libre (17) entre les deux voies de stockage (11, 12) de bouteilles et est approprié pour fonctionner sur des bouteilles présentes dans lesdites deux voies de stockage (11, 12),
caractérisée en ce que ledit système (30) pour positionner des bouteilles dans l'agencement tête-bê-

che comprend une pluralité de dispositifs de manipulation (31, 32) de bouteilles, dont chacun est approprié pour ramasser une seule bouteille en position verticale à partir de l'une des deux voies de stockage (11, 12) et pour la positionner horizontalement dans l'espace libre (17) entre les deux voies de stockage (11, 12) avec l'axe d'extension fond-goulot de bouteilles (Y) placé transversalement à ladite direction d'apport (X) de bouteilles et avec une orientation goulot-fond inversée par rapport à l'orientation reçue par les bouteilles positionnées par deux dispositifs de manipulation (32) adjacents à celles-ci, de sorte que l'ensemble desdits dispositifs de manipulation (31, 32) agencent horizontalement un ou plusieurs groupes de bouteilles placées côte à côte les unes par rapport aux autres dans l'agencement tête-bêche,
et **en ce que** lesdits dispositifs de manipulation (31, 32) sont organisés en deux groupes en fonctionnement séparés, dans laquelle les dispositifs de manipulation (31) d'un premier groupe sont appropriés pour ramasser des bouteilles à partir d'une première (11) desdites deux voies de stockage et les positionner horizontalement avec une première orientation goulot-fond, tandis que les dispositifs de manipulation (32) d'un second groupe sont appropriés pour ramasser des bouteilles à partir de l'autre voie de stockage (12) et les positionner horizontalement avec une seconde orientation goulot-fond, inversée par rapport à la première, les dispositifs (31, 32) desdits deux groupes en fonctionnement étant agencés en séquence alternée suivant une direction parallèle à ladite direction d'apport (X) de bouteilles,
et dans laquelle chaque dispositif de manipulation (31, 32) peut être positionné de manière réglable par rapport aux autres dispositifs de manipulation (31, 32) dans la direction longitudinale et/ou dans une direction transversale à ladite direction d'apport (X) de façon à adapter le positionnement des bouteilles dans l'agencement tête-bêche aux différentes tailles de bouteilles qui peuvent être traitées par l'installation (1).

2. Installation selon la revendication 1, dans laquelle ledit système (30) pour positionner des bouteilles dans l'agencement tête-bêche est associé audit dispositif (10) pour recevoir des bouteilles et dans laquelle ledit dispositif (40) de transfert de bouteilles comprend une tête de saisie de bouteilles (41) mobile et des moyens (45) pour déplacer dans l'espace ladite tête de saisie de bouteilles (41) mobile, de préférence lesdits moyens de déplacement consistant en un bras robotique (45).

3. Installation selon la revendication 1 ou 2, dans laquelle chaque dispositif de manipulation (31, 32) est mobile transversalement par rapport à ladite direction d'apport (X) afin d'ajuster la distance de saisie sur les bouteilles (B) placées dans la voie de stockage (11, 12) relative, de préférence les dispositifs de manipulation (31 ou 32) d'un groupe en fonctionnement étant mobiles tous ensemble transversalement.

4. Installation selon la revendication 1, 2 ou 3, dans laquelle les dispositifs de manipulation (31 ; 32) sont alignés sur deux rangées séparées, parallèlement à ladite direction d'apport (X), une pour chaque groupe en fonctionnement, et dans laquelle les dispositifs de manipulation (31, 32) de chaque rangée sont associés à un cadre de support (310a, 320a) mobile transversalement à ladite direction d'apport (X) au sein de l'espace compris entre les deux voies de stockage (11, 12).

5. Installation selon la revendication 4, dans laquelle les dispositifs de manipulation (31, 32) de chaque rangée sont associés cinématiquement à une vis sans fin (310 ; 320), qui, elle, est associée au cadre de support (310a, 320a) respectif et s'étend parallèlement à ladite direction d'apport (X) et dans laquelle la rotation de ladite vis sans fin (310 ; 320) détermine le glissement axial des dispositifs (31, 32) associés à celle-ci et ainsi leur répartition axiale suivant la vis sans fin (310 ; 320) pour modifier le pas axial des bouteilles dans l'agencement tête-bêche.

6. Installation selon la revendication 5, dans laquelle les dispositifs (31, 32) de chaque rangée sont raccordés cinématiquement entre eux également par des moyens d'espacement (311 ; 312) appropriés pour assurer un espacement régulier entre les dispositifs (31 ou 32) pour faire varier leur positionnement axial suivant la vis sans fin (310 ; 320) relative, de préférence lesdits moyens d'espacement (311 ; 312) étant constitués par une chaîne cinématique avec des tiges articulées.

7. Installation selon une ou plusieurs des revendications 4 à 6, dans laquelle les deux cadres de support (310a, 320a) des deux groupes en fonctionnement sont mobiles transversalement à ladite direction d'apport (X) de manière coordonnée par des moyens de déplacement (331, 332) partagés.

8. Installation selon une ou plusieurs des revendications 1 à 7, dans laquelle chaque dispositif de manipulation (31, 32) de bouteilles dudit système (30) de positionnement de bouteilles comprend un élément de saisie (33) de bouteilles, qui est mobile, de préférence par rotation, entre une position de ramassage de bouteilles, dans laquelle ledit élément de saisie (33) est positionné verticalement à proximité de la voie de stockage (11, 12) de bouteilles relative pour ramasser une bouteille en la saisissant, et une position d'orientation de bouteille, dans laquelle ledit

dispositif de saisie (33) est positionné horizontalement pour positionner horizontalement dans l'espace entre les deux voies de stockage (11, 12) une bouteille ramassée à partir de la voie de stockage (11, 12) relative.

9. Installation selon la revendication 8, dans laquelle chaque élément de saisie (33) de bouteilles est approprié pour exercer une action de saisie sur une bouteille au moyen d'au moins une ventouse à vide (34).

10. Installation selon une ou plusieurs des revendications 2 à 9, dans laquelle la tête de saisie (41) de bouteilles mobile dudit dispositif (40) de transfert de bouteilles comprend une pluralité d'éléments de saisie (42), dont chacun est approprié pour saisir une bouteille, et dans laquelle lesdits éléments de saisie (42) sont répartis sur deux rangées parallèles pour saisir un ou plusieurs groupes de bouteilles agencées dans l'agencement tête-bêche.

11. Installation selon la revendication 10, dans laquelle lesdits éléments de saisie (42) de chaque rangée sont mobiles les uns par rapport aux autres de façon à régler le pas et ainsi s'adapter au format de bouteille.

12. Installation selon la revendication 10 ou 11, dans laquelle chaque élément de saisie (42) de bouteilles est approprié pour exercer l'action de saisie sur une bouteille au moyen d'au moins une ventouse à vide (43).

13. Installation selon une ou plusieurs des revendications précédentes, dans laquelle ladite installation (1) de pose est automatisée et comprend une unité de commande électronique (100) qui est programmée pour commander au moins ledit système (30) de positionnement de bouteilles et ledit dispositif (40) de transfert de bouteilles, de sorte que, pendant que le dispositif (40) de transfert de bouteilles transfère un ou plusieurs groupes de bouteilles dans l'agencement tête-bêche vers ladite ligne de pose (20) ramassée par ledit système (30) de positionnement de bouteilles, le système (30) de positionnement de bouteilles prépare un ou plusieurs groupes de bouteilles dans l'agencement tête-bêche.

14. Procédé de pose de bouteilles dans un agencement tête-bêche, mis en œuvre au moyen d'une installation (1) de pose comprenant : - un dispositif (10) pour recevoir des bouteilles en entrée en position verticale, pouvant être raccordé à une ligne de transport de bouteilles ; et - une ligne pour poser des bouteilles (20) dans des contenants,
ledit procédé comprend les étapes de fonctionnement suivantes :

- a) le positionnement dans l'agencement tête-bêche d'un ou de plusieurs groupes de bouteilles reçues par ledit dispositif (10) de réception ; et
- b) le transfert d'un ou de plusieurs groupes de bouteilles dans l'agencement tête-bêche à ladite ligne de pose (20) de bouteilles,

dans lequel ladite étape de positionnement de bouteilles a) est mise en œuvre par un système (30) pour positionner dans l'agencement tête-bêche un ou plusieurs groupes de bouteilles et ladite étape b) est mise en œuvre par un dispositif (40) pour transférer un ou plusieurs groupes de bouteilles dans l'agencement tête-bêche à ladite ligne de pose (20), dans lequel ledit système (30) de positionnement de bouteilles est structurellement et fonctionnellement séparé dudit dispositif (40) de transfert de bouteilles, dans lequel ledit procédé de pose est mis en œuvre au moyen d'une installation (1) de pose selon une ou plusieurs des revendications 1 à 13.

15. Procédé de pose selon la revendication 14, dans lequel ladite étape de positionnement de bouteilles a) est réalisée en même temps que l'exécution de ladite étape de transfert b) sur au moins un groupe de bouteilles différentes de celles sur lesquelles ladite étape de transfert b) est réalisée.

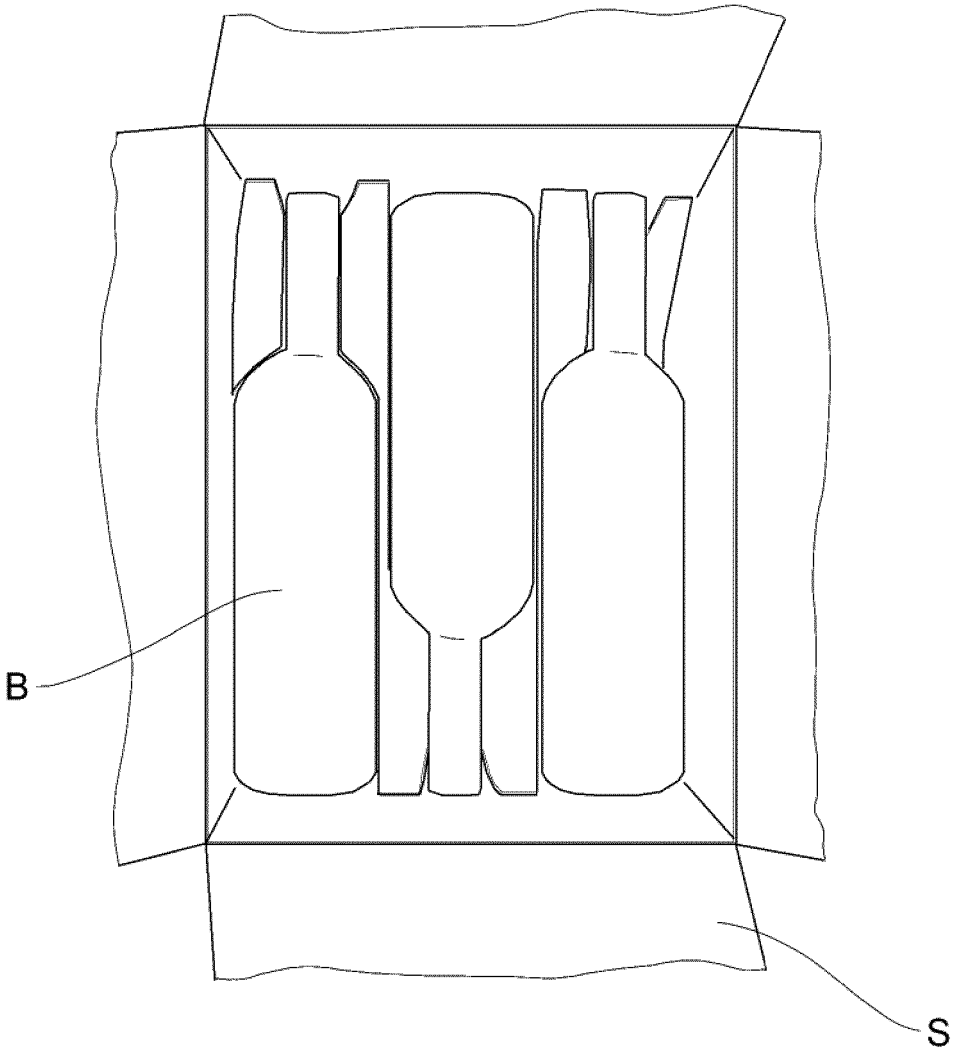


FIG.1

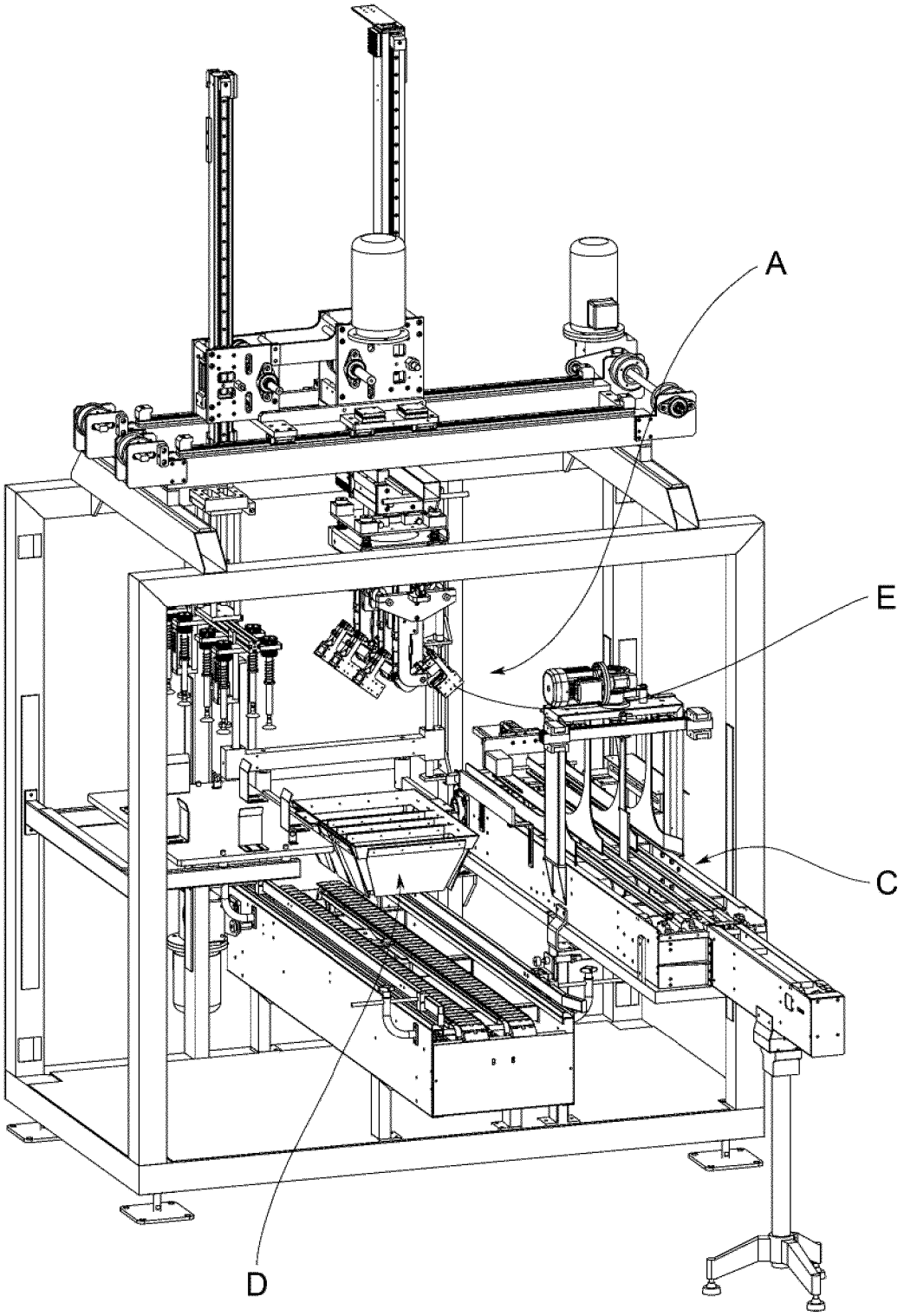


FIG.2

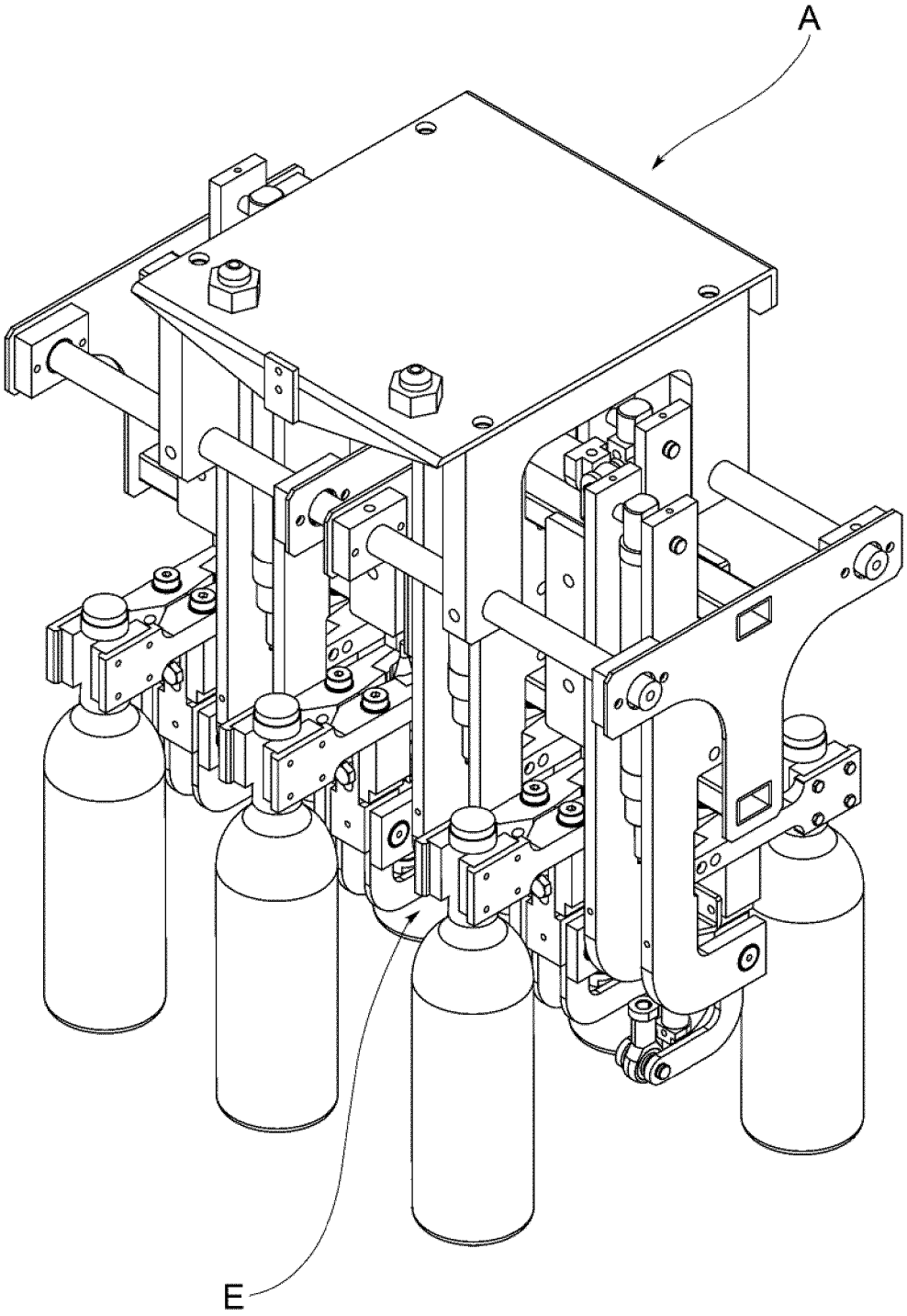


FIG.3

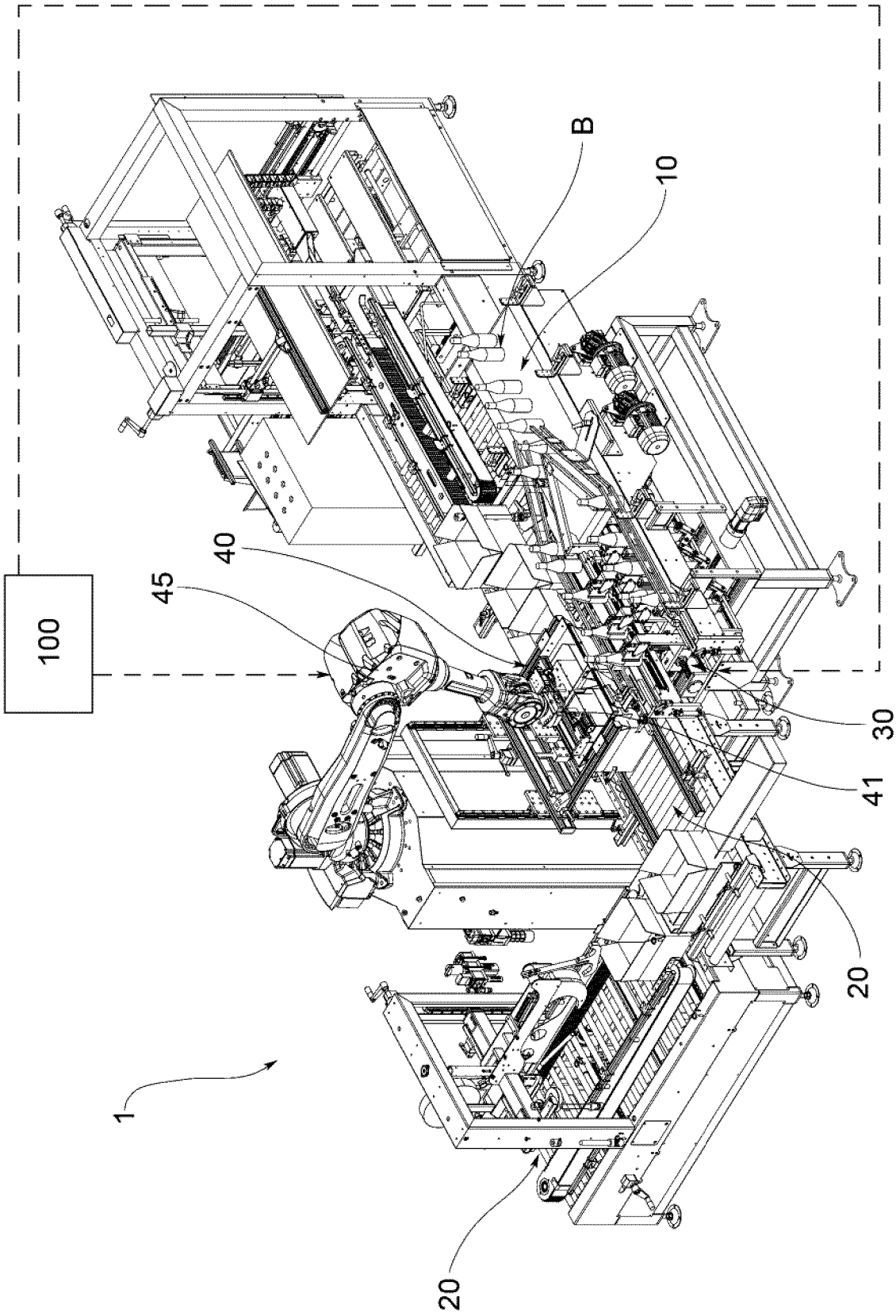


FIG.4

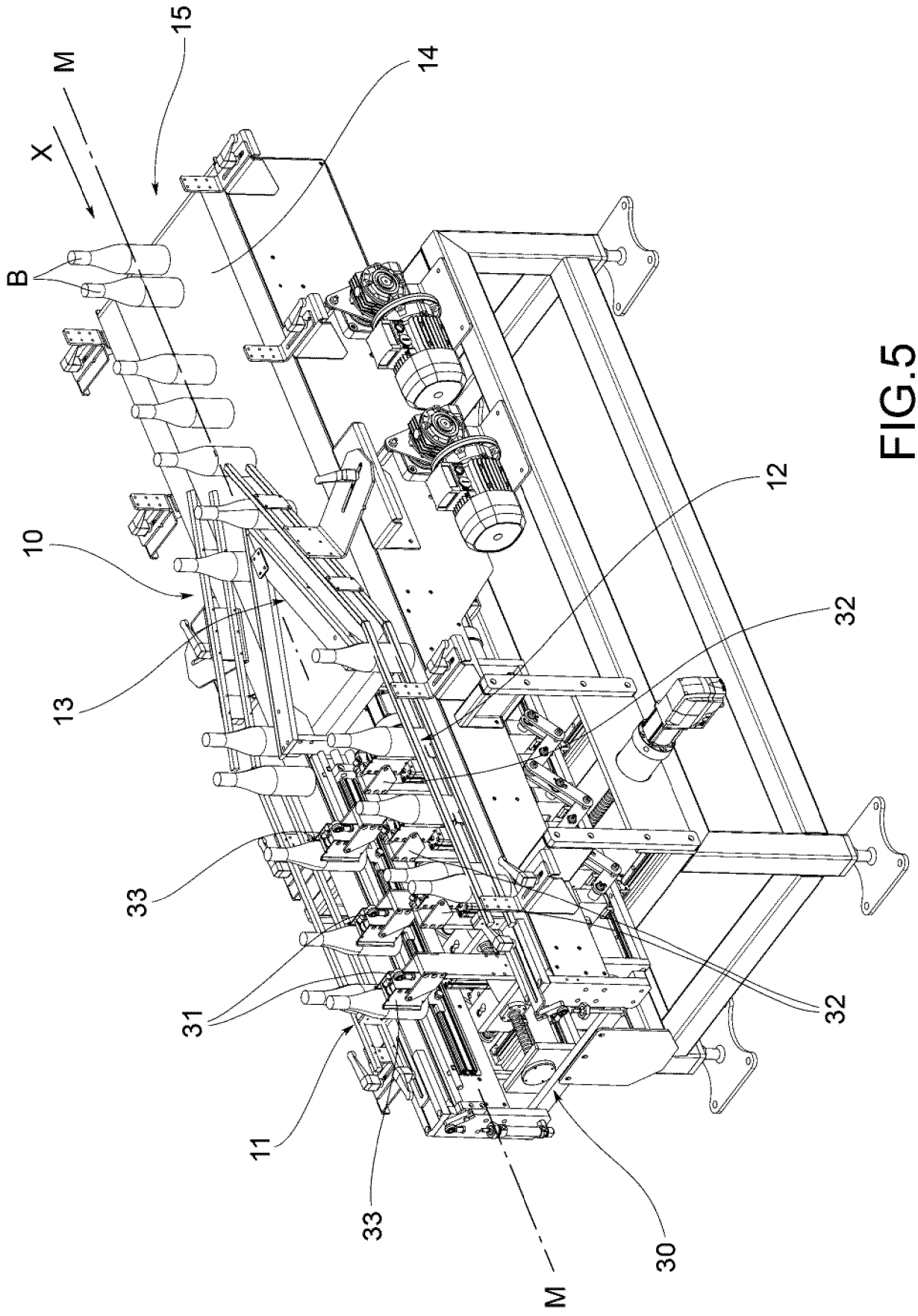


FIG.5

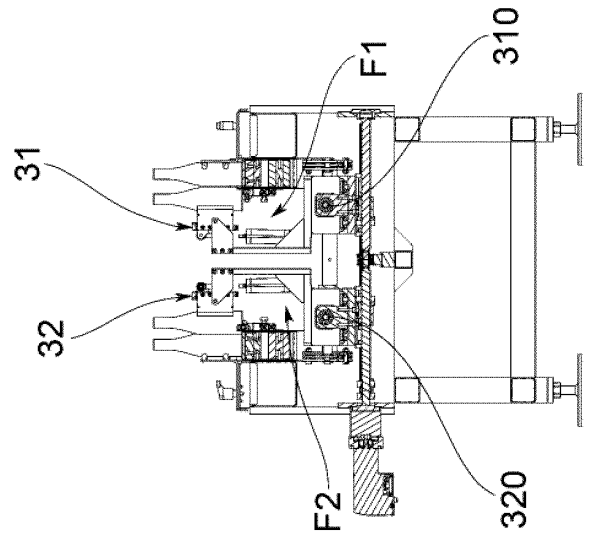


FIG.8

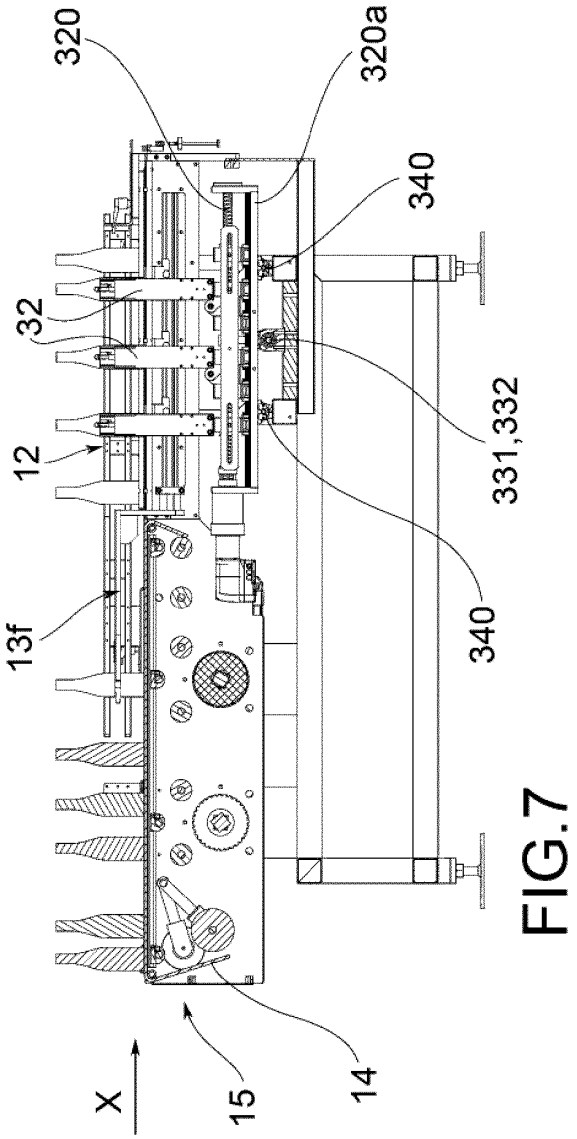


FIG.7

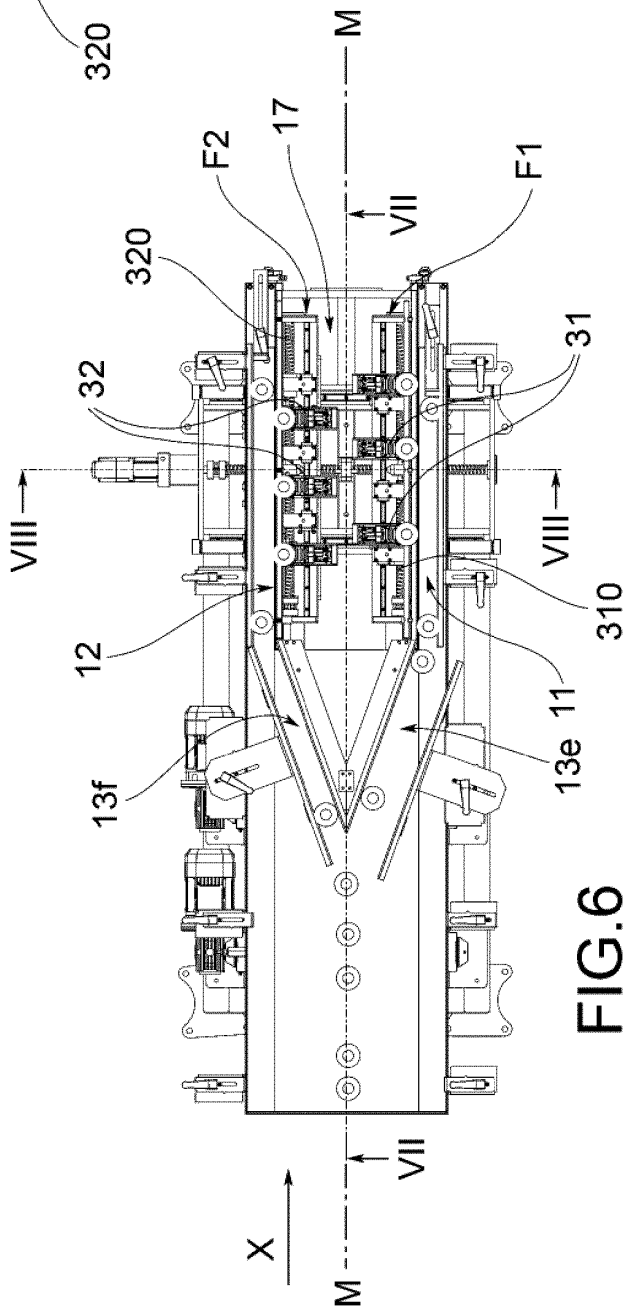


FIG.6

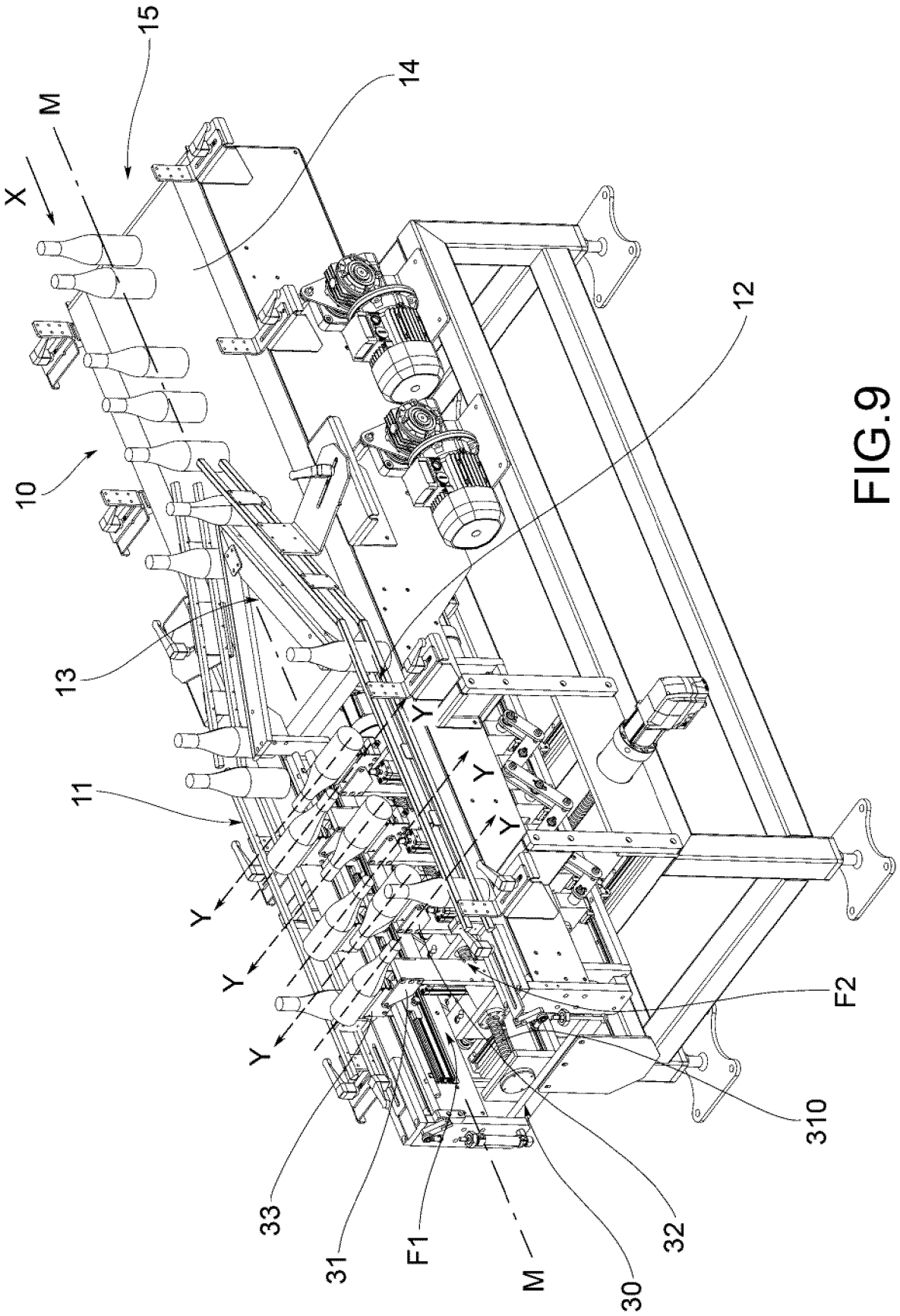


FIG.9

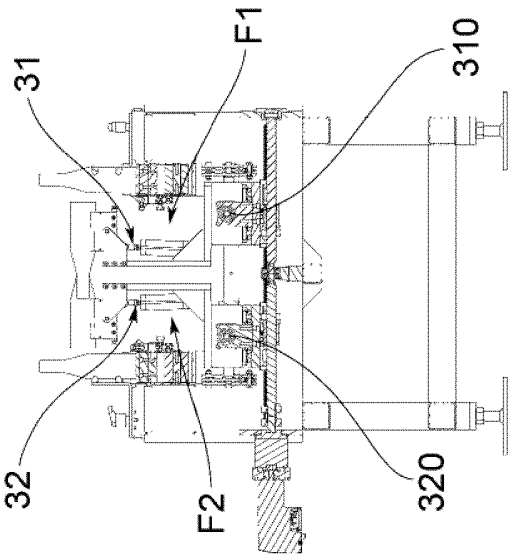


FIG.11

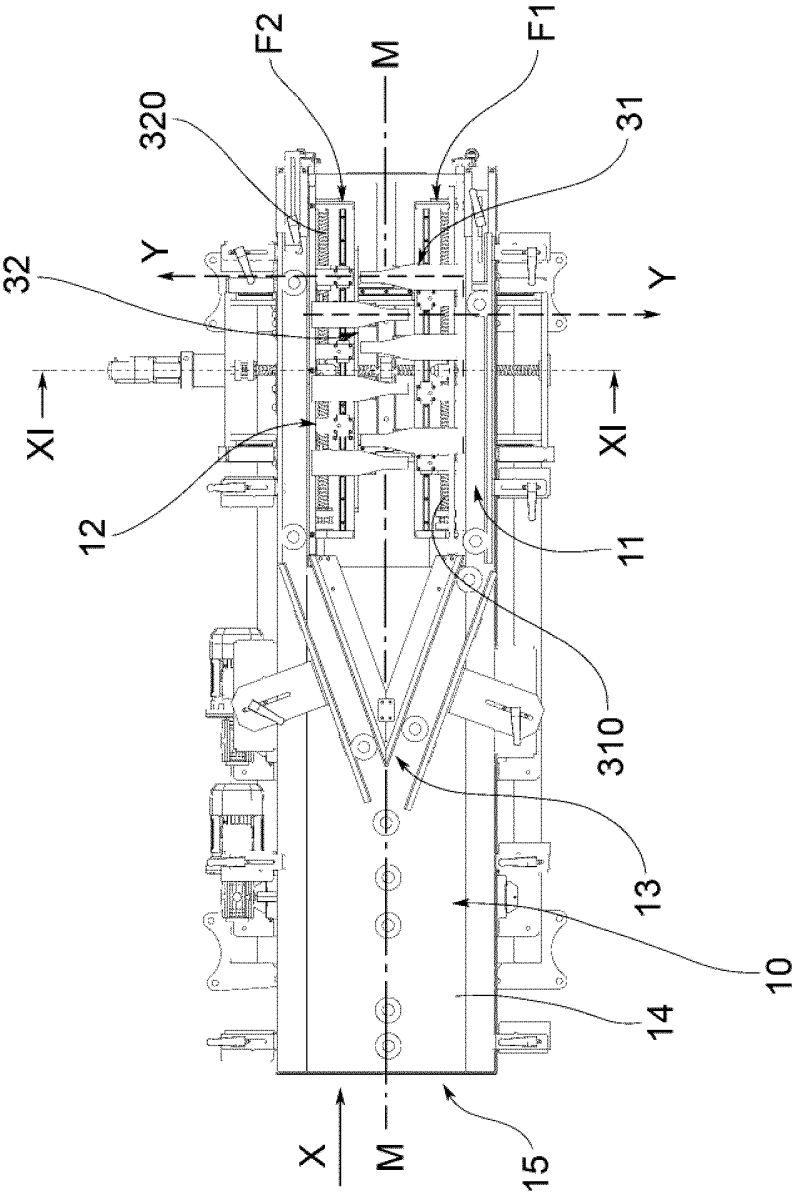


FIG.10

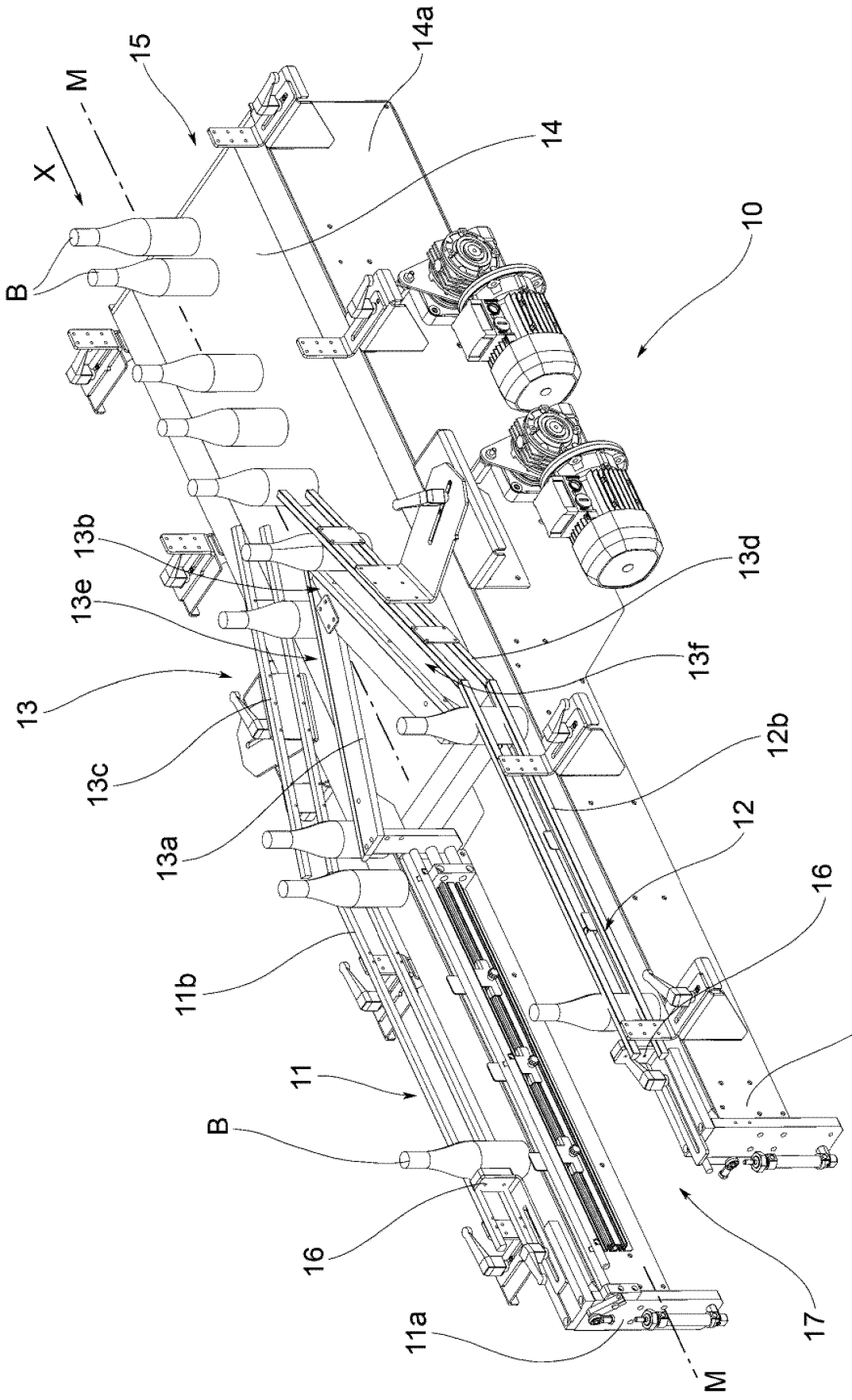
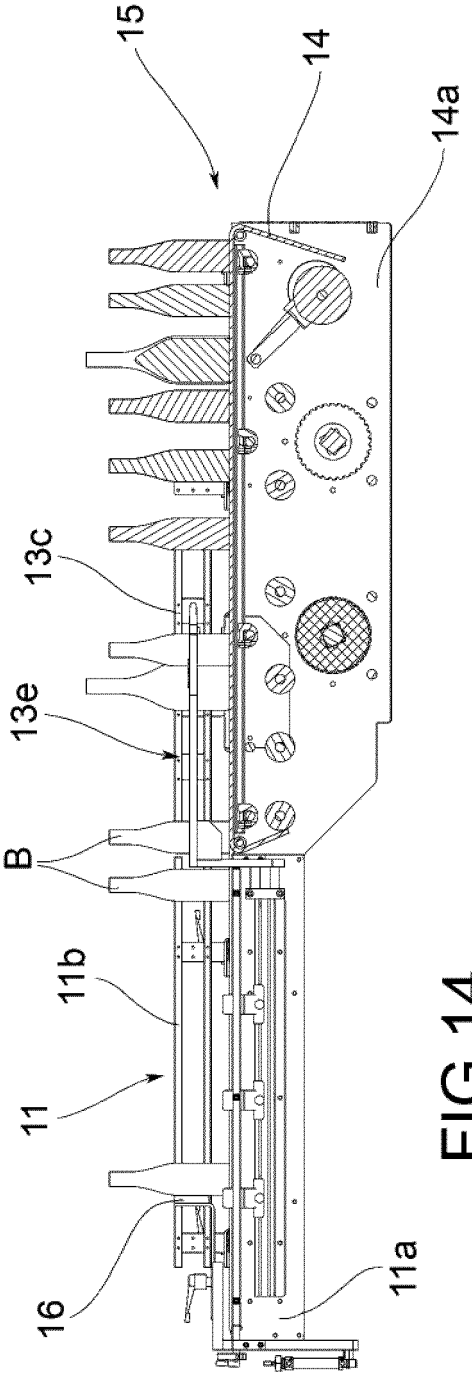

15
14a
M
X
14
B
10
13b
13e
13d
13
13f
13c
12b
13a
12
16
11b
12a
11
B
16
11a
17
M

FIG.12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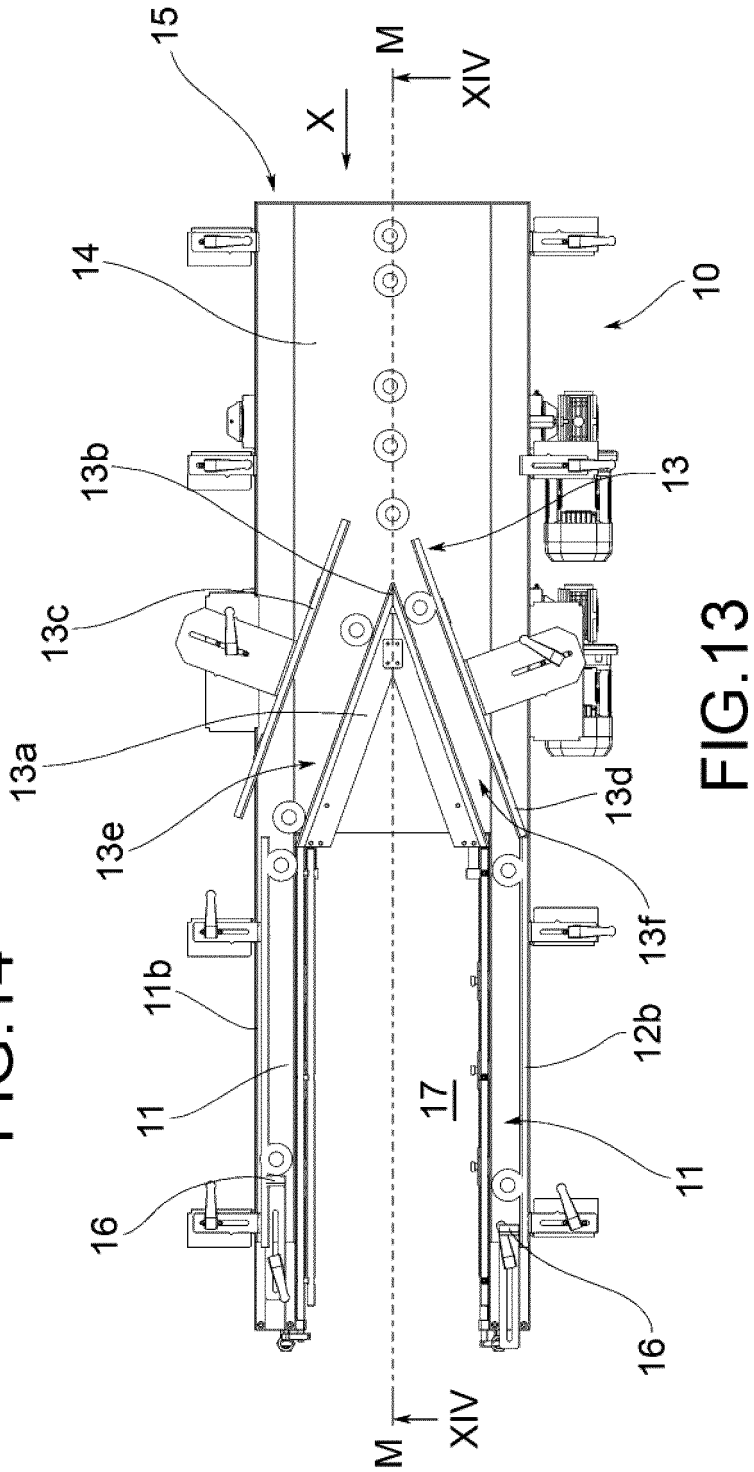
14
14a
13c
13e
B
11b
11
16
11a

FIG.14


15
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13e
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11b
12b
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17
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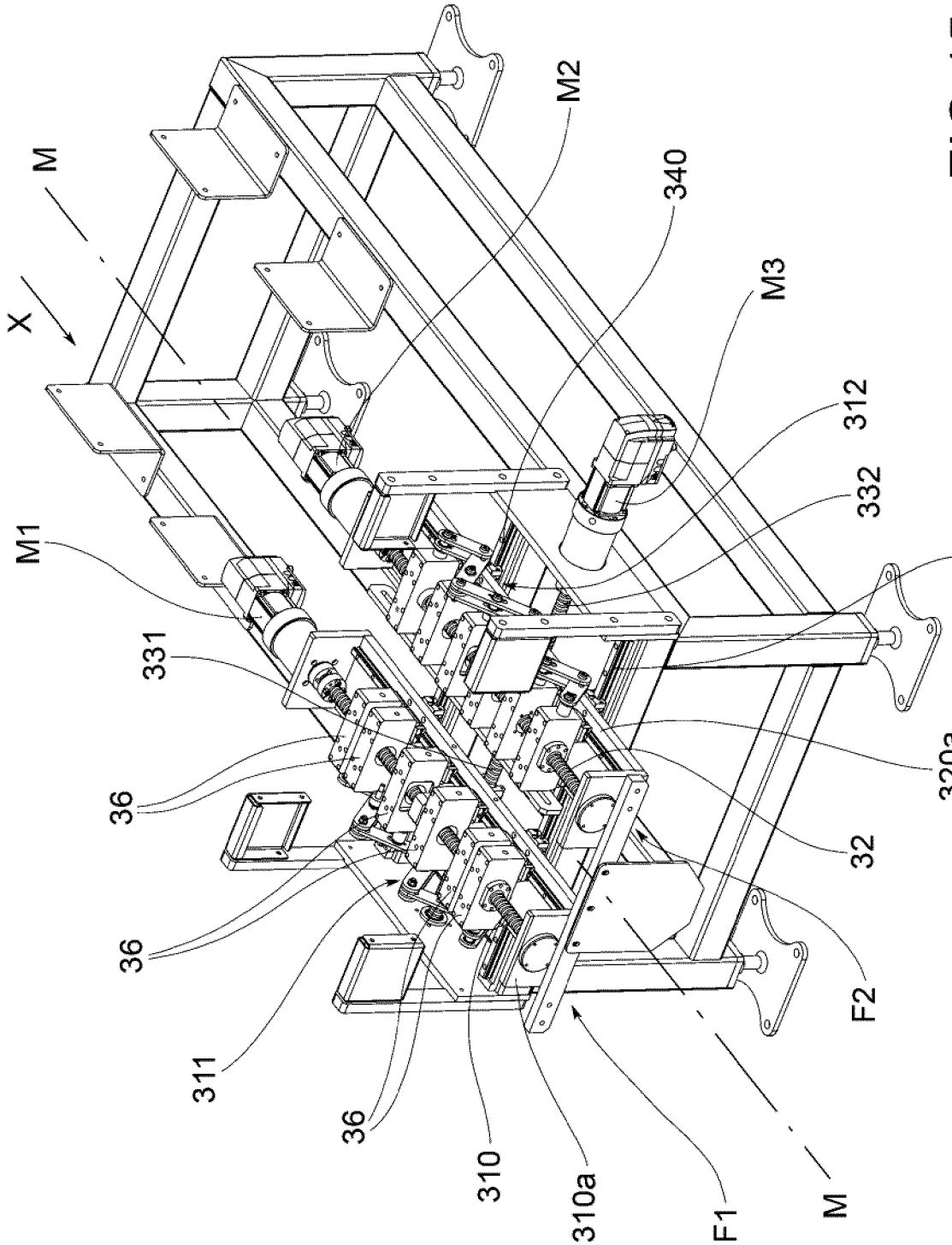
16
M
XIV

FIG.13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M2
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M3
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M1
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331
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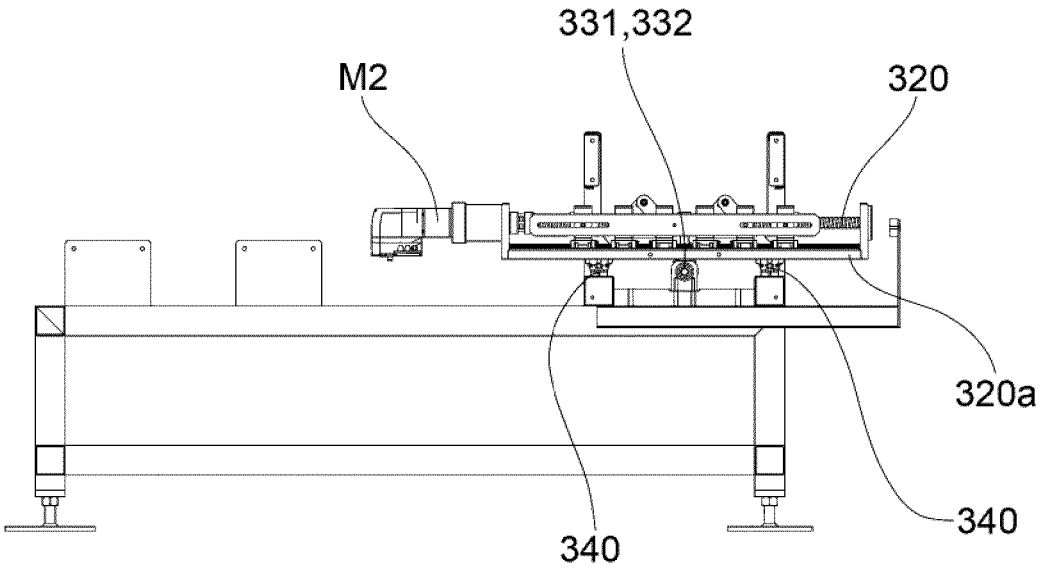
36
32
36
F2
311
36
310
310a
F1
M

FIG.15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M2
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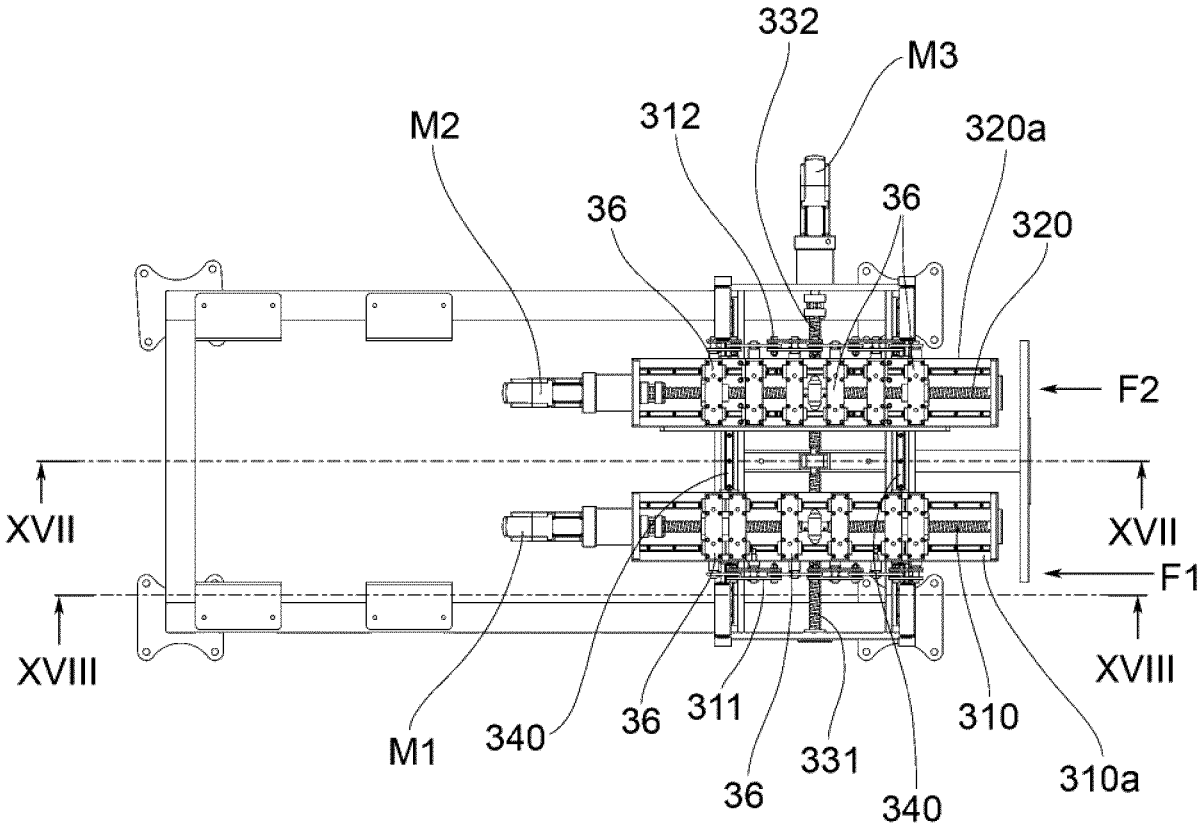
320a
340
340

FIG.17


332
M3
M2
312
320a
36
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F2
XVII
XVII
F1
XVIII
XVIII
M1
340
36
311
310
331
310a
36
340

FIG.16

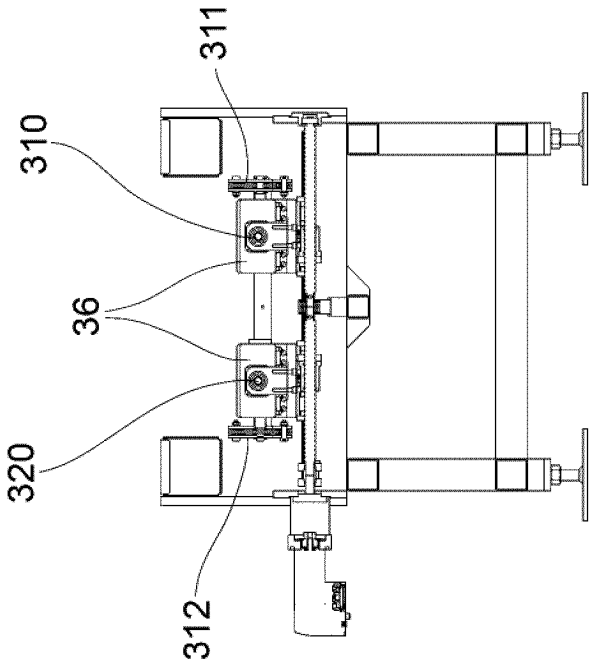

FIG.19

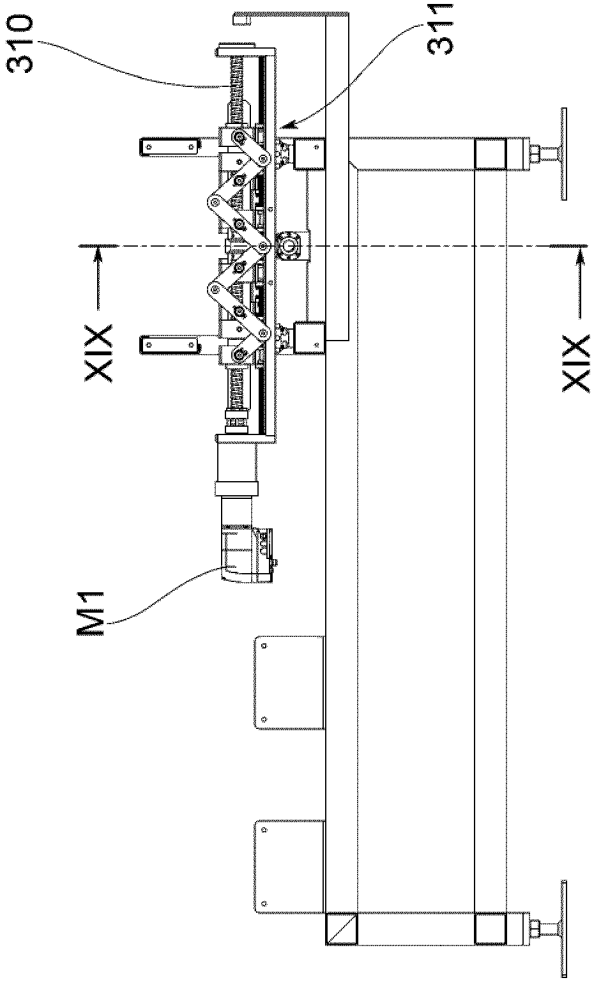

FIG.18

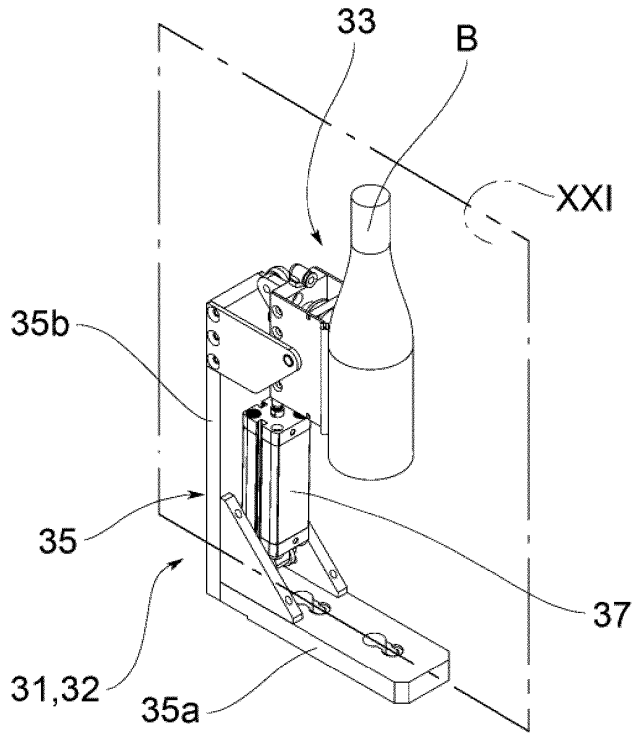

FIG.20

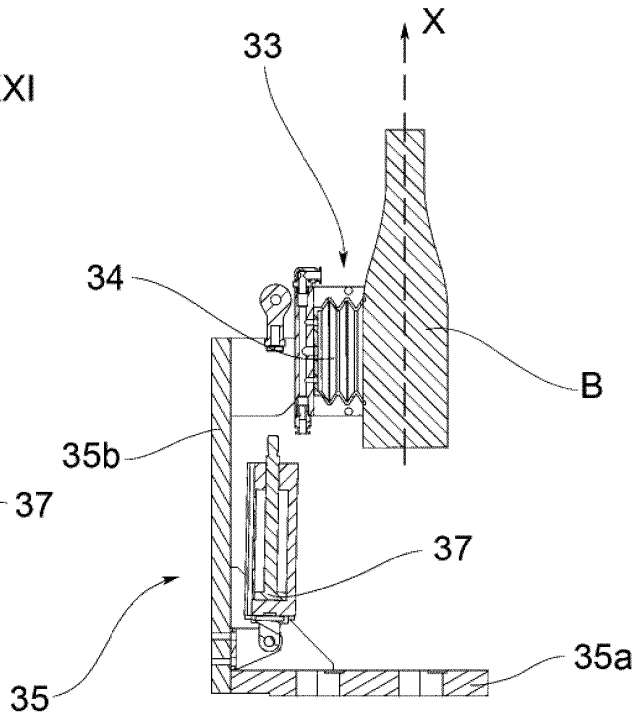

FIG.21

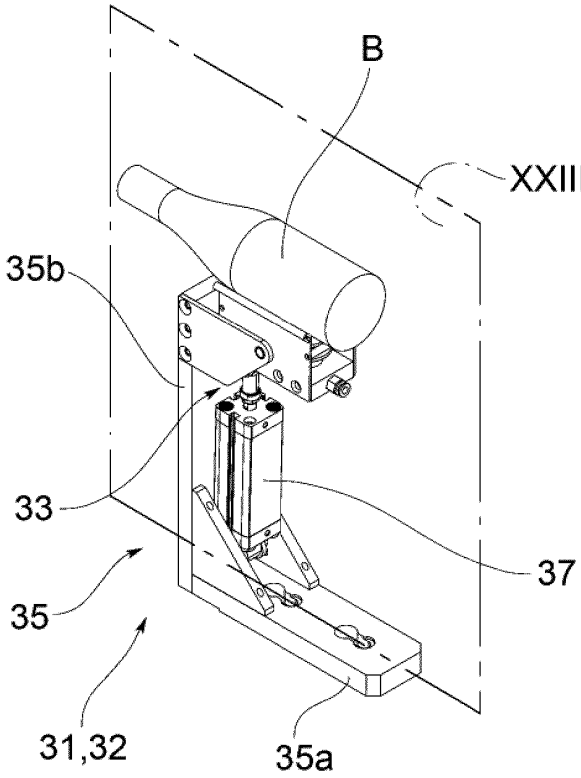

FIG.22

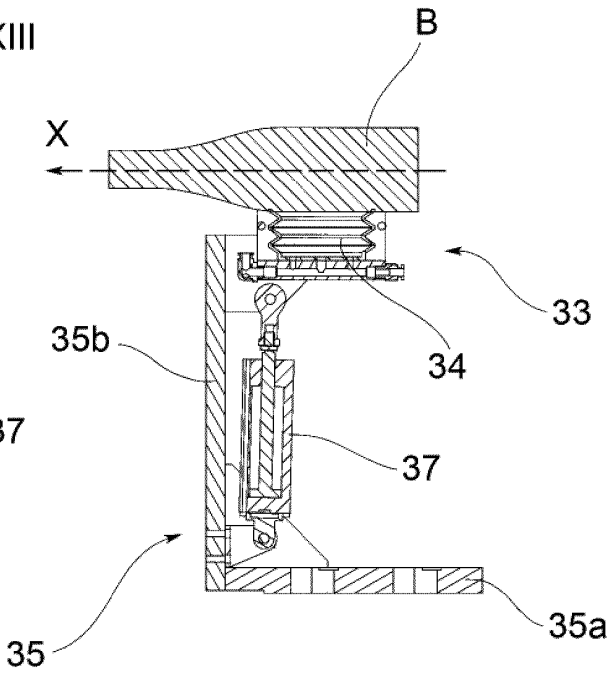

FIG.23

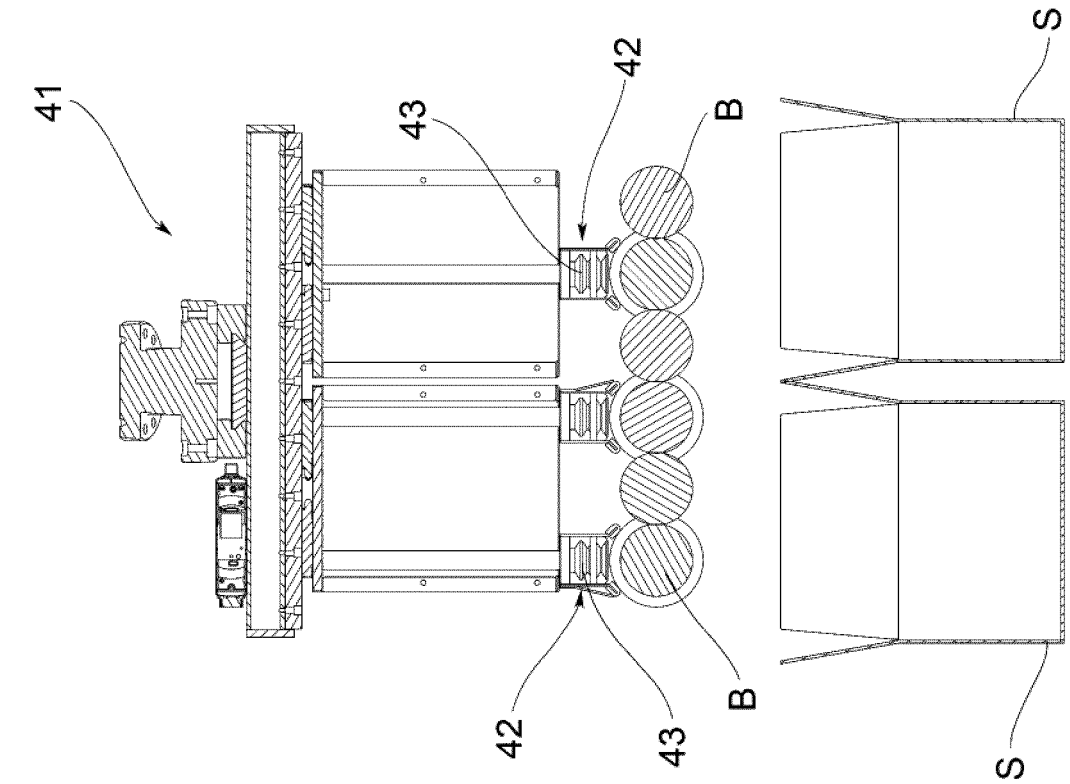

FIG.26

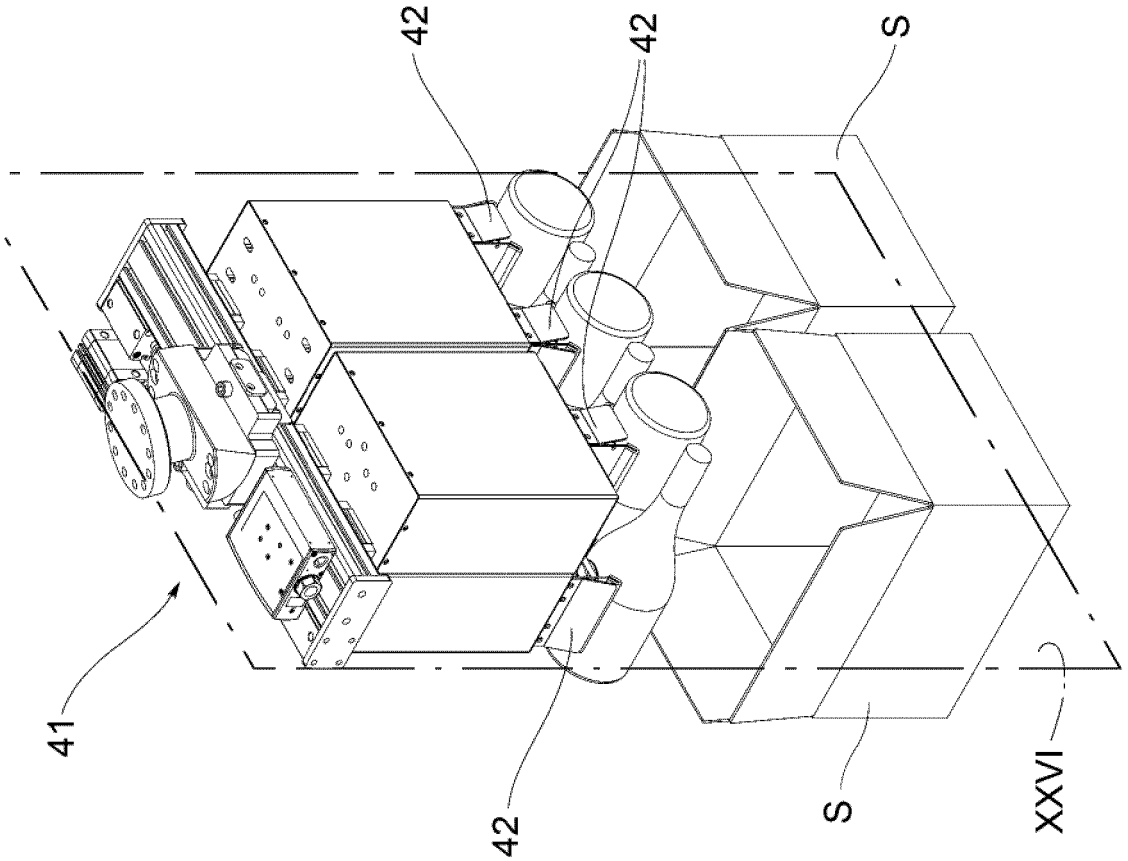

FIG.24

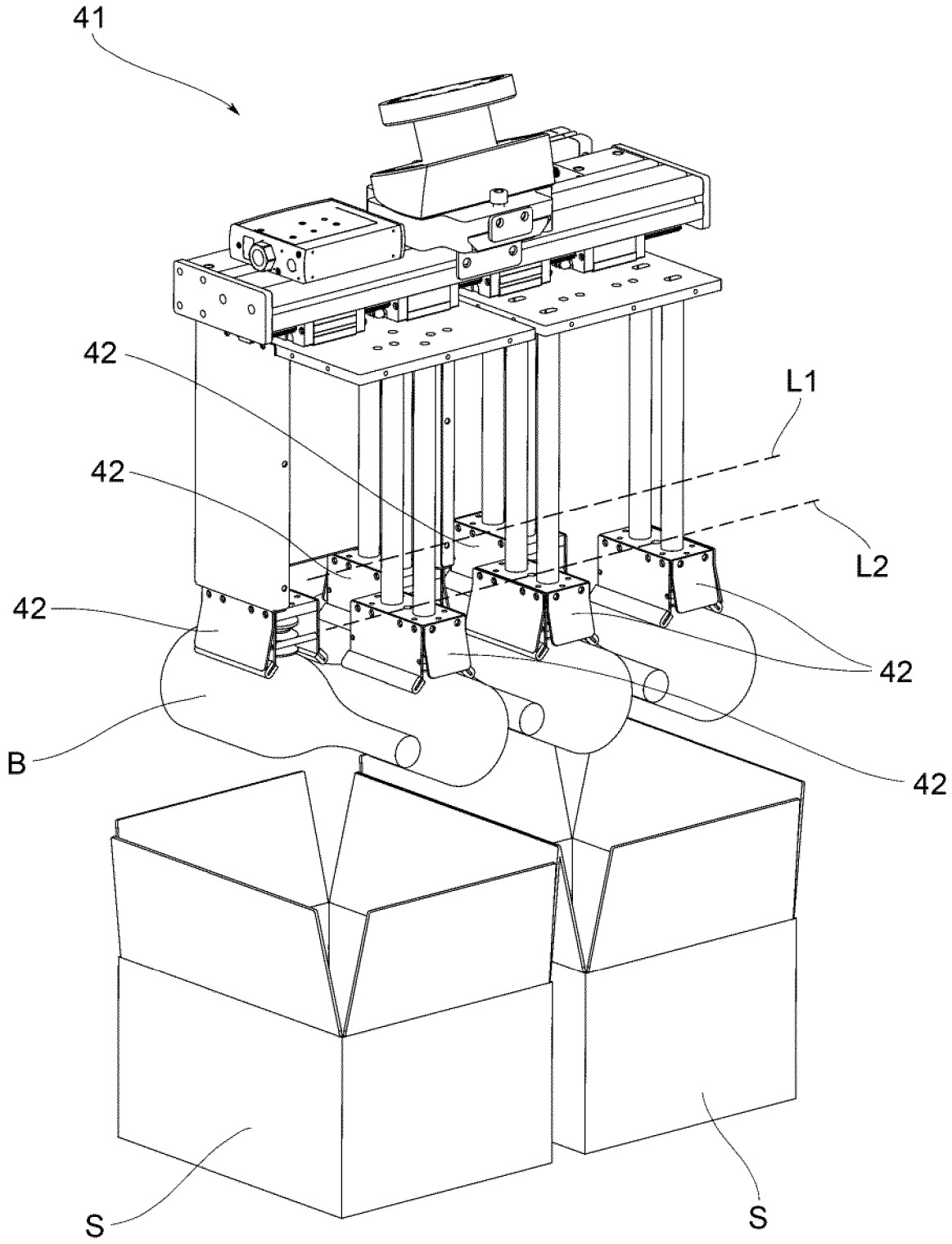

FIG.25

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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