

LOW LEVEL DUAL FLUSH W.C. CISTERN

The invention relates to a cistern comprising a closing body which is displaceable from a closing position in which the water is prevented from flowing out of the cistern to a chute into a spilling position in which such a flow of water is allowed by manual actuation of a first control-member, after which it can be brought back into the closing position by manual actuation of a second control-member.

Such a cistern is known from U.S. patent specification 1,525,475; it provides the possibility of interrupting a water flow initiated by manual actuation of the first control-member to the chute by manual actuation of the second control-member subsequently carried out in due time before the whole amount of water contained in the cistern has flowed away or has been conducted away through the chute. Such an interruption of flush results in a reduction of water consumption, which may be desirable in some cases. In the cistern according to said U.S. patent the second control-member is formed by an outwardly projecting extension of one of the standing walls in which it is arranged. In the modern cisterns of the low hanging type, which are often fairly flat and, therefore, have a relatively great height and width with a small thickness, the presence of the control-member in one of the standing sidewalls may give rise to problems of acces-

sibility when the space available in a toilet on both sides of the cistern is limited, for example, by the presence of an outlet pipe. It is noted in this respect, that the supply of water to a cistern is usually performed through a feeding mechanism arranged in one of the sidewalls of the cistern and extending on the inner side thereof, which limits the possibilities of mounting the second control-member in the side-wall concerned.

It will furthermore be obvious that the present ideas about the user's comfort oppose the presence of the second control-member in the front wall of a cistern facing the back of a user when seated. It will furthermore be evident that manual actuation of the second control-member intended to interrupt the flush, other than the manual actuation of the first control-member is not a manipulation required after the use of the toilet, but one carried out if the user so wishes.

The invention has for its object to provide, for the problems described in the preceding paragraph concerning a readily accessible disposition of the second control-member intended for interrupting the flush in a cistern of the low hanging type, a solution which is satisfying not only in practical use but also in an aesthetical aspect.

The invention has furthermore for its object to provide a cistern of a flat type having a relatively great height and width and a small thickness which not only offers the possibility of a flush interruption at the user's will, but also signals this possibility to the user in a conspicuous manner after the manual actuation of the first control-member.

For this purpose the invention proposes to arrange the two control-members in the top wall of a cistern of the low hanging type having a top wall which may be formed by a cover and to couple them with one another with the aid of coupling means in a manner such that solely the manual actuation of the first control-member brings about a relative displacement of the second control-member which enables the manual actuation of the second control-member. It will be obvious that the relative displacement of the second control-

member fulfills the afore-said signalling function.

The afore-said U.S. patent specification 1,525,475 describes a cistern in which the second control-member cooperates with an arm of a lever pivotable about a point fixed in place with respect to the cistern and serving to transfer a displacing force to the closing body. The second control-member arranged in a standing wall of the cistern is constantly in its position suitable for manual actuation, in which it is held by a spring. Thereagainst, the invention proposes to have also the first control-member co-operating with an arm of the lever, whilst the second control-member may be displaced to its position suitable for manual actuation only by such actuation of the first control-member via the lever. In this way it is prevented that a user should actuate the second control-member, be it without effect, before actuating the first control-member so that the function of the second control-member would not be justly appreciated.

In the cistern according to said U.S. patent specification, also the second control-member has the form of a push-button. The invention proposes to shape the first control-member in the form of a push-key with a bore housing the button. It is thus possible to arrange the two control-members in a clearly visible manner centrally in the top wall or the cover of the cistern, where they are readily accessible for actuation.

It is noted that German patent specification 636,511 also describes a cistern, the top wall of which has two control-members substantially in the form of pushbuttons. These control-members, either of which can be actuated at the user's choice, co-operate with the same arm of a pivotable lever serving to transfer a displacing force to the closing body of the cistern. However, when one of the control-members is actuated, there occurs blocking of a flap in its open position, whereas the flap would be moved into its closed position after first actuation of the other control-member under the action of the water flowing away towards the chute, in which latter position it prevents part of the water volume in the cistern from flowing away. After manual actuation of the

selected control-member the actuation of the other member remains without consequence. On the contrary, with the cistern embodying the invention it is possible, after the necessary actuation of the first control-member intended in fact to discharge the whole water volume of the cistern, to interrupt the flow of water by due actuation of the second control-member.

According to the invention, in a cistern in which the two control-members are formed by a push-key and a push-button arranged in a bore of the former, it is advisable to provide the arm of the lever co-operating with the second control-member with a ridge which rides along the lower end of the push-button during pivotal movement of the lever. The presence of such a ridge facilitates the relative displacement of the push-button when the push-key is being depressed for initiating the flush.

From the foregoing it is apparent that the invention provides a cistern of the low hanging type with a possibility of flush interruption in which the control-members intended for a normal flush and an interrupted flush are centrally arranged in the top side or the cover of the cistern so as to be readily accesible. This provides, in addition, the advantage that the central disposition of the control-members leaves free relatively much space on either side of them in the direction of width of the cistern, which enables an unhindered arrangement of the afore-said mechanism for filling the cistern with water which does not form part of this invention.

The invention will be described more fully with reference to the accompanying drawings of some embodiments, to which the invention is not limited, however. The drawings show in

fig. 1 a front view, partly cut-away, of an embodiment of a cistern in accordance with the invention,

fig. 2 and 3 enlarged vertical sectional views taken on the line II-II in fig. 1 in the closing position and the open position, respectively, of the closing body of the cistern and

fig. 4, on a different scale, a sectional view like that of figs. 2 and 3 of a further embodiment of a cistern in accordance with the invention.

The embodiment of a cistern in accordance with the invention shown in figs. 1, 2 and 3 is of the low hanging type and comprises an external trough 1 of a hard synthetic resin having a cover 2 that can be removed in a manner not shown and made from the same material. Members for fastening the cistern to a wall are not shown in the drawing. At 3 the cover 2 pivotally accommodates a control-key 4, which is not visible in fig. 1. Inside an opening 5 and an adjoining sleeve 6 the key 4 carries a rod 7 adapted to move freely over some length inside the sleeve 6 and having a thickened head 8. Radial extensions 9 of the rod 7 serve to prevent the rod 7 from being drawn out of the sleeve 6. The purpose and the mode of operation of the key 4, which will also be termed "control-key", and of the rod 7 with the head 8, the latter

At the end remote from the fulcrum 3 (on the right-hand side in figs. 2 and 3) the key 4 has a bent-over part 10 the underside of which bears on the top end of a pin 11 having a collar 12. As appears from figs. 2 and 3, the pin 11 is mounted in the top of the cistern 1 for such displacement in its longitudinal direction as to be maintained by a helical spring 13 bearing on said collar 12 in its position shown in fig. 2 whilst, in turn, it retains the control-key 4 by means of the bent-over part 10 thereof in the position shown in fig. 2. When subsequently the control-key 4 being in said position is depressed and the bent-over part of the key is thus also moved, the part 10 displaces the pin 11 against the effect of the helical spring 13 in downward direction, resulting in the position shown in fig. 3.

At its lower end the pin 11 bears on the short arm 14 of a two-armed lever 14, 16 which is pivotally supported in a fulcrum 15 and the long arm 16 of which has a function to be described hereinbelow. The operation of a comb 17 arranged on the long arm 16 and the co-operation of the rod 7 with said comb 17, which form parts of the invention, will be discussed later. In this stage it may be sufficient to note that

the downward displacement of the pin 11 resulting from depression of the control-key 4 causes the two-armed lever 14, 16 to carry out a tilting or pivoting movement about its fulcrum 15 from its position shown in fig. 2 to its position shown in fig. 3.

A chute 18 adjoins the underside of the cistern 1. Around the opening 19, through which the water 20 contained in the cistern may flow into the chute 18 (see fig. 3), the cistern has an internal seat 21 for a circular valve body 22. In the situation shown in fig. 2 the valve body 22 is in its closing position, in which it bears on the seat 21 and prevents the water 20 in the cistern from flowing into the chute 18. In the situation of fig. 3 the valve body 22 is in the lifted position, which may also be termed "flushing position". In this flushing position, the valve body 22 allows the water 20 in the cistern 1 to flow into the chute 18.

The valve body 22 is carried by a valve stem 23, which carries above the valve body 22 a cylindrical float 24 the floating power of which in water is sufficient to hold the valve body 22 in its flushing position of fig. 3 as soon as it is lifted out its closing position of fig. 2. The floating body 24 is located with some amount of clearance inside a flasklike body 25, the bottom 26 of which has an opening 27 allowing the valve stem 23 above the valve body 22 to pass with some amount of clearance so that the interior of the flask-like body 25, which is open at the top, can have the same water level as anywhere else inside the cistern 1. When the cistern 1 is emptying its water through the opening 19 into the chute 18 (see fig. 3), the water level in the flask-like body 25 will drop less rapidly than outside the same, since the water can flow out of the interior of the body only through the said clearance of the opening 27 around the valve stem 23 and one or more additional apertures, like 28 in the sidewall of the flask-like body 25. As a result the floating body 24 will not regain its "normal" weight until the water 20 around the flask-like body 25 has practically completely flown from the cistern 1 into the chute 18.

The flask-like body 25 has on the upper side comparatively long, neck-shaped part 29 in which a thickened part 30 of the valve stem 23 can move freely with a given amount of clearance.

5 Near its top side, the neck-shaped part 29 has a lateral opening or window 31, the lower edge 32 of which (see fig. 2) is located at a short distance above the desired maximum water level inside the cistern 1. This desired maximum water level, which is indicated in fig. 2 a few milli-
10 metres below the lower edge 32 of the window 31 by a solid line, is determined in a manner not further described here by the aforesaid mechanism shown only in fig. 1, where it is designated as a whole by reference numeral 33. This mechanism fills the cistern 1 with water as soon as a drop of the
15 water level inside the cistern gives rise thereto. When the desired maximum water level is reached the mechanism 33, which may be of any appropriate type and which does not form part of the invention, stops operating. If this operation or the termination thereof should be so disturbed that the water
20 supplied rises above the desired maximum level inside the cistern 1, the water will soon reach the lower edge 32 of the window 31 and the neck-shaped part 29 of the flask-like body 25 and flow over and across the edge 32 on the top side into the neck-shaped part 29 of the flask-like body 25. Although
25 this is not shown in the drawing, the valve stem 23 has a central channel throughout its length, that is to say, from the top end of the thickened part 30 to the lower end protruding from below the valve body 22, which channel thus opens out directly in the chute 18 also in the closing position of
30 the valve body 22 shown in fig. 2. The window 31 and the neckshaped part 29 of the flask-like body 25 thus constitute together with the central channel of the valve stem 23 an overflow safety for the cistern 1.

35 Since the filling mechanism 33 does not form part of the invention, the construction and the operation of this mechanism need not be further described.

At its top end, the thickened part 30 of the valve stem 23 has a vertical extension 34 having an opening 35 in

which extends the free end of the afore-said long arm 16 of the two-armed rocker lever 14,16 which is pivotable about its stationary fulcrum 15.

Leaving first out of consideration the presence and the operation of the rod 7 with the head 8 having the function of a control-knob and of the comb 17 arranged on the long arm 16 of the rocker lever, the normal operation of the cistern described above can be set out as follows.

As a start, the situation according to figs. 1 and 2 is considered in which the mechanism 33 inside the cistern 1 has brought the water to the level indicated by a solid line in fig. 2. When a user depresses the control-key 4, it will downwardly displace the pin 11 by means of its bent-over part 10 and, through the pin the short arm 14 of the rocker lever 14,16 so that the long arm 16 is displaced into its position shown in fig. 3 whilst by its free end, extending in the opening 35 of the vertical extension 34 of the thickened part 30 of the valve stem 23, it lifts the valve stem, i.e. displaces the same vertically upwards. As a result the valve body 22, which is held on its seat by the action of the water 20 contained in the cistern 1, is lifted from its seat so that the water can flow through the port 19 into the chute 18 (see fig. 3). As long as the floating body 24 is surrounded by water inside the flask-like body 25, its floating capacity is active so that the control-key 4 need be only transiently depressed by the user in order to ensure substantially complete emptying of the cistern through the port 19 into the chute 18. It has been pointed out already that the water contained inside the flask-like body 25 can escape therefrom only through the clearance of the valve stem 23 in the opening 27 in the bottom 26 of the flask-like body 25 and through one or more apertures 28 especially provided for this purpose. As soon as the water level inside the flask-like body 25 has dropped below the floating body 24, the latter follows the water level inside the flask-like body whilst moving back the valve body 22 by means of the valve stem 23 into the closing position of fig. 2. As soon as the valve stem 23 is displaced vertically downwards in this manner, it

carries along the free end of the long arm 16 of the rocker lever and draws the same downwards so that the short arm 14 moves the control-key 4 back into its initial position through the pin 11 and the bent-over part 10 of said key 4.

- 5 The supply of water to the interior of the cistern 1 by means of the mechanism 33 is not described here.

The operation of the cistern 1 described in the preceeding paragraph relates to the normal flush in which substantially the whole amount of water 20 initially con-
10 tained in the cistern 1 flows through the port 19 into the chute 18. Now the interruption of flush by means of the operation of the control-knob formed by the rod 7 with the thickened head 8 and the comb 17 arranged on the long arm 16 of the rocker lever in accordance with the invention will be
15 explained.

Fig. 3 shows the situation in which the cistern 1 is in the position some time after the normal actuation described above, that is to say, after the depression of the control-key 4. It will be assumed that about half the amount
20 of water 20 has flown away from the cistern 1 through the opening 19 into the chute 18. Fig. 3 shows that in this situation the control key 4 is still depressed, that is to say it is partly in a lower position than in fig. 2, and the long arm 16 and the comb 17 carried thereby have risen as compared
25 with their respective positions shown in fig. 2. The result thereof is that the rod 7, which in its initial position of fig. 2 bears on the comb 17 with its lower end and, in the embodiment described here, in said position does not protrude with its thickened head 8 above the control-key 4 (which is
30 possible, though of little practical use), is subjected to an upward relative displacement, as is shown in fig. 3. In the situation shown in fig. 3, but in general already immediately after the control-key 4 has been depressed, the control-knob formed by the rod 7 and the thickened head 8 protrudes not
35 only above the depressed control-key 4 but also above the top surface of the cover 2 so that it, so to say, offers itself to the user. In the embodiment of the invention described herein the control-knob 7,8 is, so to say, accessible only after the depression of the control-key 4.

When in the situation shown in fig. 3, in which about half of the amount of water 20 initially contained in the cistern 1 has flown away, the user depresses the control-knob, i.e. the thickened head 8, the vertically downward force exerted via the stem 7 on the comb 17 therewith will be transferred through the long lever arm 16 to the vertical extension 34 of the thickened valve stem part 30; the valve stem 23 is displaced downwards out of its position shown in fig. 3, whilst it passes the valve body 22 towards its closing position shown in fig. 2. As soon as this occurs the remaining amount of water above the valve body 22 exerts sufficient force on the valve body 22 to hold it on its seat 21. It will be obvious that in this way the flushing is interrupted. The automatically operating mechanism 33 will then cause the water level to rise in the cistern to that shown in figs. 1 and 2.

It should be noted that the use of a two-armed rocker lever 14,16 the longitudinal axis of which extends in the direction of depth of the cistern, that is to say, in fig. 1 perpendicular to the plane of the drawing, has the advantage that the construction described occupies little space in lateral direction, that is to say, in the direction of width of the cistern so that comparatively much space is available for an unhindered mounting and operation of the automatic filling mechanism 33. If desired, a cistern of relatively small dimensions in the direction of width may be used. In addition the use of a rocker lever 14,16 having its longitudinal axis extend in the direction of depth of the cistern has the advantage that both the control-key 4 and the control-knob 7,8 can be symmetrically arranged midway the width of the cistern. Of course, a less symmetrical arrangement is also possible. It will furthermore be obvious that the control-knob 7,8 need not be arranged inside the opening 5 (in the control-key 4) as in the embodiment described herein. It may be arranged separately. It is only of importance that such a control-knob should be accessible for interfering in a water flushing once started.

In the afore-going, the application of the invention is described for a cistern of the type in which the closing body has the form of a relatively simple valve mechanism 22, which bears on a seat 21 in its closed position and is lifted therefrom in its flushing position.

Fig. 4 shows the principle of application of the invention to a cistern 41 of a type in which the closing body has the form of a bell body, which will now be explained.

The cistern 41 of fig. 4, which shows a sectional view like figs. 2 and 3, is provided in the same manner as the cistern 1 with a cover 42 having a control-key 44 pivotally supported at a stationary pivotal point 43 and an opening 45 in which a control-knob formed by a thickened head 48 of a vertical rod 47 is arranged. The knob is retained in its position shown in fig. 4 in which the thickened head 48 does not project above the control-key 44 by a helical spring 49 supported at a fixed point at its lower end. In the same manner as in the embodiment described with reference to figs. 1 to 3 the control-key 44 is coupled through a bent-over part 50 with the top end of a pin 41 having a collar 42 which is held in its position shown in fig. 4 by a helical spring 43.

The said parts 41 to 45 and 47 to 53 correspond in principle with the parts 1 to 5 and 7 to 13, respectively, of the embodiment described in the foregoing.

In the embodiment shown in fig. 4 the lower end of the pin 51 is, in its initial position shown in fig. 1, in contact with a horizontal extension 54 of a bell body 55, which is guided about the said rod 47 at its top and the bottom 56 of which has two or more openings 57, each of which can be closed from the inside by a freely pivotable flap 58. At its lower end the bell body 55 has an external floating body 59, the floating capacity of which is chosen so that it is capable of holding the water-filled bell body 55 in its topmost position inside the cistern 41. In this position shown in fig. 4, the horizontal extension 54 of the bell body 55 bears on the lower end of the pin 51. As the case may be, in this position the bell body can bear against one or more fixed stops 60 at its top. One of these stops is shown in fig. 4.

The said rod 51 terminates inside the clock body 55 in a cylindrical body 61 of larger diameter having an inner cavity 62 in which two overflow windows 63 open out near the top end of the cylindrical body 61. In the open lower end of the inner cavity 62 an O-ring 64 guides a vertical stand pipe 65 open at its top, which passes into a chute pipe 66 through the bottom of the cistern 41.

It should be noted that the embodiment of fig. 4 and more particularly the above-mentioned parts 54 to 66 only serve to explain the invention for a cistern having a closing member in the form of a bell body. Such a closing body may be designed in quite different ways or operate in various manners. Since the construction and the operation of the parts 54 to 66 do not form part of the present invention little care is taken of the details of these parts in fig. 4. For the sake of completeness the following is noted with regard to the operation of the cistern of fig. 1.

When, starting from the situation illustrated in fig. 4, the user depresses the control-key 44, this will result in a similar manner as in the embodiment described above, through the bent-over key part 50 and the pin 51, in a downward displacement of the horizontal extension 54 of the bell body 55 and hence of the body itself. Through the openings 57 in the bottom 56 of the bell body and along the freely pivotable flaps 58 water will penetrate into the interior of the bell body 55. When subsequently the control-key 44 is released, the floating body 59 will lift the water-filled clock to a greater height than indicated in fig. 4 by its relatively high floating capacity chosen for this purpose. Since under these conditions the water cannot escape along the pivotable flaps 58 from the bell body, it is lifted inside this body above the overflow windows 63 in the cylindrical body 61 so that via these overflow windows 63, the internal cavity 62 and the stand pipe 65 a siphon effect to the chute 66 is obtained, the flaps 58 opening for the water penetrating through the openings 57 at the underside in the bell body.

When thereafter the control-knob 48 projects to some extent above the depressed control-key 44 (cf fig. 3) is depressed, the overflow windows 63 inside the bell will be displaced downwardly with respect thereto. As soon as the control-knob 48 is released, the spring 49 will urge the control-knob back into its position shown in fig. 4 so that the overflow windows 63 get above the water level inside the bell body 55 and the water stream through the windows 63, the internal cavity 62, the stand pipe 65 and the chute 66, i.e. the siphon effect, is interrupted.

As stated above, the above-described design and operation of the parts 54 to 66 do not form part of the invention so that further details may be dispensed with. Of importance is only that fig. 4 shows that the use of a separate control-member for flush interruption in accordance with the invention is also possible in a cistern having a closing body formed by a bell body.

For the sake of completeness it is noted that in the above-described embodiments all parts with the exception of the various helical springs 13, 49, 53, the respective floating bodies 24 and 59 and, as the case may, the flap bodies 22 and 58 are made from a synthetic resin.

From the foregoing it is apparent that the invention provides a cistern of the low hanging type with two separate control-members, i.e. a control-key and a control-knob, which are accessible midway in the direction of width of the cistern and which can be actuated for bringing about or initiating a normal flush and, respectively, an interruption of the flush.



CLAIMS

1. A cistern comprising a closing body displaceable from a closing position in which the water is prevented from flowing away from the cistern to a chute to a spilling position in which the water is allowed to flow away by manual
5 actuation of a first control-member and subsequently back to the closing position by manual actuation of a second control-member characterized in that in a cistern (1,41) of the low hanging type having a top wall (2,42) which may be formed by a cover, the two control-members (4,8,44,48) are arranged in
10 said top wall (2,42) and are coupled with one another by coupling means (10-17;50-53) in a manner such that solely manual actuation of the first control-member (4,44) brings about a relative displacement of the second control-member (8,48) which enables manual actuation of said second control-
15 member (8,48).

2. A cistern as claimed in claim 1, in which the second control-member co-operates with an arm of a lever pivotable with respect to the cistern about a fixed point and serving to transfer a displacing force to the closing body
20 characterized in that the first control-member (4) also co-operates with an arm (14) of the lever (14-17) and in that the second control member (8) can be displaced into its position suitable for manual actuation only by manual actuation of the first control-member (4) through the lever (14-17).

25 3. A cistern as claimed in claim 2 in which the second control-member has the form of a push-button charac-



cterized in that the first control-member has the form of a push-key (4, 44) having a bore (5, 6, 45) in which the push-button (8, 48) is housed.

- 5 4. A cistern as claimed in claims 2 and 3 characterized in that the arm (16) of the lever (14-17) cooperating with the second control-member (8) carries a ridge (17) which is slidable along the lower end (7) of the push-button (8) during pivotal movement of the lever (14-17).

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5. A cistern, substantially as hereinbefore described with reference to and as shown in Figures 1 to 4 of the accompanying drawings.
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