

(No Model.)

F. B. GRAVES.

ELECTRICAL APPARATUS FOR OPERATING VALVES IN MAINS.

No. 358,775.

Patented Mar. 1, 1887.

Fig. 2.

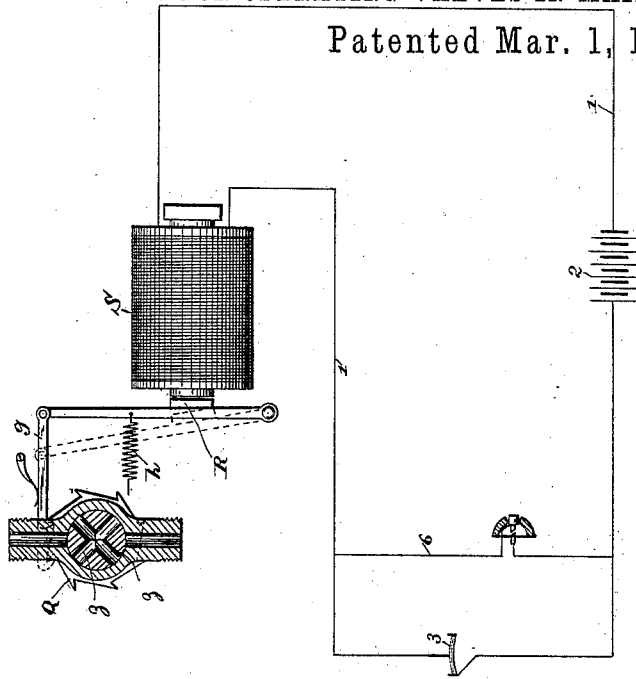
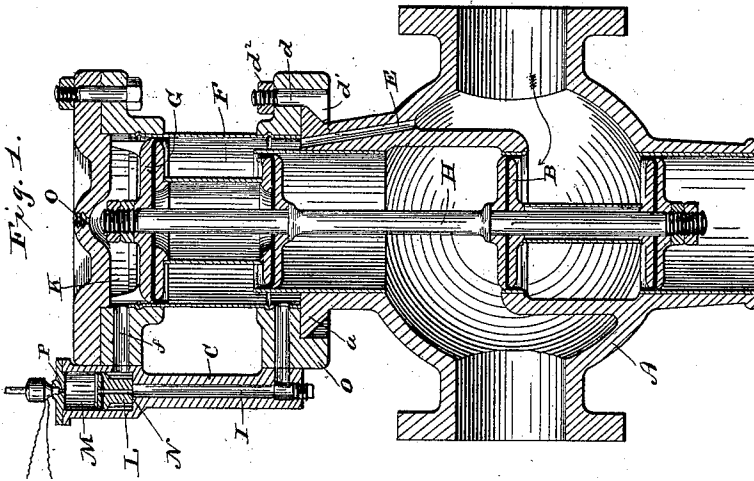


Fig. 1.



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ELECTRICAL APPARATUS FOR OPERATING VALVES IN MAINS.

SPECIFICATION forming part of Letters Patent No. 358,775, dated March 1, 1887.

Application filed October 16, 1886. Serial No. 216,450. (No model.)

To all whom it may concern:

Be it known that I, FRED B. GRAVES, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Apparatus for Operating Valves in Mains; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

This invention relates to improvements upon the class of valve-operating apparatus one form of which is shown in Letters Patent No. 253,637, granted November 30, 1886, to Henry Likly, C. A. Carpenter, and myself. The system shown in said patent consists, generally, of a main including a cut-off valve located therein, a motor for operating said valve, and a device for controlling the motor, so as to open or close the main valve when desired; and the present invention consists in certain novelties of construction and combination of parts, whereby the operation of the motor is more easily controlled, the operating parts rendered simpler, and the operation is generally improved, all of which will be hereinafter described, and pointed out particularly in the claims at the end of this specification.

Referring to the accompanying drawings, Figure 1 represents a longitudinal vertical section taken through the main cut-off valve and operating mechanism. Fig. 2 is a view of one form of electrical device and circuits therefor for setting in operation the valve-operating mechanism.

Similar letters of reference in the several figures indicate the same parts.

The letter A represents a valve-casing interposed so as to form part of the main; B B, a balanced valve arranged in said casing and adapted to control the passage of the fluid through the main. Mounted upon this valve-casing A is the casing C of the valve motor or mechanism for operating the valve, the connection between the two casings being effected by forming a flange, *a*, upon the casing A, a flange, *o*, on the casing fitting in said flange *a*, and a series of removable bolts, *d*, applied to

the casing C and having heads *d'*, which fit the inclined side of the flange on A and serve to hold the two parts together. By this mode of connection the two casings are brought close together and are arranged in small compass, and the upper casing, C, is adapted to be turned around upon the casing A and held securely at any desired point of adjustment by the turning of the nuts *d''*, applied to the bolts *d*.

From the inlet side of the casing A there extends a passage, E, to the chamber F of the valve-motor. In this chamber F there is arranged a piston, G, which is connected to the same rod or valve-stem, H, to which the valve B B in the casing A is attached. A passage, I, extends from said chamber F, below the piston G, to a space, K, above the piston, said passage being controlled by a valve, L, arranged in a chamber, M, as shown. The area of the passage I is less than that of the chamber M, and by the provision of a small channel or passage, N, in the valve L communication is effected between the passage I and the chamber M, and by reason of there being a greater area of the valve L exposed within the chamber M than in said passage I the valve is kept normally closed, so as to cut off communication between the upper and lower sides of the piston G. As shown in the prior patent referred to, the upper and lower sides of the piston present different areas to pressure, the area of the upper side being the greater.

Normally the pressure of the fluid in the main causes the chamber F to be filled through the passage E, the valve L to be closed with its lower end on the bottom of the chamber, and the piston G to be raised, so as to keep closed the valve B in the main. Whenever it is desired to open the valve B, it is only necessary to reduce the pressure in the chamber M so that the pressure on the under side of the valve L will overbalance that upon its upper side, whereupon the said valve L will be raised and allow the fluid to pass through the port *f* into the space K above the piston G, and cause said piston to be lowered by reason of the preponderating pressure upon its upper surface, and thus through the valve-

stem H open the said valve B. To close the valve B again, it is only necessary to restore the pressure in the chamber N, whereupon the valve L will again be seated and the piston G caused to rise, the fluid above said piston being displaced by being forced out through a waste-opening, O.

It is obvious that the working of the apparatus is dependent entirely upon the position of the valve L, and that the latter is worked entirely by the difference of pressure upon its two sides.

Any competent means may be employed for reducing the pressure in the chamber M so as to give this difference of pressure upon the valve. In the construction shown it is only necessary that an outlet be provided in the upper portion of the chamber M that is larger or of greater capacity than the passage through the valve, in order to effect the object. Such an outlet is shown at P in the drawings, and it may be controlled by a valve operated by the motor mechanism shown in the former patent referred to, or, as shown in Fig. 2, by means of a cock actuated by a step-by-step mechanism electrically controlled. Any cock having a number of passages through it may be employed, the object being to provide one that will require a slight motion to open or close it.

The electrical circuit which controls the valve is adapted to have interposed in it thermostatic devices for varying it; or ordinary switches or push-buttons may be employed, if desired, or both. I prefer to employ both, as the operation of the device is then rendered more perfect.

The operation of the two-way cock and step-by-step mechanism is as follows: The valve is interposed in the exhaust-pipe P from the chamber M, and the valve-plug has two passages, *z z*, through it at right angles, and has a ratchet-wheel, Q, on its outer end, as shown. Co-operating with this ratchet-wheel is a spring-pawl, *g*, connected with the armature R, adapted to be attracted by the electro-magnet S, and to be retracted by a spring, *h*. 1 represents the electrical circuit, including a battery, 2, a thermostatic or other circuit-varying device, 3, and the electro-magnet S. Upon the circuit 1 being closed by means of the thermostatic contact at 3 the armature is attracted and the ratchet-wheel rotated an eighth turn. This will serve to open the exit from the chamber M, permit the valve to open communication with the main cylinder, thus operating the main valve, and as soon as the circuit is opened again the spring returns the pawl and armature to first position, with the former in engagement with the next tooth of the ratchet. Now, when it is desired to close the main valve, the electrical circuit is again completed, this time preferably by a push-button in a shunt-circuit, 6, and the valve again turned an eighth of a revolution, closing the passage-way P and allowing the pressure in the valve-chamber to close the commu-

nication between the upper side of the motor-piston and the main, thus permitting the piston to be raised and the main valve closed, and this operation may be repeated as often as desired.

While I have described the cock in the exhaust-pipe as having two passages, it is evident that a valve having one passage through it and adapted to be rotated a quarter-revolution may be employed instead; or any other form of valve adapted to be opened by one impulse of an electric circuit and closed by another, or a valve operated by one circuit and closed by an entirely different circuit, might be employed.

I preferably employ a thermostatic device to open the valve, as the apparatus is designed for use especially in connection with a fire-extinguishing system in which water is admitted to the pipes upon the breaking out of a fire in the building; but of course other means might be employed, if desired, or the valve might be operated by hand.

If desired, the device shown in the previous patent referred to may be employed to open the valve in the exit-pipe P', and the same arrangement of circuits as shown therein employed; but the arrangement described is simpler and can be employed with advantage.

The principal differences and advantages between my present invention and the one described and shown in the former patent referred to are the compactness of the device, all the operating apparatus being in one place and secured together, while the exit-pipe P can, if desired, be carried to any desired distance and operated as described. The valve-operating device is secured directly upon the main-valve casing, and can, when desired, be rotated thereon so as to be in the most advantageous position.

I do not desire to be confined to the exact construction of devices shown herein, as others their equivalents might be employed without departing from my invention.

Having thus described my invention, what I claim as new is—

1. The combination, with the main and a valve therein, of the piston connected to the valve in the main and presenting on opposite sides different areas to pressure, a passage communicating with opposite sides of the piston, and a valve for controlling said passage and operated by a difference in pressure upon its opposite sides, as set forth.

2. The combination, with the main and a valve therein, of the piston connected to the valve in the main and presenting on opposite sides different areas to pressure, a passage communicating with opposite sides of the piston, and a valve for controlling said passage operated by a difference in pressure upon its opposite sides, and means, substantially as described, for reducing the pressure on one side of the valve located in said passage, substantially as described.

3. The combination, with the main and its

valve, of the piston connected to the valve in the main and presenting on opposite sides different areas to pressure, a passage connecting the opposite sides of the piston, a chamber in communication with said passage, and a valve located in said chamber and presenting different areas to pressure from said chamber and passage, respectively, and means for reducing the pressure in the chamber, whereby to cause the lifting of the valve therein, substantially as described.

4. The combination, with the main and its valve, of the piston connected to the valve in the main and presenting on opposite sides different areas to pressure, a passage connecting the opposite sides of the piston, a valve for controlling said passage, a chamber in which said valve operates, a means for communication between the chamber and the passage, said valve presenting different areas to pressure in the chamber and passage, respectively, as described.

5. The combination, with the main and its valve, of the piston connected to the valve in the main, and presenting on opposite sides different areas to pressure, a passage connecting the opposite sides of the piston, a chamber connected to said passage, a valve located in said chamber presenting different areas to pressure from said chamber and passage, respectively, and having a channel of communication through it, and means, substantially as described, for reducing the pressure in the chamber, as set forth.

6. The combination, with the operating-piston presenting on opposite sides different areas to pressure, a passage connecting the opposite sides of the piston, a chamber in communication with said passage, a valve located in said chamber and operated by difference in pressure in the chamber and passage, respectively, a valve by the operation of which the pressure in the chamber is controlled, an electric

circuit including an electrically-operated mechanism for shifting the valve, and devices such as described for controlling the circuit, as set forth.

7. The combination, with the operating-piston presenting on opposite sides different areas to pressure, a passage connecting the opposite sides of the piston, a chamber in communication with said passage, a valve located in said chamber and operated by difference in pressure in the chamber and passage, respectively, a valve by the operation of which the pressure in the chamber is controlled, an electric circuit including an electrically-operated mechanism for shifting the valve, and thermostatic devices for opening the valve, substantially as described.

8. The combination, with the operating-piston presenting on opposite sides different areas to pressure, a passage connecting the opposite sides of the piston, a chamber in communication with said passage, a valve located in said chamber and operated by difference in pressure in the chamber and passage, respectively, a valve by the operation of which the pressure in the chamber is controlled, an electric circuit including an electrically-operated mechanism for shifting the valve, thermostatic devices for varying the circuit and opening the valve, and a shunt-circuit including devices for manipulating it to close the valve, substantially as described.

9. The combination, with the main valve having the flanges, of the casing in which the valve-operating device works, having the flange fitting around the flange on the main casing, and the bolts for clamping the main-casing flange and securing the parts together, substantially as described.

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Witnesses:

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