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(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/softener dispenser (10) which is located at the laundry loading/unloading opening (7a) and is structured to selectively drop a mixture of detergent/softener and water into the washing tub (3); the detergent/softener dispenser (10) comprises a substantially basin-shaped container (14) which is provided with at least one detergent/softener compartment (15,21) shaped/dimensioned to be fillable with a given amount of detergent/softener, and a corresponding siphon assembly (16, 22) which is shaped/structured for draining out of the basin-shaped container (14) the detergent/softener stored within the detergent/softener compartment (15,21) when a given amount of fresh water is channeled into the detergent/softener compartment (15,21) by a water supply circuit (11) of the laundry washing machine (1), structured to point/direct at least one jet of water at the siphon assembly (16,22), so that the at least one jet bumps/strikes against the siphon assembly (16,22). The siphon assembly (16,22) comprises a channeling system (19) adapted to channel towards the bottom of the detergent/softener compartment (15,21) at least part of the jet of water that strikes/bumps against the siphon assembly (16,22).

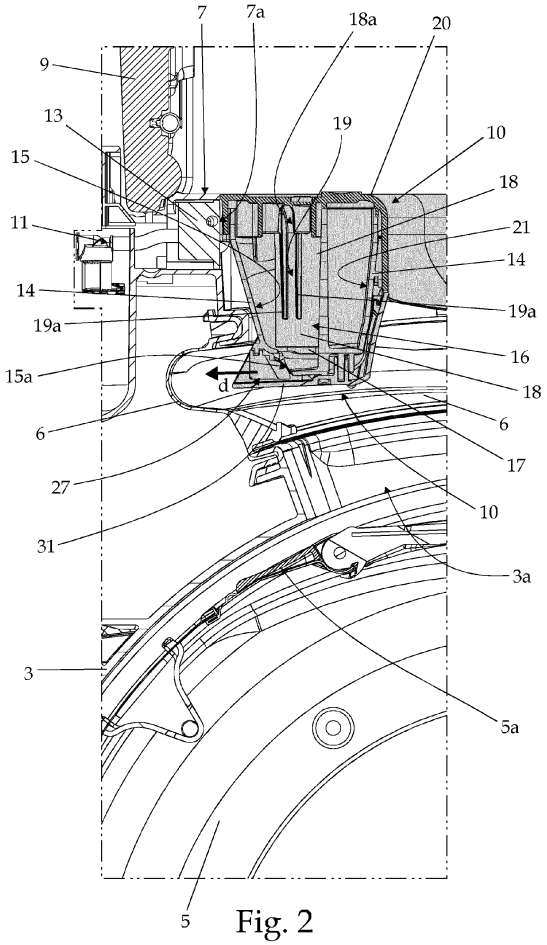

Fig. 2

EP 2 604 744 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, household appliance 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 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/softener dispenser (i.e. a dispenser for detergent or softener or both of them) 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 water supply circuit which is structured for drawing fresh water from the water mains and supplying said water into the detergent dispenser so 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 usually has difficulty in operating with highly-viscous liquid-type detergents. In fact, when poured into the detergent compartment of the detergent dispenser, highly-viscous liquid-type detergents (or softeners) generally form, on the bottom of the detergent compartment, a dense layer of liquid detergent that usually has extreme difficulty in mixing with fresh water and therefore remains stably on the bottom of the detergent compartment when the fresh water is subsequently poured into the detergent compartment, thus hampering the complete draining of the mixture of water and detergent to the washing tub. However a similar problem may occur also with powder-type detergent, in particular if a big quantity of the latter has been poured in the detergent dispenser; in this case it may be difficult to remove all the powder-type detergent form the bottom of the detergent compartment, since fresh water has not enough pressure to be able to go through the whole mass of detergent for reaching the lower region of the detergent compartment.

[0007] This is the reason why huge deposits of detergent remain on the bottom of the detergent compartment/s when the EP-2133456 detergent dispenser is requested to operate with highly-viscous liquid-type detergents or with a big quantity of powder-type detergent.

[0008] Obviously, huge deposits of detergent (or softener) remain on the bottom of the detergent compartment/s imply that a great amount of detergent (or softener) does not reach the washing tub and therefore get wasted.

[0009] Aim of the present invention is to provide a detergent/softener dispenser (i.e. a dispenser for detergent, or a dispenser for softener or a dispenser for both detergent(s) and softener) for top-loading laundry washing machines structured to correctly/efficiently operate with highly-viscous liquid-type detergents/softeners and also with a big quantity of powder-type detergent/softener.

[0010] Applicant has found that by providing a siphon assembly, adapted for draining out of a basin-shaped container the detergent/softener stored within the detergent/softener compartment when a given amount of fresh water is channeled into the same detergent/softener compartment, with a channeling system adapted to channel towards the bottom of the detergent/softener compartment at least part of a jet of water, coming from a water supply circuit, that strikes/bumps against the siphon assembly, it is possible to channel a high-speed (and/or high-pressure) jet/flux of fresh water towards the bottom of the detergent/softener compartment, so as to reach and effectively melt/remove also the detergent/softener settled in correspondence of the bottom of the detergent/softener compartment.

[0011] It is underlined that in present application expression "detergent/softener" has to be interpreted as only detergent, only softener, or both detergent and softener; for example expression "detergent/softener dispenser" has to be read as detergent dispenser or a softener dispenser or a detergent and softener dispenser (i.e. a dispenser adapted to dispense both detergent and softener). In other words, present invention may be applied to a detergent dispenser adapted to dispense only detergent and not softener, to a detergent and softener dispenser adapted to dispense both detergent and softener, and also to a softener dispenser adapted to dispense only softener and not detergent.

[0012] 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/softener dispenser which is located at the laundry loading/unloading opening and is structured to selectively drop a mixture of detergent/softener and water into the washing tub; the detergent/softener dispenser comprises a substantially basin-shaped container which is provided with at least one detergent/softener compartment shaped/dimensioned to be fillable with a given amount of detergent/softener, and a corresponding siphon assembly which is shaped/structured for draining out of the basin-shaped container the detergent/softener stored within the detergent/softener compartment when a given amount of fresh water is channeled into the detergent/softener compartment by a water supply circuit of the laundry washing machine, structured to point/direct at least one jet of water at the siphon assembly, so that the at least one jet bumps/strikes against the siphon assembly. The siphon assembly comprises a channeling system adapted to channel towards the bottom of the detergent/softener compartment at least part of the jet of water that strikes/bumps against the siphon assembly.

[0013] In an advantageous embodiment, the siphon assembly comprises an outer tubular sleeve which is arranged inside the detergent/softener compartment in such a way that the jet of water coming from the water supply circuit bumps/strikes against the outer tubular sleeve, the channeling system being provided on the outer tubular sleeve.

[0014] Preferably, the channeling system comprises a longitudinal surface channel provided on the outer surface of the tubular sleeve and extending downwards along at least a section of the outer tubular sleeve, the longitudinal surface channel being shaped/dimensioned to channel towards the bottom of the detergent/softener compartment at least part of the jet of water that strikes/bumps against the outer tubular sleeve.

[0015] More preferably, the longitudinal surface channel extends downwards from an upper portion of the outer tubular sleeve, the water supply circuit being structured to point/direct the at least one jet of water at the upper portion of the outer tubular sleeve, the longitudinal surface channel being shaped/dimensioned to channel towards the bottom of the detergent/softener compartment at least part of the jet of water that strikes/bumps against the upper portion of the outer tubular sleeve.

[0016] In an advantageous embodiment, the longitudinal surface channel is substantially rectilinear.

[0017] Preferably, the longitudinal surface channel extends substantially parallel to the longitudinal reference axis of the outer tubular sleeve.

[0018] In an advantageous embodiment, the outer tubular sleeve is provided with a pair of reciprocally parallel and spaced longitudinal ribs that protrudes from the outer surface of the tubular sleeve, starting approximately from the upper end of the outer tubular sleeve, and extends downwards along the body of the outer tubular sleeve while remaining locally substantially parallel to the tubular sleeve longitudinal reference axis, so as to form/delimit a substantially vertically-oriented, rectilinear channel.

[0019] In a further advantageous embodiment, the channeling system comprises a surface groove provided on the outer surface of the tubular sleeve and extending downwards along at least a section of the outer tubular sleeve, the surface groove being shaped/dimensioned to channel towards the bottom of the detergent/softener compartment at least part of the jet of water that strikes/bumps against the outer tubular sleeve.

[0020] Preferably, the siphon assembly comprises an inner tubular sleeve that protrudes from the bottom of the detergent/softener compartment and extends upwards inside the outer tubular sleeve up to a given distance from the upper end of the outer tubular sleeve.

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

[0022] Preferably, the upper lid-element is shaped/dimensioned so to match and fit onto an upper rim of the basin-shaped container and so to overhang above the inner tubular sleeve of the siphon assembly; and in that the outer tubular sleeve of the siphon assembly extends downwards from the upper lid so to completely sheathe the inner tubular sleeve nearly up to the bottom of the basin-shaped container.

[0023] More preferably, the outer tubular sleeve of the siphon assembly is made in one piece with the upper lid-element.

[0024] In a further advantageous embodiment, the basin-shaped container is provided with a number of detergent/softener compartments, each provided with a respective siphon assembly which is shaped/structured for draining out of the basin-shaped container the detergent/softener stored within the detergent/softener compartment when a given amount of fresh water is channeled into the corresponding detergent/softener compartment.

[0025] Preferably, the basin-shaped container of the detergent/softener dispenser is provided, for each detergent/softener compartment, with a pass-through opening which is shaped/dimensioned so to allow the free outflow, out of the basin-shaped container, of a powder-type detergent/softener stored within the detergent/softener compartment when a given amount of fresh water is channeled into the detergent/softener compartment, and in that the detergent/softener dispenser comprises at least one manually 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/softener stored within the detergent/softener

compartment.

[0026] More preferably, the clear section of the pass-through opening of the bottom of the detergent/softener compartment is greater than 1.5 square centimeters.

[0027] Even more preferably, the manually operated, movable closing member is structured to contemporaneously seal up in watertight manner the pass-through openings of all detergent/softener compartments on the basin-shaped container.

[0028] 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/softener dispenser of the Figure 1 laundry washing machine, with parts removed for clarity;
- Figure 4 is a perspective view of the upper lid of the Figure 3 detergent/softener dispenser.

[0029] With reference to Figure 1, reference number 1 indicates as a whole a top-loading laundry washing machine that preferably comprises:

- a preferably, though not necessarily, substantially parallelepiped-shaped outer boxlike casing 2, which is preferably 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 tub longitudinal reference axis L 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, but not necessarily, 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.

[0030] 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 7 on the top wall 7 of boxlike casing 2 are preferably substantially rectangular in shape.

[0031] Furthermore the pass-through opening 3a on the lateral wall of washing tub 3 is preferably bordered/delimited by an upwards protruding collar or tubular 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 the upwards projecting collar or tubular sleeve.

[0032] 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.

[0033] With reference to the exemplary embodiment illustrated in figures 1 and 2, the top-loading laundry washing machine 1 advantageously also 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/softener dispenser 10 (i.e. a dispenser for detergent, or a dispenser for softener or a dispenser for detergent and softener) 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/softener and fresh water into the beneath-located washing tub 3; and
- a water supply circuit 11 which is located inside the boxlike casing 2 and is structured for selectively drawing, according to the selected washing cycle, a given amount of fresh water from the water mains and supplying the water into the detergent/softener dispenser 10 so as to sweep away into washing tub 3 the detergent and/or softeners stored into the detergent/softener dispenser 10.

[0034] In the example shown the detergent/softener dispenser 10 is advantageously attached in a rigid and stable, though easily detachable, manner to the annular

frame (or hopper) of top wall 7 that delimits the laundry loading/unloading opening 7a, so to preferably partly extends downwards inside the elastically-deformable bellows 6.

[0035] In the example shown the annular frame (or hopper) is preferably substantially rectangular in shape and detergent/softener 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.

[0036] The water supply circuit 11, in the example shown, preferably comprises one or more water nozzles 13 which are arranged close to the laundry loading/unloading opening 7a and the detergent/softener dispenser 10, and are structured to point respective jets of fresh water towards and inside the detergent/softener dispenser 10.

[0037] With reference to Figure 2, in the example shown the one or more water nozzles 13 of the water supply circuit 11 are preferably recessed into the, preferably substantially rectangular-shaped, annular frame (or hopper) of top wall 7 that delimits the laundry loading/unloading opening 7a and supports the detergent/softener dispenser 10.

[0038] With reference to Figures 2 and 3, detergent/softener 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/softener compartment 15 which is properly shaped/dimensioned to be fillable with a given amount of liquid-type or powder-type detergent and/or with a softener. In the embodiment illustrated in enclosed figures, compartments 15 are preferably, but not necessarily, adapted to be filled with detergent and not with softener.

[0039] The water supply circuit 11 is structured to selectively channel into the detergent/softener compartment 15 a given amount of fresh water arriving from the water mains, and the detergent/softener dispenser 10 furthermore comprises a siphon assembly 16 which is located inside the detergent/softener compartment 15, directly communicates with the inside of the detergent/softener compartment 15 and is shaped/structured for draining out of the basin-shaped container 14 the liquid detergent/softener stored within the detergent/softener compartment 15 when a given amount of fresh water is channeled into the detergent/softener compartment 15 by the water supply circuit 11.

[0040] Obviously, since the basin-shaped container 14 fluidly communicates with the internal of the washing tub 3, and preferably it is located above the pass-through opening 3a on the upper section of the lateral wall of washing tub 3, the mixture of detergent/softener and fresh water that comes out of the basin-shaped container 14 via siphon assembly 16 drops by gravity into the beneath-located washing tub 3.

[0041] The siphon assembly impedes that the liquid detergent/softener would exit the detergent/softener compartment 15 (going into the washing tub) immediately after its loading into the latter, and ensures that liquid detergent/softener is drained into the washing tub only when, during the washing cycle, a given amount of fresh water is channeled into the detergent/softener compartment 15; this ensures that liquid detergent/softener may contact the laundry only after the latter has been wetted.

[0042] With reference to Figures 2, 3 and 4, the siphon assembly 16 advantageously comprises two tubular sleeves 17 and 18 of preferably substantially circular cross-section, that are inserted one inside the other, are spaced one another, and are preferably arranged inside the detergent/softener compartment 15 so to be locally substantially perpendicular to the bottom of the compartment.

[0043] The inner tubular sleeve 17 preferably extends in pass-through manner across the bottom of the basin-shaped container 14 and protrudes upwards inside the detergent/softener compartment 15 up to a given height, while preferably remaining locally substantially perpendicular to the bottom of the detergent/softener compartment 15.

[0044] The outer tubular sleeve 18 preferably has the upper end completely watertight closed and extends downwards from slightly above the top of the inner tubular sleeve 17 so to completely enclose the inner tubular sleeve 17 up to a given distance from the bottom of the detergent/softener compartment 15, remaining however locally spaced from the outer surface of the inner tubular sleeve 17.

[0045] In other words, the outer tubular sleeve 18 is arranged inside the detergent/softener compartment 15 so that the lower end of the outer tubular sleeve 18 is locally slightly spaced upwards from the bottom of the same detergent/softener compartment 15.

[0046] The inner tubular sleeve 17 advantageously protrudes from the bottom of detergent/softener compartment 15 and extends upwards inside the outer tubular sleeve 18 up to a given distance from the watertight-closed upper end of the outer tubular sleeve 18.

[0047] In the example shown the inner tubular sleeves 17 of siphon assembly 16 is preferably made in one piece with the basin-shaped container 14.

[0048] In addition to the above, with reference to Figures 2 and 4, the water supply circuit 11 is preferably additionally structured to channel the fresh water into the detergent/softener compartment 15 of the basin-shaped container 14 via a jet of fresh water oriented so as to at least partly bump/strike against the outer tubular sleeve 18 of siphon assembly 16.

[0049] Advantageously, the siphon assembly 16 comprises a channeling system adapted to channel towards the bottom of the detergent/softener compartment 15 at least part of the jet of water that strikes/bumps against the siphon assembly 16.

[0050] Preferably, the channeling system comprises a

longitudinal surface channel 19, provided on the outer surface of the outer tubular sleeve 18 and extending downwards (i.e. towards the bottom of the basin-shaped container 14) along at least a section of the tubular sleeve 18, preferably substantially vertically; the longitudinal surface channel 19 is properly shaped/dimensioned to collect and channel towards the bottom of the detergent/softener compartment 15 at least part of the fresh water that strikes/bumps against the outer tubular sleeve 18.

[0051] In the example shown the water supply circuit 11 is preferably structured to direct/point the jet of fresh water approximately towards an upper portion/section 18a of the outer tubular sleeve 18 of siphon assembly 16 located close to the upper end of the same outer tubular sleeve 18, and the outer surface of outer tubular sleeve 18 is provided with a longitudinal surface channel 19 that extends downwards from the upper portion 18a of tubular sleeve 18, and is properly shaped/dimensioned to collect and channel towards the bottom of the detergent/softener compartment 15 the fresh water that strikes against the upper portion 18a of tubular sleeve 18.

[0052] In the example shown, the longitudinal surface channel 19 is preferably substantially rectilinear and preferably extends substantially parallel to the longitudinal reference axis A of the outer tubular sleeve 18.

[0053] With reference to Figures 2 and 4, in the example shown the outer tubular sleeve 18 is provided with a pair of reciprocally parallel and spaced longitudinal ribs 19a that protrudes from the outer surface of tubular sleeve 18, starting approximately from the closed upper end of outer tubular sleeve 18, and extends downwards along the body of tubular sleeve 18 while preferably remaining locally substantially parallel to the tubular-sleeve longitudinal reference axis A, so as to form/delimit a substantially vertically-oriented, rectilinear channel 19 having a substantially rectangular cross-section, and which is able to collect and channel/direct straight towards the bottom of the detergent/softener compartment 15 the fresh water that strikes against the top portion 18a of tubular sleeve 18.

[0054] In addition to the above, with reference to Figures 2, 3 and 4, the detergent/softener dispenser 10 preferably also comprises an upper lid element 20 which is firmly fixed to the basin-shaped container 14 and is structured to directly support/form part of the siphon assembly 16 of detergent/softener dispenser 10.

[0055] The upper lid element 20 is preferably structured to directly support/form the outer tubular sleeve 18 of siphon assembly 16.

[0056] In the example shown the upper lid element 20 is preferably shaped/dimensioned so as to match and fit onto the upper rim 14a of basin-shaped container 14, and also so as to overhang above the inner tubular sleeve 17 of siphon assembly 16; the outer tubular sleeve 18 of siphon assembly 16 advantageously extends downwards from the upper lid 20 so as to completely sheathe the inner tubular sleeve 17 nearly up to the bottom of basin-shaped container 14.

[0057] Furthermore the outer tubular sleeve 18 of siphon assembly 16 is preferably made in one piece with the upper lid element 20.

[0058] With reference to Figures 3 and 4, in the example shown the basin-shaped container 14 has preferably the shape of an oblong kidney dish.

[0059] Preferably the basin-shaped container 14 is provided with two independent detergent/softener compartments 15 each preferably located at a respective end of the basin-shaped container 14, and with a further detergent/softener compartment 21 which is properly shaped/dimensioned to be fillable with a given amount of liquid detergent or softener (in the embodiment illustrated in enclosed figures, preferably, but not necessarily, only with softener) and is preferably interposed between the two detergent/softener compartments 15.

[0060] The water supply circuit 11 is structured to channel a given amount of fresh water selectively and alternatively into one or both detergent/softener compartments 15 or into the detergent/softener compartment 21, and each detergent/softener compartment 15 of the basin-shaped container 14 is provided with a corresponding siphon assembly 16 which is located inside the detergent/softener compartment 15 preferably approximately at centre of the detergent/softener compartment 15, communicates with the inside of the detergent/softener compartment 15 and is shaped/structured for draining out of the basin-shaped container 14 the liquid detergent/softener stored within the corresponding detergent/softener compartment 15 when a given amount of fresh water is channeled into said detergent/softener compartment 15 by the water supply circuit 11.

[0061] Furthermore, since the water supply circuit 11 is preferably structured to direct/point a jet of fresh water towards the upper portion 18a of the outer tubular sleeve 18 of the siphon assembly 16 of each detergent/softener compartment 15, the outer surface of the outer tubular sleeve 18 of the siphon assembly 16 of each detergent/softener compartment 15 is preferably provided with a corresponding longitudinal surface channel 19 that extends downwards from the upper portion 18a of tubular sleeve 18, and is properly shaped/dimensioned to channel towards the bottom of the detergent/softener compartment 15 the fresh water that bumps against the upper portion 18a of tubular sleeve 18.

[0062] With reference to Figures 3 and 4, to allow drainage of detergent/softener from detergent/softener compartment 21, detergent/softener dispenser 10 furthermore comprises an additional siphon assembly 22 which is preferably located inside the detergent/softener compartment 21, directly communicates with the inside of the detergent/softener compartment 21 and is shaped/structured for draining out of the basin-shaped container 14 and into the beneath-located washing tub 3 the liquid detergent/softener stored within the detergent/softener compartment 21 when a given amount of fresh water is specifically channeled into the detergent/softener compartment 21 by the water supply circuit 11.

[0063] The siphon assembly 22 is preferably located approximately at centre of detergent/softener compartment 21 and preferably comprises two tubular sleeves 23 and 24 of preferably substantially circular cross-section, that are inserted one inside the other and spaced one another, and are arranged inside the detergent/softener compartment 21, preferably so to be locally substantially perpendicular to the bottom of the compartment.

[0064] The inner tubular sleeve 23 preferably extends in pass-through manner across the bottom of the basin-shaped container 14 and protrudes upwards inside the detergent/softener compartment 21 up to a given height while preferably remaining locally substantially perpendicular to the bottom of the detergent/softener compartment 21.

[0065] The outer tubular sleeve 24 preferably has the upper end completely closed and extends downwards from slightly above the top of the inner tubular sleeve 23 so to completely enclose/sheathe the inner tubular sleeve 17 up to a given distance from the bottom of the detergent/softener compartment 21.

[0066] The inner tubular sleeve 23 of siphon assembly 22 is preferably made in one piece with the basin-shaped container 14.

[0067] Also the siphon assembly 22 may be advantageously provided with a channeling system, not illustrated, similar to the one illustrated above with respect to siphon assemblies 16, adapted to channel towards the bottom of the detergent/softener compartment 21 at least part of the jet of water that strikes/bumps against the siphon assembly 22.

[0068] In addition to the above, with reference to Figure 3, in the example shown the basin-shaped container 14 is furthermore preferably provided with a water-channeling portion/section 25 that directly adjoins the two detergent/softener compartments 15 and the detergent/softener compartment 21, matches with the water nozzles 13 (not represented in Figure 3) of the water supply circuit 11 and is properly shaped to guide/channel the jets of fresh water arriving from the water supply circuit 11 either towards the detergent/softener compartments 15 or towards the detergent/softener compartment 21, according to the direction of the jets.

[0069] The upper portion/section 18a of the outer tubular sleeve 18 of each siphon assembly 16 that is stroked by the jet of fresh water produced by the water supply circuit 11, is preferably directly faced to the water-channeling portion/section 25 of the basin-shaped container 14.

[0070] The upper lid element 20 is preferably shaped/dimensioned so to match and fitted onto the upper rim 14a of container 14 and overhangs above the inner tubular sleeve 17, 23 of all the siphon assemblies 16, 22 of detergent/softener dispenser 10; and the outer tubular sleeve 18, 24 of each siphon assembly 16, 22 extends downwards from the upper lid 20 so to sheathe the corresponding inner tubular sleeve 17, 23 nearly up to the bottom of the corresponding compartment 15, 21.

[0071] In the example shown the outer tubular sleeves 18, 24 of the siphon assemblies 16 and 22 are preferably made in one piece with the upper lid element 20.

[0072] Furthermore the upper lid element 20 is preferably shaped/dimensioned so to completely cover/hide the water-channeling portion 25 of the basin-shaped container 14 optionally even forming part of the same water-channeling portion 25, and preferably also to completely cover/hide the internal partitioning walls that divide the inside of basin-shaped container 14 into the various detergent/softener compartments 15, 21.

[0073] With reference to Figures 2 and 3, preferably, though not necessarily, the basin-shaped container 14 is furthermore provided with two pass-through openings 15a each of which is positioned preferably at least partially on the bottom of a respective detergent/softener compartment 15, and is properly shaped/dimensioned to allow the free, quick and substantially complete outflow of the detergent/softener powder stored within the detergent/softener compartment 15 out of the basin-shaped container 14 when a given amount of fresh water is channeled into the detergent/softener compartment 15, i.e. into the basin-shaped container 14, by the water supply circuit 11. The detergent/softener dispenser 10 preferably also comprises a hand-operated, movable closing member 27 which is attached to the basin-shaped container 14 and is movable between a closing position in which the movable closing member 27 contemporaneously seals up in watertight manner the pass-through openings 15a on the bottom of all detergent/softener compartments 15 to prevent the detergent/softener stored within the various detergent/softener compartments 15 from flowing out of basin-shaped container 14 through the pass-through opening 15a, and an opening position in which the movable closing member 27 does not close the pass-through openings 15a thus allowing the free outflow of the detergent/softener stored within both detergent/softener compartments 15 out of the basin-shaped container 14 through the pass-through opening 15a.

[0074] In the example shown, the clear section of each pass-through opening 15a is preferably greater than 1.5 square centimeters so to avoids any risk that the pass-through opening 15a is clogged up by the mixture of detergent/softener powder and fresh water, and to guarantee an almost complete draining away of all the detergent/softener powder stored within the corresponding detergent/softener compartment 15.

[0075] With particular reference to Figures 2 and 3, the movable closing member 27 is preferably attached to the bottom of the basin-shaped container 14, and preferably comprises an oblong sliding block 28 which is attached in sliding manner to the bottom of the basin-shaped container 14, preferably outside of latter, so as to be manually displaceable between a first and a second working position.

[0076] Advantageously the movable closing member

17 comprises two sealing gaskets 29 which are preferably made of an elastomeric material and are arranged on the sliding block 28 so as to be aligned and abut, when the oblong sliding block 28 is arranged in the first working position, each to a respective pass-through opening 15a to seal up the same pass-through opening 15a, and to be both misaligned to the corresponding pass-through openings 15a when the oblong sliding block 28 is arranged in the second working position.

[0077] Preferably the movable closing member 27 furthermore comprises a knob 30 or similar manually-operable tailpiece or part, which is preferably rigidly connected to the sliding block 28 so as to allow the user to manually displace the sliding block 28 between the first and the second working position, 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.

[0078] In the example shown the oblong sliding block 28 is preferably made of in plastic material via an injection molding process, and the knob 30 is preferably made in one piece with the same oblong sliding block 28.

[0079] Each sealing gasket 29 preferably comprises a, preferably substantially-flat, surface pad 29 which is made of a suitable elastomeric material and is preferably over-injected on the oblong sliding block 28 (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.

[0080] With reference to Figures 2 and 3, detergent/softener dispenser 10 preferably comprises a, preferably substantially tray-shaped, lower baffle 31 which is rigidly attached to the bottom of the container 14, below the movable closing member 27 (i.e. the sliding block 28), the pass-through openings 15a of the detergent/softener compartments 15 and the outlets of the siphon assemblies 16, 22, and is preferably properly shaped/dimensioned so to hide the pass-through openings 15a and the outlets of the siphon assemblies 16, 22.

[0081] The lower baffle 31 is preferably shaped/dimensioned so to deflect, preferably towards the lateral wall of the elastically-deformable bellows 6, preferably in a substantially horizontal direction, 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, 22.

[0082] General operation of the top-loading laundry washing machine 1 is clearly inferable from the above description, with no further explanation required.

[0083] As regards detergent/softener dispenser 10, the presence of the channeling system (e.g. the longitudinal surface channel 19 on the outer surface of the outer tubular sleeve 18 of the siphon assembly 16) allows the fresh water injected into the detergent/softener compartment 15 to flow at high speed (and/or pressure) along the outer tubular sleeve 18 towards the bottom of the compartment and deeply penetrate into the dense layer of highly-viscous liquid-type detergent/softener or big mass of powder-type detergent/softener that usually settles on the bottom of the detergent/softener compartment 15, thus significantly increasing the mixing of fresh water and of highly-viscous liquid-type detergent/softener or powder-type detergent/softener, within the detergent/softener compartment 15.

[0084] The high-speed (and/or high-pressure) flux of clean water conducted (guided) by the longitudinal surface channel 19 towards the bottom of the detergent/softener compartment 15, effectively removes the highly-viscous liquid-type/ powder-type detergent/softener from the bottom of the compartment and furthermore highly improves the mixing of fresh water and of detergent/softener.

[0085] In other words, the fresh water is now prevented from stagnating above the detergent/softener that settles on the bottom of the detergent/softener compartment 15, thus minimizing formation of detergent/softener deposits on the inner surface of the detergent/softener compartment 15 after drainage of the mixture of fresh water and detergent/softener.

[0086] The advantages correlated to the particular structure of detergent/softener dispenser 10 are large in number. First of all, the amount of detergent/softener that drops into the washing tub 3 is now almost equal to that stored into the detergent/softener compartment/s 15, thus detergent/softener is more efficiently used.

[0087] Furthermore periodic cleaning of the detergent/softener compartment/s 15 is no more requested, since substantially all the detergent/softener is effectively removed from the detergent/softener compartment/s.

[0088] In addition to the above, thanks to the pass-through opening/s 15a on the bottom of the detergent/softener compartment/s 15 and to the movable closing member 27 that selectively closes said pass-through opening/s 15a, detergent/softener dispenser 10 is now able to correctly operate with either liquid-type or powder-type detergents/softeners with no risk of clogging up.

[0089] In fact, when the movable closing member 27 is arranged in the opening position, the mixture of fresh water and detergent/softener powder is allowed to quickly drain away from the detergent/softener 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/softener compartment/s 15 is/are preferably inactive. Instead, when the movable closing member 27 is arranged in the closing position, the pass-through opening/s 15a is/are sealed up in watertight manner and the mixture of detergent/softener and fresh water is allowed to drain away from the corresponding detergent/softener compartment 15 solely via the siphon assembly 16 located inside the same detergent/softener compartment 15.

[0090] Clearly, changes may be made to the top-load-

ing laundry washing machine 1 and to the detergent/softener dispenser 10 as described herein without, however, departing from the scope of the present invention.

[0091] For example, in a first non-shown different embodiment, the outer surface of the outer tubular sleeve 18 of siphon assembly 16 lacks the reciprocally parallel and spaced, outwards-projecting longitudinal ribs 19a, and is instead provided with a preferably rectilinear surface groove that extends downwards from the upper end of the outer tubular sleeve 18, is preferably vertically oriented so as to be locally substantially parallel to the tubular sleeve longitudinal reference axis, and is properly shaped/dimensioned to collect and channel towards the bottom of the detergent/softener compartment 15 at least part of the fresh water that bumps against the outer tubular sleeve 18. The rectilinear surface groove forms the channeling system of the siphon assembly 16.

[0092] Furthermore, in a second non-shown different embodiment, the detergent/softener dispenser 10 comprises, for each detergent/softener compartment 15, a respective manually-operated, movable closing member 27 which is structure for selectively sealing up in watertight manner the pass-through opening 15a to prevent the detergent/softener stored within the same detergent/softener compartment 15 from flowing out of the basin-shaped container 14.

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/softener dispenser (10) which is located at the laundry loading/unloading opening (7a) and is structured to selectively drop a mixture of detergent/softener and water into the washing tub (3), wherein said detergent/softener dispenser (10) comprises a substantially basin-shaped container (14) which is provided with at least one detergent/softener compartment (15, 21) shaped/dimensioned to be fillable with a given amount of detergent/softener, and a corresponding siphon assembly (16, 22) which is shaped/structured for draining out of the basin-shaped container (14) the detergent/softener stored within the detergent/softener compartment (15, 21) when a given amount of fresh water is channeled into said detergent/softener compartment (15, 21) by a water supply circuit (11) of said laundry washing machine (1), structured to point/direct at least one jet of water at said siphon assembly (16, 22), so that said at least one jet bumps/strikes against said siphon assembly (16, 22),
characterized in that
said siphon assembly (16, 22) comprises a channeling system (19) adapted to channel towards the bottom of said detergent/softener compartment (15, 21) at least part of said jet of water that strikes/bumps against said siphon assembly (16, 22).

2. Laundry washing machine (1), according to claim 1, wherein said siphon assembly (16) comprises an outer tubular sleeve (18) which is arranged inside the detergent/softener compartment (15) in such a way that said jet of water coming from said water supply circuit (11) bumps/strikes against said outer tubular sleeve (18), said channeling system (19) being provided on said outer tubular sleeve (18).

3. Laundry washing machine (1), according to claim 2, wherein said channeling system (19) comprises a longitudinal surface channel (19) provided on the outer surface of said tubular sleeve (18) and extending downwards along at least a section of the outer tubular sleeve (18), said longitudinal surface channel (19) being shaped/dimensioned to channel towards the bottom of the detergent/softener compartment (15) at least part of said jet of water that strikes/bumps against the outer tubular sleeve (18).

4. Laundry washing machine (1), according to Claim 3, wherein said longitudinal surface channel (19) extends downwards from an upper portion (18a) of said outer tubular sleeve (18), said water supply circuit (11) being structured to point/direct said at least one jet of water at said upper portion (18a) of said outer tubular sleeve (18), said longitudinal surface channel (19) being shaped/dimensioned to channel towards the bottom of the detergent/softener compartment (15) at least part of said jet of water that strikes/bumps against said upper portion (18a) of said outer tubular sleeve (18).

5. Laundry washing machine (1), according to Claim 3 or 4, wherein the longitudinal surface channel (19) is substantially rectilinear.

6. Laundry washing machine (1), according to Claim 5, wherein the longitudinal surface channel (19) extends substantially parallel to the longitudinal reference axis (A) of said outer tubular sleeve (18).

7. Laundry washing machine (1), according to Claim 6, wherein the outer tubular sleeve (18) is provided with a pair of reciprocally parallel and spaced longitudinal ribs (19a) that protrudes from the outer surface of said tubular sleeve (18), starting approximately from the upper end of the outer tubular sleeve (18), and extends downwards along the body of the outer tubular sleeve (18) while remaining locally substantially parallel to the tubular sleeve longitudinal reference axis (A), so as to form/delimit a substantially vertically-oriented, rectilinear channel (19).

8. Laundry washing machine (1), according to Claim 2, wherein said channeling system (19) comprises a surface groove provided on the outer surface of said tubular sleeve (18) and extending downwards along at least a section of the outer tubular sleeve (18), said surface groove being shaped/dimensioned to channel towards the bottom of the detergent/softener compartment (15) at least part of said jet of water that strikes/bumps against the outer tubular sleeve (18).

9. Laundry washing machine (1), according to any one of Claims 3 to 8, wherein the siphon assembly (16) comprises an inner tubular sleeve (17) that protrudes from the bottom of the detergent/softener compartment (15) and extends upwards inside the outer tubular sleeve (18) up to a given distance from the upper end of said outer tubular sleeve (18).

10. Laundry washing machine (1), according to any one of Claims 3 to 9, wherein the detergent/softener dispenser (10) also comprises an upper lid-element (20) which is firmly fixed to the basin-shaped container (14) and is structured to directly support/form the outer tubular sleeve (18) of the siphon assembly (16).

11. Laundry washing machine (1), according to Claim 10, wherein the upper lid-element (20) is shaped/dimensioned so to match and fit onto an upper rim (14a) of the basin-shaped container (14) and so to overhang above the inner tubular sleeve (17) of the siphon assembly (16); and in that the outer tubular sleeve (18) of the siphon assembly (16) extends downwards from the upper lid (20) so to completely sheathe the inner tubular sleeve (17) nearly up to the bottom of the basin-shaped container (14).

12. Laundry washing machine (1), according to Claim 11, wherein the outer tubular sleeve (18) of the siphon assembly (16) is made in one piece with the upper lid-element (20).

13. Laundry washing machine (1), according to any one of the foregoing claims, wherein said basin-shaped container (14) is provided with a number of detergent/softener compartments (15), each provided with a respective siphon assembly (16) which is shaped/structured for draining out of the basin-shaped container (14) the detergent/softener stored within the detergent/softener compartment (15) when a given amount of fresh water is channeled into the corresponding detergent/softener compartment (15).

14. Laundry washing machine (1), according to any one of the foregoing claims, **characterized in that** the basin-shaped container (14) of the detergent/softener dispenser (10) is provided, for each detergent/softener compartment (15), with a pass-through opening (15a) which is shaped/dimensioned so to allow the free outflow, out of the basin-shaped container (14), of a powder-type detergent/softener stored within the detergent/softener compartment (15) when a given amount of fresh water is channeled into said detergent/softener compartment (15), and **in that** said detergent/softener dispenser (10) comprises at least one manually 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 the 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/softener stored within said detergent/softener compartment (15).

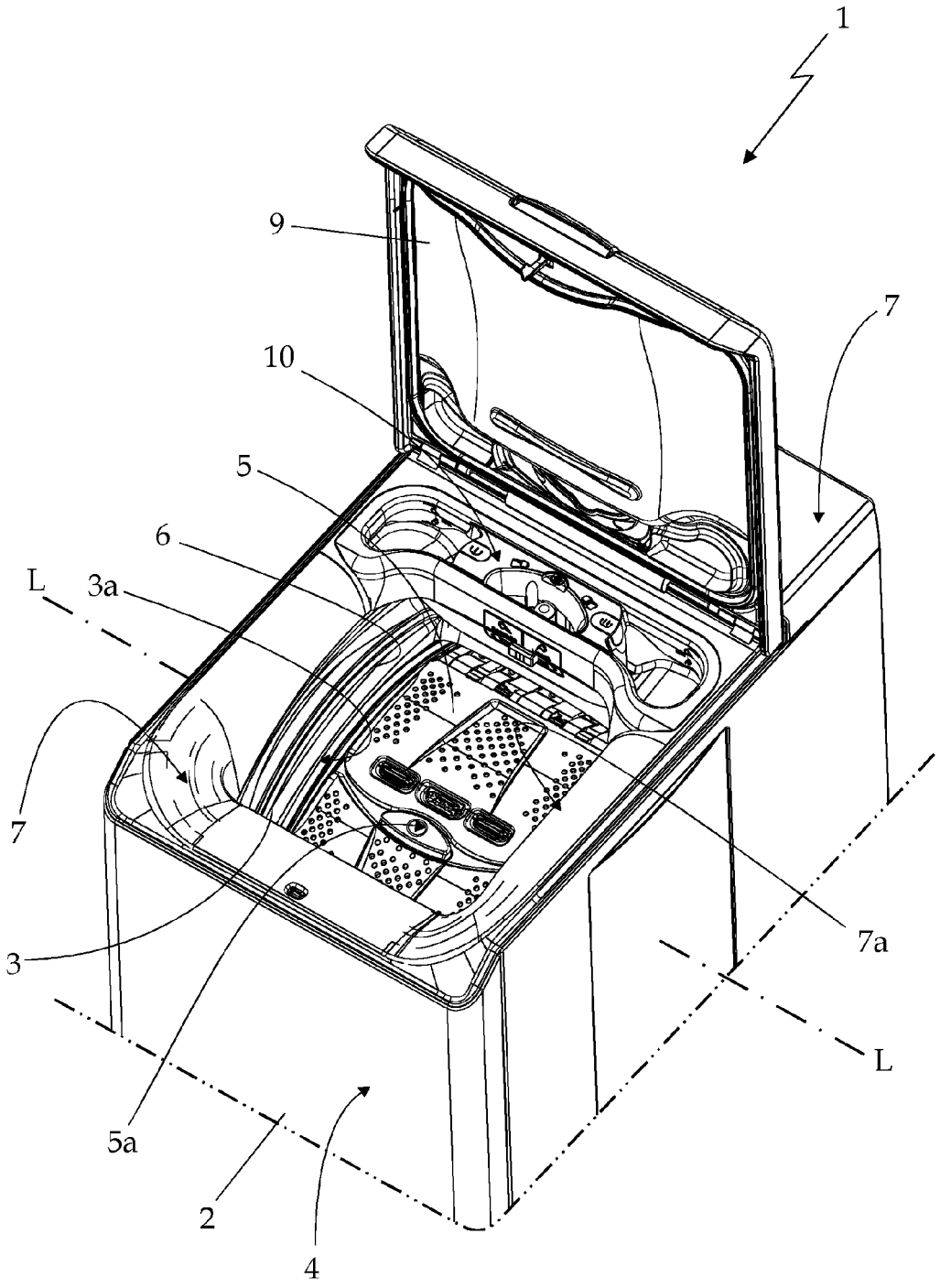

Fig. 1

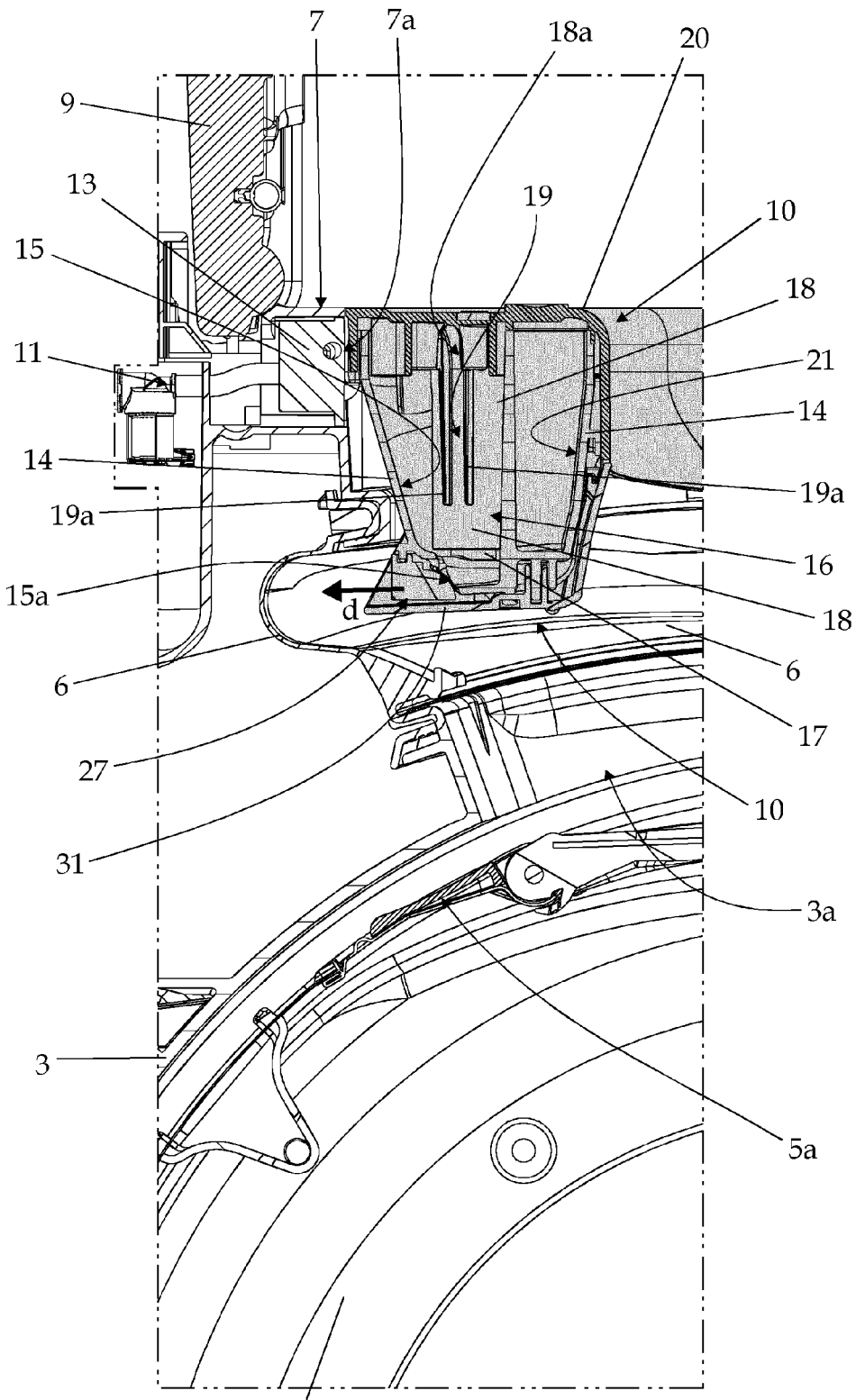
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Fig. 2

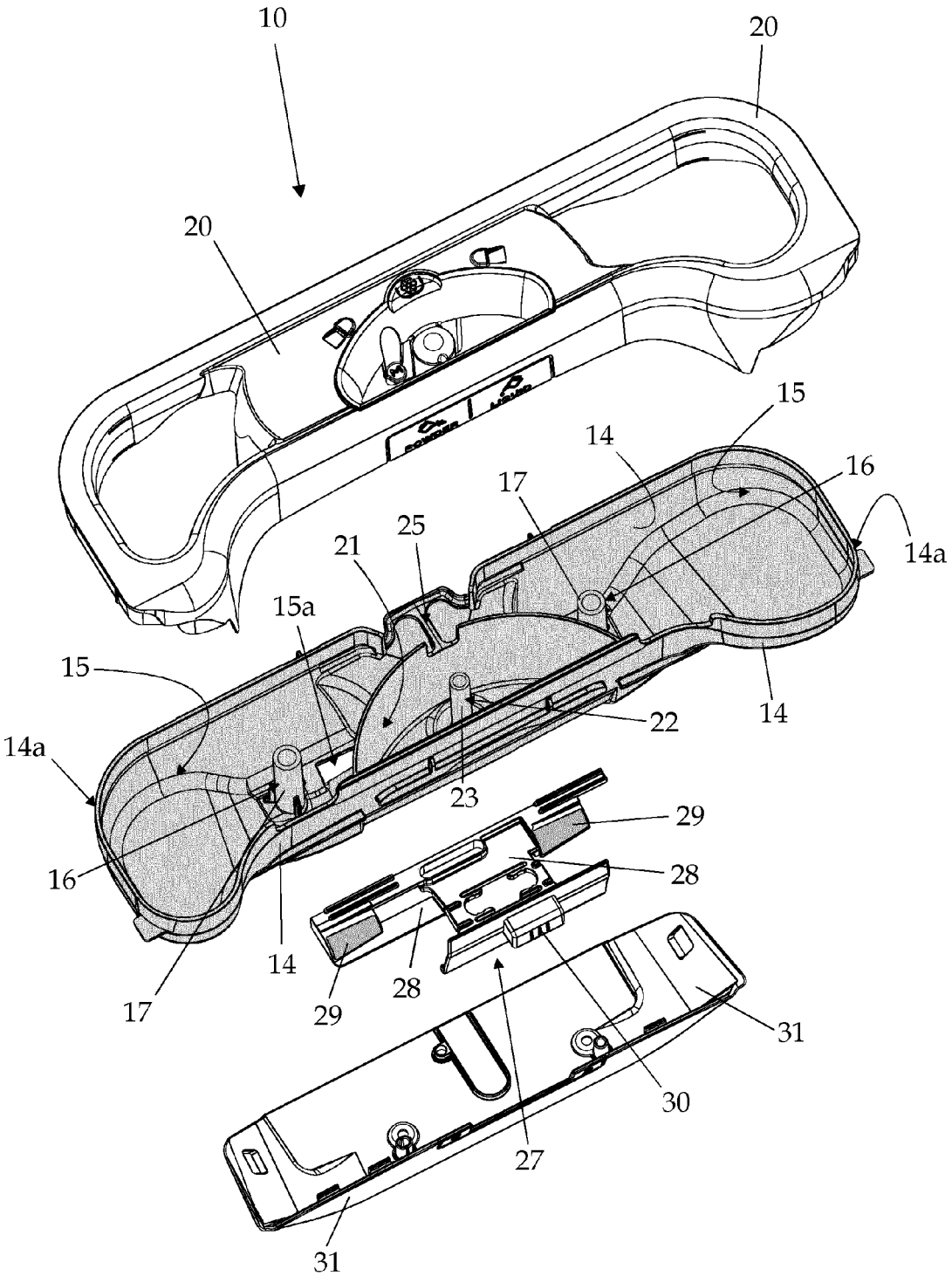
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Fig. 3

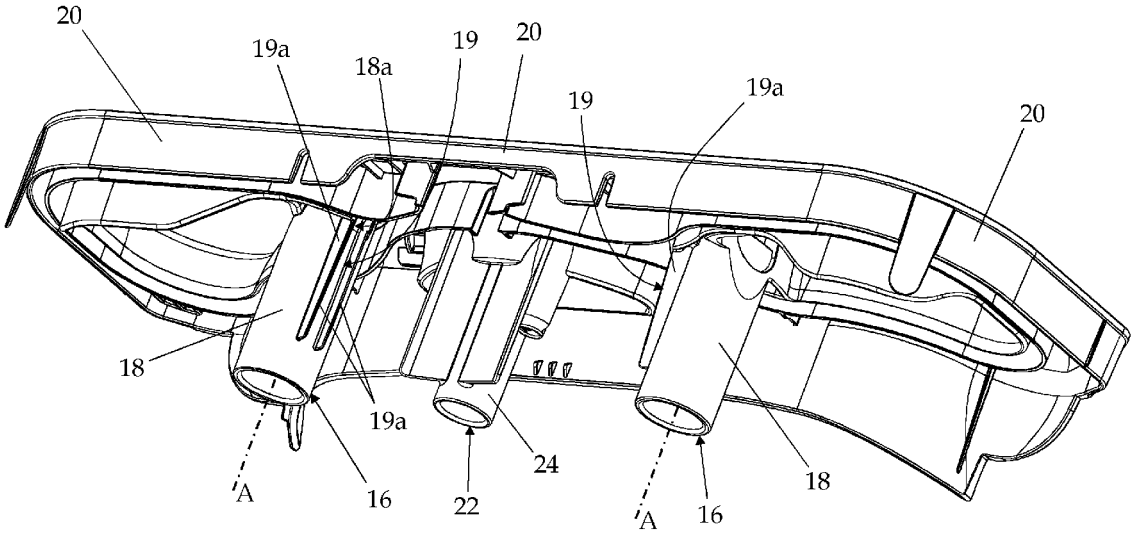

Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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