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(54) LIQUID DISPENSER DEVICE FOR A WASHING MACHINE AND WASHING MACHINE THEREOF

(57) Dispenser device (1) for washing machine comprising:
- a first half-shell (10), from the lateral edge of which a transversal wall (10P) rises;
- a second half-shell (20) having a shape corresponding to that of the first half-shell (10) so as to form an inner cavity (2) with the first half-shell;
- a supply duct (11) supplying water from a water main, wherein said supply duct (11) is formed by mutually facing sidewalls (11P) protruding from the first half-shell (10) and closed at their free edge by the second half-shell (20);
- an insert (30) comprising one emitter (31) and one receiver (32) forming an air break;
- a first partition wall (12A) protruding from said first half-shell (10) and coupled to mutually facing sidewalls (11P);
- a first passage (41) formed between a first partition wall (12A) and the second half-shell (20) to allow the liquid to flow from the supply duct (11) to the emitter (31).

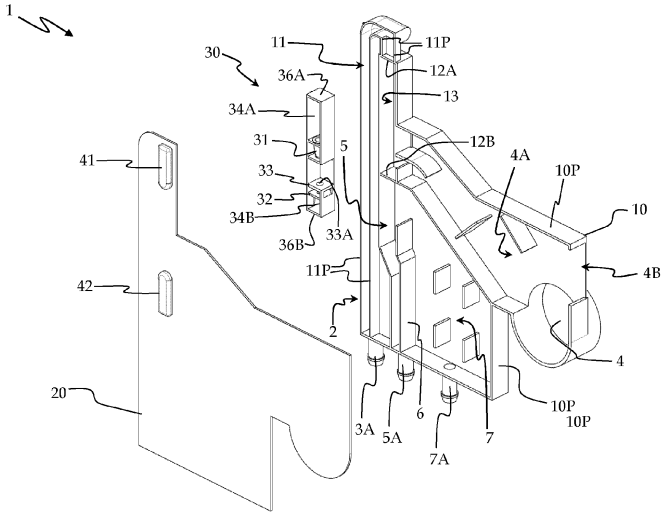

Fig. 1

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Description

[0001] The present invention relates to a dispenser device for dispensing a liquid for a washing machine for household use, in particular a dishwasher, according to the preamble of claim 1.

[0002] The present invention also relates to an associated washing machine for household use, in particular a dishwasher, comprising said liquid dispenser device.

[0003] It is known that household washing machines, particularly dishwashers, comprise a dispenser device for supplying a washing liquid into the wash tub.

[0004] Said dispenser device is typically made from plastic material and is positioned outside the wash tub, generally in association with one of the sidewalls of the washing machine.

[0005] In particular, this type of dispenser device typically consists of a flat, hollow body comprising:

- a first half-shell (or bottom wall) provided with lateral edges, from which a transversal wall rises;
- a second half-shell (or cover), which has a shape substantially corresponding to that of the first half-shell and is fixed to the transversal wall of said first half-shell,

wherein a cavity is defined between the walls of the first half-shell and second half-shell. Said first and second half-shells are usually obtained from plastic material by injection moulding, and are joined together by welding, generally vibration or hot-blade welding. Moreover, the dispenser devices known in the art typically comprise a plurality of components that allow the device to perform many different basic functions (hence the name "multi-function device" usually given to the dispenser devices known in the art); for example, said components may comprise:

- an air-break device associated with a liquid supply duct, for preventing the liquid from flowing back in the event of a pressure drop in the water main,
- an opening for venting the vapours generated inside the wash tub.

[0006] It should also be noted that, in a washing machine of a known type, the dispenser device is usually associated with a softener device, which comprises a resin container that contains ion-exchange resins, and a regeneration tank, which contains an agent (in particular, brine) for regenerating the ion-exchange resins.

[0007] As a consequence, the dispenser device is so realized as to comprise:

- a first duct connected to the resin container;
- at least one chamber for collecting the resin regeneration liquid, said at least one chamber being connected to the regeneration tank by means of a second duct.

[0008] It must be pointed out that the dispenser devices known in the art may lack a chamber dedicated to collecting the regeneration liquid, since they can be so realized as to comprise a single chamber in which the liquid is collected, which is then selectively directed (in particular, via a switching valve) towards either the resin container or the regeneration tank.

[0009] As far as the air-break device is concerned, it is required in order to avoid the risk that chemical solutions, dirty water or germ-enriched water might enter the drinking-water supply network, which risk may arise especially when a pressure drop occurs in the drinking-water supply network (e.g. during maintenance or repair work) and the washing machine connected to such water supply network is turned on at the same time.

[0010] In solutions known in the art such as, for example, the one shown in document EP2586356, dispenser devices are so constructed that either the first half-shell (or bottom wall) or, respectively, the second half-shell (or cover) are integral with first and second half-ducts tapered at respective ends facing each other to form the air-break device, wherein the first half-duct constitutes an extension of a supply duct formed by mutually facing sidewalls protruding from the bottom wall and closed by said cover; when said half-ducts are integral with the cover, said mutually facing sidewalls are so realized as to protrude from the cover, and are closed by the bottom wall.

[0011] However, the dispenser devices known in the art suffer from a few drawbacks.

[0012] In particular, an important drawback suffered by the solutions known in the art is that, in the event of a malfunction of the dispenser device and/or clogging of the output ducts leading into the wash tub of the washing machine or into any devices interposed between the dispenser device and said tub, regular water outflow from the dispenser device will be inhibited; such a malfunction of the dispenser device may even prevent the air-break device from performing its function of preventing the liquid from flowing back into the water main.

[0013] It is therefore clear that the dispenser devices known in the art cannot ensure the proper operation of the air-break device under adverse conditions, and this problem may also lead to adverse consequences on the water main to which the dispenser device and the associated washing machine are connected.

[0014] It should be noted that a malfunctioning dispenser device may also cause uncontrolled leakage of liquid outside the dispenser device, and such leakage may also cause electrical safety problems because it may affect electric components installed in the lower part of the washing machine, or dripping of liquid onto the floor whereon the washing machine stands.

[0015] In order to try to overcome such drawbacks, it is known in the art to realize the dispenser device in such a way that it comprises an insert made from plastic material which is positioned in the terminal part of a supply duct to form the air-break device, said insert being pro-

vided with an emitter that constitutes an extension of the supply duct and a receiver, wherein the emitter and the receiver of the insert have a tapered shape; typically, the respective ends of the emitter and receiver of the insert are arranged along the same straight line.

[0016] However, also those solutions known in the art which are equipped with an air break consisting of an insert suffer from a few drawbacks.

[0017] In such solutions, in fact, the dispenser device is made up of three parts that are manufactured separately by injection moulding and then welded together, so as to obtain the various functions required; in this context, the necessity of assembling the various parts makes the production process rather costly and complex.

[0018] In particular, the positioning of the insert between the two half-shells must necessarily be effected through the interposition of suitable sealing elements between the insert and the other components of the dispenser device, i.e. both between the insert and the first half-shell and between the insert and the second half-shell.

[0019] It is apparent that the use of such sealing elements, in addition to increasing the costs of the dispenser device, also makes the latter very difficult to assemble; in this context, it is also evident that a wrong positioning of the sealing elements will jeopardize the operation of the air-break device, resulting in the adverse effects already highlighted above with reference to the other known types of air-break devices.

[0020] In this frame, it is the main object of the present invention to provide a dispensing device for dispensing a liquid for a washing machine for household use, in particular a dishwasher, and a related washing machine comprising said dispenser device, which are so realized as to overcome the drawbacks of prior-art solutions.

[0021] In particular, it is one object of the present invention to provide a dispenser device which is so constructed that its parts are assembled in such a way as to ensure adequate sealing of the dispenser device, and in particular of those ducts or tracts of the dispenser device in which water will flow.

[0022] It is another object of the present invention to realize the dispenser device in such a way as to reduce the cost incurred for assembling its parts and make the production process less complex.

[0023] It is another object of the present invention to provide a dispenser device and a related washing machine which are constructed in such a way that the normal water outflow from the dispenser device will not be inhibited even in case of a malfunction of said dispenser device, particularly even in case of clogging of the output ducts leading into the tub of the washing machine and/or into any devices interposed between the dispenser device and said tub.

[0024] It is a further object of the present invention to provide a dispenser device and a related washing machine which can ensure the proper operation of the air-break device and prevent the liquid from flowing back into the water main under adverse conditions.

[0025] It is another object of the present invention to provide a dispenser device and a related washing machine which are constructed in such a way as to avoid any uncontrolled leakage of liquid outside the dispenser device, thus preventing any electrical safety problems and/or dripping of liquid onto the floor whereon the washing machine stands. It is a further object of the present invention to provide a dispenser device which is simple, economical and as small as possible in size.

[0026] Such objects are achieved by the present invention through a dispenser device for dispensing a liquid in a washing machine for household use, in particular a dishwasher, and a related washing machine comprising said dispenser device, incorporating the features set out in the appended claims, which are an integral part of the present description.

[0027] Further objects, features and advantages of the present invention will become apparent in the light of the following detailed description and the annexed drawings, which are provided herein merely by way of non-limiting explanatory example, wherein:

- Fig. 1 schematically shows an exploded perspective view of a dispenser device for dispensing a liquid for a washing machine for household use, in particular a dishwasher, according to the present invention;
- Fig. 2A is a front view of a portion of the dispenser device of Fig. 1, whereas Fig. 2B is a sectional view along the straight line A-A of Fig. 2A;
- Fig. 3 schematically shows an exploded perspective view of a first variant of the dispenser device according to the present invention;
- Fig. 4A is a front view of a portion of the dispenser device of Fig. 3, whereas Fig. 4B is a sectional view along the polyline B-B of Fig. 4A;
- Fig. 5 schematically shows an exploded perspective view of a second variant of the dispenser device according to the present invention;
- Fig. 6A is a front view of a portion of the dispenser device of Fig. 5, whereas Fig. 6B is a sectional view along the straight line C-C of Fig. 6A.

[0028] Referring now to the annexed drawings, in Figures 1, 3 and 5 reference numeral 1 designates as a whole a dispenser device for dispensing a liquid for a washing machine for household use, in particular a dishwasher, according to the present invention.

[0029] It should be noted that the annexed drawings do not show the washing machine for household use, in particular a dishwasher, that comprises said dispenser device 1.

[0030] The dispenser device 1 comprises a first half-shell 10 (or bottom wall), from the lateral edge of which a transversal wall 10P rises, and a second half-shell 20 (or cover) which has a shape substantially corresponding to that of the first half-shell 10 and is fixed to the upper edge of said transversal wall 10P so as to form an inner

cavity 2. As a result, the dispenser device 1 comprises said inner cavity 2 and is therefore hollow inside. In particular, said half-shells 10, 20 can be made from plastic material by injection moulding, and the coupling of the two half-shells 10, 20 is preferably accomplished by means of a welding process, in particular a vibration or hot-blade welding process.

[0031] In addition, the dispenser device 1 preferably has, as a whole, a flat shape, particularly in order to facilitate the coupling thereof to a wall of the washing machine without taking too much room; in particular, in an operating condition the dispenser device 1 is associated with the washing machine in such a way as to prevalently lie in a vertical plane. The dispenser device 1 comprises a supply duct 11 supplying water from a water main, wherein said supply duct 11 is formed by mutually facing sidewalls 11P protruding from the first half-shell 10 and closed at their free edge (or upper edge) by the second half-shell 20. It should be noted that, in accordance with the present invention, said sidewalls 11P may also be so realized as to protrude from the second half-shell 20 and be closed by the first half-shell 10; therefore, in the course of the present description reference will always be made to the first half-shell 10 to indicate that component from which the sidewalls 11P protrude. It must also be pointed out that, along at least a part thereof, a sidewall 11P may coincide with one of said transversal walls 10P.

[0032] The supply duct 11 is associated with a first fitting 3A that protrudes from the sidewall 10P and permits the connection of the dispenser device 1 to the water main; in particular, the first fitting 3A is connected to the water main through a suitable pipe associated with an electrovalve controlled by a control device of the washing machine (the pipe, the electrovalve and the control device are not shown in the annexed drawings). Furthermore, the first fitting 3A and the supply duct 11 may be associated with a meter (not shown in the annexed drawings), in particular a volumetric one, that allows measuring the liquid being fed into the dispenser device 1. Preferably, said meter is a turbine-type meter comprising an impeller fitted with a magnet associated with an element sensing the magnetic field generated by the magnet; for example, said sensing element may be a reed contact with foils enclosed within an envelope filled with inert gas, or a Hall-effect sensor. Also, the meter may be integrated with the body of the dispenser device 1, or may be made as a separate unit. As is known in the art, the meter, in particular of the volumetric type, generates signals that are sent to a control device (not shown), in particular an electronic or electromechanical one, of the washing machine for the purpose of determining the quantity of liquid flowing through the dispenser device 1. The dispenser device 1 preferably comprises an opening 4 for collecting and venting vapours, in particular coming from a wash tub, since said opening 4 communicates with the inner cavity 2 of the dispenser device 1. Preferably, said opening 4 is substantially circular in shape, in particular being formed in at least one of the half-shells 1A, 1B of the dispenser device 1; it is clear that, if the dispenser device 1 is made as a monolithic body, said opening 4 may be formed in at least one of the main faces forming the dispenser device 1.

[0033] The dispenser device 1 comprises also a compartment 4A located above the opening 4 (in an operating condition, i.e. when the dispenser device 1 is associated with a washing machine) for venting and/or condensing said vapours coming from the opening 4, in particular said compartment 4A comprising a second opening 4B for discharging the vapours out of the dispenser device 1 (e.g. into the environment).

[0034] The dispenser device 1 according to the present invention comprises an insert 30 that comprises at least one emitter 31 and at least one receiver 32 having respective ends facing each other, leaving a gap in between to form an air break.

[0035] It should be noted that the dispenser device 1 is also known in the art as "multifunction device", in that it comprises a plurality of components that allow the device to perform many different basic functions.

[0036] In the embodiment shown in the annexed drawings, at least said emitter 31 (which may also be defined as "spray nozzle") has a tapered shape, in particular its cross-section being narrowest at the end that is closest to the receiver 32. In accordance with a preferred embodiment (see, in particular, Figures 4B and 6B), also said receiver 32 has a tapered shape, in particular its cross-section being narrowest at the end that is closest to the emitter 31.

[0037] Moreover, the emitter 31 and/or the receiver 32 are preferably realized as tubular elements, i.e. elements having a closed cross-section.

[0038] Preferably, the respective ends of the emitter 31 and receiver 32 are arranged along the same straight line; as a consequence, the air-break device is preferably of the "injection" type (also known as "AD type"), since the emitter 31 constitutes an injector (which may also be defined as "spray nozzle") that allows the fluid to flow into the receiver 32 (which may also be defined as "collection nozzle") that faces towards it.

[0039] In particular, the end of the receiver 32 preferably has a larger cross-section than the end of the emitter 31, so as to be able to receive the liquid coming from said emitter 31.

[0040] As can be seen especially in Figures 2B, 4B and 6B, the insert 30 may also be realized in such a way as to comprise an intermediate element 33 positioned between the emitter 31 and the receiver 32, wherein said intermediate element 33 comprises:

- a second receiver element 33A facing towards said emitter 31, leaving a gap in between to form a first air break;
- a second emitter element 33B facing towards said receiver 32, leaving a gap in between to form a second air break.

[0041] It should be noted that the compartment 4A is preferably realized in such a way as to collect the liquid that has not flowed past at least one of said air breaks, in particular in the tract comprised between the emitter 31 and the receiver.

[0042] In accordance with the present invention, the dispenser device 1 comprises a first partition wall 12A protruding from said first half-shell 10 and coupled to said mutually facing sidewalls 11P, in particular for closing said supply duct 11. In this regard, it must be pointed out that said closing is essentially obtained by co-operation between the first partition wall 12A, the sidewalls 11P and said second half-shell 20.

[0043] It should be noted that said first partition wall 12A may be so constructed as to be coupled to both sidewalls 11P to form a surface disposed at an angle relative to each one of said sidewalls 11P (as shown by way of example in the embodiments illustrated in Figures 2A, 4A and 5A, wherein said first partition wall 12A develops substantially perpendicular to both sidewalls 11P), or said first partition wall 12A may be so constructed as to be essentially an extension of one of said sidewalls 11P and be coupled to the other sidewall 11P so as to form a surface at an angle relative to the latter.

[0044] Furthermore, in accordance with the present invention, the dispenser device 1 comprises a first passage 41 formed between the first partition wall 12A and the second half-shell 20 to allow the liquid to flow from the supply duct 11 to the emitter 31. In particular, said first passage 41 is formed or obtained between a free edge (which may also be defined as upper edge, i.e. a portion of the first partition wall 12A that faces towards the second half-shell 20, but is not coupled to the sidewalls 11P and to the first half-shell 10) of the first partition wall 12A and said second half-shell 20.

[0045] It should be noted that said first passage 41 can be obtained, at least partially, by means of a concavity (or recess) formed on the inner surface of the second half-shell 20 (i.e. that surface of the second half-shell 20 which faces towards the first half-shell 10 and towards the first partition wall 12A) in a position corresponding to the first partition wall 12A. This embodiment is shown in Figures 1 to 4B; in particular, it can be observed in this respect that the second half-shell 20 may be so realized as to have a corresponding rise on its external surface (i.e. the surface opposite the one facing towards the first half-shell 10 and towards the first partition wall 12A) in a position corresponding to said concavity. In addition or as an alternative, said first passage 41 may be obtained by lowering at least a portion of said first partition wall 12A (in this regard, see the third embodiment shown in Figures 5 to 6B), in particular said lowering being provided by at least a portion of the first partition wall 12A which is lower than the sidewalls 11P.

[0046] In particular, in the first embodiment shown in Figures 1 to 2B, the first passage 41 is substantially aligned with the supply duct 11 (in particular, with the terminal portion of the supply duct 11) and/or with the emitter 31; conversely, in the second embodiment shown in Figures 3 to 4B, the first passage 41 develops at an angle, in particular perpendicularly, relative to the supply duct 11 and/or the emitter 31.

[0047] In accordance with the present invention, said insert 30 comprises a first chamber 34A in fluidic communication with the emitter 31 and positioned between the emitter 31 and the first partition wall 12A, wherein said first chamber 34A has at least one opening 35A in its portion facing towards the second half-shell 20 to allow the liquid coming from the supply duct 11 and from the first passage 41 to enter the first chamber 34A.

[0048] In accordance with the present invention, the dispenser device 1 comprises a second partition wall 12B protruding from said first half-shell 10, wherein the dispenser device 1 comprises a second passage 42 formed between the second partition wall 12B and the second half-shell 20 to allow the liquid to flow from the receiver 32 to a collection chamber 5. In particular, said second passage 42 is formed or obtained between a free edge of the second partition wall 12B and said second half-shell 20. The free edge of the second partition wall 12B may also be defined as an upper edge, and essentially consists of that portion of the second partition wall 12B which faces towards the second half-shell 20.

[0049] In substance, the second partition wall 12B cooperates with the first partition wall 12A to define a seat 13 adapted to house the insert 30; it should be noted that said seat 13 may preferably be realized through the cooperation of said partition walls 12A, 12B with further septa or bulkheads protruding from the first half-shell 10.

[0050] It must be pointed out that the second passage 42 can be obtained substantially in the same manner as described with reference to the first passage 41. In fact, the second passage 42 can also be obtained:

- at least partially by means of a concavity formed on the inner surface of the second half-shell 20 in a position corresponding to the second partition wall 12B. In this context, the second half-shell 20 may be so realized as to have a rise on its outer surface in a position corresponding to said concavity (as shown in Figures 1 to 4B);
- by lowering at least a portion of said second partition wall 12B (as shown in the third embodiment illustrated in Figures 5 to 6B), in particular said lowering being provided by at least a portion of the second partition wall 12B which is lower than the sidewalls 11P.

[0051] Moreover, the second passage 42 may also be substantially aligned with the receiver 32 (e.g. as shown in the first embodiment illustrated in Figures 1 to 2B), or may develop at an angle, in particular perpendicularly, relative to said receiver 32 (e.g. as shown in the second embodiment illustrated in Figures 3 to 4B).

[0052] In accordance with the present invention, said insert 30 comprises a second chamber 34B in fluidic com-

munication with the receiver 32 and positioned between said receiver 32 and the second partition wall 12B, wherein said second chamber 34B has at least one second opening 35B in its portion facing towards the second half-shell 20 to allow the liquid coming from the receiver 32 and flowing through the second chamber 34B to enter the second passage 42.

[0053] In accordance with a preferred embodiment, the insert 30 comprises a first septum 36A and a second septum 36B lying in abutment with the first partition wall 12A and the second partition wall 12B, respectively; in particular, the first septum 36A and the second septum 36B delimit those portions of, respectively, the first chamber 34A and the second chamber 34B which are in proximity to, respectively, the first partition wall 12A and the second partition wall 12B.

[0054] The particular provisions of the present invention make it possible to overcome the drawbacks of prior-art dispenser devices by providing a dispenser device 1 which is realized in a manner such that, when the first half-shell 10, the second half-shell 20 and the insert 30 are assembled together, the dispenser device will be properly sealed, particularly in those areas of the dispenser device 1 where the liquid will flow.

[0055] In particular, the provision of the first partition wall 12A and first passage 41 (as well as the second partition wall 12B with the respective second passage 42) makes it possible to position the insert 30 between the two half-shell 10, 20 without having to resort to the interposition of any sealing elements between the insert 30 and the first half-shell 10 and between the insert 30 and the second half-shell 20.

[0056] In fact, the first partition wall 12A and the first passage 41 (as well as the second partition wall 12B and the second passage 42) will prevent the liquid flowing through the dispenser device 1 from undesirably seeping through the interstices between the mating surfaces of the insert 30 and of the two half-shells 10, 20.

[0057] In this regard, it must be pointed out that, in accordance with the teachings of the present invention, the liquid arriving at the first fitting 3A will then flow (optionally after having been measured by a volumetric meter) in the supply duct 11, go through the first passage 41, cross the air-break (from the emitter 31 to the receiver 32), go through the second passage 42 and enter the collection chamber 5.

[0058] In such a context it is therefore apparent that it is the very presence of the partition walls 12A, 12B and passages 41, 42 that will prevent the interstices between the mating surfaces of the insert 30 and the two half-shells 10, 20 from being lapped by the flowing liquid.

[0059] In addition, at least a portion of the free edge of the first partition wall 12A and/or of the second partition wall 12B can be used for realizing an optimal coupling between the first half-shell 10 and the second half-shell 20; in particular, said coupling can be adequately effected by means of a vibration or hot-blade welding process.

[0060] It is therefore apparent that the dispenser device 1 according to the present invention can be properly assembled without having to resort to the interposition of any sealing elements (e.g. gaskets, typically O-rings) between the insert 30 and the two half-shells 10, 20.

[0061] The dispenser device 1 according to the present invention is thus conceived in a manner such that its parts (i.e. the first half-shell 10, the second half-shell 20 and the insert 30) can be assembled together at low costs and in a manner such as to reduce the complexity of the production process.

[0062] The dispenser device 1 made in accordance with the teachings of the present invention therefore ensures a regular water outflow from the dispenser device 1 even in case of a malfunction of said dispenser device 1, since it guarantees the optimal operation of the air break, which in turn will avoid any backflow of liquid into the water network even under adverse conditions, while also preventing any electrical safety problems and/or dripping of liquid onto the floor whereon the washing machine stands.

[0063] The dispenser device 1 according to the present invention is therefore simple, economical, and small in size.

[0064] The dispenser device 1 according to the present invention further comprises a second fitting 5A that allows the collection chamber 5 to be connected to a softener device (not shown in the drawings), in particular to a regeneration tank containing an agent (in particular, brine) for regenerating ion-exchange resins. Preferably, the flow of liquid from the collection chamber 5 to the regeneration tank is controlled by an electrovalve (not shown) controlled by the control device of the washing machine; as is known, the capacity of the collection chamber 5 is preferably suited to the quantity and/or volume of resins in the resin container.

[0065] Said dispenser device 1 further comprises a septum 6 that allows separating the collection chamber 5 from a second collection chamber 7 associated with a third fitting 7A; as a consequence, after having filled the collection chamber 5 and having risen above the level of the septum 6, the liquid will overflow into the second collection chamber 7 and will then reach the wash tub, through the third fitting 7A, after having flowed through a softener device (not shown), in particular through a resin container (containing ion-exchange resins) of said softener device.

[0066] In substance, in accordance with the teachings of the present invention, after having filled the collection chamber 5 and risen above the level of the septum 6, the liquid will overflow into the second collection chamber 7 to reach the wash tub after having flowed through the resin container of a softener device. The liquid in the collection chamber 5 will be delivered (in particular when an electrovalve is opened) into the regeneration tank in order to regenerate the resins contained in the resin container.

[0067] It should also be noted that the dispenser device 1 according to the present invention may also be so re-

alized that the collection chamber 5 is connected to both a resin container and a regeneration tank of a softener device (not shown in the drawings); for example, such a connection may be obtained by means of a switching element (e.g. a switching valve) allowing the liquid to be directed from the collection chamber 5 to the resin container and/or to the regeneration tank.

[0068] The features and advantages of the dispenser device 1 according to the present invention and of the related washing machine are apparent from the above description.

[0069] In fact, the particular provisions of the present invention make it possible to overcome the drawbacks of prior-art dispenser devices by providing a dispenser device 1 realized in a manner such that, when the first half-shell 10, the second half-shell 20 and the insert 30 are assembled together, the dispenser device will be properly sealed, particularly in those areas of the dispenser device 1 where the liquid will flow.

[0070] In particular, the provision of the partition walls 12A, 12B and the respective passages 41, 42 (obtained between said partition walls 12A, 12B and the second half-shell 20) makes it possible to position the insert 30 between the two half-shells 10, 20 without having to resort to the interposition of any sealing elements between the insert 30 and the other components.

[0071] In fact, the partition walls 12A, 12B and the passages 41, 42 make it possible to prevent the liquid flowing through the dispenser device 1 from undesirably seeping through the interstices between the mating surfaces of the insert 30 and of the two half-shells 10, 20; in this regard, it is evident that the presence of the partition walls 12A, 12B and passages 41, 42 will prevent said interstices between the mating surfaces of the insert 30 and of the two half-shells 10, 20 from being lapped by the flowing liquid.

[0072] In addition, at least a portion of the free edge of the first partition wall 12A and/or of the second partition wall 12B can be used for realizing an adequate coupling between the first half-shell 10 and the second half-shell 20; in particular, said coupling can be effected by means of a vibration or hot-blade welding process.

[0073] It is therefore apparent that the dispenser device 1 according to the present invention can be assembled with confidence without having to resort to the interposition of any suitable sealing elements between the insert 30 and the two half-shells 10, 20.

[0074] The dispenser device 1 according to the present invention is thus conceived in a manner such that its parts (i.e. the first half-shell 10, the second half-shell 20 and the insert 30) can be assembled together at low costs and in a manner such as to reduce the complexity of the production process.

[0075] The dispenser device 1 made in accordance with the teachings of the present invention therefore ensures a regular water outflow from the dispenser device 1 even in case of a malfunction of said dispenser device 1, since it guarantees the optimal operation of the air break, which in turn will avoid any backflow of liquid into the water network even under adverse conditions, while also preventing any electrical safety problems and/or dripping of liquid onto the floor whereon the washing machine stands.

[0076] It is also apparent that the dispenser device 1 according to the present invention is simple, economical, and small in size.

[0077] The dispenser device 1 for dispensing a liquid for a washing machine for household use, in particular a dishwasher, and the related washing machine described herein by way of example may be subject to many possible variations without departing from the novelty spirit of the inventive idea; it is also clear that in the practical implementation of the invention the illustrated details may have different shapes or be replaced with other technically equivalent elements.

[0078] It can therefore be easily understood that the present invention is not limited to the above-described dispenser device 1 and washing machine, but may be subject to many modifications, improvements or replacements of equivalent parts and elements without departing from the inventive idea, as clearly specified in the following claims.

Claims

1. Dispenser device (1) for dispensing a liquid for a washing machine for household use, in particular a dishwasher, said dispenser device (1) being of the type that comprises:

- a first half-shell (10), from the lateral edge of which a transversal wall (10P) rises;
- a second half-shell (20), which has a shape substantially corresponding to that of the first half-shell (10) and is fixed to the upper edge of said transversal wall (10P) so as to form an inner cavity (2);
- a supply duct (11) supplying water from a water main, wherein said supply duct (11) is formed by mutually facing sidewalls (11P) protruding from the first half-shell (10) and closed at their free edge by the second half-shell (20);
- an insert (30) comprising at least one emitter (31) and at least one receiver (32) having respective ends facing each other, leaving a gap in between to form an air break,

said dispenser device (1) being **characterized in that** it comprises:

- a first partition wall (12A) protruding from said first half-shell (10) and coupled to said mutually facing sidewalls (11P), in particular for closing said supply duct (11);
- a first passage (41) formed between the first

partition wall (12A) and the second half-shell (20) to allow the liquid to flow from the supply duct (11) to the emitter (31), in particular said first passage (41) being formed between a free edge of the first partition wall (12A) and said second half-shell (20).

2. Dispenser device (1) according to claim 1, **characterized in that** said first passage (41) is obtained, at least partially, by means of a concavity formed on the inner surface of the second half-shell (20) in a position corresponding to the first partition wall (12A), in particular said inner surface consisting of a surface of the second half-shell (20) facing towards the first half-shell (10) and the first partition wall (12A).

3. Dispenser device (1) according to claim 2, **characterized in that** the second half-shell (20) is so realized as to have a corresponding rise on its outer surface in a position corresponding to said concavity, in particular said outer surface consisting of a surface of the second half-shell (20) opposite to that which faces towards the first half-shell (10) and towards the first partition wall (12A).

4. Dispenser device (1) according to one or more of the preceding claims, **characterized in that** said first passage (41) is formed by lowering at least a portion of said first partition wall (12A), in particular said lowering being provided by at least a portion of the first partition wall (12A) which is lower than the sidewalls (11P).

5. Dispenser device (1) according to one or more of the preceding claims, **characterized in that** said insert (30) comprises a first chamber (34A) in fluidic communication with the emitter (31) and positioned between the emitter (31) and the first partition wall (12A), wherein said first chamber (34A) has at least one opening (35A) in its portion facing towards the second half-shell (20) to allow the liquid coming from the supply duct (11) and from the first passage (41) to enter the first chamber (34A).

6. Dispenser device (1) according to one or more of the preceding claims, **characterized in that** said dispenser device (1) comprises:

- a second partition wall (12B) protruding from said first half-shell (10);
- a second passage (42) formed between the second partition wall (12B) and the second half-shell (20) to allow the liquid to flow from the receiver (32) to a collection chamber (5), in particular said second passage (42) being formed between a free edge of the second partition wall (12B) and said second half-shell (20).

7. Dispenser device (1) according to claim 6, **characterized in that** the second partition wall (12B) cooperates with the first partition wall (12A) to define a seat (13) adapted to house the insert (30), in particular said seat (13) being obtained through the cooperation of said partition walls (12A, 12B) with further septa or bulkheads protruding from the first half-shell (10).

8. Dispenser device (1) according to one or more of claims 6 and 7, **characterized in that** said second passage (42) is obtained, at least partially, by means of a concavity formed on the inner surface of the second half-shell (20) in a position corresponding to the second partition wall (12B), in particular said second half-shell (20) comprising a rise on its outer surface in a position corresponding to said concavity.

9. Dispenser device (1) according to one or more of claims 6 to 8, **characterized in that** said second passage (42) is formed by lowering at least a portion of said second partition wall (12B), in particular said lowering being provided by at least a portion of the second partition wall (12B) which is lower than the sidewalls (11P).

10. Dispenser device (1) according to one or more of claims 6 to 9, **characterized in that** said insert (30) comprises a second chamber (34B) in fluidic communication with the receiver (32) and positioned between said receiver (32) and the second partition wall (12B), wherein said second chamber (34B) has at least one second opening (35B) in its portion facing towards the second half-shell (20) to allow the liquid coming from the receiver (32) and flowing through the second chamber (34B) to enter the second passage (42).

11. Dispenser device (1) according to one or more of the preceding claims, **characterized in that** said insert (30) comprises a first septum (36A) and a second septum (36B) lying in abutment with the first partition wall (12A) and the second partition wall (12B), respectively.

12. Dispenser device (1) according to one or more of the preceding claims, **characterized in that** the first septum (36A) and the second septum (36B) delimit those portions of, respectively, the first chamber (34A) and the second chamber (34B) which are in proximity to, respectively, the first partition wall (12A) and the second partition wall (12B).

13. Dispenser device (1) according to one or more of the preceding claims, **characterized in that** the emitter (31) and/or the receiver (32) are made as tubular elements, wherein the respective ends of the emitter (31) and of the receiver (32) are arranged along the

same straight line.

14. Dispenser device (1) according to one or more of the preceding claims, **characterized in that** said insert (30) is so realized as to comprise an intermediate element (33) positioned between the emitter (31) and the receiver (32), wherein said intermediate element (33) comprises:

- a second receiver element (33A) facing towards said emitter (31), leaving a gap in between to form a first air break;
- a second emitter element (33B) facing towards said receiver (32), leaving a gap in between to form a second air break.

15. Washing machine comprising a dispenser device (1) according to one or more of the preceding claims 1 to 14.

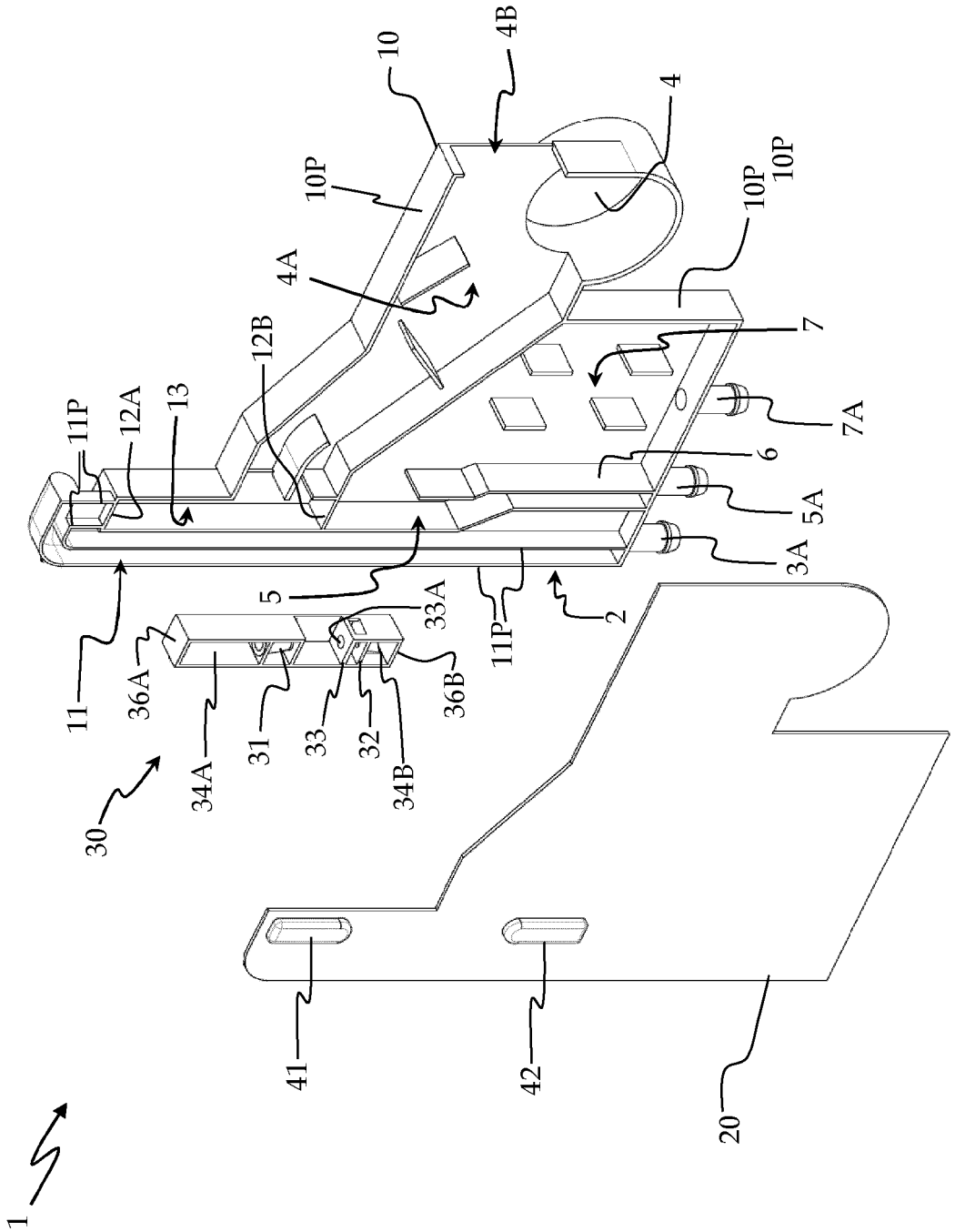

1
10
4B
4
10P
4A
12B
13
12A
11P
7
7A
6
5A
3A
5
33A
11P
2
11
36A
34A
31
33
32
34B
36B
30
41
42
20

Fig. 1

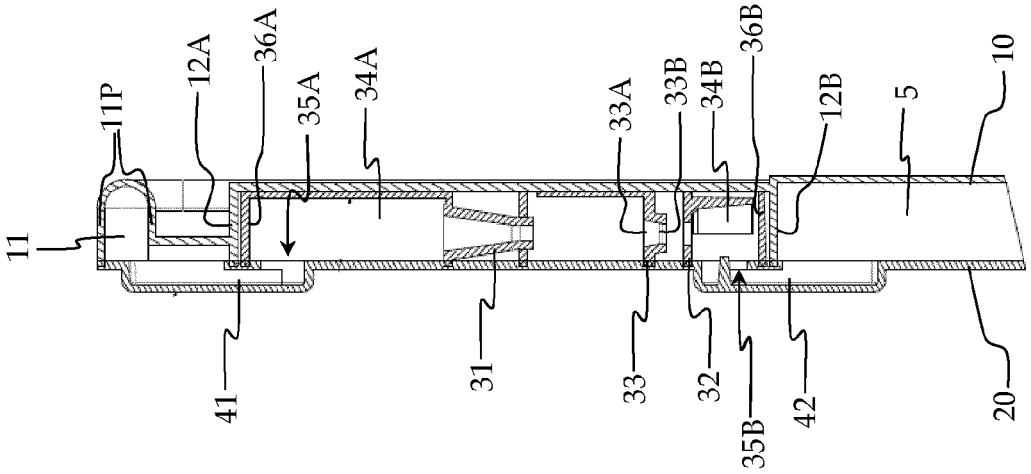

11
11P
12A
36A
35A
34A
33A
33B
34B
36B
12B
5
10
41
31
33
32
35B
42
20

Fig. 2B

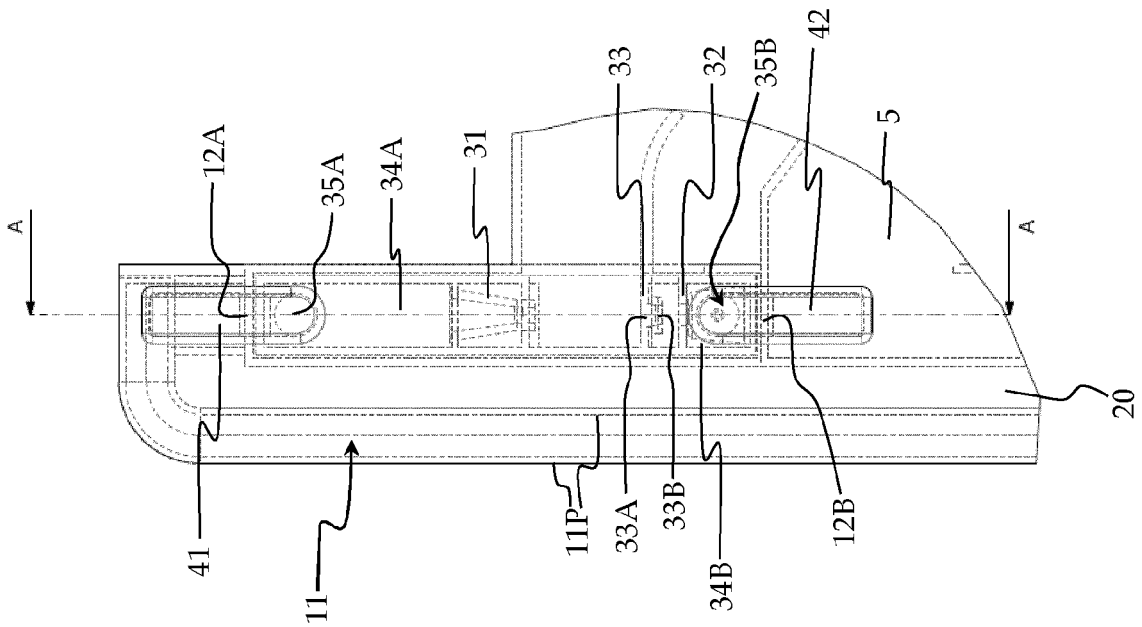
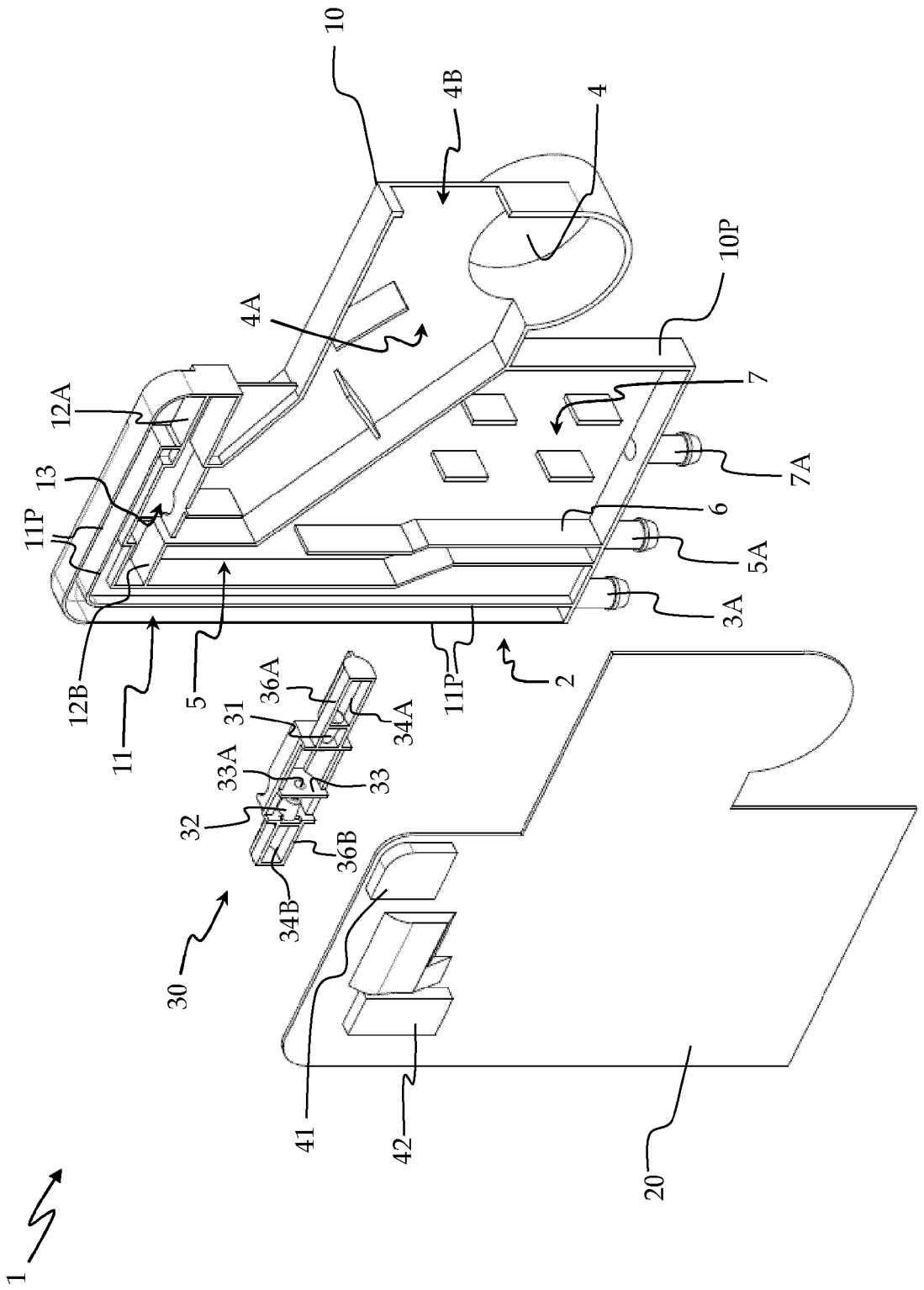

A
12A
35A
34A
31
33
32
35B
42
5
A
41
11
11P
33A
33B
34B
12B
20

Fig. 2A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4
4A
10P
12A
7
13
7A
11P
6
5A
3A
12B
11
5
11P
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36A
31
34A
33A
33
32
36B
34B
30
41
42
20
1

Fig. 3

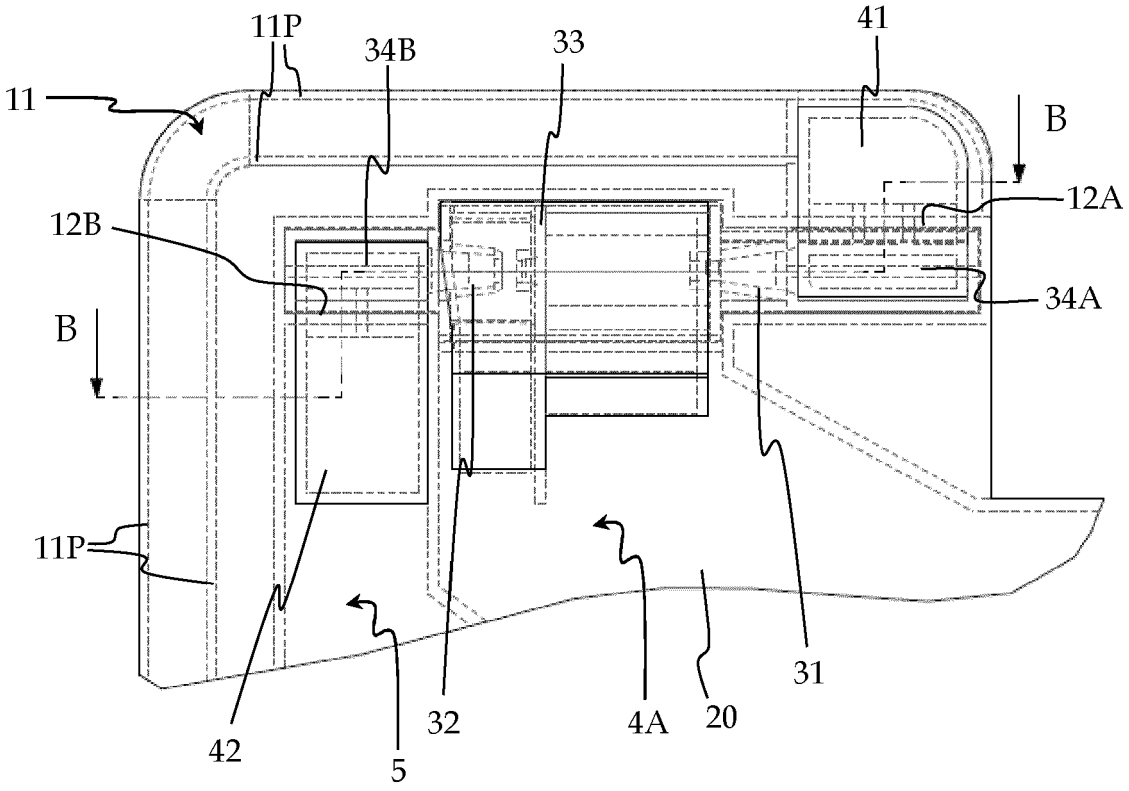

11P
34B
33
41
11
B
12A
12B
34A
B
11P
42
5
32
4A
20
31

Fig. 4A

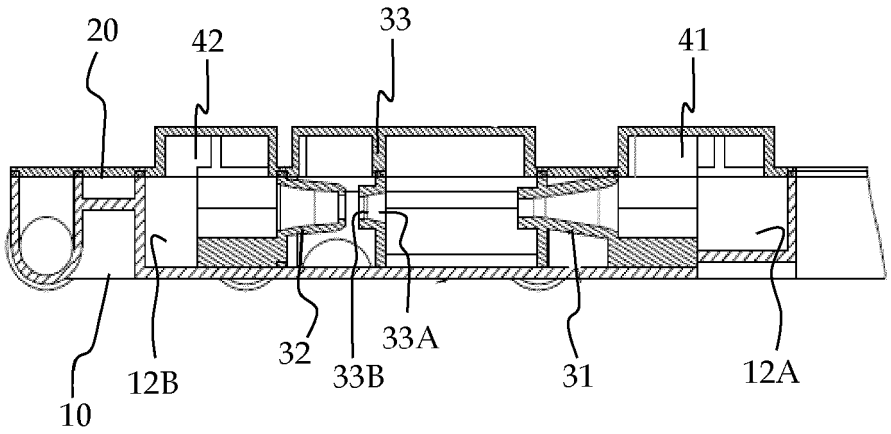
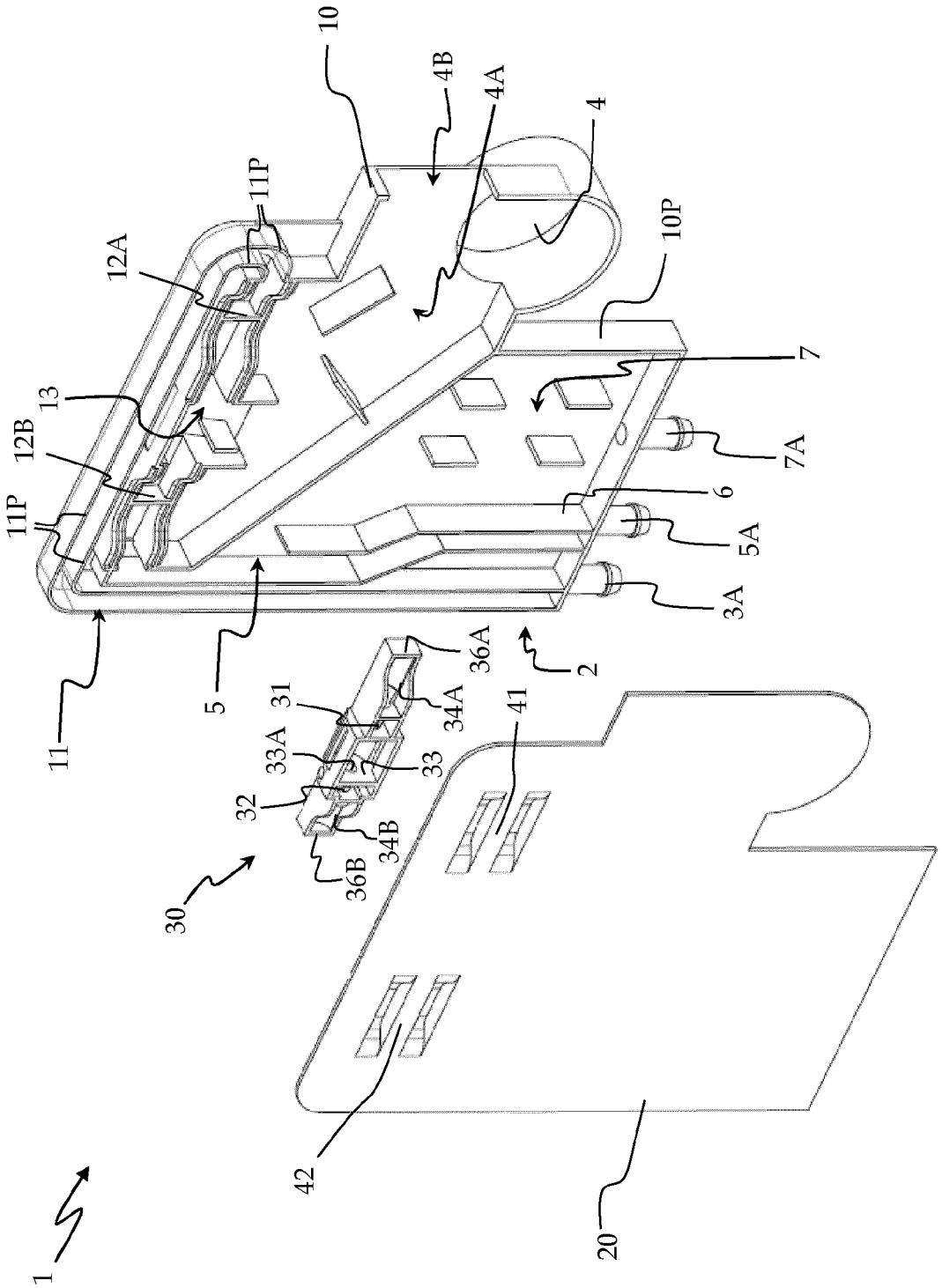

20
42
33
41
10
12B
32
33B
33A
31
12A

Fig. 4B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4B
4A
4
11P
12A
10P
7
13
12B
11P
7A
6
5A
3A
36A
2
11
5
31
34A
41
33A
33
32
34B
36B
30
42
20
1

Fig. 5

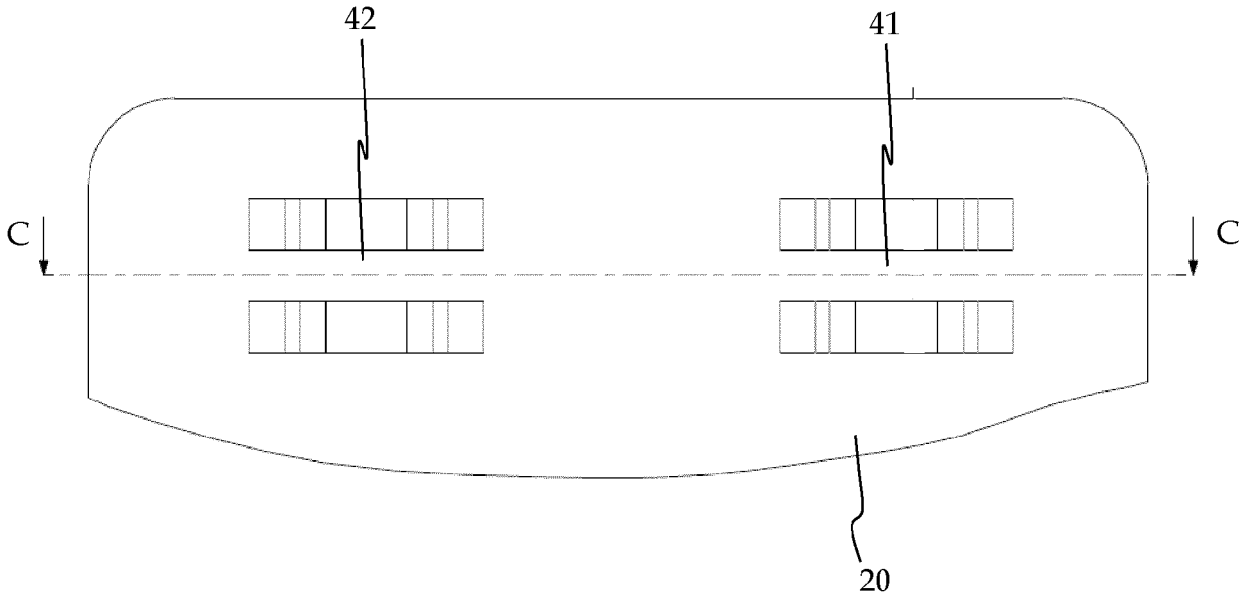

Fig. 6A

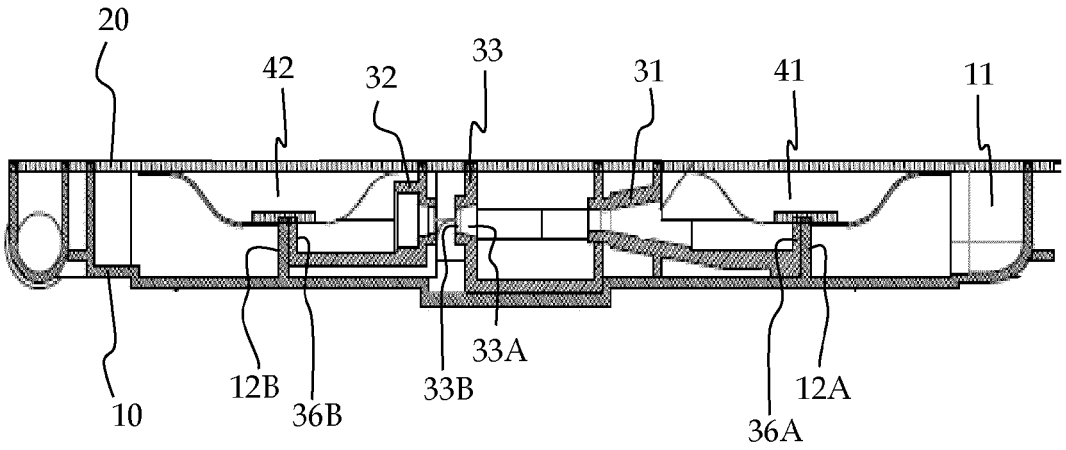

Fig. 6B

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EUROPEAN SEARCH REPORT

Application Number
EP 22 18 0387

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 September 2022	Sangiorgi, Massimo

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