(No Model.)

O. F. HAGEMAN.

SELF CLOSING COCK OR FAUCET.

No. 420,155. Patented Jan. 28, 1890.

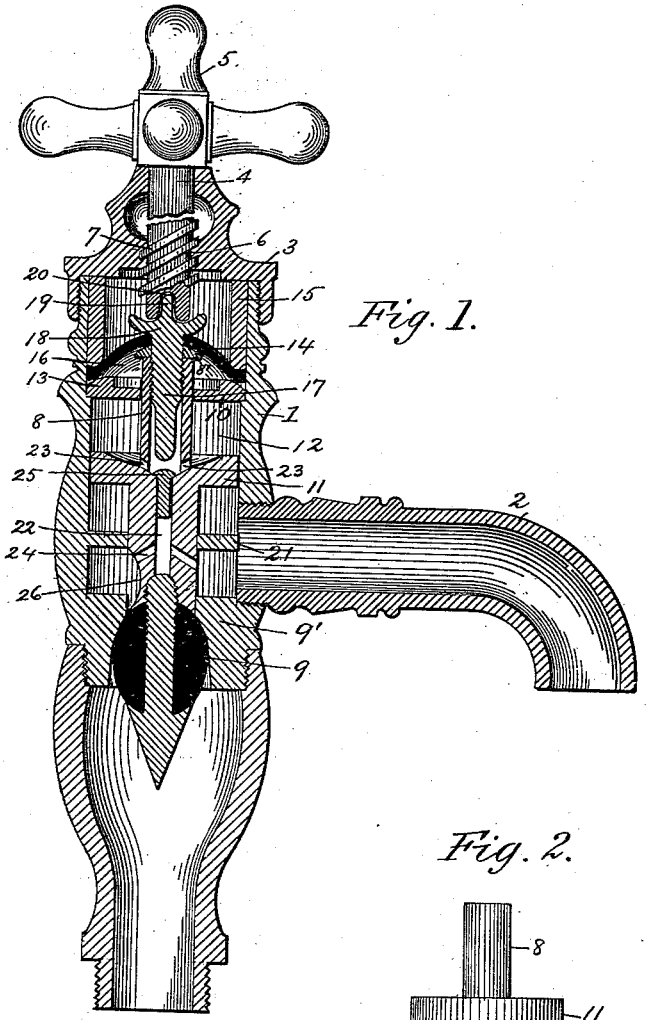
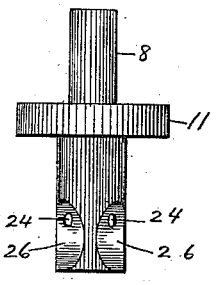


Fig. 1.

Fig. 2.



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UNITED STATES PATENT OFFICE.

OTTO F. HAGEMAN, OF ASHEVILLE, NORTH CAROLINA.

SELF-CLOSING COCK OR FAUCET.

SPECIFICATION forming part of Letters Patent No. 420,155, dated January 28, 1890.

Application filed June 17, 1889. Serial No. 314,550. (No model.)

To all whom it may concern:

Be it known that I, OTTO F. HAGEMAN, a citizen of the United States, residing at Asheville, in the county of Buncombe and State of North Carolina, have invented certain new and useful Improvements in Self-Closing Cocks or Faucets; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates, generally, to improvements in cocks or faucets, and particularly to certain new and useful improvements in a self-closing cock or faucet in which the valve is automatically seated or closed and the supply of liquid cut off by means of a spring-actuated plunger and valve-stem.

As heretofore constructed, self-closing cocks or faucets have been very defective in operation, in that the valves have been seated too quickly, causing undue pressure and rattling or "hammering" within the pipes, frequently resulting in bursting them, owing to the too sudden checking or cutting off of the supply of liquid therefrom.

My invention has for its objects to obviate the above-named and other objections and to produce a self-closing cock or faucet in which the valve will be seated gradually and slowly, and thus prevent all rattling or hammering and undue back-pressure within and consequent injury to the pipes.

My invention consists, first, in the combination, with the casing or barrel of a cock or faucet, of a spring-actuated valve, valve-stem, and plunger, a stationary disk, liquid-chambers intermediate of the outlet or spout and the top of the casing or barrel, said valve-stem being formed with inclined and vertical passages communicating with the interior of the casing or barrel and provided with a check-valve for opening and closing its vertical passage, and, second, in the several other novel features of construction and arrangement or combination of parts hereinafter fully disclosed in the description, drawings, and claims.

In the accompanying drawings, forming part of this specification, in which the same reference-numerals indicate the same parts, Figure 1 represents a central vertical section of a cock or faucet constructed according to my invention; and Fig. 2, a detail view of the valve-stem and plunger, showing the lower liquid-passages, which lead into the vertical passage in the interior of said stem, and also the curved surfaces of said stem adjacent to said passages.

In the drawings, the reference-numeral 1 designates the casing or barrel of the cock or faucet, and 2 the outlet or spout thereof. This casing or barrel is closed at the top by a screw-threaded cap 3, which is centrally perforated for the passage of the operating-stem 4, which is provided with a handle 5.

6 designates the screw-threads formed in the central portion of the cap 3, and within which loosely fit and work the correspondingly-shaped screw-threads 7, formed upon the lower end of said stem 4. These screw-threads are of such pitch that the operating-stem can be readily raised by pressure applied to its lower end through the valve-stem. 8 designates this valve-stem, which carries a suitably-secured valve 9 at its lower end, which, when closed, bears against the valve-seat 9', formed in the lower end of the casing or barrel.

Intermediate of the spout 2 and the cap 3 of the faucet is arranged and tightly secured a disk 10, and a short distance below the same is arranged a plunger 11, which forms a part of the valve-stem. The space between said disk and plunger forms a liquid-chamber 12. The stationary disk 10 is formed with a central opening, which is slightly larger in diameter than the valve-stem, and also with a raised annular flange 13 near its periphery. Upon the flange of this disk rests the periphery of an annular diaphragm 14, formed of rubber or other suitable elastic or springy material. This rubber diaphragm is held in place by the ring 15, which bears against the top of the faucet and presses with its lower edge upon the periphery of said diaphragm just over the annular flange of the stationary disk 10. The space existing between this rubber diaphragm and the stationary disk forms a liquid-chamber 16. A screw 17 passes centrally through this diaphragm and into the upper end of the valve-stem, and is formed with an enlarged cup-shaped head 18, having a central projection 19, which fits in a correspond-

ingly-shaped recess in the lower end of the operating-stem 4, said end being shaped to conform to the cup-shaped head of said screw. Surrounding this screw and arranged between the upper end of the valve-stem and the rubber diaphragm is placed a washer 8′, having a round upper surface, which holds the latter distended and prevents it from injury from direct contact with the abrupt edge of the upper end of the valve-stem.

Opposite the inner end of the spout 2, about centrally thereof and inside of the casing or barrel 1, is formed a centrally-perforated disk 21, which acts as a guide for the valve-stem 8, and also as a means for preventing a too sudden rush of the liquid against the plunger 11 when the valve 9 is lowered or opened. This valve-stem is formed with a central vertical passage 22, which extends above and below said disk 21, and by means of which communication is established between the source of supply and the chambers 12 and 16, the liquid first passing through the three inwardly-inclined lower passages 24, formed in said valve-stem, thence upwardly through said central passage, thence through the three outwardly-inclined upper passages 23 and into the lower chamber 12, thence through the small space between the upper part of the valve-stem and the opening in the stationary disk 10, which surrounds said stem, and thence into the upper chamber 16. In the upper end of the vertical passage 22 is placed the check-valve 25, consisting of a small headed pin. To facilitate the entrance of the liquid into the lower passages 24, the valve-stem is cut away to form the three curved surfaces 26, which extend above and below said passages, and thus permit a free and unobstructed passage of the liquid into the same.

The operation of my improved cock or faucet, in addition to what has already been explained, and supposing the valve to be arranged in its normal or closed position, as shown in the drawings, is as follows: When it is desired to open the valve 9, the handle 5 is turned, which forces downward the screw-threaded operating-stem 4, the screw 17, the rubber diaphragm 14, the valve-stem 8, its plunger 11, and its valve 9, the latter, when released from its seat 9′, allowing the liquid to pass upward into the casing or barrel 1 and out through the spout 2. During this time the liquid enters the valve-stem 8 through the three lower passages 24, passes up through the central passage 22, raises the check-valve 25, and thence passes into the lower chamber 12 through the three upper passages 23. From the chamber 12 it passes to the chamber 16, being forced between the valve-stem 8 and the opening in the stationary disk 10. When both the chambers 12 and 16 become filled, the upward and downward pressure of the liquid therein being equal, the check-valve 25 will drop by its own weight, close the passage 22, and cut off the supply of liquid to said chambers. When it is desired to close the valve 9, the hand is merely released from the handle 5, when the screw-threaded operating-stem 4 will be caused to rise through the cap 3 by means of the elasticity of the diaphragm 14 and the upward pressure of the liquid against the valve 9, which will raise the screw 17, and consequently the valve-stem 8 and plunger 11, and close said valve against its seat 9′. The liquid contained in chambers 12 and 16 forms a cushion to prevent the too sudden seating or closing of the valve and cutting off of the supply too quickly. This is accomplished by preventing a too rapid rise of the plunger 11 and the diaphragm 14, which are secured to and move with the valve-stem, the liquid in the chambers being slowly expelled therefrom by the upward movement of said plunger, which causes said liquid to be forced downward from the lower chamber 12 in a thin film, passing between the inner surface of the casing or barrel and the periphery of said plunger. This lessening of the liquid in the lower chamber permits the descent of the liquid from the upper chamber 16 through the small space or opening between the valve-stem and the stationary disk 10. The liquid is prevented from escaping above the upper chamber 16 by means of the diaphragm 14, which forms a water-tight seal between its upper surface and the cap 3 of the casing or barrel.

From the above it will be seen that my invention is simple, inexpensive to manufacture, easily operated, and not liable to get out of order, and that it effects the desired results in a perfect and satisfactory manner, the chambers 12 and 16 being instantly filled with the liquid and the valve gradually and slowly closed or seated as the liquid passes out of said chambers, thus preventing hammering and bursting of the pipes by undue back-pressure caused by suddenly checking or cutting off the liquid from its source of supply.

Having thus fully described the construction and arrangement or combination of the several parts of my invention, its operation and advantages, what I claim as new is—

1. In a self-closing cock or faucet, the combination, with a casing or barrel having a spout, a valve-seat, and means for forming two chambers therein above said spout, of a spring-actuated valve and valve-stem, the latter extending through said chambers and being formed with passages communicating therewith and with each other, substantially as and for the purpose described.

2. In a self-closing cock or faucet, the combination, with a casing or barrel having a valve-seat, of a valve-stem provided with a valve and plunger and formed with liquid-passages, an elastic diaphragm secured to the upper portion of said stem, a stationary disk secured to said barrel intermediate of its ends, liquid-chambers formed between said plunger and diaphragm, and a check-valve located in one of said passages and adapted to be auto-

matically closed when said chambers are full, substantially as and for the purpose described.

3. In a self-closing cock or faucet, the combination, with the casing or barrel having a spout and valve-seat, of the spring-actuated valve and valve-stem, the latter being formed with a central vertical passage 22 and with inclined passages 24 and 23, which communicate with said vertical passage, the check-valve 25, and means for forming two chambers above said spout, which communicate with said passages, substantially as and for the purpose described.

4. In a self-closing cock or faucet, the combination, with the casing having the spout and valve-seat, of the valve-stem formed with the central vertical passage 22 and the inclined passages 23 and 24, and provided with the check-valve 25, the plunger 11, and the valve 9, the elastic diaphragm secured to the upper portion of said valve-stem, and the stationary disk 10, substantially as and for the purpose described.

5. In a self-closing cock or faucet, the combination, with the casing having the spout or outlet, of the valve-stem formed with the central passage 22 and inclined passages 23 and 24, and provided with the plunger 11 and the check-valve 25, the elastic diaphragm 14, and the stationary disk 10, arranged intermediate of said diaphragm and plunger, and, in connection with said casing, forming the two liquid-chambers 12 and 16, substantially as and for the purpose described.

6. In a self-closing cock or faucet, the combination, with the casing having the spout and valve-seat, of the valve-stem formed with the central passage 22 and the inclined passages 23 and 24, communicating, respectively, with the middle and lower portions of said central passage and provided with the check-valve 25, arranged within said central passage, and with the plunger 11 and the valve 9, the stationary disk 10, the ring 15, encircling the upper portion of said stem, the cap 3, secured to the upper end of said casing, and the diaphragm 14, having its periphery confined between said ring and disk, substantially as described.

7. In a self-closing cock or faucet, the combination, with the casing having the spout and valve-seat, of the valve-stem formed with the central passage 22 and the inclined passages 23 and 24, communicating, respectively, with the middle and lower portions of said central passage, and provided with the check-valve 25, arranged within said central passage, and with the plunger 11 and the valve 9, the elastic diaphragm 14, the ring 15, encircling the upper portion of said stem, the cap 3, secured to the upper end of said casing, and the stationary disk 10, arranged between said plunger and diaphragm and having the flange 13, upon which said diaphragm rests, substantially as described.

8. In a self-closing cock or faucet, the combination, with the casing 1, having the spout 2 and the valve-seat 9′, of the valve-stem 8, formed with the central passage 22 and with the inclined passages 23 and 24, communicating, respectively, with the middle and lower portions of said central passage, and provided with the check-valve 25, the plunger 11, and the valve 9, the elastic diaphragm 14, having its periphery suitably confined, the screw 17, having the cup-shaped head 18 and the central projection 19 at its upper end, and the stem 4, having a correspondingly-shaped lower end fitting over said projection, substantially as described.

9. In a self-closing cock or faucet, the combination, with the casing 1, having the spout 2 and the valve-seat 9′, of the valve-stem 8, formed with the central passage 22 and with the inclined passages 23 and 24 and provided with the check-valve 25, the plunger 11, and the valve 9, the disk 10, the peripherally-confined elastic diaphragm 14, the ring 15, the screw-threaded cap 3, secured to the upper end of said casing, the screw 17, having the cup-shaped head 18 and the central projection 19 at its upper end, and the screw-threaded operating-stem 4, having a correspondingly-shaped lower end fitting over said projection and arranged to work in the screw-threads in said cap, substantially as described.

10. In a self-closing cock or faucet, the combination, with the casing 1, having the guide-disk 21, the spout 2 near its lower end, the stationary disk 10 near its upper end, the cap 3, and the valve-seat 9′ in its lower end, of the valve-stem 8, formed with the central passage 22 and with the inclined passages 23 and 24, and provided with the valve 9 at its lower end, the plunger 11, and the screw 17, arranged in its upper end and having the cup-shaped head 18 and the projection 19, the screw-threaded operating-stem 4, having a rounded lower end formed with the central depression 20, for receiving said projection, the peripherally-confined elastic diaphragm 14, and the ring 15, for confining the same in place, substantially as described.

11. In a self-closing cock or faucet, the combination, with the casing having a spout, and two liquid-chambers 12 and 16, arranged above said spout, of the valve-stem formed with the central vertical liquid-passage 22, with the upper and lower inclined passages 23 and 24, communicating with said vertical passage, and with the curved surfaces 26, for facilitating the entrance of the liquid into said lower passages 24, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

OTTO F. HAGEMAN.

Witnesses:
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