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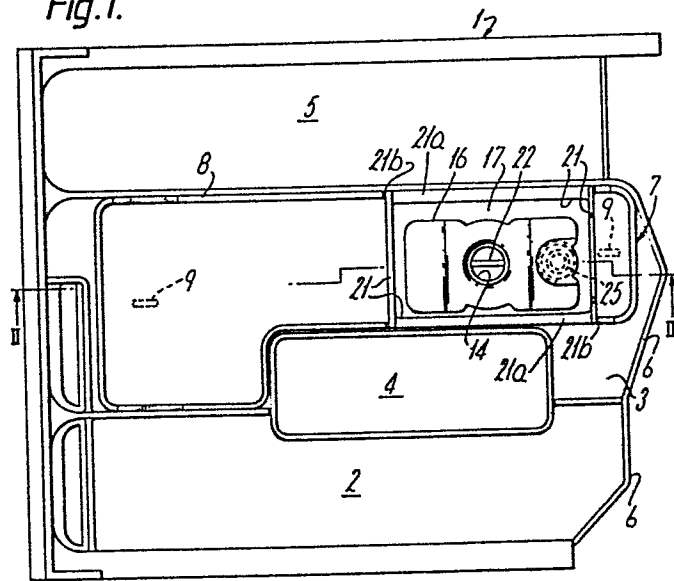
(54) **Detergent dispenser for a washing machine.**

(57) A liquid-detergent dispenser for a washing machine comprises an open-topped container (8) which can be inserted in the main-wash compartment (3) of the detergent drawer (1) of the machine. In the bottom of the container is an outlet (11) controlled by a valve member (13) which is connected to a float (16) in the form of an air-bell, accommodated in an open-topped float chamber (17). Liquid detergent deposited in the container (8) is retained therein by the valve member (13) until the water is added. Water then enters the float chamber (17) as well as the container and the float (16) is thereby raised to unseat the valve member and allow the water and detergent to flow through the outlet (11) into the compartment (3) and thence into the washing machine. When the supply of water is terminated, water is syphoned from the float chamber through an outlet (24) in the bottom

of the chamber and a further outlet (28) in the bottom of the container. This allows the float to descent and reseal the valve member to close the main outlet (11) of the container. Instead of being made for insertion in a compartment of a detergent drawer, the dispenser may be constructed as a permanent part of a detergent drawer.

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Fig.1.



DETERGENT DISPENSER FOR A WASHING MACHINE

The invention relates to a detergent dispenser for a domestic washing machine.

5 The detergents most commonly used in domestic washing machines are in powder form. To dispense a powder detergent, a prescribed quantity of the powder is deposited in an open-topped container and water is then admitted through the top of the container. As it flows down the sloping bottom of the container the water carries the detergent powder with it, out through an opening in a wall of
10 the container.

Detergent manufacturers have in recent years shown a growing interest in liquid detergents. These detergents have potential advantages over powder detergents in their lower manufacturing costs and smaller package sizes. A liquid detergent has the
15 further advantage that it can be stored in a bulk quantity inside a washing machine and supplied automatically to the dispenser in the required measured doses. At present there are two types of liquid detergent: true liquids which readily dissolve in water, and colloidal suspensions. Detergent manufacturers find difficulty in
20 formulating detergents of the true-liquid type with cleaning properties as good as those of powder detergents. This is because the phosphates necessary for a really effective cleaning action, and other builders, will only dissolve at low concentrations. In colloidal-suspension detergents the necessary phosphates and other
25 materials are carried without difficulty in a particulate form in an emulsion.

For a liquid detergent the dispenser cannot consist simply of an open-topped container with an opening in one of its walls, like the dispenser for a powder detergent, since the liquid detergent,
30 when deposited in the container, would immediately run out through the opening. The detergent must be retained in the container until the water is admitted. In the case of a true liquid detergent this presents no problem. The container is simply constructed with imperforate walls and dispensing is carried out by allowing the
35 incoming water to overflow these walls, a simple syphon being

provided for removing the water left in the container when the supply of water is terminated. Colloidal-suspension detergents cannot be dispensed in this way because the addition of water during dispensing breaks down the suspension and the heavy
5 particles tend to settle on the bottom of the container and remain there. It is an object of the invention to overcome this difficulty.

According to the invention there is provided a detergent dispenser for a washing machine, comprising a container for
10 receiving a quantity of detergent, the container having an opening for the admission of water to the container and an outlet through which the water and detergent can flow out of the container, and a closure member for closing the outlet, the closure member being operable by a float accommodated in a float chamber which has an
15 opening for the admission of water to the float chamber to cause the float to rise therein and move the closure member to open said outlet, and which has an outlet through which water can leave the float chamber to allow the float to descend and return the closure member to the closed position.

20 With the closure member in the closed position, liquid detergent deposited in the container will be retained therein until the water is added. Water then enters the float chamber as well as the container with the result that the float is raised to move the closure member to an open position so that the water and detergent
25 can flow through the outlet of the container into the washing machine.

The container and the float chamber may be left open at the top to provide the openings for the admission of water to the container and the float chamber respectively. This results in a
30 very simple construction since the supply of water to both the container and the float chamber can then come from the jets or other water-discharge devices which are usually provided above the detergent drawer in a washing machine.

The outlet of the float chamber may comprise a syphon or it
35 may comprise a simple orifice in the bottom of the float chamber.

In the latter case the orifice must be so dimensioned that the rate at which water can leave the float chamber through the orifice is lower than the rate at which water is supplied to the float chamber in the operation of the dispenser.

5 The syphon may comprise a tube projecting upwardly from the bottom of the float chamber into a dome attached to the float. This arrangement allows the syphon to be formed integrally with the float chamber by simple moulding from a plastics material. Similarly, the dome may be moulded integrally with the float from a
10 plastics material.

For simplicity of construction the closure member is preferably connected directly to the float. Manufacture of the dispenser may be simplified by moulding the closure member integrally with the float from a plastics material. To facilitate
15 the moulding operation the float preferably has substantially the form of an air-bell. As such it consists of a hollow body open at the bottom and obtaining buoyancy from air which is trapped in the hollow body as water rises in the float chamber.

20 The dispenser according to the invention can be used for dispensing powder detergent as well as liquid detergent.

25 The dispenser according to the invention may be constructed as a permanent part of the detergent drawer of a washing machine or it may be constructed as an adaptor for use with a detergent drawer which is designed to dispense only a powder detergent, more particularly a detergent drawer of the kind comprising a
30 compartment which is open at the top to receive the detergent and water and which has an opening in one of its walls through which the water and detergent can flow out of the compartment into the washing machine.

30 In an embodiment of the invention which is constructed as an adaptor for use with a detergent drawer of the above kind, the container of the dispenser is constructed for insertion in the open-topped compartment of the detergent drawer.

35 In a preferred form of this embodiment of the invention the outlet of the container is situated in the bottom of the container

and the container is constructed to be supported in the compartment of the detergent drawer with the bottom of the container spaced from the bottom of the compartment. This permits a simple construction of the dispenser since the spacing of the bottom of the container from the bottom of the compartment of the detergent drawer can be obtained simply by the provision of projections on the outer side of the bottom of the container for engagement with the inner side of the compartment.

In a simple construction of the above embodiment the outlet of the container is formed by a hole in the bottom of the container, and the closure member comprises a valve member connected to the float and extending downwardly therefrom through an opening in the bottom of the float chamber to cooperate with an annular valve seat surrounding said hole, the opening in the bottom of the float chamber being surrounded by a wall which projects upwardly from the bottom of the float chamber.

Preferably, for simplicity of construction and an efficient valve operation, said valve seat is of frusto-conical form and the valve member comprises a sleeve-shaped hollow body of circular cross-section which is guided in the wall surrounding the opening in the bottom of the float chamber and which at one end is connected to the float and at the other end has a frusto-conical surface for cooperation with the valve seat.

In the above embodiment the outlet of the float chamber may be connected to a second outlet in the bottom of the container. This provides a simple means of enabling the water in the float chamber to be discharged into the washing machine.

In an embodiment of the invention which is constructed as a permanent part of a detergent drawer of a washing machine, the container of the dispenser is constructed as a compartment of a detergent drawer of a washing machine, and the closure member comprises a gate extending across a channel leading to the outlet of the container.

In a very simple construction of this embodiment the float chamber is arranged above said channel and the gate is connected to

the float and extends downwardly therefrom through an opening in the bottom of the float chamber to seat on the bottom of the channel, the opening in the bottom of the float chamber being bounded by walls which project upwardly from the bottom of the float chamber.

The gate may have vertical edges which are slidably guided in vertical grooves in the side walls of the channel, and a horizontal edge at the bottom which seats in a groove in the bottom of the channel.

To prevent powder spilling against the gate and possibly impeding its movement when a powder detergent is being used in this embodiment, a comb-like barrier may be arranged to project downwardly from the bottom of the float chamber on the side of the gate which is nearer the entrance of the channel.

Embodiments of the invention will now be described by way of example with reference to the accompanying drawings, in which

Fig. 1 is a plan view of a detergent drawer of a washing machine, the drawer having a main-wash compartment which is constructed for dispensing a powder detergent and in which is fitted a detergent dispenser according to the invention which is constructed as an adaptor for insertion in the main-wash compartment to dispense liquid detergents,

Fig. 2 is a sectional view taken on the line II-II in Fig. 1,

Fig. 3 is a plan view of a detergent drawer comprising a dispenser according to the invention which can dispense either liquid or powder detergent, and

Fig. 4 is a sectional view taken on the line IV-IV in Fig. 3.

The detergent drawer 1 shown in Figs. 1 and 2 is formed with four open-topped, elongate, generally parallel compartments 2, 3, 4 and 5 for receiving a pre-wash detergent, a main-wash detergent, a fabric conditioner and a bleach respectively. In normal use, powder detergents placed in the pre-wash and main-wash compartments 2 and 3 are dispensed into the washing machine in conventional manner by water which is discharged from a number of jets (not shown) above the compartments and which flows down the sloping

bottoms of the compartments 2 and 3 and out through the open rear ends 6 of these compartments, carrying the powder with it.

The two compartments 4 and 5 for the liquid fabric conditioner and the liquid bleach are not open at their rear ends (the
5 right-hand ends in Figs. 1 and 2). The liquids deposited in these compartments are flushed out by water from the jets, the water which remains in the compartments after the jets are switched off being syphoned out. This is carried out in known manner and requires no illustration or description.

10 To convert the drawer 1 for dispensing a liquid detergent from the main-wash compartment 3, a liquid-detergent dispensing adaptor 7 is inserted in this compartment. No modification of the pre-wash compartment 2 is required for a liquid pre-wash detergent, since
15 this detergent may flow into the washing machine immediately it is poured into the drawer.

The adaptor 7 comprises an open-topped elongate container 8 which is moulded from a plastics material and which is constructed to be received with a sliding fit between the side walls of the main-wash compartment 3. The container 8 is supported on the
20 bottom of the compartment 3 by feet 9 which project from the bottom 10 of the container so that the bottom of the container is spaced from the bottom of the compartment 3. The feet 9 can be moulded integrally with the container 8. In the bottom 10 of the container 8 is an outlet 11 in the form of a round hole, the wall of which is
25 of frusto-conical shape to form an annular seat 12 for a valve member 13. This valve member consists of a vertically disposed sleeve-shaped hollow body 14 of circular cross-section which has a frusto-conical surface 15 at its lower end for cooperation with the valve seat 12. At its upper end the valve body 14 is connected to
30 a float 16 in the form of an air-bell, accommodated in a chamber 17 in the container 8. The float chamber 17 is open at the top and has a circular opening 18 in its bottom 19, which is spaced above the bottom 10 of the container 8. The opening 18 is surrounded by a wall 20 which projects upwardly from the bottom of the float
35 chamber 17 and in which the valve body 14 is loosely guided in the

vertical direction. This wall 20 and the bottom 19 and peripheral walls 21 of the float chamber are moulded integrally from a plastics material. Two of the walls 21 are formed at their upper edges with outwardly directed flanges 21a which engage in recesses 21b in the upper edges of the two longitudinal walls of the container 8 to locate and support the float chamber in the container. The float 16 and valve body 14 are also formed as an integral plastics moulding, the moulding operation being facilitated by the air-bell form of the float. In the open lower end of the valve body 14 is fixed a rib 22 which extends diametrically across the end of the valve body and which at its ends has tapering edges 23 which lie on the generatrix of the frusto-conical valve surface 15 of the valve member 13. The edges 23 extend downwardly from the valve surface 15 and serve to guide the valve member into the outlet 11 during the downward closing movement of the valve member so that the valve surface 15 will seat accurately on the valve seat 12.

In the bottom 19 of the float chamber 17 is an outlet 24 which comprises a syphon formed by a tube 25 which projects upwardly from the bottom of the float chamber into a dome 26 formed integrally with the float 16. The syphon tube 25 may be formed integrally with the bottom of the float chamber 17. The outlet 24 further comprises a spigot-like protrusion 27 on the bottom of the float chamber which projects downwardly into a further outlet 28 in the bottom 10 of the container 8. The outlet 28 is formed in a hollow raised portion 29 on the bottom of the container 8.

The open tops of the container 8 and the float chamber 17 provide openings through which water can be admitted to the container and the float chamber from the aforesaid jets.

In the use of the adaptor 7 a prescribed quantity of liquid detergent is deposited in the container 8. Since there is no water in the container at this stage the valve member 13 rests in the closed position on the valve seat 12 under the influence of gravity and the detergent is therefore retained in the container 8. When water is added the detergent is diluted and will tend to overflow

the walls of the container 8. However, water from the jets also enters the float chamber 17. As it rises in the float chamber the water traps air in the air-bell forming the float 16, and the float is then lifted by the rising water to raise the valve member 13 off the seat 12 and so open the outlet 11 in the bottom of the container 8. The water and detergent, including the heavy particulate matter in the detergent, can then flow out of the container through the outlet 11 into the main-wash compartment 3 of the detergent drawer 1 and thence, via the open rear end 6 of this compartment, into the washing machine. As can be seen in Fig. 2, the bottom 10 of the container 8 slopes downwards slightly towards the outlet 11. When the water jets are switched off, residual water in the container 8 drains out through the outlet 11, and at a slightly slower rate water is syphoned from the float chamber 17 through the outlet 24 to lower the valve member 13 onto the seat 12 again. The amount of water which enters the float chamber from the jets is sufficient to bring the level of water in the chamber at least to the upper end of the syphon tube 25 in order to initiate the syphoning action. This action begins after the float 16 has been lifted by the rising water to raise the valve member 13.

The syphon in the float chamber 17 is not essential; a simple orifice would suffice to empty the float chamber 17 when the supply of water from the jets is terminated. The orifice would, of course, have to be so dimensioned that the rate at which water could leave the float chamber through the orifice would be less than the rate at which it is supplied to the chamber by the jets.

Instead of having the form of an air-bell, the float 16 may be constructed as a closed hollow member, like the float of a carburettor, for example.

Instead of having a vertically movable valve member connected directly to the float 16 and controlling an outlet in the bottom 10 of the container 8, a valve member could be coupled to the float by a bell-crank lever and arranged to control an outlet formed adjacent the bottom of the container in a wall at the rear end of the container.

Figs. 3 and 4 show a detergent dispenser which is constructed as a permanent part of a detergent drawer and which is capable of dispensing either liquid or powder detergent. The container of this dispenser is formed as a main-wash compartment 30 of the drawer, which again also has compartments for a pre-wash detergent, a fabric conditioner and a bleach. An outlet 31 situated at the rear end of the compartment 30 adjacent the bottom thereof is controlled by a closure member in the form of a vertically disposed gate 32 connected directly, for example, by integral moulding, to a float 33. The float again consists of an air-bell and is accommodated in an open-topped chamber 34 arranged between the side walls of the compartment 30 above the outlet 31. The gate 32 has the form of a blade extending downwardly from the float 33 through an elongate opening 35 in the bottom of the float chamber 34, the opening 35 being bounded by walls 36 which project upwardly from the bottom of the float chamber. Below the float chamber the compartment 30 has a narrowed part which forms a channel 37 leading to the outlet 31. The gate 32 extends across this channel and has vertical edges 38 which are slidably guided in vertical grooves in the side walls 39 of the channel 37. At the bottom the gate 32 has a horizontal edge 40 which seats in a groove 41 in the bottom of the channel 37 to close the outlet 31. In this embodiment the outlet of the float chamber is formed by a simple orifice 42 without a syphon, although a syphon similar to the tube 25 in Figs. 1 and 2 may be provided if desired. The orifice 42 is so situated that water flowing through it from the float chamber falls straight through the outlet 31. The float chamber can conveniently be supported on the ledges 39a formed at the top of the side walls 39 of the channel 37.

In the use of this dispenser, liquid or powder detergent is placed in the compartment 30. In the case of liquid detergent, with the gate 32 in the closed position shown in Fig. 4 the liquid is retained in the compartment 30. When the water is added the float 33 is lifted by the water which enters the float chamber 34 and the gate 32 is thereby raised to allow the water and detergent

to flow through the outlet 31 into the washing machine. When the supply of water is terminated, as the float chamber 34 empties through the outlet 42 the float 33 descends to reseal the gate 32. Obviously, since water can also leave the float chamber through the
5 outlet 42 while water is entering the chamber during the supply of water to the dispenser, the outlet 42 must be so dimensioned that water can flow through it only at a considerably lower rate than that at which water is supplied to the float chamber by the jets.

To prevent powder detergent spilling against the gate 32 and
10 possibly impeding its movement, a comb-like barrier 43 projects downwardly from the bottom of the float chamber 34 in front of the gate 32.

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CLAIMS:

1. A detergent dispenser for a washing machine, comprising a container for receiving a quantity of detergent, the container having an opening for the admission of water to the container and an outlet through which the water and detergent can flow out of the container, and a closure member for closing the outlet, the closure member being operable by a float accommodated in a float chamber which has an opening for the admission of water to the float chamber to cause the float to rise therein and move the closure member to open said outlet, and which has an outlet through which water can leave the float chamber to allow the float to descend and return the closure member to the closed position.

2. A detergent dispenser as claimed in Claim 1, characterised in that the container and the float chamber are open at the top to provide the openings for the admission of water to the container and the float chamber respectively.

3. A detergent dispenser as claimed in Claim 1 or 2, characterised in that the outlet of the float chamber comprises a syphon.

4. A detergent dispenser as claimed in Claim 3, characterised in that the syphon comprises a tube projecting upwardly from the bottom of the float chamber into a dome attached to the float.

5. A detergent dispenser as claimed in any of Claims 1 to 4, characterised in that the closure member is connected directly to the float.

6. A detergent dispenser as claimed in Claim 5, characterised in that the closure member is formed integrally with the float by moulding from a plastics material.

7. A detergent dispenser as claimed in any of Claims 1 to 6, characterised in that the float has substantially the form of an air-bell.

8. A detergent dispenser as claimed in any of Claims 1 to 7 and which is constructed as an adaptor for use with a detergent drawer comprising a compartment which is open at the top to receive the detergent and water and which has an opening in one of its

walls through which the water and detergent can flow out of the compartment into the washing machine, characterised in that the container of the dispenser is constructed for insertion in the open-topped compartment of the detergent drawer.

5 9. A detergent dispenser as claimed in Claim 8, characterised in that the outlet of the container is situated in the bottom of the container and the container is constructed to be supported in the compartment of the detergent drawer with the bottom of the container spaced from the bottom of the compartment.

10 10. A detergent dispenser as claimed in Claim 9, characterised in that the outlet of the container is formed by a hole in the bottom of the container, and in that the closure member comprises a valve member connected to the float and extending downwardly therefrom through an opening in the bottom of the float
15 chamber to cooperate with an annular valve seat surrounding said hole, the opening in the bottom of the float chamber being surrounded by a wall which projects upwardly from the bottom of the float chamber.

 11. A detergent dispenser as claimed in Claim 10,
20 characterised in that said valve seat is of frusto-conical form and the valve member comprises a sleeve-shaped hollow body of circular cross-section which is guided in the wall surrounding the opening in the bottom of the float chamber and which at one end is connected to the float and at the other end has a frusto-conical
25 surface for cooperation with the valve seat.

 12. A detergent dispenser as claimed in any of Claims 8 to 11, characterised in that the outlet of the float chamber is connected to a second outlet in the bottom of the container.

 13. A detergent dispenser as claimed in any of Claims 1 to 7,
30 characterised in that the container is constructed as a compartment of a detergent drawer of a washing machine, and wherein the closure member comprises a gate extending across a channel leading to the outlet of the container.

 14. A detergent dispenser as claimed in Claim 13,

characterised in that the float chamber is arranged above said
channel and the gate is connected to the float and extends
downwardly therefrom through an opening in the bottom of the float
chamber to seat on the bottom of the channel, the opening in the
5 bottom of the float chamber being bounded by walls which project
upwardly from the bottom of the float chamber.

15. A detergent dispenser as claimed in Claim 14,
characterised in that the gate has vertical edges which are
slidably guided in vertical grooves in the side walls of the
10 channel, and a horizontal edge at the bottom which seats in a
groove in the bottom of the channel.

16. A detergent dispenser as claimed in Claim 13, 14 or 15,
characterised in that a comb-like barrier projects downwardly from
the bottom of the float chamber on the side of the gate which is
15 nearer the entrance of the channel.

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Fig.1.

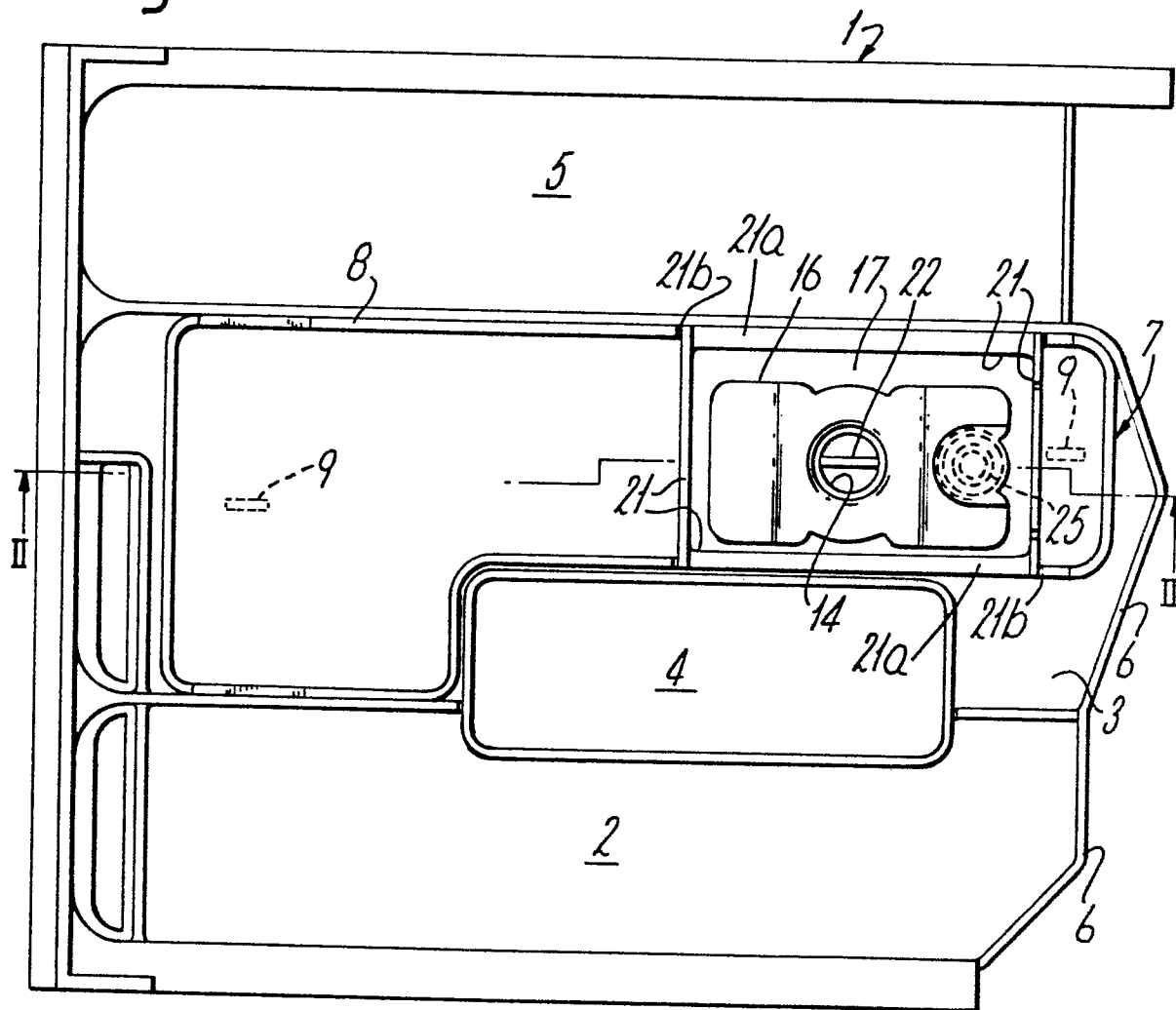


Fig.2.

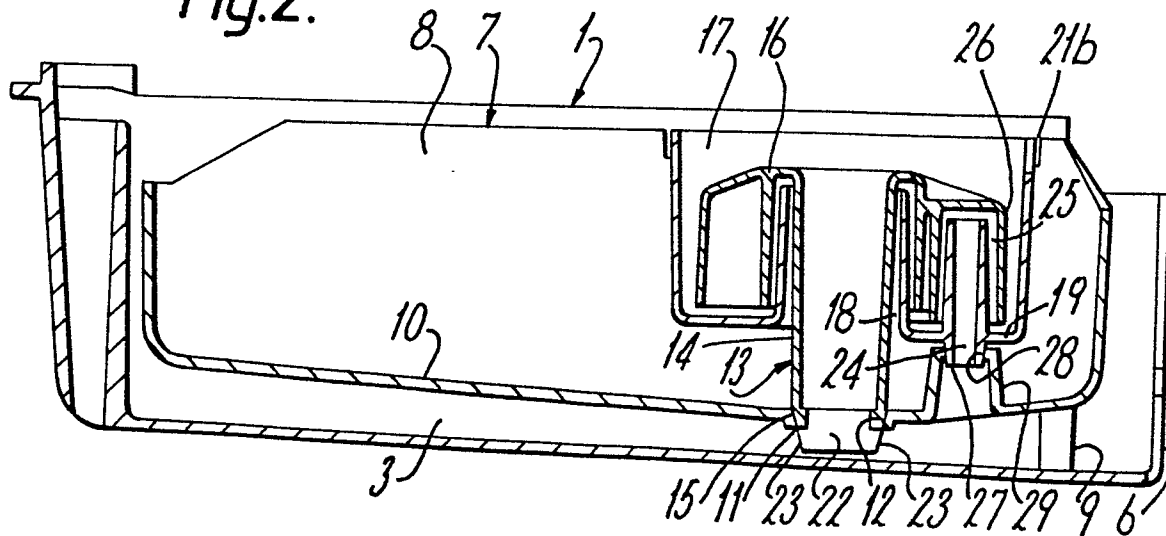


Fig. 3.

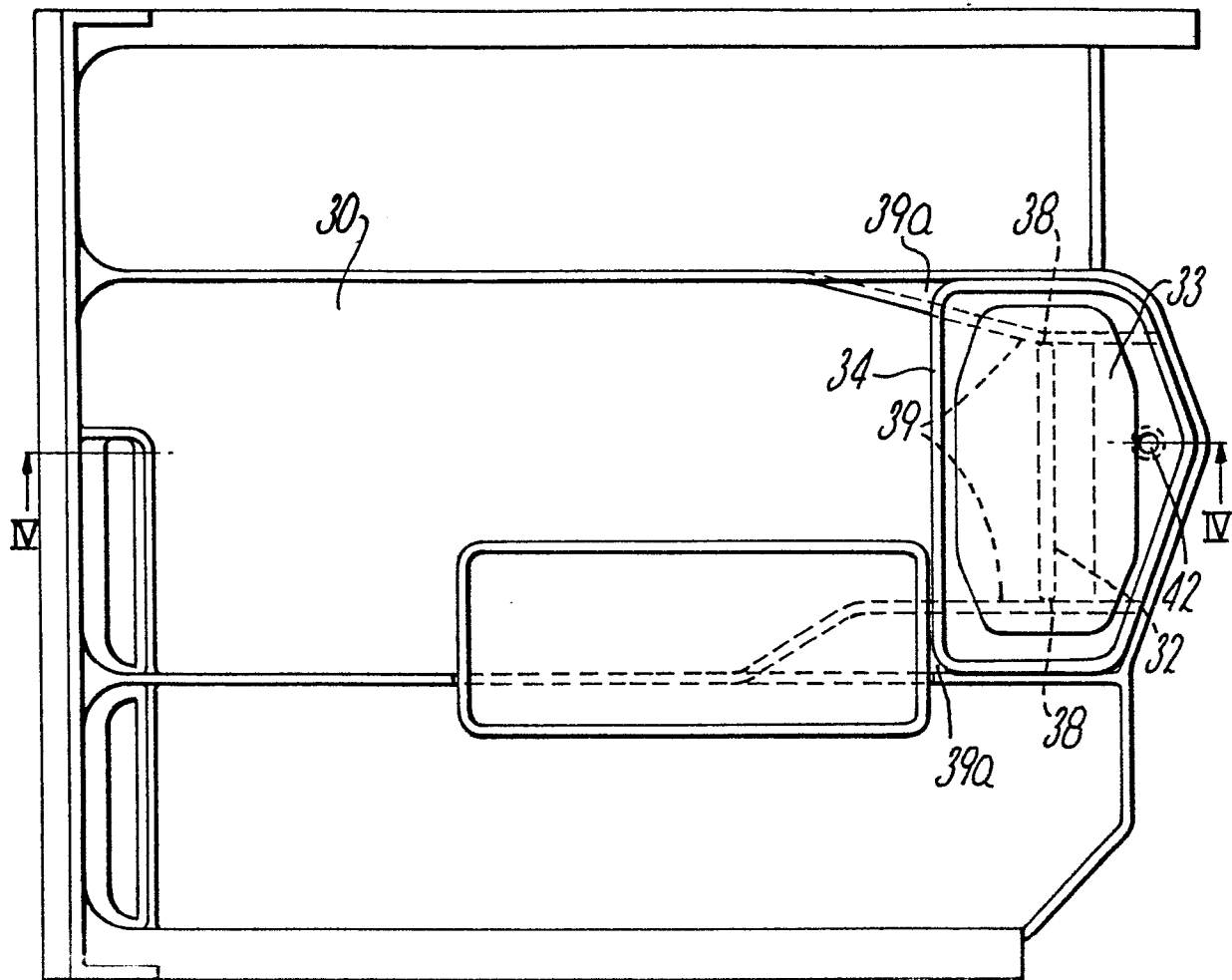


Fig. 4.

