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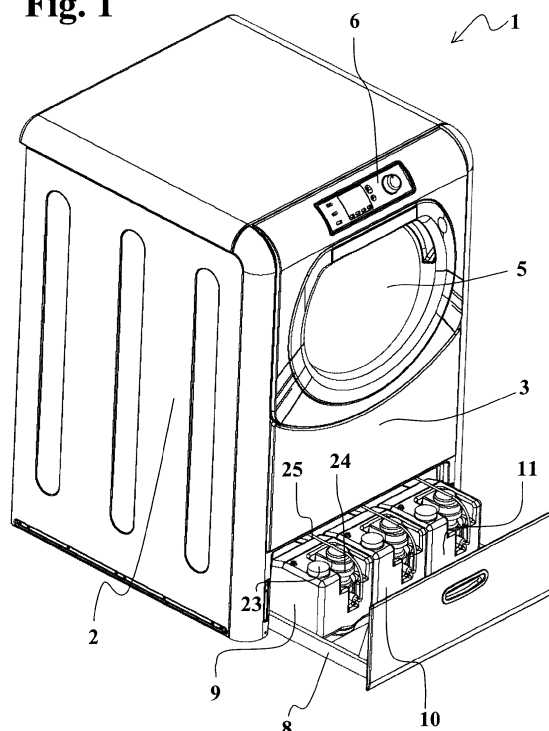
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(54) **A washing machine, in particular a laundry washer, comprising a large capacity washing agents dispenser**

(57) A laundry washing machine (1) has a washing agent dispenser device having a long operating autonomy, which comprises at least one container (9-11), adapted to contain an amount of a liquid washing agent sufficient for carrying out a plurality of treatment cycles, and delivery means (24), which can be controlled for taking dosed amounts of the washing agent from said at least one container (9-11) and delivering them to a washing tub. The machine (1) further comprises a movable support (8) for the container (9-11), said support (8) being displaceable, with respect to a corresponding seat, between an extracted position and a retracted position. Preferably, the seat is defined in a lower region of the fixed structure (2) of the machine (1), and the movable support (8) is configured substantially as a drawer. The container (9-11) is removably mounted on the movable support (8).

Fig. 1



Description

[0001] The present invention relates to a washing machine, in particular a laundry washer, according to the preamble of claim 1.

[0002] As is known, a treatment cycle of a washing machine requires the use of detergent substances, in powder or liquid form, and of possible additional substances, such as, for example, softening and perfuming agents in the case of a laundry washer or rinse-aids in the case of dishwashers, typically in the liquid form. Said substances are herein defined as a whole as "washing agents".

[0003] For the above purpose, washing machines of the most common type are provided with a dispenser device, designed to be loaded by a user with individual doses of the washing agent or agents required according to the characteristics and the amount of clothes or dishes that have to be washed, as well as to the washing cycle selected. For this purpose, the washing agents, of the types and in the amounts recommended, are loaded by the user into suitable receptacles of the dispenser, prior to start of the cycle.

[0004] In the case of front-loading laundry washers said receptacles are typically embodied by compartments of a drawer-type container, which can be partially extracted from the front area of the laundry washer. In the case of top-loading laundry washer, the dispenser is, instead, usually conceived as static container, which is in any case divided into compartments for the various washing agents and is integrated in the door of the washing machine or else in the fixed part of its cabinet, in a position corresponding to the top face thereof. In the case of dishwashers, the dispenser, usually associated to the door of the appliance, comprises a compartment for the washing detergent, provided with a mobile hatch, and a tank, provided with a cap, designed to contain an amount of liquid rinse-aid sufficient for a number of washing cycles.

[0005] Also known are laundry washer provided with dispensers for liquid washing agents that have a large storage capacity or a long operating autonomy.

[0006] The above machines, unlike the traditional ones - which must be supplied with washing agents before each treatment - are able to contain, in one or more suitable receptacles or tanks, total amounts of liquid washing agents (liquid detergent, softening agent, bleaching agent, etc.) such as to be used for a plurality of washing cycles, as well as to dispense dosed amounts of said agents in the course of each treatment carried out by the machine (for example, at each cycle, the liquid detergent is delivered into the washing tub in the washing phase, whilst the bleaching agent or softener is released during a rinsing phase, in particular during the last but one rinse and the last rinse, respectively).

[0007] GB-A-2214524 describes a front-loading laundry washer comprising elastic containers designed to contain liquid washing agents, wherein to each container

there are associated a flexible tube for sucking in the corresponding washing agent and a pump for drawing it into the tub of the machine. Said containers are arranged in a housing defined in the fixed structure of the machine cabinet and are accessible after a panel positioned in the lower part of the front wall of the cabinet has been removed. The laundry washer described in GB-A-2214524 has the drawback that loading of the washing agents requires the user to carry out a plurality of operations, some of which are somewhat inconvenient. The elastic containers have a limited capacity and cannot be cleaned, such that they must be replaced when they undergo degradation.

[0008] EP-A-0449060 describes a front-loading laundry washer having a plurality of tanks for washing agents, which are housed vertically in an area of the machine comprised between the rear wall of its washing tub and the rear wall of the respective cabinet. Loading of the washing agents is far from convenient, given that it is possible to perform it only through suitable necks that project from the rear wall of the cabinet or else through a hinged flap positioned on the upper wall of the cabinet. Clearly, this solution cannot be adopted in the case of machines of the built-in type. Positioning of the washing-agent tanks proves very disadvantageous, since it limits the space available for the washing tub, and hence the loading capacity of the washing machine, in the case where it is intended to maintain the standard dimensions of the cabinet of the machine. Any possible maintenance interventions on the dispensing system are complicated.

[0009] US-B-6,401,499 describes a top-loading laundry washer in which, housed between the front wall of the washing tub and the front wall of the cabinet there are tanks for containing washing agents. When the user presses dedicated pushbuttons, the tanks are pressurized and bring about transfer of dosed amounts of the washing agents into corresponding chambers, from which said dosed amounts are then dispensed into the washing tub. The above arrangement of the tanks as proposed in US-B-6,401,499 can be pursued only in the case of top-loading washing machines and cannot hence be adopted for front-loading washing machines. A disadvantage of the solution of US-B-6,401,499 moreover lies in the fact that cleaning of the tanks cannot be carried out, given that said tanks cannot be removed from inside the washing machine.

[0010] Also in the case of dish-washers, long autonomy dispensers have been proposed, which are, however, generally cumbersome so that arrangement thereof frequently reduces the useful space of the washing tub.

[0011] In the light of the state of the art described above, a purpose of the present invention is to provide a washing machine, in particular a laundry washer, which overcomes one or more of the aforesaid drawbacks. In said framework, an aim of the invention is to provide a machine of the type referred to above provided with a large storage capacity dispenser system that includes at least one container for washing agents that is readily ac-

cessible, both for the purposes of the operations of periodic loading of the washing agents and for the purposes of possible cleaning operations, as well as in the case where the need arises for maintenance interventions. A further aim of the invention is to provide a washing machine, in particular a laundry washer, in which the above arrangement of the aforesaid container is particularly advantageous in the light of the increasingly greater attention that is paid to the ergonomics of electrical household appliances.

[0012] These and other aims are achieved, according to the present invention, by a washing machine having the features specified in the annexed claims, which are to be understood as forming an integral part of the present description.

[0013] The characteristics of the present invention, as likewise the corresponding advantages, will emerge clearly from the ensuing detailed description and the annexed plate of drawings, which is provided purely by way of non-limiting example and wherein:

- Figure 1 is a perspective view of a first embodiment of a washing machine according to the present invention, in a first condition;
- Figure 2 is a lateral cross section of the machine of Figure 1;
- Figure 3 is a lateral cross section of the machine of Figure 1, in a second condition;
- Figure 4 is a perspective view of a second embodiment of a washing machine according to the present invention;
- Figure 5 is a schematic cross section of a large capacity or long autonomy container belonging to a dispenser for liquid washing agents of the washing machine of Figure 1; and
- Figure 6 is a schematic cross section of a variant embodiment of the container of Figure 5.

[0014] In Figures 1 to 3, reference number 1 designates as a whole a washing machine according to a first embodiment of the present invention. The machine 1 is, by way of non-limiting example, a front-loading laundry washer, but it should be borne in mind that the invention is equally applicable to top-loading laundry washers, whether of the type prearranged for just washing of laundry or else of the type prearranged for washing and subsequent drying of laundry (the so-called "washer-driers"). The machine 1 comprises all the elements necessary for its normal and proper operation, amongst which:

- a cabinet or fixed structure 2, having a front wall 3;
- an opening for loading of the clothes, made in the fixed structure 2, in particular in the front wall 3;
- a so-called "oscillating assembly", comprising a washing tub 4, for containing water or treatment liquid, and a basket or drum for containing the laundry; the drum (not represented), is mounted so that it can turn in the washing tub 4 and can be set in rotation

about its own axis by means of a motor device (not represented either);

- a door 5, mounted in a position corresponding to the aforesaid loading opening and aimed at enabling the user to gain access to the inside of the drum;
- a suspension system (not represented), which is designed to support and sustain the oscillating assembly within the fixed structure 2;
- interface means 6, which are designed to enable the user to select at least one of the programs and/or treatment parameters made available by the machine and/or to display information useful to the user;
- a control system, preferably of the electronic type, which here is assumed as being integrated in the interface means 6, configured for managing all the characteristic functions of the machine, including its treatment cycles or programs.

[0015] The tub 4 is located in an upper region of the fixed structure 2, the machine being possibly - as said - a laundry washer or a washer-drier.

[0016] The machine 1 further comprises a washing agent dispenser device, of the "large storage capacity" or "long autonomy" type. Said expressions are used herein to designate a dispenser having one or more containers that are able to retain each a liquid mass of a respective washing agent that enables a number of treatment cycles to be carried out by the machine, said device thus requiring just periodic loading by the user.

[0017] The aforesaid dispenser comprises, for each container, controllable delivery means, operation of which is managed by the control system of the machine, in order to divide up the aforesaid liquid mass, or to take from the respective container dosed amounts of the washing agent, to supply them to the washing tub 4.

[0018] According to the main aspect of the invention, the aforesaid container is mounted on a movable support structure, which can be displaced between a first position and a second position, in the first position the container being accessible and in the second position the container being inaccessible.

[0019] Preferably, the aforesaid movable support structure is adapted to slide between the aforesaid two positions. For this purpose, in the preferential embodiment, the aforesaid movable support structure can be embodied as a container shaped substantially like a drawer, in which said at least one container is positioned, preferably in a removable way.

[0020] An example of said drawer is designated by 8 in Figures 1-3. The drawer 8 is slidably mounted in a respective seat or cavity 7, which is formed in the lower part of the fixed structure 2 and, in particular, extends from the front wall 3 to the inside of the structure itself. For example, the washing tub can be supported from beneath via at least two opposed side shock-absorbing elements, with the cavity 7 that extends in the space lying between the points of bottom anchorage of said shock-absorbing elements.

[0021] The drawer 8 can be displaced manually by the user between at least a first position, represented in Figure 3, in which it is in a closed position and is located prevalently within the volume of the structure 2, and a second position, represented in Figures 1 and 2, in which it is in an open position and is located partially on the outside of the volume of the structure 2, it hence being accessible to the user, who can thus put in or take out therefrom objects of various nature.

[0022] In the embodiment represented in Figures 1-3, the machine 1 comprises three distinct containers 9, 10 and 11, suitable for containing three different liquid washing agents, each of which must be released in a particular phase of the selected washing treatment. Said washing agents can be, for example, a liquid detergent (in the container 9), a softening agent (in the container 10) and a bleaching agent (in the container 11). Obviously, other embodiments of the present invention are possible, whereby, for instance, the machine 1 comprises only two distinct containers (for example, one for the liquid detergent and one for the softening agent), or else a single container (for example, for the liquid detergent), or once again four containers (for example, one of which for a perfuming liquid substance).

[0023] As may be seen in Figure 1, the set of the three containers 9-11 occupies preferably only a portion of the drawer 8 - in the example the rear part - so as to allow the user the possibility of having available useful space in the drawer, in which he can put away other objects of various nature.

[0024] Each of the three containers 9-11 is made of rigid material, preferably plastic rigid material, and has a shape and a capacity such as to contain a respective mass of liquid washing agent sufficient for a plurality of washing treatments. Advantageously, each container 9-11 is provided with a reserve volume, in the sense that it has a capacity slightly greater than that of the bottles of washing agents currently available on the market. For example, in the particular case of the container 9 designed to contain the liquid detergent, the total capacity can appropriately be of approximately 1.5 l or else approximately 4 l, given that on the market there are prevalently available bottles containing 1 l and 3.5 l of liquid detergent.

[0025] According to a further advantageous characteristic, the containers 9-11 are housed stably in the drawer 8, but in a removable way. Thanks to said characteristic, the user of the machine 1 has the possibility of taking out conveniently the containers 9-11 from the drawer 8, if need be, for example for carrying out a cleaning operation (either manually or in a dish-washer), aimed at removing any possible deposits of washing agents on the internal walls of the containers themselves and/or any possible solid impurities present therein.

[0026] Figure 4 represents a laundry washer 12 in accordance with a second embodiment of the present invention. The washing machine 12 is, by way of non-limiting example, a front-loading laundry washes, but it

should be taken into account that also for this embodiment the machine could be of the top-loading type, and indifferently designed for just washing or else both for washing and drying of laundry.

[0027] The machine 12 is prearranged for association to a structured accessory 14, designed to raise the machine's fixed structure 13, the washing tub 4 (and hence the oscillating assembly), the door 15, and the interface means 16; said raising advantageously enables an improved ergonomics of the washing machine 12 to be obtained.

[0028] According to the embodiment of Figure 4, the structured accessory 14, which can be fixed to the structure 13 in any known way, is essentially configured as a base, located in the internal space of which there are the containers for the liquid washing agents, designated by 17, 18 and 19, with the corresponding controllable delivery means, housed in the drawer designated by 20. Said base can, for example, have an as a whole C-shaped conformation so as to define a cavity or a seat open at least at the front, within which the drawer 20 is slidably mounted.

[0029] The machine 12 can integrate right from the beginning (i.e., in the production stage) the structured accessory 14 with the corresponding drawer 20, containers 17-19, and delivery means, or else can be just prearranged for this integration. In the latter case, the integration of the structured accessory 14 can occur at any moment of the working life of the machine 12, the latter being appropriately prearranged for connection - both electrical and hydraulic - to the containers 17-19 and the corresponding delivery means. It should be noted, in any case, that also the machine 1 of the first embodiment can integrate right from the beginning the containers 9-11, or else can be made such as to enable subsequent integration of the large storage capacity dispenser, at any moment of the working life of the machine 1.

[0030] Amongst the particularly advantageous characteristics of the present invention, there should be emphasized the possibility of convenient removal of the containers, which enables the user, among other things, to carry out conveniently the corresponding cleaning operations, if necessary. The possibility of removal of the containers from the movable structure that supports them must not, however, jeopardize either the stability of the housing of the containers or proper operation of the system. For this reason, the Applicant has devised, for the aforesaid containers, some possible embodiments illustrated in Figures 5 and 6, which constitute examples having a purely explanatory and non-limiting value.

[0031] Figure 5 illustrates a first container, sectioned according to a plane orthogonal to the front wall 3 of the cabinet 2 of Figure 1. In the specific case the container 9 is illustrated, but it should be borne in mind that the containers 10 and 11 (or 17-19) can be made in a similar way.

[0032] The containers 9 illustrated has a conformation such as to guarantee a stable and at the same time re-

movable housing thereof in the movable structure represented by the drawer 8 or 20. Said container 9 is hollow, and identified in its internal space are a first cavity portion 21 and a second cavity portion 22, positioned at a lower level with respect to the first portion 21, the two portions communicating with one another. The second portion 22 is designed to contain the aforesaid reserve amount of liquid washing agent (for example, a quantity of liquid detergent sufficient to carry out three washing treatment by means of the machine 1, 12) and has a capacity notably smaller than that of the first portion 21. Purely by way of indication, the useful volume of the second portion 22 may be approximately of between 10% and 35% of the total volume of the container.

[0033] The first and second portions 21, 22 are obtained starting from a substantially parallelepipedal shape, given that the characteristic dimension of the first portion 21 (the depth designated by P1) is greater than the characteristic dimension of the second portion 22 (the depth P2). In this way, the second portion 22 of the container 9 can be at least partially inserted in a stable way in a respective seat or housing defined on the bottom of the drawer 8, 20. The aforesaid housing, which is not designated by any reference number but may be seen in Figures 2-3, preferably has a depth P3 slightly greater than the depth P2 of the second portion 22.

[0034] The container 9 has two openings for access to its internal space, preferably made in its top wall, and namely:

- a first opening, suitable for enabling the user to load the container 9 with the liquid washing agent; and
- a second opening, suitable for enabling outlet of the liquid washing agent from the container 9, when said agent, during a washing treatment, is drawn off by the corresponding delivery means, to be delivered to the washing tub 4.

[0035] Associated to the first opening, which constitutes the loading mouth for the washing agent, is a closing cap, designated by 23 in Figure 1, which prevents any solid impurities from entering the container 9 and which is removed by the user in order to load the container with the washing agent. Associated, instead, to the second opening are fixing means, designed to constrain the respective delivery means, designated by 24 in Figures 1 and 5, to the container 9, said delivery means being connected to a squirter tube 25, through which the washing agent is delivered into the washing tub 4. The delivery means 24 are fixed to the corresponding container 9 in a removable way (for example, with a snap-coupling, or a bayonet coupling, or a threaded coupling, or the like), in such a way that they can be disconnected when the user wishes to carry out cleaning of the container 9.

[0036] Figure 6 represents a possible variant embodiment of a container for liquid washing agents that can be used in the machine according to the invention, sectioned according to a plane passing through its axis. The

container of Figure 6, designated as a whole by 26, has a shape different from the one of Figure 5, which enables, in any case, the same characteristics of stability and possibility of removal to be achieved. According to said conformation, the container 26 comprises a first portion 27 of a substantially axisymmetrical shape and a second portion 28, which is also of a substantially axisymmetric shape, the two portions 27 and 28 communicating with one another. The first portion 27 is located at a higher level than the second portion 28, designed for containing the reserve amount of liquid washing agent. The first portion 27 has a characteristic dimension, i.e., the external diameter designated by D1, which is greater than the characteristic dimension of the second portion 28, i.e., the external diameter designated by D2.

[0037] As for the previous embodiment, also the container 26 - or rather its portion 28 - is suited to being stably located in a seat or housing, which is defined in the drawer 8, 20 and has the respective characteristic dimension (for example, the internal diameter of the housing, in the case where this has a substantially axisymmetrical shape) comprised between the characteristic dimension of the second portion 28 of the container 26 and the characteristic dimension of the first portion 27. In this way, part of the flared annular surface 29 that delimits at the bottom the portion 27 remains in contact with the surface surrounding the housing made in the drawer.

[0038] Also the container 26, which is hollow, has two openings for access to the corresponding internal space, which are both set in its top part, namely:

- a first opening 30 for loading the container with the washing agent, associated to which is a closing cap 31; and
- a second opening 32 for outlet of the washing agent, constrained to which are, preferably in a removable way, the delivery means, here designated by 33, designed to deliver, during a washing treatment, the liquid washing agent into the washing tub 4, through the squirter tube, here designated by 34.

[0039] In both of the embodiments provided by way of non-limiting example in Figures 5 and 6, the delivery means 24, 33 are of an electromechanical type, of a conception in itself known, housed at least partially within the container and fixed in a stable but removable way to the container itself, in a position corresponding to the outlet opening. Said dispensing means 24, 33 can comprise:

- a dosing pump 35, 36 (such as, for example, a volumetric pump, a peristaltic pump, a centrifugal pump, or an axial pump), preferably associated to which is a system for precise evaluation or metering of the amount of liquid washing agent processed by the pump itself;
- a motor-driven actuator 37, 38, electrically supplied by the power board of the machine 1 or 12, and suit-

- able for actuating the pump 35, 36;
- a suction tube 39, 40, which extends within the container 9, 26, in particular as far as in the proximity of the bottom wall of the portion 22, 28 of the container 9, 26 that contains the reserve amount of washing agent;
- means for connection 41, 42 to the squirter tube 25, 34, aimed at enabling the amount of washing liquid, taken in through the suction tube 39, 40 and processed by the dosing pump 35, 36, to be conveyed into the squirter tube 25, 34, to enable its subsequent release into the washtub 4; and
- possible sensor means, electrically supplied by the electronic control system of the machine 1, 12 and designed for detecting the value of one or more physical quantities of the liquid washing agent.

[0040] Said sensor means can comprise sensor devices of different types, in themselves known, amongst which, for example:

- level sensor means, of a type suitable for detecting the level of the liquid washing agent within the container 9, 26; according to a possible embodiment, said sensor means detect whether the level reached by the liquid washing agent in the container 9, 26 is higher than or else lower than a pre-set threshold level (the beginning of the reserve volume may be chosen as threshold level); should the level detected be lower than the threshold level, the sensor means generate a signal that is transmitted to the electronic control system of the machine 1, 12, which, on the basis of said signal, can issue a control for activation of a signalling device (for example, a warning light forming part of the interface means 6, 16), purposely dedicated for warning the user of the need to load the container 9, 26 as soon as possible;
- viscosity and/or turbidity sensor means, designed to measure the viscosity and/or turbidity of the liquid washing agent contained within the container 9, 26; from said measurements it is possible to trace back the type of liquid washing agent and it is also possible to highlight any degradation of the washing agent itself; and
- flowrate sensor means, for example a flowmeter, designed to measure the flowrate of liquid washing agent processed by the dosing pump 35, 36.

[0041] Control of the actuator 37, 38 for actuation of the pump is aimed at achieving supply into the washing tub 4 of an optimal amount of liquid washing agent and occurs by means of the control system of the machine 1, 12. In particular, said control can be carried out on the basis of the signals that the control system receives from some of the sensor means listed previously (for example, on the basis of the value of turbidity or on the basis of the value of flowrate) and/or from other sensor means possibly applied to the machine 1 (which detect param-

eters, such as the conductivity or temperature of the washing liquid, or else the weight or type or level of dirt of the clothing loaded into the tumbler, etc.).

[0042] According to a preferred embodiment of the present invention, the machine 1, 12 further comprises a sensor device of the type described in EP-A-0 582 329, for measuring the conductivity of the treatment liquid contained in the tub 4, and the electronic control system of the machine 1, 12 avails itself of the information obtained via the aforesaid conductivity sensor for controlling the pump 35, 36, in such a way that, within the tub 4, the concentration of washing agent deemed optimal will be maintained.

[0043] In particular, said conductivity sensor device enables the control system of the machine 1 - prearranged for this purpose - to regulate the amount of liquid washing agent supplied by the pump 35, 36 at the start of a washing phase, interrupting the flow of liquid agent - by deactivation of the motor-driven actuator 37, 38 - when the concentration of liquid agent in the washing tub deemed to be optimal is reached. The value of concentration deemed to be optimal is calculated or generated automatically by the electronic control system, on the basis of information such as the amount, type and level of dirt of the laundry, the water hardness, and the type of washing treatment selected by the user.

[0044] During a washing treatment, moreover, should the concentration of liquid agent drop below a pre-set threshold, the electronic control system - prearranged for this purpose - activates the actuator 37, 38 associated to the pump 35, 36 so as to bring the aforesaid concentration back to the desired level.

[0045] Clearly visible in Figures 2 and 3 is the path of a squirter tube 25, conveniently of a flexible type, suitable for setting in hydraulic connection the respective container, for example the container 9, with the point of release into the washing tub (obviously, tubes of this kind are provided for the containers 10-11, and the tube or tubes 34 of Figure 6 are of a similar construction).

[0046] The liquid detergent can be conveyed, by means of the tube 25, directly from the container 9 to the washing tub 4. Said way of delivering the liquid washing agent is well suited to being used in the case where the laundry washer does not comprise a dispenser device of the traditional type (where by "dispenser device of a traditional type" is meant a dispenser device that is to be recharged with single doses of washing agents before each washing treatment carried out by the laundry washer).

[0047] Alternatively, as exemplified in the case of the laundry washing machine 1 represented in Figures 2-3, a different mode of supply of the liquid agents may be adopted. The machine 1 comprises, in addition to the containers 9-11, also a dispenser device of the traditional type, designated by 43 only in Figures 2-3. In this case, the delivery of the liquid washing agent drawn from the container 9 occurs conveniently in a hopper 44, i.e., in the element designed to deliver the washing agents con-

tained in the dispenser 43 into the washing tub. The liquid detergent, conveyed from the container 9 to the hopper 44, thanks to the head supplied thereto by the dosing pump 35, is then removed from the hopper 44 and released into the washing tub 4 by means of the usual flow of entrainment water coming from the tube designated by 45, pre-arranged for introducing the water into the laundry washer 1.

[0048] The above variant of laundry washer 1, comprising both a large storage capacity dispenser device and a dispenser device of the traditional type, is particularly advantageous in the case where the machine is provided with a conductivity sensor device, of the type described in the aforementioned EP-A-0 582 329. A sensor of this sort is in fact able to detect automatically a possible delivery into the washing tub of a washing agent performed by the dispenser 43, and to evaluate the amount of said washing agent as a function of the concentration deemed optimal. According to the detection made by the conductivity sensor device, the electronic control system of the machine excludes activation of the actuator 37, in the case where the amount of washing agent supplied via the dispenser 43 has been sufficient to reach the desired concentration, or else activates the actuator 37 so that the amount of liquid agent that is missing for obtaining the concentration of washing agent considered optimal will be supplied by the container 9.

[0049] Located adjacent to the squirter tubes are the cables for electrical connection, not represented, through which the supply voltage is supplied to the delivery means 24 - in particular to the motor-driven actuator 37 and to the possible sensor means - and through which the signals generated by the possible sensor means reach the control system of the machine.

[0050] The materials with which the elements for hydraulic and electrical connection are made (squirter tubes 25 and electrical-connection cables) and the path followed by said elements are advantageously chosen in such a way that the container or containers (9-11, 17-19, 26) envisaged remain in any case associated to the drawer 8, 20 of the machine 1, 12 during opening and closing of the drawer itself. In this way, when the tube or tubes 25 and the electrical-connection cables are connected to the delivery means 24, 33, the possibility is not ruled out of the respective container being brought, by opening of the drawer, outside of the volume of the fixed structure, whether this be represented by the cabinet 2 or by the base 14, so as to be thus accessible to the user for operations such as loading of the washing agent or else removal of the container from its own housing in the drawer. Hence, the aforesaid connection elements are made, entirely or else at least in the part adjacent to the respective container, of flexible materials and have a portion shaped in such a way as to enable it to be freely folded over on itself when the drawer 8, 20 is opened, varying appropriately its own curvature during the displacements of the container in the horizontal direction of opening of the drawer itself.

[0051] From the present description, it may be readily understood how the invention enables the drawbacks of the state of the art to be overcome, achieving numerous advantages.

5 **[0052]** As a first advantage, the invention makes available to the user a machine with at least one large storage capacity container for liquid washing agents featuring a considerable easiness of loading. In fact, with the solution according to the present invention, the container or containers for liquid washing agents can be removed from the machine by means of a convenient operation, represented, in the case exemplified, by opening of the drawer, which does not require access to functional elements of the machine or removal of parts of the corresponding cabinet.

10 **[0053]** Additionally, since the housing of the container or containers in the drawer is a preferably removable housing, the present invention features the ease and effectiveness with which the containers can undergo cleaning treatments for removal of any possible impurities and/or encrustations. The possibility of removal of the connection between the containers and the drawer, which in no way jeopardizes the stability of the housing of the former in the latter, also enables the user to correct
15 very easily any erroneous loading of one of the containers (for example, a load with softening agent made by mistake in the container dedicated to the liquid detergent): in this case, the container is removed from its own place of installation, emptied of its content, possibly cleaned,
20 and then loaded with the right liquid washing agent.

25 **[0054]** A further important advantage of the present invention is that it makes available to the user a laundry washer with a large storage capacity dispenser for washing agents featuring a high ergonomic level, in which the oscillating assembly and the opening for loading the laundry are favourably located in a raised position, and in which in the lower part space is left for housing the containers for the liquid washing agents. With an arrangement of this sort of the functional assemblies of the machine, the operations of loading and unloading of the laundry are highly convenient, given that these operations are carried out at each washing treatment, and hence much more frequently than the operations of loading the containers with the liquid washing agents, which
30 are reasonably carried out more or less once a month.

35 **[0055]** Finally, the variant of machine that comprises both a large storage capacity dispenser device and a dispenser device of the traditional type proves advantageous. Said variant ensures for the user availability of a machine that enables him to choose from among an automatic-loading system, a manual-loading system, and a mixed-loading system, in which the machine itself, being provided with appropriate electronic control means, is able to cause release into the washing tub of an always
40 optimal amount of washing agents, even starting from an insufficient load of washing agents in the dispenser device of the traditional type.

45 **[0056]** The present invention, which is clearly suscep-

tible of industrial application, has been described with reference to a particular embodiment, but it is evident that numerous variants, all falling within the scope of the same inventive idea, are possible in the light of the knowledge of the people skilled in the art, and that all the mentioned components can be replaced by technically equivalent elements.

[0057] In addition to the embodiments represented in Figures 1 and 4, it is possible to provide also a third embodiment of the present invention, in which the machine comprises a lower cavity and is set on a base being internally hollow, where the lower cavity of the machine and the internal space of the base are in communication with one another, so as to form a housing of large dimensions, housed in which is a drawer of enlarged capacity as compared to the cases illustrated in the aforesaid figures, with the possibility of having hence also container for liquid washing agents of higher capacity.

[0058] The invention has been described with reference to a machine for treating clothes, but it will be appreciated that the idea of solution is equally applicable with the same advantages also in the case of dish-washers.

Claims

1. A washing machine, in particular a laundry washer, having a fixed structure (2; 13, 14), a washing tub (4) in said structure (2; 13, 14), loading means (45) for conveying a treatment liquid into said tub (4), a control system (6; 16), prearranged for managing treatment cycles that can be carried out by the machine (1; 12) and a washing agent dispenser device having a long operating autonomy, the dispenser device comprising:

- at least one container (9-11 ; 17-19; 26) adapted to contain a mass of a liquid washing agent sufficient for carrying out a plurality of treatment cycles; and
- delivering means (24; 33), which can be controlled for taking dosed amounts of the washing agent from said at least one container (9-11; 17-19; 26), in order to deliver said dosed amounts into the washing tub (4),

characterized in that it further comprises a movable support (8; 20) for said at least one container (9-11; 17-19; 26), the movable support (8; 20) being displaceable, with respect to a corresponding seat (7), between an extracted position and a retracted position, in the extracted position said at least one container (9-11 ; 17-19; 26) being accessible and in said retracted position said at least one container (9-11 ; 17-19; 26) being inaccessible.

2. The machine according to Claim 1, wherein said seat

(7) is defined in a lower region of said fixed structure (2; 13, 14), or underneath said tub (4).

3. The machine according to Claim 2, wherein said fixed structure (13, 14) comprises an upper part (13), in which said tub (4) is housed, and a lower part, configured as base (14) that is associated to the upper part (13), said seat (7) being defined in said lower part (14) of the fixed structure (13, 14).

4. The machine according to one of the preceding claims, wherein said movable support (8; 20) is configured substantially as a drawer.

5. The machine according to at least one of the preceding claims, wherein said at least one container (9-11; 17-19; 26) supports respective delivering means (24; 33).

6. The machine according to Claim 1, wherein said at least one container (9-11 ; 17-19; 26) is provided with a reserve volume (22; 28).

7. The machine according to Claim 1, wherein said at least one container (9-11 ; 17-19; 26) is removably mounted on said movable support (8; 20), where in particular said at least one container (9-11 ; 17-19; 26) and said movable support (8; 20) are configured for enabling a quick coupling of the former with respect to the latter and the container has a respective portion which can be engaged with a corresponding housing made in the movable support.

8. The machine according to any one of the preceding claims, wherein said at least one container (9; 26) defines an internal space having an upper portion (21; 27) and a lower portion (22; 28), the upper portion (21; 27) having a characteristic dimension (P1; D1) greater than a homologous characteristic dimension (P2; D2) of the lower portion (22; 28), where in particular said lower forms a reserve volume.

9. The machine according to any one of the preceding claims, wherein said delivering means (24; 33) comprise a pump (35; 36) and an actuator (37; 38) configured for actuating said pump.

10. The machine according to any one of the preceding claims, further comprising sensor means operatively connected to said control system (6; 16) and designed to detect one or more quantities regarding the washing agent contained in, and/or supplied by, said at least one container (9-11; 17-19; 26), said sensor means comprising in particular one or more sensors selected from among level sensors, viscosity sensors, turbidity sensors, flowrate sensors.

11. The machine according to any one of the preceding

claims, further comprising means for measuring presence and/or concentration of a washing agent in the treatment liquid contained in said tub (4), said means for measuring comprising in particular a conductivity sensor.

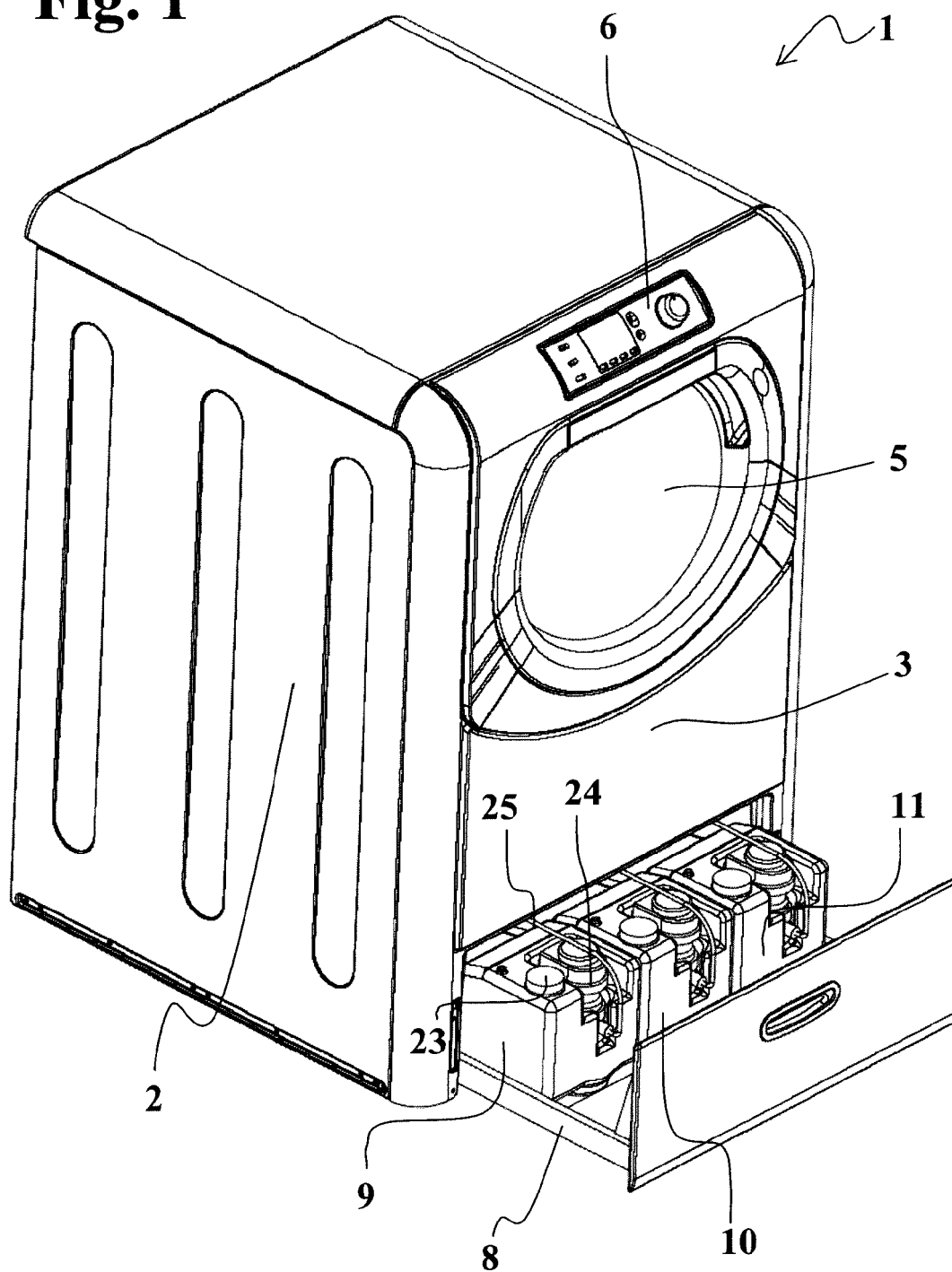
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12. The machine according to Claims 9 and 11, wherein said actuator (37; 38) is controlled by said control system on the basis of signals received from said means for measuring, in order to enable supply of an amount deemed to be optimal of the liquid washing agent in said tub (4). 10
13. The machine according to any one of the preceding claims, further comprising a single-doses dispenser device (43) of washing agents. 15
14. The machine according to Claim 13, wherein said single-doses dispenser device (43) comprises a hopper container (44) in communication with said loading means (45) and said tub (4), where in particular said at least one container (9-11; 17-19; 26) is in fluid communication with said hopper container (44), in order to enable supply of the washing agent contained in the container itself into said tub. 20 25
15. The machine according to any one of the preceding claims, wherein said at least one container (9-11; 17-19; 26) is made of rigid material, preferably plastic rigid material. 30
16. The machine according to any one of the preceding claims, wherein said at least one container (9; 26) comprises at least one first opening (30) and one second opening (32), designed to enable, respectively, loading and drawing-off of the washing agent, where in particular said dispensing means (24; 33) are removably fixed to said at least one container (9; 26) in a position corresponding to said second opening (33). 35 40
17. The machine according to one or more of the preceding claims, wherein the dispenser device having long operating autonomy comprises two or more of said container (9-11; 17-19; 26), provided for containing different liquid washing agents, said washing agents being in particular selected from amongst liquid detergents, softening agents, bleaching agents, perfuming agents, and rinse-aids. 45 50

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Fig. 1



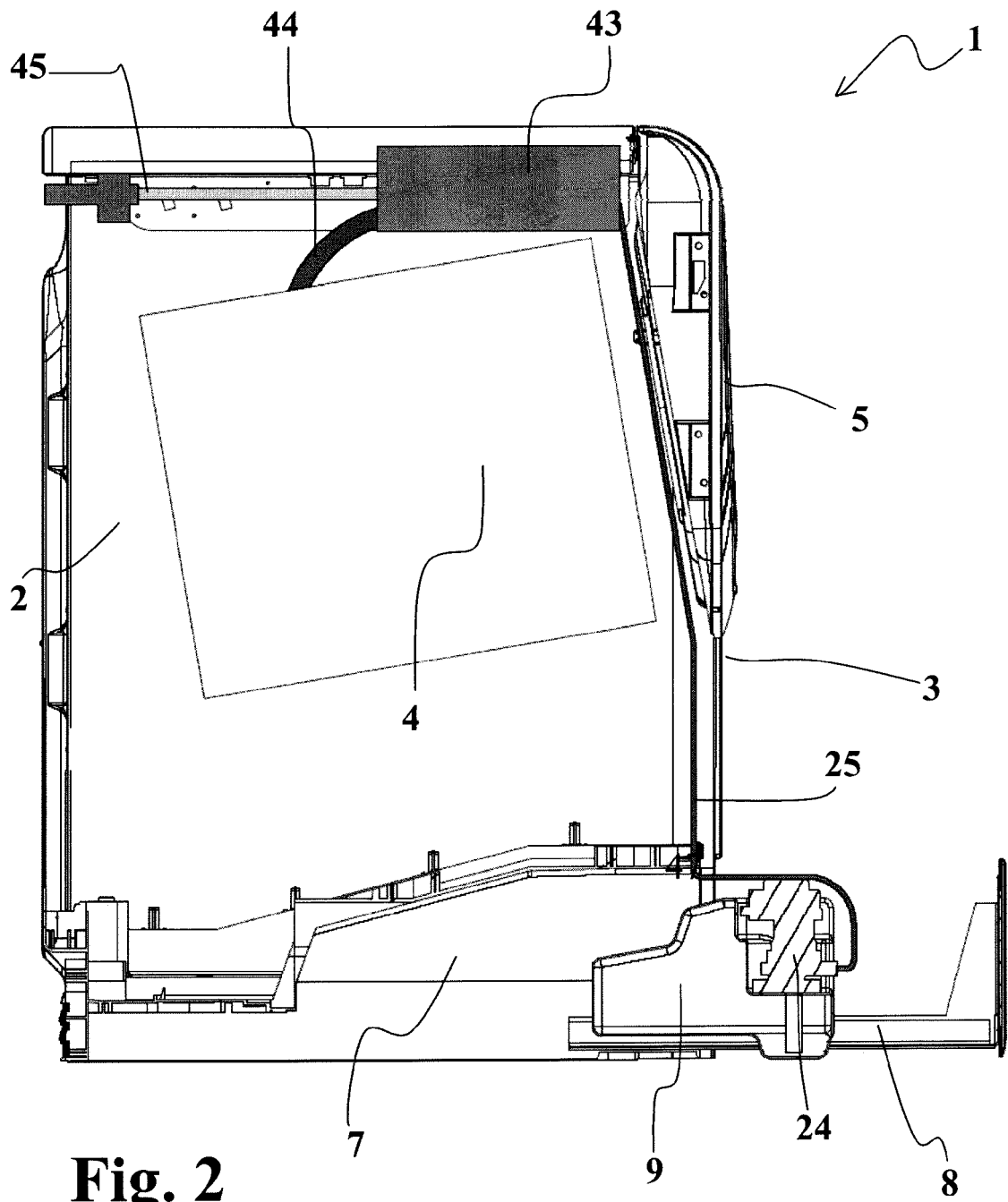


Fig. 2

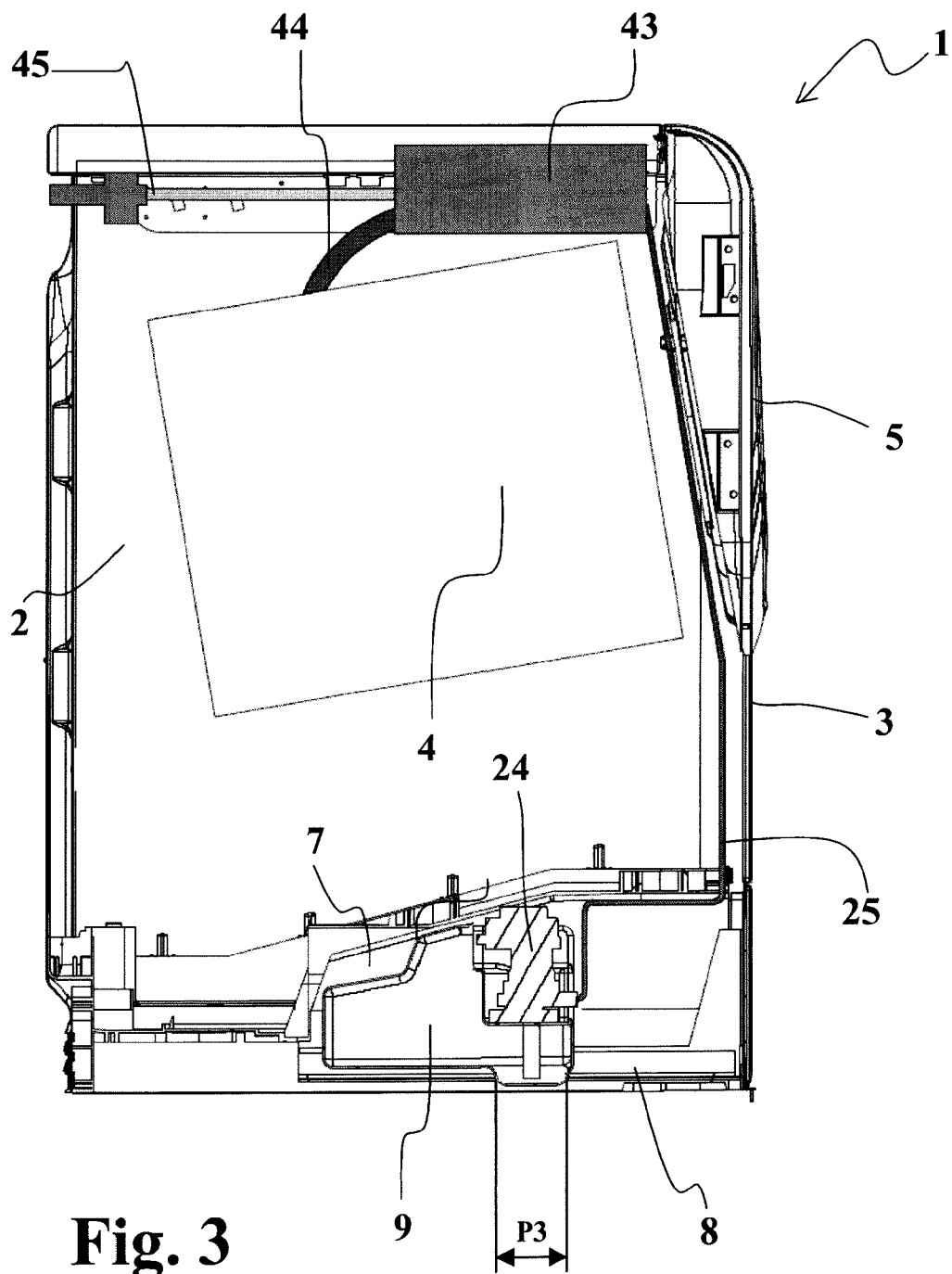
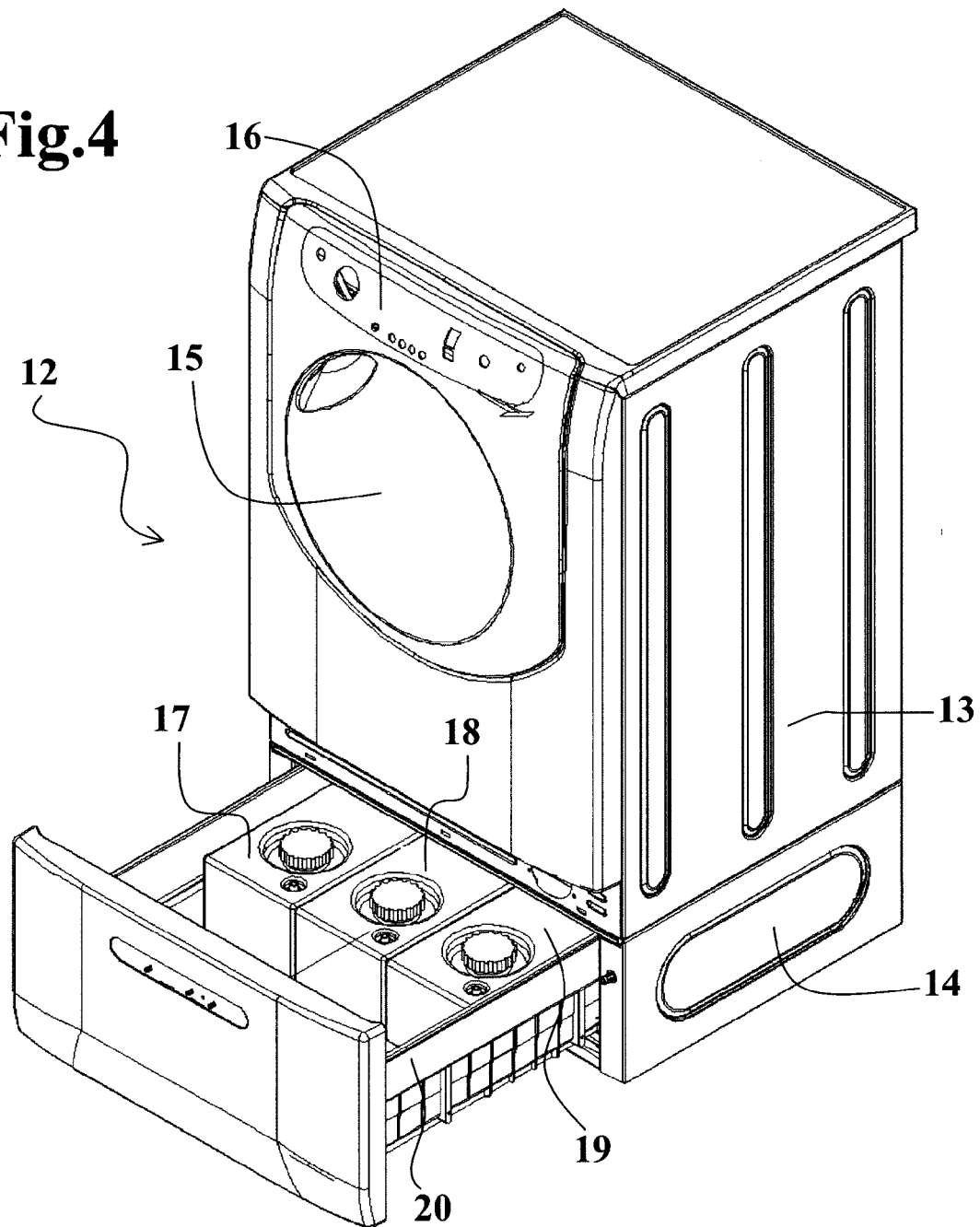
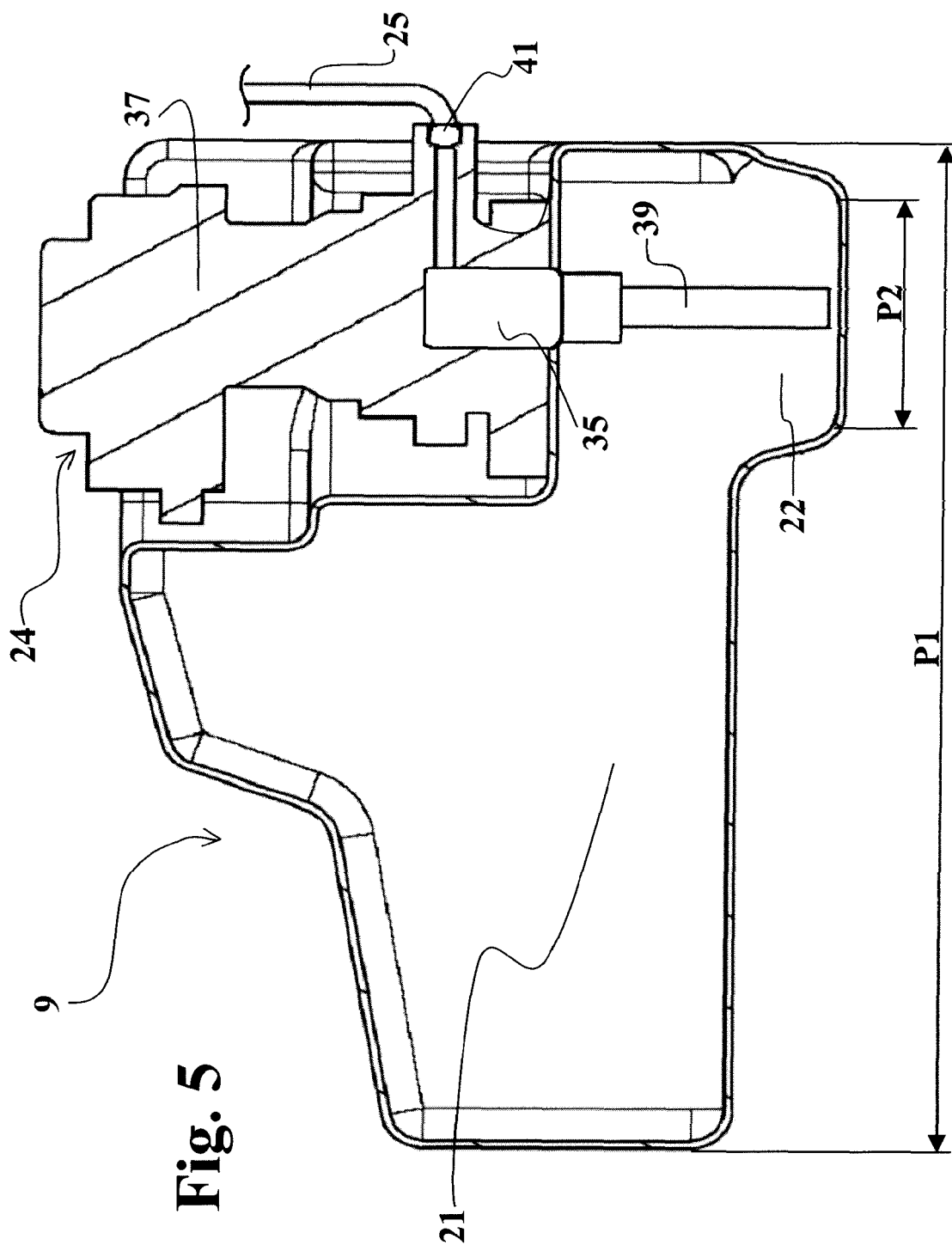


Fig. 3

Fig.4





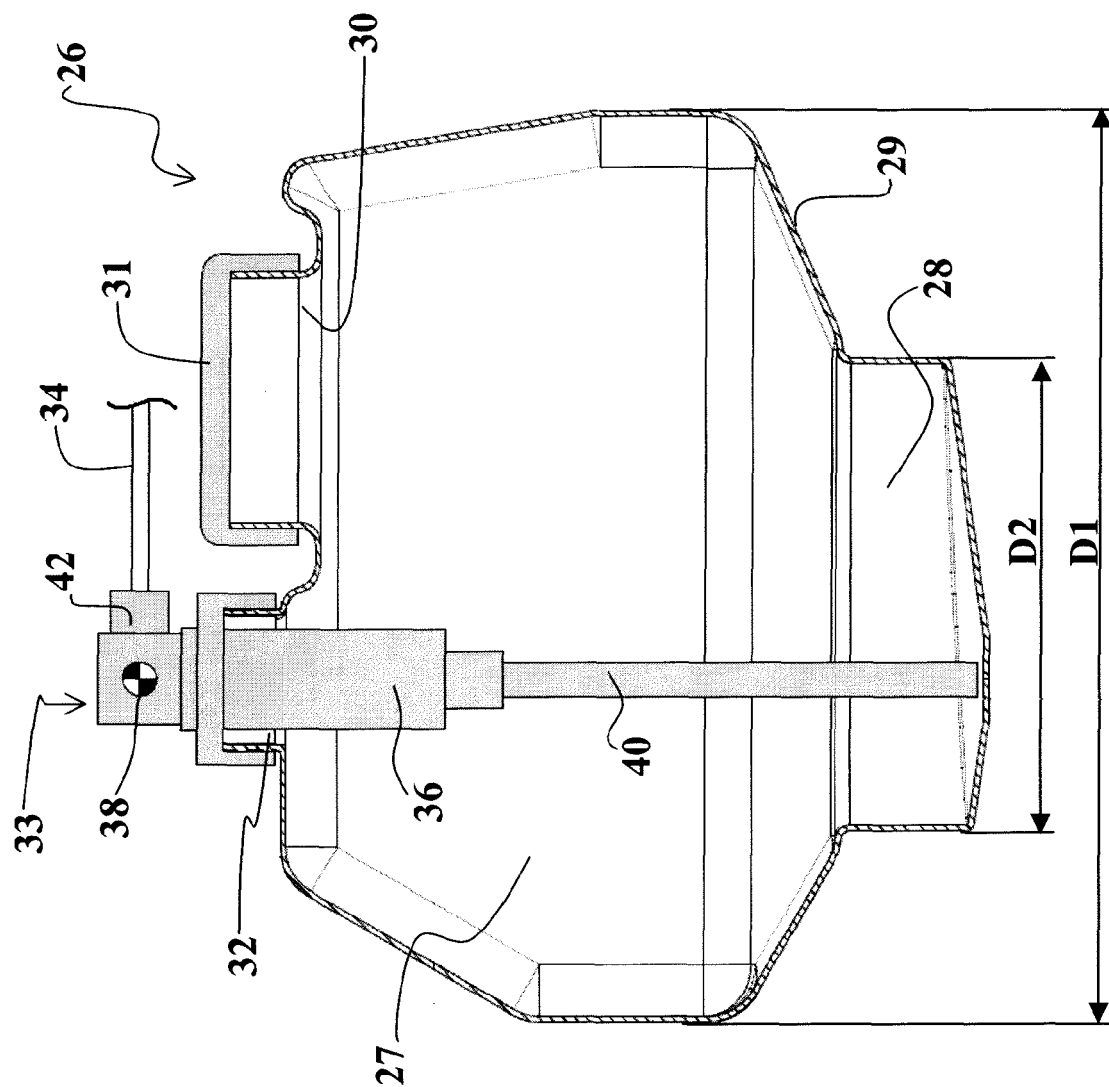


Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- GB 2214524 A [0007] [0007]
- EP 0449060 A [0008]
- US 6401499 B [0009] [0009] [0009]
- EP 0582329 A [0042] [0048]