

(19)



(11)

EP 2 604 743 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

19.06.2013 Bulletin 2013/25

(51) Int Cl.:

D06F 39/02 (2006.01)(21) Application number: **11193571.4**(22) Date of filing: **14.12.2011**

(84) Designated Contracting States:

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

Designated Extension States:

BA ME(71) Applicant: **Electrolux Home Products Corporation N.V.****1130 Brussel (BE)**

(72) Inventors:

- **De Michieli, Enrico**
33080 Porcia (PN) (IT)
- **Maiero, Marco**
33080 Porcia (PN) (IT)

(74) Representative: **Nardoni, Andrea et al**
Electrolux Italia S.p.A.
Corso Lino Zanussi, 30
33080 Porcia (PN) (IT)
(54) **Laundry washing machine**

(57) Laundry washing machine (1) comprising an outer boxlike casing (2) provided with a laundry loading/unloading opening (7a) provided on the top wall (7) of the boxlike casing (2) and allowing the access to a hollow washing tub (3) arranged inside the casing (2), and a detergent dispenser (10) which is located at the laundry loading/unloading opening (7a) and is structured to selectively drop a mixture of detergent and water into the washing tub (3); the detergent dispenser (10) comprises a substantially basin-shaped container (14) which is provided with at least one detergent compartment (15) shaped/dimensioned to be manually fillable with a given amount of detergent, and a corresponding siphon assembly (16) which communicates with the detergent compartment (15) and is shaped/structured for draining out of the basin-shaped container (14) a liquid-type detergent stored within the detergent compartment (15) when a given amount of fresh water is channeled into the detergent compartment (15). The basin-shaped container (14) is provided with a pass-through opening (15a) shaped/dimensioned so to allow the free outflow, out of the basin-shaped container (14), of a powder-type detergent stored within the detergent compartment (15) when a given amount of fresh water is channeled into the detergent compartment (15); the detergent dispenser (10) comprises a hand-operated, movable closing member (17) which is attached to the basin-shaped container (14) and is movable between a closing position in which the movable closing member (17) seals up in watertight manner said pass-through opening (15a), and an opening position in which the movable closing member (17) does not close the pass-through opening (15a) thus allowing the free outflow of the detergent stored within the detergent compartment (15) through the pass-through opening (15a).

ing (15a).

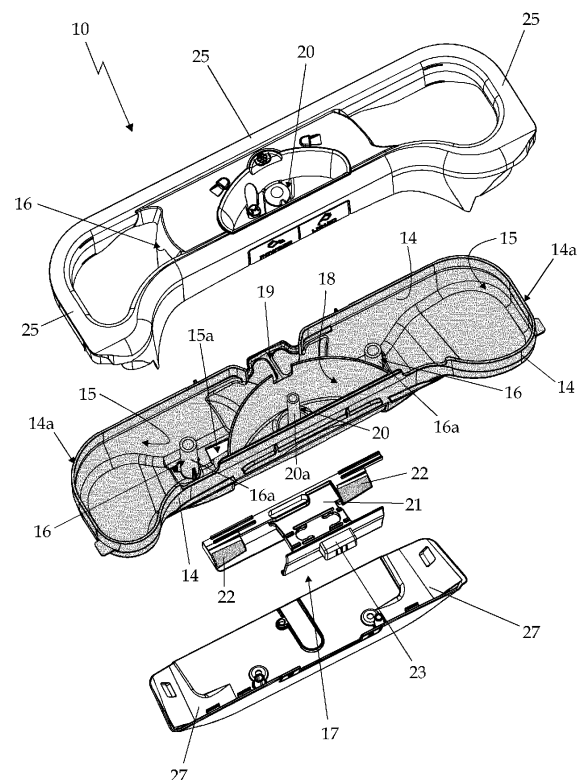


Fig. 3

EP 2 604 743 A2

Description

[0001] The present invention relates to a laundry washing machine.

[0002] In particular, the present invention relates to a top-loading home laundry washing machine, to which the following description refers purely by way of example, without implying any loss of generality.

[0003] As is known, top-loading laundry washing machines generally comprise: a substantially parallelepiped-shaped, outer boxlike casing, typically structured for resting on the floor; a substantially cylindrical hollow washing tub which is typically suspended in floating manner inside the casing by means of a number of coil springs and shock-absorbers, with the longitudinal reference axis of the washing tub oriented substantially horizontally; a substantially cylindrical, hollow revolving drum which is structured for housing the laundry to be washed, and is housed in axially rotating manner inside the washing tub for rotating about its substantially horizontally-oriented, longitudinal reference axis; an elastically-deformable bellows which connects in watertight manner a pass-through opening provided on the upper section of the lateral wall of the washing tub to the annular rim (called also hopper) of a laundry loading/unloading pass-through opening provided on the top of the casing; and an upper door which is typically hinged to the top of the casing so as to rotate to and from a closing position in which the door rests on the top of the casing to close in watertight manner the loading/unloading opening.

[0004] Known laundry washing machines of the above type furthermore typically comprise: an electric motor assembly which is located outside of the washing tub, and is structured for driving into rotation the revolving drum about its longitudinal reference axis inside the washing tub; a detergent dispenser which is usually attached to the annular rim (or hopper) of the laundry loading/unloading opening on the top of the casing, above the pass-through opening on the lateral wall of the washing tub; and a fresh water supply circuit which is structured for drawing fresh water from the water mains and supplying said water into the detergent dispenser so as to sweep away into the washing tub the detergent and/or softeners stored into the detergent dispenser.

[0005] A detergent dispenser of the above type is disclosed in European Patent Application No. 2133456.

[0006] Despite being extremely user-friendly, the detergent dispenser disclosed in European Patent Application No. 2133456 is optimized for operating with liquid-type detergents, while it has shown some problems with detergent powder. In fact, when detergent powder is poured into the detergent compartment of the detergent dispenser, it generally forms, on the bottom of the detergent compartment, a compact bed of detergent powder that usually completely clogs up the entrances of the siphon assembly of the detergent dispenser, thus hampering the correct draining of the mixture of water and detergent to the washing tub when the fresh water is sub-

sequently poured into the detergent compartment.

[0007] In fact, usually, huge deposit of detergent powder remains on the bottom of the detergent compartment/s when the EP-2133456 detergent dispenser is requested to operate with traditional powder-type detergents.

[0008] Aim of the present invention is to provide a detergent dispenser for top-loading laundry washing machines structured to correctly/efficiently operate with either liquid-type or powder-type detergents.

[0009] Applicant has found that by a laundry washing machine provided with a detergent dispenser comprising a detergent compartment provided with a siphon assembly shaped/structured for draining out of the compartment a liquid-type detergent stored therein when a given amount of fresh water is channeled into the detergent compartment, and also with a pass-through opening shaped/dimensioned so as to allow the free outflow, out of the detergent compartment, of a powder-type detergent stored within the detergent compartment when a given amount of fresh water is channeled into the detergent compartment, and provided also with a movable closing member adapted to selectively manually obstruct the pass-through opening, it is possible to effectively use both liquid detergent and powder detergent without the risk that the latter is not completely drained from the detergent dispenser, and at the same time avoiding that the liquid detergent would flow into the tub before starting the washing program.

[0010] In compliance with the above aim, according to the present invention there is provided a laundry washing machine comprising an outer boxlike casing provided with a laundry loading/unloading opening provided on the top wall of the boxlike casing and allowing the access to a hollow washing tub arranged inside the casing, and a detergent dispenser which is located at the laundry loading/unloading opening and is structured to selectively drop a mixture of detergent and water into the washing tub, wherein the detergent dispenser comprises a substantially basin-shaped container which is provided with at least one detergent compartment shaped/dimensioned to be manually fillable with a given amount of detergent, and a corresponding siphon assembly which communicates with the detergent compartment and is shaped/structured for draining out of the basin-shaped container a liquid-type detergent stored within the detergent compartment when a given amount of fresh water is channeled into the detergent compartment; the basin-shaped container is provided with a pass-through opening shaped/dimensioned so as to allow the free outflow, out of the basin-shaped container, of a powder-type detergent stored within the detergent compartment when a given amount of fresh water is channeled into the detergent compartment; the detergent dispenser comprises a hand-operated, movable closing member which is attached to the basin-shaped container and is movable between a closing position in which the movable closing member seals up in watertight manner the pass-through

opening, and an opening position in which the movable closing member does not close the pass-through opening thus allowing the free outflow of the detergent stored within the detergent compartment through the pass-through opening.

[0011] Advantageously, the movable closing member may comprise a plug element, fixed to the basin-shaped container so as to be manually displaceable to and from a closing position in which the plug element closes the pass-through opening, and a sealing gaskets, arranged on the plug element so as to abut, when the plug element is arranged in the closing position, against the perimeter of the pass-through opening to seal up the pass-through opening.

[0012] Preferably, the sealing gasket may be over-injected on the plug element.

[0013] Opportunely, the plug element may comprise a sliding block which is attached in sliding manner to the basin-shaped container so to be manually displaceable between a first and a second working position, and a surface pad which is made of a suitable elastomeric material and is arranged on the sliding block so as to be aligned, when the sliding block is arranged in the first working position, to the pass-through opening to seal up the pass-through opening.

[0014] Preferably, the movable closing member may comprise a manually-operable element which is connected to the sliding block so to allow the user to manually displace the sliding block between the first and the second working position.

[0015] Advantageously, the manually-operable element may jut out of a lateral wall of the basin-shaped container that faces the center of the laundry loading/unloading opening.

[0016] Preferably, the manually-operable element may be made in one piece with the sliding block.

[0017] Advantageously, the detergent dispenser may comprise a substantially tray-shaped, lower baffle which is rigidly attached to the bottom of the basin-shaped container, above the movable closing member, the pass-through opening of the at least one detergent compartment and the outlet of the siphon assembly of the same detergent compartment. Preferably, the lower baffle is shaped/dimensioned so to deflect the liquid mixture of detergent and fresh water that comes out from the pass-through opening or from the outlet of the siphon assembly towards a lateral wall of a bellows connecting the washing tub to the pass-through opening.

[0018] Preferably, the siphon assembly of the detergent dispenser may comprise two straight sleeves that are inserted one inside the other, at least partly spaced one another, and are arranged inside the detergent compartment; the inner straight sleeve extends in pass-through manner across the bottom of the basin-shaped container and protrudes upwards inside the detergent compartment up to a given height, and the outer straight sleeve is provided with a closed upper end and extends downwards from slightly above the top of the

inner straight sleeve so as to enclose/sheathe the inner straight sleeve up to a given distance from the bottom of the detergent compartment.

[0019] Preferably, the outer surface of the outer straight sleeve of the siphon assembly may be provided with a longitudinal surface channel that extends downwards from the upper end of the outer straight sleeve, and is shaped/dimensioned to channel towards the bottom of the detergent compartment the fresh water that bumps against the outer straight sleeve.

[0020] Opportunely, the longitudinal surface channel may be substantially rectilinear and may extend substantially parallel to the longitudinal axis of the outer straight sleeve of the siphon assembly.

[0021] In a further advantageous embodiment, the detergent dispenser may also comprise an upper lid element which is firmly fixed/fixable to the basin-shaped container and is structured to directly support/form the outer straight sleeve of the siphon assembly of the detergent dispenser.

[0022] In a further advantageous embodiment the substantially basin-shaped container is provided with a number of detergent compartments each of which is shaped/dimensioned to be manually fillable with a given amount of detergent, and has a corresponding pass-through opening shaped/dimensioned so to allow the free outflow, out of the basin-shaped container, of the powder-type detergent stored within the detergent compartment when a given amount of fresh water is channeled into the detergent compartment; the hand-operated, movable closing member is structured to selectively seal up in watertight manner the pass-through opening when arranged in the closing position.

[0023] In an advantageous embodiment, the clear section of the pass-through opening of the detergent compartment is greater than 1.5 square centimeters.

[0024] A non-limiting embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

- Figure 1 is a perspective view of the upper portion of a top-loading laundry washing machine made in accordance with the teachings of the present invention;
- Figure 2 is an enlarged section view of the top portion of the Figure 1 laundry washing machine in a wide-opened configuration and with parts removed for clarity;
- Figure 3 is an exploded perspective view of the detergent dispenser of the Figure 1 laundry washing machine, with parts removed for clarity;
- Figure 4 is a top view of the Figure 3 detergent dispenser;
- Figure 5 is a section view of the Figure 4 detergent dispenser according to section line D-D; and
- Figure 6 is a perspective view of the upper lid of the Figure 4 detergent dispenser.

[0025] With reference to Figures 1 and 2, referral number 1 indicates as a whole a top-loading laundry washing machine that advantageously comprises:

- a preferably, though not necessarily, substantially parallelepiped-shaped outer boxlike casing 2, which preferably, but not necessarily, is structured for resting on the floor;
- a preferably, though not necessarily, substantially cylindrical, hollow washing tub 3 which is arranged inside the casing 2 with the longitudinal reference axis L of tub 3 preferably oriented substantially horizontal and parallel to the front wall 4 of boxlike casing 2;
- a substantially cylindrical, hollow revolving drum 5 which is structured for housing the laundry to be washed, and is housed in axially rotating manner inside the washing tub 3 so as to be able to rotate about a rotation axis (not shown) preferably locally substantially parallel, or even coincident, with the longitudinal reference axis L of washing tub 3; and
- preferably, an elastically-deformable bellows 6 which connects in watertight manner a pass-through opening 3a provided on the upper section of the lateral wall of washing tub 3 to the annular frame or rim (called also hopper) of a superjacent laundry loading/unloading pass-through opening 7a provided on the top wall 7 of boxlike casing 2.

[0026] In the example shown, washing tub 3 is preferably suspended in floating manner inside the boxlike casing 2 via a suspension system preferably, though not necessarily, comprising a number of coil springs (not shown) and vibration dampers (not shown). The pass-through opening 3a on the lateral wall of washing tub 3 and the laundry loading/unloading opening 7a on the top wall 7 of boxlike casing 2 are preferably substantially rectangular in shape.

[0027] Furthermore the pass-through opening 3a on the lateral wall of washing tub 3 is preferably bordered/delimited by an upwards protruding collar or sleeve (not illustrated) which is preferably made in one piece with the cylindrical lateral wall of washing tub 3, and the elastically-deformable bellows 6 is preferably fitted onto said upwards projecting collar or sleeve.

[0028] Revolving drum 5 preferably has a perforated lateral wall and is provided with a door 5a, preferably, though not necessarily, double-leaf and manually-openable, which is located on the cylindrical lateral wall of the drum, and is dimensioned for providing, when opened, temporary access to the inside of revolving drum 5 when the door 5a is aligned to the pass-through opening 3a on the lateral wall of washing tub 3.

[0029] With reference to the exemplary embodiment illustrated in figures 1 and 2, the top-loading laundry washing machine 1 furthermore preferably comprises:

- an upper door 9 which is preferably hinged to the top

wall 7 of casing 2 so as to rotate to and from a closing position in which the door 9 rests, preferably substantially horizontally, on top wall 7 for closing the laundry loading/unloading opening 7a and watertight sealing the washing tub 3;

- an electric motor assembly (not shown) which is preferably attached to the washing tub 3, outside the latter, and is structured for driving into rotation the revolving drum 5 inside the washing tub 3;
- a detergent dispenser 10 which is located at the laundry loading/unloading opening 7a on top wall 7, preferably above the pass-through opening 3a on the lateral wall of washing tub 3, and fluidly communicating with the internal of the latter, and it is structured to selectively drop by gravity a mixture of detergent and fresh water into the beneath-located washing tub 3; and
- a fresh water supply circuit 11 which is located inside the boxlike casing 2, preferably close to the laundry loading/unloading opening 7a and the detergent dispenser 10, and is structured for selectively drawing, according to the selected washing cycle, a given amount of fresh water from the water mains and supplying said water into the detergent dispenser 10 so as to sweep away into washing tub 3 the detergent and/or softeners stored into the detergent dispenser 10.

[0030] In the example shown the detergent dispenser 10 is advantageously attached in a rigid and stable, though preferably easily detachable, manner to the annular frame (or hopper) of top wall 7 that delimits the laundry loading/unloading opening 7a, so as to preferably partly extends downwards inside the elastically-deformable bellows 6.

[0031] In the example shown the annular frame (or hopper) is preferably substantially rectangular in shape and detergent dispenser 10 is preferably arranged in abutment on the frame side edge located immediately adjacent to the hinge assembly connecting the upper door 9 to the top wall 7 of casing 2.

[0032] With reference to Figures 2, 3, 4 and 5, detergent dispenser 10 preferably comprises a substantially basin-shaped container 14 which is preferably structured for being rigidly attached in easy detachable manner to the annular frame (or hopper) of top wall 7 delimiting the laundry loading/unloading opening 7a, and is provided with at least one detergent compartment 15 which is properly shaped/dimensioned to be manually fillable indifferently with a given amount of liquid-type or powder-type detergent. The fresh water supply circuit 11 is structured to selectively channel into the detergent compartment 15 a given amount of fresh water arriving from the water mains, and the basin-shaped container 14 is furthermore provided with a pass-through opening 15a which is placed preferably at least partially on the bottom of the detergent compartment 15, and is advantageously properly shaped/dimensioned to allow the free, quick and sub-

stantially complete outflow of the detergent powder stored within the detergent compartment 15 out of the basin-shaped container 14 when a given amount of fresh water is channeled into the detergent compartment 15, i.e. into the basin-shaped container 14, by the fresh water supply circuit 11.

[0033] In the example shown the clear section of the pass-through opening 15a of detergent compartment 15 is preferably greater than 1.5 square centimeters so as to avoid any risk that the opening 15a is clogged up by the mixture of detergent powder and fresh water, and to guarantee an almost complete draining away of all the detergent powder stored within the detergent compartment 15.

[0034] The detergent dispenser 10 preferably comprises a siphon assembly 16 which is located inside the basin-shaped container 14, directly communicates with the detergent compartment 15 and is shaped/structured for draining out of the basin-shaped container 14 the liquid detergent stored within the detergent compartment 15 when a given amount of fresh water is channeled into the detergent compartment 15, i.e. into the basin-shaped container 14, by the fresh water supply circuit 11.

[0035] The siphon assembly impedes that the liquid detergent would exit the detergent compartment 15 (going into the washing tub) immediately after its loading into the latter, and ensures that liquid detergent is drained into the washing tub only when, during the washing cycle, a given amount of fresh water is channeled into the detergent compartment 15; this ensures that liquid detergent may contact the laundry only after the latter has been wetted.

[0036] The detergent dispenser 10 preferably comprises a hand-operated, movable closing member 17 which is attached to the basin-shaped container 14 and is movable between a closing position in which the closing member 17 seals up in watertight manner the pass-through opening 15a to prevent the detergent stored within the detergent compartment 15 from flowing out of the detergent compartment 15 through the pass-through opening 15a, and an opening position in which the closing member 17 does not close the pass-through opening 15a thus allowing the outflow of the detergent stored within the detergent compartment 15 out of the basin-shaped container 14 through the pass-through opening 15a.

[0037] Obviously, since the detergent dispenser 10 is located above the washing tub 3, and fluidly communicates with the internal of the latter, the mixture of detergent and fresh water that comes out of the basin-shaped container 14 either through the pass-through opening 15a or via the siphon assembly 16, drops by gravity into the beneath-located washing tub 3.

[0038] The movable closing member 17 is preferably attached to the bottom of the basin-shaped container 14, preferably outside of the basin-shaped container 14, and preferably comprises a plug element which is fixed to the basin-shaped container 14 so as to be manually displaceable to and from a closing position in which said plug

element closes the pass-through opening 15a.

[0039] Advantageously the movable closing member 17 comprises a sealing gasket which is arranged on the plug element so to abut, when the plug element is arranged in the closing position, against the whole perimeter of the pass-through opening 15a to seal up the latter.

[0040] Preferably the sealing gasket is over-injected on the plug element (i.e. the sealing gasket is preferably fixed to the plug element by over-injecting the gasket on the plug); this guarantees a perfect fixing of the gasket to the plug, and therefore the perfect watertight of the closure of the pass-through opening operated by the plug/sealing gasket.

[0041] With reference to Figures 3, 4 and 5, in the example shown, the basin-shaped container 14 has preferably the shape of the an oblong kidney dish, and is advantageously provided with two independent detergent compartments 15 each preferably located at a respective lobe of the basin-shaped container 14, and preferably also with a softener compartment 18 which is properly shaped/dimensioned to be manually fillable with a given amount of liquid softener and is preferably interposed between the two detergent compartments 15. The basin-shaped container 14 is furthermore preferably provided with a water-channeling portion 19 that directly adjoins the two detergent compartments 15 and the softener compartment 18, and is properly shaped to channel the fresh water arriving from the fresh water supply circuit 11 either to one, the other, or both the detergent compartments 15, or to the softener compartment 18 of the basin-shaped container 14, according to the direction of the jet of fresh water arriving in known manner from the fresh water supply circuit 11.

[0042] In view of the above, the basin-shaped container 14 is preferably provided with two pass-through openings 15a each of which is preferably placed at least partially on the bottom of a corresponding detergent compartment 15 and is properly shaped/dimensioned to allow the free outflow of the detergent powder stored within the same detergent compartment 15 out of the basin-shaped container 14 and into the beneath-located washing tub 3 when a given amount of fresh water is channeled into the detergent compartments 15 by the fresh water supply circuit 11.

[0043] In other words, each detergent compartment 15 is properly shaped/dimensioned to be manually fillable indifferently with a given amount of liquid-type or powder-type detergent, and has, preferably at least partially on its bottom, a corresponding pass-through opening 15a which is properly shaped/dimensioned to allow the free and quick downfall of the detergent powder stored within said detergent compartment 15 out of basin-shaped container 14 and into the beneath-located washing tub 3. In other words the pass-through opening 15a is advantageously so shaped/dimensioned that mixture of water and powder-type detergent can easily be drained through such pass-through opening 15a, without the risk that powder-type detergent would clog the latter.

[0044] Each detergent compartment 15 is preferably also provided with a corresponding siphon assembly 16 which is preferably located approximately at centre of the detergent compartment 15, and is preferably shaped/structured for draining out of the basin-shaped container 14 and into the beneath-located washing tub 3 the liquid detergent stored within detergent compartment 15.

[0045] With reference to Figures 3, 4 and 5, the softener compartment 18 is advantageously provided with a single siphon assembly 20 which is preferably located approximately at centre of the softener compartment 18, and is shaped/structured for draining out of the basin-shaped container 14 and into the beneath-located washing tub 3 the liquid softener stored within the softener compartment 18 when a given amount of fresh water is channeled into the softener compartment 18 by the fresh water supply circuit 11.

[0046] In the example shown the basin-shaped container 14 is preferably made of plastic material, preferably via an injection molding process.

[0047] With reference to Figure 3, the hand-operated, movable closing member 17 is preferably shaped/structured so as to contemporaneously seal up in watertight manner the pass-through openings 15a when arranged in the closing position, and to clear (or unblock) the pass-through openings 15a when arranged in the opening position.

[0048] With reference to Figures 3 and 5, the movable closing member 17 preferably comprises an oblong sliding block 21 (the plug element) which is attached, preferably in sliding manner, preferably to the bottom of the basin-shaped container 14, outside of the latter, so as to be manually displaceable between a first and a second working positions.

[0049] The movable closing member preferably comprises two surface pads 22 (the sealing gaskets), preferably substantially-flat, which are made of a suitable elastomeric material and are arranged on the sliding block 21 so as to be aligned, when the oblong sliding block 21 is arranged in the first working position, each to a respective pass-through opening 15a so as to seal up the latter, and to be both misaligned to the corresponding pass-through openings 15a when the oblong sliding block 21 is arranged in the second working position.

[0050] Preferably the movable closing member 17 furthermore comprises a knob 23, or similar manually-operable tailpiece or part, which is preferably rigidly connected to the sliding block 21, so as to allow the user to manually displace the sliding block 20 between the first and the second working positions, and which preferably juts out of the lateral wall of the basin-shaped container 14 that faces the center of the laundry loading/unloading opening 7a so to be easily reachable by the user.

[0051] In the example shown the oblong sliding block 21 is preferably made of plastic material, preferably via an injection molding process, and knob 23 is preferably made in one piece with the oblong sliding block 21.

[0052] Each surface pad 22 is preferably over-injected on the oblong sliding block 21.

[0053] With reference to Figures 3 and 5, each siphon assembly 16, 20 of detergent dispenser 10 preferably comprises two straight sleeves, of preferably substantially circular cross-section, that are inserted one inside the other (spaced one another) and are arranged inside the corresponding detergent or softener compartment 15, 18, preferably in such a way to be locally substantially perpendicular to the bottom of the respective compartment. The inner straight sleeve 16a, 20a extends in pass-through manner across the bottom of the basin-shaped container 14 and protrudes upwards inside the corresponding detergent or softener compartment 15, 18 up to a given height, preferably while remaining locally substantially perpendicular to the bottom of said detergent or softener compartment 15, 18.

[0054] The outer straight sleeve 16b, 20b has preferably the upper end completely closed and extends downwards from slightly above the top of the inner straight sleeve 16a, 20a so to completely enclose/sheathe the inner straight sleeve 16a, 20a up to a given distance from the bottom of the detergent or softener compartment 15, 18.

[0055] In the example shown the inner straight sleeves 16a, 20a of the siphon assemblies 16, 20 are preferably made in one piece with the basin-shaped container 14.

[0056] Furthermore, in the example shown the inner straight sleeve 16a of the siphon assembly 16 of each detergent compartment 15 is preferably located, i.e. extends in pass-through manner across the bottom of the basin-shaped container 14, close to the pass-through openings 15a of the same detergent compartment 15.

[0057] With reference to Figures 3, 4 and 5, the detergent dispenser 10 preferably also comprises an upper lid element 25 which is firmly fixed/fixable to the basin-shaped container 14 and is structured to directly support/form part of the siphon assemblies 16, 20 of the detergent dispenser 10.

[0058] The upper lid element 25 is preferably structured to directly support/form the outer straight sleeves 16b, 20b of the siphon assemblies 16, 20 of detergent dispenser 10.

[0059] In the example shown, the upper lid element 25 is preferably shaped/dimensioned so to match and be fitted onto the upper rim 14a of basin-shaped container 14 and also so to overhang above the inner straight sleeve 16a, 20a of all siphon assemblies 16, 20 of the detergent dispenser 10; and the outer straight sleeve 16b, 20b of each siphon assembly 16, 20 of detergent dispenser 10 preferably extends downwards from the upper lid 25 so to completely enclose/sheathe the corresponding inner straight sleeve 16a, 20a nearly up to the bottom of basin-shaped container 14.

[0060] In the example shown the outer straight sleeves 16b, 20b of all siphon assemblies 16, 20 are preferably made in one piece with the upper lid element 25.

[0061] Preferably, though not necessarily, the upper

lid element 25 is furthermore shaped/dimensioned so to completely cover/hide the water-channeling portion 19 of the basin-shaped container 14 optionally even forming part of the same water-channeling portion 19, and preferably also to completely cover/hide the internal partitioning walls that divide the inside of basin-shaped container 14 into the various detergent and softener compartments 15, 18.

[0062] With reference to Figures 2 and 6, the water-channeling portion 19 of the basin-shaped container 14 is preferably shaped so as to channel/direct, approximately directly against the upper end of the outer straight sleeve 16b of the siphon assembly 16 of the detergent compartment 15, the jet of fresh water arriving from the fresh water supply circuit 11 and directed towards the same detergent compartment 15.

[0063] Preferably, the outer surface of the outer straight sleeve 16b is provided with a longitudinal surface channel 26 that extends downwards approximately from the upper end of the outer straight sleeve 16b, and is properly shaped/dimensioned to channel towards the bottom of the detergent compartment 15 the fresh water that, coming from the water-channeling portion 19 of the basin-shaped container 14, bumps against the outer straight sleeve 16b.

[0064] In this way fresh water is actually channeled to the bottom of the detergent compartment, which ensures that all the detergent contained in the latter is effectively reached and removed by fresh water.

[0065] In the example shown, the surface channel 26 is preferably substantially rectilinear, and preferably extends substantially parallel to the longitudinal axis of the outer straight sleeve 16b.

[0066] With reference to Figure 6, in the example shown the outer straight sleeve 16b is provided with a pair of reciprocally parallel and spaced longitudinal ribs 26a that protrudes from the outer surface of outer straight sleeve 16b, starting approximately from the upper end of the outer straight sleeve 16b, and extends downwards along the body of the outer straight sleeve 16b while remaining preferably locally substantially parallel to the sleeve longitudinal axis, so as to form/delimit a vertical channel 26 which is able to channel/direct straight towards the bottom of the detergent compartment 15 the fresh water that bumps against the top end of the outer straight sleeve 16b.

[0067] With reference to Figures 2, 3 and 6, detergent dispenser 10 preferably comprises a lower baffle 27, preferably substantially tray-shaped, which is rigidly attached to the bottom of the basin-shaped container 14, above the movable closing member 17 (e.g. the sliding block 21), the pass-through openings 15a of the detergent compartments 15 and the outlets of the siphon assemblies 16, 20.

[0068] The lower baffle 27 is preferably shaped/dimensioned so to deflect, preferably towards the lateral wall of the elastically-deformable bellows 6, preferably in a substantially horizontal direction d, the liquid mixture of

detergent/softener and fresh water coming out from the pass-through openings 15a or from the outlets of the siphon assemblies 16, 20.

[0069] General operation of the top-loading laundry washing machine 1 is clearly inferable from the above description, with no further explanation required.

[0070] As regards detergent dispenser 10, when the movable closing member 17 is arranged in the opening position, the mixture of fresh water and detergent powder is allowed to quickly drain away from the detergent compartment/s 15 of the basin-shaped container 14 through the pass-through opening/s 15a. The large clear section of the pass-through opening/s 15a avoids any risk to clog up the opening/s 15a. In this working configuration the siphon assembly/s 16 of the detergent compartment/s 15 is/are substantially inactive since substantially and all the mixture exits the detergent compartment/s 15 through the pass-through opening/s 15a.

[0071] Instead, when the movable closing member 17 is arranged in the closing position, the pass-through opening/s 15a is/are sealed up in watertight manner by the movable closing member 17 and the mixture of detergent and fresh water is allowed to drain away from the corresponding detergent compartment 15 solely via the siphon assembly 16 located inside the same detergent compartment 15.

[0072] The advantages correlated to the particular structure of detergent dispenser 10 are large in number. Detergent dispenser 10, in fact, is now able to correctly operate with either liquid-type or powder-type detergents with no risk of clogging up.

[0073] The presence of the longitudinal surface channel 26 on the outer surface of the outer straight sleeve 16b of the siphon assembly 16 furthermore allows the fresh water injected into the detergent compartment 15 to flow along the outer straight sleeve 16b and deeply penetrate into the compact bed of detergent powder (or also into the mass of liquid detergent) that usually settles on the bottom of the detergent compartment 15, thus increasing the mixing and afterwards the quick and complete outflow of the detergent powder (or liquid detergent) away from the basin-shaped container 14. The fresh water, in fact, is now prevented from stagnating above the compact bed of detergent.

[0074] Clearly, changes may be made to the top-loading laundry washing machine 1 and to the detergent dispenser 10 as described herein without, however, departing from the scope of the present invention.

[0075] For example, in a different embodiment, the outer surface of the outer straight sleeve 16b may be provided with a preferably rectilinear surface groove that extends downwards from the upper end of the outer straight sleeve 16b, is preferably vertically oriented so as to be locally substantially parallel to the sleeve longitudinal axis, and is properly shaped to channel towards the bottom of the detergent compartment 15 the fresh water that bumps against the outer straight sleeve 16b.

Claims

1. Laundry washing machine (1) comprising an outer boxlike casing (2) provided with a laundry loading/unloading opening (7a) provided on the top wall (7) of said boxlike casing (2) and allowing the access to a hollow washing tub (3) arranged inside the casing (2), and a detergent dispenser (10) which is located at the laundry loading/unloading opening (7a) and is structured to selectively drop a mixture of detergent and water into the washing tub (3), wherein said detergent dispenser (10) comprises a substantially basin-shaped container (14) which is provided with at least one detergent compartment (15) shaped/dimensioned to be manually fillable with a given amount of detergent, and a corresponding siphon assembly (16) which communicates with said detergent compartment (15) and is shaped/structured for draining out of the basin-shaped container (14) a liquid-type detergent stored within the detergent compartment (15) when a given amount of fresh water is channeled into the detergent compartment (15), said laundry washing machine (1) being **characterized in that** said basin-shaped container (14) is provided with a pass-through opening (15a) shaped/dimensioned so as to allow the free outflow, out of said basin-shaped container (14), of a powder-type detergent stored within the detergent compartment (15) when a given amount of fresh water is channeled into said detergent compartment (15), **and in that** said detergent dispenser (10) comprises a hand-operated, movable closing member (17) which is attached to the basin-shaped container (14) and is movable between a closing position in which the movable closing member (17) seals up in watertight manner said pass-through opening (15a), and an opening position in which the movable closing member (17) does not close the pass-through opening (15a) thus allowing the free outflow of the detergent stored within the detergent compartment (15) through said pass-through opening (15a).
2. Laundry washing machine according to Claim 1, **characterized in that** the movable closing member (17) comprises a plug element (21), fixed to the basin-shaped container (14) so as to be manually displaceable to and from a closing position in which said plug element (21) closes said pass-through opening (15a), and a sealing gaskets (22), arranged on the plug element (21) so as to abut, when the plug element (21) is arranged in the closing position, against the perimeter of said pass-through opening (15a) to seal up said pass-through opening (15a).
3. Laundry washing machine according to Claim 2, **characterized in that** the sealing gaskets (22) is over-injected on the plug element (21).
4. Laundry washing machine according to Claim 2 or 3, **characterized in that** the plug element (21) comprises a sliding block (21) which is attached in sliding manner to the basin-shaped container (14) so to be manually displaceable between a first and a second working position, and a surface pad (22) which is made of a suitable elastomeric material and is arranged on the sliding block (21) so as to be aligned, when the sliding block (21) is arranged in the first working position, to said pass-through opening (15a) to seal up said pass-through opening (15a).
5. Laundry washing machine according to Claim 4, **characterized in that** the movable closing member (17) comprises a manually-operable element (23) which is connected to the sliding block (21) so to allow the user to manually displace the sliding block (21) between the first and the second working position.
6. Laundry washing machine according to Claim 5, **characterized in that** said manually-operable element (23) juts out of a lateral wall of the basin-shaped container (14) that faces the center of the laundry loading/unloading opening (7a).
7. Laundry washing machine according to Claim 5 or 6, **characterized in that** said manually-operable element (23) is made in one piece with the sliding block (21).
8. Laundry washing machine according to any one of the foregoing claims, **characterized in that** the detergent dispenser (10) comprises a substantially tray-shaped, lower baffle (27) which is rigidly attached to the bottom of the basin-shaped container (14), above the movable closing member (17), the pass-through opening (15a) of the at least one detergent compartment (15) and the outlet of the siphon assembly (16) of the same detergent compartment (15).
9. Laundry washing machine according to Claim 8, **characterized in that** said lower baffle (27) is shaped/dimensioned so to deflect the liquid mixture of detergent and fresh water that comes out from the pass-through opening (15a) or from the outlet of the siphon assembly (16) towards a lateral wall of a bellows (6) connecting said washing tub (3) to said pass-through opening (7a).
10. Laundry washing machine according to any one of the foregoing claims, **characterized in that** the siphon assembly (16, 20) of the detergent dispenser (10) comprises two straight sleeves that are inserted one inside the other, at least partly spaced one another, and are arranged inside the detergent compartment (15), wherein the inner straight sleeve (16a,

20a) extends in pass-through manner across the bottom of the basin-shaped container (14) and protrudes upwards inside the detergent compartment (15, 18) up to a given height, and wherein the outer straight sleeve (16b, 20b) is provided with a closed upper end and extends downwards from slightly above the top of the inner straight sleeve (16a, 20a) so as to enclose/sheathe the inner straight sleeve (16a, 20a) up to a given distance from the bottom of the detergent compartment (15, 18).

11. Laundry washing machine according to Claim 10, **characterized in that** the outer surface of the outer straight sleeve (16b) of the siphon assembly (16, 20) is provided with a longitudinal surface channel (26) that extends downwards from the upper end of said outer straight sleeve (16b), and is shaped/dimensioned to channel towards the bottom of the detergent compartment (15) the fresh water that bumps against the outer straight sleeve (16b).
12. Laundry washing machine according to Claim 11, **characterized in that** the longitudinal surface channel (26) is substantially rectilinear and extends substantially parallel to the longitudinal axis of the outer straight sleeve (16b) of the siphon assembly (16, 20).
13. Laundry washing machine according to Claim 10, 11 or 12, **characterized in that** the detergent dispenser (10) also comprises an upper lid element (25) which is firmly fixed/fixable to the basin-shaped container (14) and is structured to directly support/form the outer straight sleeve (16b, 20b) of the siphon assembly (16, 20) of the detergent dispenser (10).
14. Laundry washing machine according to any one of the foregoing claims, **characterized in that** the substantially basin-shaped container (14) is provided with a number of detergent compartments (15) each of which is shaped/dimensioned to be manually fillable with a given amount of detergent, and has a corresponding pass-through opening (15a) shaped/dimensioned so to allow the free outflow, out of the basin-shaped container (14), of the powder-type detergent stored within the detergent compartment (15) when a given amount of fresh water is channeled into said detergent compartment (15), wherein the hand-operated, movable closing member (17) is structured to selectively seal up in watertight manner the pass-through opening (15a) when arranged in the closing position.
15. Laundry washing machine according to any one of the foregoing claims, **characterized in that** the clear section of the pass-through opening (15a) of the detergent compartment (15) is greater than 1.5 square centimeters.

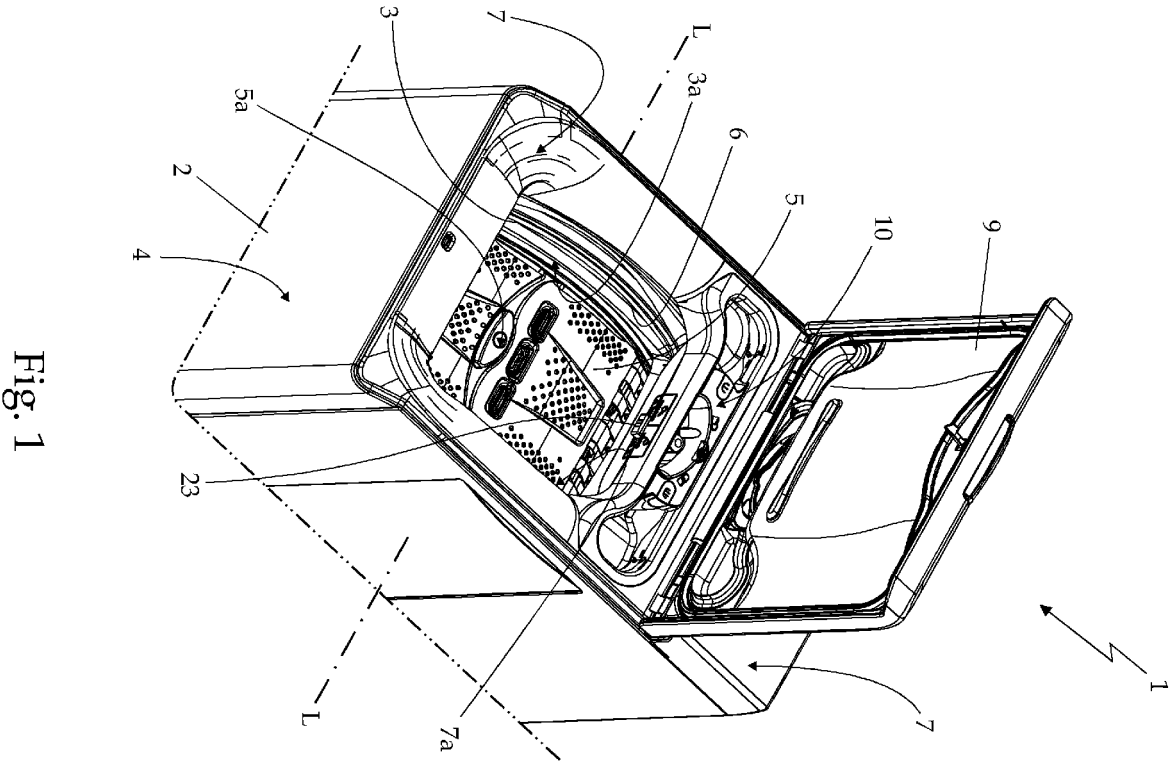
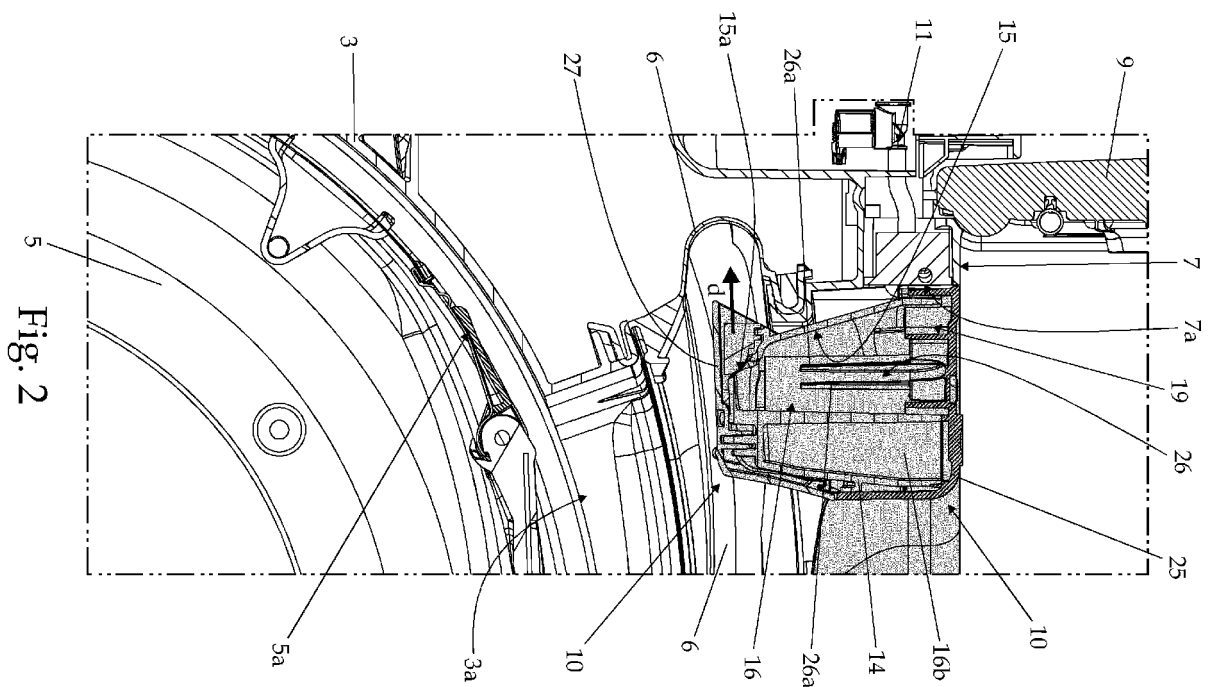


Fig. 1



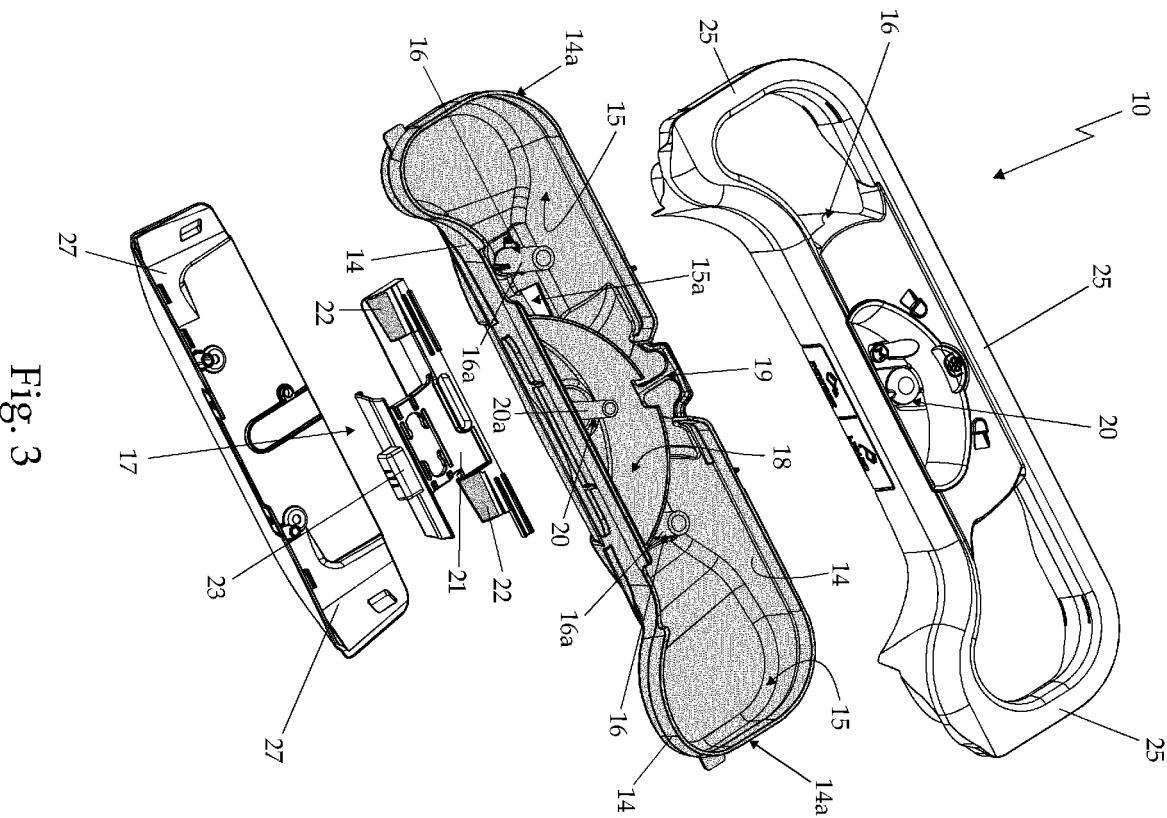


Fig. 3

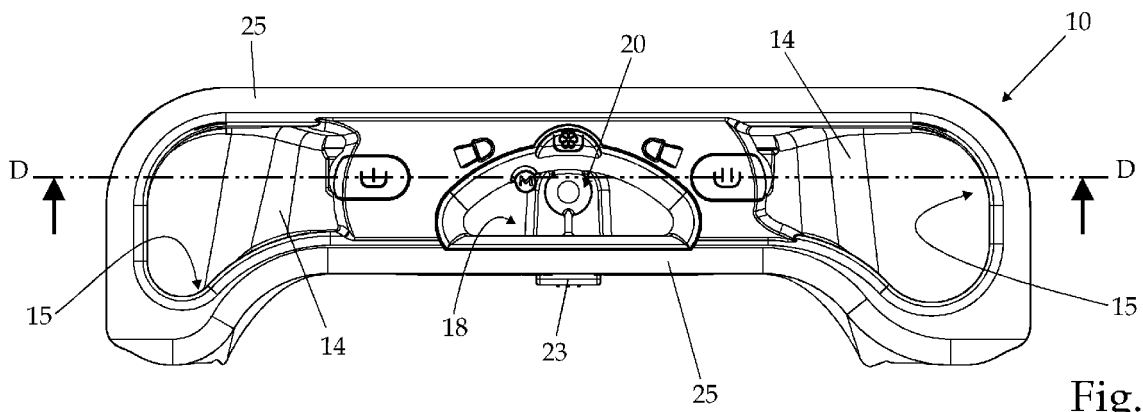


Fig. 4

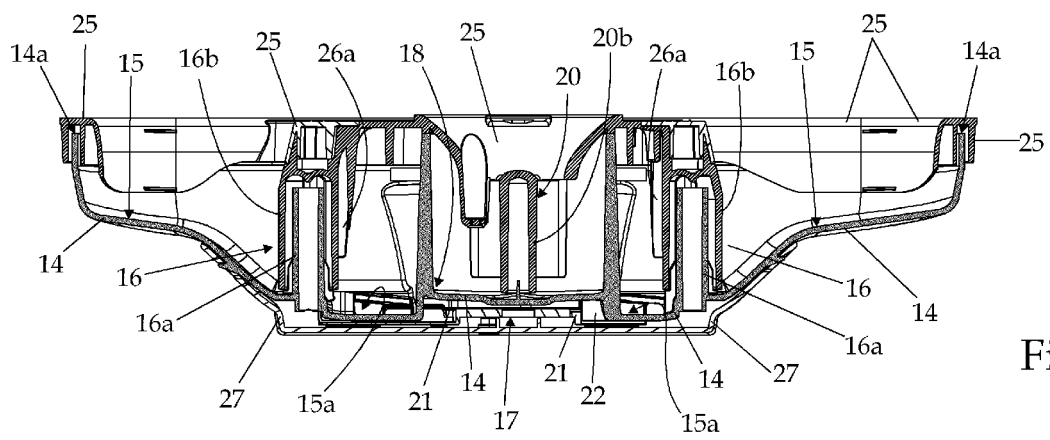


Fig. 5

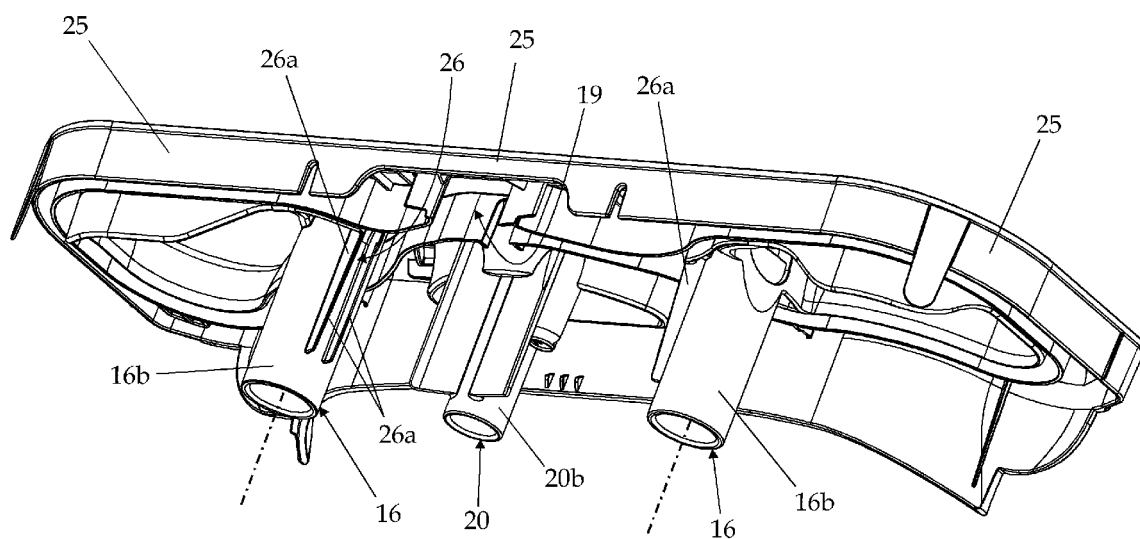


Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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

Patent documents cited in the description

- EP 2133456 A [0005] [0006] [0007]