April 26, 1949. F. M. KELLER 2,468,203

HANDLE AND OPERATING LEVER ASSEMBLY FOR FLUSHING TANKS

Filed June 24, 1946

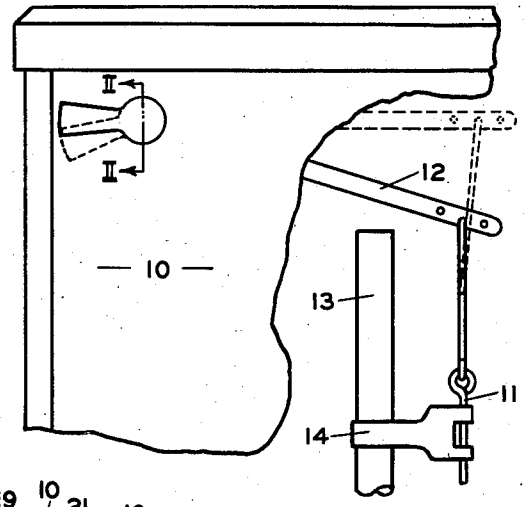


fig. 1

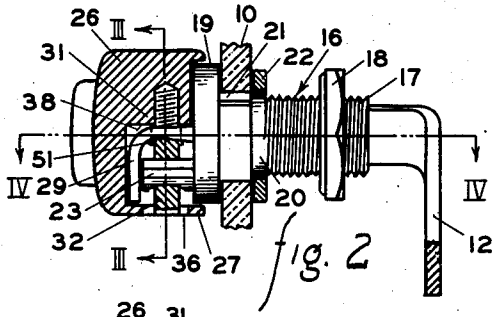


fig. 2

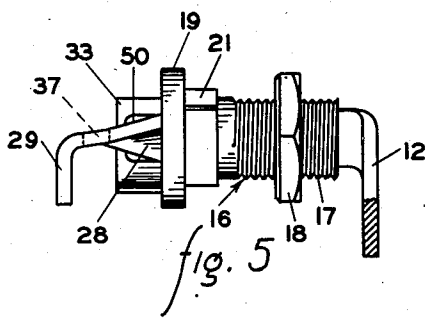


fig. 5

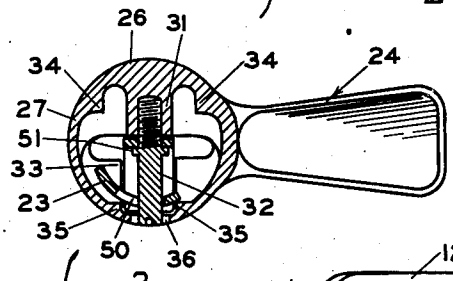


fig. 3

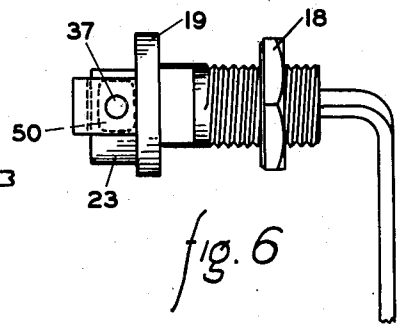


fig. 6

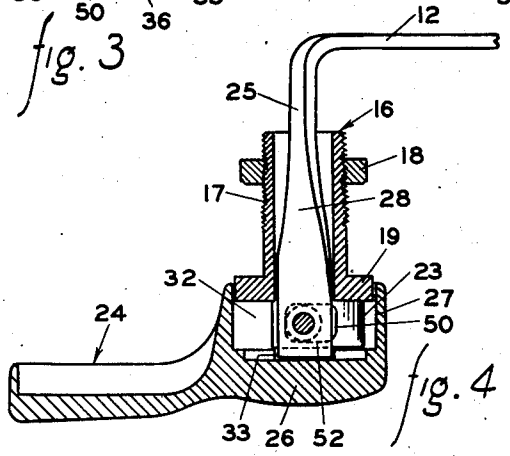


fig. 4

INVENTOR.
FRED M. KELLER

BY

ATTY.

Patented Apr. 26, 1949 2,468,203

UNITED STATES PATENT OFFICE

2,468,203

HANDLE AND OPERATING LEVER ASSEMBLY FOR FLUSHING TANKS

Fred M. Keller, Grand Rapids, Mich.

Application June 24, 1946, Serial No. 679,031

8 Claims. (Cl. 4—67)

1

The present invention relates generally to flushing tanks and more particularly to a handle and lever assembly for actuating a flush valve.

In mechanisms of this character, it is highly desirable both from an economic as well as a manufacturing standpoint that the handle and flush lever assembly comprise as few parts as possible consistent with a sturdy construction which will operate smoothly, easily and accurately. It is also desirable that the parts be so constructed and arranged as to require a minimum degree of relative movement in accomplishing their respective functions.

Further, it is desirable that lever and handle assembly means be provided which can be fully pre-assembled at the factory and can be installed into a flush tank merely by simple insertion into a suitable opening provided for it in the flush tank and the tightening of a single element.

More particularly it is desirable that the parts be capable of such pre-assembly without inconvenience and that such pre-assembly be accomplished without sacrifice of strength and/or ease or accuracy of operation.

Accordingly, it is an object of the present invention to provide a handle and actuating lever assembly for flushing tanks which is economical to manufacture, accurate in operation and sturdy in construction.

A further object of the invention is to provide a device of the above character having a minimum number of parts and which will operate with a high degree of smoothness and accuracy.

A further object of the invention is to provide a device of the above character which can be fully pre-assembled at the factory, installed directly and easily into a flush tank and affixed by the tightening of only a single element.

A further object of the invention is to provide a device of the above character having only a single critical element holding the parts together, limiting rotative movement and preventing or limiting in and out movement of the handle and lever with respect to the tank.

A further object of the invention is to provide a device of the above character wherein the said single element does not carry any material load so as to subject it to any material stress.

Other objects and advantages of the invention will become apparent from a reading of the following description taken in connection with the accompanying drawings in which:

Figure 1 is a fragmentary elevational view of a conventional flushing tank and showing flush

2

valve operating linkage with which the present invention is associated.

Figure 2 is a view of the handle and flush lever assembly and associated parts taken substantially along the line II—II of Figure 1 with certain of the parts being shown in section and others in elevation.

Figure 3 is a view taken substantially along the line III—III of Figure 2.

Figure 4 is a horizontal view taken substantially along the line IV—IV of Figure 2 but showing the flushing lever in elevation.

Figure 5 is an elevational view of one end of the flushing lever and the mounting fixture for the assembly, the parts being shown out of their normal operating relationship for the sake of clarity.

Figure 6 is similar to Figure 5 with the parts in their normal operating position.

In accomplishing the above-named objectives I have provided parts so constructed and arranged that they are held in assembled position, the lever limited in rotative movement with respect to the flush tank and the lever held against in and out movement with respect to the flush tank, all by the primary agency of a single element, and yet the arrangement is such that no material load is carried by said element at any time. The flush lever is made from material of rectangular cross-section, bent to form a rotative portion passing through the tank wall, said rotative portion being twisted to form four point bearing contact with the means supporting it. The free end of the rotative portion is received into the hollow head of a handle non-rotatively with respect thereto, and is held in place by a suitable pin which also passes through a circumferentially elongated opening in a member associated non-rotatively with a wall of the flush tank. Thus the pin holds the lever and handle together, limits their rotative movement with respect to the flush tank and prevents in and out movement with respect thereto.

Referring now to the drawings, reference numeral 10 indicates a flushing tank of conventional design having flushing provisions associated therewith including an outlet and a cooperating ball valve (not shown) which may be actuated through articulated linkage 11 by a lever 12. The tank 10 may also contain a float controlled inlet valve of well known construction (not shown) and an overflow pipe 13 having a linkage guide 14 secured thereto.

A mounting fixture, or escutcheon, is indicated generally by reference numeral 16 and comprises a hollow barrel portion exteriorly threaded as at

17 to receive a locking nut 18. Adjacent to one end thereof, the mounting fixture 16 is exteriorly of the tank formed with an enlarged annular flanged portion forming a head 19 adapted to abut the exterior face of a wall of the flushing tank 10 when in assembled position with respect thereto. The outer face of the annular head 19 of the mounting fixture is provided adjacent its outer periphery with an annularly shaped, axially projecting flange 23 the purpose of which will more fully appear as the description proceeds. Immediately behind the annular head 19, the exterior of the mounting fixture is shaped to form a rectangular base 21 adapted to fit in a similarly shaped recess or opening in the wall of the flushing tank to prevent rotation of the mounting fixture with respect thereto. Rearwardly of the rectangular base 21 the mounting fixture may be formed with a smooth annulus 20 adapted to receive a rubber or fiber sealing gasket 22 which will be engaged by the locking nut 18 when the parts are in assembled position.

The handle 24 is provided with a generally hollow head 26 having a laterally extending skirt portion 27 adapted to engage, and oscillate with respect to, the annular head 19 of the mounting fixture 16 exteriorly of the flushing tank.

As shown in the drawings one end of the actuating lever 12 is offset at right angles to provide a rotative portion 25 which extends through the mounting fixture 16 to the exterior of the flushing tank 10 where it is engaged by an operating handle 24.

As shown in Figures 2, 4 and 5 of the drawings the rotative portion 25 of the lever 12 is twisted as at 28 through approximately 80° or 90° of rotation and the free end thereof is bent laterally to form a rectangular, flat foot portion 29 to lie in the general position shown in Figure 2, so that the handle 24 and the lever 12 will be positioned in the desired angular relationship when the parts are assembled.

The magnitude of this twisting may be readily altered to provide, within all normally desired limits, any precise angular relationship needed between the handle 24 and the lever 12. This twisting also provides a four-line bearing contact between the rotative portion 25 and the internal walls of the mounting fixture 16, by which looseness and rattling thereof within said mounting fixture are prevented and a firmly guided rotation of said rotative portion 25 on a substantially unvarying axis is secured.

The interior of the head 26 of the handle 24 is provided with a boss 31 extending radially from the inner periphery of the skirt 27 to substantially the center of the handle head and, as here shown, is tapped in a bearing face 38 positioned parallel to the axis of rotation of the handle to receive a threaded pin-bolt 32 which secures the parts in assembled relation as will later more fully appear.

Other means may alternatively be provided for securing this pin-bolt in position, and the use of such other means is within the scope of this invention.

The interior of the handle head is also provided with a rectangularly shaped elongated recess 33, positioned substantially perpendicularly to the axis of rotation of said handle, to receive the similarly shaped foot portion 29 of the lever 12 and is also provided with a plurality of circumferentially spaced, diametrically opposed, axially extending ribs 34 and 35, the ends thereof adjacent the open side of the head 26 serving as bearing surfaces between the handle head and the head 19 of the mounting fixture.

By reference to Figure 2 of the drawings, the relative position and function of the parts when in assembled relation will be clear. Diametrically opposite the threaded opening in the boss 31 which is within the handle head 26, the skirt portion 27 is provided with an opening 36 to receive the pin-bolt 32, and the axially extending arcuate projection 23 on the head 19 of the escutcheon is provided with a circumferentially elongated opening 50 (Figures 3 and 5) through which the pin-bolt 32 passes, forming a lost-motion connection therewith. The end 52 of the lever, near the foot 29, is also provided with a relatively close fitting opening 37 through which the pin-bolt 32 passes before being threaded into the boss 31. Said pin-bolt has a flange 51 which engages the parts adjacent thereto of the rotative portion 25, and when the pin-bolt is fully tightened holds said rotative portion securely against the said boss 31.

In operation, movement of the handle 24 in a counterclockwise direction as viewed in Figure 1, or in a clockwise direction as viewed in Figure 3, will act to raise the flushing lever 12 through the medium of the foot portion 29 thereof which is engaged by the defining walls of the recess 33 formed in the handle head. At the same time, the pin-bolt 32 may move to the left in Figure 3 through the elongated slot 50 in the arcuate flange 23 without interference. Likewise, the said elongated slot 50 will permit counter-rotation of the handle 24 when the flushing lever 12 reassumes its lowered position. This lost motion connection also serves the function of securing the handle head and the mounting escutcheon against any relative axial movement while permitting relative oscillating movement of the handle, since said slot is of such dimension in the direction of the axis of the escutcheon 16 that the pin-bolt 32 only has a sliding clearance with the walls of said slot and is held thereby against movement with respect to the escutcheon in such axial direction. Relative displacement of the flush lever with respect to the handle is obviously prevented by the pin-bolt 32 engaging the rotative portion 25 of the lever arm 12, and through the opening 37 in the lever arm adjacent to the foot 29 tightly engaging the boss 31 of the head 26. Unitary rotation of the handle and lever 12 is insured without undue stress on said bolt 32 by reason of the foot portion 29 thereof lying in the recess 33. The primary transfer of forces is thus from the handle head through the walls of its recess 33 to the lever foot portion received into said recess and thence to the remaining parts of the lever, and the pin-bolt acts only to hold the parts in position.

While only one specific embodiment has been herein shown and described, it will be obvious to those skilled in the art that various modifications in construction and design may be made without departing from the spirit or scope of the invention which is to be limited only by the appended claims.

What is claimed and desired to be secured by Letters Patent is:

1. In an assembly for actuating the valve of a flushing tank, the combination: a hollow mounting fixture supported by said tank and having a head portion exteriorly of said tank, said head portion being provided with an axially extending arcuate flange having a circumferentially elongated opening therein, an operating handle having a head provided with a skirt portion adapted to oscillate on said mounting fixture and also pro-

vided with a securing boss and a non-circular recess interiorly thereof, a valve actuating lever interiorly of said tank having an angular rotative portion formed thereon extending through said mounting fixture in rotatable relation thereto, and said rotative portion having at its free end a foot portion received into said non-circular recess in said handle head to be engaged for rotation therewith, and a securing element connecting said foot portion to said securing boss, said securing element pasing through said elongated opening in said arcuate flange to provide a lost motion connection between said handle head and said mounting fixture.

2. In an assembly for actuating the valve of a flushing tank, the combination: a mounting fixture supported by said tank and having a portion thereof positioned exteriorly of said tank including an axially extending flange having a circumferentially elongated opening therein, an operating handle having a blind recess therein and adapted to rotate on said mounting fixture and to receive said axially extending flange, an actuating lever interiorly of said tank and having an angular portion thereof extending into said blind recess, and a single securing element having a shoulder thereon substantially removed from either end passing through a portion of said handle, through said elongated opening in said axially extending flange and through said actuating lever into a wall of said blind recess, whereby axial separation of said parts is prevented by said shoulder and limited rotation of said handle and said lever with respect to said mounting fixture is permitted.

3. In an assembly for actuating the valve of a flushing tank, a hollow mounting fixture carried by said tank and having a flange extending exteriorly thereof provided with a circumferentially elongated opening, an actuating lever having a rotative portion carried rotatively by said mounting fixture, an operating handle having a blind recess therein, the end of said rotative portion of said actuating lever and said flange received in said blind recess, said handle connected to oscillate said actuating lever, and means connecting said handle and said mounting fixture flange through said elongated opening, whereby relative oscillation of said handle with respect to said mounting fixture is permitted and axial separation of said parts is prevented.

4. In an assembly for actuating the valve of a flushing tank, the combination: a hollow mounting fixture carried by said tank, an actuating lever of rectangular cross-section wherein one transverse dimension is substantially greater than the other dimension having a rotative portion received rotatively within said mounting fixture and extending therethrough for rotation on an axis, an operating handle operatively affixed to the free end of said rotative portion, one part of said rotative portion being twisted axially with respect to another part.

5. In an assembly for actuating the valve of a flushing tank, the combination: a hollow mounting fixture carried by said tank, an actuating lever of rectangular cross-section wherein one transverse dimension is substantially greater than the other dimension having a rotative portion received rotatively within said mounting fixture and extending therethrough for rotation on an axis, an operating handle operatively affixed to the free end of said rotative portion, said handle having a bearing face substantially parallel to said axis of rotation, and an elongated recess substantially perpendicular to said axis of rotation, and one part of said rotative portion held against said bearing face and an end part of said rotative portion being substantially perpendicular to said axis and received non-rotatively into said recess, means holding said one part of said rotative portion against said bearing face.

6. In an assembly for actuating the valve of a flushing tank, the combination: a hollow mounting fixture supported by said tank and having a head portion exteriorly of said tank, said head portion being provided with an axially extending arcuate flange having a circumferentially elongated opening therein; an operating handle having a head provided with a skirt portion adapted to oscillate around said mounting fixture and also provided with a recess interiorly thereof and a securing boss within said recess; a valve actuating lever interiorly of said tank having an angular rotative portion with a flat side near its free end formed thereon extending through said mounting fixture in rotatable relation thereto, and said rotative portion having said free end received into said recess in said handle head to be engaged for rotation therewith, and a securing element holding the flat side of said free end of said rotative portion against said securing boss, said securing element passing through said elongated opening in said arcuate flange to provide a lost motion connection between said handle head and said mounting fixture.

7. An assembly for actuating the valve of a flushing tank as described in claim 6 in which said valve actuating lever is of rectangular cross-section wherein one transverse dimension is greater than the other transverse dimension and one part of said rotative portion is twisted axially with respect to another part.

8. In an assembly for actuating the valve of a flushing tank, the combination: a hollow mounting fixture supported by said tank and having a head portion exteriorly of said tank, said head portion being provided with an axially extending arcuate flange having a circumferentially elongated opening therein, an operating handle having a head provided with a recess interiorly thereof and also provided with a securing boss within said recess; a part of said head portion of said mounting fixture received into said recess, a valve actuating lever interiorly of said tank having an angular rotative portion formed thereon extending through said mounting fixture in rotatable relation thereto, and said rotative portion having its free end received into said recess in said handle head to be engaged for rotation therewith, and a securing element connecting said free end of said rotative portion to said securing boss, said securing element passing through said elongated opening in said arcuate flange to provide a lost motion connection between said handle head and said mounting fixture.

FRED M. KELLER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,147,764	Theleen	July 27, 1915
2,233,159	Crampton	Feb. 25, 1941
2,248,126	Schafer	July 8, 1941