11466/00

PCT WELTORGANISATION FÜR GEISTIGES EIGENTUM
Internationales Büro

INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

(51) Internationale Patentklassifikation 7 : F16K 31/26 — A1

(11) Internationale Veröffentlichungsnummer: **WO 00/45076**

(43) Internationales Veröffentlichungsdatum: 3. August 2000 (03.08.00)

(21) Internationales Aktenzeichen: PCT/CH99/00564

(22) Internationales Anmeldedatum: 25. November 1999 (25.11.99)

(30) Prioritätsdaten:
151/99 28. Januar 1999 (28.01.99) CH

(71) Anmelder *(für alle Bestimmungsstaaten ausser US)*: GEBERIT TECHNIK AG [CH/CH]; Schachenstrasse 77, CH-8645 Jona (CH).

(72) Erfinder; und
(75) Erfinder/Anmelder *(nur für US)*: BREGENZER, René [CH/CH]; Sonnenbergstrasse 3, CH-8632 Tann (CH). DOLDER, René [CH/CH]; Eichwiesstrasse 29, CH-8645 Jona (CH).

(74) Anwalt: GRONER, Manfred; Isler & Pedrazzini AG, Postfach 6940, CH-8023 Zürich (CH).

(81) Bestimmungsstaaten: AE, AL, AM, AT, AT (Gebrauchsmuster), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (Gebrauchsmuster), DE, DE (Gebrauchsmuster), DK, DK (Gebrauchsmuster), DM, EE, EE (Gebrauchsmuster), ES, FI, FI (Gebrauchsmuster), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Gebrauchsmuster), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO Patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), eurasisches Patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI Patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

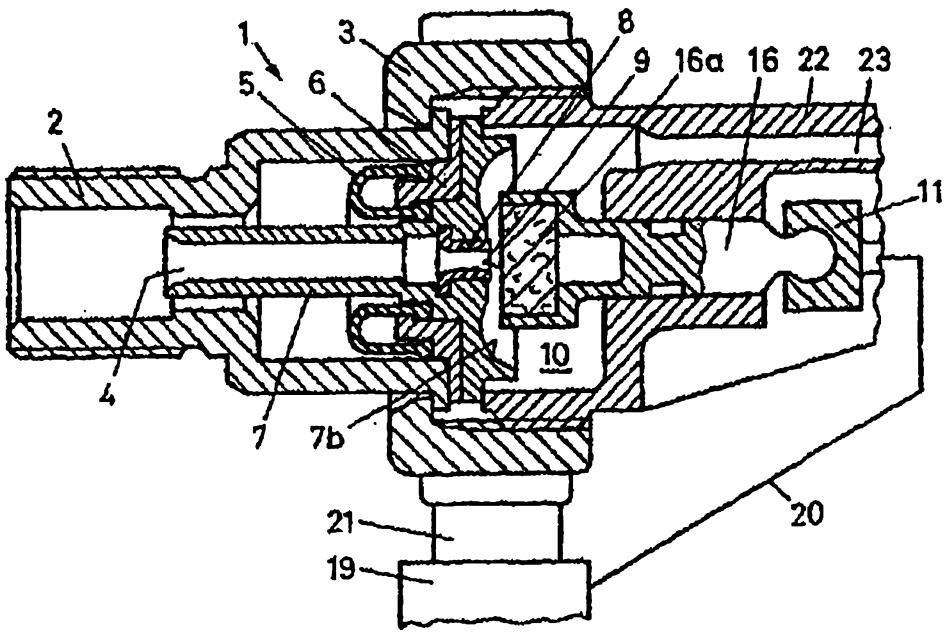
Veröffentlicht
Mit internationalem Recherchenbericht.

(54) Title: FLOAT VALVE FOR FILLING A FLUSH TANK

(54) Bezeichnung: SCHWIMMERVENTIL ZUM BEFÜLLEN EINES SPÜLKASTENS

(57) Abstract

The invention relates to a float valve for filling a flush tank and having a float (19) that is connected to an axially movable valve body (16). Said valve body (16) cooperates with a valve seat (9) of an admission nozzle of a nozzle body (7) that is to be connected to a supply line. Means (8, 15, 17) are provided for changing the cross section (A) of the nozzle that is to be sealed. This makes it possible to adapt the force being exerted on the valve body (16) to the closing force when the valve (1) is closed. The cross section (A) of the nozzle is formed, for instance, by a tubular and deformable membrane (8) or a turning nozzle plate (17).



Float valve for filling a cistern

The invention relates to a float valve for filling a cistern, having a float which is connected to an axially movable valve body which interacts with a valve seat of an inlet nozzle of a nozzle body which is to be connected to a supply line.

A float valve of this generic type has been disclosed by DE 31 53 688 C2 in the name of the applicant. This float valve is used to control the flow of water into a toilet cistern and has a valve body which is moved by means of a coupling mechanism and is held in the closed position. The reduction ratio of this coupling mechanism is low at the start of the closure movement and significantly greater at the end of this movement. This change in the reduction ratio during the closure movement provides increased security against undesired opening of the valve in the event of a pressure increase or pressure change in the feed line.

With a float valve of this type, it is essential that the lifting force of the float be dimensioned in such a way that the valve can also be connected to a feed line which is under a water pressure which is above the average. Consequently, the lifting force of the float has to be greater than that which would be optimal for a feed line under average or lower water pressure. In the case of the float valve described in the abovementioned publication and similar valves, the usual lifting force of the float is in the range from approximately 1.6 to 2.0 N. The lifting force of a float is substantially determined by its volume. A high lifting force can accordingly essentially only be achieved by a suitably high volume of the float.

In countries in which the flushing water is usually taken from a rainwater tank which is mounted, for

example, on the roof of a house, the water pressure varies very considerably and is generally relatively low. In this case, the inlet pressure may, for example, be only 1 bar. The floats which have hitherto been used for a relatively low pressure of this level therefore exhibit an unnecessarily high lifting force and, accordingly, an unnecessarily large volume. Particularly in the case of concealed cisterns, a float which is as small as possible would be desirable for space-saving reasons. In principle, a float of this type could be exchanged. However, this is relatively complex and correspondingly different floats or float valves would have to be kept in stock.

The invention is based on the object of providing a float valve of said generic type which is more compact and has a smaller volume yet nevertheless functions reliably.

According to Claim 1, the object is achieved, in a float valve of the generic type, by means for varying the nozzle cross section which is to be sealed. Since, in the float valve according to the invention, the nozzle cross section which is to be sealed is variable, this nozzle cross section can be adapted to the water inlet pressure. In the event of an unusually high water inlet pressure, this nozzle cross section is reduced, and in the event of a very low water inlet pressure the nozzle cross section is increased accordingly. In this way, the force which acts on the valve body when the valve is in the closed position can be optimally adapted to the closure force of the valve. At the same time, the filling capacity is also optimally adapted. In the event of a relatively low water inlet pressure, the nozzle cross section is increased accordingly, and the filling capacity is increased accordingly. Consequently, the float does not have to be overdimensioned from the outset, since an unusually high force on the valve body when the valve is in the

closed position can in any event be avoided by adapting the nozzle cross section.

Tests have shown that in the float valve according to the invention a lifting force in the range from 1.2 to 1.5 N is optimum. Because of this lower lifting force, the volume of the float is smaller than normal. This facilitates access to the interior of the cistern, which is particularly advantageous with a view to assembly and maintenance work, in particular in the case of concealed cisterns. Moreover, it is possible to achieve an optimum filling capacity of approximately 200 cm^3/sec. As a result, six litres of flushing water are refilled in approximately 30 seconds.

Particularly exact adjustment of the optimum nozzle cross section results if this cross section is continuously variable. According to a refinement, this is achieved in a highly cost-effective and reliable manner by means of a elastically deformable body. According to a refinement of the invention, this body is in the form of a hose and can be deformed by radially running adjustment means.

According to a refinement of the invention, the means for varying the nozzle cross section which is to be sealed are formed by a rotatable or pivotable disc having a plurality of passage openings. By rotating the disc, the passage opening corresponding to the optimum nozzle cross section is selected as the valve seat. The appropriate nozzle cross section can thus be set very easily and quickly. It is also conceivable for different nozzle bodies with different nozzle cross sections to be used.

Two exemplary embodiments of the invention are explained in more detail below with reference to the drawing, in which:

Figure 1 shows a longitudinal section through a float valve according to the invention, with individual parts having been omitted in order to preserve the clarity of the drawing,

Figure 2a shows a section through a part of the float valve shown in Figure 1, with the valve in the open position,

Figure 2b shows a partially sectional view in the direction of the arrow IIb-IIb from Figure 2a, and

Figure 3a shows a section through part of the float valve according to a variant, with the valve once again in the open position, and Figure 3b shows a view in the direction of the arrow IIIb-IIIb from Figure 3a.

The float valve 1 shown in Figure 1 has a valve housing 22 to which a connection nipple 2 is releasably attached by means of a union nut 3. A nozzle body 7 with a continuous bore 4 is clamped securely between this nipple 2 and the valve housing 22, together with a clamping ring 6. The nozzle body 7 is sealed with respect to the nipple 2 by means of a sealing element 5.

The nozzle body 7 has a valve seat 9 which is arranged approximately in the centre of a deflector screen 7b. This valve seat 9 interacts with a valve body 16 which has a rubber seal 16a. In Figure 1, the valve body 16 with the rubber seal 16a is pressed onto the valve seat 9. Consequently, the valve is closed and it is impossible for any flushing water to enter an annular chamber 10 of the valve housing 22 through the bore 4 in the nozzle body 7.

The pressure on the valve body 16 is exerted by means of a float 19 which is guided in a vertically displaceable manner on the outlet pipe 21 and is

connected to a lever 11 via a linkage 20, which is only diagrammatically indicated in this figure and is preferably designed as a coupling mechanism. The linkage 20 and the float 19 may be designed as described in the abovementioned DE 31 53 688 C2. The float 19 is situated in the cistern and is accordingly subject to a buoyancy. This lifting force is transmitted to the valve body 16 via the linkage 20 and via the lever 11.

As shown in Figures 2a and 2b, a hose-like, elastomeric diaphragm 8, the end face 8c of which is substantially flush with the valve seat 9, is inserted into the bore 4 in the nozzle body 7. At its end, the diaphragm 8 has a radial flange 8d allowing it to be secured in the nozzle body 7. In the region of the diaphragm 8, the bore 4 is widened by means of a suitably larger bore 13. A further radially running threaded bore 14, into which a grub screw 15 is inserted, projects into this bore 13. On its end side, this grub screw 15 bears against the outer side of the diaphragm 8. In the position shown in the abovementioned figures, the diaphragm 8 is elastically deformed to a slight extent by the grub screw 15, in such a manner that the nozzle cross section A shown in Figure 2b is not round and is also smaller than in the case of the undeformed diaphragm 8. If, in Figure 2a, the grub screw 15 is moved upwards in the threaded bore 14, the deformation of the diaphragm is gradually eliminated, until the diaphragm 8 bears against the bore 13 over its entire area and the nozzle cross section A is circular and therefore larger than that shown in Figure 2b. If the grub screw 15 in Figures 2a and 2b is moved further inwards in the radial direction, the size of the nozzle cross section A is accordingly reduced still further. In this way, by suitably deforming the diaphragm 8, the nozzle cross section A can be varied continuously within defined limits. Accordingly, the force which acts on the valve body 16 when the valve is in the

closed position, caused by the water pressure in the nozzle body 7, is varied. In the event of an unusually high water pressure, it is possible to continuously reduce the force on the nozzle body 16 by suitably tightening the grub screw 15 and thus reducing the nozzle cross section A. In the opposite situation, the grub screw 18 [sic] is loosened and, accordingly, the nozzle cross section A is increased.

In the embodiment shown in Figures 3a and 3b, a nozzle disc 17 is inserted into a radial recess 18 in the nozzle body 7', which nozzle disc, as shown in Figure 3b, has a plurality of, for example four, nozzle openings 17a to 17d which have different nozzle cross sections A and A' etc. The nozzle disc 17 is rotatably mounted and can be fixed in each of the four positions, for example using latching means (not shown here). Figure 3b shows the position of the nozzle disc 17 in which the nozzle passage 17a with the largest nozzle cross section A is active. In this embodiment too, therefore, the nozzle cross section can be varied. However, the variation is not continuous, but rather takes place in steps corresponding to the graduated nozzle passages 17a.

The diaphragm 8 and the nozzle disc 17 are only examples of means which can be used to vary the nozzle cross section. It will be clear to the person skilled in the art that other means with which the nozzle cross section can be varied in steps or continuously are also conceivable.

The nozzle cross section A is set during assembly. Generally, this nozzle cross section A is fixed after assembly and is only changed again in exceptional cases, although in principle this can take place at any time. The adaptation of the nozzle cross section A can be checked after assembly, by flushing and then refilling the cistern. In this case, the optimum

filling capacity of, for example, 200 cm^3/sec is easy to check. Another considerable advantage of the float valve according to the invention is that the change can be achieved using relatively simple, inexpensive parts. There is no need to change the method of operation compared to the known float valve. Since the nozzle cross section can be optimally adapted to the inlet pressure, however, a float 19 which is of relatively small volume and accordingly has a relatively high lifting force is provided.

Patent Claims

1. Float valve for filling a cistern, having a float (19) which is connected to an axially movable valve body (16) which interacts with a valve seat (9) of an inlet nozzle of a nozzle body (7) which is to be connected to a supply line, characterized by means (8, 15, 17) for varying the nozzle cross section (A) which is to be sealed.

2. Valve according to Claim 1, characterized in that the nozzle cross section is continuously variable.

3. Valve according to Claim 1 or 2, characterized in that the nozzle cross section (A) is formed by an elastically deformable body (8).

4. Valve according to Claim 3, characterized in that the body (8) is of hose-like design.

5. Valve according to Claim 3 or 4, characterized in that the deformable body (8) is a diaphragm which can be deformed, for example, by means of a radially adjustable grub screw (15).

6. Valve according to Claim 1, characterized in that the means (17) for varying the nozzle cross section (A) has [sic] by an insert (17) which is mounted in the nozzle body (7) and has at least two passages (17a-17d) of different cross sections (A, A'), which optionally form the inlet nozzle.

7. Valve according to Claim 6, characterized in that the insert (17) is a rotatable or pivotable disc.

8. Valve according to one of Claims 1 to 7, characterized in that it is a plunger valve.

Abstract

The float valve is used to fill a cistern and has a float (19) which is connected to an axially movable valve body (16). The valve body (16) interacts with a valve seat (9) of an inlet nozzle of a nozzle body (7) which is to be connected to a supply line. Means (8, 15, 17) for varying the nozzle cross section (A) which is to be sealed are provided. As a result, the force acting on the valve body (16) when the valve (1) is in the closed position can be adapted to the closure force. The nozzle cross section (A) is formed, for example, by a hose-like and deformable diaphragm (8), a rotatable nozzle disc (17), or exchangeable nozzle bodies (7).

(Figure 1)

Fig. 1

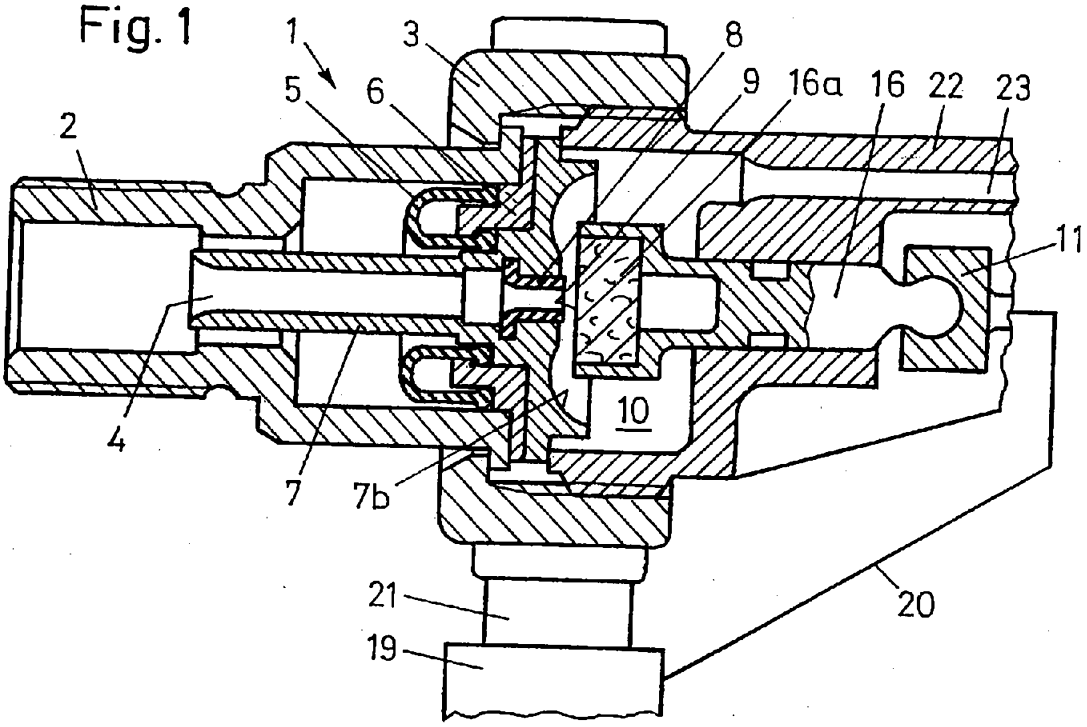


Fig. 2a

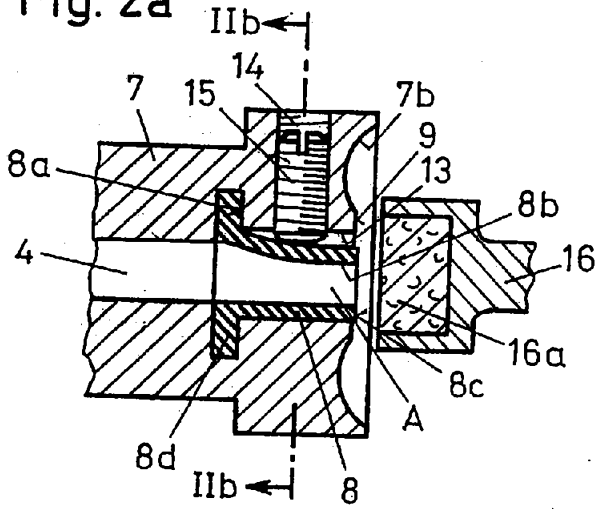


Fig. 2b

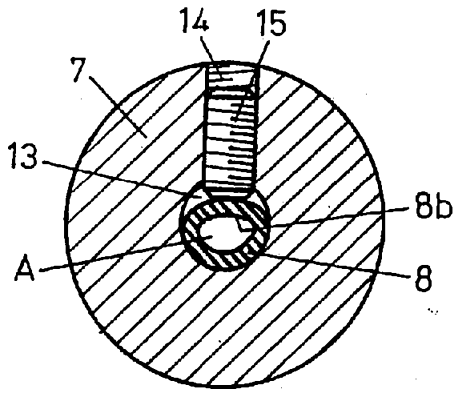


Fig. 3a

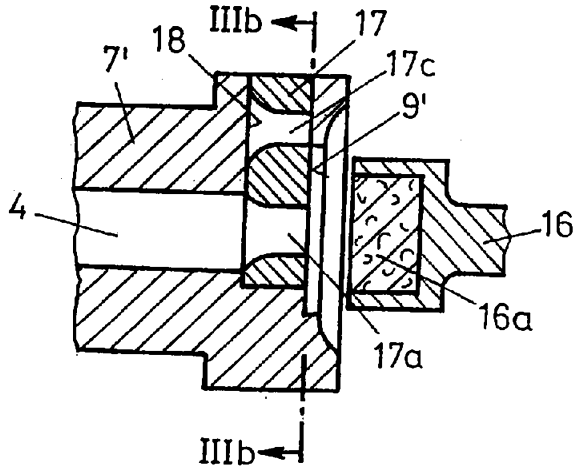


Fig. 3b