No. 686,409. Patented Nov. 12, 1901.

N. C. LOCKE.

AUTOMATIC SHUT-OFF VALVE.

(Application filed June 15, 1900.)

(No Model.) 3 Sheets—Sheet 1.

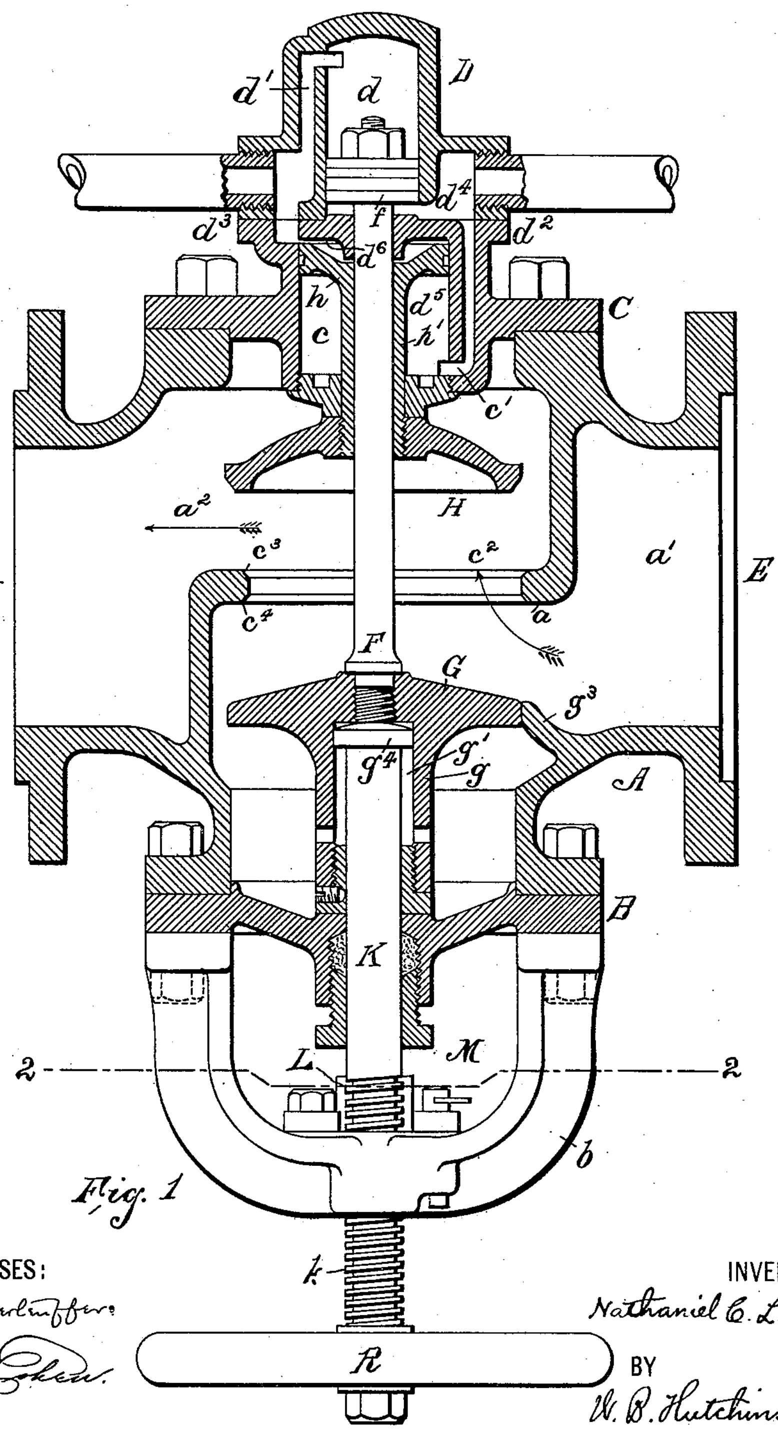

Fig. 1

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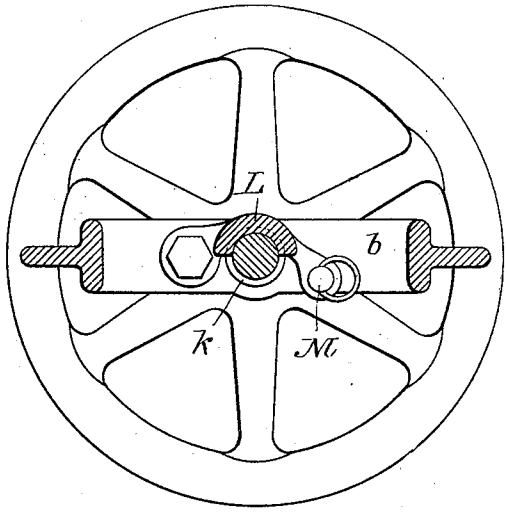

Fig. 2.

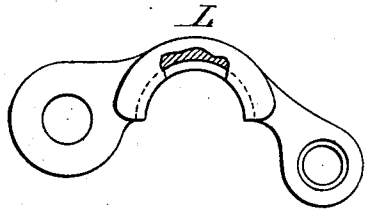

Fig. 3.

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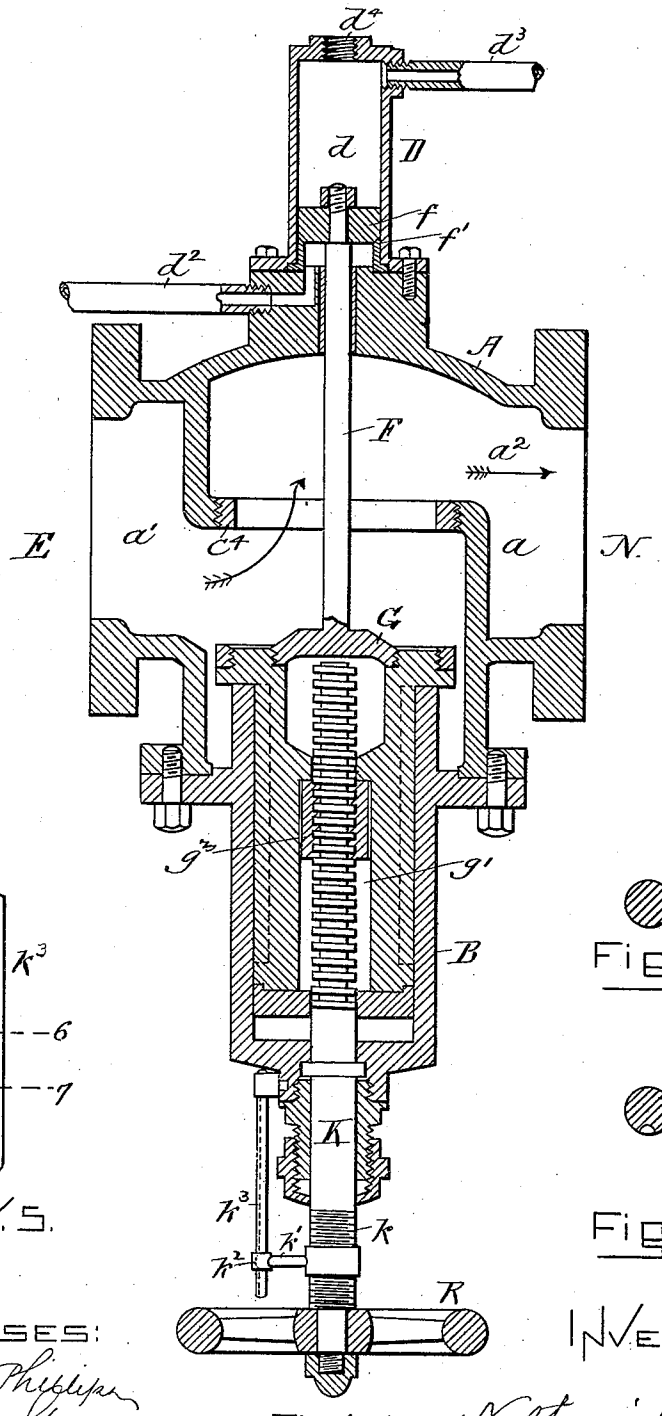

Fig. 4.

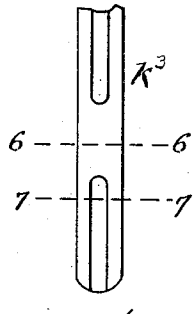

Fig. 5.

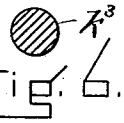

Fig. 6.

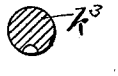

Fig. 7.

WITNESSES:
Francis E. Phillips
Ethel D. Spencer

INVENTOR:
Nathaniel C. Locke

UNITED STATES PATENT OFFICE.

NATHANIEL CHASE LOCKE, OF SALEM, MASSACHUSETTS.

AUTOMATIC SHUT-OFF VALVE.

SPECIFICATION forming part of Letters Patent No. 686,409, dated November 12, 1901.

Application filed June 15, 1900. Serial No. 20,475. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL CHASE LOCKE, of Salem, in the county of Essex and State of Massachusetts, have invented a new and useful Improvement in Automatic Shut-Off Valves, of which the following is a specification, reference being had to the accompanying drawings, making a part hereof.

The object of my invention is to produce a valve which will automatically close whenever there is a break in the conduit on either side of the valve.

It consists, essentially, in forming one or more chambers in connection with the valve, having diaphragms or pistons connected with the valve, by which sudden changes of pressure resulting from a loss of fluid by breakage of the conduit will cause the valve to close.

It also consists in other modifications and in features of construction and combination of parts which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference refer to similar parts throughout the several views.

Figure 1 is a central vertical section of one form of my improved valve. Figs. 2 and 3 are detail views illustrating means for holding the hand-screw of the valve in position. Fig. 4 is a central vertical section of a modification of my invention; and Figs. 5 to 7 are sectional views of other forms or modifications of the locking device for holding the screw in proper position, Figs. 6 and 7 being taken on the lines 6 6 and 7 7, respectively, of Fig. 5.

In carrying out my invention I preferably employ two independent valves in one casing, each valve being controlled by its own piston, arranged to operate in a separate cylinder. Each piston is subjected to fluid-pressure, the pressure in one case being taken from the inlet and in the other from the outlet side of the valve. While I may use either a piston or diaphragm, I will here show and describe the valve mechanism as operated by pistons and cylinders, which I prefer; but it will be understood that by the use of the term "piston" in the specification I also include the use of diaphragms.

Referring to Fig. 1, the main casing A has the inlet side at E, the outlet side at N, and a transverse partition a, which divides the valve into two chambers a' and a^2, which communicate by the opening c^2 through the partition a, this opening being at its opposite edges formed into valve-seats c^3 c^4, the first-mentioned seat being adapted to fit the upper valve H and the seat c^4 being for the reception of the lower valve G.

The valve G is connected to a valve-rod F, which extends upward into the cylinder D and is provided with a piston f, fitting the said cylinder. The valve H has a hollow valve-rod h', connecting with the valve H and with the piston h, and it is arranged to slide on the valve-rod F, the latter serving as a central guide.

The cylinder D is connected to conduits d^2 and d^3, by which pressure is admitted to the cylinders c and d, which cylinders are provided with passages d' and c', leading to opposite sides of the pistons f and h.

In the lower part of the valve-casing is a screw K, provided with a hand-wheel R and yoke b, the latter rising from the ring B. The screw K is provided with a clasp L, which is pivoted at one side of the screw and which may be placed in engagement with the screw-thread and held in position by a pin M, as shown best in Fig. 2.

The valve is placed in a line of steam-pipe near a boiler which forms one of a battery, and a pipe runs from the boiler to the opening d^2. A second pipe runs from near the engine to the opening d^3. The valve is then in condition to receive steam, and the operation is as follows: Steam enters at E, passing over the valve G and through the opening c^2, forcing up the valve H, as shown, while the valve G is held down by the steam as it passes over its convex surface. The valve G is further protected from closing by the rapid flow of steam by the guard g^4, which prevents any flow beneath the valve G. The pressure at the boiler being conducted to the chamber d^4 acts beneath the piston f in a direction to close the valve G and beneath the piston h in a direction to open the valve H. The pressure from near the engine will be communicated, by means of a conduit, to the chambers d and d^6, where it acts on the pis-

ton f in a direction to open the valve G and on the piston h in a direction to close the valve H. Should a break occur at the engine or in the pipe along the line sufficient to reduce the pressure somewhat below the pressure at the boiler, this reduction of pressure would be felt in chamber d above the piston f, and the full boiler-pressure would act beneath it. This at once forces the piston f to the top of the chamber d, thereby closing the valve G upon its seat c^4 and preventing further loss of steam; but should a breakage occur at the boiler the pressure would be at once reduced in the chamber d^5, when the constant pressure above the piston h would close the valve H, thus preventing steam from flowing to the damaged boiler. During this operation the screw K has been held, by means of the clasp L, in a position where it could not interfere with the automatic connection of the valve G. Should it become necessary to operate the valve G by means of the screw K and hand-wheel R, the pin M must be removed and the clasp L thrown backward out of engagement with the screw.

In order to place the valve G in position for automatic action when once it has been opened by means of the screw K, the screw must be again placed in position with its head g^2 near the top of the chamber g', as shown. When the screw is in this position, the clasp L may be applied by inserting the pin M.

In Fig. 4 the appliance is shown with but one valve in the casing adapted to be operated by a single piston and cylinder. When the valve G is open, the piston f seats upon the ring f' near the foot of the cylinder D, thereby preventing any steam from passing up around the piston from the high-pressure pipe d^2, which otherwise would soon cut away the parts and render the valve inoperative. The valve G has an extension on the back, within which is the chamber g', containing the nut g^3, which is slidable up and down in the chamber g' and which fits the screw K, and by means of this screw and the hand-wheel R, together with the aforesaid nut, the valve G may be opened or closed. By the arrangement of the nut g^3 and the chamber g' the valve G may be closed automatically without changing the position of the screw K or nut g^3. When the valve G is open, the nut g^3 is in the position shown; but when the valve G automatically closes the nut g^3 is at the other extremity of the chamber g'. The screw K has a fine screw-thread thereon at the point K', where the arm K^2 is made to move backward or forward as the valve is opened or closed by means of the screw K. K^3 is an indicator-rod having a groove or keyway extending through its entire length with the exception of a small portion, as shown in Fig. 6 and in Fig. 5 on line 6 6.

When the screw K is in position where it will not interfere with the automatic operation of the valve, the arm K^2 covers the ungrooved portion of the rod K^3.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An automatic shut-off valve for piping for conveying steam or other fluid under pressure, comprising a casing containing two valves, two pistons attached subjected to admission and delivery pressure, one common partition for said valves to seat upon respectively whenever said delivery or admission pressure is diminished substantially as herein shown and described.

2. An automatic shut-off valve for piping for conveying steam or other fluid under pressure comprising a casing containing two valves, two pistons in two cylinders, conduits connecting said cylinders with main conduit on the delivery side and acting upon said pistons in said cylinders in a direction to close one of said valves and to open the other of said valves when the delivery-pressure is diminished, conduits connecting said cylinders with the main conduit on the admission side and acting upon said pistons in said cylinders in a direction to open one of said valves and to close the other of said valves when the admission-pressure is diminished.

3. An automatic shut-off valve for piping for conveying steam or other fluid under pressure, comprising a casing containing two independent valves seating upon one common partition, two separate pistons attached to said valves by two separate piston-rods, one being a hollow valve-rod arranged to travel on the other valve-rod as a central guide, and allowing the other valve-rod to pass centrally through its valve and piston, two cylinders, piping connecting said cylinders with the admission and delivery sides of the main conduit whereby on a diminution of either the admission or the delivery pressure the automatic shut-off valve will be closed, and means for the exterior adjustment of one of the valves, substantially as shown and described.

4. An automatic shut-off valve for piping for conveying steam or other fluid under pressure, comprising a casing containing two independent valves seating upon one common partition attached to two separate pistons by means of two separate piston-rods, one passing centrally through the other, piping connecting the admission and delivery sides respectively of the main conduit with two separate cylinders, having their ports and passages so arranged that the admission-pressure tends at the same time to close one of the valves and to open the other valve and also at the same time to exert a downward pressure on one piston and an upward pressure on the other piston, and means for adjusting the valves, substantially as described.

5. A valve for conveying steam or other fluid under pressure, comprising a casing containing a valve adapted to be operated by

fluid admitted to a piston in a separate chamber with hand-wheel and screw adapted for independent service, and means for indicating and confining said screw in position for automatic use of said valve, substantially as shown and described.

In testimony that I claim the foregoing as my invention I have hereunto subscribed my name in the presence of two witnesses.

NATHANIEL CHASE LOCKE.

Witnesses:
FRANK E. PHILLIPS,
ETHEL B. SPENCER.