A. C. SCHUERMANN.

COCK OR FAUCET.

APPLICATION FILED OCT. 6, 1908.

970,562.

Patented Sept. 20, 1910.

2 SHEETS—SHEET 1.

Fig 1.

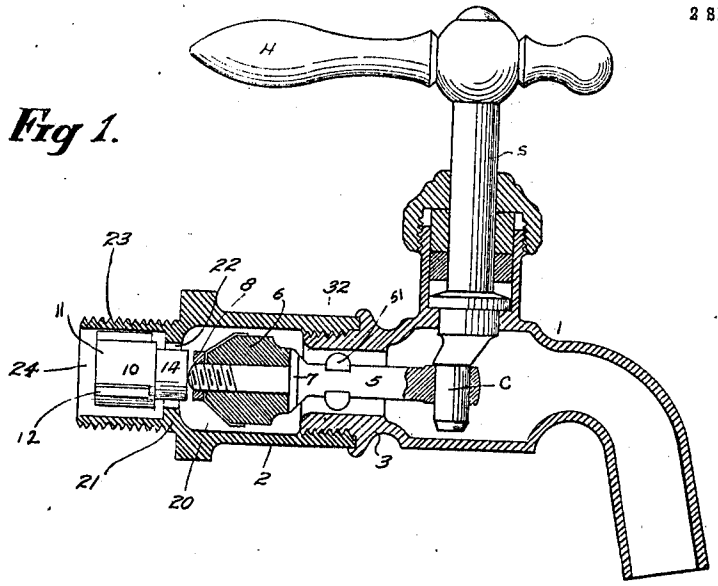
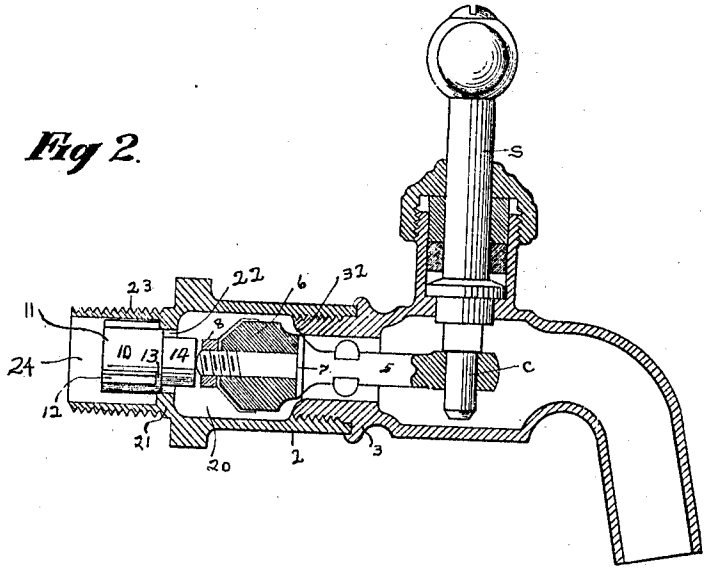


Fig 2.



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2 SHEETS—SHEET 2.

Fig 3.

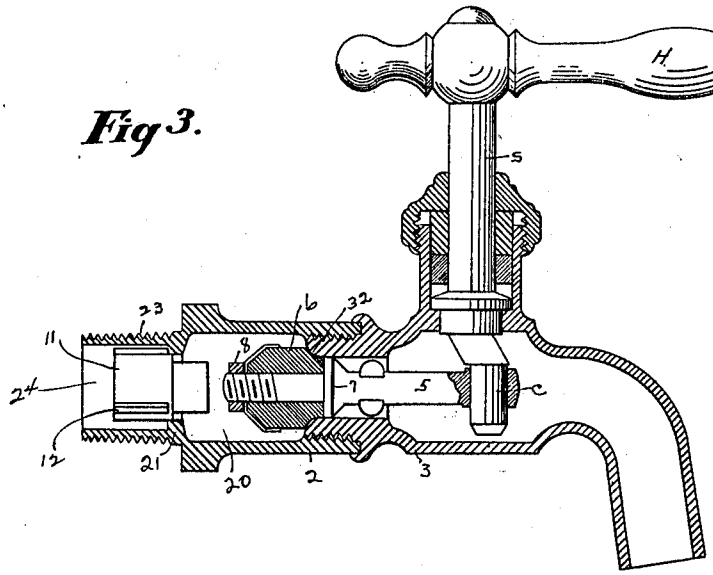


Fig 4

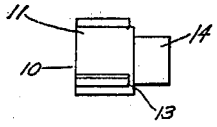
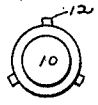


Fig 5.



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UNITED STATES PATENT OFFICE.

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COCK OR FAUCET.

970,562. Specification of Letters Patent. **Patented Sept. 20, 1910.**

Application filed October 6, 1908. Serial No. 456,430.

To all whom it may concern:

Be it known that I, ANTON C. SCHUERMANN, a citizen of the United States, and resident of Decatur, Macon county, State of Illinois, have invented certain new and useful Improvements in Cocks or Faucets; and my preferred manner of carrying out the invention is set forth in the following full, clear, and exact description, terminating with claims particularly specifying the novelty.

This invention relates to water distribution, and more especially to cocks and faucets having reciprocating valves; and the object of the same is to prevent hammering or chattering of the valves which control liquid under pressure.

To this end the invention consists essentially in a plug more or less tightly fitting an opening in a partition back of the valve chamber and operating independently of the valve proper, and the construction of parts whereby this plug is opened by the valve when the latter has partly opened, is held open while the valve is completely open, and is permitted to close by the movement of the valve when the latter has reached a point where it is partially closed.

While it is possible to employ this invention in cocks and faucets of a variety of types, whether upright or horizontal, I have described it below as used in conjunction with a cock of the Fuller type having a ball valve moving in a horizontal plane, and have shown it in that connection in the accompanying drawings wherein—

Figure 1 is a longitudinal section of a Fuller bib cock with the valve completely open; Fig. 2 is a similar section with the valve in an intermediate position; Fig. 3 is a similar section showing the valve completely closed; and Figs. 4 and 5 are side and end views of the plug in its preferred form.

The cock body 1 here shown of the Fuller type comprises two members of which the outer one 3 screws into the inner one 2 so as to leave a valve seat 32 at the inner end of the outer member, and the stem 5 leads from the usual crank or eccentric C on the handle shaft S through said member 3 (within which it may have lugs 51 to guide it in its motion) and through the Fuller ball 6, which latter is held in place between a collar 7 on the stem and a nut 8 screwed onto the threaded extremity thereof as will be understood; and when the handle H is moved through half a circle as shown in the first three views, the crank C draws the ball from the position shown in Fig. 1 past that shown in Fig. 2 to that shown in Fig. 3 where its working end is closed against the seat 32 in a manner which will be clear. Instead of these elements of a Fuller cock, it will be obvious without further illustration that the shaft S and its handle might stand in line with the stem 5 and move the latter longitudinally through the longitudinal movement of the shaft, or through its rotary movements by means of interposed mechanism such as cams or connections—the one point essential to the present invention being that the valve 6 shall reciprocate longitudinally of the axis of the cock body in its opening and closing movements and shall close with the pressure. Furthermore, instead of a cock having a horizontal axis it will be obvious without further illustration that this invention could be applied to an upright cock, provided only that the valve moves longitudinally of its axis.

Coming now more particularly to the present invention, the member 2 in rear of its valve chamber 20 has a partition 21 provided with an axial opening 22, back of which it is here shown as screw threaded as at 23 for connection with the supply pipe or support not shown. I do not limit myself to forming all parts of this member in one piece, it being necessary only that the rearmost portion of this member beyond the partition 21 shall have an enlarged cylindrical plug chamber 24. Within said chamber moves a plug 10 best seen in Figs. 4 and 5, whose body 11 is preferably cylindrical and of a size slightly smaller than the opening 22 so that it may fit therein with some little looseness as best seen in Fig. 3. The length of this body is about that shown in the drawings in its proportion to the depth of the plug chamber 24; but as greater length gives greater weight, it will be obvious that when this invention is used on upright cocks or where the liquid pressure is comparatively light, the length would probably be somewhat less. The diameter of this body is less than that of its chamber, and in order to center it therein I employ guides which are here shown as ribs 12

(preferably three or more in number) projecting radially from the body so as to fit loosely and slidably within the chamber and extending parallel with its axis from a point 13 nearly but not quite coincident with its front end backward as far as necessary, and these ribs may be formed integral with the body if desired. At the front end of said body is a stud 14, here shown as an integral projection thereon, also cylindrical although that is not necessary, but in any event smaller than the opening 22 so as to permit the free passage of liquid therethrough around said stud when the parts stand as seen in Fig. 1. The length of this stud is such that when the valve 6 is partially unseated as seen in Fig. 2, the rear end of the stem 5 will contact with the front end of the stud.

In operation, the cock stands with the valve open as shown in Fig. 1 and there is a free passage of water through the chamber 24, around the body 11 between the ribs 12, through the opening 22 around the stud 14, past the valve 6, and out through the seat 32. In closing, the parts first assume the position shown in Fig. 2, and as the valve moves forward the rear end of the stem 5 tends to move away from the front end of the stud 14 and the liquid pressure against the rear end of the plug causes it to follow the valve until the front end of its body forward of the points 13 enters the opening 22 and partially closes the flow of liquid—thus tending to prevent water hammer as experiments have shown. Further movement of the handle shaft finally carries the parts to the position shown in Fig. 3, and during this movement the valve has been drawn forward within the valve chamber 20 until the working end of the ball 6 has entered the seat 32 and reliably and completely closed the cock. A reverse movement of parts obviously first carries them from the position shown in Fig. 3 to the rear, during which the valve is unseated although the plug remains seated and permits only a partial flow of liquid. When the parts again assume the position shown in Fig. 2, the stem 5 contacts with the stud 14; and further movement of the handle shaft then unseats the plug against the pressure, so that finally the parts reassume the position shown in Fig. 1 and the cock stands wide open.

As will be seen from the drawings the movements of the valve and plug are in unison only after contact has been made between them, a time subsequent to the leaving of the valve from its seat, thereby providing movements of unequal length to the plug and valve. By this construction the liquid pressure on the valve both during the opening and closing movements is simply that of the liquid within the valve chamber augmented by the pressure of the liquid passing by the plug, as long as the valve is not in contact with the plug; as soon as such contact is had, the movement of the valve is subject to the liquid pressure in the main pipe in rear of the plug, due to the fact that while in contact with the valve the plug is being moved from its seat and necessarily against the liquid pressure in the main pipe. As soon as the plug seats, the main pressure is taken up by the plug and the valve is then relieved of the main pressure and subjected only to the reduced pressure in the valve chamber while the valve is being seated, the pressure in the valve chamber gradually increasing to the normal water pressure by the passage of the thin film of water around the plug, which film is insufficient to retain the pressure within the valve chamber while the valve is opened but out of contact with the plug. As a result the closing movement of the valve, after the plug has been seated, is relatively free from pressure of the liquid, the slight pressure that might be produced by the liquid within the valve chamber being relatively small as compared with that of the pressure in the main pipe and which is being held in check by the plug and the partition which supports the plug while the latter is seated. And while the pressure within the valve chamber, after the valve has been closed a sufficient length of time to permit equalization of the pressure in said chamber, and the main pipe, is initially that of the main pipe when the valve is being opened, the movement of the valve in opening immediately reduces this pressure until contact is had between the valve and plug, whereupon the full liquid pressure of the main pipe is placed on the valve and remains thereon until the plug again seats whereupon the pressure is immediately released and reduced and so remains until the valve has been seated, thereby causing the valve to have its movements in proximity to its seat not subject to the pressure in the main pipe and making these movements of the valve much easier without eliminating the advantages of preventing water hammer by the use of the plug.

What is claimed as new is:

1. In a liquid shut off, the combination with the cock body having a valve seat, and a partition across the body forming a valve chamber between the seat and partition, the latter having an opening; of a valve, means for moving it longitudinally within its chamber, a plug adapted to normally seat against said partition and partially close its opening when seated, and a stud projecting from the plug loosely through said opening and adapted to be engaged by the valve after the latter has moved from its seat.

2. In a liquid shut off, the combination

with the cock body having a valve seat, and a partition across the body forming a valve chamber between the seat and partition, the latter having an axial opening; of a valve, means for moving it longitudinally within its chamber, a plug adapted to normally seat against said partition and partially close its opening when seated and a stud projecting from the plug loosely through said opening and adapted to be engaged by the valve after the latter has moved from its seat and to unseat the plug as the valve is fully opened.

3. In a liquid shut off, the combination with the cock body having a valve seat, and a partition across the body forming a valve chamber between the seat and partition, the latter having an opening; of a valve, means for moving it longitudinally within its chamber and closing it with the pressure, a plug adapted by pressure to normally seat against said partition and partially close its opening when seated, and a stud projecting from the plug loosely through said opening and adapted to be engaged by the valve after the latter has moved from its seat.

4. In a liquid shut off, the combination with the cock body having a valve seat, and a partition across the body forming a plug chamber at its inner end and a valve chamber between the seat and partition, the latter having an opening; of a valve, means for moving it longitudinally within its chamber, a plug in the plug chamber adapted to normally seat against said partition and partially close its opening when seated, and a stud projecting from the plug loosely through said opening and adapted to be engaged by the valve after the latter has moved from its seat and to unseat the plug as the valve is fully opened.

5. In a liquid shut off, the combination with the cock body having a valve seat, and a partition across the body forming a plug chamber at its inner end and a valve chamber between the seat and partition, the latter having an opening; of a valve; means for moving it longitudinally within its chamber and closing it with the pressure, a plug in the plug chamber adapted by pressure to normally seat against said partition and partially close its opening when seated, said plug having its seating movement provided solely by the liquid pressure, and a stud projecting from the plug loosely through said opening and adapted to be engaged by the valve after the latter has moved from its seat.

6. In a liquid shut off, the combination with the cock body having a valve seat, and a partition across the body forming a plug chamber at its inner end and a valve chamber between the seat and partition, the latter having an axial opening; of a valve within the valve chamber, a stem passing through the valve and seat, means for moving the stem longitudinally, a plug having a cylindrical body smaller than the plug chamber and slightly smaller than said opening, longitudinal ribs on said body extending nearly to its front end and guiding it within its chamber, said ribs forming a stop to limit the forward movement of the plug, and a stud projecting from said body loosely through said opening and adapted to be engaged by the valve stem after the valve has moved from its seat and to unseat the plug as the valve is fully opened.

7. In a liquid shut off, the combination with the cock body having a valve seat, and a partition across the body forming a plug chamber at its inner end and a valve chamber between the seat and partition, the latter having an axial opening; of a valve within the valve chamber, a stem passing through the valve and seat, means for moving the stem longitudinally, a plug having a cylindrical body smaller than the plug chamber and slightly smaller than said opening, means for guiding the body longitudinally and loosely within the plug chamber, said means forming a stop to limit the forward movement of the plug, and a stud projecting from said body loosely through said opening and adapted to be engaged by the valve stem after the valve has moved from its seat and to unseat the plug as the valve is fully opened.

8. In a liquid shut off, the combination with the cock body having a valve seat, and a partition across the body forming a plug chamber at its inner end and a valve chamber between the seat and partition, the latter having an axial opening; of a valve within the valve chamber, a stem passing through the valve and seat, means for moving the stem longitudinally, a plug having a cylindrical body smaller than the plug chamber and slightly smaller than said opening, means independent of the valve for limiting the forward movement of the plug, and a stud projecting from said body loosely through said opening and adapted to be engaged by the valve stem after the valve has moved from its seat and to unseat the plug as the valve is fully opened

9. In a liquid shut off, the combination with the cock body having a valve seat, a partition across the body in rear of the seat forming a cylindrical plug chamber in rear of the partition, the latter having an opening, a valve, and means for moving it longitudinally and closing it with the pressure; of a plug having a cylindrical body smaller than the plug chamber and slightly smaller than said opening, means independent of the valve for limiting the forward movement of the plug, and a stud projecting from said body loosely through said open-

ing and adapted to be engaged by the valve after the valve has moved from its seat and to unseat the plug as the valve is fully opened.

10. In a liquid shut off, the combination with a cock body having a valve seat, a partition across the body in rear of the seat forming a cylindrical plug chamber in rear of the partition, the latter having an opening, a valve, and means for moving it longitudinally; of a plug having a cylindrical body smaller than the plug chamber and slightly smaller than said opening, means independent of the valve for limiting the forward movement of the plug, and a reduced stud projecting from said body loosely through said opening and adapted to be engaged by the valve after the valve has moved from its seat.

11. In a liquid shut off, the combination with a cock body having a valve seat, a partition across the body in rear of the seat forming a cylindrical plug chamber in rear of the partition, the latter having an opening, a valve, and means for moving it longitudinally; of a plug having a cylindrical body smaller than the plug chamber and slightly smaller than said opening, means for centering the plug during its movements within its chamber, said means limiting the forward movement of the plug and a reduced stud projecting from said body loosely through said opening and adapted to be engaged by the valve after the valve has moved from its seat.

12. In a liquid shut off, the combination with a cock body having a valve seat, a partition across the body in rear of the seat forming a cylindrical plug chamber in rear of the partition, the latter having an opening, a valve, and means for moving it longitudinally; of a plug having a cylindrical body smaller than the plug chamber, longitudinal ribs on said body for limiting the forward movement of the plug and for guiding it within its chamber, and a reduced stud projecting from said body loosely through said opening and adapted to be engaged by the valve after the valve has moved from its seat.

13. In a liquid shut off, the combination with a cock body having a valve seat, a partition in rear of and spaced from said valve seat and forming a valve chamber, said partition having an axial opening, of a valve movable axially of said chamber, and a plug normally resting against the rear side of said partition and formed to partially close said axial opening when seated, said plug and valve being relatively positioned to have unequal lengths of movement during the longitudinal movement of the valve.

14. In a liquid shut off, the combination with a cock body having a valve seat, a partition in rear of and spaced from said valve seat and forming a valve chamber, said partition having an axial opening, of a valve movable axially of said chamber, and a plug normally resting against the rear side of said partition and formed to partially close said axial opening when seated, said plug and valve being relatively positioned to have unequal lengths of movement during the longitudinal movement of the valve, the length of movement of the plug being less than that of the valve.

In testimony whereof, I have hereunto subscribed my signature, this 22nd day of September, A. D. 1908.

ANTON C. SCHUERMANN.

Witnesses:

VIRGINIA HAMILTON,

JOHN L. WADDELL.