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(71) Applicant: **Kohler Mira Limited**
Cheltenham, Gloucestershire GL52 5EP (GB)

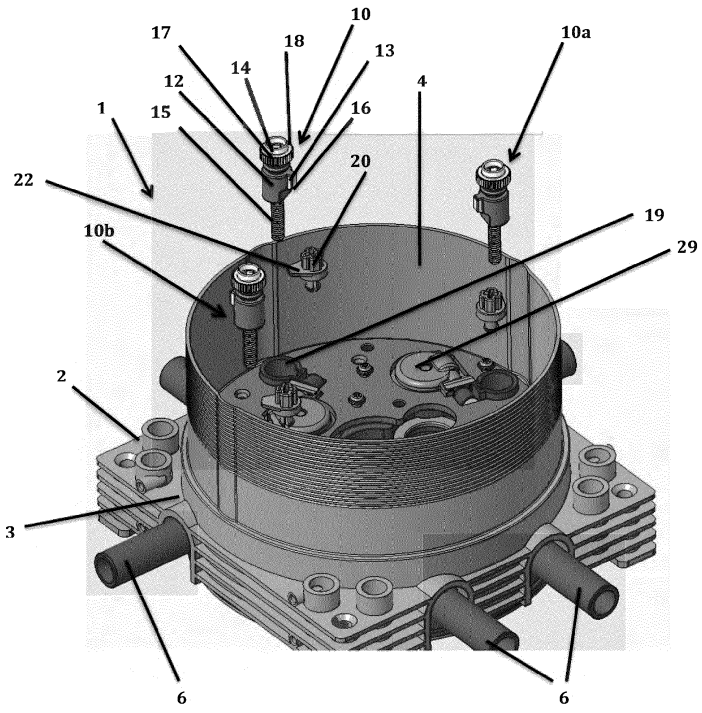
(72) Inventor: **BEATTIE, Colin**
Cheltenham, GL53 7JU (GB)

(74) Representative: **Barker Brettell LLP**
100 Hagley Road
Edgbaston
Birmingham B16 8QQ (GB)

(54) **A METHOD OF INSTALLING A CONTROL**

(57) A method of installing a control suitable for use in an ablutionary setting, comprising the steps: affixing a back plate to a mounting surface, the back plate comprising; a first valve, the first valve comprising a control lever; and an actuator comprising a first surface and a second surface, the first surface configured to contact a surface of the control lever; adjusting the actuator such that the distance between the first surface and second surface is lengthened or shortened; affixing a faceplate to the back plate, the faceplate comprising a control member arranged to operably connect to the second surface of the actuator.

Figure 1



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Description

[0001] The present disclosure relates to a method of installing a control suitable for use in an ablutionary setting. The present disclosure also relates to a system for use in an ablutionary setting.

[0002] Typically, controls used in ablutionary settings comprise a back plate affixed to a wall and a faceplate connected to the back plate. The faceplate will typically comprise one or more control members that are operably linked via an actuator to a valve or the like, the valve being connected to the back plate.

[0003] In order for the control member to sit flush with the faceplate and be in contact with the actuator when installed, it may be necessary to trim the back plate and/or front plate during installation. Because different walls have different cavity depths and different amounts of space, the amount of trimming may vary between different fittings, and so the distance between the wall and the front plate may vary. From a design perspective, this is not ideal as the designers will have set the amount the front plate should project from the wall, and the trimming means this projection will vary between different installations.

[0004] It would be beneficial to overcome or at least mitigate one or more of the problems associated with the prior art.

[0005] A first aspect provides a method of installing a control suitable for use in an ablutionary setting, comprising the steps:

affixing a back plate to a mounting surface, the back plate comprising; a first valve, the first valve comprising a control lever; and an actuator comprising a first surface and a second surface, the first surface configured to contact a surface of the control lever;
adjusting the actuator such that the distance between the first surface and second surface is lengthened or shortened;
affixing a faceplate to the back plate, the faceplate comprising a control member arranged to operably connect to the second surface of the actuator.

[0006] Advantageously, using an adjustable length actuator means that the distance from the mounting surface to the first surface of the actuator may be adjusted. As such, the variability in wall cavities can be accommodated by the actuator, so the amount the front plate projects from the wall is constant for different installations. Also, this may remove the need to trim the front plate/back plate, or at least may reduce the accuracy required when trimming either to achieve a flush finish between a control member and a faceplate.

[0007] The mounting surface may comprise a wall. The mounting surface may comprise a wall of any suitable depth. The mounting surface may comprise a rear surface and an opposing front surface, where the front surface faces into a room within a building. The back plate may be affixed to the mounting surface by any suitable means, such as screws, an adhesive, pins or clamps, for example. The back plate may be affixed to the rear surface of the mounting surface.

[0008] The back plate may be arranged such that a portion of the back plate extends through an aperture in the mounting surface. The back plate may extend through and extend away from the front surface such that a portion of the back plate extends into a room within a building. The portion of the back plate extending through the mounting surface may comprise any suitable shape.

[0009] The valve may comprise any valve suitable for use in an ablutionary fitting. The valve may comprise a mixing valve, for example a thermostatic mixing valve. The valve may comprise a diaphragm valve.

[0010] The control lever may be arranged to extend from the valve and may comprise any suitable arrangement. The control lever may comprise an elongate member arranged to rotate about an axis. The control lever may be arranged to adjust a flow of water to or from the valve. The control lever may be arranged to adjust the valve from an open configuration to a closed configuration, or vice versa. The control lever may be biased by any suitable resilient means, such as, for example, a spring or a resilient member.

[0011] The actuator may be operable to be lengthened or shortened by any suitable distance. The actuator may be arranged to be lengthened or shortened any distance between a maximum length and a minimum length. The actuator may be arranged to be lengthened or shortened in discrete increments.

[0012] The actuator may comprise two or more discrete portions. The actuator may comprise cooperating threaded portions, or may comprise a telescopic arrangement, for example. The actuator may comprise a first portion and a second portion where the first surface is disposed upon the first portion and the second surface is disposed upon the second portion.

[0013] The first portion may comprise a female threaded portion and the second portion may comprise a male threaded portion. The first portion me be arranged to receive the second portion. The first portion may comprise a body comprising a length, and the body of the first portion may comprise a threaded hole extending at least partially along the length. The first portion may comprise a threaded hole extending through the entire length.

[0014] The first portion may comprise a blind hole arranged to receive a portion of the threaded portion of the second portion. The first portion may comprise a threaded hole extending through a portion of the length, for example, through 50% or more of the length, 60% or more, 70% or more, 80% or more or 90% or more of the length.

[0015] The second portion may comprise a threaded portion and a top portion. The top portion may comprise a greater diameter than the threaded portion such that the top portion cannot be received by the threaded hole of the first portion. The threaded portion may comprise

a length less than the length of the first portion, or a length substantially the same as the first portion, or a length greater than the length of the first portion.

[0016] The threaded portion may comprise a length such that it is operable to be received by the first portion and extend through the length of the first portion such that the top portion extends from an end of the first portion and at least a portion of the threaded portion extends from an opposing end of the first portion.

[0017] Advantageously, a threaded portion extending through the first portion may increase the maximum lengthening of the actuator and therefore provide a greater range of adjustment to accommodate a greater range of depth of mounting surface and/or depth of faceplate.

[0018] The top portion may comprise a means suitable for enabling the second portion to be more easily rotated. The top portion may comprise a portion operable to receive a portion of a screwdriver, allen key, hex wrench or torx star key, or the like. The top portion may comprise a plurality of grooves arranged such that the second portion may be more easily rotated by hand.

[0019] The first surface may contact the control lever such that movement of the first surface in a first direction urges the control lever in the first direction. The control lever may be biased in a second direction where the second direction may oppose the first direction. The first surface may contact the control lever such that the biasing of the control lever in the second direction also biases the first surface, and as such biases the actuator, in the second direction. The second direction may be substantially in a direction from the back plate towards the faceplate.

[0020] The actuator may be connected to the back plate after the back plate has been affixed to the mounting surface. The actuator may be received by an aperture disposed within the perimeter of the portion of the back plate arranged to extend through the mounting surface. The back plate may be arranged such that the actuator is received into the back plate to a pre-determined depth. The pre-determined depth may be configured such that the first surface of the actuator contacts the control lever. The back plate may comprise a sleeve or the like configured to receive a portion of the actuator. The back plate and/or sleeve may be arranged such that when the actuator is received into the sleeve, the first portion of the actuator is prevented from rotating.

[0021] Advantageously, the back plate being configured such that the actuator is received to a pre-determined depth allows the first surface of the actuator to contact the control lever with the control lever in a known configuration. As such, when the actuator is received into the back plate the second surface is disposed at a position relative to the front surface of the mounting surface, the relative position being determined by the thickness of the mounting surface.

[0022] The actuator may be adjusted such that the distance between the first surface and second surface is lengthened or shortened wherein the first surface remains in a substantially constant position relative to the back plate. The actuator may be adjusted such that the second surface moves relative to the front surface of the mounting surface. The actuator may be adjusted such that the second surface moves in a direction substantially perpendicular to a plane comprising the front surface of the mounting surface.

[0023] Advantageously, adjusting the actuator such that the second surface is moved relative to the first surface of the mounting surface provides a means for the second surface to contact a control member disposed upon a faceplate such that the control member sits flush with the faceplate, wherein the faceplate may extend any distance from a mounting surface within a permitted range. The permitted range may correspond to a range extending between the maximum lengthening and shortening of the actuator.

[0024] The method may comprise a step of connecting a means for preventing further adjustment of the distance between the first surface and second surface to the back plate. In embodiments where the actuator comprises cooperating threaded portions, the means for preventing further adjustment may be operable to prevent rotation of the first portion and/or the second portion of the actuator. The means for preventing further adjustment may engage the second portion. The means for preventing further adjustment may prevent rotation of the second portion but allow axial movement of the actuator. The means for preventing further adjustment may comprise a fixing means. The fixing means may comprise a plurality of grooves arranged to cooperate with a plurality of grooves of the top portion.

[0025] Advantageously, the means for preventing further adjustment of the distance between the first surface and second surface may ensure the length of the actuator remains unchanged after connection of the faceplate.

[0026] The method may comprise a step of trimming or cutting at least a portion of the back plate. The portion arranged to extend through the mounting surface and protrude from the front surface of the mounting surface may be trimmed.

[0027] The faceplate may comprise any suitable connection to the back plate. The faceplate may connect to a portion of the back plate configured to extend through the mounting surface. The faceplate may connect to a portion of the back plate configured to protrude from the front surface of the mounting surface. The control member may operably connect to the second surface of the actuator and be arranged such that movement of the control member causes corresponding movement of the actuator.

[0028] The control member may comprise a push switch. Linear movement of the push switch may cause linear movement of the actuator.

[0029] The step of adjusting the actuator may comprise:

connecting an intermediate plate to a front surface

of the back plate; and
adjusting the actuator to lengthen or shorten the distance between the first surface and second surface.

[0030] The step of adjusting the actuator may comprise:

connecting an intermediate plate to a front surface of the back plate; and
adjusting the actuator to lengthen the distance between the first surface and second surface, such that the second portion abuts a portion of the intermediate plate.

[0031] The intermediate plate may be configured to provide a planar surface arranged at a set distance from the mounting surface. The intermediate plate may extend over a portion of the back plate that is arranged to extend through the aperture in the mounting surface. The intermediate plate may connect to the back plate by any suitable means. The intermediate plate may be arranged to receive a portion of the back plate.

[0032] The intermediate plate may comprise an aperture through which the actuator is arranged to at least partially extend. The distance between the first surface and second surface of the actuator may be lengthened or shortened such that the second surface is flush with the region of the intermediate plate surrounding the aperture through which the actuator is configured to at least partially extend.

[0033] The portion of the intermediate plate with which the actuator may abut may comprise a tab, notch or the like, arranged to extend into the aperture through which the actuator is arranged to at least partially extend. The tab may provide guidance for a user lengthening the actuator. The tab may be arranged to provide a means for limiting the lengthening of the actuator. In some embodiments, the tab may comprise a lower surface disposed substantially in the same plane as the planar surface of the intermediate plate. As such, the tab may be arranged to prevent further lengthening of the actuator when the second surface is flush with a plane of the intermediate plate. The tab may act as a guide for lengthening the actuator to the correct length.

[0034] Advantageously, the intermediate plate may not be affected by minor differences or inaccuracies in the trimmed back plate. Advantageously, a different intermediate plate may be connected to the back plate to provide a front surface arranged at a different set distance from the mounting surface and as such provide guidance for a different required length of actuator.

[0035] Advantageously, the intermediate plate may provide guidance for lengthening or shortening the actuator wherein the position of a guidance plane relative to the front surface of the mounting surface is not affected by the accuracy of the trimming of the back plate. The guidance plane may be provided by the planar surface.

[0036] The method may comprise a step of connecting the means for preventing further adjustment of the distance between the first surface and second surface to the intermediate plate.

[0037] The faceplate may then connect to the intermediate plate. The faceplate may connect to the intermediate plate by any suitable mean such as clips, pins or an adhesive means, for example. The intermediate plate may be permanently, or non-permanently connected to the back plate.

[0038] The step of adjusting the actuator may comprise:

temporarily securing the actuator before adjusting the distance between the first surface and the second surface, such that the first surface remains in a fixed position; and
releasing the actuator after adjusting the distance between the first surface and the second surface.

[0039] Advantageously, temporarily securing the actuator such that the first surface remains in a fixed position before lengthening or shortening the distance between the first surface and the second surface means the configuration of the control lever is not affected and as such the configuration of the valve is not affected during installation of the control.

[0040] The actuator may be temporarily secured by a temporary securing means. The temporary securing means may engage the actuator at a point between the first surface and the second surface.

[0041] The temporary securing means may be operable to move between an engaged position and a disengaged position. When the temporary securing means is in the disengaged position, the first surface may not be fixed in a set position and may be moveable. When the temporary securing means is in the engaged position, the first surface may remain in a fixed position. The temporary securing means, when in the engaged position, may substantially prevent movement of the first surface in an axial direction along the longitudinal axis of the actuator.

[0042] The temporary securing means may be operable to rotate between an engaged position and a disengaged position. The temporary securing means may be connected to the back plate. The temporary securing means may be connected to the intermediate plate. The temporary securing means may be detachable, or may comprise a permanent connection to the back plate and/or the intermediate plate.

[0043] The temporary securing means may be operable to form a temporary connection with the first portion of the actuator. The temporary securing means may not contact the second portion. As such, when the temporary securing means forms a connection with the first portion, the second portion may be operable to be adjusted without being inhibited by the temporary securing means.

[0044] The temporary securing means may be arranged such that the first portion of the actuator is re-

ceived into the back plate to a pre-determined depth. The pre-determined depth may be configured such that the first surface of the actuator contacts the control lever.

[0045] Advantageously, the temporary securing means being configured such that the first portion is received to a pre-determined depth allows the first surface of the actuator to contact the control lever with the control lever in a known configuration.

[0046] The step of adjusting the actuator may comprise:

temporarily securing the actuator before adjusting the distance between the first surface and the second surface, such that the first surface remains in a fixed position;
adjusting the distance between the first surface and the second surface;
connecting the means for preventing further adjustment of the distance between the first surface and second surface to the intermediate plate; and
releasing the actuator.

[0047] In some embodiments, a temporary securing means is not provided.

[0048] The step of adjusting the actuator may comprise:

adjusting the distance between the first surface and the second surface; and
connecting the means for preventing further adjustment of the distance between the first surface and second surface to the intermediate plate.

[0049] The actuator may be received into the back plate to a pre-determined depth. The pre-determined depth may be configured such that the first surface of the actuator contacts the control lever. The actuator may then be lengthened or shortened.

[0050] Advantageously, when the actuator is lengthened by means of rotating the second portion, no substantial force is exerted on the control lever. As such, the actuator can be lengthened or shortened without affecting the relative position or configuration of the lever.

[0051] A second aspect provides a system comprising:

a back plate configured to be fixed to a mounting surface, the back plate comprising; a first valve, the first valve comprising a control lever; and an actuator comprising a first surface and a second surface, the first surface configured to contact a surface of the control lever; and
a faceplate configured to fix to the back plate, the faceplate comprising: a control member arranged to operably connect to the second surface of the actuator,
wherein the distance between the first surface and second surface of the actuator is adjustable in order to accommodate a variable distance between the back plate and faceplate.

[0052] The system may also comprise:

an intermediate plate configured to attach to the back plate, wherein the faceplate attaches to the intermediate plate.

[0053] In the assembled fitting, the second surface of the actuator may be flush with a plane of the intermediate plate.

[0054] The intermediate plate may comprise one or more apertures through which the actuator may be operable to at least partially extend.

[0055] The intermediate plate may comprise one or more portions arranged to extend at least partially across the one or more apertures. Such portions may act as a guide for lengthening the actuator. Such portions may act as a limiting means when lengthening the actuator.

[0056] 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.

[0057] Example embodiments will now be described with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a back plate for use in a control suitable for an ablutionary setting;

Figure 2 is a front view of the back plate of Figure 1;

Figure 3 is perspective view of the back plate of Figures 1 and 2 when affixed to a wall;

Figure 4 is perspective view of the back plate as shown in Figure 3 when the wall has tiles affixed to a front surface; and

Figure 5 is perspective view of the back plate as shown in Figure 3 where the back plate has been trimmed;

Figure 6 is perspective view of a back plate with an intermediate plate attached;

Figure 7 is a close up view of a portion of a back plate with an intermediate plate attached;

Figure 8 is a close up view of a back plate;

Figure 9 is a close up view of a back plate;

Figure 10 is a close up view of a back plate with an intermediate plate attached;

Figure 11 is a close up view of a back plate with an intermediate plate attached;

Figure 12 is a sectional view of a back plate with an intermediate plate attached;

Figure 13 is a perspective view of a control suitable for use in an ablutionary setting;

Figure 14 is a perspective view of an alternative embodiment of a back plate for use in a control suitable for an ablutionary setting;

Figure 15 is a close up view of the back plate of Figure 14;

Figure 16 is a sectional side view of a control comprising the back plate of **Figures 14** and 15 with a valve in an open configuration; and

Figure 17 is a sectional side view of a control comprising the back plate of Figures 14 and 15 with a valve in a closed configuration.

[0058] Referring to Figures 1 and 2, there is shown an example of a back plate 1 for use in a control suitable for an ablutionary setting.

[0059] The back plate 1 comprises a rectangular base 2 having a planar front surface 3 and a cylindrical side wall 4 extending axially outward from the front surface of the base 2. The sidewall 4 is spaced away from the edges of the base 2. The side wall 4 defines a circular perimeter, and defines a volume within it. Extending from the sides of the base 2, in the same plane as the front surface, is a plurality of water connection pipes 6. The water connection pipes 6 are configured to convey a flow of fluid from hot and cold water supplies.

[0060] The back plate 1 comprises a first actuator 10 disposed within the perimeter of the side wall 4. The first actuator comprises a first portion 12 and a second portion 14. The first portion 12 comprises a first surface 16 and the second portion 14 comprises a second surface 18.

[0061] The first portion 12 and second portion 14 are arranged to allow a threaded connection. The first portion 12 comprises a collar defining threaded hole extending along a longitudinal axis, parallel to the axial direction of the sidewall 4. The first surface 16 is formed on a projection 13 on the side of the collar.

[0062] The second portion 14 comprises an elongate threaded member 15 extending along the same axial direction as the hole in the first member 12. The threaded member 15 is arranged to be received within the threaded hole of the first portion 12, such that the screw threads on the threaded hole engage the screw threads on the threaded member 15. The second portion 14 is operable to be rotated relative to the first portion 12 such that the distance between the first surface 16 and the second surface 18 is lengthened or shortened depending on the direction of rotation. Since the first member 12 can move up and down the length of the second member 14, the overall length of the actuator is limited by the length of the second member 14. Whenever the second member 14 is fully received in the first member, the length of the actuator 10 is constant. If the end of the second member 14 is only partially received in the first member 12, the length of the actuator 10 is the length of the first member 12 projecting from the end of the second member 14, in addition to the length of the second member 14.

[0063] The second surface 18 is disposed upon a top portion 17 of the second portion 14, the top portion comprising a greater diameter than the threaded member 15.

[0064] A second actuator 10a and a third actuator 10b comprise similar configurations to the first actuator 10 and are arranged spaced apart.

[0065] The base 2 comprises a plurality of sleeves 19, each sleeve 19 being configured to receive at least a portion of an actuator 10. Each sleeve 19 is configured such that when an actuator 10 is received into the sleeve 19, the first portion 12 is prevented from rotating.

[0066] Temporary securing members 20 are disposed near to each of the actuators 10, 10a, 10b. Each temporary securing member 20 is rotatably connected to the back plate 1 and comprises an arm 22. The arm 22 can be rotated about an axis parallel to the actuator 10. The rotation of the arm 22 is about a pivot 23 located at a first end of the arm. Projections 25 are formed at the first end to enable rotation of the arm 22.

[0067] Each temporary securing member 20 is arranged to rotate between an engaged position and a disengaged position. Figure 2 shows the temporary securing members 20 in an engaged position. In the engaged position, the arm 22 is configured to contact the actuator 10. A second end of the arm 22, opposite the first end, contacts the actuator underneath a ledge 27 formed in the first member 12, and prevents the first member 12 of the actuator 10 from moving axially.

[0068] Each temporary securing member 20 present may be operated individually. The temporary securing members 20 are configured to receive a tool to assist with rotating between the engaged and disengaged configurations.

[0069] A thermostatic mixer cartridge 24 is disposed centrally upon the back plate 1. The thermostatic mixer cartridge 24 comprises a plurality of inlets and outlets (not shown), each open and closed by diaphragm valve modules 29. The thermostatic mixer cartridge 24 is configured to mix flows of water supplied from one or more water connection pipes 6, and convey a mixed supply of water to one or more other water connection pipes 6. The actuators 10, 10a, 10b are operably connected to the diaphragm valve modules 29 to open and close the inlets/outlets. As will be discussed in more detail, movement of the actuators 10, 10a, 10b along the axial direction operates the valve modules 29.

[0070] The method of installing a control suitable for use in an ablutionary setting comprises a step of affixing

the back plate 1 to a surface as shown in Figure 3. The surface may comprise a wall 30. The side wall 4 is arranged to protrude through an aperture disposed upon the wall 30, and as such the base 2 is not visible in Figures 3 to 5.

[0071] As shown in Figure 4, the wall 30 may have tiles 32 affixed to a front surface. As different walls 30 may have materials comprising different thicknesses affixed to a front surface, the distance between the base 2 and the most forward surface of the surrounding tiles 32 may vary significantly between installations.

[0072] The method may comprise a step of trimming or cutting at least a portion of the sidewall 4 to adjust the length the sidewall 4 extends form the back plate 1. This step is optional and may be omitted. Figure 5 shows a back plate 1 wherein the wall 4 has been trimmed.

[0073] Figure 6 shows a back plate 1 with an intermediate plate 40 connected. The intermediate plate 40 forms a connection to the side wall 4 of the back plate 1. The intermediate plate 40 is configured to contact the tiles 32, and as such extends a known distance away from the tiles 32. The intermediate plate 40 forms a connection with the side wall 4 by receiving a portion of the side wall into a rim portion 41. The rim portion 41 is configured such that a depth of side wall 4 can be received up to a pre-determined maximum depth. Any portion of side wall 4 up to the maximum depth will not affect the relative position between the intermediate plate at the surrounding tiles 32. As such, inaccuracies when trimming the side wall 4 will not affect further installation steps.

[0074] Different intermediate plates 40 may be used in different installations configured to receive different maximum depths of side wall 4.

[0075] As can be seen in figure 6, the intermediate plate 40 comprises a plurality of apertures through which actuators 10, 10a, 10b are arranged to at least partially extend. The intermediate plate comprises a planar surface 42 which provides a guidance plane.

[0076] The temporary securing member 20 is located underneath the intermediate plate 40. However, the intermediate plate 40 includes corresponding apertures to allow access to the end of the temporary securing member 20, to allow the temporary securing member 20 to be rotated between the engaged and disengaged positions.

[0077] With the temporary securing member 20 in the engaged position, the second portion 14 of the actuators 10, 10a, 10b can be rotated relative to the first portion 12, to lengthen or shorten the distance between the first surface 16 and the second surface 18. The actuators 10, 10a, 10b may be lengthened or shortened such that the second surface 18 is flush with the plane of the planar surface 42 of the intermediate plate 40. The temporary securing member 20 can then be rotated to the disengaged position.

[0078] A separate tool may be used to rotate each actuator 10 and/or temporary securing member 20. Figures 6 and 7 show that the top portion 17 of the second member 14 may include a shaped recess 21 such that a hex key (not shown) may be received by the top portion 17 of the second portion 14 and used to rotate the second portion 14. Likewise, the projections extending from the arm may be used to engage a tool, or to allow a user to manually rotate the arm 22.

[0079] Figure 7 shows the back plate 1 and intermediate plate 40 after connecting a means for preventing further adjustment of the distance between the first surface 16 and second surface 18. The means for preventing further adjustment is a fixing member 28. The fixing member 28 connects to the intermediate plate 40. The fixing member 28 is configured to receive at least a portion of the top portion 17 of the actuator 10. The fixing member 28 and the top portion 17 comprise cooperating features such that the top portion 17, and therefore the second portion 14 of the actuator 10, cannot rotate. In the example shown, engaging ridges and grooves extending along the axial direction of the actuator 10 are used. As such, once the fixing member 28 has been connected to the intermediate plate 40, the distance between the first surface 16 and the second surface 18 is fixed.

[0080] Figure 8 shows a close up view of an actuator 10 and a temporary securing member 20. The arm 22 of the temporary securing member 20 is operable to connect to the actuator 10 at an upper region of the first portion 12. The temporary securing member 20 is configured to prevent axial movement of the first portion 12, and therefore the first surface 16 is prevented from moving axially. The temporary securing member 20 does not prevent rotation of the second portion 18 relative to the first portion 16.

[0081] Rotation of the second portion 18 causes axial movement of the second surface 18 relative to the first surface 16. Figure 9 shows the actuator in a lengthened configuration where the distance between the first surface 16 and the second surface 18 has been increased. The threaded member 15 can be seen extending from the first portion 12. The threaded connection between the first portion 12 and the second portion 14 allows for precise lengthening or shortening of the distance between the first surface 16 and the second surface 18.

[0082] When the intermediate plate 40 has been connected to the side wall 4 of the back plate 1, as shown in Figure 10, the planar surface 42 provides a guidance plane for adjusting the actuator 10 such that the second surface 18 is at the desired distance from the first surface 16. The second portion 14 is operable to be rotated by hand or by using a separate detachable tool as discussed above, until the second surface 18 is flush with the planar surface 42 of the intermediate plate 40.

[0083] Once the second surface 18 is flush with the planar surface 42 of the intermediate plate 40, the temporary securing member 20 is disengaged and the fixing member 28 can be connected to the intermediate plate 40 as shown in Figure 11. At least a portion of the top portion 17 is received by the fixing member 28. The cooperating surfaces of the fixing member 28 and the top

portion 17 are arranged such that the top portion 17 is prevented from rotating. As such, the distance between the first surface 16 and the second surface 18 becomes fixed.

[0084] Figure 12 shows a sectional view of a portion of the back plate 1. The actuator 10 is positioned within the back plate 1, the intermediate plate 40 has been connected to the back plate 1 and the fixing member 28 has been connected to the intermediate plate 40. Specifically, the actuator 10 has been received by the sleeve 19 and as such the first portion 12 is prevented from rotating. The second surface 16 is arranged to contact a lever arm 38 of a control lever 36 of the diaphragm valve module 29.

[0085] The control lever 36 is arranged to extend from the diaphragm valve module 29 and is arranged to rotate about an axis perpendicular to the axial direction of the actuator 10. In some embodiments, control lever 36 is operable to adjust the diaphragm valve module 29 from a closed configuration to an open configuration, or vice versa.

[0086] The first surface 16 contacts the control lever 36 such that movement of the first surface 16 in a first axial direction urges the lever arm 38 in the first direction. In use, with the temporary securing member 20 disengaged, a downward force on the top surface 17 of the second portion of the actuator 10 causes the actuator 10 to move downward in the axial direction. This causes the first surface 16 to be urged downwards, and as such the lever arm 38 moves downwards to rotate the control lever 36.

[0087] In the embodiments discussed above, the control lever 36 is operably connected to a diaphragm valve, but any other type of valve may be used.

[0088] Figure 13 shows an example embodiment of a faceplate 50 that has been connected to the back plate 1. The faceplate 50 comprises two push buttons 52 and a rotary control 54. The rotary control 54 is operably connected to the thermostatic cartridge 24. The push buttons 52 are operably connected to actuators 10 such that upon a button being pressed towards the plane of the tiles 52 by a user, the corresponding actuator 10 moves axially in the same direction. The push buttons 52 may include projections on their back surface to engage with the top of the actuator member to translate the downward force.

[0089] The second surface 18 of the actuators 10 has been adjusted such that it is flush with the planar surface 42 of the intermediate plate 40, and as such the push buttons 52 sit flush with a front surface 56 of the faceplate 50. In use, the push buttons 52 are operable to be depressed manually by a user. In some embodiments, the push buttons 52 are resiliently biased such that after being depressed each push button 52 returns to being flush with the front surface 56 of the faceplate 50. The control lever 36 of the diaphragm valve module 29 may also be resiliently biased such that the actuator 10 returns to its original position, ready to be actuated by the button. The control lever 36 may be biased such that the actuator 10 is biased towards the push button 52.

[0090] One or more of the push button, actuator and diaphragm valve module 29 may include a latching mechanism to ensure that when the valve is opened, it remains open until the button is actuated again, and when the valve is closed, it remains closed until the button is actuated again. Alternatively, there may be no latching and the valve may only be open when the button is depressed.

[0091] Referring to Figures 14 to 17, there is shown an example of an alternative back plate 101 for use in a control suitable for an ablutionary setting. The embodiment described in relation to Figures 14 to 17 is the same as discussed above, unless explicitly stated otherwise.

[0092] The back plate 101 is substantially the same as the back plate 1 of Figures 1 to 13 and comprises a rectangular base 102 having a planar front surface 103 and a cylindrical side wall 104 extending axially outward from the front surface of the base 102. The sidewall 104 is spaced away from the edges of the base 102. The side wall 104 defines a circular perimeter, and defines a volume within it. Extending from the sides of the base 102, in the same plane as the front surface, is a plurality of water connection pipes 106. The water connection pipes 106 are configured to convey a flow of fluid from hot and cold water supplies.

[0093] The back plate 101 comprises a first actuator 110 disposed within the perimeter of the side wall 104. The first actuator comprises a first portion 112 and a second portion 114.

[0094] The first portion 112 and second portion 114 are arranged to allow a threaded connection. The first portion 112 comprises a collar defining threaded hole extending along a longitudinal axis, parallel to the axial direction of the sidewall 104.

[0095] The first portion 112 comprises a first surface 116, and the second portion 114 comprises a second surface 118.

[0096] The first surface 116 comprises a planar surface disposed at an end of the first portion 112. The second surface 118 comprises a substantially planar surface disposed at an end of the second portion 112. The second surface 118 is disposed at an opposing end of the actuator 110 to the first surface 116. The threaded hole does not extend through the second surface 118 of the first portion 112.

[0097] Since the first member 112 can move up and down the length of the second member 114 in a similar manner to the first embodiment, the overall length of the actuator is limited by the length of the second member 114. The overall length of the actuator 110 is the length of the first member 112 projecting from the end of the second member 114, in addition to the length of the second member 114.

[0098] A second actuator 110a and a third actuator 110b comprise similar configurations to the first actuator 110 and are arranged spaced apart.

[0099] The base 102 comprises a plurality of sleeves 119, each sleeve 119 being configured to receive at least a portion of an actuator 110. Each sleeve 119 is config-

ured such that when an actuator 110 is received into the sleeve 119, the first portion 112 is prevented from rotating.

[0100] A thermostatic mixer cartridge 124 is disposed centrally upon the back plate 1. The thermostatic mixer cartridge 124 comprises a plurality of inlets and outlets (not shown), each open and closed by one or more valves (not shown). The thermostatic mixer cartridge 124 is configured to mix flows of water supplied from one or more water connection pipes 106, and convey a mixed supply of water to one or more other water connection pipes 106. The actuators 110, 110a, 110b are operably connected to the valves to open and close the inlets/outlets. Movement of the actuators 110, 110a, 110b along the axial direction operates the valves.

[0101] The method of installing a control suitable for use in an ablutionary setting comprises a step of affixing the back plate 101 to a surface as shown in Figure 15. The surface may comprise a wall and the side wall 4 is arranged to protrude through an aperture disposed upon the wall, and as such the base 102 is not visible in Figure 15.

[0102] As shown in Figure 15, the wall may have tiles 132 affixed to a front surface. As different walls may have materials comprising different thicknesses affixed to a front surface, the distance between the base 102 and the most forward surface of the surrounding tiles 132 may vary significantly between installations.

[0103] The method may comprise a step of trimming or cutting at least a portion of the sidewall 104 to adjust the length the sidewall 104 extends form the back plate 101. This step is optional and may be omitted.

[0104] Figure 15 shows a back plate 101 with an intermediate plate 140 connected. The intermediate plate 140 forms a connection to the side wall 104 of the back plate 101. The intermediate plate 140 is configured to contact the tiles 132, and as such extends a known distance away from the tiles 132. The intermediate plate 140 forms a connection with the side wall 104 by receiving a portion of the side wall into a rim portion 141. The rim portion 141 is configured such that a depth of side wall 104 can be received up to a pre-determined maximum depth. Any portion of side wall 104 up to the maximum depth will not affect the relative position between the intermediate plate at the surrounding tiles 132. As such, inaccuracies when trimming the side wall 104 will not affect further installation steps.

[0105] Different intermediate plates 140 may be used in different installations configured to receive different maximum depths of side wall 104.

[0106] The intermediate plate 140 comprises a plurality of apertures through which actuators 110, 110a, 110b are arranged to at least partially extend. The intermediate plate comprises a planar surface 142 in which the apertures are disposed.

[0107] A tab 143 is arranged to extend from the planar surface 142 and across at least a portion of each aperture. Each tab 143 is disposed in substantially the same plane as the planar surface 142.

[0108] Each tab 143 is arranged such that axial movement of the actuator 110, 110a, 110b is limited. As such, each tab 143 acts as a guide for extending the actuator 110, 110a, 110b to the correct length.

[0109] Rotation of the second portion 114 causes axial movement of the second surface 118 relative to the first surface 116. The threaded connection between the first portion 112 and the second portion 114 allows for precise lengthening or shortening of the distance between the first surface 116 and the second surface 118.

[0110] When the intermediate plate 140 has been connected to the side wall 104 of the back plate 101, as shown in Figure 15, the tab 143 provides a limiting means for adjusting the actuator 110 such that the second surface 118 is at the desired distance from the first surface 116. The second portion 114 is operable to be rotated by hand or by using a separate detachable tool as discussed above, until the second surface 118 contacts the tab 143.

[0111] Once the second surface 118 abuts the tab 143, a fixing member can be connected to the intermediate plate 140. The fixing member is arranged substantially similarly to the fixing member 28 as shown in Figure 11. At least a portion of the top portion 117 is received by the fixing member. The cooperating surfaces of the fixing member and the top portion 117 are arranged such that the top portion 117 is prevented from rotating. As such, the distance between the first surface 116 and the second surface 118 becomes fixed.

[0112] Figure 16 and 17 show a sectional view of a portion of the back plate 101. The actuator 110 is positioned within the back plate 101, the intermediate plate 140 has been connected to the back plate 011 and the fixing member has been connected to the intermediate plate 140. Specifically, the actuator 10 has been received by the sleeve 119 and as such the first portion 112 is prevented from rotating. The second surface 116 is arranged to contact a lever arm 138 of a control lever 136 of the valve. A threaded shaft 115 of the second portion 114 is shown connected to the first portion 112.

[0113] Figure 16 shows the lever arm 138 raised such that the valve is in a closed configuration. Figure 17 shows the lever arm lowered such that the valve is in an open configuration. When installing the control, the length of the actuator 110 is adjusted when the valve is closed, as in Figure 16, as this represents the furthest extent the actuator 110 will move away from the base 102.

[0114] The control lever 136 is arranged to extend from the valve and is arranged to rotate about an axis perpendicular to the axial direction of the actuator 110. In some embodiments, control lever 136 is operable to adjust valve from a closed configuration to an open configuration, or vice versa.

[0115] The first surface 116 contacts the control lever 136 such that movement of the first surface 116 in a first axial direction urges the lever arm 138 in the first direc-

tion. In use, a downward force on the second portion 114 of the actuator 110 causes the actuator 110 to move downward in the axial direction. This causes the first surface 116 to be urged downwards, and as such the lever arm 138 moves downwards to rotate the control lever 136.

[0116] In embodiments, the control lever 136 may be operably connected to any suitable type of valve.

[0117] It will be understood that the invention is not limited to the embodiments described above. Various modifications and improvements can be made without departing from the concepts disclosed herein. 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.

[0118] Other embodiments are intentionally within the scope of the invention as defined by the appended claims.

Claims

1. A method of installing a control suitable for use in an ablutionary setting, comprising the steps:

   affixing a back plate to a mounting surface, the back plate comprising; a first valve, the first valve comprising a control lever; and an actuator comprising a first surface and a second surface, the first surface configured to contact a surface of the control lever;
   adjusting the actuator such that the distance between the first surface and second surface is lengthened or shortened;
   affixing a faceplate to the back plate, the faceplate comprising a control member arranged to operably connect to the second surface of the actuator.

2. A method according to claim 1 wherein the back plate is arranged such that a portion of the back plate extends through an aperture in the mounting surface.

3. A method according to any previous claim wherein the control lever is operable to adjust a flow of water to or from the valve.

4. A method according to any previous claim wherein the actuator is arranged to be lengthened or shortened any distance between a maximum length and a minimum length.

5. A method according to any previous claim wherein the actuator comprises cooperating threaded portions.

6. A method according to any previous claim wherein a first portion comprises a female threaded portion and a second portion comprises a male threaded portion.

7. A method according to any previous claim wherein the first surface contacts the control lever such that movement of the first surface in a first direction urges the control lever in the first direction.

8. A method according to any previous claim wherein the method comprises a step of connecting a means for preventing further adjustment of the distance between the first surface and second surface to the back plate.

9. A method according to any previous claim having one or more of the following features:

   wherein the means for preventing further adjustment prevents rotation of the second portion but allows axial movement of the actuator; and/or
   wherein the method comprises a step of trimming or cutting at least a portion of the back plat; and/or
   wherein the control member comprises a push switch.

10. A method according to any previous claim wherein the step of adjusting the actuator comprises:

    connecting an intermediate plate to a front surface of the back plate; and
    adjusting the actuator to lengthen or shorten the distance between the first surface and second surface.

11. A method according to claim 10 wherein the intermediate plate comprises an aperture through which the actuator is arranged to at least partially extend.

12. A method according to claim 11 wherein the distance between the first surface and second surface of the actuator is lengthened or shortened such that the second surface is flush with the region of the intermediate plate surrounding the aperture through which the actuator is configured to at least partially extend.

13. A method according to claim 10 or claim 11 wherein the step of adjusting the actuator comprises adjusting the actuator to lengthen the distance between the first surface and second surface such that the second portion abuts a portion of the intermediate plate.

14. A system comprising:

a back plate configured to be fixed to a surface, the back plate comprising; a first valve, the first valve comprising a control lever; and an actuator comprising a first surface and a second surface, the first surface configured to contact a surface of the control lever; and
a faceplate configured to fix to the back plate, the faceplate comprising: a control member arranged to operably connect to the second surface of the actuator,
wherein the distance between the first surface and second surface of the actuator is adjustable in order to accommodate a variable distance between the back plate and faceplate.

15. The system according to claim 14 comprising:
an intermediate plate configured to attach to the back plate, wherein the faceplate attaches to the intermediate plate.

Figure 1

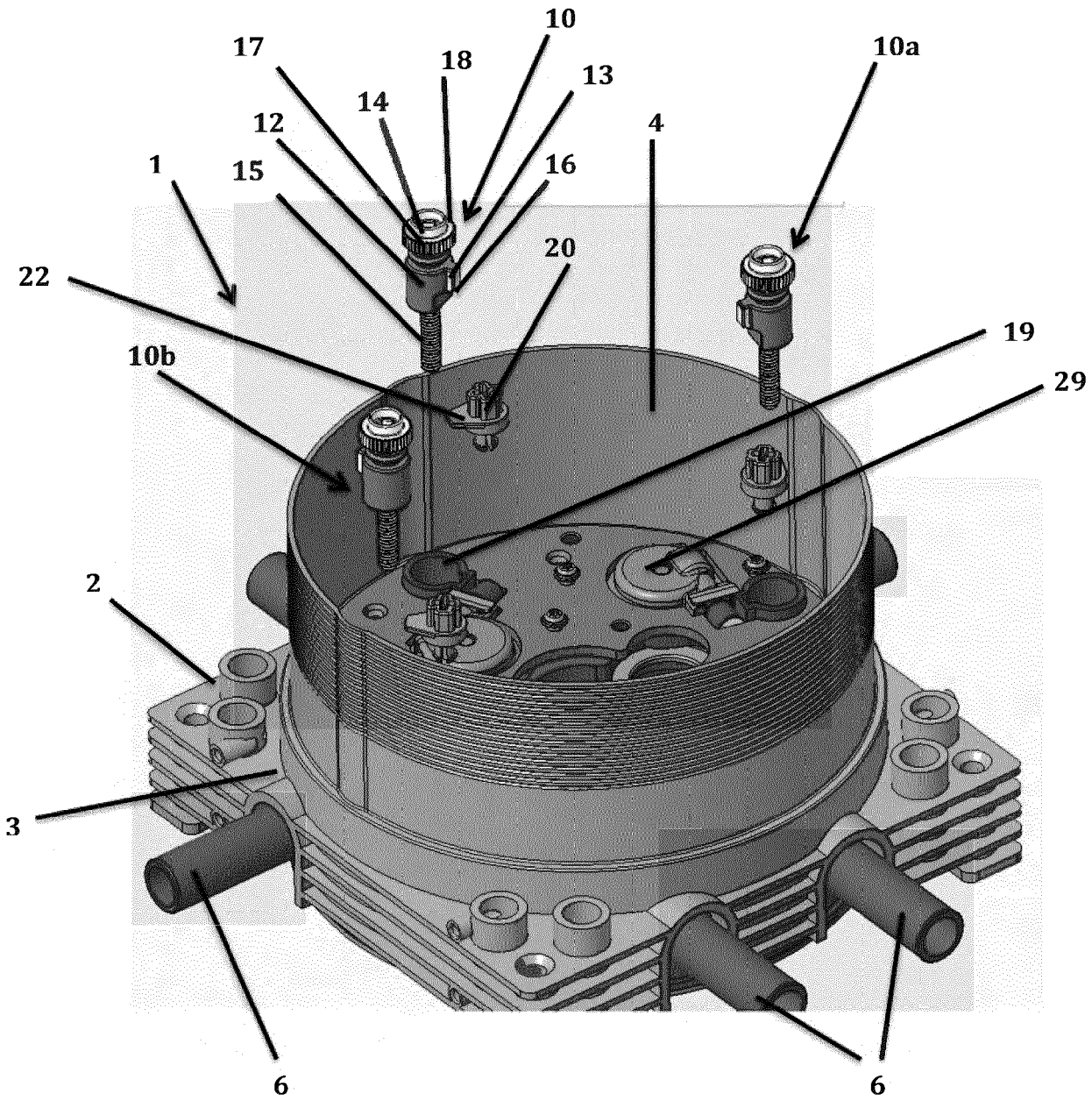


Figure 2

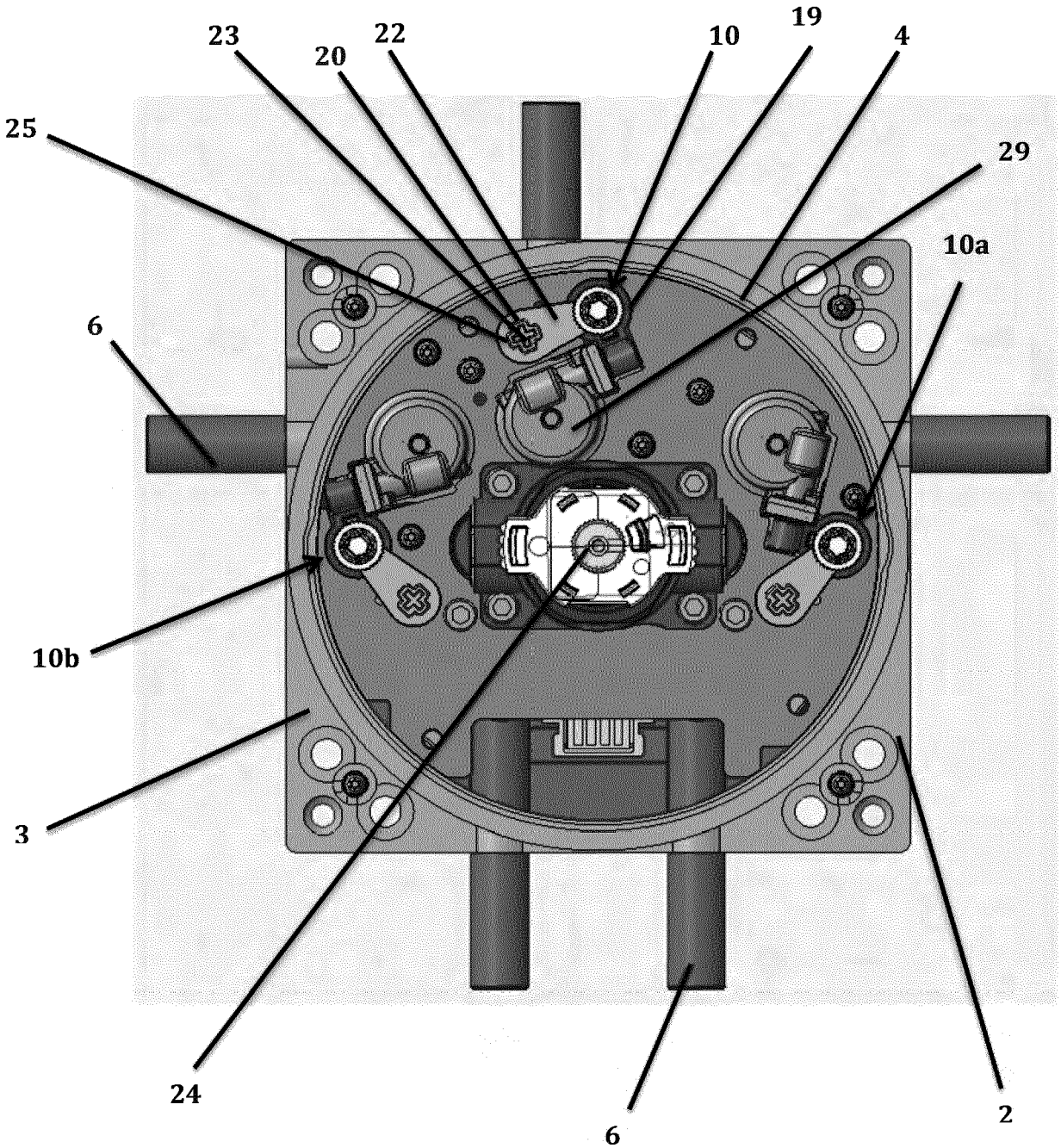


Figure 3

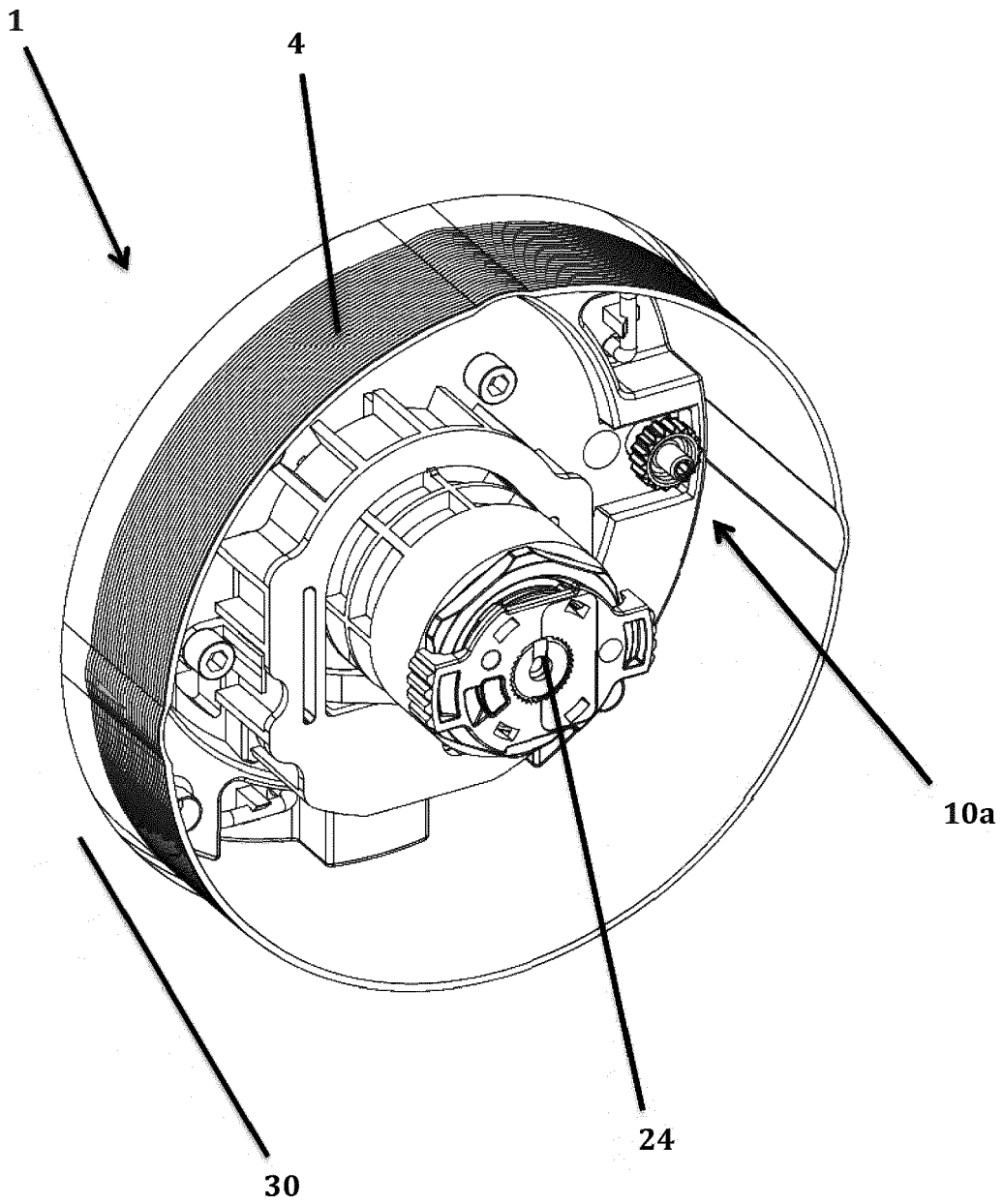


Figure 4

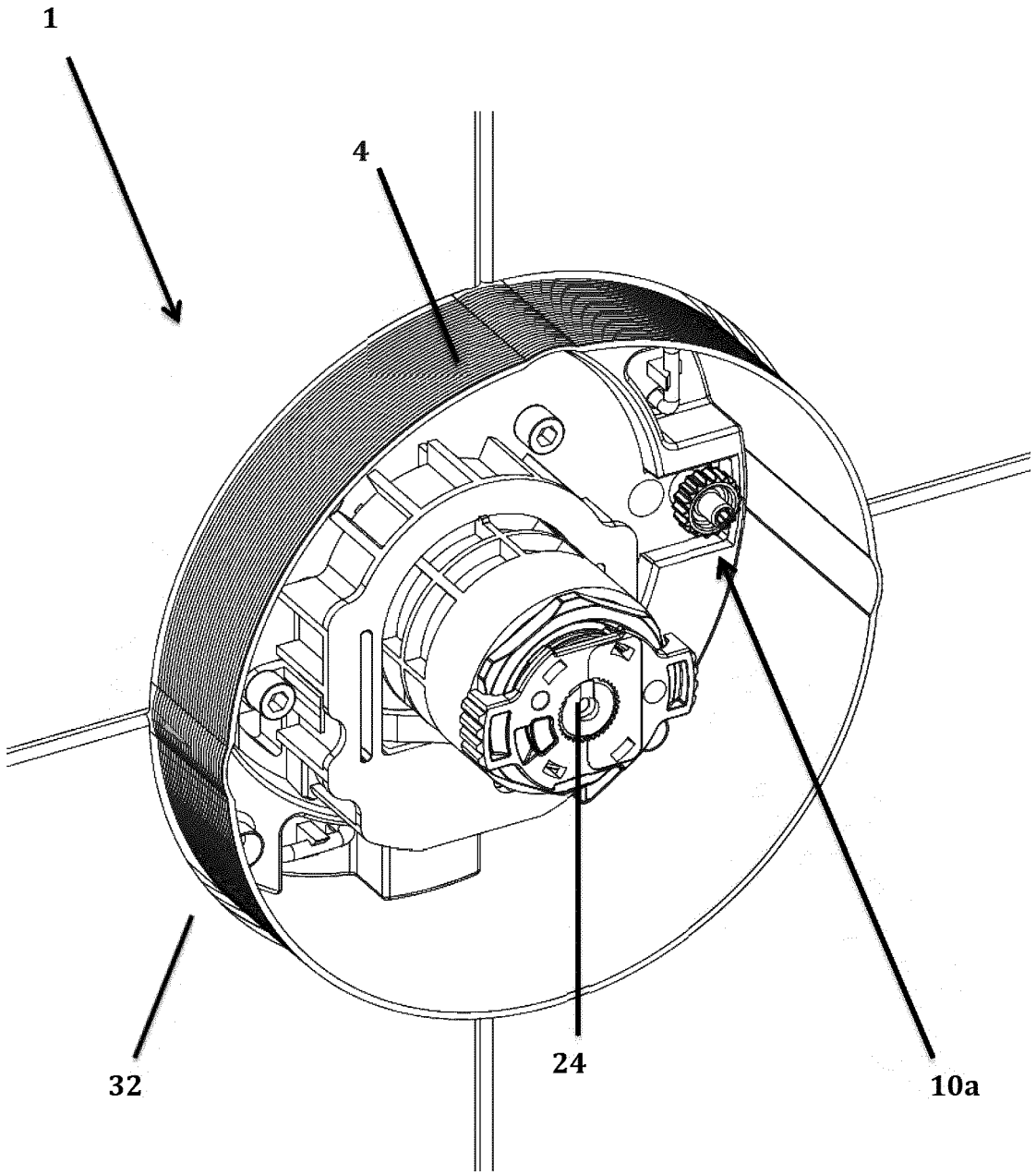


Figure 5

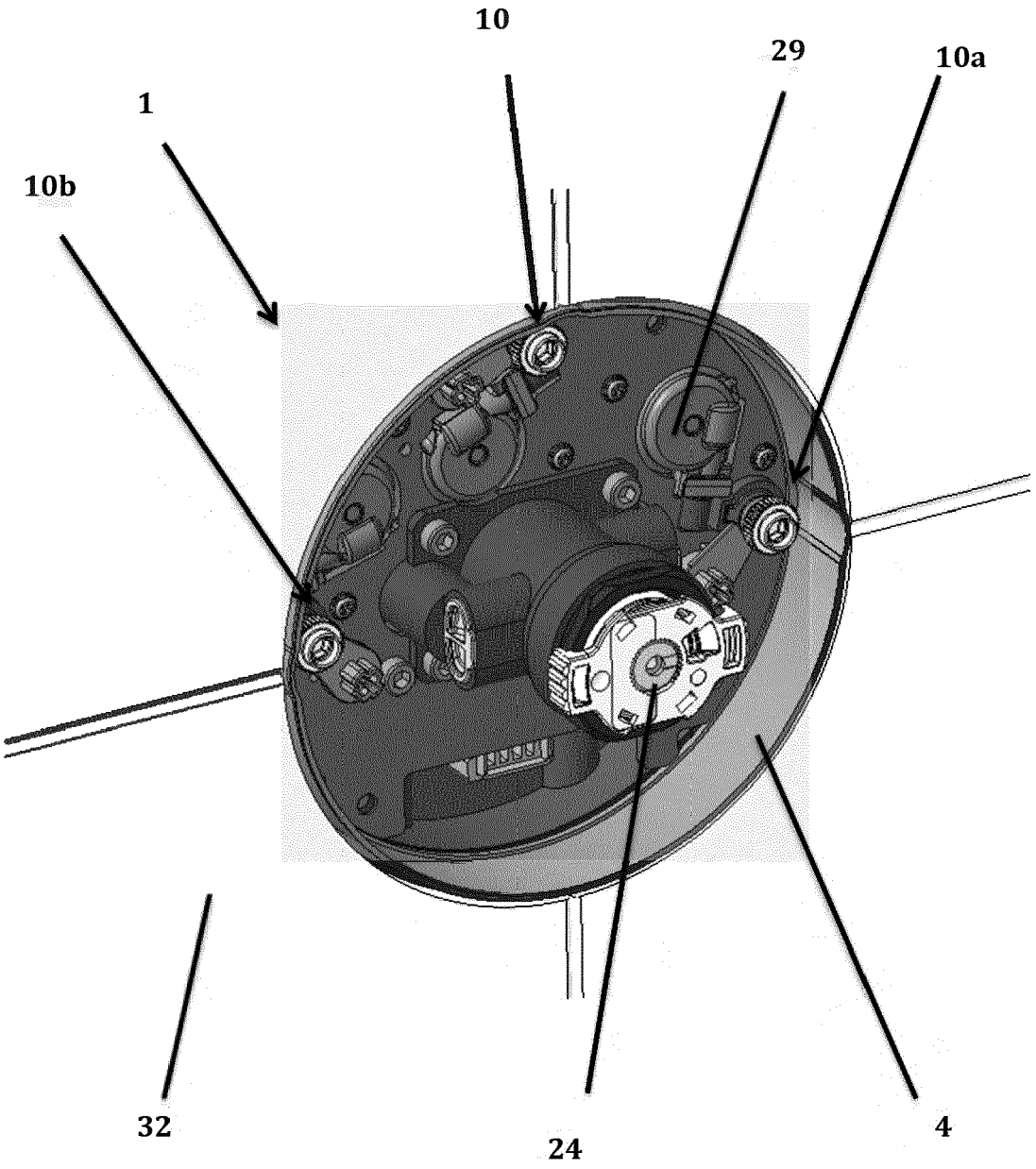
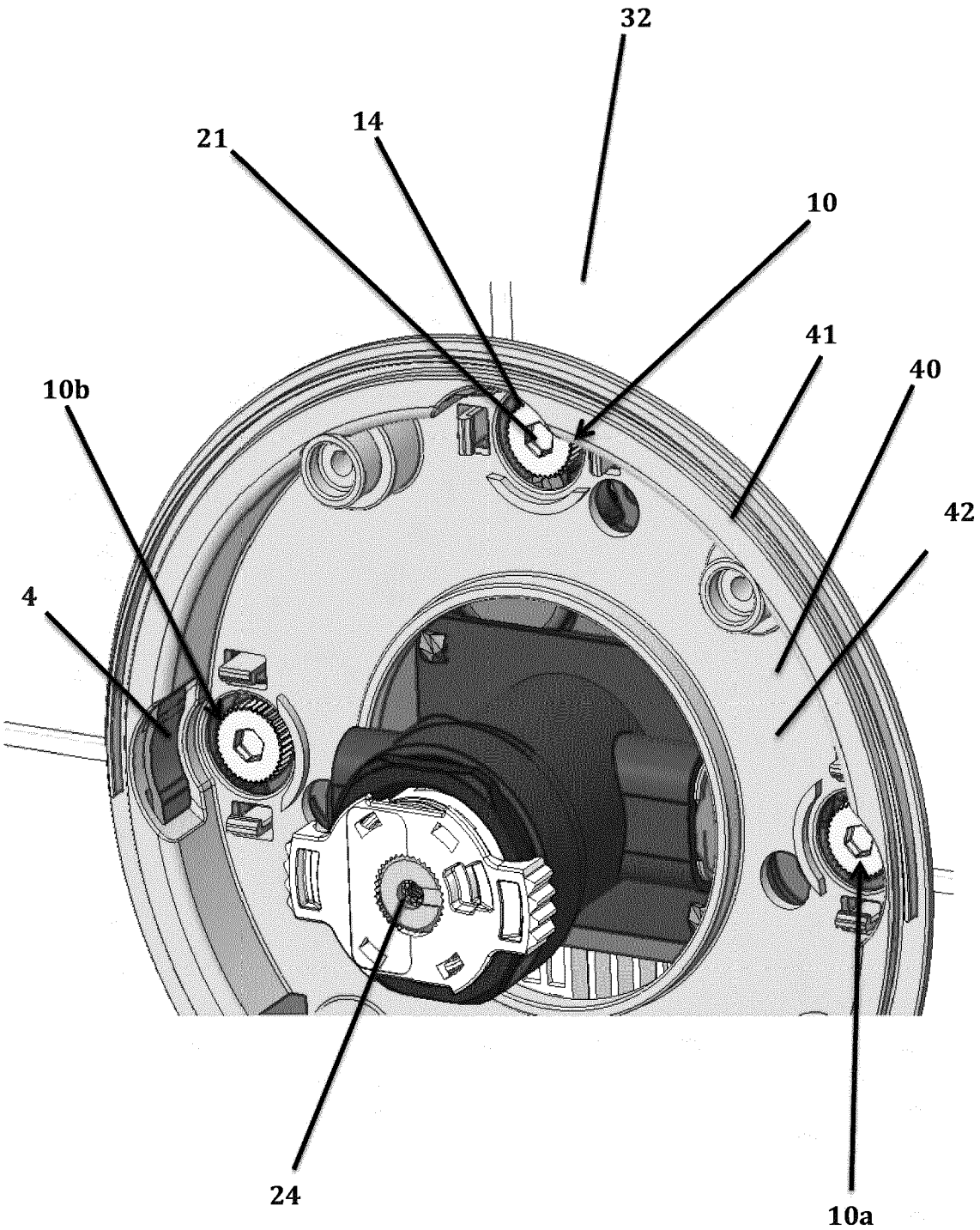


Figure 6



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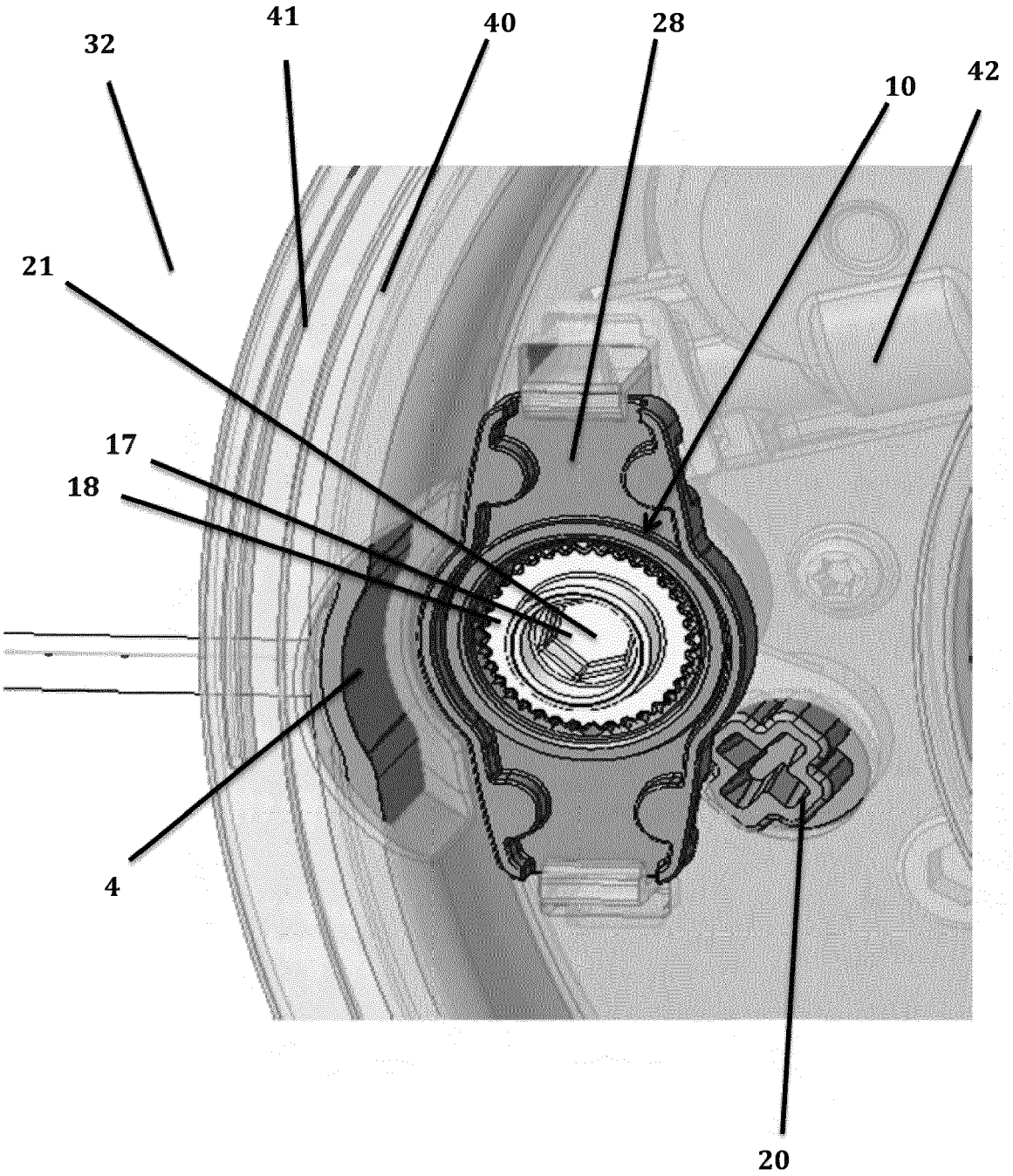


Figure 8

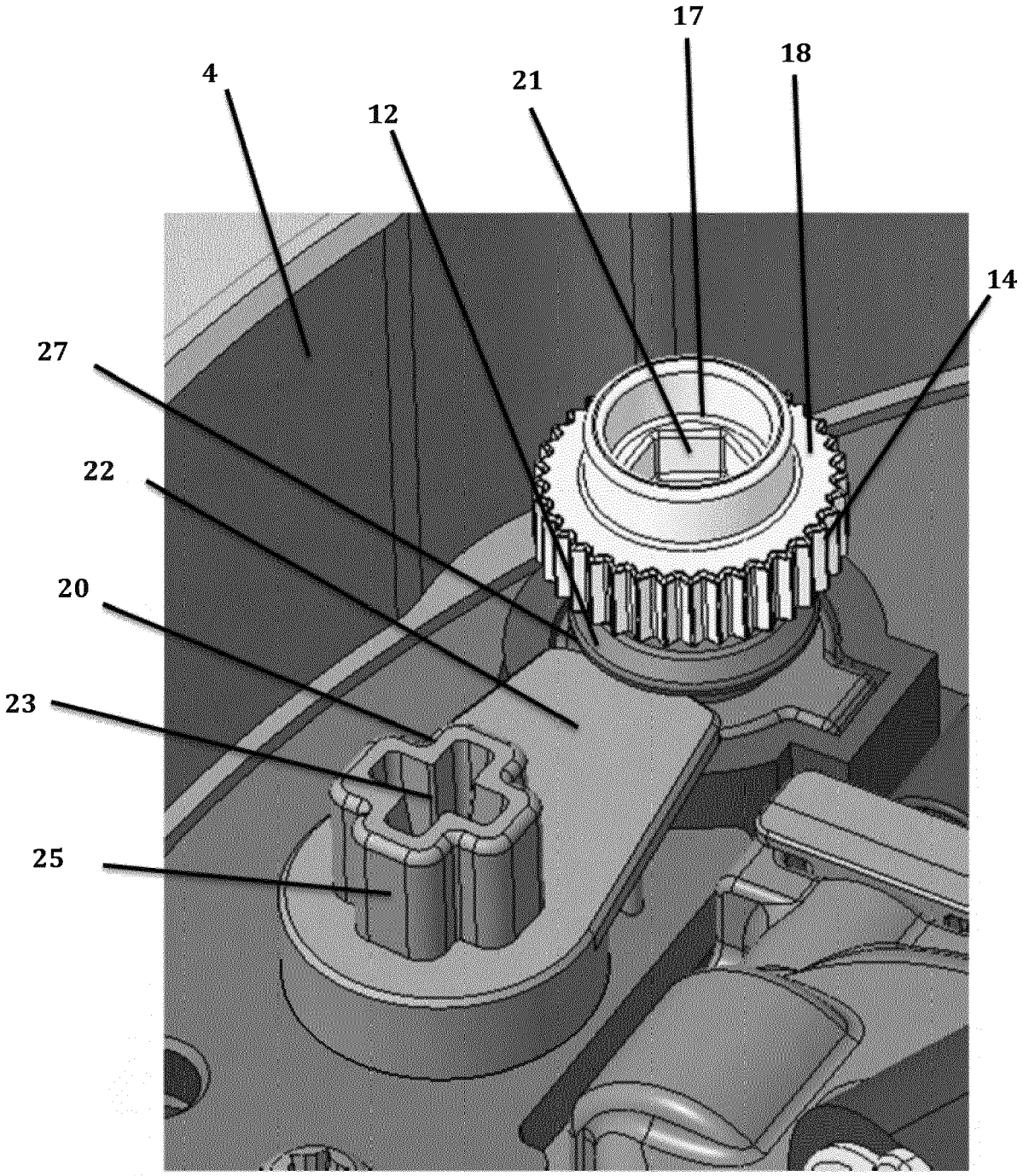


Figure 9

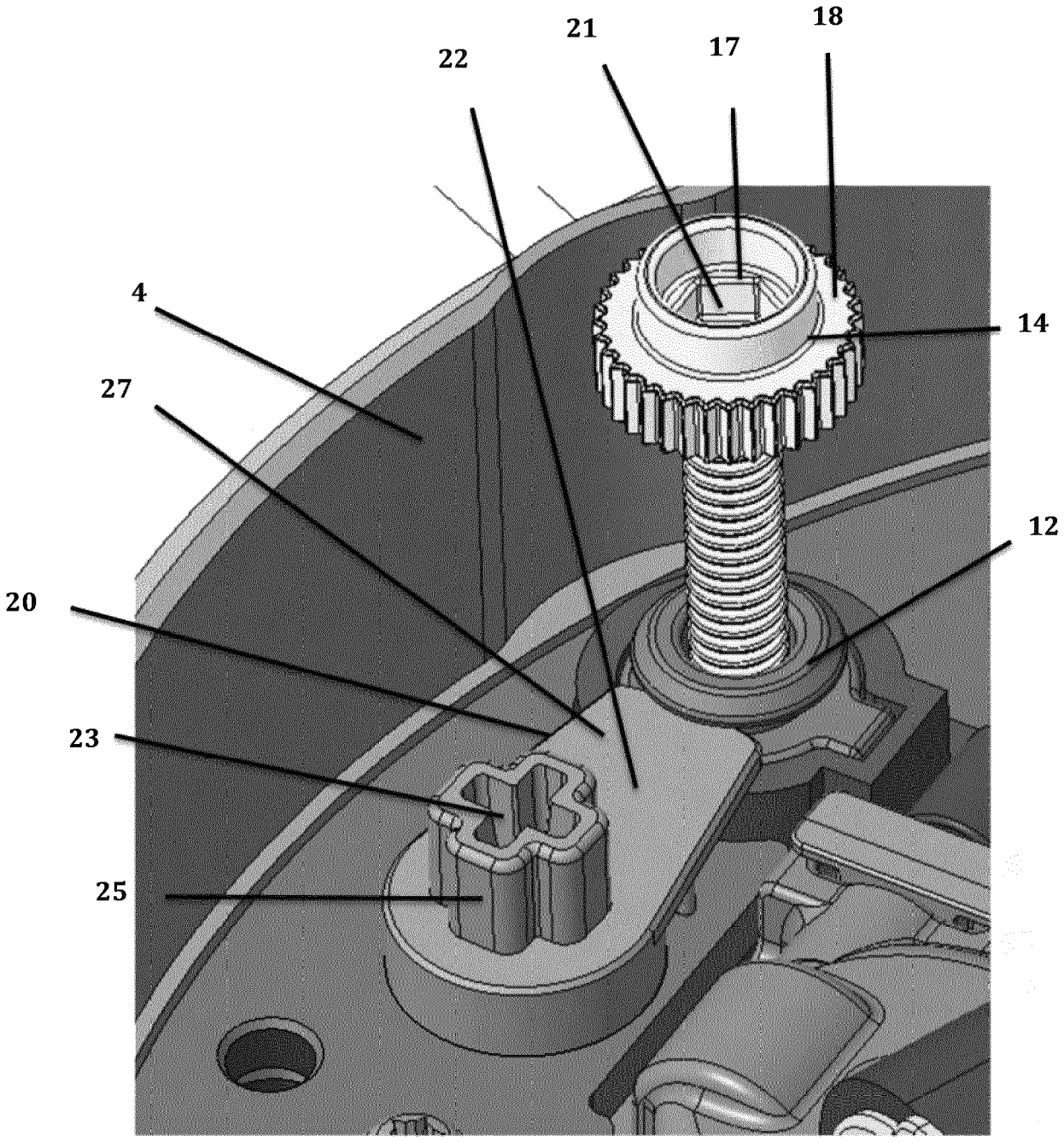


Figure 10

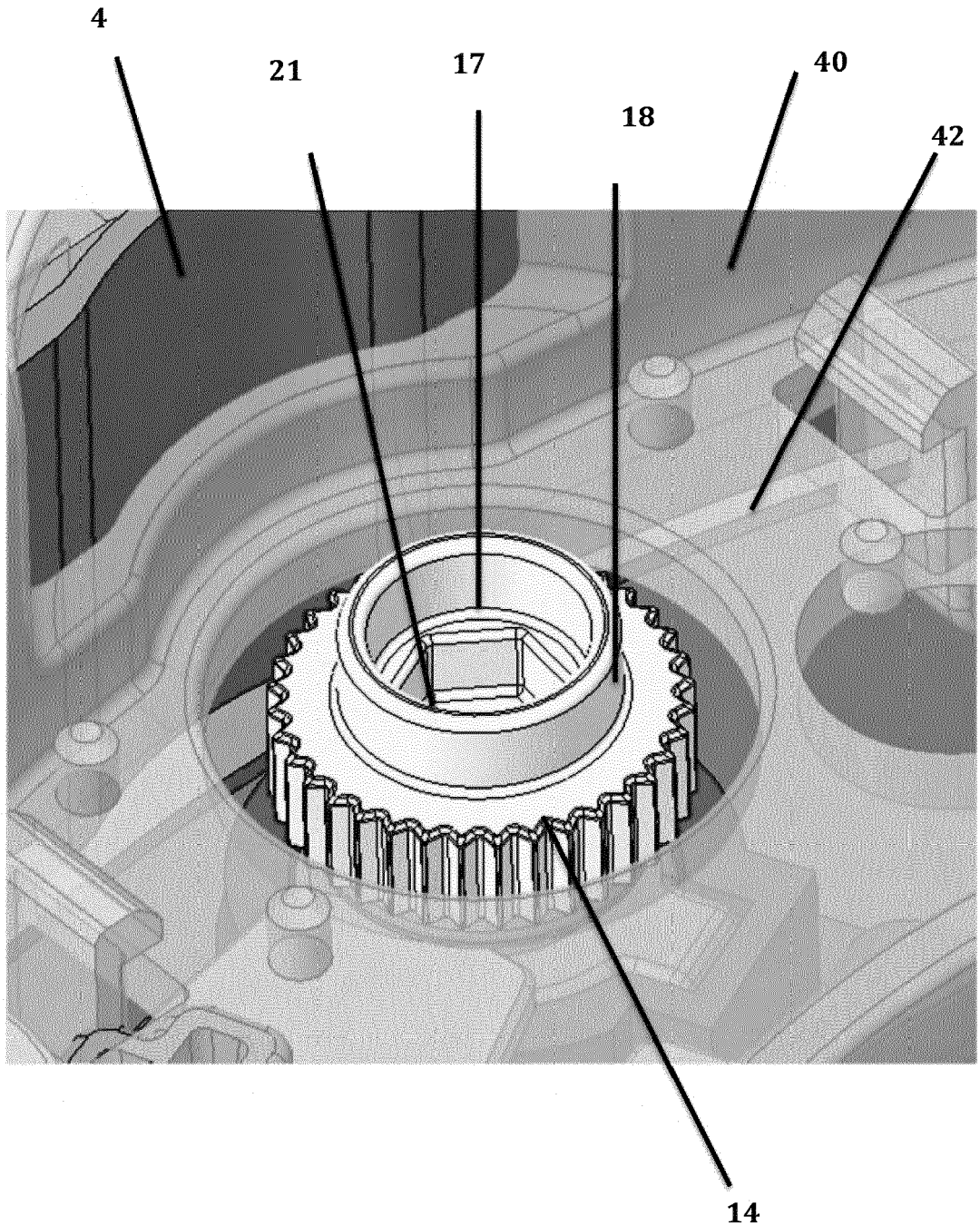


Figure 11

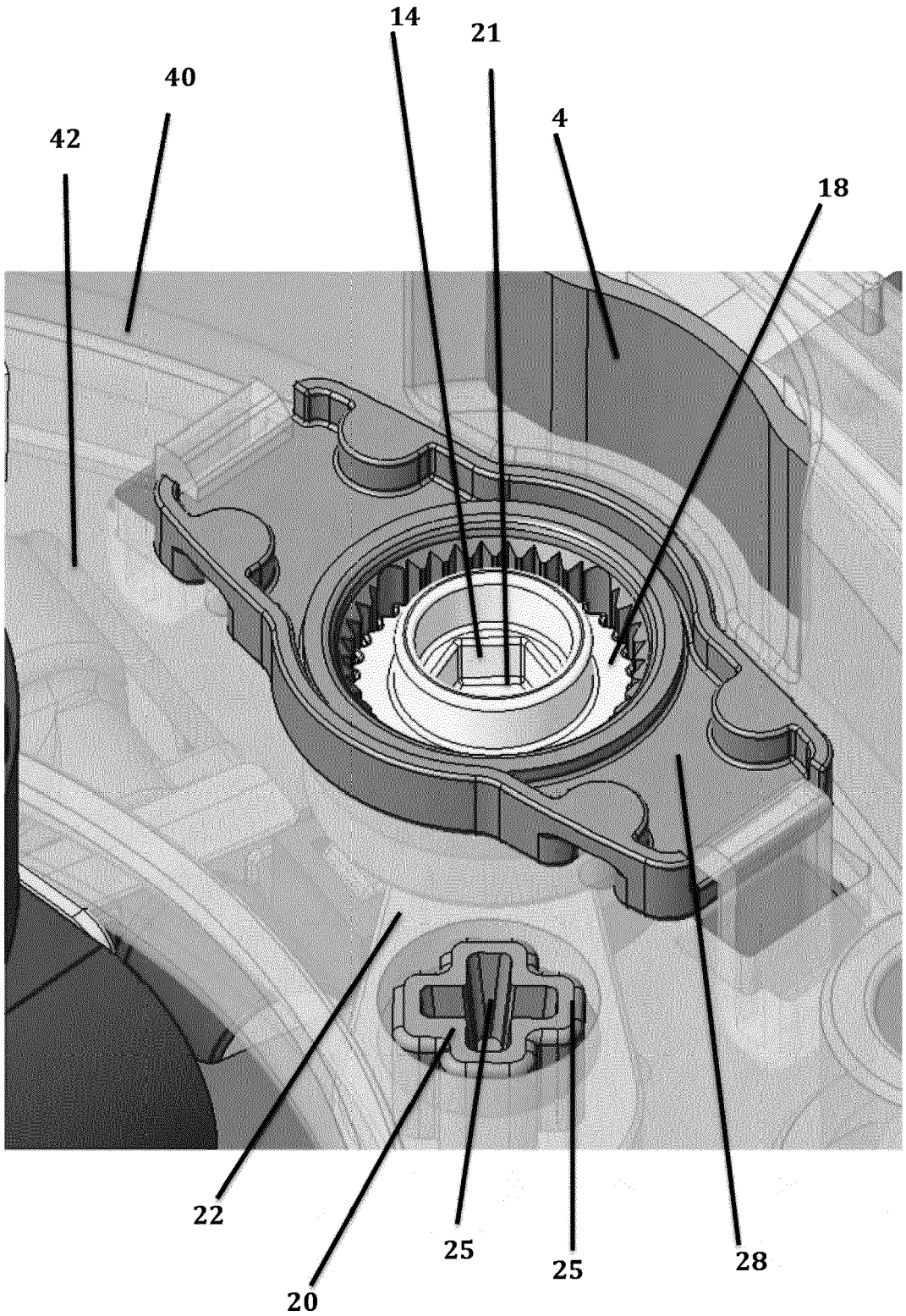


Figure 12

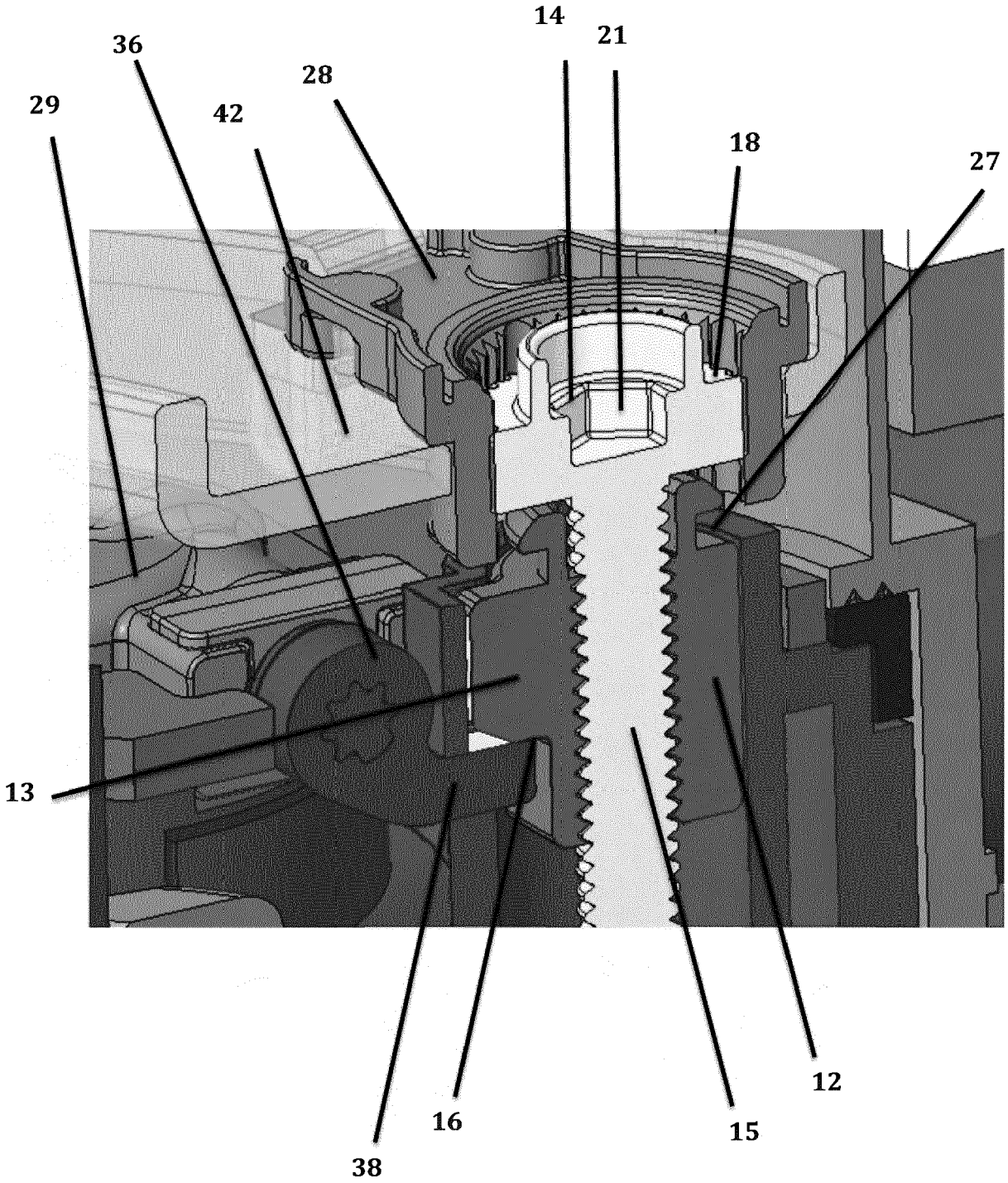


Figure 13

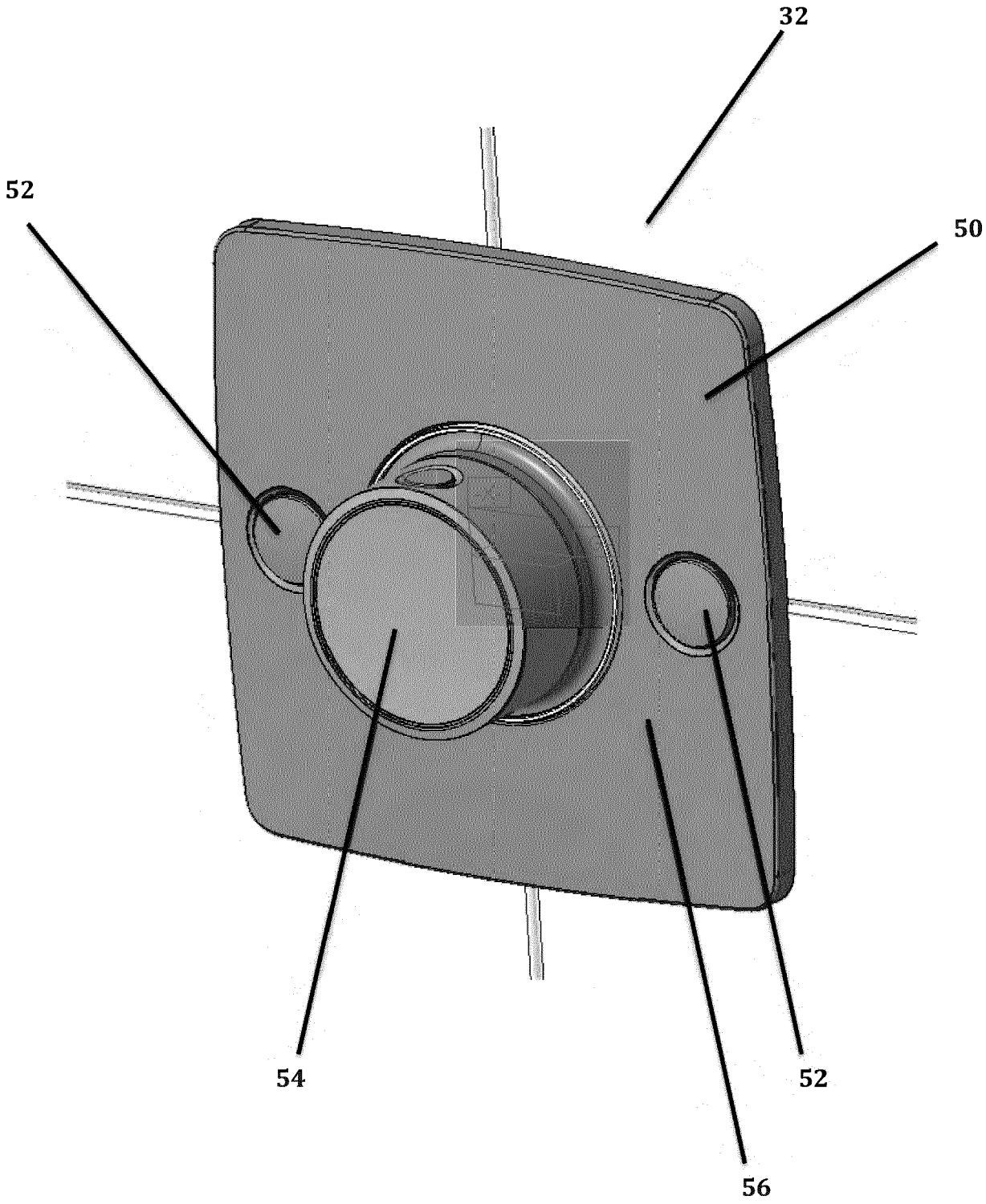


Figure 14

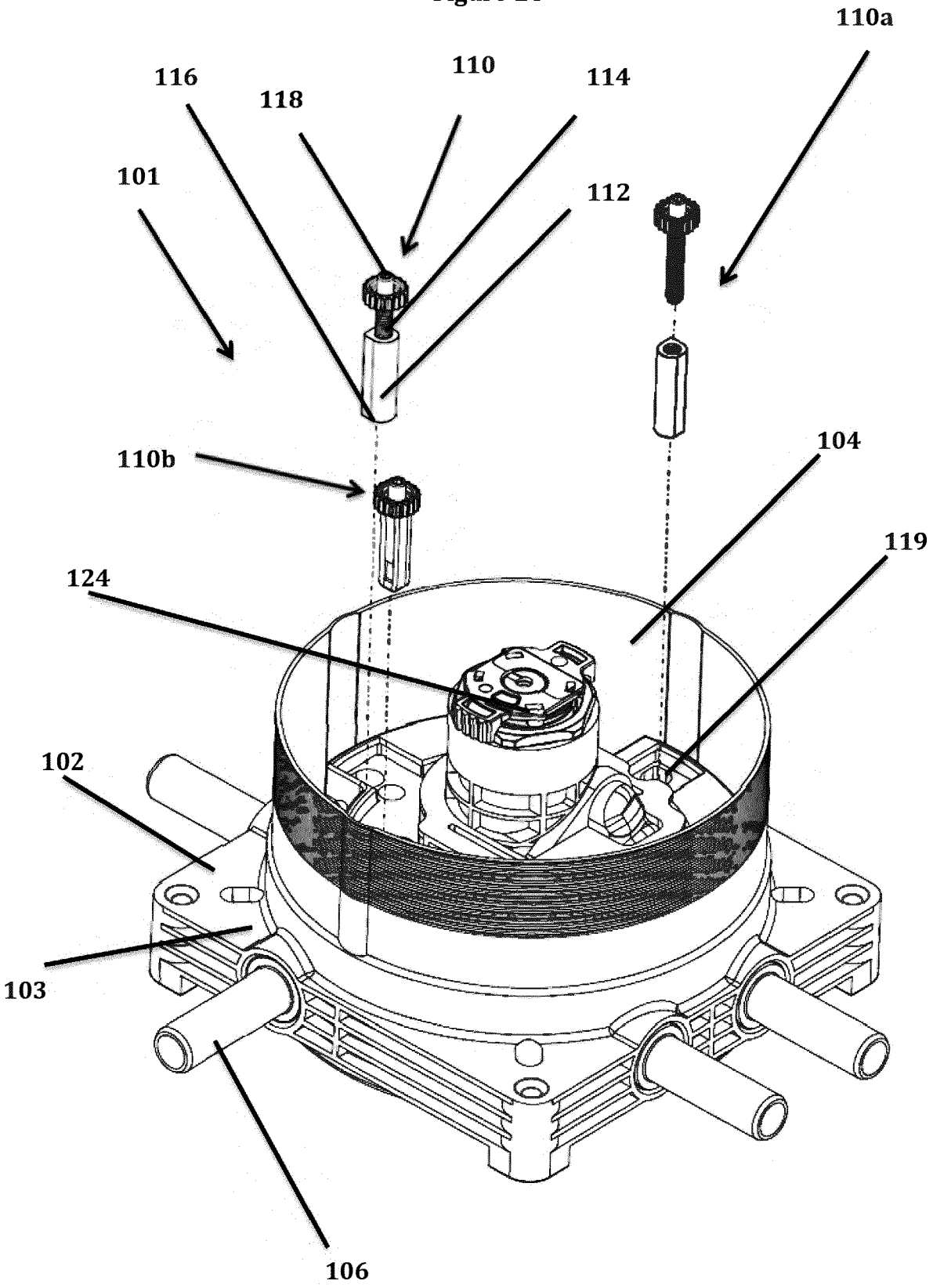


Figure 15

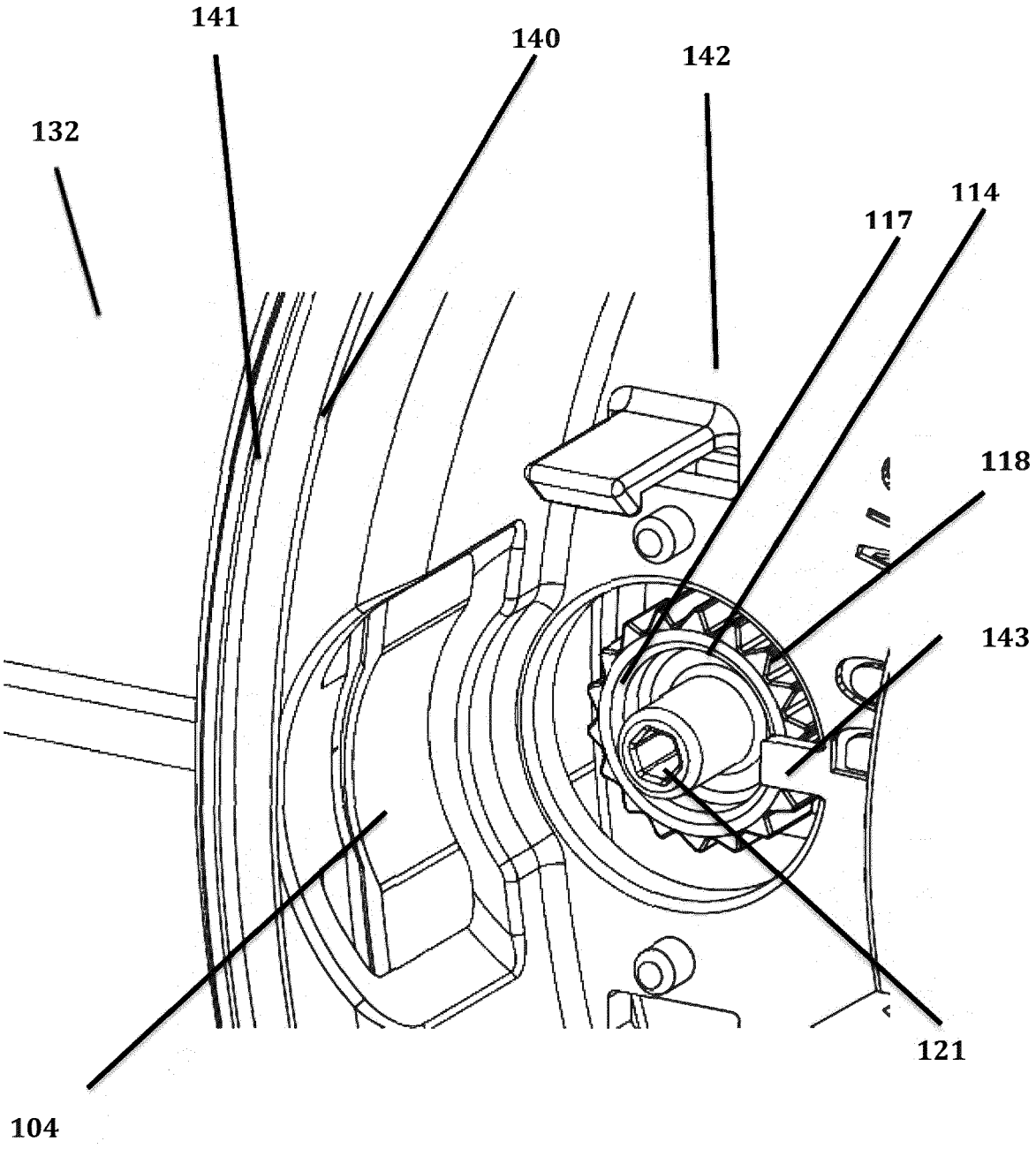


Figure 16

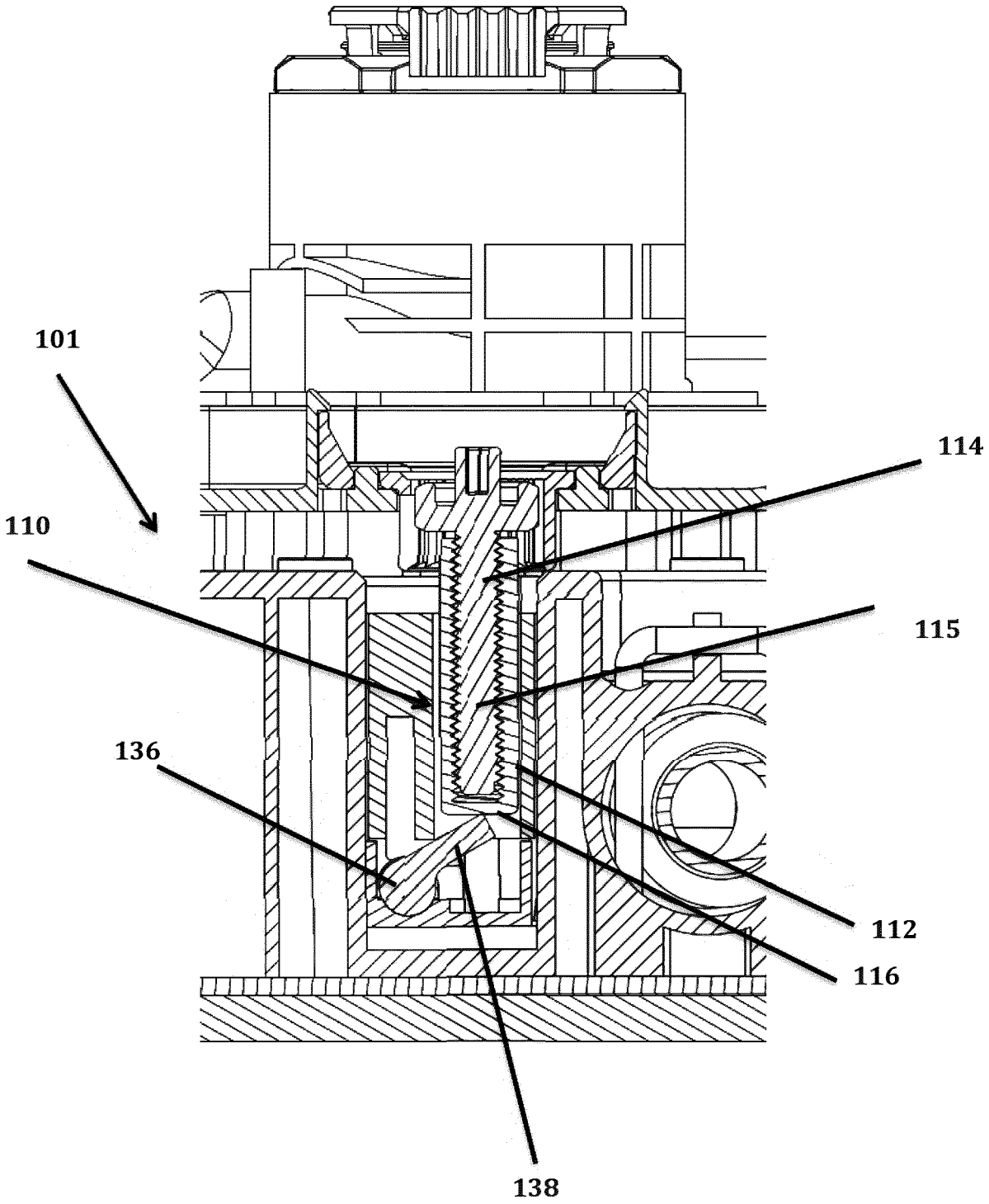
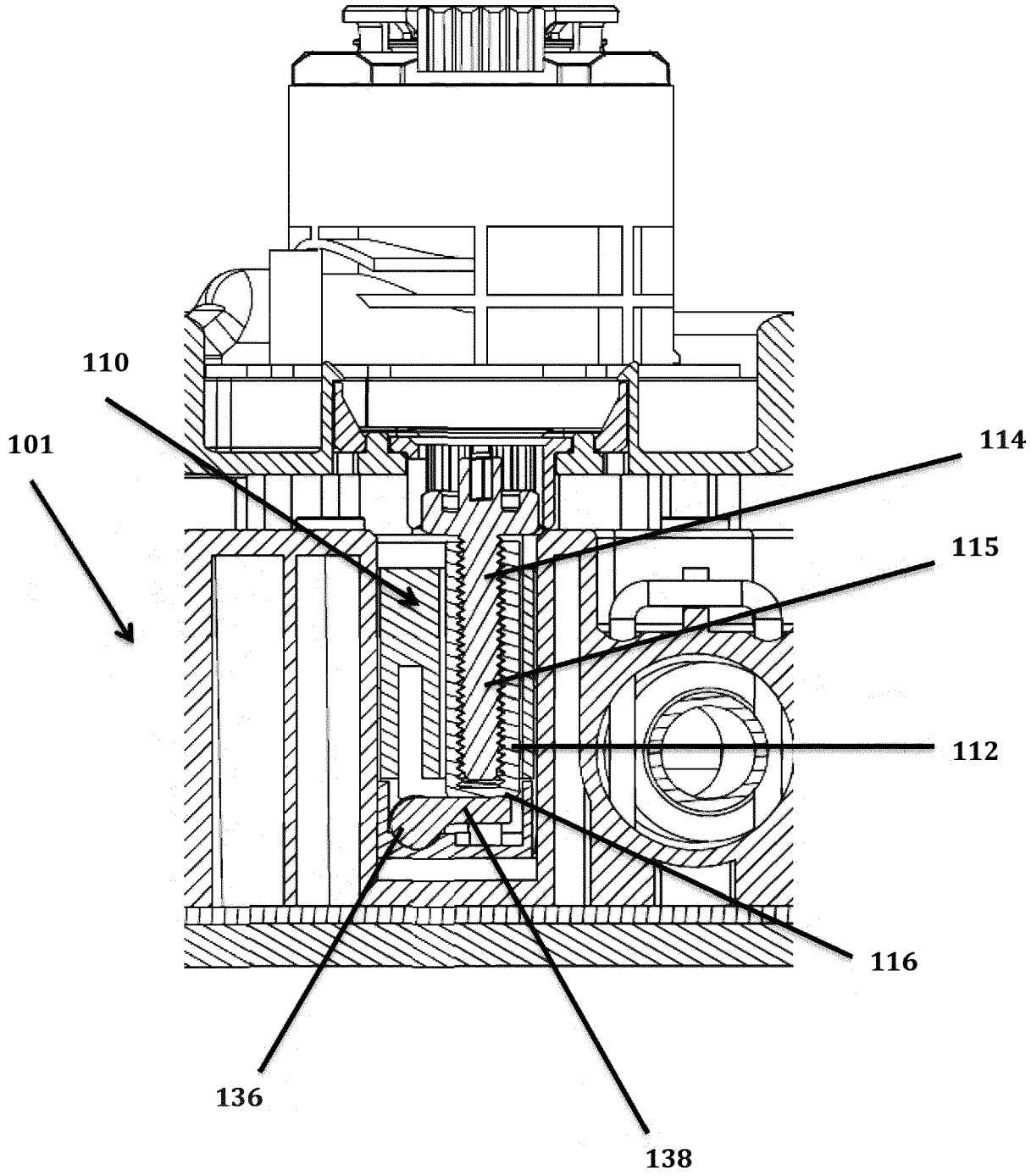


Figure 17



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EUROPEAN SEARCH REPORT

Application Number
EP 21 19 1669

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	US 2018/313066 A1 (YE LIMING [CN] ET AL) 1 November 2018 (2018-11-01) * paragraphs [0001] - [0135]; figures 1-27 * -----	1-15	INV. E03C1/02 F16K31/00
A	US 4 095 610 A (PRIESMEYER CHARLES H) 20 June 1978 (1978-06-20) * figures 1-3 * -----	1-15	
A	US 2003/136934 A1 (ERICKSON PERRY D [US]) 24 July 2003 (2003-07-24) * figures 1-10 * -----	1-15	
A	EP 3 613 908 A1 (GROHE AG [DE]) 26 February 2020 (2020-02-26) * figures 1-18 * -----	1-15	
A	US 6 973 937 B1 (YANG TSAI CHEN [TW]) 13 December 2005 (2005-12-13) * figures 1-6 * -----	1-15	
			TECHNICAL FIELDS SEARCHED (IPC) E03C F16K E03D

1 The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 January 2022	Posavec, Daniel

CATEGORY OF CITED DOCUMENTS

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11-01-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2018313066 A1	01-11-2018	CN 107013703 A	04-08-2017
		US 2018313066 A1	01-11-2018
		US 2020378098 A1	03-12-2020
US 4095610 A	20-06-1978	CA 1049373 A	27-02-1979
		US 4095610 A	20-06-1978
US 2003136934 A1	24-07-2003	CA 2473688 A1	31-07-2003
		CN 1639492 A	13-07-2005
		EP 1468213 A1	20-10-2004
		MX PA04006952 A	06-12-2004
		US 2003136934 A1	24-07-2003
		WO 03062684 A1	31-07-2003
EP 3613908 A1	26-02-2020	DE 102018120204 A1	12-03-2020
		EP 3613908 A1	26-02-2020
		US 2020056710 A1	20-02-2020
US 6973937 B1	13-12-2005	NONE	

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