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3,267,956

FROST-PROOF SILLCOCK

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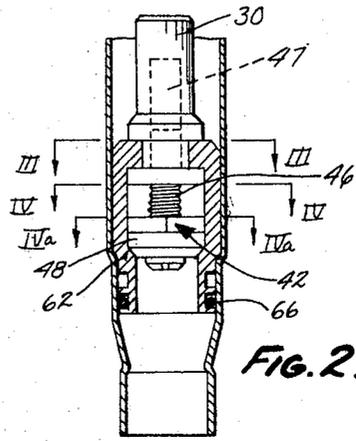
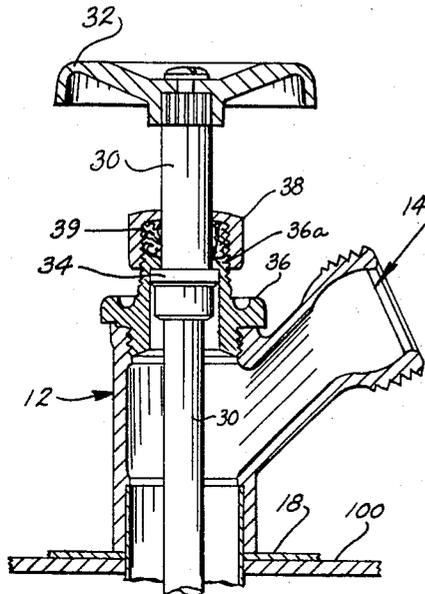


FIG. 2.

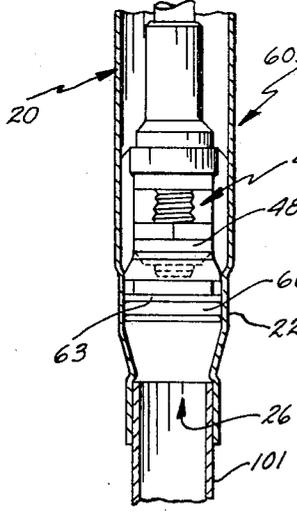


FIG. 1.

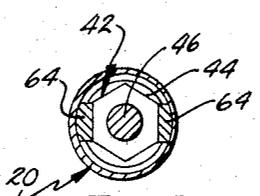


FIG. 4.

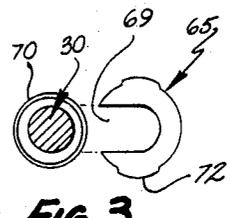


FIG. 3.

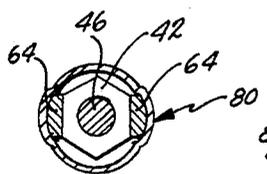


FIG. 4a.

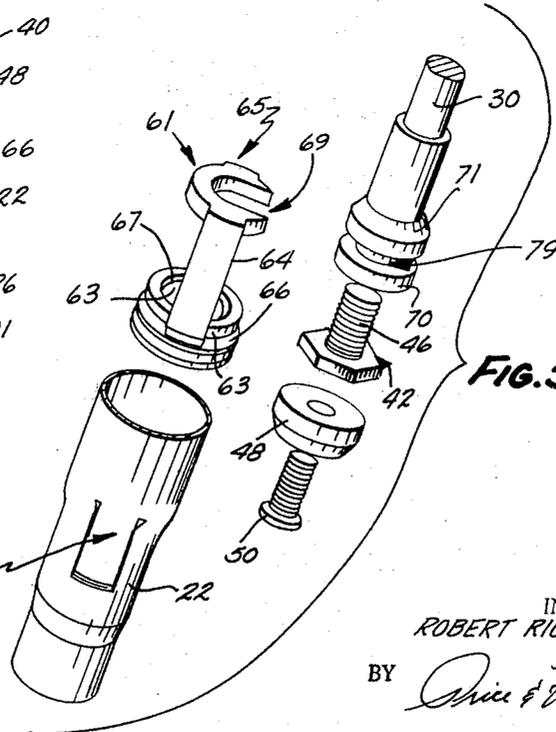


FIG. 5.

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FROST-PROOF SILLCOCK

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This invention relates to the construction of sillcocks, and particularly to the construction of frost-proof sillcocks. More particularly, this invention relates to a frost-proof sillcock having a new and inventive housing construction, valve and valve seat assembly.

It has long been known to those skilled in this art that it was possible to construct a sillcock having its valve portions remote from surface extremities such as the hand wheel by which the valve is operated and the discharge port through which liquid controlled by the sillcock is expelled. Such devices have one great advantage: they position the valve portions beyond the frost line. By so doing, they eliminate the bursting of pipes and allied problems which result from freezing of the water within them.

While frost-proof sillcocks have proved to be of great benefit in the area indicated, their construction has aggravated a vexatious problem common to all sillcocks. The problem that has been aggravated is that of replacement of the seals and seats for the sealing portions of the valve members, all of which are located deep within the structure of the sillcocks. Since the seats must be firmly retained in position so that the valve member may seat upon them, it has always heretofore been necessary to dismantle the entire exterior body of the sillcock even to inspect the condition of the seat, and if replacement was required, further dismantling was required.

The present invention has as one of its principal objects and advantages the unique solution of the problem detailed above. It is achieved by providing a frost-proof sillcock construction having a valve unit, all parts of which remain a single rigid assembly while they are being inserted into or withdrawn from the valve body.

Another of the principal objects of this invention is to provide a frost-proof sillcock which includes permitting the valve, valve seat and actuating stem to be removed without removal of the exterior housing. A further object is a novel valve seat assembly carried by the valve stem, and therefore, made readily accessible for inspection and/or replacement, since it accompanies the valve sealing member and valve stem when the same are withdrawn through the exterior end of the body sillcock.

Yet, another object of the present invention is the provision of a valve seat assembly of the type indicated which is also easily removable from the position in which it is carried by the valve stem after it and the valve sealing member have been removed from the body portion of the sillcock, yet which cannot be inadvertently dislodged from the valve member while it is within the sillcock.

Still another object of the present invention is a frost-proof sillcock construction requiring no special tools for extracting and inspecting the parts of its valve mechanisms.

A further object of this invention is a frost-proof sillcock construction of the type indicated which includes a unique valve actuating mechanism which assures satisfactory closing of the valve even through some of its parts may be in a worn condition.

Yet another object of the present invention is a unique valve seat assembly which in addition to accomplishing the things described previously serves a valuable function as a valve stem positioning means.

Another object of my present invention is the perfecting of a frost-proof sillcock construction whose valve body incorporates means for indexing and for locking

the valve seat assembly in a properly indexed position.

Additional objects and advantages are present within the inventive concept, and will occur to those skilled in the art upon reading the following specification, which in conjunction with the accompanying drawings, sets forth a preferred embodiment thereof.

In the drawings:

FIG. 1 is an elevational view of the new sillcock construction, portions of the housing having been broken away and appearing in section to more clearly show the novel features;

FIG. 2 is a fragmentary view of the lower extremity of the sillcock as shown in FIG. 1, the housing and valve seat assembly being illustrated in central section;

FIG. 3 is a sectional view taken along the section line III—III of FIG. 2, but showing the valve stem separated from the valve seat assembly in the manner separation would occur during disassembly;

FIG. 4 is a sectional view taken along the plane IV—IV of FIG. 2;

FIG. 4a is a section view taken along the plane IVa—IVa of FIG. 2; and

FIG. 5 is an exploded perspective view of the portion of the sillcock shown in FIG. 2, further illustrating details of its novel construction.

In brief, this invention concerns a frost-proof sillcock construction having a valve set assembly which, by a unique carrier or caging means, is carried by the valve member and stem, and which in so doing, permits the valve seat assembly to be withdrawn readily from the housing, simultaneously with the withdrawal therefrom of the valve sealing member and valve stem through the open end of the exterior housing.

Referring in detail to the drawings, in FIG. 1 the frost-proof sillcock construction is seen to comprise a valve body 12, having the usual fluid discharge port 14 and a flange 18 by which the sillcock may be mounted. The valve body 12 is an exterior housing, shaped on its inner extremity to receive a generally tubular inner housing 20. The housing 20 has a necked down portion 22 and an inlet port 26 of reduced diameter.

A valve stem 30 is disposed within the valve body 12 and 20. It is positioned generally centrally of the valve body 12 and 20. Means for rotating the stem 30 are provided, which may be of any preferred form, such as the hand wheel 32. Adjacent its outer extremity, the valve stem has a shoulder 34, which is abutted by a collar member 36a on the bonnet 36 to limit outward movement and properly position the stem lengthwise of the valve body. The bonnet 36 is threadedly engaged into the outer end of the valve body 12, in the manner indicated. A packing nut 38 is in turn threadedly engaged upon the bonnet 36, so that the packing 39 within the nut 38 effects a seal about the valve stem, in a manner that is generally known.

Attached to the inner portion of the valve stem 30 is a valve member 40 and a valve seat assembly 60, both of which are described in detail hereinafter.

The valve member 40, which is best illustrated in FIGS. 2 and 5, includes a control nut 42, or another similar device having control surfaces 44 thereupon. The control nut 42 is integral with the centrally disposed threaded stud 46, by which the valve member 40 is secured to the valve stem 30, as shown. A valve seal 48 of conventional design is replaceably secured to the bottom of the threaded stud 46 by suitable means such as the screw 50. The outer end of the threaded stud 46 engages the internally threaded opening 47 in the inner end of the valve stem 30.

The valve seat assembly 60 is best illustrated in FIG. 5. It includes a cage 61 having a valve seat portion 62, a sealing flange 63, a pair of diametrically spaced guides or arms 64 and a cap portion 65 at its exterior end. The

sealing flange projects inwardly beyond the valve seat portion. It has a pair of circumferential grooves seating O-ring seals 66. The seals engage the inner surface of the housing and prevent liquid from by-passing the valve unit (FIG. 1).

The valve seat proper 67 is formed at the base of the arms and is shaped to mate with the valve seal 48. The arms 64 are narrow and extend lengthwise of the housing. They are spaced to slidably receive the nut 42 between them, engage its control surfaces 44 and prevent its rotation. The side surfaces of the arms are spaced such that the cage will slidably travel lengthwise of the main portion of the inner housing 20 and the valve body 12. The length of the arms is such as to permit substantial travel of the valve seal 48 away from the valve seat. This is necessary to create an opening big enough to assure the unrestricted flow of fluid past the valve when open.

The exterior end of the cage, formed by the cap portion 65, has a U-shaped slot 69 opening through one side (FIG. 3). The width of this slot is sufficient to permit the cap to be seated about the valve stem in the annular channel 72 formed between the spaced rings 70 and 71. The ring 70 seats within the cage and the other outside the cage, thus holding the cage to the valve stem for travel with it lengthwise of the housing. The rings prevent lengthwise movement of the cage relative to the stem. The ring 70 is circular, permitting the valve stem to rotate freely with respect to the cage. The U-shaped slot 69 permits the cage to be mounted on and removed from the valve stem by simple lateral movement (FIG. 3).

The arms 64 of the cage 61 preferably have flat inner surfaces. As previously stated, these surfaces are spaced apart a distance sufficient to allow the oppositely disposed control surfaces 44 of control nut 42 to slide smoothly between them, while at the same time preventing the nut 42 from rotating. Furthermore, as best seen in FIGS. 4 and 5, the outer surfaces of the arms 64 of the cage 61 protrude slightly beyond the circumference of the valve seat 62. Thus, the arms enter the indexing channels 80, which are inwardly elongated extensions of the main diameter of housing 20 and are formed in the necked down portion 22. The channels hold the arms and thus the cage against rotation.

The operation and installation of this invention is as follows. The assembled valve is inserted through a suitable opening in a supporting structure such as that suggested by the numeral 100 (FIG. 1). It will be understood that only the valve body 12 will project beyond the structure, the remainder of the structure of the invention being inserted into an area which is not exposed, and remains at a temperature at which water will not freeze. The length of the inner housing 20 is such that the actual valving structure, that being the valve seat 67 and the cooperating valve member 48, are so remote from the exterior that this portion of the structure does not experience temperatures cold enough to freeze water. Depending upon the climate, this may be a distance of anywhere from six inches to several feet in length. The interior end of the inner housing 20 is secured by any suitable means to a supply pipe 101. In the particular form illustrated, it is secured by a soldered joint.

If the valve is disassembled, then to reassemble, the valve stem is rotated to force the seal member 48 firmly against the valve seat 67. This prevents the cage 61 from shifting rotationally about the valve stem, and thus it may be indexed to the channels 80 prior to insertion. The valve stem with the cage thus secured is now inserted through the open end of the valve body. It is important to note that with the packing nut 38 and the bonnet 36 removed, the opening at the end of the valve body 12 or exterior portion of the sillcock is large enough to permit the cage structure to pass through it without removal of the exterior valve body.

The cage is then passed lengthwise through the valve body and inner housing until it enters the restricted por-

tion of the inner end of the inner housing. It then has to be pressed inwardly until it is seated to its full depth. In this last movement, the O-ring seals 66 enter the restricted or swaged portion of the inner housing and form a pressure tight seal with the inner wall of the inner housing. At the same time, the side arms 64 of the cage 61 slide into the channels 80 locking the cage against rotation. The bonnet 36 is then tightened into place. By reason of the flange 36a, the stem is properly positioned lengthwise by this action in the event it has not been inserted quite far enough. The packing nut 38 forms a watertight seal about the stem 30. At this point, the valve is ready for operation, and by rotation of the hand wheel, the valve may be opened to discharge water.

Rotation of the valve stem 30 causes the valve seal to shift lengthwise of the cage. The nut 42 being secured against rotation will force the threaded stud 46 to shift inwardly or outwardly of the threaded opening 47, depending upon the direction of rotation of the valve stem.

When it becomes necessary to replace the sealing member 48 or to rework the valve seats, this may be accomplished simply by removing the bonnet 36 and withdrawing the valve stem and its assembled cage 61. With this structure removed, the valve stem is rotated to shift the seal 48 away from the valve seat, and the cage slipped off the valve stem sideways as indicated in FIG. 3. The sealing member can then be replaced simply by removal of the screw 50. At the same time, the valve seat is accessible for reworking as necessary. If the valve seat has been too badly damaged to be reworked, it may be easily and simply replaced by substituting a new cage member. When this has been done, the entire assembly is once more inserted in the sillcock and the valve is ready for operation.

It is a marked advantage of this invention that the exterior portion of the sillcock, that is the valve body 12, does not have to be removed in order to perform this operation. The removal of the exterior portion of this type of sillcock is often a difficult and frustrating job. Further, the flange 18 by which it is secured to the structure, will frequently damage the exterior finish of the structure during removal and replacement. This is particularly true where the finish is painted or is a stucco-like material.

The invention also has the advantage of positively and firmly securing the entire valve structure to the stem, both when it is being removed and when it is being inserted. This eliminates the problem of attempting to index un-assembled or loosely assembled parts at the end of a long rod at the bottom of a blind opening such as is commonly required with conventional frost-free sillcock constructions. This latter advantage can eliminate much of the time required to perform repairs, and thus materially reduce the cost of maintenance. It also reduces the possibility of damaged parts due to jamming or other difficulties that may occur in attempting to assemble the otherwise loosely associated parts deep within the sillcock structure. The invention has the added advantage of permitting replacement of the O-ring seals 66. Sometimes it happens that these seals deteriorate or become worn or damaged, or for other reasons fail. In conventional structures, this sometimes necessitates replacement of the entire sillcock structure. In this invention, these seals may be quickly and easily replaced at the same time the valve itself is being serviced.

Having described a preferred embodiment of this invention, it will be recognized that modifications of the invention may be made, each incorporating the principles of the invention. Such modifications are to be considered as included within the hereinafter appended claims, unless these claims by their language expressly state otherwise.

I claim:

1. A frost-free sillcock comprising: a hollow body member having an exterior portion and an elongated interior portion projecting therefrom; said exterior portion having

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a discharge port and an open end, said open end aligned with said interior portion of said body member; means for closing said open end; a valve stem extending through said means and lengthwise substantially the full length of said interior portion; the inner end of said valve stem mounting a valving unit, said valving unit having a valve body, a valve member and a valve seat said valve member being mounted, intermediate said valve stem and said valve seat; the diameter of said valving unit being less than that of the opening in said open end and being axially slideable into said body member and a locking element on said valve body locking said valve body against rotation to said interior portion of said housing adjacent the inner end thereof, permitting said stem, and valving unit to be withdrawn axially from said body member through said open end.

2. A frost-free sillcock comprising: a hollow body member having an exterior portion and an elongated interior portion projecting therefrom; said exterior portion having a discharge port and an open end, said open end aligned with said interior portion of said body member; means for closing said open end; a valve stem extending through said means and lengthwise substantially the full length of said interior portion; a cage mounted on the inner end of said valve stem; said cage having an elongated body, one end of which seats about said valve stem, said valve stem being freely rotatable with respect to said cage; the other end of said cage forming a valve seat; an indexing element on said cage engaging the walls of said interior portion of said housing and holding said cage against rotation; a sealing member mounted on the end of said valve stem and within said cage and movable by said valve stem toward and away from said valve seat; the diameter of said cage being less than that of the opening in said open end, permitting said stem and cage to be withdrawn from said body member through said opening.

3. A frost-free sillcock as described in claim 2 wherein there is a threaded element within said cage; said valve sealing member being mounted on said threaded element; a threaded opening in said valve stem receiving said threaded element; a holding member on said threaded element engaging said cage and holding said threaded element against rotation with respect thereto whereby rotation of said valve stem will shift said sealing member with respect to said valve seat.

4. A frost-free sillcock as described in claim 2 wherein said indexing element is a pair of diametrically positioned arms; the adjacent walls of said body member being of reduced diameter except for a pair of diametrically positioned channels for receiving said arms.

5. A frost-free sillcock as described in claim 4 wherein there is a threaded element within said cage; said valve sealing member being mounted on said threaded element;

a threaded opening in said valve stem receiving said threaded element; a holding member on said threaded element engaging said arms and holding said threaded element against rotation with respect to said cage whereby rotation of said valve stem will shift said sealing member with respect to said valve seat.

6. A frost-free sillcock as described in claim 5 wherein the inner end of said interior portion is of reduced diameter; said cage having an inwardly extending flange and seal means surrounding said flange and sealing against said inner end of said interior portion of said body member.

7. A frost-free sillcock comprising: a hollow body member having an exterior portion and an elongated interior portion projecting therefrom; said exterior portion having a discharge port and an open end, said open end aligned with said interior portion of said body member; a valve stem extending lengthwise through said body substantially the full length thereof; the inner end of said valve stem having a valve unit mounted thereon; said valve unit having a cage and a valve seal slidably removable from and axially of said body member; said cage being detachably secured at one of its ends to the inner end of said valve stem; said valve stem being rotatable with respect to said cage; said valve seal being within said cage; the other end of said cage having a valve seat cooperating with said valve seal; means on said cage making sliding, positive engagement with said housing and holding said cage against rotation.

8. A frost-free sillcock as described in claim 7 wherein said cage has an annular inwardly projecting flange and a seal element thereon forming a sealing engagement with the inner walls of said housing.

9. A frost-free sillcock as described in claim 7 wherein said valve stem has a pair of spaced rings forming a circumferential channel therebetween; said one end of said cage being seated between said rings and holding said cage against axial movement relative to said valve stem, said one end having a slot opening through one side of said cage for receiving said valve stem by lateral displacement.

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