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(54) MIXER WITH DISINFECTION OF LEGIONELLA

(57) A mixer for delivering cold water, hot water and mixed water in sanitary systems, provided with a device for disinfection of legionella. The mixer comprises a hollow body (10) having a cold water inlet (12), a hot water inlet (11), a delivery spout (17), and a mixing cartridge (15) inserted into a sleeve (20, 21) sealingly housed in the body (10) of the mixer. The sleeve comprises a peripheral wall (20) and a transverse wall (21) configured with an annular sealing seat (22) for a valving member (23) arranged coaxially to the cartridge (15), in a branched path (P) between the hot water inlet (11) and the cold water inlet (12). The valving member (23) can be driven from the exterior by a manual tool (35) that is insertable through an aperture (34), closed by a removable cover (25); the tool (35) is configured so as to prevent the extraction thereof during a step of thermal disinfection of the mixer.

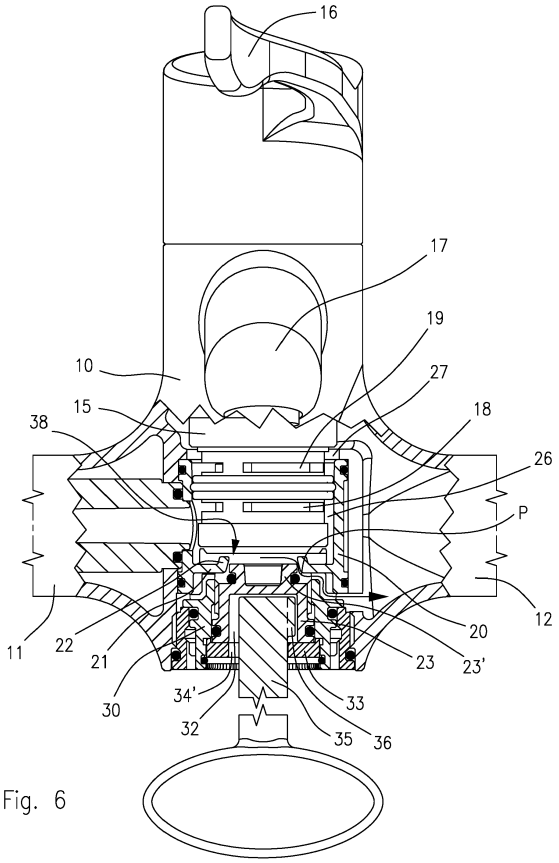

Fig. 6

EP 3 272 952 A1

Description

BACKGROUND OF THE INVENTION

[0001] The present invention refers to a mixer with disinfection of legionella, for delivering cold water, hot water and mixed water of the type in which a source of hot water and a source of cold water are connectable to one or more user connections.

[0002] As is known, the networks for recirculating and delivering sanitary hot, cold or mixed water constitute favourable places for the spread of the legionella bacterium, considering that the range of the temperatures for proliferation of the bacterium is comprised between about 20°C and 50°C, in any plant for delivering water there are critical zones that are not appropriately disinfected, in which the bacterium can proliferate dangerously.

STATE OF THE ART

[0003] The networks for distributing sanitary water have a limited risk of bacterial colonisation and growth if the temperature of the water does not exceed 20°C, nevertheless, the risk increases with the increase in the temperature of the water in circulation.

[0004] In sanitary plants it is nevertheless possible to reduce the risk of the growth of legionella by periodically recirculating hot water at a temperature equal to or greater than 60°C; nevertheless, a similar solution, in addition to entailing great consumption of energy, does not ensure disinfection of the various delivery points, or of the terminal user connections.

[0005] Mixing devices are known for example from EP0947902, EP1739333, WO90/12351 and EP0076717.

[0006] One of the problems that is particularly felt is the disinfection of the mixers for delivering sanitary hot water in large residential complexes such as hospitals, old people's homes, hotels and the like that require periodic maintenance by an operator.

[0007] In this regard, solutions have been proposed that provide a particular disinfection protocol for the mixer, for example by temporarily connecting the mixer to the hot water inlet conduit by a flexible branched pipe and by circulating the water at a temperature above 60°C, for a time that is variable according to the temperature of the water.

[0008] Solutions of this type are very complex and require the intervention of a specialised operator.

[0009] With GB 2451800 and WO 2014/136001, solutions have been proposed that provide for the adoption of a branched path between the hot water inlet and the cold water inlet, which permits circulation in the mixer of only the hot water directly through the mixing cartridge, to the delivery spout.

[0010] In particular GB 2451800, which is the prior art that is closest to the present invention, relates to a thermostatic mixer for sanitary water, in which a special bypass valve is used that defines a branched path inside the mixer, which extends between the hot water inlet and the cold water inlet.

[0011] The bypass valve is positioned on a side of the mixer, and is accessible from outside to be opened and closed by an appropriate tool.

[0012] During normal operation of the mixer, the bypass valve is normally closed; when it is desired to actuate thermal disinfection an inlet valve has to be closed of the cold water and only the hot water has to be permitted to flow through the bypass valve, at a temperature above 60°C and for a time that is sufficient for complete disinfection of the mixer.

[0013] Nevertheless, the configuration and lateral arrangement of the bypass valve entail significant overall dimensions of the mixer, and the presence of dead points with possible stagnation of water at a temperature below disinfection temperature; this entails incomplete disinfection of the mixer and the possible existence of breeding grounds, focuses, for the proliferation of the legionella.

OBJECTS OF THE INVENTION

[0014] A main object of the present invention is to provide a new and different solution for a mixer with disinfection of legionella, configured in such a manner as to supply a branched path for the hot water, during the disinfection step, which is not very tortuous, is substantially devoid of dead zones or zones of possible stagnation of water at temperatures below the legionella elimination temperatures; the mixer can be of any type, for example with a thermostatic cartridge or a ceramic disk.

[0015] A further object of the invention is to supply a mixer provided with a device for disinfection of legionella, as referred to above, which has relatively reduced overall dimensions, such as to facilitate the processing operations, and that is at the same time easy for the user to use without requiring the intervention of specialised personnel.

[0016] A still further object of the invention is to provide a mixer provided with a device for thermal disinfection of legionella, as mentioned previously, provided with a special tool for driving a valve for opening a branched path for thermal disinfection, in which the tool is configured in such a manner that it cannot be removed, so as to provide a visible signal of the ongoing disinfection, avoiding the risk that the user may inadvertently use the mixer during the disinfection step.

SHORT DESCRIPTION OF THE INVENTION

[0017] These and other objects and advantages of the invention are achievable by a mixer with thermal disinfection of legionella for delivering sanitary water, according to what is defined in claim 1.

[0018] According to a first preferential embodiment, the valving member is screwably movable in a guide bush, between an advanced closed position and a re-

tracted open position of the branched path, to prevent, respectively enable, the circulation of a flow of only hot water during a phase of thermal disinfection of the mixer.

[0019] According to a further embodiment, the auxiliary valve of the branched path for thermal disinfection of the mixer can be of ball type.

[0020] The valving member can be driven by a particular manual tool, which is temporarily retained in the valving member to prevent extraction thereof, providing in this manner a visual signal during the step of thermal disinfection of the mixer.

SHORT DESCRIPTION OF THE DRAWINGS

[0021] These and further features of the mixer with disinfection of legionella, will be clearer from the following description and from the drawings, in which:

Fig. 1 is a lateral view of a mixer with disinfection of the legionella;
Fig. 2 is a top view of the mixer of figure 1;
Fig. 3 is an enlarged longitudinal section of the mixer according to the line 3-3 of figure 4, showing a first embodiment of the auxiliary valve in the closed condition of the branched passage for the hot water;
Fig. 4 is an enlarged cross section, according to the broken line 4-4 of figure 3, in a first step of the thermal disinfection procedure;
Fig. 5 is an enlarged cross section that is similar to that of figure 4, in a second step of the thermal disinfection procedure;
Fig. 6 is a cross section similar to that of figures 4 and 5, in a third step of the thermal disinfection procedure of the mixer;
Fig. 7 is an enlarged detail of a second embodiment of the auxiliary valve.

DETAILED DESCRIPTION OF THE INVENTION

[0022] With reference to figures 1-3, a preferential embodiment will be disclosed of an assembly comprising a mixer provided with a device for thermal disinfection of legionella according to the invention, it being pointed out that the shape and general features of the assembly can differ from what is shown.

[0023] The mixer comprises a hollow body 10 that is shaped with an inlet 11 conduit that is connectable to a source of hot sanitary water, and an inlet 12 conduit that is connectable to a source of cold sanitary water; the two inlet 11 and 12 conduits are each provided with a respective shut-off valve that is schematically indicated by 13 and 14, in which the inlet 12 conduit, upstream of the shut-off valve 14 of the cold water, is provided with a ball valve 14' that has to be driven to be closed at each cycle of thermal disinfection of the legionella.

[0024] The mixer further comprises a cartridge 15 that is drivable by a lever 16 to adjust the temperature of the mixed water that is delivered through the spout 17 of the mixer.

[0025] The mixing cartridge 15 can be of any type, for example in figure 3 the mixing cartridge 15 is shown only in the general features thereof, inasmuch as it is per se and normally commercially available, and inasmuch as it does not form part of the present invention.

[0026] As shown in figure 3, the cartridge 15 is sealingly insertable into a housing seat and is configured with slits 18 for the entry of hot water, with slits 19 for the entry of cold water and with slits 29 for the exit of cold, hot or mixed water from the delivery spout 17, depending on the adjustment made by rotating in one direction or the opposite direction the lever 16, in a manner that is per se known.

[0027] As pointed out previously, the mixer comprises an auxiliary valve configured in such a manner that, in a condition of cold water completely closed by the ball valve 14', the inlet 11 conduit for hot water is placed in direct contact with the inlet 12 conduit for the cold water through a branched passage, which during a step of disinfection of the legionella enables a flow of hot water to circulate at a temperature equal to or greater than 60°C, from the hot water inlet to the cold water inlet both through the auxiliary bypass valve and through the cartridge 15 to the delivery spout 17 of the mixer.

[0028] In this manner, total thermal disinfection against legionella is achieved, avoiding tortuous paths and the formation of dangerous stagnation of water at temperatures below the disinfection temperature of legionella.

[0029] More in particular, as shown in figure 3 and in figure 4 below, the cartridge 15 is sealingly inserted into a housing seat comprising a sleeve 20 having a transverse wall 21 configured with an annular sealing seat 22 for an auxiliary bypass valve, a valving member 23 of which can be driven manually to open or close a branched path P for the hot water. Thus, the auxiliary valve comprises at least the valving member 23 and the annular sealing seat 22.

[0030] More precisely, the valving member 23 is movable from a first position - in which it is in contact with the annular sealing seat 22 and disables, i.e. closes, the aforesaid branched path P - to a second position in which it is separated from the annular sealing seat 22 and defines a passage 38 so as to enable, i.e. open, the branched path P.

[0031] The branched path P, which is enabled by the valving member 23 in the position detached from the annular sealing seat 22, is configured so as to place in direct communication the inlet 11 conduit for the hot water with the inlet 12 conduit for the cold water.

[0032] The annular seat 22 of the auxiliary bypass valve is formed centrally to the transverse wall 21 of the housing sleeve of the cartridge 15, in an underlying position axially aligned on the cartridge. The housing sleeve of the cartridge 15 is further sealingly inserted into the body 10 by annular washers 24; a removable cover 25 normally closes the lower end of the body 10 of the mixer.

[0033] The peripheral wall of the sleeve 20 is further

configured in such a manner as to define, with the cartridge 15, a first annular chamber 26 in communication with the inlet 11 conduit of hot water and with the slits 18 of the cartridge, respectively to define a second annular chamber 27 in communication with the inlet 12 conduit of the cold water and with the slits 19 of the cartridge 15, as shown.

[0034] With the reference number 28 in figure 3, a third annular chamber for the mixed water has been indicated, which communicates with the cartridge 15 through slits 29 and with the delivery spout 17 of the mixer.

[0035] As mentioned previously, the auxiliary bypass valve opening/closing the branched path P of the hot water comprises, in a position coaxial with the cartridge 15, the annular sealing seat 22 formed in the transverse wall 21 of the sleeve 20 and the valving member 23 that is movable between an advanced position, shown in figures 3-5, in which it closes the branched passage for the hot water, and a retracted position of figure 6, in which it opens the aforesaid branched path P.

[0036] In the embodiment in figures 3-6, the opening and closing valving member 23 of the auxiliary bypass valve is in the form of a cylindrical body that is axially slidable sealingly in a guide bush 30 inside a ring nut 30' at the lower end of the body 10 of the mixer.

[0037] The valving member 23 and the guide bush 30 are configured with a thread 31 such as to permit the axial movement of the valving member 23 between the two operating positions by simple screwing, by a suitable tool 35 that is drivable from outside, as explained below. In the case shown, the guide bush 30 and the ring nut 30' are configured as separate parts, nevertheless, they could be made as a single piece.

[0038] The valving member 23 has a neck portion 23' configured with a housing seat for an annular seal washer against the valve seat 22, and is configured with a cavity 32 open at the rear to insert an appropriate driving tool.

[0039] The valving member 23 is retained in the guide bush 30 by an annular element 33 having a central opening 34 configured with a side recess 34' in the form of a keyhole, to enable a key-shaped tool 35 to be inserted that is drivable manually.

[0040] The key 35, as shown in figures 5 and 6, has a cylindrical shank provided with a lateral tooth 36 configured so as to engage the cavity 32 of the valving member 23; the tooth 36 of the key 35 and the inner surface of the cavity 32 could be for example shaped with ribs and/or longitudinal lines that are mutually engageable with one another. Instead of the key 35 shown in figures, any other type of manual tool could be used to rotate the valving member 23.

[0041] With reference now to figures 3 to 6 the thermal disinfection procedure of the mixer according to the invention will now be disclosed briefly.

[0042] During normal operation of the mixer, the bypass valve of the auxiliary path, defined by the annular seat 22 and by the valving member 23, is closed because the valving member 23 is screwed into the advanced position of figure 3, in which it is sealingly closed against the seat 22; in this manner, the hot water does not circulate in the branched path P for disinfection of the legionella. By rotating the lever 16 it is thus possible to deliver normally cold water, hot water and mixed water at the desired temperature.

[0043] When it is desired to perform thermal disinfection of the mixer, supposing that it is connected to a source of hot water having a temperature that is suitable for killing legionella bacteria, for example at a temperature equal to or greater than 60°C, it is necessary to close beforehand the ball valve 14' in the supply conduit 12 of the cold water, then remove the cover 25 from the bottom of the mixer.

[0044] The operator, who in this case can simply be the operator, after removing the cover 25, inserts the key 35 or other suitable tool through the aperture 34 of the ring 33, and into the cavity 32 of the valving member 23, as shown in figure 4.

[0045] By acting manually by the key 35, it is now possible to open the auxiliary bypass valve, by rotating the valving member 23 by 180°, by loosening and axially retracting the valving member 23 against the ring 33 as shown in figure 6, then it is possible to rotate completely the lever 16 of the mixer in the direction of complete opening of the inlet for the hot water.

[0046] After the auxiliary valve and the branched passage 38 have been opened, the hot water can flow freely, at the high temperature for killing the legionella bacterium, from the hot water inlet 11, along the branched path P, to the cold water inlet 12 as far as the shut-off valve 14, and simultaneously flow through the cartridge 15 to the delivery spout 17 of the mixer; in this manner, all the parts of the mixer that are normally in contact with the hot water, with the cold water and with the mixed water are suitably disinfected.

[0047] Figures 3 to 6 show a first solution in which the bypass valve of the path for thermal disinfection of the mixer comprises a valving member 23 that is axially movable and drivable by screwing between a closed condition and an open condition.

[0048] Nevertheless, the bypass valve could be differently configured compared with the solution of figures 3-6, for example as shown in figure 7, where the same reference numbers as for the preceding figures have been used to indicate similar or equivalent parts.

[0049] Also in the case of figure 7, the bypass valve comprises the shutter 23 and the annular sealing seat 22 positioned coaxially to the cartridge 15 of the mixer. The solution of figure 7 differs from the preceding figure because the shutter 23 is of the ball type, and is provided with a passage 37 that is for example at 90°, or configured differently. The passage 37 is thus obtained inside the shutter 23, i.e. ball valving member 23.

[0050] The ball valving member 23 is supported to rotate sealingly by suitable annual seal elements that are housed in a cap that closes the lower end of the body 10 of the mixer.

[0051] For all the rest, the thermal disinfection of the mixer of figure 7 can be performed in the same manner as disclosed for the mixer of figures 3-6.

[0052] Also in the case of figure 7, the valving member 23 can be driven by a suitable manual tool, as in the preceding case, after removing a front or rear cover on the side wall of the body 10 of the mixer.

[0053] The branched path P, when enabled by the ball valving member 23, is such as to place in direct communication the inlet 11 conduit for the hot water with the inlet 12 conduit for the cold water.

[0054] From what has been said and shown in the embodiment of the attached drawings, it is clear that a mixer with disinfection of legionella has been supplied, in which the particular configuration and position of the auxiliary opening/closing valve of the flow of hot water, in a disinfection step, permits a path that is little tortuous; in this manner there is the certainty that all the parts of the mixer that could come into contact with the legionella bacterium have been properly disinfected. Further, the particular configuration of the valving member 23, or ring 33, during the disinfection step, makes it impossible to remove the key 35; in this manner a visible signal is provided that disinfection is in progress, preventing the use of the mixer during the step.

[0055] The arrangement of the valving member 23 and of the seal seat 22 that is coaxial with the cartridge 15, in addition to reducing significantly the overall dimensions of the mixer, the body 10 of which can have reduced dimensions that are comparable with those of a conventional mixer, facilitates processing and the operations of assembling the various components, and possible maintenance tasks.

Claims

1. An assembly comprising a mixer for delivering cold, hot and mixed water, provided with a device for thermal disinfection against legionella, comprising:

   - a hollow body (10) having a cold water inlet (12), a hot water inlet (11) and a delivery spout (17);
   - a mixing cartridge (15);
   - an auxiliary valve having a manually actuable valving member (23) for opening/closing a passage (37; 38) to enable/disable a branched path (P) so as to place in direct communication said hot water inlet (11) with said cold water inlet (12),
   - said mixing cartridge (15) being housed in a sleeve (20) having a transverse wall (21) configured with an annular sealing seat (22) for the valving member (23), in which the valving member (23) and the annular sealing seat (22) of the auxiliary valve are arranged coaxially to the cartridge (15) of the mixer, and
   - a tool (35) configured to engage a cavity (32) for said valving member (23) to drive said valving member (23).

2. The assembly according to the claim 1, **characterised in that** the valving member (23) of the auxiliary valve is screwably movable in a guide bush (30), between an advanced closure condition and a retracted aperture condition of the auxiliary valve of the branched path (P) for the hot water.

3. The assembly according to the claim 1 or 2, **characterised in that** the peripheral wall of the sleeve (20) for housing the thermostatic cartridge (15) defines a first annular chamber (26) for the inlet of hot water, and a second annular chamber (27) for the inlet of the cold water, said annular chambers being connectable through the auxiliary valve (22, 23) of the branched path (P).

4. The assembly according to the claim 1, **characterised in that** the auxiliary valve (22, 23) is configured as a ball valve.

5. The assembly according to any preceding claim, comprising an annular element (33), said tool (35) and said annular element (33) being configured to prevent the removal of the tool (35) from the valving member (23) in the aperture condition of the auxiliary valve, during a step of disinfection of the legionella.

6. The assembly of the mixer according to one or more of claims 1 to 5, **characterised in that** the mixing cartridge (15) is of the thermostatic type.

7. The assembly of the mixer according to one or more of claims 1 to 5, **characterised in that** the mixing cartridge (15) is of ceramic disk type.

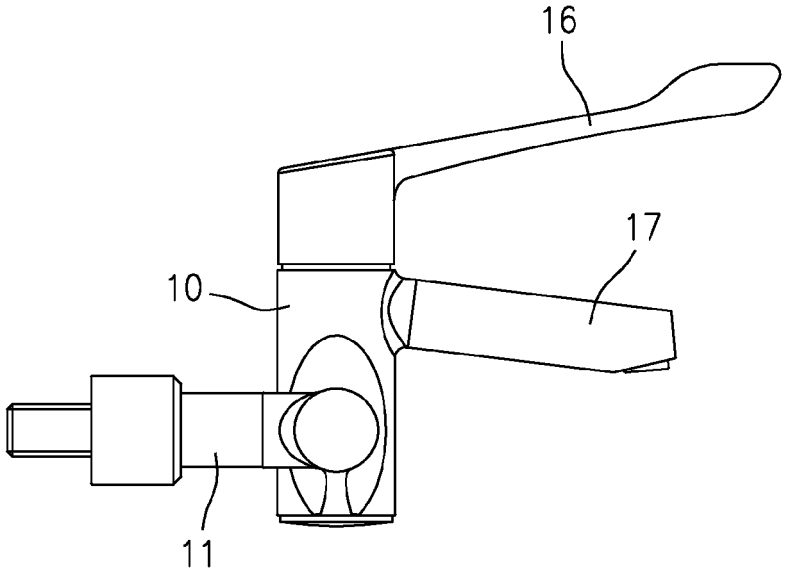

Fig. 1

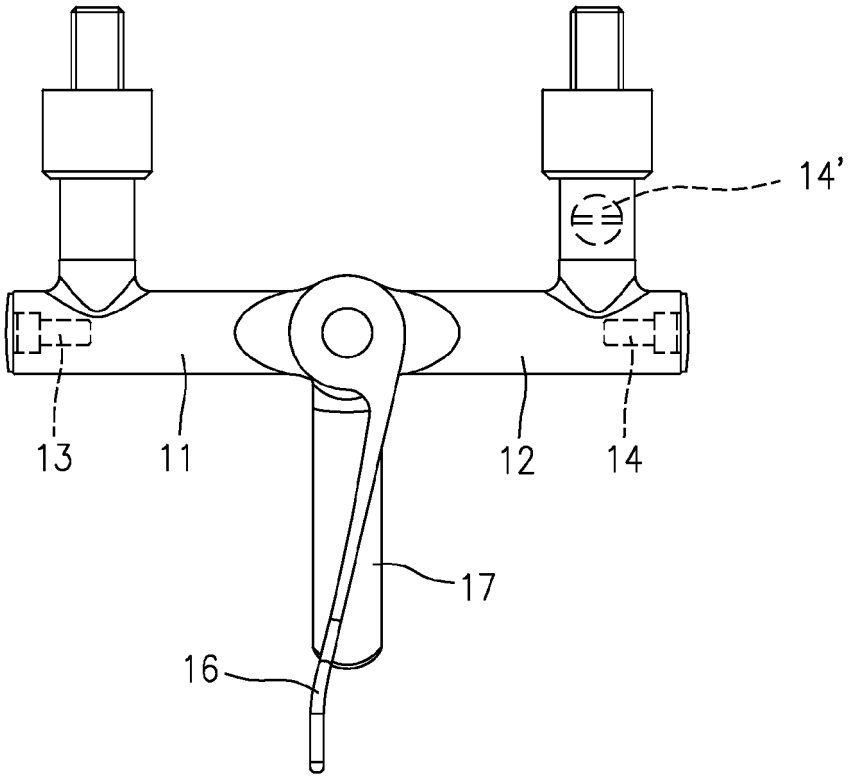

Fig. 2

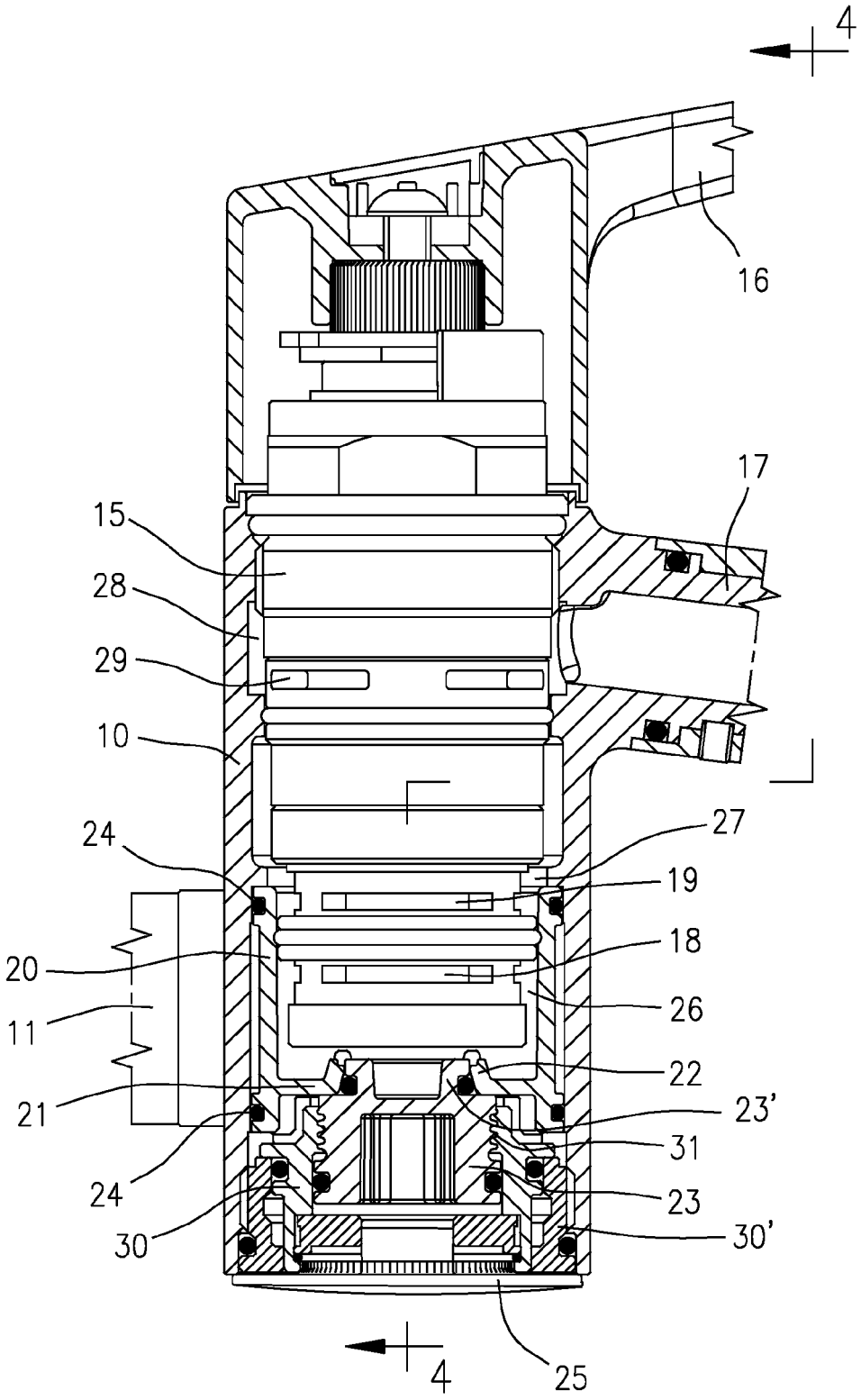

Fig. 3

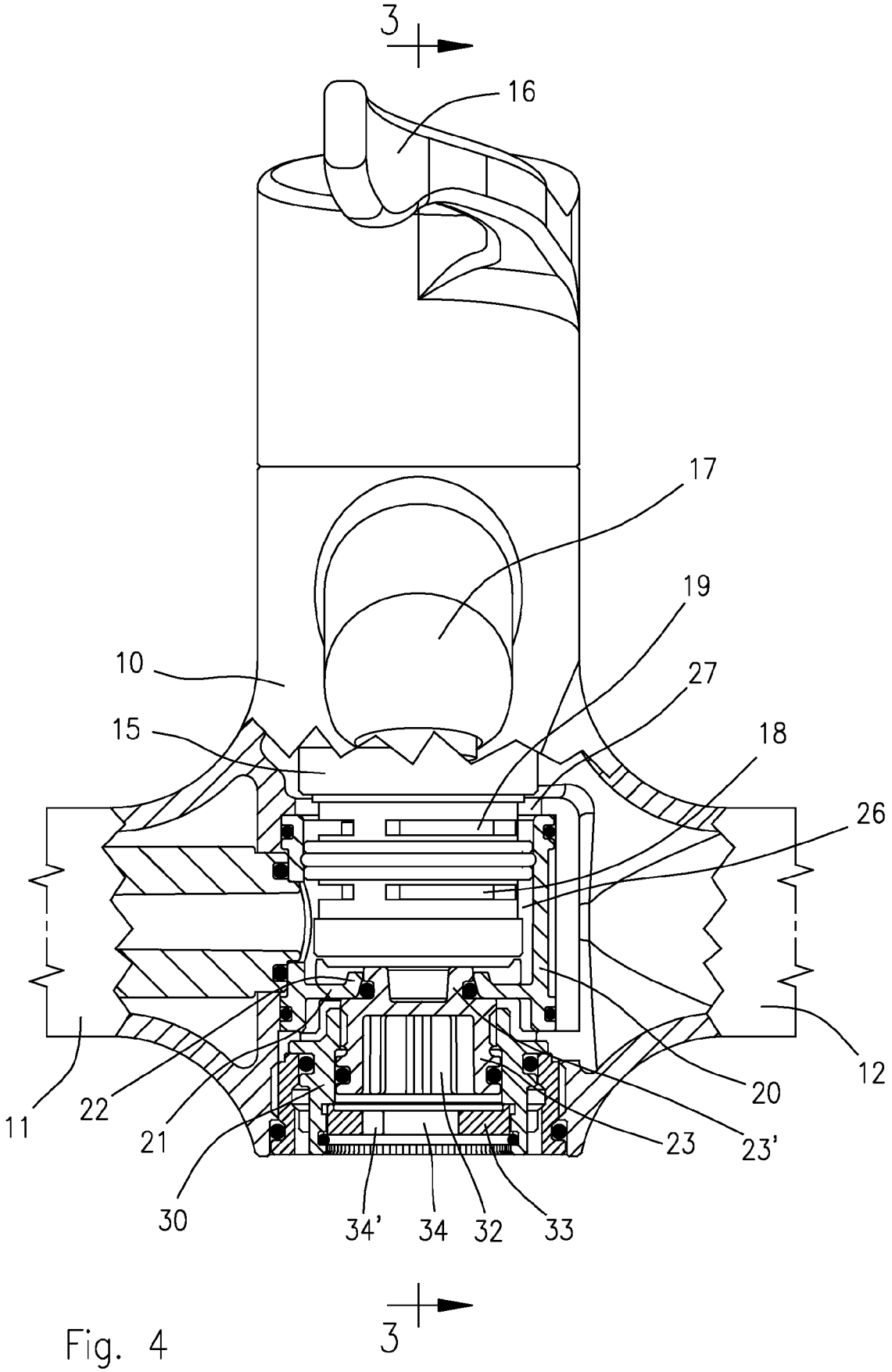

Fig. 4

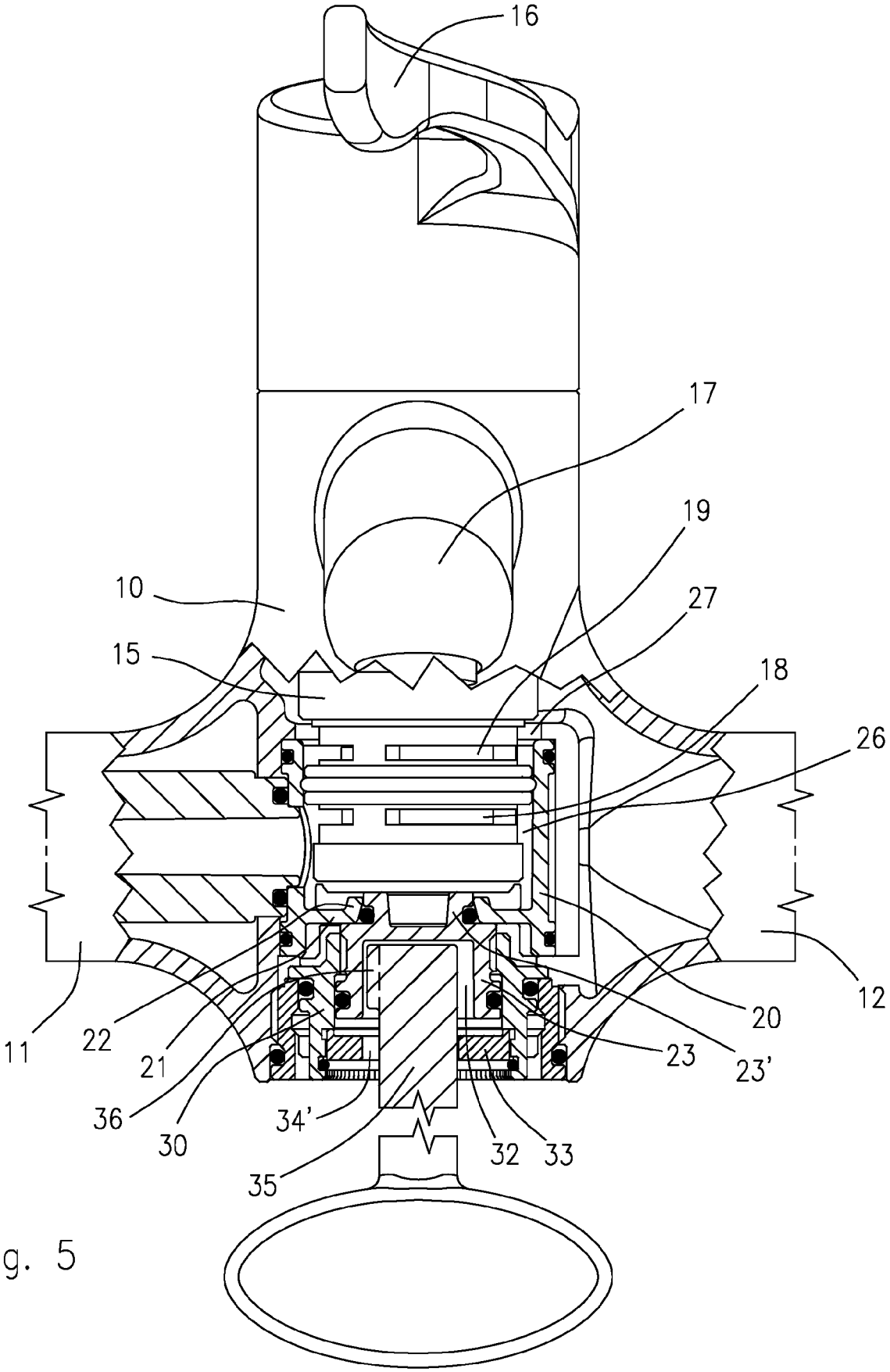

Fig. 5

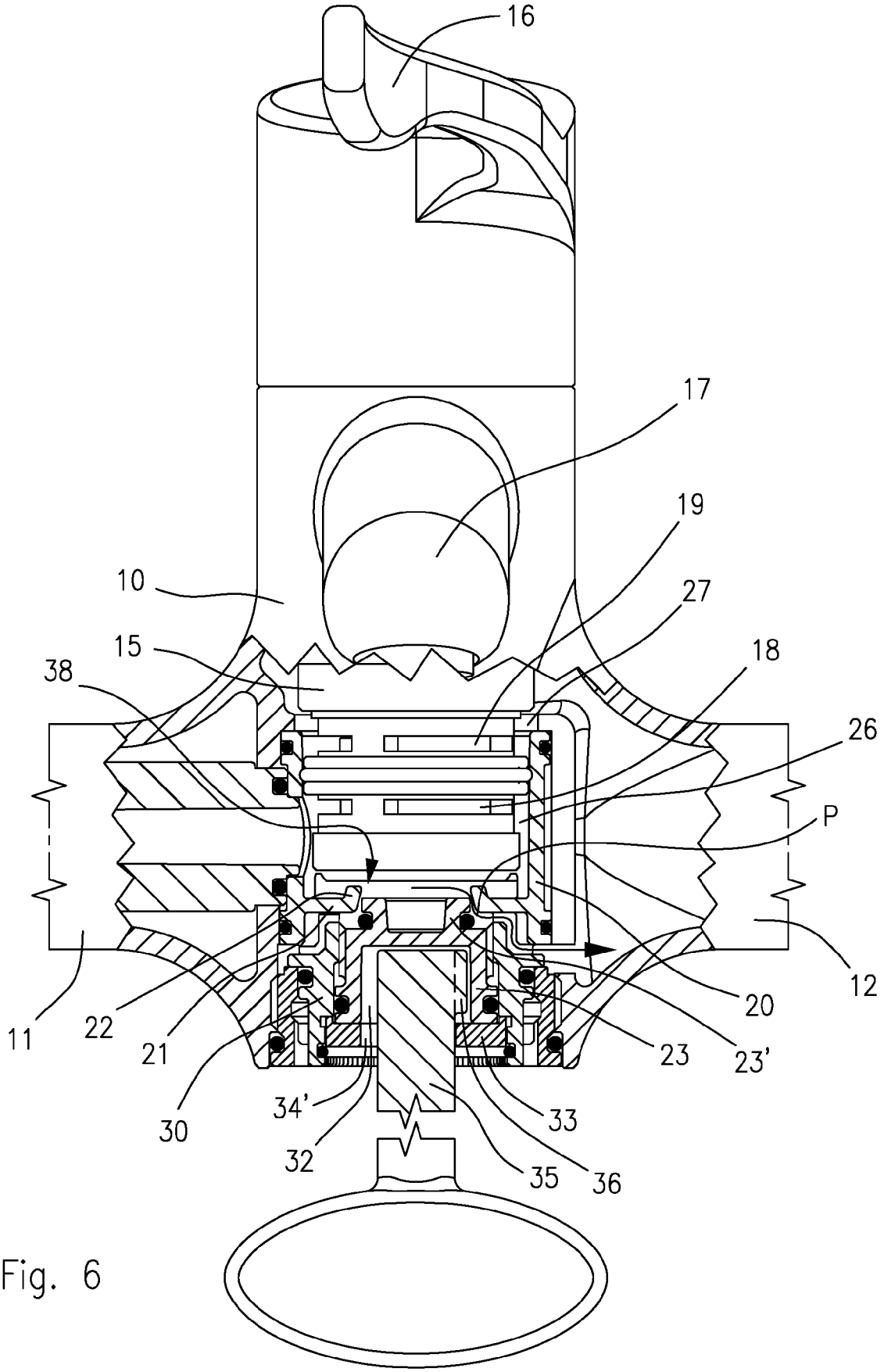

Fig. 6

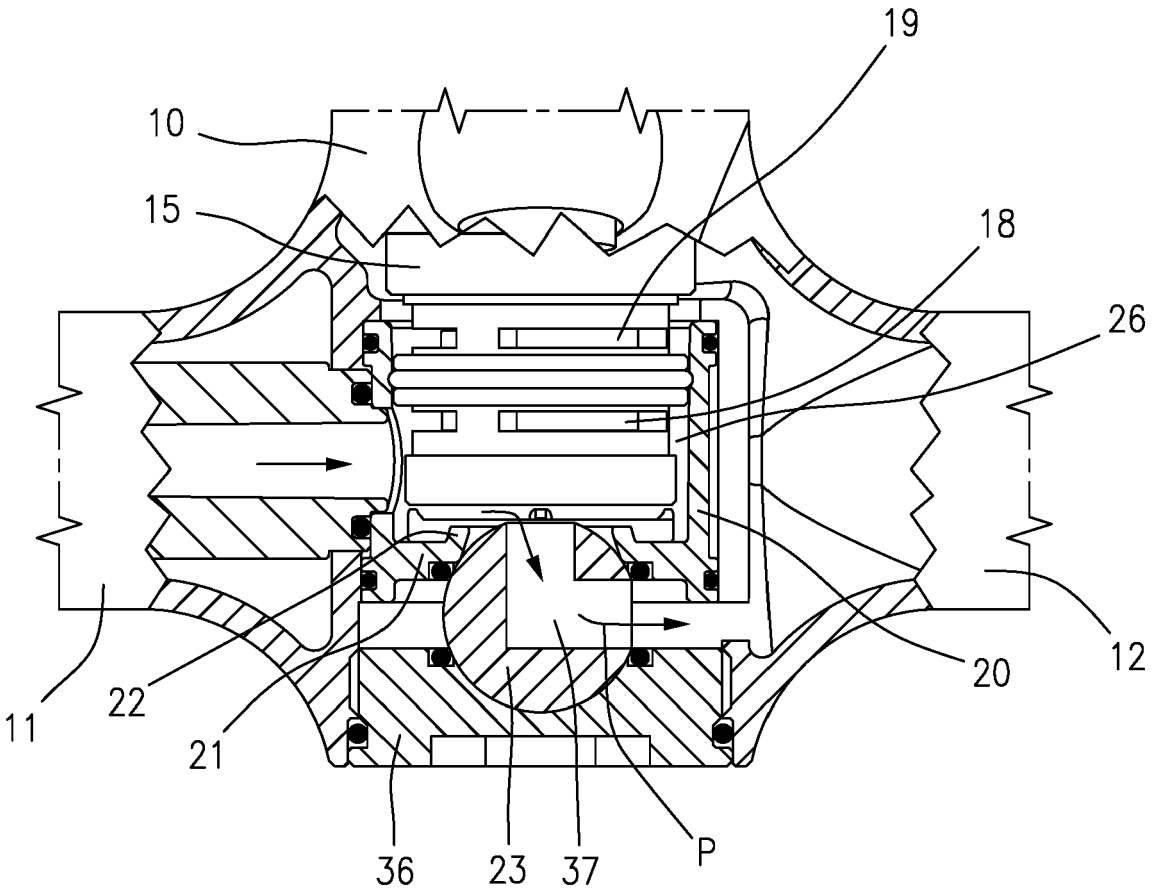

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 17 18 1677

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 October 2017	Isailovski, Marko

CATEGORY OF CITED DOCUMENTS

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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