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**DE-A1-102010 020 958**
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# DESCRIPTION

## TECHNICAL FIELD

**[0001]** The present invention relates to a machine for conveying containers. Specifically, the invention relates to the movement mechanism of the press suitable for blocking in position the container transported into the conveying machines.

**[0002]** The invention relates to the technical field of linear motors and of how these, coupled with conveyor machines, enable transport of containers along the production line.

## PRIOR ART

**[0003]** At present, conveying machines used for operating on containers are, at least for the most part, of the rotating carousel type. The carousel has, on a periphery thereof, predefined container supporting stations (commonly referred to as a "support plate") on which the containers to be treated are positioned. In particular, the carousel has a central rotation axis and for the support plates has respective rotation axes parallel to the central axis. Each support plate is rotatable about itself by taking the movement mechanically from the rotation of the carousel (for example by means of cam members or the like) or, in the most recent machines, is provided with its own electric motor that is commandable by a control unit independently with respect to the rotation of the carousel. In this way, the container loaded on the support plate can be rotated according to the operating units arranged along the carousel. For example, in order to carry out labelling operations on the container, it is necessary to perform a preliminary rotation of the container on itself in order to detect the application position of the label (by means of a suitable detecting sensor) in order then to arrange the container in the position prior to or at the labelling unit. During this procedure, in order not to make errors due to the displacement or falling of the container, it becomes necessary to keep the latter firmly in position on the rotating support plate by use of a jack. This constraining system using a jack, as illustrated in patent WO2017103813, can be mounted on magnetised carriages, which, coupled with a specific guide, define a linear motor, of which the magnetised carriages are the rotor while the guide is the stator.

**[0004]** However, the present technology has some drawbacks that the invention seeks to obviate.

**[0005]** In fact, for this purpose a pressure system is normally used, which consists of a press that is vertically movable either due to a pneumatic system, for example an air system, or due to a spring system, in which a jack presses the top of a container downwards due to the compressive or extensive work of a spring.

**[0006]** A first drawback, however, is natural wear on the components used, and in this specific case the spring.

**[0007]** Further, the spring system is not capable of guaranteeing a constant pressure, as with the case of the pneumatic system, as the force generated depends linearly on the length of the compression or extension of the spring itself (Hooke's law). Once the spring has been chosen, which is characterised by a specific elastic constant value, a correct dimensioning of the structure of the device comprising the spring is necessary; in fact, it is usually necessary to have a stroke of about 35 mm for the movement of the jack and for the compression or extension of the spring. Alternatively, the pneumatic system, even if capable of generating the same pressure all the time, independently of the displacement of the jack, would need a pressure regulator for each valve associated to each container and a rotary air distributor, thus complicating the structure and increasing the final cost.

**[0008]** A further drawback of the prior art relates to the fact that the rated height of the containers, in reality, is not always the same but can vary by more or less, even by up to a few millimetres, which compromises the operation of the spring system.

**[0009]** Lastly, the containers are usually made of glass or plastic, but these two materials are capable of withstanding different maximum pressures, while the spring system is dimensioned such as to work in a single configuration, so changing the containers would make it necessary to reconfigure the whole spring system

**[0010]** DE 10 2013 100627 A1 discloses a machine for conveying containers, comprising: a guide extending along an advancement direction of the containers; a main carriage slidably mounted on said guide, said guide and said main carriage together defining a main linear motor; at least an auxiliary carriage slidably mounted on said guide, said guide and said auxiliary carriage together defining an auxiliary linear motor; a holding device mounted on said main carriage and mobile between a raised position and a lowered position in which the holding device lifts or lowers the container; a control unit electrically connected to said guide and configured for controlling the sliding of the main carriage and said auxiliary carriage on said guide and a reciprocal distance thereof; actuating means operatively connected to said holding device and configured for moving said holding device between said raised position and said lowered position; said actuating means being operatively interposed between said holding device and said auxiliary carriage, and being activatable following the variation of the reciprocal distance between said main carriage and said auxiliary carriage; said control unit being configured for commanding the variation of the reciprocal distance between the main carriage and the auxiliary carriage so as to activate said actuating means.

**[0011]** DE 10 2010 020958 A1 and DE10 2011 086708 A1 disclose machines for conveying containers with guides and pressing devices mounted on carriages, the carriages forming linear motors with said guides.

**SUMMARY**

**[0012]** In this context, the technical task of the present invention is to provide a machine for conveying containers, which obviates the above-mentioned drawback of the prior art, with reference to a pressing device used to constrain in position a container placed on a rotating support and in movement along a guide of the machine itself.

**[0013]** An object of the present invention is the possibility of using a constraining system of the container capable of generating always the same pressure on the top of the container, independently of the movement carried out by the pressing device due to the variability of the height of the containers transported.

**[0014]** A further object of the present invention is the use of a constraining system which does not increase the complexity of the structure of the conveying machine with the addition of electrical circuits or pneumatic systems.

**[0015]** Lastly, a final object of the present invention is the use of a constraining system which is capable of operating with both containers made of a plastic material and with glass containers, without any need to have to replace parts, to have to carry out calibrations or to have to use specific positioning sensors.

**[0016]** In general, the present invention relates to a machine for conveying containers which comprises, at the top of the containers, a guide extending along an advancement direction of the containers, a main carriage and an auxiliary carriage slidably mounted on the guide, with which both the carriages define a linear motor, and a pressing device mounted on the main carriage, which is movable between a raised rest position and a lowered constrained position in which the pressing device applies a pressing force on the top of a container.

**[0017]** Each container is supported from below by a support plate that is normally mobile and preferably mounted on a carriage which defines a further base linear motor.

**[0018]** The machine further comprises a control unit electrically connected to the guide and configured for controlling the sliding of the main carriage and the auxiliary carriage on the guide and a mutual distance thereof, and actuating means operatively connected to the pressing device and configured for moving said pressing device between the raised rest position and said lowered constrained position.

**[0019]** The control unit is configured for commanding the variation of the mutual distance between the main carriage and the auxiliary carriage so as to activate said actuating means, which is operatively interposed between the pressing device and the auxiliary carriage. In other words, the main carriage and the auxiliary carriage are controllable independently of one another.

**[0020]** Preferably, the machine comprises at least two auxiliary carriages slidably mounted on

the guide, in such a way that the main carriage is interposed therebetween and each auxiliary carriage is operatively connected to the pressing device by respective actuating means.

**[0021]** Advantageously, having a main carriage interposed between two auxiliary carriages gives stability to the structure at the time when the pressing device is moved. Further, in a case where both the auxiliary carriages are moved in the same way towards the main carriage, the total force produced will be double that of the same movement of a single auxiliary carriage towards the main carriage.

**[0022]** According to a first aspect of the invention, the actuating means comprises a linkage, a first end of which is connected to the auxiliary carriage and a second end is connected to the pressing device, so that a variation of the relative distance between said main carriage and at least one auxiliary carriage induces a displacement of the pressing device between the raised rest position and the lowered constrained position.

**[0023]** It is further possible for this linkage to comprise three levers, each of which has a first end constrained at a same point and a second end constrained at a different point between said pressing means, said main carriage and said auxiliary carriage.

**[0024]** According to a second aspect of the invention, the actuating means comprises a rack connected to the auxiliary carriage and at least one nut-female screw movement system comprising the pressing device. According to a third aspect of the invention, the actuating means comprises at least one connecting rod and at least one crank associated to the connecting rod. The connecting rod has a first end constrained to the auxiliary carriage and a second end associated to the crank, while the latter is connected to the pressing device by conversion means for converting the rotary motion into a rectilinear motion.

**[0025]** Preferably, the conversion means comprises a screw-female screw movement system which includes the pressing device constrained to the main carriage, in such a way that the rotation of the pressing device is prevented and movement between the raised rest position and the lowered constrained position is enabled.

**[0026]** According to a fourth aspect of the invention, the actuating means comprises a linkage, which has a first end constrained to the auxiliary carriage and a second end constrained to a pinion, which is mounted on the main carriage. The pinion is also capable of rotating about the constraining point and enables displacement of the pressing device between the raised rest position and the lowered constrained position, as it is associated to a threaded portion thereof, due to the reciprocal displacement between the main carriage and the carriage.

**[0027]** According to a fifth aspect of the invention, the actuating means comprises a cam system having at least one shaped profile solidly constrained to the auxiliary carriage and operatively associated to a slider solidly constrained to the pressing device in order to cause movement between said raised rest position and said lowered constrained position.

**[0028]** According to a sixth aspect of the invention, the actuating means comprises at least one actuator cylinder comprising a first piston connected to said auxiliary carriage, a second piston connected to said pressing device and a volume of fluid interposed between said first and second pistons.

**[0029]** Independently of the selected aspect of the invention, the use of one of the suggested actuating means, with respect to the traditional use of a spring, enables having application of a constant pressure value on the top of the container, independently of how much the pressing device has moved from the raised rest position to the lowered constrained position.

**[0030]** In particular, the control unit is configured to control the distance between the auxiliary carriage and the main carriage according to the maximum stroke that the pressing device must carry out (for example according to the height of the container). This control is performed by controlling the currents/voltages of the electrical circuits arranged along the guide.

**[0031]** A limit value of maximum stroke of the pressing device is preferably set, which defines the minimum distance limit between the auxiliary carriage and the main carriage.

**[0032]** Alternatively or additionally, the control unit is configured to control the pressure value exerted by the pressing device on the top of the container. This pressure value is a function of the force with which the auxiliary carriage pushes towards the main carriage or vice versa.

**[0033]** A maximum pressure limit value of the pressing device is preferably set, according to the characteristics of the container (for example plastic, glass, ....). This maximum pressure value is converted into a maximum current/voltage value which is supplied to the electrical circuits.

**[0034]** In fact, as the force developed by the linear motor is proportional to the current/voltage which is supplied into the electrical circuits arranged along the guide, the control unit is configured to manage the electrical magnitudes of the electrical circuits of the guide so as to control the thrust force of a carriage towards the other one and thus the pressure of the pressing device on the container.

**[0035]** In the preferred case, the control unit is configured to carry out two checks in a parallel way:

- a first mutual distance check of the carriages so that the distance does not exceed the predefined maximum stroke limit;
- a second pressure check of the pressing device on the container so that it does not exceed the maximum pressure limit value.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0036]** Further characteristics and advantages of the present invention will become more apparent from the general and thus non-limiting description of a preferred, but not exclusive, embodiment of a machine for conveying containers, as illustrated in the accompanying drawings, in which:

▪ figure 1 illustrates, in a schematic front view, a machine for conveying containers;

▪ figure 2 illustrates, in a schematic bottom view, the sliding guide for sliding the carriages to constrain the containers;

▪ figure 3a illustrates, in a schematic side view, a first embodiment of the machine of the invention with a first type of actuating means;

▪ figure 3b illustrates, in a schematic side view, a second embodiment of the machine of the invention with a second type of actuating means;

▪ figure 3c illustrates, in a schematic side view, a third embodiment of the machine of the invention with a third type of actuating means;

▪ figure 3d illustrates, in a schematic side view, a fourth embodiment of the machine of the invention with a fourth type of actuating means;

▪ figure 3e illustrates, in a schematic side view, a fifth embodiment of the machine of the invention with a fifth type of actuating means;

▪ figure 3f illustrates, in a schematic side view, a sixth embodiment of the machine of the invention with a sixth type of actuating means;

▪ figure 3g illustrates, in a schematic side view, a seventh embodiment of the machine of the invention with a seventh type of actuating means;

▪ figure 3h illustrates, in a schematic side view, an eighth embodiment of the machine of the invention with an eighth type of actuating means.

**[0037]** In the following description, the same reference characters denote the same or corresponding parts in the various views.

## DETAILED DESCRIPTION

**[0038]** The present invention relates to the technical field of machines for conveying containers, specifically to the constraining system from above of the containers during movement thereof along the production line.

**[0039]** With reference to the cited figures, reference numeral 100 denotes in its entirety a machine for conveying containers, as shown in figure 1.

**[0040]** Figure 2 shows, with a schematic bottom view, a guide 1 which extends along an advancement direction 1a of the containers and on which at least one main carriage 2 and at least one auxiliary carriage 3 are mounted. The guide 1 can be made up of a plurality of tracks along which the various carriages are arranged, or of a single track electrically connected to a single control unit 5 for better management of the movement of the main carriage 2 and the auxiliary carriage 3.

**[0041]** The guide 1 is manufactured using a metallic material, generally ferromagnetic, and is electrically connected to a control unit 5 capable of precisely controlling the supply of electric current from a generator, for induction of a specific magnetic field. The main carriage 2, equipped with a magnet or produced with a conductor material, defines a linear motor together with the guide 1 supplied with electric current, in which the guide 1 acts as a stator and the main carriage 2 as a rotor. Likewise, the auxiliary carriage 3, provided with a magnet or made of a conductor material, defines together with the guide 1 a linear motor, where also in this case the guide 1 is the stator and the auxiliary carriage 3 is the rotor. The control unit 5 is programmed for a precise control of the electric current to be supplied to a specific portion of the guide 1, in such a way that the latter generates a specific magnetic field for a precise movement of the main carriage 2 and/or of the auxiliary carriage 3. In fact, it is possible to control the position and velocity of each single carriage, so that on the passage in proximity of the operating station 8, for example a labelling station, the carriages move with an adequate velocity for carrying out the necessary operations.

**[0042]** The main carriage 2, comprising the pressing device 4, is the carriage carrying out the vertical constraint of the containers during the movement thereof along the production line. The pressing device 4 is therefore capable of performing a vertical displacement along an axis coinciding with the main axis of the container, between a raised rest position, in which the pressing device 4 and the container are not in contact, and a lowered constrained position in which the pressing device 4 applies pressure on the top of a container. In addition to be able to vertically constrain the container, the pressing device 4 is capable of rotating about the main axis in order to follow the rotary movement of the support of the container and, consequently, of the container itself during some operations that take place along the production line, such as labelling.

**[0043]** In other words, the pressing device 4 is rotationally independent of the axial movement between the two positions with respect to a movement axis. In practice, the pressing device 4 does not rotate during the axial movement, but remains idle. In still other words, the pressing device 4 is movable only axially (without rotation).

**[0044]** The auxiliary carriage 3 is positioned upstream or downstream of the main carriage 2, with respect to the advancement direction 1a of the containers, as it has the function of accompanying the movement of the main carriage 2 in order to be able to impart the vertical

translation movement to the pressing device 4.

**[0045]** As shown in figure 2, the actuating means 6 is interposed between the main carriage 2 and the auxiliary carriage 3, which actuating means 6, once activated, is capable of inducing the vertical translational motion to the pressing device 4 to which the means is operatively associated. The main carriage 2 and the auxiliary carriage 3 define a linear motor with the guide 1 and can be translated along the advancement direction 1a of the guide 1 with not necessarily equal specific velocities due to the programming of the control unit 5, which manages position and velocity with great precision, as the mutual distance thereof can be varied in order to activate the operation of the actuating means 6 with the consequent vertical movement of the pressing device 4.

**[0046]** As shown in figure 3a, the actuating means 6 comprises a lever, the ends of which are constrained to the auxiliary carriage 3 and to the pressing device 4. The approaching between the main carriage 2 and the auxiliary carriage 3 causes a rotation of the lever about the end constrained to the auxiliary carriage 3 with a consequent vertical downwards displacement of the pressing device 4, constrained to the opposite end of the lever itself. The displacement of the pressing device 4 between a raised rest position, in which the main carriage 2 and the auxiliary carriage 3 are at the maximum distance, and a lowered constrained position, in which the main carriage 2 and the auxiliary carriage 3 are at a minimum distance, enables application of a pressing force on the container of a first force value (for example 100 N).

**[0047]** Preferably, as illustrated in figure 3b, the main carriage 2 can be interposed between two auxiliary carriages 3, each of which has actuating means 6, in the specific case a lever, with a first end constrained to the auxiliary carriage 3 itself and a second end constrained to the pressing device 4. Similarly to the previous aspect, in which only one auxiliary carriage 3 is present, the relative displacement between the auxiliary carriages 3 and the main carriage 2 imposes a vertical displacement of the pressing device 4. In this case the auxiliary carriages 3, having actuating means 6 located mirror-like with respect to the pressing device 4, must synchronously move close to and away from the main carriage 2, generating a pressure on the container that can reach a second force value that is substantially double with respect to the first one (for example 200 N).

**[0048]** Figure 3c illustrates a further embodying feature of the invention, in which the actuating means 6, interposed between an auxiliary carriage 3 and a main carriage 2, comprises a linkage 10 composed of three levers, each of which has a first end constrained at a same point 11, while each of the second ends 12, 13, 14 is constrained at a different point to the others; specifically they are constrained to the main carriage 2, to the auxiliary carriage 3 and to the pressing device 4. During the approaching between the auxiliary carriage 3 and the main carriage 2, the only constraint between the lever and the pressing device 4 is able to translate, as it is capable of translating the pressing device 4 itself. In this way, with respect to the first embodying feature of the invention, it is possible to almost double the pressure that the pressing device 4 is capable of applying to the underlying container.

**[0049]** Figure 3d illustrates an embodiment of the invention in which the actuating means 6 comprises a rack 20 connected to the auxiliary carriage 3, the relative movement of which with respect to the main carriage 2 leads to the vertical translation of the pressing device 4 due to a screw-female screw movement system 21 associated to the rack 20.

**[0050]** A further aspect of the invention is described in figure 3e, in which a main carriage 2 is interposed between two auxiliary carriages 3, and the actuating means 6 capable of moving the pressing device 4 comprises a connecting rod-crank system, one for the connection of each auxiliary carriage 3 with the pressing device 4. The crank 31 is located on the main carriage 2 and the rotation axis thereof coincides with the translation axis of the pressing device 4, to which it is operatively connected. Instead, the connecting rod 30 has a first end 32 constrained to the auxiliary carriage 3 and a second end 33 connected to the crank 31 present on the main carriage 2. The variation of the relative distance between the main carriage 2 and the auxiliary carriage 3 activates the connecting rod-crank system, which in turn is capable of imparting the translation motion to the pressing device 4 owing to a conversion system 34 for converting the rotary motion in rectilinear motion comprising a screw-female screw system. In order to obtain a fluid rotary motion, i.e. free of dead centres which might interfere with the rotation up to interrupting it, the two cranks 31 are arranged mutually offset by a non-zero angle of less than 180°, preferably comprised between 45° and 135°, still more preferably 90°. In this way, when a connecting rod 30 and the respective crank 31 are in an aligned position, defining a dead centre of the mechanism, the other connecting rod 30 and the respective crank 31 will be misaligned and thus enable continuation of the movement in a fluid way. This movement is realized owing to the precise and continuous variation of the relative distance between the auxiliary carriages 3 and the main carriage 2 by the control unit 5, i.e. the activation of the linear motors defined by the carriages independently of one another.

**[0051]** Figure 3f shows an aspect of the invention in which the main carriage 2 is interposed between two auxiliary carriages 3, the main carriage 2 being connected to each of them by specific actuating means 6. Such actuating means 6 comprises a linkage 40 having a first end 41 constrained to the auxiliary carriage 3 and a second end 42 constrained to a pinion 43, which is mounted on the main carriage 2 and is able to rotate about the constraining point. The variation in the relative distance between the main carriage 2 and the auxiliary carriage 3 causes the movement of the linkage 40, which induces the rotation of the pinion 43 which in turn, being associated to a counter-shaped portion 44 of the pressing device 4, determines the vertical translation of the latter.

**[0052]** A further viable aspect of the invention is shown in figure 3g, in which the actuating means 6 interposed between a main carriage 2 and an auxiliary carriage 3 comprises a cam system 50, the shaped profile 51 of which is solidly constrained to the auxiliary carriage 3 and is operatively associated to a slider 52 which is instead solidly constrained to the pressing device 4. The movement of the auxiliary carriage 3 and, consequently, of the shaped profile 51 with respect to the main carriage 2 determines the sliding of the slider 52 internally of the shape of the shaped profile 51, forcing the pressing device 4 to make a vertical translation.

**[0053]** Lastly, as illustrated in figure 3h, according to a further aspect of the invention the actuating means 6 comprises an actuator cylinder 60 containing a volume 63 of a compressible fluid interposed between a first piston 61 and a second piston 62. The approaching of the auxiliary carriage 3, to which the first piston 61 is connected, to the main carriage 2 determines the compression of the volume 63 of the fluid in the actuator cylinder 60 by the first piston 61, with a consequent displacement of the second piston 62, to which the pressing device 4 is connected, in order to maintain the condition of balance of the system. In this way, the horizontal translation of the first piston 61 generates a vertical translation of the second piston 62, and thus the vertical translation of the pressing device 4 between a raised rest position and a lowered constrained position.

**[0054]** The operation of the machine 100 is described in the following and is independent of the embodying feature considered among those set forth above.

**[0055]** The machine 100, according to the claims of the present patent application, is normally inserted in a broader context of a system for conveying containers in which each container is directed (by a guide 1, spacing means and an input star) on a plate of the machine 100 which transports the container along the advancement direction 1a up to an outlet star for extracting the container from the machine 100 itself.

**[0056]** The machine 100 preferably comprises a base guide arranged below the containers on which carriages for transport of the containers are mounted. A rotating plate is mounted on each carriage to set a respective container in rotation. Each carriage with the guide in turn defines a base linear motor for transport of the container. The guide 1 is arranged above the base guide and the two guides preferably extend substantially parallel to one another. Further, the movement of the base carriage is synchronised with the movement of the main carriage 2 so that the container remains upright.

**[0057]** Along the advancement direction 1a, each container passes through various units each capable of carrying out different tasks, for example, initially the first device that encounters the container is a detecting device which samples the profile of the container in the search for a recognition sign with respect to which the first label is to be applied, then the container encounters a first labelling unit which applies the first label and, possibly, other work units with different purposes.

**[0058]** In addition to being moved along the advancement direction 1a of the guide 1, the container is also set in rotation about a main axis thereof, so that the operating station, stationary with respect to the guide 1, can carry out the functions for which it is programmed, such as the orientation and the application of labels. As soon as the container is transferred by the input star onto the guide 1, a pressing device 4, due to actuating means 6 operatively connected, applies a pressing force from above in a downwards direction in order to keep the container in position during the movement and carrying-out of the operations in the work stations. The pressing device 4 is installed on a main carriage 2 slidably mounted on the guide 1, mirror-like with respect to the guide used for transport of the containers but superiorly

distanced, as it is thus capable of following the translational and rotational movements of the container along the advancement direction 1a.

**[0059]** The pressing device 4 and the actuating means 6 advantageously do not comprise a spring.

**[0060]** Lastly the bottle is collected by the carriage from the outlet star and deposited on an outlet conveyor belt.

**[0061]** Any modifications or variations which, in the light of the description, are evident to the person skilled in the art, must be considered to fall within the scope of protection established by the present invention, according to considerations of technical equivalence.

# REFERENCES CITED IN THE DESCRIPTION

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**Patent documents cited in the description**


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- DE102013100627A1 **[0010]**
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**Patentkrav**

**1.** Maskine (100) til transport af beholdere omfattende:

en føring (1), der strækker sig langs en fremføringsretning (1a) for beholderne;

en hovedvogn (2), der er glidende monteret på føringen (1), hvor føringen (1) og hovedvognen (2) sammen definerer en lineær hovedmotor;

mindst én hjælpevogn (3), der er glidende monteret på føringen (1), hvor føringen (1) og hjælpevognen (3) sammen definerer en lineær hjælpemotor;

en presseanordning (4), der er monteret på hovedvognen (2) og kan bevæges langs en akse, der falder sammen med beholderens hovedakse mellem en hævet hvileposition, hvori presseanordningen (4) og beholderen ikke er i kontakt, og en sænket tvungen position, hvori presseanordningen (4) påfører en pressekraft på det øvre af beholderen;

en styreenhed (5), der er elektrisk forbundet med føringen (1) og konfigureret til at styre glidningen af hovedvognen (2) og hjælpevognen (3) på føringen (1) og en gensidig afstand deraf;

aktiveringsmidler (6), der operativt forbundet med presseanordningen (4) og konfigureret til at bevæge presseanordningen (4) mellem den hævede hvileposition og den sænkede tvungne position; hvor aktiveringsmidlerne (6) er operativt indlejret mellem presseanordningen (4) og hjælpevognen (3), og kan aktiveres ifølge variationen af den gensidige afstand mellem hovedvognen (2) og hjælpevognen (3); hvor styreenheden (5) er udformet til at styre variationen af den gensidige afstand mellem hovedvognen (2) og hjælpevognen (3) for således at aktivere aktiveringsmidlerne (6);

hvor presseanordningen (4) er roterbart uafhængig af den aksiale bevægelse mellem den hævede hvileposition og den sænkede tvungne position.

**2.** Maskine (100) ifølge krav 1, hvor presseanordningen (4) kan rotere omkring hovedaksen uafhængigt af den aksiale bevægelse for at følge beholderens roterende bevægelse.

**3.** Maskine (100) ifølge et hvilket som helst af de foregående krav, kendetegnet ved, at den omfatter mindst to hjælpevogne (3) glidende monteret på føringen (1) på en sådan måde, at hovedvognen (2) indlejres derimellem; hvor hver hjælpevogn (3) er operativt forbundet med presseanordningen (4) ved hjælp af tilsvarende aktiveringsmidler (6).

**4.** Maskine (100) ifølge et hvilket som helst af de foregående krav, hvor aktiveringsmidlerne (6) omfatter en forbindelse (10) med en første ende (13), der er forbundet med hjælpevognen (3),

og en anden ende (14), der er forbundet med presseanordningen (4), således at en variation af den relative afstand mellem hovedvognen (2) og mindst én hjælpevogn (3) inducerer en forskydning af presseanordningen (4) mellem den hævede hvileposition og den sænkede tvungne position.

**5.** Maskine (100) ifølge krav 4, hvor forbindelsen (10) omfatter tre greb; hvor hvert af de tre greb har en første ende (11), der er forbundet ved et samme punkt; hvor hvert af de tre greb har en anden ende (12, 13, 14), der er forbundet ved et andet punkt mellem presseanordningen (4), hovedvognen (2) og hjælpevognen (3).

**6.** Maskine (100) ifølge et hvilket som helst af kravene 1 til 3, hvor aktiveringsmidlerne (6) omfatter en tandstang (20), der er forbundet med hjælpevognen (3), og mindst ét skrue-hunskruebevægelsessystem (21) omfattende presseanordningen (4).

**7.** Maskine (100) ifølge et hvilket som helst af kravene 1 til 3, hvor aktiveringsmidlerne (6) omfatter mindst én forbindelsesstang (30) og mindst én krumtap (31), der er forbundet med forbindelsesstangen (30); forbindelsesstangen (30) med en første ende (32), der er forbundet til hjælpevognen (3) og en anden ende (33) forbundet med krumtappen (31) og krumtappen (31) er forbundet med presseanordningen (4) af konverteringsmidler (34) til konvertering af rotationsbevægelsen til en retlinjet bevægelse.

**8.** Maskine (100) ifølge krav 7, hvor konverteringsmidlerne (34) omfatter et skrue-hunskruebevægelsessystem omfattende presseanordningen (4), der er forbundet til hovedvognen (2) for således at forhindre rotation af presseanordningen (4), og som muliggør bevægelsen mellem den hævede hvileposition og den sænkede tvungne position.

**9.** Maskine (100) ifølge et hvilket som helst af kravene 1 til 3, hvor aktiveringsmidlerne (6) omfatter en forbindelse (40) med en første ende (41), der er forbundet til hjælpevognen (3), og en anden ende (42), der er forbundet til et tanddrev (43) monteret roterbart på hovedvognen (2), hvilket tanddrev (43) er operativt forbundet med en gevinddel (44) af presseanordningen (4).

**10.** Maskine (100) ifølge et hvilket som helst af kravene 1 til 3, hvor aktiveringsmidlerne (6) omfatter et knastsystem (50) med mindst én formet profil (51), der er fast forbundet til hjælpevognen (3) og operativt forbundet med en glider (52), der er fast forbundet til

presseanordningen (4) for at bevirke bevægelse deraf mellem den hævede hvileposition og den sænkede tvungne position.

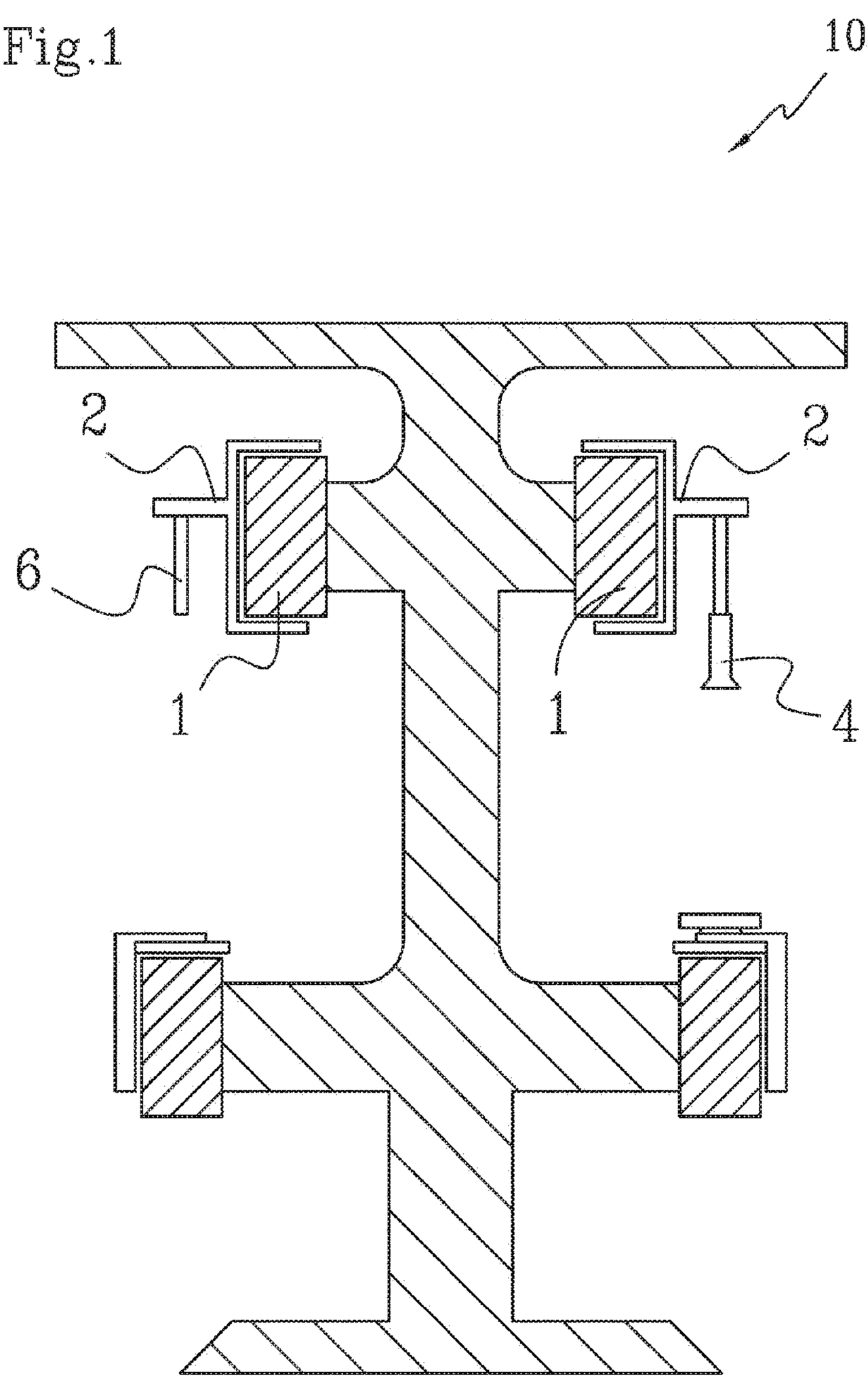
**11.** Maskine (100) ifølge et hvilket som helst af kravene 1 til 3, hvor aktiveringsmidlerne (6) omfatter mindst ét aktivatorstempel (60) omfattende et første stempel (61), der er forbundet med hjælpevognen (3), et andet stempel (62), der er forbundet med presseanordningen (4) og et fluidvolumen (63) indlejret mellem det første stempel (61) og andet stempel (62).

**12.** Maskine (100) ifølge et hvilket som helst af de foregående krav, kendetegnet ved, at styreenheden (5) er konfigureret til at styre afstanden mellem hjælpevognen (3) og hovedvognen (2) og til at begrænse minimumsafstanden mellem hjælpevognen (3) og hovedvognen (2) ifølge maksimumslaglængden, som presseanordningen (4) skal foretage.

**13.** Maskine (100) ifølge et hvilket som helst af de foregående krav, kendetegnet ved, at styreenheden (5) er konfigureret til at begrænse maksimumværdierne af strøm- og spændingsstørrelserne i forhold til den lineære motor defineret af hjælpevognen (3) ifølge en forudbestemt maksimumtrykværdi for presseanordningen (4) på det øvre af beholderen.

# DRAWINGS

Fig.1



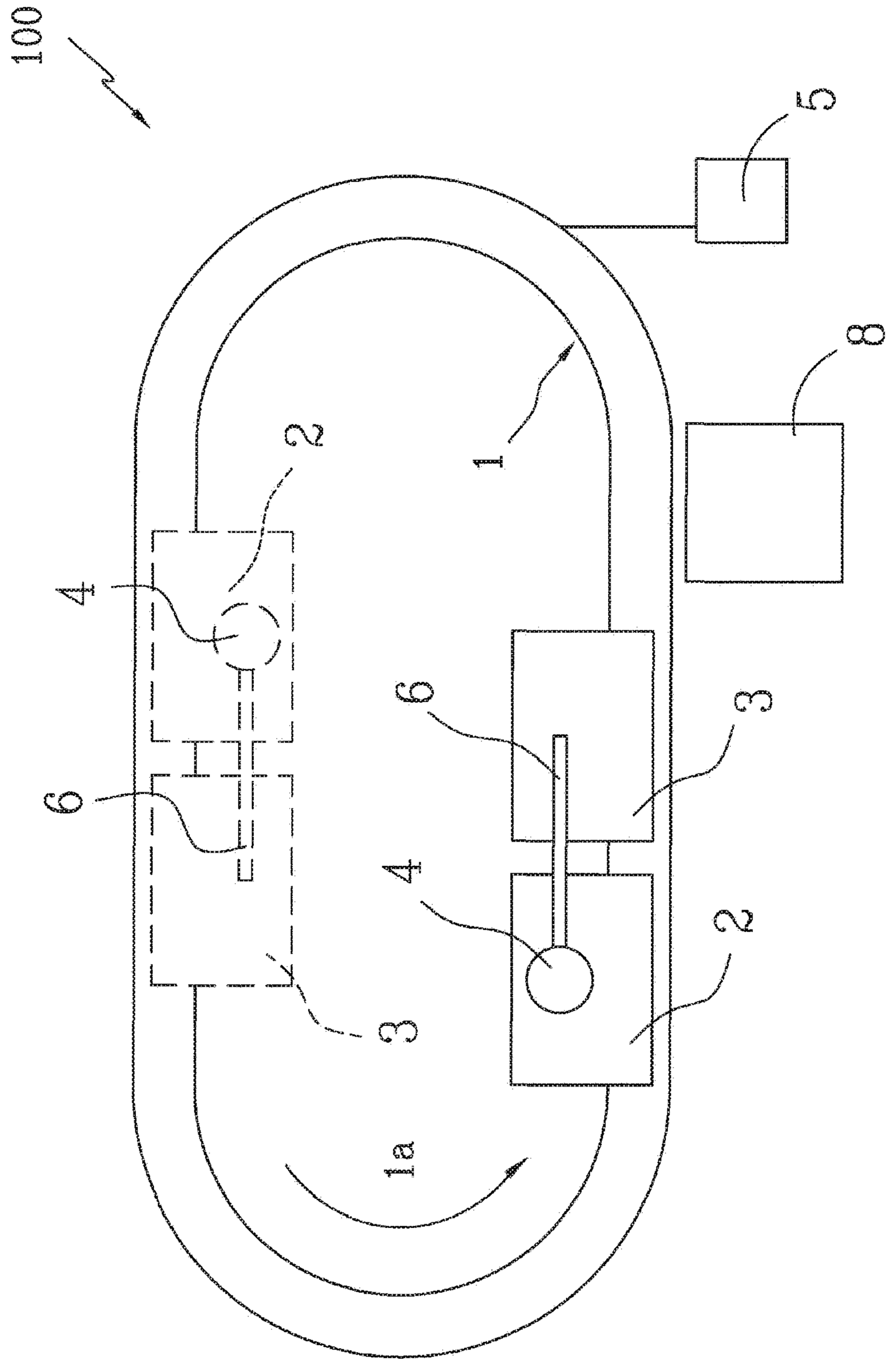



Fig.2

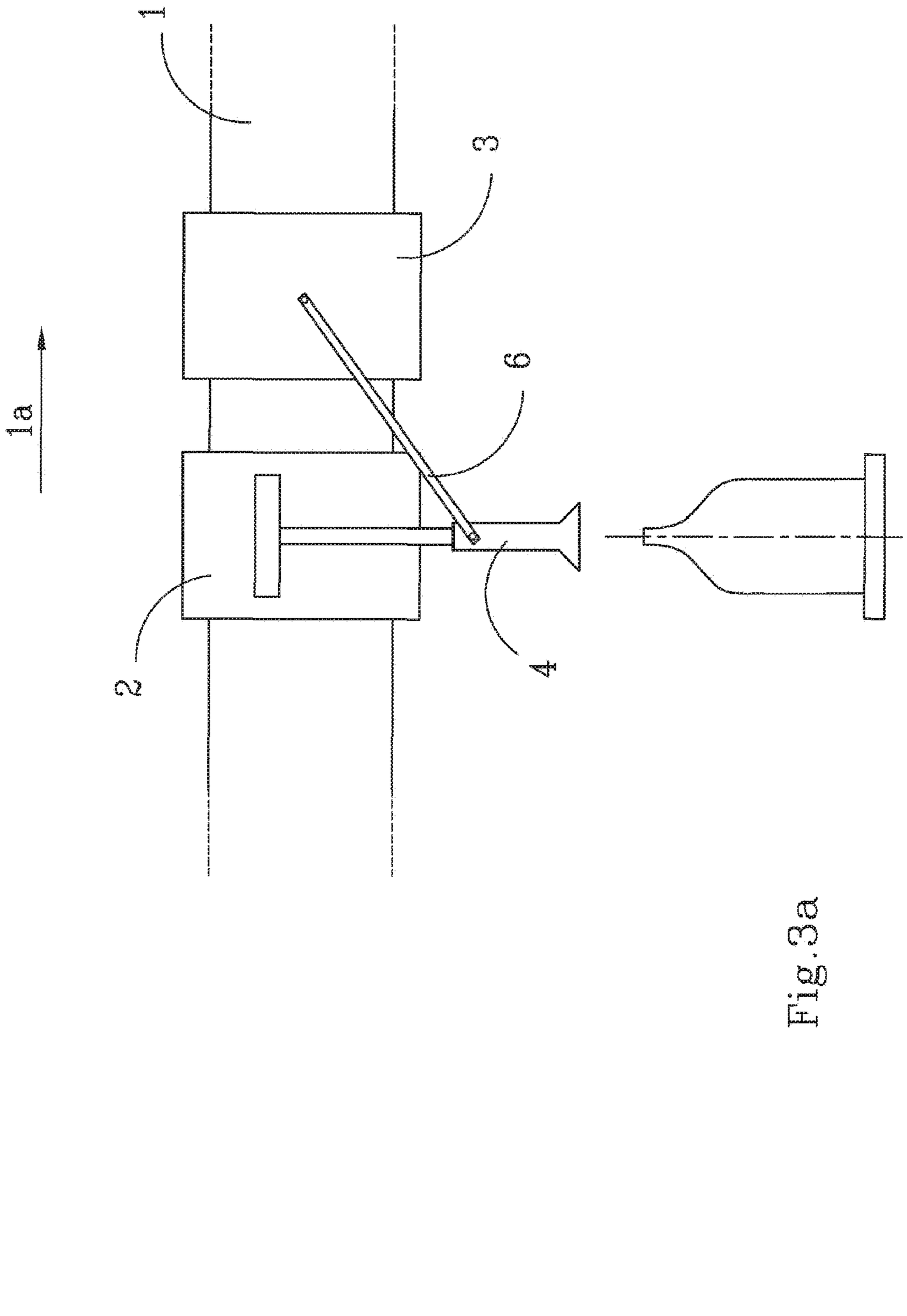



Fig.3a

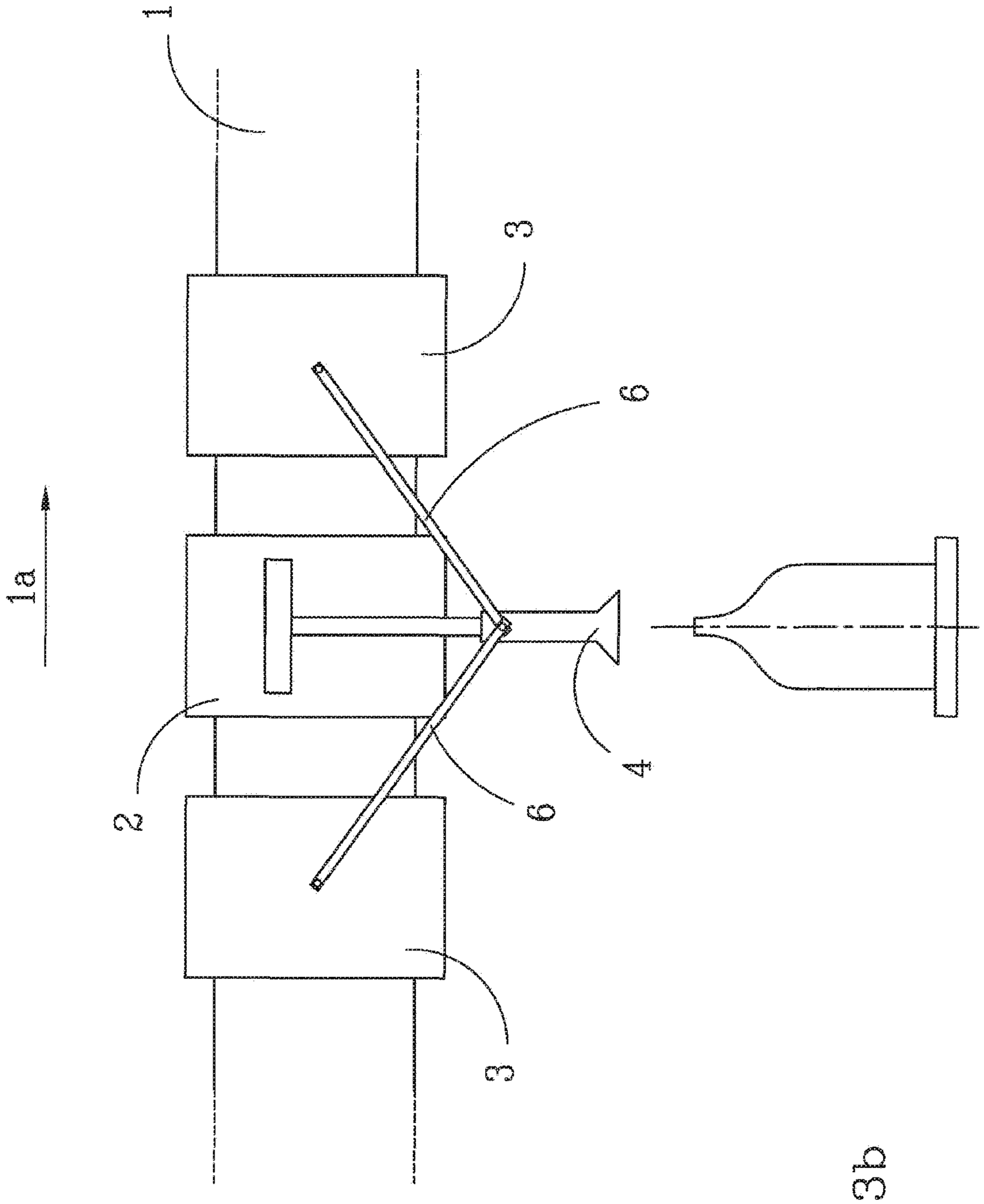



Fig.3b

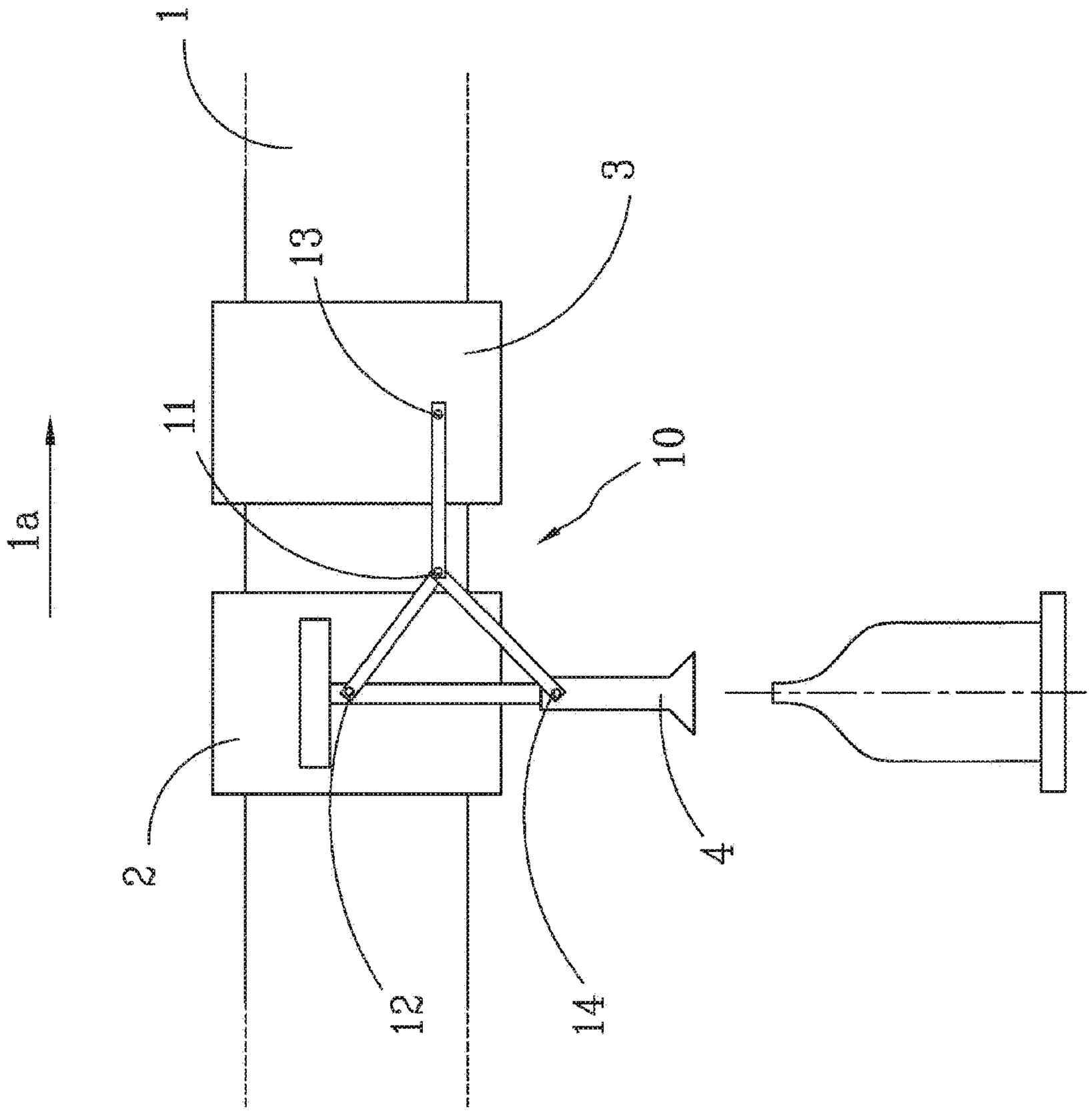



Fig.3c

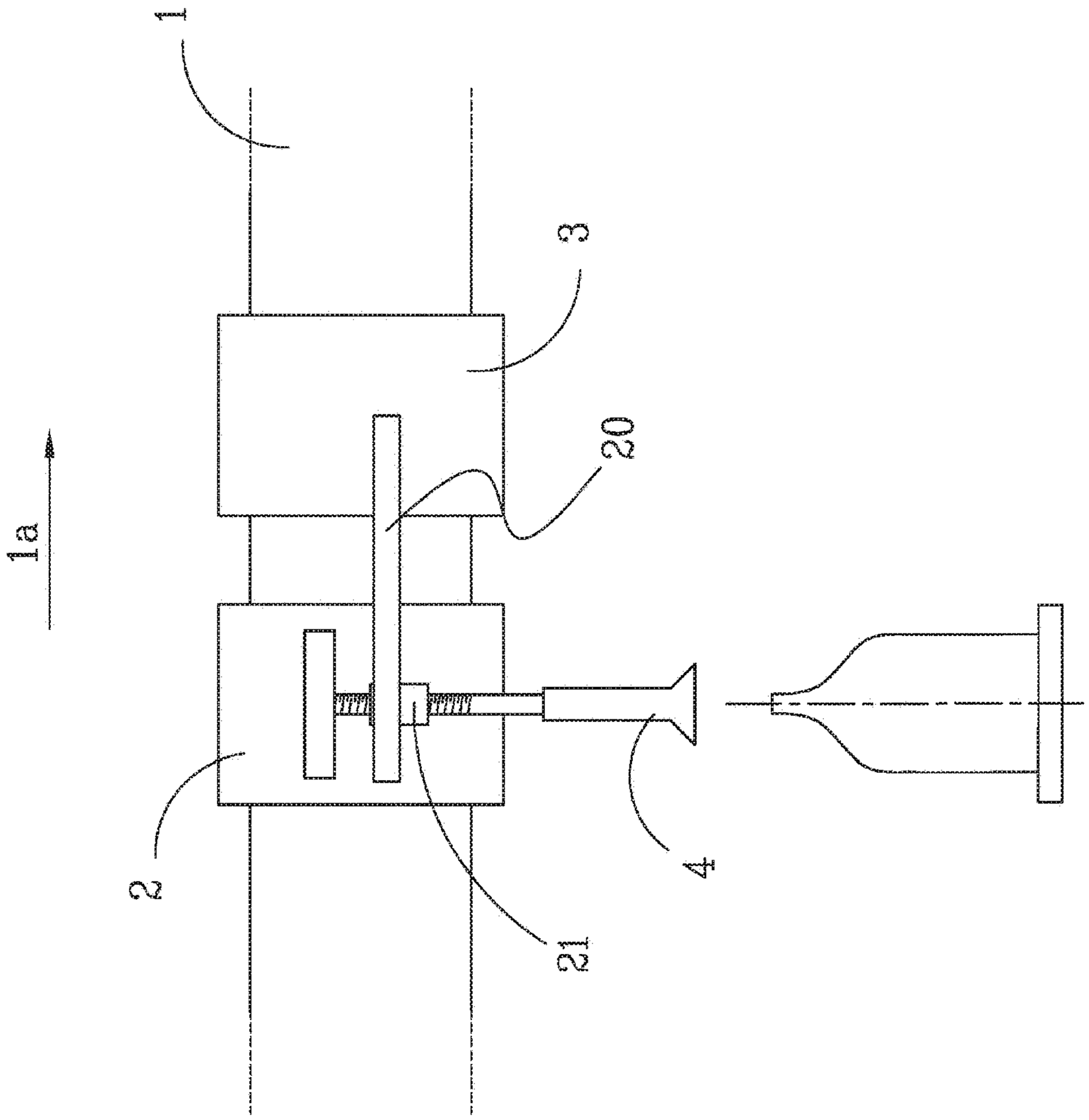



Fig. 3a

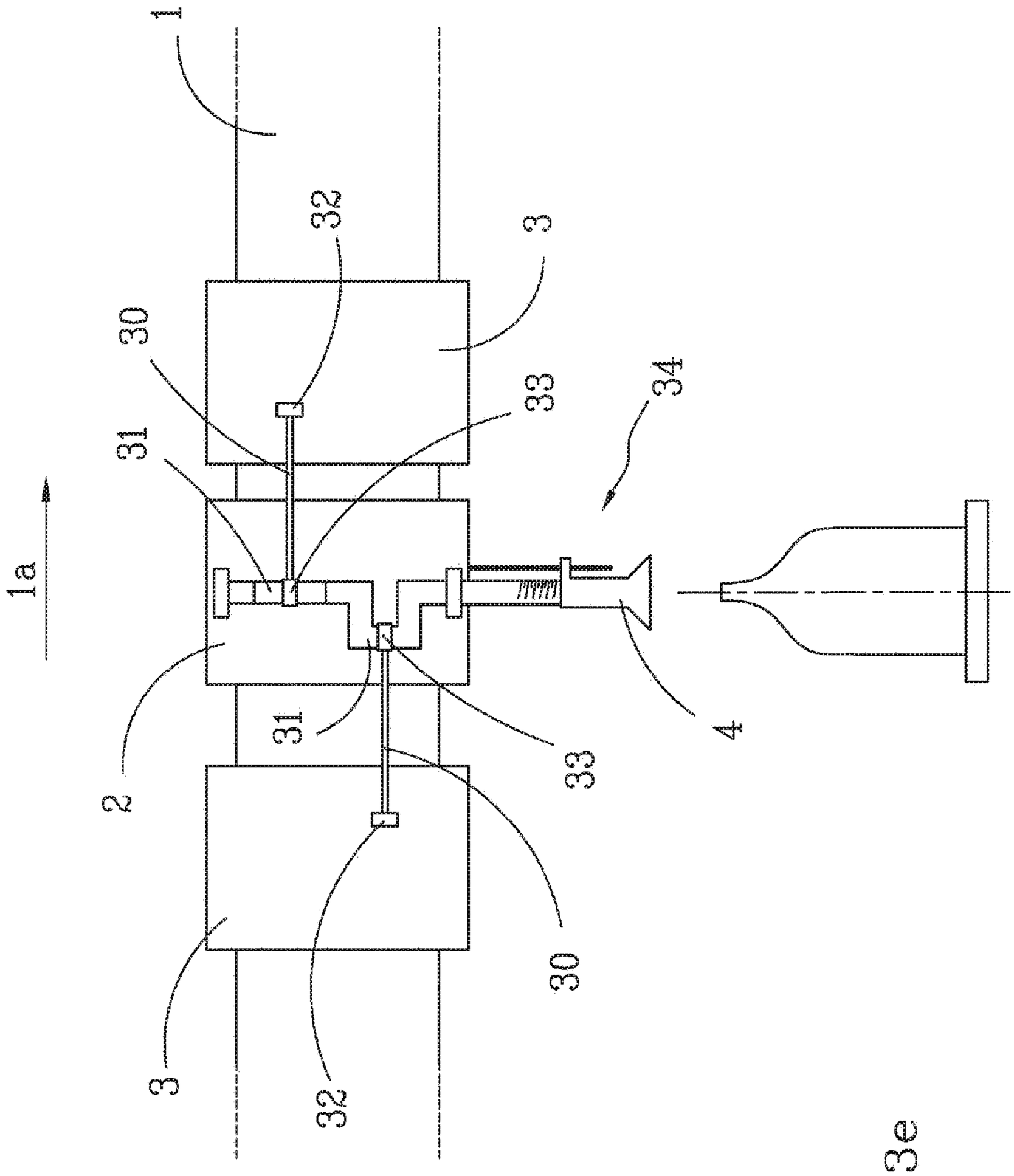



Fig.3e

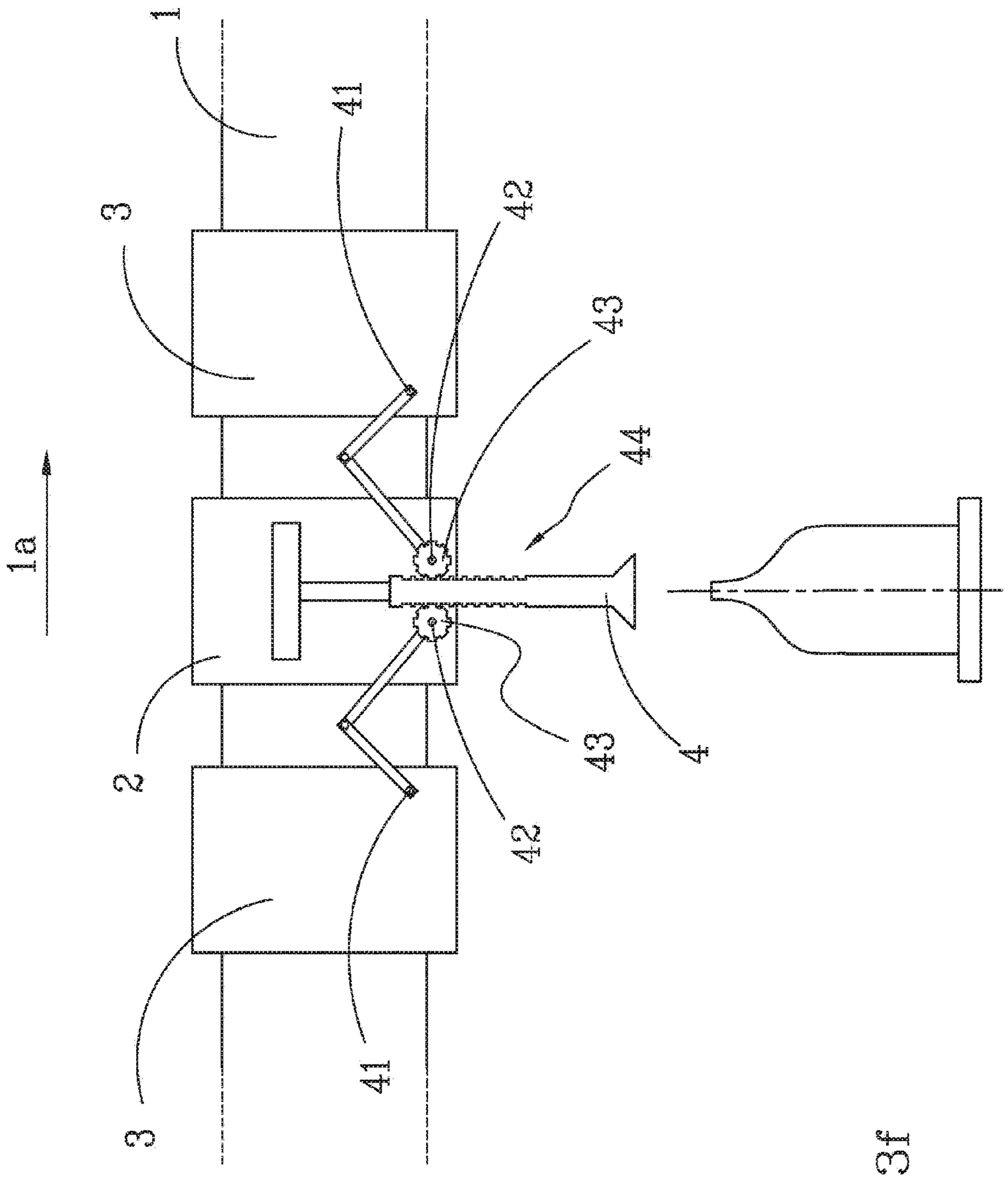



Fig.3f

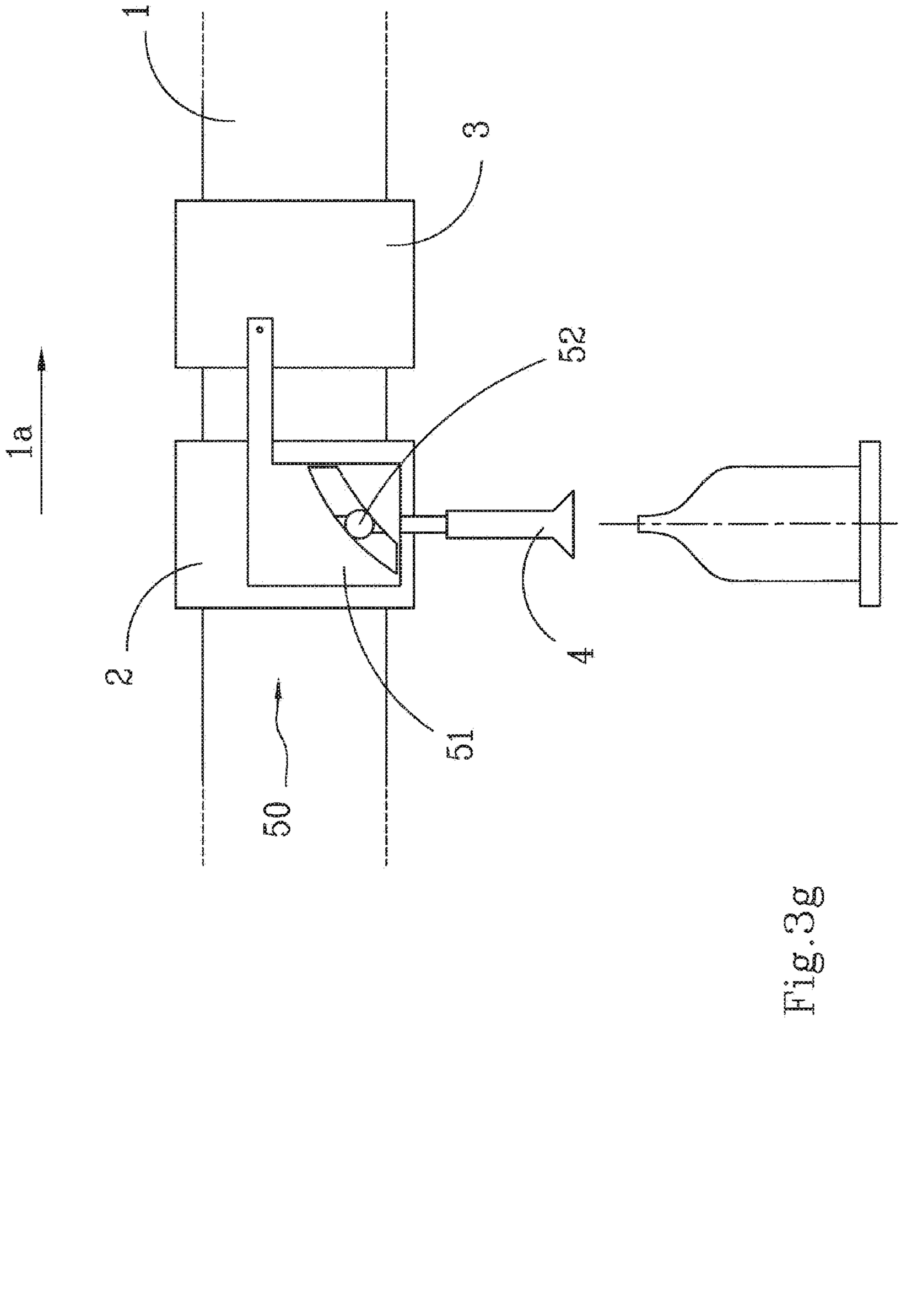



Fig. 3a

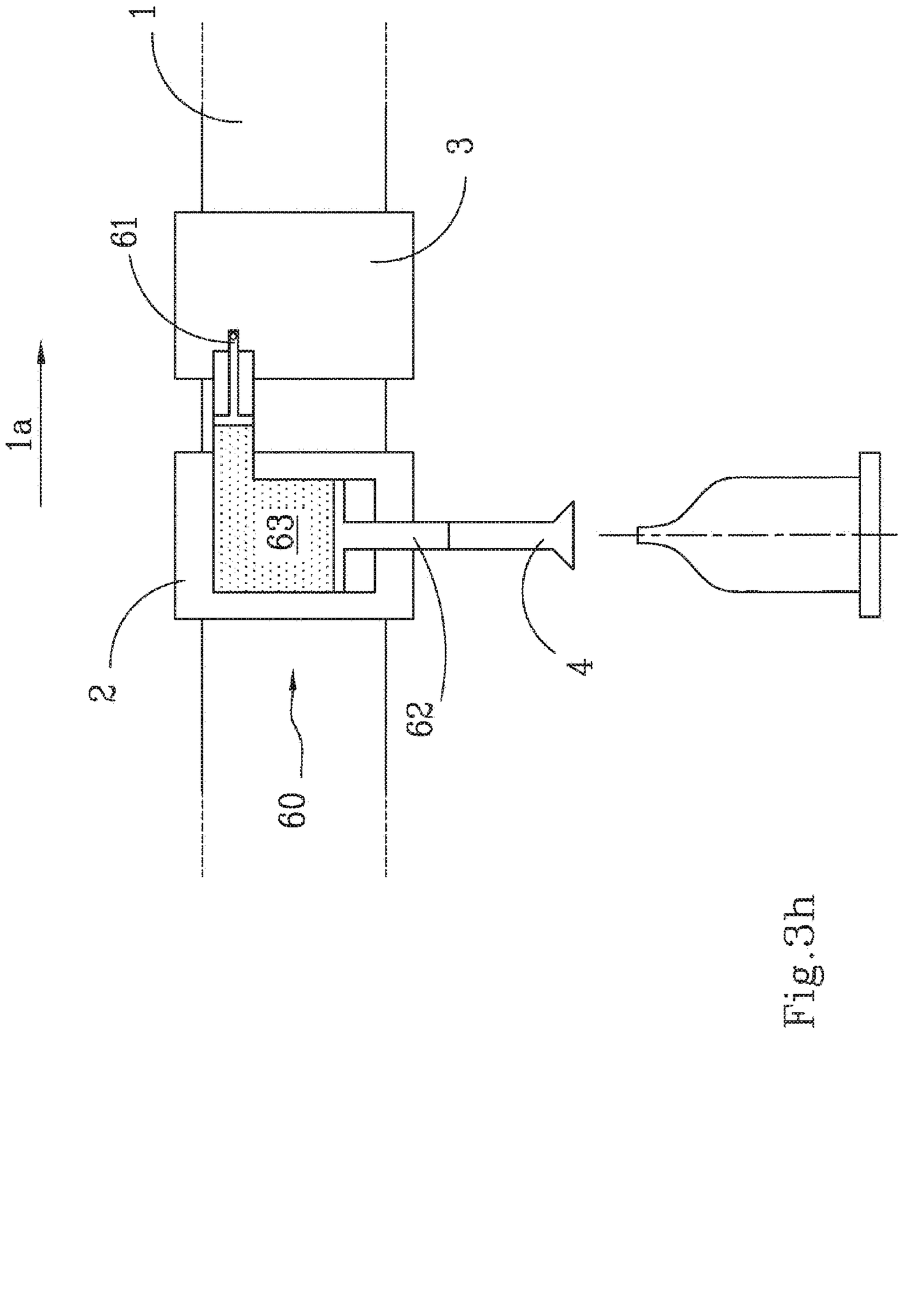



Fig.3h