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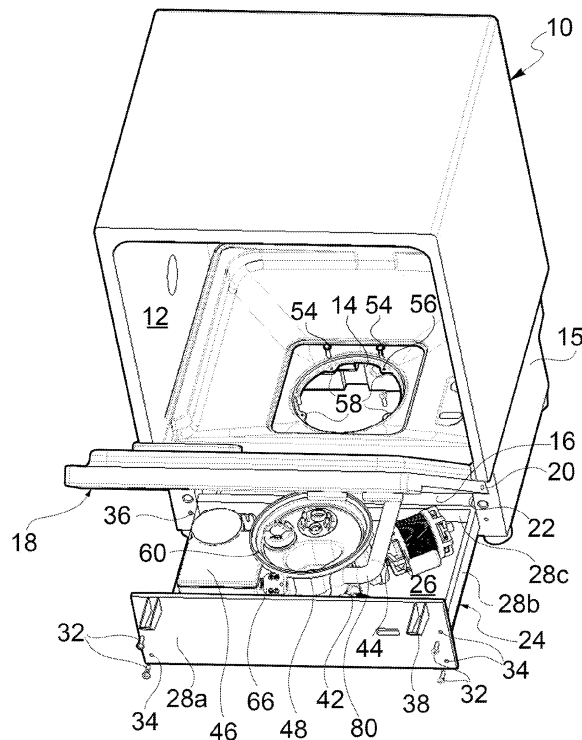
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(54) **Dishwasher**

(57) The dishwasher has a housing (10) which includes a door (18) pivoting about a substantially horizontal axis (20), encloses a washing tank (12) having at least one opening (14) at the bottom and defines a space (16) beneath the washing tank (12). A drawer (24) that con-

tains at least one component of the dishwasher, such as a sump (48), a discharge pump (42), a washing pump (44) and/or a softener (46), is slidably mounted in said space (16). The housing (10) also has, in a front wall, an opening (22) through which the drawer (24) can be removed from the space (16).

Fig.1



## Description

**[0001]** The present invention relates to a dishwasher, particularly a dishwasher including a housing with an opening closed off by a hinged door that provides access to a washing tank.

**[0002]** According to the known prior art, various components or accessories of dishwashers - such as the sump, discharge pump, washing pump, softener for softening the water supplied, and the like - are housed in the base of the dishwasher, below the washing tank.

**[0003]** It is somewhat difficult to access components or accessories housed in this location. Therefore, if one or more of them is faulty and needs to be repaired or replaced, the dishwasher has to be dismantled, which is time-consuming and adds to the cost.

**[0004]** The present invention thus aims to overcome the drawbacks of the prior art.

**[0005]** It does so with a dishwasher having the features described in claim 1 below. Preferred features of this dishwasher are described in the dependent claims.

**[0006]** To access faulty components, all that is required - after having disconnected the sump from the inside of the washing tank once the door thereof has been opened - is to remove the drawer, clearly simplifying the access procedure. Specifically, the maintenance technician can take out the whole drawer, make the necessary repairs at his own workplace, and then re-insert the drawer in its space without having to spend long time at the site where the dishwasher is installed. Moreover, removing the drawer does not significantly affect the appearance of the dishwasher. The invention therefore has the further advantage of not compromising the look of a modular kitchen that may include the drawerless dishwasher.

**[0007]** In principle, the softener may be of known type, for example one without a water collection container for forming the regenerating brine described in EP-A-1 844 693. There is equal flexibility when it comes to selecting all the other components and accessories housed in the drawer. Advantageously, the softener and the sump are integrated in a single component, as described in EP-A-2 033 566.

**[0008]** Further advantages and features of this invention will be apparent from the following detailed description, which refers to the attached drawings provided by way of nonlimiting example, in which:

Figure 1 is a perspective view from above of a dishwasher according to the invention, with the drawer pulled out,

Figure 2 is a perspective view of the lower part (housing the drawer) of the dishwasher of Figure 1,

Figure 3 is a perspective representation of the lower part of the dishwasher of the previous figures with the drawer partially inserted,

Figure 4 is a perspective representation of the lower part of the dishwasher of the previous figures with the drawer completely inserted,

Figure 5 shows a detail of the drawer in the configuration in which said drawer is partially inserted in the housing of the dishwasher,

Figure 6 shows the detail of Figure 5 in the configuration in which the drawer is completely inserted in the housing of the dishwasher, and

Figures 7 and 8 show detailed views of the rear part of the drawer and of adjacent parts of the dishwasher, respectively.

**[0009]** A dishwasher has a housing 10 that surrounds a washing tank 12 with an opening 14 at the bottom, and defines a space 16 beneath said tank 12. The tank 12 is accessed through a door 18 in the housing 10, which door can pivot about a substantially horizontal axis 20.

**[0010]** The front wall of the housing 10 also has at the bottom, below the door 18, an opening 22 through which a drawer 24 that slides into the space 16 can be removed. The housing is made up of several different parts assembled together, one of which in particular is a base 15 that closes off the space 16. Alternatively, the housing 10 may also be a single piece.

**[0011]** The drawer 24 is made up of a substantially rectangular base wall 26, positioned horizontally, and front 28a, side 28b and rear 28c vertical walls that extend from the perimeter of the base wall 26, said drawer slidably mounted on two guides 30, each of which is integral with a respective side of the housing 10 or fixed thereto. The front vertical wall 28a of the drawer 24 is higher than the other walls 28b and 28c and, when the drawer 24 is inserted, completely covers the opening 22 in the housing 10. When inserted in the space 16, the drawer 24 is fixed in place by means of screws 32 that pass through holes 34 made in the front vertical wall 28a thereof, said screws engaging in threaded seats 36 in the front part of the housing 10.

**[0012]** The drawer 24 also has centring means comprising a peg 37 that protrudes externally from the rear wall 28c thereof and is designed to fit into a hole 39 made in the rear wall 41 of the base 15.

**[0013]** Hollow protrusions 38 protrude externally from the upper ends of the front vertical wall 28a, said protrusions conveying any leaked water towards the base wall 26 which acts as a collector and also houses anti-flooding and/or water-detecting devices 43 (in particular of optical type) that are known per se. Elastic support elements, in particular tongues 40, supporting an assembly comprising a discharge pump 42, a washing pump 44 and a softener 46 for softening the water supplied to the dishwasher, which are fixed to a sump 48, protrude (see Figures 5 and 6) from the internal surface of the base wall 26. The external surface of the base wall 26 of the drawer 24 has a rib 50 that can (as will be explained in more detail below) impact against a front edge 52 of the housing 10 as the drawer 24 is inserted.

**[0014]** The sump 48 is joined to the bottom of the washing tank 12 by selective connection means in such a way that the mouth thereof closes off the opening 14 made

in the bottom of the tank 12. These selective connection means comprise a plurality of screws 54 passing through holes 56 made in ledges 58 projecting from the edge of the opening 14 and engaging in respective threaded holes 60 circumferentially staggered around the mouth of the sump 48. Once thus connected, a peg 62 protruding from the internal side wall of the space 16 comes into contact with a portion of the external surface of the sump 48 that surrounds the opening thereof.

**[0015]** The rear wall 41 of the base 15 also houses (see Figures 2, 7 and 8) an electric connector 64, a first hydraulic connector 66 for water discharge and a second hydraulic connector 68 for water supply. The electric connector 64 is directly connectable to an electric circuit fixed to the drawer 24 and to an external electric power cable 70. The electric connector 64 is provided with means 72 for retaining the electric power cable 70, which means avoid the disengagement thereof from the outside of the dishwasher. The internal electric circuit is in particular a printed circuit board 74 or "timer" which is electrically connected also to a solenoid valve 76 controlling the water loading.

**[0016]** The first hydraulic connector 66, which houses a non-return valve 78, is connectable by quick-coupling to an internal discharge conduit 80 leading from the discharge pump 42 of the sump 48, and to an external discharge tube 82. The connector 66 is provided with means 84 for retaining the external tube 82, which means avoid the disengagement thereof from the outside of the dishwasher. Two washers 85 ensure watertightness between connector 66, conduit 80 and tube 82.

**[0017]** In a substantially similar manner not shown in the figures, the second hydraulic connector 68 is connectable, in a watertight manner, by quick-coupling to an internal water supply conduit and to an external tube for mains water supply, for example a double-wall tube possibly having a water cut-off device. Advantageously, one of the connectors has an anti-jamming filter.

**[0018]** It has to be noticed that in other embodiments of the invention not shown in the figures, one of the connectors 64, 66, 68 may also act as centring means for the sliding movement of the drawer 24, as an alternative to the peg 37 designed to fit into the hole 39.

**[0019]** The drawer 24 is fitted in the space 16 in the dishwasher in the following manner. First, the assembly made up of the softener 46, the discharge pump 42, the washing pump 44 and the sump 48 is placed on the base wall 26 of the drawer 24, together with any other components such as a pressure sensor 86 and a heater 88. In this configuration, the tongues 40 (Figure 5) are housed in respective recesses 90 in the bottom of said components without applying any significant stress to said components. Next, the drawer 24 is inserted in the space 16 by sliding it along the guides 30 until the rib 50 impacts against the front edge 52 of the housing 10 (Figure 3), indicating that the sump 48 is below the washing tank 10 in line with the opening 14 thereof. The assembly can thus be lifted and fixed to the underside of the washing

tank 12, by screwing in the through-screws 54 through the holes 56 and into the respective threaded holes 60 in the sump 48. In this position, the components of the assembly no longer touch the base wall 26 of the drawer 24, while a portion of the external surface of the drawer is in contact with the peg 62 protruding from the internal wall of the housing 10. As the drawer 24 is pushed further into the space 16 (Figure 4), the rib 50 can overcome the obstacle consisting of the edge 52 and engage in grooves 92 in the guides 30, while at the same time the tongues 40 emerge from the seats 90 and can thus elastically support the components of the assembly (Figure 6) during normal operation of the dishwasher.

**[0020]** When the drawer 24 is fully inserted into the space 16, the printed circuit board 74 is connected to the electric connector 64, the first hydraulic connector 66 is connected to the internal discharge conduit 80 and the second hydraulic connector 68 is connected to the internal supply conduit (not shown in the figures), so as to guarantee hydraulic and electrical operation of the dishwasher once the electric power cable 70 and the external water supply (not shown in the figures) and discharge tubes 82 have also been connected from the outside to the relevant connectors.

**[0021]** As already stated, the cable 70 and the external water tubes cannot be disconnected from outside the dishwasher but are provided - for safety reasons - with special retaining means that can only be disengaged from the inside, once the drawer 24 has been removed. However, the dishwasher can be constructed and tested without connecting the cable 70 and external tubes. All of these can thus be made separately from the dishwasher and connected thereto only at the site of installation, simplifying packaging.

**[0022]** The drawer 24 can be removed from the dishwasher by performing, in reverse order, procedures opposite to the ones just described. For dishwasher safety reasons, it is advantageous for the connectors 64, 66, 68 to be such that when the drawer 24 is removed from the space 16, the electric circuit is disconnected first, then the hydraulic circuit. In any case, during removal - just as during insertion - the drawer 24 moves substantially horizontally, to which movement a vertical movement of the internal components, such as the sump 48, is added.

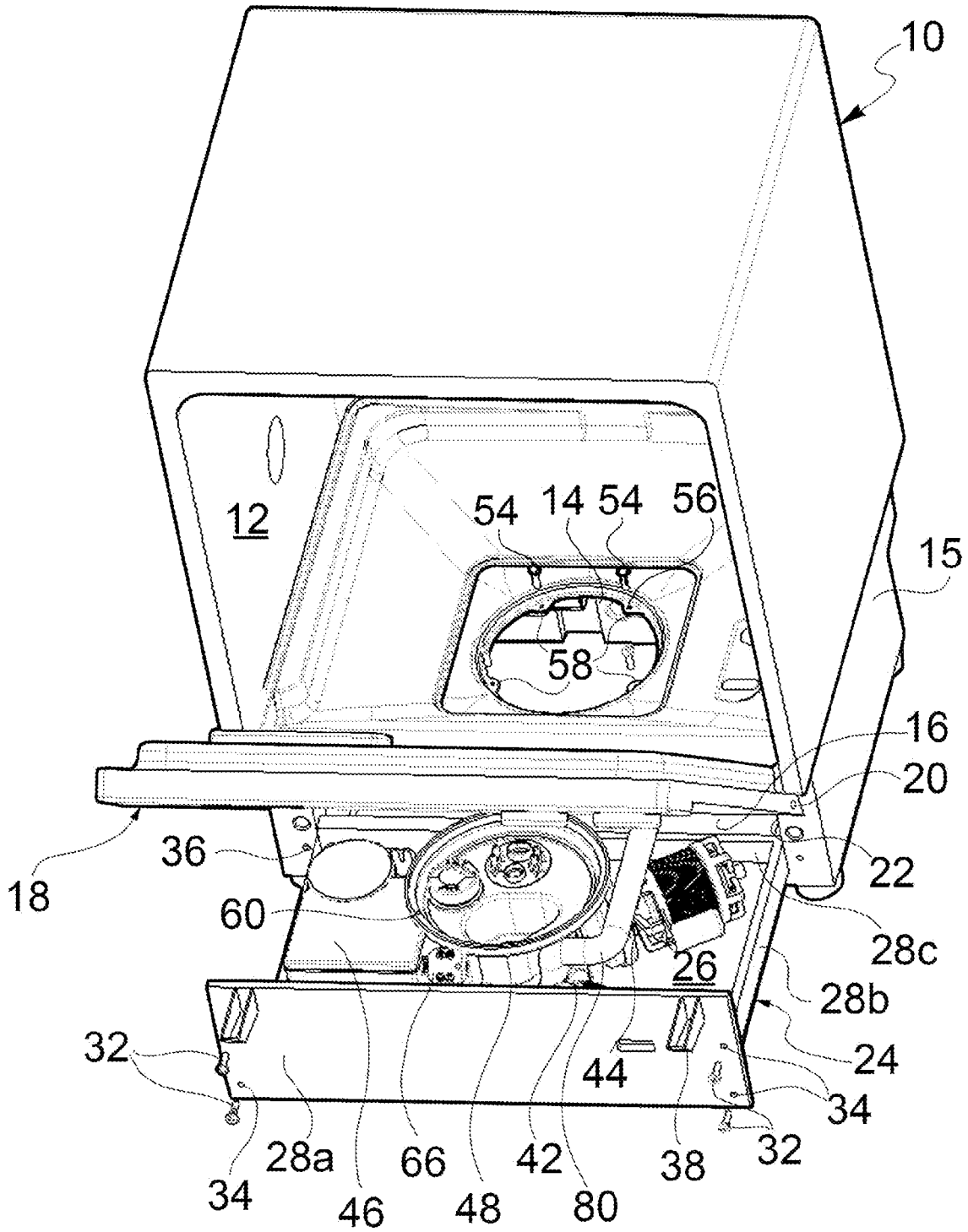
**[0023]** Naturally, without prejudice to the principle of the invention, the details of embodiments and the forms of implementation may vary widely from what has been described herein purely by way of example, without exceeding the scope of the claims.

### Claims

1. Dishwasher having a housing (10) which includes a door (18) pivoting about a substantially horizontal axis (20), encloses a washing tank (12) having at least one opening (14) at the bottom and defines a

- space (16) beneath the washing tank (12), a drawer (24) that contains at least one component of the dishwasher being slidably mounted in said space (16), and said housing (10) having, in a front wall, an opening (22) through which said drawer (24) can be removed from the space (16).
2. Dishwasher according to claim 1, wherein said drawer (24) is slidably mounted in a substantially horizontal plane on two lateral guides (30), and is preferably provided with centring means.
  3. Dishwasher according to claim 1 or 2, wherein said drawer (24) is formed by a base wall (26), positioned horizontally, and by substantially vertical walls (28a, 28b, 28c), said drawer collecting any leaked water and preferably housing an anti-flooding device and/or water-detecting device (43), in particular of optical type.
  4. Dishwasher according to claim 3, wherein the front vertical wall (28a) of the drawer (24) substantially completely covers said opening (22) in the housing (10) when the drawer (24) is inserted into the space (16), hollow protrusions (38) which convey any leaked water towards the base wall (26) preferably protruding from the external surface of said front vertical wall (28a).
  5. Dishwasher according to any one of the previous claims, wherein the external surface of the base wall (26) of the drawer (24) has a protruding rib (50) that can impact against a front edge (52) of the housing (10) as the drawer (24) is inserted.
  6. Dishwasher according to any one of the previous claims, wherein said drawer (24) contains a sump (48), a discharge pump (42), a washing pump (44) and a softener for softening (46) the water fed into the dishwasher, the softener (46), the discharge pump (42) and the washing pump (44) being preferably fixed to the sump (48), so as to constitute an assembly.
  7. Dishwasher according to claim 6, wherein elastic elements (40) supporting at least one component chosen among the sump (48), the discharge pump (42), the washing pump (44) and the softener (46), protrude from the internal surface of the base wall (26) of the drawer (24), said supporting elements (40) being inserted below the at least one component which was raised vertically following partial insertion of the drawer (24) into the space (16).
  8. Dishwasher according to any one of the previous claims, wherein at least one among an electric connector (64), a first hydraulic connector (66) for water discharge and a second hydraulic connector (68) for water supply is located in a rear wall (41) of the housing (10), and in particular of a base (15).
  9. Dishwasher according to claims 2 and 8, wherein one of said connectors (64, 66, 68) acts as centring means for the movement of the drawer (24).
  10. Dishwasher according to claim 8 or 9, wherein said electric connector (64) is connectable to an electric circuit fixed to the drawer (24) and to an external electric power cable (70), said first hydraulic connector (66) is connectable by quick-coupling to a discharge conduit (80) of the sump (48) and to an external discharge tube (82), and/or said second hydraulic connector (68) is connectable by quick-coupling to an internal water supply conduit and to an external tube for water supply, and, when the drawer (24) is inserted into the space (16), the electric circuit fixed to the drawer (24) is connected to the electric connector (64), the first hydraulic connector (66) is connected to the discharge conduit (80) and/or the second hydraulic connector (68) is connected to the supply conduit, and, when the drawer (24) is removed from the space (16), said electric circuit is disconnected from the electric connector (64), the first hydraulic connector (66) is disconnected from the discharge conduit (80) and/or the second hydraulic connector (68) is disconnected from the supply conduit.
  11. Dishwasher according to any one of claims 8 to 10, wherein said first hydraulic connector (66) houses a non-return valve (78) able to prevent dripping when the drawer (24) is extracted from the space (16).
  12. Dishwasher according to any one of claims 8 to 11, wherein said electric connector (64) is provided with means (72) for retaining the electric power cable (70), which means avoid the disengagement thereof from the outside of the dishwasher.
  13. Dishwasher according to any one of claims 8 to 12, wherein said first hydraulic connector (66) is provided with means (84) for retaining the external tube (82), which means avoid the disengagement thereof from the outside of the dishwasher.
  14. Dishwasher according to any one of claims 8 to 13, wherein one of the connectors is provided with an anti-jamming filter.
  15. Dishwasher according to any one of the previous claims 6 to 14, wherein said sump (48) is joined to the bottom of the washing tank (12) by selective connection means, in correspondence with said at least one opening (14) in the bottom of the washing tank (12), which opening (14) is preferably single.

Fig.1



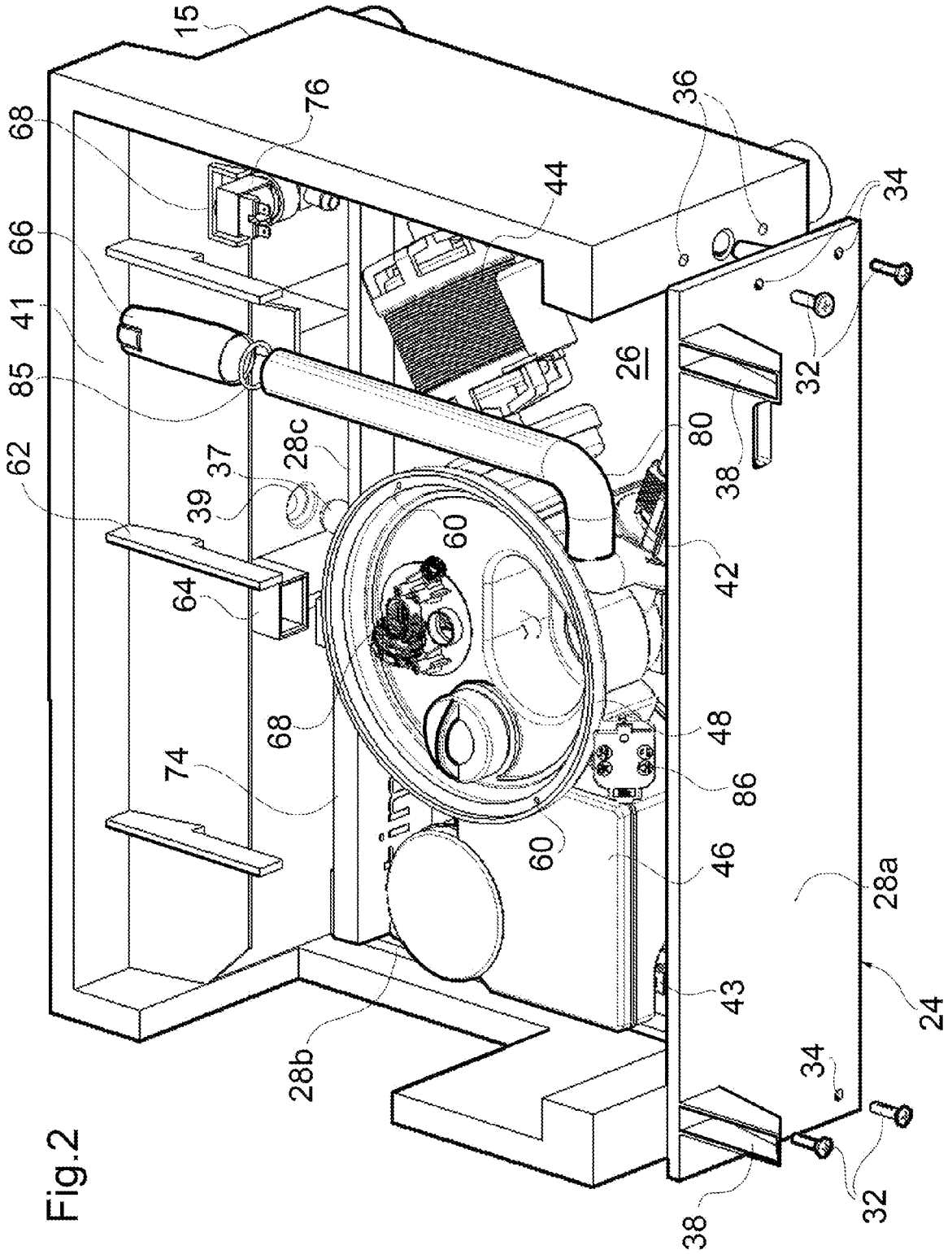
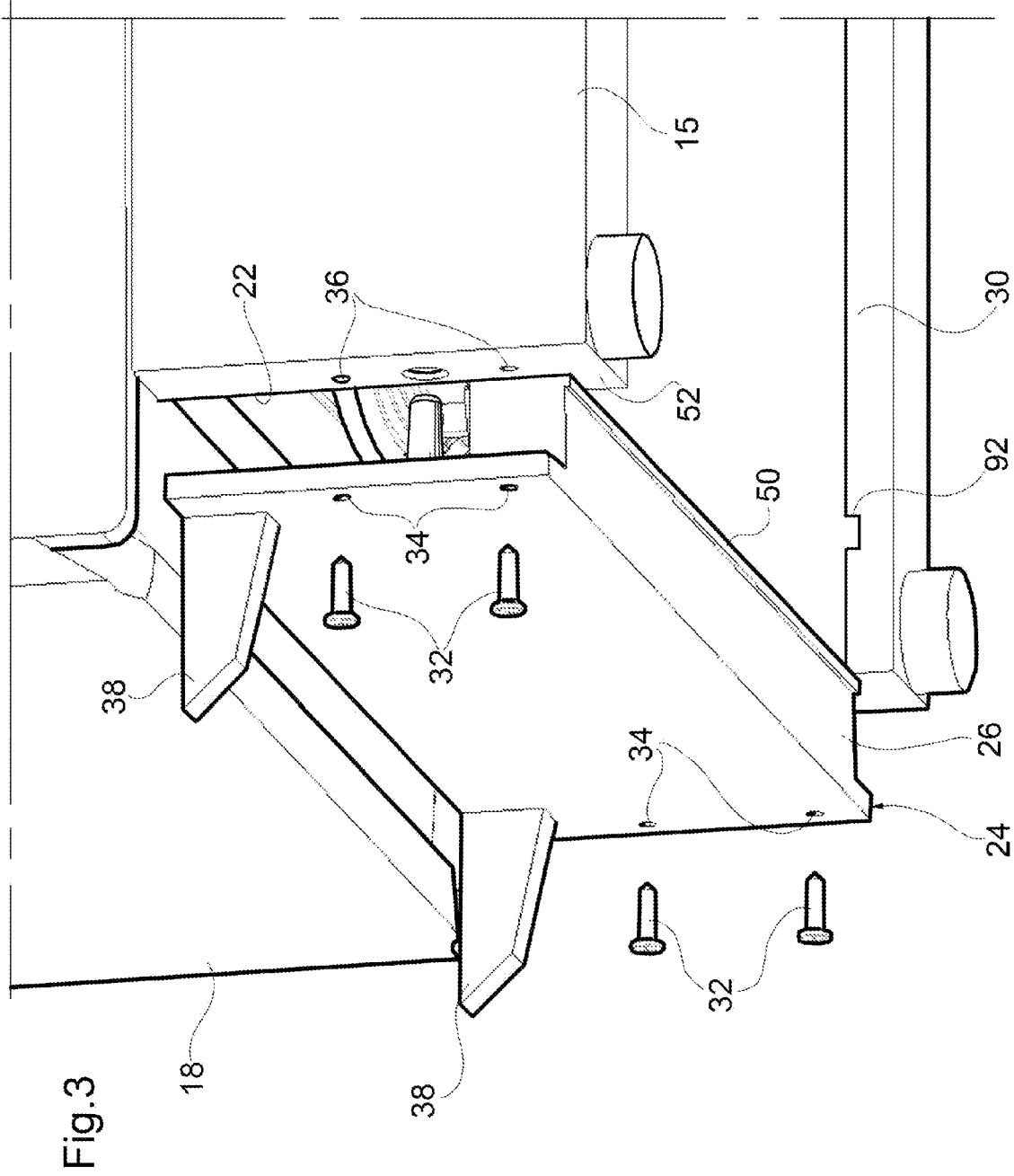


Fig. 2



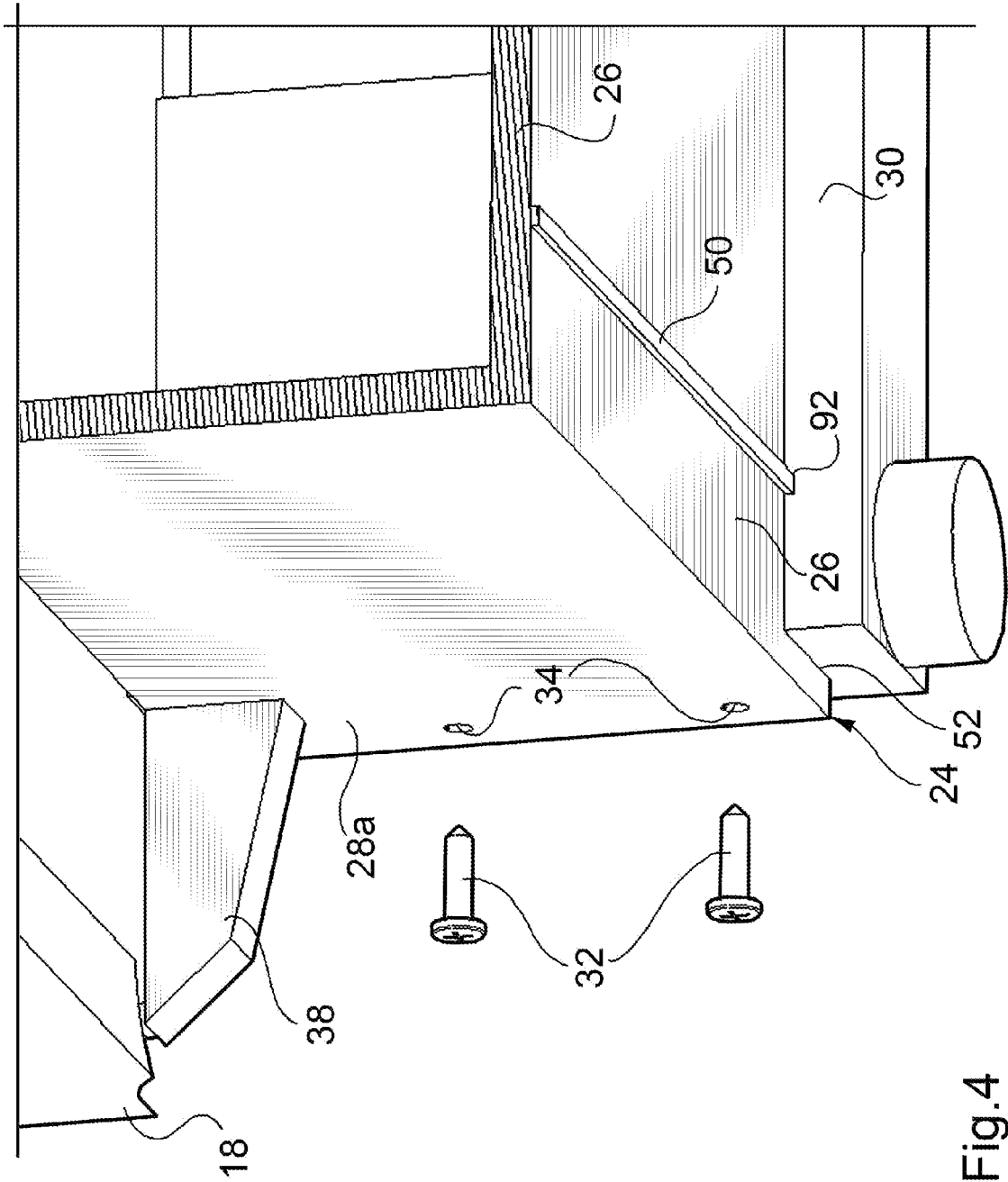


Fig.4



Fig.5

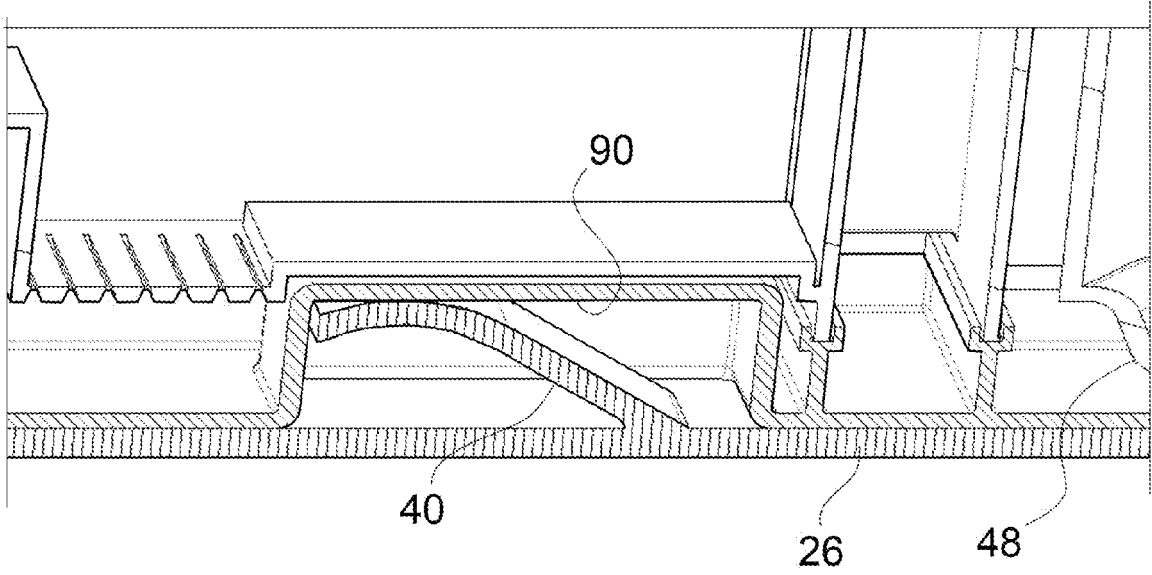
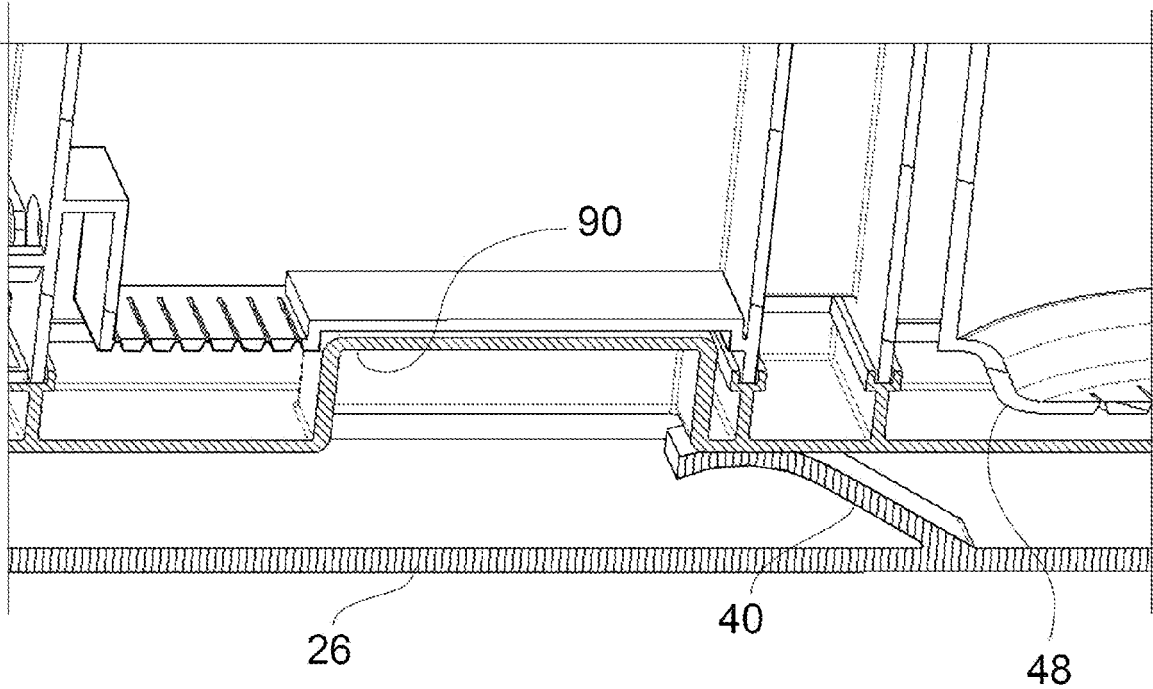
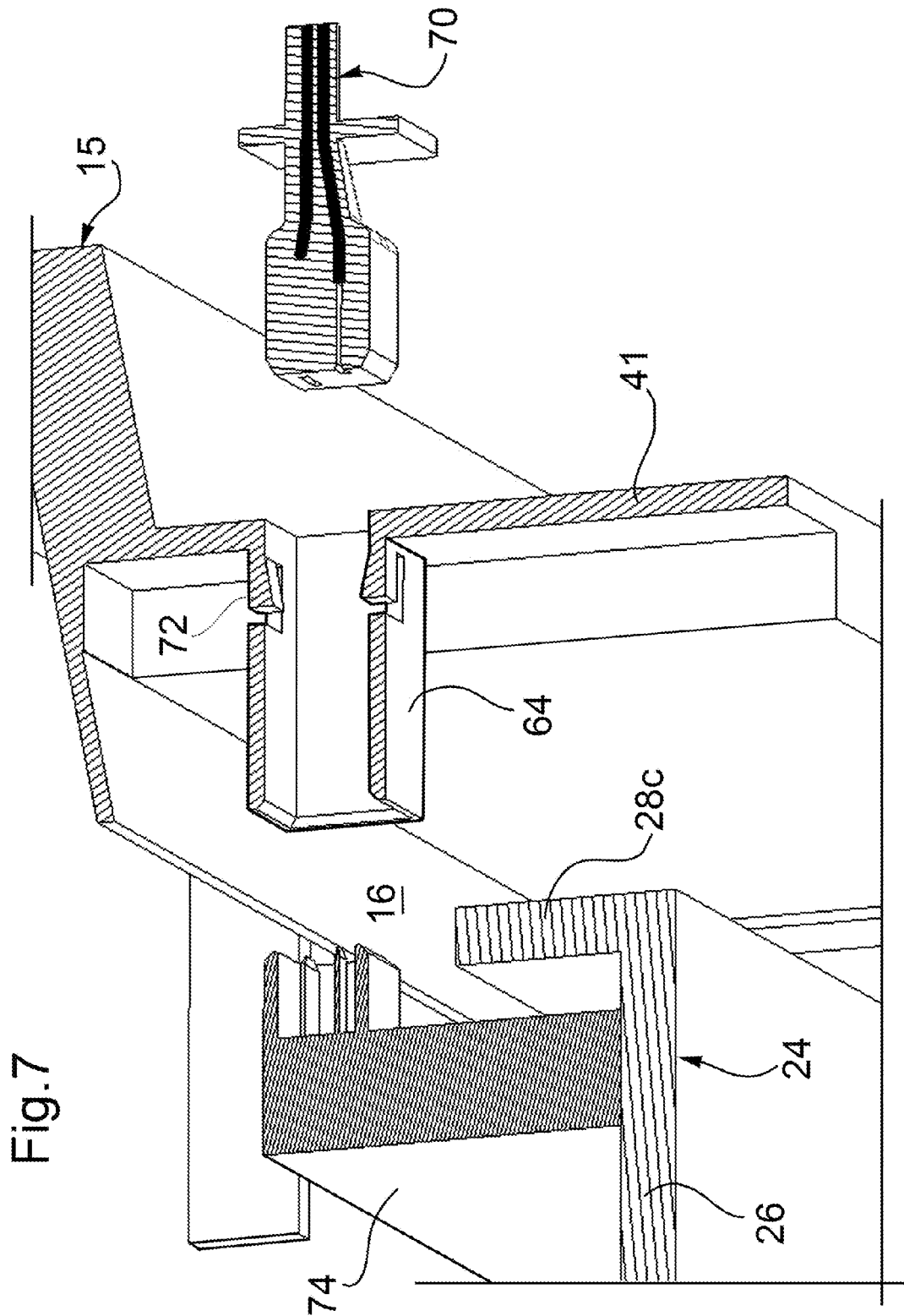
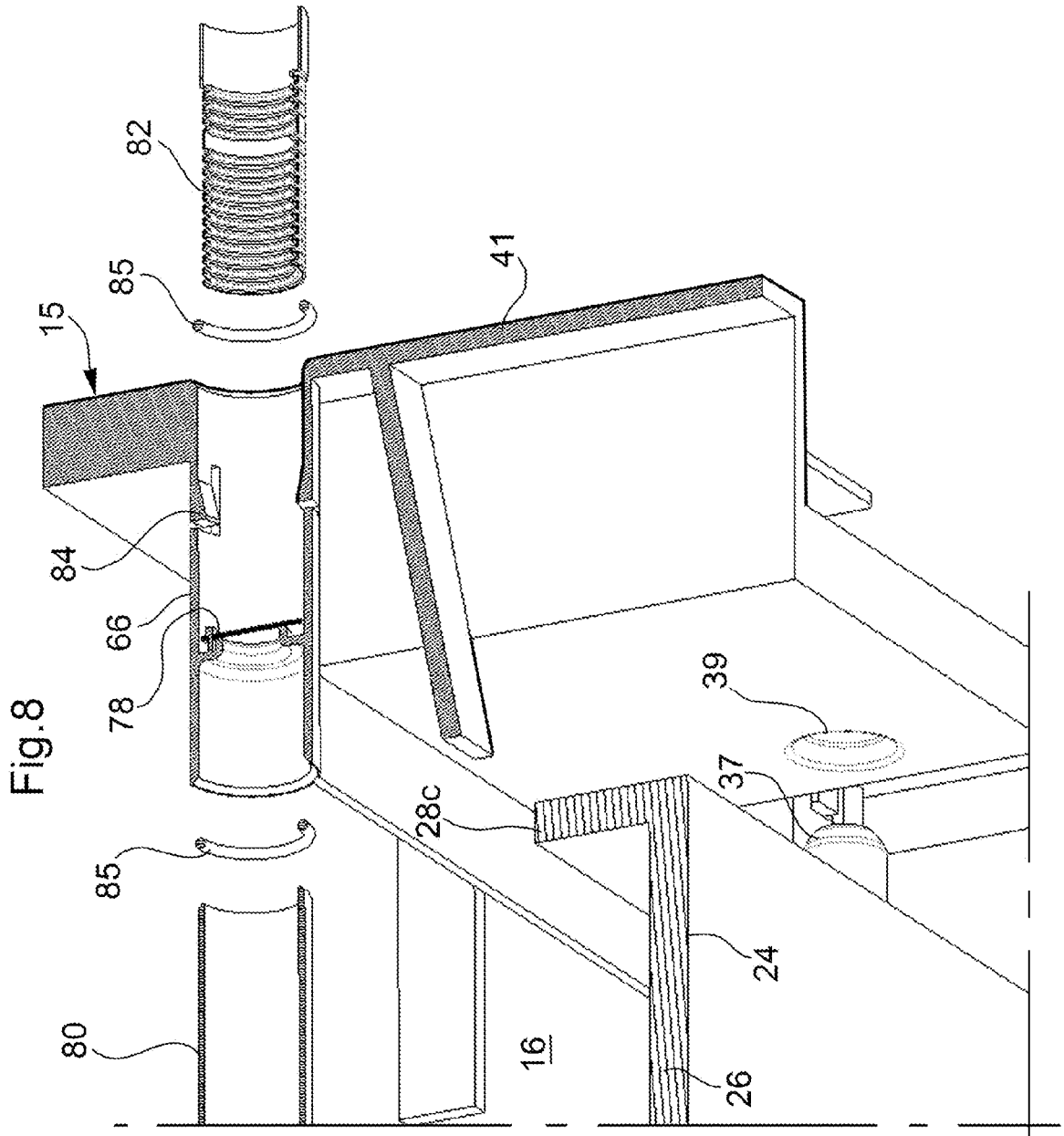


Fig.6









EUROPEAN SEARCH REPORT

Application Number  
EP 10 19 1487

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		3 February 2011	Blumenberg, Claus
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			

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ANNEX TO THE EUROPEAN SEARCH REPORT  
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03-02-2011

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