Oct. 29, 1968 H. A. FULTON ET AL 3,407,837

SILLCOCK WITH ICE EXPANSION CONTROL

Filed Oct. 20, 1965 2 Sheets-Sheet 1

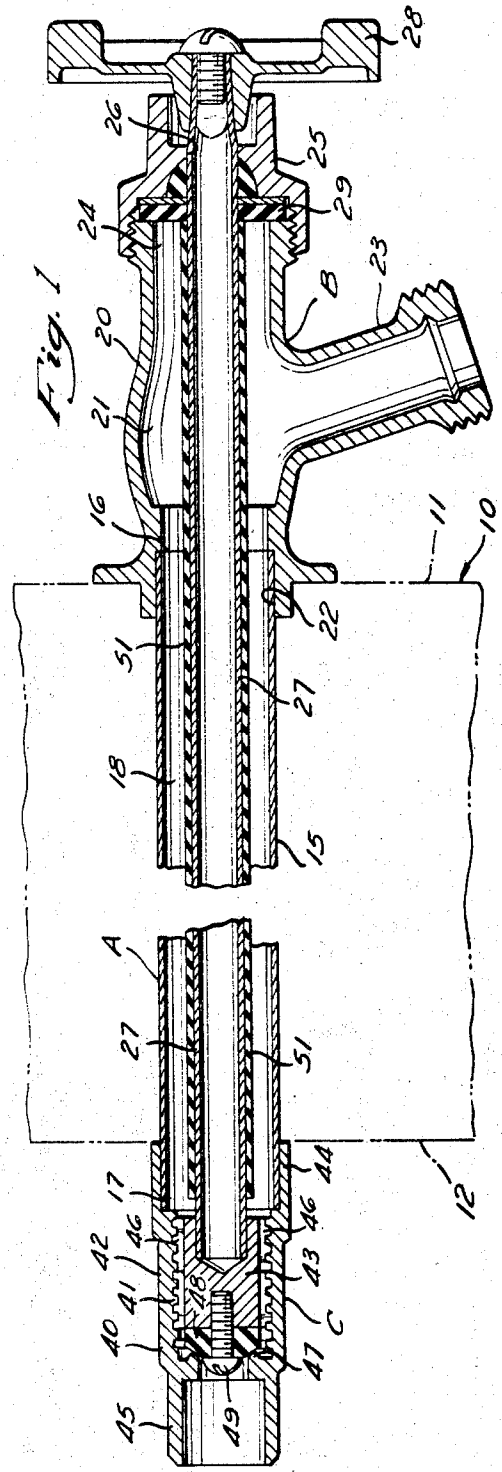


Fig. 1

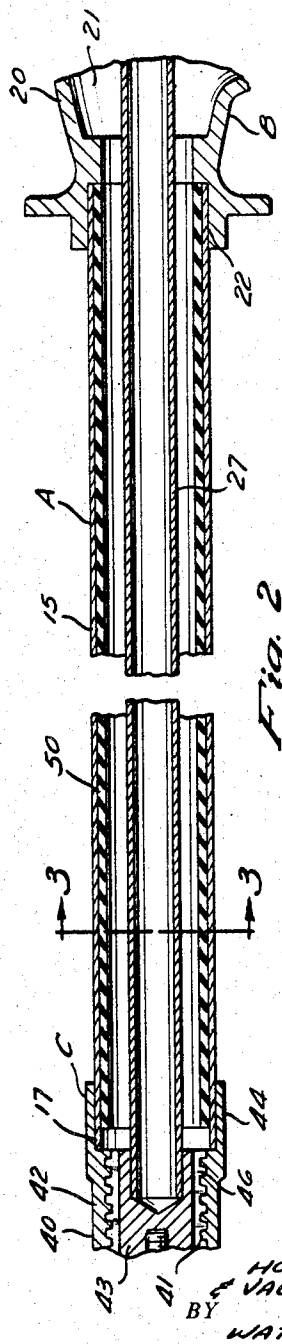


Fig. 2

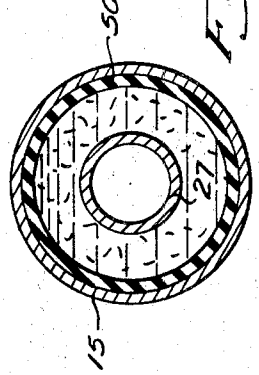


Fig. 4

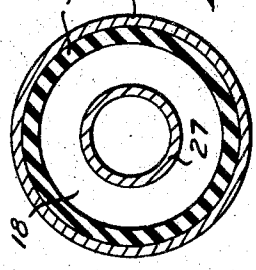


Fig. 3

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SILLCOCK WITH ICE EXPANSION CONTROL

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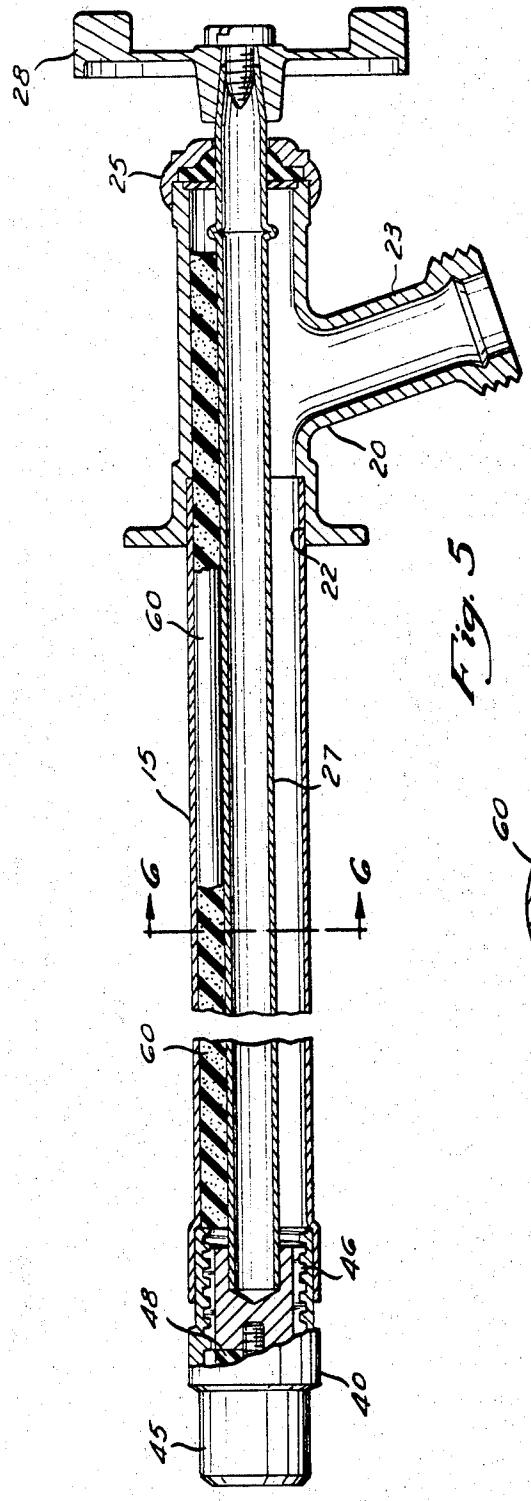


Fig. 5

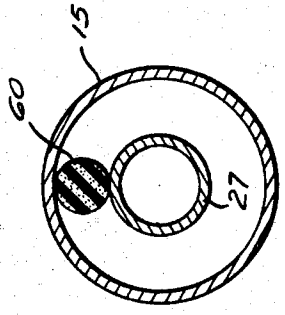


Fig. 6

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SILLCOCK WITH ICE EXPANSION CONTROL

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12 Claims. (Cl. 137—375)

ABSTRACT OF THE DISCLOSURE

A sillcock assembly including a water flow passage adapted to extend through a building wall and a non-absorbent, cushion-type sleeve, rod or liner in the passage that will compress and absorb the expansion caused by the formation of ice.

The present invention pertains broadly to improvements in sillcocks or faucets for use in geographical areas where the temperature may drop below freezing during certain months of the year.

The primary object of the invention is to provide a sillcock that will withstand the expansion resulting when ice forms therein and without injury or damange to its parts.

An object of the invention is to provide a sillcock that does not require the occupant of a building to drain the water supply line connected thereto to prevent damage from freezing when the temperature falls below freezing.

Another object of the invention is to provide a sillcock having a cushion-type sleeve, rod or liner in the freezing zone of the water channel that will compress and absorb the expansion caused by the formation of ice in the sillcock and which will return to its normal dimensions when the ice has melted.

Another object of the invention is to provide a sillcock having a cushion-type sleeve, rod or liner in the freezing zone of the water channel that does not impede the flow of water therethrough while its valve is open.

Still another object of the invention is to provide a sillcock that is made of standard parts and which is not subject to breakage caused by the formation of ice therein.

Further objects of the invention reside in a sillcock that is economic of manufacture, designed for use in all geographical areas where freezing may occur, and which is attractive in appearance.

Other objects and advantages are more or less ancillary to the foregoing objects, and the manner in which all the various objects are described will appear in the following description, which considered in connection with the accompanying drawings, sets forth the preferred embodiment of the invention.

Referring to the drawing:

FIG. 1 is a central longitudinal cross-sectional view of the sillcock showing the compressible sleeve in place on the surface of the valve stem or spindle.

FIG. 2 is a fragmentary central longitudinal cross-section view of the sillcock showing the compressible liner in place on the inner surface of the tubular body that extends between the valve and the spout thereof.

FIG. 3 is an enlarged cross-sectional view of the sillcock taken on a line 3—3 of FIG. 2 showing the compressible liner thereof in its normal position.

FIG. 4 is an enlarged cross-sectional view of the sillcock taken on a line 3—3 of FIG. 2 showing the compressible liner thereof under compression caused by the expansion of ice in the tube.

FIG. 5 is a central longitudinal cross-sectional view of the sillcock showing the compressible rod in place in the water flow passage in the tubular body that extends between the valve and the spout thereof.

FIG. 6 is an enlarged cross-sectional view of the sillcock taken on a line 6—6 of FIG. 5 showing the cylindrical rod in position within water flow passage.

Referring to the drawing it will be seen that the sillcock or faucet has a tubular body portion A that extends through a building wall **10** and having a water flow passage therein, a spout and water regulating handle assembly B located adjacent the outer surface **11** of said building wall **10** and which is connected to the outer end of said tubular body portion A and a valve assembly C located adjacent the inner surface **12** of said building wall **10** and which is connected to the inner end of tubular body portion A.

Referring now to FIG. 1, the tubular body portion A comprises a tubular pipe **15** that extends through the building wall **10**. Its length preferably is determined by the thickness of said building wall through which it passes and such additional length as to permit the connection of the said spout and water regulating handle assembly B at its outer end **16**, and the valve assembly C at its inner end **17**. A water flow passage **18** is provided in said tubular pipe **15** that extends throughout its length.

The spout and water regulating handle assembly B comprises a spout body **20** having a water flow passage **21** therein communicating with said water flow passage **18** of said tubular pipe **15**. The spout body **20** has a flanged aperture **22** to receive the outer end **16** of said tubular pipe **15**, a spout pipe **23** communicating with said water flow passage **21**, a second aperture **24** therein located opposite said flanged aperture **22** and in axial alignment therewith and adapted to receive a handle nut cap **25**. The said handle nut cap **25** has an aperture **26** therein in axial alignment with said tubular pipe **15** to receive a valve stem **27** to which a handle **28** is connected, and a seal **29** is provided between said nut cap **25** and spout body **20**.

The valve assembly C comprises an outer tubular casing **40** having threads **41** adjacent its mid-section **42** and a water regulating threaded stem connector **43** adapted to receive said threads **41**. The end section **44** of said casing **40** is adapted to receive the end **17** of said tubular pipe **15** and the other end section **45** of said casing **40** is adapted to receive a water supply pipe (not shown). Entry ports **46** are provided through said stem connector **43** adjacent said mid section **42**. There is a valve ground seat **47**, a valve washer **48** and a screw **49** therefor. The said valve stem **27** is in axial alignment with said tubular pipe **15** and extends from said handle **28** to said stem connector **43** to which it is affixed.

As shown in FIG. 2 the tubular pipe **15** is provided with a non-absorbent compressible wall covering liner **50** adjacent its inner surface and which extends throughout the length of said tubular pipe **15**. As shown in FIG. 1 the valve stem **27** is provided with a non-absorbent compressible wall covering sleeve **51** therefor which extends from the stem connector **43** to adjacent the seal **28** of the spout body **20**. As shown in FIG. 5 the water

flow passages 18 and 21 are provided with a nonabsorbent compressible rod 60 which extends from the valve assembly C to adjacent the handle nut cap 25. Preferably the said liner 50, sleeve 51 and rod 60 may be made of a rubber or a plastic material that has compressible properties. The sponge type of such materials may be used with success.

It is known, for example, that rubber can be compressed to approximately one-third of its volume.

The said liner 50, sleeve 51 and rod 60 preferably should withstand the usual water pressure without compressing but should have sufficient elasticity to compress in direct relation to the expansion caused by the formation of ice therein when the water remaining in the said tubular pipe 15 freezes.

It will be seen that when the temperature is below freezing the water that remains in the water flow passage 18 will freeze. It is well known that when water freezes it expands approximately one-eleventh of its volume and the force produced thereby is greater than the tensile strength of the materials used in constructing the said tubular pipe 15. Breakage or rupture of said tubular pipe 15 may occur unless said expansion can be controlled. The said non-absorbent compressible wall covering liner 50, sleeve 51 and rod 60 provide such a control.

As shown in the drawing the water passage 18 in the said tubular pipe 15 surrounds the valve stem 27. The volume of the water capacity therein may be calculated according to the difference between the I.D. of the tubular pipe 15 and the O.D. of the valve stem 27.

In making a determination of the thickness required for a non-absorbent compressible liner 50 and sleeve 51 wall covering to absorb the expansion caused by water freezin in said tubular pipe 15 the following should be considered: Where the sillcock is provided with a non-obsorbent compressible wall liner 50 and a sleeve 51 a determination should be made of the proper thickness of the wall covering required to absorb, by compression, the ice expansion of approximately one-eleventh of the water capacity of said water flow passage 18. In making such determination the surface area of said liner 50 and sleeve 51 should be combined. Also the compressible limit of the material of said liner 50 and sleeve 51 should be considered so that the said ice expansion will fall within such limit. Where only the liner 50 is used the thickness thereof must be increased by an amount equal to the volume lost by the absence of a sleeve and where only a sleeve 51 is used the thickness thereof must be increased by an amount equal to the volume lost by the absence of a liner.

A similar determination may be made for the size of the non-absorbent compressible rod 60 to absorb the expansion caused by water freezing in said tubular pipe 15. The compressible limit of the material of said rod 60 and the volume of the water capacity of the tubular pipe 15 should be obtained. The volumetric size of the rod 60 is one in which the ice expansion of approximately one-eleventh of the said water capacity will come within said compressible limit of the material of said rod 60.

Although the foregoing description is necessarily of detailed character, in order that the invention may be completely set forth, it is to be understood that the specific terminology is not intended to be restrictive or confining, and that various rearrangements of parts and modifications of detail may be resorted to without departing from the scope of spirit of the invention as herein claimed.

What is claimed is:

1. A sillcock of the class described comprising:
(a) a tubular pipe having a water-flow passage therein and extending through a building wall;
(b) a spout and water regulating handle means assembly connected to the outer end of said tubular pipe and having a water flow passage communicating with said tubular pipe water flow passage;
(c) a valve means assembly connected to the inner end of said tubular pipe beyond the freeze line;
(d) a valve stem within said tubular pipe and in coaxial alignment therewith, said valve stem having one end thereof affixed to the valve of said valve means assembly and the other end connected to the handle of said regulating handle means assembly;
(e) a water-flow passage in said tubular pipe between the inner surface of the wall thereof and the wall surface of the valve stem and extending the length of said tubular pipe; and
(f) a compressible non-absorbent means in said water-flow passage capable of withstanding the usual water pressures therein and having sufficient elasticity to compress when ice forms therein in direct relation to the ice expansion therein and to de-compress when said ice has melted, said compressible non-absorbent means being in contact through its length with at least one wall of said water-flow passage, and said compressible non-absorbent means having a length less than the length of said one wall and being mounted in said passage so that said means can lengthen when compressed by the formation of ice.

2. The sillcock of claim 1 in which the compressible non-absorbent means in a wall covering liner on the inner wall surface of the tubular pipe.

3. The sillcock of claim 1 in which the compressible non-absorbent means is a sleeve on said wall of the valve stem.

4. The sillcock of claim 1 in which the compressible non-absorbent means in a solid rod extending the approximate length of said water-flow passage within said tubular pipe.

5. The sillcock of claim 1 in which the compressible non-absorbent means is a wall covering liner on the said wall of the tubular pipe and a sleeve on said wall of the valve stem.

6. The sillcock of claim 1 in which the compressible non-absorbent means is rubber.

7. The sillcock of claim 6 in which the compressible non-absorbent means is sponge rubber.

8. The sillcock of claim 1 in which the compressible non-absorbent means is plastic.

9. The sillcock of claim 8 in which the compressible non-absorbent means is sponge plastic.

10. A sillcock of the class described comprising:
(a) a tubular pipe having a water flow passage therein and extending through a building wall;
(b) a spout and water regulating handle means assembly connected to the outer end of said tubular pipe and including a spout body, a water flow passage therein communicating with said water flow passage in said tubular pipe, a spout pipe communicating therewith and a handle cap nut having an aperture therein in coaxial alignment with said tubular pipe;
(c) a valve means assembly connected to the inner end of said tubular pipe beyond the freeze line including and outer tubular casing, a valve flow opening and a ground seat therein, and a water regulating stem connector having entry ports therein engaging said tubular casing;
(d) a valve stem within said tubular pipe and in coaxial alignment therewith, said valve stem having one end thereof affixed to said stem connector of said valve and the other end extending through the aperture in said cap nut and connected to a handle therefor;
(e) a water-flow passage in said tubular pipe between the inner surface of the wall thereof and the wall surface of the valve stem and extending the length of said tubular pipe; and
(f) a compressible non-absorbent sleeve means in said water-flow passage capable of withstanding the usual water pressures therein and having sufficient elasticity to compress when ice forms therein in direct rela-

tion to the ice expansion therein and to decompress when said ice is melted, said sleeve means being in contact throughout its length with at least one wall of said water-flow passage, and said sleeve means having a length less than that of said one wall and being mounted in said passage so that it can lengthen when compressed by the formation of ice in said water-flow passage.

11. The sillcock of claim **10** in which the compressible non-absorbent sleeve means is a wall covering liner on the said wall of the tubular pipe.

12. The silcock of claim **10** in which the compressible non-absorbent sleeve means surrounds and is in contact with said wall of the valve stem.

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