

J. E. BOYLE.  
 Improvement in Self-Closing Cocks.  
 No. 128,998. Patented July 16, 1872.

Fig. 1.

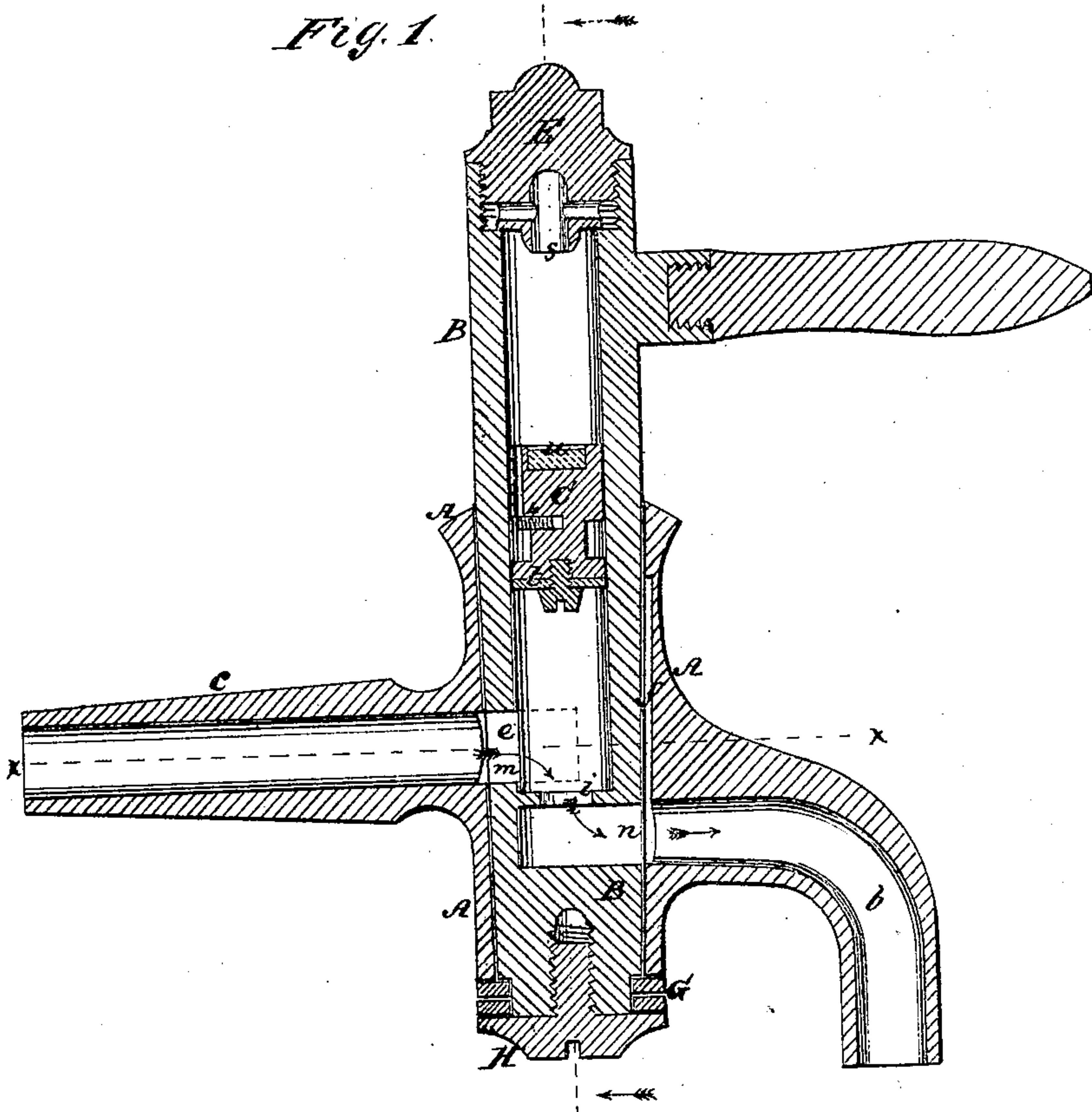


Fig. 2.

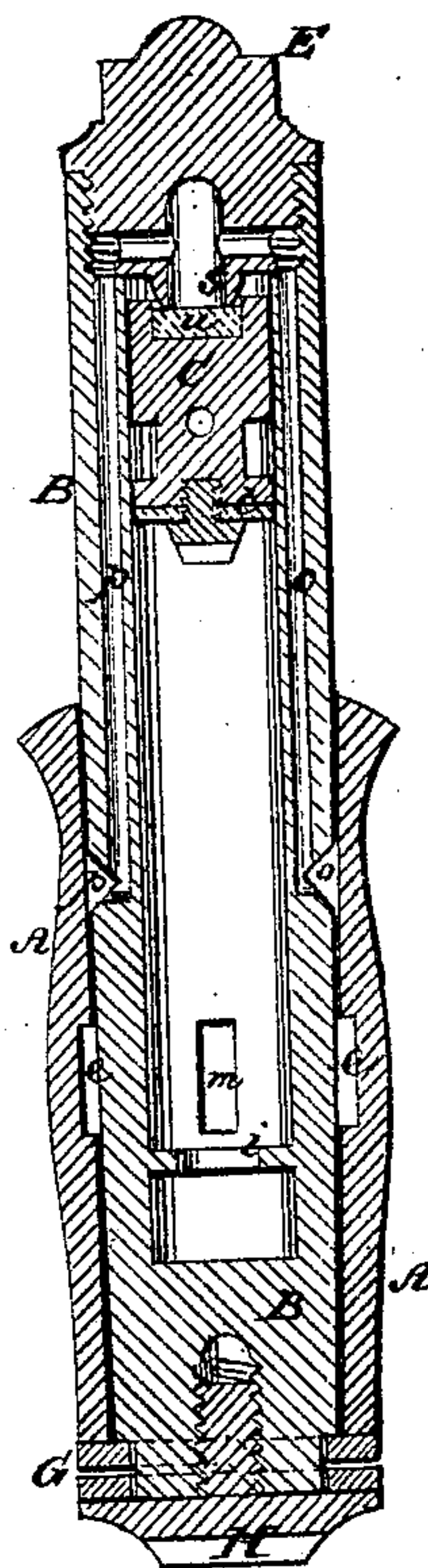


Fig. 3.

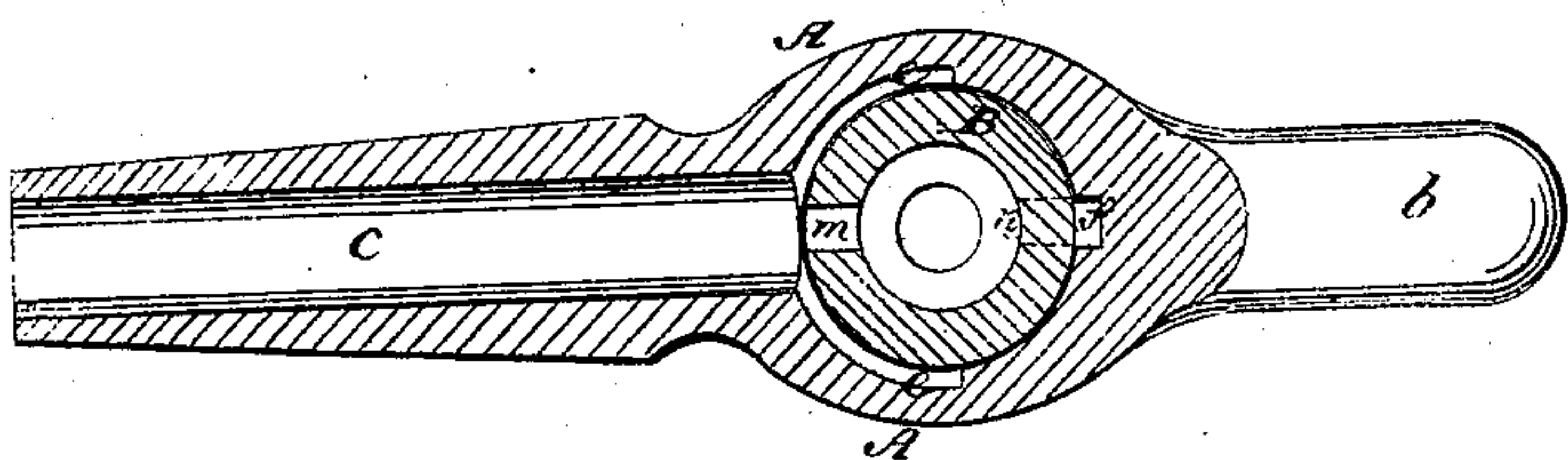


Fig. 4.

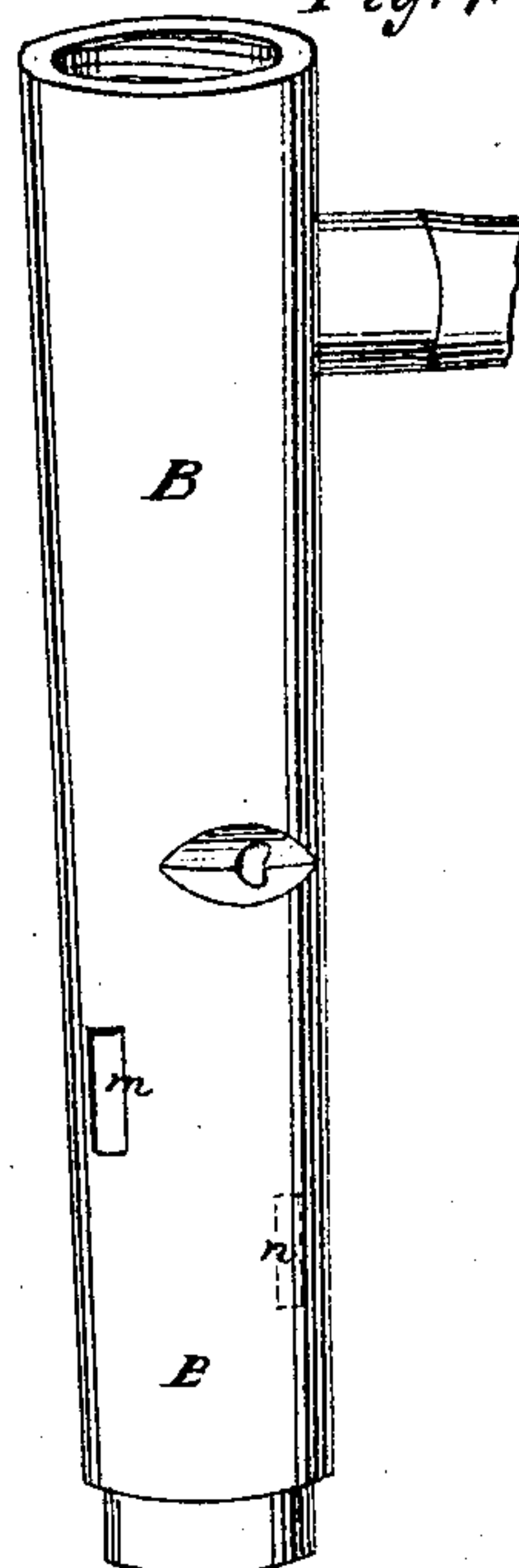
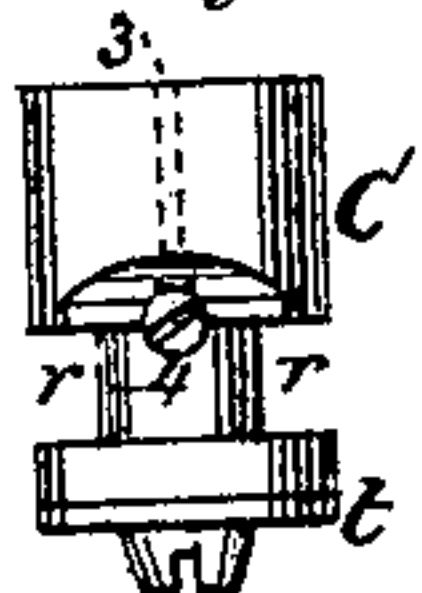


Fig. 5.



Witnesses:  
 E. Wolff  
 J. F. Fabel

Inventor:  
 Jas. E. Boyle  
 By attorney  
 J. N. McIntire.



# UNITED STATES PATENT OFFICE.

JAMES E. BOYLE, OF NEW YORK, N. Y., ASSIGNOR TO GEORGE E. PHELAN,  
OF SAME PLACE.

## IMPROVEMENT IN SELF-CLOSING COCKS.

Specification forming part of Letters Patent No. 128,998, dated July 16, 1872.

*To all whom it may concern:*

Be it known that I, JAMES E. BOYLE, of New York city, in the State of New York, have invented certain new and useful Improvements in Cocks or Faucets; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing making part of this application.

It is well known that in the use of the ordinary faucet or cock, in its various applications, a great objection exists (in cities and places where the consumption of water is a matter of expense) from the liability of accidental waste from neglect to close the faucet after having opened it; and the great loss of water and other liquids, and not infrequent flooding and damaging in stores, &c., has led to many suggestions and inventions designed to overcome these objections to the use of a cock or faucet which may, by accident or neglect, be left open, (or in such condition as to continue running; but, so far as my knowledge extends, nothing fully answering the purpose aimed at and perfectly practicable has yet been devised as a substitute for the old-fashioned key-cock and the ordinary faucets used over wash-basins, sinks, &c. Many self-closing cocks have been made, and some of this kind of cocks are in use; but they are all subject to serious objections in their use in some places. In tenement-houses, factories, &c., where the unnecessary running of the water is not only a great expense, but leads often to great damage and inconvenience, "self-closing" cocks are not useful, and have not been generally adopted, because they can be tied or otherwise secured in an open condition where people do not care to stay by them and hold them open long enough to draw the requisite quantity of water.

My invention has for its main object to provide a cock or faucet which may be opened or closed at pleasure as an ordinary faucet, but which, if left open, (or left running,) will automatically close itself in a very short time, so that, although the cock does not require to be held open, yet, if left open, it will close itself before any damage or material waste can occur; and to this end, and the object of providing a safety-cock which shall be simple and efficient in its operation, quite as durable as

and little more expensive to manufacture than the ordinary cock, my invention consists in a cock or faucet so constructed that, without changing the relation of the movable with the stationary part of the machine, (after having opened the cock,) the flow of liquid through it will be limited in duration, and will be positively cut off automatically; and my invention further consists in making this kind of cock so that the duration of the discharge, when the cock is left open, may be varied or regulated, all as hereinafter more fully described.

To enable those skilled in the art to make and use my invention, I will proceed to describe the construction and operation of my improved faucet or cock, referring by letters to the accompanying drawing, in which—

Figure 1 is a vertical longitudinal section; Fig. 2, a vertical cross-section; Fig. 3, a horizontal section at *x x*, Fig. 1; Fig. 4, a view of the key detached; and Fig. 5, a detail view of the cut-off valve.

In the several figures the same part will be found designated by the same letter of reference.

A is the barrel or body of the cock or faucet, of about the usual shape, as seen, and provided with an outlet or exit nozzle or mouth, *b*, and the induction-tube *c*. Within the body of the cock (arranged to turn freely, and formed and secured in about the usual manner) is arranged the key B, the peculiarities of the construction of which will be presently explained. C is the cut-off valve, which is placed and worked within the key B. The barrel A is made as usual, except that a water way or passage, *e*, is made, as shown, on its internal surface, extending horizontally from the induction-tube *c* fully half way around the said barrel or body A, and a water way or passage, *f*, is cut vertically up from the exit-tube *b* in the manner shown. The key B is hollow, is formed with a perforated horizontal partition at *i*, on which works the valve C, and is made with two main water-ways, *m* and *n*, and two auxiliary water ways or passages, *o p*. The induction and eduction water-ways *m* and *n* extend into the central hollow portion of the key, respectively, above and below the partition *i*, as shown, the one above, *m*, communicating always with the supply-tube *c*, and the one below, *n*,



communicating (only when the cock is open) with the exit pipe or nozzle *b*, as will be presently more fully explained. The water-passages *o p* each passes out at the side of the key, (opposite to each other,) as shown, and each extends up and communicates through the holes in the cap *E* with the central hollow portion of the key. When the key *B* is turned round in either direction to close the cock the lower end of one or the other of the passages *o p* comes into communication with the passage *f*, and a continuous communication is thus established between the internal hollow portion of the key and the open end or nozzle *b* of the cock, thus: from the central hollow portion up into the cap *E*, through one of the holes in the latter, into one of the passages *o p*; thence down said passage into passage or water-way *f*, and thence out at the nozzle *b*. The cap *E* is made with a sort of teat at *s*, which constitutes a seat for the top end of the cut-off valve, as will be presently explained; and this cap, when applied, should be packed where it forms joints with the key, in the usual manner, to render the joints water-tight. *G* is the ordinary split ring applied to the lower end of the key, and *H* the securing or retaining screw. The cut-off valve is composed of a sort of short cylinder or piston, which fits the internal hollow portion of the key *B* loosely, except at *r*, where an annular recess is turned out. It is provided with a leather or rubber disk, *t*, at its lower end, and another one, *u*, is fitted in its upper end. The leather *t* fits on the seat at partition *i* when the valve *C* is down, and the leather *u* forms a close joint on the teat *s* when the valve is up. In the valve *C* is formed, near its circumference, and extending from its top edge down to the cut-away portion or recess *r*, a channel or passage-way, 3, and at the end of said passage-way is located (in the recess *r*) a set-screw, 4, by means of which the lower end of said channel 3 may be partially closed, as and for the purposes to be presently explained.

With the foregoing description of the several parts and their arrangement together, the following explanation will make clear the operation of the faucet. I will remark, in the first place, that the normal condition or position of the cut-off valve *C* is up against the teat *s* of the cap *E*. If this be remembered, and it be borne in mind that this valve (which, when down on the seat *i*, cuts off communication between the inlet-port *m* and the exit-port *n* of the key *B*) cannot descend to its seat on partition *i* except when the water is running—that is, when the cock is open—the operation will be readily understood. I will suppose the cock to be open, as seen at Fig. 1, when the water will be passing from the supply-tube *c*, through the port *m*, thence down through the opening in partition *i*, through the port *n*, and out through nozzle *b*. At the same time it will be understood the central hollow portion of the key is filled with the water clear up to the valve *C*. Now, as this valve *C* or piston

is perforated at 3, and only fits loosely (not water-tight) in the key, it will slowly descend by gravity through the water contained in the hollow portion of the key (the water leaking through the aperture 3 and around the body of the valve) until it comes down onto its seat in the partition *i*, and the moment it is seated on this partition all communication between the inlet-port *m* of the key and the outlet-port *n* is perfectly cut off and the flow of water is stopped. Thus it will be seen that, if the cock be opened and left open, the water can run only until the valve *C* descends to its seat on the partition *i*. In making and putting up the cocks, or at any time, the length of time which the valve shall take to fall in, and consequently the length of time the water can run if the cock be left open, can be determined and fixed upon, according to the pressure under which it is to be used, by adjusting the set-screw 4 to make the passage-way 3 of the desired capacity. If this hole 3 be left entirely open the water can be displaced through it by the falling of the valve in less time, of course, than when it is partially closed up or its capacity reduced. I have so far explained the passage of the water through the cock when opened and left open, and how it will automatically stop the flow. Now, if it be desired to again draw the water the key *B* must be turned in one direction or the other to bring one or the other of the passages *o p* into communication with the vertical water-way *f*; in doing which it will be understood the exit-port *n* of the key is moved out of communication with the nozzle *b*, the induction-port *m* still keeping in communication with the supply-pipe *c*, because of the passage *e* extending sidewise in both directions from said tube *c*. As soon as the communication is established between *o* or *p* and *f*, the pressure of the water, acting on the valve *C* at the recessed portion *r*, which is now relieved of all pressure, except the weight of the small quantity of water above it contained in the key, is forced up to the top of the key against the teat *s* of cap *E*, and there remains. Now, by opening the cock—that is, turning key *B* back to the position seen at Fig. 1—the water again flows freely until the valve again descends to its seat on *i*, or until the key is turned back, and the water thus cut off. The moment the key is turned to cut off the water the valve *C* is immediately thrown up (from any point in its path of descent at which it may have arrived) and remains up until the cock is again opened. It is only when the cock is left open a sufficiently long time to permit the valve *C* to fall the whole length of its movement in the key *B* that said valve comes into play to automatically stop the flow of water through the key.

It will be seen that while the water may be drawn through the cock, and the passage of the water cut off at pleasure by the opening and closing of the cock, in the usual manner, at the same time if the cock be left open the



flow will in a short time be stopped automatically; and it will also be seen that the capacity of the cock to run, when left open, may be regulated or determined, according to circumstances, either in putting up the fixture, or at any other time, by an adjustment of the set-screw 4 in the valve C.

It will be understood that by my invention the great object is gained of providing a cock or faucet which, while it can be opened and closed to supply and cut off the water, will, if left open, automatically cut off the supply.

In lieu of having the channel 3 cut in the valve C, and provided with the set-screw 4 to vary the operation of said valve, the latter, for many purposes, when the faucets are to be used over basins, &c., may be made with simply one or more vertical grooves or gutters cut in its periphery, adapted to permit the passage of the water in the proper time. Where the average pressure is known the size and number of such grooves may be easily determined and a standard for them adopted.

In many applications of my invention the feature of adjustment in the leakage of the valve may be dispensed with.

It will be understood that in carrying out my invention the form and size of the faucet may be almost infinitely varied to adapt it to various places and uses. In making faucets to go over wash-basins, for instance, the shape would be materially different from that shown, and the central portion or hollow-shaft portion would stand still, and the supply-passage would come up in it, while the nozzle portion and barrel would turn on the said central portion.

It will be seen that in the possible event of the valve C getting stuck and inoperative it

will necessarily stick at the top of the key, because there is always more force applied to drive it up than occurs in causing its descent, and cannot, therefore, interrupt the flow of water through the cock, which will always be as useful as a cock without any valve or other means for automatically stopping the flow of water; and it will be seen, also, that since the induction and eduction ports *m n* of the key B are not in the same horizontal plane, as is the case in ordinary key-cocks, the wear will be much less, and the cock will not get leaky as soon as an ordinary cock.

To those skilled in the art all the various modes of application of my invention in the manufacture of cocks and faucets will be readily suggested.

Having so fully explained my invention that those skilled can readily understand it and use it in the manufacture of cocks and faucets for various purposes, what I claim as new, and desire to secure by Letters Patent, is—

1. A "key" or "plug" faucet or cock so made with suitable ports and a gravitating-valve within the key or plug that when left open the supply will be automatically cut off in a given time, substantially as set forth.

2. I also claim, in combination with such a cock, a means for adjusting or regulating and varying at pleasure the time or quantity of flow which can occur when the cock is left open, substantially as described.

In testimony whereof I have hereunto set my hand and seal this 17th day of April, 1872.

JAMES E. BOYLE. [L. S.]

In presence of—

JACOB FELBEL,  
J. N. MCINTIRE.

2.750 words.