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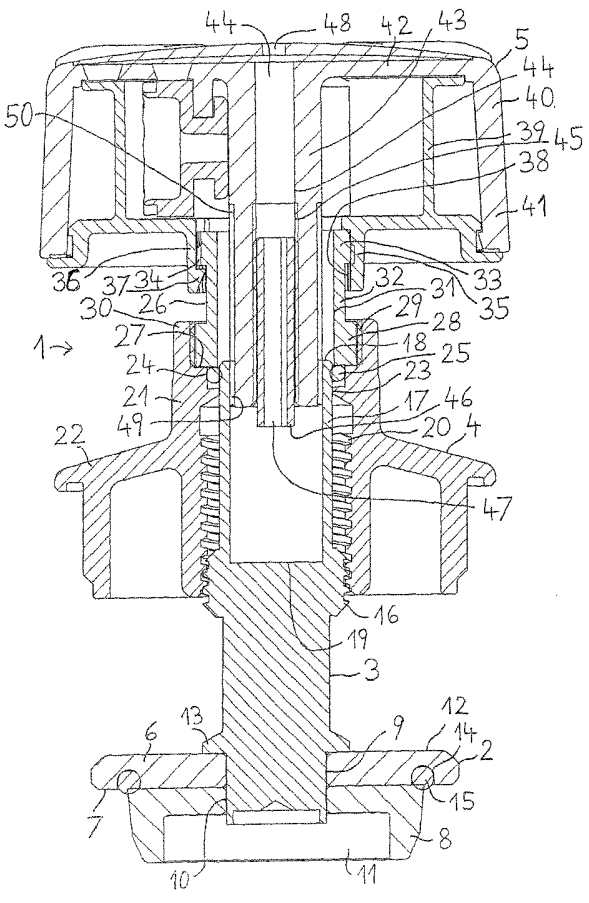
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[Continued on next page]

(54) Title: VALVE, PARTICULARLY BALANCING VALVE FOR CENTRAL HEATING PLANTS



(57) Abstract: The present invention relates to a balancing valve (1) for central heating plants, which comprises a valve body or cone (2), fastened to the one end of a spindle (3), guided in a top piece (4), the other end of the spindle supporting a handwheel (5), the cone being designed to be preadjusted before being finally adjusted against a seat, disposed in a valve housing. According to the invention the spindle (3) is threaded into the top piece (4) and is it connected to the handwheel (5) in a way, which transfers the rotational movement, via a dowel (43), which projects from the handwheel, the spindle with a blind hole (19) in its end (18) adjacent the handwheel being axially displaceably mounted on the dowel.

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ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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Valve, particularly balancing valve for central heating plants

The present invention relates to a valve of the type described in detail in the preamble of claim 1.

Such valves are used primarily to preadjust the flow through and balance the fall of pressure over a loop in a central heating plant.

Known valves, used for this purpose, are mainly satisfactory, but they have several drawbacks as regards the manufacturing and mounting time and expenses, mode of operation , adjustment and exchange possibilities as well as life.

The object of the present invention is, in the above-mentioned respects, to improve the known valves in this field and also, in additional respects, to develop the art in this field.

This object is attained according to the invention by means of a valve of the type described above, which is characterized by what is set forth in the characterizing clause of claim 1.

Additional characterizing features of and advantages of the invention are set forth in the following description, reference being made to the accompanying drawings, which show a preferred but not limiting embodiment in diametrical axial sections. The drawings show in detail in:
Fig. 1 a cone, a spindle, a top piece and a handwheel of a valve according to the invention ; and
Fig. 2 the valve according to Fig. 1, mounted in a valve housing.

A valve 1 according to the invention is shown in the drawings in its entirety. Its main parts are a valve body or cone 2, a spindle 3, a top piece 4 and a handwheel 5. These parts form a unit, which can be inserted into a socket 51 in a valve housing 52 having a seat 53 in a diaphragm 54 between an inlet 55 and an outlet 56. The housing suitably also has nipple sockets 57 and 58, designed to connect measuring nipples and multiple function nipples respectively to the inlet and the outlet respectively.

A cone 2, active in relation to seat 53, preferably has an upper plate 6, towards lower side 7 of which a guide and sealing plate 8 abuts, which has a somewhat smaller diameter. The two plates are, by means of central bores 9 and 10 and by slip and press fit, inserted onto the lower end of the spindle and secured in their positions in a suitable way, e.g. by allowing the free spindle end to reach with a certain distance into a cavity 11 in the lower side of plate 8 and be bent there, whereas

upper side 12 of plate 6 abuts a flange 13 on the spindle end. It is of course also possible to thread plate 8 and/or plate 6 onto the spindle and it may be suitable to make the connection between the spindle and the cone releasable, making it possible to exchange the cone entirely or partly. Plates 6 and 8 can of course be designed in one piece, possibly including the spindle. In case plate 8 and plate 6 are designed separate from each other, there is suitably a downwardly open ring groove 14 in the lower side of plate 6, designed to receive an O-ring 15, which in a not loaded condition projects outwards a small distance from the groove, which partially, e.g. by halves, is covered by the peripheral area of the upper side of plate 8. In this way the O-ring will, when plate 8 and plate 6 are joined to each other, be compressed and excess material will penetrate through the not covered part of the groove. The drawing shows symbolically the constricted portion. The free and towards the surroundings exposed part of the O-ring is designed , when the valve is completely closed, to seal against the inner upper edge of said seat. Such a sealing effect is satisfactory and reliable. Also, this design allows the O-ring to be exchanged.

A spindle 3 is in its central part, seen in the longitudinal direction, provided with a suitably short outer thread 16 and is within this area suitably thicker. Above the thread upper spindle part 17 has a flat outer side and is provided with an axial blind hole 19 on its interior side, which blind hole has its origin in upper free end 18. At least the mouth area of the blind hole is provided with an axial toothing 49.

A top piece 4 is screwed onto the spindle thread with an inner thread 20 in a socket or socket-like part 21, which is surrounded by a flange-like part 22, by means of which the top piece is inserted into and fastened to said valve housing. Whereas inner thread 20 is formed in that part of socket 21, which faces the cone, the axial continuation upwards of the socket mainly forms a short constriction 23, in which spindle part 17 is guided with slip fit and to which upwards an upwardly open ring groove 24 is connected, in which an O-ring 25 is inserted, which is designed to be compressed between the radial groove wall and spindle part 17 in order to obtain an efficient sealing effect. Groove 24 is sealed from above by one end surface 27 of a spacing piece 26, which with its lower, suitably flange-like end 28 is screwed into a step bore 29 in upper end 30 of socket 21. Bore 28 suitably has a larger diameter than groove 24 and the spacing piece is provided with a through axial bore 31, along which spindle part 17 can move, e.g. with slip fit.

A spacing piece 26 has a neck 32 and an upper, flange-like end 33, which along its periphery is provided with an axial toothing 34 and which is designed to hold handwheel 5 in place.

A handwheel 5, which mainly is made of a plastic material, is by means of a lower socket 35 inserted onto upper end 33 of the spacing piece, the socket in a few places along its periphery suitably being slit to form tongues 36 with inwardly directed claws 37, which surround upper end 33 of the spacing piece and prevent the handwheel from being drawn out. The inner side of the socket and suitably also the tongues is provided with an axial toothing 38, which matches the described toothing of the spacing piece. In this way the handwheel can be mounted on the spacing piece in a certain adjustment position, which is secured thanks to the toothing. The toothings and the adjacent parts respectively can be provided with bevels, which facilitates the bringing together of the same.

The handwheel part, described so far, is a handwheel body 39, on which a handwheel cover 40 is mounted having a peripheral wall 41 and an end wall 42, from which a dowel 43 projects outwards and through bore 31 of the spacing piece as well as into blind hole 19 of the spindle, which dowel is provided with a central, axial through cavity 44, that part of which, which faces the spindle, being provided with a thread 45, designed to receive a threaded bolt 46 with an axial, e.g. through hexagon opening 47 to allow an adjustment tool (not shown) to be inserted, which can be introduced into the handwheel through a hole 48 in wall 42. Bolt 46 functions as a stop element for the opening movement of the cone. The cone can be moved, since the outer side of dowel 43 is provided with an axial toothing 50, which matches toothing 49 of blind hole 19. The adjustment suitably is done by moving the cone into the desired functional position, e.g. by means of the handwheel and the measuring equipment, connected to said nipples, bolt 46 subsequently being screwed towards the bottom of the blind hole. Then the cone can be arbitrarily moved between the adjusted desired functional position and a fully closed position without any new measuring and special adjustment respectively, since the desired functional position is the stop position, obtained by the bolt, and is reached through an opening movement of the handwheel up to the stop surface of the blind hole bottom against the bolt.

Such a valve constriction has many advantages . Thus, it comprises only relatively few details, which may result in lower costs and an improved adjustment precision. The force, which the cone is subjected to in the closed and in a partially closed position respectively, is absorbed by the top piece instead of the handwheel . The spindle is tight, which means , that there is no exterior leakage via the preadjustment and the maximum limitation element (bolt 46). Only one statically cramped sealing element (O-ring 25) is used in order to prevent leakage . Bolt 46 is not required to have a sealing function. The handwheel constriction and the mounting of a spacing piece respectively and their characteristics allow the handwheel to be exchanged without requiring any new preadjustment.

The thread of the spindle transfers the sealing force from the cone to the top piece. The spacing piece functions as a part of the packing box for O-ring 25 and renders at the same time a quick mounting of the handwheel possible by means of a snap-in-function, which also results in a simple machine equipment for a fast automatic handwheel mounting. Thus, the spacing piece fixedly fastened to the top piece will not be turned or rotated, when the spindle is moved in an axial direction. At the same time as the handwheel is fixedly fastened in a certain definite position to the spacing piece, the handwheel is also fixedly fastened in a certain definite position to the spindle, which results in an advantageous double function, which additionally benefits the security, simplicity, speed etc. O-ring 25 and parts located above it can be exchanged also in operation.

The invention is not limited to the embodiments described above and shown in the drawings but can be modified and supplemented in an arbitrary way within the scope of the inventive idea and the following claims :

CLAIMS

1. A valve (1), particularly a balancing valve for central heating plants, which comprises a valve body or cone (2), fastened to one end of a spindle (3), guided in a top piece (4), the other end of the spindle supporting a handwheel (5), the cone being designed to be preadjusted before being finally adjusted against a seat, mounted in a valve housing, **c h a r a c t e r i z e d in that** the spindle (3) is threaded into the top piece (4) and is connected to the handwheel (5), in order to transfer movements, via a dowel (43), which projects from the handwheel, and in that the spindle with a blind hole (19) in its end (18) adjacent the handwheel is designed to axially and displaceably surround the free end of said dowel (43).

2. A valve according to claim 1, **c h a r a c t e r i z e d in that** the cone (2) preferably has an upper plate (6) , against the lower side (7) of which a guide and sealing plate (8) with a somewhat smaller diameter abuts, and in that in the lower side of the plate (6) a downwardly open ring groove (14) is provided, designed to receive an O-ring (15), which in a not loaded condition projects outwards a certain distance from the groove, which e.g. roughly by halves is covered by the peripheral area of the upper side of the plate (8) .

3. A valve according to claim 1 or 2, **c h a r a c t e r i z e d in that** the plate (6) and the plate (8) by means of central bores (9 and 10) with slip or press fit are inserted onto the lower end of the spindle and secured in their positions , e.g. by allowing the free spindle end to be extended a small distance into the cavity (11) in the lower side of the plate (8) and by bending it there, whereas the upper side (12) of plate (6) abuts a flange (13) on the end of the spindle, and/or in that the plate (8) and/or the plate (6) are threaded onto the spindle and in that the connection between the spindle and the cone preferably are designed removable from each other, which allows the cone to be fully or partially exchanged.

4. A valve according to claim 1, **c h a r a c t e r i z e d in that** the spindle (3) in its central part, seen in its longitudinal direction, is provided with an appropriately short outer thread (16) and preferably is thickened within the area of this thread, and/or in that above this thread the upper part (17) of the spindle is flat on its outer side, and/or in that at least the mouth area of the blind hole is provided with an axial toothing (49).

5. Valve according to claim 4, **c h a r a c t e r i z e d in that** the top piece (4) is screwed onto the spindle thread with an inner thread (20) in a seat or a seat-like part (21), which is surrounded by a

flange-like part (22), by means of which the top piece is inserted into and fastened in said valve housing, in that the inner thread (20) is formed in that part of the seat (21), which faces the cone, and in that the axial continuation of the seat upwards mainly consists of a short constriction (23), in which said upper spindle part (17) is guided with slip fit.

6. A valve according to claim 5, **c h a r a c t e r i z e d in that** to said constriction (23) upwards an upwardly open ring groove (24) is connected, into which an O-ring (25) is inserted, which is designed to be compressed between the radial groove wall and said spindle part (17) in order to obtain an efficient sealing effect, in that the groove (24) from above is covered by one of the end surfaces (27) on a spacing piece (26), which with its lower, suitably flange-like end (28) is screwed into a step bore (29) in the upper end (30) of the seat (21), in that the bore (28) suitably has a larger diameter than the groove (24), and in that the spacing piece is provided with a through axial bore (31), along which the spindle part (17) can be moved, e.g. with slip fit.

7. A valve according to claim 6, **c h a r a c t e r i z e d in that** the spacing piece (26) has a neck (32) and an upper flange-like end (33), which along its periphery is provided with an axial toothing (34) and which is designed to constitute fastening means for the handwheel (5).

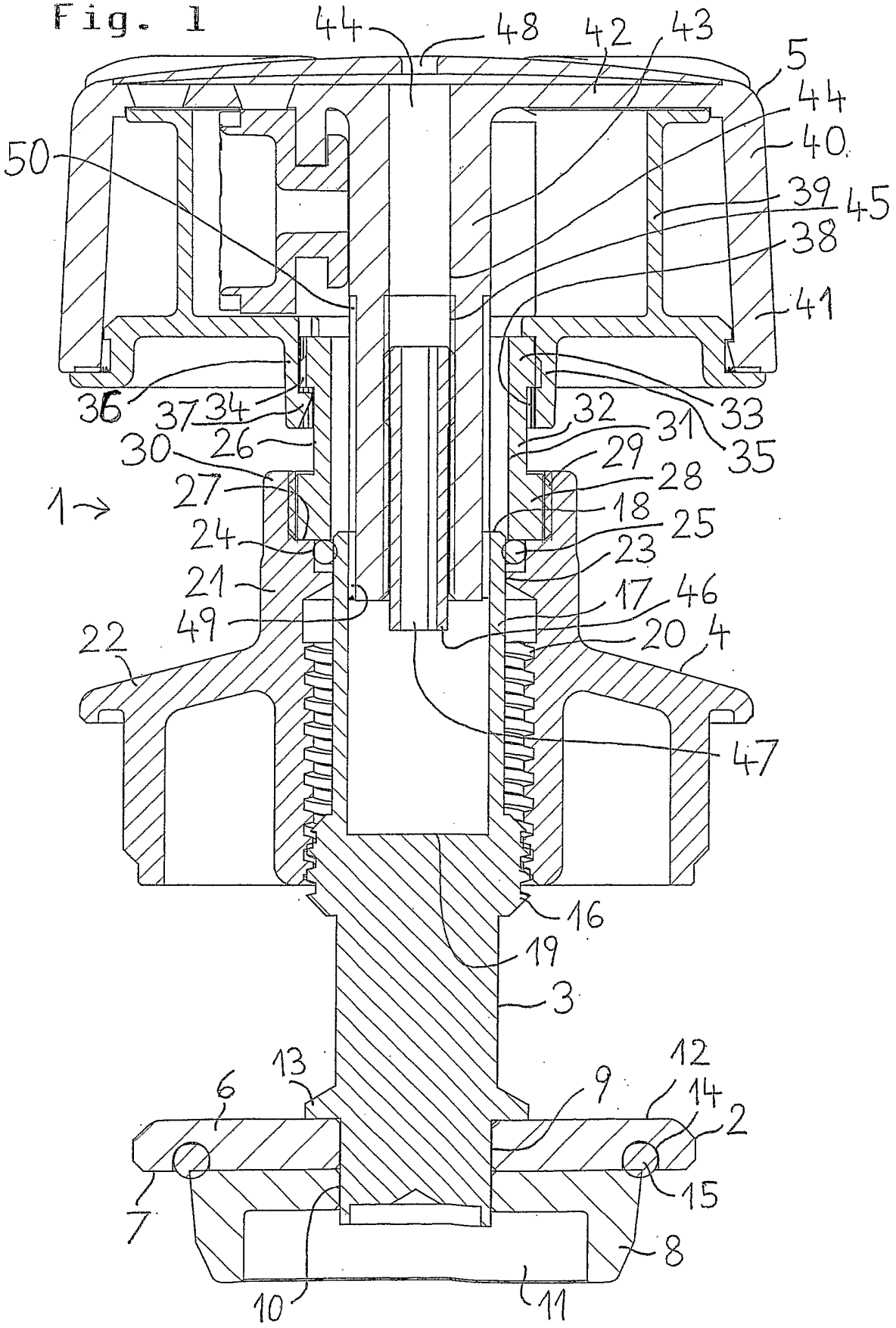
8. A valve according to claim 7, **c h a r a c t e r i z e d in that** the handwheel (5), which mainly is made of a plastic material, by means of a lower seat (35) is inserted onto the upper end (33) of the spacing piece, the seat in a few locations along its periphery suitably being slit in order to obtain tongues (36) with inwardly directed claws (37), which surround the upper end (33) of the spacing piece and prevent the handwheel from being drawn out.

9. A valve according to claim 8, **c h a r a c t e r i z e d in that** the inner side of the seat and suitably also the tongues is provided with an axial toothing (38), which matches the described toothing of the spacing piece , in order to attach the handwheel to the spacing piece in a certain definite adjustment position, which is secured thanks to the toothing , and in that the toothings and the adjacent parts of the toothings respectively preferably are provided with bevels, which facilitate the bringing together of said components.

10. A valve according to claim 9, **c h a r a c t e r i z e d in that** the handwheel (5) comprises a handwheel body (39), to which a handwheel cover (40) is to be attached having a peripheral wall (41) and an end wall (42), from which said dowel (43) projects through the bore (31) of the spacing piece and into the blind hole (19) of the spindle and which preferably is provided with a central,

axial through cavity (44), the part of which , which faces the spindle, being provided with a thread (45) in order to receive a threaded bolt (46) with an axial, e.g. through hexagon opening (47) in order to allow an insertion of an adjustment tool, which can be inserted into the handwheel through a hole (48) in said end wall (42), in that the bolt (46) is designed to be used as a stop for the opening movement of the cone, and in that the cone is movable, the outer side of the dowel (43) being provided with an axial toothing (50), which matches the toothing (49) of the blind hole (19).

Fig. 1


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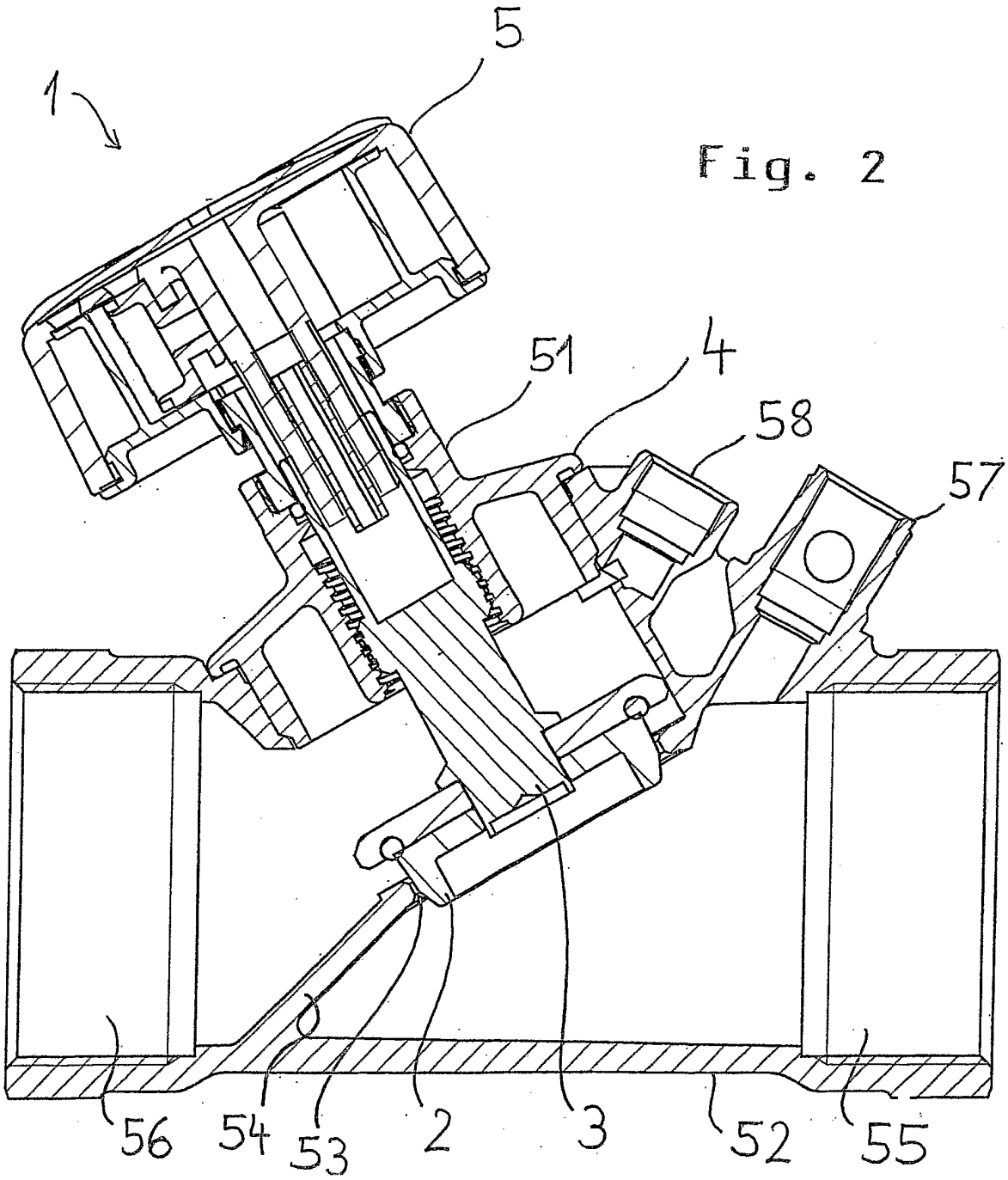


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 02/02103

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: F16K 1/02
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: F16K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 9203677 A1 (TOUR & ANDERSSON AB), 5 March 1992 (05.03.92), figures 1-12	1-10
Y	US 3098637 A (G.N. BAUSTIAN), 23 July 1963 (23.07.63), figures 1-3	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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Date of the actual completion of the international search	Date of mailing of the international search report
5 February 2003	11-02-2003
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Lena Nilsson / MRo Telephone No. +46 8 782 25 00

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Information on patent family members

30/12/02

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