

(19) World Intellectual Property Organization
International Bureau



PCT



(43) International Publication Date
30 November 2006 (30.11.2006)

(10) International Publication Number
WO 2006/126230 A1

(51) International Patent Classification:
A47J 31/40 (2006.01)

(21) International Application Number:
PCT/IT2006/000377

(22) International Filing Date: 19 May 2006 (19.05.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
FI2005A000112 27 May 2005 (27.05.2005) IT

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,

CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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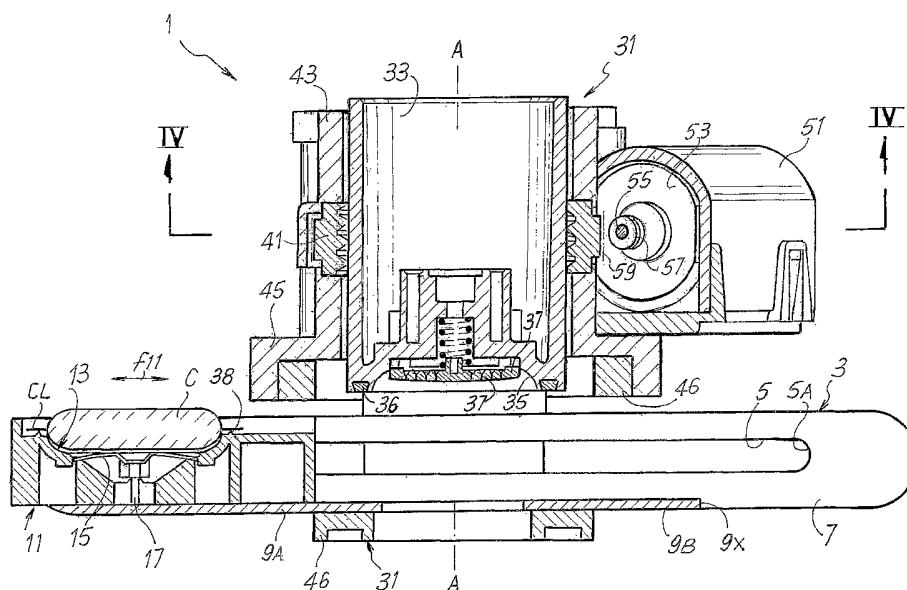
— as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

Published:

— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: DEVICE AND METHOD FOR PRODUCING BEVERAGES, IN PARTICULAR COFFEE, FROM SINGLE PORTION PACKAGES



(57) Abstract: The device comprises an upper half-chamber (35) and a lower half-chamber (13), connectable to each other to define an infusion chamber. The upper half-chamber is provided with vertical movement (f33) to open and close the infusion chamber, and the lower half-chamber is produced in a drawer (11) movable horizontally from a position to load the single portion package (C) to an infusion position under the upper half-chamber. The drawer is also provided with an overtravel movement to be taken to a third position to eject the single portion package after the beverage has been extracted.

Device and method for producing beverages, in particular coffee, from single portion packages

DESCRIPTION

Technical field

5 The present invention relates to improvements to machines or devices for producing beverages by extracting substances from single portion packages.

 In particular, although not exclusively, the present invention relates to a device for producing coffee or similar beverages by extracting substances from single portion packages using pressurized hot water.

10 State of the art

 To produce hot beverages, in particular espresso coffee, machines or devices which use single portion packages of preparations from which the beverage is extracted through the inflow of pressurized hot water are currently used in domestic, professional and commercial environments. Single portion
15 packages, which in the case of espresso coffee contain ground coffee, are commonly produced in the form of capsules or cartridges made of plastic, aluminum sheets or other sealed materials. The machine or device for preparing the beverage has an infusion chamber composed of two portions or half-chambers, which are tightly connected and are provided with perforators to pierce
20 the capsule in appropriate positions and allow inflow of hot water and outflow of the beverage.

 Alternatively to capsules or cartridges, single portion packages in the form of "bags" are also used. Bags are formed of two valves of material permeable to water, such as tissue paper or non-woven material. The two valves are bonded
25 along the edges to define therebetween the volume containing the coffee powder or other preparation destined to produce the beverage.

 In this case the device for preparing the beverages does not require perforators, as pressurized water passes directly through the permeable material holding the coffee powder or other food product and the beverage produced
30 through contact between the food product and the water flows out through the material forming the opposed valve of the bag.

 EP-A-832592 describes a machine for automatically preparing espresso coffee using bags. In this machine the bags are produced in the form of a continuous strip, which constitutes a sort of magazine. Individual bags are defined

along the strip, which are inserted in the infusion chamber sequentially

US-A-4846052 describes a machine to produce coffee using perforable cartridges.

US-A-3260190 describes a further machine or device for producing coffee or
5 other beverages from sealed cartridge container or capsule container. The device
has a drawer to insert a capsule into the infusion chamber and to remove the used
capsule from the infusion chamber. The infusion chamber is defined by an upper
half-chamber and by a lower half chamber, provided with perforators which create
through holes in the upper and lower surface of the capsule to allow inflow of hot
10 water and outflow of the beverage,

US-A-6345570 describes a device or machine for producing espresso coffee
using ready made bags which are inserted in the machine by means of a drawer.
The drawer forms a housing for the bag and cooperates with a vertically movable
upper half-chamber which, when the drawer is in the infusion position, is lowered
15 onto said drawer to seal the edges of the bag against the perimeter edge of the
bag housing in the drawer. After the beverage has been prepared, the upper
portion of the infusion head is raised and the drawer is retracted, while the used
bag is retained so that it disengages from the drawer and is dropped into a
container for used bags placed under the infusion head.

20 WO-A-0049926 describes a machine or device for preparing beverages
using ready made bags of the same type as those described in US-A-6345570.
However, in this case the drawer inside which the bag is placed to be inserted in
the infusion head is also used to remove the used bag from the machine. The
used bag is unloaded during the retracting movement, i.e. during the travel with
25 which the drawer is returned to the external position to receive a new fresh bag.

Another machine or device for preparing hot beverages using single portion
packages in the form of bags is described in WO-A-9517121.

DE-A-19647039 describes a machine for preparing coffee in which a single
portion package is transferred under an infusion head by means of a drawer. The
30 drawer has a pivoting compartment which, when the drawer is retracted, is
overturned to manually remove the used single portion package.

US-A-6820535 describes an automatic machine for producing coffee using
capsules. A series of separate magazines to house capsules with different
qualities of coffee are combined with a mechanism to insert individual capsules

into the infusion head. The infusion head has a lower portion with a grill of perforators and holes for outflow of the beverage and a vertically movable upper portion with a perforator which breaks the upper wall of the capsule to allow inflow of pressurized water.

5 US-A-6799503 describes a machine or device for producing coffee using capsules with an infusion chamber similar to the one described in US-A-6820535. However, in this case, the capsules are not contained in an automatic magazine, but are inserted individually in a drawer which transports each single capsule inside the infusion head. The infusion head is produced in two parts, namely a
10 lower fixed part and an upper part vertically movable against the lower part. The drawer and the infusion head are produced so that while a capsule is positioned in the infusion head for hot water to flow through it to produce a first cup of coffee, the drawer can return to the external position to receive a second capsule which, automatically and sequentially, will be inserted into the infusion head once the first
15 capsule has been ejected by an ejector associated with the infusion chamber.

Objects and summary of the invention

The object of the present invention is to produce a device, i.e. a machine for producing a beverage, such as, although not exclusively, coffee, from a single portion package which is particularly efficient, easy to service and practical to use.

20 In substance, according to a first aspect, the invention relates to a device for producing a beverage from a single portion package, comprising an upper half-chamber and a lower half-chamber, connectable to each other to define an infusion chamber, the upper half-chamber being provided with a vertical movement to open and close the infusion chamber, and the lower half-chamber
25 being produced in a drawer movable horizontally from a loading position of the single portion package to an infusion position under the upper half-chamber. Characteristically, the drawer is provided with an overtravel movement to be taken to a third position to eject the single portion package after extraction of the beverage, the second position being intermediate between said first and said third
30 position.

In substance, according to the invention the drawer which is used to load and insert the single portion package in the infusion area also performs the dual function of forming the lower part of the infusion chamber, i.e. the lower half-chamber, and of ejecting the used single portion package, in a position different

from the position to load fresh packages.

According to a possible advantageous embodiment of the invention the drawer can be provided with an additional unloading movement to eject the single portion package when the drawer is in said third position. Advantageously, this
5 unloading or ejecting movement can be a rotating or pivoting movement with which the drawer is made to overturn. The rotating or pivoting movement is preferably about an approximately horizontal axis which is preferably approximately orthogonal to the direction of movement with which the drawer travels through the various operating positions. The axis of oscillation could also
10 be inclined with respect to the horizontal and could even have a different orientation with respect to the direction of movement of the drawer, for example approximately parallel or in any case lying on a plane parallel to the direction of feed of the drawer.

It must be understood that the whole drawer or only a part thereof can be
15 subjected to the additional unloading movement, although the first solution is more advantageous as it is simpler as regards construction. The only relevant factor is that the seat receiving the single portion package is overturned or opened to unload the used single portion package. For example, the drawer can comprise a moving slide, provided with a simple translational movement, disposed on which is
20 a pivoting element, defining the seat in which the single portion package is inserted. Differently, the drawer can be produced in two portions which open, for example, with a pivoting movement about a vertical axis.

The three positions, for loading, infusion and ejection respectively, can advantageously be aligned along a trajectory which is preferably rectilinear.
25 Nonetheless, it would also be possible for the drawer to be moved through three positions disposed along a different trajectory, for example an arc of circumference or also along a trajectory of another shape. When the movement is along an arc of circumference, the drawer can be provided with a principal rotating or pivoting movement about a vertical axis and with an additional pivoting or
30 rotating movement about a horizontal or inclined axis to eject the used single portion package from the drawer.

In a preferred embodiment of the invention, the unloading movement with which the drawer is provided is combined with a translational movement of the drawer from the second position to the third position, said drawer therefore moving

at least in one stretch of the trajectory thereof with a roto-translational movement.

In a possible advantageous embodiment, the device is provided with a horizontal sliding guide of the drawer, which extends from the first position to the third position of the drawer, the upper half-chamber of the infusion head being
5 disposed in an intermediate position of said guide.

In a possible embodiment of the invention the drawer movement could be controlled manually. In this case the drawer could be moved by hand by the user to be moved from one to the other of the three positions. Suitable limit stops can define one or the other of the various positions taken by the drawer. A cam
10 mechanism or a toothed wheel and rack or the like can be provided to impose the additional unloading movement on the drawer.

Nonetheless, in a preferred embodiment of the invention the horizontal movement of the drawer is controlled by an actuator, such as a linear actuator or preferably an electronically controlled electric motor.

Advantageously, according to a particularly efficient embodiment of the
15 invention, a single actuator controls movement of the drawer from one to the other of said three positions and the additional unloading movement of the drawer to eject the used single portion package. However, it would also be possible to use an additional actuator for this purpose, although this solution is less advantageous
20 from the viewpoint of costs and overall dimensions, as well as reliability of the device.

In a possible embodiment, the drawer is associated with means to transmit motion from said single actuator and with a constraining member which acts on said drawer for a stretch of the travel thereof from one to the other of said
25 positions. The action of the constraining member ceases in proximity to the third position, while the means to transmit motion and the constraining member are arranged and designed so that under the action of the means to transmit motion, in the stretch of travel in which said constraining member acts on said drawer, the drawer is constrained to move without rotating, while where the constraining
30 member does not act on the drawer the latter is made to pivot.

In a possible embodiment, the means to transmit motion to the drawer are composed of a toothed belt with at least one branch parallel to the trajectory of the drawer; and a toothed wheel constrained non-rotationally to the drawer and meshing with said branch of the toothed belt.

The constraining member can, for example, include a supporting surface, which exerts a vertical constraining force on the drawer.

Other solutions which attain the same function could also be used. For example, the drawer could be moved along a shaped guide, which imparts a rotating movement to the drawer in the final part of the travel, although this
5 solution is less advantageous, above all from the viewpoint of overall dimensions.

According to a different aspect, the invention relates to a device for producing beverages in single portion packages, comprising an infusion head and a movable drawer, forming a housing for the single portion packages, wherein the
10 drawer is provided with a movement through three aligned and sequential positions, respectively a loading position for loading a single portion package, an infusion position and an ejection position for ejecting the used package, the infusion position being intermediate with respect to loading and ejecting positions. Preferably, the housing forms a first portion of an infusion chamber, the second
15 portion of which is formed by a vertically movable element placed over the infusion position. Moreover, the drawer is preferably provided with an additional unloading movement to eject the used single portion package from said housing.

Further aspects and advantageous characteristics of the device according to the invention are indicated in the claims and shall be described in greater detail
20 hereunder, with reference to an embodiment provided by way of example.

According to a further aspect, the invention also relates to a method for preparing beverages from single portion packages comprising the steps of:

- placing a single portion package in a housing positioned in an initial loading position and forming a first part of an infusion chamber;
- 25 ➤ moving said single portion package along an insertion direction under a second part of said infusion chamber;
- closing the infusion chamber by moving said first and said second part of the infusion chamber towards each other for tight connection;
- extracting the beverage from the infusion chamber;
- 30 ➤ moving the used single portion package farther in said direction of insertion towards an ejecting position and ejecting the used single portion package from said housing;
- returning said housing to the initial loading position.

Further advantageous characteristics of the method according to the

invention are indicated in the appended claims.

Brief description of the drawings

The invention shall now be more apparent by following the description and accompanying drawing which shows a practical embodiment of the invention.

5 More specifically, in the drawing:

Figure 1 shows a side view of the device according to the invention with the drawer in a first loading position of the single portion package;

Figure 2 shows a plan view according to II-II of the Figure 1;

Figure 3 shows a longitudinal section according to III-III in Figure 2;

10 Figure 4 shows a section according to IV-IV in Figure 3;

Figure 5 shows a side view analogous to Figure 1 of the device with the drawer in a second intermediate infusion position;

Figure 6 shows a section analogous to the section in Figure 3 with the drawer in the intermediate position for preparing the beverage;

15 Figure 7 shows a side view analogous to the view in Figure 1 with the drawer in a third unloading, or ejecting position of the used single portion package; and

Figure 8 shows a section analogous to the section in Figure 3 of the device with the drawer in the unloading position.

Detailed description of the preferred embodiment of the invention

20 The drawing illustrates a device or machine for producing hot beverages according to the invention, limited to the part relative to movement of the single portion packages and to the actual infusion head. It is understood that the members described hereunder will be inserted in a suitable housing with which the conventional members provided in this type of machine will be associated, such
25 as: the boiler to prepare hot water, the pumps to supply pressurized hot water, optional steam generating systems, the nozzles to prepare milk froth or the like, the ducts for outflow of the beverage into the cup or other container, and so on.

Moreover, in the text hereunder and in the accompanying drawings, reference shall be made to a device specifically destined for the preparation of
30 beverages using single portion packages of the type known as bags, i.e. in which the powder or other material destined to produce the beverage is contained between two layers or valves joined to each other along the edge of said bag and made of a material permeable to water. Nonetheless, it is understood that with suitable modifications of the portions defining the chamber or infusion head the

same device can use capsules of the perforable type. The perforators and the systems for inflow of water and outflow of beverage from capsules of this type are known to those skilled in the art and do not require detailed description herein.

5 The device, indicated as a whole with 1, is housed in the structure of the machine, not shown. It comprises a guide indicated as a whole with 3, composed of slots 5 extending horizontally and produced in a pair of tracks 7. Extending between the tracks 7 are horizontal flat walls or surfaces 9A and 9B, sliding on which is a drawer, provided with an alternate horizontal movement according to the double arrow f11.

10 The drawer 11 has, in the example shown, an inner seat 13 for single portion packages C in the form of bags containing coffee powder or another product destined to produce beverages through the flow of hot water. As observed previously, the device can also be modified to receive and use single portion packages in the form of capsules or cartridges. The bottom of the seat 13 has a
15 perforated plate 15, for passage of the beverage outflowing from the bag C, which is then discharged through a hole 17 towards a dispensing duct (not shown) into a cup or other container placed in the machine either by the user or automatically.

As can be seen by comparing Figures 3, 6 and 8, the drawer 11 can have different positions which will be described in greater detail hereunder with
20 reference to operation of the device. In general and preliminarily, it can be seen that the drawer 11 can take a loading position (Figure 3) in which a single portion package C can be loaded in the drawer. It can be placed in the seat 13 of the drawer 11 manually by the user when the device is incorporated in a manual machine, or it can be loaded by a magazine when the machine is automatic.

25 Figure 6 shows the position taken by the drawer 11 in the supply step, i.e. the step to prepare the beverage, while Figure 8 shows the position of the drawer in the ejection step, i.e. the step to unload the used single portion package C after preparation of the beverage.

30 In the positions shown in Figures 3 and 6 the drawer 11 is in the horizontal position and rests on the walls 9A (in the position in Figure 3) and 9A, 9B (in the position in Figure 6). Vice versa, when the drawer is transferred to the unloading position of the used single portion package C it is (Figure 8) in a zone devoid of the lower supporting surface defined by the surfaces or walls 9A, 9B and is made to pivot to eject the used single portion package. A container for used single

portion packages is located under the position taken by the drawer 11 in Figure 8.

The translating and pivoting movement of the drawer is obtained by means of a single actuator indicated with a broken line in Figure 2 and omitted for greater clarity of the drawing in the remaining figures. The actuator 19 can be an electronically controlled electric motor. Keyed onto the output shaft of the actuator 19 is a toothed pulley 21 to control a toothed belt 23, in turn driven around a second idle toothed pulley 25. The toothed pulleys 21 and 25 are supported at the ends of one of the tracks 7, which form horizontal guides 3. The upper and lower branches 23A and 23B of the belt extend over and under the slot 5.

Engaging with the upper branch 23A of the belt 23 is a toothed wheel 27 (see in particular Figures 1 and 7) keyed onto a shaft 29 with a square section, constrained rigidly to the drawer 11. When the actuator 19 rotates the pulley 21, the movement imparted thereby to the toothed belt 23 causes corresponding movement of the drawer 11 through the action of transmission by the toothed wheel 27.

When the drawer 11 is in contact with the horizontal flat walls or surfaces 9A and/or 9B, it cannot pivot and therefore the toothed wheel 27 remains engaged with one or more of its teeth with the teeth of the upper branch 23A of the belt 23 and moves with a rectilinear translational motion. When, on the other hand, the drawer loses the support offered by the surface 9A or 9B (Figure 8) it can pivot and consequently the rotational movement of the pulley 21 is transformed, by means of the transmission 23, 27, into a pivoting movement (clockwise or counter-clockwise depending on the direction of rotation of the pulley 21) of the drawer 11.

The horizontal guide 3 is combined with a unit indicated as a whole with 31 (and which can be constrained thereto), housing a substantially cylindrical body 33 defining an upper half-chamber, i.e. an upper portion of an infusion chamber of the device 1, the lower half-chamber or portion of which is composed of the seat 13 of the drawer 11. When the drawer 11 is in the intermediate position of Figure 6, the upper and lower half-chambers can connect to form the infusion chamber inside which the single portion package C remains constrained.

Configuration of the body 33 is shown in detail in Figures 3, 6 and 8.

The body 33 inferiorly has a seat 35 substantially symmetrical to the seat 13 of the drawer 11 and forming the upper half-chamber. Disposed at the center of the seat is a filter 37, formed by a perforated metal disk, through which high

temperature pressurized water coming from a boiler (not shown and of per se known type) flows to produce the beverage by extracting the substances contained in the single portion package C. The filter 37 is elastically stressed by a compression spring and when the infusion chamber is closed it is thrust upward by
5 the bag C against the force of the spring. When the infusion chamber is re-opened, the elastic spring associated with the filter 37 guarantees detachment of the bag from the upper half-chamber and therefore prevents the used bag from remaining inside the machine.

Disposed around the seat 35 is an O-ring 36 cooperating with an annular
10 boss 38 surrounding the seat 13 of the drawer 11. In the example shown the single portion packages C have an annular lip CL formed by the connecting and welding zone of the two valves which form the bag C, said lip resting on the annular boss 38 and on which the O-ring 36 acts with pressure when the cylindrical body 33 defining the upper half-chamber of the infusion head is lowered
15 towards the drawer 11 to the position shown in Figure 6.

The body 33 is provided with an external thread 39 which engages in a nut screw 41 held between two blocks 43, 45 of molded plastic material, in order to rotate about the axis A-A of the cylindrical body 33, but remaining constrained axially. In this way rotation of the nut screw 41 in one direction or the other causes
20 lifting or lowering of the cylindrical body 33 and therefore opening or closing of the infusion chamber defined by the upper half-chamber 35 and by the lower half-chamber 13. In this movement the cylindrical body 33 is guided inside a substantially cylindrical seat 47 formed by the blocks 43 and 45. The seat 47 and the cylindrical body 45 have a cross section (Figure 4) which prevents rotation of
25 the cylindrical body 33 about the axis A-A thereof.

The block 43 at least partially also forms a housing 51 for an electric motor 53 to control the nut screw 41. The output shaft 55 of the motor 53 (Figure 4) is provided with a screw 57 engaging with external teeth 59 of the nut screw 41. Rotation of the motor 53 therefore causes rotation of the nut screw 41 and
30 consequently the lifting or lowering movement of the cylindrical body 33.

The blocks 43 and 45 are constrained to each other and to a third block 46 to form the unit 31. The guide 3 is constrained to the block 46.

Operation of the device described hereinbefore is as follows.

When a beverage requires to be prepared, the drawer 11 is taken to the first

position thereof to load a single portion package C, shown in Figures 1, 2 and 3. In this position the drawer 11 is in the horizontal position and rests on the lower flat surface or wall 9A. If the machine is of the manual type the drawer in this position can preferably be located outside the machine, accessible from the front thereof to allow the user to insert the single portion package C manually into the seat 13. If, on the other hand, the machine is automatic, the position of the drawer 11 in this step will be under an automatic magazine of single portion packages, which may be of the multiple type to allow the user to choose between various qualities of beverage by selecting the single portion package desired.

10 Once the single portion package C has been placed in the seat 13 (Figure 3), the drawer is made to translate, automatically or manually by the user, controlled by the actuator 9, from the position in Figures 1, 2 and 3 to the position in Figures 5 and 6. During this translational movement the drawer 11 remains in contact with the lower surfaces 9A, 9B and is therefore obliged to translate without
15 pivoting.

 In the position in Figures 5 and 6, the seat 13 of the drawer 11 is aligned axially with the seat 35 above produced in the body 33. Having reached this position, the body 33 can be lowered with a movement according to the arrow f33 (Figures 5 and 6) to close the infusion chamber taking the O-ring 36 to press
20 against the annular boss 38. This movement is controlled by the motor 53 sequentially after a control unit (not shown) enables the lowering movement, having received a signal indicating that the drawer 11 has reached the position in Figures 5 and 6 e.g. by a microswitch, not shown, or by an encoder associated with the actuator 19.

25 Closing of the infusion chamber causes compression of the single portion package C and upwards thrust of the filter 37. Upon reaching the hermetically closed position along the edges of the single portion package C, the control unit of the machine enables the inflow of pressurized hot water through the filter 37.

 After the beverage has been dispensed, the motor 53 controls raising of the
30 cylindrical body 33 and thus the opening of the infusion chamber to allow removal of the used single portion package C. The elastic force acting on the filter 37 and the small distance it can travel through the effect of the elastic thrust guarantees detachment of the used single portion package.

 Unloading of the single portion package takes place by producing, by means

of the actuator 19, further rotation of the pulley 21 in the same direction (clockwise in the example) which produced translation of the drawer 11 from the position in Figure 3 to the position in Figure 6. As can be seen in Figures 7 and 8, further translation from left to right (in the drawing) of the drawer 11 makes this move
5 beyond the right corner of the lower supporting surface 9B and consequently it is free to pivot through the action of translation of the upper branch 23A of the belt 23 engaging with the toothed wheel 27 keyed onto the square shaft 29 integral with the drawer 11.

Rotation or pivoting of the drawer 11 causes partial overturning (Figure 8)
10 and consequently the single portion package C falls into the container for used packages below (not shown). The drawer can be retractable manually or in a motorized way, controlled by the user to remove the used packages and optionally to perform any cleaning. Pivoting of the drawer 11 can be performed when the drawer has carried out the entire translating movement and the pins or shafts with
15 which it is guided in the slots 5 have come to rest upon the end 5A of said slots. Vice versa, as there is no constraint to prevent rotation of the drawer after this has moved with the axis of the wheel 27 beyond the edge 9X of the surface 9B, the drawer can start to pivot before coming into contact with the end 5A of the slots, and therefore in the last stretch of its movement it will have a roto-translational
20 motion. The final position of the drawer at the end of the pivoting movement can be defined by the edge 9X against which the drawer strikes (Figure 8). Alternatively, a different type of control can be provided, such as an encoder on the motor 19. In any case, it is advantageous for the drawer 11 to be subjected to a slight impact at the end of its travel to facilitate detachment of the single portion
25 package C, should the latter tend to adhere to said drawer. This makes it unnecessary to use an elastic system to detach the package from the drawer, as instead is provided on the filter 37 on the upper portion of the infusion chamber.

By inverting the movement of the motor 19 the drawer 11 is returned to the initial loading position (Figures 1, 2 and 3) to receive a new single portion package
30 C. The edge or corner 9X of the wall 9B forms a stop which urges the drawer 11 to perform the reverse pivoting movement to be returned to the horizontal position and then translate to the loading position.

It is understood that the drawing purely shows a possible embodiment of the invention, which may vary in forms and arrangements without departing from the

scope of the concept on which the invention is based. Any reference numerals in the appended claims are provided for the purpose of facilitating reading thereof with reference to the description and to the drawing and do not limit the scope of protection represented by the claims.

CLAIMS

1. A device for producing a beverage from a single portion package, comprising an upper half-chamber and a lower half-chamber, connectable to each other to define an infusion chamber, the upper half-chamber being provided with vertical movement to open and close the infusion chamber, and the lower half-chamber being produced in a drawer movable horizontally from a position to load the single portion package to an infusion position under the upper half-chamber, characterized in that said drawer is provided with an overtravel movement to be taken to a third position to eject the single portion package after the beverage has been extracted, the second intermediate position being between said first and said third position.

2. Device as claimed in claim 1, characterized in that said drawer is provided with an additional unloading movement to eject the single portion package when the drawer is in said third position.

3. Device as claimed in claim 2, characterized in that said drawer is provided with movable portion, which performs said additional unloading movement to eject the single portion package.

4. Device as claimed in claim 2, characterized in that the whole of said drawer is provided with said additional unloading movement to eject the single portion package.

5. Device as claimed in claim 2, 3 or 4, characterized in that said unloading movement is a pivoting or rotating movement.

6. Device as claimed in claim 5, characterized in that said unloading movement is combined with the movement to move the drawer from the second position to the third position, said drawer moving with a roto-translational motion.

7. Device as claimed in one or more of the previous claims, characterized in that said drawer is movable according to a translating movement through said first, said second and said third position.

8. Device as claimed in claims 6 and 7, characterized in that said drawer is provided with a roto-translational movement at least in the final step of movement from the second position to the third position.

9. Device as claimed in one or more of claims 5 to 8, characterized in that said unloading movement is a pivoting movement about a substantially horizontal axis.

10. Device as claimed in one or more of claims 5 to 9, characterized in that said unloading movement is a pivoting movement about an axis substantially orthogonal to the direction of movement of the drawer from one to the other of the three loading, infusion and ejection positions.

5 11. Device as claimed in one or more of claims 5 to 9, characterized in that said unloading movement is a pivoting movement about an axis approximately parallel to the direction of movement of the drawer from one to the other of the three loading, infusion and ejection positions.

10 12. Device as claimed in one or more of claims 5 to 8, characterized in that said unloading movement is a pivoting movement about an axis inclined with respect to the horizontal.

15 13. Device as claimed in one or more of the previous claims, characterized in that it comprises a horizontal sliding guide of said drawer, which extends from said first of position the drawer to said third position of the drawer, the upper half-chamber of the infusion head being disposed at the level of an intermediate position of said guide.

14. Device as claimed in one or more of the previous claims, characterized in that said upper half-chamber has an elastic element to detach the single portion package from the seat defined in the upper half-chamber.

20 15. Device as claimed in one or more of the previous claims, characterized in that the horizontal movement of the drawer is controlled by an actuator.

25 16. Device as claimed in one or more of the previous claims, characterized in that a single actuator controls movement of the drawer from one to the other of said three positions and the additional unloading movement of the drawer to eject the used single portion package.

30 17. Device as claimed in claim 16, characterized in that said drawer is associated with means for transmission of motion from said single actuator and with a constraining member which acts on said drawer for a stretch of the travel thereof from one to the other of said positions, the action of said constraining member ceasing in proximity to the third position, the transmission means and the constraining member being arranged and designed so that under the action of the means for transmission of motion, in the stretch of travel in which said constraining member acts on said drawer, the drawer is constrained to move without rotating, while where the constraining member does not act on the drawer

it is made to pivot.

18. Device as claimed in claim 17, characterized in that said transmission means include: a toothed belt with at least one branch parallel to the trajectory of said drawer; and a toothed wheel constrained non-rotationally to the drawer and
5 engaging with said branch of the toothed belt.

19. Device as claimed in claim 17 or 18, characterized in that said constraining member includes a supporting surface, which exerts a vertical constraining force on said drawer.

20. Device as claimed in one or more of the previous claims, characterized
10 in that said upper half-chamber is integral with a substantially cylindrical body with an external thread, engaging in a nut screw connected by a transmission of motion to an actuating motor to control vertical movement of said upper half-chamber.

21. Device as claimed in claim 20, characterized in that said substantially
15 cylindrical body is guided in a seat inside which said nut screw is housed revolvingly.

22. Device as claimed in claim 21, characterized in that said substantially
cylindrical body and said seat have respective cross sections configured to allow sliding of the substantially cylindrical body inside said seat parallel to the axis of
20 said cylindrical body and to prevent rotation of the substantially cylindrical body about said axis.

23. Device as claimed in claim 21 or 22, characterized in that said seat is produced at least partially in a block of plastic material also forming at least part of a housing for said motor.

24. Device as claimed in one or more of claims 21 to 23, characterized in
25 that said nut screw is mounted free to rotate but axially constrained between two axially aligned and superimposed portions, forming said seat.

25. Device as claimed in claim 24, characterized in that the two superimposed portions forming the seat for said substantially cylindrical body are
30 produced from two blocks of plastic material.

26. Device as claimed in one or more of claims 21 to 25, characterized in that said seat is integral with a supporting unit of the drawer guide.

27. A device for producing beverages from single portion packages, comprising an infusion head and a movable drawer, forming a housing for the

single portion packages, wherein the drawer is provided with a movement through three sequential positions, respectively a loading position for loading a single portion package, an infusion position and an ejection position for ejecting the used package, the infusion position being intermediate with respect to loading and
5 ejection positions

28. Device as claimed in claim 27, wherein said three positions are aligned along a rectilinear or arc of circumference shaped path.

29. Device as claimed in claim 27 or 28, wherein said housing forms a first portion of an infusion chamber, the second portion of said infusion chamber being
10 formed by a vertically movable element placed over said infusion position.

30. Device as claimed in claim 27, 28 or 29, wherein said drawer is provided with an additional unloading movement to eject the used single portion package from said housing.

31. Device as claimed in claim 30, characterized in that said unloading
15 movement is a pivoting movement about an approximately horizontal axis and preferably substantially orthogonal to the direction of movement of said drawer from one to the other of said three positions.

32. Device as claimed in claim 30 or 31, characterized in that a single actuator controls movement of the drawer from one to the other of said three
20 positions and the additional unloading movement.

33. Device as claimed one or more of claims 27 to 32, wherein said drawer is provided with a translating movement through said three positions.

34. Method for preparing beverages from single portion packages comprising the steps of:

- 25
- placing a single portion package in a housing in an initial loading position and forming a first part of an infusion chamber;
 - moving said single portion package in a direction of insertion under a second part of said infusion chamber;
 - closing the infusion chamber by moving said first and said second part of the
30 infusion chamber towards each other for tight connection;
 - extracting the beverage from the infusion chamber;
 - moving the used single portion package farther in said direction of insertion towards an ejecting position and ejecting the used single portion package from said housing;

➤ returning said housing to the initial loading position.

35. Method as claimed in claim 34, wherein said housing is made to pivot to eject the used single portion package.

36. Method as claimed in claim 34 or 35, wherein said housing is provided
5 with a translating movement.

37. Method as claimed in claim 35 or 36, wherein said housing is moved according to a roto-translational motion from the position to extract the beverage to the position to eject the used single portion package.

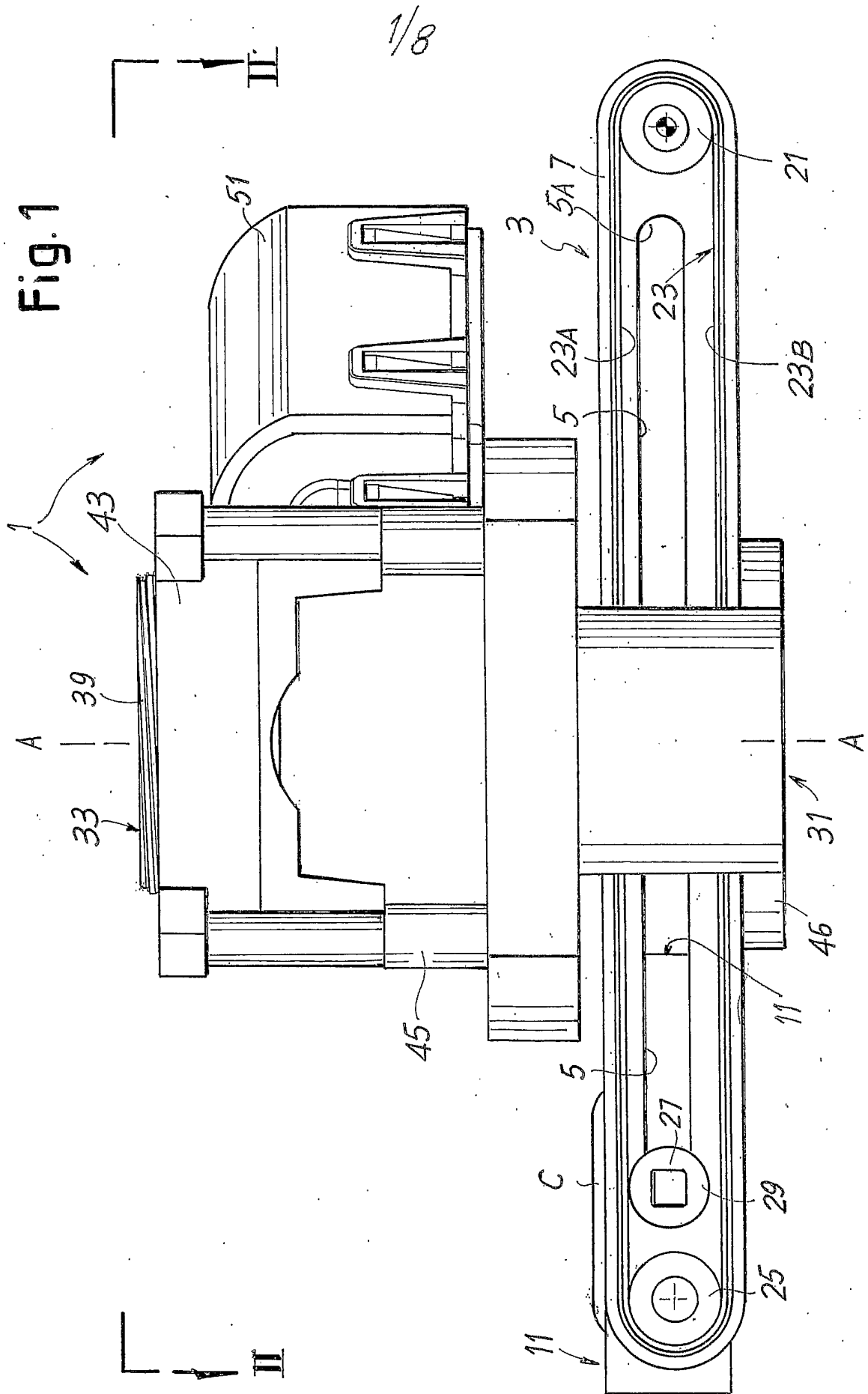
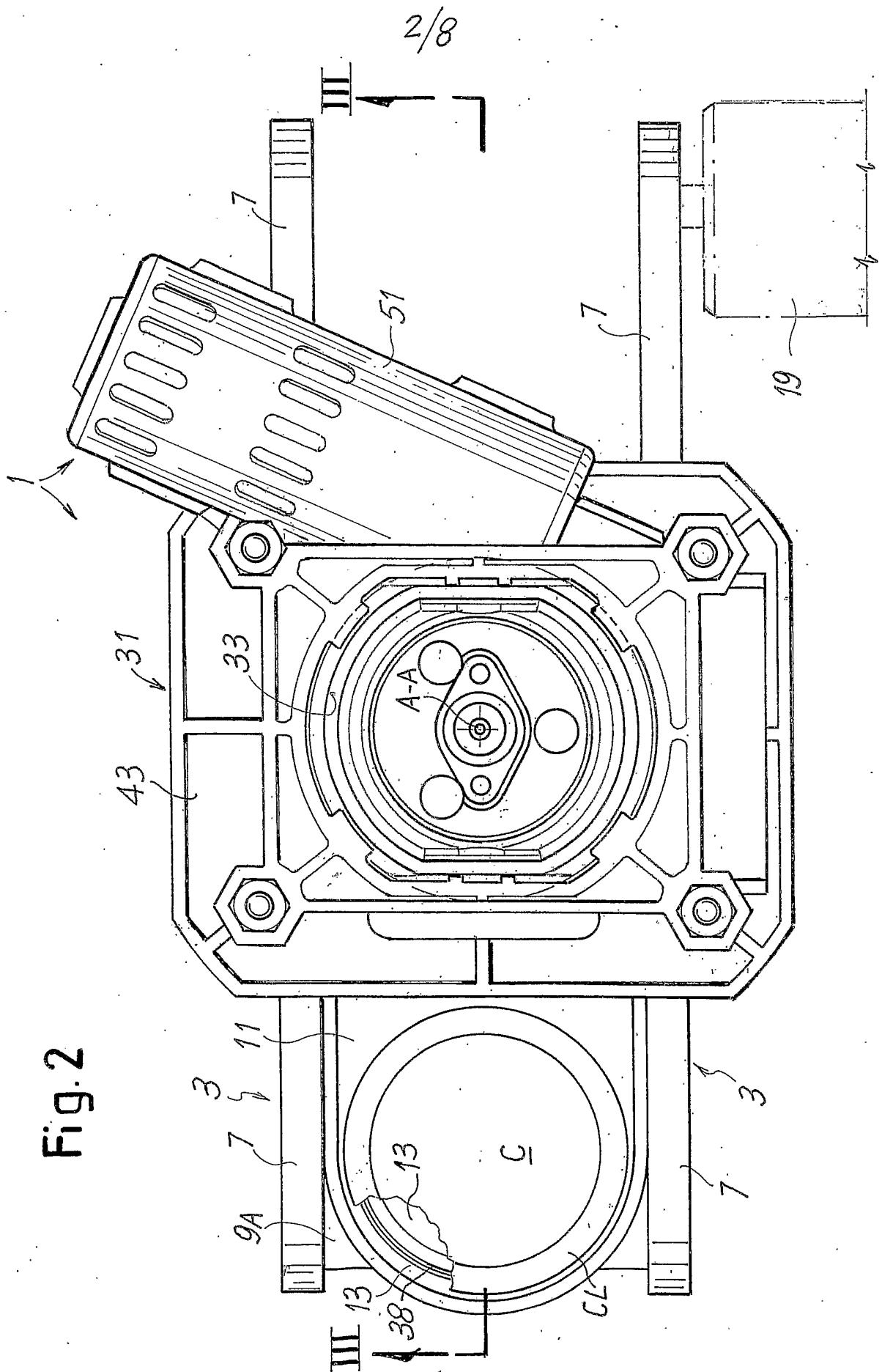


Fig. 2



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Fig. 3

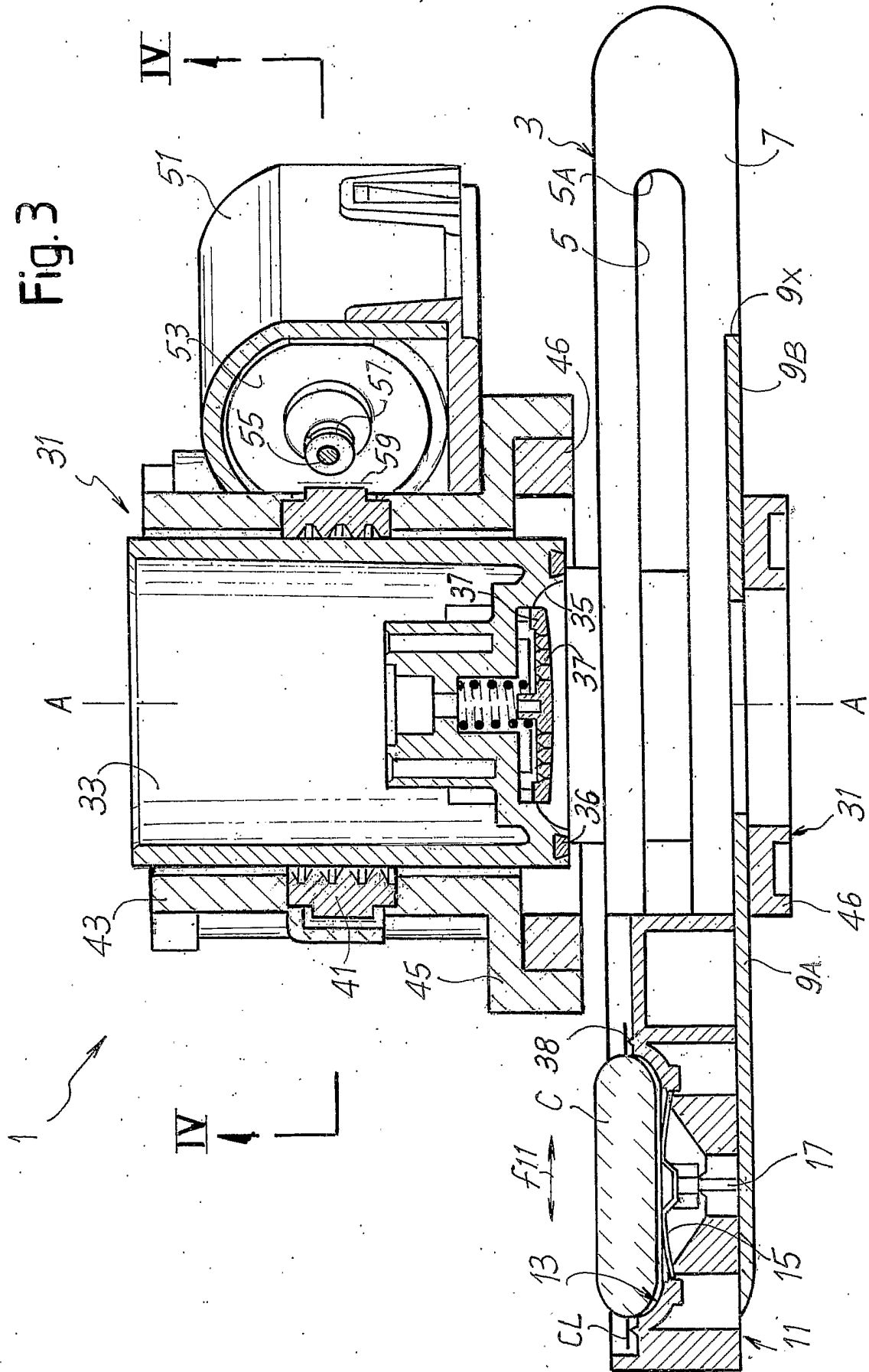
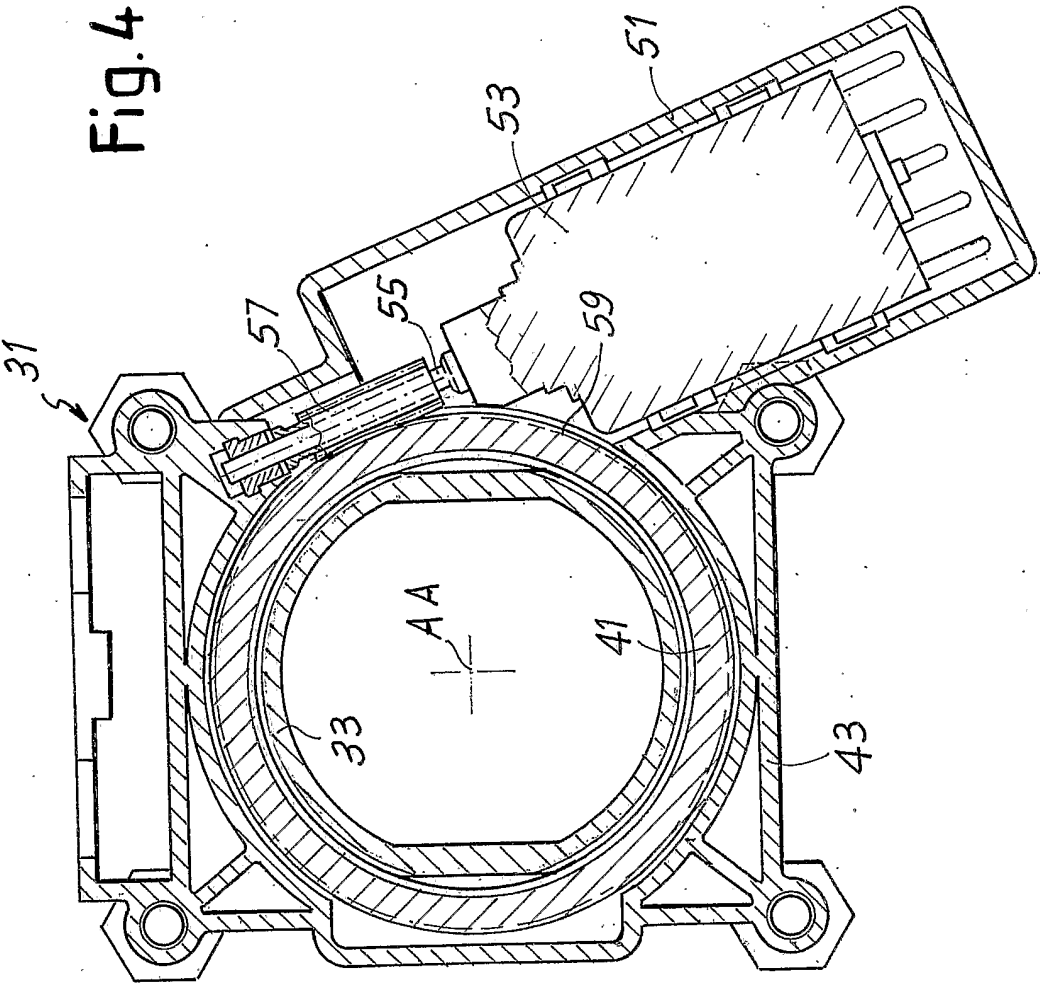


Fig. 4



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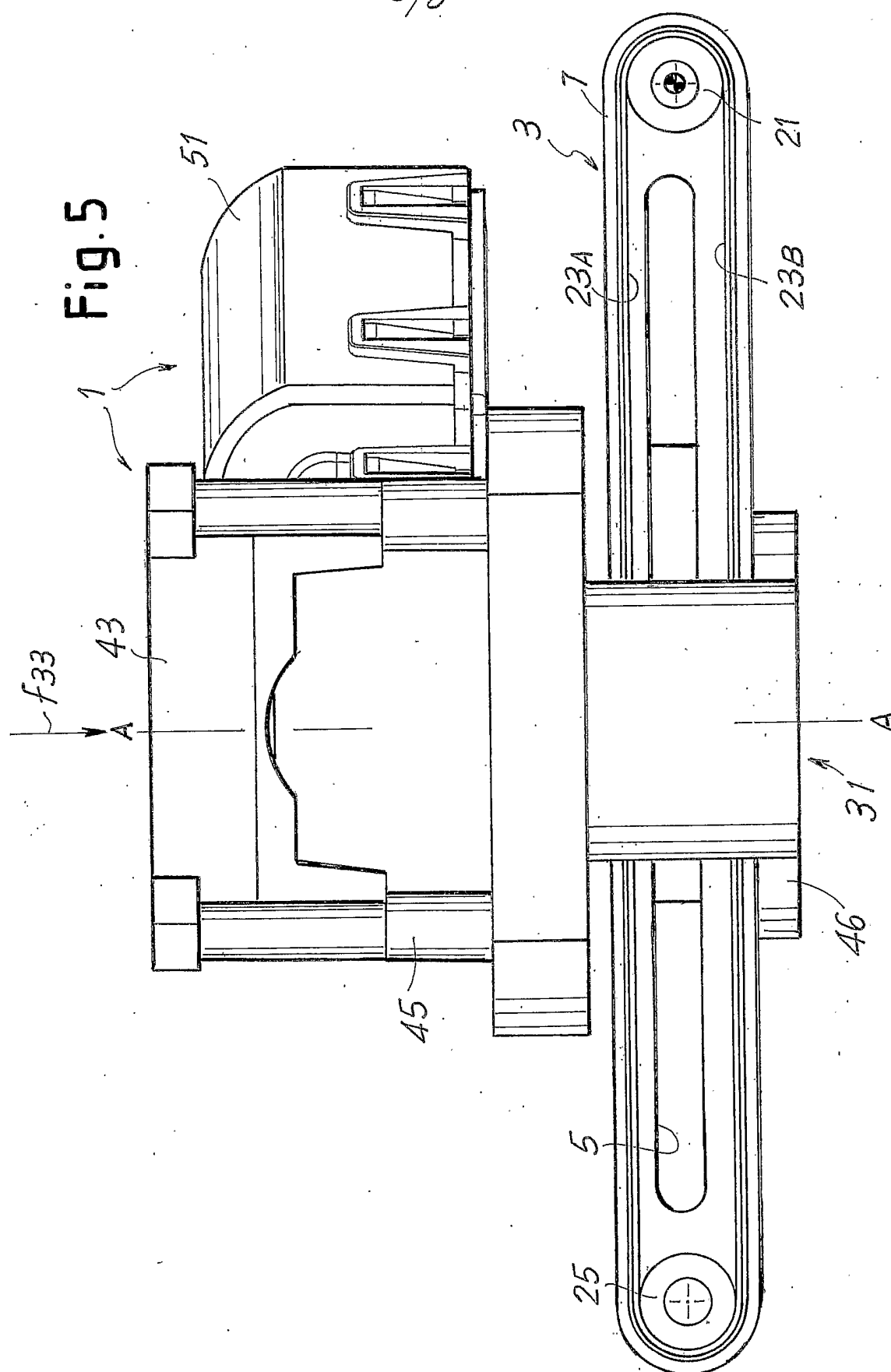
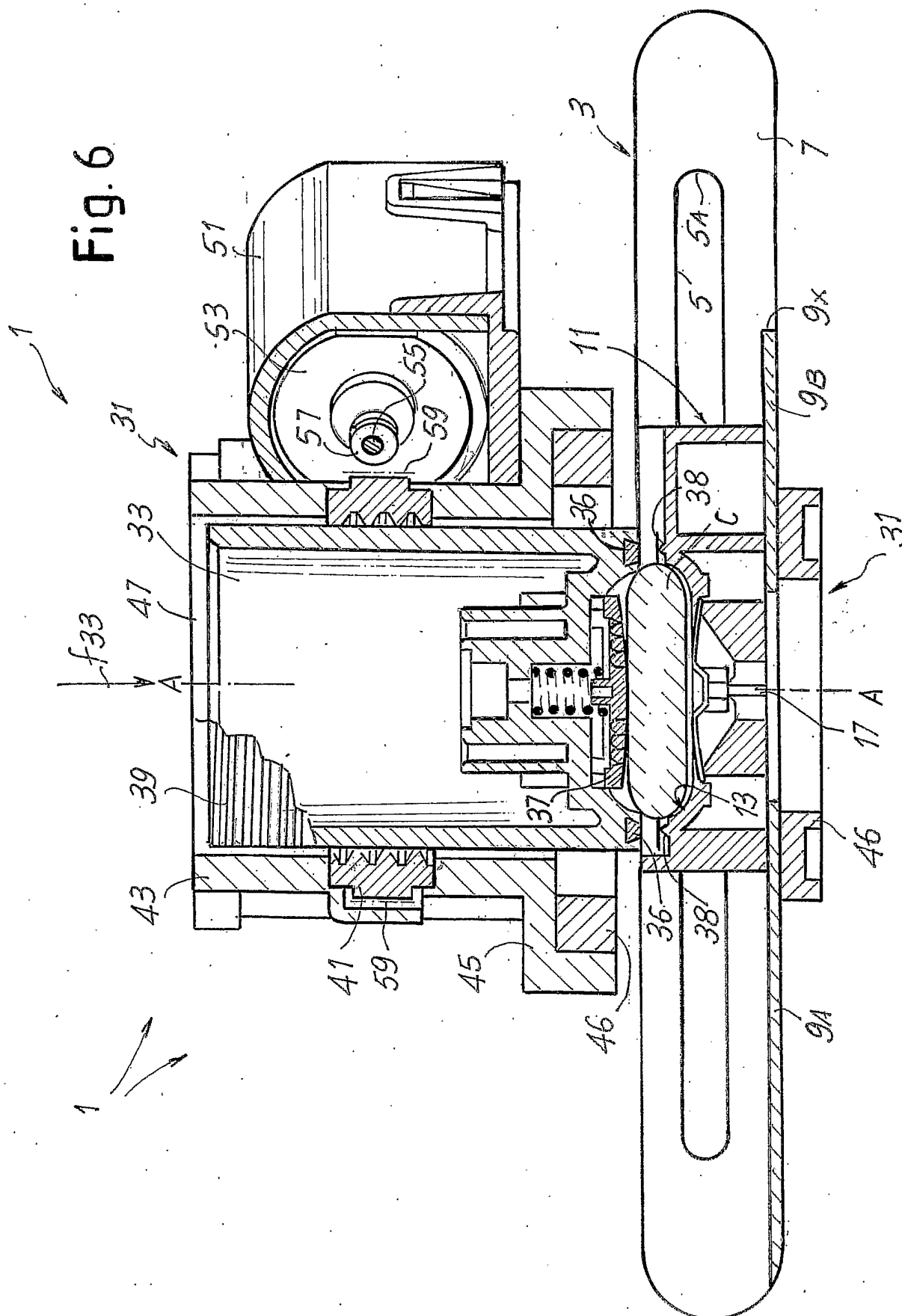
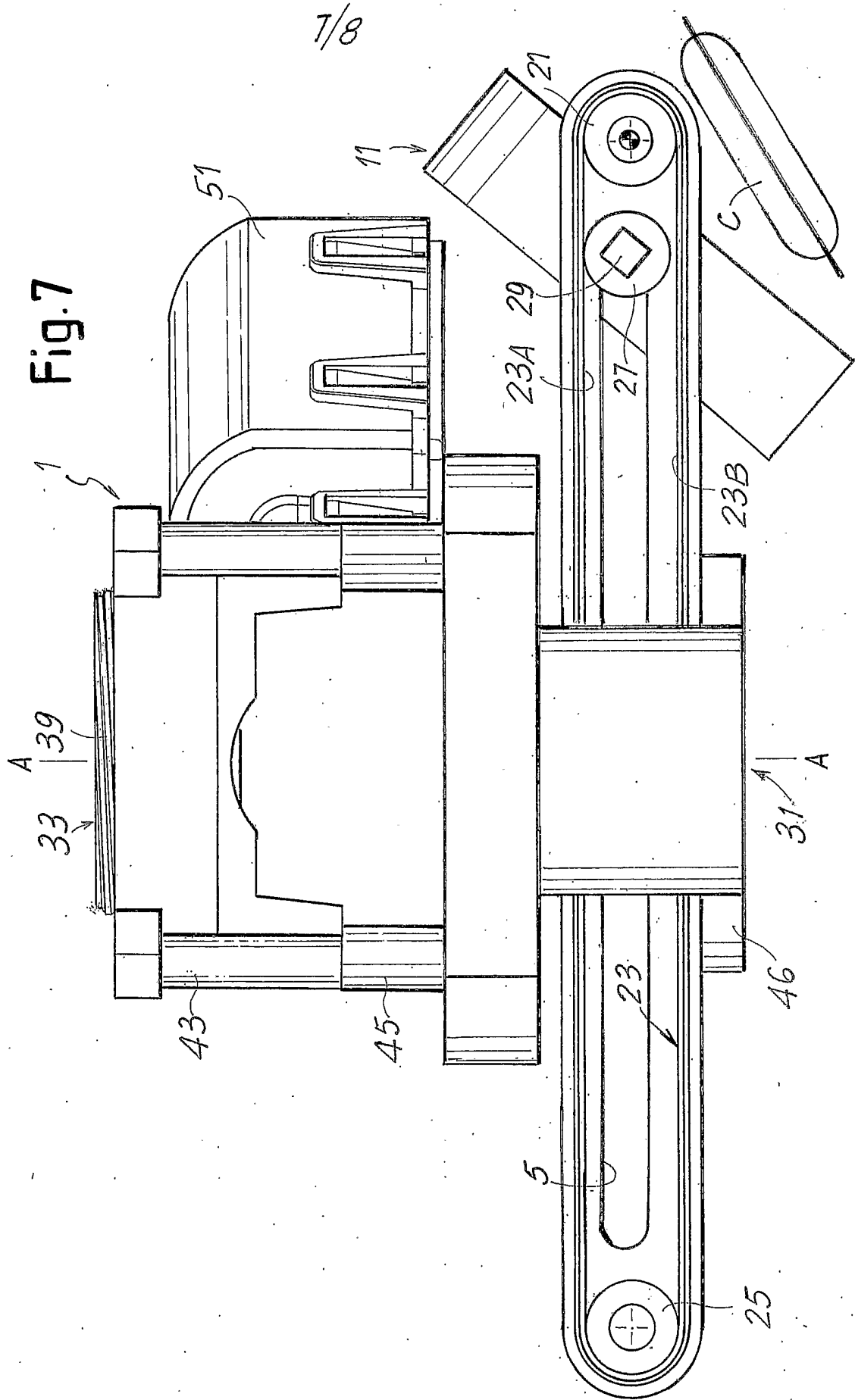
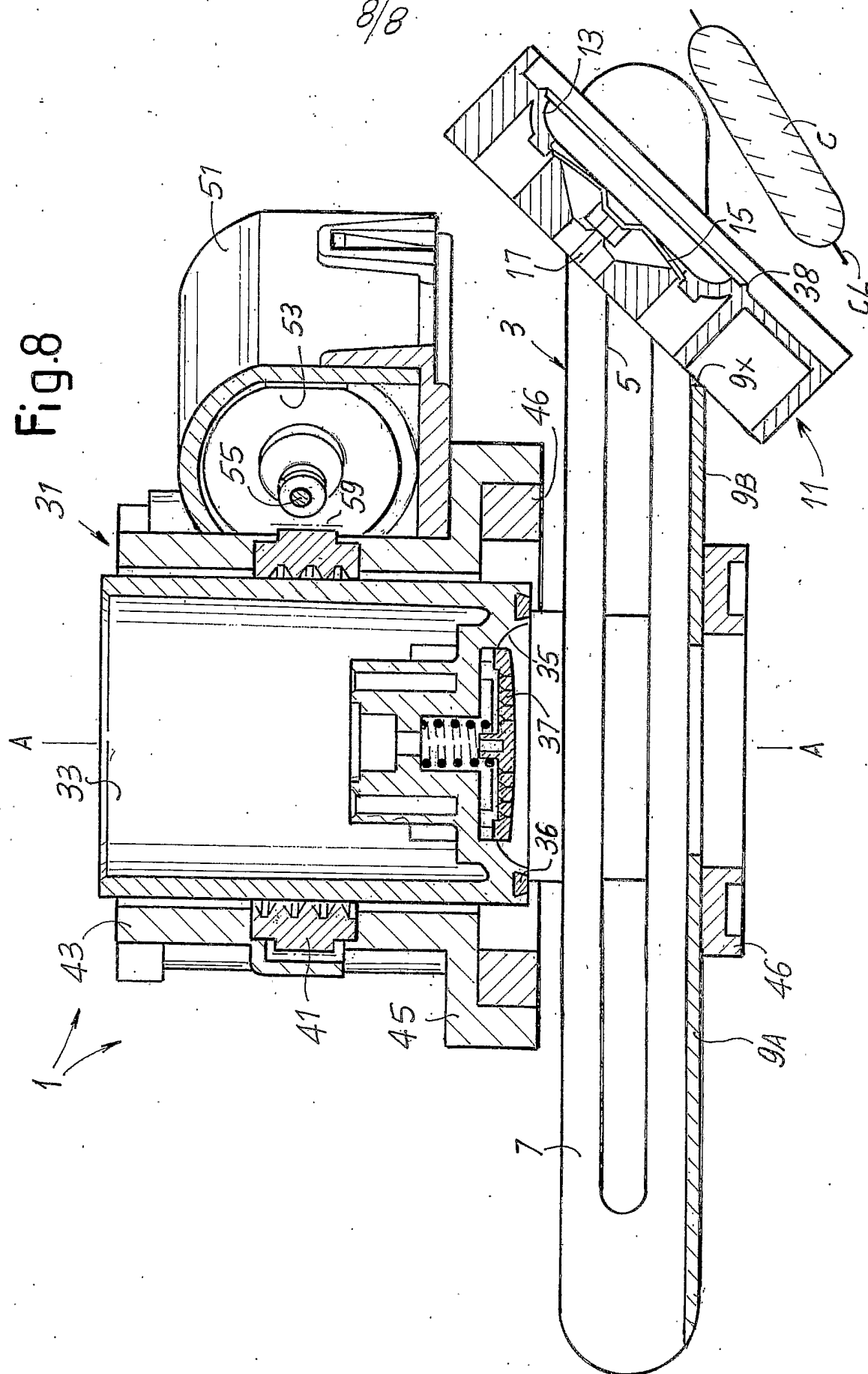


Fig. 6





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INTERNATIONAL SEARCH REPORT

International application No

PCT/IT2006/000377

A. CLASSIFICATION OF SUBJECT MATTER

INV. A47J31/40

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 2004/237793 A1 (ZURCHER ALAIN ET AL) 2 December 2004 (2004-12-02) paragraph [0037] - paragraph [0063]; figures 3,5,8,10-15	1-37
A	US 2003/071056 A1 (HALE ROBERT) 17 April 2003 (2003-04-17) paragraph [0030] - paragraph [0034]; figures 1-5	



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

13 September 2006

Date of mailing of the international search report

20/09/2006

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IT2006/000377

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