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(54) **OPERATING ASSEMBLY FOR AN OPERATING UNIT OF A CONCEALED SANITARY FITTING**

(57) The disclosure provides an operating assembly (10) for operating a diverter valve or another operating unit of a concealed sanitary fitting for a controlled release of water. The operating assembly (10) has a rosette (12) configured to be fixed to a wall so that it covers the operating unit, a rotary handle (20) for manually actuating the operating unit and a connecting device (40) which interlockingly connects the rotary handle (20) to the operating unit and which defines a rotational axis (41). In order to compensate installation depth fluctuations of the concealed sanitary fitting, the connecting device has a length along the rotational axis (41) that, according to the invention, can be varied by exerting a force on the connecting device (40) acting along the rotational axis (41).

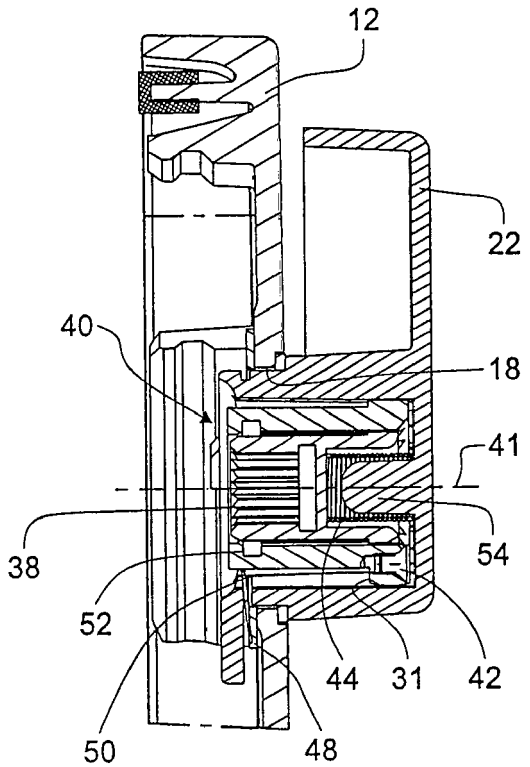

Fig. 3

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The invention relates to an operating assembly for an operating unit of a concealed sanitary fitting which may be used in a bathroom or kitchen, for example, for a controlled release of water.

[0002] In a concealed sanitary fitting a valve or another bulky operating unit is accommodated in a recess that is provided in a wall or another building structure. In this way the bulky operating unit of the sanitary fitting is concealed from the user's vision. The handle needed to actuate the operating unit is visible and accessible to the user.

2. Description of the Prior Art

[0003] It is known in the prior art to use a diverter valve to selectively deliver water to at least two water outlets of a concealed sanitary fitting. This diverter valve can be actuated by a user with the help of a rotary handle that is accessible from the outside.

[0004] US 6,637,048 B1 discloses a concealed sanitary fitting comprising a rosette which supports a rotary handle. The rotary handle can be swiveled clockwise and counterclockwise to switch on one water outlet or to direct the flow elsewhere.

[0005] Depending on the accuracy of the recess construction, more or less large fluctuations in the installation depth of the components may occur. Sometimes additional connecting members such as bushings might be necessary to connect the handle to the operating unit such that the torque from the handle is transferred to a shaft contained in the operating unit. In other cases, subsequent construction work on the wall recess will be of need, resulting in higher installation cost.

[0006] It is therefore an object of the present invention to provide an operating assembly for an operating unit which allows to easily overcome installation depth fluctuations without the need for further components and without modifying the recess.

SUMMARY OF THE INVENTION

[0007] This object is achieved by an operating assembly for an operating unit of a concealed sanitary fitting comprising a rosette configured to be fixed to a wall covering the concealed sanitary fitting, a rotary handle for manually actuating the operating unit, and a connecting device interlockingly connecting the rotary handle to the operating unit and defining a rotational axis. According to the invention, the connecting device has a length along the rotational axis that is capable of being varied by exerting a force on the connecting device acting along the rotational axis in order to compensate installation depth fluctuations of the concealed sanitary fitting. The connecting device comprises a two-stage telescopic shaft with two shaft members which are movable along the rotational axis.

[0008] Torque transmission may be provided via a gearing connection between the two shaft members. Axial misalignment of the connecting device with the operating unit may be compensated when shaft members allow inclination towards one another to a certain extent.

[0009] The present invention is based on the conception that the installation process of conventional concealed sanitary fittings typically involves the steps of first installing the valve or another operating unit in the recess, covering the recess with the rosette, and then connecting the rotary handle to the operating unit using the connecting device. During the last connecting step the variable length of the connecting device can be used to establish the connection without exactly knowing the distance which has to be bridged by the connecting device.

[0010] One way to achieve this is to use a connecting device which has originally its maximum length when it is coupled to the operating unit. The length is then reduced by exerting an axial force until the proximal end of the connecting device has reached its optimum position so that the handle may be attached to it. Alternatively, it is also possible to begin with a connecting device having originally its minimum length. Then the length of the connecting device is increased, for example with the help of a thin rod that is pushed into the connecting device, until the distal end of the connecting device is coupled to the operating unit.

[0011] In order to overcome maximum depth fluctuations, the connecting device may be forced into its maximal length by a spring force acting along the rotational axis. This simplifies the mounting of the operating assembly, because the connecting device has automatically its maximum length when it is coupled to the operating unit. The operating assembly may then be mounted without the need for tools that change the length of the connecting device. If the connecting device comprises a telescopic shaft, axial movements of shaft members may be prevented in the presence of such a spring force.

[0012] As mentioned above, it is possible to use a connecting device whose length is increased, for example using a special tool, before its distal end is coupled to a shaft of the operating unit. Preferably, however, the length of the connecting device is capable of being reduced by exerting a compressive force on the connecting device acting along the rotational axis. This can be easily accomplished if a spring force is used as explained above. For example, a helical spring may extend parallel to the rotational axis and produce the axial force. If the installation depth is shorter than the maximal length of the connecting device, this spring force urges the distal end of the connecting device towards the operating unit, and ideally couples this distal end to the operating unit.

[0013] In order to prevent damage to components of the operating unit by overload torque, the rosette may

comprise at least one fixed abutment member that limits the rotation angle of the connecting device. In that case the rotary handle may comprise at least one stop member that cooperates with the at least one fixed abutment member to limit the rotation angle of the connecting device.

[0014] In another embodiment the operating assembly comprises at least one locking mechanism that provides a preferred angular position of the connecting device. Thus a standard setting can be applied to the sanitary fitting.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Various features and advantages of the present invention may be more readily understood with reference to the following detailed description taken in conjunction with the accompanying drawings in which:

Fig. 1 is an exploded view showing a first embodiment of the operating assembly according to the invention;

Fig. 2 is a cross section view of the first embodiment of the operating assembly at its maximum length;

Fig. 3 is a cross section view of the first embodiment of the operating assembly at its fully retracted state;

Fig. 4 is a back view of the first embodiment of the operating assembly showing the rotation limitation components;

Fig. 5 is an exploded view showing a second embodiment of the operating assembly according to the invention;

Fig. 6 is a cross section view of the second embodiment of the operating assembly at its maximum length;

Fig. 7 is a cross section view of the second embodiment of the operating assembly at its fully retracted state.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

1. First embodiment

[0016] FIG. 1 shows in an exploded view the components of an operating assembly 10 for a diverter valve of a concealed sanitary fitting according to a first embodiment of the invention.

[0017] The operating assembly 10 comprises a rosette 12 that is configured to be fixed to a wall for covering a concealed sanitary fitting (not shown) received in the wall. For this purpose a back side that faces the wall comprises fixation members 14. The rosette 12 further comprises an opening 16 for a sanitary fitting handle (not shown), as well as an opening 18 which receives a rotary handle 20 of the operating assembly 10 used for manually actuating the diverter valve (not shown).

[0018] A forward direction is defined as the direction towards the diverter valve, a backward direction is defined as the direction towards a user of the sanitary fitting.

[0019] The rotary handle 20 comprises a gripping portion 22 facing backwards and a gearing portion 24 facing forwards. The gearing portion 24 comprises straight teeth 26 arranged along the inner wall of a cylindrical recess 27 formed in the rotary handle 20.

[0020] The operating assembly 10 further comprises a first shaft member 28 that is configured as a hollow shaft comprising a through-bore. The first shaft member 28 has straight teeth 29 axially extending on an outer gearing portion 30. The outer gearing portion 30 is arranged along an outer wall shoulder 31 adjacent the backward end of the first shaft member 28. The teeth 29 of the first shaft member cooperate with the teeth 26 of the gearing portion 24. Since the length of the teeth 26 of the gearing portion 24 is bigger than the length of the teeth 29 of the outer gearing portion 30, a relative movement of the first shaft member 28 and the gearing portion 24 in forward and backward direction with simultaneous teeth mesh is allowed.

[0021] On the inner wall of the first shaft member 28 an inner gearing portion 32 is arranged, such that teeth 33 of the inner gearing portion 32 engage a second shaft member 34 by cooperating with straight teeth 35 of an outer gearing portion 36 of the second shaft member 34. The outer gearing portion 36 is arranged on an outer wall shoulder 37 adjacent the backward end of the second shaft member 34. Since the length of the teeth 33 of the inner gearing portion 32 is bigger than the length of the teeth 35 of the outer gearing portion 36, a relative movement of the second shaft member 34 and the first shaft member 28 in forward and backward direction with simultaneous teeth mesh is allowed.

[0022] The second shaft member 34 further comprises an inner gearing portion 38 arranged in a recess at a forward end of the second shaft member 34. With the inner gearing portion 38 the second shaft member 34 engages a corresponding gearing portion of the diverter valve (not shown).

[0023] In this way the gearing portion 24, the first shaft member 28 and the second shaft member 34 define a connecting device 40 as shown in the cross section views in FIG. 2 and FIG. 3. The connecting device 40 interlockingly connects the rotary handle 20 to the diverter valve. The gearing portion 24, the first shaft member 28 and the second shaft member 34 being arranged coaxially to each other define a rotational axis 41. If shoulders 29 and 37 have a torus contour, an axial misalignment of the diverter valve and the rotary handle 20 may be com-

pensated. Thus the rotational axis may divert from a straight line and be slightly angled instead.

[0024] Since the first shaft member 28 and the second shaft member 34 can be moved along the rotational axis 41, the connecting device 40 has a length along the rotational axis 41 measured from the backward end of the gearing portion 24 to the forward end of the second shaft member 34 which is capable of being varied with a simultaneous gear mesh of the gearing portions. In this way the gearing portion 24, the first shaft member 28 and the second shaft member 34 define a two-stage telescopic shaft.

[0025] In the following the telescopic function of the connecting device 40 is described with reference to FIG. 1 and the cross-sections of the connecting device 40 shown in FIGS. 2 and 3. FIGS. 2 and 3 show the operating assembly 10 in its assembled state. The rotary handle 20 is received in the opening 18 of the rosette 12. The rotary handle 20 comprises a circumferential groove 46 arranged axially in such a distance from the gripping portion that it can receive a clamp 48 from the backside of the rosette 12. Thus the rotary handle 20 is secured in its axial position with respect to the rosette 12. A lug 50 formed integrally with the clamp 48 defines the forward end position of the first shaft member 28 within the gearing portion 24 of the rotary handle 20. The backward end position of the first shaft member 24 is defined by the back wall of the recess 27. The first shaft member 28 comprises a shoulder 52 which defines the forwards end position of the second shaft member 34 within the first shaft member 28. A screw 42 received in the backward end of the first shaft member 28 limits the outer gearing portion 36 of the second shaft member 34 in its axial movement along the teeth 33 of the inner gearing portion 32 of the first shaft member 28 and defines its backward end position.

[0026] The recess 27 of the rotary handle 20 comprises a pin 54 which intrudes into a helical spring 44 thus securing the latter in its radial position. The spring 44 exerts a spring force on the connecting device 40 by acting with its backward end on the back wall of the recess 27 and with its forward end on the second shaft member 34. Thus the first gearing member 28 and the second gearing member 34 are forced into their forward end position, so that the connecting device 40 is forced into its maximal length along the rotational axis 41. This position is shown in FIG. 2.

[0027] By applying a compressive force on the connecting device 40 that overcomes the spring force, the length of the connecting device 40 can be varied. In this way the length of the connecting device 40 is easily adapted to the installation depth of the present concealed sanitary fitting. In practice, when fluctuations in the installation depth of different concealed sanitary fittings occur, these can be overcome without the need for additional compensation components. FIG. 3 shows the operating assembly 10 with the connecting device 40 in its fully retracted state.

[0028] The operating assembly 10 according to the invention is limited in its rotation angle by two fixed abutment members 56 arranged on the backside of the rosette 12. A stop member 58 formed on the rotary handle 20 as a radially protruding lug comprises stop surfaces 60 arranged on the periphery of the stop member 58 which come to an abutment with the fixed abutment members 56 when rotated to a predefined maximal rotation angle. The maximal rotation angle of the rotary handle 20 is defined by the angle distance 57 between one fixed abutment member 56 and the corresponding stop surface 60 of the stop member 58, as shown in FIG. 4.

2. Second embodiment

[0029] FIG. 5 shows in an exploded view a second embodiment of the invention. Same components have the same reference signs. The second embodiment differs from the first embodiment in that the rotary handle 20 comprises a gripping portion 22 and a recess 62 which is interlockingly connected to a separate cup-shaped gearing member 64 comprising the recess 27 carrying the gearing portion 24 with the internal teeth 26. In a circumferential wall of the gearing member 64, three flexible tongues 66 extending parallel to the rotational axis 41 are cut which comprise outer snap portions 68 to connect to the rotary handle 20. The gearing member 64 receives the first shaft member 28 and the spring 44. The backward end position of the first shaft member 28 is defined by the back wall of the recess 27. The forward end position of the first shaft member 28 is defined by shoulder portions 70 of the flexible tongues 66 of the gearing member 64. In order to be inserted into the gearing member 64 a force is exerted on the first shaft member 28. Then the outer gearing portion 30 of the first shaft member 28 pushes the shoulder portions 70 radially outwards, thereby overcoming the spring force of the flexible tongues 66.

[0030] The rotary handle 20 with the gearing member 64 are secured to the rosette 12 via an intermediate member 72 fastened to the rosette 12 with screws 73. The intermediate member 72 comprises an opening 74 which receives the gearing member 64. The intermediate member 72 further comprises a recess 76 formed in a plane perpendicular to the rotational axis 41 and facing the backward direction. In the recess 76 the fixed abutment members 56 are arranged which cooperate with stop surfaces 60 arranged on the periphery of a radially protruding lug as the stop member 58. In contrast to the first embodiment described above, the stop member 58 in this case is arranged on a separate ring 78 which is interlockingly connected to the gearing member 64. For this purpose, an inner ring wall 80 comprises axial grooves 81 which engage the gearing member 64 by cooperating with axial teeth 82 arranged adjacent the forward end of the gearing member 64. A covering 84 is interlockingly connected to the intermediate member 72 and covers the recess 76.

[0031] In the assembled state the opening 74 of the intermediate member 72 covers the shoulder portions 70 of the flexible tongues 66 preventing the shoulder portions 70 from moving radially such that the forward end position of the first shaft member 28 is secured.

[0032] In this embodiment a locking mechanism 85 is provided in the operating assembly such that a preferred angle position of the rotary handle 20 can be achieved. For this purpose, a leaf spring 86 as an active locking component is arranged in the intermediate member 72 and exerts a spring force on a locking pin 88 pushing it against the outer wall of the ring 78. A locking groove 90 as a passive locking component is arranged in a portion of the outer wall which does not include the stop member 58. When the rotary handle 20 is rotated around the rotation axis 41, the locking pin 88 is pushed by the leaf spring 86 into the locking groove 90 thus defining the preferred angular position of the rotary handle 20.

[0033] The second shaft member 34 is secured to the first shaft member 28 in the same manner as described above with reference to the first embodiment. In this way the gearing portion 24, the first shaft member 28 and the second shaft member 34 define the connecting device 40 as shown in the cross section views in FIG. 6 and FIG. 7.

[0034] FIG. 6 shows, similar to FIG. 2 for the first embodiment, the connecting device 40 forced into its maximal length along the rotational axis 41 by the spring force of the spring 44.

[0035] FIG. 7 shows, similar to FIG. 3 for the first embodiment, the operating assembly 10 with the connecting device 40 in its fully retracted state, which is obtained by exerting a compressive force on the connecting device 40 that overcomes the spring force of spring 44.

3. Important features

[0036] Important features of the invention are subject of the following numbered sentences:

1. An operating assembly for operating an operating unit of a concealed sanitary fitting comprising:

- a rosette (12) configured to be fixed to a wall covering the operating unit,
- a rotary handle (20) for manually actuating the operating unit,
- a connecting device (40) interlockingly connecting the rotary handle (20) to the operating unit and defining a rotational axis (41),

characterized in that
the connecting device (40) has a length along the rotational axis (41) that is capable of being varied by exerting a force on the connecting device (40) acting along the rotational axis (41) in order to compensate installation depth fluctuations of the concealed sanitary fitting.

2. The operating assembly according to sentence 1, characterized in that the connecting device (40) comprises a telescopic shaft with at least one shaft member (28, 34) which is movable along the rotational axis (41).

3. The operating assembly according to sentence 1 or 2, characterized in that the connecting device (40) is forced into its maximal length by a spring force acting along the rotational axis (41).

4. The operating assembly according to any of the preceding sentences, characterized in that the length of the connecting device (40) is capable of being reduced by exerting a compressive force on the connecting device (40) acting along the rotational axis (41).

5. The operating assembly according to any of the preceding sentences, characterized in that the rosette (12) comprises at least one fixed abutment member (56) that limits the rotation angle of the connecting device (40).

6. The operating assembly according to sentence 5, characterized in that the rotary handle (20) comprises at least one stop member (58) that cooperates with the at least one fixed abutment member (56) to limit the rotation angle of the connecting device (40).

7. The operating assembly according to sentence 1, characterized in that the operating assembly (10) comprises at least one locking mechanism (85) that provides a preferred angular position of the connecting device (40).

Claims

1. An operating assembly for operating an operating unit of a concealed sanitary fitting comprising:

- a rosette (12) configured to be fixed to a wall covering the operating unit,
- a rotary handle (20) for manually actuating the operating unit,
- a connecting device (40) interlockingly connecting the rotary handle (20) to the operating unit and defining a rotational axis (41),

wherein
the connecting device (40) has a length along the rotational axis (41) that is capable of being varied by exerting a force on the connecting device (40) acting along the rotational axis (41) in order to compensate

installation depth fluctuations of the concealed sanitary fitting,
the connecting device (40) comprises a two-stage telescopic shaft with two shaft members (28, 34) which are movable along the rotational axis (41).

2. The operating assembly according to claim 1, wherein the connecting device (40) is forced into its maximal length by a spring force acting along the rotational axis (41).

3. The operating assembly according to any of the preceding claims, wherein the length of the connecting device (40) is capable of being reduced by exerting a compressive force on the connecting device (40) acting along the rotational axis (41).

4. The operating assembly according to any of the preceding claims, wherein the rosette (12) comprises at least one fixed abutment member (56) that limits the rotation angle of the connecting device (40).

5. The operating assembly according to claim 4, wherein the rotary handle (20) comprises at least one stop member (58) that cooperates with the at least one fixed abutment member (56) to limit the rotation angle of the connecting device (40).

6. The operating assembly according to claim 5, wherein the operating assembly (10) comprises at least one locking mechanism (85) that provides a preferred angular position of the connecting device (40).

7. The operating assembly according to any of the preceding claims, wherein the connecting device (40) comprises a gearing portion (24) of a rotary handle (20), a first shaft member (28) and a second shaft member (34).

8. The operating assembly according to claim 7, wherein the first shaft member (28) has

- straight teeth (29) axially extending on an outer gearing portion (30) that is arranged along an outer wall shoulder (31) adjacent a backward end of the first shaft member (28), wherein the teeth (29) on the outer gearing portion (30) of the first shaft member (28) cooperate with teeth (26) of the gearing portion (24) of the rotary handle (20),
- an inner wall on which an inner gearing portion (32) is arranged such that teeth (33) of the inner gearing portion (32) engage the second shaft member (34), and

wherein the second shaft member (34) has

- straight teeth (35) axially extending on an outer gearing portion (36) that is arranged along an outer wall shoulder (37) adjacent a backward end of the second shaft member, wherein the teeth (35) on the outer gearing portion (36) of the second shaft member (28) cooperate with the teeth (33) of the inner gearing portion (32) of the first shaft member (28),
- an inner gearing portion (38) arranged in a recess at a forward end of the second shaft member (34), wherein the inner gearing portion (38) of the second shaft member (34) engages a corresponding gearing portion of the operating unit.

9. The operating assembly according to claim 8, wherein the wall shoulders (31, 37) have a torus contour so that an axial misalignment of the operating unit and the rotary handle (20) may be compensated.

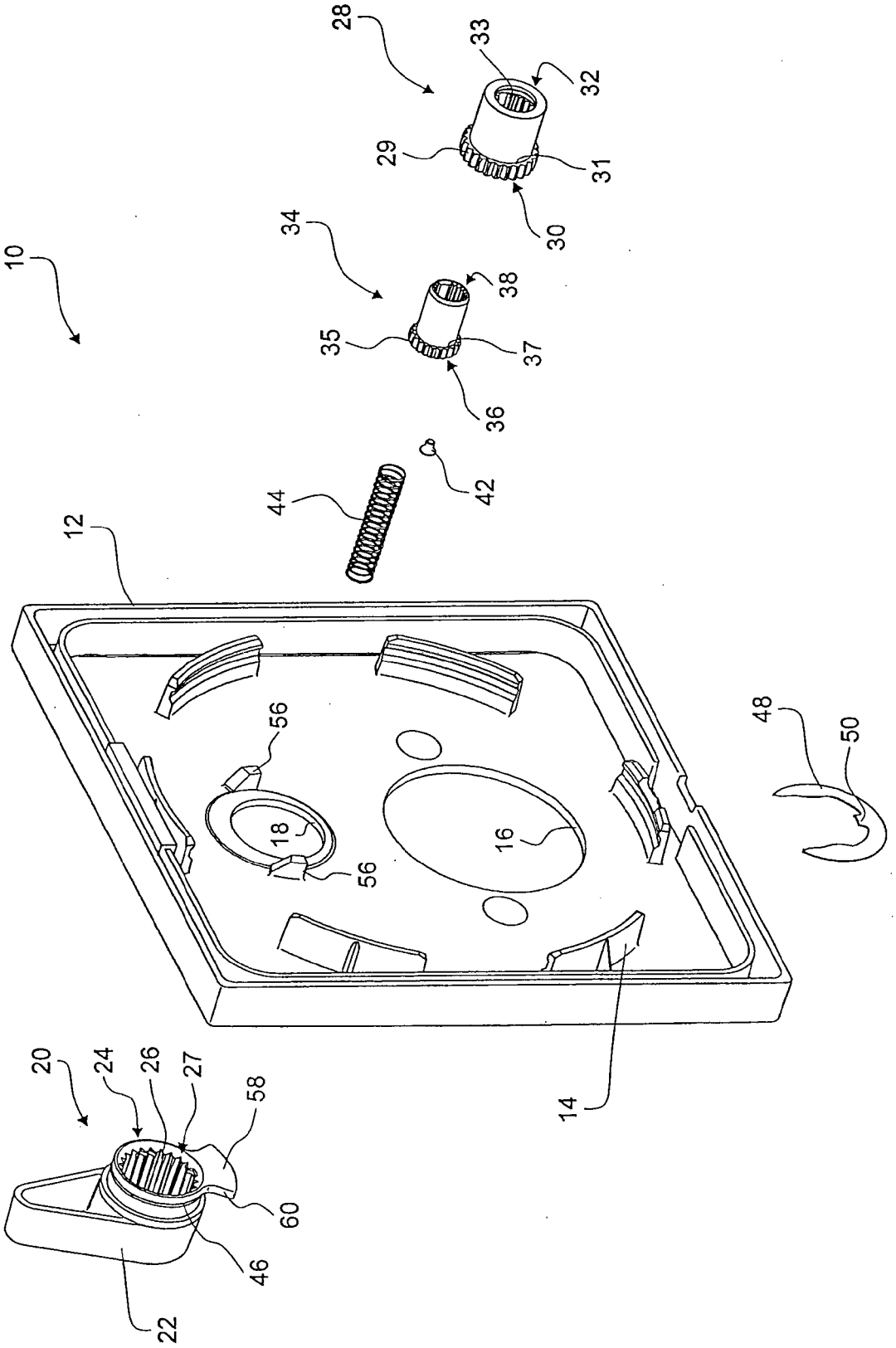
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Fig. 1

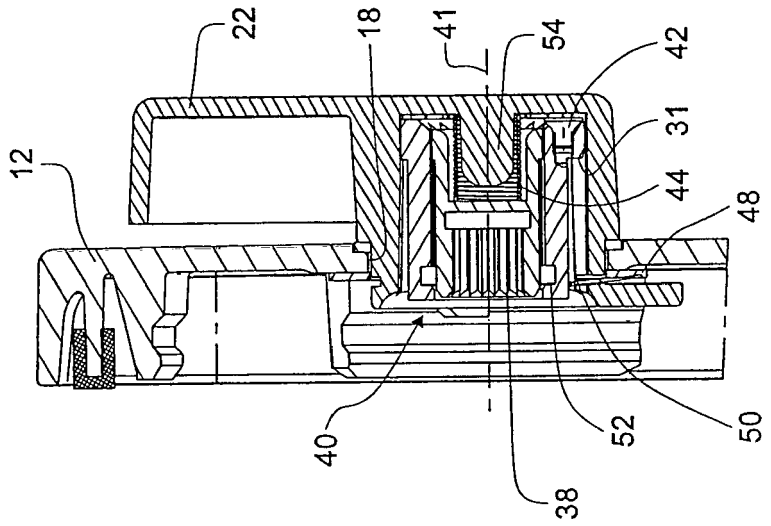
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Fig. 3

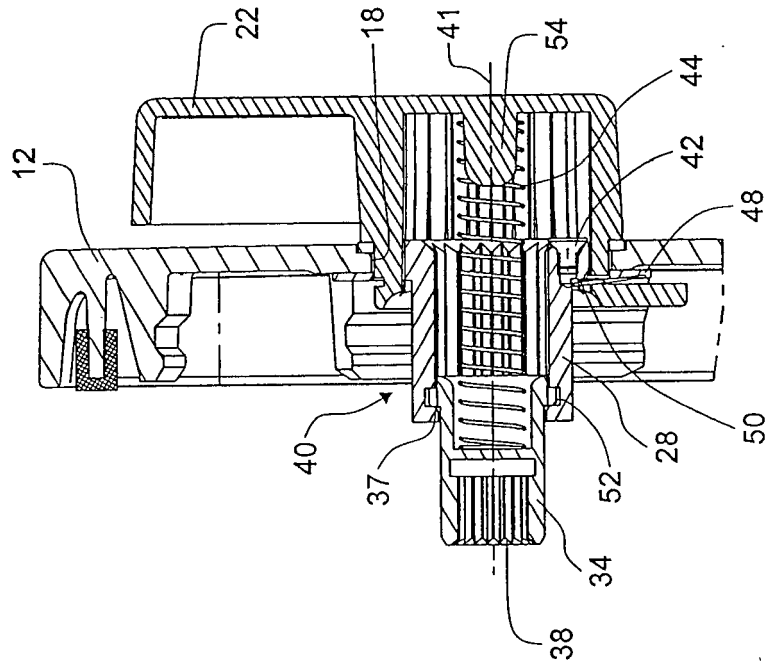
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Fig. 2

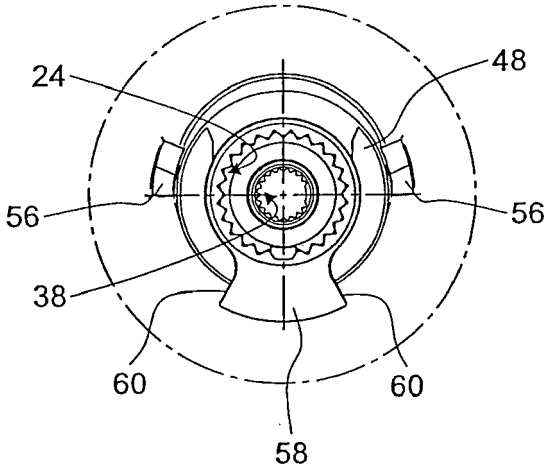

Fig. 4

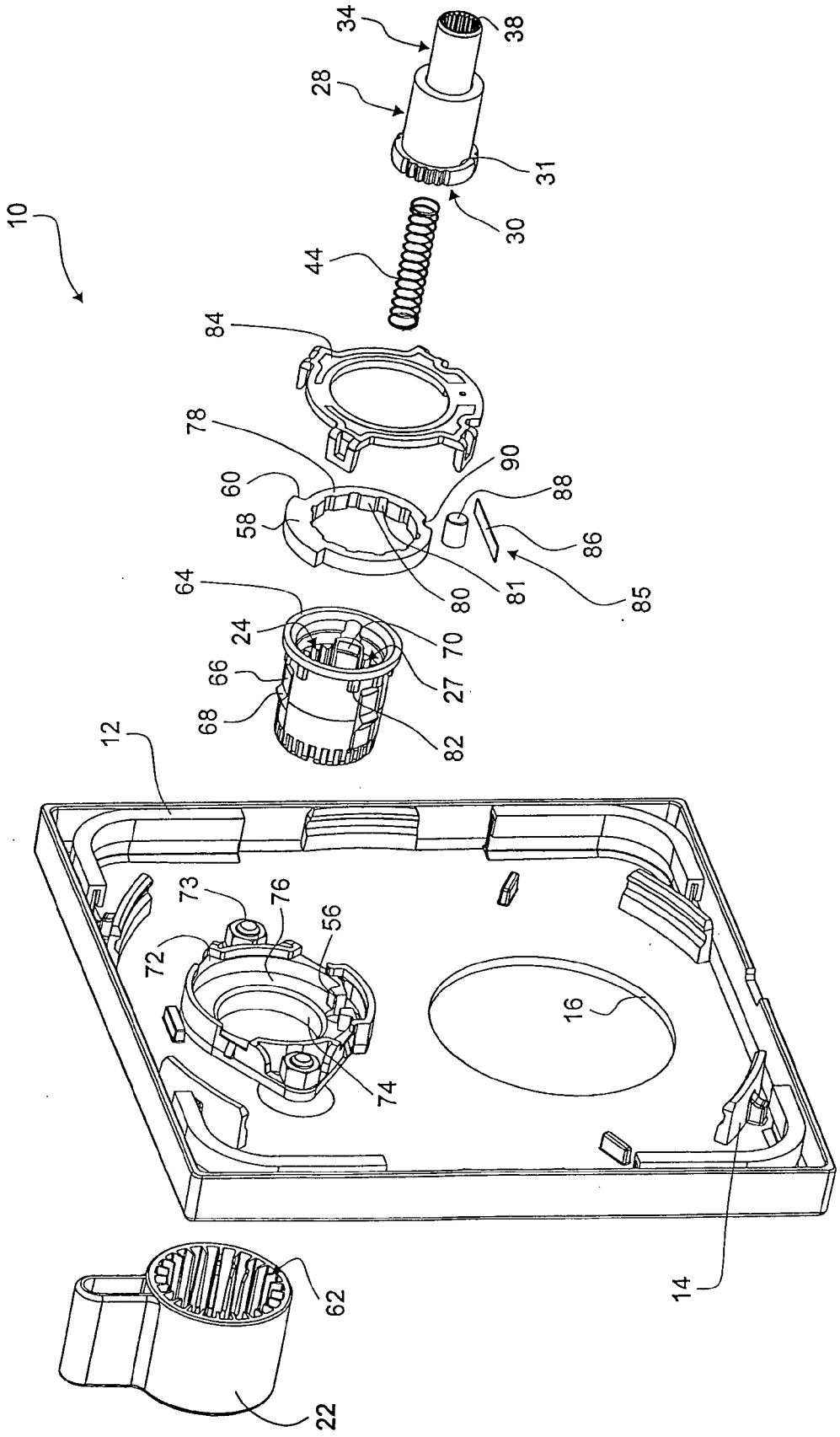
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Fig. 5

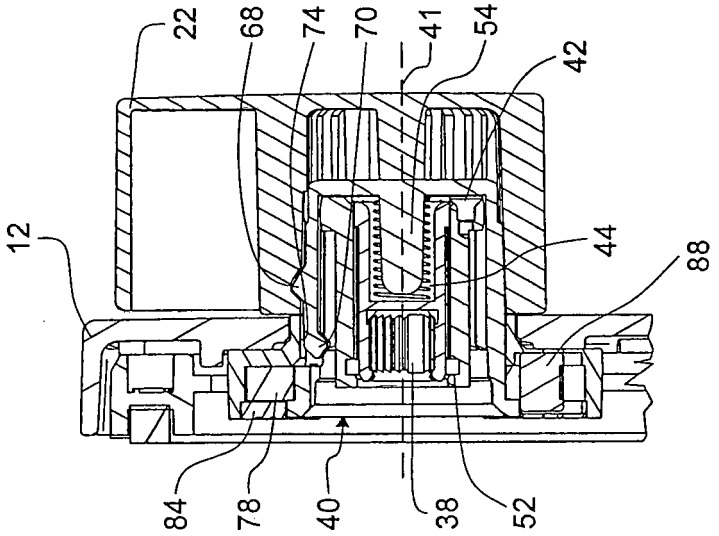
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Fig. 7

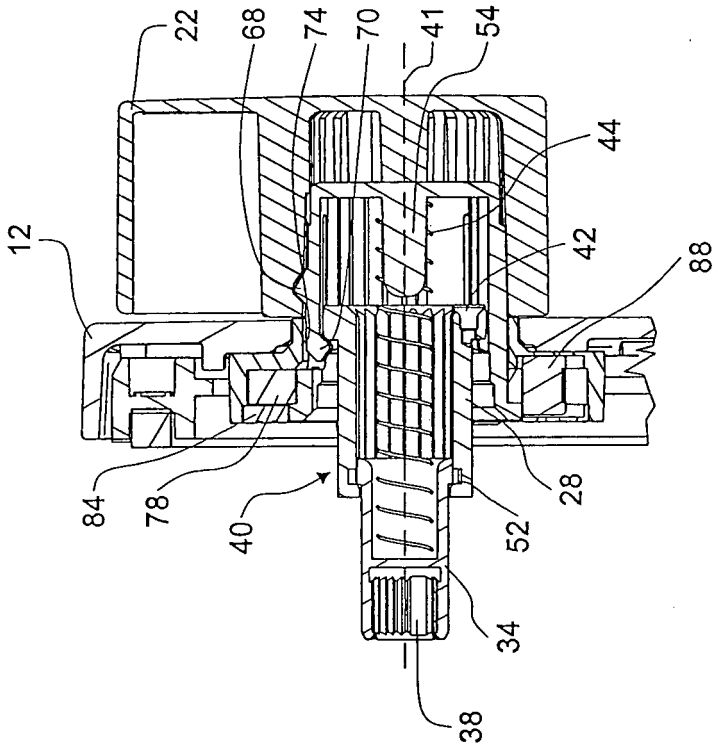
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Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 16 00 0536

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 281 878 A1 (GROHE ARMATUREN FRIEDRICH [DE]) 14 September 1988 (1988-09-14) * column 2, line 7 - line 28; figure 1 *	1,3,7-9	INV. E03C1/02 E03C1/042
A	EP 0 506 215 A2 (ORAS OY [FI]) 30 September 1992 (1992-09-30) * abstract *	1	
A	DE 27 57 315 B1 (GROHE ARMATUREN FRIEDRICH) 29 March 1979 (1979-03-29) * claim 1 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

E03C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 August 2016	Flygare, Esa

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 00 0536

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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