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

(11) EP 2 061 012 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
20.05.2009 Bulletin 2009/21

(51) Int Cl.:
G07F 13/10 *(2006.01)*

(21) Application number: **08171998.1**

(22) Date of filing: **07.06.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(30) Priority: **01.06.2007 IT MI20071130**

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
07425356.8 / 1 998 297

(71) Applicant: **F.A.S. International S.p.A.**
36015 Schio (Vicenza) (IT)

(72) Inventor: **Cattaneo, Pietro**
36015, Schio (VI) (IT)

(74) Representative: **Fiorani, Giuseppe et al**
Perani Mezzanotte & Partners
Piazza San Babila, 5
20122 Milano (IT)

Remarks:
This application was filed on 17-12-2008 as a divisional application to the application mentioned under INID code 62.

(54) Improved automatic vending machine

(57) The present invention concerns an automatic vending machine (1) comprising a frame (2) defining internally a volume for housing the internal components necessary for operation of the said vending machine (1) and supporting a first part of said internal components, in which there is an internal frame (4) able to support most of the internal components movably with respect to the frame (2), the internal frame (4) being itself movable with respect to the frame (2), between a first retracted position and a second working position.

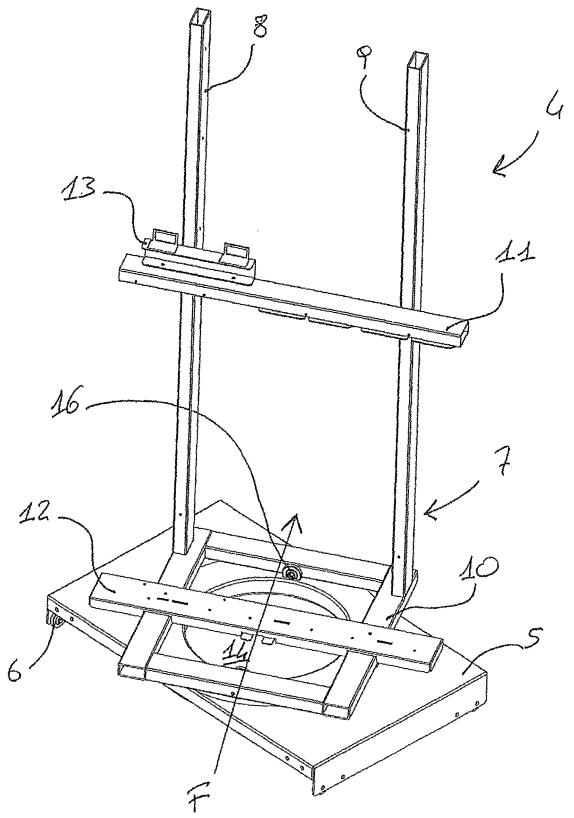

Fig 1.

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Description

[0001] The present invention relates to an improved automatic vending machine, in particular for hot beverages such as tea, coffee, chocolate, cappuccino and the like.

[0002] These types of automatic vending machines are becoming increasingly widespread also in public places, such as train stations or underground railway stations.

[0003] The reliability of the vending machines is therefore increasingly important: if a machine is out of order even for a short period of time, negative consequences may be suffered both in terms of lost revenue and in terms of bad publicity owing to the large number of potential customers who are unable to avail themselves of the products in the machine.

[0004] There exists therefore the need to provide an improved vending machine in which it is possible to detect potential malfunctions prior to installation.

[0005] It is also important to solve the problem of the negative image created by a vending machine under repair: in the known vending machines, the internal components are arranged in layers such that, in order to gain access to a component situated at the rear, it is necessary to remove the components which are arranged in front of it. These preliminary operations, in addition to being long and laborious (and therefore costly), may create in the potential consumer a sense of mistrust in the vending machine and in the products dispensed by it, which is all the greater the more protracted and the more evident the repair operations are.

[0006] In order to minimize this reaction it is therefore important to be able to perform rapid repair of a faulty machine, possibly disguising the repair and/or maintenance operations being carried out on the machine such that they seem like normal replenishing operations for a person who happens to be passing by.

[0007] In view of the state of the art described, the object of the present invention is to provide an automatic vending machine which minimizes the potential losses resulting from a vending machine which is faulty or under repair.

[0008] In accordance with the present invention, this object is achieved by means of an automatic vending machine according to claim 1.

[0009] The characteristic features and advantages of the present invention will become clear from the following detailed description of a practical embodiment, provided by way of a non-limiting example with reference to the accompanying drawings in which:

- Figure 1 is a perspective view, from above, of a preferred embodiment of the internal frame according to the present invention;
- Figure 2 shows a perspective view, from below, of the frame according to Figure 1;
- Figure 3 shows a front view of the frame according to Figure 1 with the internal components of the vending machine mounted on it;
- Figure 4 shows a rear view of the frame according to Figure 1 with the internal components of the vending machine mounted on it;
- Figure 5 shows a perspective view from below, partially cut away, of the frame according to Figure 1 inside the frame of an automatic vending machine;
- Figure 6 shows a schematic view, from above, of a section of a vending machine in which the internal components are in the working position;
- Figure 7 shows a schematic view, from above, of the vending machine according to Figure 5 in which the internal components are in the extracted position;
- Figure 8 shows a schematic view, from above, of the vending machine according to Figure 5 in which the internal components are in the extracted and partially rotated position;
- Figure 9 shows a schematic view, from above, of the vending machine according to Figure 5 in which the internal components are in the extracted position and rotated through 180° with respect to the working position.

[0010] As shown in the figures, 1 denotes overall an automatic vending machine, comprising a frame 2, defining a volume able to house the internal components necessary for operation of the said vending machine. This frame 2 is normally closed by a front panel 3 which is normally opened only for the maintenance and/or product replenishing operations.

[0011] The frame 2 also has, mounted thereon, the components, which may also be partially external, such as, for example, the devices necessary for interfacing with the user.

[0012] In the embodiment shown, the vending machine 1 comprises an internal frame 4 which supports movably with respect to the frame 2 substantially all the internal components necessary for and/or serving the function of preparing the beverages.

[0013] For example, the components for preparation of the beverages may be regarded as being all the components for dispensing and heating the water, for performing mixing with the milk, tea or coffee and for the transfer of the beverage thus formed to the dispensing point, where it will be introduced into a cup, if necessary provided with a spoon, and to which sugar is added as required.

[0014] The internal frame 4 shown in Figures 1 and 2 comprises a sliding base 5, which is mounted slidably with respect to the frame 2, for example by means of roller wheels 6 which travel inside horizontal guides fixed to the frame 2, and a rotating frame 7, mounted rotatably, for example about a vertical axis of rotation, with respect to the frame 2.

[0015] The sliding base 5 may therefore pass from a retracted position, corresponding to the end-of-travel point furthest from the door 3 of the vending machine 1,

to an advanced position.

[0016] Advantageously, the rotating frame 7 is mounted rotatably on the sliding base 5, for example with its own axis of rotation passing through the centre of the sliding base 5. The rotating frame 7 is therefore rotatable and displaceable with respect to the frame 2.

[0017] The rotating frame 7 may rotate more easily about its axis when the sliding base is in the advanced position.

[0018] Figures 5 to 9 show four different positions of the internal frame 4, which are schematically represented by means of a view, from above, of the internal components mounted on the internal frame 4: in Figure 6, the internal frame 4 is in the working position, with the sliding base 5 in the retracted position: in Figure 7 the sliding base 5 is in the advanced position and the internal components which are mounted frontally are accessible; Figures 8 and 9 show two different angles of rotation of the rotating frame 7: in Figure 9, the angle is 180° and the internal components mounted at the rear are accessible.

[0019] As can be seen in Figures 1 and 2, the rotating frame 7 comprises two uprights 8, 9 which are fixed to a base 10. The figures show two cross-pieces 11, 12 which are fixed to the uprights 8, 9 and to the base 10, respectively. The cross-piece 11 may further comprise a C-shaped part 13 for mounting the container with the coffee grains.

[0020] The uprights 8, 9 define a front side F and a rear side P of the rotating frame 7: they are arranged, symmetrically, in the rear half of the said base 10.

[0021] Both the base 10 and the sliding base 5 have an opening 14 which is able to allow the physical connection means, for connecting together the internal components and the remainder of the vending machine, to pass through.

[0022] The opening 14 is large enough to allow all the physical connection means (not shown in the figures) to pass through. These include, for example, water supply and discharge pipes, power supply cables, the pipe for discharging the coffee grounds, or data transmission cables (if present). These physical connection means are known in the art and will therefore not be described further.

[0023] The opening 14 shown in the figures has a diameter of about 200-280 mm, but other dimensions are possible.

[0024] The internal frame 4 is secured to the frame 2 by suitable fixing means so as to be able to be fixed in the working position, for example by means of screws, bolts or spring systems, so that an operator may easily render them movable with respect to each other and, if necessary, separate them; the two frames 2, 4 are therefore not irreversibly fastened together, for example by means of welding, brazing, bonding or the like.

[0025] Connection means which allow relative rotation, but prevent relative axial movement, are present between rotating frame 7 and sliding base 5.

[0026] Preferably, these connection means comprise a swivel ring 15 so as to allow the physical connection means to pass through. In order to favour the relative rotation between the rotating frame 7 and the sliding base 5, the connection means comprise rolling means, such as, for example, wheels 16.

[0027] Advantageously, the frame 2 and/or the internal frame 4 may comprise stop means for preventing an excessive rotation of the rotating frame 7 relative to the frame 2 from twisting excessively the ducts inside the swivel ring 15.

[0028] The angle through which the rotating frame 7 is free to rotate relative to the sliding base 5 is such as to allow an operator access to the entire rear part of the rotating frame 7. This angle is advantageously greater than 100°, for example greater than 180° for each direction, and is preferably less than 270°.

[0029] It is also possible to render the rotating frame 7 movable in a single direction; in this case, the angle of rotation may be at least 270° and is advantageously about 360°.

[0030] If necessary, indexing means may also be envisaged for defining preferred angular positions of relative stability during rotation of sliding base 5 and rotating frame 7.

[0031] In the preferred embodiment shown in the figures, the internal frame 4 has, mounted thereon, some internal components which are accessible from the front side and some internal components which are accessible from the rear side, namely after the internal frame 4 has been rotated relative to its working position.

[0032] In this embodiment, the components mounted on the internal frame 4 so as to be accessible from the front are: the containers 17 for the products, except for spoons, sugar and cups, and the associated dispensing pipes, the ground-coffee dispensing system 18, including the grinder and the proportioning device, the product mixers 19, the coffee grounds discharge pipes (not shown), and the ducts for conveying the prepared beverage from the mixer to the dispensing point (not shown).

[0033] Still with reference to the embodiment shown in the figures, the components mounted on the internal frame 4 so as to be accessible at the rear are: the product mixer motors 20, the hydraulic system comprising the boiler 21, the water pump, the mixing and regulating solenoid valves, the motor of the ground coffee dispensing system, the gear motors 22 for the product dispensers arranged at the front, the mains voltage transformer 23, the switchboard with fuses, the power control board 24 and the associated connections 25.

[0034] Still with reference to the preferred embodiment to which the figures relate, the components fixed directly onto the frame 2 are the selection electronics, the money control and storage devices, the systems for collecting and temporarily storing the solid and liquid waste, while the cup, sugar and spoon dispensers (not shown) may also be mounted directly on the front panel 3.

[0035] With the present invention it is possible, during production of the vending machine 1, to pre-assemble

on the internal frame 4 all the components which must be fixed thereto, obtaining a functionally complete unit on which it is possible to perform reliability tests so as to detect most of the anomalies before final assembly inside the frame 2, namely before the vending machine 1 is distributed.

[0036] Moreover, as a result of this arrangement, it is possible to perform easily operating tests directly at the installation site and, where necessary, act rapidly. In fact, the vending machine 1 may be fully operational even when the internal frame 4 is in the position shown in Figure 9, with the door open.

[0037] This allows a further reduction in the time required for repairs.

[0038] Preferably, the internal components are fixed to the internal frame 4 before the latter is in turn fixed to the frame 2.

[0039] This means that the internal frame 4, together with the components mounted on it, forms a completely autonomous and operational modular unit and, should it be necessary, all the internal components of the vending machine 1 may be easily replaced by simply supplying and replacing the old unit with a new unit at the installation site.

[0040] Advantageous results are achieved when most of the internal components are mounted on the internal frame 4, including preferably the operating and control electronics.

[0041] The vending machine 1 according to the present invention is therefore assembled in the following manner: firstly the internal components are mounted on the rotating frame 7 of the internal frame 4 and operation of the entire unit is tested.

[0042] Then the internal frame 4 is mounted in the frame 2 in the working position, performing the necessary physical connections, for example for water, electricity and data. The working position of the internal frame is the one where the front side F is directed towards the opening of the vending machine 1 and the internal frame 4 is situated in the retracted position.

[0043] In this way, in order to access the components mounted on the rear side, it is not required to disassemble the internal components arranged at the front in order to access those which are arranged at the rear, but it will be sufficient to extract the internal frame 4 and rotate it into the desired position, for example through 180°.

[0044] As can be seen, the vending machine 1 according to the present invention allows the downtime due to malfunctions to be reduced to a minimum, allowing preliminary testing of its internal components; it also allows repair of the vending machine to be performed such that it resembles a replenishing operation.

[0045] It is considered that, with the arrangement of the components according to the preferred embodiment described in the present description, it is possible to achieve the objects of the present invention; it is clear, however, that different arrangements are nevertheless possible, for example by varying the position of one, some or all the internal components fixed to the internal frame 4, to the frame 2 or to the door 3, provided that the objects of the present invention are achieved.

[0046] Some exemplary embodiments of previous teachings are:

1. An automatic vending machine (1) comprising:

- a frame (2) defining internally a volume for housing the internal components necessary for operation of the vending machine (1);
- said frame (2) supporting a first part of said internal components;

wherein it comprises an internal frame (4) able to support a second part of said internal components movably with respect to said frame (2), between a first advanced position and a second working position;

said internal frame (4) being itself movable with respect to said frame (2), between said first advanced position and said second working position.

2. Vending machine (1) according to the preceding embodiment, in which said second part of said internal components constitutes most of said internal components.

3. Vending machine (1) according to any one of the preceding embodiments, in which said internal frame supports at least all the internal components necessary for preparation of the beverages, including the control electronics.

4. Vending machine (1) according to any one of the preceding embodiments, in which said internal frame (4) comprises a rotating frame (7) which is mounted rotatably with respect to said frame (2).

5. Vending machine (1) according to the preceding embodiment, in which said rotating frame (7) comprises a swivel ring (16) defining the axis of rotation of said internal frame (4) with respect to said frame (2).

6. Vending machine (1) according to the preceding embodiment, in which the physical connection means connecting together said second part of the internal components, the remaining internal components and the exterior of the vending machine (1) pass inside said swivel ring (16).

7. Vending machine (1) according to any one of embodiments 4 to 6, in which said rotating frame (7) may rotate with respect to said frame (2) through at least 100° in each direction, from the orientation corresponding to that of normal operation of said vending machine (1).

8. Vending machine (1) according to any one of embodiments 4 to 7, comprising rotation limiting means able to limit the rotation of said rotating frame (7) relative to said frame (2) so as to avoid excessive twisting of said physical connection means.

9. Vending machine (1) according to any one of em-

bodiments 4 to 8, in which said vending machine (1) comprises indexing means able to define one or more angular positions of stable equilibrium during rotation of said rotating frame (7) with respect to said frame (2).
10. Vending machine (1) according to any one of the preceding embodiments, in which said internal frame (4) comprises a sliding base (5) which is mounted slidably with respect to said frame (2) between a retracted position and an advanced position.
11. Method for the production of a beverage vending machine (1) according to any one of the preceding embodiments, comprising, in order, the steps of:

(a) mounting said internal components on said internal frame (4);
(b) mounting said internal frame (4) in said frame (2).

12. Method according to the preceding embodiment, in which said internal components are mounted so to be able to be rotated and displaced with respect to said frame (2).
13. Method according to either one of embodiments 11 or 12, comprising, in order, the steps of:

(c) positioning said rotating frame (7), relative to said frame (2), in the angular position corresponding to that of normal operation of said vending machine;(z) closing the door (3) of said vending machine (1);

in which the steps (a), (b), (c) and (z) are performed in this order.

[0047] Obviously, a person skilled in the art, in order to meet unforeseen and specific requirements, may make numerous modifications and variations to the configurations described above, all of which moreover are contained within the scope of protection of the invention as defined by the claims.

Claims

1. An automatic vending machine (1) comprising:

- a frame (2) defining internally a volume for housing the internal components necessary for operation of the vending machine (1);
- said frame (2) supporting a first part of said internal components;

wherein said automatic vending machine (1) comprises an internal frame (4) movable with respect to said frame (2), between a first advanced position and a second working position and able to support a second part of said internal components, movably with respect to said frame (2);
said internal frame (4) comprising a rotating frame (7) rotatably mounted with respect to said frame (2).

2. Vending machine (1) according to the previous claim, in which said internal frame (4) is mounted rotatably about a vertical axis of rotation with respect to said frame (2).

3. Vending machine according to any previous claim, comprising physical connection means for connecting together the internal components mounted on said internal frame (4) and the remainder of the vending machine.

4. Vending machine (1) according to the previous claim, comprising rotation limiting means able to limit the rotation of said rotating frame (7) relative to said frame (2) so as to avoid excessive twisting of said physical connection means.

5. Vending machine (1) according to any one of claims 3 or 4, in which said physical connection means are selected from the group comprising: water supply and discharge pipes, power supply cables, the pipe for discharging the coffee grounds, or data transmission cables.

6. Vending machine (1) according to any previous claim, in which said rotating frame (7) may rotate with respect to said frame (2) through at least 100° in each direction, from the orientation corresponding to that of normal operation of said vending machine (1).

7. Vending machine (1) according to any previous claim, in which said vending machine (1) comprises indexing means able to define one or more angular positions of stable equilibrium during rotation of said rotating frame (7) with respect to said frame (2).

8. Vending machine (1) according to any previous claim, in which said internal frame (4) comprises a sliding base (5) which is mounted slidably with respect to said frame (2) between a retracted position and an advanced position.

9. Vending machine (1) according to the previous claim, in which said rotation frame (7) is mounted on said sliding base (5).

10. Vending machine (1) according to any previous claim, in which the axis of rotation of said rotating frame (5) passes through the centre of said sliding base (5).

11. Vending machine (1) according to any previous claim, in which said second part of said internal com-

ponents are selected from the group comprising: all the components for dispensing and heating the water, for performing mixing with the milk, tea or coffee and for the transfer of the beverage thus formed to the dispensing point, the containers (17) for the products, except for spoons, sugar and cups, and the associated dispensing pipes, the ground-coffee dispensing system (18), including the grinder and the proportioning device, the product mixers (19), the coffee grounds discharge pipes, and the ducts for conveying the prepared beverage from the mixer to the dispensing point, the product mixer motors (20), the hydraulic system comprising the boiler (21), the water pump, the mixing and regulating solenoid valves, the motor of the ground coffee dispensing system, the gear motors (22) for the product dispensers arranged at the front, the mains voltage transformer (23), the switchboard with fuses, the power control board (24) and the associated connections (25).

12. Vending machine (1) according to the previous claim, in which said internal components mounted on said internal frame (4) so to be accessible from the front of said internal frame are selected in the group comprsing: the containers (17) for the products, except for spoons, sugar and cups, and the associated dispensing pipes, the ground-coffee dispensing system (18), including the grinder and the proportioning device, the product mixers (19), the coffee grounds discharge pipes and the ducts for conveying the prepared beverage from the mixer to the dispensing point.

13. Vending machine (1) according to the previous claim, in which said internal components mounted on said internal frame (4) so to be accessible from the rear of said internal frame (4) are selected in the group comprising: the product mixer motors (20), the hydraulic system comprising the boiler (21), the water pump, the mixing and regulating solenoid valves, the motor of the ground coffee dispensing system, the gear motors (22) for the product dispensers arranged at the front, the mains voltage transformer (23), the switchboard with fuses, the power control board (24) and the associated connections (25).

14. Vending machine (1) according to any one of the previous claims, in which the components fixed directly onto the frame (2) are chosen in the group comprising the selection electronics, the money control and storage devices and the systems for collecting and temporarily storing the solid and liquid waste.

15. Vending machine (1) according to any one of the previous claims, comprising a front panel (3) on which the cup, sugar and spoon dispensers are directly mounted, said front panel (3) normally closing said frame (2).

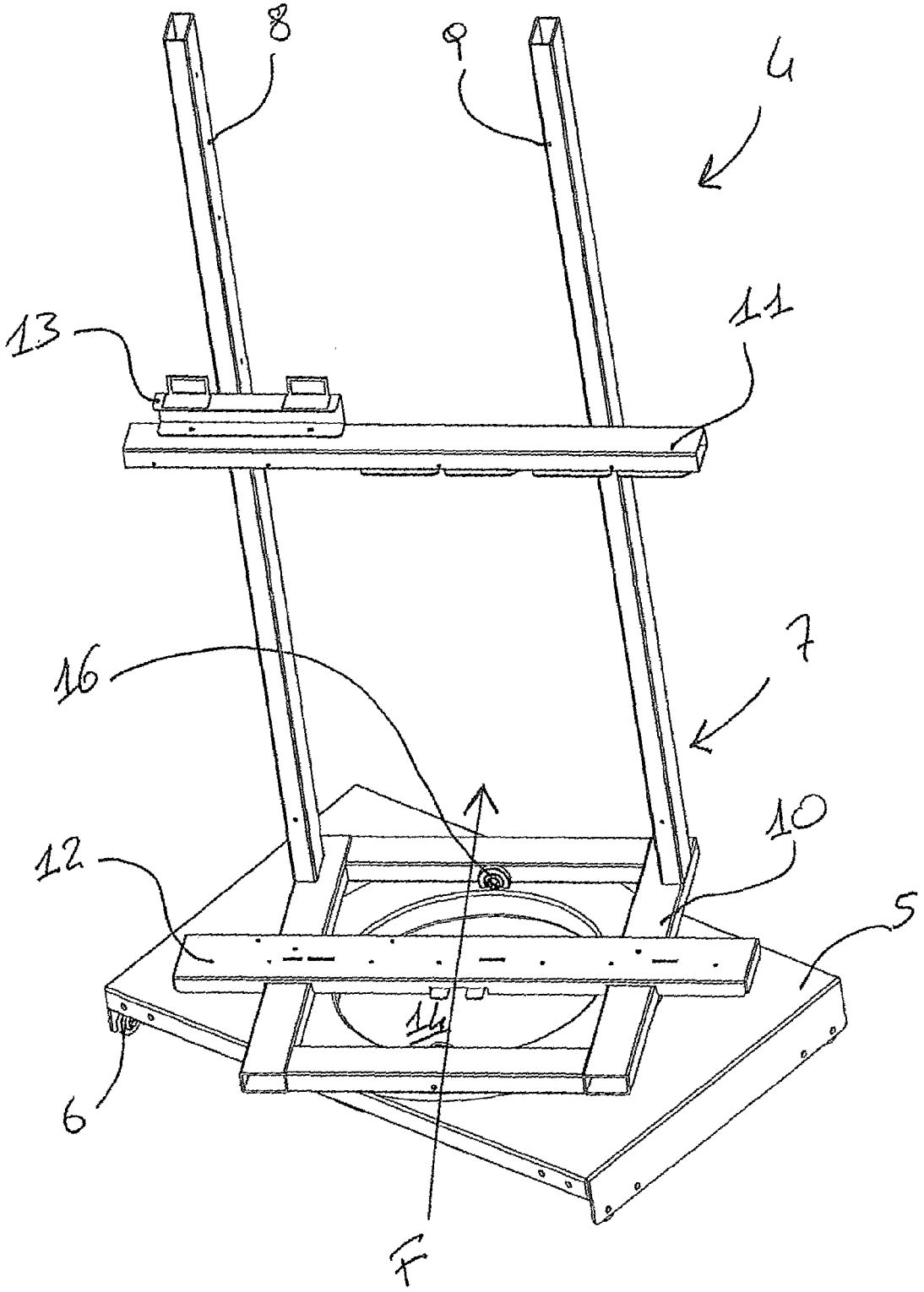

Fig 1.

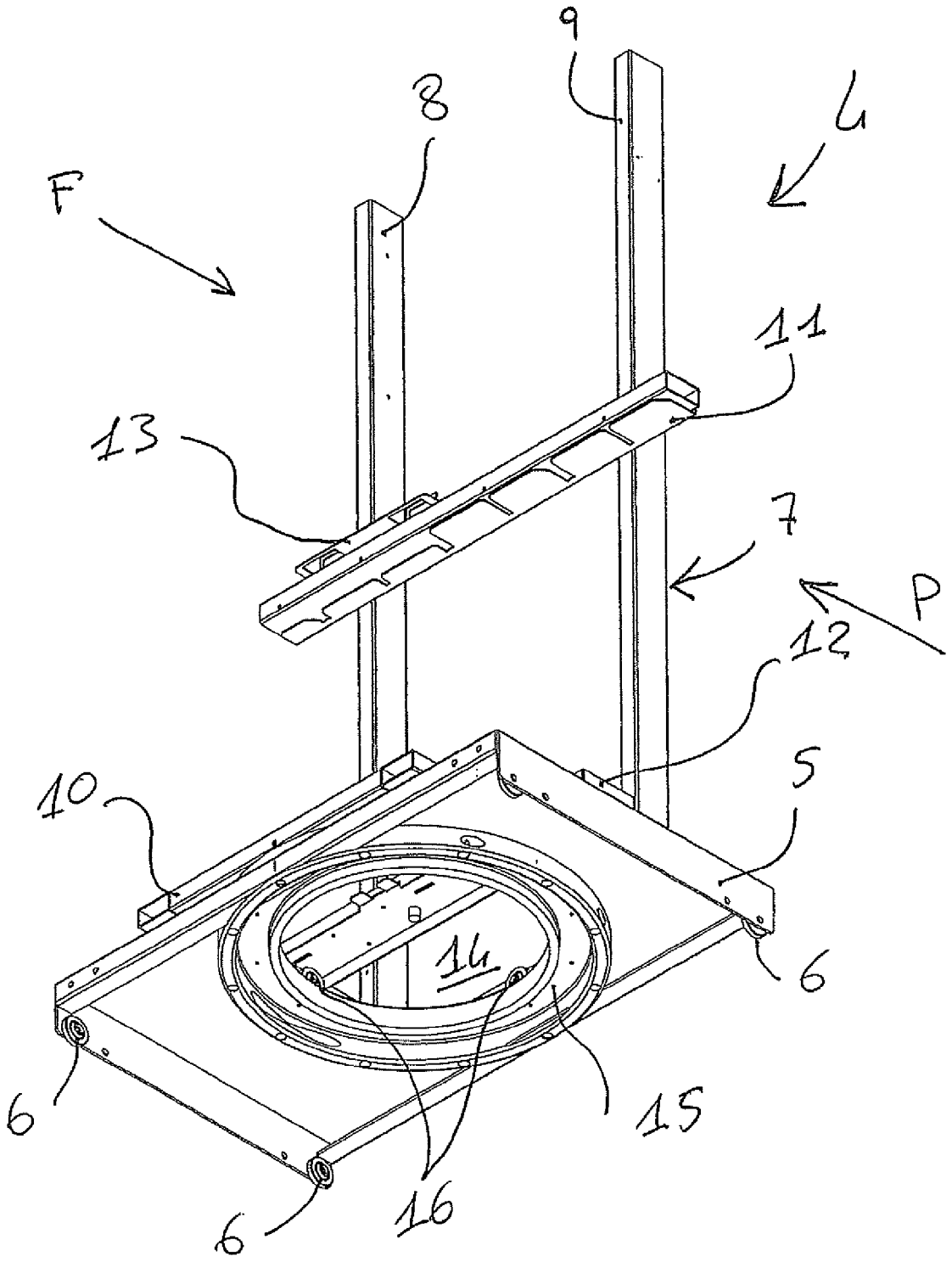

Fig. 2

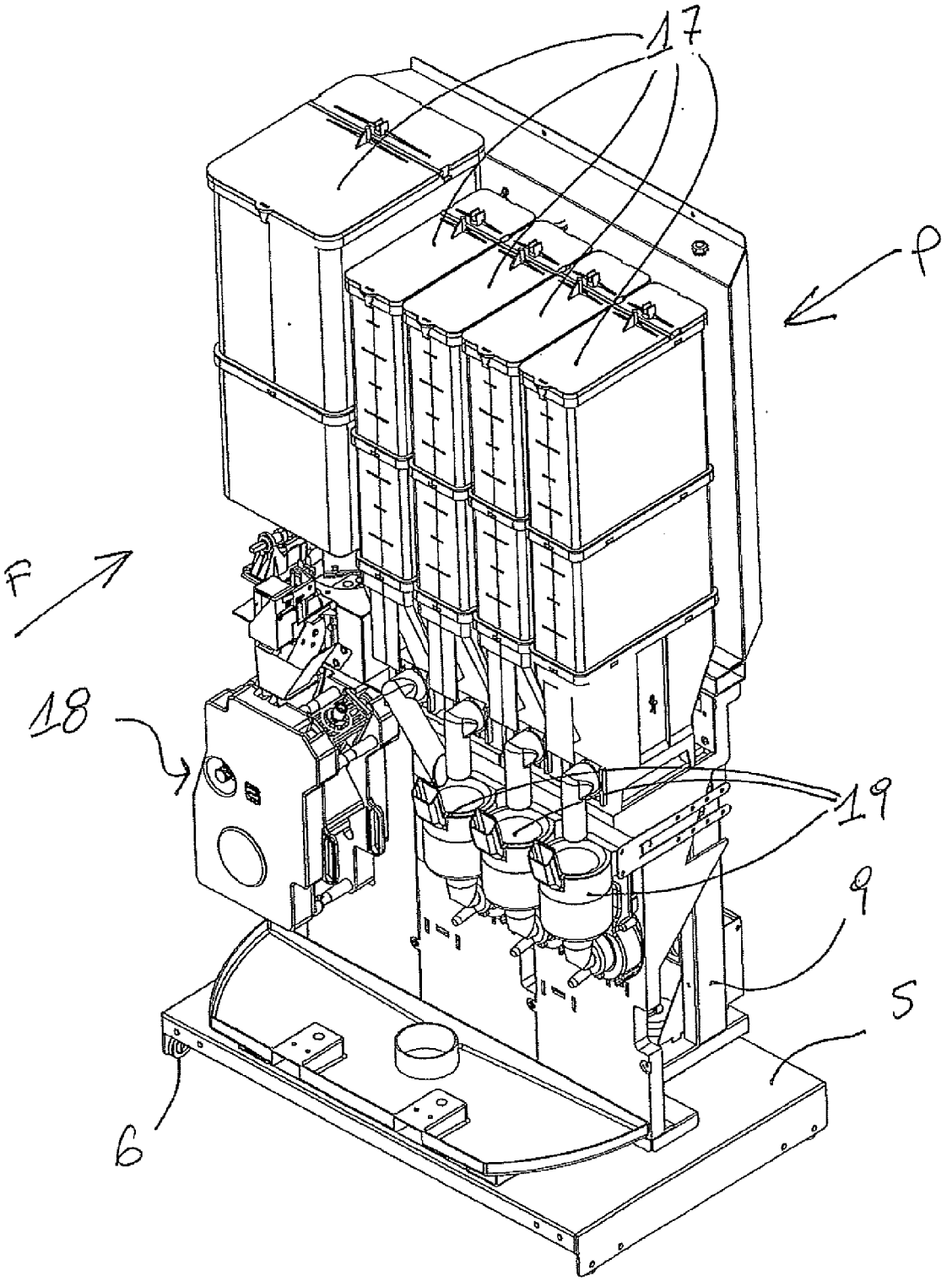

Fig. 3

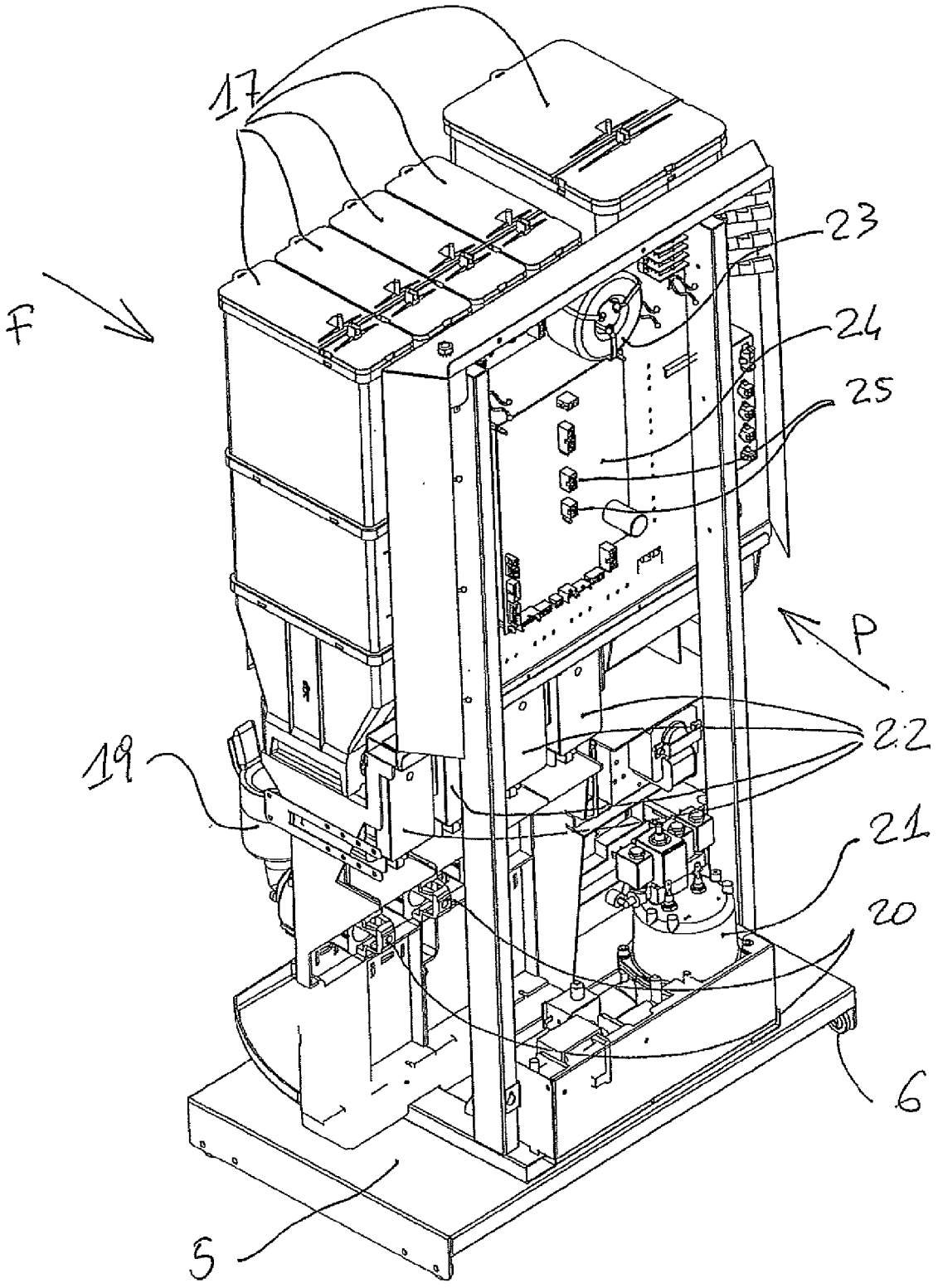

Fig. 4

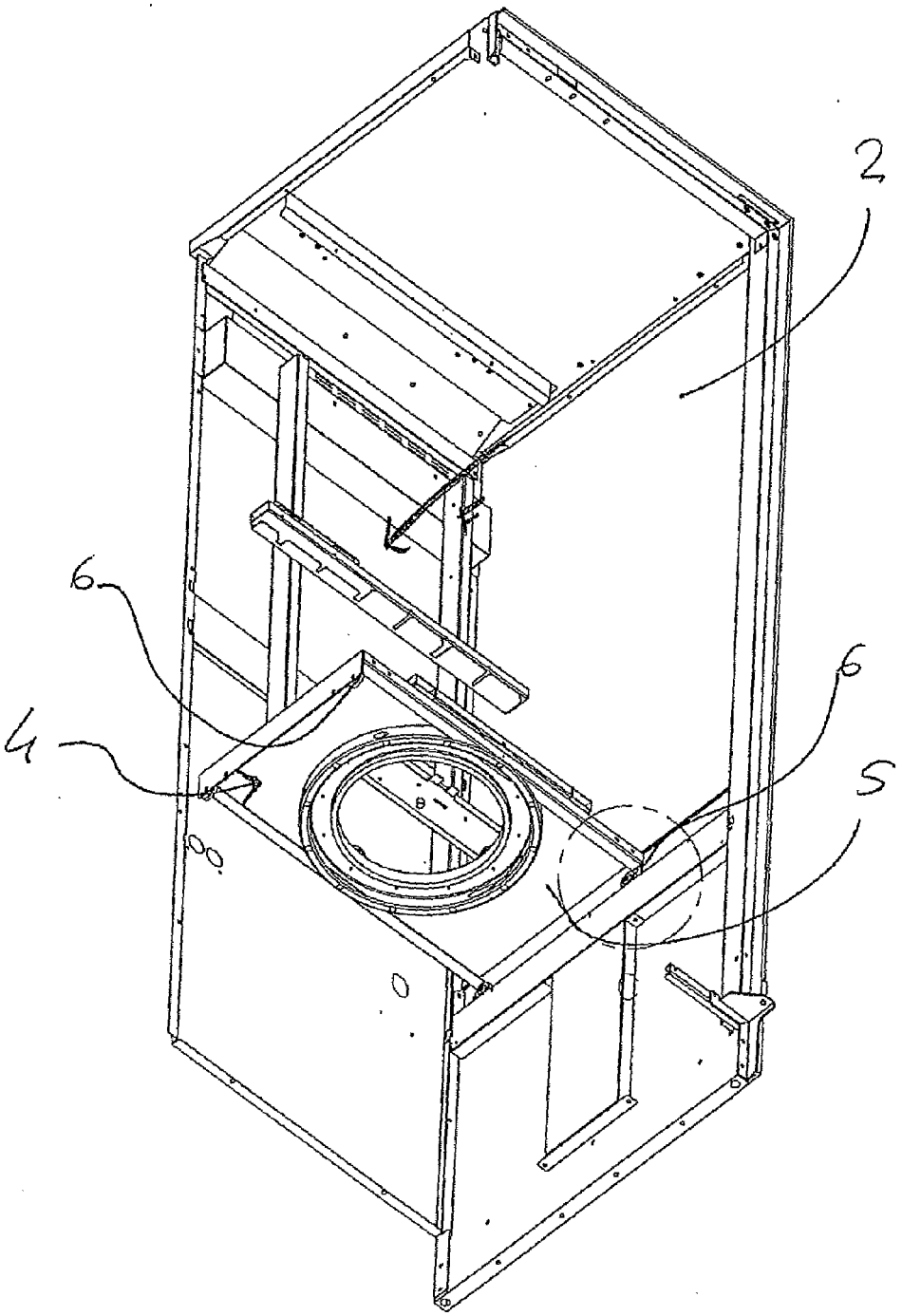

Fig. 5

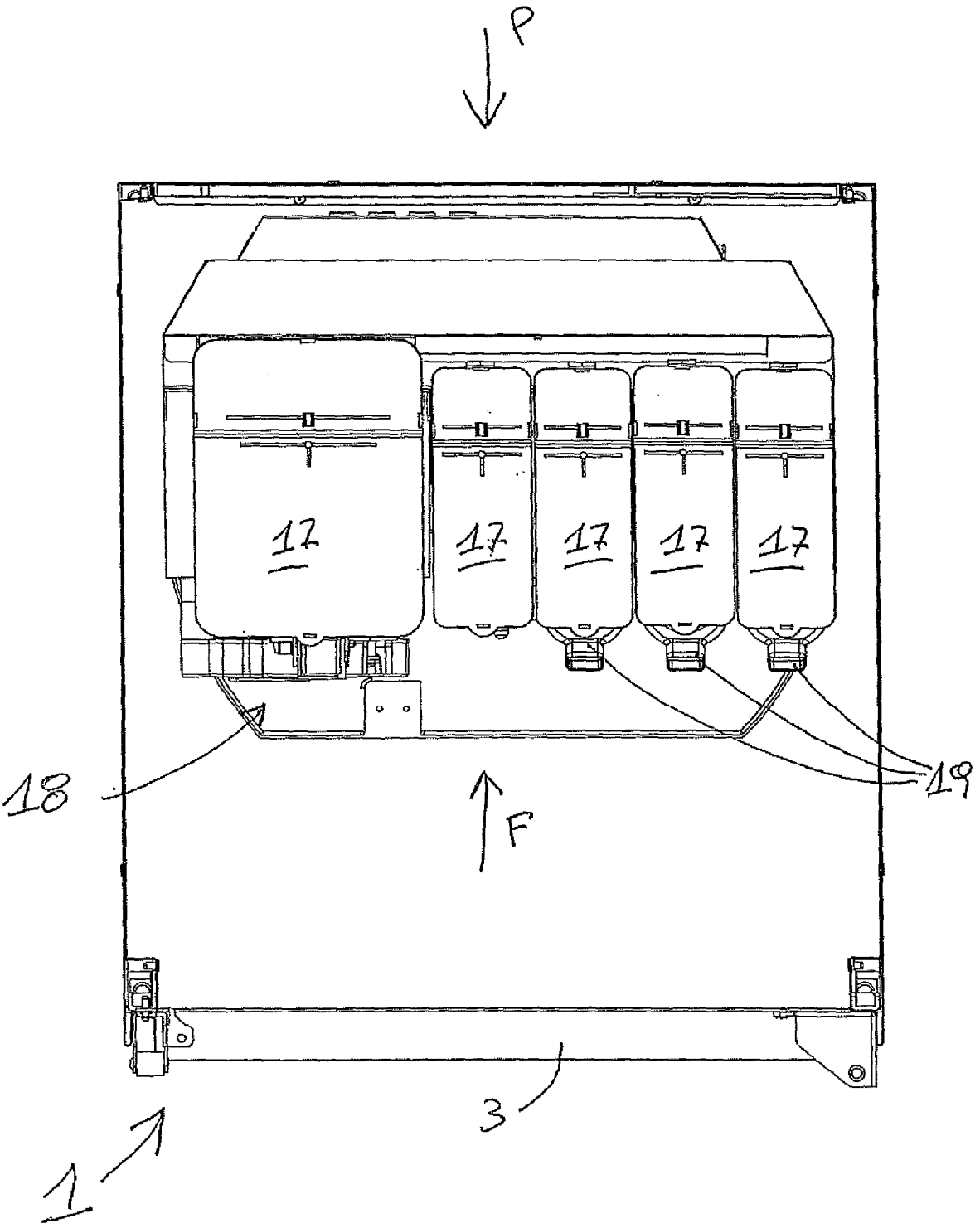

Fig. 6

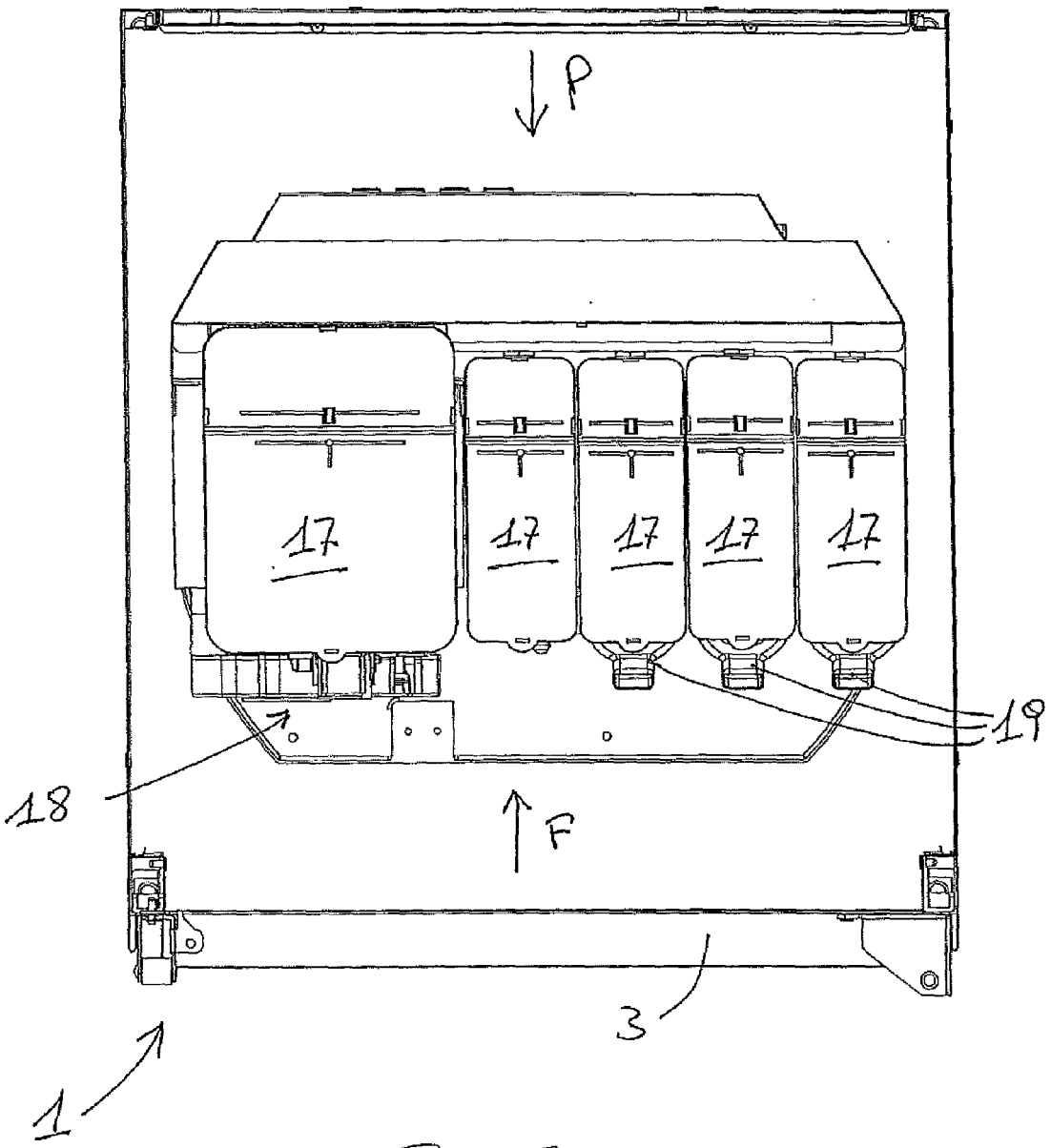

Fig. 7

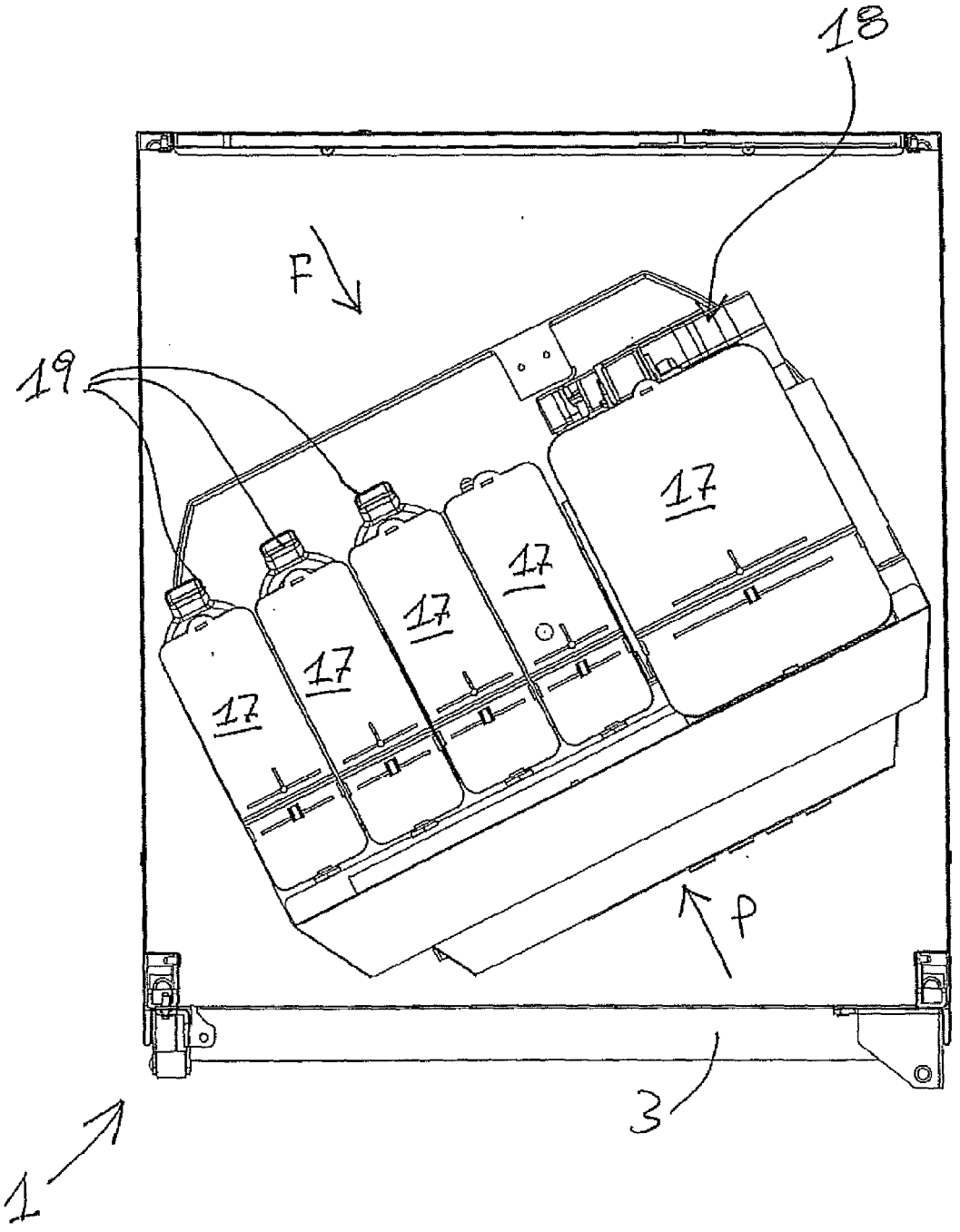

Fig. 8

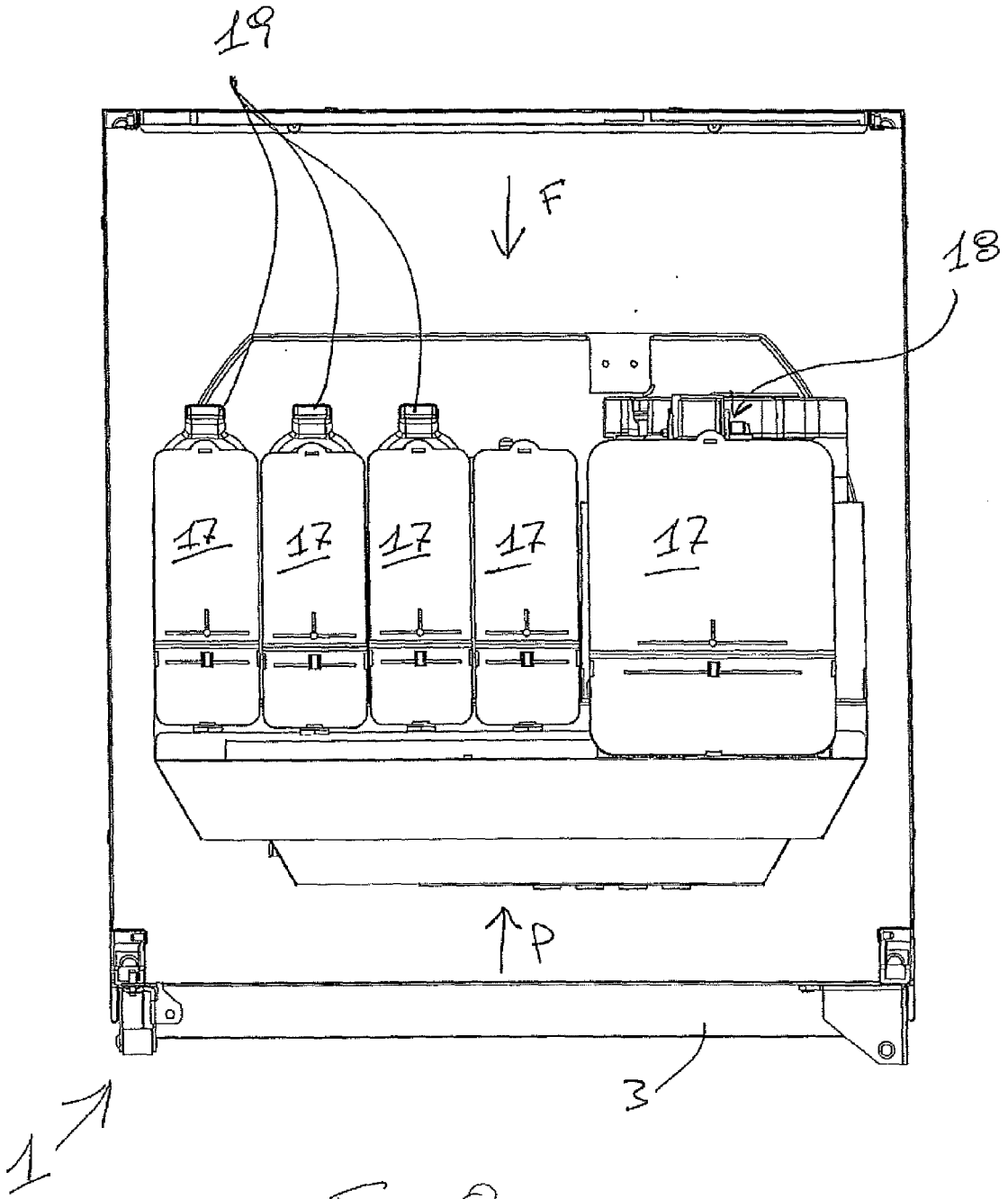

Fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 08 17 1998

DOCUMENTS CONSIDERED TO BE RELEVANT

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	4 March 2009	Aupiais, Brigitte

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 17 1998

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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04-03-2009

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