(19) Europäisches Patentamt
European Patent Office
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(11) **EP 3 144 433 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
22.03.2017 Bulletin 2017/12

(51) Int Cl.:
E03C 1/02 *(2006.01)*

(21) Application number: **16189639.4**

(22) Date of filing: **20.09.2016**

(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:
MA MD

(30) Priority: **21.09.2015 DE 102015012040**

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(54) AN ASSSEMBLY OF A CONCEALED SANITARY FITTING HAVING A CONNECTING MEMBER AND A VALVE FUNCTION UNIT

(57) An assembly of a concealed sanitary fitting (10) comprises a connecting member (12) for installation in an installation recess of a sanitary installation and a valve function unit (30). For compensation of a chaotic laying the assembly comprises a water passage diverter element (44) which comprises a counter-connection interface (50) corresponding to a counter-connection interface (32) of the valve function unit (30) and a connection interface (46) corresponding to a connection-interface (16) of the connecting member (12). The connection interface (46) comprises connection openings (48a, 48b, 48c, 48d) and the counter-connection interface (50) comprises counter-connection openings (52a, 52b, 52c, 52d), wherein the counter-connection openings (52a, 52b, 52c, 52d) are connected with the connection openings (48a, 48b, 48c, 48d) via internal water passages (60, 62). Furthermore, at least one of the counter-connection openings (52a, 52c) is connected with a connection openings (48c, 48a) that is not aligned with the at least one of the counter-connection openings (52a, 52c).

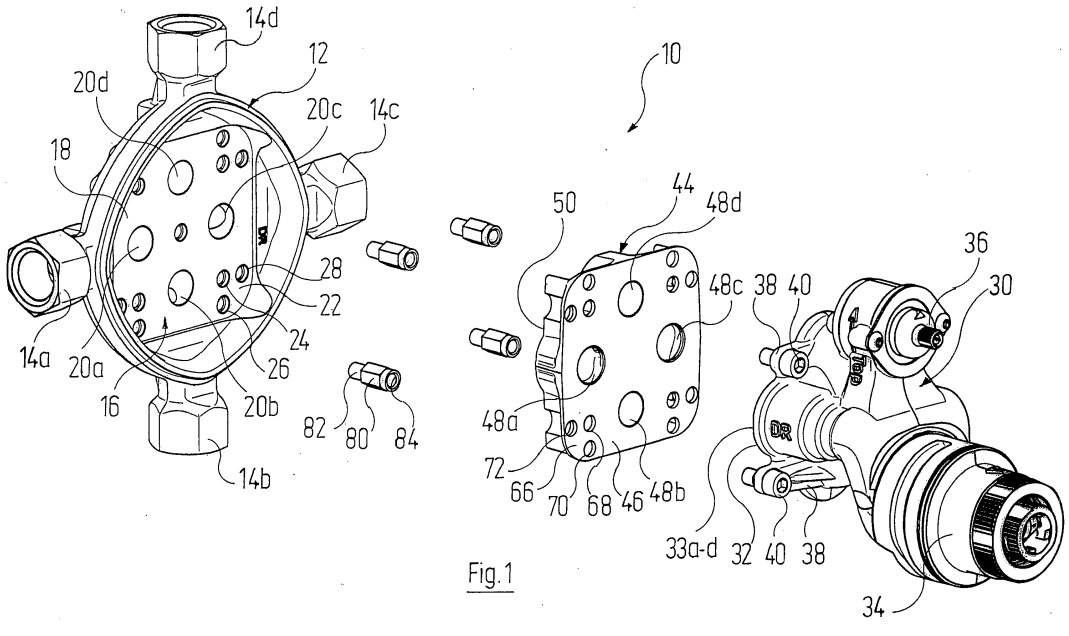

Fig.1

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Description

BACKGROUND OF THE INVENTION

1. Field of the invention

[0001] This invention relates to a concealed sanitary fitting having a connecting member and a valve function, which may be used for sanitary installations like bathrooms, toilets or kitchens for a controlled release of water.

[0002] In a concealed sanitary fitting, the valve function unit used to control the water flow is accommodated in an installation recess that is provided in a wall or another building structure. In this way, the bulky valve function unit of the sanitary fitting may be concealed under a rosette from the user's vision and only operating elements project from the wall. For the purpose of this invention the term concealed sanitary fitting may or may not comprise the operating elements and the rosette.

2. Description of the prior art

[0003] Recently, increasing use has been made of concealed sanitary fittings, where the building owner can postpone his decision on the precise type of concealed sanitary fitting he desires until the final phase of interior works on a building. For this purpose, a universally usable connecting member having connection pieces for connection with the pipework laid in the building wall and a connection interface for connection with a valve function unit is installed in a first step in an installation recess of the sanitary installation. Thus, the connecting member is connected in particular to the domestic cold water pipe, the domestic hot water pipe and optionally one or more mixed-water-discharging pipes. The installation recess thus equipped is then covered until the interior works on the building, such as tiling for example, have been largely completed. Only then, the covering of the installation recess is removed again. The building owner now decides which specific type of concealed fitting he desires, for example a single-lever mixer valve, a thermostatic valve or the like. The manufacturer of the concealed sanitary fitting has a complete set of valve function units available, which are standardized such that they can all be connected to the same universal connecting member, but contain different valve elements. For this purpose the valve function units all have a counter-connection interface complementary to the connection interface. The specific valve function unit desired by the building owner is then connected to the connecting member. Finally, all that given, a rosette is fitted, which covers the valve function unit inside the installation recess while providing through holes for operating elements of the sanitary fitting.

[0004] However, sometimes when the sanitary fitting is put into operation it turns out, that the pipework has not been correctly connected to the connecting member. For example, it turns out that the cold water pipe has been connected to the hot water connection piece of the connecting member and vice versa. In technical terminology this is called a chaotic laying of the pipe work. Depending on the nature of the chaotic laying and the desired valve function unit functions of the concealed sanitary fitting are impaired or even fully prevented, like e.g. the use of a thermostat.

[0005] The manufacturer of the concealed sanitary fitting therefore provides specialized valve function units which comprise differing water ways for a compensation of the chaotic laying. However, to provision such specialized valve function units is complex and costly.

SUMMARY OF THE INVENTION

[0006] An object of the present invention is to provide an assembly of a concealed sanitary fitting of the type mentioned at the beginning, which facilitates the compensation for a chaotic laying of the pipework connected to the connecting member.

[0007] This object is achieved by an assembly of a concealed sanitary fitting comprising

a) a connecting member for installation in an installation recess of a sanitary installation, comprising

- connection pieces for connection with a pipework of the sanitary installation and
- a first connection interface comprising first connection openings which are connected to the connection pieces

b) a valve function unit comprising

- a first counter-connection interface complementary to the first connection interface, wherein the first counter-connection interface comprises first counter-connection openings for connection with first connection openings of the connecting member.

[0008] According to the invention

c) the assembly comprises a water passage diverter element which comprises

- a second counter-connection interface corresponding to the first counter-connection interface of the valve function unit and
- a second connection interface corresponding to the first connection-interface of the connecting member,

wherein

- the second connection interface comprises second connection openings and the second coun-

ter-connection interface comprises second counter-connection openings, wherein the second counter-connection openings are connected with the second connection openings via internal water passages and wherein

- at least one of the second counter-connection openings is connected with a second connection openings that is not aligned with the at least one of the second counter-connection openings.

[0009] The invention is based on the idea that an additional water passage diverter element is interposed in between the connecting member and the valve function unit in order to compensate for a chaotic laying. Such an additional water passage diverter element should have complementary connection and counter-connection interfaces for allowing the sanitary fitting to be mounted with or without the additional component. Thus, the manufacturer and/or the plumbers do only have to provide a few different water passage elements, which can be used for all the different valve function units. This reduces overall costs for compensating chaotic layings.

[0010] In order to divert a water passage in the water passage diverter element, at least one of the counter-connection openings should not be connected to the connection opening which it is aligned with. Instead it has to be connected to a connection opening with a different logical position with respect to the interface geometry.

[0011] Preferably, at least two of the second connection openings of the water passage diverter element are connected with at least two second counter-connection openings such that the water passages between the two second connection and counter-connection openings interchange. Generally, it is possible to provide water passage diverter elements which combine two or more counter-connection openings to one connection opening. However, in most cases an interchange of the water passages is needed.

[0012] Preferably, the water passage diverter element is configured such that water passages of diametrically opposed second connection and counter-connection openings are interchanged. Generally, the connecting member uses diametrically opposed connection pieces for connecting the hot and cold water pipes and the other diametrically opposed connection pieces for outlets. Very often plumbers confuse the cold and hot water pipes because theses pipes generally run parallel to each other. Therefore, a water passage exchanger element interchanging diametrically opposed connections is of particular importance.

[0013] Preferably, the water passage diverter element is configured such that water passages of circumferentially neighboring second connection and counter-connection openings are interchanged. Two such water passage diverter elements can be stacked in order to achieve a diametrically opposed interchange of water passages. Therefore, with one type of water passage diverter element different chaotic laying problems can be compensated.

[0014] To even more increase flexibility and ease of operation, the manufacture may also include a water passage extension element, wherein each of the second counter-connection openings is connected to its respective aligned second connection opening. Such an extension element may be used to bring the valve function unit closer to the level of the wall if the connecting member has been installed to deep in the installation recess.

[0015] Preferably, the water passage diverter element comprises a helicoid shaped partition wall between two water passages. A partition wall with a substantially helicoid shape turning around 180° allows to interchange two water passages inside a smaller section. This allows to provide a diverter element with a lower profile.

[0016] Preferably, the assembly comprises two water passage diverter elements. Using two water passage diverter elements the user is able to compensate for more complicated chaotic layings like an interchange of the hot and cold water pipes as well as of the shower outlet and the bathtub outlet.

[0017] Preferably, the water passage diverter element comprises four second connection and counter-connection openings arranged in a cross shape. This allows for a good distribution of the typically four openings. The openings may be arranged on the main axes of a quadratic plane of the second connection and counter-connection interfaces.

[0018] Preferably, the first and second connection interfaces and the first and second counter-connection interfaces have a fourfold symmetry. This way, the connecting member and/or the valve function unit can be installed in steps of 90° rotations. This allows to take into account most of the requirements given by general sanitary installations. Using a water passage diverter elements which connects each of the second counter-connection opening with a neighboring second connection opening to the corresponding aligned second connection opening one is able to turn the orientation of the valve function unit by 90° after installation of the connecting member.

[0019] Preferably, the water passage diverter element has a twofold symmetry. This way, rotations of the diverter element about 180° do not matter and mounting of the water passage diverter elements is simplified.

[0020] Preferably, the water passage diverter element has a plate shape with a thickness of less than 2,5 cm, in particular less than 1,6 cm, preferably less than 1,0 cm. Having a low profile is particular important for the usability of the water passage diverter element, because otherwise the extent to which the valve elements of the valve function unit protrude out of the wall gets too large. The lateral shape of the plate will generally correspond to the shape of the first connection interface of the connecting member.

[0021] Preferably, the water passage diverter element is mounted using standoffs having an outer thread and

an inner thread. Although longer fixing screws could be used for interposing the water passage diverter element between the connecting member and the valve function unit, it is advantageous to use standoffs, because it allows stacking of several water passage diverter elements. Furthermore, the standoffs may conveniently be packaged with the diverter elements.

[0022] Preferably, the water passage diverter element comprises markers showing the interchanged water passages. Such markers like grooves, edges or painted symbols increase user comfort, because the exchanged water passages are immediately visible also for non-specialists.

[0023] According to another aspect of the invention, a concealed sanitary fitting is provided which is assembled from any of the assemblies described above. With the concealed sanitary fitting a chaotic laying can be compensated in a cost efficient manner.

[0024] According to another aspect, a water passage diverter element for interposition between a connecting member and a valve function unit of a concealed sanitary fitting is provided, which comprises

a) a second counter-connection interface corresponding to a first counter-connection interface of the valve function unit and

b) a second connection interface corresponding to a first connection-interface of the connecting member,
wherein

c) the second connection interface comprises second connection openings and the second counter-connection interface comprises second counter-connection openings, wherein the second counter-connection openings are connected with the second connection openings via internal water passages and wherein

d) at least one of the second counter-connection openings is connected with a second connection openings that is not aligned with the at least one of the second counter-connection openings.

[0025] Such a water passage diverter element can efficiently be provided by the manufacturer independent of the type of valve function unit which has to be mounted in a connecting member installed with a chaotic laying. In particular, the water passage diverter element may comprise further features described above with respect to the whole assembly of the concealed sanitary fitting or in the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] Various features and advantages of the present invention may be more readily understood from the following detailed description referring to accompanying drawings in which:

Fig. 1 is an exploded view of a concealed sanitary fitting according to the invention;

Fig. 2 is a top view of a water way diverter element of the concealed sanitary fitting;

Fig. 3 is a side view of the water way diverter element;

Fig. 4 is a bottom view of the water way diverter element;

Fig. 5 is a back view of the water way diverter element;

Fig. 6 is a sectional view along cut plane A-A shown in Fig. 2;

Fig. 7 is a sectional view along cut plane B-B shown in Fig. 2;

Fig. 8 is a sectional view along cut plane C-C shown in Fig. 2;

Fig. 9 is a sectional view along cut plane D-D shown in Fig. 2;

Fig. 10 is a back view of the water way diverter element;

Fig. 11 is a perspective view of the assembled concealed sanitary fitting.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

1. Concealed sanitary fitting

[0027] Fig. 1 shows in an exploded view major components of a concealed sanitary fitting 10 according to the invention. Other components like a housing, handling elements or a rosette are not shown.

[0028] The concealed sanitary fitting 10 comprises a connecting member 12 configured to be fixed in an installation recess provided in a wall or another building structure of a sanitary installation.

[0029] The connecting member 12 comprises four connection pieces 14a, 14b, 14c, 14d for connection of the connecting member 12 with the pipework of the sanitary installation (not shown). The connecting pieces 14a, 14b, 14c, 14d are protruding in a cross-shape from the connecting member 12 and are normally pointing upwards, downwards, left and right when the connecting member 12 is install in the installation recess.

[0030] The connecting member 12 further comprises a first connection interface 16, which comprises a sub-

stantially quadratic plane 18 having four first connection openings 20a, 20b, 20c, 20d. The four first connection openings 20a, 20b, 20c, 20d of the first connection interface 16 are also arranged in a cross-shape and are aligned along the main axes of the quadratic plane 18 together with the respective connection pieces 14a, 14b, 14c, 14d. Each of the first connection openings 20a, 20b, 20c, 20d is connected with one of the connection pieces 14a, 14b, 14c, 14d via an internal channel. This way, a water passage is provided from the domestic cold and hot water pipes to further water guide elements such as shower heads and bath tub outlets via the first connection interface 16.

[0031] For mounting purposes, the first connection interface 16 comprises an arrangement 22 of threaded holes 24, 26 and 28 in each corner of the quadratic plane 18 as a mounting means.

[0032] The concealed sanitary fitting 10 further comprises a valve function unit 30 having a first counter-connection interface 32 configured to cooperate with the first connection interface 16 of the connecting member 12. In the embodiment shown in Fig. 1 and 2 the valve function unit 30 comprises a thermostatic mixer valve 34 using a valve cartridge for mixing and a switch valve 36 for switching between the shower and the bath tub outlet as valve elements. The thermostatic mixer valve 34 and the switch valve 36 may later be connected at their front side to operating elements (not shown), which can be manually operated by a user.

[0033] The valve function unit 30 further comprises mounting lugs 38 having through holes, which cooperate with fixing screws 40 as a mounting means.

[0034] When the plumber has correctly connected the connection pieces 14a, 14b, 14c, 14d of the connecting member 12 to the pipework of the sanitary installation, the valve function unit 30 can be mounted directly to the connecting member 12 by tightening the fixing screws 40 in the threaded holes 24, 26 or 28.

[0035] However, if the connection of two connection pieces 14a, 14b, 14c, 14d with the pipework has been erroneously interchanged, an intermediate water passage diverter element 44 may be interposed between the connecting member 12 and the valve function unit 30.

[0036] Assuming that in the present embodiment, the hot and cold water pipes have been interchanged on the connection pieces 14a and 14c, the details of the water passage diverter element 44 compensating for this interchange can be seen from Figs. 2 to 9.

[0037] The water passage diverter element 44 has a substantially quadratic plate-like shape with a thickness of about 1,5 cm and a lateral length that is equal or slightly smaller than the lateral length of the first connection interface 16 of the connecting member 12, namely between 5 and 10 cm. The water passage diverter element 44 further comprises a second connection interface 46 shown in Fig. 2, which corresponds to the first connection interface 16 of the connecting member 12 with respect to the interface geometry.

[0038] The second connection interface 46 again comprises four second connection openings 48a, 48b, 48c, 48d arranged in a cross-shape at the same lateral positions as the first connection openings 20a, 20b, 20c, 20d of the connecting member 12 (Fig. 2). Furthermore, the water passage diverter element 44 comprises on its opposing side a second counter-connection interface 50, which comprises four second counter-connection openings 52a, 52b, 52c, 52d.

[0039] As shown in Figs. 4, and 6 to 9, each of the four second counter-connection openings 52a, 52b, 52c, 52d is surrounded by a groove 54 which receives a sealing ring 56. Although not visible in the figures, such grooves and sealing rings are identically provided at the first counter-connection interface 32 of the valve function unit 30 around four first counter-connection openings.

[0040] The sectional view along cut plane B-B in Fig. 7 shows that the two second connection openings 48b and 48d are connected by through bores 58b and 58d to the two second counter-connection openings 52b and 52d being aligned with the two second connection openings 48b and 48d.

[0041] In contrast, the two other second connection openings 48a and 48c are connected with the two other second counter-connection openings 52 a and 52d via two internal channels 60 and 62 provided inside the water passage diverter element 44 crossing along the cut plane D-D of Fig. 9. This way, the water passages through these two second connection openings 48a and 48c are interchanged such that the second counter-connection openings 52a and 52c are linked with a respective second connection opening 48c and 48a which is not at the same position with respect to the interfaces.

[0042] The two internal channels 60 and 62 are parted from each other by a substantially helicoid shaped partition wall 64 provided in the water passage diverter element 44.

[0043] Furthermore, the water passage diverter element 44 comprises an arrangement 66 of through holes 68, 70, 72 on each corner, wherein the arrangement 66 corresponds to the arrangement 22 of threaded holes 24, 26, 28 in the connecting member 12. For mounting purposes and the saving of materials, the water passage diverter element 44 has a reduced thickness around the arrangement 66 of through holes 68, 70, 72, but comprises strengthening rips 74 between the through holes 68, 70, 72.

[0044] Finally, the water passage diverter element 44 comprises two bent edges 76, 78 extending along the short axis of the water passage diverter element 44 and arranged on the main axis of the quadratic plane, on which the two interchanging internal channels 60, 62 are arranged. These bent edges 76, 78 are used as indicators for the user to immediately see which water passages are interchanged.

[0045] For mounting the water passage diverter element 44 between the connecting element 12 and the valve function unit 30 the assembly of the concealed san-

itary fitting 10 comprises four standoffs 80 having an outer thread 82 complementary to the inner thread of the threaded holes 24, 26, 28 in the connecting member 12 and an inner thread 84 corresponding to these inner threads. The standoffs 80 are configured to be arranged below the through holes 68, 70, 72 of the water passage diverter element 44 at the region of reduced thickness.

[0046] When the valve function unit 30 is mounted in the connecting member 12 the user first crews the standoffs 80 in those threaded holes 24, 26, 28 of the connecting member 12 that correspond to the positions provided by the mounting lugs 38 of the valve function unit 30. Then the water passage diverter element 44 is placed on the protruding standoffs 80 with the second counter-connection interface 50 pointing towards the first connection interface 16 of the connecting member 12. During this step, the user may choose which pair of water passages is interchanged by rotating the water passage diverter element 44 by 90°. Finally, the valve function unit is mounted on the water passage diverter element 44 by placing the fixing screws 40 into the through holes of the mounting lugs 38 and the through holes 68, 70, 72 of the water passage diverter element 44 and by tightening the fixing screws 40 into the standoffs 80.

[0047] Fig. 10 shows the concealed sanitary fitting 10 assembled in this way.

[0048] If not only two connection pieces 14a, 14c are wrongly connected but also the other two connection pieces 14b, 14d are erroneously interchanged, the user can connect an additional water passage diverter element 44 on top of the first water diverter element 44 using further standoffs 80.

[0049] The embodiment shown in the figures shows a water passage diverter element 44 which interchanges two water passages arranged diametrically opposed with respect to a central axis of the connection interface 16. However, according to the same principles a water passage diverter element 44 may be provided wherein two circumferentially neighboring water passages are interchanged. In this case, the bent edges 76, 78 would be provided at two neighboring sides of the water passage diverter element 44. By interposing two of these diverter elements 44 turned by 90° it would even be possible to interchange diametrically opposed water passages. Thus, only one type of water passage diverter elements 44 has to be provided by the manufacturer.

[0050] As can be seen from the figures of the described embodiment, a water passage diverter element 44 according to the invention may preferably be formed in one piece. In particular, in combination with the helicoid shaped partition wall 64, the water passage diverter element 44 made in one piece has a low profile.

Claims

1. An assembly of a concealed sanitary fitting (10) comprising

a) a connecting member (12) for installation in an installation recess of a sanitary installation, comprising

- connection pieces (14a, 14b, 14c, 14d) for connection with a pipework of the sanitary installation and
- a first connection interface (16) comprising first connection openings (20a, 20b, 20c, 20d) which are connected to the connection pieces (14a, 14b, 14c, 14d)

b) a valve function unit (30) comprising

- a first counter-connection interface (32) complementary to the first connection interface (16), wherein the first counter-connection interface (32) comprises first counter-connection openings (33a, 33b, 33c, 33d) for connection with first connection openings (20a, 20b, 20c, 20d) of the connecting member (12)

characterized in that

c) the assembly comprises a water passage diverter element (44) which comprises

- a second counter-connection interface (50) corresponding to the first counter-connection interface (32) of the valve function unit (30) and
- a second connection interface (46) corresponding to the first connection-interface (16) of the connecting member (12),

wherein

- the second connection interface (46) comprises second connection openings (48a, 48b, 48c, 48d) and the second counter-connection interface (50) comprises second counter-connection openings (52a, 52b, 52c, 52d), wherein the second counter-connection openings (52a, 52b, 52c, 52d) are connected with the second connection openings (48a, 48b, 48c, 48d) via internal water passages (60, 62) and wherein
- at least one of the second counter-connection openings (52a, 52c) is connected with a second connection openings (48c, 48a) that is not aligned with the at least one of the second counter-connection openings (52a, 52c).

2. The assembly according to claim 1, **characterized in that** at least two of the second connection openings (48c, 48a) of the water passage diverter element (44) are connected with at least two second counter-

connection openings (52a, 52c) such that the water passages (60, 62) between the two second connection and counter-connection openings (48a, 48c, 52c, 52a) interchange.

3. The assembly according to claim 2, **characterized in that** the water passage diverter element is configured such that water passages (60, 62) of diametrically opposed second connection and counter-connection openings (48a, 48c, 52c, 52a) interchange.

4. The assembly according to claim 2, **characterized in that** the water passage diverter element (44) is configured such that water passages of circumferentially neighboring second connection and counter-connection openings (48a, 48b, 48c, 48d, 52a, 52b, 52c, 52d) interchange.

5. The assembly according to any of the preceding claims, **characterized in that** the water passage diverter element (44) comprises a helicoid shaped partition wall (64) between two water passages (60, 62).

6. The assembly according to any of the preceding claims, **characterized in that** the assembly comprises two water passage diverter elements (44).

7. The assembly according to any of the preceding claims, **characterized in that** the water passage diverter element (44) comprises four second connection and counter-connection openings (48a, 48b, 48c, 48d, 52a, 52b, 52c, 52d) arranged in a cross shape.

8. The assembly according to any of the preceding claims, **characterized in that** the first and second connection interfaces (16, 46) and the first and second counter-connection interfaces (32, 50) have a fourfold symmetry.

9. The assembly according to any of the preceding claims, **characterized in that** the water passage diverter element (44) has a twofold symmetry.

10. The assembly according to any of the preceding claims, **characterized in that** the water passage diverter element (44) has a plate shape with a thickness of less than 2,5 cm, in particular less than 1,6 cm, preferably less than 1,0 cm.

11. The assembly according to any of the preceding claims, **characterized in that** the water passage diverter element (44) is mounted using standoffs (80) having an outer thread (82) and an inner thread (84).

12. The assembly according to any of the preceding claims, **characterized in that** the water passage diverter element (44) comprises markers (76, 78) indicating the interchanged water passages (60, 62).

13. A concealed sanitary fitting (10) assembled from the assembly according to any of the preceding claims.

14. A water passage diverter element (44) for interposition between a connecting member (12) and a valve function unit (30) of a concealed sanitary fitting (10) comprising

a) a second counter-connection interface (50) corresponding to a first counter-connection interface (32) of the valve function unit (30) and
b) a second connection interface (46) corresponding to a first connection-interface (16) of the connecting member (12),
wherein
c) the second connection interface (46) comprises second connection openings (48a, 48b, 48c, 48d) and the second counter-connection interface (50) comprises second counter-connection openings (52a, 52b, 52c, 52d), wherein the second counter-connection openings (52a, 52b, 52c, 52d) are connected with the second connection openings (48a, 48b, 48c, 48d) via internal water passages (60, 62) and wherein
d) at least one of the second counter-connection openings (52a, 52c) is connected with a second connection openings (48c, 48a) that is not aligned with the at least one of the second counter-connection openings (52a, 52c).

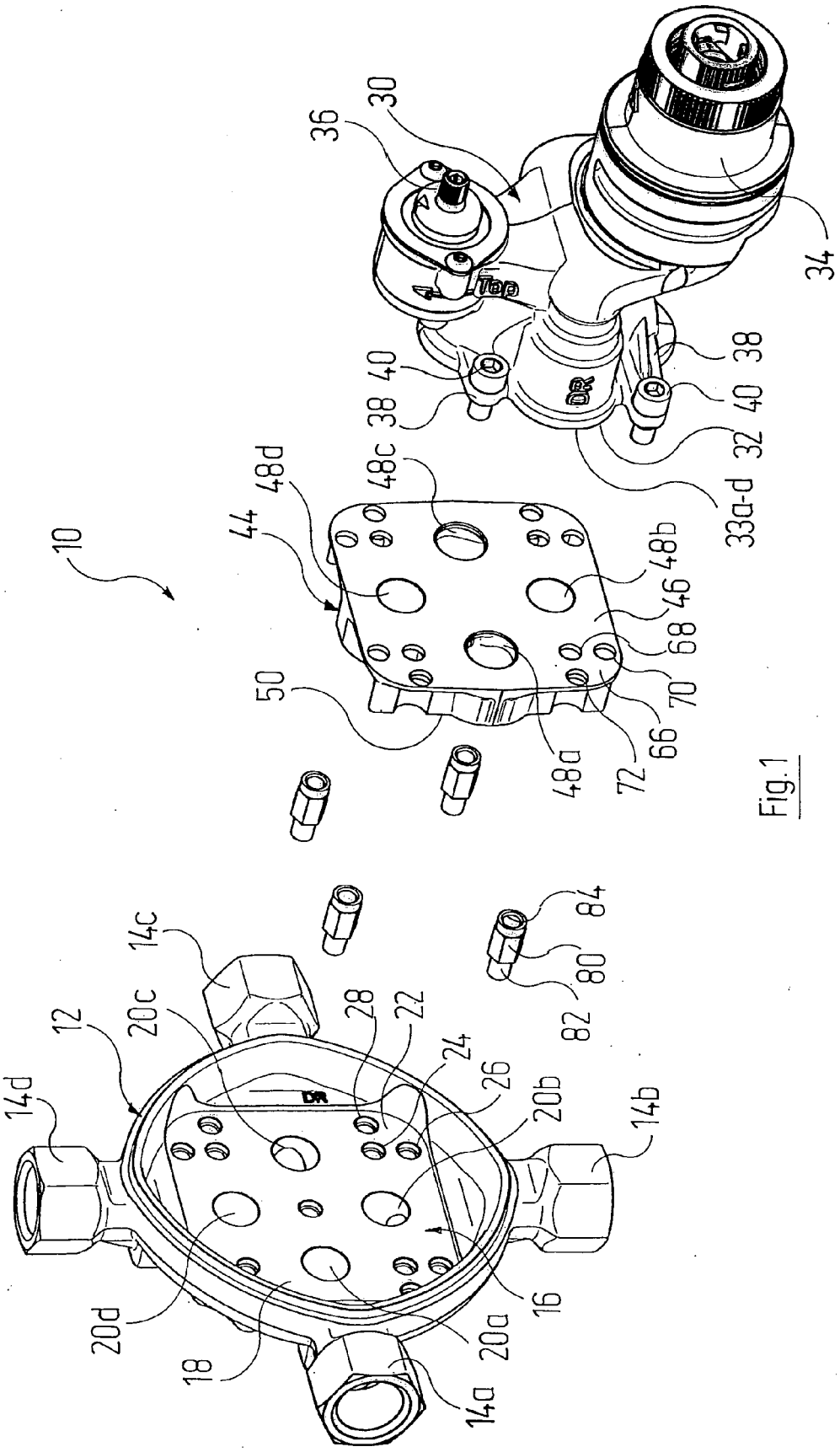
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Fig.1

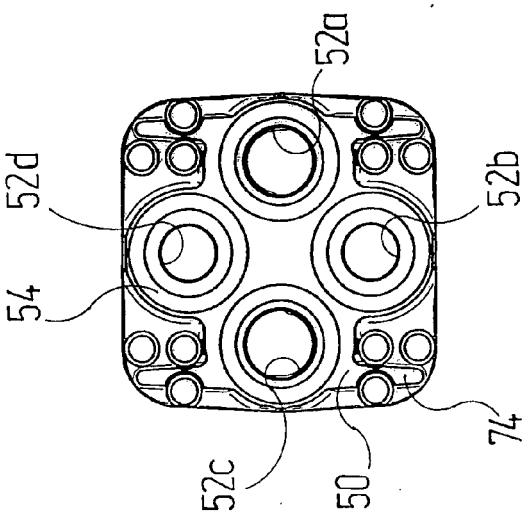

Fig. 4

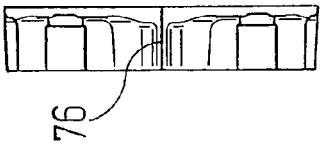

Fig. 3

Fig. 5

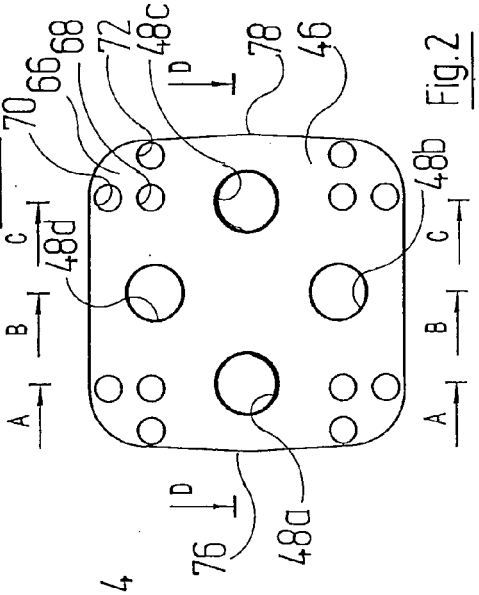

Fig. 2

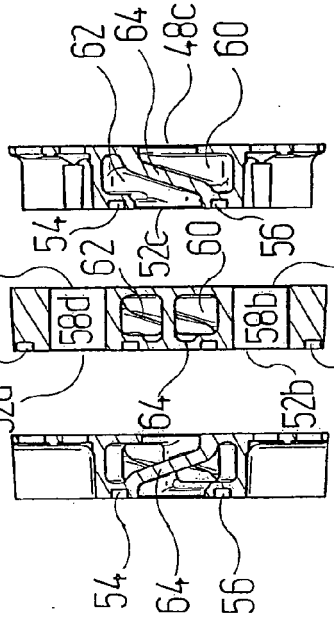

Fig. 8 C-C

Fig. 7 B-B

Fig. 6 A-A

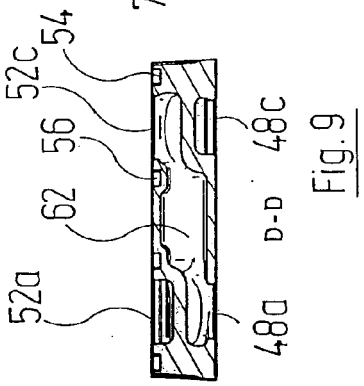

Fig. 9

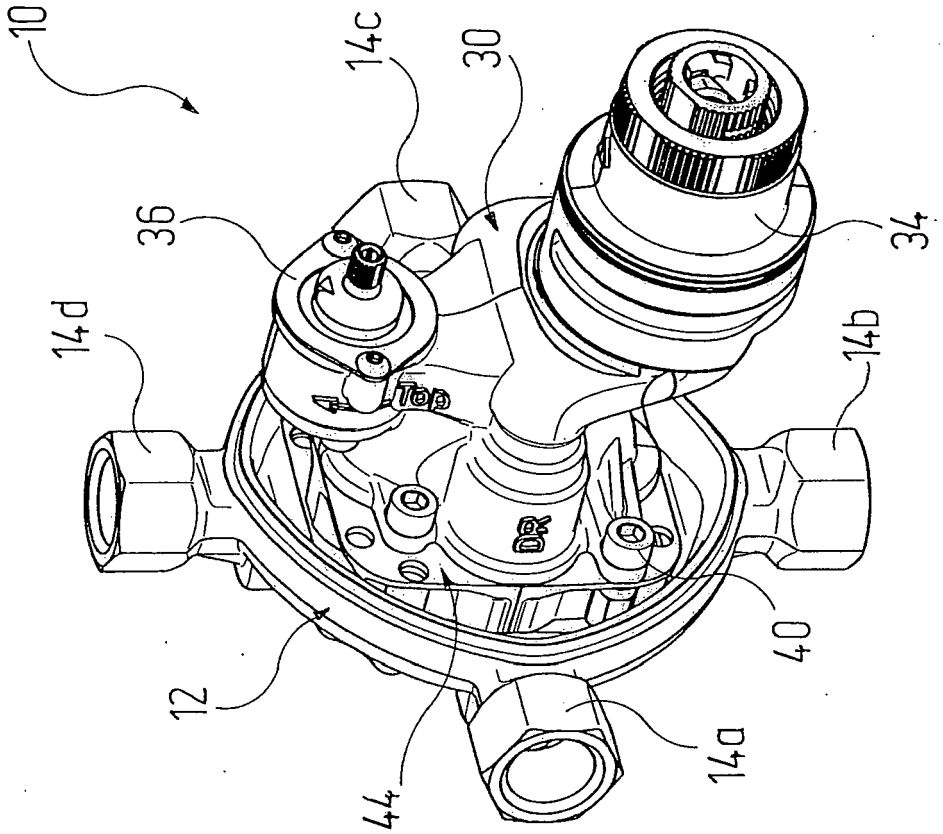

Fig.10

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EUROPEAN SEARCH REPORT

Application Number
EP 16 18 9639

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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