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(54) MOUNTING ASSEMBLY

(57) A mounting assembly for a fluid handling device comprising:
a base, configured to be secured to a surface;
a waterway body comprising a first end and a second end, comprising:
an inlet portion disposed at the first end, the inlet portion including one or more inlet tubes, the or each inlet tube being securable, at an inlet connection point, to a water supply pipe extending from the surface;
and
an outlet tube disposed at the second end, the outlet tube being configured to be connected to the fluid handling device, wherein a waterway body provides fluid communication from the inlet tube(s) to the outlet tube;

wherein the waterway body is connected to the base at the second end;
wherein the waterway body or a part thereof is rotatable with respect to the base about a first rotation axis extending in a perpendicular direction from the base; and
wherein the waterway body is configured such that a first distance from the inlet tube(s) to the outlet tube may be adjusted and a second distance between the inlet connection point(s) and the surface may be adjusted.

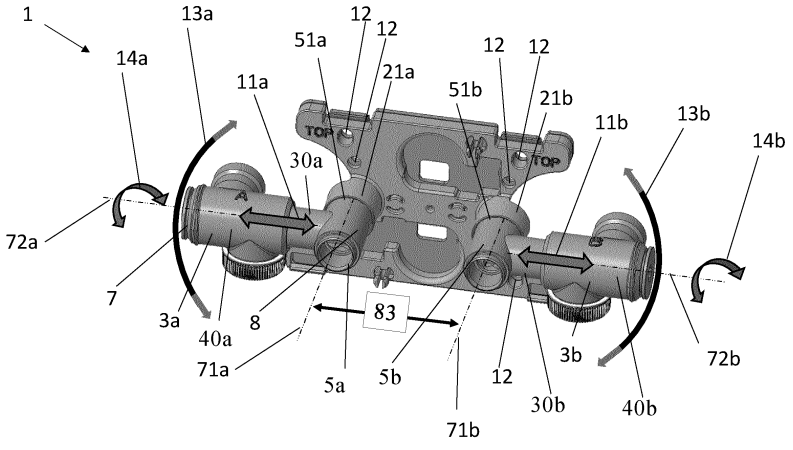

Figure 6

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Description

[0001] This disclosure relates to a mounting assembly for a fluid handling device, for example a mounting assembly for a fluid handling device comprising a mixer valve.

[0002] Typically, a shower mixer valve has separate inlets for connection to supplies of hot and cold water and an outlet for connection to a shower head such as a handset or a spray head.

[0003] When a shower mixer valve is fitted in a new installation, the location and spacing of the hot- and cold-water supply pipes can be adjusted and arranged to be suitably spaced for connection to the hot and cold inlets of the mixer valve. However, when replacing a shower mixer valve in an existing installation, problems can arise if the spacing between the hot- and cold-water supply pipes is not the same as the spacing between the hot and cold inlets of the new valve.

[0004] Traditionally, this problem has been addressed by supplying the mixer valve with inlets that can be screwed into bosses on a body of the valve, wherein the screw threaded engagement between the inlets and the bosses allows the spacing between the inlets to be adjusted. However, this solution compromises the aesthetic quality of the mixer valve as large bosses need to be added to the body to provide room for threads sufficient to attach and adjust the position of the inlets to the body.

[0005] An alternative solution has been to provide inlets that are telescopic to allow the spacing between the inlets to be adjusted. Although the aesthetic appearance is improved the adjustment that can be provided is limited as the sliding portion must seal at both ends.

[0006] Another problem that can arise when replacing a shower mixer valve or other fluid handling device in an existing installation is that the projection of the water supply pipes from the mounting surface may not be suitable for connection to the inlets of the new mixer valve. It may be that the distance the pipes project from the mounting surface is too great or too small to mount the new mixer valve without altering the length of the supply pipes. Such changes to the supply pipes may be difficult, especially when connecting the new mixer valve to existing compression fittings.

[0007] A further problem that may arise when replacing a fluid handling device in an existing installation is that the water supply pipes may project from the wall at different heights to one another. This can result in a skewed installation of the fluid handling device on the wall, which has negative aesthetic implications and may make user operation of the device more difficult.

[0008] WO 2017/103566 discloses a mixer valve having a first pair of inlets and a second pair of inlets. The spacing between the first pair of inlets is greater than the spacing between the second pair of inlets. The first and/or the second pair of inlets may be adjustable such that a linear or angular spacing between the first and/or second pair of inlets is adjustable.

[0009] A first aspect provides a mounting assembly for a fluid handling device comprising:

a base, configured to be secured to a surface;
a waterway body comprising a first end and a second end, comprising:

an inlet portion disposed at the first end, the inlet portion including one or more inlet tubes, the or each inlet tube being securable, at an inlet connection point, to a water supply pipe extending from the surface; and
an outlet tube disposed at the second end, the outlet tube being configured to be connected to the fluid handling device, wherein a waterway body provides fluid communication from the inlet tube(s) to the outlet tube;

wherein the waterway body is connected to the base at the second end;
wherein the waterway body or a part thereof is rotatable with respect to the base about a first rotation axis extending in a perpendicular direction from the base; and
wherein the waterway body is configured such that a first distance from the inlet tube(s) to the outlet tube may be adjusted (i.e. is adjustable) and a second distance between the inlet connection point(s) and the surface may be adjusted (i.e. is adjustable).

[0010] The inlet portion may be rotatable with respect to the outlet tube about a second rotation axis. The second rotation axis may be perpendicular to the first rotation axis.

[0011] The inlet portion may include a plurality of inlet tubes.

[0012] At least two of the inlet tubes may be of different lengths such that rotation of the inlet portion about the second rotation axis may allow an installer to select between at least two inlet tubes having different lengths. This may allow a second distance between the inlet connection point(s) and the surface to be adjusted to accommodate for different water supply pipe projection distances. Pipe projection distances may be measured perpendicular to the surface from which the pipe(s) project from the surface to the furthermost point of the water supply pipe.

[0013] One or more of the inlet tubes may extend in a radial direction away from the second rotation axis.

[0014] At least two of the inlet tubes may be disposed at different points along a length of the inlet portion.

[0015] The inlet portion may be configured such that a longitudinal axis of a first one of the inlet tubes is non-parallel with a longitudinal axis of a second one of the inlet tubes.

[0016] The longitudinal axis of the first one of the inlet tubes may be perpendicular with the longitudinal axis of the second one of the inlet tubes.

[0017] The waterway body may comprise a first pipe section and a second pipe section. The second pipe section may be movable longitudinally relative to the first pipe section. For instance, the second pipe section may be arranged concentrically with the first pipe section. The second pipe section may be slidably mounted on the first pipe section. The second pipe section may be a part of the inlet portion.

[0018] An outer diameter of the first pipe section may be less than or equal to an inner diameter of the second pipe section. The first pipe section may be configured to fit within the second pipe section telescopically.

[0019] The second pipe section may be removably attached to the first pipe section.

[0020] A longitudinal axis of the first pipe section and a longitudinal axis of the second pipe section may both be coincident with the second rotation axis.

[0021] In an implementation, the or a first pipe section may be movable in a direction along a length of the outlet tube. The or a first pipe section may be movable a bounded distance in a direction along the length of the outlet tube. This may allow a distance from a surface to an inlet connection point to be varied, which may, for example, facilitate installation of the mounting assembly.

[0022] The mounting assembly may further comprise one or more removeable caps securable to at least one of the one or more inlet tube(s).

[0023] The first waterway body may be configured to be pressure balanced in line with the water supply pipe to which is directly connects.

[0024] The first waterway body may be configured to be pressure balanced about the second rotation axis.

[0025] The mounting assembly may further comprise one or more further waterway bodies. For instance, the mounting assembly may comprise a first waterway body and a second waterway body. The second waterway body may be different from, similar or substantially identical to the first waterway body.

[0026] A second aspect provides a plumbing system comprising:

a mounting assembly according to the first aspect coupled to at least one fluid supply pipe;
a fluid handling device fluidically connected to the output tube(s) of the mounting assembly; and
a fluid delivery device fluidically connected to the fluid handling device.

[0027] The fluid handling device may include a mixer valve, e.g. a thermostatic mixer valve.

[0028] The fluid handling device may include a diverter valve.

[0029] The fluid delivery device may be one of: a shower or a faucet.

[0030] The person skilled in the art will appreciate that except where mutually exclusive, a feature described in relation to any one of the above aspects may be applied *mutatis mutandis* to any other aspect. Furthermore except where mutually exclusive any feature described herein may be applied to any aspect and/or combined with any other feature described herein.

[0031] The invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1 is a schematic view of a first example of a mounting assembly for a fluid handling device;

Figure 2 is a cross-sectional view of a first portion of the mounting assembly of Figure 1;

Figure 3 is a schematic view of a second portion of the mounting assembly of Figure 1;

Figure 4 is a schematic view of the mounting assembly of Figure 1 in situ, prior to fixation to a first set of water supply pipes;

Figure 5 is a schematic view of the mounting assembly of Figure 1 in situ, prior to fixation to a second set of water supply pipes;

Figure 6 is a schematic view of the mounting assembly of Figure 1, showing the various modes of rotation and translation of parts of the mounting assembly of Figure 1;

Figure 7 is a schematic view of a portion of a second example of a mounting assembly for a fluid handling device; and

Figure 8 is a is a schematic view of a plumbing system.

[0032] Figure 1 shows a first example of a mounting assembly 1 for a fluid handling device. The mounting assembly 1 includes a base 2. The base 2 is configured to be secured to a surface such as a wall. The base 2 is substantially planar and contains a plurality of apertures 12 for receiving fittings such as screws to secure the base 2 to the surface.

[0033] A first waterway body 3a has a first end 7 and a second end 8. The first waterway body 3a is connected at the second end 8 to the base 2. The first waterway body 3a includes a first inlet portion 4a disposed at the first end 7. The first inlet portion 4a includes a first inlet tube 41a and a second inlet tube 41a'. Example implementations may include one or more inlet tubes, e.g. up to or at least two inlet tubes, up to or at least four inlet tubes, up to or at least six inlet tubes or up to or at least eight inlet tubes.

[0034] The first inlet tube 41a is securable, at a first inlet connection point 42a, to a water supply pipe (not shown) extending from the surface. The first inlet tube 41a may be secured to the water supply pipe by any suitable means. For example, the first inlet connection

point 42a may have a screw thread disposed on an outer surface thereof and a threaded nut (not shown) may be used to secure the first inlet tube 41a to the water supply pipe.

[0035] The second inlet tube 41a' is securable, at a second inlet connection point 42a', to a water supply pipe (not shown) extending from the surface. The second inlet tube 41a' may be secured to the water supply pipe by any suitable means. For example, the second inlet connection point 42a' may have a screw thread disposed on an outer surface thereof and a threaded nut (not shown) may be used to secure the second inlet tube 41a' to the water supply pipe. A first blanking cap 47 is fitted on the second inlet tube 41a'.

[0036] The first waterway body 3a further includes a first outlet tube 5a disposed at the second end 8. The first outlet tube 5a is configured to be connected to a fluid handling device (not shown) downstream thereof. As such, the first waterway body 3a provides fluid communication from the first inlet tube 41a and the second inlet tube 41a' to the first outlet tube 5a.

[0037] A second waterway body 3b has a first end 7' and a second end 8'. The second waterway body 3b is connected at the second end 8' to the base 2. The second waterway body 3b includes a second inlet portion 4b disposed at the first end 7'. The second inlet portion 4b includes a third inlet tube 41b and a fourth inlet tube 41b'. Example implementations may include one or more inlet tubes, e.g. up to or at least two inlet tubes, up to or at least four inlet tubes, up to or at least six inlet tubes or up to or at least eight inlet tubes.

[0038] The third inlet tube 41b is securable, at a third inlet connection point 42b, to a water supply pipe (not shown) extending from the surface. The third inlet tube 41b may be secured to the water supply pipe by any suitable means. For example, the third inlet connection point 42b may have a screw thread disposed on an outer surface thereof and a threaded nut (not shown) may be used to secure the third inlet tube 41b to the water supply pipe.

[0039] The fourth inlet tube 41b' is securable, at a fourth inlet connection point 42b', to a water supply pipe (not shown) extending from the surface. The fourth inlet tube 41b' may be secured to the water supply pipe by any suitable means. For example, the fourth inlet connection point 42b' may have a screw thread disposed on an outer surface thereof and a threaded nut (not shown) may be used to secure the fourth inlet tube 41b' to the water supply pipe. A second blanking cap 47' is fitted on the fourth inlet tube 41b'.

[0040] The second waterway body 3b further includes a second outlet tube 5b disposed at the second end 8'. The second outlet tube 5b is configured to be connected to a fluid handling device (not shown) downstream thereof. As such, the second waterway body 3b provides fluid communication from the third inlet tube 41b and the fourth inlet tube 41b' to the second outlet tube 5b.

[0041] The second waterway body 3b is substantially identical to the first waterway body 3a. Hence, the second waterway body 3b will not be described in the same detail, in order to avoid repetition. While the first waterway body 3a and the second waterway body 3b are substantially identical in the mounting assembly 1, in other implementations the first waterway body 3a and the second waterway body 3b may not be substantially identical.

[0042] Figure 2 is a cross-sectional view of a first portion of the mounting assembly 1, in which the first waterway body 3a is shown in detail. The second waterway body 3b is substantially identical to the first waterway body 3a and will not be described in corresponding detail, in order to avoid repetition.

[0043] Referring to Figure 2, the first waterway body 3a comprises a first pipe section 30a. The first pipe section 30a extends from the first end 7 of the first waterway body 3a towards the second end 8 of the first waterway body 3a. The first pipe section 30a communicates with the first outlet tube 5a. A longitudinal axis 72a of the first pipe section 30a is perpendicular to a longitudinal axis 71a of the first outlet tube 5a. An outer diameter of the first pipe section 30a is indicated by a double-headed arrow 36a.

[0044] At the first end 7 of the first waterway body 3a, a stopper 9 is releasably secured to the first pipe section 30a. The stopper 9 comprises an end plate 91 and a shaft 92 extending therefrom. The stopper 9 is secured to the first pipe section 30a by interlocking screw threads on an interior surface of the first pipe section 30a and an exterior surface of the shaft 92 of the stopper 9. An O-ring 332a provides a fluid-tight seal between the shaft 92 of the stopper 9 and an inner surface of the first pipe section 30a.

[0045] The first pipe section 30a has a pair of apertures 31a in a wall thereof at an intermediate point along a length of the first pipe section 30a. The apertures 31a provide fluid communication from outside the first pipe section 30a to inside the first pipe section 30a.

[0046] In implementations, the first pipe section 30a may have a different number and arrangement of apertures. The first pipe section 30a may have one or more apertures 31a in a wall thereof to provide fluid communication from outside the first pipe section 30a to inside the first pipe section 30a. The one or more apertures may include, for example, one, two, three, four or up to 10 apertures. The one or more apertures may be spaced regularly or irregularly around a circumference of the first pipe section 30a. The one or more apertures may be spaced at different points along the length of the first pipe section 30a.

[0047] A filter element 93 is fitted within the first pipe section 30a. The filter element 93 is configured to filter fluid passing along the first pipe section 30a towards the first outlet tube 5a. For instance, the filter element 93 may act to filter out sediment or other material from water supplied from a water supply connected to the first inlet tube 41a or the second inlet tube 41a'. In implementations, there may be no filter element present within the first

waterway body 3a, e.g. within the first pipe section 30a.

[0048] The first inlet portion 4a comprises a second pipe section 40a. The first inlet tube 41a and the second inlet tube 41a' are attached to the second pipe section 40a. The second pipe section 40a is arranged concentrically with the first pipe section 30a and is slidably mounted on the first pipe section 30a. A pair of O-rings 331a, one at each end of the second pipe section 40a, provide a fluid-tight seal between the first pipe section 30a and the second pipe section 40a. It will be appreciated that the pair of O-rings 331a represent an example of suitable sealing means and that other sealing means may be employed instead.

[0049] The outer diameter 36a of the first pipe section 30a is less than an inner diameter 46a of the second pipe section 40a. The first pipe section 30a is configured to fit within the second pipe section 40a telescopically. The second pipe section 40a may be moved longitudinally relative to the first pipe section 30a, as indicated by a double-headed arrow 11a, in order to vary a length of the first waterway body 3a.

[0050] The internal diameter 46a of the second pipe section 40a varies along the length of the second pipe section 40a to create a first space 32a between a portion of the first pipe section 30a and a portion of the second pipe section 40a. The first space 32a communicates with the first and second inlet tubes 41a, 41a . In this example, the inner diameter 46a of the second pipe section 40a is smaller at both ends of the second pipe section 40a than at the centre of the second pipe section 40a. The apertures 31a in the first pipe section 30a allow fluid from the inlet tubes 41a, 41a' to flow from the first space 32a into the first pipe section 30a. Fluid may then flow on to the outlet tube 5a.

[0051] When installing the mounting assembly 1, an installer can slide the second pipe section 40a along the first pipe section 30a (shown by arrow 11a in Figure 2). In this way, the waterway body 3a is configured such that a first distance 81a, 81a' from the respective first or second inlet tube(s) 41a, 41a' to the outlet tube 5a may be adjusted. As shown in Figure 2, the first distance 81a and alternate first distance 81a' are measured from a centreline of outlet tube 5a to a centreline of the first inlet tube 41a or the second inlet tube 41a' respectively. For example, the first distance may be 35 mm or 38 mm or in the range of from 30 mm to 40 mm. The alternate first distance 81a' may be 23 mm or 26 mm or in the range of from 18 mm to 29 mm.

[0052] When retrofitting the mounting assembly 1 into an existing bathroom, the water supply pipes have a set spacing apart from one another. The adjustability makes the mounting assembly 1 compatible with a variety of water supply pipe spacings.

[0053] The end plate 91 is configured such that the end plate 91 limits the translation 11a and acts to prevent the second pipe section 40a from sliding off the first pipe section 30a of the waterway body 3a when the mounting assembly 1 is installed. A maximum translation 11a may be 20 mm, 22 mm, 23 mm and/or in the range of from 15 to 40 mm. Removing the stopper 9 from the first pipe section 30a may remove, or facilitate the removal of, the filter element 93, allowing the filter element 93 to be cleaned and/or replaced. Removing the stopper 9 from the first pipe section 30a may also allow the first inlet portion 4a to be removed from the first pipe section 30a. Consequently, the first inlet portion 4a may be cleaned, repaired or replaced, if necessary. For instance, a first inlet portion having a different configuration from that of the first inlet portion 4a may be employed to provide a mounting assembly 1 capable of providing different adjustability.

[0054] The waterway body 3a is connected to the base 2, such that the waterway body can rotate about a first rotation axis extending longitudinally along the first outlet tube 5a. The first outlet tube 5a has an open end distal from the base 2 and a closed end 51a adjacent the base 2. The closed end 51a of the first outlet tube 5a is received in a first socket portion 21a of the base 2. A perturbation 52a protruding from the closed end 51a of the first outlet tube 5a extends further into the socket portion 21a of the base 2. The first outlet tube 5a may be connected to the base 2 in any suitable way that allows the waterway body 3a to be rotated, in use, about the first rotation axis 71a. The connection between the first outlet tube 5a and the base 2 may be configured such that some resistance has to be overcome, in order to rotate, in use, the waterway body 3a about the first rotation axis 71a. The resistance may be such that the first waterway body 3a does not freely rotate about the first rotation axis 71a, i.e. a user may need to urge the first waterway body 3a to rotate about the first rotation axis 71a, in order to select a desired orientation of the first waterway body 3a relative to the base 2.

[0055] When installed at a site of use, the mounting assembly 1 may be surrounded at least partially by a casing (not shown). The casing may shroud the mounting assembly 1 and, optionally, at least some of a fluid handling device attached to the mounting assembly 1. The casing may protect the mounting assembly 1 and/or the fluid handling device from dirt ingress, thereby potentially increasing service lifetime and/or reliability of the mounting assembly 1. The casing may have any design aesthetic, with different design aesthetics being provided by different casings.

[0056] The waterway body 3a is rotatable with respect to the base 2 about the first rotation axis 71a. This may allow the or a casing (not shown) and/or the or a fluid handling device to be fixed relative to a surface 23 (Figure 2) without skew even if there is a difference in the height of the two water supply pipes. This may have aesthetic advantages as well as improve the ease of operation of an ablutionary fitting comprising the fluid handling device. For example, an installer may wish the horizontal of the casing to be parallel to a floor in a bathroom. In another example where the fluid handling device is a mixer valve, preventing skew of the ablutionary fitting comprising the

fluid handling device and a handle operably connected thereto may increase ease of user operated water temperature selection and/or maintain a desired aesthetic, since the handle would have the intended orientation.

[0057] As shown in Figures 2 and 3, the inlet portion 4a is rotatable with respect to the outlet tube 5a about a second rotation axis 72a, wherein the second rotation axis 72a is perpendicular to the first rotation axis 71a. A longitudinal axis of the first pipe section 30a and a longitudinal axis of the second pipe section 40a are both coincident with the second rotation axis 72a. Translation of the second pipe section 40a relative to the first pipe section 30a, illustrated by the block arrow 11a in Figure 2, is parallel to the second rotation axis 72a.

[0058] Referring to Figure 3, the first inlet portion 4a is configured such that a longitudinal axis 73a of the first inlet tube 41a is non-parallel with a longitudinal axis 74a of the second inlet tube 41a'. In this example, the longitudinal axis 73a of the first inlet tube 41a is perpendicular with the longitudinal axis 74a of the second inlet tube 41a'.

[0059] The first inlet tube 41a and the second inlet tube 41a' are of different lengths. Hence, a second distance 82a (Figure 2) between the inlet connection point 42a and the surface 23 (measured when the mounting assembly 1 is installed and the inlet portion 4a is rotated to minimise the second distance 82a) differs from an alternate second distance between the inlet connection point 42a' and the surface 23 (measured when the mounting assembly 1 is installed and the inlet portion 4a is rotated to minimise the alternate second distance). For example, the second distance 82a may be 4 mm, 9 mm or in the range of from 5 to 14 mm, while the alternate second distance may be 10 mm, 15 mm or in the range of from 10 to 20mm. As such, rotation of the inlet portion 4a about the second rotation axis 72a allows an installer to select between two inlet tubes 41a, 41a' having different lengths. In this way, a user may select between a second distance 82a and an alternate second distance.

[0060] Figures 4 and 5 show the mounting assembly 1 in situ, prior to fixation to a pair of water supply pipes.

[0061] In Figure 4, the pair of water supply pipes comprises a first water supply pipe 6a configured to convey cold water and a second water supply pipe 6b configured to convey hot water. The first water supply pipe 6a and the second water supply pipe 6b are separated by a water supply pipe spacing 60. The first water supply pipe 6a and the second water supply pipe 6b each project a distance from a surface (not shown) to which the base 2 is to be fixed.

[0062] In Figure 5, the pair of water supply pipes comprises a first water supply pipe 6a' configured to convey cold water and a second water supply pipe 6b' configured to convey hot water. The first water supply pipe 6a' and the second water supply pipe 6b' are separated by a water supply pipe spacing 60'. The water supply pipe spacing 60' in Figure 5 is less than the water supply pipe spacing 60 in Figure 4. The first water supply pipe 6a' and the second water supply pipe 6b' each project a distance from a surface (not shown) to which the base 2 is to be fixed. The first water supply pipe 6a' and the second water supply pipe 6b' in Figure 5 project further from the surface than do the first water supply pipe 6a and the second water supply pipe 6b in Figure 4.

[0063] As shown in Figure 4, the first inlet tubes 41a and the second inlet tube 41a' are disposed at different points along the second rotation axis 72a. The first distance 81a measured between the first inlet tube 41a and the outlet tube 5a differs from an alternate first distance 81a' measured between the second inlet tube 41a' and the outlet tube 5a. In this example, the first distance 81a is greater than the alternate first distance 81a'. However, it is within the scope of the disclosure that the first distance 81a could be the same as or less than the alternate first distance 81a'.

[0064] Rotation of the first inlet portion 4a with respect to the outlet tube 5a about the second rotation axis 72a enables selection between the first distance 81a and the alternate first distance 81a'. This feature is used in conjunction with the translation 11a of the inlet portion 4a along the second rotation axis 72a (when an installer slides the second pipe section 40a along the first pipe section 30a) to increase the range of water supply pipe spacings 60, 60' that may be accommodated by the mounting assembly 1. An example of this can be seen through comparison of Figures 4 and 5.

[0065] In this embodiment, the first inlet tube 41a is longer than the second inlet tube 41a' and the third inlet tube 41b is longer than the fourth inlet tube 41b'. The first inlet tube 41a and the third inlet tube 41b have the same length as each other. The second inlet tube 41a' and the fourth inlet tube 41b' have the same length as each other. As such, the first inlet tube 41a and the third inlet tube 41b may be better suited for connection to the first water supply pipe 6a and the second water supply pipe 6b of Figure 4, which each have a shorter projection distance from the surface 23. Conversely, the second inlet tube 41a' and the fourth inlet tube 41b' may be better suited for connection to the first water supply pipe 6a' and the second water supply pipe 6b' of Figure 5, which each have a longer projection distance from the surface 23.

[0066] To select between the first inlet tube 41a and the second inlet tube 41a , an installer can rotate the first inlet portion 4a about the second rotation axis 72a. This rotation is shown in Figure 5 by an arrow 14a. Translation 11a of the first inlet portion 4a along the second rotation axis 72a may be required depending upon the water supply pipe spacing 60 (Figure 4), 60' (Figure 5).

[0067] To select between the third inlet tube 41b and the fourth inlet tube 41b', an installer can rotate the second inlet portion 4b, as indicated in Figure 5 by an arrow 14b.

[0068] Translation of the second inlet portion 4b in a longitudinal direction may be required depending upon the water supply pipe spacing 60 (Figure 4), 60' (Figure 5).

[0069] As the stopper 9 is reversibly secured to the first end 7 of the first waterway body 3a, the second pipe section 40a is removably attached to the first pipe section 30a. An installer of the mounting assembly 1 may therefore select the orientation of the first inlet portion 4a relative to the first waterway body 3a. For example, the installer may choose to slide the second pipe section 40a onto the first pipe section 30a such that the first inlet tube 41a lies closer to the first outlet tube 5a than the second inlet tube 41a' lies to the first outlet tube 5a. Alternatively, the installer may reverse the first inlet portion 4a prior to installation such that the second inlet tube 41a' lies closer to the first outlet tube 5a than the first inlet tube 41a lies to the first outlet tube 5a. In this way, the mounting assembly 1 is able to accommodate a variety of existing water supply pipe configurations 6a, 6b, 6a', 6b' with varied pipe projection distances and a large range of water supply pipe spacings 60, 60' while maintaining compact product dimensions.

[0070] The configurations shown in Figures 4 and 5 are meant only as examples and it will be apparent to a person skilled in the art that the rotations and translations discussed above could be used to configure the mounting assembly 1 to be suitable for a wide variety of water supply pipe configurations. The wide range of rotations and translations available for adapting the mounting assembly 1 are shown in Figure 6.

[0071] The block arrow 11a illustrates the translation of the second pipe section 40a relative to the first pipe section 30a of the first waterway body 3a. The arrow 14a illustrates the rotation of the inlet first portion 4a about the second rotation axis 72a. The curved arrow 13a illustrates rotation of the first waterway body 3a relative to the base 2 about the first rotation axis 71a. The block arrow 11b illustrates the translation of the second pipe section 40b relative to the first pipe section 30b of the second waterway body 3b. The arrow 14b illustrates the rotation of the second inlet portion 4b about a fourth rotation axis 72b. The curved arrow 13b illustrates rotation of the second waterway body 3b relative to the base 2 about a third rotation axis 71a.

[0072] The second waterway body 3b is substantially similar to the first waterway body 3a and is connected to the base 2 a third distance 83 from the where the first waterway body 3a is connected to the base 2. The third distance 83 measured as the distance between the centrelines of the first waterway body 3a and the second waterway body 3b at its narrowest point, may be at least 1 cm, up to or at least 2 cm, up to or at least 5 cm, up to or at least 10 cm or up to or at least 20 cm.

[0073] As shown in Figure 6, the second inlet portion 4b is rotatable with respect to the second outlet tube 5b about the fourth rotation axis 72b, wherein the fourth rotation axis 72b is perpendicular to the third rotation axis 71b. A longitudinal axis of the first pipe section 30b and a longitudinal axis of the second pipe section 40b of the second waterway body 3b are both coincident with the fourth rotation axis 72b. Translation of the second pipe section 40b relative to the first pipe section 30b of the second waterway body 3b is parallel to the fourth rotation axis 72b.

[0074] As shown in Figure 6, the second waterway body 3b is rotatable with respect to the base 2 about the third rotation axis 71b, which is parallel to the first rotation axis 71 about which the first waterway body 3a is rotatable with respect to the base 2.

[0075] Either or both of the first waterway body 3a or the second waterway body 3b may be configured to be pressure balanced in line with the water supply pipe 6a, 6a', 6b, 6b' to which they directly connect (i.e., for the first waterway body 3a, about the first rotation axis 71a). Similarly, either or both of the first waterway body 3a or second waterway body 3b may be configured to be pressure balanced about the second rotation axis 72a or fourth rotation axis 72b respectively. In use, pressure balancing in these ways may limit or prevent the fluid supply, from the water supply pipe 6a, 6a', 6b, 6b' to which they directly connect, from forming net rotational or translational forces acting on the moving parts of the first 3a and/or second waterway body 3b, limiting the stresses imposed on these components in use.

[0076] Either or both of the first waterway body 3a or the second waterway body 3b may comprise a hydraulic lock with a controlled bleed (not shown). The hydraulic lock may act to control flow, reducing the effect of flow instabilities on pressure balancing. This may enable more effective pressure balancing in line with the water supply pipe 6a, 6a', 6b, 6b' to which they directly connect (i.e. about the first rotation axis 71a or third rotation axis 71b respectively).

[0077] Pressure balancing and, where present, the hydraulic lock(s) may limit or prevent movable parts of the first waterway body 3a and/or the second waterway body 3b, such as the first inlet portion 4a and the second inlet portion 4b, from moving under the pressure of fluid flowing therethrough from the water supply pipes 6a, 6a', 6b, 6b'.

[0078] While Figures 1, 4, 5 and 6 show the mounting assembly 1 including the first waterway body 3a and the second waterway body 3b, it will be appreciated by a person skilled in the art that the provision of only a first waterway body 3a in combination with, for example, a straight pipe, would at least in part, ameliorate the aforementioned problems associated with conventional assemblies.

[0079] Figure 7 is a schematic view of a portion of a second example of a mounting assembly 10 for a fluid handling device. The portion of the mounting assembly 10 shown in Figure 7 includes a first waterway body 3a'. The mounting assembly 10 may include a second waterway body, which may be substantially the same as the first waterway body 3a'.

[0080] The mounting assembly 10 includes a base 2'. The base 2' is configured to be secured to a surface 23' such as a wall.

[0081] The first waterway body 3a' has a first end 700

and a second end 800. The first waterway body 3a' is connected at the second end 800 to the base 2'. The first waterway body 3a' includes a first inlet portion 4a' disposed at the first end 700. The first inlet portion 4a' includes a first inlet tube 410a and a second inlet tube.

[0082] The first inlet tube 410a is securable, at a first connection point 420a, to a water supply pipe (not shown) protruding from the surface 23'. The first inlet tube 410a may be secured to the water supply pipe by any suitable means. The second inlet tube is securable, at a second inlet connection point, to a water supply pipe protruding from the surface.

[0083] The first waterway body 3a' includes a first outlet tube 5a' disposed at the second end 800. The first outlet tube 5a' is configured to be connected to a fluid handling device (not shown) downstream thereof. As such, the first waterway body 3a' provides fluid communication from the first inlet tube 410a and the second inlet tube to the first outlet tube 5a'.

[0084] The first waterway body 3a' comprises a first pipe section 30a'. The first inlet portion 4a' comprises a second pipe section 40a'. The first inlet tube 410a and the second inlet tube are attached to the second pipe section 40a'.

[0085] The first pipe section 30a' extends from the first end 700 of the first waterway body 3a' towards the second end 800 of the first waterway body 3a'. The first pipe section 30a' communicates with the first outlet tube 5a'. A longitudinal axis of the first pipe section 30a' is perpendicular to a longitudinal axis of the first outlet tube 5a'.

[0086] At the first end 700 of the first waterway body 3a', a stopper 900 is releasably secured to the first pipe section 30a'. The stopper 900 comprises an end plate 901 and a shaft 902 extending therefrom. The stopper 900 is secured to the first pipe section 30a' by interlocking screw threads on an interior surface of the first pipe section 30a' and an exterior surface of the shaft 902 of the stopper 900. An O-ring 332a' provides a fluid-tight seal between the shaft 902 of the stopper 900 and an inner surface of the first pipe section 30a'.

[0087] The first pipe section 30a' has a four apertures 31a' in a wall thereof at an intermediate point along a length of the first pipe section 30a'. The apertures 31a' provide fluid communication from outside the first pipe section 30a' to inside the first pipe section 30a'.

[0088] In implementations, the first pipe section 30a' may have a different number and arrangement of apertures. The first pipe section 30a' may have one or more apertures 31a' in a wall thereof to provide fluid communication from outside the first pipe section 30a' to inside the first pipe section 30a'. The one or more apertures may include, for example, one, two, three, four or up to 10 apertures. The one or more apertures may be spaced regularly or irregularly around a circumference of the first pipe section 30a'. The one or more apertures may be spaced at different points along the length of the first pipe section 30a'.

[0089] The first waterway body 3a' may be configured to be pressure balanced in line with the water supply pipe to which it is secured. Similarly, the first waterway body 3a' may be configured to be pressure balanced about the longitudinal axis of the first pipe section 30a'. In use, pressure balancing in these ways may limit or prevent water supply from the water supply pipe from forming net rotational or translational forces acting on the moving parts of the first waterway body 3a', limiting the stresses imposed on these components in use.

[0090] The first waterway body 3a' may comprise a hydraulic lock with a controlled bleed (not shown). The hydraulic lock may act to control flow, reducing the effect of flow instabilities on pressure balancing. This may enable more effective pressure balancing in line with the water supply pipe to which the first waterway body 3a' is secured.

[0091] Pressure balancing and, where present, the hydraulic lock(s) may limit or prevent movable parts of the first waterway body 3a', such as the first inlet portion 4a' and/or the first pipe section 30a', from moving under the pressure of fluid flowing therethrough from the water supply pipe.

[0092] A filter element (not shown) may be fitted within the first pipe section 30a'. The filter element may be configured to filter fluid passing along the first pipe section 30a' towards the first outlet tube 5a'. For instance, the filter element may act to filter out sediment or other material from water supplied from a water supply connected to the first inlet tube 410a or the second inlet tube. In implementations, there may be no filter element present within the first waterway body 3a', e.g. within the first pipe section 30a'.

[0093] The second pipe section 40a' is arranged concentrically with the first pipe section 30a' and is slidably mounted on the first pipe section 30a'. A pair of O-rings 331a', one at each end of the second pipe section 40a', provide a fluid-tight seal between the first pipe section 30a' and the second pipe section 40a'. It will be appreciated that the pair of O-rings 331a' represent an example of suitable sealing means and that other sealing means may be employed instead.

[0094] An outer diameter of the first pipe section 30a' is less than an inner diameter of the second pipe section 40a', such that the first pipe section 30a' is configured to fit within the second pipe section 40a' telescopically. The second pipe section 40a' may be moved longitudinally relative to the first pipe section 30a', in order to vary a length of the first waterway body 3a'.

[0095] The internal diameter of the second pipe section 40a' varies along the length of the second pipe section 40a' to create a first space 32a' between a portion of the first pipe section 30a' and a portion of the second pipe section 40a'. The first space 32a' communicates with the first inlet tubes 410a and the second inlet tube. In this example, the inner diameter of the second pipe section 40a' is smaller at both ends of the second pipe section 40a' than at the centre of the second pipe section 40a'. The apertures 31a' in the first pipe section 30a' allow fluid

from the first inlet tube 410a and the second inlet tube to flow from the first space 32a' into the first pipe section 30a'. Fluid may then flow on to the outlet tube 5a'.

[0096] When installing the mounting assembly 10, an installer can slide the second pipe section 40a' along the first pipe section 30a'. In this way, the first waterway body 3a' is configured such that a first distance from the first inlet tube 410a or the second inlet tube to the outlet tube 5a may be adjusted. For example, the first distance from the first inlet tube 410a to the outlet tube 5a may be 35 mm or 38 mm or in the range of from 30 mm to 40 mm. The first distance from the second inlet tube to the outlet tube 5a may be 23 mm or 26 mm or in the range of from 18 mm to 29 mm.

[0097] When retrofitting the mounting assembly 10 into an existing bathroom, the water supply pipes have a set spacing apart from one another. The adjustability makes the mounting assembly 10 compatible with a variety of water supply pipe spacings.

[0098] The end plate 901 is configured such that the end plate 901 limits the translation and acts to prevent the second pipe section 40a' from sliding off the first pipe section 30a' of the first waterway body 3a' when the mounting assembly 1 is installed. A maximum translation may be 20 mm, 22 mm, 23 mm and/or in the range of from 15 to 40 mm. Removing the stopper 900 from the first pipe section 30a' may remove, or facilitate the removal of, the filter element if present, allowing the filter element to be cleaned and/or replaced. Removing the stopper 900 from the first pipe section 30a' may also allow the first inlet portion 4a' to be removed from the first pipe section 30a'. Consequently, the first inlet portion 4a' may be cleaned, repaired or replaced, if necessary. For instance, a first inlet portion having a different configuration from that of the first inlet portion 4a' may be employed to provide a mounting assembly 10 capable of providing different adjustability.

[0099] The first waterway body 3a' is connected to the base 2' such that the first waterway body 3a' can rotate about a first rotation axis extending longitudinally along the first outlet tube 5a'. The first outlet tube 5a' has an open end 50a' distal from the base 2' and a closed end 51a' adjacent the base 2'. A perturbation 52a' protruding from the closed end 51a' of the first outlet tube 5a' extends into a socket portion 21a' of the base 2'. The first outlet tube 5a' may be connected to the base 2' in any suitable way that allows the waterway body 3a' to be rotated, in use, about the first rotation axis. The connection between the first outlet tube 5a' and the base 2' may be configured such that some resistance has to be overcome, in order to rotate, in use, the waterway body 3a' about the first rotation axis. The resistance may be such that the first waterway body 3a' does not freely rotate about the first rotation axis, i.e. a user may need to urge the first waterway body 3a' to rotate about the first rotation axis, in order to select a desired orientation of the first waterway body 3a' relative to the base 2'.

[0100] The first waterway body 3a' includes a joint part 51' and the base 2' includes a socket 21a'.

[0101] The first pipe section 30a' has a T-shape comprising a stem portion 130a' extending in a direction from the first end 700 to the second end 800 of the first waterway body 3a' and a cross portion 131a' perpendicular to the stem portion 130a'.

[0102] The cross portion 131a' is housed within the outlet tube 5a'. The cross portion 131a' has an open end 132a' leading to the open end of 50a' of the first outlet tube 5a'. The cross portion 131a' has a closed end 133a' opposite the open end 132a'. Accordingly, the first pipe section 30a' provides an L-shaped conduit for fluid flow. The closed end 133a' of the cross portion 131a' includes a blind hole 53' which receives an elongate locating formation 56' protruding from the closed end 51a' of the first outlet tube 5a' in a direction opposite the perturbation 52a'. A pair of O-rings 335, one disposed in an annular groove near the open end 132a' of the cross portion 131a' and the other disposed in an annular groove near the closed end 133a' of the cross portion 131a' provide a fluid-tight seal between an outer surface of the cross portion 131a' and an inner surface of the first outlet tube 5a'. It will be appreciated that the pair of O-rings 335 represent an example of suitable sealing means and that other sealing means may be employed instead.

[0103] The stem portion 130a' passes through an aperture 55' in a side wall of the first outlet tube 5a'. The aperture 55' is elongated in a direction along the length of the first outlet tube 5a'. As indicated by a double headed arrow 85, the first pipe section 30a' may be moved towards or away from the surface 23'. For example, this may allow a user to vary, in use, a distance 82a from the first connection point 420a to the surface 23', in order to facilitate installation and/or to accommodate variations in water supply pipe protrusion distances.

[0104] The aperture 55' is configured so as to limit the extent of the movement 85 of the first pipe section 30a' towards or away from the surface 23'. The first outlet tube 5a' has a flange 54' adjacent the open end 50' configured to prevent further movement of the first pipe section 30a' in a direction away from the surface 23'. The blind hole 53' and the elongate locating formation 56' are configured to permit a limited extent of movement of the first pipe section 30a' in a direction towards or away from the surface 23'. At all points in the permitted extent of the movement 85, the pair of O-rings 335 maintain a fluid-tight seal between an outer surface of the cross portion 131a' and an inner surface of the first outlet tube 5a' and at least a portion of the elongate locating formation 56' is received within the blind hole 53'.

[0105] The permitted extent of the movement 85 of the first pipe section 30a' towards or away from the surface 23' may be up to or at least 2 mm, up to or at least 3 mm, up to or at least 5 mm or up to or at least 10 mm. For example, the permitted extent of the movement 85 of the first pipe section 30a' towards or away from the surface 23' may be from 2 mm to 10 mm.

[0106] As noted above, the distance 82a from the first

connection point 420a to the surface 23' may be adjusted. This may allow for small adjustments to be made to the distance 82a or the without requiring the first inlet portion 4a' to be rotated. For example, the distance 82a may be varied by be up to or at least 2 mm, up to or at least 3 mm, up to or at least 5 mm or up to or at least 10 mm. For example, the distance 82a may be varied from 4 mm to 9mm, from 4 mm to 10 mm or may be varied from 4 mm to 14 mm.

[0107] This has the advantage of, increasing the range of pipe projection distances that the mounting assembly 10 may adapt to. Furthermore, this eases the installation process as, for example, an installer may need some additional adjustability when securing the connection point 420a, a water supply pipe protruding from the surface 23'.

[0108] When installed at a site of use, the mounting assembly 10 may be surrounded at least partially by a casing (not shown). The casing may shroud the mounting assembly 10 and, optionally, at least some of a fluid handling device attached to the mounting assembly 10. The casing may protect the mounting assembly 10 and/or the fluid handling device from dirt ingress, thereby potentially increasing service lifetime and/or reliability of the mounting assembly 10. The casing may have any design aesthetic, with different design aesthetics being provided by different casings.

[0109] The waterway first body 3a' is rotatable with respect to the base 2' about the first rotation axis. This may allow the or a casing (not shown) and/or the or a fluid handling device (not shown) to be fixed relative to the surface 23 without skew even if there is a difference in the height of the two water supply pipes. This may have aesthetic advantages as well as improve the ease of operation of an ablutionary fitting comprising the fluid handling device. For example, an installer may wish the horizontal of the casing to be parallel to a floor in a bathroom. In another example where the fluid handling device is a mixer valve, preventing skew of the ablutionary fitting comprising the fluid handling device and a handle operably connected thereto may increase ease of user operated water temperature selection and/or maintain a desired aesthetic, since the handle would have the intended orientation.

[0110] The inlet portion 4a' is rotatable with respect to the outlet tube 5a' about a second rotation axis, wherein the second rotation axis is perpendicular to the first rotation axis. A longitudinal axis of the first pipe section 30a' and a longitudinal axis of the second pipe section 40a' are both coincident with the second rotation axis. Translation of the second pipe section 40a' relative to the first pipe section 30a' is parallel to the second rotation axis.

[0111] In an implementation, the mounting assembly may be configured such that one or more of the outlet tubes may be fixedly attached to the base and a first pipe section associated therewith may be movable in an arc relative to the outlet tube.

[0112] Figure 8 is a schematic view of a plumbing system 100. The plumbing system 100 comprises the mounting assembly 1 described herein. The base 2 of the mounting assembly 1 is secured to a wall 23". An inlet tube of the mounting assembly 1 is coupled to a first water supply pipe 6a" protruding from the wall 23". Another inlet tube of the mounting assembly 1 is coupled to a second water supply pipe 6b" protruding from the wall 23". The first water supply pipe 6a" conveys cold water from a cold water supply (not shown) and the second water supply pipe 6b" conveys hot water from a hot water supply (not shown).

[0113] A fluid handling device 101 is fluidically connected to the first outlet tube and the second outlet tube of the mounting assembly 1. In this example, the fluid handling device 101 is a mixer valve, which receives a first fluid flow from the first outlet tube and a second fluid flow from the second outlet tube. The mixer valve is operable to mix the first fluid flow and the second fluid flow so as to produce a principal fluid stream having a user-desired temperature. The plumbing system 100 further comprises a fluid delivery device 102 fluidically connected to the fluid handling device 101. In this example, the fluid delivery device 102 is a shower head and the principal fluid stream having the user-desired temperature is conveyed from the mixer valve to the shower head via a riser bar 103 and an arm 104 extending laterally from an upper end of the riser bar 103. However, it will be apparent to those skilled in the art that the fluid delivery device 102 may alternately be any fluid delivery device 102 such as a bathroom or kitchen faucet.

[0114] In another example, the fluid handling device 101 may be fluidically connected to both a shower and a faucet. The fluid handling device 101 may act as a diverter valve to actuate relative output flows of the shower and the faucet in response to a user diverter selection. The fluid handling device 101 may act as a mixer valve and a diverter valve, with the combined functionality of both valves.

[0115] The plumbing system 100 further comprises a casing 22 which covers at least in part the mounting assembly 1 and the fluid handling device 101. The casing 22 may be secured to the base 2 of the mounting assembly 1 and/or to the wall 23". The casing 22 may cover all or parts of the fluid handling device 101. The casing 22 may prevent the build-up of dirt or debris, increasing the ease of cleaning.

[0116] In this example, the plumbing system 100 is an ablutionary system, more specifically a shower system. However, this embodiment is not meant as limiting and the plumbing system 100 may be any fluid delivery system such as a fertiliser distribution system used in agriculture or a multi-type gas distribution system for use in a laboratory.

[0117] The first water supply pipe 6a" protrudes from the wall 23" at a first height 61 from a floor 24'. The second water supply pipe 6b" protrudes from the wall 23" at a second height 62 from the floor 24'. The first height 61

may be greater than, less than or equal to the second height 62.

[0118] Alternatively, the plumbing system 100 may comprise the mounting assembly 10 instead of the mounting assembly 1. The plumbing system 100 may include any mounting assembly according to the present disclosure.

[0119] Unless otherwise stated, the distances and spacings described in this disclosure are measured from and to (where appropriate) the centreline of the pipes or tubes concerned.

[0120] Within this disclosure, the term 'end' designates a furthest part of that object. This includes but is not limited to a terminal plane of an object. For example, an end of a pipe or tube may encompass some of the length of that pipe or tube such as 2 cm, 5cm or up to half of the length of the pipe or tube.

[0121] While the example mounting assemblies disclosed herein are discussed in relation to water supply pipes, it will be apparent to those skilled in the art that the mounting assemblies may be installed with fluid supply pipes of any type.

[0122] Except where mutually exclusive, any of the features of any of the above-described aspects may be employed mutatis mutandis in any of the other above-described aspects.

[0123] Various modifications can be made to the example embodiments described herein without departing from the scope of the invention.

[0124] Except where mutually exclusive, any of the features may be employed separately or in combination with any other features and the disclosure extends to all combinations and sub-combinations of one or more features disclosed herein.

Claims

1. A mounting assembly for a fluid handling device comprising:

a base, configured to be secured to a surface;
a waterway body comprising a first end and a second end, comprising:

an inlet portion disposed at the first end, the inlet portion including one or more inlet tubes, the or each inlet tube being securable, at an inlet connection point, to a water supply pipe extending from the surface; and
an outlet tube disposed at the second end, the outlet tube being configured to be connected to the fluid handling device, wherein a waterway body provides fluid communication from the inlet tube(s) to the outlet tube;

wherein the waterway body is connected to the base at the second end;
wherein the waterway body or a part thereof is rotatable with respect to the base about a first rotation axis extending in a perpendicular direction from the base; and
wherein the waterway body is configured such that a first distance from the inlet tube(s) to the outlet tube may be adjusted and a second distance between the inlet connection point(s) and the surface may be adjusted.

2. The mounting assembly of claim 1, wherein the inlet portion is rotatable with respect to the outlet tube about a second rotation axis.

3. The mounting assembly of claim 2, wherein the second rotation axis is perpendicular to the first rotation axis.

4. The mounting assembly of claim 1, claim 2 or claim 3, wherein the inlet portion includes a plurality of inlet tubes.

5. The mounting assembly of claim 4, wherein at least two of the inlet tubes are of different lengths such that rotation of the inlet portion about the second rotation axis may allow an installer to select between at least two inlet tubes having different lengths.

6. The mounting assembly of claim 4 or claim 5, wherein at least two of the inlet tubes are disposed at different points along a length of the inlet portion.

7. The mounting assembly of claim 4, claim 5 or claim 6, wherein the inlet portion is configured such that a longitudinal axis of a first one of the inlet tubes is non-parallel with a longitudinal axis of a second one of the inlet tubes.

8. The mounting assembly of any one of the preceding claims, wherein the waterway body comprises a first pipe section and a second pipe section and the second pipe section is movable longitudinally relative to the first pipe section.

9. The mounting assembly of claim 8, wherein the second pipe section is slidably mounted on the first pipe section.

10. The mounting assembly of claim 8 or claim 9, wherein the second pipe section is removably attached to the first pipe section.

11. The mounting assembly of any one of the preceding claims, wherein the or a first pipe section is movable in a direction along a length of the outlet tube.

12. The mounting assembly of claim 11, wherein the or

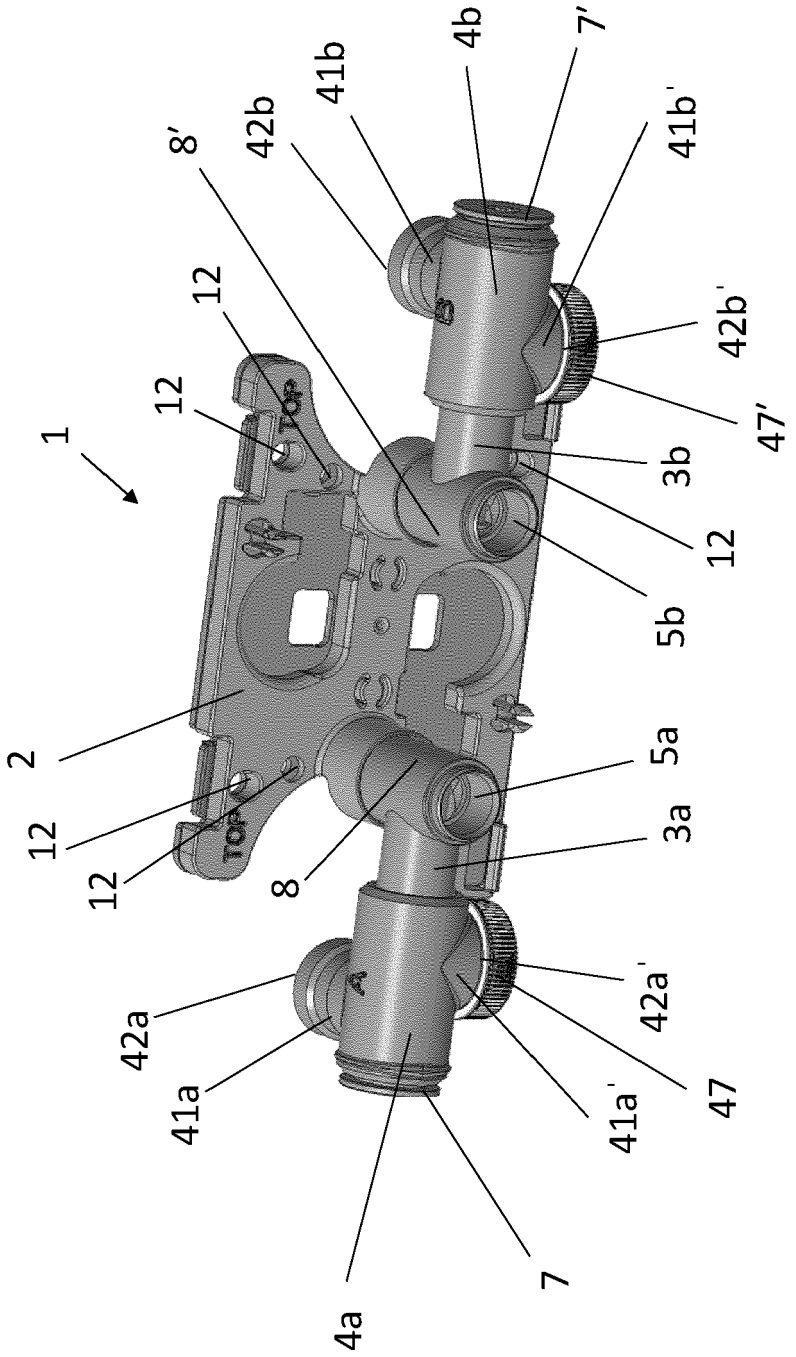
a first pipe section is movable a bounded distance in a direction along the length of the outlet tube.

13. The mounting assembly of any one of the preceding claims comprising one or more further waterway bodies.

14. A plumbing system comprising:

a mounting assembly according to any one of claims 1 to 13 coupled to at least one fluid supply pipe;
a fluid handling device fluidically connected to the output tube(s) of the mounting assembly; and
a fluid delivery device fluidically connected to the fluid handling device.

15. The plumbing system of claim 14, wherein: the fluid handling device includes a mixer valve and/or a diverter valve; and/or the fluid delivery device is a shower or a faucet.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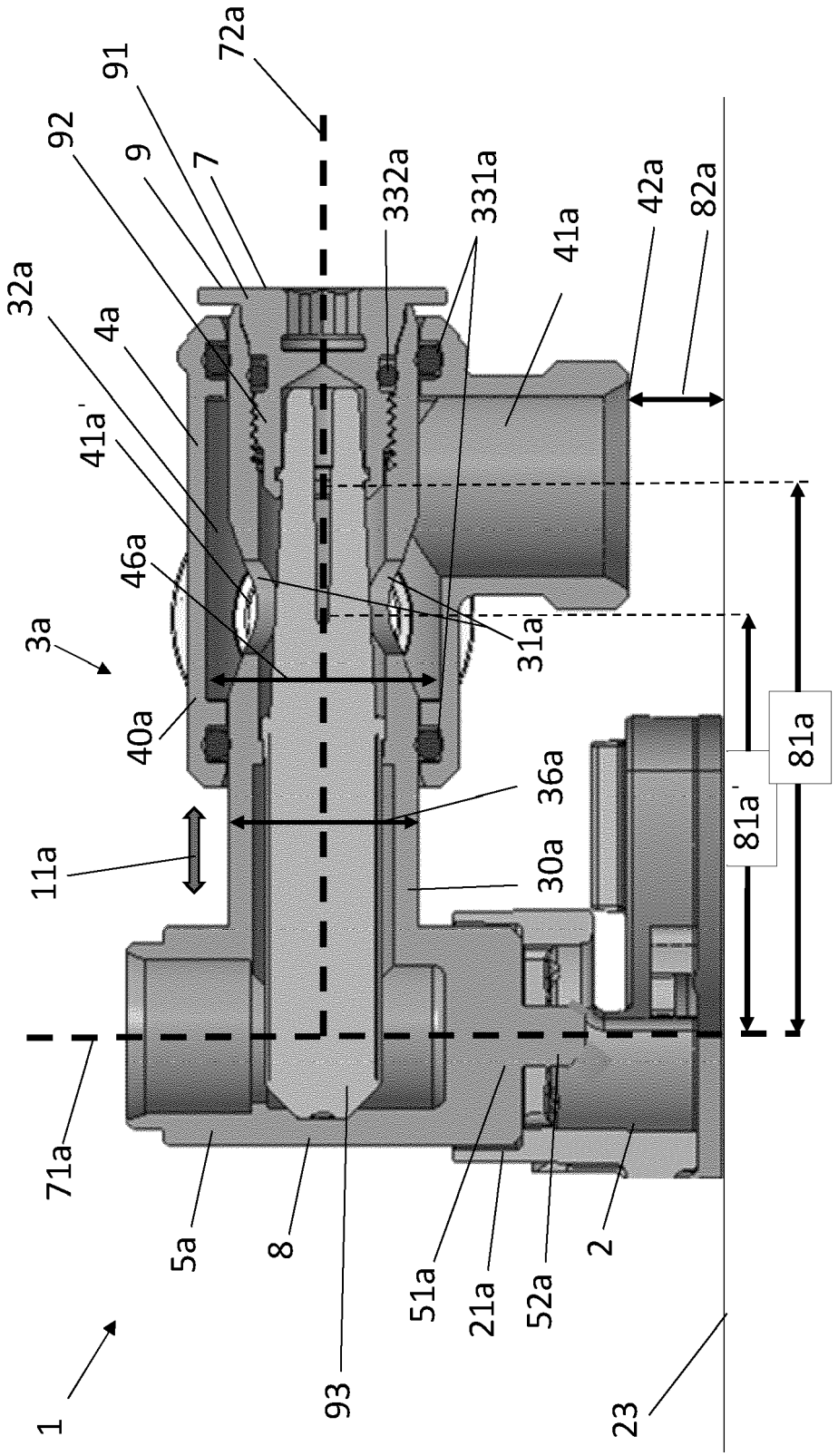
41a'
47

Figure 1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1

Figure 2

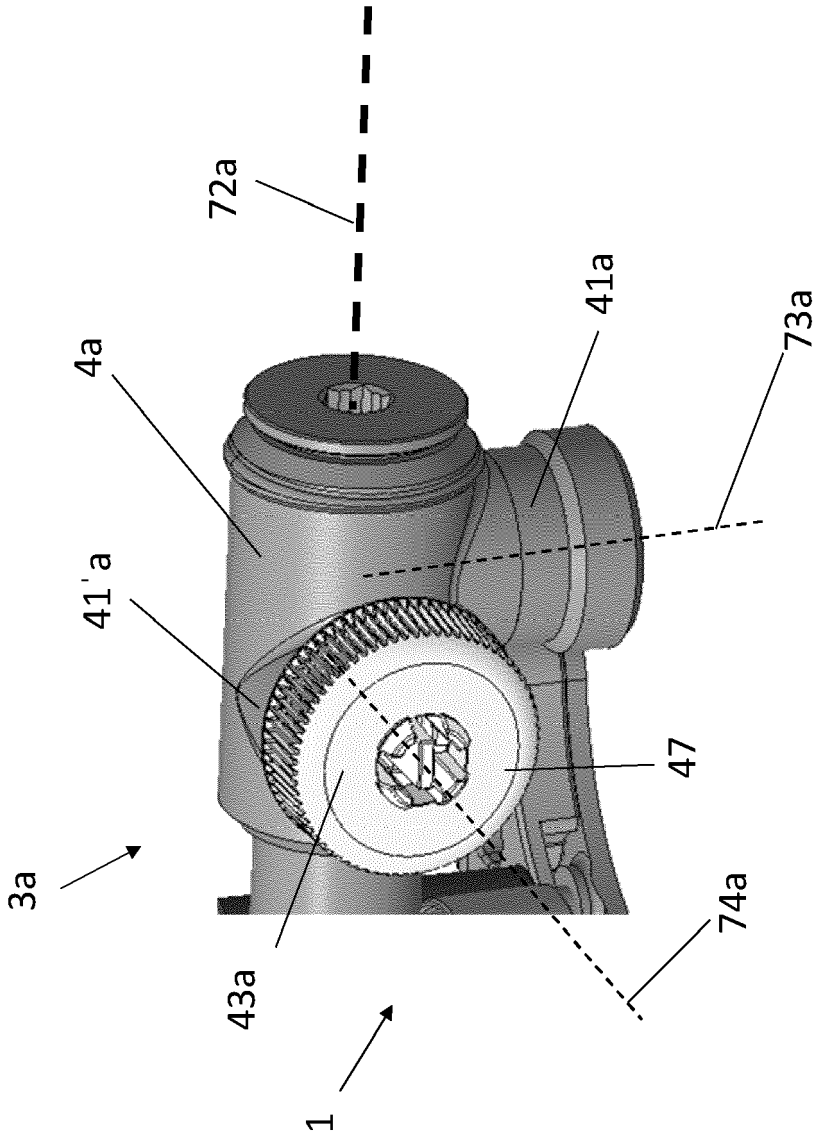
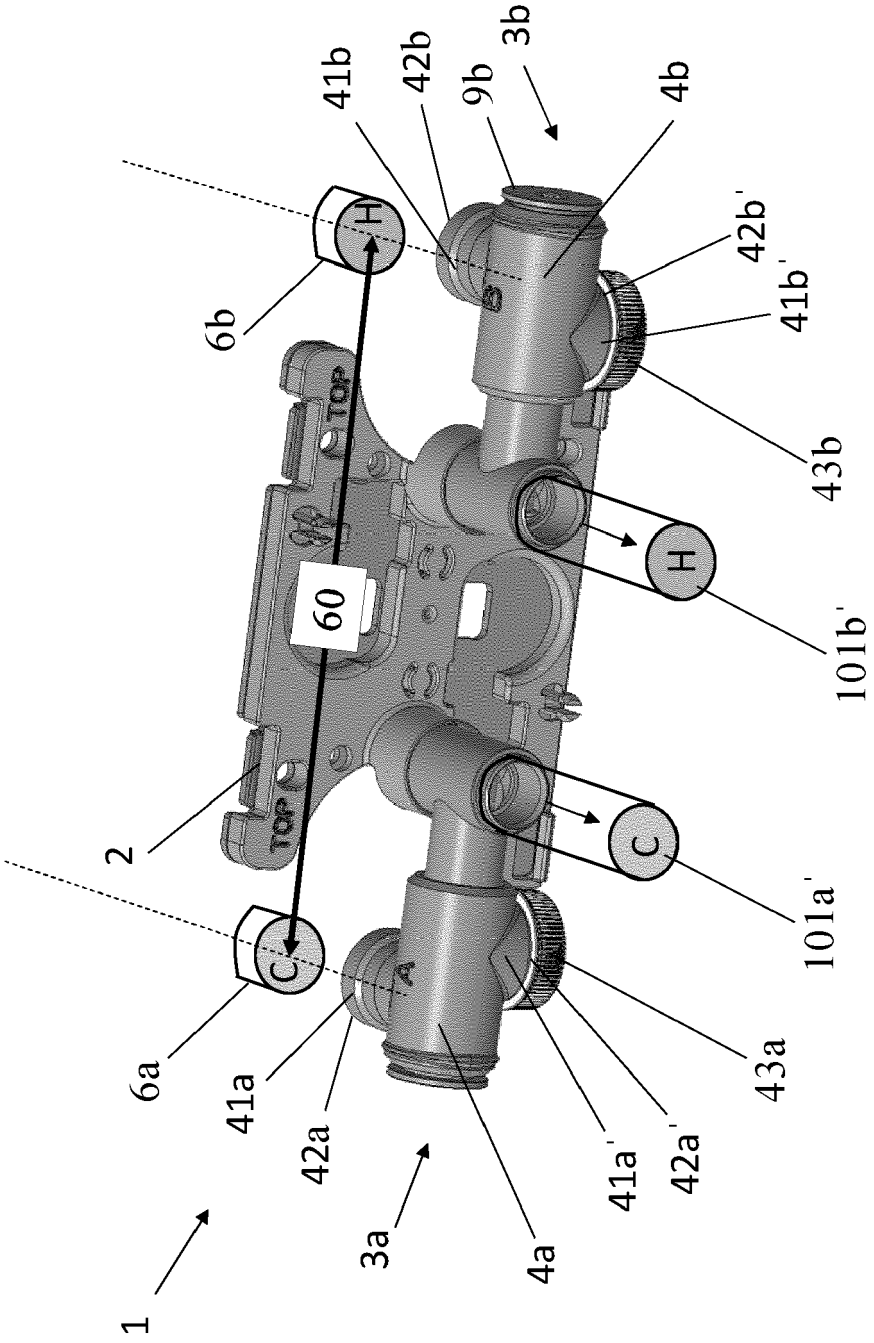


Figure 3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42b'
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43b
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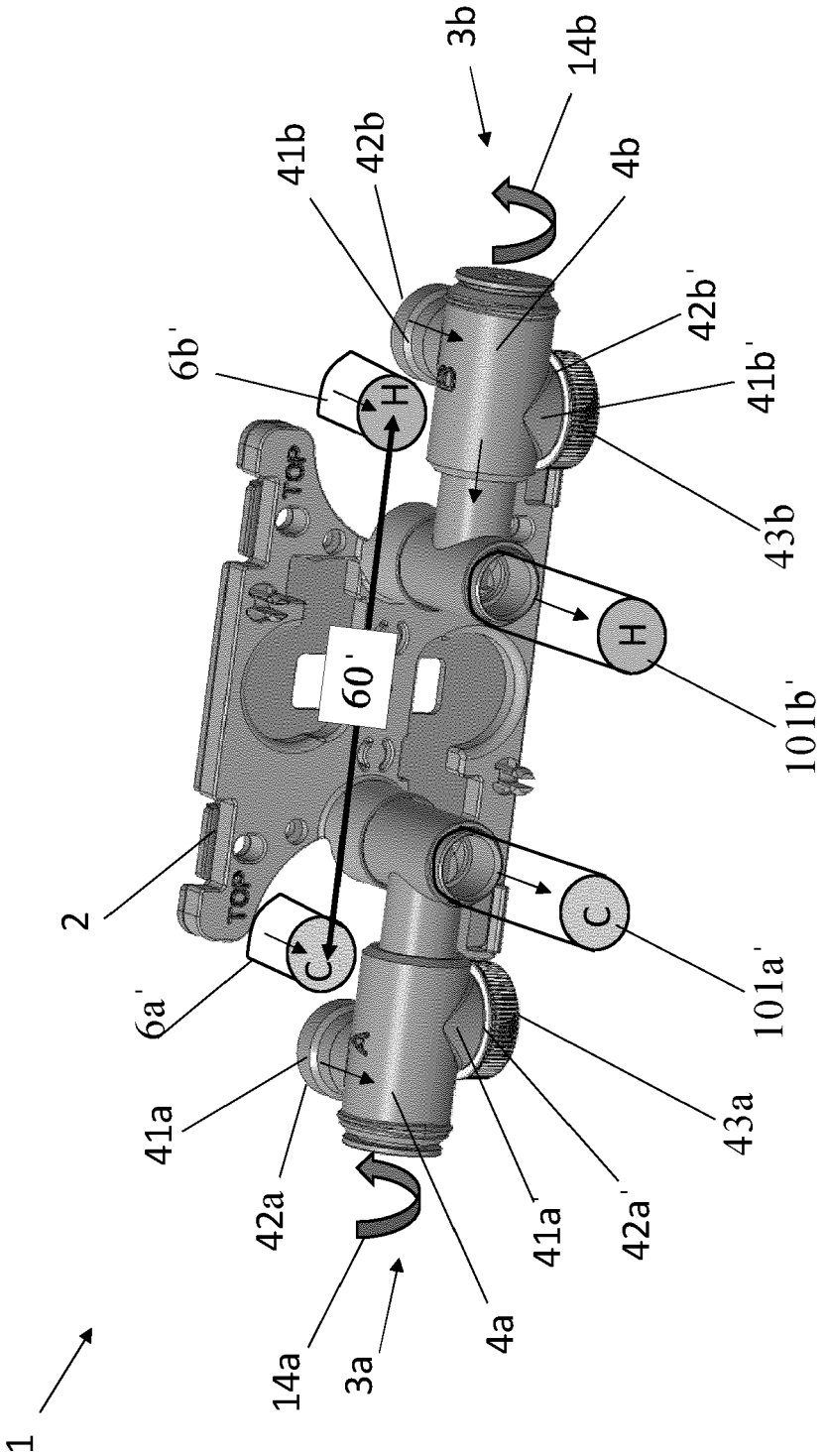
101b'
C
H
TOP

Figure 4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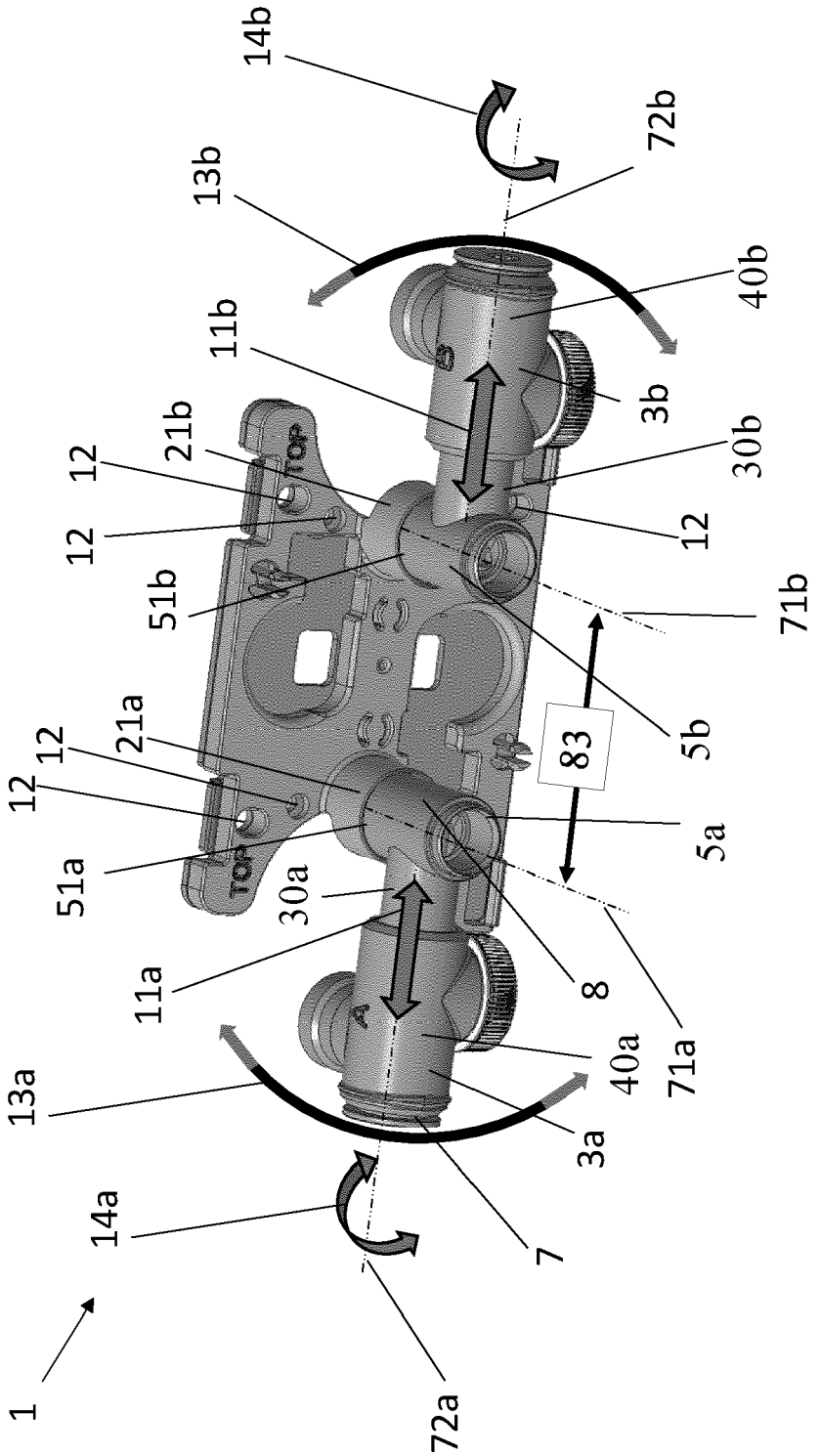
101b'
C
H
TOP

Figure 5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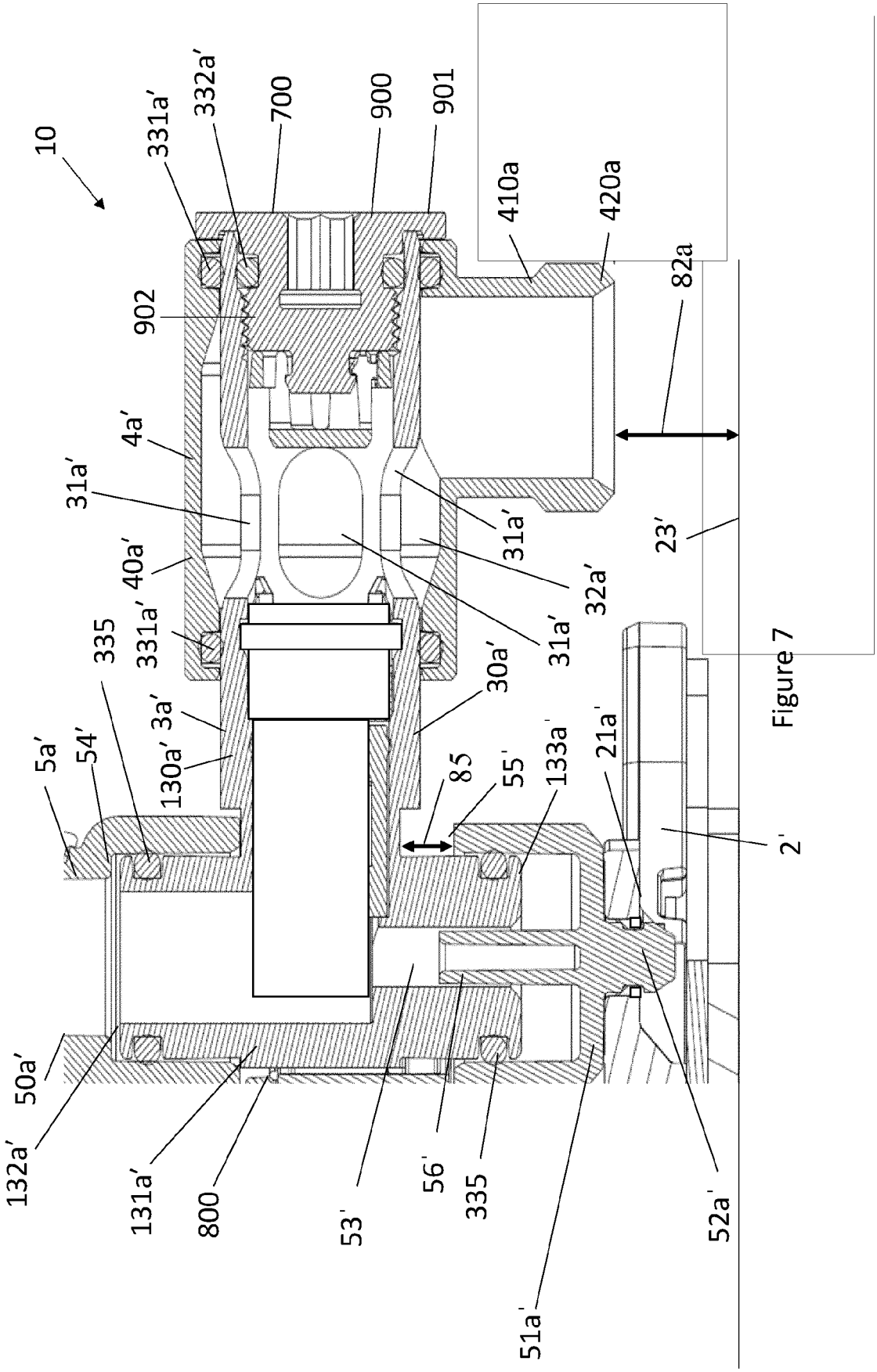
72a

Figure 6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54'
130a'
3a'
30a'
31a'
32a'
23'
85
55'
133a'
21a'
2'
50a'
132a'
131a'
800
53'
56'
335
51a'
52a'

Figure 7

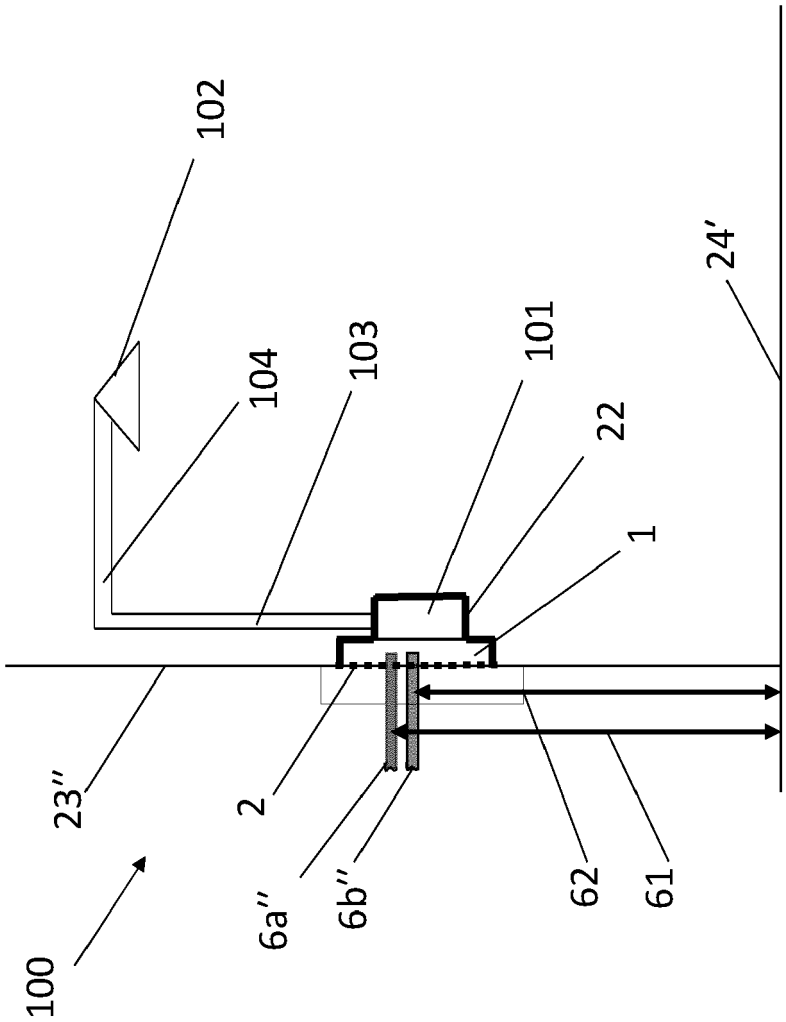

Figure 8

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 23 18 3347

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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E03C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 November 2023	Posavec, Daniel

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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L : document cited for other reasons

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