

1

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ADJUSTABLE HANDLE ASSEMBLY FOR FLUSH VALVES

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This invention is concerned with certain new and useful improvements in flush valves for water closets and other plumbing fixtures, and the principal object of the invention is to design a novel extension handle assembly for a flush valve located behind a wall or partition.

Another object of the invention is to design an operating handle assembly for a flush valve which is adjustable to accommodate various thicknesses of walls through which the handle assembly extends.

A further object is to provide a new and improved handle assembly for a flush valve concealed behind a wall, in which only one type of extendable handle assembly is required to fit any wall thickness encountered by the plumber when installing the flush valve.

Another object is to design an adjustable handle assembly and extension for a flush valve in which the mechanical action of the mechanism extending between the handle and the plunger for tripping the flush valve remains positive and constant regardless of the adjusted distance between each end of the assembly extending through a wall.

Further objects are to provide a new and improved handle unit for a flush valve which is easy to assemble, readily adjustable for various wall thicknesses, is simple in construction, reliable in operation and fills a long felt need.

With the foregoing and other objects in view, the invention consists of certain novel features of construction, operation, and combination of elements which will be more fully described and pointed out hereinafter.

Referring now particularly to the drawings which illustrate a preferred embodiment of the invention;

Fig. 1 is a partial cross-sectional side view of a typical plumbing installation illustrating the invention;

Fig. 2 is a full size cross-sectional side view of the handle unit;

Fig. 3 is a similar cross-sectional side view with parts of the handle unit shown in operated position, while

Fig. 4 is a cross-sectional view taken along the line 4—4 of Fig. 2.

In many cases it is desirable that flush valves for flushing water closets be concealed behind a wall in front of which the water closet is located. In this event, it is necessary that the operating member or handle for operating the flush valve, protrude from the front of the wall where it is readily accessible to the user of the water closet. When installing such concealed types of flush valves, the plumber is many times confronted with the problem of ordering the correct length of the coupling member, which extends between the operating handle and its attachment to the flush valve. This is so because there are different thicknesses of toilet room walls which he may encounter in different installations. Often times finishing surfaces in the toilet room are of different thicknesses not anticipated by the plumber and the handle extension ordered will not fit the particular installation. Furthermore, plumbing supply houses must maintain a

2

large stock of many different lengths of handle extensions to accommodate the various wall thicknesses encountered in the trade. The foregoing disadvantages are all overcome by the present invention in which a novel handle extension assembly is designed which will fit all conceivable wall thicknesses usually encountered by an installing plumber. The handle unit is provided with means whereby its length can be adjusted and clamped to a wall of almost any thickness while still functioning in a reliable manner to operate a flush valve.

Referring to Fig. 1, this shows a typical installation of a wall hung closet bowl 5, provided with a well-known type of flush valve 6, such as the "Sloan Royal" flush valve, wherein the inlet water supply pipe 7 is connected to a throttle and stop valve 8 attached to the flush valve 6. The outlet 9 of the flush valve leads into the closet bowl 5 in the usual manner and an operating handle 10 for the flush valve protrudes from the wall 11 where it is readily accessible to the user. The handle extension unit indicated generally at 12 connects the operating handle 10 with flush valve 6 and is attached thereto by the coupling nut 13. It will be readily apparent that the handle extension or assembly 12 must be sized to accommodate many different types of wall thicknesses and still positively actuate the flush valve in each case.

The handle extension and assembly as shown in Fig. 2 is provided at the opposite end from handle 10 with a plunger 14 which is adapted to be projected forward when handle 10 is actuated, to tilt or trip the stem 16 of the relief valve within the flush valve 6, in the well known manner. This action will cause the flush valve 6 to operate and to flush the closet bowl 5 as is understood. The plunger 14 is guided axially by a threaded bushing 17 having a packing and nut 18 on the front end for preventing leakage outward from the flush valve and the plunger 14. For the purpose of restoring the plunger 14 after its operation a coil spring 19 is provided in a recess of the bushing 17 and presses against the head portion 21 attached to plunger 14. The coupling nut 13 enables the bushing 17 and the other parts of the assembly to be securely attached to the body of the flush valve 6 as seen in Fig. 1.

One portion of the handle extension assembly comprises a tube 22 threaded internally at 23 where it is attached to the rear of bushing 17 and supported thereby. A second tubular extension 24 is threaded internally into the other end of extension 22, as shown at 26, so that the two tubes are adjustably telescoped within one another. The tube 22 is also provided with an external thread 27 upon which a flanged lock nut 28 is threaded as shown. At the right hand end, tube 24 is threaded at 30 to receive a sleeve member 31 having a shoulder 32 against which the flange portion 33 of handle 10 normally abuts. A circular wall flange 29 threads onto the front end of sleeve member 31 and clamps tightly against the front wall 11 when the flanged nut 28 is threaded against the rear wall as shown in Fig. 1.

When the plumber installs the handle assembly, the first removes the wall flange 29 and pushes the unit through the hole from the rear of the wall 11 until both sleeve 31 and extension tube 24 project a slight distance out from the front of the wall. Coupling nut 13 is then securely clamped to the flush valve to hold the handle assembly rigidly on the valve. The part of extension tube 24 projecting through the front wall is then grasped and held to enable the wall flange 29 to be tightly threaded onto sleeve 31. Wall flange 29 is then rotated further to enable extension tube 24 to telescopically thread inward into tube 22 until wall flange 29 engages the front wall surface. This establishes the correct length of the assembled unit to exactly fit the thickness of the wall through which it extends. To lock the extension

tubes in position, the lock nut 28 is then threaded tightly up against the rear of the wall 11. It will thus be apparent that with this simple arrangement the unit can be installed and adjusted very easily for almost any thickness of wall that may be encountered in the trade. The gaps 50 and 51 between the extension tubes will vary, depending upon the adjustment required, and the length of the tubes is selected to provide for the maximum wall thicknesses likely to be encountered by a plumber.

In large installations where a row of water closets and flush valves are installed along a wall, the adjustable handle assembly is a distinct advantage because many times the thickness of the wall will vary considerably between the individual closets in the row along the wall. With the novel handle assembly, installation is speeded up considerably since the plumber does not have to supply or cope with different lengths of extension assemblies.

Since the extension tubes 22 and 24 are adjustable with respect to one another, it is necessary that some means be provided to insure a positive and direct drive between handle 10 at one end and plunger 14, at the other end of the assembly, in all adjusted positions of the extension tubes. This is provided by the arrangement including the threaded rod 34 extending within the tubes 22 and 24, which rod is securely screwed at 35 into the bushing member 36 and which in turn abuts the cam portion 33 of handle 10. At the other end, rod 34 is provided with a long threaded portion which adjustably screws into the bushing 37. The bushing 37 is securely fastened as by soldering into one end of a thin sleeve 38, the other end of which has a key member 39 suitably secured to it, as shown. The front end 40 of key member 39 butts up against the head 21 of plunger 14. A similar key member 41 is securely fastened to the bushing 36 at the other end of rod 34. Both of the key members 39 and 41 have circular flange portions (see Fig. 4), each of which include oppositely disposed recesses 42, 43, 44 and 45, respectively. These recesses are adapted to engage and slide along keyways formed internally in extension tubes 22 and 24, the recesses 42 and 43 in key member 39 being slidable along keyways 46 and 47, respectively, while recesses 44 and 45 of key member 41 are slidable along keyways 48 and 49.

The foregoing arrangement insures that a positive connection is maintained between the handle 10 and plunger 14, regardless of the adjustment of extension tubes 22 and 24. As seen in Fig. 3, operating the handle 10 downward, as shown, tilts the cam portion 33 against shoulder 32 and forces bushing 36 to the left. As a result, threaded rod 34 and sleeve 38 are also moved forward, causing key member 40 to push the plunger head 21 and plunger 14 outward. The relief valve stem 16 of the flush valve 6 is accordingly tilted to cause a flushing operation of the flush valve in the well known manner.

As has been pointed out, the two extension tubes 22 and 24 may be adjusted relative to one another to accommodate various wall thicknesses, and while this adjustment is being made, the rotation of tube 24 while tube 22 is held in position, will cause similar rotation of key member 41 by virtue of its engagement at recesses 44 and 45 with keyways 48 and 49, respectively. As a result, member 36 is likewise rotated to cause an in or out threaded movement of rod 34 with respect to bushing 37. Since sleeve 38 is now held from rotating by key member 39 at the other end, the rod 34 will be merely threaded into bushing 37 an amount depending on the wall thickness encountered. It will thus be seen that the slots or recesses 42, 43 and 44, 45, in key members 39 and 41, will be slid or moved along the keyways 46, 47 and 48, 49, respectively, during the adjusting operation and thereby prevent the relative rotation of the key member with respect to their associated extension tubes.

While the invention has been shown and described in only one preferred embodiment, it will be understood

that it is capable of certain modification, and it is therefore not desired to limit the same to the precise construction shown but only to the extent of the appended claims.

What is claimed is:

1. In a handle assembly for a flush valve mounted behind a wall and through which said assembly extends, a pair of wall extension tubes threaded together and adjustable lengthwise within one another to accommodate walls of different thicknesses, a wall flange and operating handle mounted on the end of one of said extension tubes, a coupling nut and flush valve operating plunger mounted on the end of said other extension tube clamping means on said last extension tube cooperating with said wall flange for clamping said assembly to a wall, connecting means arranged within said extension tubes between said operating handle and said operating plunger, and means for adjusting the length of said connecting means at the same time said extension tubes are adjusted, said connecting means comprising a pair of elongated members threaded together, the threading on said elongated members and said extension tubes being of the same pitch whereby both are simultaneously adjustable for the same degree of movement.

2. In a flush valve assembly mounted and extending through a wall, a pair of extension tubes threaded together and adjustable lengthwise one within the other to accommodate walls of different thicknesses, an operating handle on one end of said assembly and a flush valve operating plunger on the other end of said assembly, connecting means arranged within said extension tubes, whereby said operating handle is adapted to actuate said flush valve operating plunger, said connecting means comprising a threaded rod and sleeve member for adjusting the relative length of the same in accordance with the adjusted position of said extension tubes, and key members slidably connecting said rod and sleeve member with said connecting tubes for preventing relative rotation of said rod and sleeve members while said extension tubes are being adjusted, the threading on said rod and sleeve member being the same pitch as on said extension tubes, whereby both are simultaneously adjusted for the same degree of movement.

3. In a flush valve assembly extending through a wall, two extension tubes threaded together and adjustable lengthwise within one another to compensate for walls of different thicknesses, an operating handle arranged on one end of said assembly and an operating plunger on the other end of said assembly, connecting means arranged axially within said extension tubes whereby said operating handle is adapted to actuate said operating plunger, said connecting means including a rod threaded into a sleeve member, a key member attached to said rod and a second key member attached to said sleeve member, and slidable means interconnecting said key members with said extension tubes whereby said rod and sleeve member are adjusted in accordance with the adjusted position of said extension tubes, the threading on said rod and sleeve member being the same pitch as on said extension tubes, whereby both are simultaneously adjusted for the same degree of movement.

4. In a flush valve assembly extending through a wall, a pair of extension tubes threaded together and adjustable lengthwise to accommodate walls of different thicknesses, an operating handle supported on one of said extension tubes, a flush valve operating member supported on the other of said extension tubes on the opposite end of said assembly from said operating handle, connecting means arranged axially within said extension tubes whereby said operating handle is adapted to actuate said operating plunger, said connecting means comprising adjustably threaded rod and sleeve members, a key member attached to said rod member and a second key member attached to said sleeve member, one of said key members being associated with one extension tube and the other key member with the other extension tube, slidable key-

5

way means between said key members and said extension tubes whereby the rotation of one of said extension tubes rotates the associated key member and causes said rod and sleeve members to be adjusted accordingly, said key member being slidable in said keyway means while the other of said key members is prevented from rotating by said keyway means in the other of said extension tubes, the threading on said rod and sleeve member being the same pitch as on said extension tubes, whereby both are simultaneously adjusted for the same degree of movement.

5. In a flush valve assembly extending through a wall, a pair of extension tubes threaded together and adjustable lengthwise to accommodate walls of different thicknesses, an operating handle supported on one of said extension tubes, a flush valve operating member supported on the other of said extension tubes on the opposite end of said assembly from said operating handle, connecting means arranged axially within said extension tubes whereby said operating handle is adapted to actuate said operating plunger, said connecting means comprising rod and sleeve members adjustably threaded into one another, key members attached to said rod and sleeve members, cooperating keyway means between said key members and said extension tubes whereby adjustment of said extension tubes causes rotation of one of said key members and in turn said rod and sleeve members, said keyway means comprising slots in the edges of said key members and longitudinal ridges in said extension tubes, the threading on said rod and sleeve member being the same

6

pitch as on said extension tubes, whereby both are simultaneously adjusted for the same degree of movement.

6. In a flush valve assembly of adjustable length, for extending through a wall, a pair of extension tubes threaded together and adjustable lengthwise in relation to each other, a wall engaging element mounted on each said extension tube, whereby to engage opposite sides of the wall through which said tubes pass, at least one of said wall engaging elements being axially adjustable along the extension tube upon which it is mounted, an operating handle supported on one of said extension tubes, a flush valve operating member supported on the other said extension tubes on the opposite end of said assembly from said operating handle, connecting means arranged axially within said extension tubes, extending between said operating handle and said valve operating member, said connecting means including at least two axially adjustable connector elements, the extension tubes being in screw-threaded relation with each other and the adjustable connector elements being in screw-threaded relation with each other, the screw threads on said connector elements and said extension tubes being of the same pitch, and means for preventing rotation of one of said extension tubes in relation to its associated connector element and of the other said extension tubes in relation to the other of said connector elements.

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