

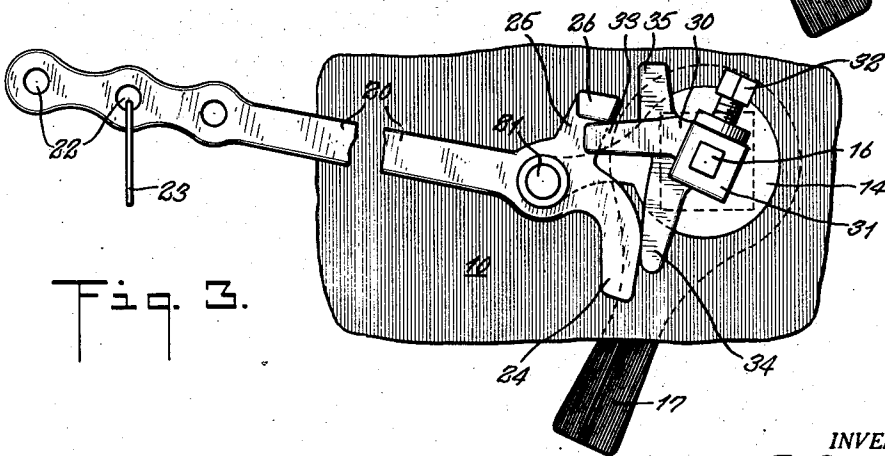
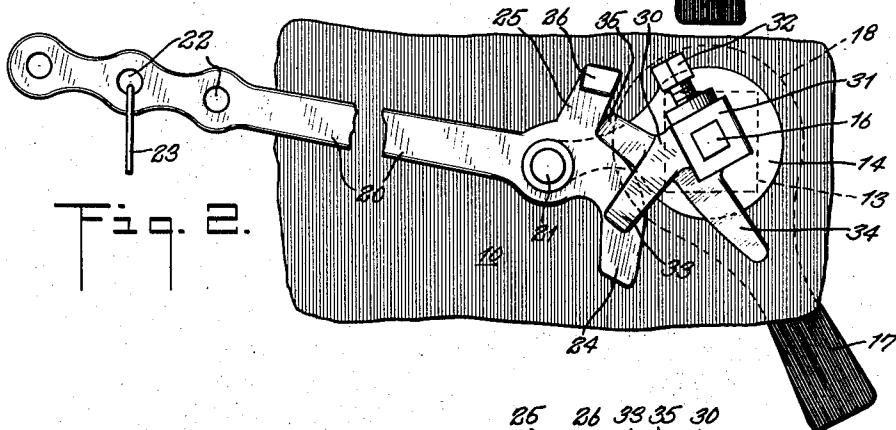
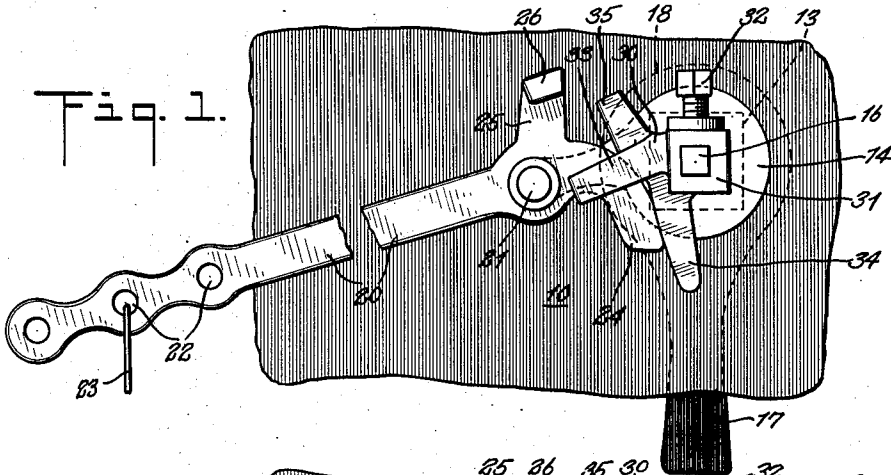
April 10, 1951

J. F. DUNCAN
FLUSHING DEVICE

2,548,658

Filed Oct. 2, 1948

2 Sheets-Sheet 1



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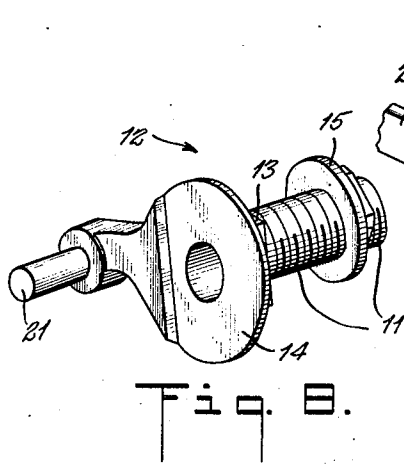
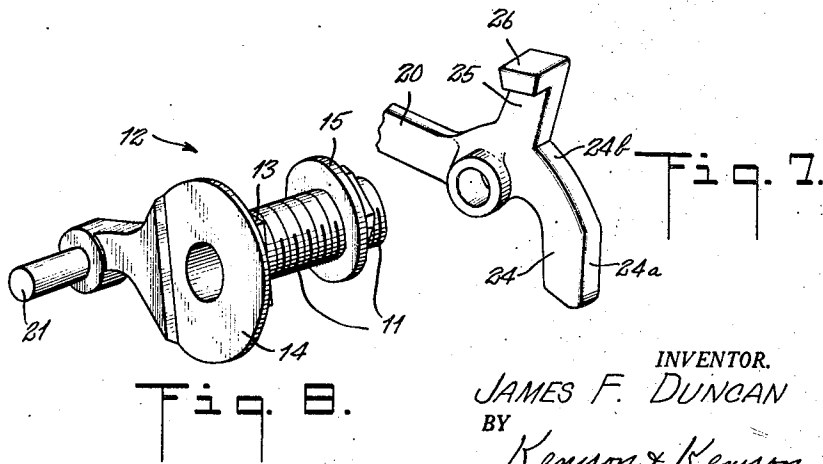
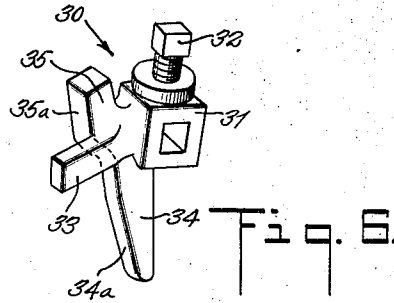
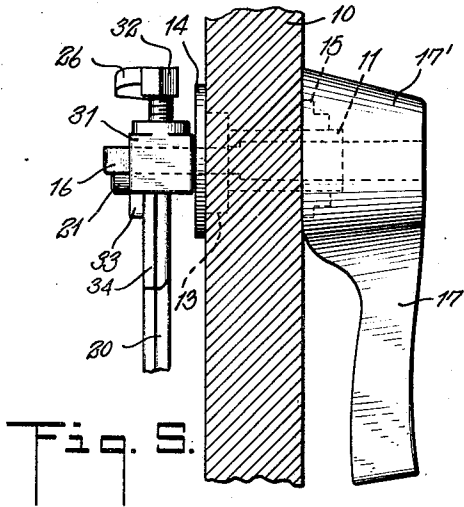
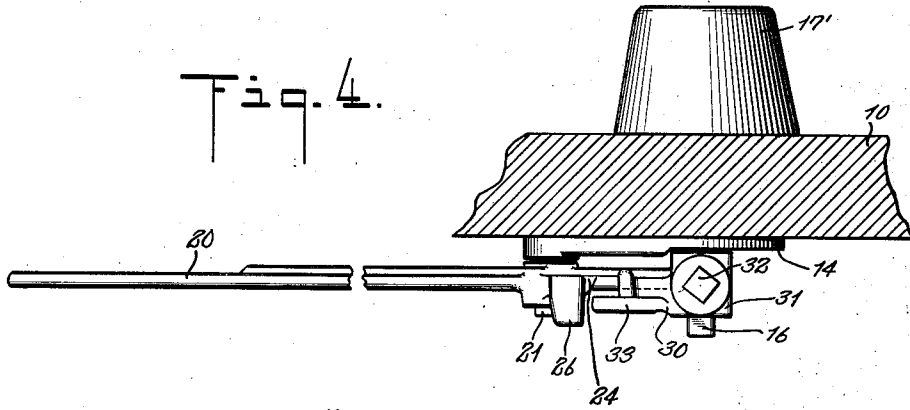
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2 Sheets-Sheet 2



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FLUSHING DEVICE

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6 Claims. (Cl. 4-67)

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This invention relates to flushing devices, and more particularly to improvements in valve-operating lever mechanisms for flush tanks and the like.

Among the salient features and objects of the invention are the provision of a lever mechanism which requires only a single connection to the wall of the flush tank and which is suitable for attachment to flush tanks having walls of different thicknesses; the provision of a lever mechanism in which the actuating handle may be mounted in either a horizontal or vertical position to accommodate various arrangements of different flush tanks and their accessories, and in which the actuating handle and crank may be rotated in either direction to operate the valve, the valve lever being disposed in its rest or non-flushing position in engagement with the actuating crank so that movement of the lever in one direction is limited by such engagement but so that movement of the lever in the opposite direction to open the flush valve is effected by movement of the actuating crank in either direction about its center of rotation; the provision of such lever mechanism including stop means for limiting the rotational or pivotal movement of the valve lever and actuating crank to avoid moving either into a dead center position; and the provision of such lever mechanism which is of simplified design and construction, which may be easily and quickly installed and which is positive in its operation.

The realization of these and other novel features, objects and advantages of the invention will be apparent from the following description, taken in conjunction with the accompanying drawings, which illustrate one embodiment of the invention and in which:

Fig. 1 is a front elevation of a lever mechanism in accordance with this invention, looking from within the flush tank, and with the mechanism shown in the position corresponding to the closed or rest condition of the flush valve;

Fig. 2 is similar to Fig. 1 but with the lever mechanism shown in the position corresponding to the open condition of the flush valve when the operating handle has been rotated in a counter-clockwise direction from its rest position;

Fig. 3 is similar to Fig. 1 but with the lever mechanism shown in the position corresponding to the open condition of the flush valve when the operating handle has been rotated in a clockwise direction from its rest position;

Fig. 4 is a top plan view of the lever mechanism as shown in Fig. 1;

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Fig. 5 is an end elevation of the lever mechanism as shown in Fig. 1;

Fig. 6 is a perspective view of the actuating crank;

Fig. 7 is a perspective view of a portion of the valve lever; and

Fig. 8 is a perspective view of the lever mechanism support fitting.

Referring to the drawings, and particularly to Figs. 1, 4, 5 and 8, the wall 10 of a flush tank which is provided with a conventional flush valve, has a square or rectangular aperture within which is mounted the bushing 11 of the support fitting 12 constructed of cast bronze or other suitably strong and durable material. The tank wall aperture is just large enough to receive a correspondingly shaped projection 13 which is formed integrally with the plate 14 of the support fitting and which surrounds the inner end of bushing 11. A clinch nut 15, threaded over the outer end of the bushing, secures the fitting to the tank wall with projection 13 seated in the wall aperture and with the plate 14 held firmly against the inner side of the tank wall. A washer of leather, neoprene or similar material may be disposed between nut 15 and the outer surface of the tank wall, if desired, to avoid the possibility of cracking the tank wall, which may be of porcelain, when the clinch nut is tightened. Bushing 11 and projection 13 are of sufficient overall length, e. g., about $1\frac{1}{4}$ inches, to accommodate the support fitting for almost any wall thickness of the various flush tanks now in use.

The central opening of bushing 11 extends through plate 14 to provide a passageway for the pintle 16 of the actuating handle 17 which has a hollow cap-like portion 17' from within which pintle 16 projects. The depth of handle portion 17' is sufficient to accommodate therein the outer end of bushing 11 and clinch nut 15, with the edge of the cap engaging the outer surface of the tank wall as shown in Figs. 4 and 5. Approximately one-half of pintle 16 is of circular cross-section and enlarged to just fit within bushing 11 so as to provide a bearing mounting for the handle. The inner half of pintle 16 which extends through the inner portion of bushing 11 and through plate 14 and projects into the tank is substantially square in cross-section to provide flat surfaces against which a set screw of the actuating crank may be securely tightened.

The valve lever 20 is pivotally mounted near one end on a pin 21 which projects inwardly from an extension of plate 14 and which is spaced from the bushing opening therein. At its outer

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end the valve lever 20 is provided with a plurality of spaced apertures 22 for selective connection with a valve rod 23 which in turn is connected to the stem of the flush valve.

The pivot end of lever 20, as best shown in Fig. 7, has a downwardly curved cam arm 24 with two contiguous cam faces 24a, 24b, and adjacent thereto, a stop arm 25 extending upwardly. These arms lie in the plane of lever 20, but arm 25 has a projection 26 at the top thereof extending inwardly from and substantially normal to the plane of lever 20.

An actuating crank 30, as best shown in Fig. 6, has a hub portion 31 with a square opening therein which is mounted on the square end of pintle 16 and secured to the pintle by means of a set screw 32. To minimize movement of the operating handle axially of pintle 16, crank 30 is mounted close to plate 14, with pintle 16 extending through fitting 12 and crank 30 so that the edges of handle portion 17' engage the outside of the tank wall. With crank 30 mounted in this position and with the lever arms 24 and 25 properly engaged with the cam arms of crank 30 (as described subsequently) lever 20 is pivotally retained on pin 21 by means of a stop arm 33 which extends from the hub of crank 30 and overlies the inner side of arms 24 and 25. It will thus be seen that to assemble the valve operating mechanism it is necessary only to affix the support 12 to the tank wall by means of nut 15, mount lever 20 on pin 21, insert pintle 16 through bushing 11, cooperatively engage cam arm 24 with the actuating cam arms of crank 30, attach crank 30 to the pintle by means of set screw 32 and connect rod 23 to the proper aperture of lever 20. The entire mechanism is attached to the tank wall by a single connection and hence requires only one aperture in the tank wall. The operating handle may be mounted in any horizontal or vertical position merely by inserting the pintle through the support fitting with the handle disposed in the desired horizontal or vertical position before passing it through the hub of the actuating crank and before tightening the set screw.

The actuating arms of crank 30 comprise a cam arm 34 extending downwardly from the side of the crank hub adjacent lever 20, and a cam arm 35 extending angularly upwardly from the same side of the crank hub. With the crank mounted on pintle 16 as described above, arms 34 and 35 are disposed in the plane of lever 20 so that the side edge portion 24a of lever cam arm 24 is adapted to engage the edge 34a of crank cam arm 34 and so that the top edge portion 24b of lever cam arm 24 is adapted to engage the edge 35a of crank cam arm 35, as shown in Fig. 1.

When the flush valve is closed the lever mechanism is disposed as shown in Fig. 1 with the lever cam arm 24 simultaneously engaging and bearing against crank cam arms 34 and 35. In this rest position further rotation of lever 20 in a counter-clockwise direction about pin 21 is restricted by reason of the simultaneous and balancing engagement of lever cam arm 24 with crank cam arms 34 and 35. This construction and arrangement permits the operating handle 17 to be mounted on crank 30 in any desired position.

When the operating handle is rotated from the rest position shown in Fig. 1 in a counter-clockwise direction to the position shown in Fig. 2, crank 30 also rotates in a counter-clockwise direction so that the edge 35a of cam arm 35, bearing against the top edge portion 24b of lever cam

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arm 24, causes lever 20 to pivot in a clockwise direction about pin 21, thus raising the outer end of lever 20 and operating the flush valve. Rotation of the operating handle in this counter-clockwise direction beyond the operating position of lever 20 is restricted by engagement of the top end of arm 35 with the edge of lever stop arm 25 as shown in Fig. 2. When the handle is released from the position shown in Fig. 2, the weight of lever 20, as it falls in accordance with the movement of the conventional time-delay float mechanism (not shown), returns the mechanism to the position shown in Fig. 1.

When the operating handle is rotated from the rest position in a clockwise direction to the position shown in Fig. 3, crank 30 also rotates in a clockwise direction so that the edge 34a of cam arm 34, bearing against the side edge portion 24a of lever arm 24, causes lever 20 to pivot in a clockwise direction about pin 21, thus raising the outer end of lever 20 and opening the flush valve. Rotation of the operating handle in this clockwise direction beyond the operating position of lever 20 is restricted by engagement of the top edge of stop arm 33 with the projection 26 of stop arm 25, as shown in Fig. 3. When the handle is released from the position shown in Fig. 3, the weight of lever 20, as it falls in accordance with the movement of the conventional time-delay float mechanism (not shown), returns the mechanism to the position shown in Fig. 1.

From the foregoing it will be apparent that the pair of crank cam arms 34 and 35 extend from the crank at predetermined angles with respect to the cam portions 24a and 24b of lever cam arm 24 so as to provide the required amount of pivotal movement of lever 20 to open the flush valve upon cam engagement of lever arm 24 with either of cam arms 34 or 35. It will also be apparent that lever stop arm 25 and stop projection 26 thereof are disposed at predetermined angles with respect to crank arm 35, which engages arm 25 as described above, and with respect to crank stop arm 33, which engages stop projection 26 as described above, to permit the desired amount of pivotal movement of lever 20 to open the flush valve but so as to limit rotation or pivoting of either lever 20 or crank 30 and to avoid moving either to a dead center position.

It is further apparent that the invention provides a lever mechanism which may be actuated by rotating the operating handle in either direction from its rest position, and by reason of engagement of crank arms 34 and 35 with cam arm 24, lost motion between the operating handle and valve lever is avoided so that the flush valve is opened as soon as the operating handle is rotated even slightly from its rest position.

Although only one embodiment of the invention has been described in detail, various changes and modifications of the mechanism may be made without departing from the invention as defined in the appended claims.

I claim:

1. In a valve-operating lever mechanism for flush tanks and the like, the combination comprising an operating handle having a pintle adapted for pivotal mounting in the wall of the flush tank, an actuating crank adapted for attachment to said pintle and having a pair of cam arms extending at predetermined angles therefrom, a valve lever adapted to be pivotally mounted relative to the flush tank wall and to be connected near one end to the flush tank flush valve, said lever having a cam arm extend-

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ing from the other end thereof and provided with two contiguous cam faces adapted for cooperative engagement with said crank cam arms, whereby rotation of said lever in one direction is restricted when said lever cam arm simultaneously engages both of said crank cam arms, and whereby rotation of said lever in the opposite direction to open the flush valve is effected by cam engagement of either of said crank cam arms with said lever cam arm as said crank is rotated in either direction by corresponding rotation of said operating handle.

2. In a valve-operating lever mechanism for flush tanks and the like, the combination as defined in claim 1 and including a stop arm extending from said valve lever adjacent said cam arm thereof, and a stop arm extending from said crank and adapted to overlie said lever cam and stop arms to retain said lever on its pivot mount.

3. In a valve-operating lever mechanism for flush tanks and the like, the combination as defined in claim 1 and including a stop arm having a projection and extending from said valve lever adjacent and at a predetermined angle with respect to said cam arm thereof, and a stop arm extending from said crank at a predetermined angle with respect to one of said crank cam arms, said stop arms being disposed relative to each other so that said crank stop arm engages said projection on said lever stop arm to restrict the pivotal movement of said lever in one direction as said lever is pivoted by cam engagement of said lever cam arm and said one crank cam arm upon rotation of said crank.

4. In a valve-operating lever mechanism for flush tanks and the like, the combination as defined in claim 1, and including a stop arm having a projection and extending from said valve lever adjacent and at a predetermined angle with respect to said cam arm thereof, and a stop arm extending from said crank at a predetermined angle with respect to one of said crank cam arms and adapted to overlie said lever cam and stop arms to retain said lever on its pivot mount, said crank and lever stop arms being disposed relative to each other so that said crank stop arm engages said projection on said lever stop arm to restrict the pivotal movement of said lever in one direction as said lever is pivoted

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by cam engagement of said lever cam arm and said one crank cam arm upon rotation of said crank.

5. In a valve-operating lever mechanism for flush tanks and the like, the combination as defined in claim 1 and including a stop arm extending from said lever adjacent and at a predetermined angle with respect to said cam arm thereof, said stop arm being disposed relative to one of said crank cam arms so that said one crank cam arm engages said lever stop arm to restrict the pivotal movement of said lever in one direction as said lever is pivoted by cam engagement of said lever cam arm and said one crank cam arm upon rotation of said crank.

6. In a valve-operating lever mechanism for flush tanks and the like, the combination comprising an operating handle having a pintle adapted for pivotal mounting in the wall of the flush tank, an actuating crank adapted for attachment to said pintle and having a pair of cam arms extending therefrom, a valve lever adapted to be pivotally mounted relative to the flush tank wall and to be connected near one end to the flush tank flush valve, said lever having a cam arm at its other end provided with two contiguous cam faces adapted for cooperative engagement with the cam arms of said crank, whereby pivotal movement of said lever in one direction is restricted by the simultaneous engagement of said lever cam arm with both of said crank cam arms, and whereby the flush valve is opened by pivotal movement of said lever in the opposite direction through cam engagement of said lever cam arm and either of said crank cam arms as said crank is rotated in either direction by corresponding rotation of said operating handle.

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