Sept. 7, 1937. C. W. HESS ET AL 2,092,670

FLUSH VALVE

Filed April 30, 1936

FIG. 1.

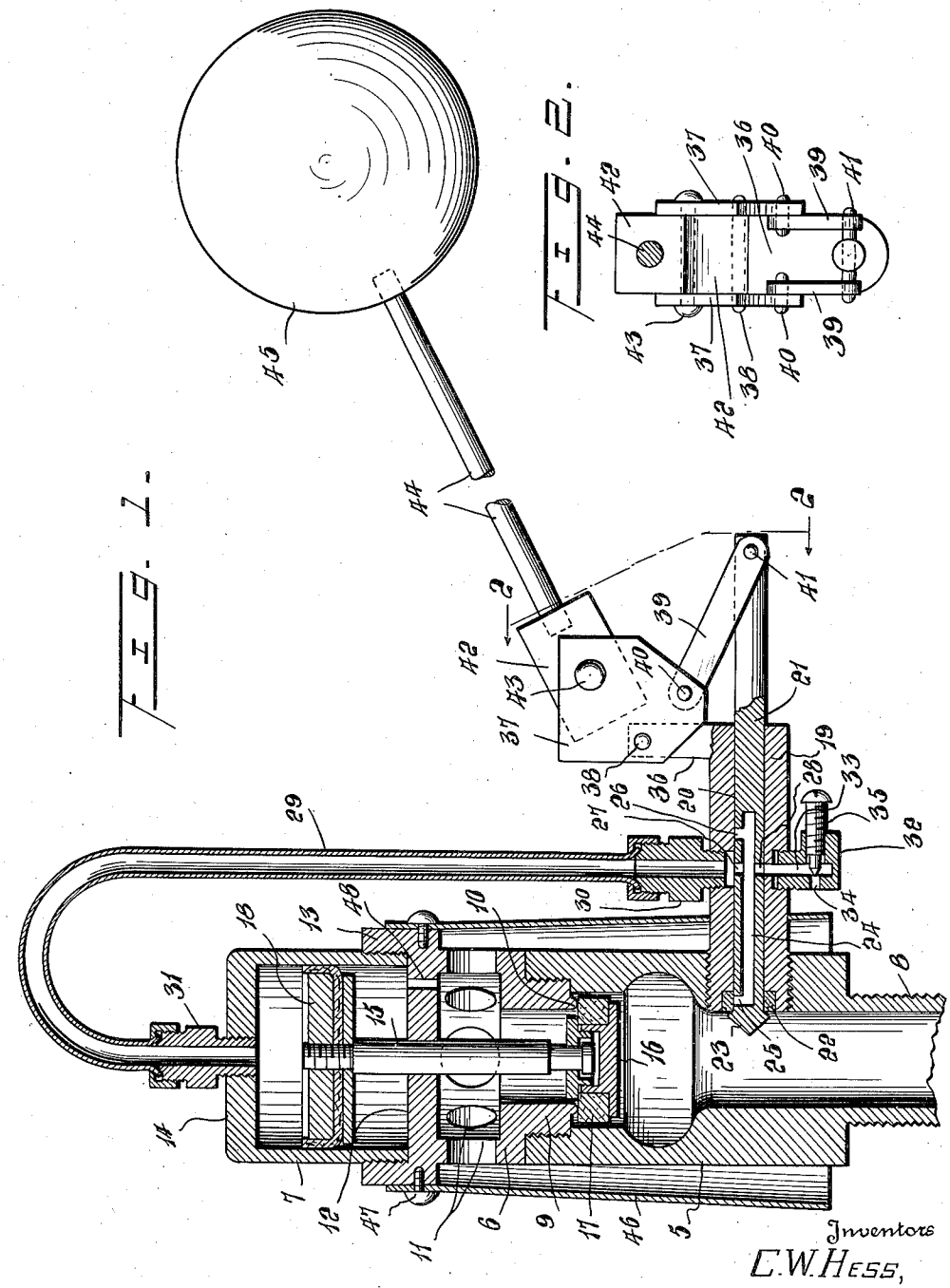


FIG. 2.

Inventors
C. W. HESS,
W. J. CRIST

By

Attorney.

Patented Sept. 7, 1937

2,092,670

UNITED STATES PATENT OFFICE

2,092,670

FLUSH VALVE

Charles W. Hess and Walter J. Crist, Middletown, N. Y.

Application April 30, 1936, Serial No. 77,267

6 Claims. (Cl. 137—139)

This invention relates to certain new and useful improvements in flush valves.

The primary object of the invention is to provide a flush valve for toilet tanks and designed to work with a wide range of pressures and to be substantially silent in operation, hammering of the valve on its seat being eliminated with the valve slowing and gently closing on its seat.

With the above and other objects in view that will become apparent as the nature of the invention is better understood, the same consists in the novel form, combination and arrangement of parts hereinafter more fully described, shown in the accompanying drawing and claimed.

In the drawing:—

Figure 1 is a vertical longitudinal sectional view of a flush valve for toilet tanks constructed in accordance with the present invention; and

Figure 2 is a detail sectional view taken on line 2—2 of Figure 1.

Referring more in detail to the accompanying drawing, the flush valve mechanism comprises a lower cylindrical valve body, a central valve body portion 6 and an upper valve body portion 7. The lower valve body portion 5 carries a depending externally threaded extension 8 for mounting in the bottom wall of a flush tank and to be placed into communication with a source of water supply under pressure. The central body portion 6 of the valve has a depending annular externally threaded flange 9 that is engaged with internal threads at the upper end of the lower valve body 5 and said flange 9 carries an annular valve seat 10 at its lower end. A circular series of openings 11 are formed in the side wall of the central portion 6 of the valve for the discharge of water into the flush tank and the upper end of the central portion 6 is closed by a top wall 12. An upstanding internally threaded annular flange 13 rises from the upper end of the central portion 6 of the valve body and threadedly receives the lower externally threaded end of the upper portion 7 of the valve body that is in the form of a cylinder and closed at its upper end by the top wall 14.

The valve mechanism includes a stem 15 slidable through an opening in the top wall 12 of the central valve body section 6, the stem 15 carrying a loosely mounted holder 16 at its lower end for a valve gasket 17 that moves upwardly into engagement with the valve seat 10, the gasket 17 being of a diameter slightly less than the diameter of the adjacent portion of the bore of the lower valve body part 5 to provide a restricted passage that permits the valve 17 to gently close on its seat 10 with the absence of pounding or hammering actions. A piston construction 18 is carried by the upper end of the valve stem 15 and works in the upper cylindrical valve body portion 7 to control the opening and closing movements of the valve 17.

An elongated cylindrical valve block 19 is carried by and projects laterally of the lower end of the lower valve body portion 5, the valve block 19 having a longitudinal bore 20 extending therethrough and in which a valve stem 21 is reciprocably mounted. The inner end of the valve block 19 communicates with the passage through the valve body 5 and has a valve seat 22 formed at its inner end that is engaged by a conical valve 23 at the inner end of the valve stem 21. An axial passage 24 is formed in the valve stem 21 and communicates with a lateral port 25 at the inner end of the valve stem 21 at the base of the conical valve 23, the port 25 to be closed when the valve 23 is engaged with its seat 22. A pair of lateral ports 26 and 27 adjacent the inner end of the passageway 24 are disposed at one side of the valve stem 21 and a single lateral port 28 is arranged opposite the port 27.

A conduit 29 extends between the upper side of the valve block 19 and the top wall 14 of the upper valve body section 7, the connection 30 between one end of the conduit 29 and the valve block 19 being in the range of movement of the ports 26 and 27, the other end of the conduit 29 being attached by the connector 31 with the wall 14 as illustrated.

The speed or timing of closing movement of the valve 17 is regulated by a control device associated with the lower side of the valve block 19 and including a board block 32 having a port 33 adapted to register with the port 28 and a lateral port 34 having the area of opening thereof controlled by the valve screw 35.

The operating means for the valve stem 21 includes a system of levers interposed between the valve stem and a ball float, the reference character 36 designating an arm rising from the outer end of the valve block 19 and upon which a pair of lever plates 37 are pivotally mounted respectively at opposite sides of the arm 36 upon the cross pin 38, as shown in Figure 2. A pair of links 39 are interposed between the lever plates 37 and the outer end of the valve stem 21, being pivotally connected as at 40 to the lever plates 37 and pivotally connected as at 41 to the valve stem 21. A block 42 is disposed between the two lever plates 37 and is rigidly connected thereto

by the cross pin 43, the block 42 carrying a float arm 44, with a ball float 45 at its outer end. An annular skirt 46 is secured at its upper end as at 47 to the annular flange 13 rising from the central valve body portion 6 and incloses the discharge openings 11 for directing the water downwardly into the tank with a minimum of noise, the skirt 46 having an opening therein for the passage of the valve block 19.

When the tank is flushed, the float 45 descends and by the operation of the lever system, the valve stem 21 is projected into the passageway in the lower valve body portion 5 to unseat the conical valve 23, water under pressure entering the lateral port 25 at the inner end of the valve stem 21 and flowing through the passageway and by way of the port 26 that has been moved into registration with the conduit 29 to flow through the conduit and enter the upper end of the upper valve body section 7 to lower the piston construction 18 therein and to accomplish the unseating of the valve 17, water then flowing through the central body section 6 and escaping through the outlets 11 to be directed downwardly by the annular skirt 46 into the tank. A bleed opening 48 is formed in the upper wall 14 of the central section 6 for the discharge of any water that may enter the lower end of the upper section 7 below the piston construction 18. When the float 45 rises in the tank, the valve 23 is gradually moved toward its seat 22 and water pressure then is directed against the valve 17 for gradually closing the same on its seat 10 and water in the upper end of the upper section 7 of the valve body is discharged by way of the conduit 29 into the passage 24 to the valve block 17 by way of the port 27 and for escape into the tank by way of the port 28 and screw valve controlled port 34.

While there is herein shown and described the preferred embodiment of the invention, it is nevertheless to be understood that minor changes may be made therein without departing from the spirit and scope of the invention as claimed.

We claim:—

1. In a flush valve mechanism of the character described, a valve casing, a reciprocating valve therein, a piston connected to the valve for operation thereof, a valve block projecting laterally of the valve casing and communicating therewith below the valve, a slide valve in the valve block, means forming communication between the valve block and piston, means for actuating the slide valve in the valve block, the valve casing including an intermediate section having a valve seat at its lower end with the reciprocating valve movable upwardly into contact therewith, a top wall on said section, lateral discharge ports in the side wall of the section below the top wall, and a depending annular skirt surrounding the discharge ports.

2. In flush valve mechanism of the character described, a valve casing, a reciprocating valve therein, a piston connected to the valve for operation thereof, a valve block projecting laterally of the valve casing and communicating therewith below the valve, a slide valve in the valve block, means forming communication between the valve block and piston, means for actuating the slide valve in the valve block, a timing needle valve carried by the valve block for regulating the speed of closing movement of the reciprocating valve, the valve casing including an intermediate section having a valve seat at its lower end with the reciprocating valve movable upwardly into contact therewith, a top wall on said section, lateral discharge ports in the side wall of the section below the top wall, and a depending annular skirt surrounding the discharge ports.

3. In a flush valve mechanism of the character described, a valve casing, a reciprocating valve therein, a piston connected to the valve for operation thereof, a valve block projecting laterally of the valve casing and communicating therewith below the valve, a slide valve in the valve block, means forming communication between the valve block and piston, means for actuating the slide valve in the valve block, the valve casing including an intermediate section having a valve seat at its lower end with the reciprocating valve movable upwardly into contact therewith, a top wall on said section, lateral discharge ports in the side wall of the section below the top wall, a depending annular skirt surrounding the discharge ports, the slide valve being of stem-form and having a valve head at its inner end, and an axial bore having a lateral port at one end adjacent the valve head and lateral ports at the other end associated with the means forming communication between the valve block and piston.

4. In flush valve mechanism of the character described, a valve casing, a reciprocating valve therein, a piston connected to the valve for operation thereof, a valve block projecting laterally of the valve casing and communicating therewith below the valve, a slide valve in the valve block, means forming communication between the valve block and piston, means for actuating the slide valve in the valve block, a timing needle valve carried by the valve block for regulating the speed of closing movement of the reciprocating valve, the valve casing including an intermediate section having a valve seat at its lower end with the reciprocating valve movable upwardly into contact therewith, a top wall on said section, lateral discharge ports in the side wall of the section below the top wall, a depending annular skirt surrounding the discharge ports, the slide valve being of stem-form and having a valve head at its inner end and an axial bore having a lateral port at one end adjacent the valve head and lateral ports at the other end associated with the means forming communication between the valve block and piston.

5. In flush valve mechanism of the character described, a valve casing, a reciprocating valve therein, a piston connected to the valve for operation thereof, a valve block projecting laterally of the valve casing and communicating therewith below the valve, a slide valve in the valve block, means forming communication between the valve block and piston, means for actuating the slide valve in the valve block, a timing needle valve carried by the valve block for regulating the speed of closing movement of the reciprocating valve, the valve casing including an intermediate section having a valve seat at its lower end with the reciprocating valve movable upwardly into contact therewith, a top wall on said section, lateral discharge ports in the side wall of the section below the top wall, a depending annular skirt surrounding the discharge ports, the slide valve being of stem-form and having a valve head at its inner end and an axial bore having a lateral port at one end adjacent the valve head and lateral ports at the other end associated with the means forming communication between the valve block and piston and the timing needle valve.

6. In a flush valve mechanism of the character

described, a valve casing, a reciprocating valve therein, a piston connected to the valve for operation thereof, a valve block projecting laterally of the valve casing and communicating therewith below the valve, a slide valve in the valve block, means forming communication between the valve block and piston, means for actuating the slide valve in the valve block, the valve casing including an intermediate section having a valve seat at its lower end with the reciprocating valve movable upwardly into contact therewith, a top wall on said section, lateral discharge ports in the side wall of the section below the top wall, a depending annular skirt surrounding the discharge ports, the upper end of the casing constituting a cylinder for the piston and a stem connecting the piston and reciprocating valve.

WALTER J. CRIST.
C. W. HESS.