No. 650,179. Patented May 22, 1900.

A. W. KNOX.

AUTOMATIC CUT-OFF.

(Application filed Nov. 29, 1895.)

(No Model.) 2 Sheets—Sheet 1.

FIG:4.

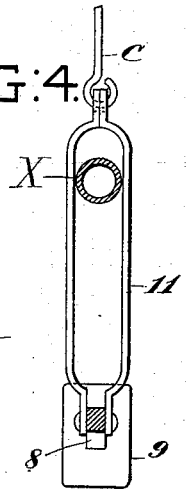

FIG:1.

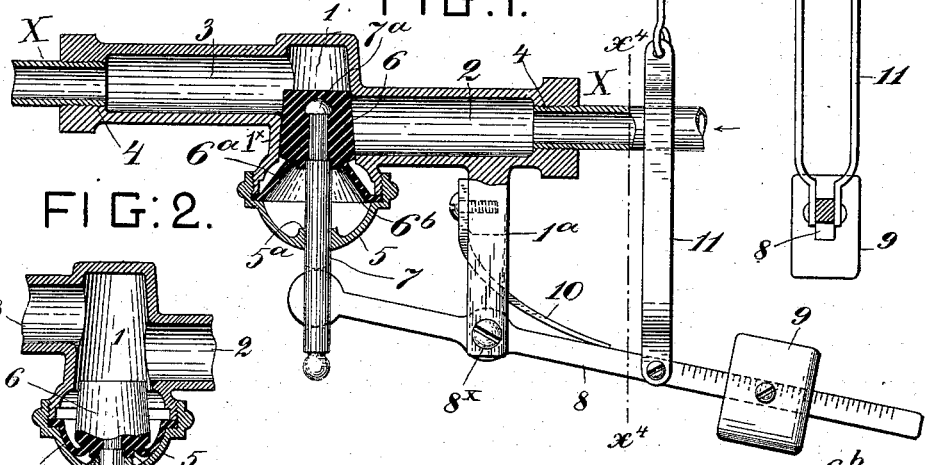

FIG:2.

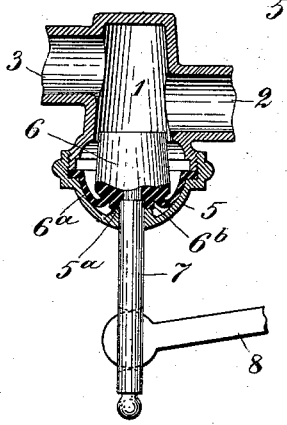

FIG:2a

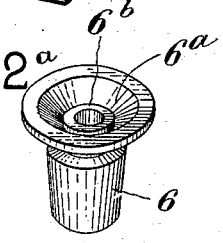

FIG:3.

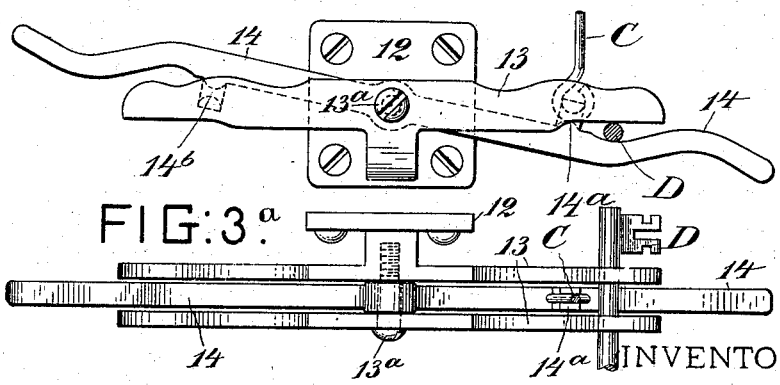

FIG:3a

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(No Model.) 2 Sheets—Sheet 2.

FIG: 5.

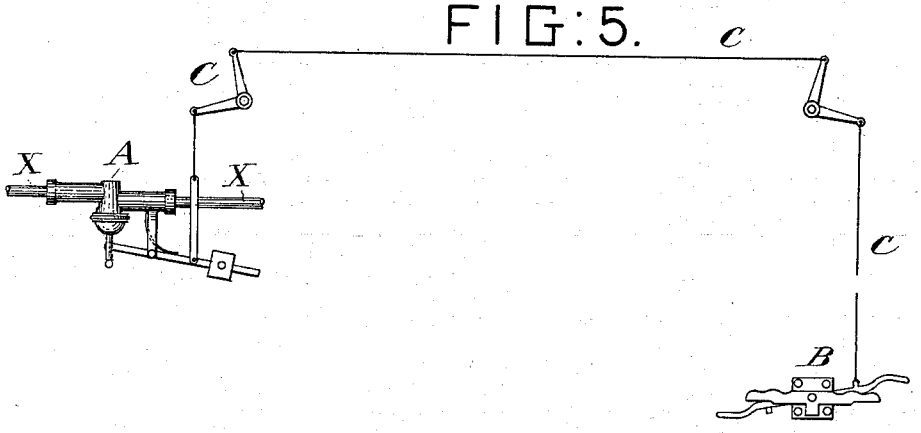


FIG: 6.

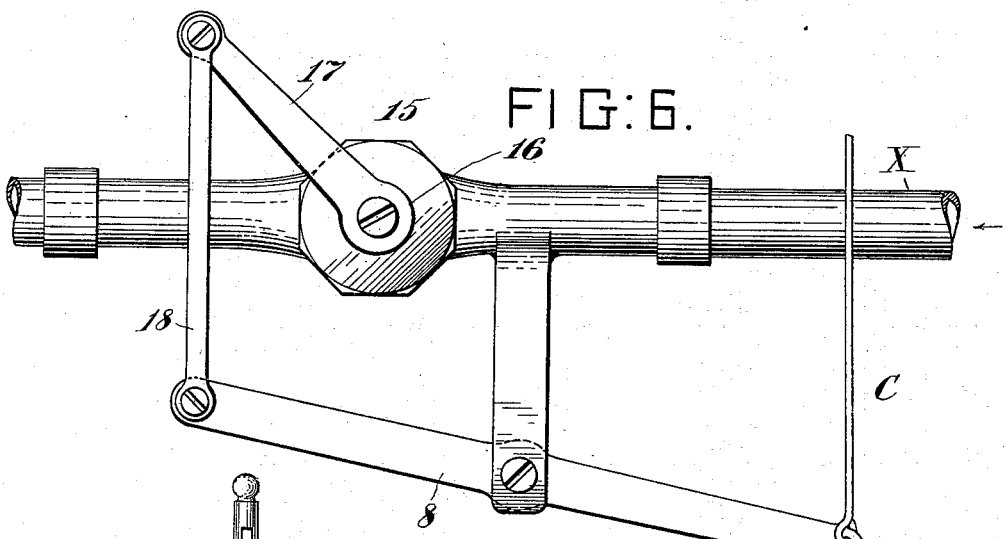


FIG: 7.

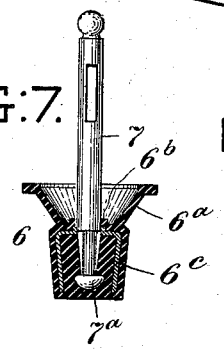
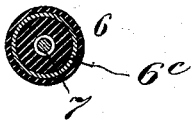


FIG: 7a.



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UNITED STATES PATENT OFFICE.

ANDREW W. KNOX, OF NEW YORK, N. Y.

AUTOMATIC CUT-OFF.

SPECIFICATION forming part of Letters Patent No. 650,179, dated May 22, 1900.

Application filed November 29, 1895. Serial No. 570,341. (No model.)

To all whom it may concern:

Be it known that I, ANDREW W. KNOX, a subject of the Queen of Great Britain, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Automatic Cut-Offs, of which the following is a specification.

My invention relates, in the main, to devices for automatically cutting off the water-supply to a building or to some part thereof when the valve or plug of the cock is released on locking up the building or room at night, the object of such devices being to insure the shutting off of the water at the closing hour, so that if a faucet in any of the rooms be left open accidentally there will be no overflow, and consequently no damage therefrom.

The object of the present invention is to provide a self-closing cut-off cock placed in the service-pipe at any part of the building—the cellar or on any of the floors above—and a controller placed in the business office or other convenient place under the eye of the proprietor or of some responsible person, whereby he may see at any time whether the porter has properly attended to his duties; also, to provide an improved cock or cut-off especially adapted for automatic operation.

In the accompanying drawings, which illustrate an embodiment of the invention, Figure 1 is a longitudinal section of the automatic cut-off. This view shows the cock closed. Fig. 2 is a similar view of a part of the cut-off, showing the cock open; and Fig. 2ª shows the valve detached. Fig. 3 is a side elevation of the controller, and Fig. 3ª a plan thereof. Fig. 4 is a section on line x^4 in Fig. 1, showing the loop-link in front elevation. Fig. 5 is a general view, on a small scale, illustrating the operation of the device and the connections between the cut-off cock and the controller. Fig. 6 shows the application of my invention to a common rotary spring-compression cock. Figs. 7 and 7ª illustrate the preferred form of valve.

Referring primarily to the first five figures of the drawings and particularly to Fig. 5, X represents the service-pipe, which supplies water to a building. A is, in general, the cut-off cock or device in said pipe, and B the controller. As here represented the cut-off device A is supposed to be on an upper floor and the controller B on a lower floor, in the office. The cut-off cock is normally closed by a spring or weight, or both, acting on a lever, and this lever is connected, through the medium of a wire or cord, with the lever of the controller, the drawings showing, in Fig. 5, an ordinary bell wire and cranks C to communicate the motion of the controller-lever to the lever of the cut-off cock.

Referring to Figs. 1, 2, and 4, I will now describe the cut-off device or cock. The body of the cock has a valve-chamber 1, an inlet-chamber 2, and an outlet-chamber 3. The service-pipe X screws into the respective ends of the chambers 2 and 3, and in order that the same size of cut-off cock may be employed with service-pipes of different sizes I prefer to make the cock of such size as to suit the largest size of service-pipe and to form fillets 4 in the outer ends of the respective chambers 2 and 3, which fillets may be cut or bored away and screw-threaded to fit the size of service-pipe to be used.

The valve-chamber 1 is closed by a screw-cap 5, and in the said chamber is fitted a coned rubber plug-valve 6. This valve is molded with a hollow to receive a metal stem 7, which has on its inserted end a ball or enlargement 7ª, which prevents the stem from being readily disengaged from the valve. On the upper edge of the valve 6 is integrally formed an upwardly-flaring cup-diaphragm 6ª, the margin of which is clamped tightly between the cap 5 and the outer margin of the chamber 1, forming a hermetic joint. This diaphragm prevents leakage about the stem of the valve. The valve-stem 7 projects out and plays through an aperture in the cap 5, and when the valve is displaced, so as to open the cut-off cock, as seen in Fig. 2, an elevated annulus 6ᵇ on the valve bears on an elevated annulus 5ª on the inner face of the cap 5 and forms a hermetic joint about the valve-stem. This will prevent leakage about the stem in case any of the water reaches this point when the cock is full open.

It is not necessary that the detachable stem 7 shall fit tightly in the aperture of the cap 5 through which it plays nor that it shall be packed at this point, as the cup-diaphragm on the valve prevents leakage. A little looseness in the attachment of the valve to the

stem (see Fig. 7) is rather desirable than otherwise.

In order to hold the valve closed, as in Fig. 1, I employ a lever 8, fulcrumed at $8^{\times}$ in a bracket 1^{a} on the body. One arm of the lever 8 engages a slot in the valve-stem 7 and on the other arm is a weight 9, adapted by preference to be adjusted along the lever-arm and fixed thereto. In Fig. 1 I have also shown a spring 10, fixed to the bracket 1^{a} and bearing on the lever-arm. Either the spring or weight, or both, as shown, may be employed to hold the cock normally closed. To that arm of the lever 8 which carries the weight is secured a loop-link 11, (see Figs. 1 and 4,) adapted to embrace the service-pipe, and to the upper end of this link is attached one end of the wire C, leading to the controller B.

Figs. 3 and 3^{a} illustrate the construction of the controller on a large scale. An attaching-plate 12, adapted to be screwed to the wall of the room, bears two rigid parallel arms 13, between which is pivotally mounted at 13^{a} the controller-lever 14. To one arm of this lever is attached at 14^{a} the other end of the wire C, one end of which, as stated above, is secured to the loop-link 11, as seen in Fig. 1. Now when the water is shut off at the cock A, Fig. 5, the lever 14 will stand as seen at B in Fig. 5, and when the building is unlocked in the morning in opening the house for business the janitor or porter will go into the office or wherever the controller B is placed, pull down the end of the lever 14 at the right in Fig. 3, and place the key D between said lever and the under side of the parallel arms 13, as clearly shown. This has the effect to open the cock and hold it open, so that the water may flow through it freely. On closing the house at night he must remove the key to lock up the building, and then the lever 13 will be set free, so that the weight 9 or spring 10 will instantly act through the lever 8 and valve 6 to shut off the water. Thus the attendant cannot fail to do all that is necessary to shut off the water unless he determines to leave it on designedly, and there would be no object in this. As the controller may be situated anywhere, it will naturally be placed where the attendant will find it at hand when locking up and unlocking, and there will be no inducement for neglecting it.

By placing the controller in the office, where it will be under the eye of the proprietor or of some one in his confidence, he can ascertain at a glance if the attendant places the key D of the building between the lever 14 and the abutment on the controller and not some other thing. It should be compulsory that the key only be so used.

It will be obvious that the arms 13 serve as fixed abutments, between which and the lever 14 the key is placed, and it is not important that these abutments should be of exactly the form shown.

Respecting the valve 6, I would say that where the pressure or head on the water is considerable the solid-rubber plug-valve 6 (shown in Figs. 1 and 2) is apt to be displaced, and to obviate this I prefer in all cases the construction shown in Figs. 7 and 7^{a}, the former of which is a vertical axial section and the latter a transverse section of the valve. In this construction an inverted cup 6^{c}, of metal, is molded in the rubber of the valve to give it such a degree of stiffness as a skeleton furnishes to the body of an animal. It will be noted that at the plug of the valve the metal is overlaid by only a comparatively-thin layer of rubber, which is designed to serve as a packing to the valve. The diaphragm 6^{a} (see Fig. 2) is not ruckled when the valve is displaced, but lies smooth against the metal of the cap 5.

I have not deemed it necessary to show more than one arrangement of the cock A and controller B; but it will be obvious that the cock may, for example, be placed in the cellar and the controller be placed on one of the floors above. In that case the wire C, leading down to the cock, may be attached to the other arm of the lever 14 at 14^{b}. For convenience merely and to adapt the controller to various situations I prefer to make the arms 13 project symmetrically at both sides of the plate 12 and make the lever 14 of the form shown, so that it may be inverted or turned end for end at will. This construction enables one form or pattern of the controller to be adapted for any situation. Any one accustomed to bell-hanging can arrange the wires and bell-cranks to suit the particular situation or conditions.

I much prefer to employ the cut-off cock illustrated in Figs. 1 and 2; but good results may be attained with other forms of cocks. In Fig. 6 I have shown how an ordinary spring compression-cock 15 may be employed. In this form of cock the way is opened by rotating the stem 16 about one-fourth of a revolution through the medium of an arm 17 on the stem. This arm is coupled by a link 18 to the lever 8, to the other arm of which the wire C is coupled. When the lever 8 is released, the spring in the chamber of the cock rotates the plug or valve back to its seat.

It will be noted that the inlet-chamber 2 (see Fig. 1) is out of alinement with the outlet-chamber 3, so that when the valve 6 is seated and the pressure of the water is on the side thereof adjacent to chamber 2, the lateral pressure on the valve will be resisted to a great degree by the wall $1^{\times}$ of the valve-chamber opposite to the chamber 2. This is very important under conditions where the pressure or head of water is considerable.

Having thus described my invention, I claim—

1. In an automatic cut-off for service-water, the combination with the water-service pipe, of an automatically-closing cock in said pipe, said cock having an opening-lever, of

a pivoted lever 14, connected at one end with the lever of said cock, the connector between said levers, and a fixed abutment adjacent to the lever 14, whereby the cock may be opened by swinging the arm of said lever past said abutment and held open by the insertion of the key of the building between the lever-arm and said abutment, as set forth.

2. In an automatic cut-off for service-water, the combination with said service-pipe, and a cut-off cock having a body connected with said pipe and a movable valve and stem, of the opening-lever 8, a weight or spring adapted to close the cock automatically, a controller comprising an attaching-plate with arms 13, and a lever 14 pivotally mounted between said arms, and a connector between the levers 8 and 14, whereby when the lever 14 is operated to open the cut-off cock, its arm passes the abutment and permits the insertion of the key of the building between them to hold the cock open, substantially as set forth.

3. The combination with the body of the cock, having an inlet, an outlet, a valve-chamber, and a cap therefor, of the rubber plug-valve 6, fitting in said chamber and having a cup-diaphragm 6^a, the margin of which is fixedly clamped between the cap and the margin of the valve-chamber, and the non-rotative, smooth stem of said valve extending out of said chamber, substantially as and for the purposes set forth.

4. The combination with the body of the cock, having an inlet, an outlet, a valve-chamber, and a cap 5 for said chamber provided with an aperture for the passage of the valve-stem and a raised annulus 5^a about said aperture, of the said valve-stem, and the rubber valve 6, having a cup-diaphragm 6^a clamped to the valve-chamber by the cap 5, and having a raised annulus 6^b, about the valve-stem, adapted to seat on the cap when the cock is opened, substantially as set forth.

5. A cock having a plug-valve 6, of rubber, containing an embedded metal skeleton 6^c, in the form of an inverted metal cup with an aperture in its bottom for the passage of the valve-stem, substantially as set forth.

6. A cock having a rubber plug-valve 6, having a removable stem 7, provided with a head 7^a, and having also a metal skeleton 6^c, in the form of an inverted cup with an aperture in its bottom for the passage of the inserted end of the stem, substantially as set forth.

7. A cock having a rubber plug-valve 6, provided with a cup-diaphragm about its upper part and with a metal skeleton 6^c in the form of an inverted cup with an aperture in the bottom for the passage of the valve-stem, and the said stem 7, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ANDREW W. KNOX.

Witnesses:
HENRY CONNETT,
PETER A. ROSS.