



(11)

EP 3 888 521 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
06.10.2021 Bulletin 2021/40

(51) Int Cl.:
A47L 15/42 (2006.01) **A47L 15/44** (2006.01)
D06F 39/02 (2006.01) **D06F 39/14** (2006.01)

(21) Application number: **21165780.4**

(22) Date of filing: **30.03.2021**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(72) Inventors:
• **RAVEDATI, Paolo**
10024 Moncalieri (TO) (IT)
• **BECCHIO, Marco**
10041 Carignano (TO) (IT)
• **GARETTO, Luca**
10098 Rivoli (TO) (IT)
• **POMPA, Alessandro**
10129 Torino (IT)

(30) Priority: **30.03.2020 IT 202000006559**

(71) Applicant: **ELBI International S.p.A.**
10129 Torino (IT)

(74) Representative: **Vitillo, Giuseppe**
Barzanò & Zanardo Milano S.p.A.
Corso Vittorio Emanuele II, 61
10128 Torino (IT)

(54) **DISPENSER SYSTEM FOR A DETERGENT, SUCH AS A WASHING AGENT AND/OR A RINSING AGENT, ASSOCIATED WITH A DOOR OF A WASHING MACHINE, IN PARTICULAR A DISHWASHER**

(57) The dispenser system (10) comprises: a tank assembly (12) defining a receptacle (14) therein intended for containing a detergent; a pump assembly (16) configured to dispense a quantity of the detergent outside the receptacle (14) into a washing chamber (WC) positioned in a washing machine (WM); a motor apparatus (18) configured to operate the pump assembly (16). Also provided is a tank-holder assembly (20) intended to be fixed to the inner face of the door (D) of the washing machine (WM). The tank assembly (12) comprises and supports the pump assembly (16). The tank assembly (12) is mounted in a repeatedly removable way with respect to the tank-holder assembly (20), and is configured to reversibly acquire: a disassembled condition, wherein it is disassembled from the tank-holder assembly (20) and the respective pump assembly (16) is kinematically uncoupled from the motor apparatus (18); and an assembled condition, wherein it is mounted to the tank-holder assembly (20) and the respective pump assembly (16) is kinematically coupled to the motor apparatus (18).

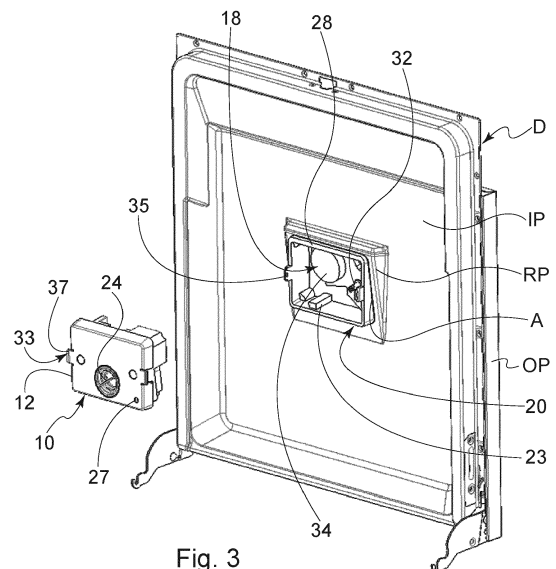


Fig. 3

Description

Technical field

[0001] The present invention refers to a dispenser system for a detergent, such as a washing agent and/or a rinsing agent, associated with a door of a washing machine, in particular a dishwasher.

Technical background

[0002] Dispenser systems for detergents are known, in particular within washing machines, such as laundry washing machines or dishwashers. As is typical in many applications, such systems are associated with the door of the washing machine and comprise a tank assembly defining a receptacle therein intended for containing a detergent, and a pump assembly configured to collect a quantity of the detergent from the receptacle. The pump assembly is then configured to dispense the quantity of detergent outside the receptacle, into a washing chamber of the washing machine. Moreover, a motor apparatus is provided which is configured to operate the pump assembly.

[0003] US patent 7,571,734 describes a detergent dispenser system in which a tank is coupled in a fixed way within the door assembly between the inner and the outer door panel. However, such system suffers from some drawbacks which it is desirable to overcome. In particular, in the above-mentioned dispenser system, the tank is difficult for an operator to access, which makes it necessary to disassemble the entire door assembly in order to access the tank components for cleaning or maintenance purposes.

[0004] Patent publication EP 1 959 045 A1 describes a dispenser system fixed to the door assembly and in which a compartment is provided to accommodate a container equipped with flexible walls and enclosing a liquid washing agent. The compartment also contains a peristaltic pump configured to repeatedly compress the container so as to dispense the liquid washing agent within the container. However, also such a system has various drawbacks that it is desirable to overcome. For example, the system is bound to the use of a container with flexible walls in which the detergent is packaged and having predetermined shapes and sizes, which makes such a system incompatible with the use of detergents made available in a traditional form, such as the typical detergents in a liquid or gel form contained in bottles which are poured in the desired quantity into the dispenser tank. Furthermore, cleaning and maintaining the system overall is not easy for a user.

Summary of the invention

[0005] An object of the present invention is to provide a system that is innovative with respect to those provided according to the prior art.

[0006] According to the present invention, this and other objects are achieved by means of a system having the technical features mentioned in the appended independent claim.

[0007] It should be understood that the appended claims form an integral part of the technical teachings herein provided in the following detailed description relating to the present invention. In particular, some preferred embodiments of the present invention including optional technical features are defined in the appended dependent claims.

[0008] Further features and advantages of the present invention will become apparent from the detailed description below, given purely by way of non-limiting example, with particular reference to the accompanying drawings summarised below.

Brief description of the drawings

[0009]

Figure 1 is a perspective and schematic representation of a washing machine, in particular a dishwasher, having a door incorporating a dispenser system provided according to an exemplary embodiment of the present invention. In said figure, the door is open and a tank assembly of the system is in an assembled configuration with respect to a tank-holder assembly of such system.

Figure 2 is an exploded perspective view of the system shown in figure 1, wherein the door to which the system is overall applicable is also visible.

Figure 3 is a perspective view of the door shown in the previous figures, wherein the door is in a vertical position and the tank assembly of the system is in a configuration which is disassembled from the relevant tank-holder assembly.

Figure 4 is a rear perspective view of the tank-holder assembly of the system shown in the preceding figures when assembled to the door of the washing machine.

Figures 5 to 8 are sectional views - in perspective and in lateral elevation - of the system shown in the preceding figures and wherein the tank assembly is in the assembled configuration with respect to the tank-holder assembly.

Figure 9 is a partial perspective view of the system shown in the preceding figures and wherein only some components of the tank assembly appear when in the assembled configuration, in order to better illustrate some preferred technical features of such system.

[0010] For the sake of completeness, the following is a list of the alphanumeric references used to identify parts, elements and components shown in the drawings summarised above.

WM.	<i>Washing machine</i>
WC.	<i>Washing chamber</i>
C.	<i>Case</i>
D.	<i>Door</i>
X-X.	<i>Hinging axis</i>
S.	<i>Screws</i>
IP.	<i>Inner panel</i>
OP.	<i>Outer panel</i>
A.	<i>Aperture</i>
RP.	<i>Recessed portion</i>
10.	<i>Dispenser system</i>
12.	<i>Tank assembly</i>
13.	<i>Container</i>
14.	<i>Receptacle</i>
16.	<i>Pump assembly</i>
16a.	<i>Tube</i>
16b.	<i>Rotor</i>
17.	<i>Case</i>
17a.	<i>Upper half-shell</i>
17b.	<i>Lower half-shell</i>
18.	<i>Motor apparatus</i>
19.	<i>Suction orifice</i>
20.	<i>Tank-holder assembly</i>
21.	<i>Delivery orifice</i>
22.	<i>Float element</i>
23.	<i>Detector element</i>
24.	<i>Closure element</i>
25.	<i>Permanent magnet</i>
26.	<i>Non-return valve</i>
27.	<i>Delivery passageway</i>
27a.	<i>Inlet</i>
27b.	<i>Outlet</i>
28.	<i>Flange</i>
29.	<i>Suction passageway</i>
30.	<i>Sealing perimetral gasket</i>
31.	<i>Compartment or housing</i>
32.	<i>Output shaft</i>
33.	<i>Elastic arms</i>
34.	<i>Electric motor</i>
35.	<i>Lateral appendixes</i>
36.	<i>Transmission mechanism</i>
37.	<i>Gripping tab</i>
38.	<i>Casing</i>
40.	<i>Annular gasket</i>

Detailed description of the invention

[0011] With reference to the above-summarized drawings, reference number **10** generally indicates a dispenser system provided according to an exemplary embodiment of the present invention. System **10** is configured to dispense a detergent, such as a washing agent and/or a rinsing agent.

[0012] With particular reference to figure 1, system **10** is associated with a door **D** of a washing machine **WM**, in particular a dishwasher. In the illustrated embodiment, door **D** is movably mounted with respect to case **C** of washing machine **WM**; for example, door **D** is hinged

next to the bottom of the case of washing machine **WM**, around a substantially horizontal hinging axis **X-X**. In figure 1, door **D** is in a substantially horizontal position, wherein washing chamber **WC** defined by case **C** can be accessed from outside.

[0013] In the illustrated embodiment, the quantity of detergent contained in system **10** can include a plurality of detergent doses to be respectively dispensed in a plurality of washing cycles performed in subsequent moments by washing machine **WM**. In particular, each of such doses can be determined and/or dispensed in a controlled manner during a respective washing cycle of the washing machine **WM**.

[0014] With particular reference to figures 2 and 3, system **10** is visible in combination with a door **D** in a vertical position (wherein washing chamber **WC** is closed).

[0015] With particular reference to figures 5 to 8, system **10** comprises a tank assembly **12** comprising a container **13** defining a receptacle **14** therein intended for containing the quantity of detergent (in particular, in a liquid or gel form).

[0016] System **10** further comprises a pump assembly **16** configured to collect a quantity of the detergent from receptacle **14**. Pump assembly **16** is further configured to dispense the quantity of detergent outside receptacle **14** into washing chamber **WC** positioned in washing machine **WM**.

[0017] Moreover, system **10** further comprises a tank-holder assembly **20** intended to be fixed to the inner face of door **D** of the washing machine. In particular, tank-holder assembly **20** is provided with a motor apparatus **18** configured to operate pump assembly **16**.

[0018] Tank assembly **12** comprises and supports pump assembly **16**. Moreover, tank assembly **12** comprises and supports pump assembly **16** in a repeatedly removable way. More specifically, tank assembly **12** is mounted in a repeatedly removable way with respect to tank-holder assembly **20**.

[0019] In particular, pump assembly **16** is configured to acquire a coupled condition (figures 3, 5-9) and an uncoupled condition (figure 2).

[0020] In the coupled condition, pump assembly **16** is simultaneously assembled to tank assembly **12** and hydraulically connected to receptacle **14**. In the disassembled condition, pump assembly **16** is simultaneously disassembled from tank assembly **12** and hydraulically disconnected from said receptacle **14**.

[0021] In particular, tank assembly **12** is configured to reversibly acquire an assembled condition (figures 1 and 5-8) and a disassembled condition (figure 3).

[0022] In the assembled condition (and when pump assembly **16** is in the respective coupled condition), tank assembly **12** is mounted to tank-holder assembly **20** and coupled pump assembly **16** is kinematically connected to motor apparatus **18**. On the contrary in the disassembled condition (when the pump assembly **16** is still in the respective coupled condition), tank assembly **12** is disassembled from tank-holder assembly **20** and coupled

pump assembly **16** is kinematically disconnected from motor apparatus **18**.

[0023] For example, when tank assembly **12** is brought to the disassembled condition with respect to tank-holder assembly **20**, a user can easily perform cleaning and/or maintenance thereon; in such a situation, when pump assembly **16** is brought to the uncoupled condition with respect to tank assembly **12**, a user can perform cleaning and/or maintenance thereon as well. The same is true for tank-holder assembly **20** and associated motor apparatus **18** which remain firmly fixed to door **D** by means of tank-holder assembly **20**. Optionally, in the disassembled condition, receptacle **14** of tank assembly **12** can also be comfortably filled up with the detergent; however, as will be described in the following in connection with other optional technical features of system **10**, receptacle **14** can also be filled up when tank assembly **12** is in the assembled condition (in particular, when door **D** is open).

[0024] When pump assembly **16** is in the coupled condition, tank assembly **12** is therefore operationally unitary with it and therefore remains integral with the latter in the transition between the assembled and disassembled conditions.

[0025] In other words, tank assembly **12**, pump assembly **16** and tank-holder assembly **20** are provided as separate and distinct units, so that they can be repeatedly assembled and disassembled to form system **10** which, in use, is installed on door **D** of washing machine **WM**.

[0026] Preferably, system **10** further comprises a level sensor configured to detect the quantity of detergent contained in receptacle **14**. In particular, with reference to figures 5 and 9, the level sensor includes a float element **22** positioned in receptacle **14** and configured to float above the or free surface of the detergent contained in receptacle **14**. The level sensor further comprises a detector element **23** (figure 2) configured to cooperate with float element **22** in such a way as to provide a level signal representative of the level reached by the or free surface of the detergent contained in receptacle **14** (e.g., when door **D** is closed).

[0027] In the illustrated embodiment, as visible from figure 2, detector element **23** is supported by tank-holder assembly **20** in a position facing float element **22** of tank assembly **12**, in particular when tank assembly **12** is in the assembled condition. For example, detector element **23** is positioned at the bottom of tank-holder assembly **20**.

[0028] In the illustrated embodiment, with particular reference to figure 9, float element **22** is equipped with a permanent magnet **25**, while detector element **23** is provided with a printed circuit board (or PCB) equipped with a magnetic detector configured to interact with the permanent magnet in such a way as to output said level signal (e.g., by transmitting it to a control unit of washing machine **WM**). In particular, float element **22** is hinged to a support pin (not numbered) provided on a wall of tank assembly **12**.

[0029] In the illustrated embodiment, container **13** of tank assembly **12** further comprises a closure element

24 configured to be mounted removably, in such a way as to close, in particular fluid-tightly, receptacle **14**. By way of non-limiting example, closure element **24** is a cap which can be closed, for example by pressing or screwing it to container **13** of tank assembly **12**. In particular, closure element **24** is user-removable (e.g. user-unscrewable) from container **13** and, when removed, has the function of allowing loading of the detergent into receptacle **14**, and, when applied, has the function of protecting the detergent from the water within washing chamber **WC** and from the heat that develops during the different washing and/or drying phases of the washing cycle. By means of closing element **24**, filling of receptacle **14** of tank assembly **12** is allowed both in the assembled and in the disassembled condition. Indeed, when door **D** is open, receptacle **14** can be directly accessed by removing closing element **24** - even without having to remove tank assembly **12** from tank-holder assembly **20**.

[0030] Preferably, pump assembly **16** is configured to dispense at least a portion or dose of the detergent amount contained in receptacle **14** in a controlled manner and according to predetermined criteria. In particular, as mentioned above, receptacle **14** may be sized to accommodate a plurality of detergent doses.

[0031] In the illustrated embodiment, pump assembly **16** may be a peristaltic pump including an elastically deformable tube **16a**. The peristaltic pump includes a case **17** which encloses tube **16a** therein. In particular, case **17** includes an upper half-shell **17a**, and a lower half-shell **17b** coupled to each other at their periphery.

[0032] In the coupled condition of pump assembly **16**, tube **16a** communicates, on the one hand, with receptacle **14** and, on the other hand, with washing chamber **WC**; moreover, the peristaltic pump comprises a rotor **16b** rotationally supported by case **17** (in particular by lower half-shell **17b**) and cooperating with tube **16a**. Rotor **16b** is configured to be operated by motor apparatus **18**, in such a way as to impart a necking that moves along tube **16a** - thus collecting the detergent from receptacle **14** and dispensing it into washing chamber **WC**.

[0033] In particular, when pump assembly **16** acquires the coupled condition, it is positioned outside tank assembly **12**, and is therefore positioned outside receptacle **14**. In particular, pump assembly **16** is coupled with tank assembly **12** in a compartment or housing **31** formed in the container.

[0034] A non-limiting example of the hydraulic connections provided when pump assembly **16** is in the coupled condition with tank assembly **12** will be described in detail below.

[0035] On the one hand, case **17** (in particular, upper half-shell **17a**) of pump assembly **16** has a suction orifice **19** and a delivery orifice **21** which are hydraulically connected to the inlet of tube **16a** and, respectively, to the outlet of tube **16a**. In particular, suction orifice **19** and delivery orifice **21** are obtained on a wall of case **17** adjacent to container **13** of tank assembly **12** when pump assembly **16** is in the coupled condition.

[0036] On the other hand, container **13** has a suction passageway **29** hydraulically communicating with receptacle **14** and a delivery passageway **27** hydraulically communicating with the outside of container **13**, in particular intended to flow into washing chamber **WC**. In particular, suction passageway **29** is an orifice obtained on a wall of container **13** adjacent to case **17** when pump assembly **16** is in the coupled condition. In particular, delivery passageway **27** is a pass-through conduit passing through container **13**, in particular a fluid-tight pass-through conduit passing through receptacle **14**. Preferably, inlet **27a** of delivery passageway **27** is obtained on a wall of container **13** adjacent to case **17** when pump assembly **16** is in the coupled condition; outlet **27b** of delivery passageway **27** is obtained on another wall of container **13** intended to be facing washing chamber **WC**.

[0037] In the coupled condition of pump assembly **16**, suction orifice **19** is fluid-tight hydraulically connected (e.g., by interposition of a sealing gasket) to suction passageway **29**, while delivery orifice **21** is fluid-tight hydraulically connected to delivery passageway **27**, in particular to inlet **27a** (e.g., by interposition of a sealing gasket).

[0038] As is clear to a person skilled in the art, the repeatedly removable coupling between tank assembly **12** and pump assembly **16** occurs in a manner known per se through releasable coupling means, in particular distributed between container **13** and case **17**. In particular, such coupling means may advantageously be of the snap-fit and/or bayonet type.

[0039] For example, such coupling means may be similar to those described for the connection between tank assembly **12** and tank-holder assembly **20**. Possibly, suction passageway **29** and delivery passageway **27** may include portions protruding from the wall of container **13** and penetrating suction orifice **19** and delivery orifice **21**, so as to ensure a mechanical coupling as well as a fluid-tight hydraulic connection.

[0040] Vice versa, in a further embodiment alternative, such protruding portions may be held by orifices **19**, **21** and penetrate into respective passageways **29**, **27**.

[0041] Thus, in use, when pump assembly **16** is operated, it controls suction of the detergent from receptacle **14** and its dispensing into washing chamber **WC**. Initially, the detergent is sucked through suction passageway **29** of container **13** and then passes through suction orifice **19** of case **17** and into the inlet of tube **16a**. Rotation of rotor **16b** propels the liquid towards the outlet of tube **16a**. Subsequently, the detergent is dispensed through delivery orifice **21** of case **17** and then passes through delivery passageway **27** of container **13**, being then distributed outside the latter into washing chamber **WC**.

[0042] In the illustrated embodiment, tank assembly **12** comprises a non-return valve **26** configured to allow air to flow into receptacle **14** and prevent it from flowing out, so as to allow a pressure compensation within receptacle **14**.

[0043] In the illustrated embodiment, in particular as seen in figure 4, tank-holder assembly **20** is intended to

be coupled to door **D** through suitable fastening means, for example a plurality of screws **S**.

[0044] In particular, door **D** comprises an inner panel **IP**, operatively facing washing chamber **WC**, and an outer panel **OP**, operatively facing the environment outside washing machine **WM**.

[0045] A gap is defined between inner panel **IP** and outer panel **OP**, and tank-holder assembly **20** is intended to be fixed to inner panel **IP**.

[0046] More in particular, tank-holder assembly **20** is intended to be coupled through an aperture **A** formed in and passing through inner panel **IP**.

[0047] Preferably, tank-holder assembly **20** is fixed at a recessed portion **RP** positioned in door **D**. In particular, recessed portion **RP** is formed on the inner side (operatively facing washing chamber **WC**) of inner panel **IP**; aperture **A** being formed through said recessed portion **RP**.

[0048] In the illustrated embodiment, tank-holder assembly **20** comprises a portion of flange **28** that is mounted - e.g., in the rear - on inner panel **IP** around aperture **A**, through the fastening means, for example, the plurality of screws **S** passing through flange **28** and inner panel **IP**.

[0049] In particular, tank-holder assembly **20** is shaped in the form of a tray extending at least partially within the gap defined between inner panel **IP** and outer panel **OP** of door **D**. Such a tray shape is configured to accommodate tank assembly **12** therein, such that, in the assembled condition, tank assembly **12** operatively extends through inner panel **IP**, on one side, into the washing chamber **WC**, and, on the other side, into the gap positioned between inner panel **IP** and outer panel **OP**.

[0050] For example, the coupling between tank assembly **12** and tank-holder assembly **20** may occur through releasable-type quick coupling means, in particular snap-fit coupling means. Such releasable coupling means comprise a pair of elastic arms **33** (e.g., L-shaped ones) held by tank assembly **12** and configured to elastically and releasably fit into recesses formed in corresponding lateral appendixes **35** held by tank-holder assembly **20** (in particular, frontally protruding from flange **28**). Elastic arms **33** are disengageable from lateral appendixes **35** by means of gripping tabs **37** superiorly held by such elastic arms **33** and configured to be pushed by a user in such a way as to spread said elastic arms **33** apart and cause them to uncouple.

[0051] In the illustrated embodiment, a sealing peripheral gasket **30** is provided which is fastened between tank-holder assembly **20** and the inner face of door **D**, in particular between flange **28** and inner panel **IP**.

[0052] In the illustrated embodiment, motor apparatus **18** is attached to the tank-holder assembly **20**, for example through suitable engaging or fastening means (such as screws). In particular, motor apparatus **18** is attached to tank-holder assembly **20** on an opposite side with respect to the one in which tank assembly **12** is configured to be assembled.

[0053] In the illustrated embodiment, motor apparatus

18 comprises an output shaft **32** which is rotationally driven and kinetically couplable with pump assembly **16**. In particular, output shaft **32** is kinematically connected to pump assembly **16** when tank assembly **12** is in the assembled condition with tank-holder assembly **20**; vice versa, output shaft **32** is kinematically disconnected from pump assembly **16** when tank assembly **12** is in the disassembled condition from tank-holder assembly **20**. Preferably, in the assembled condition, output shaft **32** is axially inserted into a rotor of pump assembly **18**, for example rotor **16b** of the peristaltic pump of such pump assembly **18**. In the illustrated embodiment, output shaft **32** passes through tank-holder assembly **20**, for example at a bottom wall thereof. In particular, output shaft **32** protrudes through tank-holder assembly **20** in order to kinematically couple with pump assembly **16** in the assembled condition of tank assembly **12**.

[0054] In the illustrated embodiment, motor apparatus **18** further comprises an electric motor **34** configured to rotationally drive output shaft **32**.

[0055] Preferably, motor apparatus **18** further comprises a transmission mechanism **36**, for example a gear motor assembly, driven by electric motor **30** and configured to transfer rotation to output shaft **32**.

[0056] Preferably, motor apparatus **18** is provided with a casing **38** attached to tank-holder assembly **20** and from which output shaft **32** - which in turn passes through tank-holder assembly **20** - protrudes. In particular, casing **38** contains electric motor **34** and transmission mechanism **36** therein.

[0057] In the illustrated embodiment, an annular gasket **40** (only visible in figure 5) is provided which is positioned around output shaft **32** and fluid-tight fastened between motor apparatus **18** and tank-holder assembly **20**. In particular, annular gasket **40** provides fluid tightness in the coupling between output shaft **32** and pump assembly **16**, when tank assembly **12** is in the assembled condition. For example, annular gasket **40** is fastened between the bottom of tank-holder assembly **20** tray body and casing **38** of motor apparatus **18**.

[0058] In the assembly through door **D**, motor apparatus **18** is positioned in the gap positioned between inner panel **IP** and outer panel **OP**. Therefore, all components of system **10** that are operationally subjected to electrical voltage (and that belong to motor apparatus **18**) are fluid-tightly contained within door **D** and thus separated from washing chamber **WC**; thus, contact with liquids during the washing phases of washing machine **WM** is advantageously avoided for such components.

[0059] Naturally, without prejudice to the principle of the invention, the embodiments and implementation details may be widely varied with respect to what is described and illustrated purely by way of non-limiting example, without thereby departing from the scope of the invention as defined in the appended claims.

Claims

1. Dispenser system (**10**) for a detergent, such as a washing agent and/or a rinsing agent, associated with a door (**D**) of a washing machine (**WM**), in particular a dishwasher; said system comprising:

- a tank assembly (**12**) comprising a container (**13**) defining a receptacle (**14**) therein intended for containing said detergent;

- a pump assembly (**16**) configured to collect a quantity of said detergent from said receptacle (**14**) and dispense said quantity of said detergent outside said receptacle (**14**) into a washing chamber (**WC**) positioned in said washing machine (**WM**);

- a tank-holder assembly (**20**) intended to be attached to the inner face of the door (**D**) of said washing machine (**WM**) and provided with a motor apparatus (**18**) configured to operate said pump apparatus (**16**); and

wherein said tank assembly (**12**) comprises and supports, in a repeatedly removable way, said pump assembly (**16**), which is configured to reversibly acquire

a coupled condition, wherein said pump assembly (**16**) is simultaneously mounted to said tank assembly (**12**) and hydraulically connected to said receptacle (**14**);

an uncoupled condition, wherein said pump assembly (**16**) is simultaneously disassembled from said tank assembly (**12**) and hydraulically disconnected from said receptacle (**14**); and

wherein said tank assembly (**12**) is mounted in a repeatedly removable way with respect to said tank-holder assembly (**20**), and is configured to reversibly acquire

a disassembled condition, wherein said tank assembly (**12**) is disassembled from said tank-holder assembly (**20**) and the coupled pump apparatus (**16**) is kinematically disconnected from said motor apparatus (**18**), and

an assembled condition, wherein said tank assembly (**12**) is mounted to said tank-holder assembly (**20**) and the coupled pump apparatus (**16**) is kinematically connected to said motor apparatus (**18**).

2. System according to claim 1, further comprising a level sensor (**22, 23**) configured to detect the quantity of detergent contained in the receptacle (**14**).

3. System according to claim 2, wherein the level sensor comprises:

- a float element (**22**) positioned in the receptacle (**14**) and configured to float above the or free surface of the detergent contained in the recep-

- tacle **(14)**; and
 - a detector element **(23)** configured to cooperate with the float element **(22)** in such a way as to provide a level signal representative of the level reached by the or free surface of the detergent contained in the receptacle **(14)**. 5
4. System according to claim **3**, wherein the detector element **(23)** is supported by the tank-holder assembly **(20)**, in a position facing the float element **(22)** of the tank assembly **(12)** when the tank assembly **(12)** is in the assembled condition. 10
5. System according to any of the preceding claims, wherein said container **(13)** of said tank assembly **(12)** comprises a closure element **(24)** configured to be mounted removably, in such a way as to fluid-tightly close the receptacle **(14)**. 15
6. System according to any of the preceding claims, wherein said pump assembly **(16)** comprises a peristaltic pump. 20
7. System according to any of the preceding claims, the pump assembly **(16)** is positioned in the tank assembly **(12)** outside the receptacle **(14)**. 25
8. System according to any of the preceding claims, wherein the motor apparatus **(18)** is attached to the tank-holder assembly **(20)**. 30
9. System according to any of the preceding claims, wherein the motor apparatus **(18)** comprises an output shaft **(32)** which is rotationally driven and kinetically couplable with the pump assembly **(16)**. 35
10. System according to claim **9**, wherein the output shaft **(32)** is respectively kinematically coupled to and uncoupled from the pump assembly **(16)**, when the tank assembly **(12)** is respectively in the assembled condition and in the disassembled condition with respect to the tank-holder assembly **(20)**. 40
11. Washing machine **(WM)** comprising a case wherein a washing chamber **(WC)** and a door **(D)** movably mounted with respect to the case are defined; said washing machine further comprising a system **(10)** provided according to any of the preceding claims and associated with the door **(D)**. 45
12. Washing machine according to claim **11**, wherein the door **(D)** comprises: 50
- an inner panel **(IP)** operatively oriented towards the washing chamber **(WC)** and on which the tank-holder assembly **(20)** is attached, and 55
 - an outer panel **(OP)** operatively oriented towards the environment outside the washing ma-

chine **(WM)**.

13. Washing machine according to claim **12**, wherein, between said inner panel **(IP)** and said outer panel **(OP)** a gap is defined in which the tank-holder assembly **(20)** and the motor apparatus **(18)** are positioned.

14. Machine according to claim **12** or **13**, wherein the tank-holder assembly **(20)** is coupled to the inner panel **(IP)** by means of a through aperture **(A)** formed in the latter.

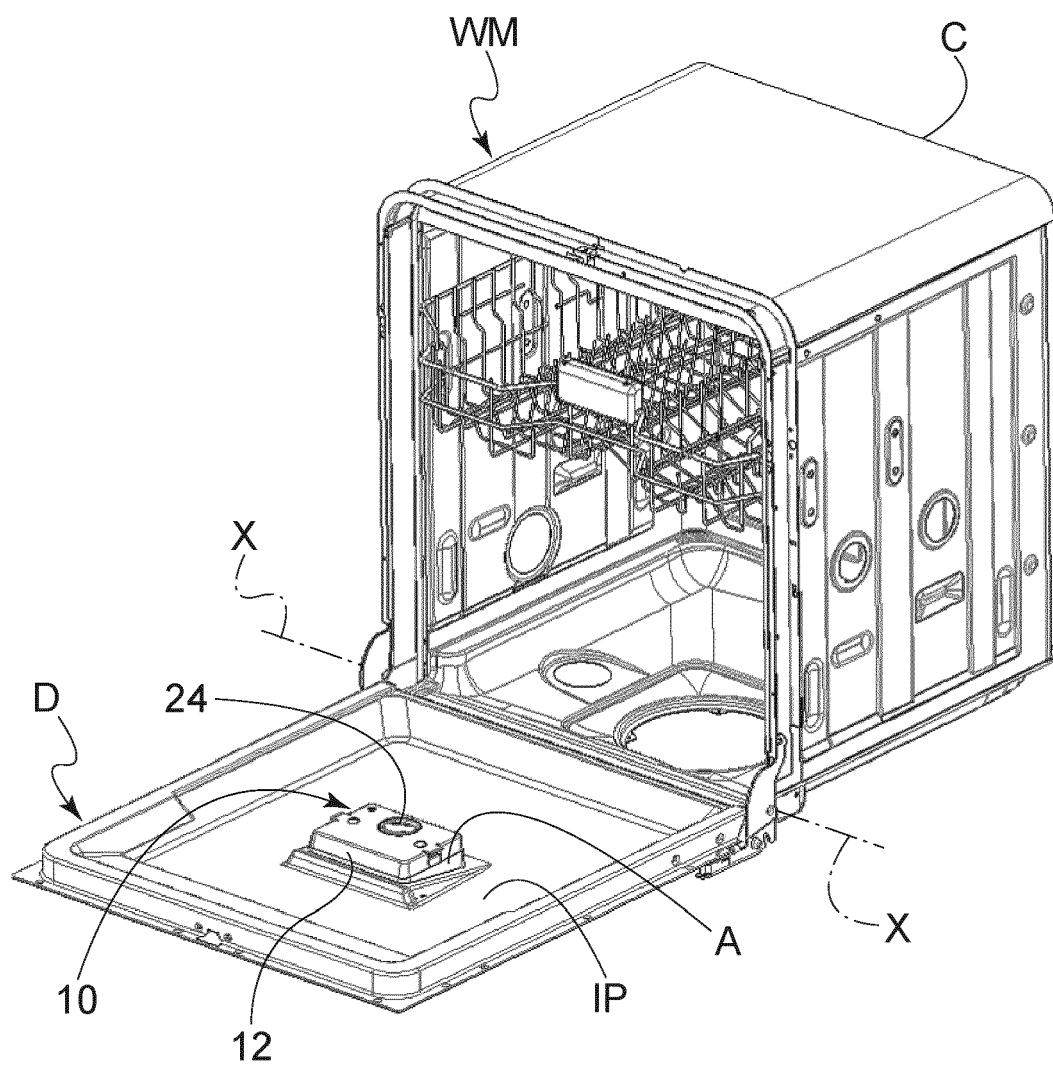
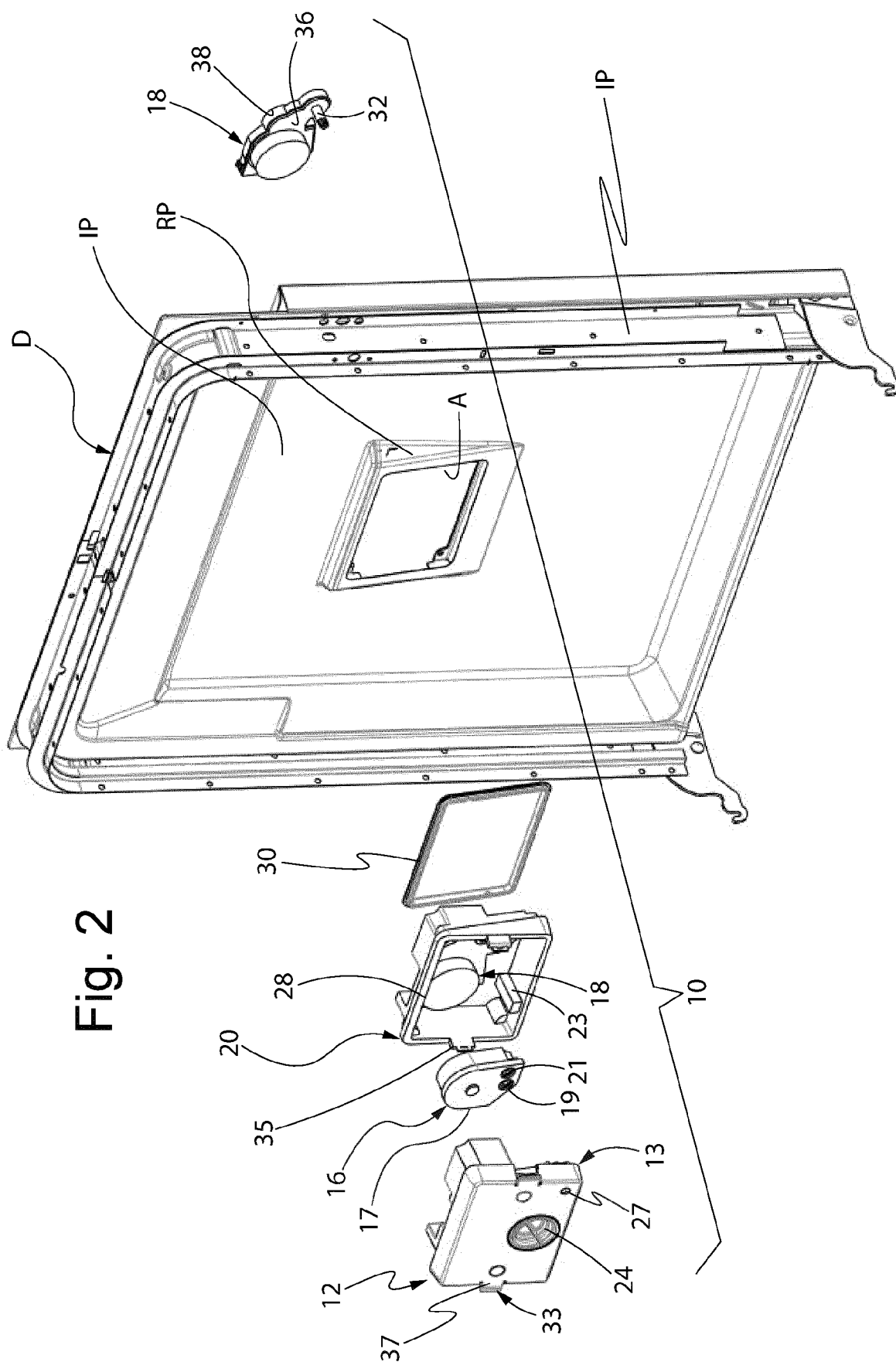
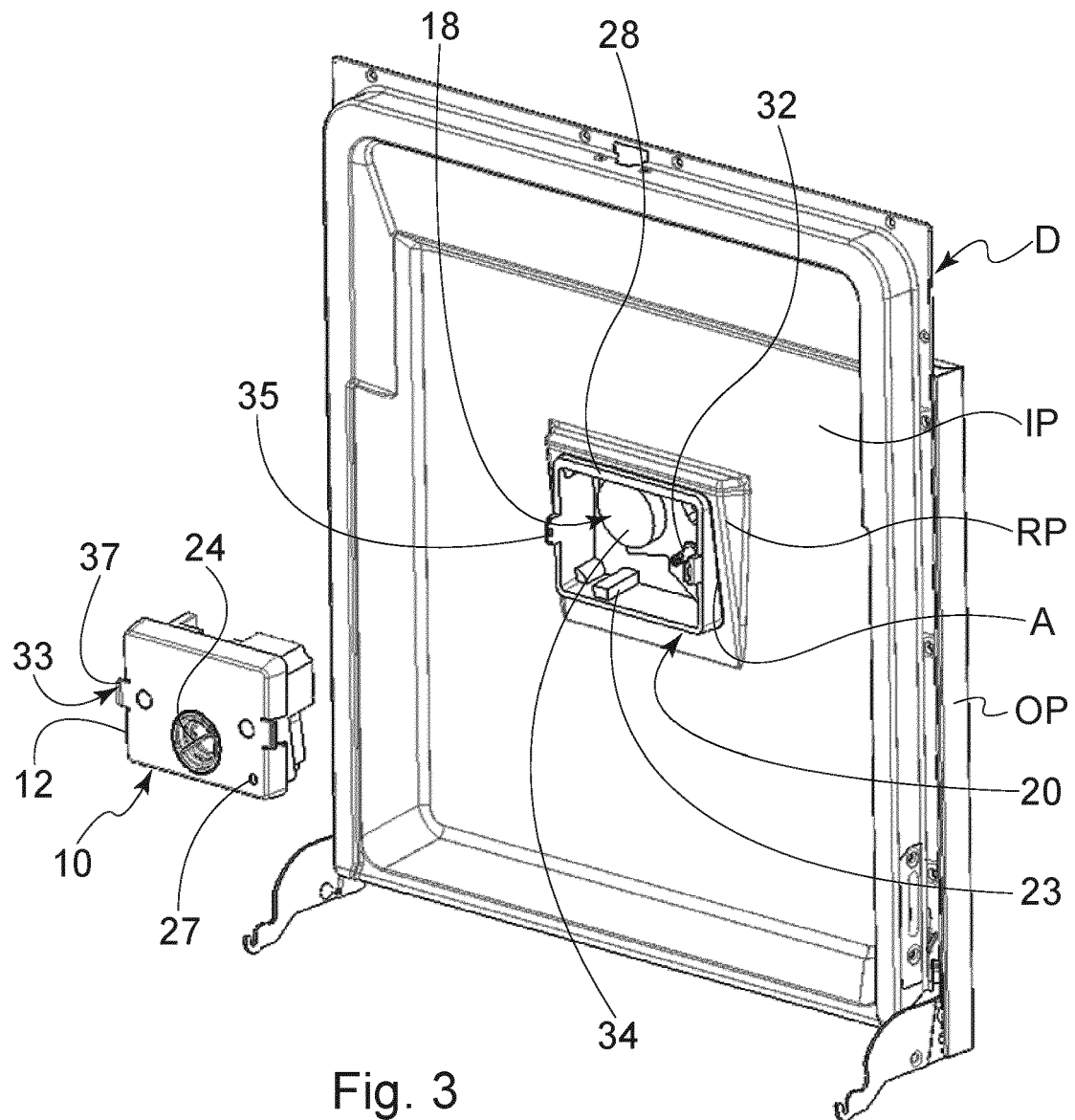


Fig. 1





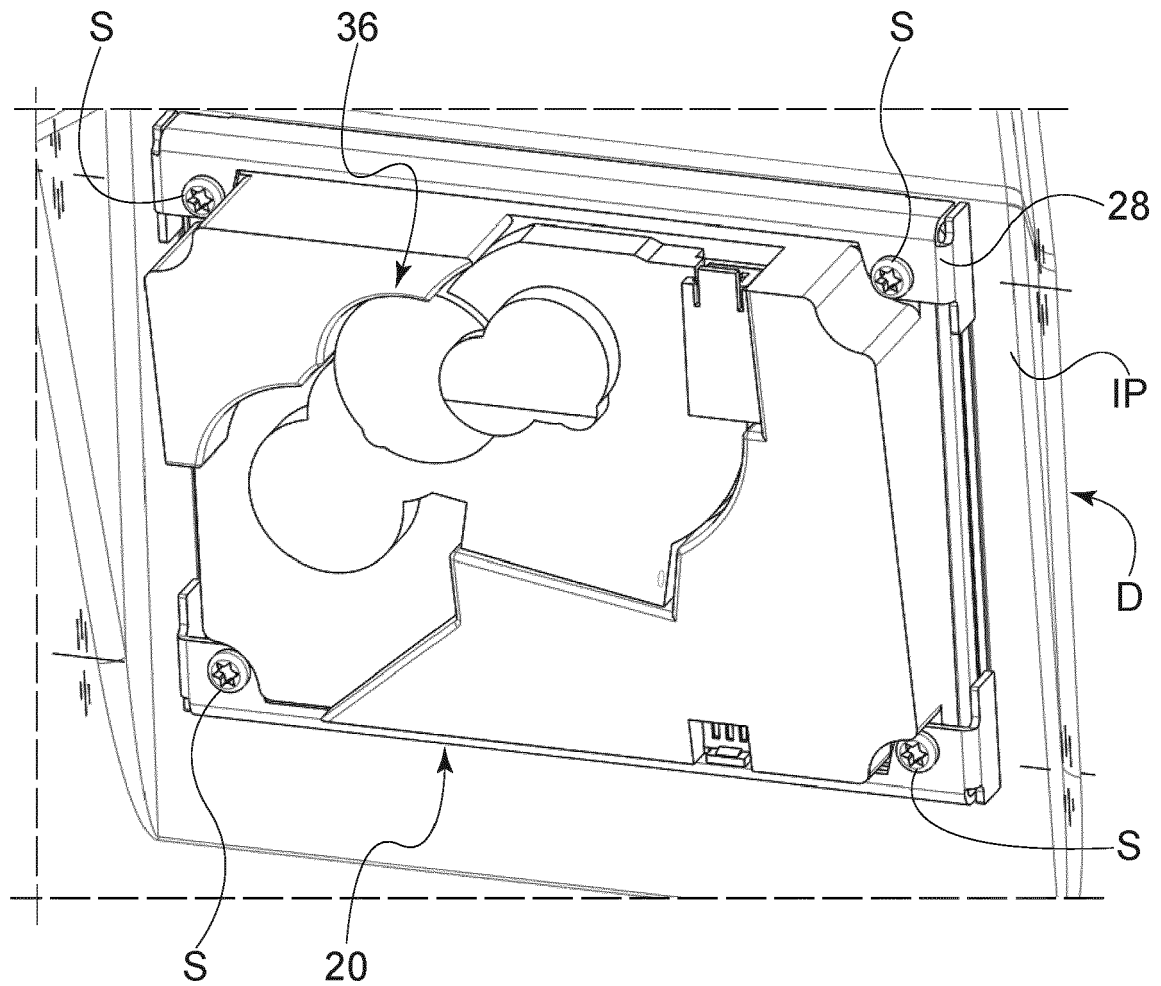


Fig. 4

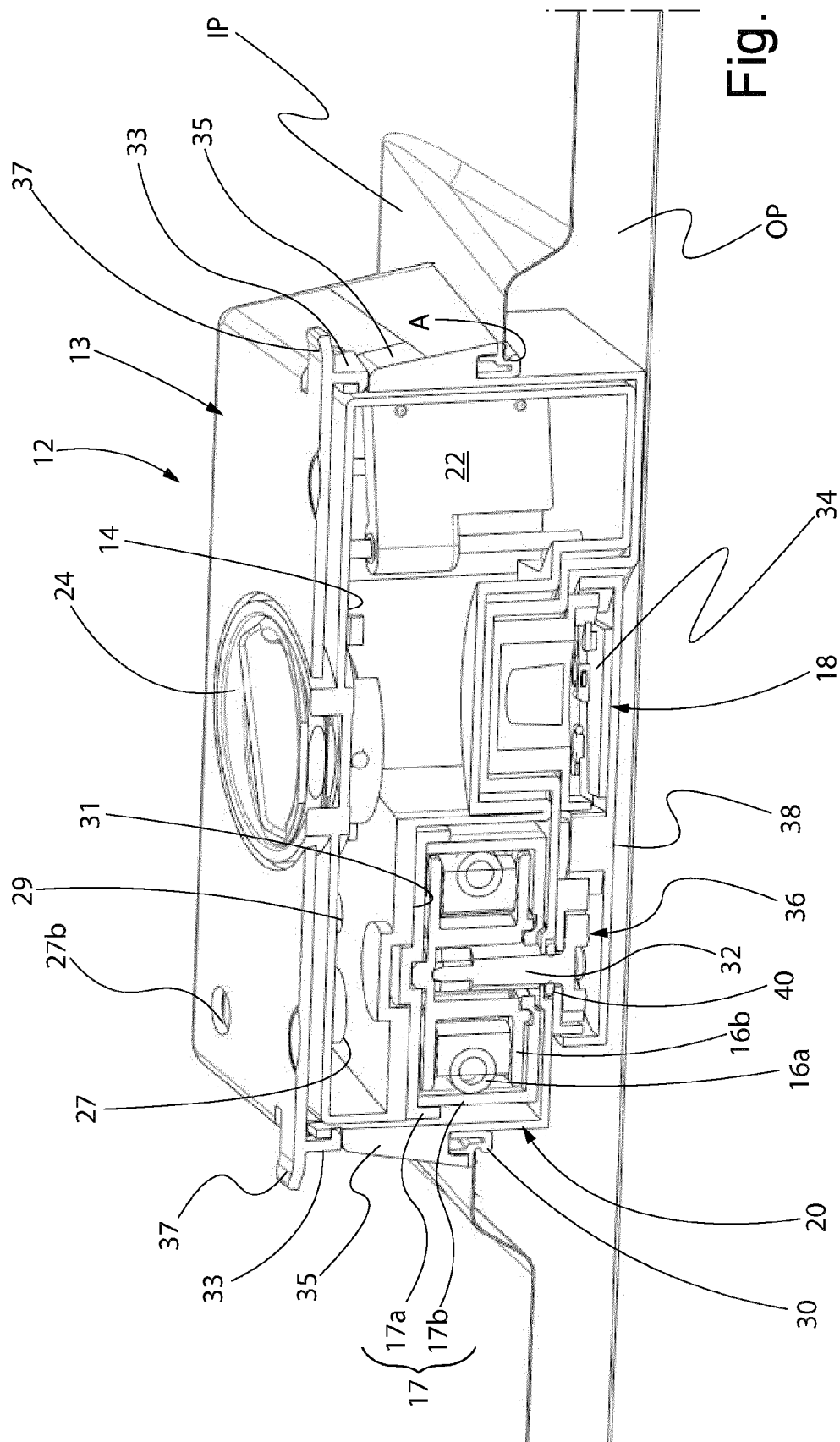


Fig. 5

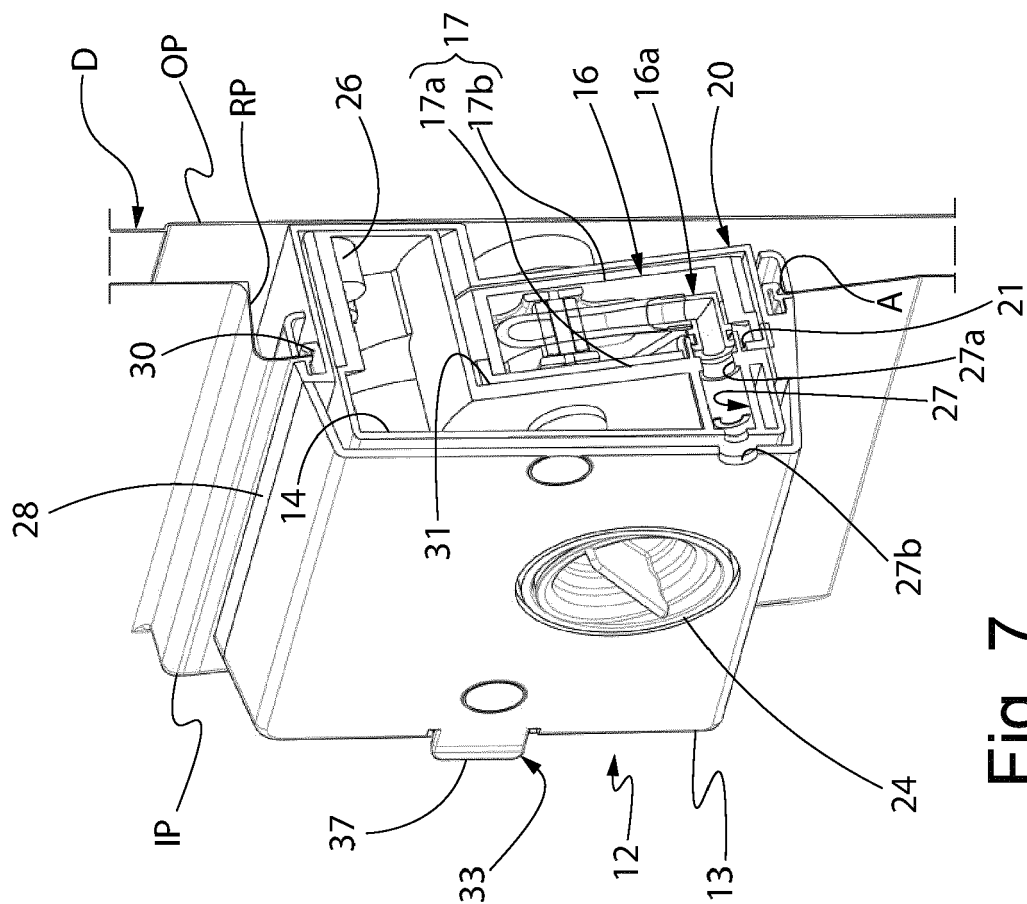


Fig. 7

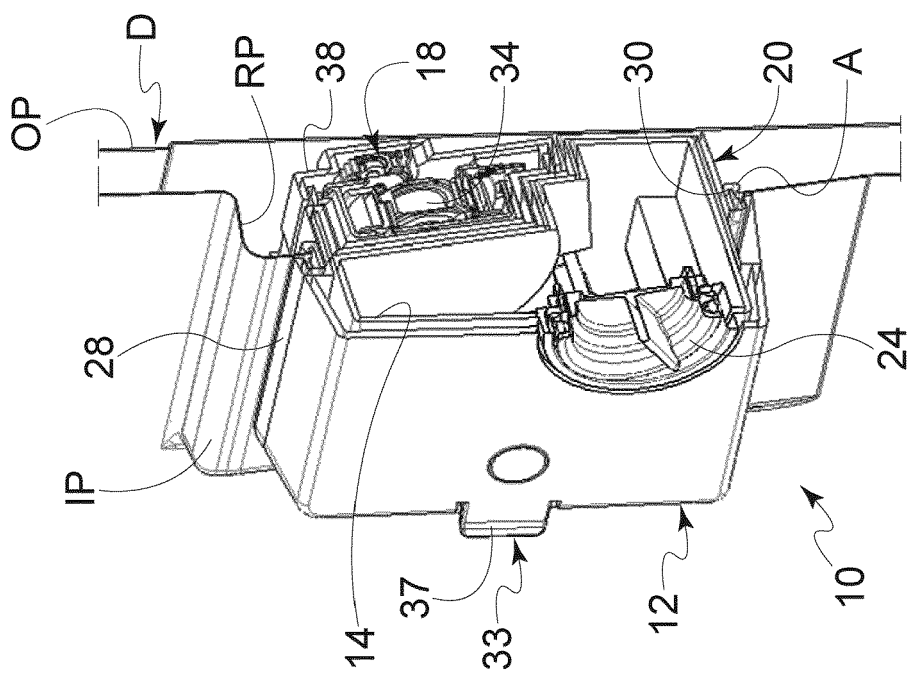
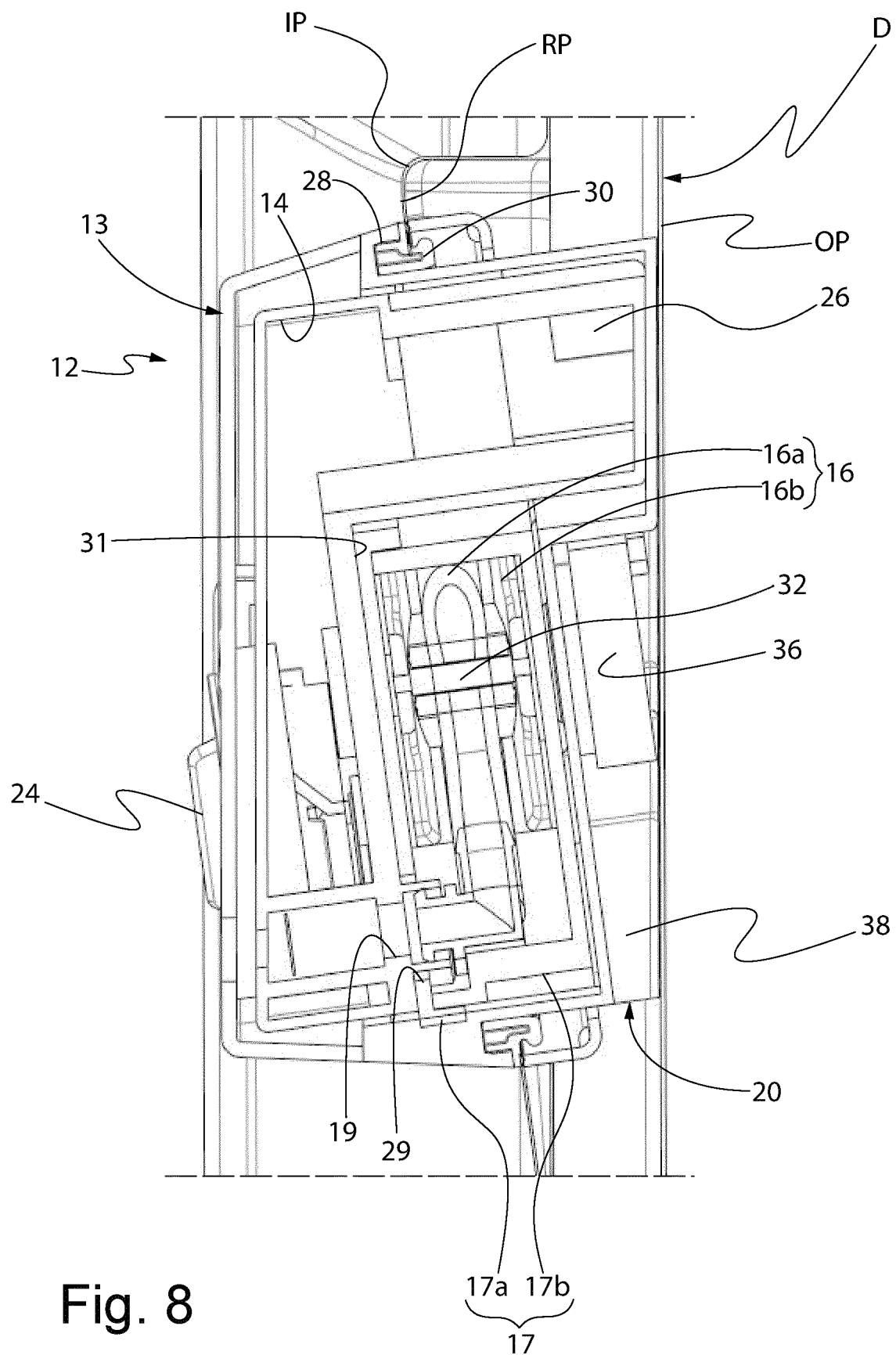
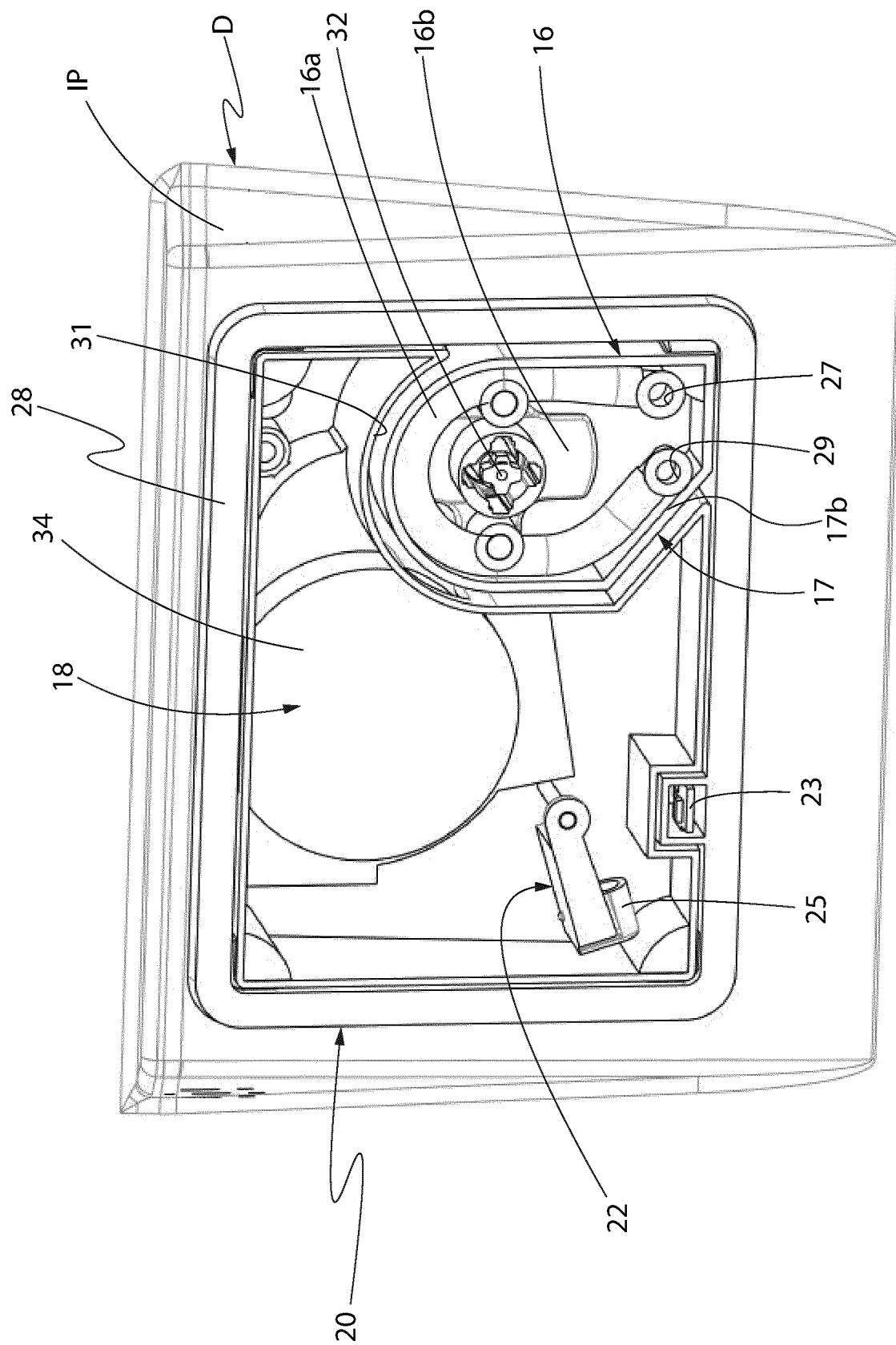


Fig. 6





உ.த.



EUROPEAN SEARCH REPORT

 Application Number
EP 21 16 5780

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2017/042404 A1 (KAN UGUR [TR] ET AL) 16 February 2017 (2017-02-16)	1,5,7-14	INV. A47L15/42 A47L15/44
Y	* abstract; figures * * paragraphs [0026] - [0037] *	2-4,6	
Y	----- CN 110 916 587 A (FOSHAN SHUNDE MIDEA WASHING APPLIANCES MFG CO LTD) 27 March 2020 (2020-03-27)	2-4	ADD. D06F39/02 D06F39/14
Y	* abstract * * paragraphs [0064] - [0085]; figures *		
Y	----- US 2016/177491 A1 (DA PONT PAOLO [IT] ET AL) 23 June 2016 (2016-06-23)	6	
	* abstract * * paragraphs [0053] - [0067]; figures *		
X	----- KR 2015 0103988 A (LG ELECTRONICS INC [KR]) 14 September 2015 (2015-09-14)	1,2,5, 7-14	
Y	* the whole document *	3,4,6	
A	----- EP 3 502 336 A1 (CANDY SPA [IT]) 26 June 2019 (2019-06-26)	1-14	TECHNICAL FIELDS SEARCHED (IPC)
	* abstract; figures *		A47L D06F
A	----- US 7 931 032 B1 (PENKAUSKAS DANIEL J [US] ET AL) 26 April 2011 (2011-04-26)	1-14	
	* abstract; claims; figures * * column 3, line 62 - column 7, last line *		
A	----- US 2016/273150 A1 (DEL POS MAURIZIO [IT] ET AL) 22 September 2016 (2016-09-22)	1-14	
	* abstract * * paragraphs [0008], [0012], [0027] - [0029], [0079] - [0130]; figures 1-6 *		
	----- -/-		
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 July 2021	Examiner Prosig, Christina
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

EPO FORM 1503 03.82 (P04C01)



EUROPEAN SEARCH REPORT

Application Number
EP 21 16 5780

5

10

15

20

25

30

35

40

45

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2017/306551 A1 (KIM YOUNGWOONG [KR] ET AL) 26 October 2017 (2017-10-26) * abstract; figures *	1-14	
A,D	EP 1 959 045 A1 (ELECTROLUX HOME PROD CORP [BE]) 20 August 2008 (2008-08-20) * abstract; figures *	1-14	
			TECHNICAL FIELDS SEARCHED (IPC)
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 July 2021	Examiner Prosig, Christina
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

2

50

55

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 21 16 5780

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

29-07-2021

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2017042404 A1	16-02-2017	EP 3130272 A1 PL 3130272 T3 US 2017042404 A1	15-02-2017 30-08-2019 16-02-2017
CN 110916587 A	27-03-2020	NONE	
US 2016177491 A1	23-06-2016	CN 105940153 A EP 3033452 A1 PL 3033452 T3 TR 201807238 T4 US 2016177491 A1 WO 2015022622 A1	14-09-2016 22-06-2016 28-09-2018 21-06-2018 23-06-2016 19-02-2015
KR 20150103988 A	14-09-2015	NONE	
EP 3502336 A1	26-06-2019	CN 109957936 A EP 3502336 A1 ES 2834374 T3 RU 2018145587 A	02-07-2019 26-06-2019 17-06-2021 22-06-2020
US 7931032 B1	26-04-2011	NONE	
US 2016273150 A1	22-09-2016	AU 2013405844 A1 EP 3071742 A1 US 2016273150 A1 WO 2015074688 A1	14-04-2016 28-09-2016 22-09-2016 28-05-2015
US 2017306551 A1	26-10-2017	CN 106715781 A EP 3202968 A1 KR 20160038270 A US 2017306551 A1 WO 2016052907 A1	24-05-2017 09-08-2017 07-04-2016 26-10-2017 07-04-2016
EP 1959045 A1	20-08-2008	AT 464421 T EP 1959045 A1 ES 2343033 T3 PL 1959045 T3 RU 2009134125 A WO 2008098729 A1	15-04-2010 20-08-2008 21-07-2010 30-09-2010 20-03-2011 21-08-2008

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 7571734 B [0003]
- EP 1959045 A1 [0004]