

(19)



(11)

EP 3 310 237 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

19.06.2019 Bulletin 2019/25

(51) Int Cl.:

A47L 15/42 ^(2006.01) **A47L 15/48** ^(2006.01)

(86) International application number:

PCT/IB2016/053613

(21) Application number: **16745821.5**

(22) Date of filing: **17.06.2016**

(87) International publication number:

WO 2016/203442 (22.12.2016 Gazette 2016/51)

(54) INTEGRATED COMPONENT FOR A DISHWASHING MACHINE

INTEGRIERTES BAUELEMENT FÜR EINE GESCHIRRSPÜLMASCHINE

COMPOSANT INTÉGRÉ POUR LAVE-VAISSELLE

(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**

(30) Priority: **19.06.2015 IT UB20151520**

(43) Date of publication of application:

25.04.2018 Bulletin 2018/17

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Description

[0001] The present invention relates to the field of dish-washing machines and in particular to the accessories for softening the mains water supplied to it.

[0002] Various water-softening devices form part of the prior art, some of which are described in the prior art documents cited hereinbelow.

[0003] EP 0 205 787 and EP 0 205 788 describe dish-washing machines provided with a bulky decalcifying device, which has a vessel intended specifically to contain the water to be supplied to the salt reservoir so as to produce a brine for regenerating ion exchange resins, and in which the salt reservoir is above the chamber which contains said resins.

[0004] EP 0 367 062 describes a decalcifying device which has a single body formed at least by three parts welded together and is provided with a vessel intended specifically to contain the water to be supplied to the salt reservoir so as to produce a brine for regenerating ion exchange resins.

[0005] EP 0 565 876 and EP 0 571 806 describe bulky decalcifying devices each provided with a vessel intended specifically to contain the water to be supplied to the salt reservoir, wherein the regeneration process is controlled by means of two separate electric control devices.

[0006] EP 2 564 752 describes a decalcifying device formed by a number of separate parts assembled together.

[0007] EP 1 497 491 describes a decalcifying device, wherein the resin regeneration takes place in an open circuit and which lacks a device for blowing out the vapours which form inside the washing tank of the respective dishwasher.

[0008] IT 1 360 369 describes a decalcifying device formed by a number of parts welded together, wherein provision is made of a vessel intended specifically to contain the water to be supplied to the salt reservoir, and wherein the conduit for blowing out vapours from the washing tank is formed at the filler tube for loading the salt, thus compromising the drying efficiency.

[0009] It is an object of the present invention to provide a decalcifying device and a dishwashing machine in which it is installed which have a structure and production method which are simplified with respect to those described in the prior art.

[0010] According to the invention, this object is achieved by an integrated component having the features mentioned specifically in the accompanying claim 1. Preferred features of the invention are specified in the dependent claims.

[0011] The present invention also relates to a dishwashing machine comprising an integrated component of the type mentioned above.

[0012] Further advantages and features of the present invention will become evident from the detailed description hereinbelow, which is provided purely by way of non-limiting example and with reference to the accompanying

drawings, in which:

Figure 1 is a perspective view of an integrated component of the invention,

Figure 2 is a view of the component shown in Figure 1, with a number of parts in exploded form,

Figures 3 to 5 are schematic elevated views illustrating successive steps for mounting the component of the preceding figures on a washing tank,

Figures 6 and 7 are schematic views in frontal and lateral elevation, respectively, of the hydraulic circuit of the component of the invention during the water-softening step,

Figures 8 and 9 are schematic views in frontal and lateral elevation, respectively, of the hydraulic circuit of the component of the invention during the regeneration step,

Figure 10 is a view in vertical section of the integrated component of the invention along the line X-X shown in Figure 1,

Figure 11 is an elevated view, on an enlarged scale, of a detail (salt loading zone) of the integrated component of the invention,

Figure 12 is a view in vertical section of the detail shown in the preceding figure along the line XII-XII shown in Figure 1, and

Figure 13 is a view in vertical section of the detail shown in Figure 11 along the line XIII-XIII.

[0013] Figure 1 shows an integrated component for supplying and treating water for a dishwashing machine, said component comprising a monolithic body 10 of plastics material. The latter comprises an approximately flat part 12 arranged in a substantially vertical manner, from a lower portion of which there protrudes an attachment 14 having a substantially parallelepiped shape. The term "monolithic" in the present description is intended to mean an assembly formed by two or more parts which are joined permanently to one another and are no longer separable, apart from possibly as a result of irreversible breakage.

[0014] Advantageously, the monolithic body 10 is produced by welding together (Figure 2) two half-parts 10a, 10b along a line which lies in a vertical plane. The half-part 10a, arranged at the rear with reference to Figure 2, may be a simple planar sheet, or may include elevations which, in combination with those of the half-part 10b, form the internal circuits of the component, which includes (figures 6-9):

- an inlet conduit 16 for water, on which a flowmeter 18 is optionally positioned;
- a chamber 20 containing substances with water-softening properties, in particular ion exchange resins, into which the inlet conduit 16 opens out and out of which there leads an outlet conduit 22 having an air break 24 in its initial section;
- a salt-containing reservoir 26, positioned in the at-

tachment 14, that is in the lowest portion of the body 10, and having a filler tube 28 for loading the salt, which is provided with a plug 29 (shown for greater clarity only in Figures 12 and 13);

- a compartment 30 for blowing out vapours, having an inlet opening 32 and an outlet opening 34;
- a conduit 36 for supplying decalcified water to the reservoir 26 so as to produce a brine for regenerating substances with water-softening properties; and
- a conduit 38 for connecting the reservoir 26 to the chamber 20.

[0015] The component further comprises a valve 41 - preferably of deviator or deviator/mixing kind - which is situated at a point wherein the conduit 36 for supplying water to the reservoir 26 branches off from the inlet conduit 16. Furthermore, a non-return valve 43 is arranged on the conduit 38 connecting the reservoir 26 to the chamber 20. The valve 43 is controlled by the valve 41 or possibly may also form an integral part of the latter. As will be explained further hereinbelow, the valve 41 can assume a first operating configuration in which it prevents the flow along the conduit 36 for supplying water to the reservoir 26, while it allows the flow along the inlet conduit 16 towards the chamber 20, so that all the water supplied to the branch-off point is directed directly into the latter, and a second operating configuration in which it allows the flow along the conduit 36, and possibly also that along the inlet conduit 16 directed towards the chamber 20. These operating methods are known per se, however, and are described, for example, in detail in EP 1 844 693 A1/EP 2 561 790 A1.

[0016] The inlet opening 32 of the compartment 30 for blowing out vapours is formed (Figures 1 and 10) in a protrusion 42 of the central portion of the substantially flat part 12, which has a circular cross section and a substantially horizontal axis 44 and has on its lateral external surface a plurality of elastic tabs 46 that are circumferentially offset. Each tab 46 has, in plan view, a substantially rectangular shape, is connected to the protrusion 42 only on one side 48, and has a thickness which increases gradually proceeding towards the opposite side which constitutes a free edge. On the other hand, the filler tube 28 for loading the salt is part of a protrusion 50 of the attachment 14 of the monolithic body 10, said filler tube having a substantially circular cross section and a substantially vertical axis 52 and having a plurality of elastic tabs 46 on its lateral external surface. The structure of these tabs 46 is substantially analogous to that of the tabs described previously in relation to the protrusion 42.

[0017] As is shown in Figures 3-5, the protrusions 42, 50 make it possible for the component to be connected directly to a washing tank 54 of the dishwashing machine, without it being necessary to use additional fixing elements, such as nuts and the like, and/or tubes, thereby facilitating the adoption of automated assembly processes. In particular, first the protrusion 50 (Figure 4) and then the protrusion 42 (Figure 5) are connected. The pos-

sibility of at least one of the two connections conventionally using known fixing elements, such as tightening nuts and the like, is not excluded, however.

[0018] The tank 54 is made from metal sheet and has, in a substantially vertical side wall 56 and in a substantially horizontal bottom wall 58, a respective projection 60, within each of which provision is made of an opening 62 having a shape corresponding to that of the protrusion 42, 50 of the integrated component inserted therein. This insertion is made possible by the curvature of the respective elastic tabs 46, which firstly curve inwards radially and then expand radially outwards, acting as elastic holding means which prevent subsequent inadvertent removal of the component. A water-tight seal at the openings 62 of the tank 54 is ensured by respective O-rings 64 arranged between the internal wall of each projection 60 and a facing section of the external wall of the protrusion 42, 50.

[0019] Once the component has been connected to the washing tank 54 at the vertical wall 56 and at the horizontal wall 58, the weight of said component is supported essentially by the protrusion 42 of the central portion of the substantially flat part 12.

[0020] Both of the connections between the openings 62 of the tank 54 and the protrusions 42, 50 of the monolithic body 10 are formed with a certain degree of play, corresponding to the machining tolerances with which the openings 62 can be formed. In particular, the connection which involves the protrusion 42 has to allow a movement along the horizontal axis 44, whereas the connection which involves the protrusion 50 has to allow a movement along the vertical axis 52.

[0021] The presence of a respective connection on each of the two orthogonal walls 56, 58 in any case makes the assembly of the component on the tank 54 intrinsically stable, and therefore the presence of elastic holding means, such as the tabs 46, on the protrusions 42, 50 is not essential. Indeed, embodiments of the present invention (not shown in the figures) are possible in which the protrusions 42, 50 do not have tabs 46 and the component is kept assembled on the tank 54 owing to the interference which exists between the respectively facing parts and the interposed O-rings 64.

[0022] At the end of the assembly process, the opening 32 is in communication with the tank 54 and can thus act as an inlet into the compartment 30 for the vapours which are generated in the tank 54 during the washing operations and should be removed. In a manner known per se, these vapours can be discharged later passing through the outlet opening 34 of the compartment 30. This discharge also makes it possible to dampen any pressure variations which form in the washing tank 54 due to variations in temperature.

[0023] At the top (Figure 1), the chamber 20 containing ion exchange resins has an outwards opening 66 provided with a removable plug 68, typically made of plastics material, such as to allow for the introduction or removal of said resins, as desired. The plug 68 has a plastic cou-

pling advantageously with a degree of play of less than 0.2 mm in the part in contact with the resins and a leak-tight coupling on the wall of the opening 66 which prevents water escaping owing to a plastic-on-plastic contact. If appropriate, provision may be made for a sealing gasket to be present between the wall of the opening 66 and the plug 68. In embodiments of the invention which are not shown, the plug 68 may be formed in one piece with one of the two half-parts 10a, 10b, to which it is connected by a flap or similar holding means which allow for the opening/closing movement with respect to the opening 66, in any case holding the plug on the body 10.

[0024] This arrangement is extremely advantageous because it makes it possible to hydraulically test the component before the resins are introduced into the chamber 20. As a result, only the parts which have passed the test are loaded with the resins, whereas those which are rejected can be passed on directly for the recycling operations. Analogously, at the end of the service life of the component, it is possible to remove the plug 68 and empty the chamber 20 of the resins, such that in this case, too, the component from which the latter have been removed can easily be recycled.

[0025] During normal operation of the component, the valve 41 assumes the first operating configuration in which it prevents the flow along the conduit 36 for supplying water to the reservoir 26, while it allows the flow along the inlet conduit 16 towards the chamber 20. In this way, all the water supplied is directed directly into the chamber 20, where it is decalcified by the ion exchange resins (cf. Figures 6 and 7). The decalcified water exits from the top of the chamber 20 through the conduit 22, and firstly passes through the air break section 24, which does not cause a loss of pressure owing to its position downstream of the chamber 20. Then, the decalcified water enters (Figures 10 and 12) into a conduit 53, which issues, in a manner known per se, into the washing tank 54 through a passage formed between an arch of the circumferential wall of the filler tube 28 and the wall of the protrusion 50 arranged coaxially outside it.

[0026] When the ion exchange resins are exhausted, it is necessary to regenerate them. For this purpose, the valve 41 assumes the second operating configuration in which it allows both the flow along the conduit 36 and the flow along the inlet conduit 16 directed towards the chamber 20. In this way, the water which has flowed into the reservoir 26 forms a brine, which, by means of the connecting conduit 38, is directed into the chamber 20, where it regenerates the ion exchange resins.

[0027] Clearly, without departing from the principle of the invention, the constructional details and the embodiments may be greatly varied with respect to that described purely by way of example, without thereby departing from the scope of the invention as defined in the accompanying claims.

Claims

1. Integrated component for supplying and treating water for a dishwashing machine, comprising a monolithic body (10) of plastics material, within which an inlet conduit (16) for water, a chamber (20) containing substances with water-softening properties, into which said inlet conduit (16) leads, a salt-containing reservoir (26) arranged in the lowermost portion of the body (10) and having a filler tube (28) for loading the salt, an outlet conduit (22) of water from said chamber (20), a conduit (36) for supplying water to said reservoir (26) in order to produce therein a brine for regenerating the substances with water-softening properties, and a conduit (38) connecting said reservoir (26) to said chamber (20) are defined, said component being **characterized in that** it further comprises a compartment (30) for blowing out vapours having an inlet opening (32) and an outlet opening (34), and a valve (41) situated at a point wherein said conduit (36) for supplying water to said reservoir (26) branches off from said inlet conduit (16), said valve (41) being able to assume a first operating configuration in which it prevents the flow along the conduit (36) for supplying water to said reservoir (26), while it allows the flow along the inlet conduit (16) towards the chamber (20), so that all the water supplied to the branch-off point is directed directly into the chamber (20), and a second operating configuration in which it allows the flow along the conduit (36) for supplying water to said reservoir (26).
2. Component according to claim 1, wherein, in the second operating configuration, said valve (41) allows, beyond the flow along the conduit (36) for supplying water to said reservoir (26), also the flow along the inlet conduit (16) towards the chamber (20).
3. Component according to claim 1 or 2, wherein said valve (41) controls a non-return valve (43) arranged on the conduit (38) connecting the reservoir (26) to the chamber (20).
4. Component according to claim 1 or 2, wherein said valve (41) is integral with a non-return valve (43) arranged on the conduit (38) connecting the reservoir (26) to the chamber (20).
5. Component according to any one of the preceding claims, wherein said valve (41) is of deviator or deviator/mixing kind.
6. Component according to any one of the preceding claims, wherein a flowmeter (18) is arranged on said inlet conduit (16) for water.
7. Component according to any one of the preceding

claims, wherein said monolithic body (10) is produced by welding together two half-parts (10a, 10b), preferably along a line which substantially lies in a vertical plane.

8. Component according to any one of the preceding claims, wherein said chamber (20) has an outwards opening (66) provided with a removable plug (68).
9. Dishwashing machine comprising a washing tank (54) and an integrated component according to any one of the preceding claims, wherein the component is directly connected to the tank (54) without using supplementary fixing elements and/or tubes.
10. Dishwashing machine according to claim 9, wherein the component is connected to a side wall (56) and to a bottom wall (58), respectively, of the washing tank (54).

Patentansprüche

1. Integrierte Komponente zum Zuführen und Behandeln bzw. Aufbereiten von Wasser für eine Geschirrspülmaschine, umfassend einen monolithischen Körper (10) aus Kunststoffmaterial, innerhalb dessen eine Einlassleitung (16) für Wasser, eine Kammer (20), die Substanzen mit Wasserenthärtungseigenschaften enthält, in welche die Einlassleitung (16) führt, ein Salz enthaltendes Reservoir (26), das im untersten Abschnitt des Körpers (10) angeordnet ist und ein Einfüllrohr (28) zum Beladen des Salzes aufweist, eine Auslassleitung (22) für Wasser aus der Kammer (20), eine Leitung (36) zum Zuführen von Wasser zu dem Reservoir (26), um darin eine Salzsole zum Regenerieren der Substanzen mit wasserenthärtenden Eigenschaften zu erzeugen, und eine Leitung (38), die das Reservoir (26) mit der Kammer (20) verbindet, definiert sind, wobei die Komponente **dadurch gekennzeichnet ist, dass** sie ferner eine Kammer (30) zum Ausblasen von Dämpfen mit einer Einlassöffnung (32) und einer Auslassöffnung (34) und ein Ventil (41) umfasst, das sich an einem Punkt befindet, an dem die Leitung (36) zum Zuführen von Wasser zu dem Reservoir (26) von der Einlassleitung (16) abzweigt, wobei das Ventil (41) in der Lage ist, eine erste Betriebskonfiguration, in der es den Fluss entlang der Leitung (36) zum Zuführen von Wasser zu dem Behälter (26) verhindert, während es den Fluss entlang der Einlassleitung (16) in Richtung der Kammer (20) erlaubt, so dass das gesamte dem Abzweigungspunkt zugeführte Wasser direkt in die Kammer (20) gerichtet wird, und eine zweite Betriebskonfiguration anzunehmen, in der es den Fluss entlang der Leitung (36) zum Zuführen von Wasser zu dem Reservoir (26) erlaubt.

2. Komponente nach Anspruch 1, wobei das Ventil (41) in der zweiten Betriebskonfiguration jenseits des Flusses entlang der Leitung (36) zum Zuführen von Wasser zu dem Reservoir (26) auch den Fluss entlang der Einlassleitung (16) in Richtung der Kammer (20) erlaubt.
3. Komponente nach Anspruch 1 oder 2, wobei das Ventil (41) ein Rückschlagventil (43) steuert bzw. regelt, das an der Leitung (38) angeordnet ist, die das Reservoir (26) mit der Kammer (20) verbindet.
4. Komponente nach Anspruch 1 oder 2, wobei das Ventil (41) integral mit einem Rückschlagventil (43) ist, das an der Leitung (38) angeordnet ist, die das Reservoir (26) mit der Kammer (20) verbindet.
5. Komponente nach einem der vorhergehenden Ansprüche, wobei das Ventil (41) vom Umlenk- oder Umlenk-/Mischtyp ist.
6. Komponente nach einem der vorhergehenden Ansprüche, wobei ein Durchflussmesser (18) an der Einlassleitung (16) für Wasser angeordnet ist.
7. Komponente nach einem der vorhergehenden Ansprüche, wobei der monolithische Körper (10) durch Zusammenschweißen von zwei Halbschüssen (10a, 10b) hergestellt wird, vorzugsweise entlang einer Linie, die im Wesentlichen in einer vertikalen Ebene liegt.
8. Komponente nach einem der vorhergehenden Ansprüche, wobei die Kammer (20) eine nach außen gerichtete Öffnung (66) aufweist, die mit einem entfernbaren Stopfen (68) versehen ist.
9. Geschirrspülmaschine umfassend einen Waschtank (54) und eine integrierte Komponente nach einem der vorhergehenden Ansprüche, wobei die Komponente ohne Verwendung zusätzlicher Befestigungselemente und/oder Rohre direkt mit dem Tank (54) verbunden ist.
10. Geschirrspülmaschine nach Anspruch 9, wobei die Komponente mit einer Seitenwand (56) bzw. einer Bodenwand (58) des Waschtanks (54) verbunden ist.

Revendications

1. Composant intégré destiné à la fourniture et au traitement de l'eau pour un lave-vaisselle, comprenant un corps monolithique (10) de matière plastique, à l'intérieur duquel sont définis un conduit d'entrée (16) pour l'eau, une chambre (20) contenant des substances dotées de propriétés d'adoucissement de

l'eau, dans laquelle mène ledit conduit d'entrée (16), un réservoir contenant du sel (26) agencé dans la partie la plus basse du corps (10) et possédant un tube de remplissage (28) permettant de charger le sel, un conduit d'évacuation (22) d'eau depuis ladite chambre (20), un conduit (36) destiné à alimenter en eau ledit réservoir (26) afin de produire dans celui-ci une saumure destinée à régénérer les substances dotées de propriétés d'adoucissement de l'eau, et un conduit (38) reliant ledit réservoir (26) à ladite chambre (20),

ledit composant étant **caractérisé en ce qu'il** comprend en outre un compartiment (30) destiné à évacuer les vapeurs présentant une ouverture d'entrée (32) et une ouverture de sortie (34), et une soupape (41) située en un point au niveau duquel ledit conduit (36) destiné à alimenter en eau ledit réservoir (26) part dudit conduit d'entrée (16), ladite soupape (41) pouvant adopter une première configuration de fonctionnement dans laquelle elle empêche l'écoulement le long du conduit (36) destiné à alimenter en eau ledit réservoir (26), alors qu'elle permet l'écoulement le long du conduit d'entrée (16) vers la chambre (20), de sorte que toute l'eau alimentant le point de bifurcation est dirigée directement dans la chambre (20), et une seconde configuration de fonctionnement dans laquelle elle permet l'écoulement le long du conduit (36) destiné à alimenter en eau ledit réservoir (26).

2. Composant selon la revendication 1, dans lequel, dans la seconde configuration de fonctionnement, ladite soupape (41) permet également, au-delà de l'écoulement le long du conduit (36) destiné à alimenter en eau ledit réservoir (26), l'écoulement le long du conduit d'entrée (16) vers la chambre (20).
3. Composant selon les revendications 1 ou 2, dans lequel ladite soupape (41) commande un clapet anti-retour (43) agencé sur le conduit (38) reliant le réservoir (26) à la chambre (20).
4. Composant selon les revendications 1 ou 2, dans lequel ladite soupape (41) est solidaire d'un clapet anti-retour (43) agencé sur le conduit (38) reliant le réservoir (26) à la chambre (20).
5. Composant selon l'une quelconque des revendications précédentes, dans lequel ladite soupape (41) est du type directionnel ou du type directionnel/mélangueur.
6. Composant selon l'une quelconque des revendications précédentes, dans lequel un débitmètre (18) est agencé sur ledit conduit d'entrée (16) pour l'eau.
7. Composant selon l'une quelconque des revendications précédentes, dans lequel ledit corps monolithi-

que (10) est produit par soudage l'une à l'autre de deux demi-pièces (10a, 10b), de préférence le long d'une ligne qui se trouve sensiblement dans un plan vertical.

8. Composant selon l'une quelconque des revendications précédentes, dans lequel ladite chambre (20) présente une ouverture vers l'extérieur (66) pourvue d'un bouchon amovible (68).
9. Machine à laver la vaisselle comprenant une cuve de lavage (54) et un composant intégré selon l'une quelconque des revendications précédentes, dans laquelle le composant est directement relié à la cuve (54) sans utilisation d'éléments de fixation et/ou de tubes supplémentaires.
10. Machine à laver la vaisselle selon la revendication 9, dans laquelle le composant est relié à une paroi latérale (56) et à une paroi inférieure (58), respectivement, de la cuve de lavage (54).

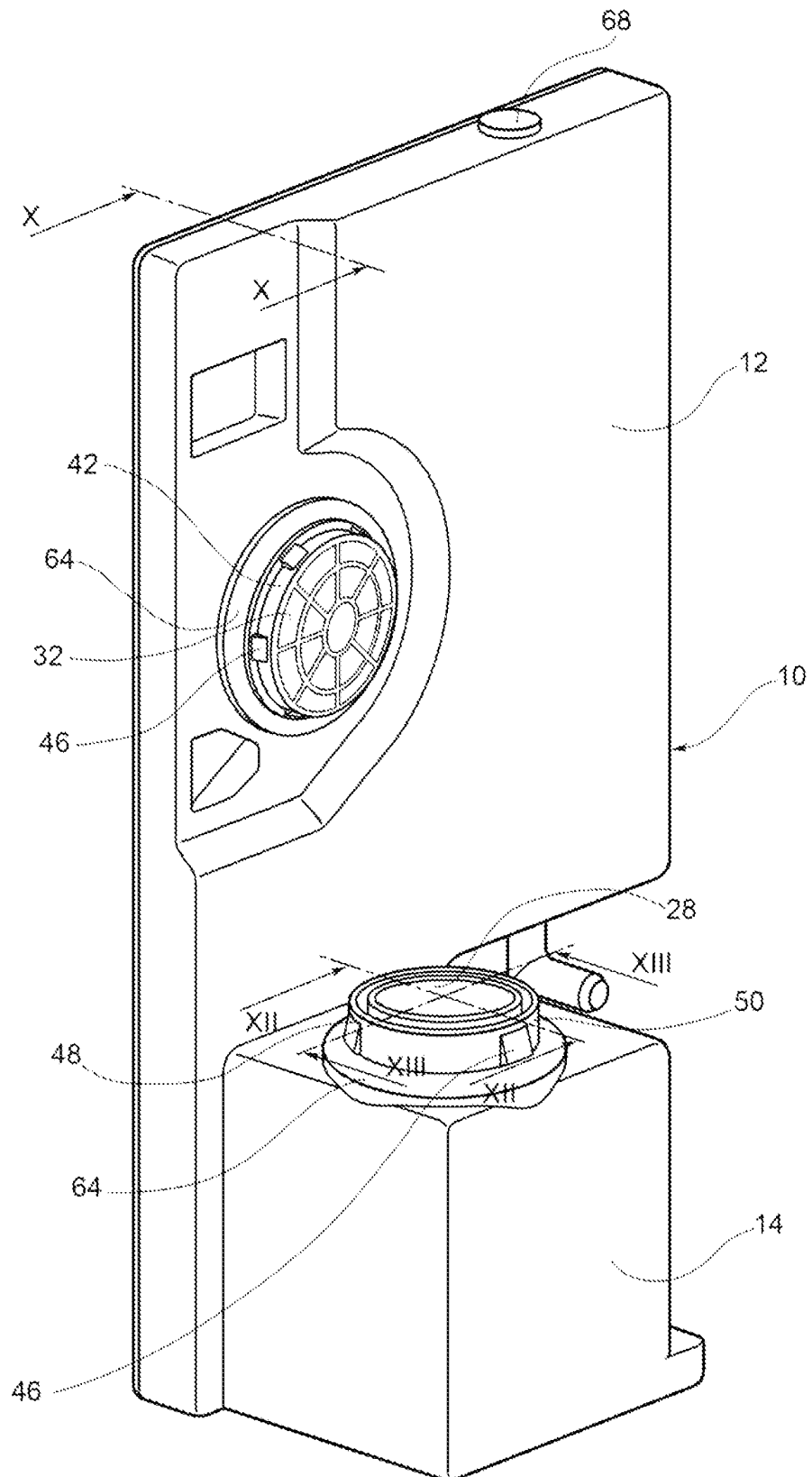


FIG. 1

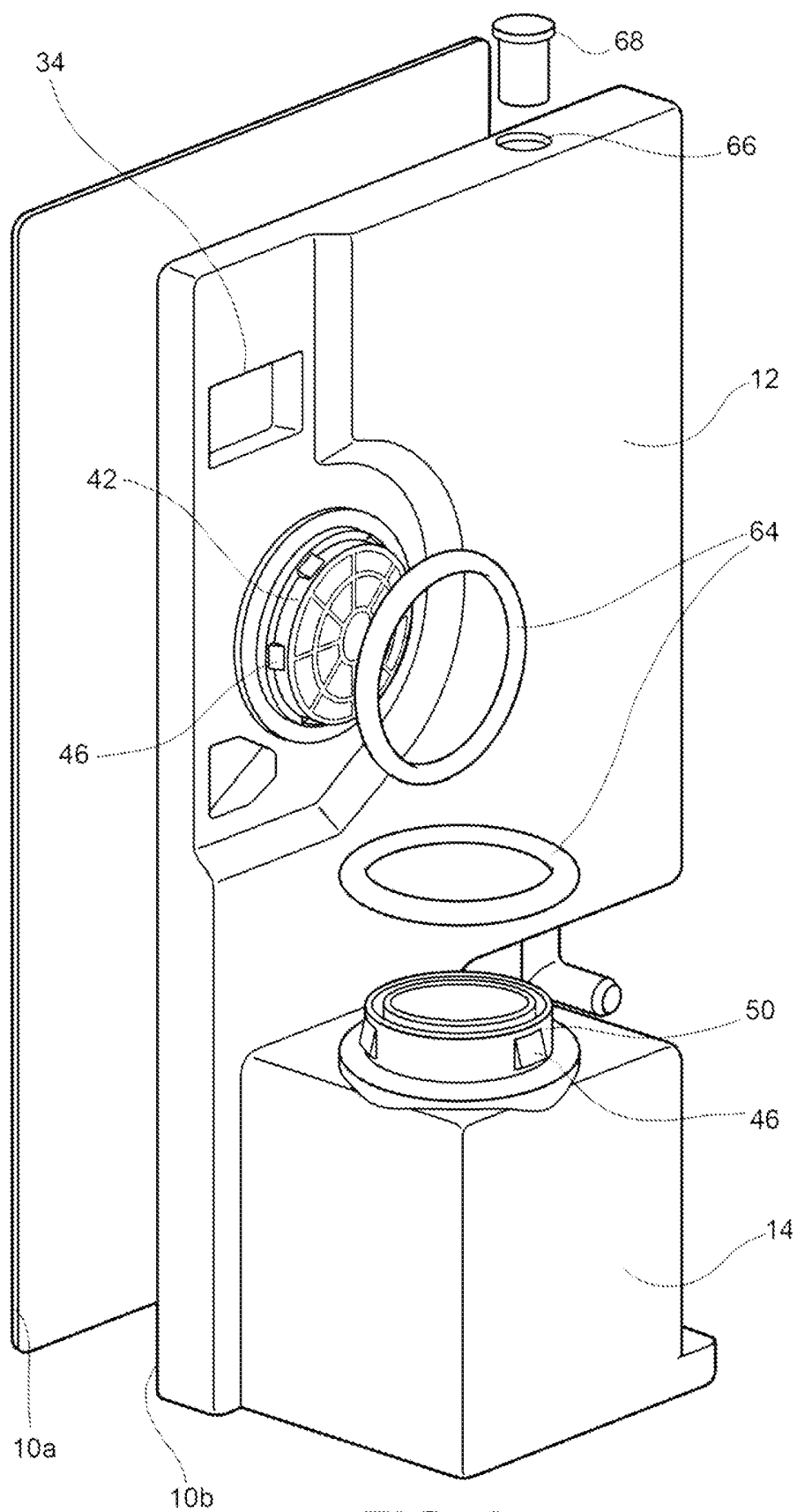


FIG. 2

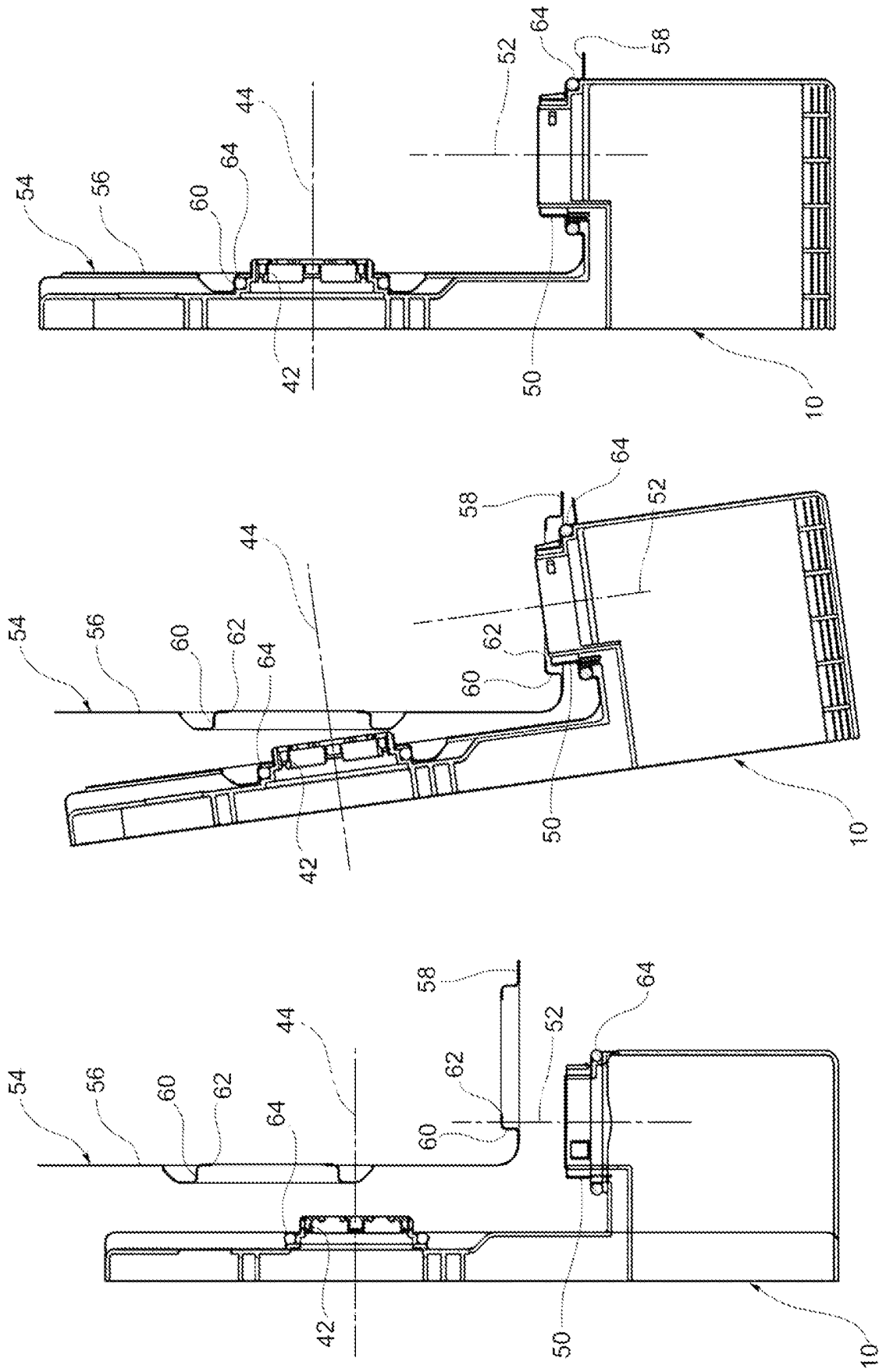
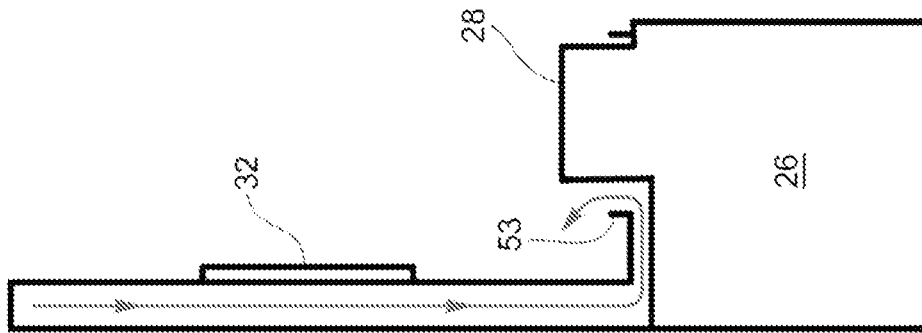
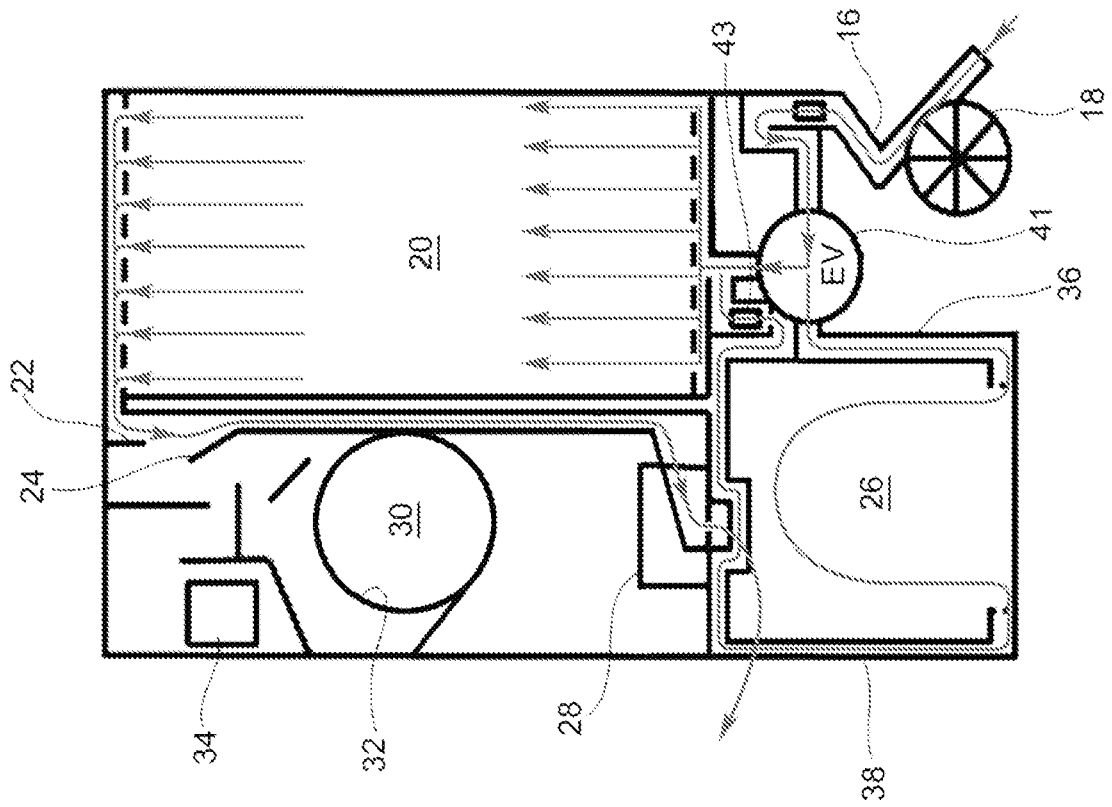


FIG. 3

FIG. 4

FIG. 5



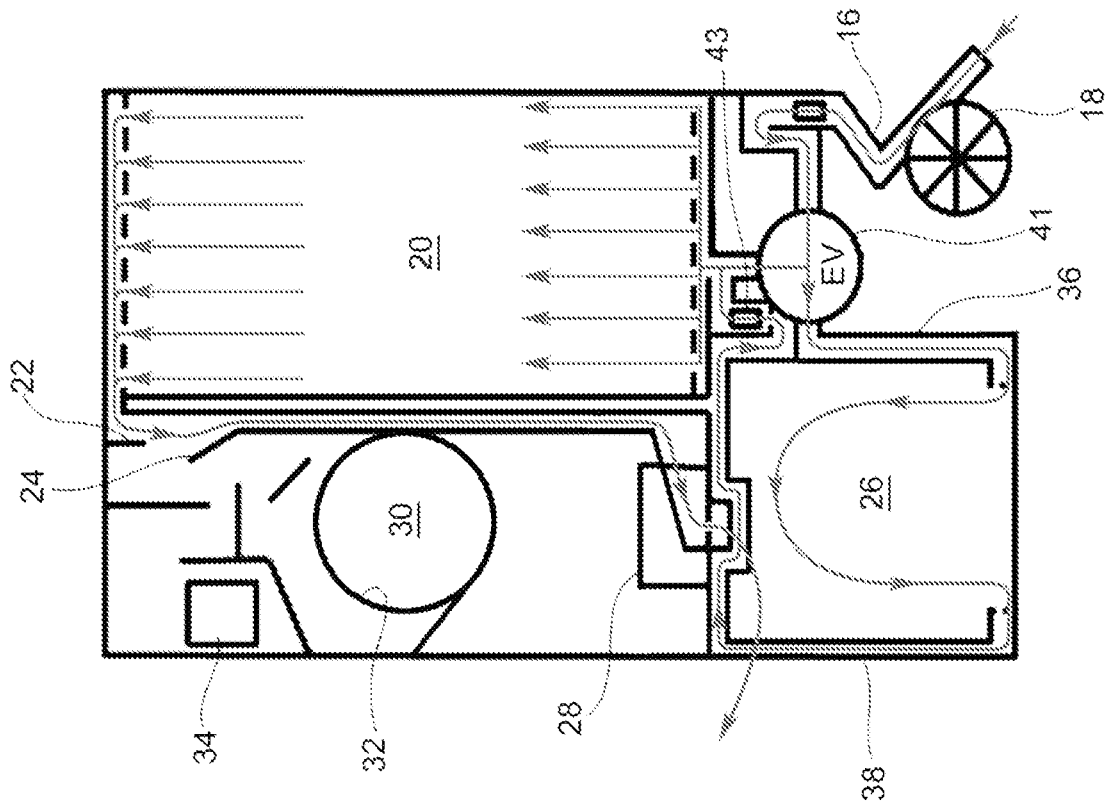


FIG. 8

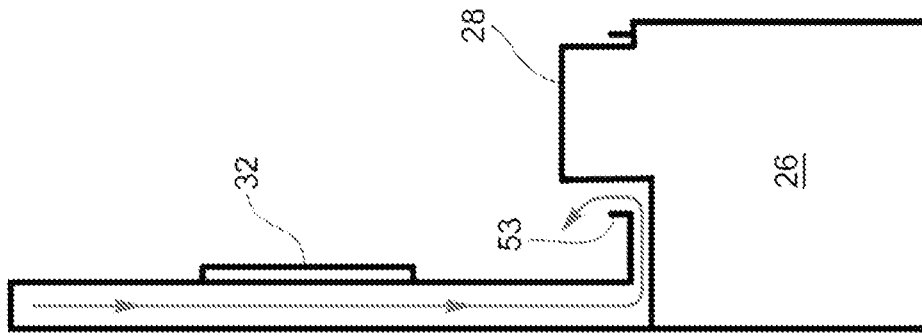


FIG. 9

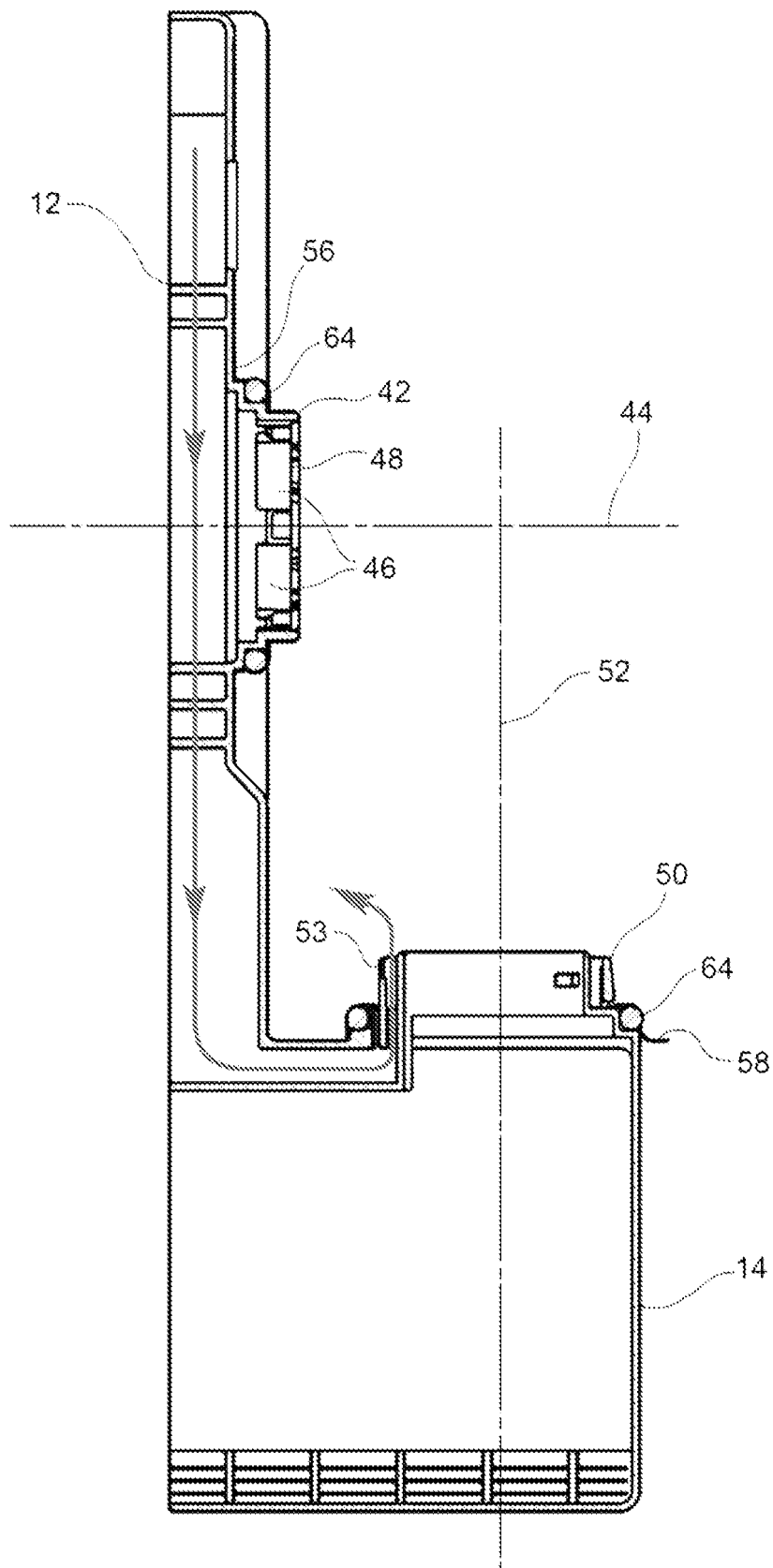


FIG. 10

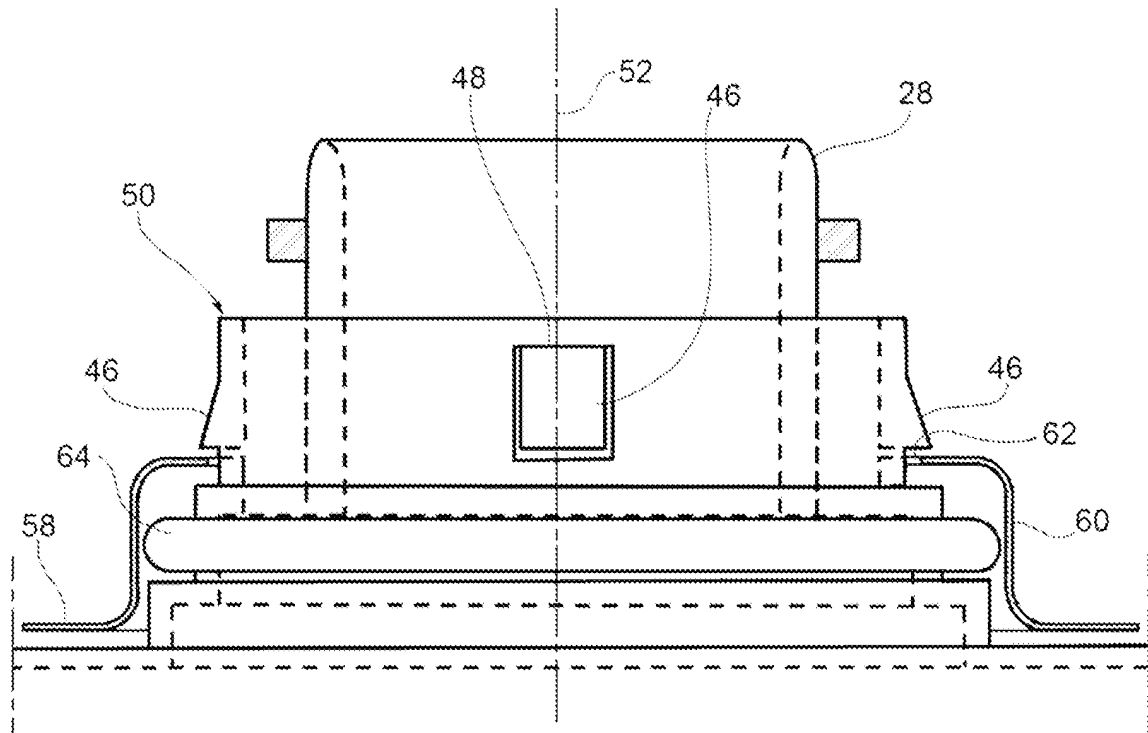


FIG. 11

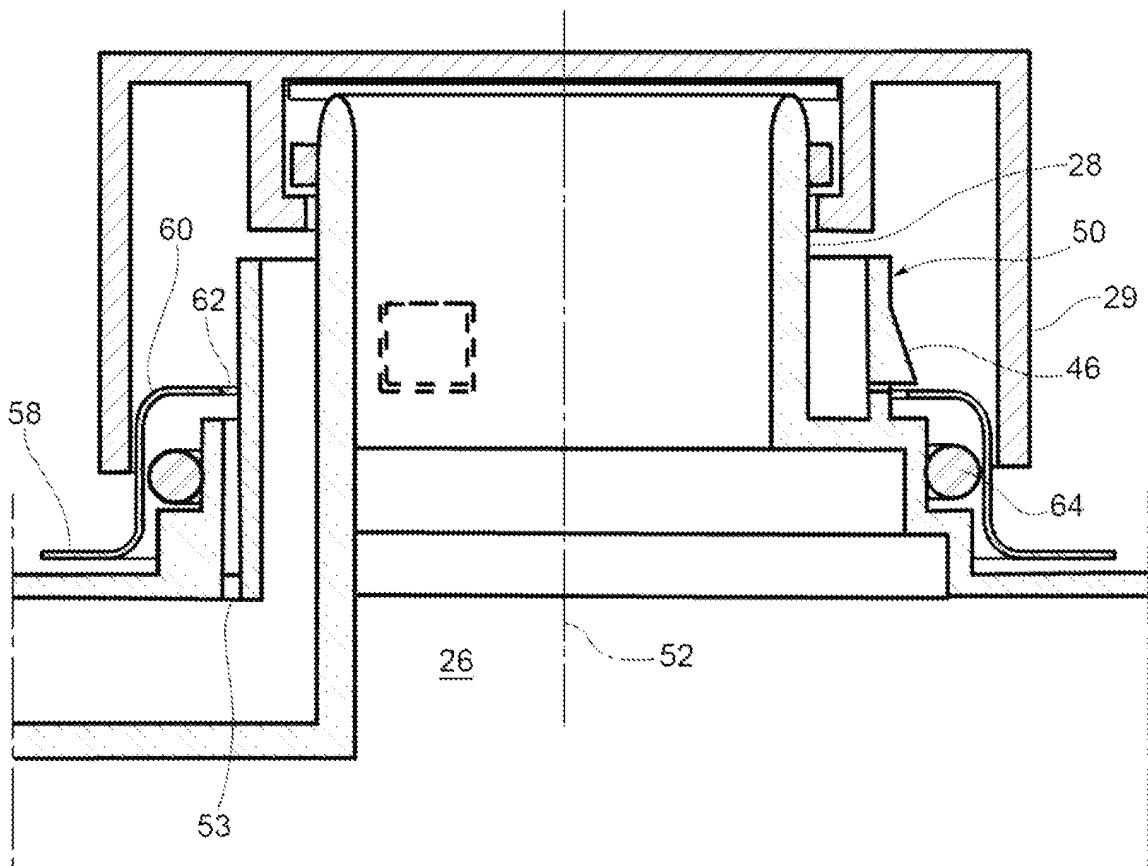


FIG. 12

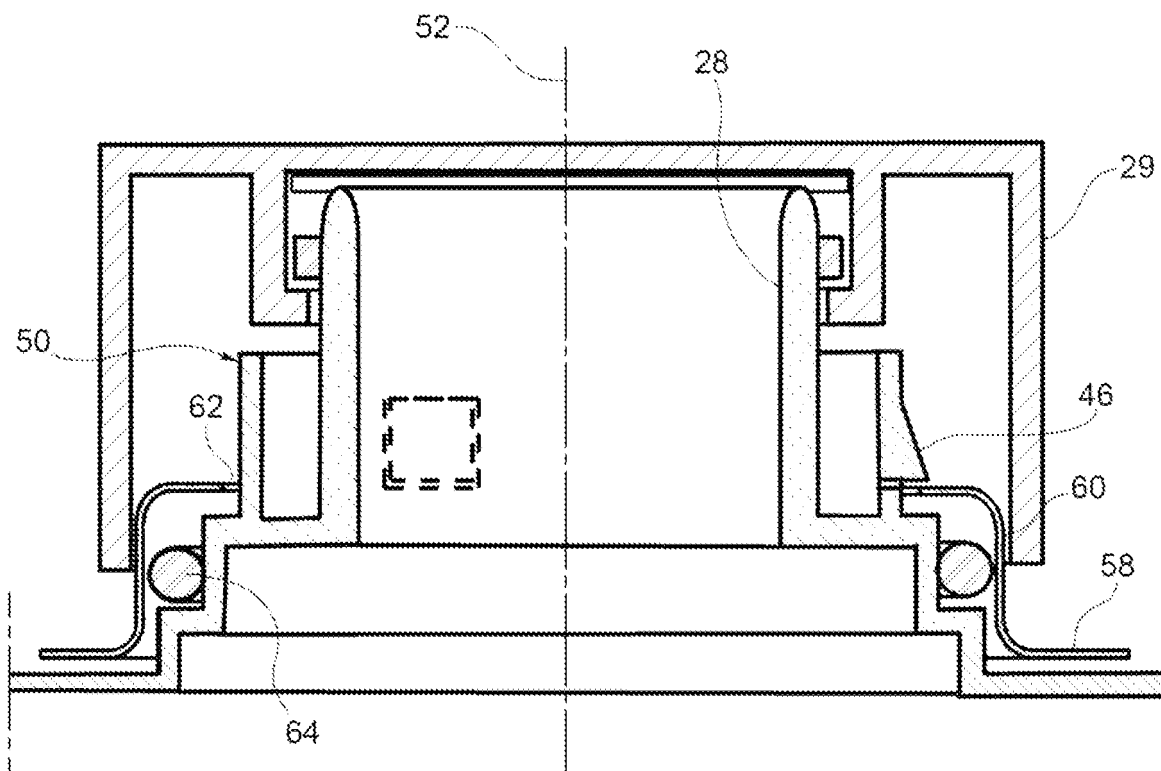


FIG. 13

REFERENCES CITED IN THE DESCRIPTION

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- EP 2564752 A **[0006]**
- EP 1497491 A **[0007]**
- IT 1360369 **[0008]**
- EP 1844693 A1 **[0015]**
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