(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 536 637 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
18.12.2013 Bulletin 2013/51

(21) Application number: **11700550.4**

(22) Date of filing: **18.01.2011**

(51) Int Cl.:
B65B 31/02 *(2006.01)* ***B65B 31/04*** *(2006.01)*
B65B 51/10 *(2006.01)*

(86) International application number:
PCT/EP2011/050621

(87) International publication number:
WO 2011/101190 (25.08.2011 Gazette 2011/34)

(54) DEVICE FOR VACUUM PACKAGING, PARTICULARLY OF FOOD PRODUCTS

VORRICHTUNG ZUM VAKUUM-VERPACKEN, INSBESONDERE VON LEBENSMITTELN

DISPOSITIF D'EMBALLAGE SOUS VIDE, EN PARTICULIER DE PRODUITS ALIMENTAIRES

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **06.08.2010 IT TV20100117**
19.02.2010 IT TV20100019

(43) Date of publication of application:
26.12.2012 Bulletin 2012/52

(73) Proprietor: **Extru SA**
31840 Huarte Araquil (ES)

(72) Inventor: **SCOLARO, Mauro**
I-20063 Cernusco sul Naviglio (IT)

(74) Representative: **Modiano, Micaela Nadia et al**
Modiano & Partners (IT)
Via Meravigli, 16
20123 Milano (IT)

(56) References cited:
EP-A1- 0 405 718
EP-A1- 0 603 704
EP-A1- 0 832 819
US-A- 5 155 969
US-A1- 2007 186 517

EP 2 536 637 B1

Printed by Jouve, 75001 PARIS (FR)

Description

Technical field

[0001] The present application relates to a packaging device, particularly for packaging food products and technical materials.

Background Art

[0002] Such machines are known e.g. from US 5155969.

[0003] Besides, vacuum machines are known which have a bell-shaped chamber and comprise a vacuum pump connected to a chamber, also known as a vacuum chamber, and inside which a preformed pouch, which is open on three sides, is usually arranged, a food product being placed inside it.

[0004] In these machines of the known type, the preformed pouch, with the product already inside it, is then placed inside the vacuum chamber and vacuum is then produced inside the chamber; then heat-sealing is performed at the free side of the preformed pouch.

[0005] This known technology entails the need to use preformed pouches, which thus have one size that is comparable to the dimensions of the product; moreover, considerable labor is required.

[0006] Thus, there are operating steps that extend the time required to achieve vacuum packaging of the product; moreover, if packaging occurs in a controlled atmosphere, there is a waste of most of the gas because the gas is dispersed not only in the pouch but also and mostly inside the vacuum chamber.

[0007] EP603704 is also known in which the packaging of food products occurs by using a film made of plastic material, which is conveyed through a folding station in order to obtain a double layer and is then heat-sealed so as to define pockets.

[0008] These pockets are obtained in the desired size or capacity before being filled and sealed.

[0009] Heat-sealing and forming are followed by filling and by the closing and cutting of the pockets or pouches thus obtained: this solution, however, is complicated, in that it involves multiple and separate stations for performing the individual operations to which the film made of plastic material must be subjected in sequence.

[0010] Moreover, the above solution involves a hot or a cold forming of the plastic film and the filling, by means of a nozzle, of liquid products, flours or finely granulated materials, and therefore it is not possible to consider the use of the illustrated solution for solid products having predetermined volumes such as sliced meats, meat, portioned cheeses, and trays containing food and non-food products.

[0011] In the described known solution, moreover, in order to achieve the closure of the pocket or pouch it is necessary to make the pocket or pouch pass through various operating steps, with the consequent need for optimum centering of the pouch at each station so as to allow the optimum and desired processing.

[0012] EP0405718 is also known which describes a solution that illustrates a packaging device, particularly for packaging food products or technical materials that can be inserted between longitudinally folded parts of a single-folded film from an open side thereof, the device comprising means for thermal bonding or heat-sealing which are substantially L-shaped in order to seal the film both at the open longitudinal side and at its transverse sides, and at least one nozzle for producing vacuum and/or for introducing the gas or mixture.

[0013] EP0832819B1 is also known whose priority is Italian Patent Application AL960002 dated September 26, 1996 and which illustrates a packaging device which comprises a vacuum chamber that can be opened to receive a length of at least one single-folded film with the material to be packaged inserted therein and can be respectively closed hermetically, after which it is possible to produce the vacuum and/or introduce the gas or mixture with the portion or length of film which assumes a pocket-like shape, heat-sealing means being furthermore provided which are arranged for operation inside the vacuum chamber, the at least one nozzle being arranged at the vacuum chamber so as to face, after being closed, toward the open longitudinal and/or transverse sides of the film length.

[0014] This solution, too, is not free from drawbacks, since it has been found that micro-creases form during the step of heat-sealing the film and this may cause problems in the seal and it worsens the aesthetic appearance of the packaging.

[0015] Moreover, the flow of gas inside the film is not optimum, thus lowering the efficiency of the device.

[0016] Finally, when the operator pulls away the sheet, the sheet may assume an incorrect arrangement.

[0017] Another problem is also noted: when a vacuum is provided in a bell, and therefore inside the pouch being formed, it is then necessary to compensate the vacuum partially with gas; however, if the compensation is excessive, the bell opens during the heat-sealing step.

[0018] Since one is working with a system with a particularly variable equilibrium, there is no precise control of the volume of gas introduced in the pouch or bag being formed.

[0019] The quantity, in absolute values and in relative values (%), of gas that remains inside the pouch being formed is thus extremely variable and difficult to control, and this produces a series of pouches or packages that are more or less inflated or deflated, depending on the individual case.

[0020] The problem then worsens if it is necessary to often change the format of the packaging.

[0021] Another problem is observed during the heat-sealing step of the film that is heat-sealed and cut on the transverse side, with respect to the direction of advancement of the film itself: since it is often made of heat-shrinking material, the film can shrink, reducing its width, and

this might prevent the accommodation of the incoming tray.

[0022] The tray can thus arrive and find an insufficient space to accommodate it, and this causes its redirection toward the open side of the pouch, ending up on the longitudinal heat-sealing bar, causing machine downtimes and lost time for cleaning it.

[0023] Finally, it is noted that the return of air into the bell or vacuum chamber occurs, for constructive reasons, usually in a region far from the heat-sealing bar or it coincides with the vacuum port by means of the use of a three-way valve, but this does not optimize the conveyance of the flow inside the bell.

Disclosure of the Invention

[0024] The aim of the present invention is to solve the above-mentioned technical problems, eliminating the drawbacks of the cited background art, by providing a device that makes it possible to obtain a vacuum packaging or a compensated vacuum packaging of technical products or food products such as sliced meats, meat, portioned cheeses, trays that contain food and non-food products, thus making it possible to optimize the gas inside the pouch so that uniformly inflated pouches or packages are obtained.

[0025] Within this aim, an object of the present solution is to provide a device that can be used even by an operator who is not specially trained in the adjustments of format changes.

[0026] Another object is to provide a device that allows the optimum insertion of the tray in the single-folded film, previously heat-sealed and cut on the transverse side.

[0027] Another object is to provide a device that allows the optimum insertion of the tray in the pouch, thus avoiding machine downtimes and lost time for cleaning it.

[0028] Another object is to provide a device that adds to the preceding characteristics that of being structurally simple, reliable and safe in use.

[0029] This aim and these objects, as well as others that will become better apparent hereinafter, are achieved by a packaging device, particularly for manually or automatically packaging trays containing food products or technical materials which can be inserted, by means of a loading platform, between longitudinally folded parts of a single-folded film and comprising means for thermal bonding or heat-sealing for sealing, and at least one nozzle for producing a vacuum and/or for introducing the gas or mixture, and a vacuum chamber, characterized in that said single-folded film is fixed and said vacuum chamber is movable transversely to the direction of insertion of said trays and comprises at least one presser, movable over said single-folded film, which is forced on top of said trays and is provided with means adapted to convey the streams of air and/or gas, the return of air into said vacuum chamber occurring by means of a series of holes provided between a transverse heat-sealing bar, which constitutes said thermal bonding means, and the wall of said vacuum chamber that is parallel thereto.

Brief description of the drawings

[0030] Further characteristics and advantages of the present invention will become better apparent from the following detailed description of four particular embodiments, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a side perspective view of a device in its embodiments;

Figure 2 is a sectional view of the device, taken along the line II-II of Figure 1, in the condition in which the vacuum chamber is open;

Figure 3 is a view, similar to the preceding one, of the condition in which, with the vacuum chamber open, the tray placed inside the single-folded film is inserted;

Figure 4 is a view, similar to the preceding one, of the condition in which the vacuum chamber is closed and the presser is placed above the single-folded film;

Figure 5 is a sectional view, taken along the line V-V of Figure 4;

Figure 6 is a top view of the device in which, in order to make the drawing more intelligible, the pair of supports for the single-folded film has been omitted;

Figure 7 is a partially sectional top view of the tray arranged inside the vacuum chamber and of the means adapted to convey the streams of air and/or gas inside it;

Figure 8 is a sectional view of the device, taken along the line II-II of Figure 1, in the condition in which the vacuum chamber is open;

Figure 9 is a view, similar to the preceding one, of the condition in which, with the vacuum chamber open, the tray placed inside the single-folded film is inserted;

Figure 10 is a view, similar to the preceding one, of the condition in which the vacuum chamber is closed and the presser is placed above the single-folded film;

Figure 11 is a sectional view, taken along the line XI-XI of Figure 10;

Figure 12 is a top view of the device in which, in order to make the drawing more intelligible, the pair of supports for the single-folded film has been omitted;

Figures 13 to 15 are partially sectional top views of the vacuum chamber with the tray arranged inside it during the various packaging steps and of the means adapted to convey the streams of air and/or gas inside it.

Ways of carrying out the Invention

[0031] With reference to Figures 1 to 7, the reference numeral 1a designates the packaging device particularly

for technical materials or food products, which are designated by the reference numeral 2.

[0032] The device la comprises a bell-shaped vacuum chamber, designated by the reference numeral 3, which is essentially constituted by a lower container 4 and by an upper lid 5, which can be closed; bands or gaskets 6 for airtightness are arranged perimetrically to the container 4 and the lid 5.

[0033] The device uses a single-folded film 7, which thus has a first longitudinal side 8 which is closed and a second longitudinal side 9 which is open.

[0034] An L-shaped first heat-sealing bar 10 is arranged within the bell-shaped vacuum chamber 3, with one side adjacent to the inlet 11 of the food product; an essentially L-shaped cutting blade (not shown) is arranged laterally adjacent to the first heat-sealing bar 10 and the lines of the L are arranged respectively parallel to and at right angles to the first heat-sealing bar 10.

[0035] The technical materials or food products 2 are stored inside an adapted tray 12, which is placed at a loading platform 13, which is conveniently motorized or movable on suitable means such as, for example, a roller bed.

[0036] The single-folded film 7 is kept open by virtue of the presence of a pair of supports 14a, 14b, between which the loading platform 13 is interposed; this pair of supports 14a, 14b can be moved mutually closer by means of a suitable handwheel 15 which is adapted to adjust their mutual position.

[0037] The device 1a comprises at least one means that is adapted to draw the single-folded film 7, this means being constituted by a suitable motor 16 which actuates a roller 17 which cooperates with a complementary roller 18, the single-folded film 7 being made to pass between these rollers.

[0038] The motor 16, the roller 17 and the complementary roller 18 are supported by a suitable arm, which protrudes from a suitable fixed footing 19.

[0039] The pair of supports 14a, 14b and the handwheel 15, as well as the loading platform 13, are also fixed with respect to the footing 19, so that the single-folded film 7, during its use, can only slide along an axis that is the axis of the loading platform 13, but it is fixed with respect to other possible movements.

[0040] The vacuum chamber 3 however can be moved along an axis that is transverse to the direction of advancement of the single-folded film 7, which coincides with the direction of insertion of the tray 12.

[0041] The vacuum bell 3 is arranged inside a suitable frame 20 constituted by a pair of uprights 21 a, 21b and a pair of crossmembers 22a, 22b, the latter supporting a pair of first cylinders 23a, 23b adapted to move the upper lid 5 and a guide 24 adapted to allow the sliding of the frame 20 at a suitable complementary guide 25 which is integral with the footing 19.

[0042] A raised shelf 26 is provided inside the lower container 4, adjacent to the end of the loading platform 13, and is adapted to support the tray 12 inside the vacuum bell 3.

[0043] At the upper lid 5 there is internally at least one presser 27, which is movable by means of a pair of suitable second cylinders 28a, 28b, which are externally jointly connected to the upper lid 5 in a region adjacent to the upper crossmember 22a.

[0044] A pair of third cylinders 29a, 29b and a pair of fourth cylinders 30a, 30b are also arranged at the outer surface of the upper lid 5, are arranged along mutually perpendicular directions and are adapted to actuate a second heat-sealing bar 31, which is arranged mirror-symmetrically with respect to the first heat-sealing bar 10.

[0045] The presser 27 is provided with means adapted to convey the streams of air and/or gas, these means being constituted by a plurality of ribs 32 which protrude from it in the direction of the tray 12 and are arranged transversely to the direction of advancement of the single-folded film 7.

[0046] These ribs 32 are preferably made of rubber, so as to be able to adhere at the edges 33 of the tray 12, thus defining channels 34 adapted to allow the passage of the air and/or gas.

[0047] Advantageously, the presser 27 moves jointly with the opening and closing of the bell-shaped vacuum chamber 3. The shape and function of the presser 27 make it possible to better create the vacuum inside the package 35 and allow a better and more constant introduction of the gas inside it.

[0048] Moreover, the movement of the presser makes it possible to adapt to the height of the tray 12 and prevents, during the introduction of the gas, the corner 36 of the package 35, which inflates like a balloon, from reaching the upper level of the tray 12: thus having a visible heat seal 37 on the upper window of the package 35 is avoided, thus avoiding a very poor aesthetic appearance that can however be observed in the background art.

[0049] The packaging device is further constituted by means adapted to convey the streams of air and/or gas, these means being constituted by a nozzle 38, which is integral with the bell-shaped vacuum chamber 3 and is accommodated hermetically within a box-like appendage 39 provided in two half-shells which protrude laterally to the bell-shaped vacuum chamber 3 along an axis which is perpendicular to the axis of advancement of the single-folded film.

[0050] In this manner, the single-folded film 7 is trapped, with the free end 40 of the second longitudinal side 9, which is open, trapped above and below the nozzle, forcing the gas, when it is introduced, to enter the bag that constitutes the package 35, flushing the inside to then flow out into the bell-shaped vacuum chamber 3.

[0051] We thus obtain an assurance of vacuum and of the subsequent filling and of the replacement of the air in the bag that contains the product, the use of a long nozzle making it possible to modify easily the size of the bag that constitutes the package 35 by fitting the single-folded film 7 more or less on the nozzle 38 while keeping

the drawing system of the single-folded film 7 stationary.

[0052] Obviously, the force of the cylinders that keep the bell-shaped vacuum chamber 3 closed is greater than the force of the heat-sealing cylinders, and the frame 20 that supports them is shaped like a closed cage.

[0053] It is thus possible to produce a total or partial vacuum, and compensate with gas up to atmospheric pressure, while avoiding, as occurs in the background art, working in highly unstable pressure regions for filling the bag with the gas, the use of the presser making it possible to obtain packages that are identical in the entire batch.

[0054] The device comprises, moreover, a plurality of holes 41 for the return of air into the bell-shaped vacuum chamber 3, in order to return it to atmospheric pressure following the heat-sealing of the package 35. These holes 41 are provided between the first heat-sealing bar 10 and the adjacent wall 42 of the bell-shaped vacuum chamber 3.

[0055] We thus obtain at the same time the cooling of the heat-seal 37 immediately after heat-sealing, thus preventing the retraction of the package 35.

[0056] With reference to the previously cited Figures 8 to 15, the reference numeral 1b designates the device for packaging particularly technical materials or food products, which are designated by the reference numeral 2.

[0057] The device 1b comprises a bell-shaped vacuum chamber, designated by the reference numeral 3, which is essentially constituted by a lower container 4 and by an upper lid 5, which can be closed; bands or gaskets 6 for airtightness are arranged perimetrically to the container 4 and to the lid 5.

[0058] The device uses a single-folded film 7, which thus has a first longitudinal side 8 which is closed and a second longitudinal side 9 which is open.

[0059] A first transverse heat-sealing bar 10a is located in proximity to the inlet of the bell-shaped vacuum chamber 3 and, more precisely, inside it, with one side adjacent to the inlet 11 of the food product; a cutting blade (not shown) is arranged laterally adjacent to the first transverse heat-sealing bar 10a.

[0060] The technical materials or food products 2 can be stored inside a suitable tray 12, which is arranged at a loading platform 13, which is conveniently motorized or movable on suitable means such as, for example, a roller bed.

[0061] As an alternative, the technical materials or food products 2 may be arranged directly on the loading platform 13 so as to provide packaging directly without the tray 12.

[0062] The single-folded film 7 is kept open by virtue of the presence of a pair of supports 14a, 14b, between which the loading platform 13 is interposed, the pair of supports 14a, 14b being movable mutually closer by means of a suitable handwheel 15 adapted to adjust their mutual position.

[0063] The device 1b further comprises at least one means that is adapted to draw the single-folded film 7, this means being constituted by a suitable motor 16, which actuates a roller 17 which cooperates with a complementary roller 18, the single-folded film 7 being made to pass between these rollers.

[0064] The motor 16, the roller 17 and the complementary roller 18 are supported by a suitable arm, which protrudes from a suitable fixed footing 19.

[0065] The pair of supports 14a, 14b and the handwheel 15, as well as the loading platform 13, are fixed with respect to the footing 19, so that the single-folded film 7, during its use, can only slide along an axis which is the axis of the loading platform 13, but it is fixed with respect to other possible movements.

[0066] The vacuum chamber 3 however can be moved along an axis which is transverse to the direction of advancement of the single-folded film 7, which coincides with the direction of insertion of the tray 12.

[0067] The vacuum bell 3 is arranged inside a suitable frame 20 constituted by a pair of uprights 21 a, 21 b and by a pair of crossmembers 22a, 22b, the latter supporting a pair of first cylinders 23a, 23b, which are adapted to move the upper lid 5, and a guide 24, which is adapted to allow the sliding of the frame 20 at a suitable complementary guide 25 which is integral with the footing 19.

[0068] A raised shelf 26 is provided inside the lower container 4, adjacent to the end of the loading platform 13, and is adapted to support the tray 12 inside the vacuum bell 3.

[0069] At the upper lid 5 there is internally at least one presser 27, which is movable by means of a pair of suitable second cylinders 28a, 28b, which are externally jointly connected to the upper lid 5 in a region which is adjacent to the upper crossmember 22a.

[0070] As an alternative, the single-folded film 7 can remain stationary and the bell-shaped vacuum chamber 3 moves with respect to the single-folded film 7.

[0071] Again at the outer surface of the upper lid 5 there is a pair of third cylinders 29a, 29b, which are adapted to actuate a second transverse heat-sealing bar 31a, which is arranged mirror-symmetrically with respect to the first transverse heat-sealing bar 10a.

[0072] As an alternative, the first transverse heat-sealing bar 10a and the second transverse heat-sealing bar 31a can be arranged outside the bell-shaped vacuum chamber 3.

[0073] In this manner, we would obtain advantageously a more slender structure, with the third cylinders 29a, 29b arranged outside the bell-shaped vacuum chamber 3, so as to be able to have an increase in the useful volume that can be utilized inside the bell-shaped vacuum chamber 3.

[0074] Inside the bell-shaped vacuum chamber 3 there is a first longitudinal heat-sealing bar 10b, so as to correspond to the open longitudinal side 9 of the single-folded film 7 of the food product, so as to be able to intersect the heat seals performed by the transverse heat-sealing bars 10a.

[0075] Laterally adjacent to the first longitudinal heat-sealing bar 10b there is a cutting blade, and at the outer surface of the lid 5 there is a pair of fourth cylinders 30a, 30b adapted to actuate a second longitudinal heat-sealing bar 31 b, which is arranged mirror-symmetrically with respect to the first longitudinal heat-sealing bar 10b.

[0076] In this manner, it is possible to perform multiple heat seals, one after the other, of the single-folded film 7 along a transverse direction with respect to the sliding direction thereof, so as to prepare multiple trays 12 before performing the vacuum operation, and then the vacuum operation is performed with a single longitudinal heat seal which intersects all the transverse heat seals.

[0077] The presser 27 is provided with means adapted to convey the streams of air and/or gas, these means being constituted by a plurality of ribs 32 which protrude therefrom in the direction of the tray 12 and are arranged transversely to the direction of advancement of the single-folded film 7.

[0078] These ribs 32 are preferably made of rubber so as to be able to adhere at the edges 33 of the tray 12, defining channels 34 adapted to allow the passage of the air and/or gas.

[0079] The presser 27 moves advantageously jointly with the opening and closing of the bell-shaped vacuum chamber 3. The shape and function of the presser 27 makes it possible to better obtain the vacuum inside the package 35 and allows a better and more constant introduction of the gas inside it.

[0080] Moreover, the movement of the presser makes it possible to adapt to the height of the tray 12 and prevents, during the introduction of the gas, the corner 36 of the package 35, which inflates like a balloon, from reaching the upper level of the tray 12: thus having a visible heat seal 37 on the upper window of the package 35 is avoided, thus avoiding a poor aesthetic appearance, which can be observed in the background art.

[0081] The packaging device is further constituted by means adapted to convey the streams of air and/or gas, these means being constituted by a nozzle 38, which is integral with the bell-shaped vacuum chamber 3 and is accommodated hermetically within a box-like appendage 39 provided in two half-shells which protrude laterally to the bell-shaped vacuum chamber 3 along an axis which is perpendicular to the axis of advancement of the single-folded film.

[0082] In this manner, the single-folded film 7 is trapped, with the free end 40 of the second longitudinal side 9 which is open, trapped above and below the nozzle, thus forcing the gas, when it is introduced, to enter the bag that constitutes the package 35, flushing the inside to then flow out into the bell-shaped vacuum chamber 3.

[0083] We thus obtain an assurance of vacuum and of the subsequent filling and of the replacement of the air in the bag that contains the product, the use of a long nozzle making it possible to modify easily the size of the bag that constitutes the package 35 by fitting the single-folded film 7 more or less over the nozzle 38, while keeping the drawing system of the single-folded film 7 stationary.

[0084] Obviously, the force of the cylinders that keep closed the bell-shaped vacuum chamber 3 is greater than the force of the heat-sealing cylinders, and the frame 20 that supports them is shaped like a closed cage.

[0085] It is thus possible to produce a total or partial vacuum and compensate with gas up to atmospheric pressure, while avoiding, as occurs in the background art, working in highly unstable pressure regions for filling the bag with the gas, the use of the presser making it possible to obtain identical packages in the entire batch.

[0086] The device comprises, moreover, a plurality of holes 41 for the return of air into the bell-shaped vacuum chamber 3, in order to return it to atmospheric pressure after the heat-sealing of the package 35. These holes 41 are provided between the first heat-sealing transversal bar 10a and the adjacent wall 42 of the bell-shaped vacuum chamber 3.

[0087] We thus obtain, at the same time, the cooling of the heat seal 37 immediately after heat-sealing, thus preventing the retraction of the package 35.

[0088] In practice it has been found that the invention has achieved the set aim and objects, a device having being devised which, using a single-folded film, makes it possible to obtain a vacuum or modified-atmosphere package in which the gas inside the bag or pouch that constitutes the package is optimized, so that the packages are uniformly inflated, also making it possible to perform the vacuum operation on multiple trays at the same time.

[0089] The possibility to move the bell-shaped vacuum chamber 3 makes it possible to modify the size of the bag or pouch that constitutes the package 35 quickly and easily, since the operator in this case only has to move the position of the frame 20 and thus also the complex of elements associated with the bell-shaped vacuum chamber 3 as a function of the width of the tray 12 to be packaged, and this without touching anything else, with the consequence of having almost nil downtimes.

[0090] Obviously, the device can be controlled by suitable mechanical and/or electronic means for predetermining the desired position of the frame 20 in one or more preset points, so that for each type of package 35 it is possible to set, for example by means of a computer, the position of the frame 20 automatically as the package that arrives on the loading platform 13 varies.

[0091] The device can thus be used also by an operator who is not particularly trained in the adjustments of format changes and it allows the optimum insertion of the tray in the single-folded film, previously sealed and cut on the transverse side, thus allowing the optimum insertion of the tray in the bag and avoiding machine downtimes and lost time for its cleaning.

[0092] Finally, the device is structurally simple, reliable and safe in use.

[0093] Obviously, the invention is susceptible of nu-

merous modifications and variations, all of which are within the scope of the appended claims.

[0094] Thus, for example, it is possible to consider keeping the frame 20 fixed and making the single-folded film 7 movable transversely as well with respect to the direction of advancement.

[0095] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

[0096] In the exemplary embodiments that follow, individual characteristics, given in relation to specific examples, may actually be interchanged with other, different characteristics that exist in other exemplary embodiments.

[0097] Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

[0098] The materials used, as well as the dimensions that constitute the individual components of the invention, may of course be more pertinent according to the specific requirements.

[0099] The various means for performing certain different functions certainly need not coexist only in the illustrated embodiment but can be present per se in many embodiments, including ones that are not illustrated.

[0100] The characteristics indicated as advantageous, convenient or the like can also be omitted or be replaced with equivalent characteristics.

[0101] The disclosures in Italian Patent Applications No. TV2010A000019 and No. TV2010A000117 from which this application claims priority are incorporated herein by reference.

Claims

1. A packaging device (1a, 1b), particularly for manually or automatically packaging trays containing food products or technical materials which can be inserted, by means of a loading platform (13), between longitudinally folded parts of a single-folded film (7) and comprising means for thermal bonding or heat-sealing for sealing, and at least one nozzle for producing a vacuum and/or introducing the gas or mixture, and a vacuum chamber (3), **characterized in that** said single-folded film (7) is fixed and said vacuum chamber (3) is movable transversely to the direction of insertion of said trays (12) and comprises at least one presser, movable over said single-folded film (7), which is forced on top of said trays (12) and is provided with means adapted to convey the streams of air and/or gas, the return of air into said vacuum chamber (3) occurring by means of a series of holes provided between a transverse heat-sealing bar, which constitutes said thermal bonding means, and the wall of said vacuum chamber that is parallel thereto.

2. The device (1a) according to claim 1, **characterized in that** said vacuum chamber is a bell-shaped vacuum chamber (3) constituted by a lower container (4) and by a closeable upper lid (5), bands or gaskets (6) adapted for airtightness being provided perimetrically to said container (4) and to said lid (5), said single-folded film (7) having a first longitudinal side (8) which is closed and a second longitudinal side (9) which is open, said single-folded film (7) being kept open by the presence of a pair of supports (14a, 14b) between which said loading platform (13), motorized or movable on means, is interposed, said pair of supports (14a, 14b) being movable mutually closer by means of a handwheel (15) adapted to adjust their mutual position.

3. The device (1a) according to claims 1 and 2, **characterized in that** it comprises at least one means adapted to draw said single-folded film (7), said means being constituted by a motor (16) which actuates a roller (17) which cooperates with a complementary roller (18), said single-folded film (7) being made to pass between said rollers, said motor (16), said roller (17) and said complementary roller (18) being supported by an arm, which protrudes from a fixed footing (19), with which said pair of supports (14a, 14b), said handwheel (15) and said loading platform (13) are also associated.

4. The device (1a) according to claims 1 and 2, **characterized in that** said bell-shaped vacuum chamber (3) is moved along an axis that is transverse to the direction of advancement of said single-folded film (7), which coincides with the direction of insertion of a tray (12) that is adapted to contain said technical materials or food products (2).

5. The device (1a) according to claims 1 and 4, **characterized in that** said bell-shaped vacuum chamber (3) is arranged inside a frame (20) constituted by a pair of uprights (21a, 21b) and by a pair of crossmembers (22a, 22b), said crossmembers supporting respectively a pair of first cylinders (23a, 23b) adapted to move said upper lid (5) and a guide (24) adapted to allow the sliding of said frame (20) at a complementary guide (25) which is integral with said footing (19).

6. The device (1a) according to claims 1 and 2, **characterized in that** a raised shelf (26) is provided inside said lower container (4), which is adjacent to the end of said loading platform (13), and is adapted to support said tray (12) inside said bell-shaped vac-

uum chamber (3), at said upper lid (5) there being arranged internally at least one presser (27), which is movable by means of a pair of second cylinders (28a, 28b), which are externally jointly connected to said upper lid (5) in a region that is adjacent to said upper crossmember (22a).

7. The device (1a) according to one or more of the preceding claims, **characterized in that** it comprises a first heat-sealing bar (10), which is L-shaped and arranged within said bell-shaped vacuum chamber (3), with one side adjacent to the inlet (11) of the food product; a cutting blade being arranged laterally adjacent to said first heat-sealing bar (10), a pair of third cylinders (29a, 29b) and a pair of fourth cylinders (30a, 30b) being arranged at the outer surface of said upper lid (5) and being arranged along mutually perpendicular directions and being adapted to actuate a second heat-sealing bar (31), which is arranged mirror-symmetrically with respect to said first heat-sealing bar (10).

8. The device (1a) according to claims 1 and 7, **characterized in that** said presser (27) is provided with means adapted to convey the streams of air and/or gas, said means being constituted by a plurality of ribs (32) which protrude from it in the direction of said tray (12) and are arranged transversely to the direction of advancement of said single-folded film (7), said ribs (32) being made of rubber, so as to be able to adhere at the edges (33) of said tray (12), defining channels (34) adapted to allow the passage of the air and/or gas.

9. The device (1a) according to claims 1 and 8, **characterized in that** said presser (27) moves jointly with the opening and closing of said bell-shaped vacuum chamber (3).

10. The device (1a) according to one or more of the preceding claims, **characterized in that** it comprises means adapted to convey the streams of air and/or gas, said means being constituted by a nozzle (38), which is integral with the bell-shaped vacuum chamber (3) and is accommodated hermetically within a box-like appendage (39) provided in two half-shells which protrude laterally to said bell-shaped vacuum chamber (3) along an axis which is perpendicular to the axis of advancement of said single-folded film.

11. The device (1a) according to claims 1 and 2, **characterized in that** it comprises a plurality of holes (41) for the return of air into said bell-shaped vacuum chamber (3), to return it to atmospheric pressure following the heat-sealing of said package (35), said plurality of holes being provided between said first heat-sealing bar (10) and the adjacent wall (42) of said bell-shaped vacuum chamber (3).

12. The device (1a) according to one or more of the preceding claims, **characterized in that** it is controlled by mechanical and/or electronic means for predetermining the desired position of said frame (20) in one or more preset points, so that for each type of package (35) it is possible to set, by means of a computer, the position of said frame (20) automatically as the package that arrives on said loading platform (13) varies.

13. The device (1a) according to one or more of the preceding claims, **characterized in that** said frame (20) is also movable transversely with respect to the direction of advancement of said single-folded film (7).

14. The device (1b) according to claim 1, comprising a loading platform (13) that supports a single-folded film (7) that defines at least two parts which are folded longitudinally to accommodate trays (12) that contain food products and technical materials (2), thermal bonding or heat-sealing means being comprised which are adapted to seal said folded parts of said single-folded film (7) peripherally with respect to said trays (12), and at least one nozzle (38) being comprised which is adapted to provide a vacuum and/or adapted to introduce a gas or a mixture in a vacuum chamber (3) that accommodates said trays (12) inserted between said folded parts of said single-folded film (7), so that said single-folded film (7) and said vacuum chamber (3) are movable with respect to each other transversely to the direction of insertion of said trays (12) in said vacuum chamber (3), **characterized in that** said thermal bonding or heat-sealing means comprise a plurality of independent heat-sealing bars (10a, 31a, 10b, 32b), at least one of them being transverse and at least one of them being longitudinal with respect to the direction of advancement of said single-folded film (7).

15. The device (1b) according to claim 14, **characterized in that** said vacuum chamber (3) is bell-shaped and is provided by a lower container (4) and by an upper lid (5), which can be closed onto said container (4), bands or gaskets (6) for airtightness being interposed perimetrically between said container (4) and said lid (5).

16. The device (1b) according to one or more of claims 14 and 15, **characterized in that** it comprises a pair of supports (14a, 14b), which can be moved mutually closer by means of a handwheel (15) adapted to adjust their mutual position in order to open said single-folded film (7), said loading platform (13) being interposed between said pair of supports (14a, 14b), and said single-folded film (7) having a first longitudinal side (8) which is closed and a second longitudinal side (9) which is open.

17. The device (1b) according to one or more of claims 14 to 16, **characterized in that** it comprises at least motor means (16) which are adapted to draw said single-folded film (7) and actuate a roller (17) that cooperates with a complementary roller (18), said single-folded film (7) being passed between said rollers, said motor means (16), said roller (17) and said complementary roller (18) being supported by an arm that protrudes from a fixed footing (19) with which said pair of supports (14a, 14b), said handwheel (15) and said loading platform (13) are associated.

18. The device (1b) according to one or more of claims 14 to 17, **characterized in that** said vacuum chamber (3) is arranged within a frame (20) constituted by a pair of uprights (21a, 21b) and by a pair of crossmembers (22a, 22b), said crossmembers supporting respectively a pair of first cylinders (23a, 23b) adapted to move said lid (5) and a guide (24) adapted to allow the sliding of said frame (20) at a guide (25) that is integral with said footing (19).

19. The device (1b) according to one or more of claims 14 to 18, **characterized in that** said vacuum chamber (3) can move along an axis which is substantially transverse to the direction of advancement of said single-folded film (7), said substantially transverse axis coinciding with the direction of insertion of said trays (12).

20. The device (1b) according to one or more of claims 14 to 19, **characterized in that** it comprises at least one presser (27), which can move above said single-folded film (7), can engage said trays (12) in an upper region, and is provided with means adapted to convey the streams of air and/or gas.

21. The device (1b) according to one or more of claims 14 to 20, **characterized in that** said means adapted to convey the streams of air and/or gas comprise a plurality of ribs (32) which protrude in the direction of said tray (12) and are arranged transversely to the direction of advancement of said single-folded film (7), said ribs (32) being made of rubber in order to adhere at the edges (33) of said tray (12) so as to define a plurality of channels (34) adapted to allow the passage of air and/or gas.

22. The device (1b) according to one or more of claims 14 to 21, **characterized in that** inside said container (4), adjacent to the end of said loading platform (13), there is a raised shelf (26), which is adapted to support said tray (12) inside said vacuum chamber (3), said presser (27) being arranged internally at said lid (5) and being movable by means of a pair of second cylinders (28a, 28b), which are externally jointly connected to said lid (5) in a region that is adjacent to said crossmember (22a).

23. The device (1b) according to one or more of claims 14 to 22, **characterized in that** said presser (27) can move jointly with the opening and closing of said vacuum chamber (3).

24. The device (1b) according to one or more of claims 14 to 23, **characterized in that** it comprises at least one nozzle (38) which is integrally connected to said vacuum chamber (3), said at least one nozzle (38) being accommodated hermetically within a box-like appendage (39) that is provided in two half-shells that protrude laterally from said vacuum chamber (3) along an axis which is perpendicular to the axis of advancement of said single-folded film (7).

25. The device (1b) according to one or more of claims 14 to 24, **characterized in that** it comprises a first transverse heat-sealing bar (10a), which is arranged in proximity to the inlet (11) of said vacuum chamber (3), a cutting blade being laterally adjacent to said first transverse heat-sealing bar (10a), at the outer surface of said lid (5) there being a pair of third cylinders (29a, 29b) adapted to actuate a second transverse heat-sealing bar (31 a), which is arranged mirror-symmetrically with respect to said first transverse heat-sealing bar (10a).

26. The device (1b) according to one or more of claims 14 to 25, **characterized in that** it comprises a first longitudinal heat-sealing bar (10b), which is arranged inside said vacuum chamber (3) so as to correspond to said open longitudinal side (9) of said single-folded film (7) of the food product, a cutting blade being arranged laterally adjacent to said first longitudinal heat-sealing bar (10b), at the outer surface of said lid (5) there being a pair of fourth cylinders (30a, 30b) adapted to actuate a second longitudinal heat-sealing bar (31 b), which is arranged mirror-symmetrically with respect to said first longitudinal heat-sealing bar (10b).

27. The device (1b) according to one or more of claims 14 to 26, **characterized in that** it comprises a plurality of holes (41) for the return of the air into said vacuum chamber (3) in order to return it to atmospheric pressure after the heat-sealing of said package (35), said plurality of holes (41) being provided between said first transverse heat-sealing bar (10a) and the adjacent wall (42) of said bell-shaped vacuum chamber (3).

28. The device (1b) according to one or more of claims 14 to 27, **characterized in that** it is controlled by adapted mechanical and/or electronic means for predetermining the desired position of said frame (20) in one or more preset points, so that for each

type of package (35) it is possible to set, by means of a computer, the arrangement of said frame (20) automatically as the package that arrives on said loading platform (13) varies.

29. The device (1b) according to one or more of claims 14 to 28, **characterized in that** said frame (20) can also move transversely with respect to the direction of advancement of said single-folded film (7).

Patentansprüche

1. Eine Verpackungsvorrichtung (1a, 1b), insbesondere zum manuellen oder automatischen Verpacken von Ablagen, die Lebensmittel oder technische Materialien enthalten, die mit Hilfe einer Beladungsplattform (13) zwischen längs gefaltete Teile einer einfach gefalteten Folie (7) eingeführt werden können, wobei die Verpackungsvorrichtung zum Verschließen Mittel zum thermischen Bonden oder Heißabdichten und mindestens eine Düse zur Erzeugung eines Vakuums und/oder Einleiten des Gases oder Gemisches sowie eine Vakuumkammer (3) enthält, **dadurch gekennzeichnet, dass** die einfach gefaltete Folie (7) befestigt wird und die Vakuumkammer (3) schräg in Förderrichtung der Ablagen (12) beweglich ist und mindestens eine Pressvorrichtung umfasst, die über die einmal gefaltete Folie (7) bewegt werden kann und die auf die Oberseite der Ablagen (12) aufgedrückt wird und mit Mitteln versehen ist, die geeignet sind, den Luft- und/oder Gasstrom zu leiten, wobei die Rückführung der Luft in die Vakuumkammer (3) durch eine Reihe von Öffnungen stattfindet, die zwischen einer schrägen Heißabdichtungsleiste, die die Mittel zum thermischen Bonden bildet, und der Wand der Vakuumkammer vorgesehen sind, die parallel zu dieser verläuft.

2. Die Vorrichtung (1a) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Vakuumkammer eine glokkenförmige Vakuumkammer (3) ist, die durch einen unteren Behälter (4) und einen verschließbaren oberen Deckel (5), Bänder oder Dichtungen (6) gebildet wird, durch die eine Luftundurchlässigkeit am Umkreis des Behälters (4) und des Deckels (5) entsteht, wobei die einmal gefaltete Folie (7) eine erste Längsseite (8) hat, die geschlossen ist, und eine zweite Längsseite (9), die offen ist, wobei die einmal gefaltete Folie (7) durch das Vorhandensein eines Trägerpaars (14a, 14b) offen gehalten wird, zwischen denen die Beladungsplattform (13), angetrieben oder auf Mitteln beweglich, angeordnet ist, wobei die Träger des Trägerpaars (14, 14a) mittels eines Handrads (15) näher zueinander bewegt werden können, so dass ihre Position zueinander eingestellt werden kann.

3. Die Vorrichtung (1a) nach den Ansprüchen 1 und 2, **dadurch gekennzeichnet, dass** sie mindestens ein Mittel umfasst, um die einmal gefaltete Folie (7) zu ziehen, wobei die Mittel durch einen Motor (16) gebildet werden, der eine Rolle (17) antreibt, die mit einer komplementären Rolle (18) zusammenwirkt, wobei die einmal gefaltete Folie (7) zwischen den Rollen hindurchgeführt wird, wobei der Motor (16), die Rolle (17) und die komplementäre Rolle (18) durch einen Arm getragen werden, der aus einer festen Basis (19) ragt, mit der das Trägerpaar (14a, 14b), das Handrad (15) und die Beladungsplattform (13) ebenfalls verbunden sind.

4. Die Vorrichtung (1a) nach einem der Ansprüche 1 und 2, **dadurch gekennzeichnet, dass** die glockenförmige Vakuumkammer (3) entlang einer Achse bewegt wird, die quer zur Förderrichtung der einmal gefalteten Folie (7) ist, die mit der Einsetzrichtung einer Ablage (12), die geeignet ist, technische Materialien oder Lebensmittel (2) zu enthalten, übereinstimmt.

5. Die Vorrichtung (1a) nach den Ansprüchen 1 und 4, **dadurch gekennzeichnet, dass** die glockenförmige Vakuumkammer (3) innerhalb eines Rahmens (20), der aus einem Ständerpaar (21a, 21b) und einem Paar aus Querstreben (22a, 22b) gebildet ist, angeordnet ist, wobei die Querstreben jeweils ein erstes Zylinderpaar (23a, 23b) tragen, das geeignet ist, den oberen Deckel (5) und eine Führung (24) zu bewegen, die geeignet sind, den Rahmen (20) an einer komplementären Führung (25) zu schieben, die in die Basis (19) integriert ist.

6. Die Vorrichtung (1a) nach den Ansprüchen 1 und 2, **dadurch gekennzeichnet, dass** im unteren Behälter (4) eine erhöhte Platte (26) vorgesehen ist, die sich am Ende der Beladungsplattform (13) befindet und geeignet ist, die Ablage (12) in der glockenförmigen Vakuumkammer (3) zu tragen, wobei am oberen Deckel (5) mindestens eine Pressvorrichtung (27) angeordnet ist, die mittels eines zweiten Zylinderpaars (28a, 28b) bewegbar ist, wobei diese Zylinder außen in einem Bereich, der sich angrenzend zu den oberen Querstreben (22a) befindet, mit dem oberen Deckel (5) verbunden sind.

7. Die Vorrichtung (1a) nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie eine erste Heißabdichtungsleiste (10) umfasst, die L-förmig und innerhalb der glokkenförmigen Vakuumkammer (3) angeordnet ist, wobei sich ein Ende an der Einlassöffnung (11) für das Lebensmittel befindet, wobei ein Schneidmesser seitlich an der ersten Heißabdichtungsleiste (10), ein drittes Zylinderpaar (29a, 29b) und ein viertes Zylinderpaar (30a, 30b) an der Außenfläche des

oberen Deckels (5) und entlang zueinander senkrechten Richtungen angeordnet und geeignet sind, eine zweite Heißabdichtungsleiste (3 1) zu betätigen, die spiegelsymmetrisch zur ersten Heißabdichtungsleiste (10) angeordnet ist.

8. Die Vorrichtung (1a) nach den Ansprüchen 1 und 7, **dadurch gekennzeichnet, dass** die Pressvorrichtung (27) mit Mitteln versehen ist, die geeignet sind, die Luft- und/oder Gasströme zu leiten, wobei die Mittel durch eine Vielzahl von Rippen (32) gebildet sind, die aus der Pressvorrichtung (27) in Richtung der Ablage (12) herausragen und quer in Förderrichtung zu der einmal gefalteten Folie (7) angeordnet sind, wobei die Rippen (32) aus Gummi sind, so dass sie an den Kanten (33) der Ablage (12) haften können und Kanäle (34) definieren, die geeignet sind, den Durchtritt von Luft und/oder Gas zu ermöglichen.

9. Die Vorrichtung (1a) nach den Ansprüchen 1 und 8, **dadurch gekennzeichnet, dass** sich die Pressvorrichtung (27) gleichzeitig mit dem Öffnen und Schließen der glockenförmigen Vakuumkammer (3) bewegt.

10. Die Vorrichtung (1a) nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie Mittel umfasst, die geeignet sind, den Luft- und/oder Gasstrom zu leiten, wobei die Mittel durch eine Düse (38) gebildet sind, die einstückig mit der glockenförmigen Vakuumkammer (3) gebildet und hermetisch innerhalb eines boxähnlichen Fortsatzes (39) aufgenommen ist, der durch zwei Halbschalen gebildet ist, die seitlich aus der glokkenförmigen Vakuumkammer (3) entlang einer Achse ragen, die senkrecht zur Förderachse der einmal gefalteten Folie ist.

11. Die Vorrichtung (1a) nach den Ansprüchen 1 und 2, **dadurch gekennzeichnet, dass** sie eine Vielzahl von Öffnungen (41) für die Rückführung der Luft in die glokkenförmige Vakuumkammer (3) umfasst, damit die Luft nach dem Heißabdichten der Verpakkung (35) wieder auf einen atmosphärischen Druck zurückgeführt wird, wobei die Vielzahl der Öffnungen zwischen der ersten Heißabdichtungsleiste (10) und der angrenzenden Wand (42) der glockenförmigen Vakuumkammer (3) vorgesehen ist.

12. Die Vorrichtung (1a) nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie durch mechanische und/oder elektronische Mittel zur Vorbestimmung der gewünschten Position des Rahmens (20) in einem oder mehreren voreingestellten Punkten gesteuert wird, so dass es für jede Verpakkungsart (35) möglich ist, mit Hilfe eines Computers die Position des Rahmens (20) automatisch einzustellen, wenn die auf der Beladungsplattform (13) ankommende Einheit variiert.

13. Die Vorrichtung (1a) nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Rahmen (20) hinsichtlich der Förderrichtung der einmal gefalteten Folie (7) auch quer verschiebbar ist.

14. Die Vorrichtung (1b) nach Anspruch 1, umfassend eine Beladungsplattform (13) die eine einmal gefaltete Folie (7) trägt, die mindestens zwei Teile definiert, die längs gefaltet sind, um Ablagen (12), die Nahrungsmittel und technische Materialien (2) enthalten, aufzunehmen, wobei Mittel zum thermischen Bonden oder Heißabdichten enthalten sind, die geeignet sind, die gefalteten Teile der einmal gefalteten Folie (7) in Bezug auf die Ablagen (12) peripher zu verschließen, und mindestens eine Düse (38), die geeignet ist, ein Vakuum zu erzeugen und/oder ein Gas oder ein Gemisch in eine Vakuumkammer (3) einzuleiten, in der die Ablagen (12) aufgenommen sind, die zwischen den gefalteten Teilen der einmal gefalteten Folie (7) eingeführt werden, so dass die einmal gefaltete Folie (7) und die Vakuumkammer (3) quer zueinander in Förderrichtung der Ablagen (12) in die Vakuumkammer (3) beweglich sind, **dadurch gekennzeichnet, dass** die Mittel zum thermischen Bonden oder Heißabdichten eine Vielzahl von unabhängigen Heißabdichtungsleisten (10a, 31 a, 10b, 32b) umfassen, von denen mindestens eine quer und mindestens eine in Längsrichtung zur Förderrichtung der einmal gefalteten Folie (7) ist.

15. Die Vorrichtung (1b) nach Anspruch 14, **dadurch gekennzeichnet, dass** die Vakuumkammer (3) glockenförmig ist und mit einem unteren Behälter (4) und einem oberen Deckel (5) versehen ist, der auf dem Behälter (4) geschlossen werden kann, wobei für die Luftundurchlässigkeit zwischen dem Behälter (4) und dem Deckel (5) Bänder oder Dichtungen (6) umlaufend eingesetzt werden.

16. Die Vorrichtung (1b) nach einem oder mehreren der Ansprüche 14 und 15, **dadurch gekennzeichnet, dass** sie ein Trägerpaar (14a, 14b) umfasst, wobei die Träger mittels eines Handrads (15) näher zueinander bewegt werden können, so dass ihre Position zueinander eingestellt werden kann, um die einmal gefaltete Folie (7) zu öffnen, wobei die Beladungsplattform (13) zwischen dem Trägerpaar (14a, 14b) angeordnet ist und die einmal gefaltete Folie (7) eine erste Längsseite (8) hat, die geschlossen ist, und eine zweite Längsseite (9), die offen ist.

17. Die Vorrichtung (1b) nach einem oder mehreren der Ansprüche 14 bis 16, **dadurch gekennzeichnet, dass** sie mindestens Motormittel (16) umfasst, die geeignet sind, die einmal gefaltete Folie (7) zu zie-

hen und eine Rolle (17) anzutreiben, die mit einer komplementären Rolle (18) zusammenwirkt, wobei die einmal gefaltete Folie (7) zwischen den Rollen hindurchgeführt wird, wobei die Motormittel (16), die Rolle (17) und die komplementäre Rolle (18) durch einen Arm getragen werden, der aus einer festen Basis (19) ragt, mit der das Trägerpaar (14a, 14b), das Handrad (15) und die Beladungsplattform (13) verbunden sind.

18. Die Vorrichtung (1b) nach einem oder mehreren der Ansprüche 14 bis 17, **dadurch gekennzeichnet, dass** die Vakuumkammer (3) innerhalb eines Rahmens (20) angeordnet ist, der aus einem Ständerpaar (21a, 21b) und einem Paar aus Querstreben (22a, 22b) gebildet ist, angeordnet ist, wobei die Querstreben jeweils ein erstes Zylinderpaar (23a, 23b) tragen, das geeignet ist, den oberen Deckel (5) und eine Führung (24) zu bewegen, die geeignet ist, den Rahmen (20) an einer Führung (25) entlang gleiten zu lassen, die in die Basis (19) integriert ist.

19. Die Vorrichtung (1b) nach einem oder mehreren der Ansprüche 14 bis 18, **dadurch gekennzeichnet, dass** sich die Vakuumkammer (3) entlang einer Achse, die im Wesentlichen quer zur Förderrichtung der einmal gefalteten Folie (7) ist, bewegen kann, wobei die Achse, die im Wesentlichen eine Querachse ist, mit der Einsetzrichtung der Ablagen (12) übereinstimmt.

20. Die Vorrichtung (1b) nach einem oder mehreren der Ansprüche 14 bis 19, **dadurch gekennzeichnet, dass** sie mindestens eine Pressvorrichtung (27) umfasst, die oberhalb einer einmal gefalteten Folie (7) bewegt werden kann und die Ablagen (12) in einem oberen Bereich fassen kann und die mit Mitteln versehen ist, um den Luft- und/oder Gasstrom zu leiten.

21. Die Vorrichtung (1b) nach einem oder mehreren der Ansprüche 14 bis 20, **dadurch gekennzeichnet, dass** die Mittel, die geeignet sind, den Luft- und/oder Gasstrom zu leiten, eine Vielzahl von Rippen (32) umfassen, die in Richtung der Ablage (12) herausragen und quer zur Förderrichtung der einmal gefalteten Folie (7) angeordnet sind, wobei die Rippen (32) aus Gummi sind, so dass sie an den Kanten (33) der Ablage (12) haften, um eine Vielzahl von Kanälen (34) zu definieren, die geeignet sind, den Durchtritt von Luft und/oder Gas zu ermöglichen.

22. Die Vorrichtung (1b) nach einem oder mehreren der Ansprüche 14 bis 21, **dadurch gekennzeichnet, dass** sich im Inneren des Behälters (4) am Ende der Beladungsplattform (13) eine erhöhte Platte (26) befindet, die geeignet ist, die Ablage (12) in der Vakuumkammer (3) zu tragen, wobei die Pressvorrichtung (27) innen am Deckel (5) angeordnet ist und mit Hilfe eines zweiten Zylinderpaars (28a, 28b) bewegbar ist, wobei die Zylinder außen in einem Bereich, der an die Querstreben (22a) angrenzt, mit dem Deckel (5) verbunden sind.

23. Die Vorrichtung (1b) nach einem oder mehreren der Ansprüche 14 bis 22, **dadurch gekennzeichnet, dass** sich die Pressvorrichtung (27) gleichzeitig mit dem Öffnen und Schließen der glockenförmigen Vakuumkammer (3) bewegen kann.

24. Die Vorrichtung (1b) nach einem oder mehreren der Ansprüche 14 bis 23, **dadurch gekennzeichnet, dass** sie mindestens eine Düse (38) umfasst, die einstückig mit der Vakuumkammer (3) verbunden ist, wobei die mindestens eine Düse (38) hermetisch innerhalb eines boxähnlichen Fortsatzes (39) aufgenommen ist, der durch zwei Halbschalen gebildet ist, die seitlich an der Vakuumkammer (3) entlang einer Achse hervorragen, die senkrecht zur Förderachse der einmal gefalteten Folie (7) ist.

25. Die Vorrichtung (1b) nach einem oder mehreren der Ansprüche 14 bis 24, **dadurch gekennzeichnet, dass** sie eine erste Quer-Heißabdichtungsleiste (10a) umfasst, die sich in der Nähe der Einlassöffnung (11) der Vakuumkammer (3) befindet, wobei sich seitlich an der ersten Quer-Heißabdichtungsleiste (10a) ein Schneidmesser, an der Außenfläche des Deckels (5) ein drittes Zylinderpaar (29a, 29b) befindet, das geeignet ist, eine zweite Quer-Heißabdichtungsleiste (31a) zu betätigen, die spiegelsymmetrisch zur ersten Quer-Heißabdichtungsleiste (10a) angeordnet ist.

26. Die Vorrichtung (1b) nach einem oder mehreren der Ansprüche 14 bis 25, **dadurch gekennzeichnet, dass** sie eine erste Längs-Heißabdichtungsleiste (10b) umfasst, die sich innerhalb der Vakuumkammer (3) befindet, um mit der offenen Längsseite (9) der einmal gefalteten Folie (7) des Nahrungsmittels zu korrespondieren, wobei seitlich an der ersten Längs-Heißabdichtungsleiste (10b) ein Schneidmesser angeordnet ist, an der Außenfläche des Deckels (5) sich ein viertes Zylinderpaar (30a, 30b) befindet, das geeignet ist, eine zweite Längs-Heißabdichtungsleiste (31b) zu betätigen, die spiegelsymmetrisch zur ersten Längs-Heißabdichtungsleiste (10b) angeordnet ist.

27. Die Vorrichtung (1b) nach einem oder mehreren der Ansprüche 14 bis 26, **dadurch gekennzeichnet, dass** sie eine Vielzahl von Öffnungen (41) für die Rückführung der Luft in die Vakuumkammer (3) umfasst, um die Luft nach dem Heißabdichten der Verpackung (35) wieder auf einen atmosphärischen Druck zu bringen, wobei die Vielzahl der Öffnungen (41) zwischen der ersten Quer-Heißabdichtungslei-

ste (10a) und der angrenzenden Wand (42) der glokkenförmigen Vakuumkammer (3) vorgesehen ist.

28. Die Vorrichtung (1b) nach einem oder mehreren der Ansprüche 14 bis 27, **dadurch gekennzeichnet, dass** sie durch geeignete mechanische und/oder elektronische Mittel zur Vorbestimmung der gewünschten Position des Rahmens (20) in einem oder mehreren voreingestellten Punkten gesteuert wird, so dass es für jede Verpackungsart (35) möglich ist, mit Hilfe eines Computers die Anordnung des Rahmens (20) automatisch einzustellen, wenn die auf der Beladungsplattform (13) ankommende Verpakkung variiert.

29. Die Vorrichtung (1b) nach einem oder mehreren der Ansprüche 14 bis 28, **dadurch gekennzeichnet, dass** der Rahmen (20) hinsichtlich der Förderrichtung der einmal gefalteten Folie (7) auch quer verschiebbar ist.

Revendications

1. Dispositif d'emballage (1a, 1b), particulièrement pour emballer manuellement ou automatiquement des plateaux contenant des produits alimentaires ou des matériaux techniques qui peuvent être insérés, au moyen d'une plateforme de chargement (13), entre les parties pliées longitudinalement d'un film à pliage unique (7) et comportant des moyens pour le thermocollage ou le thermoscellage pour le scellage, et au moins une buse pour produire un vide et/ou introduire le gaz ou le mélange, et une chambre à vide (3), **caractérisé en ce que** ledit film à pliage unique (7) est fixe et ladite chambre à vide (3) est mobile transversalement à la direction d'insertion desdits plateaux (12) et comprend au moins un presseur, mobile au-dessus dudit film à pliage unique (7), qui est forcé sur lesdits plateaux (12) et qui est pourvu de moyens conçus pour transporter les flux d'air et/ou de gaz, le retour d'air dans ladite chambre à vide (3) se produisant au moyen d'une série de trous prévus entre une bar de thermoscellage transversale, constituant lesdits moyens de thermocollage, et la paroi de ladite chambre à vide qui est parallèle à celle-ci.

2. Dispositif (1a) selon la revendication 1, **caractérisé en ce que** ladite chambre à vide est une chambre à vide (3) en forme de cloche constituée par un contenant inférieur (4) et par un couvercle supérieur (5) pouvant être fermé, des bandes ou des joints (6) conçus pour l'étanchéité à l'air étant prévus au niveau du périmètre dudit contenant (4) et dudit couvercle (5), ledit film à pliage unique (7) ayant un premier côté longitudinal (8) qui est fermé et un deuxième côté longitudinal (9) qui est ouvert, ledit film à pliage unique (7) étant maintenu ouvert par la présence d'une paire de supports (14a, 14b) entre lesquels ladite plateforme de chargement (13), motorisée ou mobile sur des moyens, est interposée, ladite paire de supports (14a, 14b) pouvant être rapprochés mutuellement au moyen d'un volant (15) conçu pour ajuster leurs positions mutuelles.

3. Dispositif (1a) selon les revendications 1 et 2, **caractérisé en ce qu'**il comporte au moins un moyen conçu pour tirer ledit film à pliage unique (7), ledit moyen étant constitué par un moteur (16) qui actionne un rouleau (17) qui coopère avec un rouleau complémentaire (18), ledit film à pliage unique (7) étant amené à passer entre lesdits rouleaux, ledit moteur (16), ledit rouleau (17) et ledit rouleau complémentaire (18) étant supportés par un bras, qui fait saillie d'un pied (19) fixe, avec lequel ladite paire de supports (14a, 14b), ledit volant (15) et ladite plateforme de chargement (13) sont également associés.

4. Dispositif (1a) selon les revendications 1 et 2, **caractérisé en ce que** ladite chambre à vide (3) en forme de cloche est déplacée le long d'un axe qui est transversal à la direction d'avance dudit film à pliage unique (7), qui coïncide avec la direction d'insertion d'un plateau (12) qui est conçu pour contenir lesdits matériaux techniques ou produits alimentaires (2).

5. Dispositif (1a) selon les revendications 1 et 4, **caractérisé en ce que** ladite chambre à vide (3) en forme de cloche est agencée à l'intérieur d'un cadre (20) constitué par une paire de montants (21a, 21b) et par une paire de traverses (22a, 22b), lesdites traverses supportant respectivement une paire de premiers vérins (23a, 23b) conçus pour déplacer ledit couvercle supérieur (5) et un guide (24) conçu pour permettre le coulissement dudit cadre (20) au niveau d'un guide complémentaire (25) qui est d'un seul tenant avec ledit pied (19).

6. Dispositif (1a) selon les revendications 1 et 2, **caractérisé en ce qu'**une étagère surélevée (26) est prévue à l'intérieur dudit contenant inférieur (4), laquelle est adjacente à l'extrémité de ladite plateforme de chargement (13), et est conçue pour supporter ledit plateau (12) à l'intérieur de ladite chambre à vide (3) en forme de cloche, au moins un presseur (27) étant agencé à l'intérieur dudit couvercle supérieur (5), lequel peut être déplacé au moyen d'une paire de deuxièmes vérins (28a, 28b), qui sont extérieurement reliés conjointement audit couvercle supérieur (5) dans une région qui est adjacente à ladite traverse supérieure (22a).

7. Dispositif (1a) selon une ou plusieurs des revendications précédentes, **caractérisé en ce qu'**il com-

porte une première barre de thermoscellage (10), en forme de L et agencée dans ladite chambre à vide (3) en forme de cloche, avec un côté adjacent à l'entrée (11) du produit alimentaire ; une lame de coupe étant agencée latéralement adjacente à ladite première barre de thermoscellage (10), une paire de troisièmes vérins (29a, 29b) et une paire de quatrièmes vérins (30a, 30b) étant agencés au niveau de la surface extérieure dudit couvercle supérieur (5) et étant agencés le long de directions mutuellement perpendiculaires et étant conçus pour actionner une deuxième barre de thermoscellage (31), qui est agencée avec une symétrie spéculaire par rapport à ladite première barre de thermoscellage (10).

8. Dispositif (1a) selon les revendications 1 et 7, **caractérisé en ce que** ledit presseur (27) est pourvu de moyens conçus pour transporter les flux d'air et/ou de gaz, lesdits moyens étant constitués par une pluralité de nervures (32) qui font saillie de ceux-ci dans la direction dudit plateau (12) et qui sont agencées transversalement à la direction d'avance dudit film à pliage unique (7), lesdites nervures (32) étant constituées de caoutchouc, de manière à être capables d'adhérer aux bords (33) dudit plateau (12), définissant des canaux (34) conçus pour permettre le passage de l'air et/ou du gaz.

9. Dispositif (1a) selon les revendications 1 et 8, **caractérisé en ce que** ledit presseur (27) se déplace conjointement avec l'ouverture et la fermeture de ladite chambre à vide (3) en forme de cloche.

10. Dispositif (1a) selon une ou plusieurs des revendications précédentes, **caractérisé en ce qu'**il comporte des moyens conçus pour transporter les flux d'air et/ou de gaz, lesdits moyens étant constitués par une buse (38), qui est d'un seul tenant avec la chambre à vide (3) en forme de cloche et qui est logée hermétiquement dans un appendice (39) en forme de boîte réalisé par deux demi-coques qui font saillie latéralement de ladite chambre à vide (3) en forme de cloche le long d'un axe qui est perpendiculaire à l'axe d'avance dudit film à pliage unique.

11. Dispositif (1a) selon les revendications 1 et 2, **caractérisé en ce qu'**il comporte une pluralité de trous (41) pour le retour de l'air dans ladite chambre à vide (3) en forme de cloche, pour la ramener à la pression atmosphérique à la suite du thermoscellage dudit emballage (35), ladite pluralité de trous étant prévus entre ladite première barre de thermoscellage (10) et la paroi (42) adjacente de ladite chambre à vide (3) en forme de cloche.

12. Dispositif (1a) selon une ou plusieurs des revendications précédentes, **caractérisé en ce qu'**il est commandé par des moyens mécaniques et/ou électroniques pour déterminer au préalable la position souhaitée dudit cadre (20) en un ou plusieurs points prédéterminés, de sorte que, pour chaque type d'emballage (35), il soit possible d'établir, au moyen d'un ordinateur, la position dudit cadre (20) automatiquement alors que l'emballage qui arrive sur ladite plateforme de chargement (13) varie.

13. Dispositif (1a) selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ledit cadre (20) est également mobile transversalement par rapport à la direction d'avance dudit film à pliage unique (7).

14. Dispositif (1b) selon la revendication 1, comportant une plateforme de chargement (13) qui supporte un film à pliage unique (7) qui définit au moins deux parties qui sont pliées longitudinalement pour loger des plateaux (12) qui contiennent des produits alimentaires et des matériaux techniques (2), comprenant des moyens de thermocollage ou de thermoscellage qui sont conçus pour sceller lesdites parties pliées dudit film à pliage unique (7) au niveau de la périphérie desdits plateaux (12), et comprenant et au moins une buse (38) conçue pour réaliser un vide et/ou conçue pour introduire un gaz ou un mélange dans une chambre à vide (3) qui loge lesdits plateaux (12) insérés entre lesdites parties pliées dudit film à pliage unique (7), de sorte que ledit film à pliage unique (7) et ladite chambre à vide (3) soient mobiles l'un par rapport à l'autre transversalement à la direction d'insertion desdits plateaux (12) dans ladite chambre à vide (3), **caractérisé en ce que** lesdits moyens de thermocollage ou de thermoscellage comportent une pluralité de barres de thermoscellage (10a, 31a, 10b, 32b) indépendantes, au moins l'une d'elles étant transversale, au moins l'une d'elles étant longitudinale par rapport à la direction d'avance dudit film à pliage unique (7).

15. Dispositif (1b) selon la revendication 14, **caractérisé en ce que** ladite chambre à vide (3) est en forme de cloche et est réalisée par un contenant inférieur (4) et par un couvercle supérieur (5), qui peut être fermé sur ledit contenant (4), des bandes ou des joints (6) pour l'étanchéité à l'air étant interposés au niveau du périmètre entre ledit contenant (4) et ledit couvercle (5).

16. Dispositif (1b) selon une ou plusieurs des revendications 14 et 15, **caractérisé en ce qu'**il comporte une paire de supports (14a, 14b), qui peuvent être rapprochés mutuellement au moyen d'un volant (15) conçu pour ajuster leurs positions mutuelles afin d'ouvrir ledit film à pliage unique (7), ladite plateforme de chargement (13) étant interposée entre ladite paire de supports (14a, 14b), et ledit film à pliage unique (7) ayant un premier côté longitudinal (8) qui

est fermé et un deuxième côté longitudinal (9) qui est ouvert.

17. Dispositif (1b) selon une ou plusieurs des revendications 14 à 16, **caractérisé en ce qu'**il comporte au moins des moyens formant moteur (16) conçus pour tirer ledit film à pliage unique (7) et actionner un rouleau (17) qui coopère avec un rouleau complémentaire (18), ledit film à pliage unique (7) passant entre lesdits rouleaux, lesdits moyens formant moteur (16), ledit rouleau (17) et ledit rouleau complémentaire (18) étant supportés par un bras qui fait saillie d'un pied (19) fixe avec lequel ladite paire de supports (14a, 14b), ledit volant (15) et ladite plateforme de chargement (13) sont associés.

18. Dispositif (1b) selon une ou plusieurs des revendications 14 à 17, **caractérisé en ce que** ladite chambre à vide (3) est agencée dans un cadre (20) constitué par une paire de montants (21a, 21b) et par une paire de traverses (22a, 22b), lesdites traverses supportant respectivement une paire de premiers vérins (23a, 23b) conçus pour déplacer ledit couvercle (5) et un guide (24) conçu pour permettre le coulissement dudit cadre (20) au niveau d'un guide (25) qui est d'un seul tenant avec ledit pied (19).

19. Dispositif (1b) selon une ou plusieurs des revendications 14 à 18, **caractérisé en ce que** ladite chambre à vide (3) peut se déplacer le long d'un axe qui est sensiblement transversal à la direction d'avance dudit film à pliage unique (7), ledit axe sensiblement transversal coïncidant avec la direction d'insertion desdits plateaux (12).

20. Dispositif (1b) selon une ou plusieurs des revendications 14 à 19, **caractérisé en ce qu'**il comporte au moins un presseur (27), qui peut se déplacer audessus dudit film à pliage unique (7), qui peut venir en prise avec lesdits plateaux (12) dans une région supérieure, et qui est pourvu de moyens conçus pour transporter les flux d'air et/ou de gaz.

21. Dispositif (1b) selon une ou plusieurs des revendications 14 à 20, **caractérisé en ce que** lesdits moyens conçus pour transporter les flux d'air et/ou de gaz comprennent une pluralité de nervures (32) qui font saillie dans la direction dudit plateau (12) et qui sont agencées transversalement à la direction d'avance dudit film à pliage unique (7), lesdites nervures (32) étant constituées de caoutchouc afin d'adhérer aux bords (33) dudit plateau (12) de manière à définir une pluralité de canaux (34) conçus pour permettre le passage d'air et/ou de gaz.

22. Dispositif (1b) selon une ou plusieurs des revendications 14 à 21, **caractérisé en ce que**, à l'intérieur dudit contenant (4), adjacente à l'extrémité de ladite plateforme de chargement (13), il y a une étagère surélevée (26), qui est conçue pour supporter ledit plateau (12) à l'intérieur de ladite chambre à vide (3), ledit presseur (27) étant agencé à l'intérieur dudit couvercle (5) et pouvant être déplacé au moyen d'une paire de deuxièmes vérins (28a, 28b), qui sont extérieurement reliés conjointement au dit couvercle (5) dans une région qui est adjacente à ladite traverse (22a).

23. Dispositif (1b) selon une ou plusieurs des revendications 14 à 22, **caractérisé en ce que** ledit presseur (27) peut se déplacer conjointement avec l'ouverture et la fermeture de ladite chambre à vide (3).

24. Dispositif (1b) selon une ou plusieurs des revendications 14 à 23, **caractérisé en ce qu'**il comporte au moins une buse (38) qui est reliée d'un seul tenant à ladite chambre à vide (3), ladite au moins une buse (38) étant logée hermétiquement dans un appendice (39) en forme de boîte réalisé par deux demi-coques qui font saillie latéralement de ladite chambre à vide (3) le long d'un axe qui est perpendiculaire à l'axe d'avance dudit film à pliage unique (7).

25. Dispositif (1b) selon une ou plusieurs des revendications 14 à 24, **caractérisé en ce qu'**il comporte une première barre de thermoscellage transversale (10a), agencée à proximité de l'entrée (11) de ladite chambre à vide (3), une lame de coupe étant latéralement adjacente à ladite première barre de thermoscellage transversale (10a), une paire de troisièmes vérins (29a, 29b) étant prévus au niveau de la surface extérieure dudit couvercle (5), ladite paire de troisièmes vérins étant conçus pour actionner une deuxième barre de thermoscellage transversale (31a), qui est agencée avec une symétrie spéculaire par rapport à ladite première barre de thermoscellage transversale (10a).

26. Dispositif (1b) selon une ou plusieurs des revendications 14 à 25, **caractérisé en ce qu'**il comporte une première barre de thermoscellage longitudinale (10b), qui est agencée à l'intérieur de ladite chambre à vide (3) de manière à correspondre au dit côté longitudinal (9) ouvert dudit film à pliage unique (7) du produit alimentaire, une lame de coupe étant agencée latéralement adjacente à ladite première barre de thermoscellage longitudinale (10b), une paire de quatrièmes vérins (30a, 30b) étant agencés au niveau de la surface extérieure dudit couvercle (5), ladite paire de quatrièmes vérins étant conçus pour actionner une deuxième barre de thermoscellage longitudinale (31b), qui est agencée avec une symétrie spéculaire par rapport à ladite première barre de thermoscellage longitudinale (10b).

27. Dispositif (1b) selon une ou plusieurs des revendi-

cations 14 à 26, **caractérisé en ce qu'**il comporte une pluralité de trous (41) pour le retour de l'air dans ladite chambre à vide (3) afin de la ramener à la pression atmosphérique après le thermoscellage dudit emballage (35), ladite pluralité de trous (41) étant prévus entre ladite première barre de thermoscellage transversale (10a) et la paroi (42) adjacente de ladite chambre à vide (3) en forme de cloche.

28. Dispositif (1b) selon une ou plusieurs des revendications 14 à 27, **caractérisé en ce qu'**il est commandé par des moyens mécaniques et/ou électroniques conçus pour déterminer au préalable la position souhaitée dudit cadre (20) en un ou plusieurs points prédéterminés, de sorte que, pour chaque type d'emballage (35), il soit possible d'établir, au moyen d'un ordinateur, l'agencement dudit cadre (20) automatiquement alors que l'emballage qui arrive sur ladite plateforme de chargement (13) varie.

29. Dispositif (1b) selon une ou plusieurs des revendications 14 à 28, **caractérisé en ce que** ledit cadre (20) peut également se déplacer transversalement par rapport à la direction d'avance dudit film à pliage unique (7).

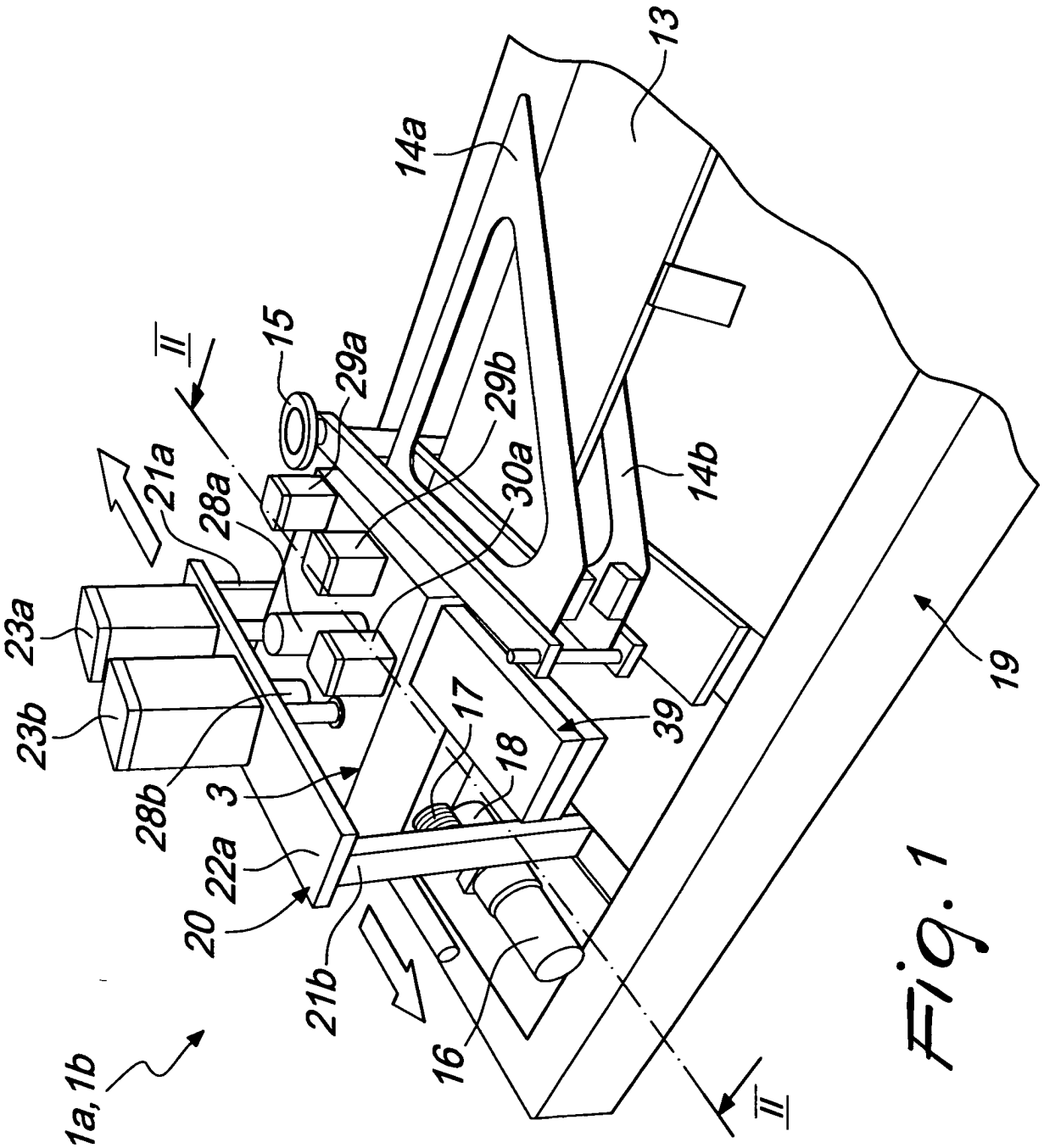
13
14a
15
29a
29b
II
21a
28a
30a
14b
23a
23b
28b
3
17
18
39
19
22a
20
21b
16
1a, 1b
II

Fig. 1

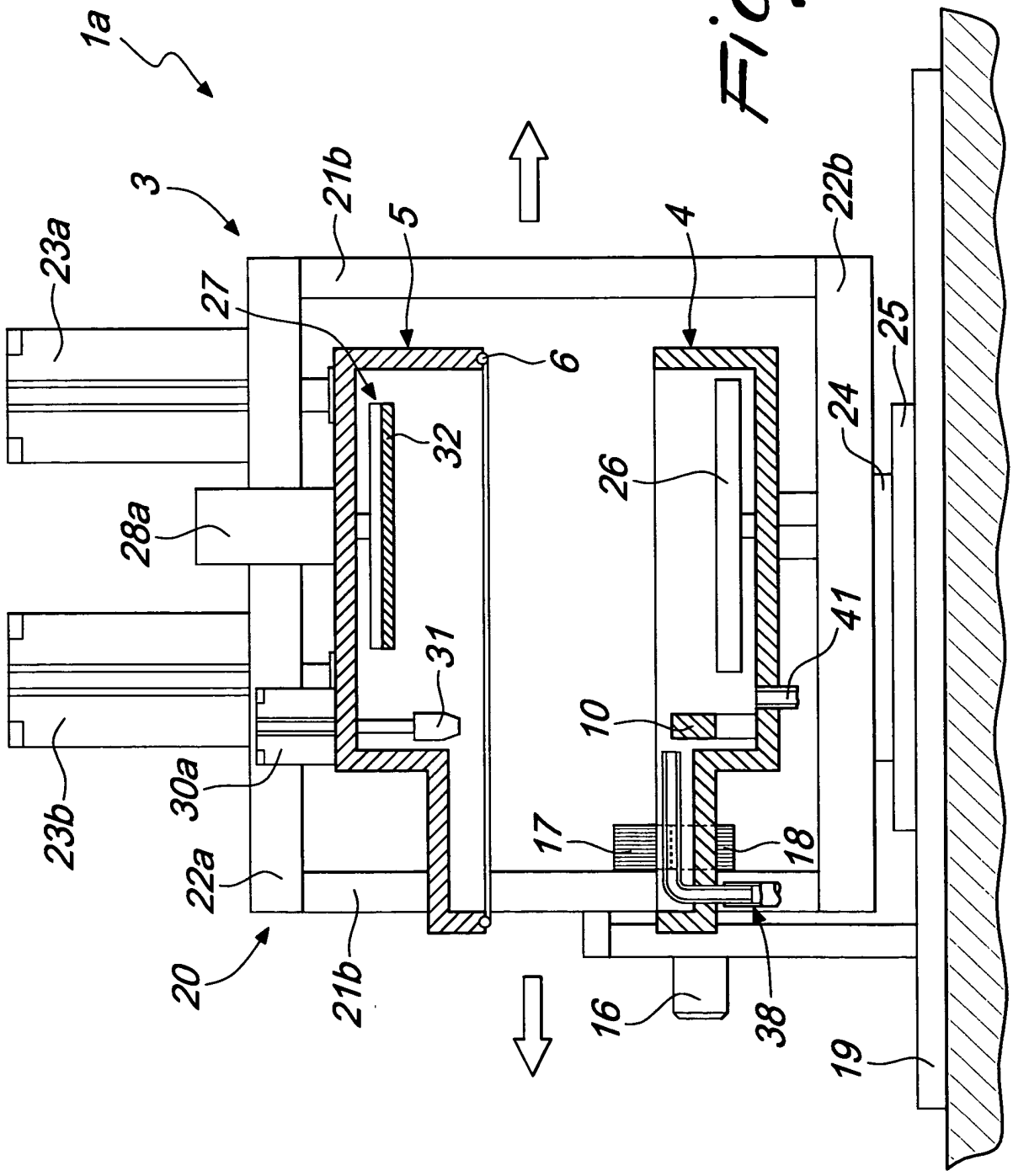
1a
3
23a
27
21b
5
4
22b
25
6
32
24
26
28a
41
31
10
30a
23b
17
18
22a
20
21b
16
38
19

Fig. 2

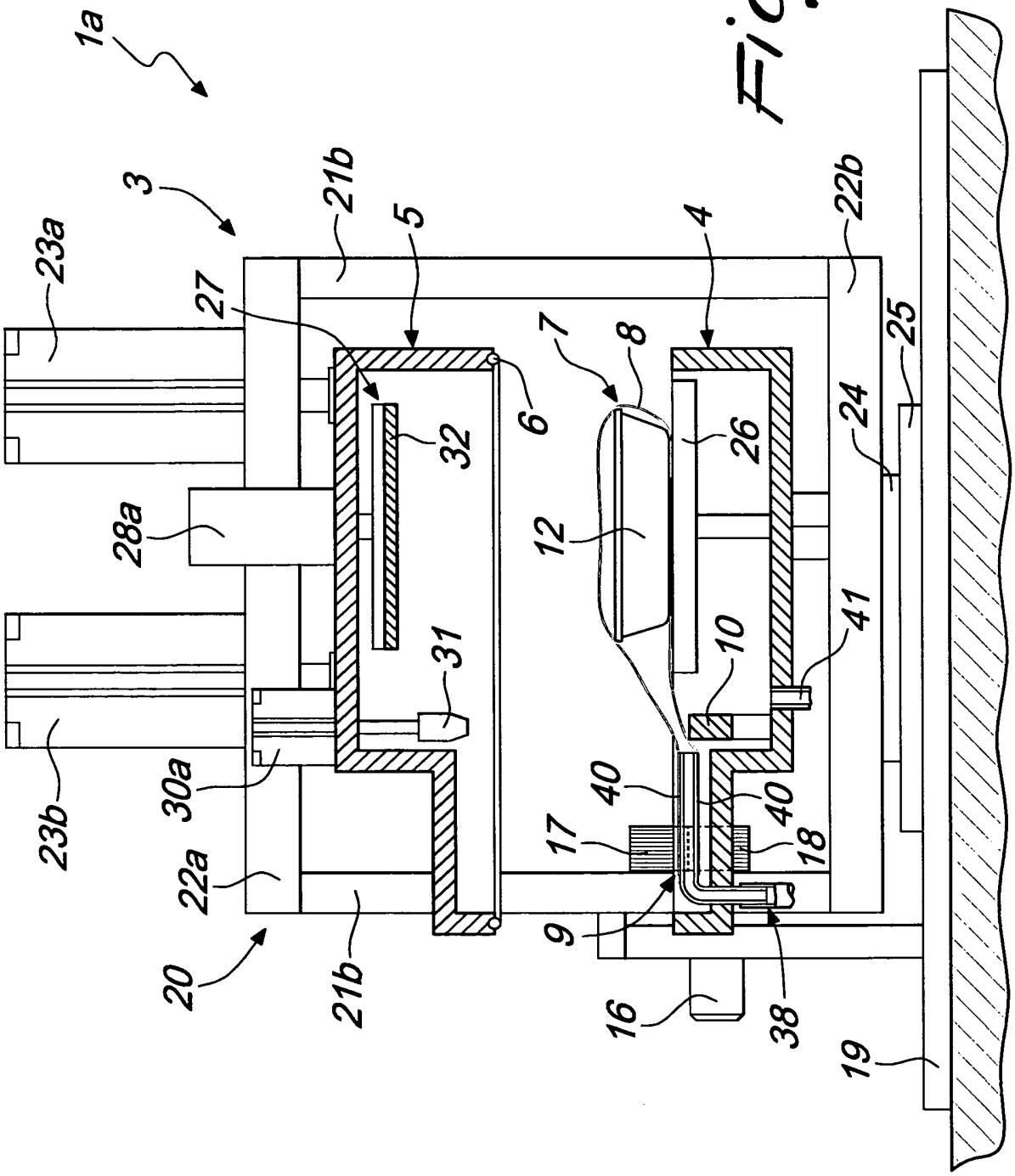
1a
3
21b
5
4
22b
23a
27
7
8
25
6
32
26
24
28a
12
41
31
10
23b
30a
40
40
17
18
22a
9
20
21b
16
38
19

Fig. 3

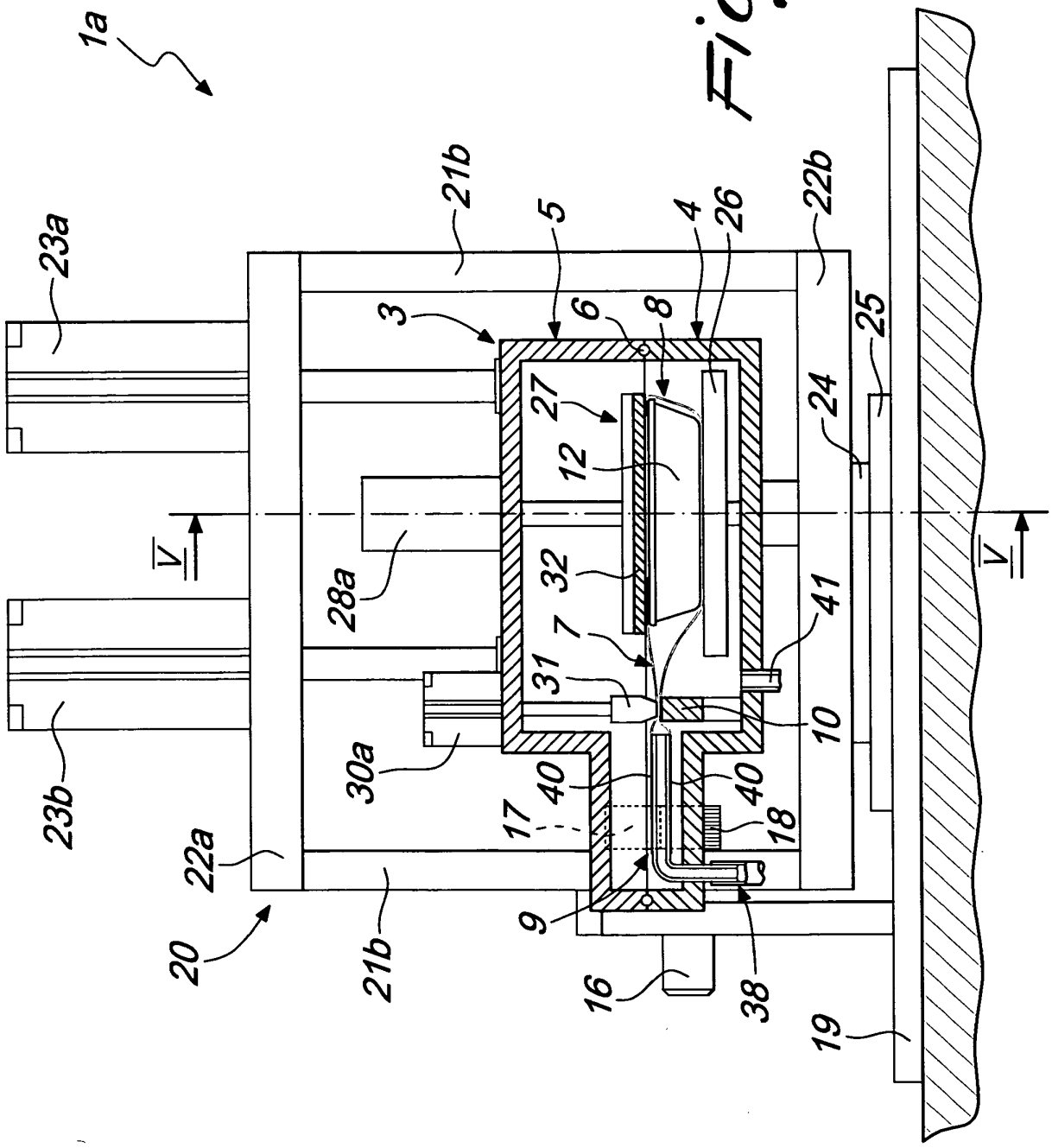
1a
23a
21b
5
4
26
22b
3
6
8
25
27
24
12
V
V
28a
32
41
7
31
10
23b
30a
40
40
17
18
22a
9
20
21b
16
38
19

Fig. 4

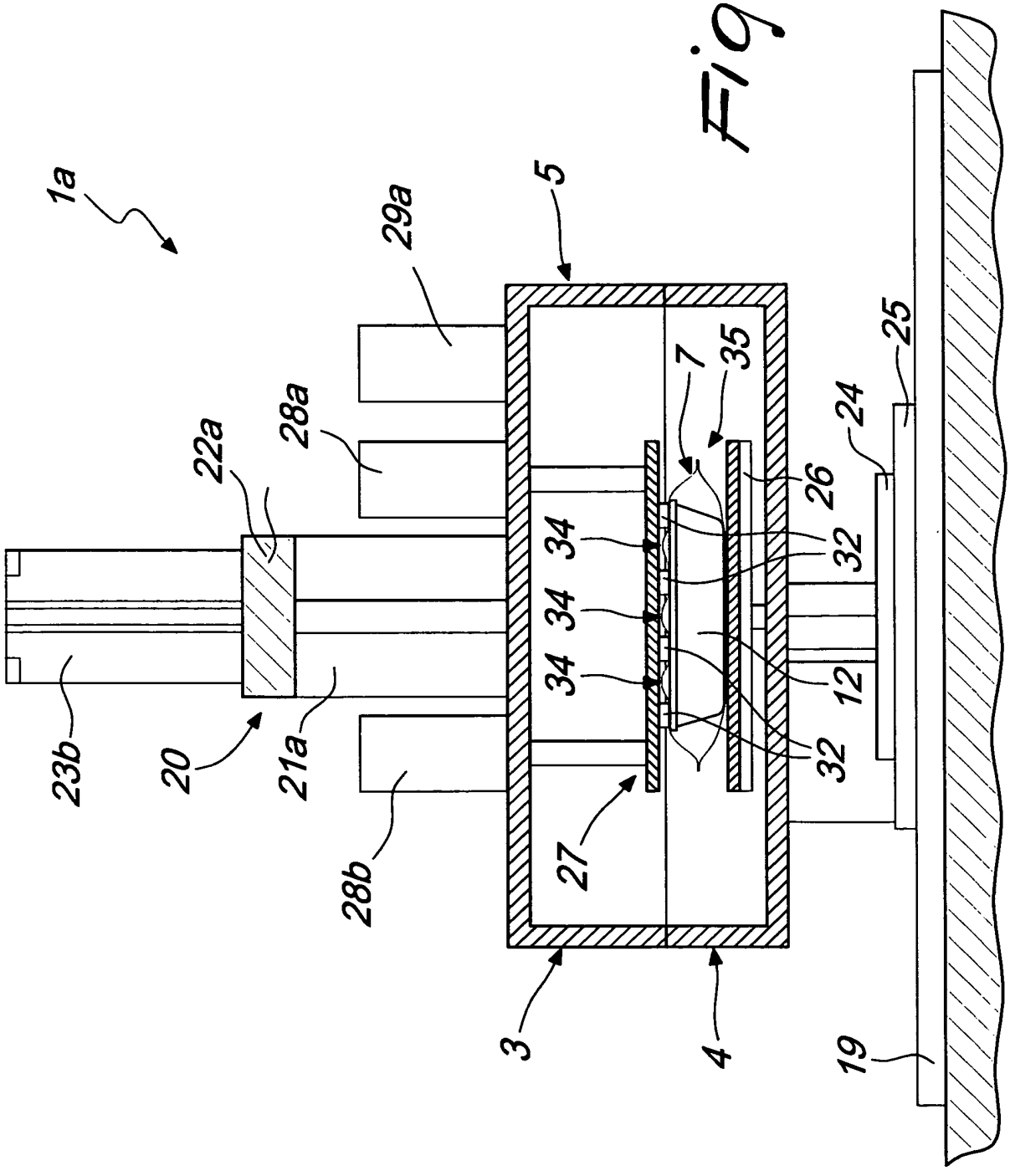
1a
29a
5
7
35
25
24
22a
28a
26
34
32
34
34
12
32
23b
20
21a
28b
27
3
4
19

Fig. 5

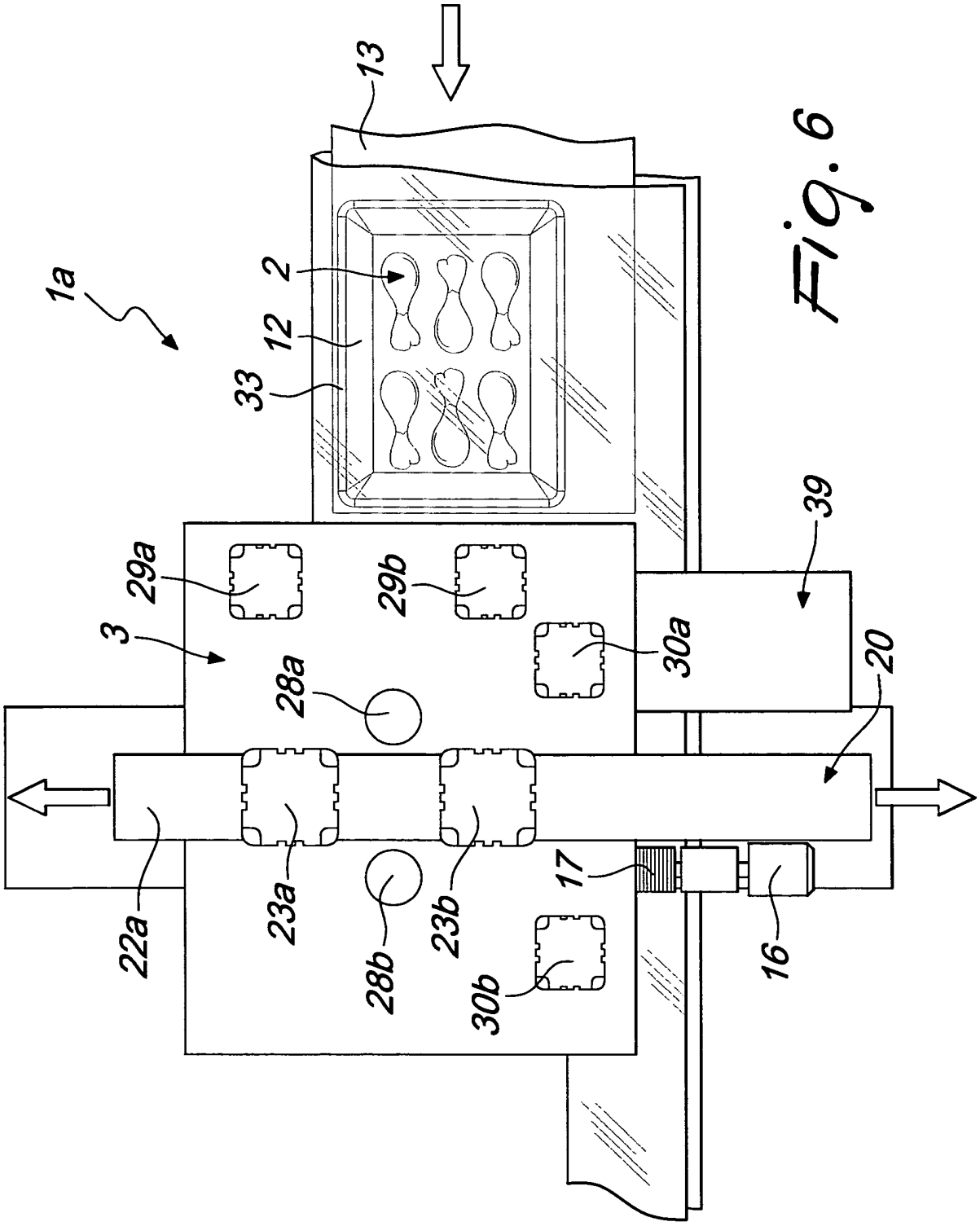

Fig. 6

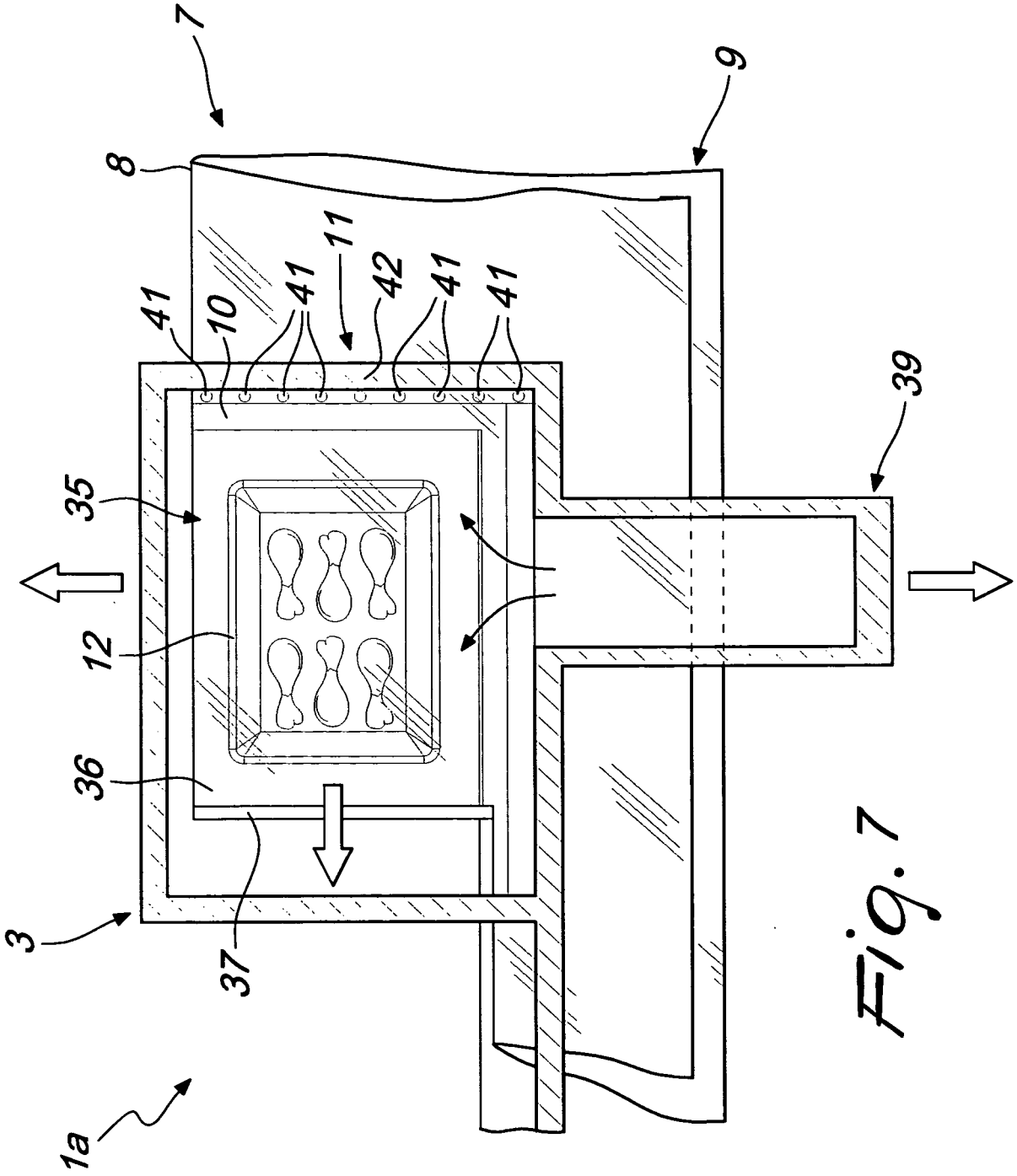

Fig. 7

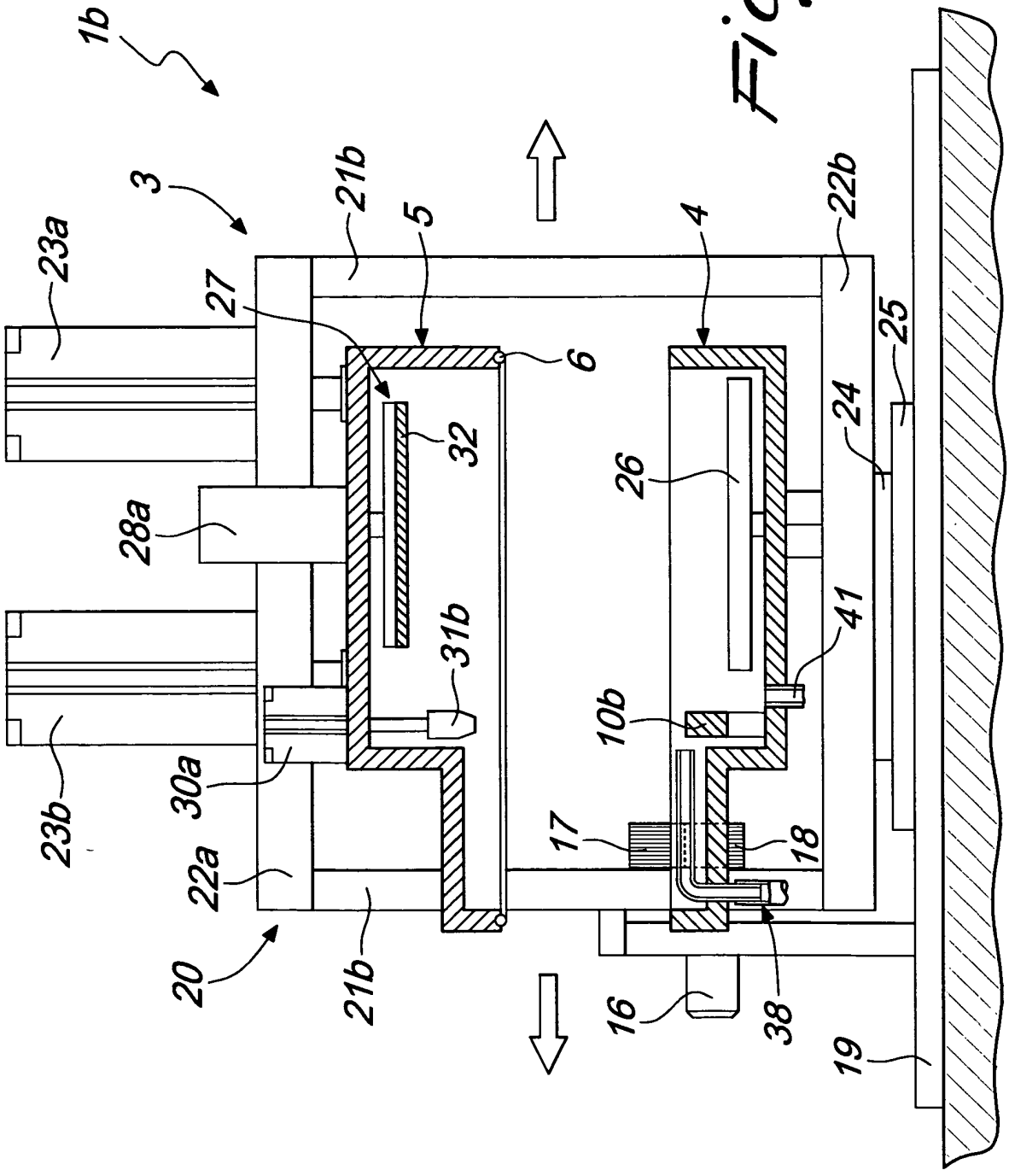
1b
3
21b
5
4
22b
23a
27
6
25
32
24
26
28a
41
31b
10b
23b
30a
17
18
22a
20
21b
16
38
19

Fig. 8

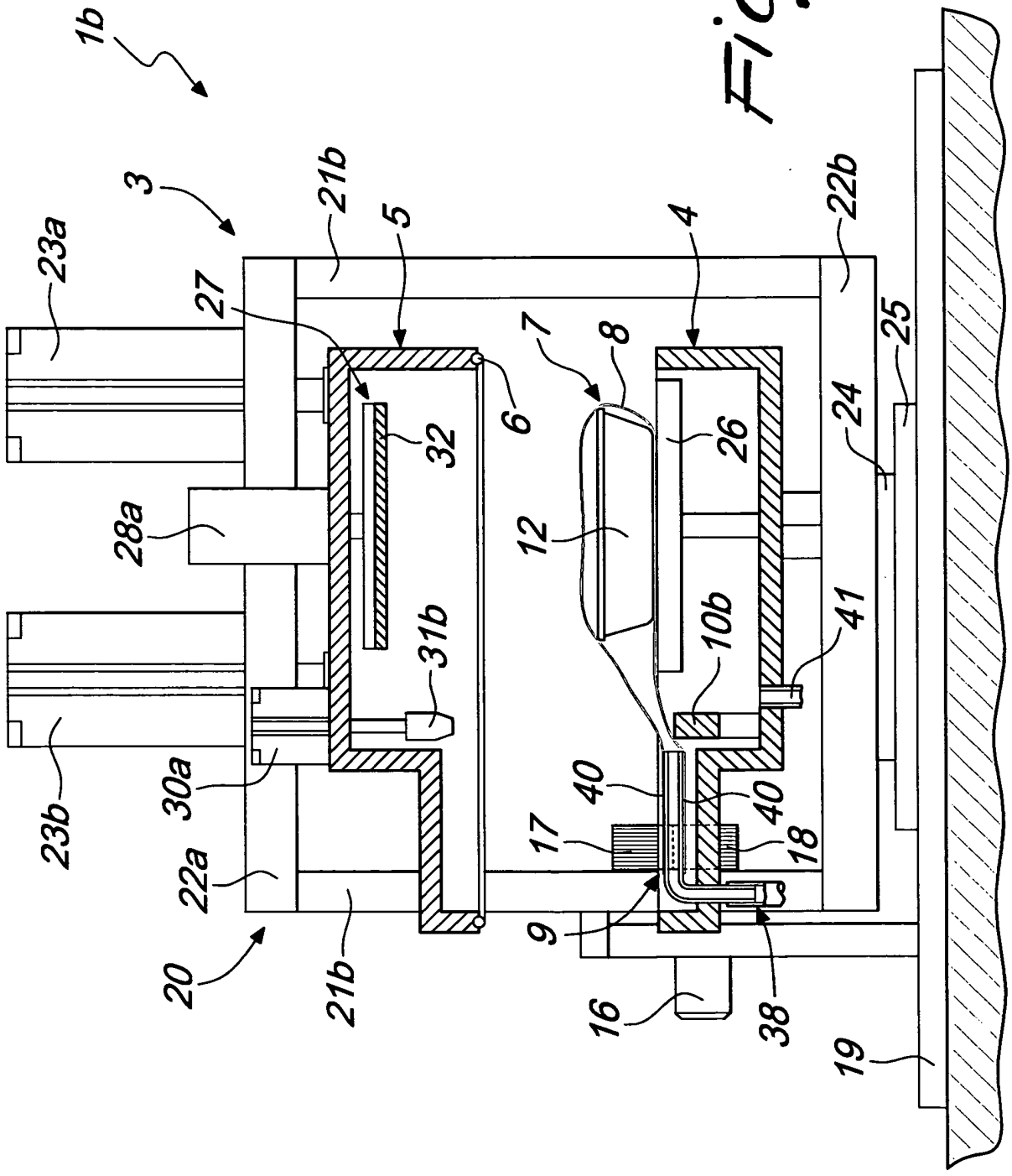
1b
3
21b
5
4
22b
23a
27
7
8
25
6
24
32
26
28a
12
31b
10b
41
30a
40
40
23b
17
18
22a
9
20
21b
16
38
19

Fig. 9

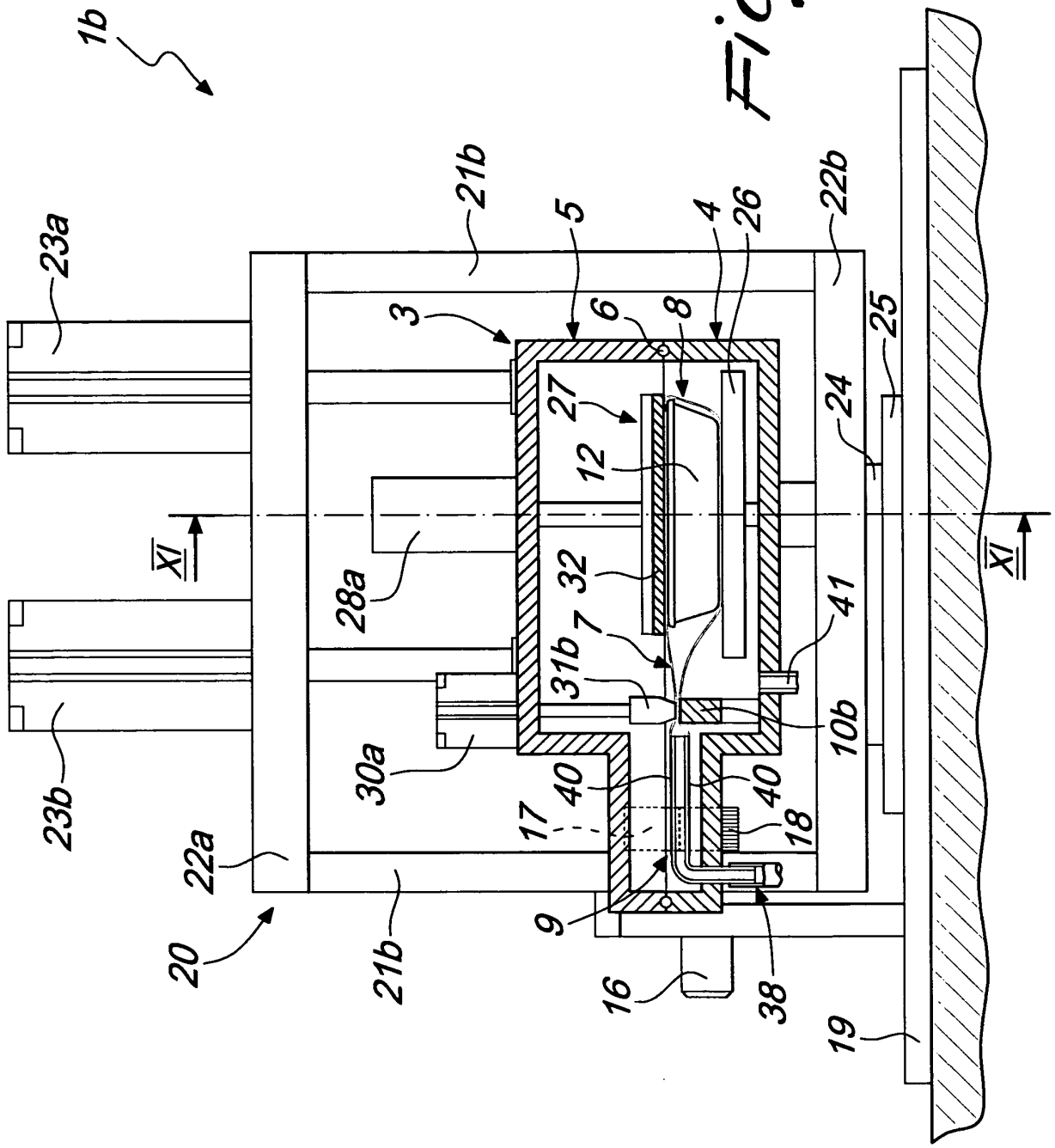
1b
23a
21b
5
4
26
22b
3
6
8
25
27
24
12
XI
XI
28a
32
41
7
31b
10b
23b
30a
40
40
17
18
22a
9
20
21b
16
38
19

Fig. 10

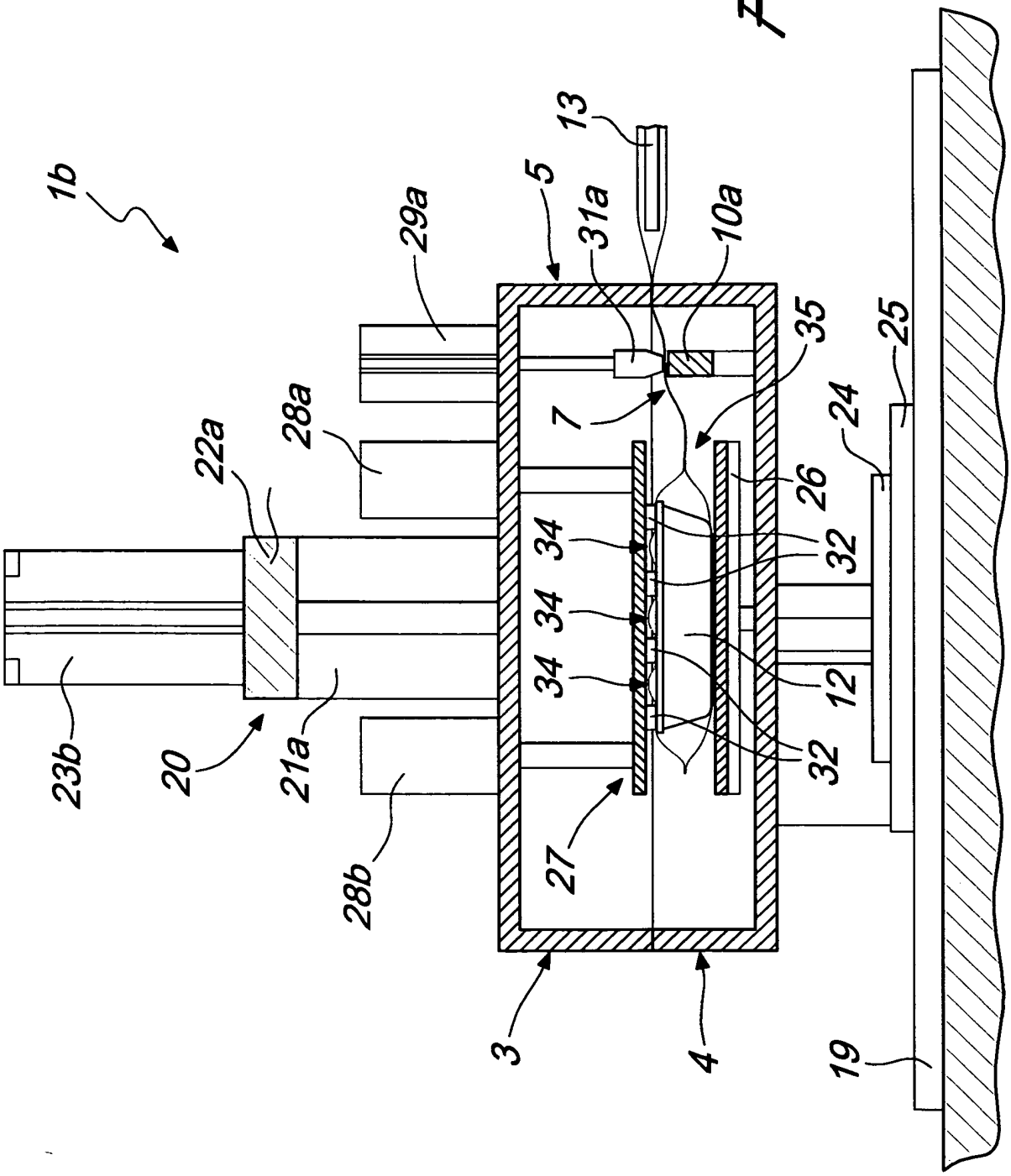
1b
29a
5
13
31a
10a
35
25
28a
22a
7
24
26
34
32
34
34
12
32
23b
20
21a
28b
27
3
4
19

Fig. 11

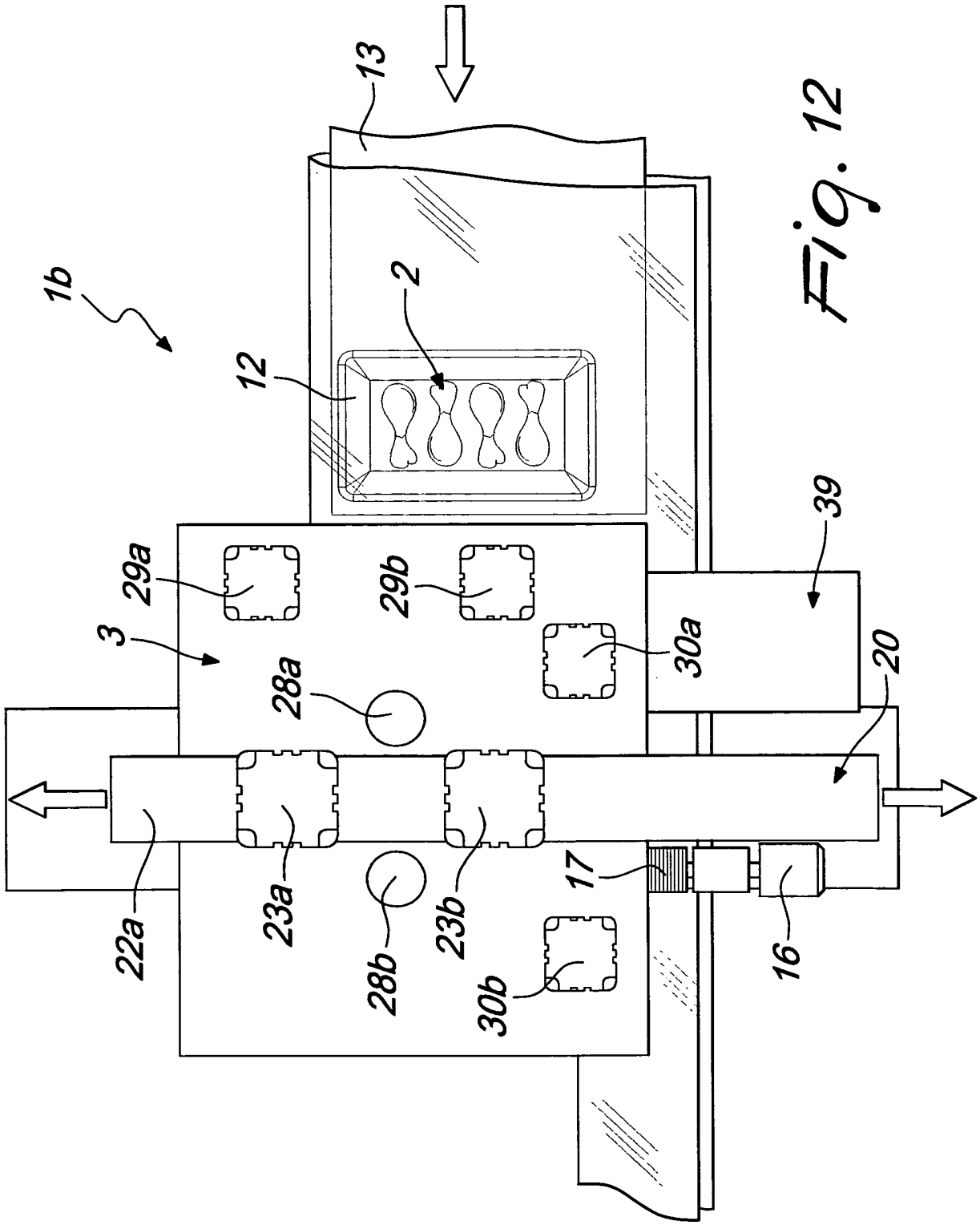

Fig. 12

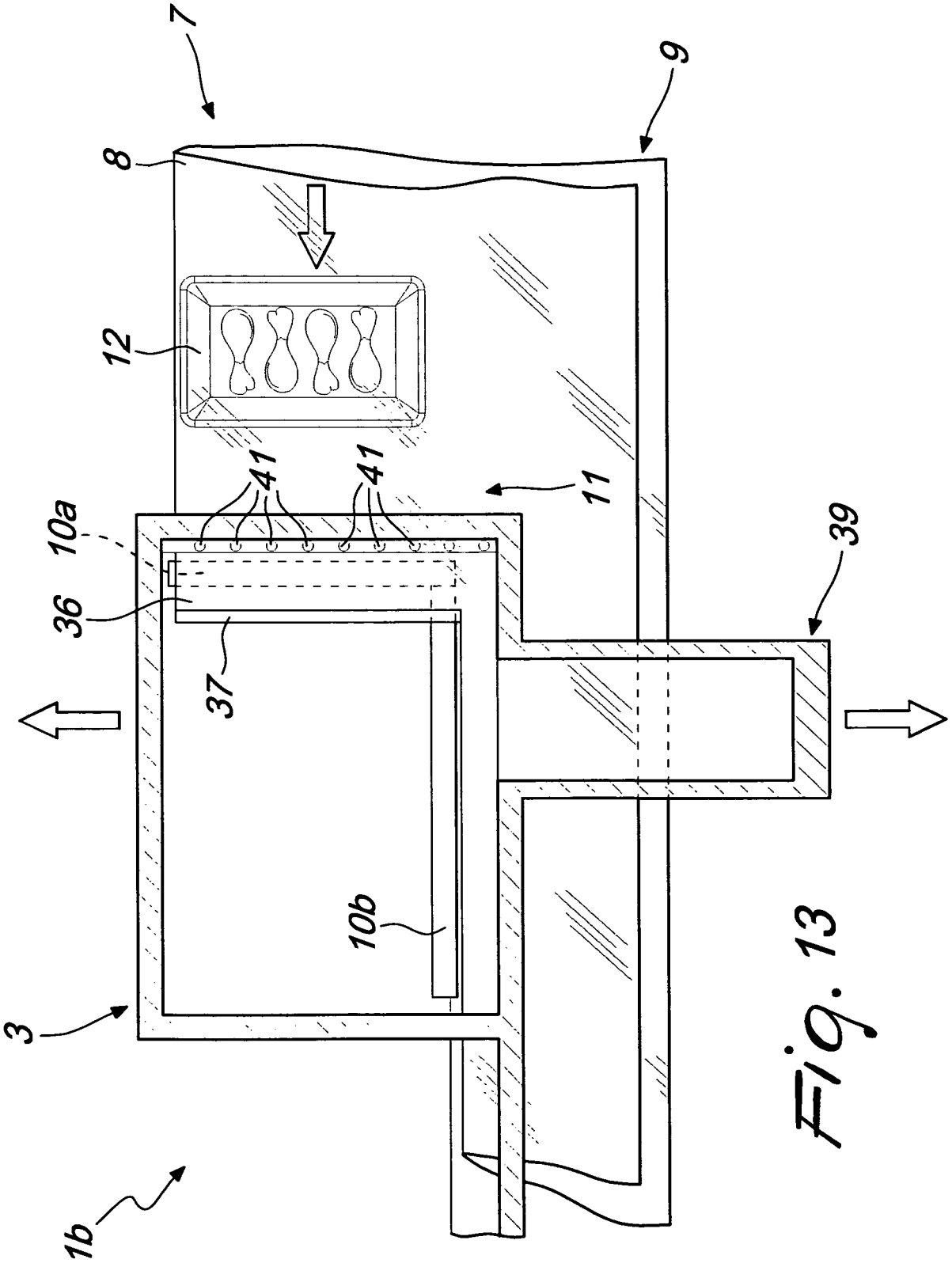

Fig. 13

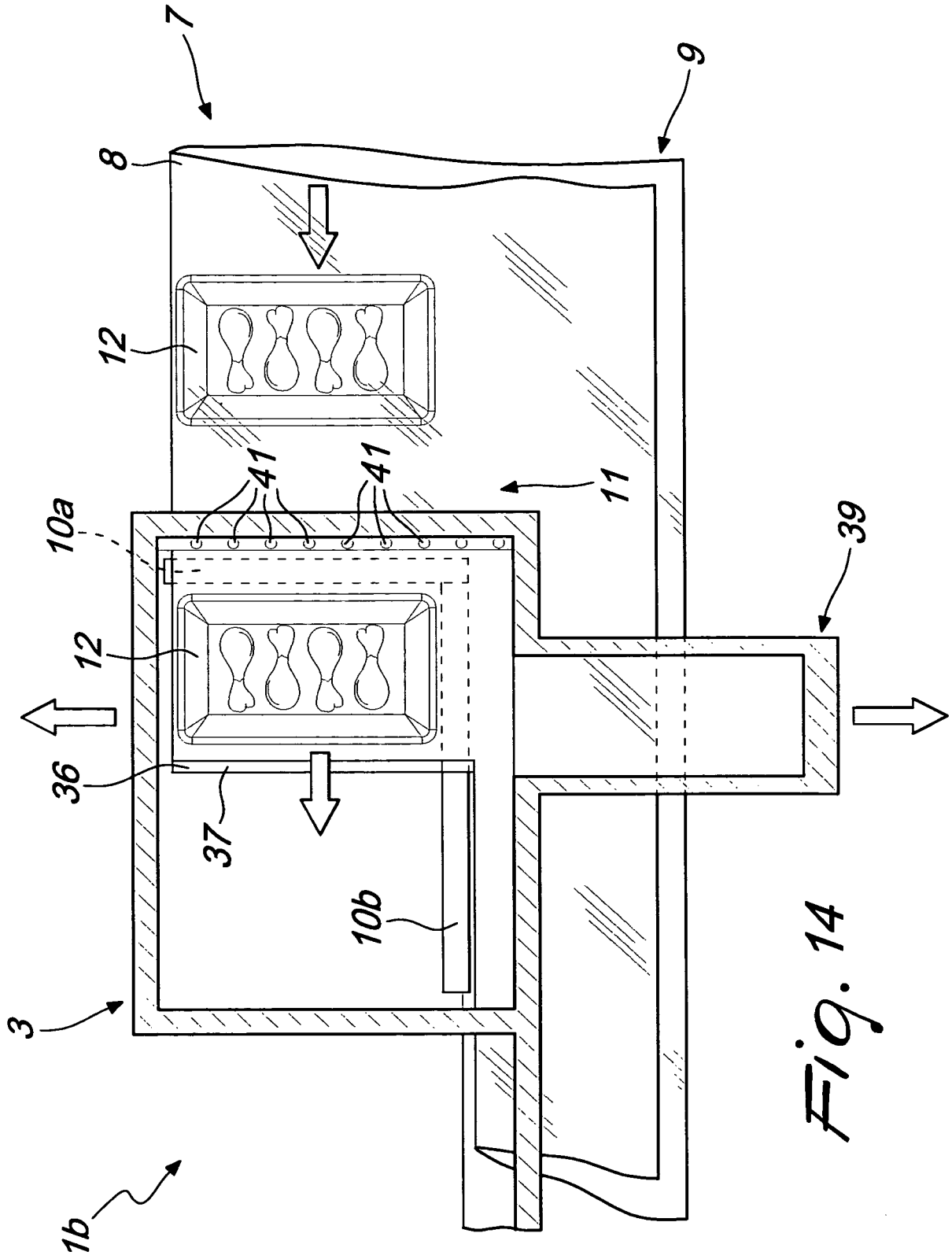

Fig. 14

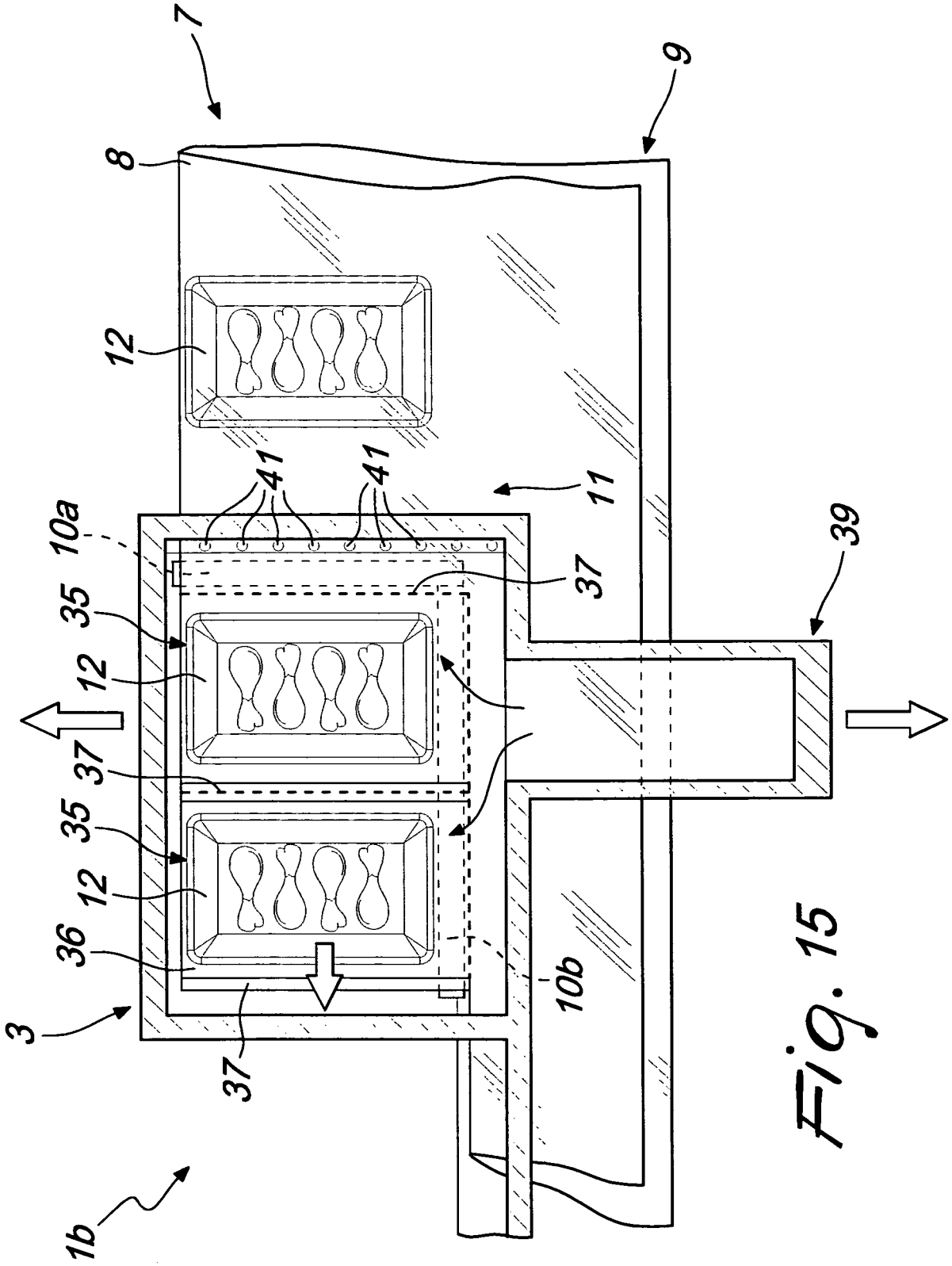

Fig. 15

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 5155969 A **[0002]**
- EP 603704 A **[0007]**
- EP 0405718 A **[0012]**
- EP 0832819 B1 **[0013]**
- IT AL960002 **[0013]**
- IT TV20100019 A **[0101]**
- IT TV20100117 A **[0101]**