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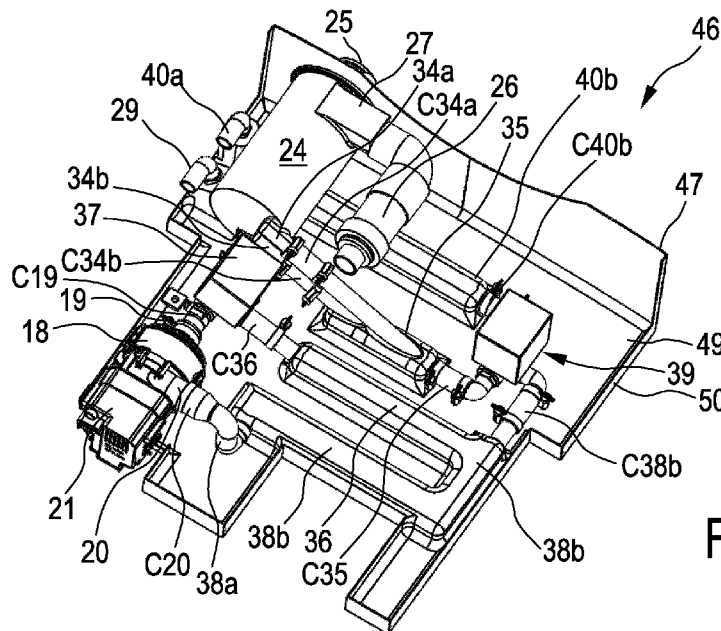


Fig. 7

(57) Abstract: An insertion module (46) for a water-conducting domestic appliance comprises a carrier (49) and thereon a pump (18), valves (37, 39), a filter (24), a water conduit with a plurality of water lines and water conducting connections (C19, C20, C34a, C34b, C35, C38b, C40b) between the pump (18), the valves (37, 39) and the filter (24). The pump (18) is arranged detachably held on the carrier (49). The water-conducting connections (C19, C20) for a supply line of the pump and for a discharge line of the pump are provided in two separate plug-in directions extending at right angles to each other. The water-conducting connections are designed to be fastenable without tools and to be detachable without tools, and the water lines of the water conduit are partly integrally formed in the carrier (49).



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Insertion module for a water-conducting domestic appliance and water-conducting domestic appliance with such an insertion module

Technical field and prior art

5 The invention is directed to an insertion module for a water-conducting domestic appliance as well as to a water-conducting domestic appliance with such an insertion module. The insertion module may preferably be designed as a kind of drawer.

It is known for example from EP 4 086 383 A1 to provide a washing machine with a drawer-like module, which includes a main part of the water conduit of the washing machine. The module can be extracted from the washing machine to service the module, for example a pump or a filter.

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Summary of the Invention

It is an object of the invention at hand to provide an insertion module for a water-conducting domestic appliance as well as a water-conducting domestic appliance with such an insertion module to overcome problems in the art and, in particular, to provide a water-conducting domestic appliance which is specifically and in detail adapted to be easier repaired and easier serviced, while at the same time the construction is simple and simply adapted.

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This object is solved by an insertion module for a water-conducting domestic appliance having the features of claim 1 as well as by such a water-conducting domestic appliance having the features of claim 16. Advantageous and preferred configurations of the invention are the subject of the further claims and are explained in more detail below. Some of the features may be described only with regard to the method or only with regard to the baking oven. However, regardless of this, they are intended to be able to apply by themselves for the method for operating a baking oven and for the baking oven independently of one another. The wording of the claims is made to the content of the description by means of express references.

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The insertion module for a water-conducting domestic appliance, preferably a washing machine or a dishwasher, comprises a pump, at least one valve or a plurality of valves, a filter, and a water conduit having a plurality of water lines and water conducting connections between the pump, the at least one valve and the filter. The water lines are connected to the pump, to the at least one valve or to the filter by means of the water-conducting connections, wherein these water-conducting connections may be for example in the form of manually removable line connectors

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or screw clamps, wherein the screws may be provided with wing nuts. The module also has a carrier, which preferably is an extended and/or flat carrier. The pump, the at least one valve, the filter and the water conduit are arranged on this carrier. The carrier may have a base size slightly smaller than the water-conducting domestic appliance, for example 5% to 20% smaller.

5 In the invention at hand, the pump is arranged and detachably held on the carrier, preferably by screws, a snap-in connection, or a clamp connection. A mounting and/or plug-in direction of water-conducting connections for the pump is provided in only one single and common plug-in direction or is provided in two separate plug-in directions extending at an angle of between 60° and 90° to each other, preferably at right angles. This direction of water-conducting connections for the pump
10 may in particular be provided for a supply line or a pump inlet of the pump and for a discharge line or a pump outlet of the pump. The water-conducting connections, preferably some or all, are designed such that they can be fastened without tools and be detached without tools. This allows for easy servicing by a user of the domestic appliance himself, such that not for every technical issue an experienced service technician needs to be called. Furthermore, the water lines of the
15 water conduit are fixed to the carrier, which allows for the insertion module to be better handled as a functional element.

By providing the water-conducting connections for the pump in only one single and common plug-in direction or in two separate plug-in directions extending at an angle of between 60° and 90° to each other a manufacturing of the module is easy and fool-proof, which is also the case for a
20 repair by a user himself. It is for example very easy to dismount the pump, possibly replace it and put it back into place when the water-conducting connections are straight and visibly provided. Furthermore, the water-conducting connections can have a simple construction.

In an embodiment of the invention, further water-conducting connections may also run parallel to the one or to the two plug-in directions as at the pump. This may in particular be for the at least
25 one valve, preferably for more than only one valve. In preferred manner, every valve of module has water-conducting connections at right angles to each other.

In a further embodiment of the invention, two different plug-in directions of the water-conducting connections are provided on the whole module. These two different plug-in directions or, if there are more plug-in directions, all the plug-in directions are either parallel or at right angles to each
30 other.

The water-conducting connections may be designed as manually fixable and manually releasable hose clamps, alternatively they may comprise manually fixable and manually releasable hose

clamps. They can be provided with wing nuts to be handled manually in an easy way, in particular where the space to handle the water-conducting connections may be limited such that tools are difficult to use.

5 In an embodiment of the invention, at least some of the water-conducting connections are designed such that they can be displaced or are telescopic in themselves in such a way that, after loosening fastenings or clamping connections or said hose clamps, the water-conducting connection can be shortened or alternatively lengthened in order to loosen a functional element connected thereto in a water-conducting manner in the direction at right angles to the longitudinal direction of the water-conducting connection. The water-conducting connection may in particular
10 be plugged into one another or into each other in the fastened state, which may provide for a sufficiently water-tight connection if designed properly, preferably as a push fit fitting or the like. Any clamp mentioned before may fix the plug-in connection or push fit fitting finally against disassembly. It may also improve the water tightness.

15 In another embodiment of the invention, at least some of the water-conducting connections are formed identically. This allows for easier manufacturing. In preferred manner, all the water-conducting connections on the same functional element may be formed identically, for example on the pump or on the at least one valve. Preferably, most, or even all water-conducting connections of the insertion module are identically formed.

20 In a preferred embodiment of the invention, at least one water line of the water conduit or of the insertion module may be at least partially integrally formed in the carrier and by the carrier. In particular the carrier together with at least a part of this water line is produced in a plastic injection molding process or in a 3D printing process. Such an integration allows for an easier manufacturing process and for improved water tightness because no flexible hose may break or the like. This water line may preferably be completely formed in and by the carrier, in particular
25 onto an even ground of the carrier. Respective connections to such an integrated water line may be provided, for example by protruding nipples or fittings, which may even form a part of a water-conducting connection described above. It may also be provided that any water line of the insertion module is either at least partially or fully integrally formed in the carrier or may run freely, such that no water line is fixed to the carrier by itself, for example screwed or clamped directly to
30 the carrier. Such a freely running water line may be provided to the valves or to the pump, wherein they may be designed rather short and/or from sufficiently rigid material to have sufficient stability such that no additional fixture to the carrier is needed.

It is possible to fasten electrical connection lines to the top of or onto the water lines, in particular they may be fastened in a detachable manner. This is in particular advantageous if the water lines are integrally formed with the carrier as explained before. In preferred manner, the electrical connection lines may be arranged at the uppermost region of the water lines. This helps to keep them dry and protected from any water on the carrier. This also serves to have them readily accessible if any repair or replacement is needed. This also helps to provide electrical connections such as plug connectors in such a way on the functional elements such as the pump that they are easily accessible from above.

In an alternative embodiment of the invention, some or all electrical connection lines are arranged underneath the carrier or on the underside of the carrier, respectively. This is preferred if the carrier is watertight as a drawer or the like, so if water from above, for example from the tub or the drum, may be caught on and in the drawer. The electrical connection lines underneath the carrier are in this way protected against water or becoming wet.

The carrier may generally be designed to have some areas being higher than other areas or than a lowermost area of the carrier. This allows for the electrical connection lines as well as for other electrical components to be placed in these higher areas, either on top of the carrier such that any water will quickly run down and away from them. Alternatively, they can be arranged underneath the carrier but also in these higher areas, where they are also protected against water underneath them on the floor.

In preferred manner, the carrier may be designed to have a plurality of areas of different height, wherein in each of these areas the same height is given. These areas may in particular be in the form of terraces or the like, preferably with only a slight inclination towards the next lower area for water to run easily off. It may be provided that each area extends over a complete length or over a complete width of the carrier, such that there may be provided three to five terraces in total. As mentioned before, electrically connected or electrically conductive areas or electrical functional elements should be arranged in areas higher than the lowermost area.

In one embodiment, the carrier may have or form a closed surface, preferably a kind of a collecting trough for water. This may be realized in such a way that at least some areas of the carrier, in particular the entire carrier, have upwardly drawn walls or boundaries to form the collecting trough. Such walls or boundaries should preferably extend along an outer edge of the carrier, in particular with similar height. This provides for the carrier to be water-tight and even to be able to collect some water dripping from the water conduit if a water-conducting connection is loosened.

In an alternative embodiment, the carrier may be designed in a grid-like manner with openings or as a web or the like. This allows for all water from above to simply drip down on the floor through and underneath the module, where it may be collected or dried easily. In preferred manner, this grid-like carrier should be provided with grid webs circumferentially along its outside to enhance its stability.

In a further embodiment of the invention, the pump can be attached to the carrier by means of a slide-in attachment with a slide-in direction parallel to the direction of insertion of a water-conducting connection to the pump, in particular the direction of a pump inlet or a supply line. Such a sliding attachment can preferably have a slide-in foot provided at the bottom or underside of the pump, which slide-in foot engages in and under a slide-in tab projecting upwardly from the carrier when attaching the pump to the carrier. This same attachment movement may at the same time also effect insertion of the water-conducting connection to the pump. The same may apply in the opposite manner with detaching the pump and at the same time allows for height and/or length compensation. This may be necessary if an original pump is exchanged for a non-original pump after some time for repair, wherein this -original pump is different with regard to its dimensions.

In a preferred embodiment, a dosing device for additives, which in particular may be cleaning agents, detergents, descaling agents or the like, can additionally be arranged on the carrier. Such a dosing device can also be connected to the water conduit, preferably by means of at least one dosing valve. This allows for a short distance of such a dosing device to the main part of the water conduit arranged on the module, in particular the pump. This allows for a very good admixing of any additives into the water when being pumped by the pump.

Preferably, the at least one valve, more preferably several or all the valves of the insertion module, can be supported and carried exclusively at their water-conducting connections. This serves not having to attach the valves additionally to the carrier. As these valves together with any electric valve drive are usually not very heavy, they can easily be supported by only its water-conducting connections. In preferred manner, at least some of the valves are three-way ball valves, wherein the three water-conducting connections are such that two of them are in parallel directions and one is at an angle thereto, preferably at right angles. This serves for a secure support of the valve. The water-conducting connections may be loosened one after the other to detach the valve, which is easy to do.

In a preferred embodiment, the filter may fixedly be arranged on the carrier, in particular be fixed by screws or clamps. The filter itself needs only rarely to be replaced or taken out. This is even more so the case if the filter can generally be opened by a lid or the like, and any filter element or filter elements therein may be removed for replacement or for cleaning. Such a filter is for example
5 known from EP 4 140 559 A1. The filter may additionally be designed and used as a water reservoir, so it needs to have a certain volume for water resulting in a certain and significant weight. For this reason, it is better to have the filter securely fixed to the carrier.

In a further embodiment of the invention, different areas of the carrier or of the water conduction or of the water-conducting connections may have different colors and/or be provided with different
10 markings. These different colors and/or different markings may preferably differ according to various criteria being important for manufacturing the module and for servicing or repairing it. Some of the criteria may be water pressure, clean water or wastewater flow or relating to electric details. They may be defined by which water pressures prevail or whether electrically conductive connections or components are designed for AC or for DC, or the like. Colors can be applied after
15 manufacturing the carrier, whereas markings can be produced together with it by molding or 3D printing.

A water-conducting domestic appliance according to the invention has an insertion module described before, which insertion module is arranged at the bottom or lower region of the domestic appliance. This may in particular be the lowermost region of the domestic appliance just above a
20 support surface of the domestic appliance, either above the floor or an appliance base. The insertion module is at least partially extractable or movable forwards out of the domestic appliance or out of a housing of the domestic appliance, respectively. In particular, the insertion module may be formed as a drawer from EP 4 086 383 A1 mentioned at the beginning.

In an embodiment of the appliance, the insertion module has a first locking device with a
25 mechanical stop, which mechanical stop is designed in such a way that the insertion module together with the carrier can be pulled out of the domestic appliance or extracted only between 20% and 50%, in particular 30% to 40%. Then the mechanical stop is provided for striking thereagainst or any part of the appliance to prevent further extracting the carrier. The mechanical stop may preferably be designed to be releasable, in particular releasable only with a specific tool
30 or with a key and/or with an electronic stop like for the doorlock of the door 13, which is also supervised by an appliance control for being able to stop any function of the appliance when the module is extracted further. This stop helps to prevent unauthorized persons to fully extract the insertion module, where maybe certain functional elements or sensitive or dangerous regions are located at the rear end which is not accessible. Only with the specific

tool or key the locking device with the mechanical stop can be unlocked to fully extract the module or to take it out of the appliance. Alternatively, the mechanical stop can be unlocked without specific tools, but unlocked manually for example in an easy way. In this case the mechanical stop serves for raising the awareness of any person servicing the appliance.

- 5 In preferred manner, a direction of extractability of the insertion module from the domestic appliance may correspond to a plug-in direction of some of the water-conducting connections. This helps to arrange the connections in an orderly manner. In some cases, an extraction of the insertion module, preferably for more than a defined distance, may at the same time loosen or open a water-conducting connection, for example to a tub outlet of a washing machine. This
10 allows for an easier extraction of the module.

In an embodiment of the invention, the filter may be arranged in a front region of the insertion module, in particular may be accessible from the front of the insertion module by means of an openable cover or lid. Then a filter element may be taken out of the filter even without extracting the insertion module.

- 15 The pump may be arranged in a rear region of the insertion module, in particular in the rearmost 2% to 25%. So, the pump is only accessible after mainly or fully extracting the insertion module out of the appliance. This helps to make the extractability according to what shall be serviced.

- In a further embodiment of the invention, only exactly two water connections or three water connections are provided on the insertion module, a first water connection may be designed as a
20 water inlet. A second water connection may be designed as a wastewater or distribution outlet, so only two water connections to the outside are provided. These two water connections are preferably arranged in the foremost 5% to 50% of the insertion module, more preferably water-conducting connections being provided to the water connections with a plug-in direction along a direction of extractability of the insertion module from the domestic appliance, but in the direction
25 against it. It can be provided that these two water connections water connections must be loosened to extract the module for more than 20% or 30%, wherein such a loosening can take place automatically with extracting the module. A third water connection may be provided, preferably to a tub outlet, wherein this third water connection may be designed telescopically or elastically with a variable length. This elasticity is also described in EP 4 086 383 A1.

- 30 These and further features are evident not only from the claims but also from the description and the drawings, the individual features each being implemented by themselves or in multiples in the form of sub combinations for an embodiment of the invention and in different fields and being able

to be advantageous and independent protectable embodiments for which protection is claimed here. The division of the application into individual sections and subheadings does not limit the general validity of the statements made thereunder.

Short description of the drawings

- 5 In the following, embodiments of the invention will be described in detail with reference to the drawings. Throughout the drawings, the same elements will be denoted by the same reference numerals. In the drawings show:
- Fig. 1 a schematic view onto a washing machine from the side with regard to its functional elements, in particular a water conduit with water lines and valves,
- 10 Fig. 2 an oblique view onto a washing machine according to the invention with a front side having an insertion module completely inserted such that the washing machine is closed,
- Fig. 3 the washing machine of Fig. 2 with the insertion module being partly extracted,
- Fig. 4 a view onto the washing machine of Fig. 3 with the insertion module almost completely extracted,
- 15 Fig. 5 an enlarged view from a different perspective according to Fig. 3,
- Fig. 6 the insertion module alone with a view oblique from above showing the functional elements provided thereon,
- Fig. 7 the insertion module of Fig. 6 with a view from behind,
- Fig. 8 the insertion module in a view from above,
- 20 Fig. 9 a separate carrier for an insertion module without integrated water lines,
- Fig. 10 a simplified front view onto a washing machine according to the invention with a functional module having a carrier being divided in areas of different height,
- Fig. 11 an enlarged view onto the position of Fig. 3 having a lock with a lock-pin for a limited extraction,
- 25 Fig. 12 a view onto the lock similar to Fig. 11 from a different perspective,
- Fig. 13 a view on the situation of Fig. 11 from below showing the lock-pin blocked by the housing of the washing machine, and
- Fig. 14 an enlarged sectional view onto the backside of the filter with back-wash lines and water-conducting connections with wing nuts.

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Detailed description of the embodiments

Fig. 1 shows a washing machine 11 according to the invention as a water-conducting domestic appliance, wherein mainly water-conducting functions are shown. The washing machine 11 has

a conventional housing 12 with a front side, in which a door 13 is located as conventional, see also for example Fig. 3. The door 13 gives access to a drum 14, which is shown in chain-dotted lines, said drum 14 being rotatably arranged in a tub 15. The tub 15 has a tub outlet 16 at its lowermost region, wherein the tub outlet 16 is connected via a telescope tub outlet line 26 to a filter valve 27 and a filter 24. The filter valve 27 can be a simple check valve to avoid water or contaminants from the filter 24 to be conducted back into the tub 15. It is mounted directly and can even be integrated into the filter 24, such that this valve 27 cannot be specifically activated. In consequence, this valve does also not have any water-conducting connection that needs to be tightened or loosened.

10 From the filter 24 a filter outlet 32 leads to a filter valve 37, which is a three-way ball valve with an electric actuator, for example a motor, a stepper motor or an electromotor. A back-wash inlet 34 leads into the filter 24, which will be explained later in detail.

The filter valve 37 is connected to a pump inlet 19 of a pump 18, which will also be described later in detail. The pump 18 has a pump outlet 20 which is connected to a pump outlet line 38 leading away from the pump 18. The pump outlet line 38 branches off with an additional line 36, which goes back to the filter valve 37 as the third connection. Behind this branching off to the additional line 36, a pump valve 39 is provided, which is also a three-way ball valve with an electric actuator. One outlet of the pump valve 39 goes to the left and is connected to a back-wash line 35, leading to the back-wash inlet 34 into the filter 24. This serves as a back-wash function, which is known for such a filter from EP 4 140 559 A1, to which explicit reference is made hereby.

Another outlet of the pump valve 39 leads via a distribution line 40b to another three-way ball valve, which is a distribution valve 41. One outlet of the distribution valve 41 is a wastewater outlet 42 and leads to the right out of the washing machine 11. Another outlet of the distribution valve 41 leads to a tub line 43, which again runs to a spray device 44 for spraying water into the drum 14.

Fresh water may enter the washing machine 11 and the water conduit as described before via a freshwater valve 28 and a freshwater line 30. This leads into the filter 24 at a freshwater inlet 29. Alternatively, the freshwater inlet 29 could be connected directly with the filter outlet 32 or an inlet of the filter valve 37. The freshwater valve 28 is preferably not provided on the insertion module but in the upper rear region of the washing machine 11.

In Fig. 2, the washing machine 11 is shown obliquely from the front with the door 13 in the housing 12, wherein an insertion module 46 according to the invention is provided underneath this door

13 in the lowermost region of the washing machine 11. This insertion module 46 is shown in Fig. 1 inside the housing 12 by a dotted horizontal division line which runs above the telescope tub outlet line 26, the back-wash line 35 and the pump valve 39. The insertion module 46 has a front side 47, which is flush with the front side of the rest of the housing 12. On the right side of the front side 47, a filter lid 25 for the filter 24 is provided. This filter lid 25 can be opened from the outside without extracting the insertion module 46 to clean the filter in an easy way, preferably by taking out any filter elements therein.

Fig. 3 shows the washing machine 11 of Fig. 2 with the insertion module 46 partly extracted, which is about 30% to 40% of its length. A number of the functional elements described with reference to Fig. 1 are visible, which, for sake of clarity, are not provided with reference numerals here, but later on in enlarged views.

As has been explained before and will be described in more detail with reference to Figs. 11 to 13, a lock or other locking device or blocking device is provided for the insertion module 46 to be pulled out or extracted only to the extent shown in Fig. 3. This allows for a first level of service or repair, or maintenance of the functional elements provided in the insertion module 46. The filter 24 is shown, whereas the pump 18 cannot be reached, but is still safely inside the housing 12. Only after unlocking, for example with a specific key or a defined tool or the like, can the insertion module 46 be extracted completely, which is shown in Fig. 4. All the functional elements of the insertion module 46 are fully accessible and can be serviced or repaired or replaced. In particular, if any connectors or the like for water and electricity are unconnected, the insertion module 46 could be replaced completely for a new one or for repair purposes and returning afterwards.

The different perspective view of Fig. 5 corresponding to the position of the insertion module 46 of Fig. 3 shows that the filter 24 is freely accessible in this position as well as the pump valve 39 and the telescope tub outlet line 26. This telescope tub outlet line 26 can extend or is length-variable when still being tightly connected to the tub outlet 16 of the tub 15 until this position. For further extracting the insertion module 46, a water-conducting connection of the telescope tub outlet line 26 must be loosened, preferably at its rear end. Furthermore, as can be taken from the enlarged view of Fig. 6 showing the details of the insertion module 46, there are only two further water-conducting connections of the insertion module 46, which is the freshwater inlet 29 and a distribution outlet 40a, which leads to the distribution line 40b of Fig. 1. The respective water-conducting connections must be loosened, as is already shown for the telescope tub outlet line 26. Of course, there are also electric connections to the pump 18 or its pump motor 21, respectively, as well as to the filter valve 37 and the pump valve 39. These electric connections may come from a power control or washing machine control, respectively, which may be arranged

in the upper part of the housing 12. Such electrical connections might be realized as plug connectors, which will be described later on with reference to Fig. 8. Also, such electrical connections should preferably be only accessible for disconnecting them after the insertion module 46 has been completely extracted according to Fig. 4 but should not be accessible already
5 in the position of Fig. 3.

In Fig. 6 it can be seen that the filter valve 37 is provided shortly behind the filter 24. An electric actuator for the filter valve 37 in cube form is located above it and, as such a three-way ball valve is known in the art, needs no further description. In similar manner, the filter valve 37 is connected directly to the pump inlet 19. The pump 18 forms a unit together with its pump motor 21. A pump
10 outlet 20 is provided on top of the pump 18, wherein a direction of the pump outlet 20 is at right angles to the direction of the pump inlet 19, and also at right angles to the freshwater inlet 29 and the distribution outlet 40a which are running in the same direction. The pump outlet 20 is also connected via a pump outlet line 38a, which is angled two times at 90° , and is a freely movable or rotatable part. The pump outlet line 38a is connected with a water-conducting connection to a
15 pump outlet line 38b, which is integrally formed in a carrier 49 of the insertion module 46 in one part. It can be taken from Figs. 6 to 8 that the pump outlet line 38b is also directly connected to the additional line 36, which is also integrally formed in the carrier 49. This additional line 36 leads via a separate short free line and a water-conducting connection to the filter valve 37. The pump outlet line 38b also leads via a short water line to the pump valve 39. One outlet of the pump valve
20 39 leads to the back-wash line 35 being also integrally formed with the carrier 49. A part of it extends at an oblique angle of about 15° to 30° to an upper first back-wash inlet 34a of the filter 24. Another oblique back-wash line 35 is to a second back-wash inlet 34b. As the filter 24 has two different filter stages inside, which are a coarse particle filter and a fine filter, two back-wash inlets 34a and 34b are provided. Each of the back-wash inlets 34a and 34b has its own water-
25 conducting connection.

Another outlet of the pump valve 39 leads via a water-conducting connection to the distribution line 40b, which is also integrally formed together with the carrier 49. It leads to the distribution outlet 40a on the other side of the filter 24.

In the view from above of Fig. 8, the water-conducting connections are shown with specific
30 numerals. A water-conducting connection C32 is provided between the filter 24 and the filter valve 37. Another water-conducting connection C19 is provided to the pump inlet 19. A third water-conducting connection C36 is provided to the additional line 36. At the pump outlet 20, a water-conducting connection C20 is provided to the rigid pump outlet line 38a. Also, the pump outlet

line 38a is provided with a water-conducting connection to the pump outlet line 38b, which but usually needs not to be loosened.

5 A water-conducting connection C38b is provided to the pump valve 39, which has two further water-conducting connections, one of which is the connection C35 to the back-wash line 35. The other is the connection C40b to the distribution line 40b. As has been explained before, two water-conducting connections C34a and C34b are provided to the back-wash inlets 34a and 34b.

10 As can be easily taken from Fig. 8, there are only two directions for mounting or plug-in of water-conducting connections to essential functional elements such as the pump 18 and the pump valve 39 as well as to the freshwater inlet 29 and the distribution outlet 40a. This allows for a simplified manufacture as well as maintenance and repair. Also, the two water-conducting connections C19 and C32 to the filter valve 37 are along one of these directions, which is exactly the extraction direction of the insertion module 46 according to Figs. 2 to 4. As has been explained above, this also allows for a simple replacement of some of the functional elements such as the pump 18 or one of the valves 37 or 39, respectively. To replace the valve 37, the water-conducting connections C19 and C32 are loosened and, as they are partly telescopic as explained above, they can be disengaged completely and away from the filter valve 37. Then the third water-conducting connection C36 only needs to be loosened somewhat, such that the filter valve 37 can be disengaged along the direction of the connection C36. The same applies to the pump valve 39.

20 In similar manner, for disengaging the pump 18, the water-conducting connections C19 and C20 are loosened. Either a flexibility of the pump outlet line 38a allows for its complete disengagement from the pump outlet 20. Alternatively, the other water-conducting connection to the integral pump outlet line 38b can be loosened somewhat such that the rigid pump outlet line 38a can be rotated somewhat to disengage from the pump outlet 20. After this, the pump 18 can be disengaged from the connection C19 by pulling against the extraction direction.

25 Also, the pump valve 39 can be easily disengaged by loosening and retracting the water-conducting connection C38b. After that, the water-conducting connections C35b and C40b only need to be loosened a bit such that the pump valve 39 can be easily disengaged in their direction and in a direction away from the filter 24.

30 The water-conducting connections, which are in each case designated with a capital C, may in some cases or even in every case be identical, such that only one sort of component is needed. Alternatively, they can be different such that one kind has telescopic functions and the other not.

They should all be tightened and loosened without the need of tools, but only by hand, for example by wing nuts.

Fig. 14 shows an enlarged sectional view onto the rear side of the filter 24 with back-wash line 35 to the back-wash inlets 34a and 34b. The water-conducting connections C34a and C34b on these
5 are shown having wing nuts W for fixing and ensuring the water-tight connection. It can be seen that each water-conducting connection C has a round pipe section P of some cm length, for example 5cm to 8cm in this case. This pipe section P has an inner diameter slightly above the diameter of the back-wash inlets 34a and 34b and the extensions of the integral back-wash line 35 such that they can slide over them with ease, but are almost water tight against them. If the
10 hose clamps are tightened with the wing nuts W, the ends of the pipe sections P are water-tight against the back-wash inlets 34a and 34b or any other water lines, see for example the water-conducting connections C38b and C34b. If the hose clamps with the wing nuts W are loosened, then the pipe sections P can be displaced to loosen the connection, as can be seen at the water-conducting connection C34a having been displaced away from the back-wash inlet 34a for about
15 2cm. This connection is now loose. In the same manner, at first the water-conducting connection C38b at the pump valve 39 could be loosened with the wing nuts W and the pipe section P be displaced away from the pump valve 39. Then only the wing nuts of the water-conducting connections C35 and C40b that are on the side towards the pump valve 39 could be loosened, and without the need of displacing the pipe sections P, the pump valve 39 could simply be pulled
20 out in the direction at right angles to the extraction direction of the insertion module 46.

Fig. 9 shows either an alternative embodiment of a carrier 49 for an insertion module without integral water lines, where these water lines are mounted and fixed on top of the carrier 49. In an alternative understanding, the carrier 49 of Fig. 9 shows the basic concept, which has been discussed above, where the carrier 49 is provided with a closed and water-tight surface and a
25 circumferential carrier wall 50. This carrier wall 50 serves to form a kind of water-collecting trough such that a small amount of water dripping from one of the water lines or the connections is collected therein and may not drop down on a floor of the room where the washing machine 11 is installed.

Another detail that can be taken from Fig. 9 is a slide-in tab 52. This slide-in tab 52 serves for
30 mounting and fixing the pump 18 to the carrier 49. For this purpose, the pump 18 has a projecting foot mounted at right angle to its underside, which foot can be guided into the slide-in tab 52. After fixing the water-conducting connections C19 and C20, especially the last one, as it is at right angles to the insertion direction of the pump 18, it is fixedly and securely mounted to the carrier 49.

Another concept for designing the carrier for the insertion module is shown in Fig. 10 in a sectional view from the side. The washing machine 111 of Fig. 10 with a housing 112 and a door 113 is provided with an insertion module 146, which basically corresponds to the one described above. In this case, the carrier 149 is not formed essentially flat as in Fig. 9 but is divided in three areas of different height. The left area is the highest one, and a control 160 for the washing machine 111 could be provided thereupon. This has the advantage that any water coming from above will at once run down from this highest area of the carrier 149 to lower areas.

On the middle area, further electronics 161 can be provided which can, on the one hand, be protected easier and are less expensive. On the lowermost area of the carrier 149, a pump outlet line 138b is provided as well as a detergent tank 158b and a dosing device 159. Another such detergent tank 158a can be provided in the upper left region of the washing machine 111, for example for being manually filled. Another component on the lowermost area of the carrier 149 is a slide-in tab 152 similar to the one of Fig. 9 for mounting and fixing a pump.

Also, in the embodiment of Fig. 10 the carrier 149 is watertight, such that beneath the two higher areas cables 162a and 162b can be provided. This serves for protecting these cables against water coming from above.

An alternative way of arranging cables or electric connections, respectively, is shown in Fig. 8 with regard to the pump 18 or its pump motor 21, respectively. On the top of the pump motor 21, a pump plug connector 22 is provided, preferably integral on the pump motor 21. The electrical connection serves for providing the pump motor 21 with power. In case the pump 18 is a so-called heating pump, which is provided with an integrated heating element, further electrical connections to this heating element are provided in the pump plug connector 22. A cable 62a runs freely from the pump plug connector 22 and is fixed to the top of the integrated pump outlet line 38b by means of fixing clips 63 as part of a wire harness 62b. Other cables could be provided on top of the pump outlet line 38b or on any of the other integrated lines 35, 36 or 40b.

As electrical connections are also needed for the filter valve 37 and the pump valve 39, they could be all provided in integral manner by means of a so-called wire harness 62b. Such a wire harness 62b has the advantage that it allows for a quick and defined manufacturing of the washing machine 11. On the other hand, if one of the cables should be defect or needs to be replaced, for example because another valve model or pump model needs to be installed which is provided with different plug connectors, this cable of the wire harness cannot be used anymore. In this case, fixing clips 63 are advantageous that allow for not only fixing the needed and already present wire harness, but allow for the fixing of additional cables for repair purposes.

The main reason for fixing cables 62a or a wire harness 62b, respectively, to the top of the integrally formed water lines 38b, 35, 36 or 40b is that, on the one hand, they can easily be reached. Another reason is that they are also provided on a high location of the insertion module 46 or the carrier 49, respectively, similar to what has been described for the control 160 and the electronics 161 of Fig. 10.

From Figs. 11, 12 and 13 the function to achieve the intermediate locked position of the insertion module 46 can be taken. A lock 54 with a lock-pin 55 is provided on the carrier 49 a small distance behind the freshwater inlet 29. The lock-pin 55 protrudes downward below the carrier 49, for example for 1 cm to 3 cm. In the view of Fig. 13 of the washing machine 11 from below, it can be taken that the housing 12 at its underside forms a kind of frame with a large central opening. When extracting the insertion module 46 out of the housing 12, the lower end of the lock-pin 55 moves freely in this central opening, until it abuts at the front part of the housing 12. This corresponds to the position of Fig. 3 described before. Only if the lock-pin 55 is removed or at least moved upwards somewhat, the insertion module 46 can be extracted more and even completely. For removing the lock-pin 55, the lock 54 can be provided to be only accessible by means of a specific key or of a specifically formed tool, such that only professional service personnel are equipped with such a key or tool. This allows for the rear part of the insertion module 46, in particular with the filter valve 37 and the pump 18, as well as a main part of the electrical connections, to be blocked for private persons, only learned service personnel should have access.

Claims

1. An insertion module for a water-conducting domestic appliance, the insertion module comprising:
 - a pump,
 - at least one valve,
 - a filter,
 - a water conduit having a plurality of water lines and water conducting connections between the pump, the valve and the filter, the water lines being connected to the pump, the valve, or the filter by means of the water-conducting connections,
 - an extended carrier, on which the pump, the valve, the filter, and the water conduit are arranged,characterized in that:
 - the pump is arranged detachably held on the carrier,
 - a mounting/plug-in direction of water-conducting connections for the pump, in particular for a supply line of the pump and for a discharge line of the pump, is provided in one common plug-in direction or is provided in two separate plug-in directions extending at an angle of between 60° and 90° to each other,
 - the water-conducting connections are designed to be fastenable without tools and to be detachable without tools,
 - the water lines of the water conduit are fixed to the carrier.
2. Insertion module according to claim 1, characterized in that further water-conducting connections, in particular at the at least one valve, also run parallel to the one or to the two plug-in directions as at the pump.
3. Insertion module according to claim 1 or 2, characterized in that two different plug-in directions of the water-conducting connections are provided, and these two different plug-in directions are at right angles to each other.
4. Insertion module according to one of the preceding claims, characterized in that the water-conducting connections are designed as manually fixable and manually releasable hose clamps or comprise manually fixable and manually releasable hose clamps.
5. Insertion module according to one of the preceding claims, characterized in that at least some of the water-conducting connections are designed to be displaceable or telescopic

in themselves in such a way that, after loosening fastenings or clamping connections, the water-conducting connection can be shortened in order to loosen a functional element connected thereto in a water-conducting manner in the direction at right angles to the longitudinal direction of the water-conducting connection, the water-conducting connection in particular being plugged into one another in the fastened state.

6. Insertion module according to one of the preceding claims, characterized in that at least some of the water-conducting connections are identically formed, in particular all the water-conducting connections on the same functional element, preferably all water-conducting connections being identically formed.
7. Insertion module according to one of the preceding claims, characterized in that at least one water line of the water conduit is at least partially integrally formed in the carrier and by the carrier, preferably completely formed in the carrier, wherein in particular the carrier together with at least a part of the water line is produced in a plastic injection molding process or in a 3D printing process.
8. Insertion module according to one of the preceding claims, characterized in that electrical connection lines are fastened to the top of or on the water lines, in particular are fastened in a detachable manner, preferably the electrical connection lines being arranged at the uppermost region of the water lines.
9. Insertion module according to one of the claims 1 to 7, characterized in that electrical connection lines are arranged under the carrier or on the underside of the carrier, preferably in areas of the carrier which are designed to be higher than other areas or than a lowermost area of the carrier.
10. Insertion module according to one of the preceding claims, characterized in that the carrier has a plurality of areas of different height, wherein in its area the same height is given, in particular areas in the form of terraces, preferably each area extending over a complete length or over a complete width of the carrier, in particular electrically connected or electrically conductive areas or electrical functional elements being arranged in areas higher than the lowermost area.
11. Insertion module according to one of the preceding claims, characterized in that the carrier is designed to have a closed surface, preferably the carrier forming a collecting trough for water in such a way that areas of the carrier, in particular the entire carrier, have upwardly

- drawn walls or boundaries to form the collecting trough, which walls or boundaries preferably extend along an outer edge of the carrier.
12. Insertion module according to one of the preceding claims, characterized in that the pump is attached to the carrier by means of a slide-in attachment with a slide-in direction parallel to the direction of insertion of a water-conducting connection to the pump, preferably with a slide-in foot provided at the bottom of the pump, which slide-in foot engages under a slide-in tab projecting upwardly from the carrier.
 13. Insertion module according to one of the preceding claims, characterized in that a dosing device for additives, in particular cleaning agents, detergents, descaling agents, or the like, is arranged on the carrier and is connected to the water conduit, preferably by means of at least one dosing valve.
 14. Insertion module according to one of the preceding claims, characterized in that the at least one valve, preferably all valves of the insertion module, are supported exclusively at the water-conducting connections.
 15. Insertion module according to one of the preceding claims, characterized in that the filter is fixedly arranged on the carrier.
 16. Insertion module according to one of the preceding claims, characterized in that different areas of the carrier or of the water conduit or of the water-conducting connections have different colors and/or different markings, preferably the different colors and/or different markings differ according to which water pressures prevail or whether electrically conductive connections or components are designed for AC or for DC.
 17. Water-conducting domestic appliance with an insertion module according to one of the preceding claims, characterized in that the insertion module is arranged at the bottom of the domestic appliance, in particular in the lowermost region of the domestic appliance just above a support surface of the domestic appliance, wherein the insertion module is at least partially withdrawable or movable forwards out of the domestic appliance or out of a housing of the domestic appliance.
 18. Domestic appliance according to claim 17, characterized in that the insertion module has a first locking device with a mechanical stop, which is designed in such a way that the insertion module together with the carrier can be pulled out of the domestic appliance

between 20% and 50% and then the mechanical stop is provided for striking thereagainst to prevent further pulling out of the carrier, the mechanical stop preferably being releasable, in particular releasable only with a tool or with a key.

19. Domestic appliance according to claim 17 or 18, characterized in that a direction of extractability of the insertion module from the domestic appliance corresponds to a plug-in direction of the water-conducting connections.
20. Domestic appliance according to one of the claims 17 to 19, characterized in that the filter is arranged in a front region of the insertion module, in particular is accessible from the front of the insertion module by means of an openable cover, and/or in that the pump is arranged in a rear region of the insertion module, in particular in the rearmost 2% to 25%.
21. Domestic appliance according to one of the claims 17 to 20, characterized in that two water connections are provided on the insertion module, a first water connection being designed as a water inlet and a second water connection being designed as a distribution outlet, wherein these two water connections are arranged in the foremost 5% to 50% of the insertion module, preferably water-conducting connections being provided to the water connections with a plug-in direction along a direction of extractability of the insertion module from the domestic appliance.

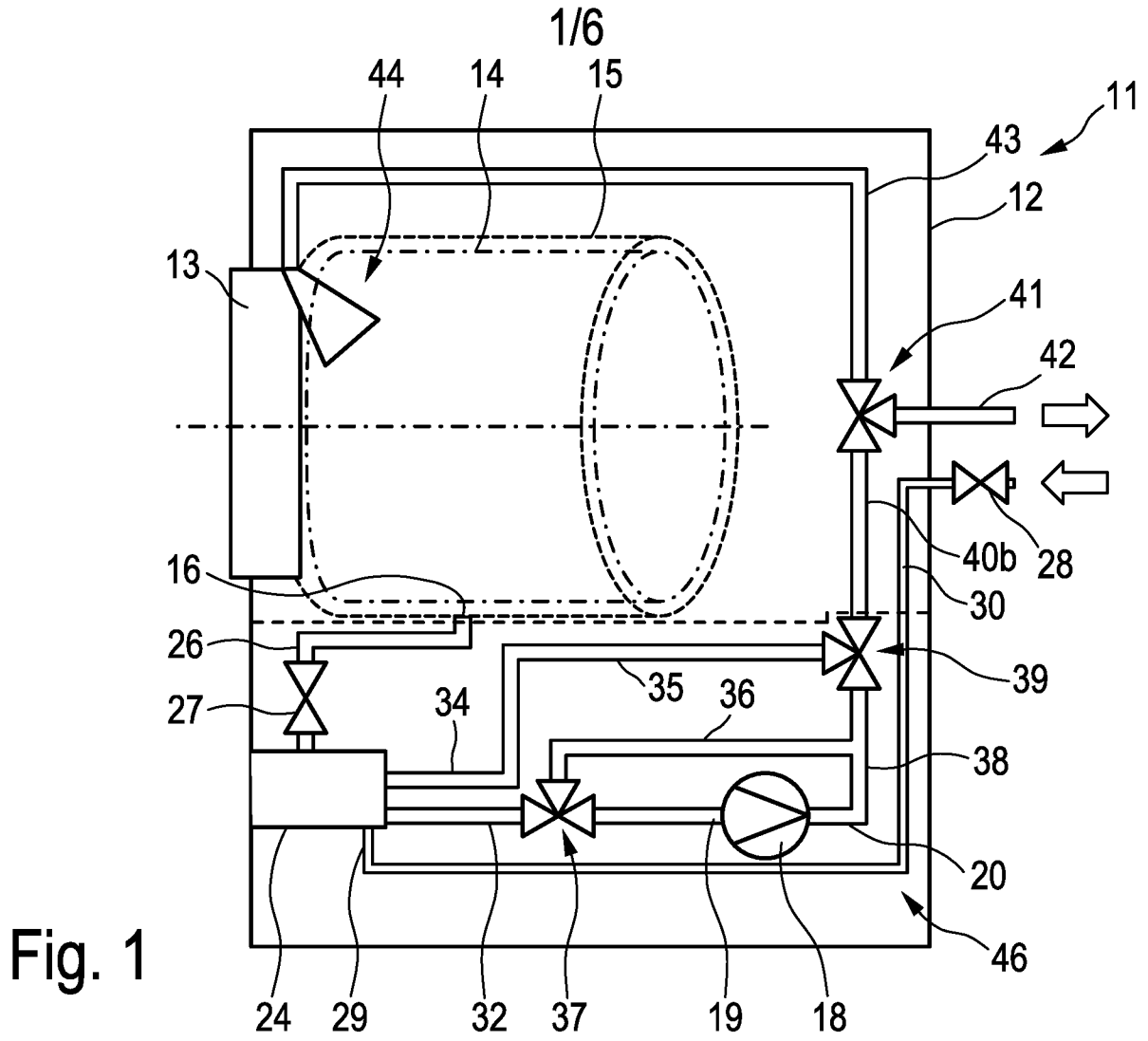


Fig. 1

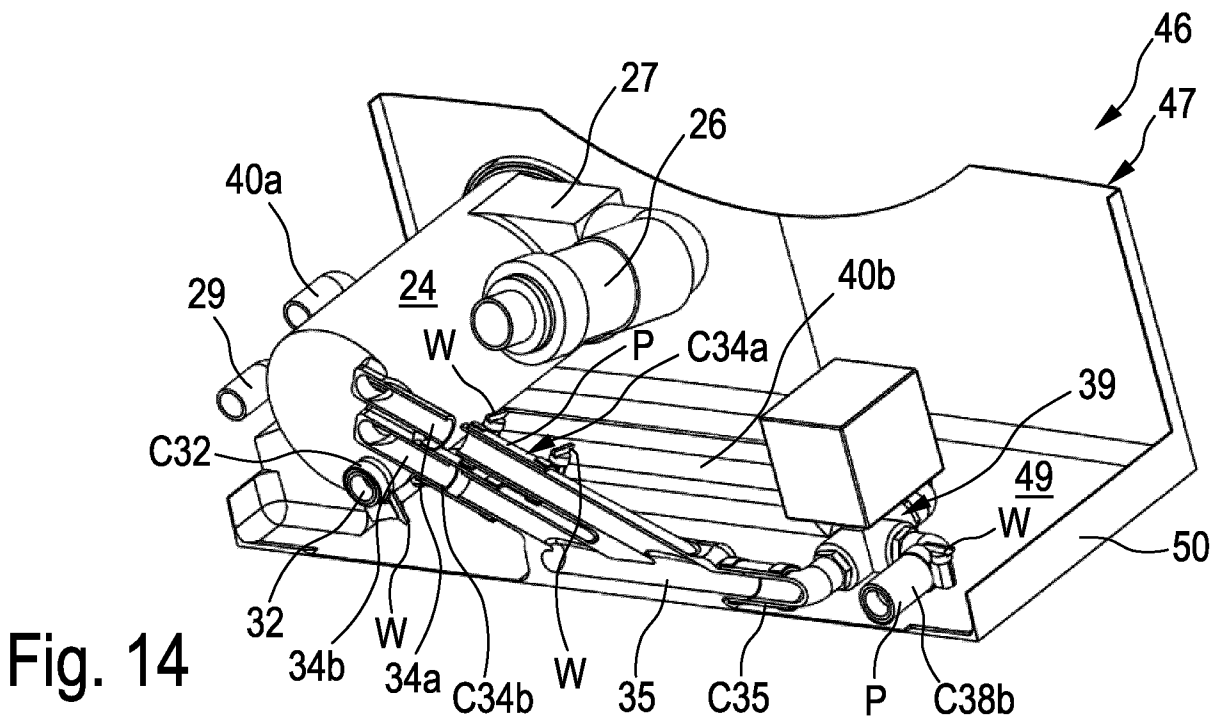


Fig. 14

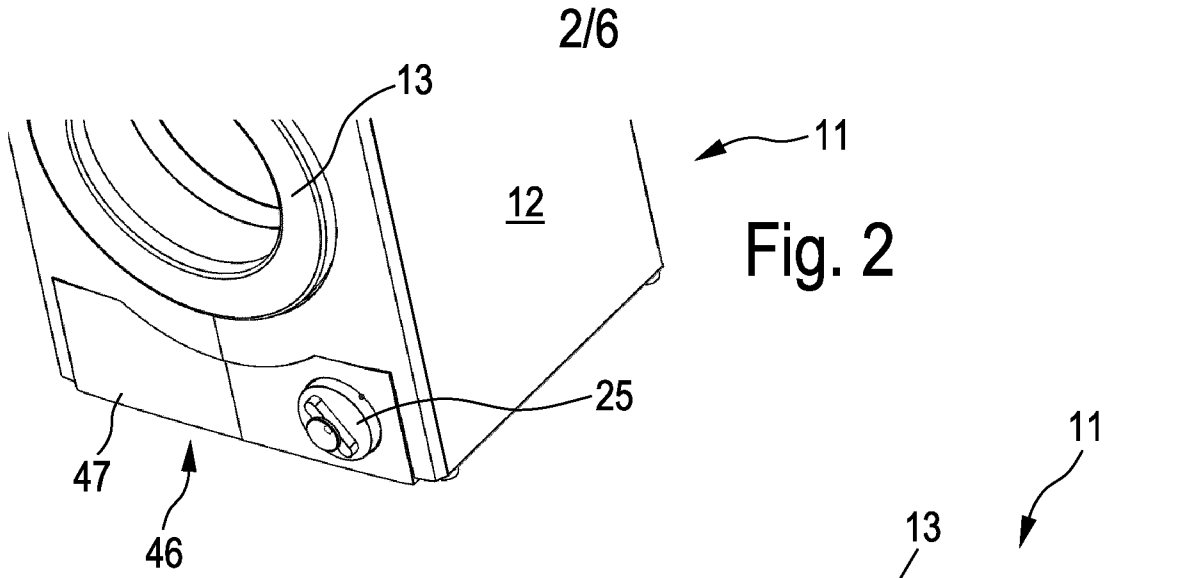


Fig. 3

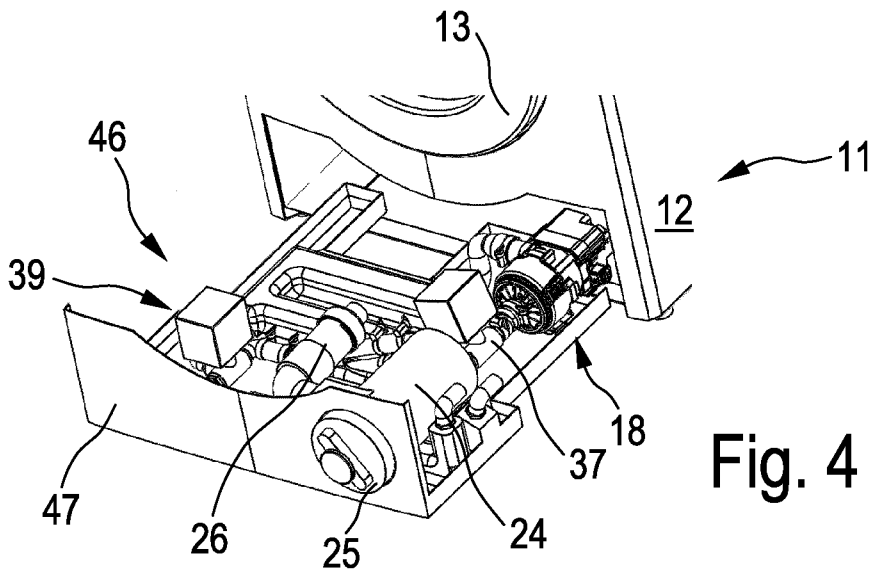
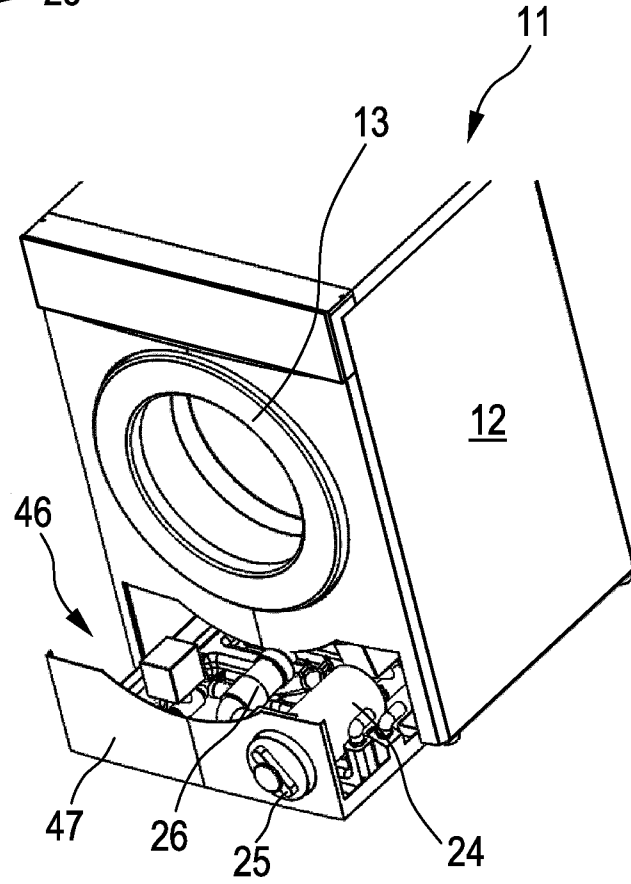


Fig. 4

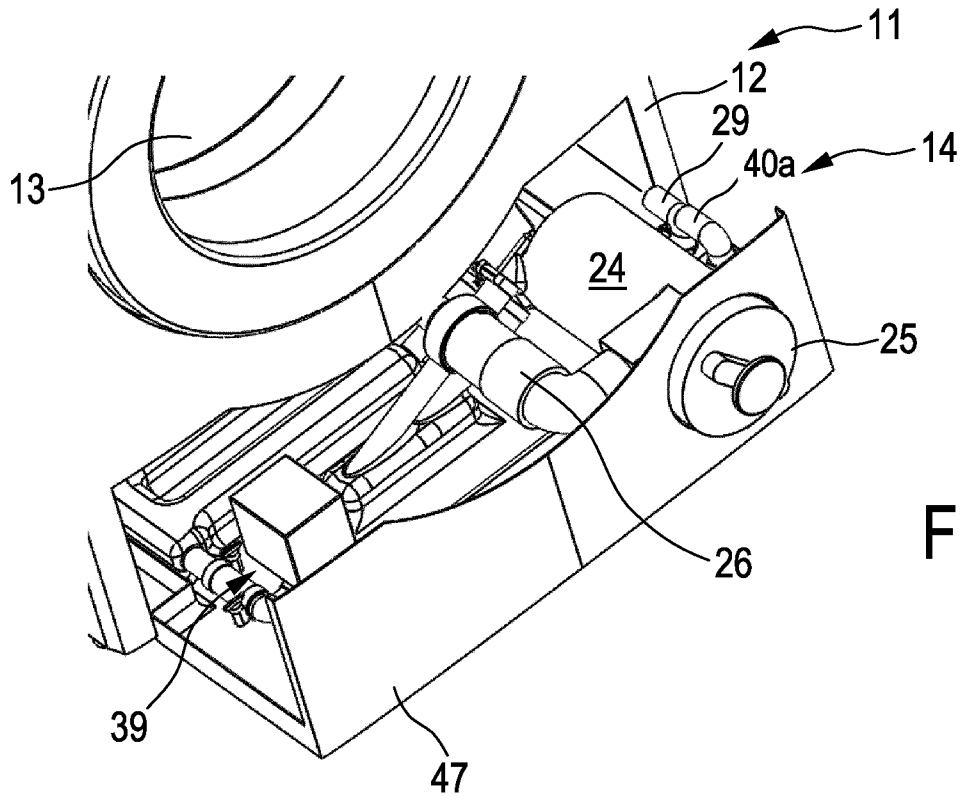


Fig. 5

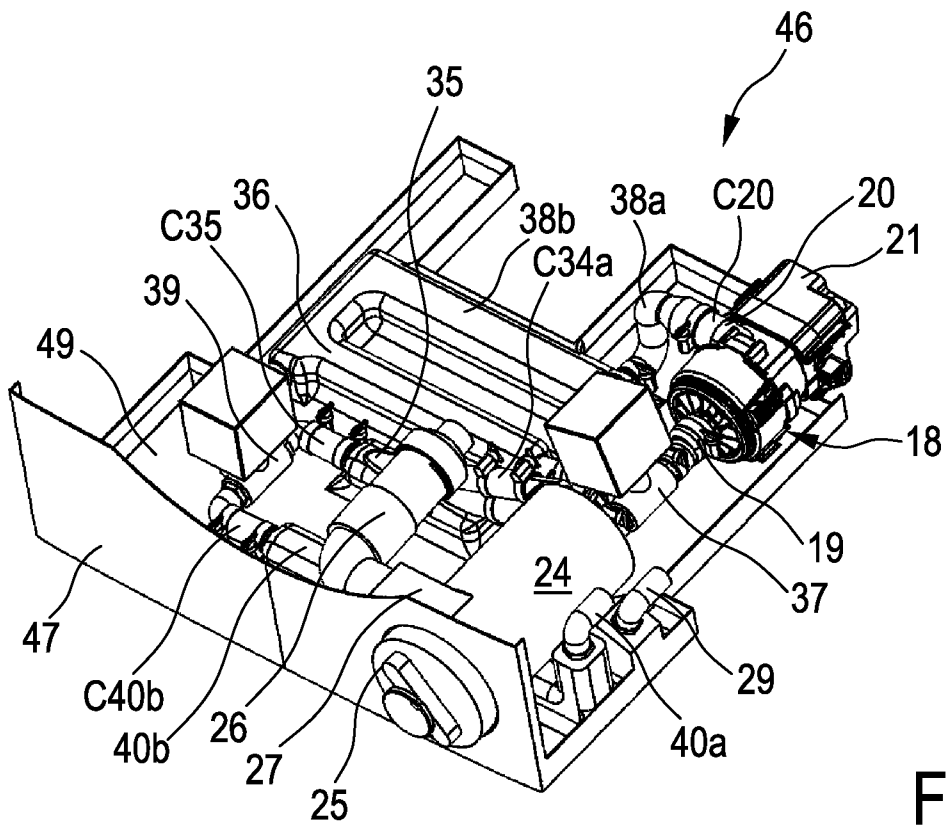
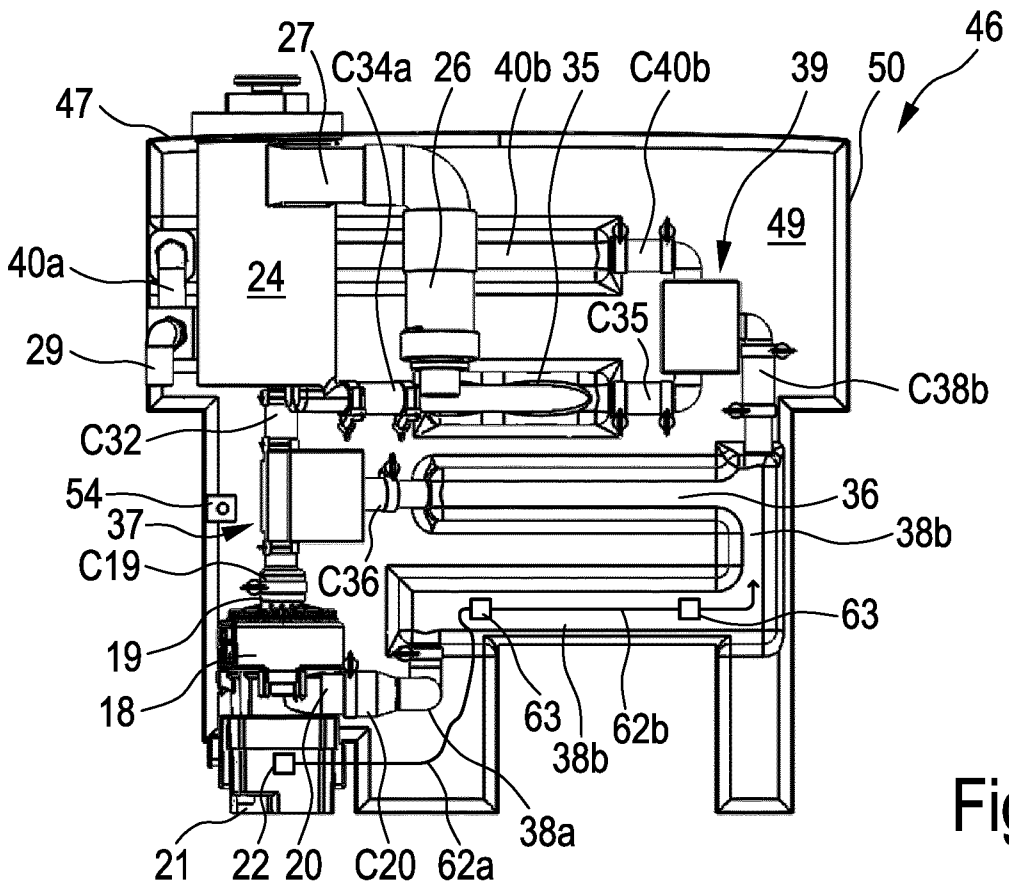
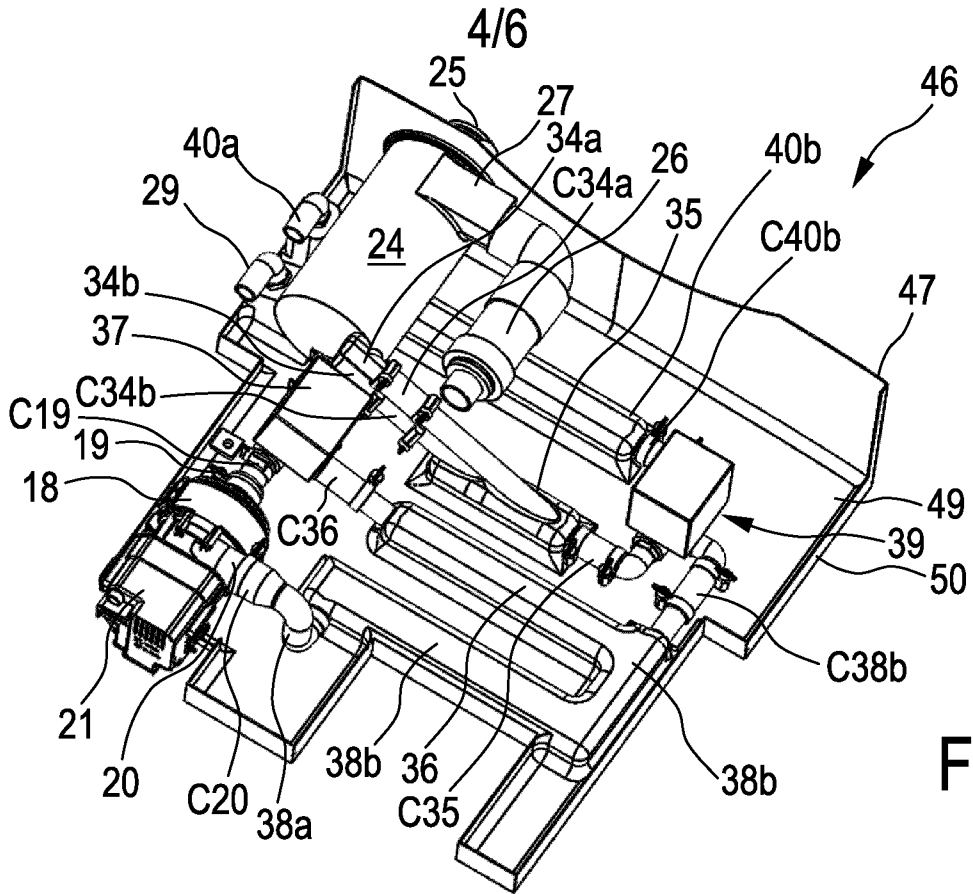
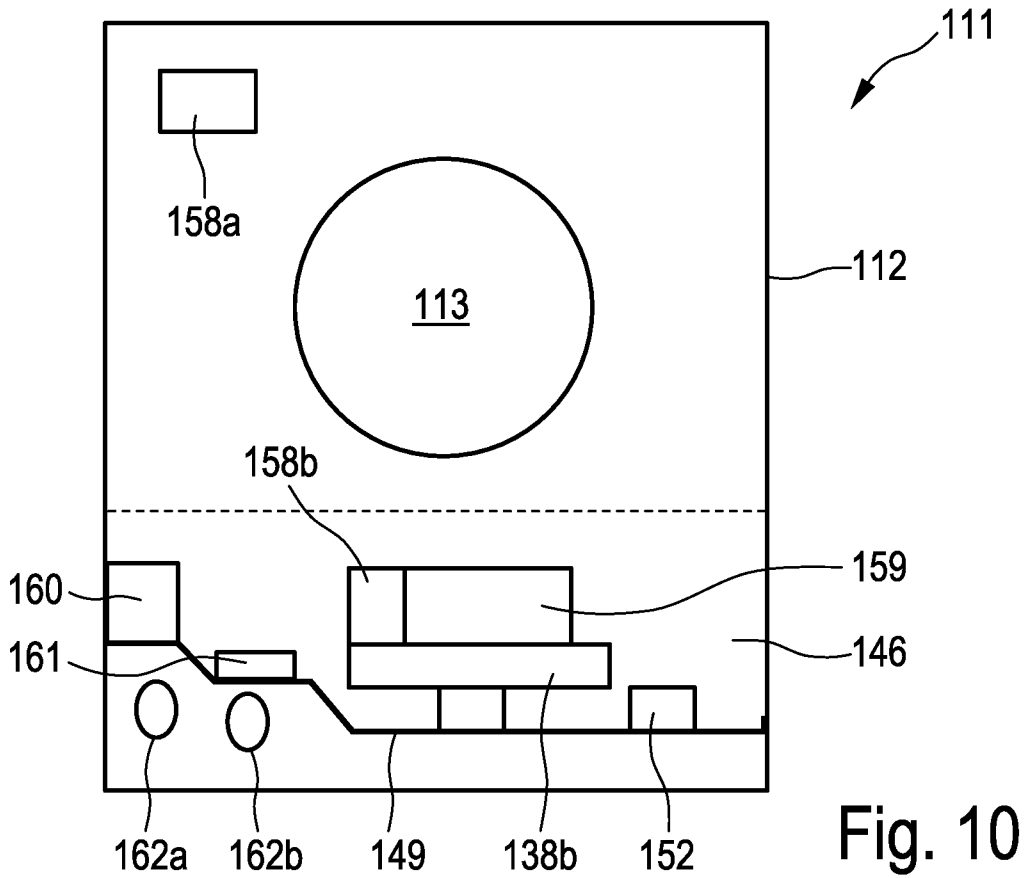
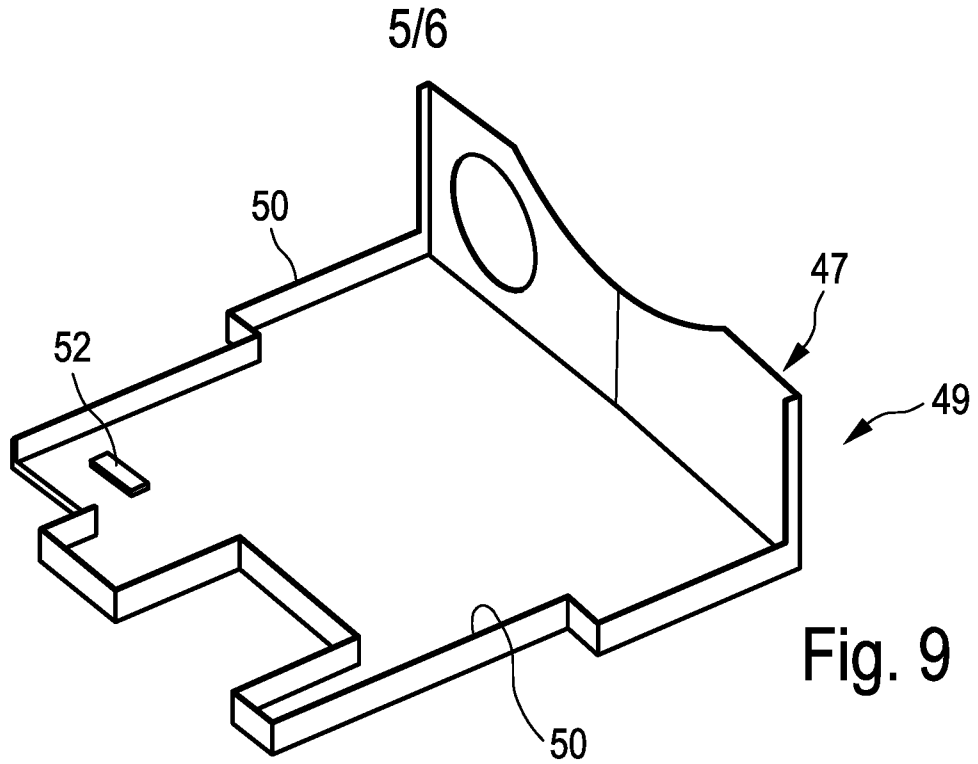


Fig. 6





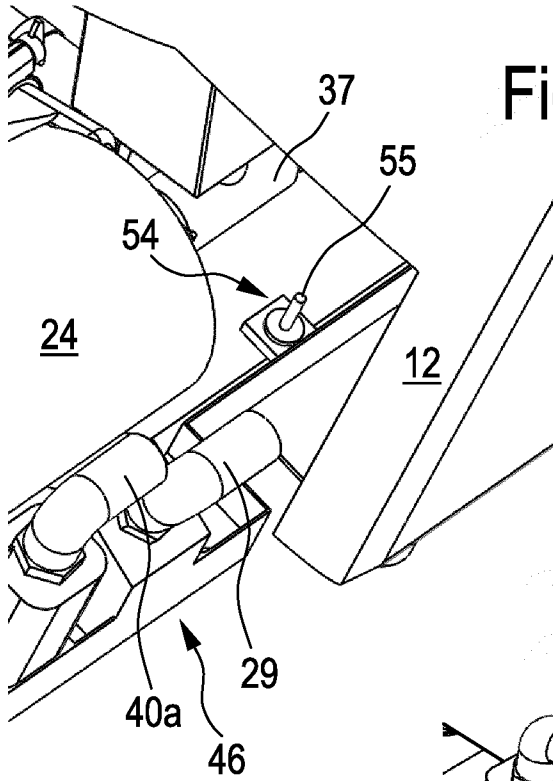


Fig. 11

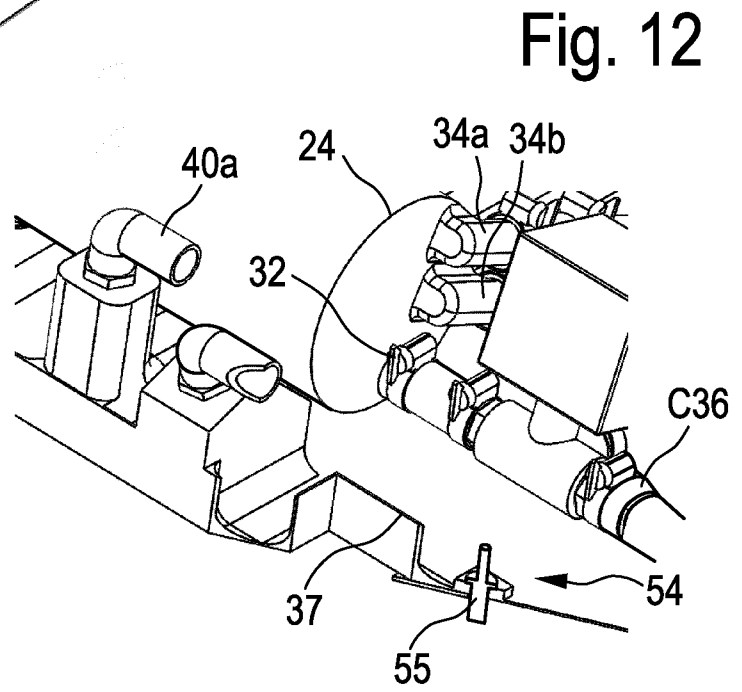


Fig. 12

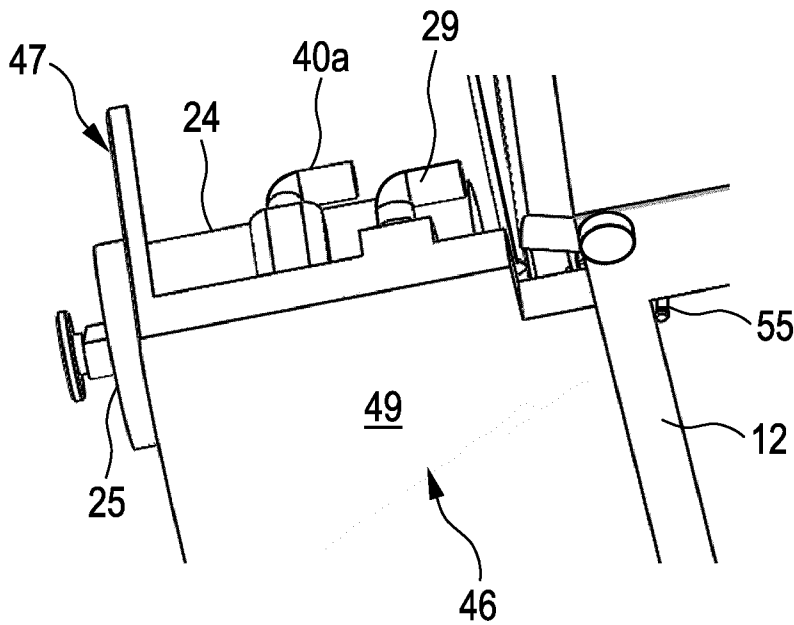


Fig. 13

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2023/065126

A. CLASSIFICATION OF SUBJECT MATTER
INV. D06F39/08 D06F39/12 A47L15/42
ADD. D06F39/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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Further documents are listed in the continuation of Box C.

See patent family annex.

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Date of mailing of the international search report

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Popara, Velimir

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International application No
PCT/EP2023/065126

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