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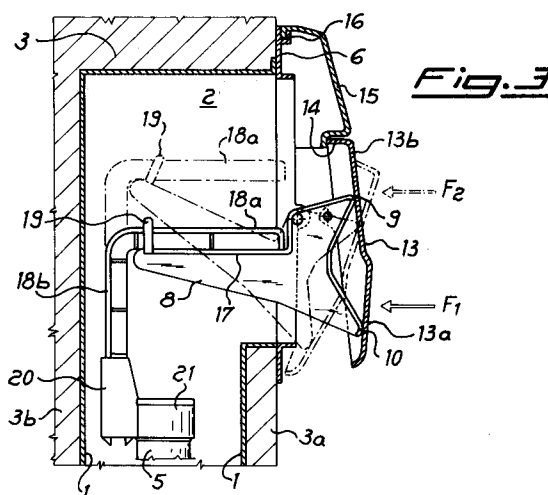
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I-20123 Milano (IT)(54) **Operating device with self-adjustable extension, particularly for discharge valves of water cisterns for sanitary services.**

(57) Operating device with self-adjustable extension particularly for discharge valves of water cisterns for sanitary services housed inside a void (2) in a wall (3) with a frontal aperture (4), comprising a flat supporting frame (6) fixable to the partition (3) at the position of the said quadrangular aperture (4) and supporting an operating lever (8) of substantially triangular shape, oscillating eccentrically about a horizontal axis (7) of the said frame in such a way as to have two vertices (9, 10) external to the frame and in contact with a control push button (13) pivoted eccentrically on the said operating lever (8), and an opposite vertex (11) which is free to slide and is guided by corresponding means (17, 19) on a horizontal arm (18a) of a member substantially of inverted L-shape whose other vertical arm (18b) has at its end a coupling (20) with which are associated connecting means (21) capable of engaging with the upper end of a vertical tube (5) carrying the discharge valve of the cistern (1).

**EP 0 555 922 A1**

The present invention relates to a lever device with self-adjustable length for the double-action operation of discharge valves, particularly of the type for enclosed water cisterns for sanitary equipment and the like.

There are at present various known forms of operating devices for the opening and/or closing of the discharge valves of water cisterns for sanitary services, of the type external to the partition or of the type internal to it, in other words of the enclosed or concealed type.

There are also known operating devices for the said discharge valves, designed in such a way as to permit the interruption of the water supply at any moment in order to avoid excessive consumption of water where this is not required.

In the particular case of enclosed cisterns, in other words those housed in a cavity inside the wall, the present operating devices controlling their discharge valves do not provide a wide range of simple adjustment in depth and height of the lever mechanisms located between the operating button or lever, normally positioned visibly in a position external to the partition, and the valve control tube inside the cistern and inside the partition; on the contrary, only small adjustments are possible, and these do not normally make it possible to compensate in all cases for the differences in distance between the visible partition surface and the vertically mobile tube which operates the discharge valve, these differences being principally due to the different thicknesses of the partitions in front of the cistern.

In cases where there are significant differences of thickness in the partition in front of the cistern, therefore, the known operating devices must be either made with suitable dimensions or adapted with dispositions and substitutions of parts which do not always ensure the proper functioning of the mechanisms.

Consequently, there arises the technical problem of producing an operating device for the said discharge valves of enclosed cisterns, capable of overcoming the limitations of use of the known devices, and, in particular, capable of being easily and rapidly adapted, during fitting, to the various distances between the front surface of the wall enclosing the cistern and the corresponding discharge valve operating tube, and also to different heights or lengths of this discharge tube.

Within the scope of this problem, one object of the invention is the production of an operating device of the type specified above, capable of permitting the said adjustments without the use of replacement parts having different dimensions, according to the thickness of the wall in front of the cistern, and capable of permitting the said adjustments automatically and without the use of tools,

even by non-specialist personnel, with evident practical and economic advantages.

A further object of the invention is that of producing an operating device for the said discharge valve, capable of permitting interruption, at any desired moment, of the discharge flow while maintaining substantially the same operating pressure of the control push button or lever, regardless of the thickness of the wall in front of the cistern.

These and other objects, which will be more clearly understood from the following description, are achieved with an operating device with self-adjustable extension particularly for discharge valves of water cisterns for sanitary services housed inside a void in a wall with a frontal aperture, comprising a supporting frame fixable to the partition at the position of the said quadrangular aperture and supporting an operating lever of substantially triangular shape, oscillating eccentrically about a horizontal axis of the said frame in such a way as to have two vertices external to the frame and in contact with a control push button pivoted eccentrically on the said operating lever, and an opposite vertex which is free to slide and is guided by corresponding means on a horizontal arm of a member substantially of inverted L-shape whose other vertical arm has at its end a coupling with which are associated connecting means capable of engaging with the upper end of a vertical tube carrying the discharge valve of the cistern, the said free sliding of the operating lever on the L-shaped member being such as to provide automatic adjustment of the horizontal extension of the control device according to the mounting of the frame on the external surface of the front partition containing the cistern.

According to the invention, the said means of guiding the L-shaped lever member are also made to consist substantially of a rectilinear rail or the like formed on the upper edge of the lever, and a link member disposed near the end of the lever in such a way as to enable the latter to raise the said L-shaped member and to keep the arm in a horizontal position regardless of the angle of inclination of the operating lever and regardless of the sliding of the lever along the horizontal arm.

Additionally, the said vertically displaceable coupling member at the end of the vertical arm of the said L-shaped member is fitted slidably on the said arm and is provided with catch means with teeth or the like, capable of ensuring its stable locking at various heights on the said arm.

Also according to the invention, the said L-shaped member is to be made with a quadrangular, box-shaped or U-shaped section, and the said coupling on it is displaceable and fixable in two diametrically opposite positions in such a way as to have the said projecting means in a position

between the partition in front of the cistern and the valve-carrying tube, or between the tube and the partition behind the cistern, thus providing further means of compensating for the distances due to different thicknesses of the front partition.

Further characteristics and advantages of the present invention will be more clearly understood from the following detailed description of certain practical embodiments, with reference to the attached sheets of drawings, provided for information only, in which the following are shown:

- in Figure 1: a schematic section through a discharge valve operating device according to the invention, illustrated in association with an enclosed cistern with a thin front partition;
- in Figure 2: an exploded view of the device shown in Figure 1, shown during the process of insertion;
- in Figure 3: the device according to the invention, shown in the rest position (solid lines) and during operation (broken lines); and
- in Figure 4: the device according to the invention applied to an enclosed cistern with a thick front partition.

With reference to the said figures, an enclosed cistern consists of a prismatic container 1, with an open top, at the bottom of which is a discharge aperture which is either closed or opened by a valve operated by the vertical tube 5 which also acts as an overflow for the discharge of the water if the water level rises above a predetermined safe level.

The said container is housed in a void 2 formed in a wall 3, whose partition 3a in front of the cistern 1 may be of different thicknesses, according to the dimensions of the cistern or the function of the wall, for example. To provide access to the interior of the void 2 and consequently of the cistern 1, an aperture 4, normally of quadrangular form, is made in the partition or wall 3a in front of the cistern.

The discharge valve operating device to which the invention relates is such that it may be used with front walls 3a whose thicknesses vary over a wide range, normally from 15 cm (Fig. 1) to more than 100 cm (Fig. 4).

The said device consists of a supporting frame 6 consisting of a flat sheet provided with apertures and fixable by screws or the like to the visible surface of the wall 3a around the perimeter of the aperture 4 formed in the wall.

An operating lever 8 whose axis of rotation 7 is horizontal is pivoted in the central part of the frame 6; the said lever 8 substantially consists of a plate eccentrically rotatable about the said axis 7 and

having the shape of an irregular triangle with two vertices 9 and 10 external to the frame 6, and a third vertex 11 inside the void 2. A curved plate 13, rocking around a hinge-pin 12, is pivoted at 12 on the operating lever 8, eccentrically with respect to the median longitudinal axis of the said lever 8, and forms the oscillating lever push button for the operation of the triangular lever 8, being disposed so that it rests against the vertices 9 and 10 of the said lever 8 when the device is not in operation; additionally, the upper edge 14 of the push button 13 is bent towards the inside and makes contact with a longitudinal step 14a formed on the periphery of a retaining cover 15 which in turn is attached to the supporting frame 6, as shown by 16 in the figures.

On the upper horizontal side 17 of the operating lever 8 there is formed a rail or like guide on which rests the horizontal arm 18a of an L-shaped member 18 with a cross-section which, for example, may be of quadrangular inverted U shape or the like; the said L-shaped member is held in the guide of the lever 8 by a link 19 which is integral with the lever 8 at its interior vertex 11, while the vertical arm 18b forms a bar having at its lower end a coupling 20 which is displaceable along the vertical arm and is provided with internal teeth capable of locking it securely at various heights.

A connecting device 21 of open annular shape is also integral with and projects from the coupling 20, so that it forms two arms capable of encircling and retaining the upper end of the tube 5 which operates the discharge valve.

The section of the internal cavity of the coupling 20 is square, so that it can slide without rotating along the arm 18b, this design enabling the coupling and its lateral connector 21 to be disposed in either of two diametrically opposite positions with respect to the arm 18b, and consequently enabling the tube 5 to be engaged in either of two diametrically opposite positions, namely between the tube and the rear wall 3b as in Figure 1, or between the tube and the front wall 3a as in Figure 4, these positions being determined by the thickness of the wall in front of the cistern, as will be explained more clearly in the following text.

The device described above has the advantage of being capable of being rapidly and easily adapted to the various situations which may be present in relation to the thickness of the wall in front of the cistern and the dimensions of the cistern, without replacement and/or modification and/or deformation of the levers; the sliding of the lever 8 along the horizontal arm 18a of the L-shaped member 18 enables the device to be adjusted automatically by the pressure of the frame 6, carrying the lever 8, against the front surface of the partition 3a of the wall 3, regardless of its thickness.

The operation of the device is as follows: when the lower part 13a of the push button is pressed in the direction of the arrow F_1 , the lever 13 oscillates, presses against the vertex 10 and causes the lever 8 to rotate about the pivot 7, bringing its end 11 upwards, as shown in broken lines in Figure 3; conversely, when the upper part 13b is pressed in the direction of the arrow F_2 , it presses against the vertex 9 and causes the same lever 8 to rotate in the opposite direction to the preceding one, bringing its end 11 downwards. Figure 3 shows in broken lines the position taken by the push button 13 when the lever 8 is rotated upwards.

As shown in Figure 3, whenever the discharge valve is opened, the horizontal arm 18 of the L-shaped member is raised by the side 17 of the operating lever and is brought to the higher position while remaining horizontal, so that the raising of the tube 5 always takes place in the vertical direction, in other words in the direction of opening of the discharge valve. The arm 18c is kept in the horizontal position by the link 19 which, when the lever 8 is in the raised position (Fig. 1), is inclined while keeping the arm 18c in contact with the end 11 of the said operating lever 8.

The various possibilities of application of the operating device described above are clearly illustrated in the individual figures. In figure 1, in which the thickness of the wall 3a in front of the cistern is limited, the arm 18a is kept entirely above the lever 8 and the coupling 20 may be positioned so that it engages with the tube 5 in front of it, in other words between the tube 5 and the rear wall 3b.

The same device shown in Figure 1 may also be used in the case of a wall 3a whose thickness may, for example, be double; in this case (Figure 4), in order to compensate for the greater distance between the front of the wall 3a and the discharge tube 5, it may be sufficient to rotate the coupling 20 through 180° and to engage the tube 5 between the wall and the tube, while keeping the position of the lever 18 unchanged with respect to the lever 8.

However, in the case of a front wall 3a of even greater thickness, the device is positioned as illustrated in Figure 4, in which, in order to compensate for the greater distance between the wall 3a and the discharge tube 5, the lever 8 ceases to slide along the horizontal arm 18a of the L-shaped member 18 when the frame 6 bears against the partition 3a, thus providing, as a result of the different thickness of the partition, a different position of the link 19 with respect to the arm 18a.

The example in Figure 4 illustrates, in addition to the said different relative position, the possibility of rotating the coupling 20 through 180° so that it engages the tube 5 at the front of the tube, in other words between the partition 3a and the tube, in

order to compensate for a further amount of depth in relation to the increased thickness of the front partition 3a. The tube 5 is still raised in the way described previously, in other words with the end 11a of the lever 8 which acts under the link 19 which retains the arm 18d so that this arm may be displaced upwards while remaining in the horizontal position to raise the discharge tube 5 in a suitable way.

Consequently, with a device according to the invention with a lever arm projecting from the operating lever 8 which is horizontally displaceable and a coupling 20 for engaging the tube 5 which is rotatable through 180° , it is possible to compensate for the different distances between the tube and the front of the wall in front of the cistern, regardless of the thickness of the wall.

The device to which the invention relates may advantageously be constructed in such a way that it also enables a substantially constant force to be applied to operate the oscillating lever 13 forming the control push button in the case where the lever 8 is moved horizontally away from the said horizontal arm 18a and also in the case where the lever 8 is inserted under the whole of the said arm.

Finally, the particular form of the operating lever 18, which has two points of contact 9 and 10 with the oscillating push button 13, makes it possible to achieve, as stated previously, the controlled closing of the discharge valve with the interruption of the flow of water, in order to make advantageous savings of water.

Modifications of the shape and dimensions of the various components may be made to the invention as described in practical embodiments, without departing from the scope of protection of the invention.

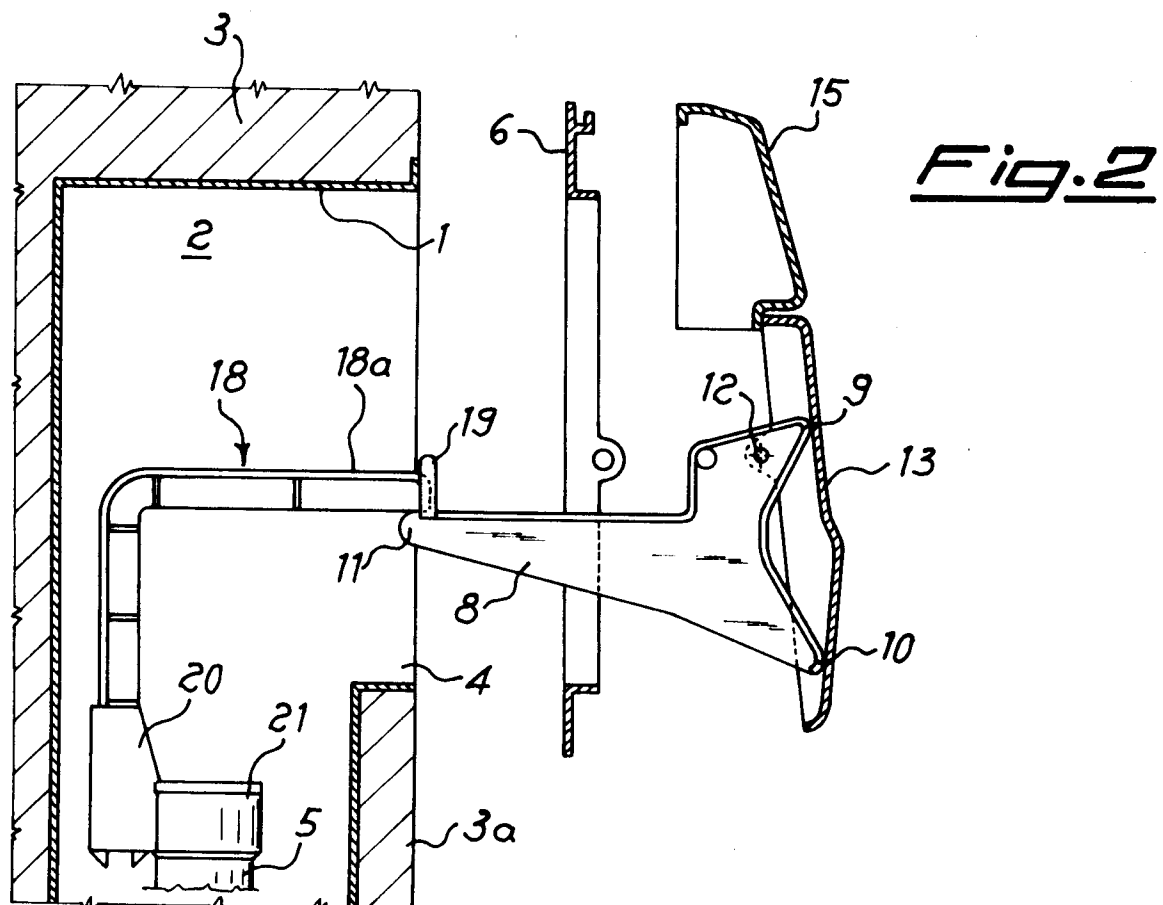
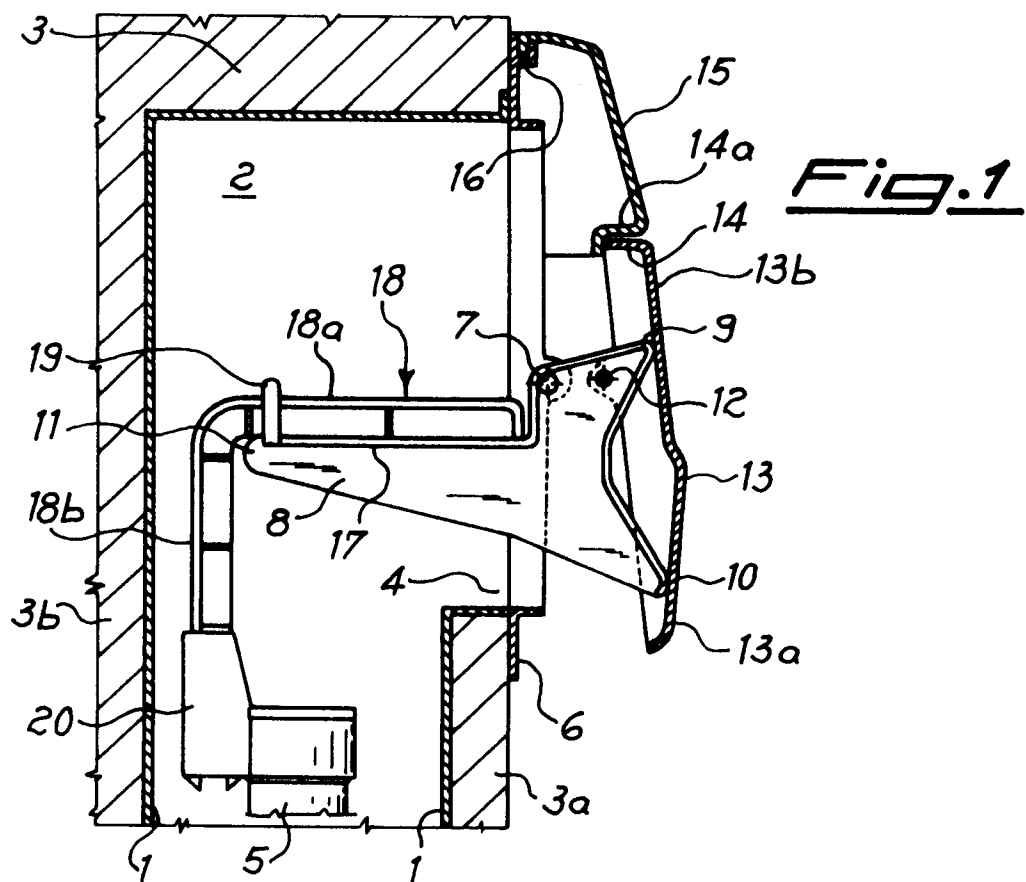
Claims

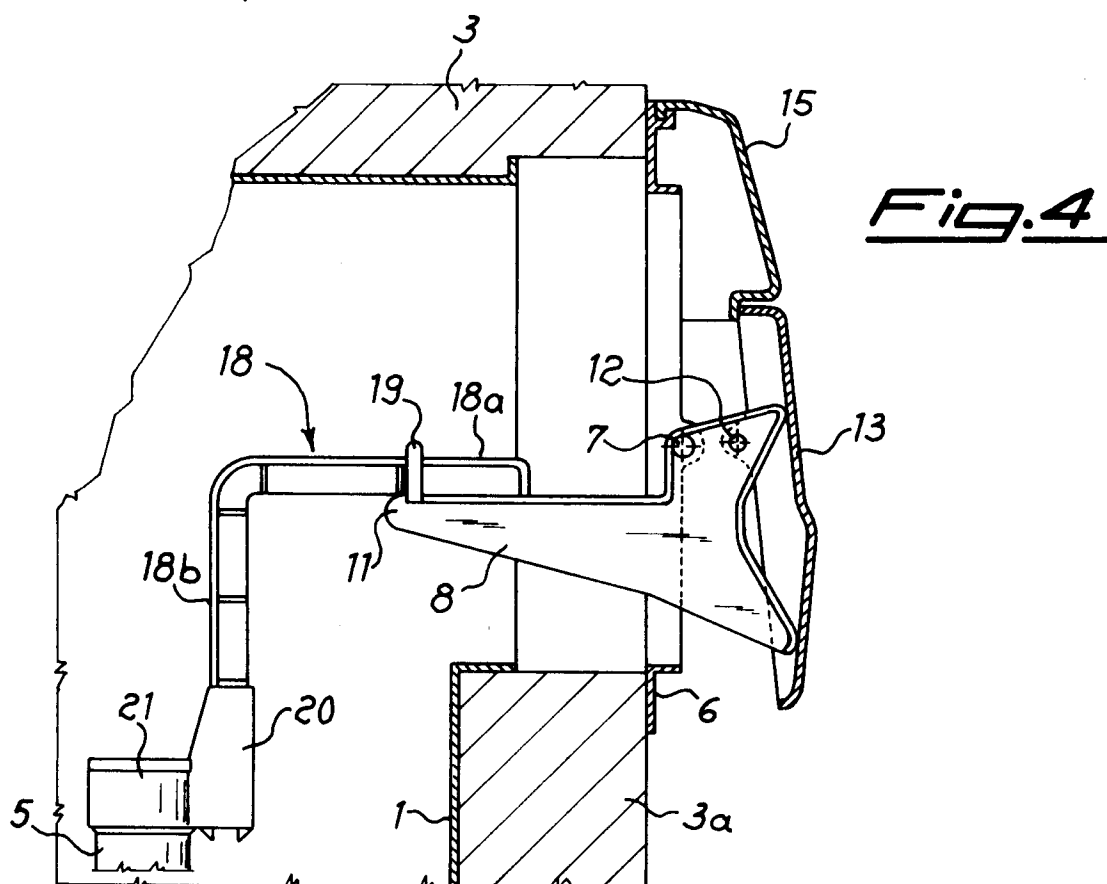
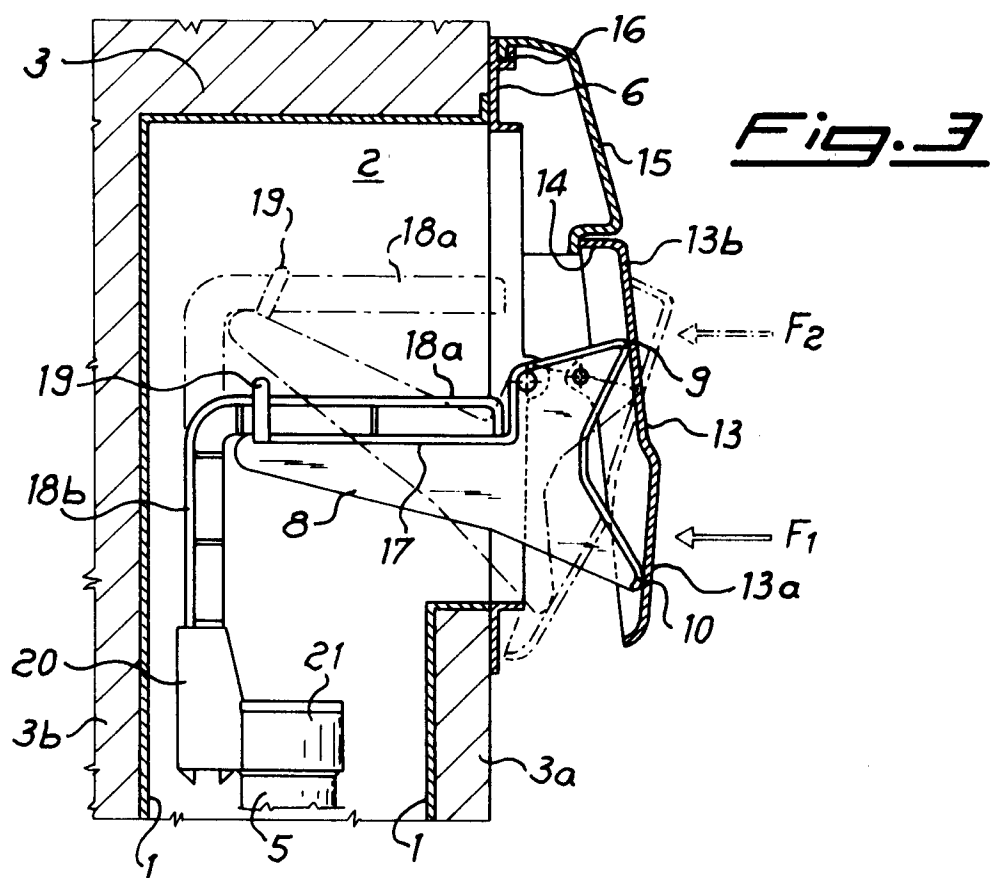
1. Operating device with self-adjustable extension particularly for discharge valves of water cisterns (1) for sanitary services housed inside a void (2) in a wall (3) with a frontal aperture (4), characterized in that it comprises a flat supporting frame (6) fixable to the partition (3) at the position of the said quadrangular aperture (4) and supporting an operating lever (8) of substantially triangular shape, oscillating eccentrically about a horizontal axis (7) of the said frame in such a way as to have two vertices (9, 10) external to the frame and in contact with a control push button (13) pivoted eccentrically on the said operating lever (8), and an opposite vertex (11) which is free to slide and is guided by corresponding means (17, 19) on a horizontal arm (18a) of a member substantially of inverted L-shape whose other

vertical arm (18b) has at its end a coupling (20) with which are associated connecting means (21) capable of engaging with the upper end of a vertical tube (5) carrying the discharge valve of the cistern (1), the said free sliding of the operating lever (8) on the L-shaped member being capable of providing automatic adjustment of the horizontal extension of the control device by the pressure of the frame (6) against the external surface of the front partition (3a) containing the cistern (1).

2. A control device according to claim 1, characterized in that the said means of guiding the lever (8), along the L-shaped member (18) substantially consist of a rectilinear rail or the like formed on the upper side (17) of the latter and a link member (19) located near the end (11) of the lever (8) in such a way as to enable the lever to raise the said L-shaped member while keeping the arm (18a) in a horizontal position regardless of the angle of inclination of the operating lever (8) and regardless of the extent to which the lever is moved away from the horizontal arm (18a).
3. A device according to claim 1, characterized in that the said coupling member which is slidable on the vertical arm (18b) of the said L-shaped member, may be attached in two diametrically opposite positions so that the said means of connection (21) may be disposed in a position between the front wall (3a) and the valve carrying tube (5) or in a position between the tube (5) and the rear partition (3b), according to the thickness of the front partition of the containing void.
4. A device according to claims 1 to 3, characterized in that catch means, with equally spaced teeth or the like, capable of providing the secure locking of the said coupling (20) at various heights on the arm (18b) are formed at least on the vertical arm (18b) of the said L-shaped member.
5. A device according to the preceding claims, characterized in that the said push button with oscillating lever (13) is made substantially quadrangular with the edge (14) of the upper horizontal side bent so that it bears against a stop (14a) formed in a fixed cover (15) associated with the said frame (6).

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EUROPEAN SEARCH REPORT

Application Number

EP 93 20 0329

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	LU-A-83 666 (GEBERIT AG) * the whole document * ---	1	E03D5/09 E03C1/01
A	DE-U-8 617 785 (SCHNEIDER) * page 7, line 1 - page 8, line 19; figure 1 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E03D E03C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 MAY 1993	Examiner DE COENE P.J.S.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			