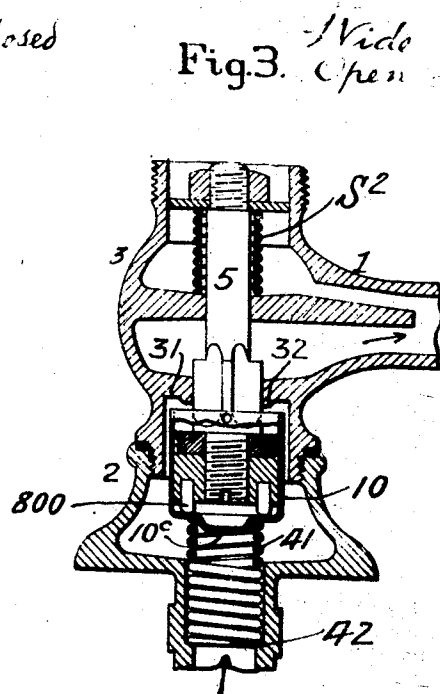
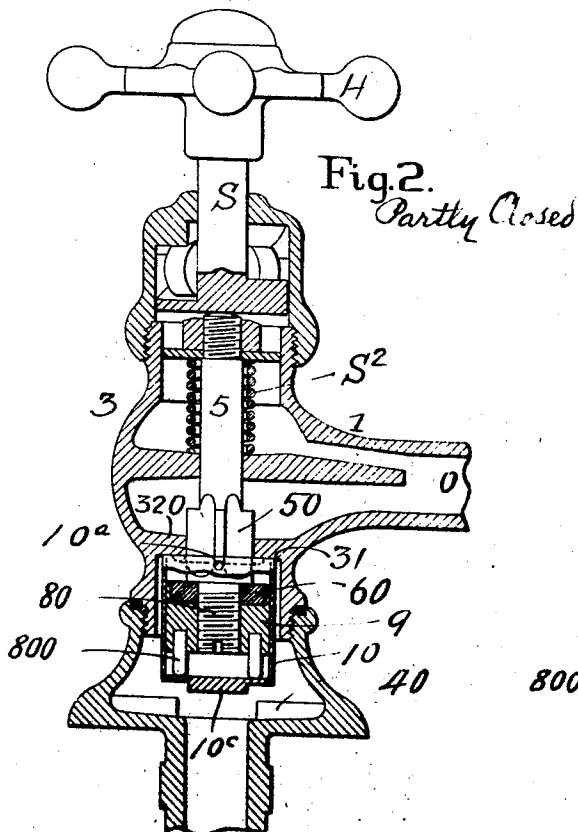
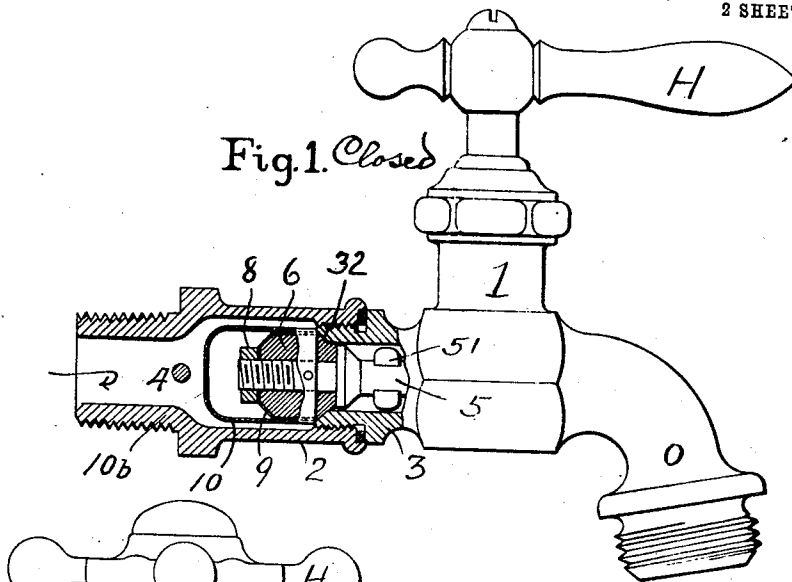


1,024,093.

H. MUELLER, DEC'D.
O. B. & A. MUELLER, EXECUTORS.
COCK OR FAUCET.
APPLICATION FILED DEC. 1, 1908.

Patented Apr. 23, 1912.
2 SHEETS—SHEET 1.



Witnesses
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Fig. 4. 1st Position

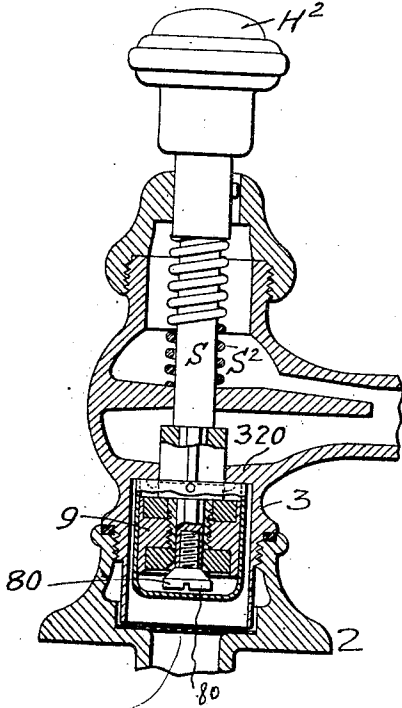


Fig. 5. 2^d Position

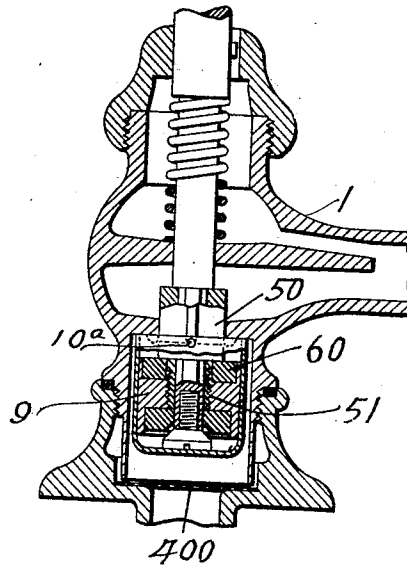


Fig. 6. 3^d Position Wide Open

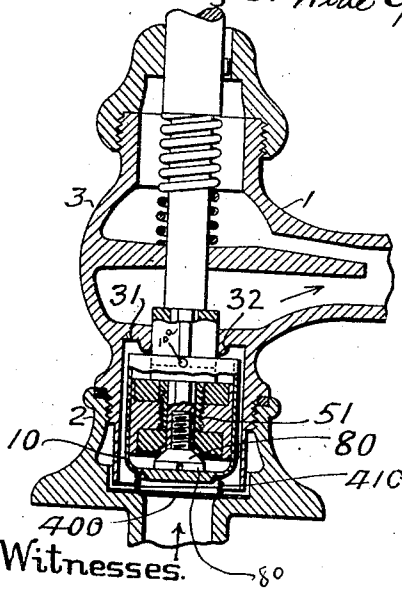
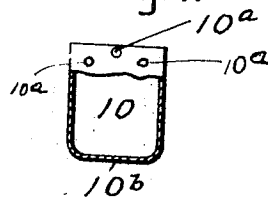


Fig. 7.



Witnesses.

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UNITED STATES PATENT OFFICE.

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COCK OR FAUCET.

1,024,093.

Specification of Letters Patent.

Patented Apr. 23, 1912.

Application filed December 1, 1908. Serial No. 465,545.

To all whom it may concern:

Be it known that I, HENRY MUELLER, 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 an extent it is an improvement on or elaboration of the invention set forth in the Letters Patent granted to me September 21, 1909, No. 934,620.

The invention consists essentially in a cup which is perforated near its outer open end, and whose body fits snugly but slidably around the valve and incloses its rear end so as to produce a nearly water-tight chamber for the purposes set forth below, and it consists incidentally in the structure of the various valves with which this idea may be employed and the details for carrying it out, all as described in the following specification and illustrated in the drawings wherein—

Figure 1 is an elevation of a Fuller bib cock embodying my invention, a part of the cock body being shown in section to expose essential and generic elements, and this view illustrates the position of parts when the cock is completely closed; Fig. 2 is a central vertical section of an upright basin cock whose stem is reciprocated through undulated ways and rollers by the rotary movement of the handle shaft, this view illustrating the use of a perforated cup and valve of slightly different structure than shown in Fig. 1 and showing the parts in the position they assume when the cup has been seated and the cock is partly closed; Fig. 3 is a similar section through part of a cock of this kind illustrating a yet different type of cup adapted to be seated by a spring, this view showing the position of parts when the cock is wide open; Fig. 4 is a section through an upright cock whose stem is recip-

roated to open the valve by pressure on a knob and to close the valve by the expansion of a spring, this view showing the parts in the first position they assume as the valve is being opened; Fig. 5 is a similar view of the same cock showing the second position of parts as the valve is being opened; Fig. 6 is a similar view of the same cock showing the position of parts when the valve is completely opened; and Fig. 7 is a detail view giving a side elevation of the cup shown in Fig. 1.

The cock body 1 comprises two members, of which the outer one 3 may screw into the inner one 2 so as to leave a valve seat 32 at the inner end of the outer member as in Fig. 1, or this valve seat may be formed in a partition 320 in the outer member below the spout or outlet O as in the other views. In any event it is surrounded by a shoulder 31, and the valve stem 5 leads through the seat to the valve head 9 which carries the Fuller ball 6 or the valve ring 60, of which either is adapted to contact with the seat, the head being held to the stem by a nut 8 thereon or a screw 80 taking thereinto as will be clear. In the Fuller type of cock the stem may have lugs 51 to guide it in its movements within the member 3, and in the other types of cocks the stem fits slidably through the seat 32 and there has grooves 50 so that when the valve is opened the liquid can flow through the seat. The inlet of water is through the axis of the body as indicated by the arrow, and it will be clear that by turning the handle H or depressing the knob H² the handle shaft S will be reciprocated so that the stem 5 will be moved longitudinally to open or close the valve in Fig. 1 or to open it in the other views where a spring S² assists the inlet pressure in closing it.

It is the object of the present invention to prevent hammering or chattering of the valves in cocks of various types, to which end I employ the following structure: Within the cock body and out of contact with its inner wall is a cup 10 whose closed end 10^b is directed toward the inlet whereby it is subjected to the impact of the inflowing water, and stands in rear of the valve head and may abut against a fixed stop when the valve is open; and this stop may consist of a pin 4 across the cock body,

lugs 40 within it, or a strainer 400 which may be located within the base of the faucet as best seen in Fig. 4. The cylindrical wall 10 of this cup rather closely but loosely surrounds the valve head 9, and its open end is adapted to seat against the shoulder 31 when the cup is drawn forward by the movements of parts as described below. The cup is provided in its side walls with perforations as indicated at 10^a, these perforations being slightly in rear of its open end as shown, and which may be in staggered relation to each other as indicated in Fig. 7, and their size and number are proportionate to the requirements of each individual case. The closed end of the cup may be stamped in slightly concavo-convex form as shown at 10^b, or it may have an axial projection 10^c on its exterior as shown in Fig. 2; and the valve head 9 may contact with said closed end by a nut 8, the head of a screw 80, or the tips of pins 800, all serving as studs which project from said valve head.

In Fig. 3 a spring 41 is located between a shoulder 42 in the base of the cock and the closed end of the cup and presses the latter toward its seat which is the shoulder 31; but in this and other views of the drawings herewith the pressure of the inflowing liquid and its impact against the cup tends to close the cup against its seat, and the spring is not always necessary. When a spring is employed the projection on the closed end of the cup is useful for centering the spring, as shown in Figs. 3 and 6. The cup is of such length as to have some play longitudinally upon the valve head, around which its fit is as close as a free sliding connection will permit, whereby a sufficient amount of water may pass through the perforations, between it and the valve head, and into the closed end of the cup, and yet its passage either way will be restricted. As shown in the drawings, there is an open annular passage between the outside of the cup and the inside of the cock body through which the liquid flows when the cock is open. In Fig. 1 this cup is shown as mounted slidably over and around the Fuller ball, and the nut 8 serves as the stud. In Figs. 2 and 3 it is shown as mounted around a valve head, and the latter has one or more pins 800 which constitute the stud. In Figs. 4, 5, and 6 the cup is also mounted slidably around the valve head, but the latter is here shown as having a tubular stem 51 which passes through the valve seat 32 and is grooved at 50, while the handle shaft S abuts against the upper end of the stem and the latter is attached to the valve head by a screw 80 passing through the head and its stem and taking into the handle shaft. The head of this screw serves as the stud in a cock of this character, and by preference the valve head and its stem have some lost mo-

tion on the screw, whereas in the other cocks illustrated the head is moved positively by the handle shaft S.

The generic idea in all forms of cock illustrated is that the cup is slidably mounted around the valve head which latter carries a stud so as to form a chamber within the closed end of the cup, and this end is presented toward the pressure so as to be subject thereto, whether the springs of Figs. 3 and 6 are employed or not.

In operation the parts stand with the valve open as seen in Figs. 3 and 6, and the water is flowing in through the axial inlet, against and around the cup, past its front end, through the seat 32, and along the grooves 50 if they are employed. In closing the shut off, the first movement of the handle shaft draws the valve toward its seat and carries the cup with it by reason of the fact that the inlet to the space between the valve and the bottom of the cup is restricted and there is a tendency to form a vacuum therein. The parts are shown with the cock partly closed in Fig. 2, wherein this first movement has carried the front end of the cup into contact with the shoulder 31 but the valve has not reached its seat, and therefore the perforations 10^a yet permit the passage of a small amount of water from the inlet around the valve and through the seat. Further movement of the handle shaft finally carries the parts to the position shown in Fig. 1, and during this movement the valve has been drawn forward within the cup. This tends to create a vacuum within the cup, and such vacuum sucks in water through the restricted space between it and the valve head, and therefore retards the final closing of the valve and prevents water hammer.

A reverse movement of parts obviously first carries them from the position shown in Fig. 1 to the rear until the bottom 10^b of the cup strikes the stop, after which the continued movement of the handle shaft will slide the valve head rearwardly within the cup and slowly expel the water accumulated between them in a manner which will be clear. As the valve head and cup leave the seat and shoulder simultaneously the cock will be opened quickly, but the further movement of the handle shaft to restore the parts to the wide open position of the cock will be retarded by the slow expulsion of water through the restricted passage between the valve and cup. The purpose of the stud is to prevent the valve head from opening so wide that it would expel all the water within the cup, which might possibly cause the parts to stick. In my former construction the open end of the cup was notched or made irregular and the shoulder flat— in the present case the use of the perforations 10^a a little in rear of the open end

of the cup permits the shoulder to stand a little beyond the valve seat so that the valve may make reliable contact therewith, even though it be a valve ring of such soft material that it is pressed slightly over the outer edge of the seat when closed tightly.

In the modified form of cock shown in Figs 4, 5, and 6, the action of the cup with respect to the valve head is the same as above described, but the head itself has a certain lost motion. In opening this cock the first movement of the handle shaft causes it to abut against the upper end of the stem so that the screw head descends within the cup and expels a trifle of the liquid trapped therein, the liquid expelled being forced back toward the pressure. Further movement of the handle shaft next opens the valve and expels more liquid, but now that the valve is unseated as seen in Fig. 5 this water may run out through the valve seat along with what inflowing water passes through the perforations. In this position of parts the screw head has reached the closed end of the cup as shown. Further movement of the handle shaft carries the parts to the position illustrated in Fig. 6, where the cup has been forcibly unseated and the cock is wide open. Thus it will be seen that by this construction the valve head and cup do not leave their seats simultaneously, and the cock therefore becomes one which will open slowly as well as close slowly—thus obviating water hammer in any event.

What is claimed as new is:

1. In a liquid shut off, the combination with the cock body, a valve seat therein, a valve, and a handle and shaft for moving the valve; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the cup and valve, and an open annular space between the cup and the cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve whereby it is held thereon by suction, the wall of the cup having perforations near its open end.

2. In a liquid shut-off, the combination with the cock body, a valve seat therein, an annular abutment exterior of said seat, a valve, and a handle and shaft for moving the valve; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the cup and valve, and an open annular space between the cup and the cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve whereby it is held thereon by suction, and having a body longer than the valve whereby its open end will engage said abutment, before the valve strikes its

seat, the wall of the cup having perforations near its open end.

3. In a liquid shut-off, the combination with a cock body, a valve seat therein, a valve whose stem projects loosely through said seat and is grooved, and a handle and shaft for moving said valve; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the cup and valve, and an open annular space between the cup and the cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve whereby it is held thereon by suction, the wall of the cup having perforations near its open end.

4. In a liquid shut-off, the combination with a cock body, a valve seat therein, an abutment exterior of said seat, a valve whose stem projects loosely through said seat and is grooved, and a handle and shaft for moving the valve; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the cup and valve, and an open annular space between the cup and the cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve whereby it is held thereon by suction, and having a body longer than the valve whereby its open end will engage said abutment before the valve strikes its seat, the wall of the cup having perforations near its open end.

5. In a liquid shut-off, the combination with the cock body, a valve seat therein, an annular abutment exterior of said seat, said seat projecting beyond the abutment toward the inlet, a valve, and a handle and shaft for moving the valve; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the cup and valve, and an open annular space between the cup and cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve whereby it is held thereon by suction, the wall of the cup having perforations near its open end.

6. In a liquid shut-off, the combination with the cock body, a valve seat therein, an annular abutment exterior of said seat, said seat projecting beyond the abutment toward the inlet, a valve whose stem projects loosely through said seat, and a handle and shaft for moving the valve; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the cup and valve, and an open space between the cup and the cock body, said restricted

passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve whereby it is held thereon by suction, and having a body longer than the valve whereby its open end will engage said abutment before the valve strikes its seat, the wall of the cup having perforations near its open end.

7. In a liquid shut-off, the combination with the cock body having a valve seat and surrounding abutment, a valve stem projecting loosely through said seat, a valve head carried thereby, and a stud on the inlet end of the head; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the valve and cup, and an open annular space between the cup and cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve facing the inlet, said closed end being subject to the impact of the liquid, whereby the cup is held on the valve by suction.

8. In a liquid shut-off, the combination with the cock body having a valve seat and surrounding abutment, a valve stem projecting loosely through said seat, a valve head carried thereby, and a stud on the inlet end of the head; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the valve and cup, and an open annular space between the cup and cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve facing the inlet, said closed end being subject to the impact of the liquid, whereby the cup is held on the valve by suction, and a stop in the cock body for limiting the opening movement of the cup.

9. In a liquid shut-off, the combination with the cock body having a valve seat and surrounding abutment, a valve stem projecting loosely through said seat, a valve head carried thereby, and a stud on the inlet end of the head; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the valve and cup, and an open annular space between the cup and cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve facing the inlet, said closed end being subject to the impact of the liquid, whereby the cup is held on the valve by suction, and a spring in the cock body engaging this end and pressing the cup toward the abutment.

10. In a liquid shut-off, the combination with the cock body having a valve seat and

surrounding abutment, a valve stem projecting loosely through said seat, a valve head carried thereby, and a stud on the inlet end of the head; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the valve and cup, and an open annular space between the cup and cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve facing the inlet, said closed end being subject to the impact of the liquid, whereby the cup is held on the valve by suction, said end having an axial projection, and a spring in the cock body engaging this end around its projection and pressing the cup toward the abutment.

11. In a liquid shut-off, the combination with the cock body having a valve seat and surrounding abutment, a valve stem projecting loosely through said seat, a valve head carried thereby, and a stud on the inlet end of the head; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the valve and cup, and an open annular space between the cup and cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve facing the inlet, said closed end being subject to the impact of the liquid, whereby the cup is held on the valve by suction, said end having an axial projection, and a spring in the cock body engaging this end around its projection and pressing the cup toward the abutment, said cup having its wall provided with perforations near its open end.

12. In a liquid shut-off, the combination with the cock body having a valve seat and surrounding abutment, a valve stem projecting loosely through said seat, a valve head carried thereby, and a stud on the inlet end of the head; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the valve and cup, and an open annular space between the cup and cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve facing the inlet, said closed end being subject to the impact of the liquid, whereby the cup is held on the valve by suction, a spring in the cock body engaging this end and pressing the cup toward the abutment, and a stop in the cock body for limiting the opening movement of the cup.

13. In a liquid shut-off, the combination with the cock body having a valve seat and surrounding abutment, a valve stem projecting loosely through said seat, a valve head carried thereby, and a stud on the inlet

end of the head; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the cup and cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve facing the inlet, said closed end being subject to the impact of the liquid, whereby the cup is held on the valve by suction, a spring in the cock body engaging this end and pressing the cup toward the abutment, and a stop in the cock body for limiting the opening movement of the cup, said cup having its wall provided with perforations near its open end.

14. In a liquid shut-off, the combination with the cock body having a valve seat and surrounding abutment, a valve stem projecting loosely through said seat, and a valve head carried by said stem; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the valve and cup, and an open annular space between the cup and cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve facing the inlet, said closed end being subject to the impact of the liquid, whereby the cup is held on the valve by suction, and a stop in the cock body for limiting the opening movement of the cup.

15. In a liquid shut-off, the combination with the cock body having a valve seat and surrounding abutment, a valve stem projecting loosely through said seat, and a valve head carried by said stem; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the valve and cup, and an open annular space between the cup and cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve facing the inlet, said closed end being subject to the impact of the liquid, whereby the cup is held on the valve by suction, and a spring in the cock body engaging this end and pressing the cup toward the abutment.

16. In a liquid shut-off, the combination with the cock body having a valve seat and surrounding abutment, a valve stem projecting loosely through said seat, and a valve head carried thereby; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the valve and cup, and an open annular space between the cup and cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve facing the

inlet, said closed end being subject to the impact of the liquid, whereby the cup is held on the valve by suction, said end having an axial projection, and a spring in the cock body engaging this end around its projection and pressing the cup toward the abutment.

17. In a liquid shut-off, the combination with the cock body having a valve seat and surrounding abutment, a valve stem projecting loosely through said seat, and a valve head carried thereby; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the valve and cup, and an open annular space between the cup and cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve facing the inlet, said closed end being subject to the impact of the liquid, whereby the cup is held on the valve by suction, said end having an axial projection, and a spring in the cock body engaging this end around its projection and pressing the cup toward the abutment, said cup having its wall provided with perforations near its open end.

18. In a liquid shut off, the combination with the cock body having a valve seat and surrounding abutment, a valve stem projecting loosely through said seat, and a valve head carried thereby; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the valve and cup, and an open annular space between the cup and cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve facing the inlet, said closed end being subject to the impact of the liquid, whereby the cup is held on the valve by suction, a spring in the cock body engaging this end and pressing the cup toward the abutment, and a stop in the cock body for limiting the opening movement of the cup.

19. In a liquid shut-off, the combination with the cock body having a valve seat and surrounding abutment, a valve stem projecting loosely through said seat, and a valve head carried thereby; of a cup within which the valve is slidably fitted with a permanently-open restricted passage between the valve and cup, and an open annular space between the cup and cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve facing the inlet, said closed end being subject to the impact of the liquid, whereby the cup is held on the valve by suction, said end having an axial projection, a spring in the cock

body engaging this end around its projection and pressing the cup toward the abutment, and a stop in the cock body for limiting the opening movement of the cup.

20. In a liquid shut-off, the combination with the cock body having a valve seat and surrounding abutment, a valve stem projecting loosely through said seat, and a valve head carried thereby: of a cup within which the valve is slidably fitted with a permanently open restricted passage between the valve and cup, and an open annular space between the cup and cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the cup, the cup having its closed end behind the valve facing the inlet, said closed end being subject to the impact of the liquid, whereby the cup is held on the valve by suction, said end having an axial projection, a spring in the cock body engaging this end around its projection and pressing the cup toward the abutment, and a stop in the cock body for limiting the opening movement of the cup, said cup having its wall provided with perforations near its open end.

21. In a liquid shut off, the combination with a cock body having a valve seat, an annular abutment external of said seat, a valve stem projecting loosely through said seat, a valve head carried by said stem, a handle and shaft, and connections between the head and said shaft so that the valve head has some lost motion; of a cup within which the valve is slidably fitted with a restricted passage between the cup and valve, and an open annular space between the cup and cock body, the cup having its closed end behind the valve head, said end being engaged by said connections and held thereby away from said head during the opening movement of the valve.

22. In a liquid shut off, the combination with a cock body having a valve seat, an annular abutment external of said seat, a valve stem projecting loosely through said seat, a valve head carried by said stem, a handle and shaft, and connections between the head and said shaft so that the valve head has some lost motion; of a cup within which the valve is slidably fitted with a restricted passage between the cup and valve, and an open annular space between the cup and cock body, the cup having its closed end behind the valve head, said end being engaged by said connections and held thereby away from said head during the opening movement of the valve, and a stop on the cock body for limiting the opening movement of the cup.

23. In a liquid shut off, the combination with a cock body having a valve seat, an annular abutment external of said seat, a tubular valve stem projecting loosely through said seat, a valve head carried thereby, a handle and shaft, and a screw taking through the head and stem and engaging said shaft so that between the end of the latter and the head of the screw the valve head has some lost motion; of a cup within which the valve is slidably fitted with a restricted passage between the cup and valve and an open annular space between the cup and cock body, the cup having its closed end behind the valve head, said end being engaged by the head of the screw during the opening movement of the valve.

24. In a liquid shut-off, the combination with a cock body having a valve seat, an annular abutment external of said seat, a tubular valve stem projecting loosely through said seat, a valve head carried thereby, a handle and shaft, and a screw taking through the head and stem and engaging said shaft so that between the end of the latter and the head of the screw the valve head has some lost motion; of a cup within which the valve is slidably fitted with a restricted passage between the cup and valve, and an open annular space between the cup and cock body, the cup having its closed end behind the valve head, said end being engaged by the head of the screw during the opening movement of the valve, and a stop in the cock body for limiting the opening movement of the cup.

25. In a liquid shut-off, the combination with the cock body, a valve seat therein, a valve, and a handle and shaft for moving the valve; of a casing having a closed end within which the valve is slidably fitted with a restricted passage between the casing and valve, and an open annular space between the casing and cock body, said restricted passage forming the sole liquid feed and discharge to and from the interior of the closed end of the casing, the casing having its closed end behind the valve and having a body longer than the valve, the casing being provided with a restricted liquid passage in advance of the valve when the latter is in open position.

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

HENRY MUELLER.

Witnesses:

VIRGINIA HAMILTON,
JOHN L. WADDELL.