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(54) **LAUNDRY WASHING MACHINE COMPRISING A DETERGENT DISPENSING ASSEMBLY**
WASCHMASCHINE, UMFASSEND EINE TENSIDABGABEVORRICHTUNGSANORDNUNG
MACHINE À LAVER LE LINGE COMPRENANT UN ENSEMBLE DE DISTRIBUTION DE DÉTERGENT

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Description

[0001] The present invention relates to a laundry washing machine (which may be of the front-loading type or of the top-loading type) comprising a detergent dispensing assembly; the laundry washing machine can have or not also a drying function.

[0002] As is known, a front-loading home laundry washing machine generally comprises: a substantially parallelepiped-shaped outer boxlike casing structured for resting on the floor; a substantially bell-shaped washing tub which is usually suspended in floating manner inside the casing, directly facing a laundry loading/unloading through opening realized in the front wall of the casing; a substantially cylindrical, elastically-deformable bellows which watertight connects the front opening of the washing tub to the laundry loading/unloading opening formed in the front wall of the casing; a porthole door which is hinged to the front wall of the casing to rotate to and from a closing position in which the door closes the laundry loading/unloading opening in the front wall of the casing for watertight sealing the washing tub; a substantially cylindrical, bell-shaped rotatable drum structured for housing the laundry to be washed, and which is fitted inside the washing tub with its concavity facing the laundry loading/unloading opening and is supported by the washing tub in axially rotating manner so as to be able to freely rotate about its substantially horizontally-oriented, longitudinal axis; and an electrically-powered motor assembly which is structured for driving into rotation the rotatable drum about its longitudinal axis inside the washing tub.

[0003] The front-loading home laundry washing machine moreover comprises: a detergent dispensing assembly which is located inside the boxlike casing and is structured for selectively feeding into the washing tub, according to the washing cycle selected by the user, a given amount of detergent, softener and/or other washing agent suitably mixed with fresh water arriving from the water mains; and finally a fresh-water supply circuit which is structured for selectively drawing fresh water from the water mains according to the washing cycle selected by the user, and channelling said fresh water to the detergent dispensing assembly or directly to the washing tub.

[0004] In most of the front-loading laundry washing machines currently on the market, the detergent dispensing assembly generally comprises a detergent drawer which is fitted/inserted in manually extractable manner into a corresponding drawer housing whose entrance is located on front wall of the casing, above the laundry loading/unloading opening. The detergent drawer is moreover divided into a number of detergent compartments each structured for being manually fillable with an amount of detergent, softener or other washing agent sufficient to perform a single washing cycle, and the detergent dispensing assembly furthermore comprises a drawer flush circuit which is connected to the fresh-water supply circuit for receiving fresh water, and is structured for selectively spilling/pouring, when the detergent drawer is completely

fitted/inserted into the drawer housing, a shower of water droplets directly into any one of the detergent compartments of the detergent drawer, so as to selectively flush the detergent, softener or other washing agent out of the same detergent compartment and down onto the bottom of the drawer housing. The mixture of water and detergent, softener or other washing agent afterwards flows into the washing tub via a drain duct that branches off from the basin-shaped bottom of the drawer housing.

[0005] More in detail, the drawer flush circuit generally comprises a plate-like water delivery member which is usually incorporated into the upper cover of the drawer housing so as to be located immediately above the detergent drawer when the latter is completely inserted/recessed into the drawer housing. The plate-like water delivery member is provided with a number of shower-making portions/sections each of which is vertically aligned to a corresponding detergent compartment of the detergent drawer, and is structured for feeding a shower of water droplets into the detergent compartment located immediately beneath; and the drawer flush circuit furthermore comprises an electrically-operated valve assembly or flow diverter assembly which is located immediately upstream of the water delivery member, and is structured for channeling the fresh water arriving from the fresh-water supply circuit selectively and alternatively towards any one of the shower-making sections/portions of the water delivery member.

[0006] According to WO2006008773 the plate-like water delivery member consists of a plate-like lower element and a plate-like upper element that are made of plastic via an injection moulding process, and are vibration welded to one another to form the plate-like upper cover of the drawer housing.

[0007] The upper face of the plate-like lower element has a number of perforated portions/sections each vertically aligned to a corresponding detergent compartment of the detergent drawer, and a number of upwards-protruding ribs that delimit in pairs a series of water ducts each of which is shaped to channel the fresh water arriving from the electrically-operated valve assembly or flow diverter assembly to a corresponding perforated portion/section of the plate-like lower element. The lower face of the plate-like upper element, instead, is shaped so as to directly abut against the crest line of the upwards-protruding ribs of the plate-like lower element, and to be vibration welded to the same upwards-protruding ribs so as to watertight close the top of each water duct and complete the water delivery member.

[0008] Unluckily, during the vibration welding of the plate-like upper element to the upwards-protruding ribs of the plate-like lower element it may happen that drops of welding burr partially obstruct the inside of one or more of water ducts, thus causing a wrong outflow of the water from the plate-like water delivery member with all problems concerned. The clear section (i.e. the section in which the water actually flows) of each water duct, in fact, is suitably sized so to have a specific water flowrate along

the water duct, and the presence of welding burrs can locally drastically reduce the clear section of the duct. Document EP2653601 discloses the plate-like water delivery member comprising a case having the water duct that is heat-welded to a water pouring lid body by heating; also for this kind of welding, burrs can result on the inside of the water ducts, obstructing water passage.

[0009] Aim of the present invention is to prevent the welding burrs to reduce the clear section of the water ducts of the plate-like water delivery member of the detergent dispensing assembly.

[0010] In compliance with the above aim, according to the present invention there is provided a laundry washing machine comprising a detergent dispensing assembly which comprises a detergent drawer structured for receiving a given amount of washing agent and which is fitted in extractable manner into a corresponding drawer housing, and a water delivery member which is associated to the drawer housing so as to be located immediately above the detergent drawer when the latter is completely inserted/recessed into the drawer housing; the water delivery member is provided with at least one shower-making portion structured for feeding a shower of water droplets into the beneath-located detergent drawer, and with at least one internal water supply duct which extends inside the body of the water delivery member and is structured so as to channel the fresh water towards said shower-making portion; the water delivery member comprises a first and a second, reciprocally overlapped, plate-like elements which are made of plastic material and are welded to one another so as to form a monolithic body, and the at least one water supply duct being laterally delimited, in the interspace between the first and the second plate-like elements, by two first partitioning ribs each protruding from the inner face of the first or second plate-like element towards the other plate-like element, and watertight merged via vibration welding to the body of said other plate-like element; at least a segment of the internal water supply duct is additionally laterally delimited by two second partitioning ribs each protruding from the inner face of the first or second plate-like element inside the lane laterally delimited by the first partitioning ribs, and extending towards the other plate-like element up to rest with the crest line of the ribs in abutment against the conjugated inner face of said other plate-like element.

[0011] It is underlined that the crest line of the second partitioning ribs lean abuts or leans against with the conjugated inner face of the other plate-like element, but is not welded to this inner face; this ensures that the clear section of the water supply ducts is not reduced/obstructed by welding burrs, since the clear section of the water supply ducts is laterally delimited by a two second partitioning ribs, each protruding from one of the plate-line elements, which, as just underlined, are not welded to the inner face of the other plate-like element, while the first partitioning ribs (which are welded and which can therefore generate welding burrs) are positioned externally to the second partitioning ribs. In other words, po-

tentially welding burrs generated during the vibration welding in the first partitioning ribs are kept external to the clear section of the water supply ducts (this clear section is therefore defined laterally by the second partitioning ribs) by the presence of the second partitioning ribs.

[0012] It is underlined that, advantageously, the first partitioning ribs can protrude both from a same plate-line element (for example the first plate-line element), or they can advantageously protrude one from one of the plate-line elements (for example the first plate-line element) and one from the other plate-line element (for example the second plate-line element).

[0013] Advantageously, first partitioning ribs are watertight merged via vibration welding to the body of said other plate-like element, without interruption along the whole length of the first partitioning ribs.

[0014] It is underlined that, advantageously, also the second partitioning ribs can protrude both from a same plate-line element, or they can advantageously protrude one from one of the plate-line elements and one from the other plate-line element.

[0015] Advantageously, the crest lines of the second partitioning ribs rests in abutment against the conjugated inner face of the other plate-like element without interruption along the whole length of said second partitioning ribs.

[0016] Preferably, the internal water supply duct is laterally delimited by the couple of second partitioning ribs for its whole length.

[0017] Preferably, each second partitioning rib is locally parallel to an adjacent first partitioning rib.

[0018] Advantageously, the detergent drawer is divided into a number of detergent compartments each structured for being manually fillable with a given amount of detergent, softener or other washing agent, and in each shower-making portion the plate-like water delivery member is vertically aligned to a respective detergent compartment of the detergent drawer, and is structured for feeding a shower of water droplets solely into the beneath-located detergent compartment.

[0019] Preferably, the second partitioning ribs protrude both from the inner face of the first plate-like element, or both from the inner face of the second plate-like element, or one from the inner face of the first plate-like element and the other from the inner face of the second plate-like element.

[0020] Advantageously the first plate-like element comprises an outer annular rib which protrudes from the inner face of one between the first plate-like element and second plate-like element while surrounding the partitioning ribs and as a whole, and extends towards the other plate-like element up to reach and watertight merge with the body of said other plate-like element.

[0021] Preferably the first plate-like element of the water delivery member is directly faced to the detergent drawer and is provided, along one or more segments of the at least one internal water supply duct, with a number

of transversal through holes.

[0022] Advantageously the cross-section of one or more of these through holes is suitably sized to allow the water flowing inside the water supply duct to trickle out of the plate-like water delivery member and drop into the beneath-located detergent drawer.

[0023] Preferably the laundry washing machine comprises an electrically-operated water flow controlling device which is interposed between the plate-like water delivery member and the fresh-water supply circuit, and is structured for controlling the flow of fresh water from the fresh-water supply circuit along the at least one water supply duct of the plate-like water delivery member.

[0024] Advantageously the plate-like water delivery member is provided with a number of internal water supply ducts and the electrically-operated water flow controlling device is structured for controlling the flow of fresh water along each water supply duct of the plate-like water delivery member.

[0025] Preferably the electrically-operated water flow controlling device is attached to a side of the plate-like water delivery member, or is recessed/incorporated into the water delivery member.

[0026] A non-limiting embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

- Figures 1 is a side view of a laundry washing machines provided with a detergent dispensing assembly realized in accordance with the teachings of the present invention, with parts removed for clarity;
- Figures 2 is a perspective view of the Figure 1 detergent dispensing assembly with parts removed for clarity and in a partially opened configuration;
- Figure 3 is an exploded perspective view of the Figure 2 detergent dispensing assembly;
- Figure 4 is a top view of the upper portion of the Figure 2 detergent dispensing assembly, with parts removed for clarity;
- Figure 5 is a front view of the plate-like water delivery member of the detergent dispensing assembly shown in Figure 4, sectioned according section line A-A.

[0027] With reference to attached Figures, reference number 100 indicates a laundry washing machine 100 comprising a detergent dispensing assembly numbered 1 as a whole.

[0028] In the attached Figures laundry washing machine 100 is a front-loading laundry washing machine; anyway the invention can be applied as well also to a top-loading laundry washing machine. The laundry washing machine according to the invention can be provided or not with a drying function.

[0029] Laundry washing machine 100 preferably comprises:

- a preferably substantially parallelepiped-shaped,

boxlike outer casing 101, preferably structured for resting on the ground;

- a substantially bell-shaped washing tub 102 which is arranged inside the casing 101, preferably directly facing a laundry loading/unloading through opening realized in the front wall 103 of the outer casing 101;
- a substantially cylindrical, bell-shaped rotatable drum (not shown) which is structured for housing the laundry to be washed, and is fitted inside the washing tub 102 in such a way to be able to freely rotate about its longitudinal axis inside the washing tub 102;
- an electrically-powered motor assembly 104 which is structured for driving into rotation the rotatable drum (not shown) about its longitudinal axis inside the washing tub 102 ; and
- a porthole door 105 which is preferably hinged to the front wall 103 of the casing 101 to rotate to and from a closing position in which the door 105 closes the laundry loading/unloading opening on front wall 103 for watertight sealing the washing tub 103.

[0030] The laundry washing machine 100 furthermore comprises the detergent dispensing assembly 1 which is located inside the casing 101 preferably above the washing tub 102 and preferably, though not necessarily, immediately underneath the upper worktop or top wall 106 of the casing 101, and is structured for selectively feeding into the washing tub 102, according to the washing cycle selected by the user, a given amount of detergent, softener and/or other washing agent suitably mixed with fresh water; and preferably a fresh-water supply circuit (not shown) which is connectable directly to the water mains, and is structured for selectively channelling, according to the washing cycle manually-selected by the user, a flow of fresh water from the water mains to detergent dispensing assembly 1 or directly to washing tub 102.

[0031] In the example shown the rotatable drum (not shown) of laundry washing machine 100 is preferably arranged inside the washing tub 102 with the drum rotation axis locally substantially coaxial to the longitudinal axis L of the washing tub 1, and with the circular front opening or mouth of the drum directly aligned and faced to the circular front opening or mouth of washing tub 102, so as to receive the laundry to be washed through the laundry loading/unloading opening realized on front wall 103.

[0032] The washing tub 102, in turn, is preferably arranged inside the outer casing 101 with its longitudinal axis L substantially horizontally-oriented, i.e. substantially perpendicular to front wall 103.

[0033] Furthermore the washing tub 102 is preferably suspended in floating manner inside the casing 101 via a suspension system that preferably, though not necessarily, comprises at least one, and preferably a couple of upper coil springs 107 connecting the upper portion of washing tub 102 to the top of casing 101, and preferably

at least one, and preferably a couple of vibration dampers 108 connecting the bottom portion of washing tub 102 to the bottom of casing 101; and the laundry washing machine 100 is preferably provided with a substantially cylindrical elastically-deformable bellows 109 which water-tight connects the front mouth of washing tub 102 to the laundry loading/unloading opening realized on front wall 103 of casing 101.

[0034] With reference to Figures 2 and 3, the detergent dispensing assembly 1 in turn basically comprises a detergent drawer 2 which is structured for being manually fillable with a given amount of detergent, softener or other washing agent, and is fitted/inserted in manually extractable manner into a corresponding, preferably substantially basin-shaped, drawer housing 3 whose entrance 4 is preferably located on front wall 103 of the outer casing 101, above the laundry loading/unloading opening realized on front wall 103.

[0035] More in detail, the detergent drawer 2 is preferably divided into a number of detergent compartments 5 each structured for being manually fillable with a given amount of detergent, softener or other washing agent sufficient to perform only a single washing cycle.

[0036] The detergent dispensing assembly 1 furthermore comprises a drawer flush circuit 6 which is connected to the fresh-water supply circuit (not shown) of the laundry washing machine 100 for receiving the fresh water of the water mains, and is structured for selectively spilling/pouring, when the detergent drawer 2 is completely fitted/inserted into the drawer housing 3, a shower of water droplets directly into the detergent drawer 2 so as to selectively flush the detergent, softener or other washing agent out of the detergent drawer 2 and down onto the substantially basin-shaped bottom 7 of drawer housing 3.

[0037] More in detail, in the example shown the drawer flush circuit 6 is preferably structured for selectively and alternatively spilling/pouring, when the detergent drawer 2 is completely fitted/inserted into the drawer housing 3, a shower of water droplets into any one of the detergent compartments 5 of detergent drawer 2, so as to selectively flush the detergent, softener or other washing agent out of the same detergent compartment 5 and down onto the substantially basin-shaped bottom 7 of drawer housing 3.

[0038] With reference to Figure 1, preferably the substantially basin-shaped bottom 7 of drawer housing 3, in turn, communicates with the inside of the beneath-located washing tub 102 via a drain duct 110 that preferably branches off from the deeper portion of the basin-shaped bottom 7 of drawer housing 3 and ends, preferably directly, into the washing tub 102, so as to allow the mixture of water and detergent, softener or other washing agent to flow by gravity directly into the washing tub 102.

[0039] With reference to Figures 2, 3, 4 and 5, the drawer flush circuit 6 in turn comprises a water delivery member 8 which is associated to the drawer housing 3 so as to be located immediately above the detergent drawer 2

when the latter is completely inserted/recessed into the drawer housing 3, and is provided with one or more shower-making portions/sections 9 each of which is faced to the beneath-located detergent drawer 2, and is structured for feeding a shower of water droplets (e.g. by gravity or due to the pressure of the water coming from the water mains) into the detergent drawer 2; and preferably also an electrically-operated valve assembly 10 or similar water flow controlling device, which is interposed between the water delivery member 8 and the fresh-water supply circuit (not shown) of the laundry washing machine 100, and is structured for controlling the flow of fresh water from the fresh-water supply circuit towards each shower-making section/portion 9 of the water delivery member 8.

[0040] More in detail, the water delivery member 8 is provided with one or more shower-making portions/sections 9 each of which is faced to the beneath-located detergent drawer 2, and is structured for feeding a shower of water droplets into the detergent drawer 2; and with one or more internal water supply ducts 11 each of which extends inside the body of the plate-like water delivery member 8, and is structured so as to channel the fresh water arriving from the fresh-water supply circuit (not shown) of the laundry washing machine 100 towards a corresponding shower-making section/portion 9 of the water delivery member 8.

[0041] In other words, each water supply duct 11 extends inside the body of the plate-like water delivery member 8 so as to put a corresponding shower-making section/portion 9 of the water delivery member 8 in direct communication with the electrically-operated valve assembly 10 or similar water flow controlling device, which in turn is structured for controlling the flow of fresh water along each water supply duct 11 of the plate-like water delivery member 8.

[0042] With reference to Figures 3, 4 and 5, in the example shown, in particular, the water delivery member 8 is preferably provided with a number of shower-making portions/sections 9 each of which is vertically aligned to a corresponding detergent compartment 5 of the detergent drawer 2, and is structured for feeding a shower of water droplets solely into the beneath-located detergent compartment 5; and the electrically-operated valve assembly 10 is preferably structured for independently controlling the flow of fresh water from the fresh-water supply circuit of the laundry washing machine 100 towards each of the shower-making sections/ portions 9 of the water delivery member 8.

[0043] In other words, the electrically-operated valve assembly 10 is interposed between the fresh-water supply circuit (not shown) of the laundry washing machine 100 and the various internal water supply ducts 11 of the water delivery member 8, and is preferably structured for independently controlling the flow of fresh water along each water supply duct 11 of the water delivery member 8.

[0044] With reference to Figures 2, 3 and 4, in the ex-

ample shown the water delivery member 8 is preferably shaped/structured so as to form the upper lid that covers the top of the substantially basin-shaped drawer housing 3, and is preferably rigidly attached to the top of drawer housing 3 preferably, though not necessarily, via a snap-on locking mechanism.

[0045] The electrically-operated valve assembly 10, in turn, is preferably attached to a side of the water delivery member 8, and each water supply duct 11 extends inside the body of the water delivery member 8 from a corresponding shower-making section/portion 9 of the water delivery member 8 up to the side of the water delivery member 8 where the electrically-operated valve assembly 10 is located.

[0046] According to an alternative advantageous embodiment, the electrically-operated valve assembly 10 may be replaced by an electrically-operated flow diverter assembly which is structured for selectively and alternatively channeling the fresh water arriving from the fresh-water supply circuit of the laundry washing machine 100 towards any one of the internal water supply ducts of the water delivery member 8.

[0047] In addition to the above, with reference to Figures 2, 3, 4 and 5, the water delivery member 8 comprises two, reciprocally overlapped, plate-like elements 12 and 13 which are made of plastic material preferably via an injection moulding process, and are vibration welded to one another so as to form a plate-like monolithic body which is arranged on top of the substantially basin-shaped drawer housing 3 with the plate-like element 12 directly faced to the detergent drawer 2.

[0048] In the example shown, the plate-like elements 12 and 13 are preferably suitably shaped so as to form, when vibration welded to one another, a plate-like monolithic body which is shaped/structured so as to form the whole upper lid that covers the top of the substantially basin-shaped drawer housing 3.

[0049] Furthermore, the two reciprocally overlapped plate-like elements 12 and 13 are suitably shaped/structured so as to delimit in between themselves at least the one or more water supply ducts 11 of the water delivery member 8.

[0050] With particular reference to Figures 3, 4 and 5, the two plate-like elements 12 and 13 are reciprocally faced at a given distance to one another, and at least one, and preferably each, water supply duct 11 of the water delivery member 8 is laterally delimited, in the interspace between the plate-like elements 12 and 13, by a corresponding couple of partitioning ribs 14 which advantageously protrude from the inner face 15 of plate-like element 12 towards the overhanging plate-like element 13, and are advantageously watertight merged via vibration welding to the body of the plate-like element 13, preferably substantially without interruption along the whole length of the partitioning ribs 14. Preferably the partitioning ribs 14 are furthermore locally substantially parallel to one another.

[0051] In other words, the plate-like element 12 is pro-

vided with a number of partitioning ribs 14 which protrude from the preferably substantially flat, inner face 15 of plate-like element 12 towards the overhanging plate-like element 13, so as to reach the preferably substantially flat, opposite inner face 16 of plate-like element 13, and each partitioning rib 14 is watertight merged via vibration welding to the body of the plate-like element 13, preferably substantially without interruption along the whole length of the partitioning rib 14, so that the various partitioning ribs 14 of plate-like element 12 can laterally delimit in pairs the one or more internal water supply ducts 11 of the water delivery member 8.

[0052] In the example shown, each couple of partitioning ribs 14 of plate-like element 12 extends towards the overhanging plate-like element 13 while remaining locally substantially perpendicular to the inner faces 15 and 16 of both plate-like elements 12 and 13.

[0053] In addition to the above, at least one, and preferably each, internal water supply duct 11 of the water delivery member 8 is additionally laterally delimited, on both sides and preferably for the whole length of the water supply duct 11, by a couple of second partitioning ribs 17 which protrude preferably both from the inner face 15 of plate-like element 12 inside the lane laterally delimited by the couple of first partitioning ribs 14 delimiting the water supply duct 11, preferably while remaining each locally substantially parallel to the adjacent first partitioning rib 14.

[0054] However, differently from the first partitioning ribs 14, the second partitioning ribs 17 extend advantageously towards the overhanging plate-like element 13 up to simply rest with the respective crest lines 17a in abutment against the conjugated inner face 16 of plate-like element 13 preferably substantially without interruption for the whole length of the second partitioning ribs 17.

[0055] In other words, the crest lines 17a of the second partitioning ribs 17 abuts against the inner face 16 of plate-like element 13, and they are not welded to the plate-like element 13.

[0056] With reference to Figures 3, 4 and 5, therefore, at least one, and preferably each, internal water supply duct 11 of the water delivery member 8 is laterally delimited, on each side and preferably for the whole length, firstly by an internal partitioning rib 17 which protrudes from the inner face 15 of plate-like element 12 and extend towards the overhanging plate-like element 13, so as to simply rest with the crest line of the rib 17a in abutment against the conjugated inner face 16 of the same plate-like element 13, preferably substantially for the whole length of the partitioning rib 17; and secondly by an external partitioning rib 14 which protrudes from the inner face 15 of the plate-like element 12 behind and substantially alongside the internal partitioning rib 17, and extend towards the overhanging plate-like element 13 preferably while remaining locally substantially parallel to the adjacent internal partitioning rib 17, up to reach and watertight merge with the body of plate-like element 13, preferably without interruption along the whole length of the external

partitioning rib 14.

[0057] More in detail, in the example shown each internal water supply duct 11 of the water delivery member 8 is preferably laterally delimited, on both sides and substantially along the whole length of the duct, by an internal partitioning rib 17 which protrudes from the inner face 15 of the plate-like element 12 and extend towards the overhanging plate-like element 13 so as to simply rest with the crest line of the rib 17a in abutment against the conjugated inner face 16 of the same plate-like element 13 preferably without interruption for the whole length of the partitioning rib 17; and by an external partitioning rib 14 which protrudes from the inner face 15 of the plate-like element 12 alongside and behind the internal partitioning rib 17, and extends towards the overhanging plate-like element 13 while remaining locally substantially parallel to the adjacent internal partitioning rib 17, up to reach and watertight merge with the body of plate-like element 13, preferably without interruption along the whole length of the external partitioning rib 14.

[0058] With reference to figure 3, 4 and 5, the plate-like element 12 is preferably, though not necessarily, additionally provided with an outer annular rib 18 which protrudes from the inner face 15 of plate-like element 12 while surrounding the partitioning ribs 14 and 17 as a whole, and extends towards the overhanging plate-like element 13 up to reach the plate-like element 13 preferably substantially without interruption along the whole perimeter of the inner face 16 of plate-like element 13.

[0059] Alike the external partitioning ribs 14, the outer annular rib 18 is watertight merged via vibration welding to the body of the plate-like element 13, preferably substantially without interruption along the whole length of the annular rib 18.

[0060] Lastly the plate-like element of the water delivery member 8 directly faced to detergent drawer 2, i.e. plate-like element 12, is preferably also provided, along one or more segments of preferably each internal water supply duct 11 - i.e. along one or more segments of each lane delimited by a couple of external partitioning ribs 14 and, if present, also by a couple of internal partitioning ribs 17 -, with a number of transversal through holes 19. The cross-section of preferably each through hole 19 is preferably suitably sized to allow the water flowing inside the water supply duct 11 to trickle out of the water delivery member 8 and slowly drop into the beneath-located detergent drawer 2, preferably inside the perimeter of a single detergent compartment 5 of the beneath-located detergent drawer 2.

[0061] The one or more sectors of plate-like element 12 which are provided with the calibrated through holes 19 form the shower-making portions/sections 9 of the water delivery member 8 of drawer flush circuit 6.

[0062] General operation of detergent dispensing assembly 1 and of laundry washing machine 100 are identical to that of today's detergent dispensing assemblies and of today's laundry washing machines, thus no further explanation are necessary.

[0063] With reference to Figures 2 and 3, the assembly of the water delivery member 8 advantageously comprises the steps of:

- 5 - obtaining a plate-like element 12 having a number of water-delivery-conduit internal partitioning ribs 17, a number of water-delivery-conduit external partitioning ribs 14 which are taller than the internal partitioning ribs 17, and optionally also an outer annular rib 18 which surrounds the partitioning ribs 14 and 17 as a whole, and is preferably as tall as the external partitioning ribs 14;
- 10 - putting the plate-like element 13 with its inner face 16 in abutment against the crest lines of the external partitioning ribs 14 of plate-like element 12 and optionally also against the crest line of the outer annular rib 18, whereas the crest lines 17a of the internal partitioning ribs 17 of plate-like element 12 remain spaced from the inner face 16 of plate-like element 13;
- 20 - starting vibration welding of plate-like element 13 to the external partitioning ribs 14 of plate-like element 12, so as to allow the crest lines of the external partitioning ribs 14 to progressively melt and dig into the
- 25 - stopping vibration welding when the inner face 16 of plate-like element 13 arrives locally substantially tangent to the crest lines 17a of the internal partitioning ribs 17 of plate-like element 12.

[0064] The advantages resulting from the particular structure of the water delivery member 8 are remarkable.

[0065] The clear section of the various water supply ducts 11 of the water delivery member 8 is laterally delimited by the plate-like elements 12 and 13 and by the two internal partitioning ribs 17 which are not involved in the vibration welding process. The crest lines 17a of partitioning ribs 17, in fact, simply abuts against the internal face 16 of plate-like element 13. Therefore there is no risk that the vibration welding of the two plate-like elements 12 and 13 to one another can accidentally reduce the area of the clear section of one or more of the internal water supply ducts 11, thus jeopardising the correct outflow of the fresh water along the various water supply ducts 11.

[0066] In fact, during vibration welding of plate-like element 13 to the partitioning ribs 14 of plate-like element 12, any drop of welding burr remains entrapped inside the cavity between the external partitioning rib 14 and the flanked internal partitioning rib 17, and is therefore unable to locally reduce the clear section of the water supply duct 11.

[0067] Clearly, changes may be made to the detergent dispensing assembly 1 and/or to the laundry washing machine 100 without, however, departing from the scope of the present invention as defined in the appended claims.

[0068] For example, one or more internal water supply ducts 11 of the water delivery member 8 may be additionally laterally delimited by a couple of internal partitioning ribs 17 only for a short segment of their overall length, and this short segment of the water supply duct 11 preferably may have the clear section with the shortest area.

[0069] According to an alternative embodiment, the couple of internal partitioning rib 17 delimiting at least one and preferably each internal water supply duct 11 of the water delivery member 8, may advantageously protrude from the inner face 16 of the plate-like element 13 and extend towards the beneath-located plate-like element 12 in between the couple of external partitioning ribs 14, so as to simply rest with the crest line of the rib 17a in abutment against the conjugated inner face 15 of the same plate-like element 12 preferably without interruption along the whole length of the partitioning rib 17.

[0070] In other words, the external partitioning ribs 14 delimiting in pairs the one or more water supply ducts 11 of the water delivery member 8, protrude from the inner face 15 of the plate-like element 12 towards the overhanging plate-like element 13; whereas the internal partitioning ribs 17 delimiting in pairs the one or more water supply ducts 11 of the water delivery member 8, protrude from the inner face 16 of plate-like element 13 towards the beneath-located plate-like element 12.

Claims

1. Laundry washing machine (100) comprising a detergent dispensing assembly (1) which comprises a detergent drawer (2) structured for receiving a given amount of washing agent and which is fitted in extractable manner into a corresponding drawer housing (3), and a water delivery member (8) which is associated to the drawer housing (3) so as to be located immediately above the detergent drawer (2) when the latter is completely inserted/recessed into the drawer housing (3);
said water delivery member (8) being provided with at least one shower-making portion (9) structured for feeding a shower of water droplets into the beneath-located detergent drawer (2), and with at least one internal water supply duct (11) which extends inside the body of the water delivery member (8) and is structured so as to channel the fresh water towards said shower-making portion (9);
said water delivery member (8) comprising a first (12) and a second, reciprocally overlapped, plate-like elements (13) which are made of plastic material and are welded to one another so as to form a monolithic body, and said at least one water supply duct (11) being laterally delimited, in the interspace between said first (12) and said second plate-like elements (13), by two first partitioning ribs (14) each protruding from the inner face (15, 16) of the first or second

plate-like element (12, 13) towards the other plate-like element (13, 12), and watertight merged via vibration welding to the body of said other plate-like element (13, 12);

the laundry washing machine (100) being **characterized in that** at least a segment of the internal water supply duct (11) is additionally laterally delimited by two second partitioning ribs (17) each protruding from the inner face (15, 16) of the first (12) or second plate-like element (13) inside the lane laterally delimited by the first partitioning ribs (14), and extending towards the other plate-like element (12, 13) up to rest with the crest line of the ribs (17a) in abutment against the conjugated inner face (15, 16) of said other plate-like element (12, 13), but not being welded to this inner face (15, 16).

2. Laundry washing machine (100) according to Claim 1, wherein the crest lines (17a) of the second partitioning ribs (17) rests in abutment against the conjugated inner face (15, 16) of the other plate-like element (12, 13) without interruption along the whole length of said second partitioning ribs (17).
3. Laundry washing machine (100) according to Claim 1 or 2, wherein the internal water supply duct (11) is laterally delimited by said second partitioning ribs (17) for its whole length.
4. Laundry washing machine (100) according to any one of the preceding claims, wherein each second partitioning rib (17) is locally parallel to an adjacent first partitioning rib (14).
5. Laundry washing machine (100) according to any one of the preceding claims, wherein the detergent drawer (2) is divided into a number of detergent compartments (5) each structured for being manually fillable with a given amount of detergent, softener or other washing agent, and wherein in each shower-making portion (9) the water delivery member (8) is vertically aligned to a respective detergent compartment (5) of the detergent drawer (2), and is structured for feeding a shower of water droplets solely into the beneath-located detergent compartment (5).
6. Laundry washing machine (100) according to any one of the preceding claims, wherein the second partitioning ribs (17) protrude both from the inner face (15) of the first plate-like element (12), or both from the inner face (16) of the second plate-like element (13), or one from the inner face (15) of the first plate-like element (12) and the other from the inner face (16) of the second plate-like element (13).
7. Laundry washing machine (100) according to any one of the preceding claims, wherein the first plate-like element (12) comprises an outer annular rib (18)

which protrudes from the inner face (15, 16) of one between the first plate-like element (12) and second plate-like element (13) while surrounding the partitioning ribs (14) and (17) as a whole, and extends towards the other plate-like element (12, 13) up to reach and watertight merge with the body of said other plate-like element (12, 13).

8. Laundry washing machine (100) according to any one of the preceding claims, wherein the first plate-like element (12) of the water delivery member (8) is directly faced to the detergent drawer (2) and is provided, along one or more segments of said at least one internal water supply duct (11), with a number of transversal through holes (19).
9. Laundry washing machine (100) according to any one of the preceding claims, comprising an electrically-operated water flow controlling device (10) which is interposed between the water delivery member (8) and the fresh-water supply circuit, and is structured for controlling the flow of fresh water from the fresh-water supply circuit along said at least one water supply duct (11) of the water delivery member (8).
10. Laundry washing machine (100) according to Claim 9, wherein said water delivery member (8) is provided with a number of internal water supply ducts (11) and the electrically-operated water flow controlling device (10) is structured for controlling the flow of fresh water along each water supply duct (11) of the water delivery member (8).
11. Detergent dispensing assembly according to Claim 9 or 10, wherein said electrically-operated water flow controlling device (10) is attached to a side of the water delivery member (8), or is recessed/incorporated into the water delivery member (8).

Patentansprüche

1. Waschmaschine (100), umfassend eine Waschmittelabgabeanordnung (1), die eine Waschmittelschublade (2) umfasst, die zum Aufnehmen einer vorgegebenen Menge von Waschmittel ausgebildet ist und die ausziehbar in einem entsprechenden Schubladengehäuse (3) angeordnet ist, und ein Wasserabgabeelement (8), das mit dem Schubladengehäuse (3) verbunden ist, um unmittelbar oberhalb der Waschmittelschublade (2) angeordnet zu sein, wenn diese vollständig in das Schubladengehäuse (3) eingeführt/eingefahren ist; wobei das Wasserabgabeelement (8) mit mindestens einem Sprühabschnitt (9) bereitgestellt ist, der zum Einleiten einer Sprühung aus Wassertropfen in die darunter angeordnete Waschmittelschublade (2)

ausgelegt ist, wobei mindestens ein interner Wasserzufuhrkanal (11), der sich innerhalb des Körpers des Wasserabgabeelements (8) erstreckt, ausgelegt ist, um das Wasser zum Sprühabschnitt (9) zu leiten;

wobei das Wasserabgabeelement (8) ein erstes (12) und ein zweites, sich damit überschneidendes, plattenartiges Element (13) aufweist, die aus einem Kunststoffmaterial hergestellt sind und aneinander geschweißt sind, um einen monolithischen Körper zu bilden, wobei der mindestens eine Wasserzufuhrkanal (11) lateral im Zwischenraum zwischen dem ersten (12) und dem zweiten plattenartigen Element (13) durch zwei Trennrippen (14) begrenzt ist, die jeweils von der inneren Fläche (15, 16) des ersten oder zweiten plattenartigen Elements (12, 13) zum anderen plattenartigen Element (13, 12) vorstehen und über Vibrationsschweißen wasserdicht mit dem Körper des plattenartigen Elements (13, 12) übergehen;

wobei die Waschmaschine (100) **dadurch gekennzeichnet ist, dass** mindestens ein Segment des inneren Wasserzufuhrkanals (11) zusätzlich durch zwei zweite Trennrippen (17) lateral begrenzt ist, die jeweils von der inneren Fläche (15, 16) des ersten (12) bzw. zweiten plattenartigen Elements (13) innerhalb der Bahn vorstehen, die durch die ersten Trennrippen (14) begrenzt wird, und sich zu dem anderen plattenartigen Element (12, 13) hoch erstrecken, um auf der Gratlinie der Rippen (17a) angrenzend an der zugeordneten inneren Fläche (15, 16) des anderen plattenartigen Elements (12, 13) aufzuliegen, aber nicht an diese innere Fläche (15, 16) geschweißt sind.

2. Waschmaschine (100) nach Anspruch 1, wobei die Gratlinien (17a) der zweiten Trennrippen (17) angrenzend auf der zugeordneten inneren Fläche (15, 16) des anderen plattenartigen Elements (12, 13) ohne Unterbrechung entlang der gesamten Länge der zweiten Trennrippe (17) aufliegen.
3. Waschmaschine (100) nach Anspruch 1 oder 2, wobei der interne Wasserzufuhrkanal (11) durch die zweiten Trennrippen (17) über gesamte Länge lateral begrenzt ist.
4. Waschmaschine (100) nach einem der vorhergehenden Ansprüche, wobei jede zweite Trennrippe (17) lokal zu einer angrenzenden ersten Trennrippe (14) parallel verläuft.
5. Waschmaschine (100) nach einem der vorhergehenden Ansprüche, wobei die Waschmittelschublade (2) in eine Anzahl von Waschmittelfächer unterteilt ist (5), die jeweils zum manuellen Füllen mit einer vorgegebenen Menge von Waschpulver, Weichspüler oder einem anderen Waschmittel ausgelegt sind,

wobei in jedem Sprühabschnitt (9) das Wasserabgabeelement (8) vertikal mit einem zugehörigen Waschmittelfach (5) der Waschmittelschublade (2) ausgerichtet ist und zum Einleiten einer Sprüfung aus Wassertropfen nur in das darunter angeordnete Waschmittelfach (5) ausgelegt ist.

6. Waschmaschine (100) nach einem der vorhergehenden Ansprüche, wobei die zweiten Trennrippen (17) sowohl von der inneren Fläche (15) des ersten plattenartigen Elements (12) als auch von der inneren Fläche (16) des zweiten plattenartigen Elements (13) oder von der inneren Fläche (15) des ersten plattenartigen Elements (12) und der anderen inneren Fläche (16) des zweiten plattenartigen Elements (13) vorstehen.
7. Waschmaschine (100) nach einem der vorhergehenden Ansprüche, wobei das erste plattenartige Element (12) eine äußere ringförmige Rippe (18) aufweist, die von der inneren Fläche (15, 16) entweder des ersten plattenartigen Elements (12) oder des zweiten plattenartigen Elements (13) vorsteht und gleichzeitig die Trennrippen (14) und (17) ganz umgibt und sich zu dem anderen plattenartigen Element (12, 13) hoch erstreckt, um den Körper des anderen plattenartigen Elements (12, 13) zu erreichen und damit wasserdicht überzugehen.
8. Waschmaschine (100) nach einem der vorhergehenden Ansprüche, wobei das erste plattenartige Element (12) des Wasserabgabeelements (8) direkt zu der Waschmittelschublade (2) weist und entlang eines oder mehrerer Segmente des mindestens einen internen Wasserzufuhrkanals (11) mit einer Anzahl von quer verlaufenden Durchgangslöchern (19) bereitgestellt ist.
9. Waschmaschine (100) nach einem der vorhergehenden Ansprüche, umfassend eine elektrisch betriebene Wasserströmungssteuervorrichtung (10), die zwischen dem Wasserabgabeelement (8) und dem Frischwasserversorgungskreis angeordnet ist, und zum Steuern der Strömung von frischem Wasser aus dem Frischwasserversorgungskreis entlang des mindestens einen Wasserzufuhrkanals (11) des Wasserabgabeelements (8) ausgelegt ist.
10. Waschmaschine (100) nach Anspruch 9, wobei das Wasserabgabeelement (8) mit einer Anzahl von inneren Wasserzufuhrkanälen (11) bereitgestellt ist und die elektrisch betriebene Wasserströmungssteuervorrichtung (10) zum Steuern der Strömung von Frischwasser entlang jedes Wasserzufuhrkanals (11) des Wasserabgabeelements (8) ausgelegt ist.
11. Waschmittel-Abgabeanordnung nach Anspruch 9

oder 10, wobei die elektrisch betriebene Wasserströmungssteuervorrichtung (10) an einer Seite des Wasserabgabeelements (8) befestigt ist oder in das Wasserabgabeelement (8) eingebaut/integriert ist.

Revendications

1. Machine à laver le linge (100) comprenant un ensemble de distribution de détergent (1) comprenant un tiroir de détergent (2) structuré de manière à recevoir une quantité donnée d'un agent de lavage et qui est agencé d'une façon extractible dans un logement de tiroir correspondant (3), et un élément de distribution d'eau (8) qui est associé au logement de tiroir (3) de manière à être situé immédiatement au-dessus du tiroir de détergent (2) lorsque ce dernier est complètement inséré/encastré dans le logement de tiroir (3);
ledit élément de distribution d'eau (8) est pourvu d'au moins une partie de douchage (9) structurée de manière à délivrer une douche de gouttelettes d'eau dans le tiroir de détergent situé en dessous (2), et d'au moins un conduit d'alimentation d'eau interne (11) qui s'étend à l'intérieur du corps de l'élément de distribution d'eau (8) et qui est structuré de manière à canaliser l'eau fraîche en direction de ladite partie de douchage (9);
ledit élément de distribution d'eau (8) comprend un premier (12) et un second (13) éléments en forme de plaque qui se chevauchent réciproquement, qui sont constitués d'une matière plastique et qui sont soudés l'un à l'autre de manière à former un corps monolithique, et ledit au moins un conduit d'alimentation d'eau interne (11) est délimité latéralement, dans l'inter-espace entre lesdits premier (12) et second (13) éléments en forme de plaque, par deux premières nervures de séparation (14) qui font chacune saillie à partir de la face intérieure (15, 16) du premier ou du second élément en forme de plaque (12, 13) en direction de l'autre élément en forme de plaque (13, 12), et sont fusionnés d'une manière étanche à l'eau via un soudage par vibration au corps dudit autre élément en forme de plaque (13, 12);
la machine à laver le linge (100) étant **caractérisée en ce qu'**au moins un segment du conduit d'alimentation d'eau interne (11) est délimité latéralement par lesdites secondes nervures de séparation (17) faisant chacune saillie à partir de la face intérieure (15, 16) du premier (12) ou du second (13) élément en forme de plaque à l'intérieur du chemin délimité latéralement par les premières nervures de séparation (14), et s'étendant en direction de l'autre élément en forme de plaque (12, 13) jusqu'à reposer avec la ligne de crête des nervures (17a) en butée contre la face intérieure conjuguée (15, 16) dudit autre élément en forme de plaque (12, 13), mais sans être soudée à cette face intérieure (15, 16).

2. Machine à laver le linge (100) selon la revendication 1, dans laquelle les lignes de crête (17a) des secondes nervures de séparation (17) reposent en butée contre la face intérieure conjuguée (15, 16) de l'autre élément en forme de plaque (12, 13) sans interruption le long de la totalité de la longueur desdites secondes nervures de séparation (17). 5
3. Machine à laver le linge (100) selon la revendication 1 ou 2, dans laquelle le conduit d'alimentation d'eau interne (11) est délimité latéralement par lesdites secondes nervures de séparation (17) sur la totalité de sa longueur. 10
4. Machine à laver le linge (100) selon l'une quelconque des revendications précédentes, dans laquelle chaque seconde nervure de séparation (17) est localement parallèle à une première nervure de séparation adjacente (14). 15
5. Machine à laver le linge (100) selon l'une quelconque des revendications précédentes, dans laquelle le tiroir de détergent (2) est divisé en un certain nombre de compartiments de détergent (5) structurés chacun de manière à être remplissables manuellement avec une quantité donnée de détergent, d'adoucissant ou d'un autre agent de lavage, et dans laquelle dans chaque partie de douchage (9) l'élément de distribution d'eau (8) est aligné verticalement avec un compartiment de détergent respectif (5) du tiroir de détergent (2) et est structuré de manière à délivrer une douche de gouttelettes d'eau uniquement dans le compartiment de détergent situé en dessous (5). 20
6. Machine à laver le linge (100) selon l'une quelconque des revendications précédentes, dans laquelle les secondes nervures de séparation (17) font saillie toutes les deux à partir de la face intérieure (15) du premier élément en forme de plaque (12), ou toutes les deux à partir de la face intérieure (16) du second élément en forme de plaque (13), ou une à partir de la face intérieure (15) du premier élément en forme de plaque (12) et l'autre à partir de la face intérieure (16) du second élément en forme de plaque (13). 25
7. Machine à laver le linge (100) selon l'une quelconque des revendications précédentes, dans laquelle le premier élément en forme de plaque (12) comporte une nervure annulaire extérieure (18) qui fait saillie à partir de la face intérieure (15, 16) d'un premier parmi le premier élément en forme de plaque (12) et le second élément en forme de plaque (13) tout en entourant les nervures de séparation (14) et (17) comme un tout, et qui s'étend en direction de l'autre élément en forme de plaque (12, 13) jusqu'à atteindre et se fusionner de façon étanche à l'eau avec le corps dudit autre élément en forme de plaque (12, 13). 30
8. Machine à laver le linge (100) selon l'une quelconque des revendications précédentes, dans laquelle le premier élément en forme de plaque (12) de l'élément de distribution d'eau (8) est situé directement en face du tiroir de détergent (2) et est pourvu, le long d'un ou de plusieurs segment(s) dudit au moins un conduit d'alimentation d'eau interne (11), d'un certain nombre de trous traversants transversaux (19). 35
9. Machine à laver le linge (100) selon l'une quelconque des revendications précédentes, comprenant un dispositif de commande d'écoulement d'eau à commande électrique (10) qui est interposé entre l'élément de distribution d'eau (8) et le circuit d'alimentation en eau fraîche, et qui est structuré de manière à commander l'écoulement d'eau fraîche à partir dudit circuit d'alimentation en eau fraîche le long dudit au moins un conduit d'alimentation d'eau (11) de l'élément de distribution d'eau (8). 40
10. Machine à laver le linge (100) selon la revendication 9, dans laquelle ledit élément de distribution d'eau (8) est pourvu d'un certain nombre de conduits d'alimentation d'eau internes (11), et le dispositif de commande d'écoulement d'eau à commande électrique (10) est structuré de manière à commander l'écoulement d'eau fraîche le long de chaque conduit d'alimentation d'eau (11) de l'élément de distribution d'eau (8). 45
11. Ensemble de distribution de détergent selon la revendication 9 ou 10, dans lequel ledit dispositif de commande d'écoulement d'eau à commande électrique (10) est attaché à un côté de l'élément de distribution d'eau (8), ou est encastré/incorporé dans l'élément de distribution d'eau (8). 50

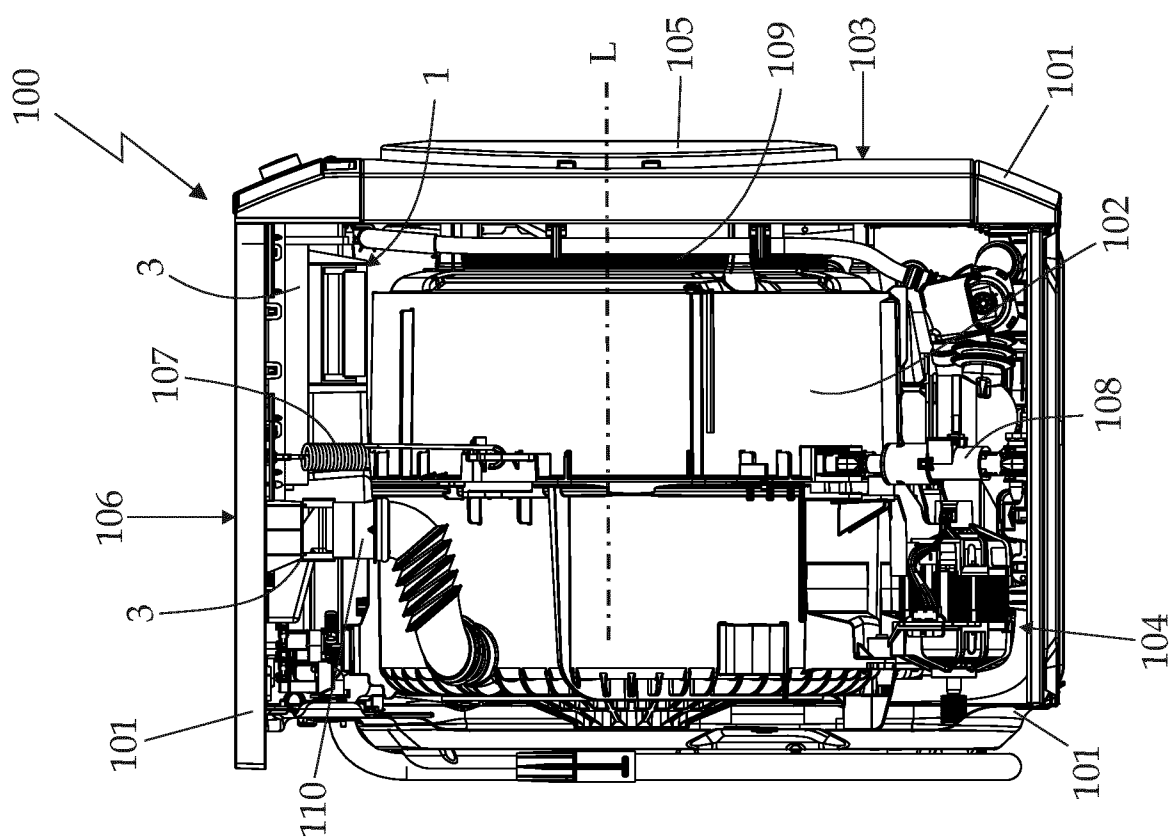


Fig. 1

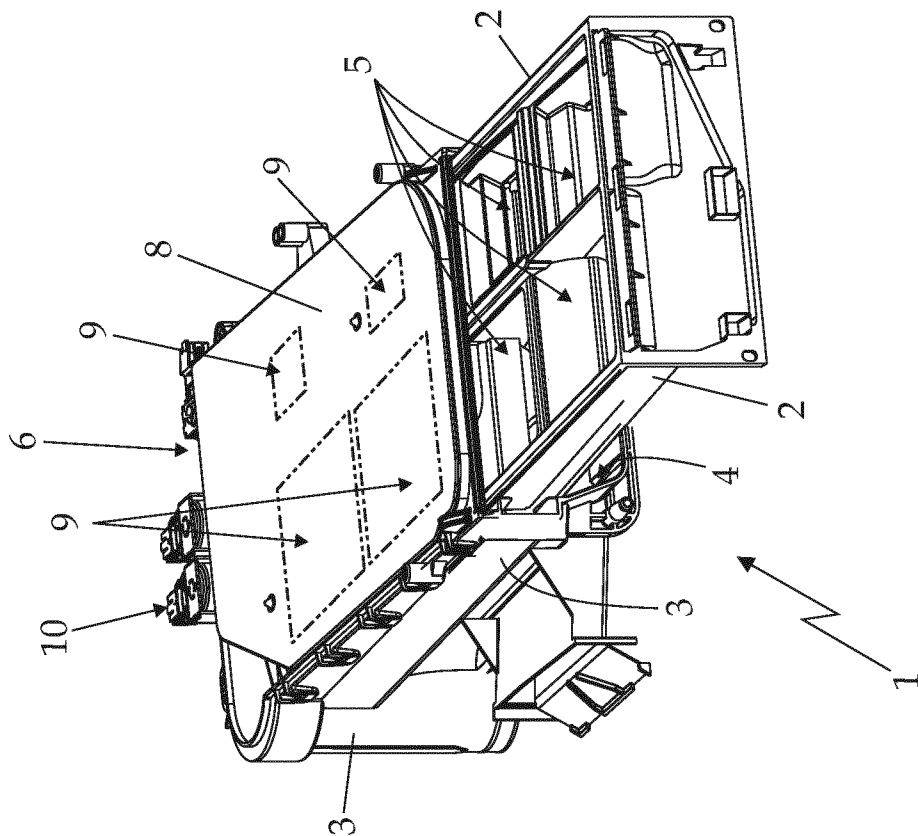


Fig. 2

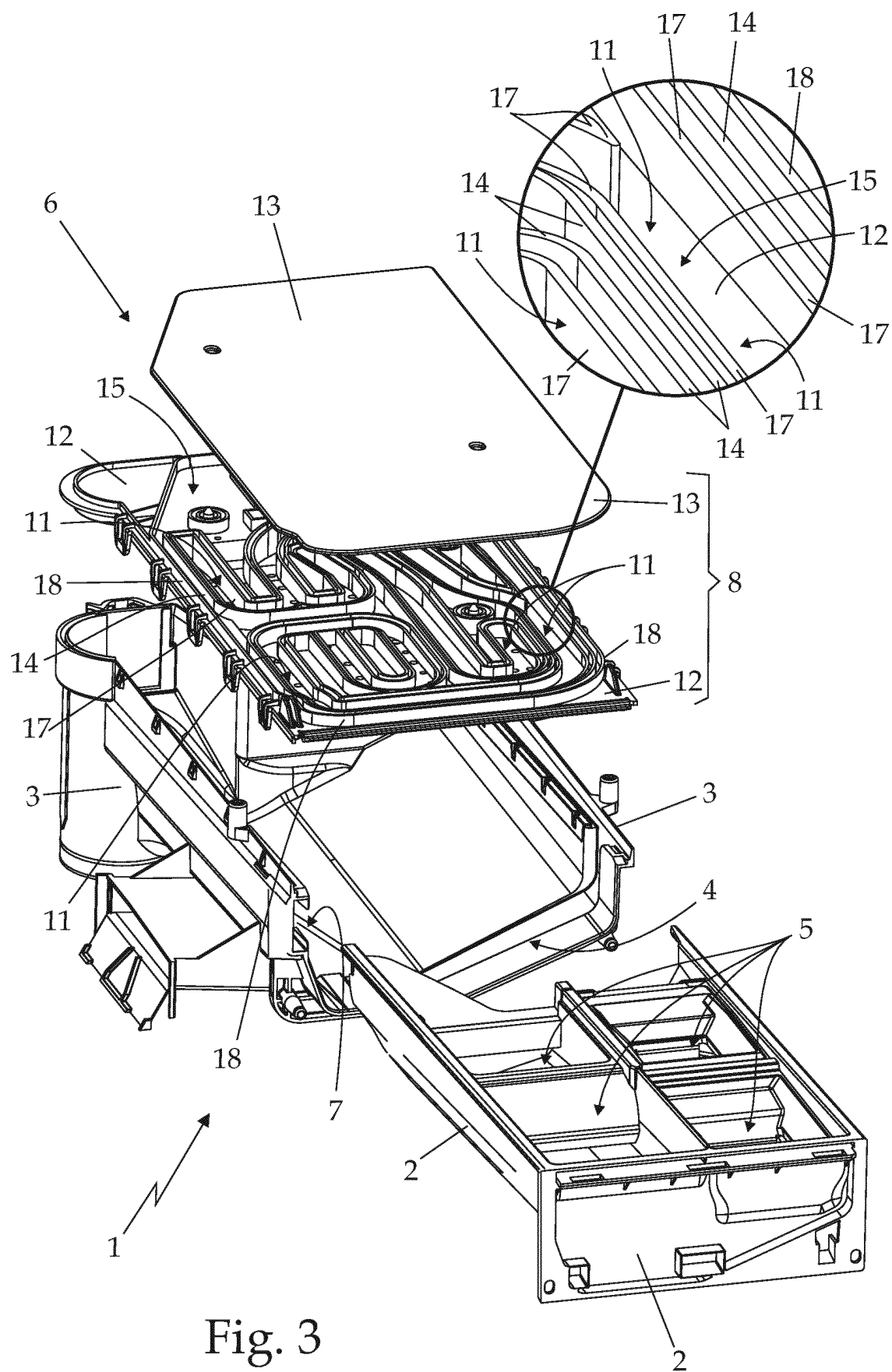


Fig. 3

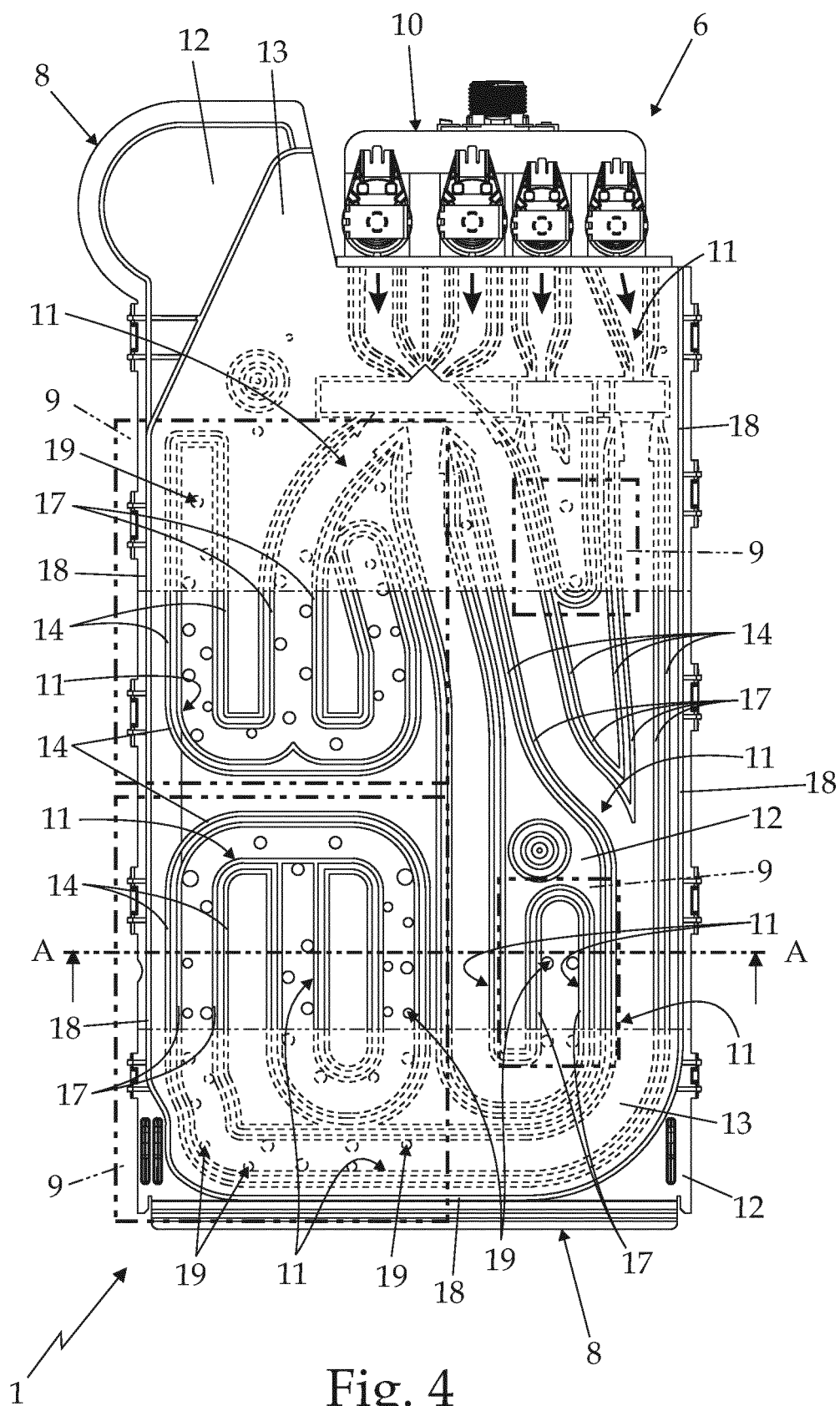


Fig. 4

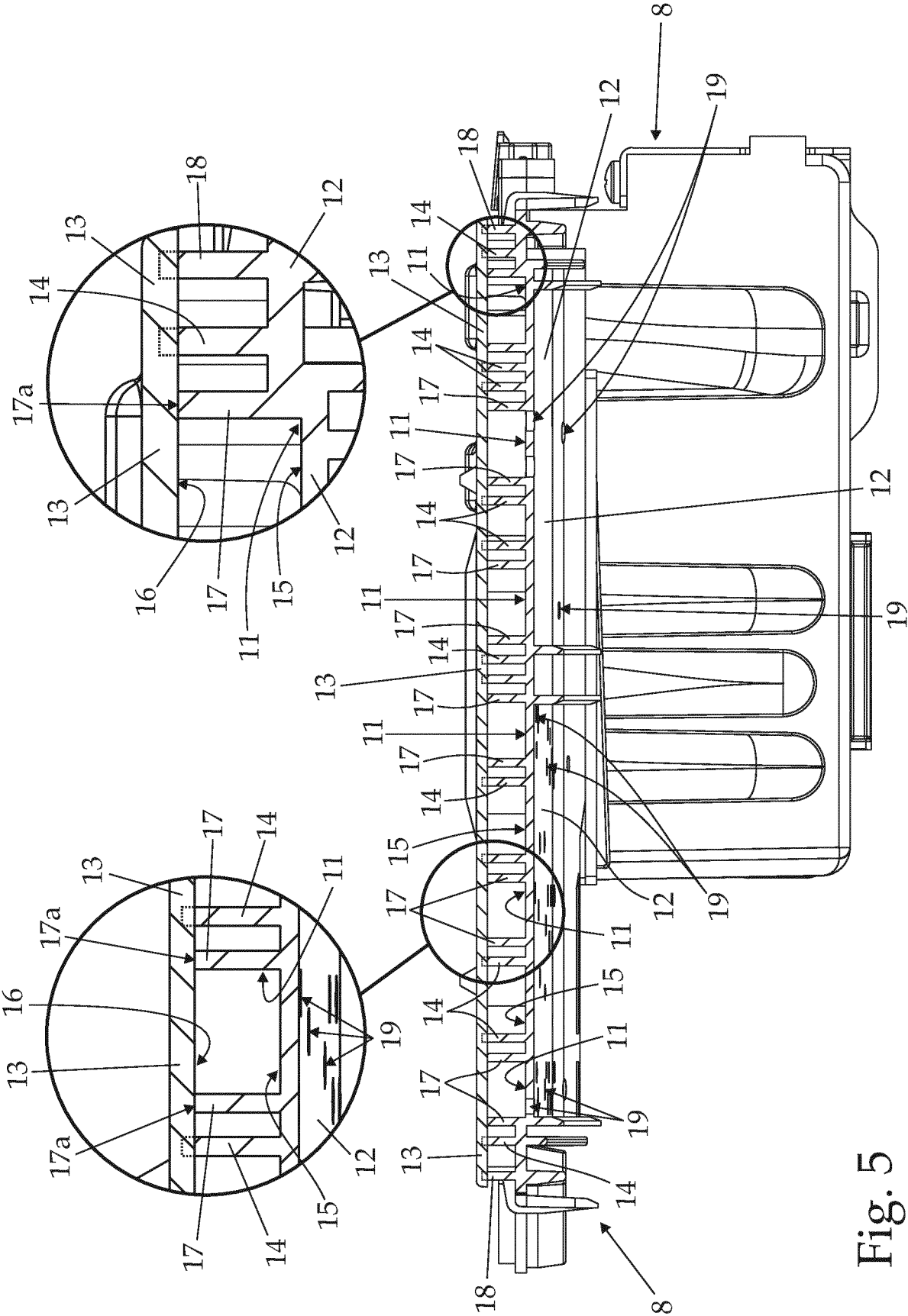


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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