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(54) Draining device for a washing machine and washing machine

(57) A Draining device (7) for draining washing liquid from a tub interior (9) of a washing tub (2) of a washing machine,

a) the draining device (7) comprising a draining sump (10) with a sump outlet (15), a draining conduit (75) and a draining pump (70) and a filter element (76) arranged or to be arranged within the draining conduit (75),

b) the draining pump (70) having at least one pump wheel (72) arranged within a pump wheel housing (73) and a pump drive (71) for driving the pump wheel (72) in a rotational movement about a central axis (A) as rotational axis,

c) wherein the filter element (76) has a filtering section (77) for filtering out objects (110), which have dimensions and/or size (L') greater than specified dimensions and/or size (L'>L) and which, thus, are potentially harmful for the pump wheel (72), from the drained washing liquid,

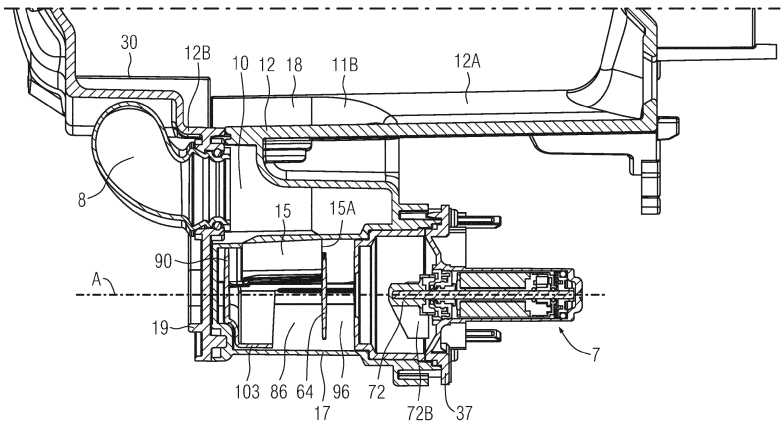
d) wherein the filtering section (77) is divided into a first filter chamber (86) and a second filter chamber (96) by an obstructing wall (64),

e) wherein the first filter chamber (86) is in direct fluid communication with the sump (10) through the sump outlet (15),

f) wherein the second filter chamber (96) is in fluid communication with the pump wheel (72) and arranged downstream to the first filter chamber (86) with regard to the stream of drained washing liquid (L) and

g) wherein the obstructing wall (64) is arranged below the sump outlet (15) and oriented with regard to the outlet periphery (15A) of the sump outlet (15) in such a way that the main flow direction of the washing liquid (L) and the objects (110, 111) contained therein flowing through the sump outlet (15) is at least approximately parallel to the obstructing wall (64) at least in the region close to the obstructing wall (64).

FIG 17



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Description

[0001] The invention relates to a draining device for a washing machine and a washing machine.

[0002] Washing machines in households, also called domestic washing machines, are well-known and usually are used for washing laundry.

[0003] Washing machines usually comprise washing tubs in which a rotatable drum is housed for receiving goods to be washed, usually laundry. Washing liquid is introduced into the washing tub, which washing liquid consists only of water or mainly of water and detergents or washing or cleaning agents added to or dissolved in the water for improving the washing quality.

[0004] Usually at the bottom of the washing tub a draining device is arranged for draining the washing liquid from the tub in order to either feed back the washing liquid into the washing tub again, often being heated by a heating element arranged in or near the tub bottom, in a closed circuit or circulation mode or to drain the washing liquid out of the washing machine into a sewage conduit, in an open circuit, when it is not needed any more. Usually the washing tub has a sump at the tub bottom which is in fluid connection to the draining device.

[0005] EP 0 110 482 Al discloses a washing machine having a washing tub with a draining sump integral with a first shell-like tub part of the washing tub and a basically flat or planar second tub part for closing the sump from one side thereof. The second tub part and the first tub part are connected with each other at a seam. The sump is fluidly connected to a parallel compartment through a rectangular slit in one of its side walls. Below this compartment a draining conduit is arranged for draining liquid from the compartment, which conduit is made integral with the first tub part at three sides and closed at the front by the second tub part. The draining pump will be connected to this conduit but is not described. Because of the shape of the rectangular opening bigger obstacles cannot pass through and the water escaping from the sump through the opening into the parallel compartment will be filtered from such larger obstacles and be drained downwards into the draining conduit.

[0006] EP 2 316 999 Al discloses a filter unit for a household appliance, in particular for a washing machine, comprising a filter receiving body, a filter opening in the filter receiving body, a cap for closing the filter opening, a drain passage passing through the cap and a closing means for closing the drain passage. A swivel-mounted lever element in connection or in operative connection with the closing means for opening and closing the closing means. The filter received in the filter receiving body is for instance a sieve and/or diaphragm, adapted for allowing the free passage of a liquid and for draping lint, fluff and other small object, i. e. buttons, coins etc. which may be contained in the liquid. The filter unit is interposed between the washing tub and the drain pump. The filter is shaped in a basically cylindrical shape and has a grid- or sieve-like lower wall and a cylindrical wall and two semicircular intermediate walls being arranged actually displaced at a distance and a with their circular edges facing away from each other. The lever element forms a handle element for the cap in order to remove the filter manually for cleaning purposes.

[0007] EP 1 593 768 A2 discloses a washing machine comprising a washing tub, a drain case to discharge the wash-water and a drain filter, position in the drain casing comprising a filter member having a plurality of filter holes protrusions. The protrusions perpendicularly protrude upward from the surface of the filter member with the filter protrusions having a length larger than the depths of the filter holes. In front the filter has a hand lever with a knob for rotating and taking out the filter manually for emptying or cleaning. Perpendicular to a longitudinal axis which is the insertion axis of the filter the pump is arranged which is in fluid connection to the draining conduit.

[0008] US 2007/0240457 Al discloses a washing machine comprising a drain pump draining water comprising a drain casing provided with an inlet and an outlet to supply and discharge the water in the plurality of filtering pins to filter impurities contained in the water and a drain filter provided with through holes defined therein into which the plurality of filtering pins are respectively connected. The drain filter is inserted into a drain casing and provided with a knob in the front to be removed from the drain casing for cleaning purposes. The pump with a pump wheel is attached to a pump wheel housing formed integral with the drain casing.

[0009] In all these known draining devices the filter can be taken out by the user from the front of the washing machine in order to remove objects caught in the filter and allow for an adequate operation of the draining device.

[0010] It is a purpose of the invention to propose a new draining device with a filter for a washing machine.

[0011] This purpose is achieved by a draining device having the features of claim 1. Preferred embodiments and improvements according to the invention are claimed in the dependent claims.

[0012] The draining device according to claim 1 is provided for draining washing liquid from a tub interior of a washing tub of a washing machine and comprises a draining sump with a sump outlet, a draining conduit and a draining pump and a filter element arranged or to be arranged within the draining conduit. The draining pump has at least one pump wheel arranged within a pump wheel housing and a pump drive for driving the pump wheel in a rotational movement about a central axis as rotational axis. The filter element has a filtering section for filtering out objects, which have dimensions and/or size greater than specified dimensions and/or size and which, thus, are potentially harmful for the pump wheel, from the drained washing liquid. The filtering section is divided into a first filter chamber and a second filter chamber by an obstructing wall. The first filter chamber is in direct fluid communication with the sump through the sump outlet and the second filter chamber is in fluid com-

munication with the pump wheel and arranged downstream to the first filter chamber with regard to the stream of drained washing liquid. The obstructing wall is arranged below the sump outlet and oriented with regard to the outlet periphery of the sump outlet in such a way that the main flow direction of the washing liquid and the objects contained therein flowing through the sump outlet is at least approximately parallel to the obstructing wall at least in the region close to the obstructing wall.

[0013] By these measures the potentially harmful objects are guided mainly in a direction parallel to the obstructing wall and the filtering effect for such potentially harmful objects is improved, as they are safely kept away from the second filter chamber and, thus, the pump wheel.

[0014] In a preferred and advantageous embodiment the obstructing wall abuts with the outlet periphery of the sump outlet and is arranged essentially in a common plane with the outlet periphery and/or is arranged orthogonal to the flow cross-section of the sump outlet and/or orthogonal to the central axis.

[0015] Preferably, at least one intermediate space is formed between a contour of the obstructing wall and a surrounding wall, in particular the inner wall of the conduit, allowing the passage of the washing liquid and not potentially harmful objects, but obstructing objects being potentially harmful.

[0016] In a further embodiment a housing front wall of the pump wheel housing has a central opening through which the central axis runs in the mounted state and which serves as a filter outlet through which the filtering section and the pump wheel housing are in fluid connection. The obstructing wall is arranged in front of the filter outlet at a distance, which is smaller than a diameter of the filter outlet. The obstructing wall has, in axial projection along the central axis, a larger diameter than the diameter of the filter outlet.

[0017] Advantageously, the two filter chambers are surrounded and/or radially delimited by the inner wall of the draining conduit. Further advantageously, the axial length of the first filter chamber is larger than, in particular at least by a factor 2, than the axial length of the second filter chamber.

[0018] In a preferred embodiment the diameter of the filter outlet as well as the axial length of the first chamber and the axial length of the second chamber and the shape of the contour of the obstructing wall are all adapted to the specified dimensions and/or size of objects so that further objects having dimensions and/or size greater than such specified dimensions and/or size will not pass the filtering section, but preferably rather be obstructed from passing the obstructing wall and stay in the first chamber or below the obstructing wall.

[0019] Preferably, the distance of the obstructing wall to the filter outlet or the length of the second filter chamber is chosen to be at most 1/2 of the specified dimensions and/or size of objects. Further preferably, the diameter of the filter outlet is chosen to be smaller than the specified dimensions and/or size of objects and/or larger than the distance of the obstructing wall to the filter outlet or the length of the second filter chamber.

[0020] In a preferred and advantageous embodiment the obstructing wall has a straight first contour section being inclined under an inclination angle with respect to a horizontal plane and being arranged in an upper region of the obstructing wall and/or the obstructing wall has at least one convexly curved, in particular circular, contour section in a lower region of the obstructing wall.

[0021] A length of the first contour section is chosen to be at most equal to the specified dimensions and/or size of objects and/or chosen to be about twice the distance of the obstructing wall to the filter outlet or the length of the second filter chamber.

[0022] Usually the draining conduit has a conduit wall structure surrounding an inner chamber of the draining conduit, into which inner chamber the filter element is inserted or is to be inserted.

[0023] In particular, a separating part of the conduit wall structure of the draining conduit separates the sump from the inner chamber of the draining conduit and the inner chamber of the draining conduit is in fluid connection with the sump through the at least one sump outlet, which sump outlet is formed as an opening in the separating part of the conduit wall structure.

[0024] The sump outlet is preferably formed rectangular and/or covers an angle range of at most 90°, preferably below 80° and/or has a curved, preferably cylindrically curved, outlet periphery. The outlet periphery is preferably convex as seen from the conduit inner chamber.

[0025] In a special embodiment a positioning element is provided at the filter element which is to be inserted into a positioning slot at the conduit wall structure of the conduit which positioning devices also support an angular fixation between filter element and conduit.

[0026] According to claim 14 a washing machine comprises a washing tub having a tub interior and housing a rotatable drum for receiving goods to be washed, and a draining device according to the invention, wherein the draining sump is arranged in a lower region of the washing tub.

[0027] Preferably the sump outlet is oriented towards a sump inlet of the draining sump or facing the sump inlet to allow for a direct and short flow path for the drained washing liquid through the sump and/or wherein the sump outlet is arranged above a sump bottom distanced by an intermediate lower section of the separating part of the conduit wall structure of the conduit.

[0028] Further exemplary embodiments are described and explained in the following with reference to the drawings, which show in

FIG 1 a washing tub unit in a three-dimensional perspective from the front under a viewing angle from the side,

FIG 2 the washing tub unit of FIG 1 in a perspective

view from the rear under a viewing angle from the side,

FIG 3 a rear tub part of the washing tub unit according to FIG 1 and FIG 2 in a perspective view from the front under a viewing angle from above,

FIG 4 the sump of the rear tub part of FIG 3 in greater detail in a perspective view from the front under a viewing angle from above,

FIG 5 a draining device of the washing tub unit according to FIG 1 to 4 in a perspective view from the front under a side viewing angle,

FIG 6 the draining device of FIG 5 in a perspective and, for illustrative purposes, partially sectioned view mainly from the side,

FIG 7 the draining device of FIG 5 and FIG 6 in a perspective and, for illustrative purposes, partially sectioned view from the rear under a viewing angle from above,

FIG 8 the lower parts of the front tub part and the rear tub part and the draining device according to FIG 1 to 7 in an explosive, partially sectioned view from the side before mounting or assembly,

FIG 9 the lower parts of the front tub part and the rear tub part and the draining device according to FIG 8 in a three-dimensional explosive view from the rear under a side viewing angle,

FIG 10 the lower section of the washing tub unit with the front tub part and the rear tub part and the draining device as shown in FIG 8 or FIG 9 in an explosive, partially sectioned view from the side in the assembled or mounted state,

FIG 11 shows a preferred embodiment of a filter element in a perspective view,

FIG 12 shows the draining conduit with the inserted filter element in a cross sectional view,

FIG 13 shows the draining conduit with the draining pump wheel inserted into the pump wheel housing of the filter element according to FIG 11 or FIG 12 in a longitudinal section view with objects to be filtered out,

FIG 14 shows the filter element inserted into the conduit in a cross sectional view with objects to be filtered out,

FIG 15 shows a partly sectioned and opened three-dimensional side view from the front of the draining device with the filter element inserted into the conduit and the pump mounted onto the draining conduit,

FIG 16 the draining device according to FIG 15 in a perspective partially side view from the rear,

FIG 17 the relative position of the obstructing wall of the filter element and the outlet periphery of the sump outlet in a longitudinal section view of the draining device according to FIG 15 or Fig 16, and,

FIG 18 the draining device according to FIG 17 in a perspective partially side view from the front.

[0029] Identical or at least corresponding parts and quantities in FIG 1 to 18 are designated with the same reference numerals.

[0030] FIG 1 and FIG 2 show a washing tub unit for a washing machine comprising a washing tub 2 and a draining device 7. The washing tub 2 is basically assembled from two parts, in this case a front tub part 21 and a rear tub part 22, which are connected (or: joined) in a connecting (or: joining) area 20 in order to form the washing tub 2 that it is closed in a liquid-tight manner, at its rear and at its circumference.

[0031] In the connecting area 20 at least one front connecting (or: joining) part 23 of the front tub part 21 and at least one rear connecting (or: joining) part 24 of the rear tub part 22 are connected with each other, in particular by hot welding in order to form a sort of liquid-tight welding seam in the connecting area 20. The front connecting part 23 and the rear connecting part 24 are in particular formed at least partially like connecting flanges which are pressed against each other and then connected, in particular welded by hot welding, to form a permanent connection between the two connecting parts 23 and 24 and thus between the two tub parts 21 and 22.

[0032] The connecting area 20 is preferably arranged in or forms a connecting or joining plane. In particular the connecting parts 23 and 24 have planar surfaces that are joined, in particular welded, in the connecting plane.

[0033] The front tub part 21 and the rear tub part 22 are, therefore, at least in their connecting parts 23 and 24, formed or made of a material that can be hot welded, preferably a suitable thermoplast or thermoplastic material, as are well known in the art

[0034] Preferably the complete rear front tub part 21 and the complete rear tub part 22 are formed from such a thermoplast or thermoplastic material and are produced by moulding between or in at least two complementary moulding forms, in particular injection-moulding in the moulding forms.

[0035] The hot welded connection also ensures a water tight connection so that no water or washing liquid

can escape from the washing tub 2 through or in the connecting area 20 and no further seals or sealing rings are required.

[0036] At the front of the washing tub unit there is an opening 4 for loading of goods to be washed, such as laundry, into the tub interior 9 inside the washing tub 2 which opening 4 is formed in a front tub part 21. The opening 4 is at least partially surrounded by a counterweight structure 5 associated to the front tub part 21 for balancing the washing tub unit during operative conditions. The opening 4 allows access from the exterior or outside of the washing tub 2 to a carrier, in this case a rotatable or rotating drum 3, arranged in the tub interior 9 of the washing tub 2. Adapted to the rotating drum 3 the washing tub 2 is preferably mainly formed in a cylindrical shape. The drum 3 is rotatable or can be rotated by a rotation drive or drum drive 6 a part of which is shown in FIG 1 below the washing tub 2 but is not explained any further as the rotation and the drive of the rotating drum are well-known in the art.

[0037] The drum drive 6 is fastened at fastening section 61 arranged at the lower section of the rear tub part 21. The rear tub part 21 has a central through-hole 60 for a drive axle (not shown) connecting the drum drive 6 with the drum 3 for rotation of the drum 3 and bearing the forces and momenta exerted by the rotating drum 3 and the load of the laundry or the washing goods within the drum 3. For this purpose, as can be seen in FIG 2, the rear side of the rear tub part 22 is reinforced with reinforcing ribs 62 around the through-hole 60.

[0038] As can be seen best in FIG 3 and FIG 4 in the tub bottom 12 a sump 10 is formed, which has an advantageous construction according to the invention. The sump 10 has a mainly horizontal sump bottom 13 and a side wall structure 11 rising upwards from the sump bottom 13 up to the tub bottom 12, so that the sump bottom 13 is the lowest wall of the sump 10 and arranged below the tub bottom 12. An opening in the tub bottom 12 surrounded by the side wall structure 11 forms a sump inlet 18 for the washing liquid in the uppermost part of the sump 10. The sump bottom 13 and the side wall structure 11 are arranged lower than the tub bottom 12 so that washing liquid in the washing tub 2 can be collected and drained in the sump 10 under the influence of gravity and/or, in addition, low pressure exerted by a draining pump 70 of the draining device 7.

[0039] A carrier bridge 14 extends within the sump inlet 18 over the sump 10 as a protrusion or extension of the tub bottom 12 inwards from a side wall part 11B and serves as a resting surface or element for coupling a holding element for a heating element (not shown) for heating the washing liquid within the tub 2 which heating element is connected electrically outside the tub 2 through a through-hole 63 in the back of the rear tub part 22.

[0040] A rear tub bottom part 12A and adjacent side wall parts 11A, 11B, 11C and 11D of the side wall structure 11 of the sump 10 and the sump bottom 13, that is to say all limiting walls of the sump 10 except for a front sump wall 11E, are integral with or part of the rear tub part 22, preferably formed from the same thermoplastic material and in the same injection-moulding process in the same moulding form.

[0041] The side wall parts 11A, 11B and 11C follow each other around the sump 10, preferably arranged rectangularly to each other, and are at least approximately vertical walls with sloped upper entry sections at the sump inlet 18 and preferably horizontally curved intermediate transition sections in between the side wall parts 11A, 11B and 11C. The side wall part 11D is arranged above the vertical side wall part 11C and slopes upwardly from the vertical side wall part 11C forming a bottom wall of an air channel 16 of the sump 10 for releasing air bubbles caught in the liquid in the sump 10.

[0042] A sump front wall 11E which closes the side wall structure 11 of the sump 10 at the front is formed integral with the front tub part 21 and connected with the adjacent side wall parts 11A and 11C and 11D and with the sump bottom 13 at the connecting parts 23 and 24 in the connecting area 20 to close and also seal the sump 10.

[0043] Preferably the front wall 11E lies in the connecting plane of the two tub parts 21 and 22 and is surrounded by the connecting parts 23 and 24 which are connected, in particular welded, together in the connecting area 20.

[0044] A front tub bottom part 12B of the tub bottom 12 is integral with the front tub part 21 and partly connected by the hot welding in a sealed manner with the rear tub bottom part 12A in or at the connecting area 20 and partly separated from the rear tub bottom part 12A by the sump 10 and by the air outlet 16 of the sump 10.

[0045] The draining device 7 is shown in greater detail in FIG 5 to 10. Adjacent to the sump 10 and arranged at least partly lower than the sump 10 and its sump bottom 13 there is a draining conduit 75 of the draining device 7.

[0046] The draining conduit 75 has, next to the sump 10, a mainly cylindrical circumferential wall 17 in which a, preferably rectangular, opening is formed as a sump outlet 15 through which the sump 10 is in fluid connection with the draining conduit 75. The sump outlet 15 is arranged above the sump bottom 13, the sump bottom 13 slightly sloping downward towards the section of the circumferential wall 17 which is below the sump outlet 15. Preferably, the sump outlet 15 is arranged in an upper region of the circumferential wall 17 to allow for smooth draining flow from the sump 10 into the draining conduit 75. A rear outlet periphery 15A and a front outlet periphery 15B (FIG 18) of the sump outlet 15 are arranged at axially (with respect to an axis A further described below) opposite ends of the sump outlet 15.

[0047] The draining conduit 75 also comprises, at a first end, here a rear end 75A, a pump receiving part 37 which has a mainly cylindrical circumferential wall 87 in which a draining outlet 74 is formed. A central (geometrical) axis A of the draining conduit 75 runs through the central region of the circumferential wall 17 and the pump

receiving part 37 being their respective central or cylinder axis.

[0048] The pump receiving part 37 or its circumferential wall 87 is arranged coaxially and subsequent to the circumferential wall 17 with respect to the central axis A at an opposite end of the circumferential wall 17 than the front tub part 21. The circumferential wall 87 of the pump receiving part 37 has a greater diameter or radius from the axis A than the circumferential wall 17. The circumferential walls 17 and 87 of the draining conduit 75 together enclose an inner space or inner chamber 85 of the draining conduit 75.

[0049] Now, the circumferential wall structure of the conduit 75, in particular the circumferential wall 17 in the front of the conduit 75 and also a part of the circumferential wall 87 of the pump receiving part 37 in the rear of the conduit 75, protrudes or extends into the sump 10 and connects the sump bottom 13 with the side wall parts 11B and 11C of the side wall structure 11 of the sump 10, thus forming a rigid structure, as can be seen best in FIG 3 and 4. Therefore, the circumferential walls 17 and 87 of the draining conduit 75 form themselves curved side wall parts of the side wall structure 11 of the sump 10 and, at the same time, separation wall(s) between the sump 10 and the conduit inner chamber 85.

[0050] The curved circumferential wall 17 and 87 of the conduit 75 within the sump 10, i.e the parts defining side wall parts of the side wall structure 11 or separation walls between the sump 10 and the conduit 75, describe or cover an angle range β of usually at least 90°, preferably between 100° and 120°, measured around the central axis A. The corresponding opening angle α of the sump outlet 15, i.e. the opening in the circumferential wall 17 through which the sump 10 is in fluid communication with the inner chamber 85 of the conduit 75, is smaller than the angle range β and typically 80° or less. The opening angle α is also the opening angle of the curved rear outlet periphery 15A as well as the curved front outlet periphery 15B of the sump outlet 15.

[0051] This design and arrangement of the sump outlet 15 as an, preferably rectangular, opening in a curved, preferably cylindrical, and concave as seen from the sump 10 (or convex as seen from the conduit inner chamber 85) separation wall between the sump 10 and the inner chamber 85 of the conduit 75 leads to very good flow results within the sump 10 and at the same time to a very solid and rigid construction. In particular, due to the sump outlet 15 being oriented towards the sump inlet 18 there is a direct and short flow path for the drained liquid through the sump 10 resulting in less turbulences.

[0052] The conduit 75 is, thus, rigidly connected with the sump side wall structure 11 and the tub bottom 12 over a pre-determined length and with at least two sump side wall parts 11B and 11C and the sump bottom 13 so that forces exerted on the conduit 75 are distributed and born in a larger section into three dimensions

[0053] In addition to the draining conduit 75 having the sump outlet 15 as the draining conduit inlet the draining device 7 comprises a draining pump 70 with a pump wheel 72 (only shown in FIG 8 and FIG 10) as well as a pump drive 71, usually an electric motor with or without a gear and preferably with, usually electronic, control of the rotational speed, for rotating the pump wheel 72 about a rotational axis which is the central axis A of the draining conduit 75 in the mounted state.

[0054] A rear side 87 of the pump receiving part 37 at the rear end 75A of the conduit 75 pointing away from the circumferential wall 17 is formed like a ring-shaped flange or flange ring surrounding a rear opening 88 of the pump receiving part 37. The pump drive 71 is fixed at this rear side 87 of the pump receiving part 37 of the draining conduit 75 at the rear end 75A, preferably by means of a circular planar drive flange 82 and screws 83 to be guided through guidings 84 in the drive flange 82 and to be screwed into corresponding screw holes 88 at the rear side 87. Therefore, the pump receiving part 37 and thus the whole conduit 75 has to bear the weight of the pump 70 which is accomplished by the rigid tube-like construction and the rigid connection with the sump 10 as already described. Preferably, a gasket or sealing ring (not shown) is arranged between the pump receiving part 37 of the draining conduit 75 and the drive flange 82 for sealing.

[0055] The pump wheel 72 together with a mainly cylindrical pump wheel housing 73 is introduced through the rear opening 88 into the inner conduit chamber 85 and arranged within the pump receiving part 37 or, more specifically, inside the part of the inner conduit chamber 85 of the draining conduit 75 that is surrounded by the circumferential wall 87 of the pump receiving part 37.

[0056] The whole circumferential wall structure 17 and 87 and the pump receiving part 37 of the conduit 75 are formed integral with the rear tub part 12, i.e. formed in the same material and/or injection-moulding process.

[0057] The front tub part 21 has a cover wall 25. The cover wall 25 covers or closes the draining conduit 75 and its inner chamber 85 at a second end, here a front end, 75B which is, as seen axially along the central axis A, opposite to the rear end 75A and, further upwardly, forms the sump front wall 11E of the sump 10 and continues into a front tub bottom part 12B of the tub bottom 12 which is more or less directed at a right angle to the cover wall 25. So the front cover of the conduit 75 and the sump 10 are formed integrally by the same cover wall 25 which in turn is formed integrally with the front tub part 21.

[0058] The cover wall 25 is at least at the side towards the conduit 75 or sump 10 mainly flat or planar and is at least at the front end 75B of the conduit 75 oriented orthogonal to the central axis A of the conduit 75. Furthermore, the cover wall 25 is connected with the circumferential wall 17 of the conduit 75, usually in the connecting area 20 and/or in the connecting plane, which connection is made at the same time the two tub parts 21 and 22 are connected by hot welding.

[0059] Due to the front wall of the conduit 75 formed

by the cover wall 25 and the front wall 11E of the sump 10 also formed by the cover wall 25 being planar, preferably lying in the same connecting plane, the cavity or volume or the conduit 75 as well as of the sump 10 is in each case formed entirely in the rear tub part 22 and only closed by the front tub part 21. This allows for simple moulding forms and manufacture.

[0060] In the sump front wall 11E, which is preferably constituted or formed by the cover wall 25, there is a hole or an opening 80 for mounting a pipe or level detection tube 28 of a level detection device 8. The level detection tube 28 is arranged at least slightly upwardly and is closed at a distal end or upper end 28A opposite to the connecting end 28B which is connected in the opening 80. A different level of washing liquid in the sump 10 and the tub bottom 12 will result in a different filling level in the level detection tube 28 and cause a variation of the air pressure above the liquid level which can be detected or sensed by an air pressure sensor 81 at the upper end 28A.

[0061] This opening 80 is arranged above the draining conduit 75 and on the other side of the sump 10 than the sump outlet 15, basically opposite to the sump outlet 15, which results in the level detection tube 28 being emptied efficiently by the pump pressure being exerted in the sump 10 through the sump outlet 15. A central axis of the, preferably circular, opening 80 and/or an inserting direction for inserting the connecting end 28B of the level detection tube 28 is oriented parallel to the central axis A of the conduit 75.

[0062] Within or in the interior or inner chamber 85 of the draining conduit 75 a filter element (or: filter) 76 is arranged, having a filtering section 77 for filtering out objects of specific size and/or dimensions, in particular larger or longer objects, from the draining liquid to keep the objects away from (or: prevent them from reaching) the pump wheel 72. The filtering section 77 is arranged essentially within the circumferential wall 17 of the conduit 75 when the filter element 76 is mounted.

[0063] The filter element 76 is shown in particular in FIG 8 to FIG 16 in different views.

[0064] The filter element 76 has further a, preferably mainly cylindrical, pump wheel housing 73 formed integral with the filter element 76 or the filtering section 77 and being arranged within the pump receiving part 37 of the conduit 75 in the mounted state.

[0065] The central axis A of the conduit 75 extends, in the mounted state, preferably in a horizontal direction or in a horizontal plane orthogonal to the direction of gravity which results in a horizontal axial flow of draining liquid through the draining conduit 75 and improves the filtering effect of the filter 76.

[0066] The main draining flow direction of the liquid in the direction from the sump outlet 15 to the rear end 75A to the pump wheel 72 is, thus, horizontal and orientated from the front to the rear or away from the front tub part 21 and its front cover 25. Also there is an axial inflow along the horizontal axis A towards the pump wheel 72 which in turn has a radial outflow like a centrifugal pump.

[0067] The draining outlet 74 of the pump receiving part 37 of the draining conduit 75 consists of a short pipe or tube extending from the circumferential wall 87 outwardly, essentially in radial direction from the axis A, and is inclined upwardly with respect to the axis A or a horizontal plane.

[0068] In the preferred embodiment shown, a filter element 76 is mounted into the inner chamber 85 of the draining conduit 75 by inserting the filter element 76 through the rear opening 88 in an axial direction along the central axis A. A correct angular position of the filter element 76 within the conduit 75 is ensured by a positioning element 91 at the filter element 76 which is to be inserted into a positioning slot 92 at the circumferential wall 17 of the conduit 75 which positioning means 91 and 92 also support an angular fixation between filter element 76 and conduit 75.

[0069] Furthermore, for a correct positioning in axial and angular direction, a further positioning element 90 is provided at the second end 75B of the filter element 76 having a kind of leaf-like shape with a fitting contour 100 which, when the filter 76 is inserted correctly into the conduit 75, is inserted into and fits into a corresponding fitting contour 200 of a positioning receiving element 190 in the cover wall 25. In such a manner the filter element 76 is fixed and safely held within the conduit 75 in its predetermined position without any additional fixing means.

[0070] The pump wheel housing 73 has a sort of bowl or pot shape and is provided with a, preferably mainly cylindrical, housing circumferential wall 93 surrounding or enclosing the central axis A when mounted and with a, preferably circular ring-shaped, housing front wall 94 being perpendicular to the central axis A and separating as a separation wall the interior of the housing circumferential wall 93 from the filtering section 77.

[0071] The housing circumferential wall 93 is provided with an opening over a certain angle about the axis A as a housing outlet 78. The separation wall or housing front wall 94 has a central opening through which the central axis A runs in the mounted state and which serves as a filter outlet 79 or a housing inlet and brings the filtering section 77 and the pump wheel housing 73 in fluid connection. The opening of the filter outlet 79 is preferably circular with a diameter D the central axis A preferably being its middle axis in the mounted state, so that the filter outlet 79 is arranged in a central position of the filter element 76 and around the central axis A of the conduit 75 which is the central axis and the rotational axis of the pump wheel 72 .

[0072] When the filter element 76 is mounted the pump wheel housing 73 is received in the pump receiving part 37 of the conduit 75 and its housing outlet 78 overlaps in the angular range and is, thus, in fluid connection with the draining outlet 74 at the circumferential wall 87, which angular positioning is assisted and ensured by the positioning elements 90 and 91 being inserted into the positioning receiving element 190 or the positioning slot 92.

The pump wheel housing 73 has a slightly smaller diameter than the circumferential wall 87 of the conduit 75.

[0073] Once the filter element 76 is correctly inserted into the conduit 75 the pump wheel 72 of the pump 70 can be introduced into the pump wheel housing 73 of the filter element 76. In the mounted state the central axis A is the central axis of the pump wheel housing 73 and the pump wheel 72 as its rotational axis and preferably axis of inertia for balanced rotation. When the pump wheel 72 is introduced into the pump wheel housing 73, the blades or wings of the pump wheel 72 have a radial distance to the inner wall of the pump wheel housing 73 and can be rotated about the axis A within the pump wheel housing 73 in order to suck or draw in washing liquid from the sump 10 through the sump outlet 15 into the inner conduit chamber 85 and through the filtering section 77 and thereafter through the filer outlet 79 into the pump wheel housing 73 and to dispense or pump the liquid out of the pump wheel housing 73 through the housing outlet 78 and the draining outlet 74 in a mainly radial direction. So, the draining pump 70 and its pump wheel 72 have an axial inflow and a radial outflow for the washing liquid with respect to the central axis A.

[0074] In other words, the pump wheel 72 is separated from the sump 10 by means of the draining conduit 75 and the filter element 76 and the flow path and thus flow resistance are reduced, thereby reducing energy losses. The pump wheel 72 generates a low pressure in the conduit 75 and thus in the sump 10 and a steady flow of the drained liquid through the horizontal conduit 75.

[0075] The filtering section 77 of the filter element 76 according to the preferred embodiment shown has a first filter chamber 86 and a second filter chamber 96. The two filter chambers 86 and 96 are arranged axially one behind the other, in the mounted state axially along the central axis A, are surrounded by the inner wall of the conduit 75, here of the cylindrical circumferential wall 17 of the conduit 75, and are separated or divided from each other by an obstructing wall 64, extending or oriented in particular orthogonal to the central axis A which runs more or less through a centre of the obstructing wall 64. The obstructing wall 64 has a maximum diameter dmax and a minimum diameter dmin.

[0076] The filter element 76 has in its front region behind the positioning element 90 a shell-shaped or semi-shell wall 103 in it lower region at which the positioning element 90 is arranged. The semi-shell wall 103, as well as the obstructing wall 64, are in their radially outermost region fixed to two side bars 101 and 102 extending axially, when mounted parallel to the central axis A and being at their ends connected with the housing front wall 94.

[0077] The axial length a of the first chamber 86 corresponds in particular to the axial distance between the front wall of the semi-shell wall 103 and the obstructing wall 64 and is preferably larger than, in particular at least by a factor 2, than the axial length b of the second chamber 96 which corresponds in particular to the axial distance between the obstructing wall 64 and the housing front wall 94.

[0078] Now, as shown in FIG 13 and 14 in particular, the washing liquid which is drained from the sump 10 through the sump outlet 15 can have larger and more or less solid or strong objects 110 of certain size or dimensions contained in it which could damage the rotating pump wheel 72 if they reached it. Such potentially harmful objects 110 can in particular be longish, but thin objects 110 having a minimal length L' greater than a pre-specified length L and a diameter or thickness much smaller than the length L', such as pieces of tooth picks for instance which sometimes are left on tablecloths or in pockets of trousers or shirts to be washed.

[0079] In order to filter out such, for the pump wheel 72, potentially harmful objects 110, the design of the filtering section 77 is adapted to the pre-specified length L of objects 111 so that those objects 110 having a length L'>L will under normal conditions not pass the filtering section 77, but rather be obstructed from passing the obstructing wall 64 and stay in the first chamber 86 or below the obstructing wall 64 where they can be collected once in a while during cleaning of the filter element 76.

[0080] In particular the diameter D of the opening or filter outlet 79 as well as the length a of the first chamber 86 and the length b of the second chamber 96 and the shape of the contour of the obstructing wall 64 are all adapted to the length L of the objects 111, i.e. objects that, having L as their maximum length, are admitted to pass the obstructing wall 64 and to be expelled from the machine by the pump wheel 72. Objects 111 are considered not dangerous whether they access the pump wheel 72 because their maximum size L can be pumped out through the draining outlet 74.

[0081] The obstructing wall 64 is in an axial projection parallel along the central axis A larger in all radial directions than the filter outlet 79 or has a larger projection area overlapping the projection area of the filter outlet 79 in all radial directions, and, in particular, the maximum diameter dmax and the minimum diameter dmin of the obstructing wall 64 are both larger than the diameter D of the opening of the filter outlet 79.

[0082] Further, in particular, the length b of the second filter chamber 96 is chosen to be at most 1/2 L ($b < L/2$) and the diameter D of the filter outlet 79 is chosen to be smaller than L ($D < L$) and larger than b ($D > b$).

[0083] The contour of the obstructing walls 64 at its circumference opposing the inner wall of the conduit 75 defines intermediate spaces (or: gaps, slots) for the passage of water or other washing liquid and also of small objects that are no dangerous for the pump wheel 72 and are passed to allow for longer periods of cleaning cycles for the filter. However, the contour of the obstructing wall 64 and its intermediate spaces with the inner wall of the conduit 76 are designed to obstruct the passage of the potentially harmful objects 110 having a size L' greater than the pre-defined size or dimension L through these intermediate spaces.

[0084] In the preferred embodiment shown, the obstructing wall 64 has a straight first contour section (or: chamfer section) 65 being inclined under an inclination angle y with respect to a horizontal plane H and having a length e and a convexly curved, in particular circular, second contour 68 and a third contour 69 being convexly curved as well. The intermediate space forming a liquid passing passage between the first contour 65 and the wall 17 of the conduit 75 is designated 95, the intermediate space forming a liquid passage between the second contour 68 and its circumferential wall 17 is designated with 98 and an intermediate space forming a third liquid passing passage between the third contour 69 and the circumferential wall is designated with 99. In other circumferential regions the obstructing wall 64 is fixed to the side bars 101 and 102.

[0085] The length e of the first contour section 65 is preferably chosen to be at most equal to the length L of the objects 111 ($e :\leq L$), preferably e = L and/or preferably chosen to be about 2 b (e = 2b).

[0086] The first contour section 65 is arranged in the upper part or region of the obstructing wall 64 so as to prevent the passage of heavy objects such as coins, metal clips, staples etc. which will drop or sink to the bottom of the filter in front of the obstructing wall 64 and can thus not close or obstruct the first intermediate space 95. Furthermore, due to the inclination under an inclination angle γ the first contour section 65 is arranged asymmetric and a direct passage of the objects 110 through this first intermediate space 95 is further prevented by this measure.

[0087] The widths of the other two intermediate spaces or gaps 98 and 99 are much smaller than the lengths L of the objects 111 and are smaller in their longitudinal extension than L and allow, due to their curvature, no passage of objects 111 of length L.

[0088] The obstructing wall 64 is arranged axially with respect to the axis A relative to the sump outlet 15 in such a way that the sump outlet 15 is arranged completely in front of the obstructing wall 64. The front outlet periphery 15B of the sump outlet 15, which is axially displaced with respect to the axis A, is arranged in between the positioning protruding element 90 and the obstructing wall 64 of the filter element 76, closer to the positioning protruding element 90. Thus, the sump outlet 15 connects only the first filter chamber 86 directly to the sump 10. The second filter chamber 96 is not directly connected to the sump outlet 15. In this way, the washing liquid exiting from the sump 10 and having objects 110, 111 contained therein will first flow into the first filter chamber 86 and be filtered by the shape and design of the filtering section 77 and leave the filter 76 through the filter outlet 79 without the objects 110.

[0089] As can be seen in the figures, best in FIG 17 and 18, the obstructing wall 64 abuts with the rear end or rear outlet periphery 15A of the sump outlet 15. In particular the front side of the obstructing wall 64 runs practically in the same plane as and parallel to rear outlet periphery 15A of the rectangular sump outlet 15.

[0090] By this arrangement the flow of the washing liquid L through the sump outlet 15 will be practically parallel to the obstructing wall 64 at the rear outlet periphery 15A resulting in objects 110 or 111 being carried by the washing liquid L also flowing along the and parallel to the obstructing wall 64 in a downward direction. Consequently, the objects 110 will be pushed downwards in the first filter chamber 86 and be caught there or below the obstructing wall 64 and only few objects 111 will, if at all, be able to float upwards again against the stream of the washing liquid L.

[0091] This arrangement of the sump outlet 15 with regard to the obstructing wall 64 and the first filter chamber 86 results, therefore, in an improved filtering of the potentially harmful objects 110.

[0092] The potentially harmful objects 110 will stay or be stuck in the first chamber 86 of the filter element 76 and be partially supported by the semi-shell wall 103 or can also get stuck and held down or stored in the intermediate space 99 under the obstructing wall 64, but it is practically excluded that such objects 110 reach the filter outlet 79.

[0093] In FIG 13 and 14 the situation of objects 111 having a length L and potentially harmful objects 110 having a length L'> L within the 76 is shown. It can be seen that the objects 110 can under normal circumstances not pass through the filtering section 77 into the pump wheel housing 73 with the pump wheel 72, while objects 11 can pass forward and be expelled from the machine.

[0094] The pump wheel housing 73 being integral with the filter element 76 has in particular a shape that increases in diameter in two steps starting from the housing front wall 94. This results in particular in a higher flow velocity through the filter outlet 79. The central body 72A of the pump wheel 72 is arranged at a distance in front of the filter outlet 79 and the wheel blade 72B arranged at the central body 72A extend radially outwards from the central body 72A into the radially extending parts of the pump wheel housing 73 and its circumferential walls 67.

[0095] In order to facilitate and improve the connection between the front tub part 21 and the rear tub part 22 at the connecting area 20 connecting elements 26 and 27 can be provided wherein, as shown, the connecting element 26 arranged at the front tub part 21 is a protruding part and is received by a receiving recess as a second connecting element 27 which design improves the connecting properties of hot welding and constitutes a welded water tight sealing. Also the connecting parts 26 and 27 allow for a pre-positioning of the two tub parts 21 and 22 before welding.

[0096] The front tub part 21 and the rear tub part 22 are, in the preferred embodiment shown, both formed in such a way that they can be injection-moulded from a thermoplastic material between two moulding forms in a moulding process reducing the use of runners or moveable form parts in further moulding steps. At least one,

preferably both, of the two moulding forms, usually an inner moulding form, forms cavities and concave spaces in the tub parts 21 and 22 such as the sump 10 or the tub interior 9 or the draining conduit 75 which cavities or concave spaces start at the connecting line between the two moulding parts and are open towards the connecting part line of the moulding parts, wherein the sump 10 and the conduit 75 are preferably basically formed in the rear tub part 22. In particular, the front tub part 21 and preferably also the most part of the rear tub part 22 have a shape that allows for direct linear retraction of the moulding forms along a common retraction direction which is parallel to an axis running through the tub part 21 or 22 in case of tub part 22 the central axis A of the draining conduit 75. In order to be able to withdraw or retract each of the moulding forms after the moulding process it is necessary that no moulded part of the freshly moulded tub part is in the way of a moulding form section along the retraction direction. The moulding process will be anyway greatly simplified if the number of moulded parts in the way of a moulding form section along the retraction direction is very little, for example just one.

[0097] This is achieved in the construction of the tub parts 21 and 22 by not allowing or by limiting in number, in a direction opposite to the retraction direction, any broadening or increase in the diameter or inner dimension of each of the cavities or concave spaces in the tub parts 21 and 22 in any lateral direction which is orthogonal to the retraction direction of each of the two moulding forms. In other words, the inner dimensions or diameters of each cavity and concave space, as seen in a linear projection along the retraction axis, in particular along or parallel to the central axis A, in the front tub part 21 and in the most part of the rear tub part 22, in particular the sump 10, the tub interior 9 and the draining conduit 75, stay the same or decrease, i.e. do not increase, in a direction which is opposite to each moulding form retraction direction. This allows linear retraction of an inner moulding form which has the complementary shape to these cavities or concave spaces out of these cavities and spaces of a freshly moulded front tub part 21 and the most part of rear tub part 22 in a retraction direction parallel to the retraction axis, in particular central axis A.

[0098] According to a further embodiment of the present invention, not shown in the drawings, the above described draining device 7 may be provided as a part which is independent, i.e separated, from the tub body and mountable to the latter by means of a manifold, such as a rubber conduit, preferably in a removable manner. In this alternative arrangement of the invention, the manifold that puts in fluid communication the washing tub 2 with the draining device 7 has a first end connectable to the sump outlet 15 or to an opening 18 formed in the tub bottom 12, in case the sump 10 is not formed in the tub 2, and a second end, opposite to the first end, connectable to the draining device 7 via an opening formed in the circumferential wall 17.

[0099] Since in this alternative configuration the draining device 7 is a separate piece, it has to be arranged within the inner chamber of a washing machine cabinet containing the tub 2 and all the operational devices for carrying out a washing process on laundry articles, through an appropriate fixing device. Such fixing device may be provided with one or more brackets attaching, preferably in a removable manner, the draining device 7 to a bottom and/or side inner wall of the cabinet.

[0100] Furthermore, the draining conduit 75 is closed at a first end 75A by the pump drive 71 of the draining pump 70 which is fixed at this rear side 87 of the pump receiving part 37 of the draining conduit 75 at the rear end 75A, preferably by means of a circular planar drive flange 82 and screws 83 to be guided through guidings 84 in the drive flange 82 and to be screwed into corresponding screw holes 88 at the rear side 87. A second end 75B of the draining conduit 75, opposite to the first end 75A is closed by a cover wall 25 which is separated by the tub body. The cover wall 25 may be formed integral with the circumferential wall 17, or it may be attached to the latter by welding or any removable fastening device known in the art, like screws for example. The alternative arrangement here disclosed allows to form the washing tub by a moulding process that is greatly simplified because there are no moulded parts in the way of a moulding form section along the mould retraction direction. In this way a sensible cost saving may be obtained.

[0101] List of reference numerals

2	washing tub
3	drum
4	opening
5	front frame
6	drum drive
7	draining device
8	level detection device
9	tub interior
10	draining sump
11	side wall structure
11A	side wall part
11B	side wall part
11C	side wall part
11D	side wall part
11E	front side wall part
12	tub bottom
12A	front tub bottom part
12B	rear tub bottom part
13	sump bottom
14	carrier bridge
15	sump outlet
15A	rear outlet periphery
15B	front outlet periphery
16	air outlet
17	circumferential wall
18	sump inlet
19	reinforcing rib
20	connecting area/seam
21	front tub part

22	rear tub part
23	front connecting part
24	rear connecting part
25	front cover
26,27	connecting element
28	level detection tube
28A	distal end
28B	connecting end
30	deflector element
37	pump receiving part
38	flange
39	sealing ring
60	through-hole
61	fastening element
62	reinforcing ribs
63	through-hole
64	obstructing wall
65	first contour
66	separating wall
67	housing wall
68	second contour
69	third contour
70	draining pump
71	pump drive
71A	pump drive axle
72	pump wheel
72A	wheel base body
72B	wheel blades
73	pump wheel housing
74	draining outlet
75	draining conduit
75A	first end
75B	second end
76	filter element
77	filtering section
78	housing outlet
79	filter outlet
80	connecting hole
81	air pressure sensor
82	drive flange
83	screws
84	screw guidings
85	inner conduit chamber
86	first filter chamber
87	circumferential wall
88	rear opening
89	screw holes
90	positioning protruding element
91	positioning element
92	positioning slot
93	housing circumferential wall
94	housing front wall
95	liquid passing passage (intermediate space)
96	second filter chamber
97	rear side
98	liquid passing passage (intermediate space)
99	liquid passing passage (intermediate space)
100	fitting contour
101	side bar
102	side bar
103	semi-shell wall
104	upper edge
110	objects
111	objects
165	recess
190	Positioning receiving element
200	fitting contour
A	central axis
H	horizontal plane
α, β	angle range
γ	inclination angle
a	length
b	length
c	inner diameter
dmin	diameter
dmax	diameter
e	length
L	length
D	diameter

Claims

1. Draining device (7) for draining washing liquid from a tub interior (9) of a washing tub (2) of a washing machine,

a) the draining device (7) comprising a draining sump (10) with a sump outlet (15), a draining conduit (75) and a draining pump (70) and a filter element (76) arranged or to be arranged within the draining conduit (75),

b) the draining pump (70) having at least one pump wheel (72) arranged within a pump wheel housing (73) and a pump drive (71) for driving the pump wheel (72) in a rotational movement about a central axis (A) as rotational axis,

c) wherein the filter element (76) has a filtering section (77) for filtering out objects (110), which have dimensions and/or size (L') greater than specified dimensions and/or size (L'>L) and which, thus, are potentially harmful for the pump wheel (72), from the drained washing liquid,

d) wherein the filtering section (77) is divided into a first filter chamber (86) and a second filter chamber (96) by an obstructing wall (64),

e) wherein the first filter chamber (86) is in direct fluid communication with the sump (10) through the sump outlet (15),

f) wherein the second filter chamber (96) is in fluid communication with the pump wheel (72) and arranged downstream to the first filter chamber (86) with regard to the stream of drained washing liquid (L) and

g) wherein the obstructing wall (64) is arranged below the sump outlet (15) and oriented with re-

gard to the outlet periphery (15A) of the sump outlet (15) in such a way that the main flow direction of the washing liquid (L) and the objects (110, 111) contained therein flowing through the sump outlet (15) is at least approximately parallel to the obstructing wall (64) at least in the region close to the obstructing wall (64).

2. Draining device according to claim 1, wherein the obstructing wall (64) abuts with the outlet periphery (15A) of the sump outlet (15) and is arranged essentially in a common plane with the outlet periphery (15A) and/or orthogonal to the flow cross-section of the sump outlet (15) and/or orthogonal to the central axis (A).

3. Draining device according to claim 1 or claim 2, wherein between a contour (65, 68, 69) of the obstructing wall (64) and a surrounding wall, in particular the inner wall of the conduit (75), at least one intermediate space (95, 98, 99) is formed allowing the passage of the washing liquid (L) and not potentially harmful objects (111), but obstructing objects (110) being potentially harmful.

4. Draining device according to any of the preceding claims,

a) wherein a housing front wall (94) of the pump wheel housing (73) has a central opening through which the central axis (A) runs in the mounted state and which serves as a filter outlet (79) through which the filtering section (77) and the pump wheel housing (73) are in fluid connection,
b) wherein the obstructing wall (64) is arranged in front of the filter outlet (79) at a distance (b), which distance (b) is smaller than a diameter (D) of the filter outlet (79), and
c) wherein the obstructing wall (64) has, in axial projection along the central axis (A), a larger diameter (dmax, dmin) than the diameter (D) of the filter outlet (79).

5. Draining device according to any of the preceding claims, wherein the two filter chambers (86, 96) are surrounded and/or radially delimited by the inner wall (17) of the draining conduit (76) and/or wherein the axial length (a) of the first filter chamber (86) is larger than, in particular at least by a factor 2, than the axial length (b) of the second filter chamber (96).

6. Draining device according to claim 4 or claim 5 referring back to claim 4, wherein the diameter (D) of the filter outlet (79) as well as the axial length (a) of the first chamber (86) and the axial length (b) of the second chamber (96) and the shape of the contour of the obstructing wall (64) are all adapted to the specified dimensions and/or size (L) of objects (111) so that further objects (110) having dimensions and/or size (L') greater than said specified dimensions and/or size (L) will not pass the filtering section (77), but preferably rather be obstructed from passing the obstructing wall (64) and stay in the first chamber (86) or below the obstructing wall (64).

7. Draining device according to claim 4 or claim 5 referring back to claim 4 or according to claim 6, wherein the distance (b) of the obstructing wall (64) to the filter outlet (79) or the length (b) of the second filter chamber (96) is chosen to be at most 1/2 of the specified dimensions and/or size (L) of objects (111) and/or wherein the diameter (D) of the filter outlet (79) is chosen to be smaller than the specified dimensions and/or size (L) of objects (111) and/or larger than the distance (b) of the obstructing wall (64) to the filter outlet (79) or the length (b) of the second filter chamber (96).

8. Draining device according to one of the preceding claims, wherein the obstructing wall (64) has a straight first contour section (65) being inclined under an inclination angle (γ) with respect to a horizontal plane (H) and being arranged in an upper region of the obstructing wall (64) and/or wherein the obstructing wall (64) has at least one convexly curved, in particular circular, contour section (69) in a lower region of the obstructing wall (64)..

9. Draining device according to claim 8, wherein a length (e) of the first contour section (65) is chosen to be at most equal to the specified dimensions and/or size (L) of objects (111) and/or chosen to be about twice the distance (b) of the obstructing wall (64) to the filter outlet (79) or the length (b) of the second filter chamber (96).

10. Draining device according to one of the preceding claims,
wherein the draining conduit (75) has a conduit wall structure (17, 87) surrounding an inner chamber (85) of the draining conduit (75), into which inner chamber (85) the filter element (76) is inserted or is to be inserted.

11. Draining device according to claim 10, wherein a positioning element (91) is provided at the filter element (76) which is to be inserted into a positioning slot (92) at the conduit wall structure (17, 87) of the conduit (75) which positioning devices (91, 92) also support an angular fixation between filter element (76) and conduit (75).

12. Draining device according to claim 10 or claim 11,

a) wherein a separating part of the conduit wall

structure (17, 87) of the draining conduit (75) separates the sump (10) from the inner chamber (85) of the draining conduit (75) and
b) wherein the inner chamber (85) of the draining conduit (75) is in fluid connection with the sump (10) through the at least one sump outlet (15), which sump outlet (15) is formed as an opening in the separating part of the conduit wall structure (17, 87).

13. Draining device according to any of the preceding claims, wherein the sump outlet (15) is formed rectangular and/or covers an angle range of at most 90°, preferably below 80° and/or has a curved, preferably cylindrically curved, outlet periphery (15A), which preferably is convex as seen from the conduit inner chamber (85).

14. Washing machine comprising a washing tub (2) having a tub interior (9) and housing a rotatable drum (3) for receiving goods to be washed, and a draining device (7) according to any of the preceding claims, wherein the draining sump (10) is arranged in a lower region of the washing tub (2).

15. Washing tub unit according to claim 14, wherein the sump outlet (15) is oriented towards a sump inlet (18) of the draining sump (10) or facing the sump inlet (18) to allow for a direct and short flow path for the drained washing liquid (L) through the sump (10) and/or wherein the sump outlet (15) is arranged above a sump bottom (13) distanced by an intermediate lower section of the separating part of the conduit wall structure of the conduit (75).

FIG 1

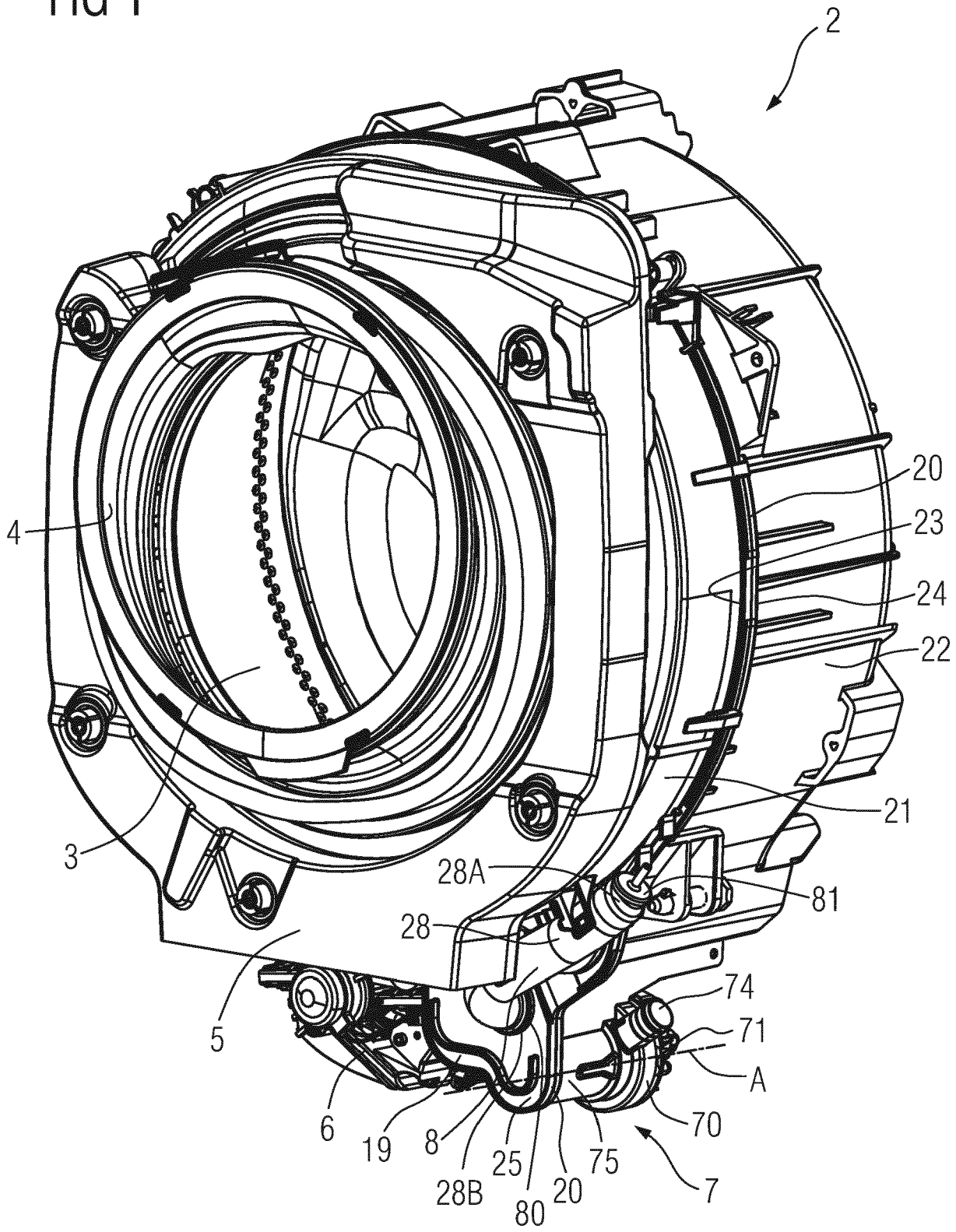


FIG 2

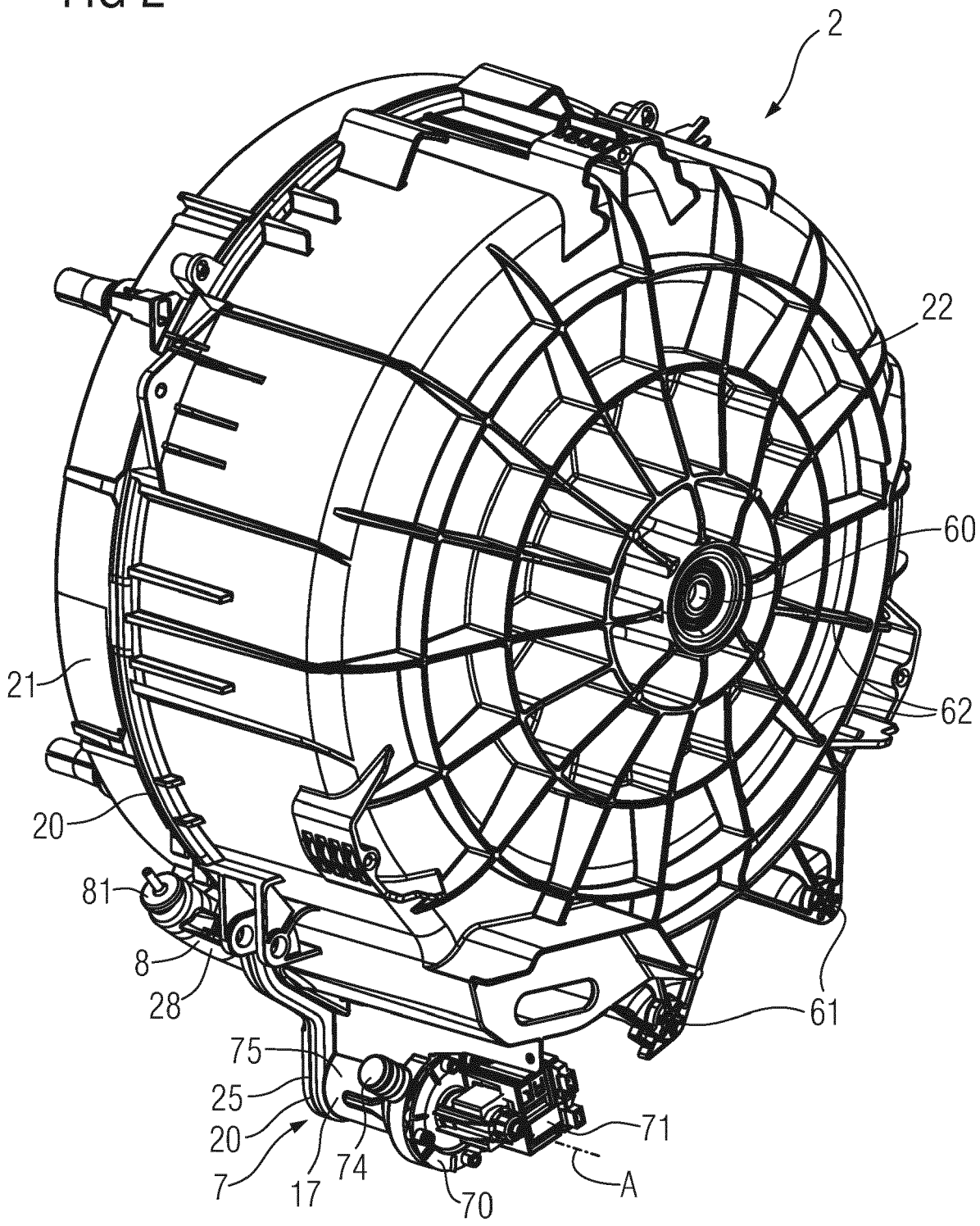
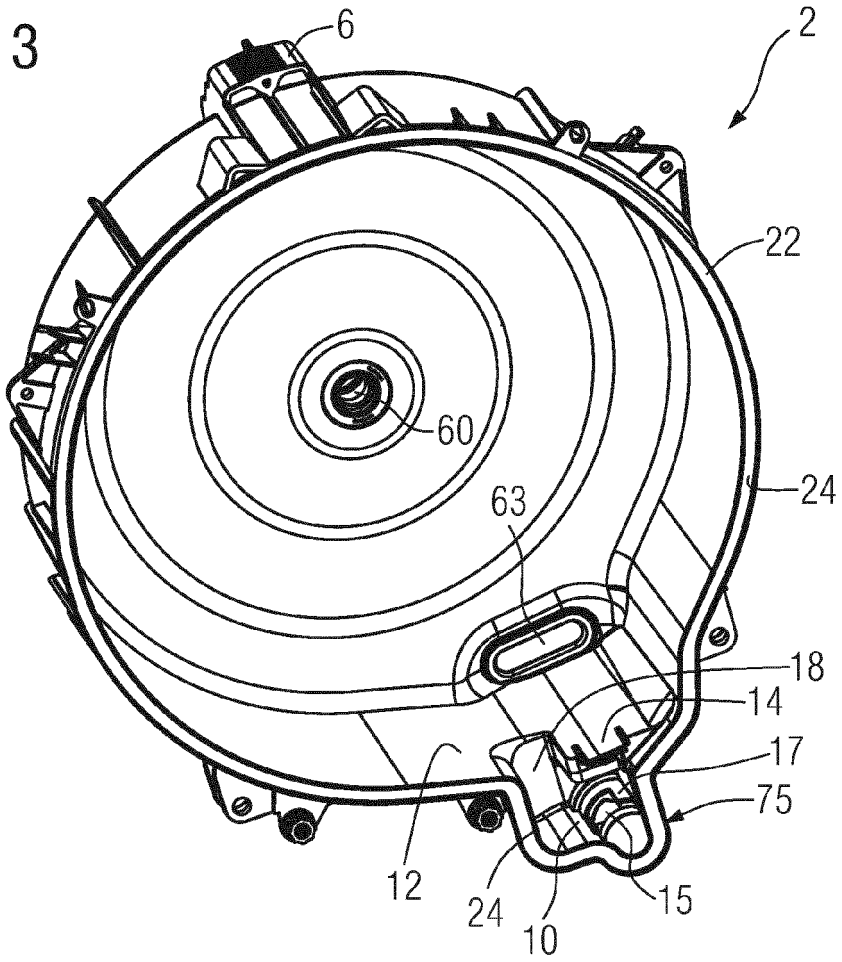


FIG 3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2
22
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63
18
14
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75
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24
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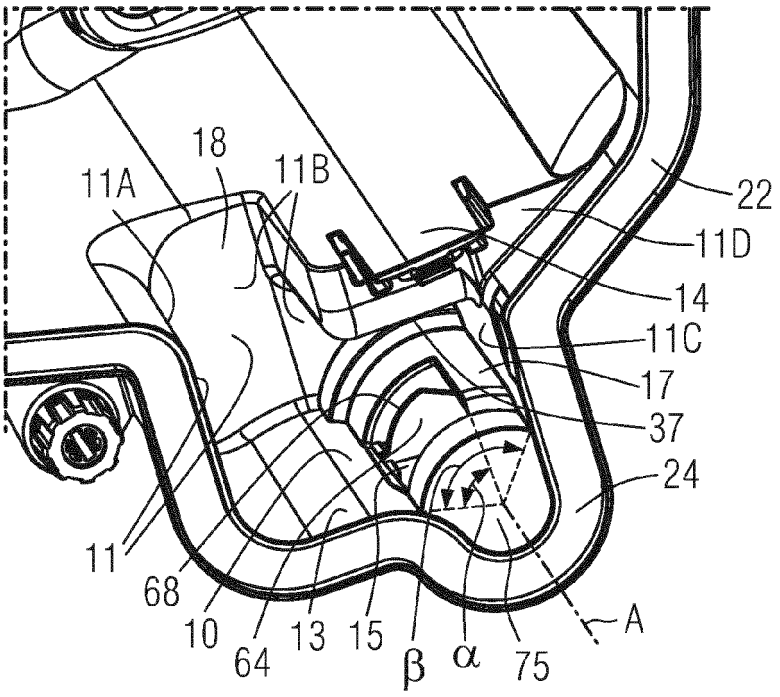
15

FIG 4


18
11A
11B
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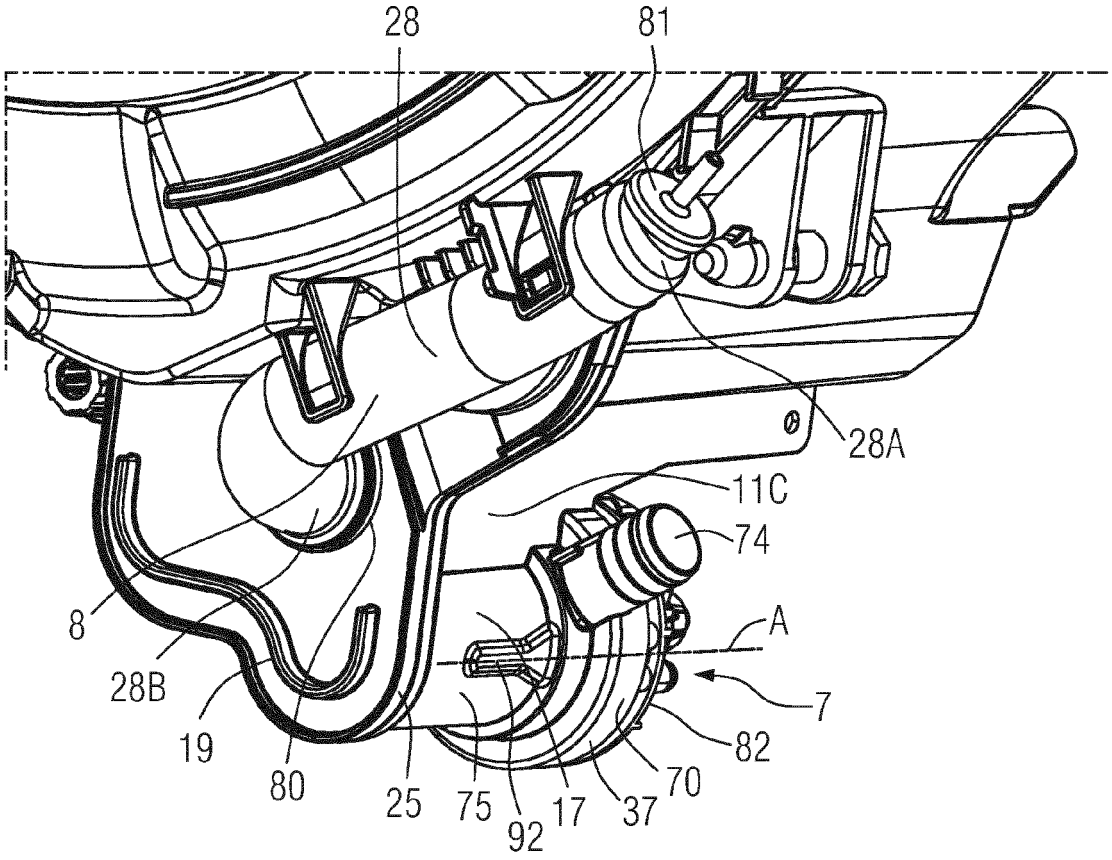
11D
14
11C
17
37
24
11
68
10
64
13
15
β
α
75
A

FIG 5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81
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11C
74
8
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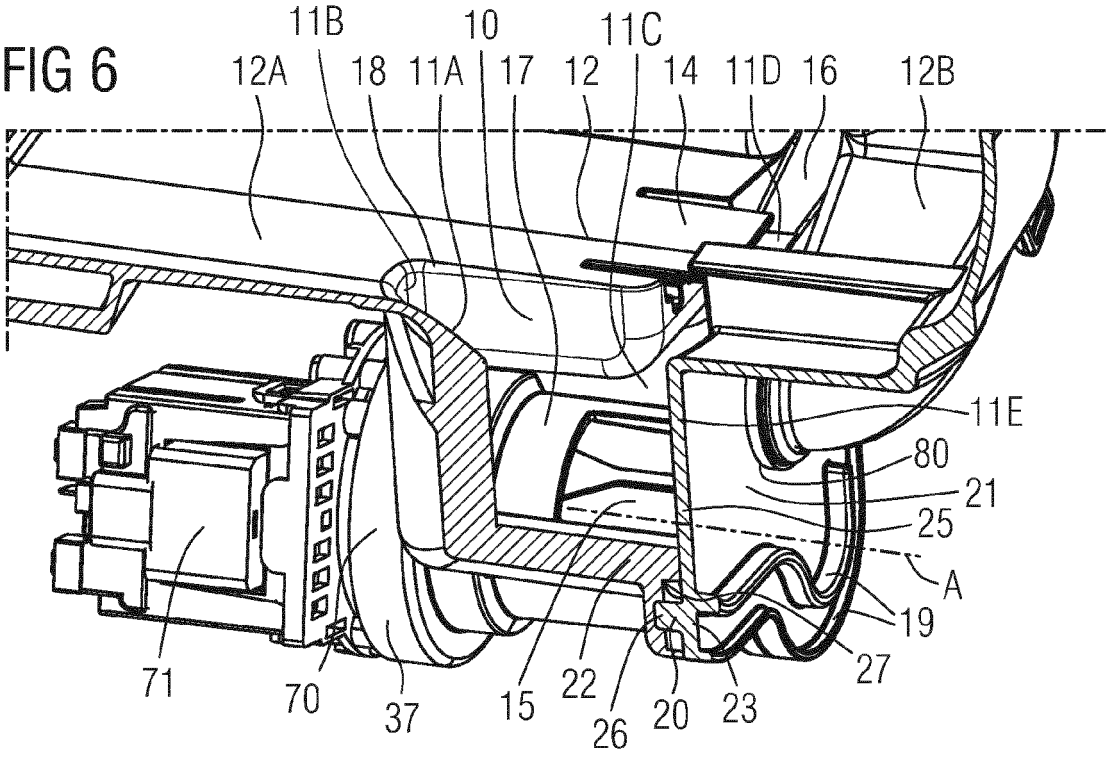
17
37

FIG 6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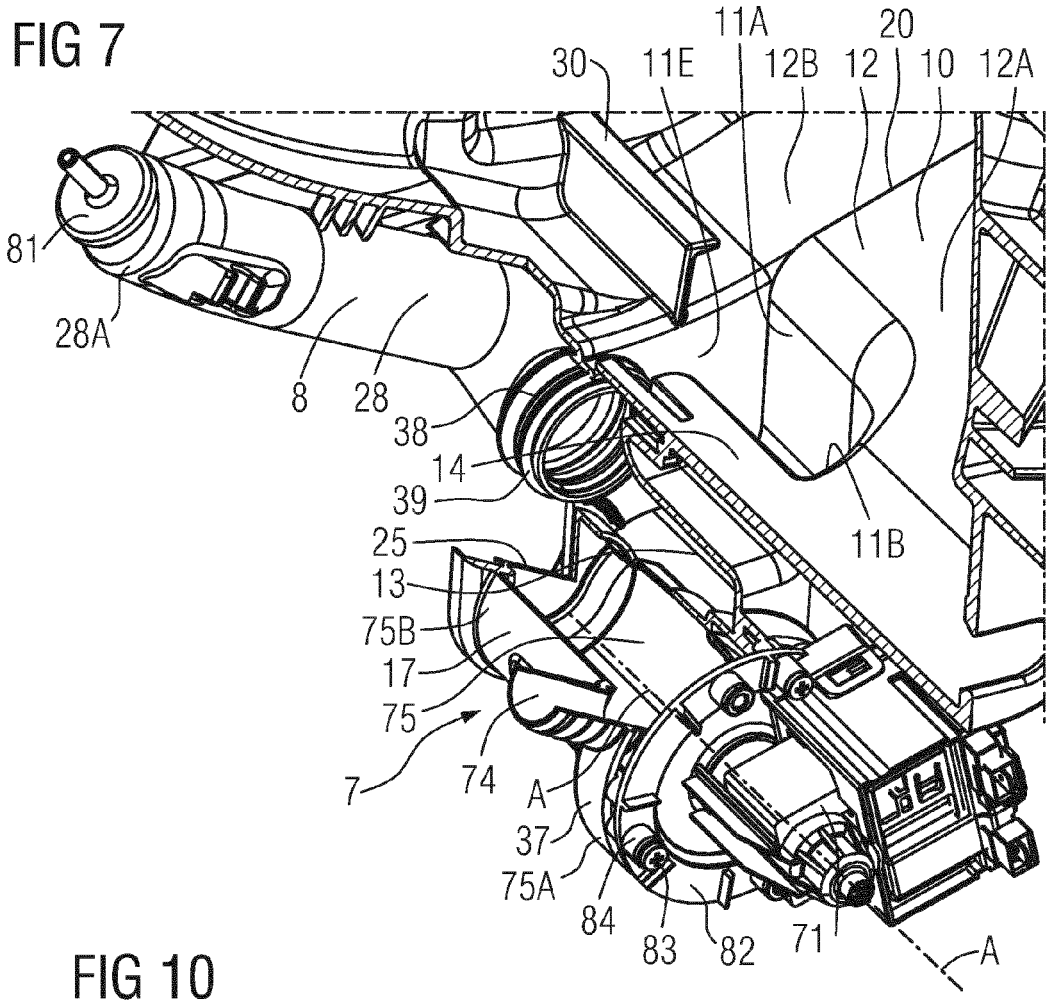
23

FIG 7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17
75
7
74
A
37
75A
84
83
82
71
11B
A

FIG 10

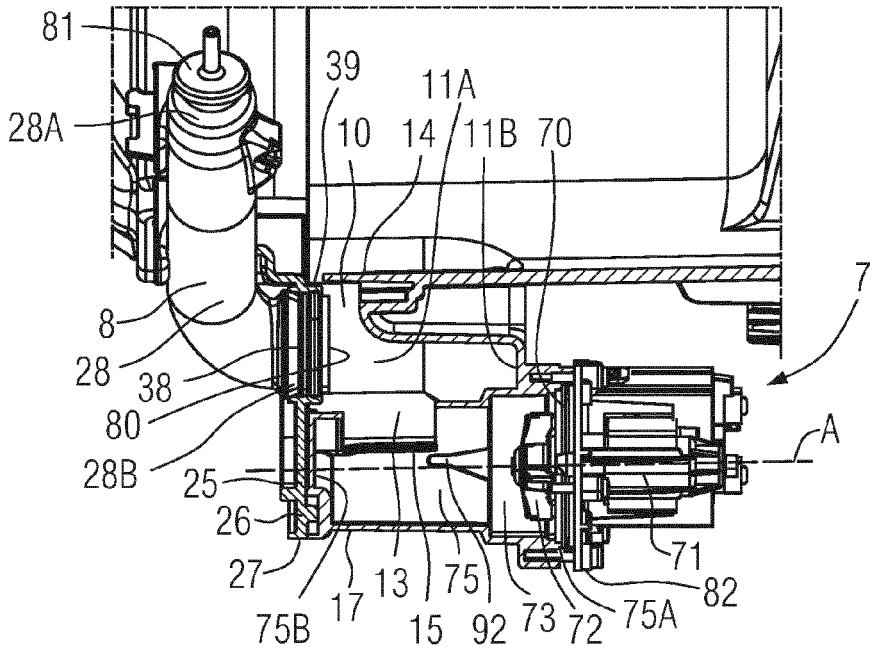

81
28A
39
11A
10
14
11B
70
7
8
28
38
80
28B
25
26
27
75B
17
13
15
75
92
73
72
75A
82
71
A

FIG 8

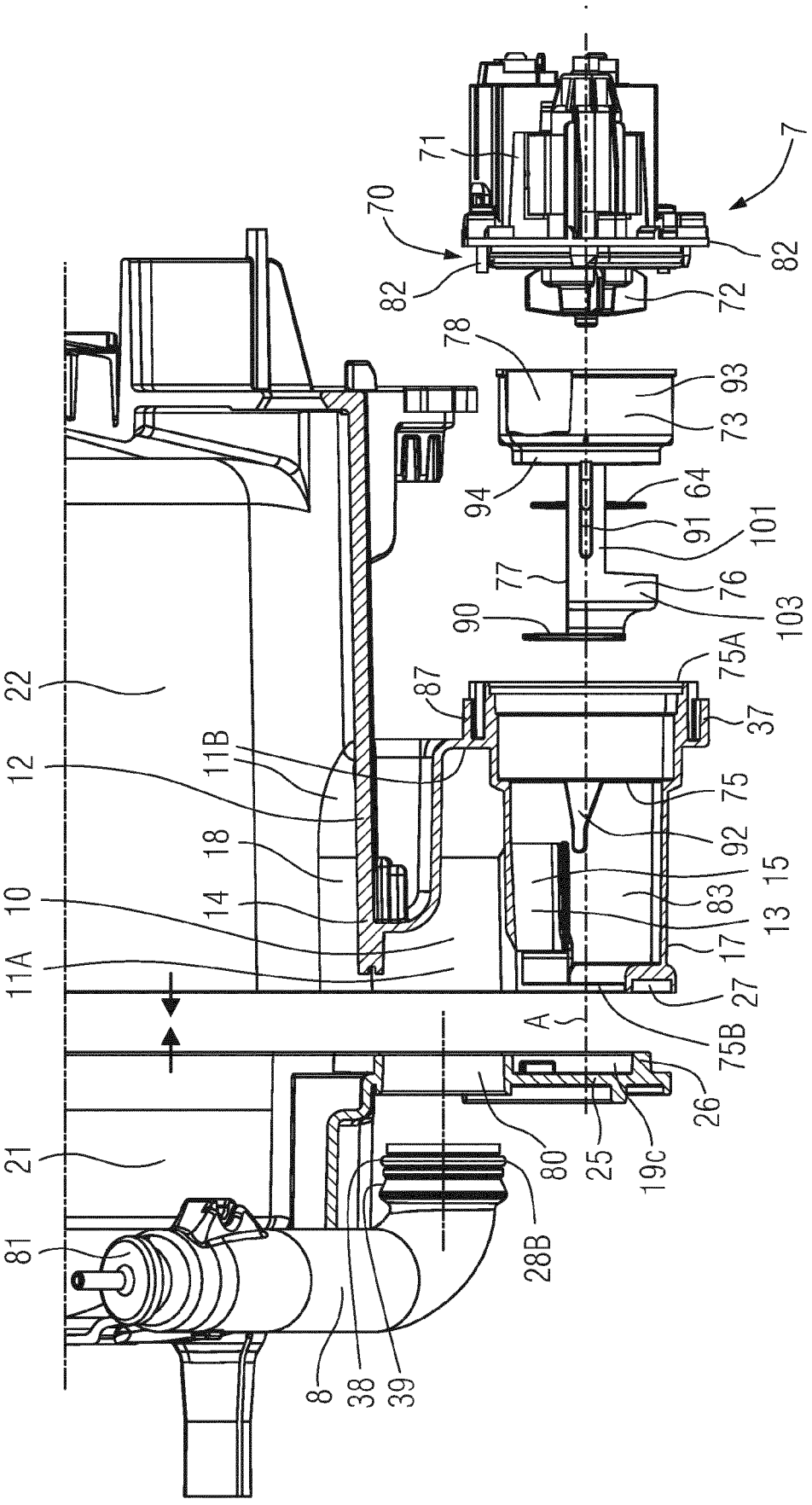

7
71
70
82
72
78
93
73
94
64
91
101
77
76
90
103
75A
87
37
22
12
11B
75
92
18
15
10
14
83
13
11A
17
27
A
75B
26
21
80
25
19c
81
28B
8
38
39

FIG 9

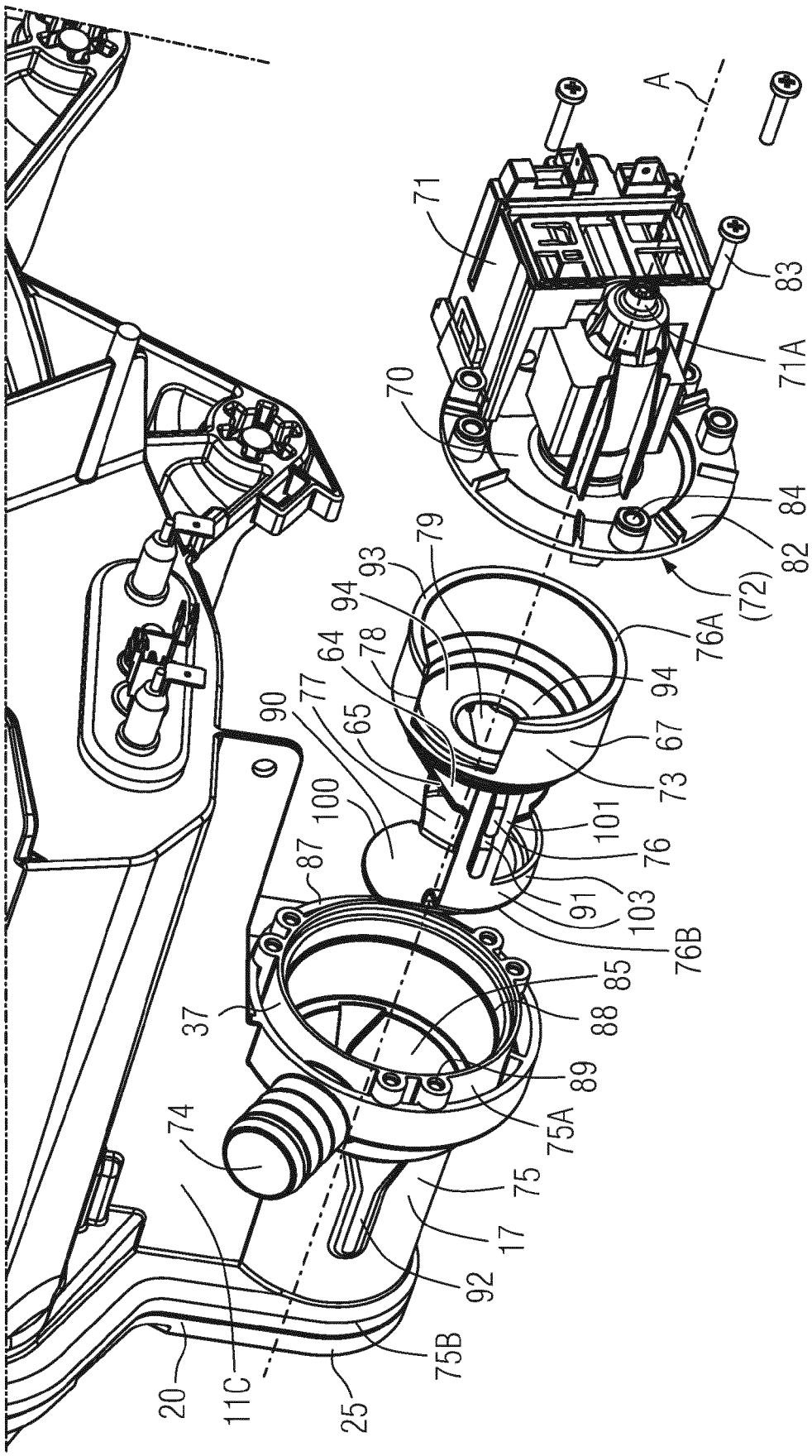

A
71
83
71A
70
84
82
(72)
76A
79
93
94
64
78
77
65
90
100
87
94
67
73
101
76
91
103
76B
85
88
89
75A
37
74
75
17
92
75B
20
11C
25

FIG 11

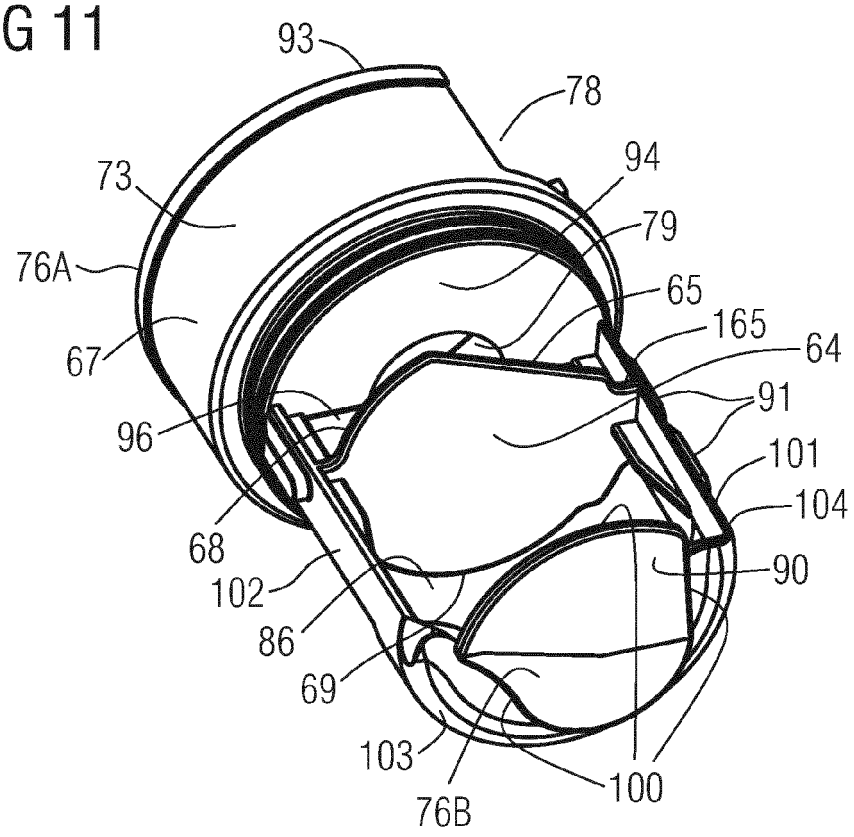

93
78
94
73
79
76A
65
165
64
67
91
96
101
104
68
90
102
86
69
103
100
76B

FIG 12

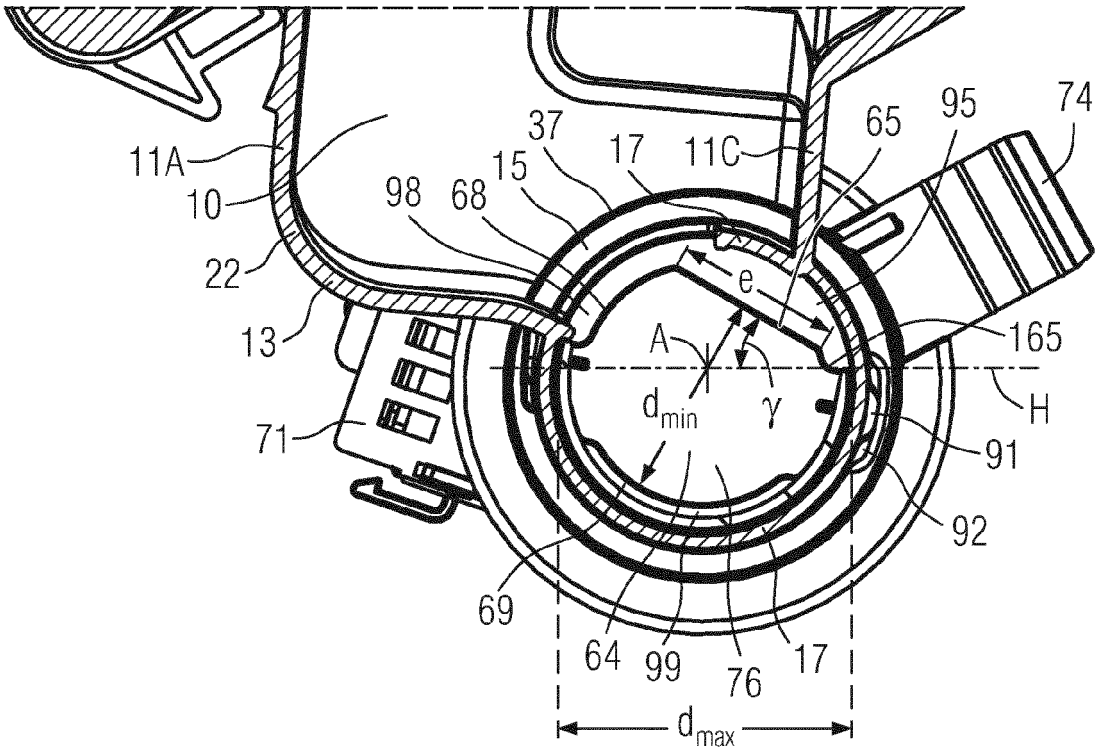

11A
10
22
13
71
37
15
17
11C
98
68
65
95
74
e
A
165
H
d_{min}
γ
91
92
69
64
99
76
17
d_{max}

FIG 13

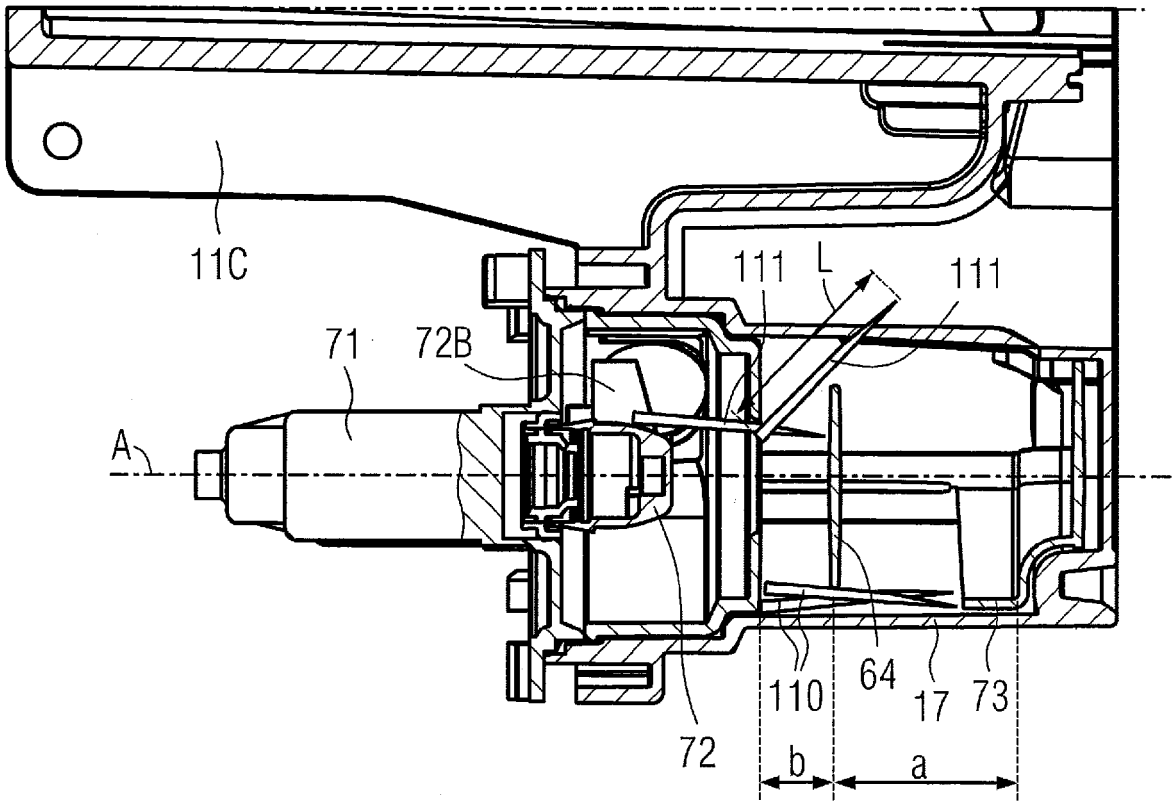

11C
111
L
111
71
72B
A
64
110
17
73
72
b
a

FIG 14

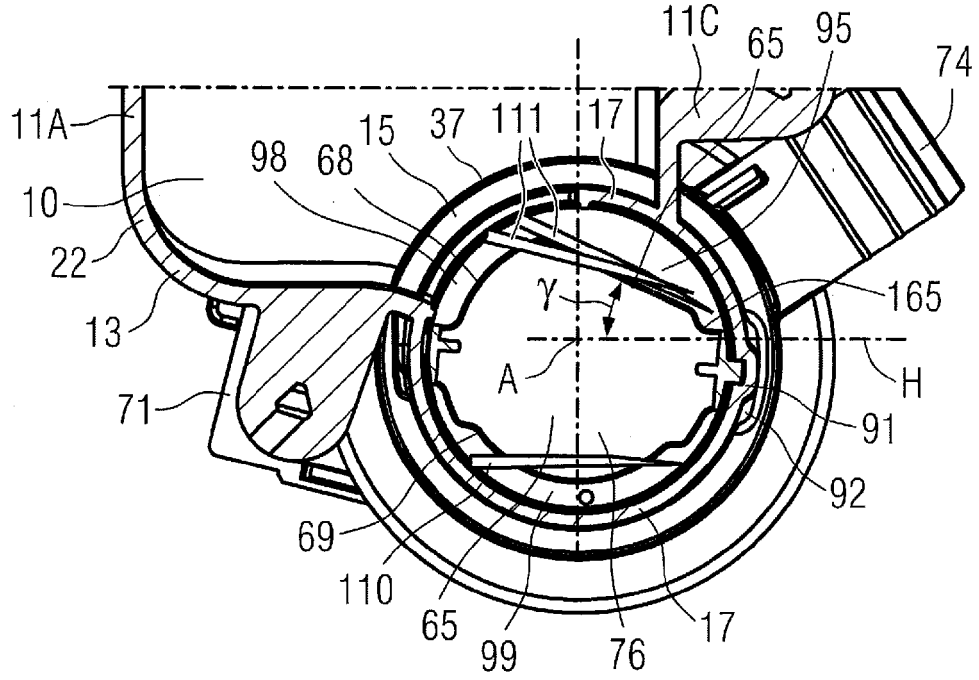

11C
65
95
74
11A
15
37
111
17
98
68
10
22
γ
165
13
A
H
71
91
92
69
110
65
99
76
17

FIG 15

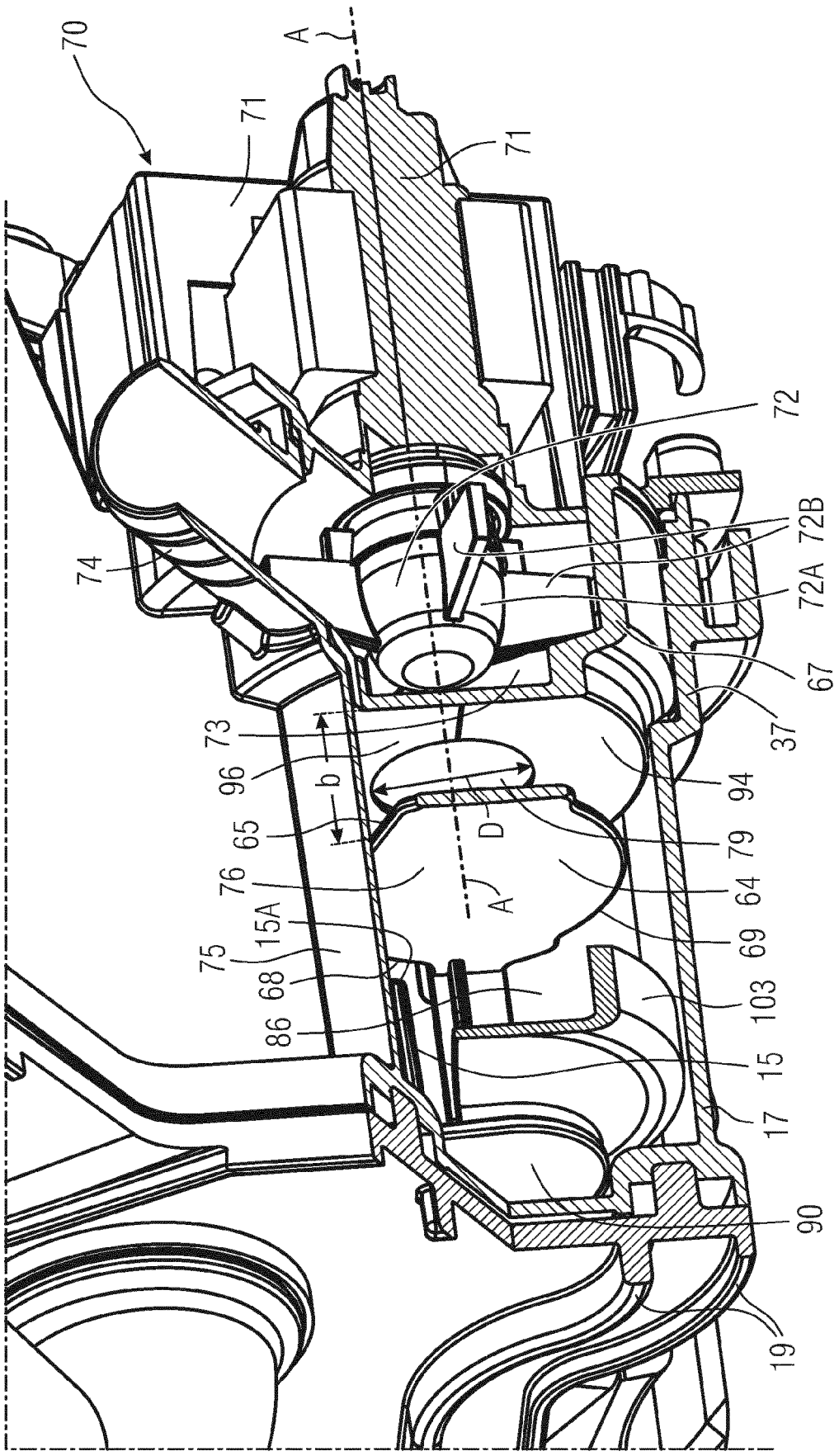

70
71
71
A
72
74
72B
72A
67
37
73
96
b
94
65
D
79
76
64
A
15A
69
75
68
103
86
15
17
90
19

FIG 16

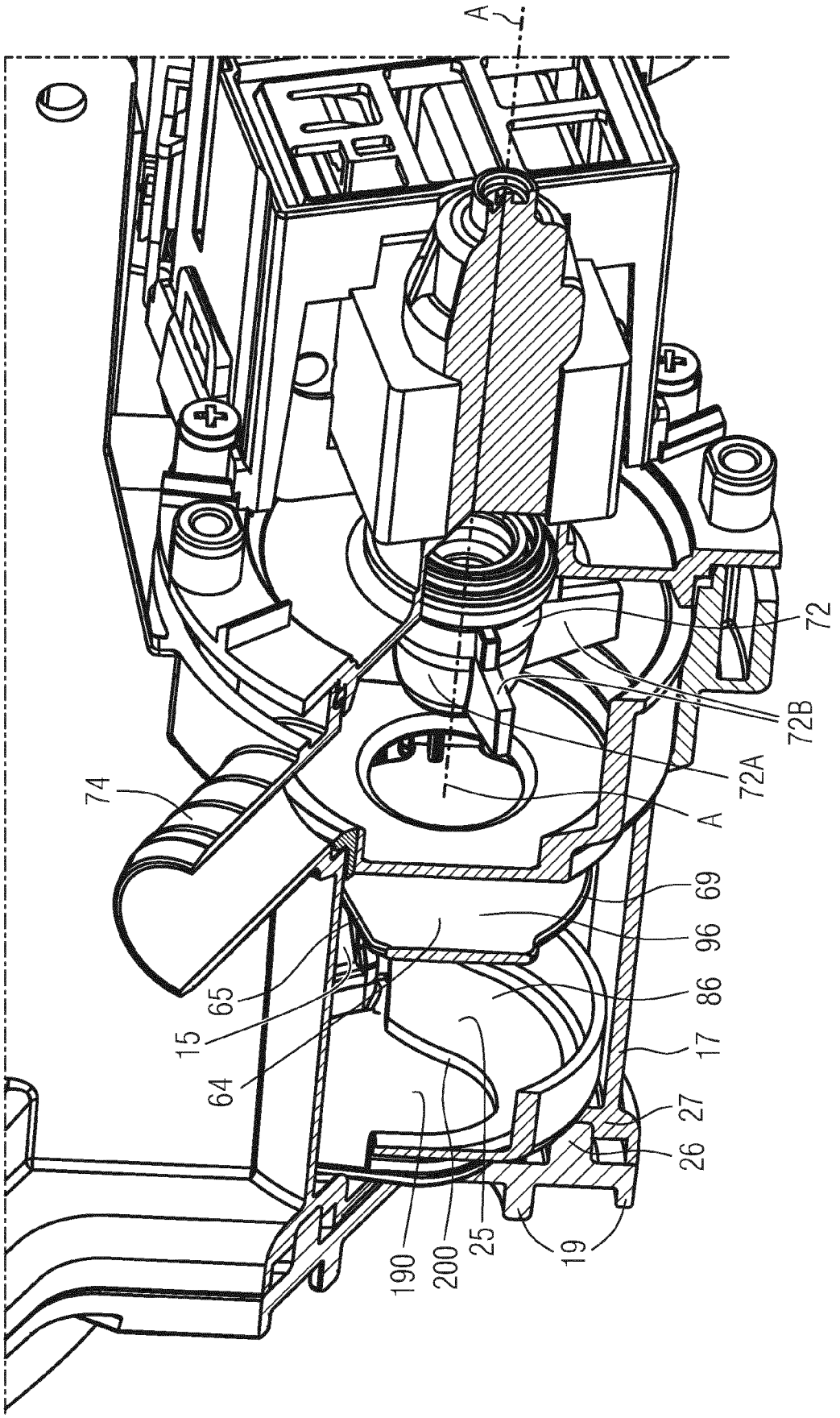
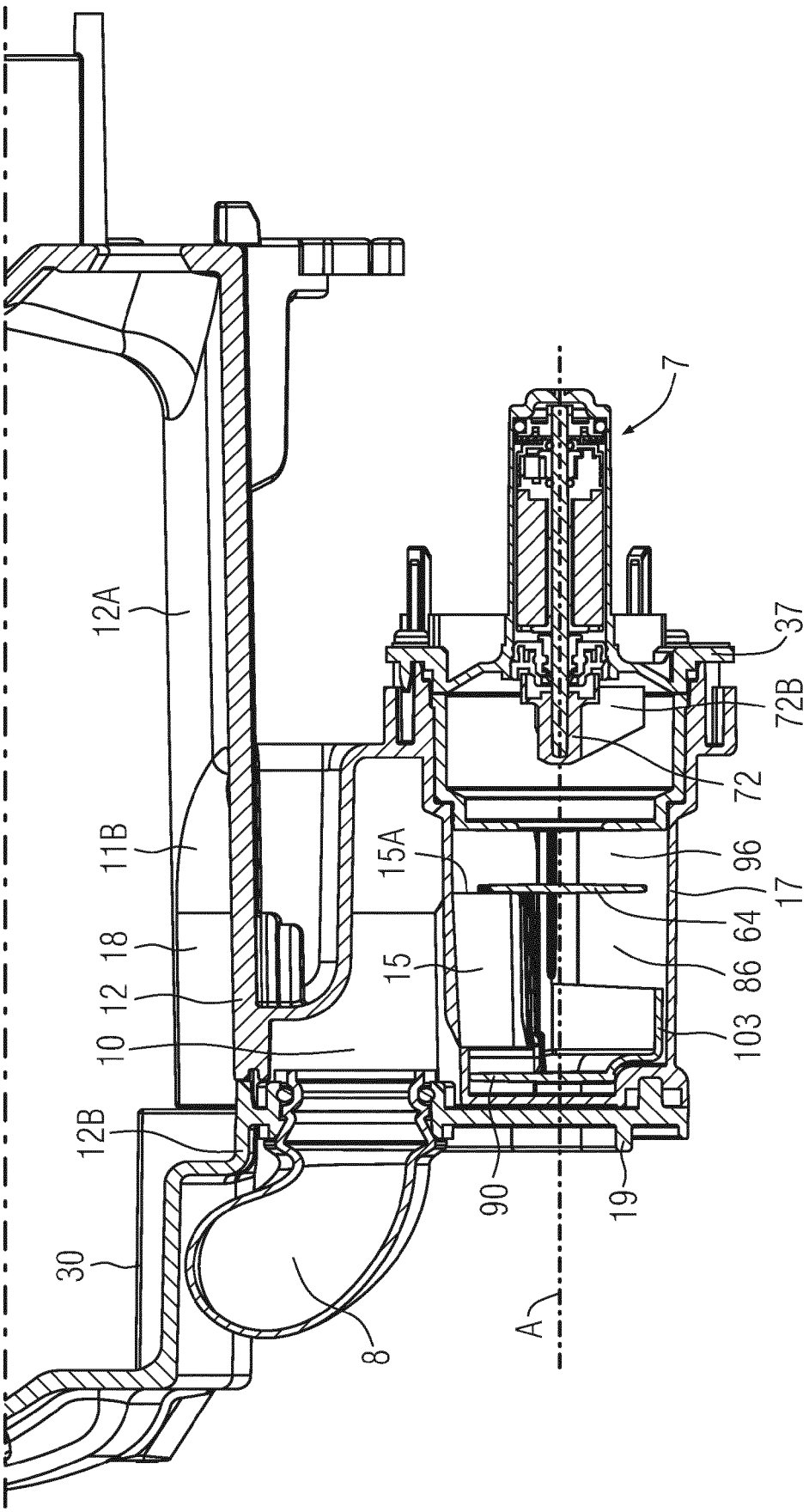


FIG 17



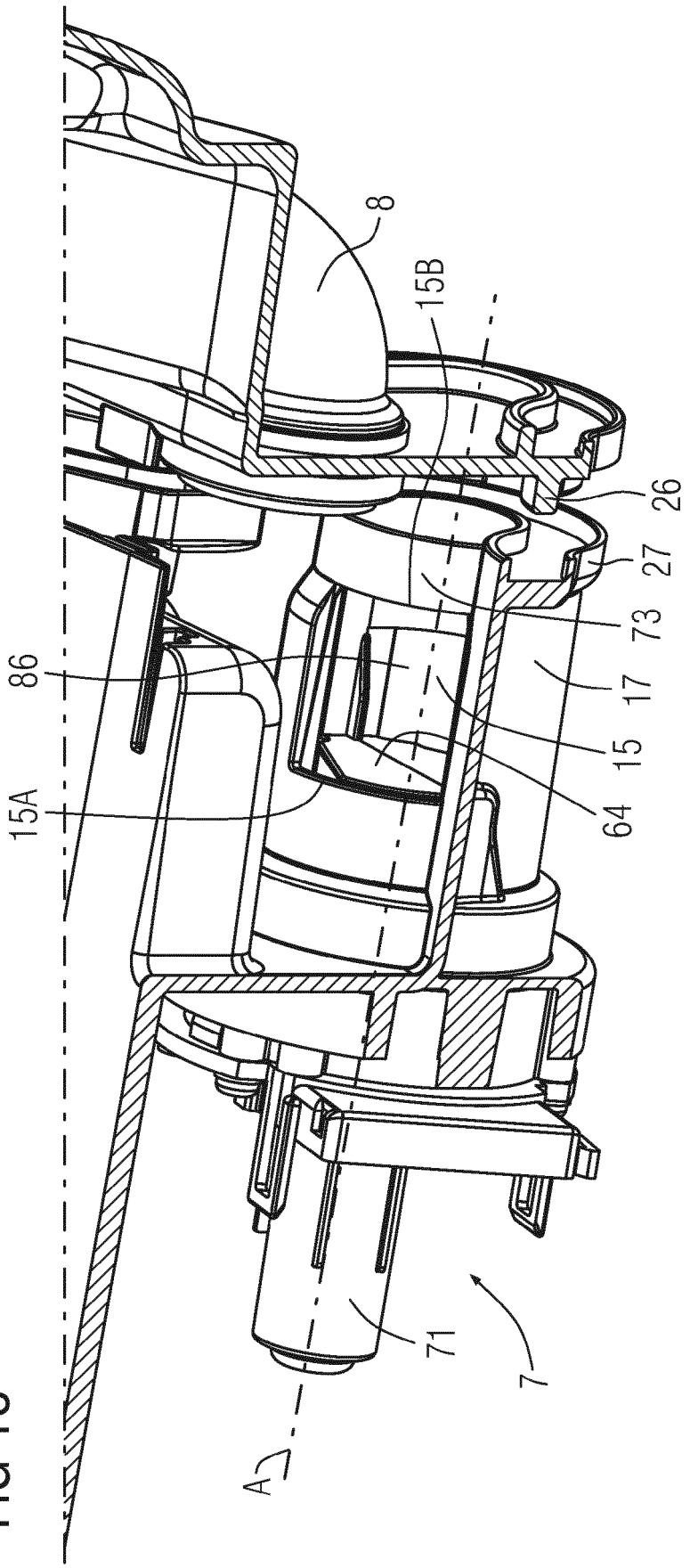


FIG 18

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EUROPEAN SEARCH REPORT

Application Number
EP 12 15 7051

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Munich	13 August 2012	Spitzer, Bettina

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