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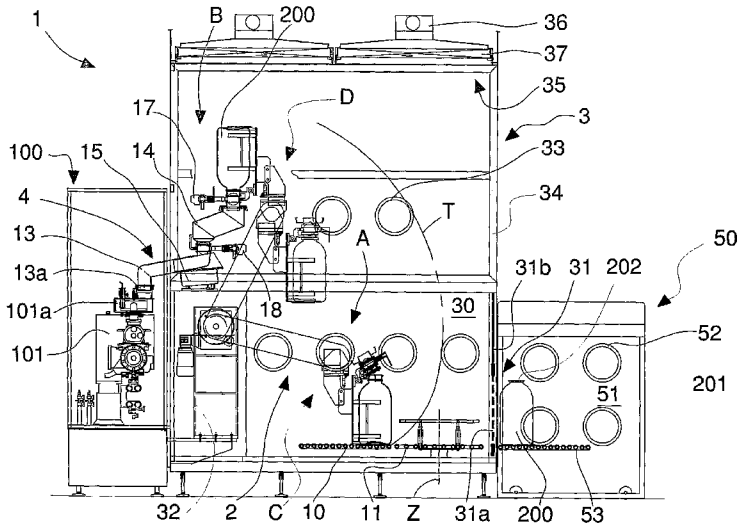
(54) **Title:** APPARATUS AND METHOD FOR FEEDING A PACKAGING WITH A PRODUCT



(57) **Abstract:** An apparatus (1) for feeding a product to be packaged (100) to a packaging machine provided with a dosing unit (101), comprises lifting means (2) suitable for lifting and moving at least a container (200; 300) of said product in such a way as to connect said container (200, 300) to said dosing unit (101) to transfer thereto the product contained in said container (200; 3 00); a method for feeding a product to be packaged (100) to a packaging machine provided with a dosing unit (101) by the apparatus (1), comprises the steps of introducing a container (200, 300) of product inside said apparatus (1), fixing said container (200, 300) to lifting means (2) of said apparatus (1), moving said container (200, 300) using said lifting means (2) in such a way as to connect it to said dosing unit (101), transferring the product contained in said container (200, 300) to said dosing unit (101).

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Apparatus and method for feeding a packaging machine with a product

The present invention relates to an apparatus and a method for feeding a packaging machine with a product.

In particular, the invention relates to an apparatus and a method for transferring a product contained in suitable containers, for example a pharmaceutical powder, to a dosing unit of said machine and for assembling and/or dismantling automatically and/or semi automatically elements, parts and components of said dosing unit.

In known packaging machines, the dosing unit, which during the machine operation doses preset quantities of a powder product, comprises a tank or hopper, which has to be periodically filled. The hopper is fed by pouring into the latter the contents of a refilling container, typically a barrel or a bag.

The aforesaid container can be directly connected to the hopper or indirectly connected by interposing one or more connecting pipes or conduits.

The operations for transferring, positioning and connecting the refilling container to the hopper are carried out manually by one or more operators, in some cases with the help of a suitable lifting device that is capable to lift the container up to the dosing unit.

These operations are long and laborious and further require the machine to be stopped and therefore production to be interrupted. In addition, it is required a plurality of skilled operators which able to perform the required manual operations.

Likewise, the operations required for assembling the connecting pipe or pipes to the dosing unit are manual. As the pipes are in contact with the product they must be assembled, properly cleaned and sterilised at the start of each new production batch.

In the pharmaceutical field, product packaging processes, and in particular dosing processes, are required to be performed

with sterile materials and in sterile environments in order to prevent said products undergoing particle and microbiological contamination, i.e. contamination due to the presence in the air of solid suspended particles such as ash, dust, spores, microorganisms.

For this reason, the packaging machines are placed inside chambers that bound an internal sterile processing environment that is insulated from an adjacent external environment that is not sterile or has a different degree of sterility.

The sterility of the processing environment is ensured by the cleanliness and sterility of each component and element contained inside the sterile chamber and by the presence of a suitable monodirectional flow of sterile air filtered by suitable high-efficiency filters (HEPA). The monodirectional air flow consists of parallel streams of sterile air that move in the same direction substantially at the same speed, in such a way as to create a homogenous air current without turbulence. The air flow when descends from top to bottom forms a front of sterile air that drags away contaminating particles eventually present in the chamber and prevents said particles from rising again from the bottom of the chamber.

Inside the sterile chamber there is provided the entrance for the operators assigned to perform a plurality of operations on the packaging machine, including those disclosed above.

The objective is to perform operations on the machine without compromising the sterility of the sterile environment and without contaminating previously sterilised parts and components assembled or to be assembled on the machine, in order to avoid procedures for restoring sterility that are laborious, long and very expensive.

In order to avoid the contamination of the sterile environment, and above all of the parts with which they come into contact, the operators wear suitable protective overalls that cover all parts of their body.

Nevertheless, although they are provided with protective

overalls, the operators always constitute a potential source of particle contamination. It has in fact been observed that the proximity and the direct contact of said operators with sterilised objects may compromise the sterility of the latter. It is therefore opportune to avoid direct contact of the operators with parts of the machine that have to contact the product to be packaged, specifically with the connecting pipes of the product and the refilling containers thereof.

In order to overcome this drawback, the packaging machines can be provided with protection cabins that define an internal space that is inaccessible directly by the operators. On the walls of the cabins there are special openings provided with gloves, so-called "glove ports" by means of which the operators are able to handle the objects inside said internal space without coming into direct contact therewith.

Nevertheless, in known packaging machines the operation that are necessary for assembling and/or dismantling parts and components of the dosing unit and for feeding the latter with the product cannot, however, be performed by the operators from outside the cabin, through the glove openings.

It is in fact necessary to open one or more doors of the cabin not only for introducing or extracting parts, components and product containers, but also and particularly for performing the manual assembling/dismantling operations.

In an insertion and mounting step, a direct intervention of the operators inside the machine protection cabin may jeopardize the sterility of the latter and require successive procedures for washing and sterilising the machine and the space inside the cabin, with a consequent increase of cost and time required to set up the machine for production.

In a dismantling and extraction step, typically at the end of production, a direct manual intervention of the operators exposes the latter to the proximity of and contact with parts on which the packaged product is present in more or less great quantities. This direct, prolonged and repeated contact

with pharmaceuticals may be harmful and hazardous for the health of the operators, in particular in the case of products in the form of fine powders, which can be easily diffused in the air and thus be inhaled and/or absorbed by the operators.

In order to overcome this problem it is necessary to limit the operating time of each operator, i.e. the time during which the latter is in contact with parts and components touched by the product. This is achieved through a frequent turnover of operators, which requires a suitable number of operators to be available and prepared for operations on the packaging machine, with a consequent increase in the running costs of the plant.

Alternatively, it is necessary to provide the operators with particular equipment, such as completely airtight overalls and masks that are able to insulate the operators completely from the surrounding environment. This equipment is very costly and in addition limits the operator movements and the performable manual operations.

An object of the present invention is to improve known apparatuses and methods for feeding an automatic machine with product to be packaged, in particular a packaging machine operating in a sterile environment.

Another object is to devise an apparatus and a method that enable a dosing unit of an automatic packaging machine to be fed with product without requiring direct manual operations of operators.

A further object is to obtain an apparatus and a method that enable said packaging machine to be fed without requesting the stop thereof, i.e. without interrupting the production.

Another object is to obtain an apparatus and a method that allows transferring and assembling and/or dismantling components for conveying the product to the dosing unit, without requiring direct manual operations by operators.

Still another object is to carry out an apparatus and a method allowing the operators to avoid direct contact with

product containers and with parts and components to be transferred and assembled and/or dismantled.

In a first aspect of the invention an apparatus is provided for feeding with a product to be packaged a packaging machine having a dosing unit, comprising lifting means for picking and moving at least a container of said product in such a way as to connect said container to said dosing unit to transfer to the latter the product contained in said container.

Owing to this aspect of the invention it is possible to carry out an apparatus that enables a dosing unit of a packaging machine to be fed with product without requiring the direct manual operation of operators. The lifting means in fact allows the container to be removed and connected to the dosing unit in a substantially automatic manner.

The lifting means and the structure of the machine further allow transferring and assembling and/or dismantling parts and components for conveying the product from the container to the dosing unit, in an automatic manner or with reduced interventions by operators.

Such conveying means, interposed between the product container and the dosing unit, facilitates the connection and forms an intermediate product store tank, that enables the packaging machine to operate even during operations that are necessary for replacing an empty product container with a full product container. In this way the apparatus of the invention enables the packaging machine to be fed continuously without interrupting production.

As the apparatus is provided with containing means arranged for enclosing the lifting means and defining an operating space that is substantially insulated and airtight, it is possible to avoid direct contact of the operators with product containers and with conveying means. The operators can, in fact, operate inside the apparatus only indirectly through openings for gloves provided on side walls of the containing means. This insulation is particularly advantageous because it avoids direct contact of the

operators with the product to be packaged and/or with sterile parts and components to be assembled.

In a second aspect of the invention a method is provided for feeding with a product to be packaged a packaging machine having a dosing unit with the apparatus according to the first aspect, comprising inserting a container of said product inside said apparatus, fixing said container to lifting means of said apparatus, moving said container using said lifting means in such a way as to connect it to said dosing unit, transferring the product contained in said container to said dosing unit.

The invention can be better understood and implemented with reference to the enclosed drawings that illustrate a preferred embodiment by way of non-limiting example, in which:

Figure 1 is a schematic front view of an apparatus according to the invention in association with a packaging machine and a transferring unit, in which lifting means is shown that supports a first product container, represented in various and successive operating positions;

Figure 2 is a top view of the apparatus in Figure 1;

Figure 3 is an enlarged partial view of the apparatus in Figure 1;

Figure 4 is a view like the one in Figure 1 showing lifting means supporting a second product container, represented in various and successive operating positions;

Figure 5 is an enlarged partial view of the apparatus in Figure 4, showing the second container in various phases of introduction into the apparatus;

Figure 6 is an enlarged side view of supporting means of second product container;

Figure 7 is a front view of supporting means of Figure 5, showing wrapping means in a closed position and, shown by a broken line, in an open position.

Figure 8 is a top view of supporting means in Figure 6;

Figure 9 is a view like the one in Figure 1, showing lifting

means supporting conveying means of the product, shown in various and successive operating positions;

Figure 10 is a schematic and partial side view of the apparatus in Figure 9, showing conveying means in a connecting position and, shown on a broken line, in an upper position;

Figure 11 is an enlarged partial view of the apparatus in Figure 9, showing conveying means in various steps of introduction into the apparatus;

Figure 12 is an enlarged partial view of the apparatus in Figure 9, showing conveying means in two distinct upper operating positions;

Figure 13 is a schematic front view of the apparatus in association with a further transferring unit, showing supporting means of the first product container in various steps of introduction into the apparatus;

Figure 14 is a view like the one in Figure 13, showing supporting means of the second product container in steps of introduction into the apparatus.

With reference to figures 1 to 3, numeral 1 indicates an apparatus for feeding a product to be packaged, for example a product in powder, to a packaging machine 100 provided with a dosing unit 101.

The apparatus 1 comprises lifting means 2 for taking a product container 200 in a picking position A, and moving said container 200 to a feeding position B in which an opening 201 of said container 200 is connected to the dosing unit 101 so as to enable the product to drop by force of gravity. In this case, the container 200 is a rigid drum or barrel with a cylindrical shape.

Conveying means 4 is provided for connecting said opening 201 of the barrel 200 to a hopper or feeding tank 101a of the dosing unit 101.

The apparatus 1 further comprises containing means 3 configured for enclosing the lifting means 2 so as to define an operating space 30 that is practically isolated from the

environment in which the apparatus 1 is positioned and separated from the packaging machine 100. The latter, for example, can be arranged adjacent to the apparatus 1.

The containing means 3 consists substantially of a cabin provided with side walls on which there is fixed a plurality of openings for gloves 33, so-called "glove ports", which enable the operators to access and indirectly operate inside the operating space 30.

The cabin 3 has access means 31 that enables a product container 200 to be introduced inside and removed therefrom. Access means comprises an opening 31a that can be hermetically closed by means of a door 31b.

The apparatus 1 is provided with ventilation means 35 arranged in an upper portion of the cabin 3 for generating a vertical mondirectional air flow from top to bottom. The ventilation means 35 comprises one or more fans or blowers 36 that are able to suck sterile air from the external environment and direct it, through filter means 37, for example high-efficiency filters, to inside the operating space 30.

The lifting means 2 comprises an anthropomorphic arm equipped with an elongated member or arm 5 hinged on an end thereof and rotatably supporting, at the remaining free end, a connecting member or wrist 6.

The arm 5 is rotatably connected to a supporting frame 32 of the apparatus 1 in such a way as to rotate around a first rotation axis X1, which is horizontal, i.e. substantially parallel to a sustaining plane 90 of the apparatus 1, between a lower position C and an upper position D.

The supporting frame 32 can be fixed to the structure of the packaging machine 100 to minimise the positioning errors of the conveying means 4.

The wrist 6 is rotatably coupled with the arm 5 around a second rotation axis X2, which is substantially parallel to the first rotation axis X1.

Driving means 59 is provided for moving in an independent

manner the arm 5 and the wrist 6. Said driving means 59 may comprise, for example, a pair of brushless electric motors, controlled by a management and control unit in such a way as to move the arm 5 and the wrist 6 according to complex motion trajectories, with set speed and acceleration values.

Transmission means that is of known type and not shown, is provided inside the arm 5 to connect the wrist 6 to the respective motor of driving means 59.

First supporting means 7 suitable for receiving and supporting the barrel 200 is fixed to the wrist 6.

Joint means 8 is rotatably connected to the first supporting means 7. Joint means 8 comprises an attachment portion 8a arranged for connecting the opening 201 of the barrel 200 to first fitting means 9 configured for engaging and connecting to the conveying means 4 in the feeding position B.

The removable connection of joint means 8 to the opening 201 and to the fitting means 9 is achieved, for example, through Tri-clamp connections or the like. The connection to the joint means 8 enables the barrel 200 to be fixed firmly to first supporting means 7.

First fitting means 9 comprises first valve means 19, consisting for example of a known type of rotating cell that is arranged for closing the opening of the barrel 201 in order to enable the movement thereof with no loss of powder. First valve means 19, in the feeding position B is controlled in opening to enable the powder product to come out from the barrel.

The apparatus 1 further comprises sustaining means 10, 11 suitable for slidably supporting the barrel 200. In particular, the sustaining means comprises a first sustaining plane 10 and a second sustaining plane 11 that are substantially coplanar and enable the barrel 200 to be moved inside the operating space 30 between the loading zone P and the first door 31b of the cabin 3, through which first door the barrel 200 is inserted and/or removed.

Second sustaining plane 11 that is interposed between the

first sustaining plane 10 and the first door 31b is mounted rotatably around an axis Z that is substantially orthogonal to the plane 11. Second sustaining plane 11 by rotating allows a full barrel to be introduced into the apparatus 1 and at the same time allows a empty barrel to be removed, as explained in detail in the following.

An embodiment of the apparatus 1 that is not illustrated comprises further access means that is arranged on a front wall of the cabin 3 to remove the empty barrel. In this way, it is possible to separate the loading zone of product containers from the unloading zone of the empty containers.

The sustaining planes 10, 11 comprise, for example, respective idling or driven roller conveyors.

In a condition of use, the conveying means 4 is removably fixed to vibrating supporting means 15 that is able to transmit vibrations to the conveying means 4 during operation such as to make easier the sliding and the descent of the powder product.

For this reason, the gripping means 6 comprises respective vibrating means 74 for transmitting to the container 200 vibrations such as to break up and make slidable the powder product contained therein.

The apparatus 1 comprises first moving means 66 suitable for moving and rotating the vibrating supporting means 15. In particular, the first moving means 66 is arranged for lifting and/or lowering the vibrating supporting means 15 along a vertical lifting direction S, i.e. substantially orthogonal to the sustaining plane 90, and at the same time for rotating the vibrating supporting means 15 by a preset angle, comprised for example between 20° and 90°, around an axis Y which is substantially parallel to said lifting direction S (Figure 12).

The first moving means 66 comprises, for example, a linear actuator and cam means of known type and which have not been shown that rotate the vibrating supporting means 15 during rectilinear movement thereof.

The conveying means 4 comprises a feeding pipe 13 having an elongated shape and a storing pipe 14 which are connected together through connecting means 16. The latter comprises adjusting means 20, consisting for example of a rotating cell of known type, arranged for hermetically sealing an internal conduit of said connecting means and therefore the passage between the storing pipe 14 and the feeding pipe 13.

The feeding pipe 13 and the storing pipe 14 comprise respective end portions having almost parallel axes and which in use are almost vertical and orthogonal to the sustaining planes 10, 11. The end portions of each pipe are connected together by respective elongated central portions having axes that are incident and tilted with respect to the axes of the corresponding end portions.

A first end portion 13a of the feeding pipe 13 is inserted into the hopper 101a of the dosing unit 101, whilst a respective first end portion 14a of the storing pipe 14 is connected to the barrel 200 in the feeding position B, by means of a respective connecting portion 69 of the first fitting means 9.

Remaining second end portion 13b of feeding pipe 13 and remaining second end 14b of storing pipe 14 are connected together through the connecting means 16.

Conveying means 4 enables the barrel 200 and the hopper 101a to be connected and acts as a product store tank to enable the packaging machine 100 to operate even during the operations that are necessary for replacing an empty product container with a full product container.

In particular, the dimensions of the storing pipe 14 are such as to contain a part of the contents of the barrel 200, in such a way that said pipe 14 could act as an intermediate feeding hopper for the dosing unit 101. The adjusting means 20 allows adjusting the product sliding from the storing pipe 14.

The apparatus comprises first actuating means 17 and second actuating means 18 configured for engaging and driving

respectively the first valve means 19 and the adjusting means 20 in the feeding position B. In particular, the actuating means 17, 18 can be connected to respective control stems that control a rotation of the rotating cells 19, 20.

Actuating means 17, 18 are, for example, rotating, pneumatic or electric actuators and they are fixed to the supporting frame 32 of the apparatus 1.

The operation of the apparatus 1 provides introducing a barrel 200 of product inside the cabin 3 through the first door 31b.

The barrel 200, closed by a cap 202, can be carried by a transferring unit 50 that is brought near to the apparatus 1 in such a way as to put in communication the operating chamber 30 of the cabin 3 with the inner chamber 51 of the transferring unit 50, by opening the access means 31.

The transferring unit 50 is provided with a slidable support 53, for example a roller conveyor, arranged facing and almost coplanar with the sustaining means 10, 11 of the apparatus.

The barrel 200 can be manually moved from the transferring unit to the second sustaining plane 11 by operators through the opening for gloves of the cabin 3 and possible openings for gloves 52 that can be provided on the transferring unit 50. Alternatively, transferring unit may comprise movable supporting means of barrel that is able to exit partially from said transferring unit and position said barrel 200 directly on the second sustaining plane 11.

The latter is then rotated around the vertical axis Z thereof to arrange the barrel 200 full of products opposite the first sustaining plane 10 and simultaneously position a possible empty barrel at the door 31b for the subsequent removal thereof.

If the sustaining planes 10, 11 comprise idling rollers, an operator transfers the barrel 200 on the first sustaining plane 10 to the loading zone P and moves said container 200 until it abuts on the first supporting means 7 in the picking position A.

First supporting means 7 are fixed previously to the wrist 6 of the lifting means 2, arranged in the lowered position C.

At this point, the barrel 200 can be opened by removing the cap 202 and the opening 201 thereof can be closed through the connection to first joint means 8, to which first fitting means 9 are fixed.

Joint means 8, which is hinged on the first supporting means 7, is simply rotated until it engages the opening 201 of the barrel 200.

After the connection has been made, the barrel 200 is fixed to the first supporting means 7 and is suitably closed by the first joint means 8 in association with the first fitting means 9.

At this point the lifting means 2 is driven to lift and move the barrel 200 in such a way as to make the first fitting means 9 connect up with the free end portion 14a of the storing pipe 14. In order to obtain this result, the barrel is subjected to a rotation and rectilinear motion obtained through the simultaneous or sequential rotation of the arm 5 around the first rotation axis X1 and of the gripping means 6 around the second rotation axis X2. The arm rotates, for example, by an angle comprised between 50° and 80° from the lowered position C to the upper position D, whilst the gripping means 6 rotates by 180° in such a way as to overturn the barrel and arrange the opening 201 facing downwards, in the feeding position B. If rotation of the arm 5 of the gripping means is simultaneous the barrel 200 moves following the trajectory T of Figure 1.

In the feeding position B, the first valve means 19 of first fitting means 9 is connected to the first actuating means 17. The operation of the latter causes opening of the first valve means 19 and thus the descent of the powder product into the storing pipe 14.

Sensors of known type and not shown in the figures, are provided for controlling the level of product in the conveying means 4.

When the container 200 is empty, the lifting means 2 returns the latter to the first sustaining plane 10 in the picking position A. After being detached from the first fitting means 8, the barrel 200 can be moved to the second sustaining plane 11 and then transferred outside the apparatus, for example loaded onto the transferring unit 50.

With reference to figures 4 to 8, the apparatus 1 is arranged for feeding the packaging machine 100 with powder product fed by second containers 300 in the form of bags or sachets.

The opening 31a allows to introduce into the apparatus a bag 300 containing a powder product or to remove an empty bag.

The sustaining means of the apparatus comprises a third sustaining plane 21, positioned at the door 31b and arranged for receiving and supporting the bag 300 during introducing and/or removing.

The bag 300 is carried, for example, by the transferring unit 50.

The bag 300 is positioned inside a sealed external packaging 310 on a slidable support 53, for example a respective roller conveyor of the transferring unit 50. The external packaging 310 preserves the sterility of bag 300, which has to be introduced into the apparatus 1 without coming into direct contact with the operators.

The bag 300 can be moved from the transferring unit 50 to the third supporting plane 21 manually by one or more operators operating through suitable openings for gloves 33, 52 of the cabin 3 and of the transferring unit 50'.

After the opening of the external packaging 310, the operator keeps the latter immobilised and simultaneously pushes the bag 300 to exit through the opening 31a onto the roller conveyor 21, ensuring that he does not touch it.

The opening 31a can be provided with means for stopping and preventing the passage of the external packaging 310.

The third sustaining plane 21 is slightly inclined downwards in the direction of the lifting means 2 to facilitate the transfer of the bag 300 to said lifting means 2.

Instead of the first supporting means 7, second supporting means 22 is fixed to the wrist 6 of the lifting means 2 for receiving and supporting the bag 300.

The bag consists, for example, of two sheets of superimposed plastic material sealed along peripheral edges in such a way as to form a hermetically sealed flexible and yielding packaging having the shape of a "bottle".

With particular reference to Figure 8, the bag 300 has a central portion 300a inside which the product collects, a bottom portion 300b and a neck portion 300c with an elongated rectangular shape that has to be cut transversely for opening the bag.

With particular reference to Figure 6 to 8, second supporting means 22 comprises a fixed supporting element 28 to which enclosure means 23 for receiving the bag 300 is slidably fixed.

In particular, enclosure means 23 comprises two parts, an upper part 24 and a lower part 25, that are superimposable and substantially specular and are provided with respective cavities 24a, 25a that are suitable for forming, in a closed condition of said enclosure means 23, an internal housing 26 that is able to contain and enclose the central portion 300a of the bag 300.

The cavities 24a, 25a are configured to form also a passage 27 through which the neck portion 300c of the bag can exit.

End portions 24b, 25b of the upper part 24 and lower part 25 can compress the bottom portion 300b of the bag 300 to lock the latter inside enclosure means 23.

The two parts 24, 25 are hinged together along a longitudinal edge by means of hinges 39 that enable the enclosure means 23 to be opened and closed "as a book" to allow the bag 300 to be introduced easily.

The enclosure means 23 comprises a first carriage 29 supporting the lower part 25 of the enclosure means 23 and provided with rectilinear guides 29a, slidably supported by idling rollers 38 of the supporting element 28. The first

carriage 29 is movable in a sliding direction V, which is substantially longitudinal and parallel to the sustaining plane 90.

Once the bag 300 has been inserted into the enclosure means 23, the neck portion 300c of the bag 300 is extended for executing a transverse opening cut thereupon.

Opening means 40 is provided to enable the two plastic sheets to be detached that constitute the bag 300, at the neck portion 300c on which the cut was performed that is necessary to make the bag opening 301.

Second fitting means 46 is provided to connect the bag 300 to the conveying means 4.

The opening means 40 further comprises an abutment guide 73, for example a shaped metal sheet suitable for guiding a knife handled by an operator during cutting of the neck portion 300c and for protecting from accidental contact with the gloves of the operator an inlet portion 47 of the second fitting means 46, which inlet portion 47 is arranged for being inserted into the opening 301 of the bag 300 created by the opening means 40.

The protective metal sheet 73 is removed by the operator before connecting the third protection means 45 to the bag 300.

In an embodiment that is not illustrated, opening means 40 comprises a cutting element that is slidably fixed to the abutment guide 73 to cut the neck portion 300c of the bag.

Opening means 40 comprises first suction cup means 41 and second suction cup means 42 connected to a vacuum source so as to be able to adhere by vacuum to the external surfaces of the bag 300, on both sides.

The first suction cup means 41 and the second suction cup means 42 face each other and are movable in opposite directions, between an adhesion position R, in which they almost abut to adhere to respective flaps of the bag 300 that are joined together and a detachment position U in which said suction cup means 41, 42 are spaced in such a way as to

separate and move apart the two flaps to form the product outlet opening 301.

Opening means 40 further comprises abutting means 43 arranged around the neck portion 300c and arranged for being abutted by the flaps of the bag 300 that are widened and separated by the suction cup means 41, 42. The abutting means 43 give the shape or section of the opening 301 of the bag 300.

Third actuating means 44 is provided for driving the suction cup means 41, 42. This actuating means 44 comprises a plurality of levers that is able to move and/or lock the suction cup means 41, 42 in the two adhesion R and detachment U positions.

Second fitting means 47 further comprises a respective connecting portion 48 arranged for engaging the end portion 14a of storing pipe 14.

In a condition of use, second fitting means 46 is fixed to the supporting element 28 of the second supporting means 22 and comprises second valve means 49 similar to first valve means 19 and arranged for closing the mouth of the bag 300 to enable movement thereof without powder exiting.

Second valve means 49 in the respective feeding position B' of the bag 300 is operated to open in order to allow the powder product to exit from the bag.

The inlet portion 47 of second fitting means 46 is inserted into the bag 300 by moving the bag towards said inlet portion 47, i.e. by moving the enclosure means 23, the latter being slidable, due to the first carriage 29, along the movement direction V.

The first carriage 29 can be moved manually by an operator, using one or more gloves of respective openings for gloves 33, or by driving means mounted on said first carriage 29.

After insertion, locking means 70 seal the neck portion 300c of the bag to the inlet portion 47 in order to prevent product escaping.

Locking means 70 comprises, for example, a lever fixed rotatably to the lower part 25 of enclosure means 23 and

provided with a tooth 70a that is suitable for being inserted into a slot 47a made in the inlet portion 47 of second fitting means 46.

In a locking condition of lever 70, the tooth 70a by being inserted into the slot 47a pushes into the latter a part of the neck portion 300c of the bag, holding and locking said bag around the inlet portion 47. The lever 70 can be locked in the locking position by means of a screw and a threaded knob.

The simultaneous or sequential rotation of arm 5 and wrist 6 enables the bag 300 to be lifted and moved in such a way as to make the second fitting means 46 abut on the storing pipe 14.

In order to obtain this result, the arm is rotated from the lowered position C to the raised position D, for example by an angle comprised between 70° and 130°, whilst the wrist 6 is rotated by 45° in such a way as to upturn the bag 300 and arrange the respective connecting portion 48 of second fitting means 46 vertical and aligned with the end portion 14a of storing pipe 14, in the respective feeding position B' of the bag 300.

If rotation of arm 5 and wrist 6 is simultaneous, the bag 300 moves following the trajectory T' in Figure 4.

In the respective feeding position B', second valve means 49 of second fitting means 46 is connected to the first actuating means 17. The operation of the latter determines opening of second valve means 49 and descent of powder product into the storing pipe 14.

After emptying has been completed, the lifting means 2 returns the bag 300 to the respective picking position A'. After being released by second fitting means 46, the empty bag 300 can be extracted from the enclosure means 23, moved to the third sustaining plane 21 and then transferred outside the apparatus 1, for example to the transferring unit 50, or be placed inside a compartment situated inside the cabin 3.

With reference to figures 9 to 11, the apparatus 1 is

arranged for allowing the conveying means 4 to be assembled and mounted semiautomatically and is thus arranged for setting up the packaging machine 100 for production.

The conveying means 4 is introduced separately inside the cabin 3, using a further transferring unit 50' that can be removably locked to the apparatus 1 in a hooking position K, in which the operating chamber 30 of the cabin 3 is in communication with the internal chamber 51' of the further transferring unit 50', by previously opening the access means 31.

For this reason the apparatus 1 may comprise attaching means 68 arranged for coupling with connecting means 58 of transferring unit 50' in such a way as to lock the latter to the access means 31. The connecting means 58 comprises, for example, one or more threaded bolts arranged for being inserted and tightened in respective threaded seats of the attaching means 68 of the apparatus 1 (Figure 11).

The further transferring unit 50' comprises first transferring means 54 and second transferring means 55 for supporting and moving respectively the feeding pipe 13 and the storing pipe 14. The connecting means 16 can be previously assembled with the respective second end portion 14b of said storing pipe 14.

The transferring means 54, 55 are movable between respective internal positions, in which the feeding pipe 13 and the storing pipe 14 are contained in the transferring unit 50' and respective external positions, in which the aforesaid pipes 13, 14 are introduced into the cabin 3 of the apparatus.

The transferring means 54, 55 can be driven manually by the operators, for example through respective openings for gloves 52' provided in the further transferring unit 50', or automatically, through driving means, for example electric motors.

Housing means 45, which is arranged for receiving and supporting the feeding pipe 13, is previously fixed to wrist

6 of lifting means 2.

One or more operators, who work through corresponding openings for gloves 33, transfer the feeding pipe from the first transferring means 54 to the housing means 45 manually. Similarly, the operators remove the storing pipe 14 from second transferring means 55 and connect it to the feeding pipe 13. The connecting means 16 is fixed to the respective second end portion 13b of connecting pipe 13.

In order to facilitate the aforesaid connection, the feeding pipe 13 can be provided with reference pins, which abut seats made in the storing pipe 14 or in the connecting means 16.

At this point, arm 5 and wrist 6 of lifting means 2 can be driven in such a way as to lift the conveying means 4 along a vertical lifting direction L, i.e. orthogonal to the sustaining plane 90, so as to transfer it from a respective picking position W to a first upper position E.

At this first upper position E, conveying means 4 is connected to second moving means 60 of the apparatus 1, in order to allow the disengagement of lifting means 2 and the descent of arm 5.

Second moving means 60 is movable along a respective sliding direction M, in such a way as to transfer conveying means 4 from the first upper position E to a second upper position F. Said sliding direction M is almost parallel to the sustaining plane 90 and orthogonal to the lifting direction S of the vibrating supporting means 15.

Second moving means 60 comprises, for example, a second carriage 61 that is slidable by means of rollers 65 on a longitudinal sliding guide 62 fixed to a further supporting frame 34 of the apparatus 1.

Second carriage 61 has a first hooking element 63 that is configured for coupling with a corresponding second hooking element 64 provided on the feeding pipe 13. The hooking elements 63, 64 have, for example, "tri-clamp" attachments.

Second moving means 60 can be moved manually by an operator or can be automatically moved. In this case, suitable motor

means is provided for driving the second carriage 61.

In the second upper position F, the vibrating supporting means 15, positioned by first moving means 66 in a respective raised position H, abuts conveying means 4. In this position, the connecting pipe 13 is engaged with a supporting element 67 of vibrating supporting means 15, to which it can be removably locked, for example using threaded knobs or suitable clamps.

After being fixed to the vibrating supporting means 15, the feeding pipe 13 can be uncoupled and separated from second moving means 60.

First moving means 66 when driven causes the descent of vibrating supporting means 15 to a lowered position N, for the connection of conveying means 4 to the dosing unit 101 of the packaging machine 100, in a connecting position G.

In particular, as shown in Figures 9 and 10, first moving means 66 during the descent rotates the vibrating supporting means 15 and therefore the conveying means 4 by an angle such as to enable the first end portion 13a of feeding pipe 13 to be inserted into an upper opening of the hopper 101a of dosing unit 101.

The rotation amount is correlated both to dimensions and shape of feeding pipe 13 and of storing pipe 14 and to the position of packaging machine 100 and of respective dosing unit 101.

In the connecting position G, conveying means 4 is thus arranged for receiving a barrel 200 or a bag 300 so as to discharge the product inside the hopper 101a.

It should be observed that apart from the operation of coupling/uncoupling the conveying means 4 to/from the second moving means 60 and to/from the vibrating supporting means 15, conveying means 4 is moved automatically from the respective picking position W to the connecting position G by lifting means 2 and by first moving means 66, without direct and manual interventions by operators, thus simplifying and accelerating the whole assembly sequence. By repeating the

aforesaid procedures in reverse order, it is possible to dismantle the conveying means 4, which can be returned in the respective picking position W.

In this position, conveying means 4 can be dismantled in such a way as to enable the operators to position the feeding pipe 13 and the storing pipe 14 with the connecting means 16 respectively on the first transferring means 54 and on the second transferring means 55 of transferring unit 50.

First supporting means 7 and second supporting means 22, which have to be fixed to the wrist 6 of lifting means 2 according to the product container to be used, can be introduced and/or removed from the cabin 3 of apparatus 1 using the same transferring unit 50' used for conveying the conveying means 4.

For this reason, transferring unit 50' may comprise third transferring means 56 suitable for supporting and moving the first supporting means 7 and which is movable in such a way as to introduce, at least partially, said first supporting means 7 onto the second sustaining plane 11 (Figure 13).

Third transferring means 56 can be driven manually by one or more operators through the openings for gloves 52 provided on transferring unit 50.

Alternatively, third transferring means 56 can be moved by respective driving means, for example electric motors.

Once first supporting means 7 is arranged on the second sustaining plane 11, it is then moved in a rectilinear manner on the first sustaining plane 10 at the lifting means 2, which is arranged in the lower position C, in such a way as to be fixed to the wrist 6.

At this point, lifting means 2 is arranged for receiving a product barrel 200.

If the packaging machine 100 has to be fed using bags of product 300, the transferring unit 50' may comprise fourth transferring means 57 suitable for supporting and moving the second supporting means 22. Fourth transferring means 57 is movable in such a way as to introduce, at least partially,

second supporting means 22 inside the cabin 3, on the second sustaining plane 11 (Figure 14).

Second fitting means 46, which is also to be introduced inside the cabin 3 of the apparatus 1, is further fixed to the second supporting means 22.

For this reason, enclosure means 23 is provided with a first connecting element 71 configured for coupling with a second connecting element 72 fixed to the second fitting means 46.

Connecting elements 71, 71 have, for example, "tri-clamp" attachments.

Connecting element 71 is for example a pin with a tri-clamp attachment fixed to the upper part 24 of the enclosure means 23.

Fourth transferring means 57 can be driven manually by one or more operators through the openings for gloves 52 present on the transferring unit 50 or, alternatively, through respective driving means, for example electric motors, connected to said third transferring means 56.

Once the second supporting means 22 is arranged on the second supporting plane 11, it is moved onto the first sustaining plane 10 at the lifting means 2, arranged in the lower position C, in such a way as to be connected to the wrist 6.

Second fitting means 46 can be detached from the enclosure means 23 and then fixed to the supporting element 28.

At this point, lifting means 2 is arranged for receiving and moving a product bag 300.

As shown in Figure 10, housing means 45 of conveying means 4 is positioned, when not in use, inside the apparatus 1 and is moved and fixed to the wrist 6 when necessary.

The apparatus 1 according to the invention further enables the powder product, which is inside the conveying means 4, to be recovered in the case of a stop of packaging machine 100.

For this reason, actuating means 17, 18 closes the valve means 19, 49 of fitting means 9, 46 and the adjusting means 20 of connecting means 16.

Storing pipe 14 is then fixed to the wrist 6 of the lifting

means 2 by means of a suitable bracket that is of known type and is not shown and disconnecting means 16 is detached from the feeding pipe 13.

At this point, the wrist 6 is rotated clockwise by a preset angle until the container 200, 300 is taken to a vertical position with the opening 201, 301 facing upwards.

Valve means 19, 49 is then opened manually to enable the powder contained inside the storing pipe 14 to slide into the container 200, 300. In order to facilitate this operation, the vibrating means 74 of the wrist 6 is activated.

After a preset period of time has elapsed, the vibrating means 74 is deactivated and the valve means 19, 49 is closed manually.

The wrist 6 is rotated so as to return the container 200, 300 to the feeding position B, B' for enabling a subsequent connection of connecting means 16 to the connecting pipe 13.

After the connecting means 16 is coupled to the connecting pipe 13 and the storing pipe 14 is detached from the wrist 6, second actuating means 18 opens the adjusting means 20 and vibrating supporting means 15 is activated for a preset period of time.

In this way, powder product, which can remain inside the conveying means 4, is conveyed inside the feeding tank 101a of dosing unit 101.

CLAIMS

1) Apparatus (1) for feeding a product to be packaged (100) to a packaging machine provided with a dosing unit (101), comprising lifting means (2) suitable for lifting and moving at least a container (200; 300) of said product in such a way as to connect said container (220, 300) to said dosing unit (101) to transfer thereto the product contained in said container (200; 300).

2) Apparatus according to claim 1, comprising containing means (3) suitable for enclosing said lifting means (2) and defining an operating space (30) that is substantially insulated and airtight.

3) Apparatus according to claim 2, wherein said containing means (3) comprises access means (31) for introducing into and/or removing from said operating space (30) at least said container (200, 300).

4) Apparatus according to claim 3, wherein said access means (31) comprises an opening (31a) and is closable by means of a door (31b).

5) Apparatus according to any one of claims 2 to 4, wherein said containing means (3) has side walls provided with a plurality of openings for gloves (33).

6) Apparatus according to any one of claims 2 to 5, comprising ventilation means (35) arranged in an upper portion of said containing means (3) and suitable for generating and directing a monodirectional flow of filtered air inside said operating space (30).

7) Apparatus according to claim 6, wherein said ventilation means (35) comprises fan means (36) and filter means (37).

8) Apparatus according to claim 3 or 4, comprising sustaining means (10, 11, 21) suitable for slidably supporting at least said container (200, 300) and interposed between said lifting means (2) and said access means (31).

9) Apparatus according to any preceding claim, wherein said

lifting means (2) comprises an elongated arm (5) that is rotatably connected to frame means (32) and rotatably supports a connecting member (6), said elongated arm (5) and said connecting member (6) being rotatable respectively around a first rotation axis (X1) and around a second rotation axis (X2) that are substantially parallel.

10) Apparatus according to claim 9, wherein said frame means (32) is fixed to said packaging machine (100).

11) Apparatus according to claim 10, comprising driving means (59) suitable for moving said arm (5) and said connecting member (6).

12) Apparatus according to any preceding claim, comprising conveying means (4) suitable for connecting an opening (201, 301) of said container (200; 300) to a feeding tank (101a) of said dosing unit (101).

13) Apparatus according to claim 12, wherein said conveying means (4) comprises a feeding pipe (13) and a storing pipe (14) that are removably interconnected through connecting means (16).

14) Apparatus according to claim 13, wherein said connecting means (16) comprises adjusting means (20) suitable for stopping and/or adjusting the passage of product through said connecting means (16).

15) Apparatus according to claim 13 or 14, wherein said feeding pipe (13) comprises a respective first end portion (13a) arranged to be connected to said feeding tank (101a), said storing pipe (14) comprising a respective first end portion (14a) arranged to be connected to the opening (201, 301) of said container (200, 300).

16) Apparatus according to any one of claims 12 to 15, comprising fitting means (9, 46) couplable with the opening (201, 301) of said container (200, 300) for connecting said container to said conveying means (4).

17) Apparatus according to claim 16, as appended to claim

15, wherein said fitting means (9, 46) comprises respective connecting portions (69, 48) arranged for engaging the end portion (14a) of storing pipe (14).

18) Apparatus according to claim 16 or 17, wherein said fitting means (9, 46) comprises valve means (19, 49) suitable for stopping and/or adjusting the passage of product through said fitting means (9, 46).

19) Apparatus according to claims 14 and 18, comprising first actuating means (17) and second actuating means (18) configured for engaging and driving respectively said valve means (19, 49) and said adjusting means (20) in a feeding position (B), wherein said container (200, 300) is connected to said dosing unit (101).

20) Apparatus according to claim 9, comprising supporting means (7, 22) that is removably couplable with said connecting member (6) and suitable for receiving and supporting said container (200, 300).

21) Apparatus according to claim 20, wherein said supporting means (7, 22) comprises first supporting means (7) configured for receiving and supporting a first container (200) having the shape of a drum or a barrel and second supporting means (22) configured for receiving and supporting a first container (200) having the shape of a bag.

22) Apparatus according to claim 21, wherein first supporting means (7) comprises joint means (8) that is movable and suitable for making the first container (200) abut and lock on said first supporting means (7).

23) Apparatus according to claims 18 and 22, wherein said joint means (8) comprises an attachment portion (8a) suitable for connecting the opening (201) of the first container (200) to first fitting means (9).

24) Apparatus according to claim 21, wherein said second supporting means (22) comprises a supporting element (28) that is removably couplable with said connecting member (6) and slidably supports enclosure means (23),

arranged for receiving and containing said second container (300).

25) Apparatus according to claim 24, wherein said enclosure means (23) comprises an upper part (24) and a lower part (25), which are superimposable in a closing condition and are provided with respective cavities (24a, 25a) that are suitable for forming in said closing condition an internal housing (26) that is arranged for containing and enclosing a central portion (300a) of said second container (300).

26) Apparatus according to claim 25, wherein said upper part (24) and said lower part (25) are configured for forming a passage (27) through which a neck portion (300c) of said second container (300) can exit.

27) Apparatus according to claim 25 or 26, wherein said upper part (24) and said lower part (25) comprise respective end portions (24b, 25b) suitable for clamping a bottom portion (300b) of said second container (300) to lock the latter inside the enclosure means (23).

28) Apparatus according to any one of claims 25 to 27, wherein said upper part (24) and said lower part (25) are rotatably connected along a longitudinal edge by hinge means (39).

29) Apparatus according to any one of claims 24 to 28, wherein said second supporting means (22) comprises first carriage means (29) fixed to said enclosure means (23) and slidably coupled with said supporting element (28).

30) Apparatus according to claim 26 comprising opening means (40) fixed to said second supporting means (22) and suitable at least for detaching opposite flaps of said second container (300), at said neck portion (300c), on which an opening cut was made, in such a way as to form an opening (301) of said second container (300).

31) Apparatus according to claim 30, wherein said opening means (40) comprises first suction cup means (41) and

second suction cup means (42) that are movable between an adhesion position (R), wherein they substantially abut on one another and adhere to external surfaces of said opposite flaps of second container (300), and a detachment position (U), wherein said suction cup means (41, 42) are spaced apart from one another so as to separate and move apart said opposite flaps and form the opening (301) of said second container (300).

32) Apparatus according to claim 30 or 31, wherein said opening means (40) comprises abutting means (43) arranged around said neck portion (300c) and configured for abutting said opposite flaps that are separated and widened by the suction cup means (41, 42) in the detachment position (U) in such a way as to shape said opening (301).

33) Apparatus according to any one of claims 30 to 32, comprising third actuating means (44) suitable for driving said suction cup means (41, 42) between said adhesion position (R) and said detachment position (U).

34) Apparatus according to claims 16 and 21, wherein said second supporting means (22) is arranged for supporting second fitting means (46) provided with an inlet portion (47) suitable for being inserted into said opening (301).

35) Apparatus according to claim 34, comprising locking means (70) fixed to said second supporting means (22) and suitable for locking the neck portion (300c) of the second container (300) to the connecting portion (47).

36) Apparatus according to claim 35, wherein said locking means (70) comprises a lever rotatably fixed to said supporting means (22) and provided with a tooth (70a) that is suitable for being inserted into a slot (47a) made in the inlet portion (47).

37) Apparatus according to claim 9 or 10, comprising housing means (45) that is removably couplable with said connecting member (6) of said lifting means (2) and

suitable for receiving and supporting at least said feeding pipe (13).

38) Apparatus according to any one of claims 12 to 19, comprising vibrating supporting means (15) suitable for supporting at least said conveying means (4) and transmitting to the latter vibrations such as to break up and make slidable a powder product contained therein.

39) Apparatus according to claim 38, comprising first moving means (66) suitable for moving said vibrating supporting means (15) along a lifting direction (S), between a raised position (H), wherein said vibrating supporting means (15) receives said conveying means (4) and a lowered position (N), wherein said conveying means (4) is connected to the dosing unit (101).

40) Apparatus according to claim 39, wherein said first moving means (66) is further suitable for rotating said vibrating supporting means (15) around an axis (Y), which is substantially parallel to said lifting direction (S), during the movement between said raised position (H) and said lowered position (N).

41) Apparatus according to any one of claims 38 to 40, comprising second moving means (60) suitable for supporting and moving said conveying means (4) along a respective sliding direction (M) between a first upper position (E), wherein said moving means (60) receives said conveying means (4) from the lifting means (2), and a second upper position (F), wherein said moving means (60) gives said conveying means (4) to said vibrating supporting means (15).

42) Apparatus according to claim 41, wherein said second moving means (60) comprises second carriage means (61) that is slidable on a fixed sliding guide (62) of said apparatus (1) and provided with a first hooking element (63) arranged for coupling with a second hooking element (64) provided on the feeding pipe (14).

43) Apparatus according to any one of claims 9 to 43,

wherein said lifting means (2) comprises vibrating means (74) associated with said connecting member (6) and suitable for transmitting to the container (200, 300) vibrations such as to at least break up and make slidable a powder product contained therein.

44) Apparatus according to any preceding claim, comprising attaching means (68) arranged for locking to said access means (31) a transferring unit (50, 50') suitable for moving and transferring at least a container (200, 300) and/or conveying means (4) and/or supporting means (7, 22) and/or fitting means (9, 46).

45) Method for feeding a product to be packaged (100) to a packaging machine provided with a dosing unit (101) that is part of a feeding apparatus (1), comprising the step of introducing a container (200, 300) of said product inside said apparatus (1), fixing said container (200, 300) to lifting means (2) of said apparatus (1) in a picking position (A, A'), moving said container (200, 300) using said lifting means (2) to a feeding position (B, B'), in such a way as to connect it to said dosing unit (101), transferring the product contained in said container (200, 300) to said dosing unit (101).

46) Method according to claim 45, wherein introducing said container (200, 300) comprises transferring the latter from a transferring unit (50) to sustaining means (10, 11, 21) of said apparatus (1) through access means (31) thereof.

47) Method according to claim 46, wherein there is provided opening and closing said access means (31) respectively before and after said introducing.

48) Method according to any one of claims 45 to 47, wherein there is provided introducing a first container (200) having the shape of a barrel or a second container (300) having the shape of a bag.

49) Method according to claim 49, wherein before introducing said second container (300) there is provided cutting

and opening an external packaging (310) containing said container (300).

50) Method according to claim 49, wherein said introducing comprises extracting the second container (300) from said external packaging (310), inserting into said access means (31) said container (300) and transferring the latter to said sustaining means (21).

51) Method according to any one of claims 45 to 50, wherein fixing said container (200, 300) comprises positioning and locking the latter to supporting means (7, 22) removably connected to said lifting means (2).

52) Method according to claim 51, as appended to any one of claims 48 to 51, wherein said positioning and locking the second container (300) comprises inserting the latter inside enclosure means (23) of second supporting means (22) that is arranged open, closing said enclosure means (23) to contain and enclose a central portion (300a) of said second container (300) and lock a bottom portion (300b) thereof.

53) Method according to any one of claims 45 to 52, wherein before moving said moving means (2) there is provided opening said container (200, 300) and connecting an opening (201, 301) of the latter to fitting means (9, 46) provided with valve means (19, 49).

54) Method according to claim 53, as appended to claim 48, wherein opening the first container (200) comprises removing a cap (202) from the opening (201) thereof.

55) Method according to claim 53, as appended to claim 52, wherein opening the second container (300) comprises inserting a neck portion (300c) thereof, exiting from said enclosure means (23), into opening means (40) of second supporting means (22), cutting said neck portion (300c) and separating and removing opposite flaps of said neck portion (300c) to form the opening (301) of said second container (300).

56) Method according to claim 54, wherein connecting the

opening (301) of said second container (300) comprises moving said enclosure means (23) in such a way as to insert said opening (301) into an inlet portion (47) of second fitting means (46) and locking said neck portion (300c) around said inlet portion (47) using locking means (70).

57) Method according to any one of claims 45 to 56, wherein said moving comprises lifting and rotating said container (200, 300).

58) Method according to any one of claims 53 to 56, wherein connecting said container (200, 300) to said dosing unit (101) comprises connecting the fitting means (9, 46) coupled with said container (200, 300) to conveying means (4) connected to a feeding tank (101a) of said dosing unit (101).

59) Method according to any one of claims 53 to 57, wherein transferring said product comprises opening the valve means (19, 49) of the fitting means (9, 46).

60) Method according to claim 58, wherein there is provided mounting and/or dismantling said conveying means (4) on or from said apparatus (1).

61) Method according to claim 60, wherein said mounting comprises introducing said conveying means (4) inside said apparatus (1), associating said conveying means (4) to lifting means (2), transferring said conveying means (4) to vibrating supporting means (15) of the apparatus, moving said vibrating supporting means (15) to connect said conveying means (4) to the dosing unit (101).

62) Method according to claim 60, wherein said introducing comprises transferring said conveying means (4) from a transferring unit (50) to said apparatus (1) through said access means (31) and positioning said conveying means (4) on housing means (45) removably connected to the lifting means (2).

63) Method according to claim 62, wherein there is provided introducing said dismantled conveying means (4) and

assembling the latter by coupling a connecting pipe (13), positioned on said housing means (45), to a storing pipe (14) by interposing connecting means (16).

64) Method according to any one of claims 61 to 63, wherein said transferring comprises moving the conveying means (4) along a substantially rectilinear raising direction (L) using said lifting means (2), fixing said conveying means (4) to second moving means (60) of the apparatus (1), moving said conveying means (4) using said moving means (60) at the vibrating supporting means (15), positioning and fixing said conveying means (4) on said vibrating supporting means (15).

65) Method according to claim 64, wherein in the feeding position (B, B') of the container (200, 300), there is provided closing adjusting means (20) of the connecting means (16) and valve means (9, 49) of fitting means (9, 46), fixing the storing pipe (14) to the lifting means (2), detaching the connecting means (16) from the feeding pipe (13), rotating the container (200, 300) and the storing pipe (14) connected thereto in such a way that the opening (201, 301) of the container (200, 300) faces upwards, opening valve means (19, 49) to enable the product in the storing pipe (14) to slide into the container (200, 300).

66) Method according to claim 65, wherein there is further provided driving vibrating means (74) of the lifting means (2) to promote the descent of the product using vibrations induced in the storing pipe (14).

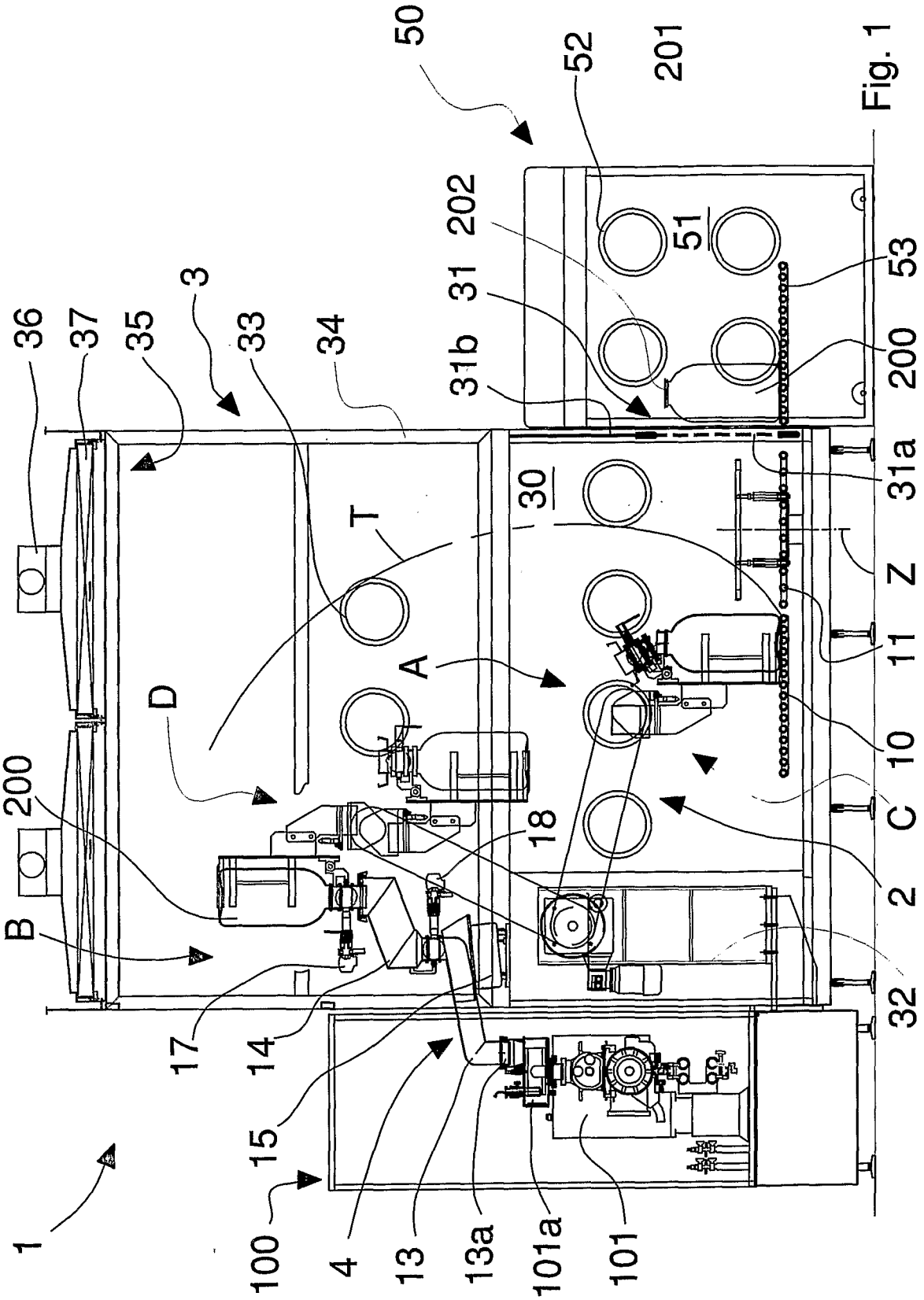
67) Method according to claim 65 or 66, wherein there is provided closing said valve means (19, 49), rotating the container (200, 300) and the storing pipe (14) in the feeding position (B, B'), connecting the connecting means (16) to the connecting pipe (13), detaching the storing pipe (14) from the lifting means (2), opening the adjusting means (20) to enable the product, which is in the storing pipe (14) and in the connecting pipe

(13), to slide into the feeding tank (101a) of said dosing unit (101).

68) Method according to claim 67, wherein there is further provided driving said vibrating supporting means (15) to promote the descent of the product using vibrations induced in the storing pipe (14).

69) Apparatus for feeding a packaging machine with a product to be packaged, substantially as disclosed and claimed and for the specified objects.

70) Method for feeding a packaging machine with a product to be packaged, substantially as disclosed and claimed and for the specified objects.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101
1

Fig. 1

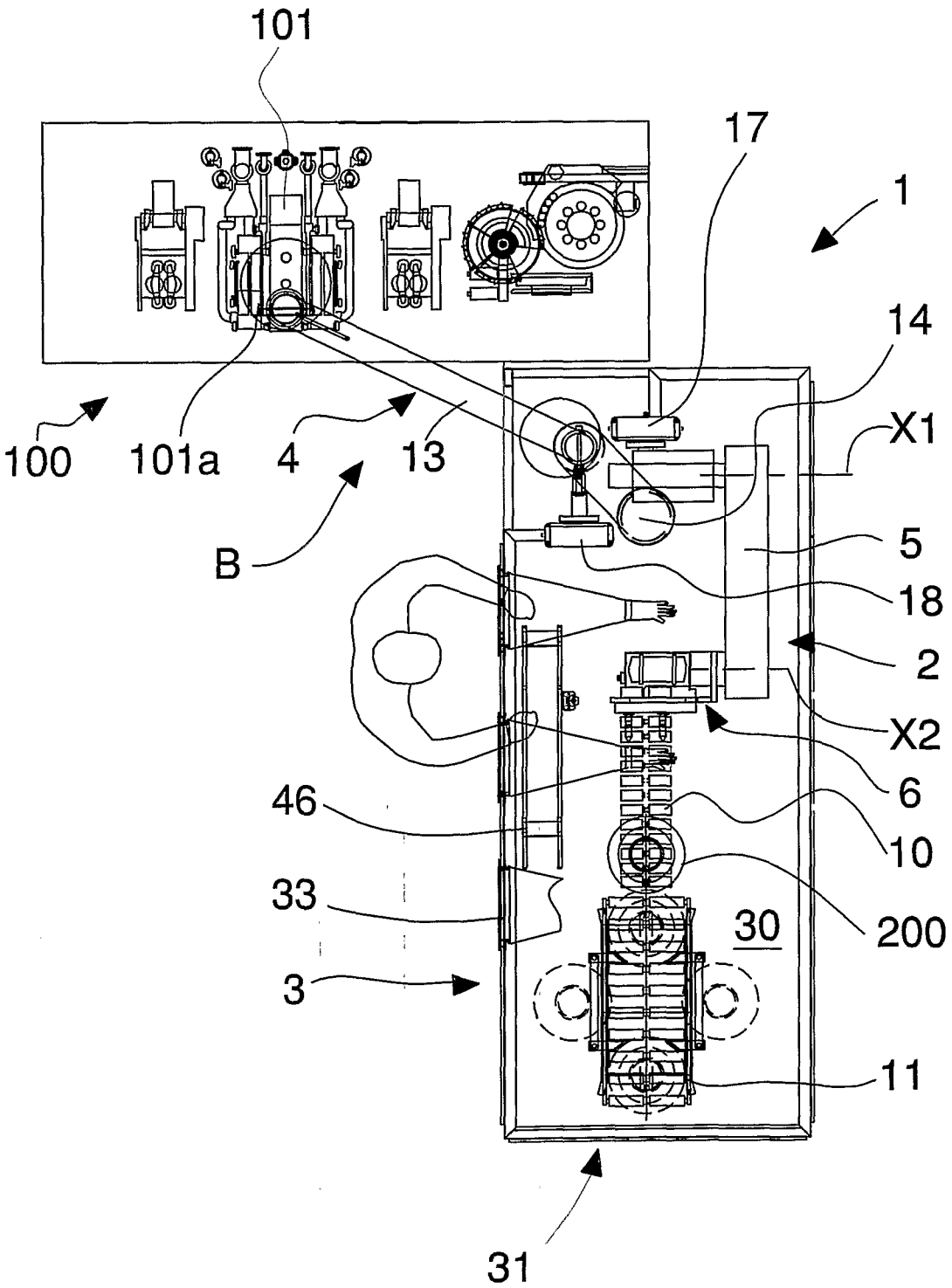
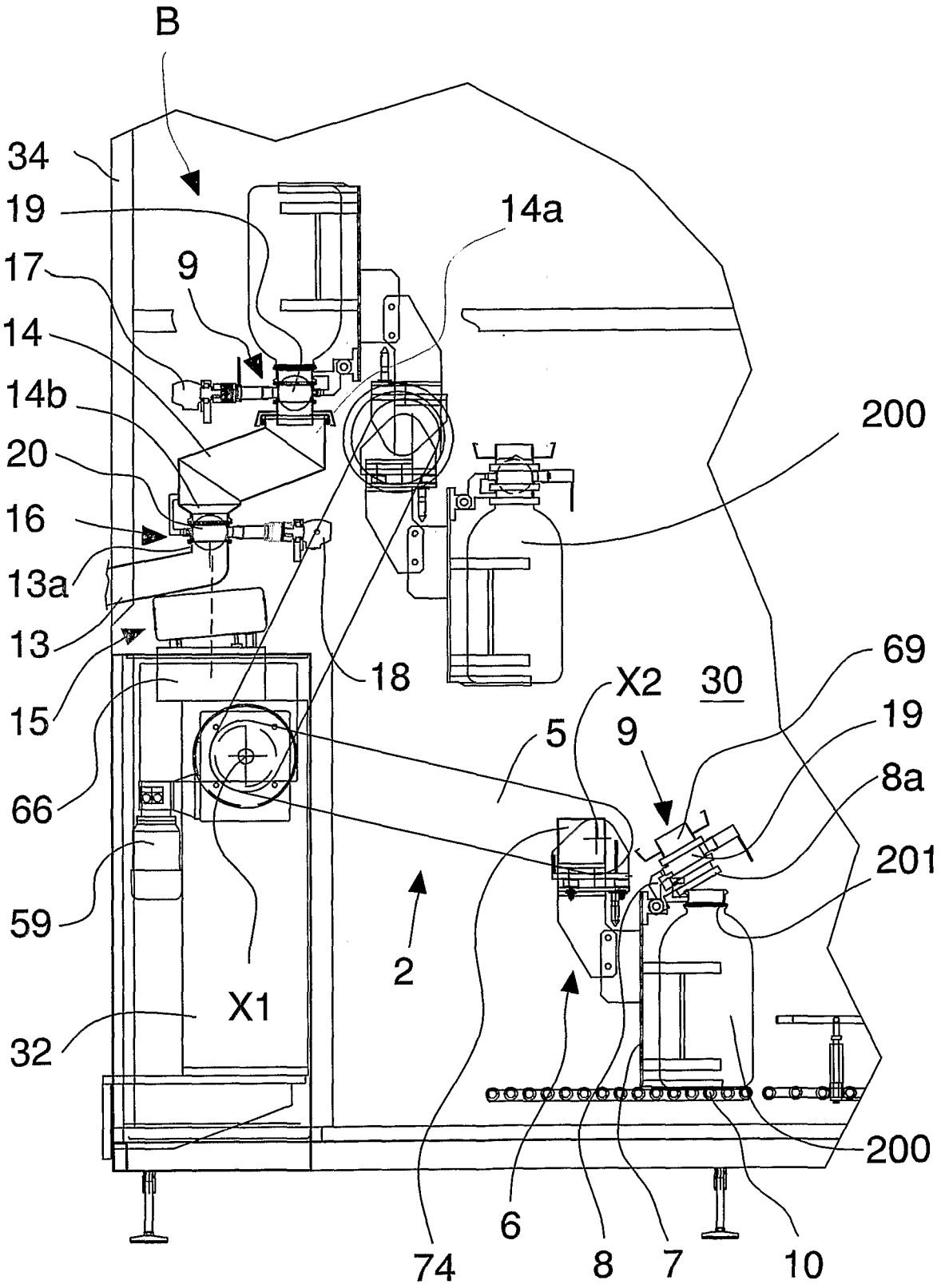


Fig. 2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6
74
8
7
10
200

Fig. 3

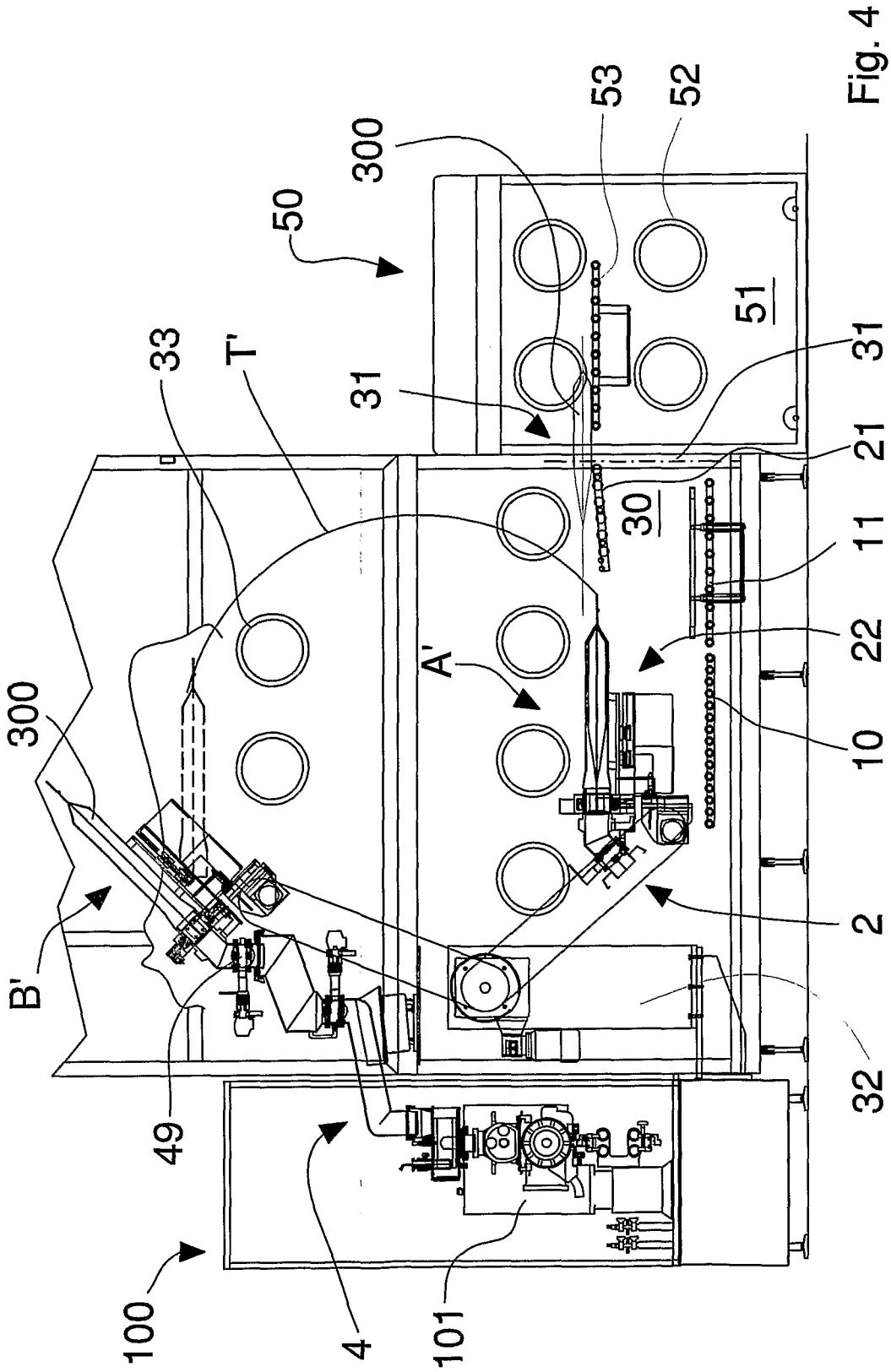
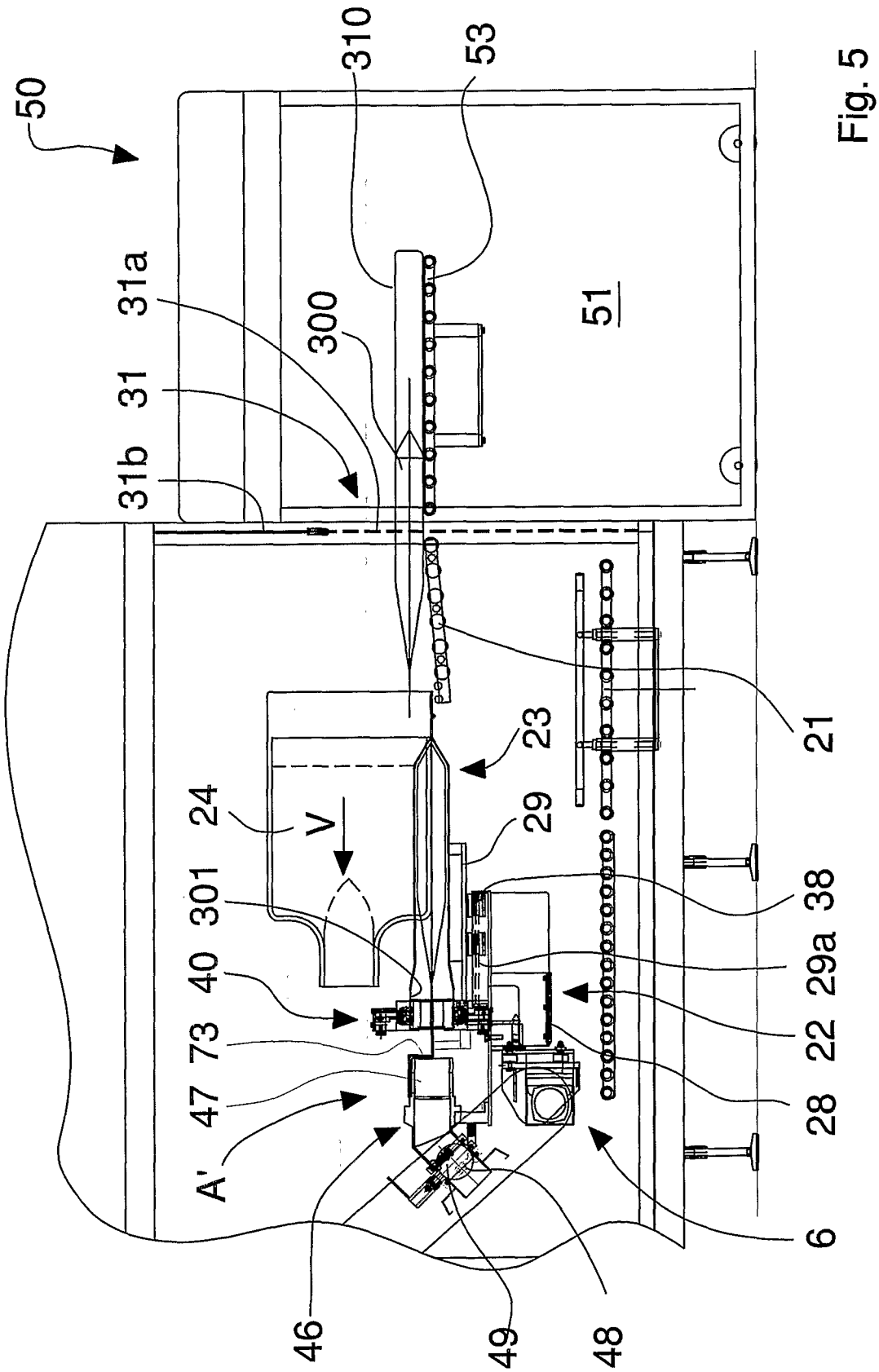


Fig. 4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310
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31a
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51
31
31b
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23
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A'
6
46
49
48

Fig. 5

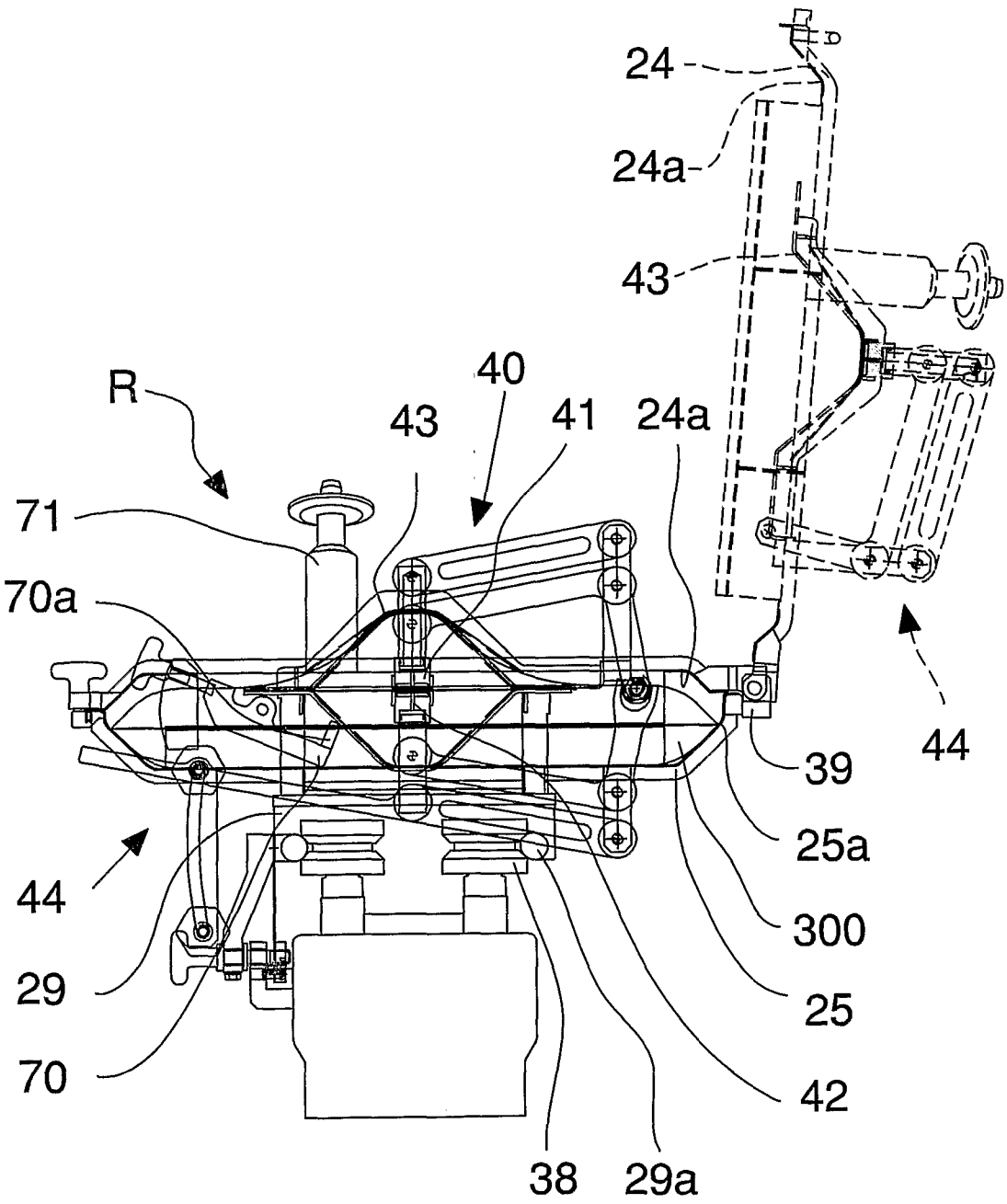
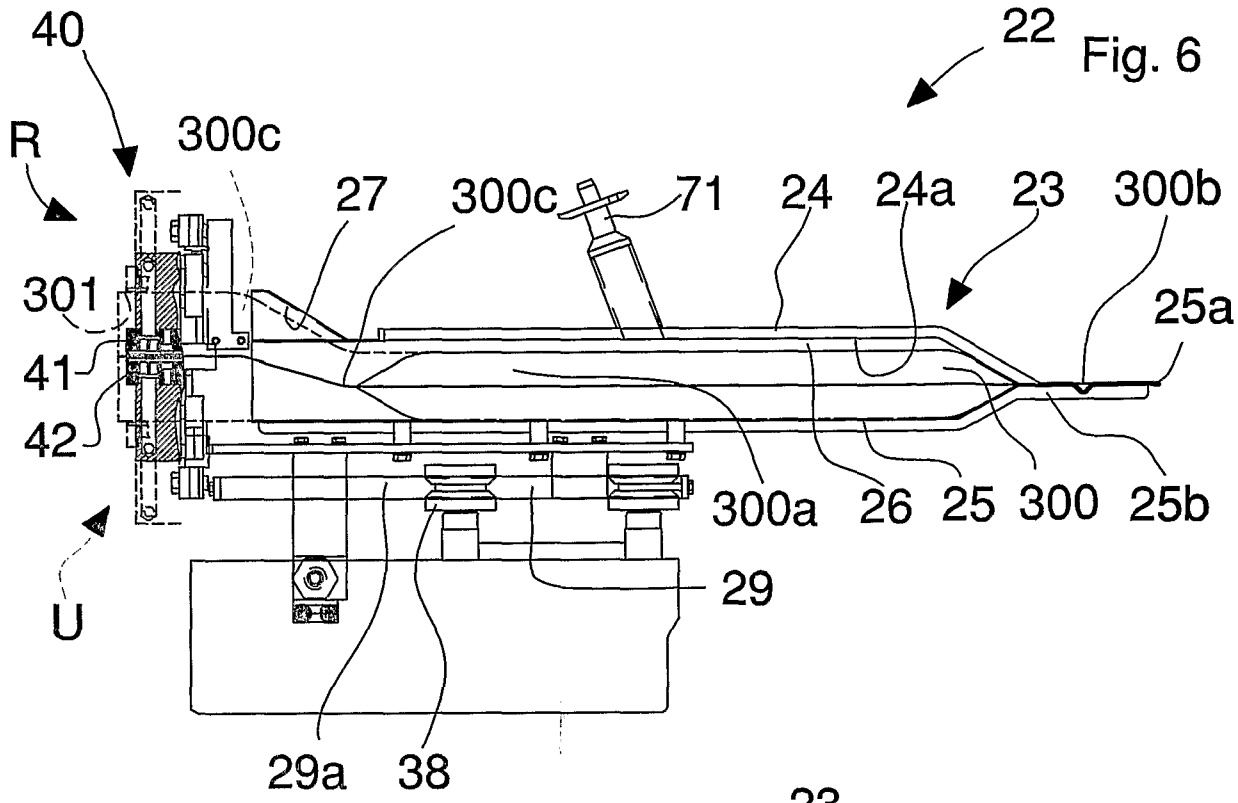


Fig. 7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25b
29
U
29a
38

Fig. 6

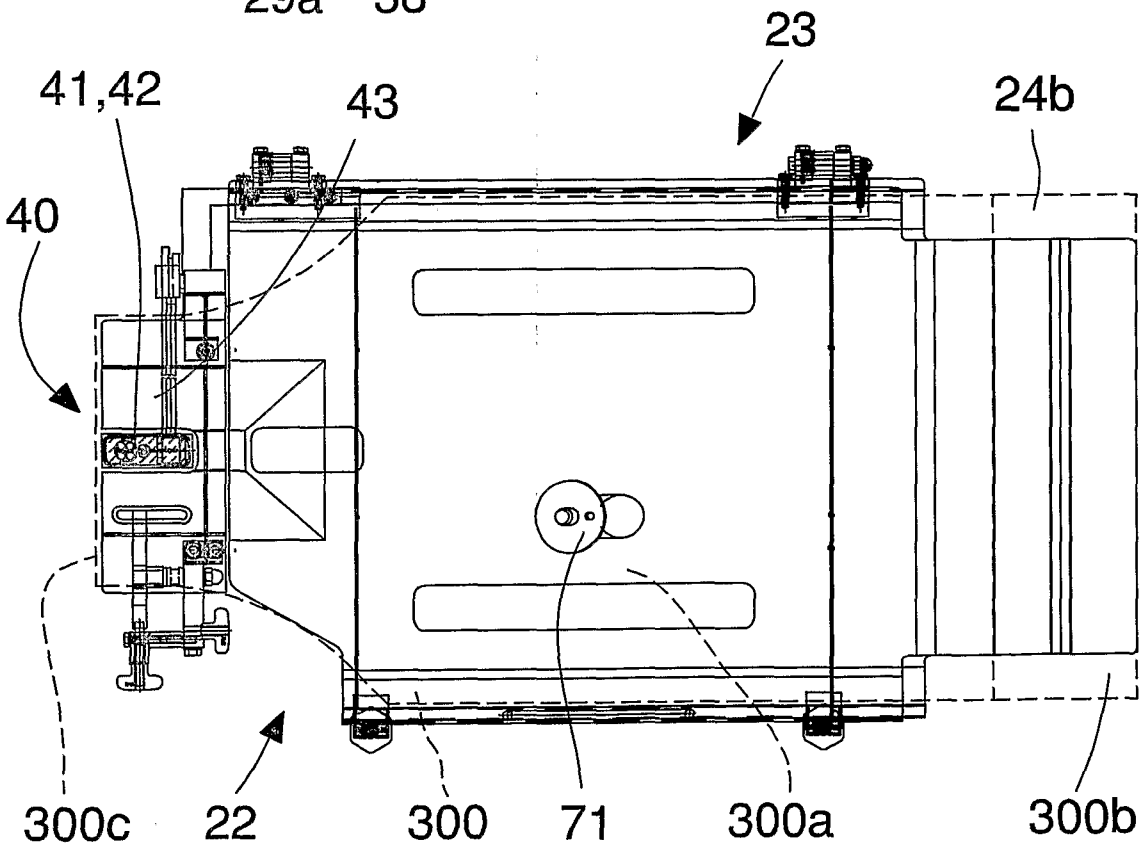
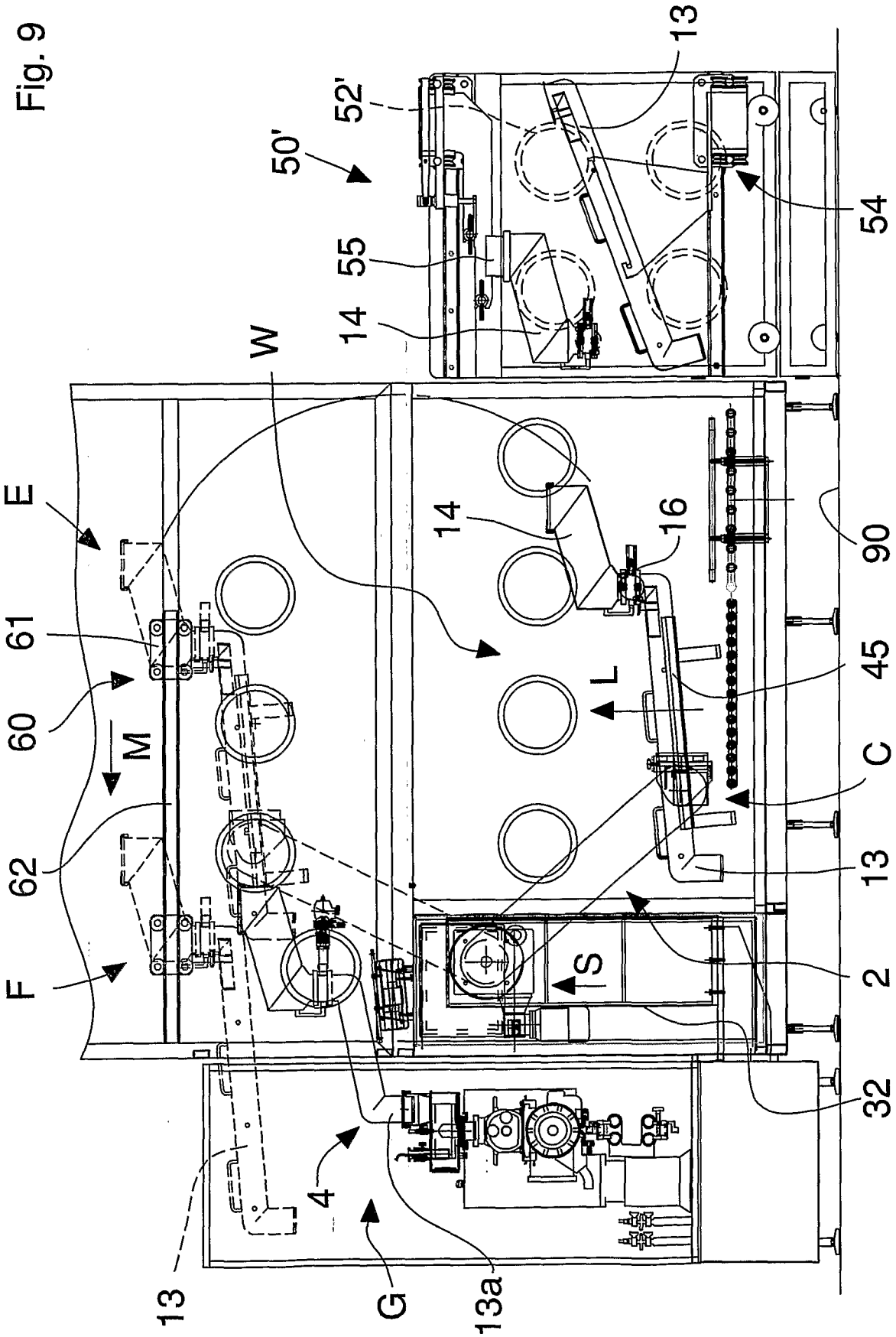

23
41,42
43
24b
40
300c
22
300
71
300a
300b

Fig. 8

Fig. 9



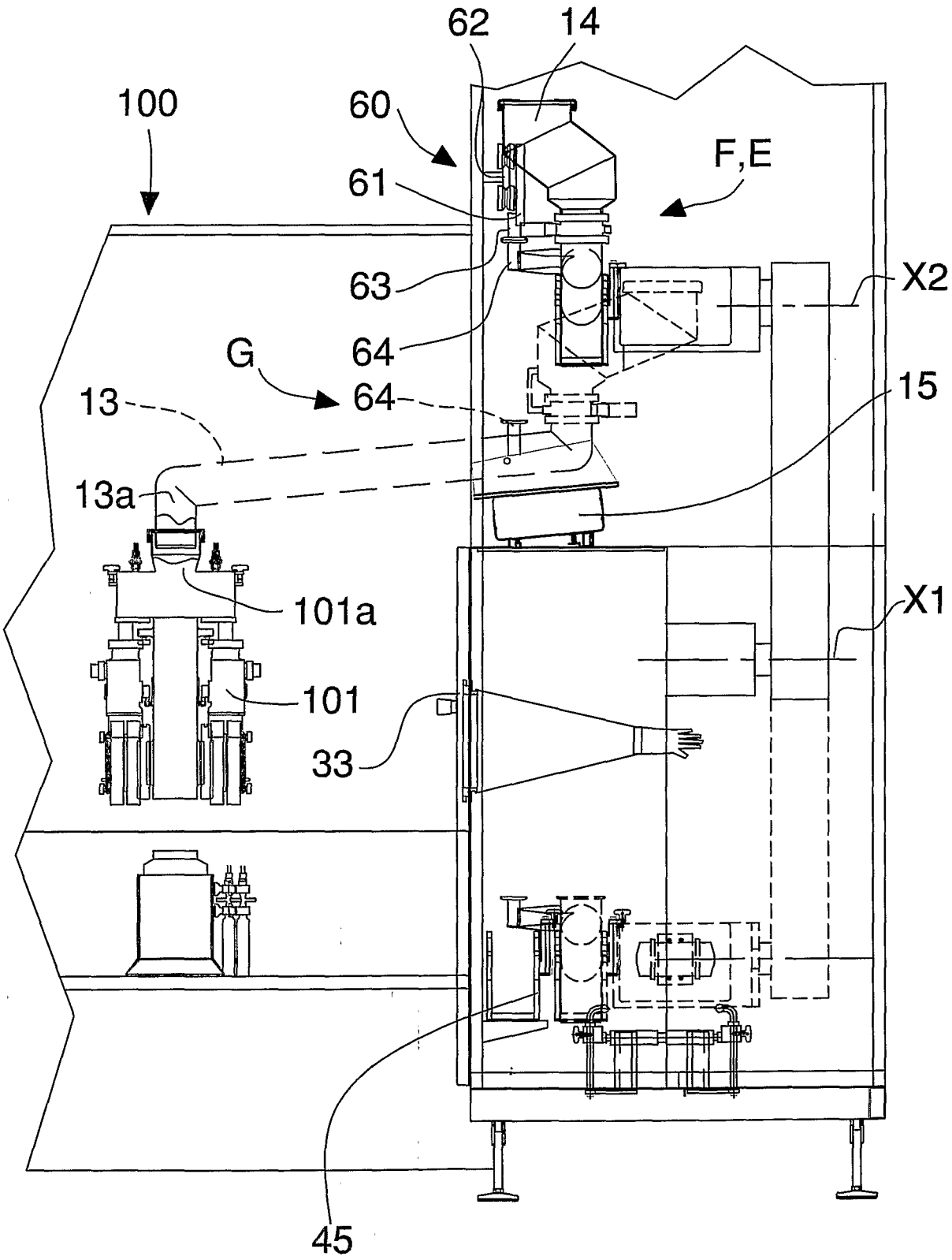


Fig. 10

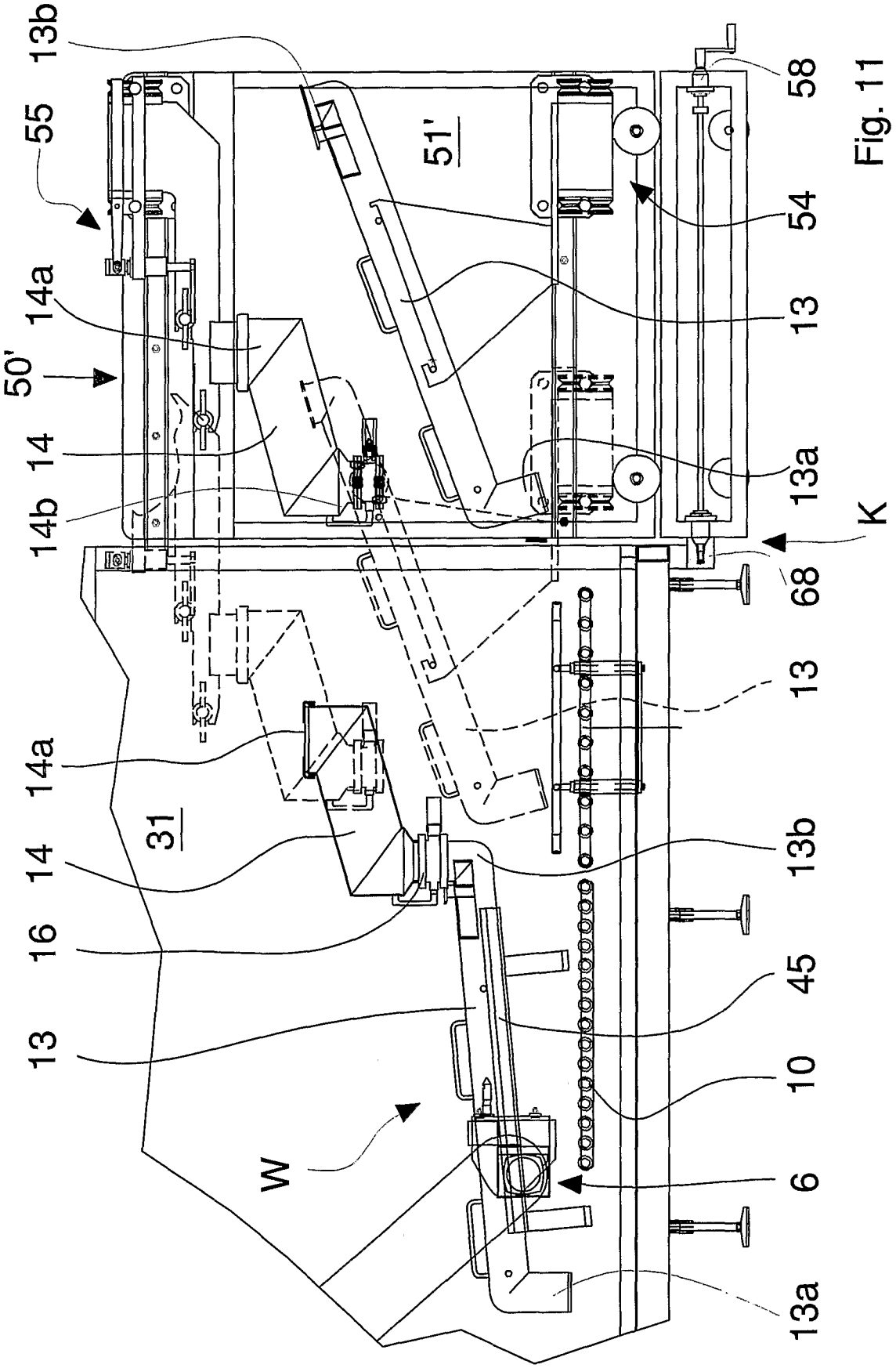

13b
55
14a
50'
14
14b
51'
58
54
13
13a
K
68
13
14a
31
14
16
13
13b
45
10
6
13a
W

Fig. 11

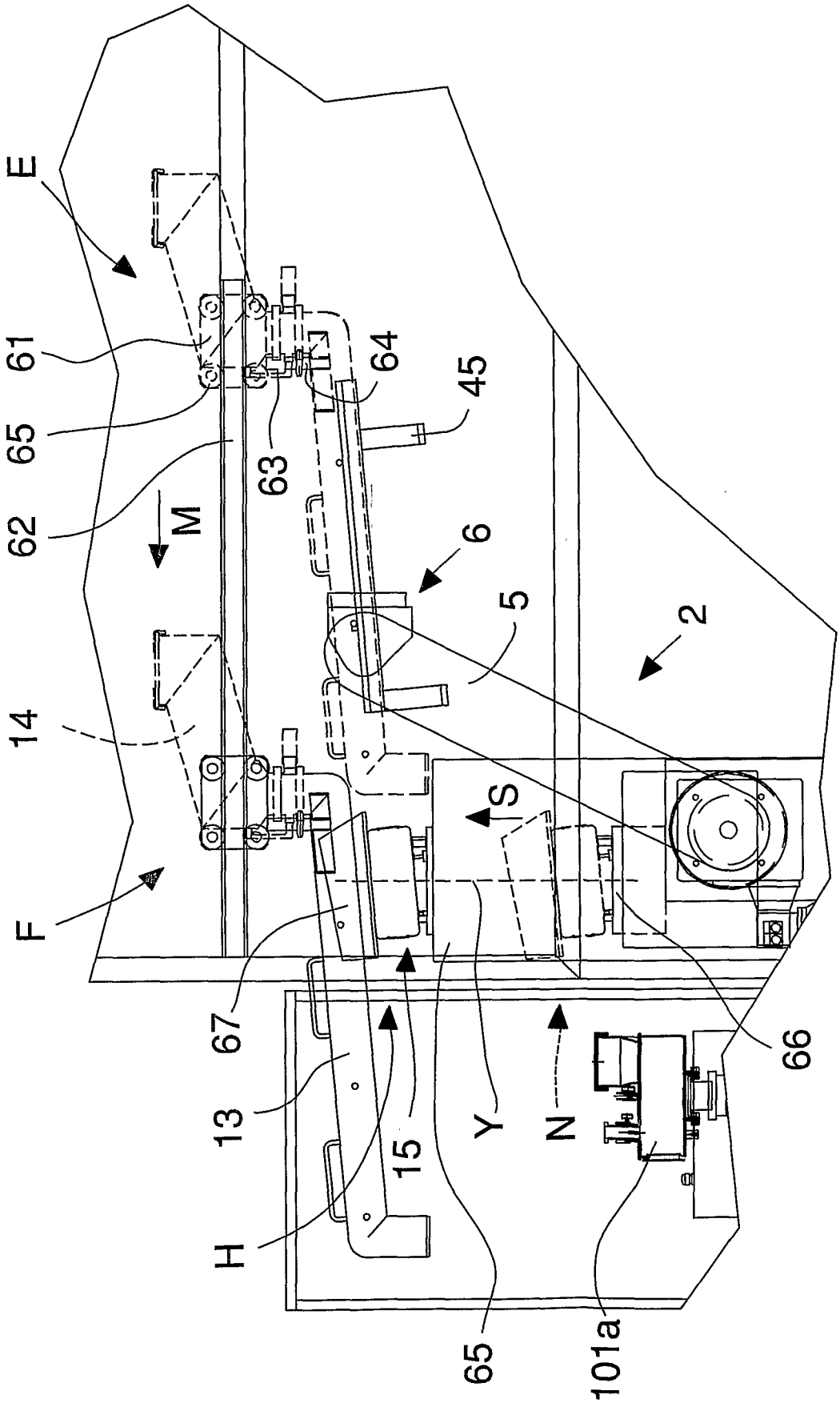
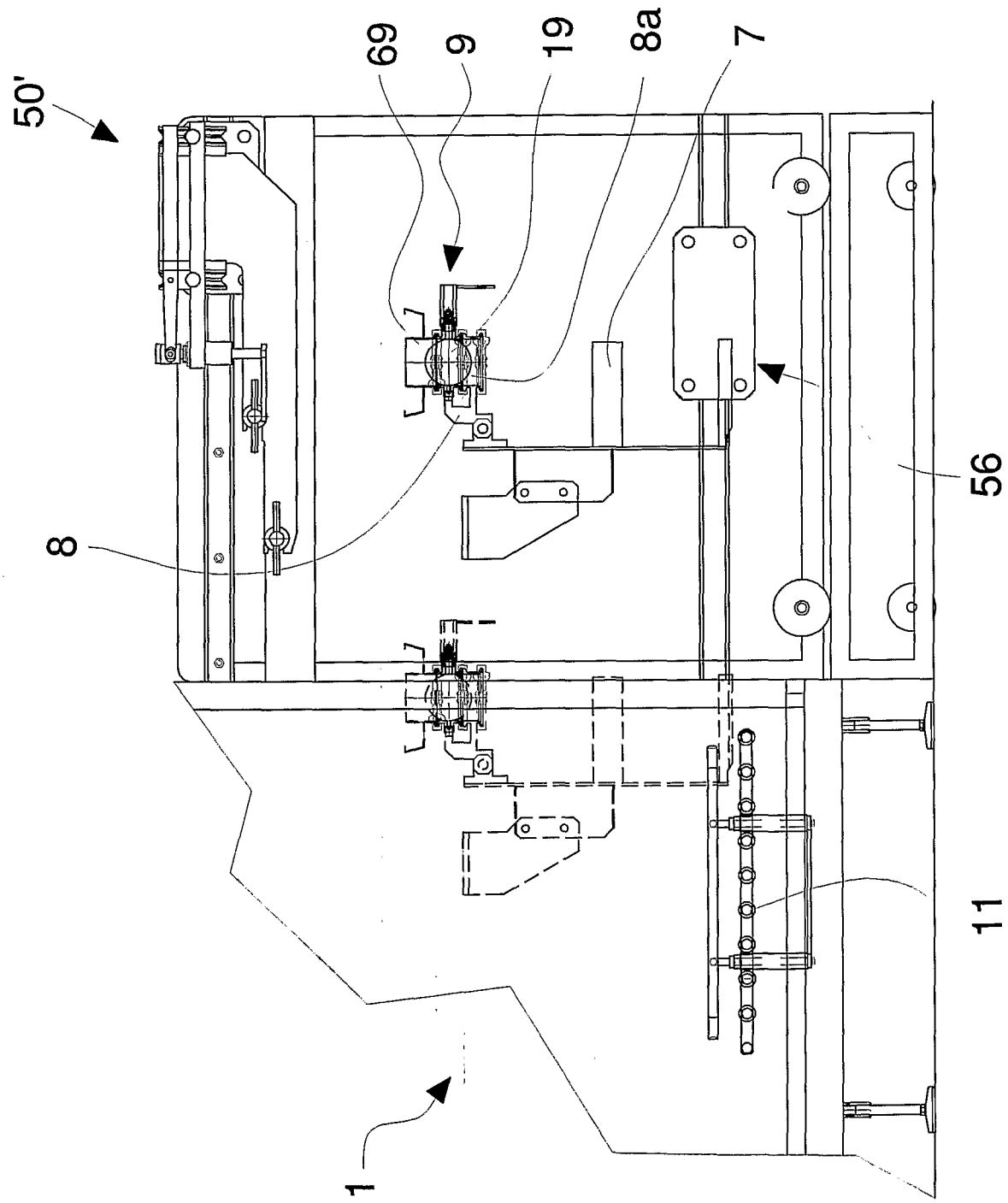


Fig. 12

Fig. 13



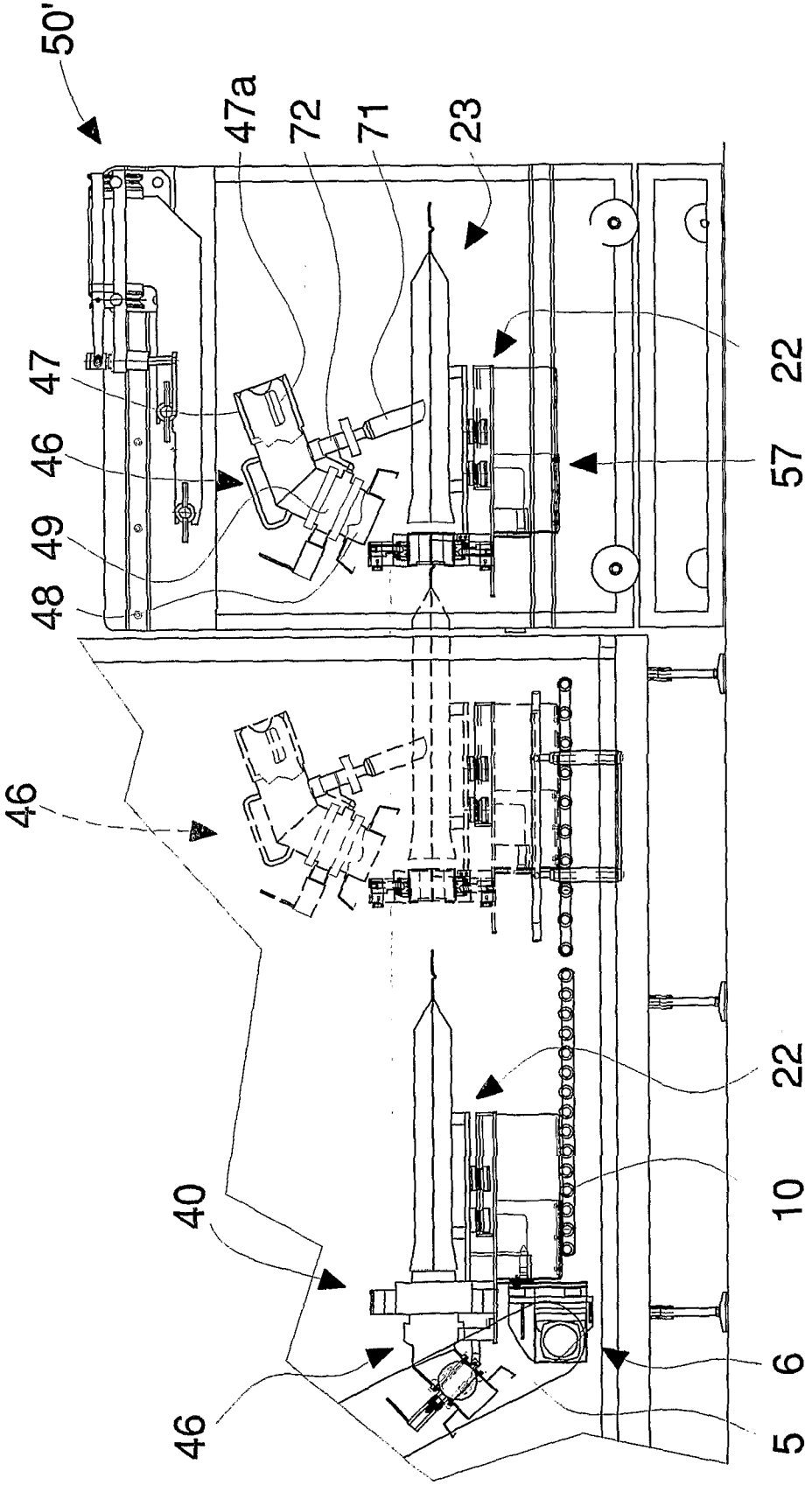


Fig. 14