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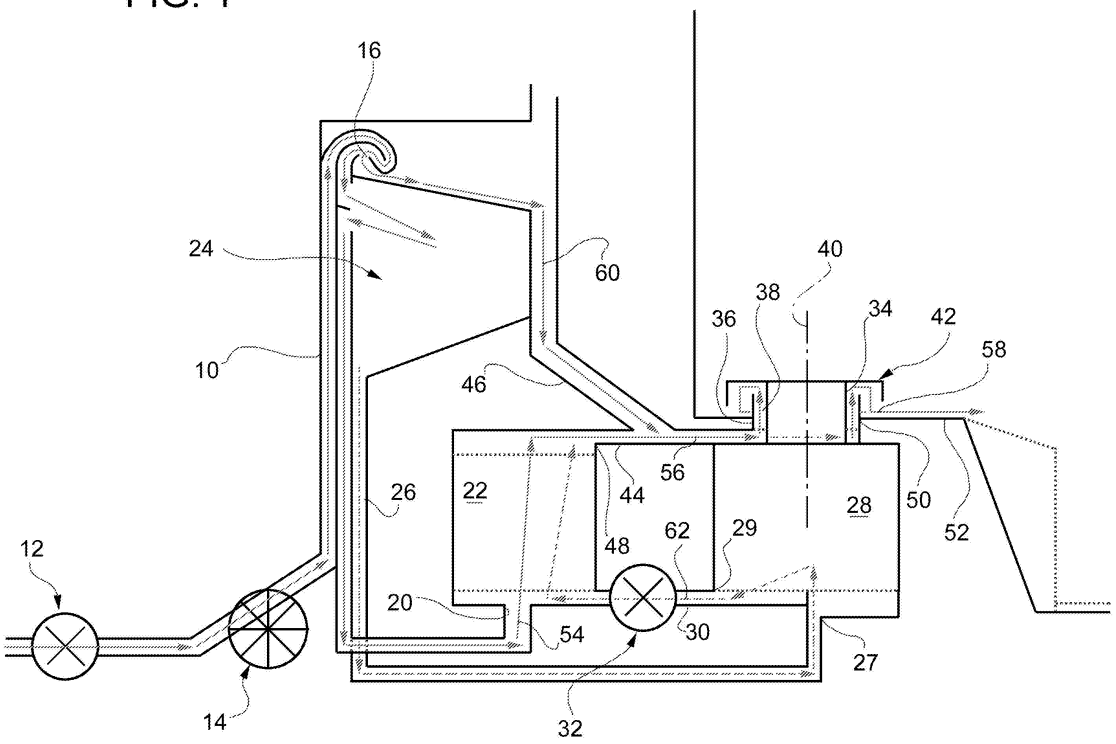
(54) Integrated device for supplying and treating water for a dishwashing machine

(57) The device comprises: a supply line (10); a first tank (22) for containing substances with water-softening properties, provided with at least one inlet opening (20) for water to be softened and an outlet opening (48) for softened water; a second tank (28) for containing salt, provided with at least one water inlet opening (27) and an outlet opening (29) for a regeneration brine formed following dissolving of the salt in the water, and having a neck (34); an annular wall (36) which surrounds externally at least one bottom portion of the neck (34) forming an interspace (38); and a line (44) for connecting the outlet opening (20) of the first tank (22) to the interspace (38). The annular wall (36) is intended to be mounted inside an opening (50) formed through the bottom (52) of the washing chamber, where the softened water supplied from the connection line (44) is conveyed and made to pass through the interspace (38).

FIG. 1



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Description

[0001] The present invention relates to a device for supplying and treating water for a dishwashing machine.

[0002] The object of the present invention is to provide a device of this kind which is highly integrated so as to reduce the complexity of the operations necessary for assembling it on a dishwashing machine and the number of hydraulic connections - which are a potential cause of leaks - needed to perform said assembly.

[0003] This object is achieved by means of a device for supplying and treating water for a dishwashing machine, comprising:

- a supply line;
- a first tank for containing substances with water-softening properties, provided with at least one inlet opening for water to be softened and an outlet opening for softened water;
- a second tank for containing salt, provided with at least one water inlet opening and an outlet opening for a regeneration brine formed following dissolving of the salt in the water, and having a neck;
- an annular wall which surrounds externally at least one bottom portion of said neck forming an interspace; and
- a line for connecting the outlet opening of the first tank to said interspace, said annular wall being intended to be mounted inside an opening formed through the bottom of the washing chamber, where the softened water supplied from said connection line is conveyed and made to pass through said interspace.

[0004] As a result of the structure of the device according to the invention, it is possible to dispense with a separate pipe for connecting it to the washing chamber, with consequent simplification in the assembly procedures, and reduced costs.

[0005] A further object of the present invention also consists of a dishwashing machine comprising a device for supplying and treating water of the type described above.

[0006] Further advantages and characteristic features of the present invention will become clear from the detailed description which follows, with reference to the accompanying drawings provided by way of a non-limiting example in which:

Figure 1 is schematic illustration of the hydraulic circuit of a device according to the invention;

Figure 2 is a schematic illustration of the hydraulic circuit of a further embodiment of the device according to the invention;

Figure 3 is a schematic illustration, on a larger scale, of part of the hydraulic circuit of the device according to Figure 2;

Figure 4 is a perspective view of a ring nut of the device according to the previous figures; and

Figure 5 is a schematic illustration, equivalent to Figure 3, of part of the hydraulic circuit of yet another embodiment of the device according to the invention.

[0007] A device for supplying and treating water for a dishwashing machine comprises (Fig. 1) a line 10 for supplying the water, along which line an electric filling valve 12 and a flowmeter 14 are arranged. The supply line 10 also includes a blow-off section 16 and leads to an inlet opening 20 of a first tank 22 for containing substances with water-softening properties. The line 10 also supplies a water storage chamber 24 which is connected by a line 26 to an inlet opening 27 of a second tank 28 for containing salt, the outlet opening 29 of which is connected by a line 30, provided with a selective intercepting member 32, to the first tank 22. The second tank 28 has a neck 34 which is surrounded externally by an annular wall 36 so as to determine the formation of an interspace 38. The latter too may have an annular extension or extend only over an arc of a circumference. The neck has a vertical axis 40 coinciding with that of the body of the tank 28. A removable plug 42 closes the inlet mouth of the neck 34 and is situated above the interspace 38 without touching the upper edge of the annular wall 36. The constructional details of the neck 34, the plug 42 and the interspace 38 are, for example, described in the document EP-A-1 025 793, the content of which must be regarded as incorporated in the present description by way of citation.

[0008] A line 44, into which a further line 46 which collects the waste water from the blow-off section 16 leads, connects an outlet opening 48 of the first tank 22 to the interspace 38.

[0009] The device described above is assembled on a dishwashing machine so that the annular wall 36 is sealingly mounted through an opening 50 formed in the bottom 52 of the washing chamber.

[0010] During normal operation of the dishwashing machine, the water supplied via the line 10 passes through the first tank 22 (arrow 54) where it is softened and then enters the line 44 and is directed (arrow 56) into the interspace 38, from where it enters directly (arrow 58) into the washing chamber. By means of the line 46, the waste water from the blow-off section 16 is also conveyed (arrow 60) into the line 44 where it is combined with the softened water and follows the same path as it.

[0011] Periodically, regeneration of the water-softener substances contained in the first tank 22 is also performed in a substantially conventional manner. For this purpose, the selective intercepting member 32 is opened so as to cause the water which has collected inside the chamber 24 to flow towards the second tank 28 with the formation of a brine which is then conveyed (arrow 62) via the line 30 into the first tank 22 so as to regenerate the water-softener substances contained inside it.

[0012] The device according to the invention may therefore be assembled in a considerably simplified man-

ner on a dishwashing machine because it does not require the presence of any separate pipe for supplying the water into the washing chamber.

[0013] Figures 2 to 4 show an alternative embodiment of the device according to the invention, in which numbers the same as those used in the preceding figures identify the same or equivalent parts.

[0014] Differently from the previous embodiment, the neck 34 of the second tank 28 has an axis 40 which is inclined with respect to the vertical so that it comprises a first region 62 which forms an acute angle with the adjacent horizontal shoulder portion 64 of the body of the second tank 28 and a second region 66 which forms an obtuse angle with the adjacent horizontal shoulder portion 68 of the body of the second tank 28. The zone of the annular wall 36 facing the first region 62 of the neck 34 has, formed therein, a plurality of holes 70 for communication between the interspace 38 and the washing chamber, which are circumferentially spaced from each other. Moreover, the line 46 which collects the waste water from the blow-off section 16 communicates with a breather opening 72.

[0015] Figure 3 shows in greater detail the assembly of the annular wall 36 through the opening 50 formed in the bottom 52 of the washing chamber, which is inclined in a manner corresponding to the axis 40 of the neck 34. In particular, the annular wall 36 has on its outer surface a thread 74 which is intended to engage with a matching thread 75 of a fixing ring nut 76 (shown separately in Figure 4) which is also provided with a plurality of circumferentially spaced radial holes 78 and is arranged above the bottom 52 of the washing chamber. An annular seal 80 is instead arranged between the underside of the bottom 52 of the washing chamber and the facing surfaces of the device.

[0016] The general operating principles of the device remain substantially unchanged with respect to those described with reference to Figure 1, as regards both the normal water-softening step and the regeneration step. It moreover should be noted that the outflow of the water from the interspace 38 to the washing chamber occurs through the holes 70, 78 formed in the part which is situated lower than the annular wall 36 and in the ring nut 76, respectively. Moreover, the vapours which form inside the washing chamber may penetrate into the interspace 38, in particular into its portion which is situated at a greater height, and from here be conveyed, via the line 46 which is never completely full of water, to the breather opening 72 (arrow 82 in Figure 2) where they are discharged outside.

[0017] This second embodiment of the device according to the invention therefore integrates the further function of discharging of the vapours formed inside the washing chamber, allowing further simplification of the structure and the method of assembling the dishwashing machine with which the device is associated.

[0018] Figure 5 shows a further alternative embodiment of the device according to the invention, in which the same numbers as those used in the previous figures identify the same or equivalent parts. The parts not shown in Figure 5 are similar to those of the device according to the previous embodiment.

[0019] As in the embodiment previously described, the neck 34 of the second tank 28 has its axis 40 which is inclined with respect to the vertical. In this case, moreover, the annular wall 36 has a first circumferential portion 84 which surrounds the bottom section 85 of the neck 34 of the second tank 28, forming the interspace 38, and a second circumferential portion 86 which is situated above the first portion 84 and which forms the upper section of the neck 34. The bottom section 85 and the upper section 86 of the neck 34 are joined by a wall 94 which is shaped in the manner of a circumferential rim or optionally an arc of a circumferential rim and which extends transversely with respect to the bottom section 85 and upper section 86. The outer surface of the annular wall 36 has a thread 74, the bottom section of which is engaged by a matching thread 75 of a fixing ring nut 76 and the upper section of which is engaged by a matching thread 88 of a circumferential shoulder 90 which protrudes transversely from a bottom wall 92 of a plug 42 for closing the inlet mouth of the neck 34. Both the first circumferential portion 84 of the annular wall 36 and the ring nut 76 have respective pluralities of circumferentially staggered radial holes 70, 78. In a similar manner to the embodiment described previously, the supply water flows out of the interspace 38 towards the washing chamber via the holes 70, 78. At the same time, the constructional design of the supply device is simplified since a same thread 74 is used for mating with two different parts, namely the ring nut 76 and the plug 42.

[0020] Obviously, without modifying the principle of the invention, the constructional details and the embodiments may vary greatly with respect to that described purely by way of example, without thereby departing from the scope claimed.

Claims

1. Device for supplying and treating water for a dishwashing machine, comprising:

   - a supply line (10);
   - a first tank (22) for containing substances with water-softening properties, provided with at least one inlet opening (20) for water to be softened and an outlet opening (48) for softened water;
   - a second tank (28) for containing salt, provided with at least one water inlet opening (27) and an outlet opening (29) for a regeneration brine formed following dissolving of the salt in the water, and having a neck (34);
   - an annular wall (36) which surrounds externally at least one bottom portion of said neck (34)

forming an interspace (38); and
- a line (44) for connecting the outlet opening (20) of the first tank (22) to said interspace (38), said annular wall (36) being intended to be mounted inside an opening (50) formed through the bottom (52) of the washing chamber, where the softened water supplied from said connection line (44) is conveyed and made to pass through said interspace (38).

2. Device according to Claim 1, in which said supply line (10) has a blow-off section (16), the waste water from which is directed along a further line (46) for connection to said interspace (38), from where it is conveyed into the washing chamber.

3. Device according to any one of the preceding claims, comprising moreover a removable plug (42) which closes the inlet mouth of said neck (34).

4. Device according to any one of the preceding claims in which said annular wall (36) has on its outer surface a thread (74) which is intended to mate with a matching thread (75) formed in a fixing ring nut (76).

5. Device according to any one of the preceding claims, in which said line (46) for collecting waste water leads to the line (44) for connecting the outlet opening (48) of the first tank (22) to said interspace (38) .

6. Device according to any one of the preceding claims, in which said neck (34) has its axis (40) inclined with respect to the vertical, so that it comprises a first region (62) which forms an acute angle with the adjacent shoulder portion (64) of the body of the second tank (28) and a second region (66) which forms an obtuse angle with the adjacent shoulder portion (68) of the body of the second tank (28).

7. Device according to Claim 6, in which at least one hole (70) able to connect the interspace (38) to the washing chamber is formed in the zone of the annular wall (36) facing the first region (62) of the neck (34).

8. Device according to Claim 7, in which said annular wall (36) has a plurality of holes (70) which are circumferentially staggered with respect to each other.

9. Device according to any one of the preceding claims, in which said interspace (38) has an annular extension or extends over an arc of a circumference.

10. Device according to any one of the preceding Claims 6 to 9, in which said line (46) for collecting the waste water from the air blow-off section (16) of the supply line (10) communicates with a breather opening (72) via which the vapours which form in the washing chamber may be discharged.

11. Device according to any one of the preceding Claims 1 to 9, in which said annular wall (36) has a first circumferential portion (84) which surrounds a bottom section (85) of the neck (34) of the second tank (28) forming said interspace (38) and a second circumferential portion (86) which is situated above the first portion (84) and which forms the upper section of said neck (34), the outer surface of said annular wall (36) having a thread (74), the bottom section of which is engaged by a matching thread (75) of a fixing ring nut (76) and the upper section of which is engaged by a matching thread (88) of a circumferential shoulder (90) which protrudes transversely from the bottom wall (92) of a plug (42) for closing the inlet mouth of said neck (34).

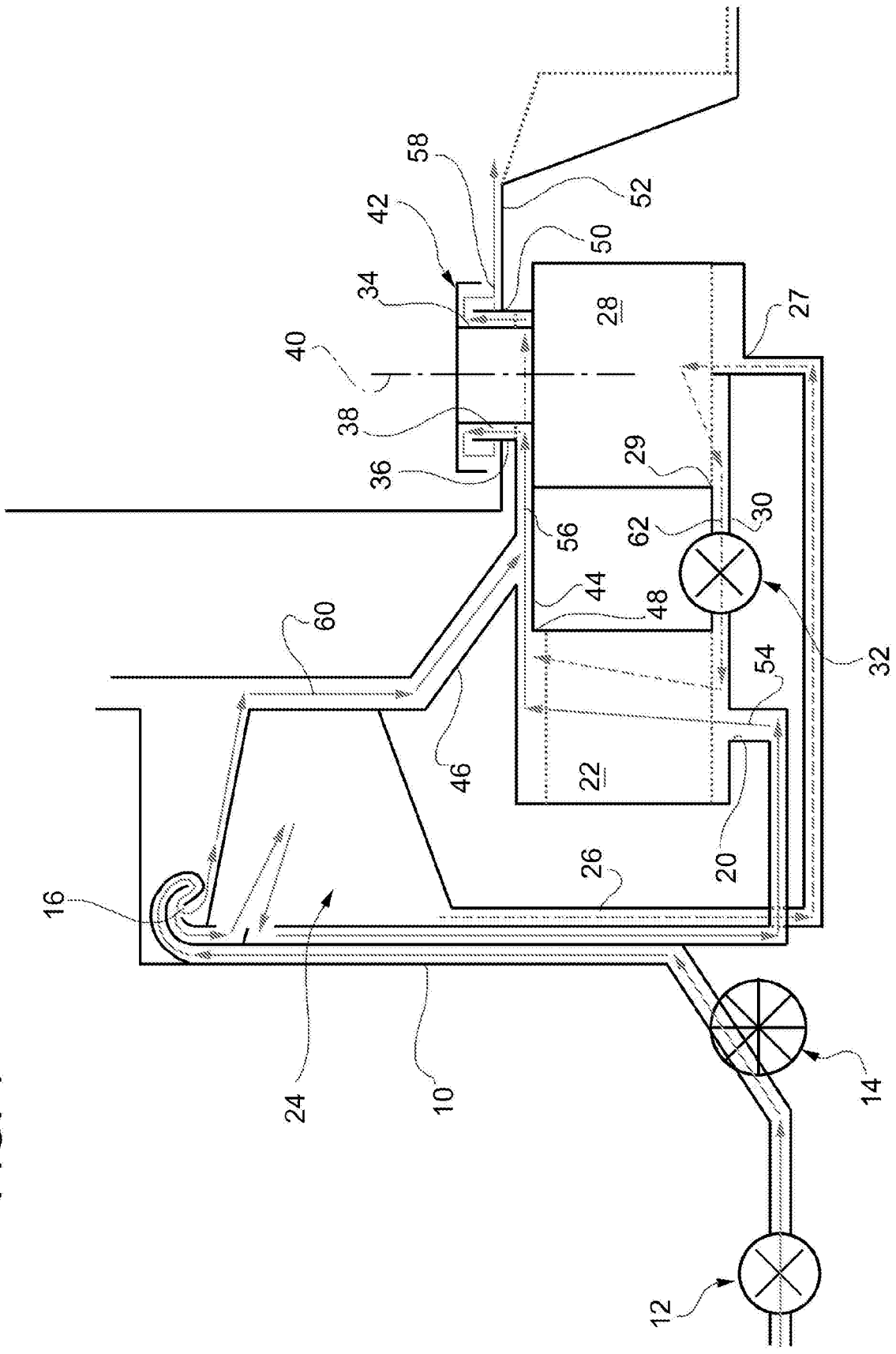
12. Device according to Claim 11, in which the bottom section (85) and the upper section (86) of said neck (34) are joined together by a wall (94) which is shaped in the manner of a circumferential rim or an arc of a circumferential rim and which extends transversely with respect to said bottom section (85) and upper section (86).

13. Device according to Claim 11 or 12, in which said first circumferential portion (84) of the annular wall (36) has a plurality of circumferentially staggered radial holes (70).

14. Device according to any one of the preceding Claims 11 to 13, in which said ring nut (76) has a plurality of circumferentially staggered radial holes (78).

15. Dishwashing machine, comprising a device according to any one of the preceding claims, in which the annular wall (36) is inserted inside an opening (50) formed in a bottom wall (52) of the washing chamber.

FIG. 1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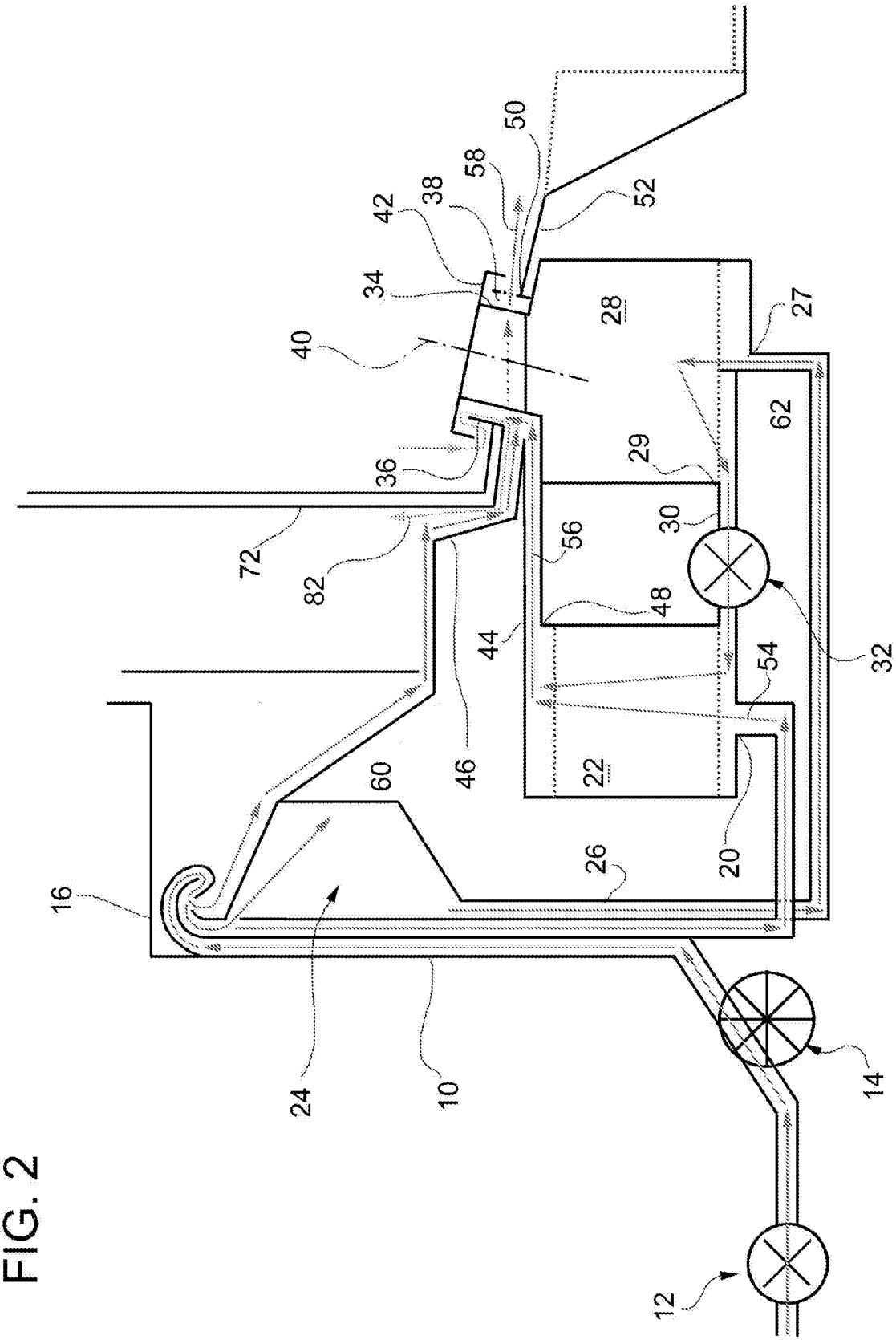
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FIG. 2

FIG. 3

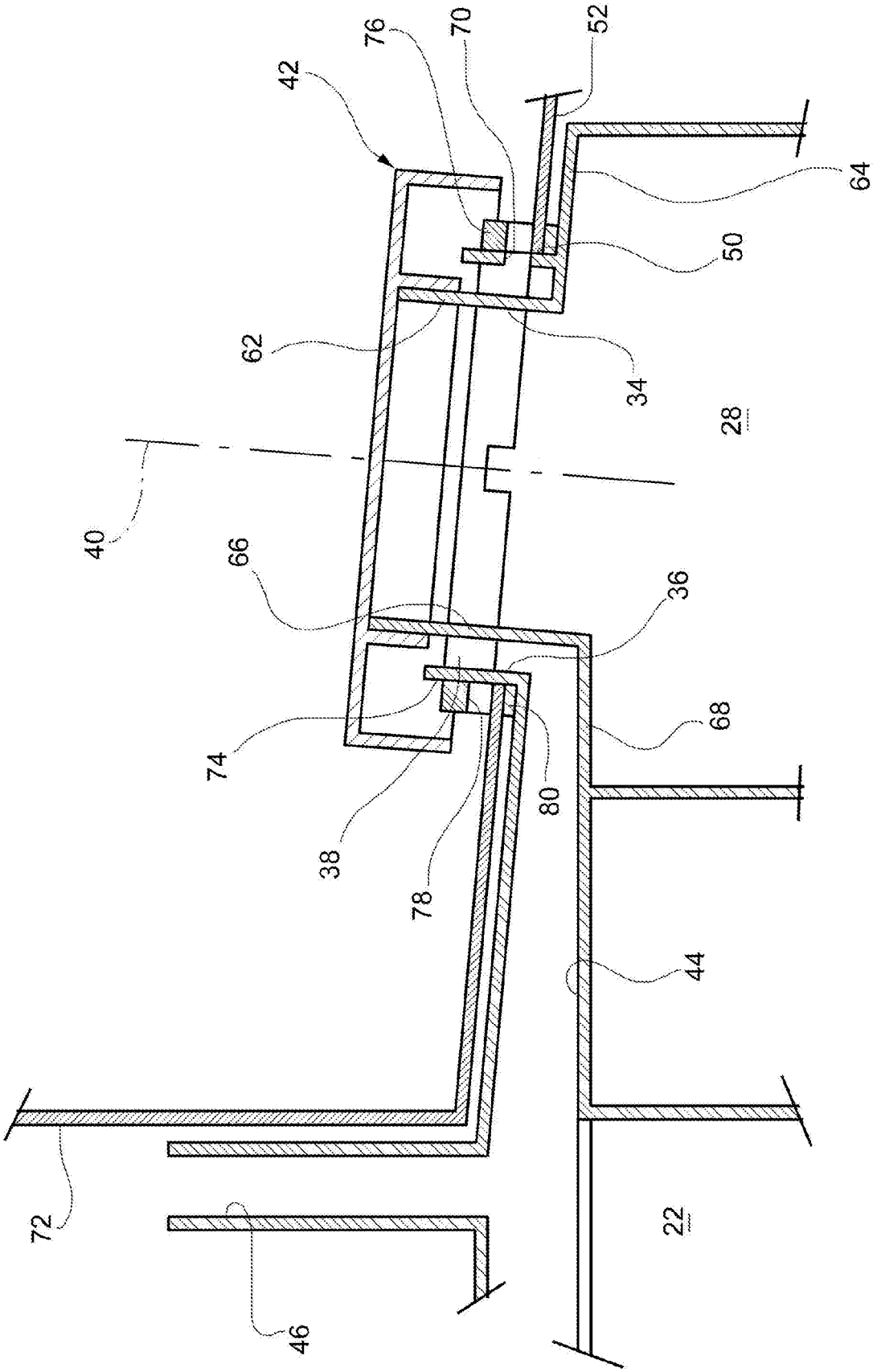


FIG. 4

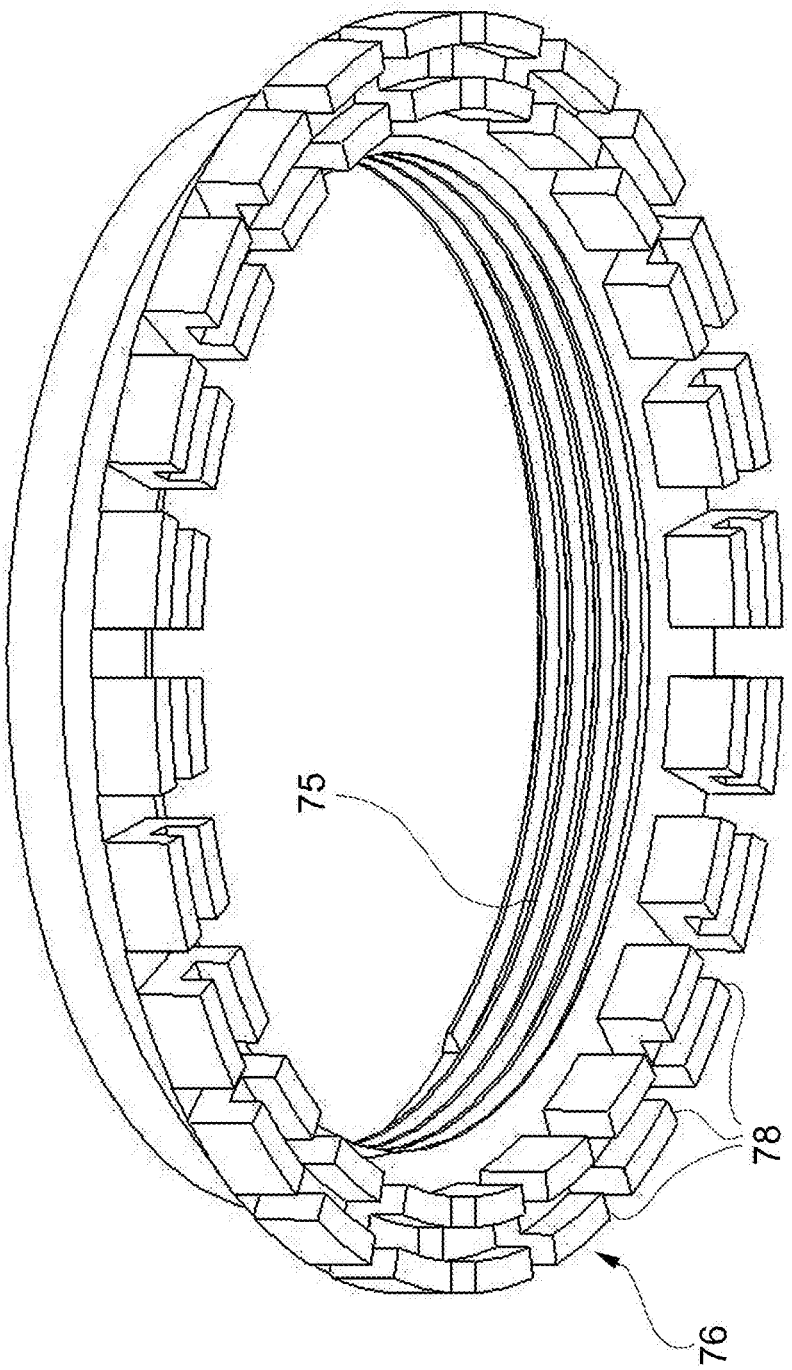
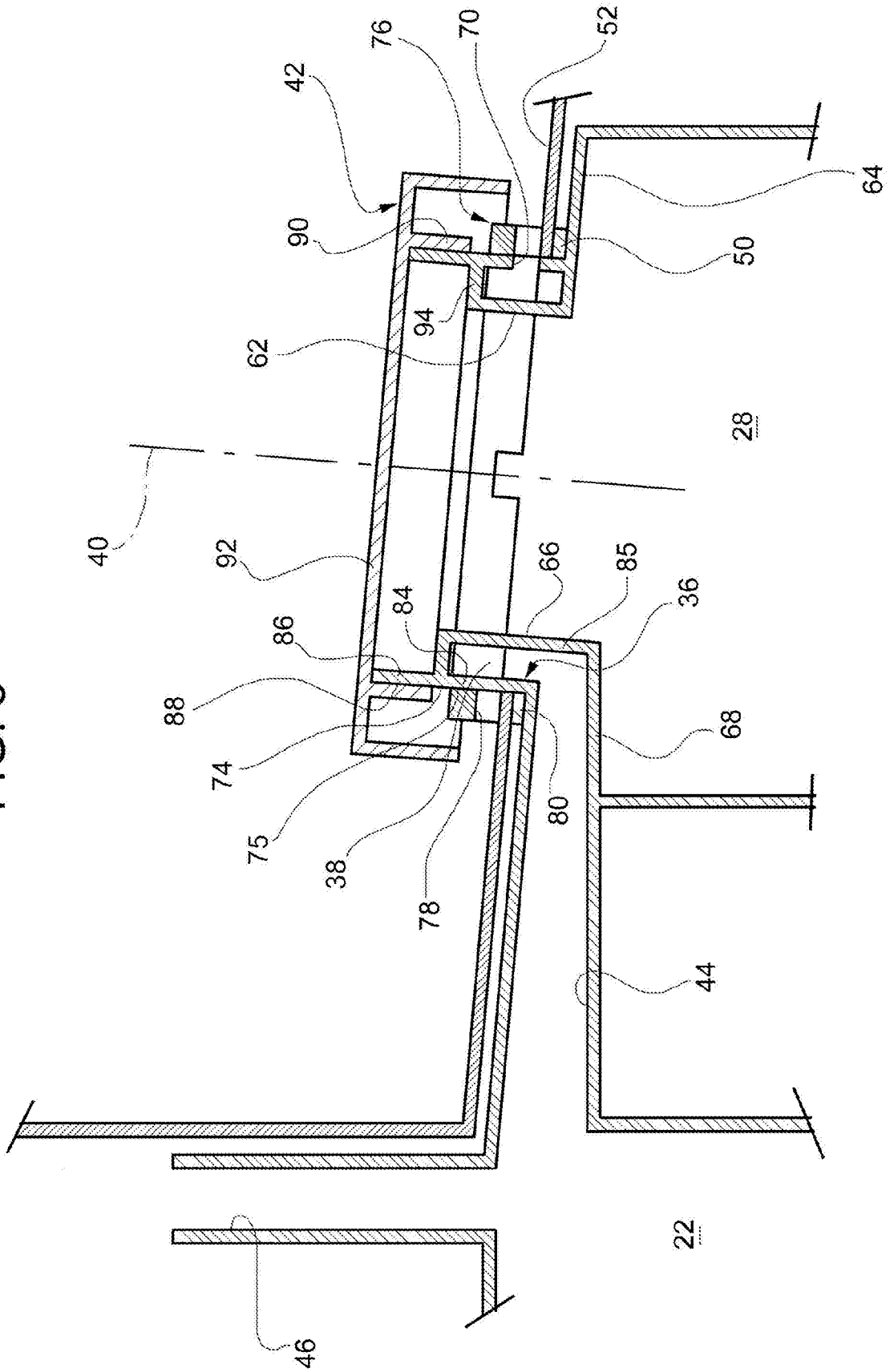


FIG. 5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EUROPEAN SEARCH REPORT

Application Number
EP 07 10 5756

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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D,A	EP 1 025 793 A2 (BITRON SPA [IT]) 9 August 2000 (2000-08-09) * paragraph [0012] - paragraph [0028]; figure 1 * -----	1-15	
A	DE 196 14 813 A1 (BITRON SPA [IT]) 17 October 1996 (1996-10-17) * the whole document * -----	1-15	
A	DE 26 46 307 A1 (EURO HAUSGERAETE GMBH) 20 April 1978 (1978-04-20) * page 5; figure 1 * -----	1-15	
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TECHNICAL FIELDS SEARCHED (IPC)

A47L
D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 June 2007	Hannam, Martin

CATEGORY OF CITED DOCUMENTS

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REFERENCES CITED IN THE DESCRIPTION

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