

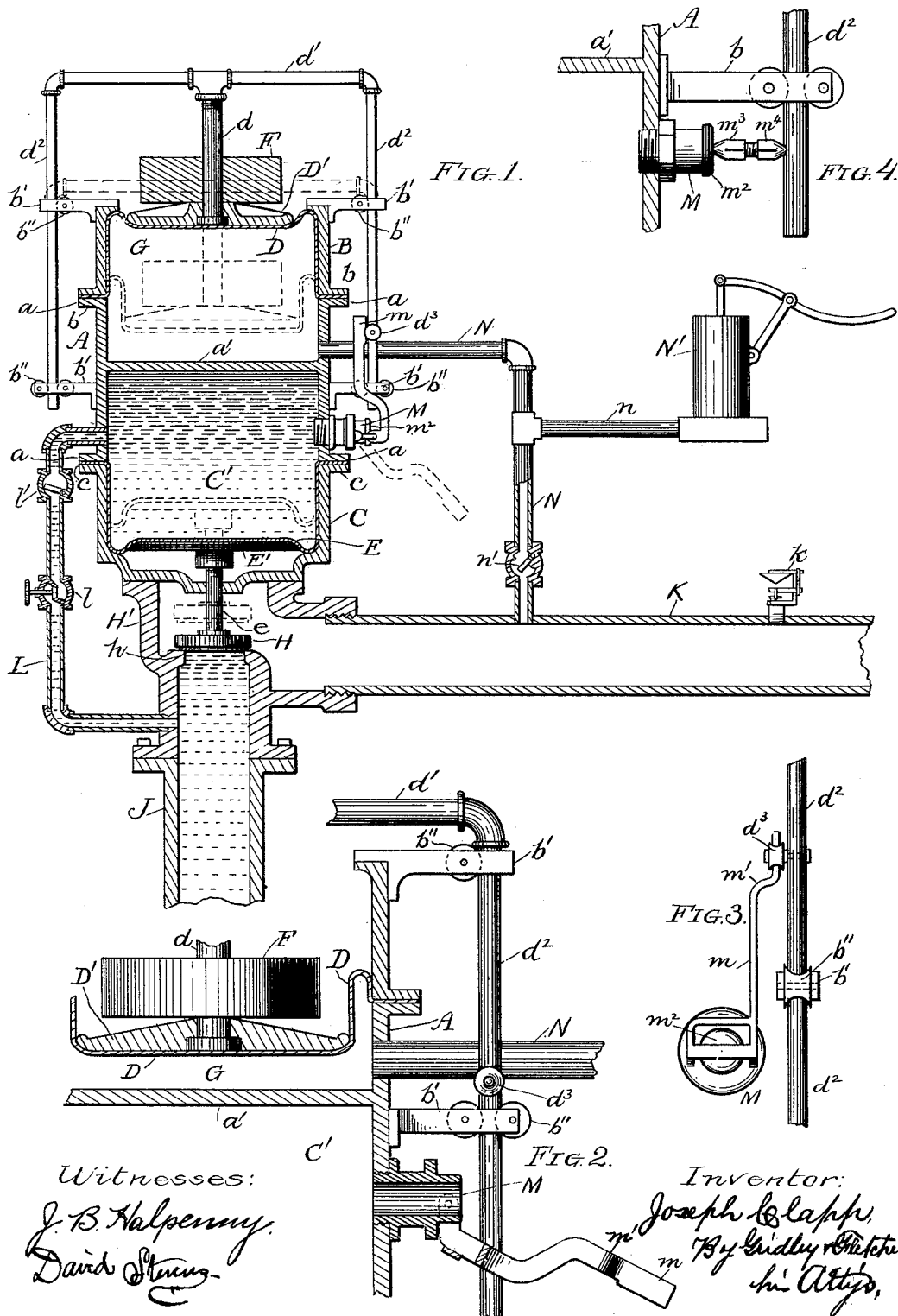
(No Model.)

2 Sheets—Sheet 1.

J. CLAPP.
AUTOMATIC VALVE.

No. 406,087.

Patented July 2, 1889.



(No Model.)

2 Sheets—Sheet 2.

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AUTOMATIC VALVE.

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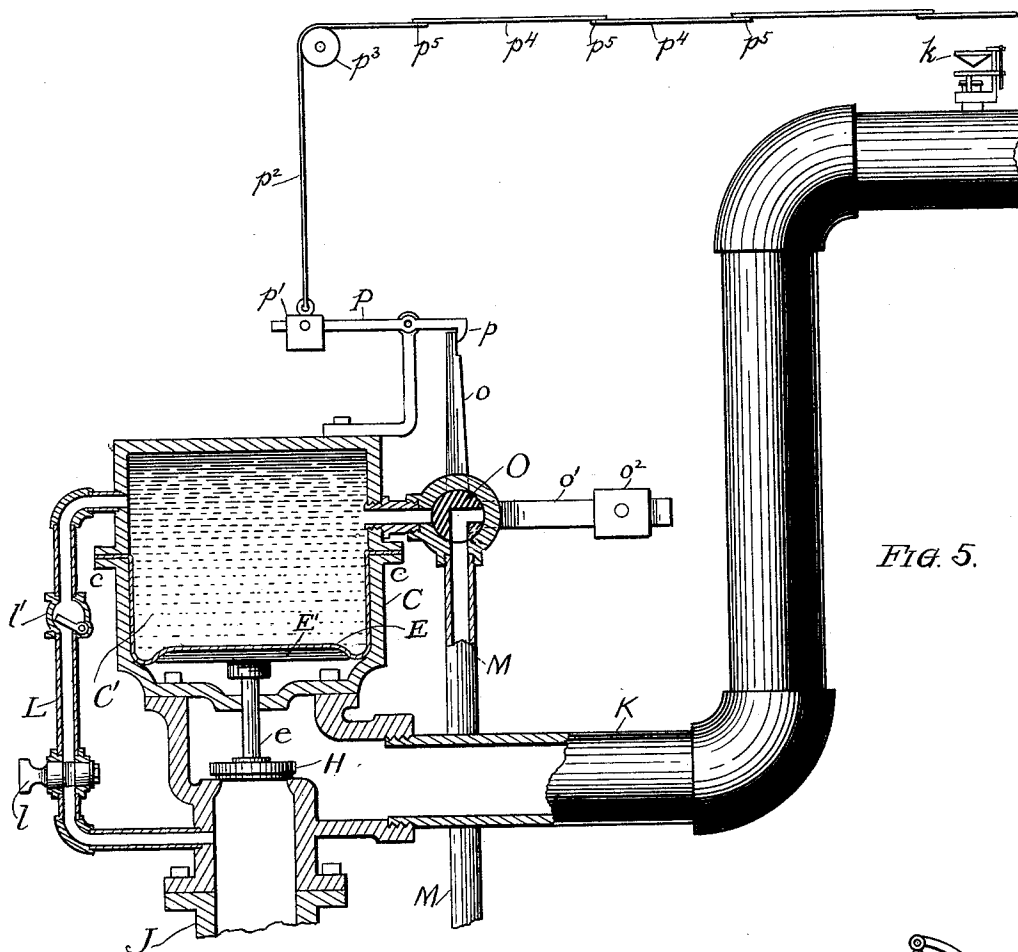


FIG. 5.

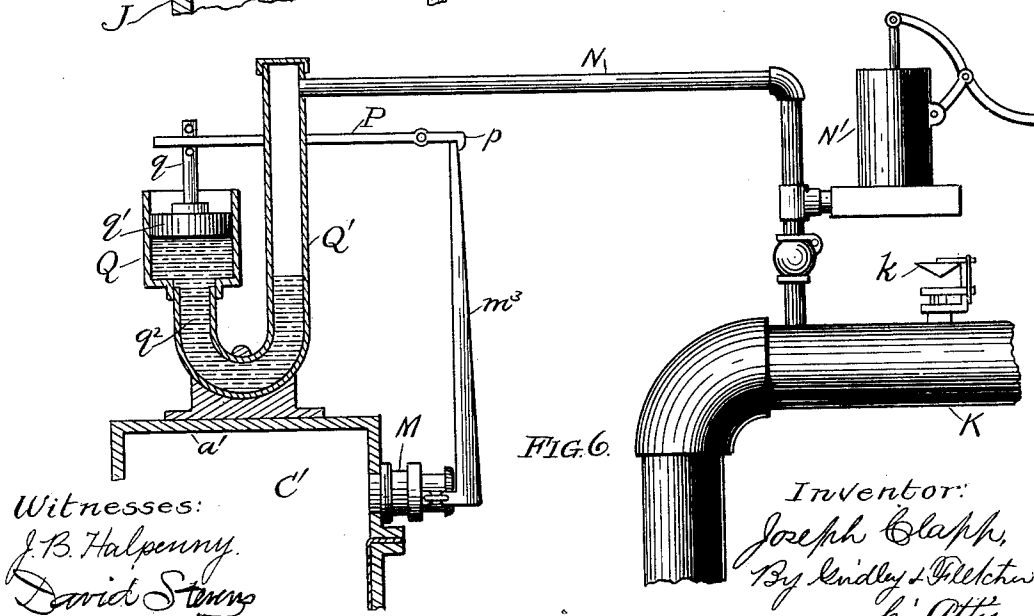


FIG. 6.

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UNITED STATES PATENT OFFICE.

JOSEPH CLAPP, OF EVANSTON, ILLINOIS, ASSIGNOR TO THE CLAPP AUTOMATIC FIRE-EXTINGUISHER COMPANY, OF ILLINOIS.

AUTOMATIC VALVE.

SPECIFICATION forming part of Letters Patent No. 406,087, dated July 2, 1889.

Application filed August 25, 1888. Renewed May 17, 1889. Serial No. 311,166. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH CLAPP, of Evanston, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Valves, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in which—

- 10 Figure 1 is a central vertical sectional view of my improved valve and the pipes connecting therewith, the operating parts being in a normal position. Fig. 2 is a like sectional view in detail of a portion of the valve-case and certain of the connecting parts, which are shown in an abnormal position. Fig. 3 is a side view in detail of one of the guide-rods of the frame and the lever and valve for normally preventing the escape of water from the case. Fig. 4 is a detail view showing a modification of the means for closing the eduction-pipe of the valve-chamber. Fig. 5 is a central vertical sectional view showing a modification of said invention, and Fig. 6 is a like view showing a still further modification.

Like letters of reference in the different figures indicate like parts.

- 30 The purpose of my invention is to provide a self-acting valve for use in connection with automatic fire-extinguishing systems, and which may be so constructed that the water from the supply-pipe may communicate directly and continuously with a valve-chamber provided with a valve of differential area connected with the valve which controls the flow of water in the supply-pipe, and an eduction-pipe and releasing mechanism preferably operated by means of the escape of compressed air from the distributing-pipes caused by the opening of the usual automatic "sprinkler-head," whereby the diaphragm in the air-chamber may be caused to collapse, thus permitting the valve in the supply-pipe to open and admit the water to the distributing-pipes.

To this end my invention consists in the combination of elements, hereinafter more particularly described and claimed.

- 50 Referring to the drawings, A represents a cylindrical metallic shell provided with an-

nular flanges *a a* and a rigid partition *a'*. To the respective ends of the cylinder A are attached short cylinders B C, which are provided with flanges *b c*, corresponding to the flanges *a*, to which they are attached by means of suitable bolts or screws. Flexible diaphragms D E, preferably of rubber, are attached to the respective ends of the cylinder A, the edges of said diaphragms, respectively, being clamped between the flanges *a b*, as shown.

To the diaphragm D is attached a metallic plate D', which serves as a support for a rod or standard *d*, to which is rigidly attached a guide-frame consisting of the cross-bar *d'* and depending bars *d² d²*, which pass through the ends of rigid arms *b'*, attached to the case, and in which are secured rollers *b²* to guide said frame and permit it to move up and down without friction. A weight F is placed upon the plate D' to insure the downward movement of the diaphragm D when the air is removed from the chamber G beneath, as hereinafter stated.

To the diaphragm E is attached a metal plate E', to which is attached a valve-stem *e*, which is guided through a bore in the end of the shell C, and to the opposite end of which is attached a valve H, adapted to rest upon a valve-seat *h* in a coupling H', which is attached, respectively, to the case C, a service-pipe J, and a distributing-pipe K, the latter of which is provided with a series of automatic sprinklers *k*, which are held normally closed by means of a joint of fusible solder.

A small pipe L connects the supply-pipe J with the chamber C' in the lower part of the cylinder A, so that said chamber is filled with water at a pressure corresponding to that in the pipe J; but as the area of the diaphragm E is much larger than that of the valve H the latter is normally held to its seat, thus preventing the water in the supply-pipe from passing into the distributing-pipe so long as the pressure in the chamber C' remains constant or the water is permitted to remain in said chamber.

M is an outlet-pipe communicating with the chamber C', which is held normally closed by means of a cap, which may in turn be secured in position by means of the lever *m*, which is

pivoted to the pipe M, as shown in the drawings, and the outer end of which is arranged to rest against a friction-roller d^3 upon the movable rod d^2 . Said lever m is bent laterally at m' , as more clearly shown in Fig. 3, and as the roller d^3 is moved downwardly it is disengaged from the lever m , which falls, as shown in Fig. 2, and permits the cap to be released, which allows the water to flow out of the chamber C'. I prefer to place a reduction-valve l and a check-valve l' in the pipe L, so that the flow of water in said pipe may be regulated, it being essential that it should flow out of the pipe M when open much faster than through said pipe L; but said result may be accomplished by simply reducing the size of the pipe L.

N is a pipe which communicates with the air-chamber G and with the distributing-pipe K. An air-pump N' is connected with the pipe N by means of the pipe n . Air is thus forced and compressed within the distributing-pipes and the chamber G. A check-valve n' is located in the pipe N below its junction with the pipe n .

The action of said automatic valve is as follows: Upon compressing air in the distributing-pipes and the chamber G the weight F and diaphragm D are raised until the lever m may be supported against the roller d^3 . The pressure of the water in the chamber C' against the diaphragm E closes the valve H and retains the water in the supply-pipe; but as soon as a sprinkler-head k is opened the air from the distributing-pipes and chamber G is released, when the weight F falls and carries with it the frame, which releases the lever m and allows the water to escape from the chamber C', thus permitting the valve H to be opened by the pressure of water from beneath when it is distributed through the pipes K. The check-valve n' prevents the water from flowing into the chamber G, while the valve l' prevents that in the chamber C' from escaping into the service-pipe in case the supply of water is shut off. Upon closing the outlet M the pressure upon the diaphragm E closes the valve H, and the supply of water is thus cut off from the distributing-pipes. The air may then be pumped into the distributing-pipes and chamber G, when the device is again ready for action in the event of a fire.

The check-valve l not only serves to prevent the water from flowing out of the chamber C' through the pipe L in case of stoppage at the water-works from which the supply is received, but enables a volume of air to be compressed in the chamber with the water, which causes a constant elastic pressure upon the diaphragm E, thereby serving as a factor of safety against possible leakage of the valve H, or an appreciable reduction of pressure upon said diaphragm resulting from a slight loss of water from said chamber in the event of the supply being temporarily cut off, as stated.

I do not confine myself to the lever m and

the parts described as operating in connection therewith to retain the outlet M normally closed, as it is obvious that various means differing in mechanical construction may be adopted—such as, for example, that shown in Fig. 4. In lieu of the lever m and roller d^3 , I extend the rod d^2 downwardly to a point opposite or below the pipe M, and between the cap m^2 , which closes the pipe, and said rod I place a stud, which consists of the two parts m^3 m^4 , one of which is screw-threaded and tapped into the other, as shown, so that any desired degree of pressure may be placed upon the cap by turning the screw. While the rod d^2 remains in its normal position the cap is held in place; but as soon as the rod descends the stud falls and releases the cap.

I have shown in Figs. 5 and 6 still further modifications of said invention for the purpose of releasing the water from the chamber C', whereby I am enabled to dispense with the weighted diaphragm D. In Fig. 5 I extend the pipe M downwardly and place a two-way valve O at the elbow, to which valve is rigidly attached arms o o' , the latter of which is provided with a weight o^2 . The arm o' is held normally in a horizontal position by means of a detent p upon the end of a pivoted lever P, which engages with the arm o . A weight p' is attached to the opposite end of the arm P, and is held suspended by means of a cord or chain p^2 , trained over a pulley p^3 , and preferably attached to wires or strips p^4 , secured to each other by means of fusible solder, as at p^5 . Upon the fusing of said joints the weight p' falls, which releases the arm o , thereby allowing the weight o^2 to descend and open the valve O. In Fig. 6 the pipe M is closed by means of a cap normally held in place by means of a lever m^3 in engagement with a detent p upon the end of the pivoted lever P, arranged substantially as shown in Fig. 5; but in lieu of the weight p' the opposite end is loosely attached to a piston-rod q , the piston q' of which is arranged within a cylinder Q, communicating at the bottom with a bent pipe Q', connected with the distributing-pipes by means of the pipe N. The cylinder and pipe Q' are partially filled with mercury q^2 , which, being brought into contact with the compressed air in the distributing-pipes, raises the piston q' , and thus holds the detent p in normal engagement with the lever m^3 . Upon the opening of a sprinkler-head and the consequent escape of air the mercury falls in the cylinder Q, the piston is lowered, the detent disengaged, and the pipe M opened. Thus it is obvious that numerous ways may be employed for releasing the water from the chamber C', any one of which may be adopted without departing from the primary and more important features of my invention.

Having thus described my invention, I claim—

1. The combination, with a supply-pipe of a fire-extinguishing system, of a water-chamber,

a diaphragm therein in operative connection with the valve which governs the flow of water to the supply-pipe and having a larger area than said valve, a branch pipe or lateral way forming direct communication between said water-chamber and supply-pipe independently of the position of said supply-valve, whether closed or open, and means, substantially as described, for releasing the water from said chamber.

2. The combination, with a supply-pipe, of a valve to govern the flow of water therein, a water-chamber, a diaphragm of larger area than and in operative connection with the valve governing the flow of water in the supply-pipe, a branch pipe or lateral way forming direct communication with said water-chamber and supply-pipe, a normally-closed eduction-pipe of a size to permit the water to flow from the chamber faster than it can enter from said branch pipe, and means, substantially as specified, for opening said eduction-pipe upon the opening of a sprinkler-head, substantially as shown and described.

3. The combination, with the supply and distributing pipes of an automatic fire-extinguishing system, of a valve for normally closing said supply-pipe, a water-chamber upon the opposite side of said valve and in direct communication therewith, a diaphragm of larger area than said valve located in said chamber and attached to said valve, a normally-closed outlet larger than the inlet for releasing the water from said chamber, and means, such as described, for permitting the same to open upon the escape of air from the distributing-pipes, substantially as shown and described.

4. The combination, with the supply and distributing pipes of an automatic fire-extinguishing apparatus, of a valve for normally closing the supply-pipe, the chamber C', a flexible diaphragm therein attached to said valve, a pipe connecting the supply-pipe with said chamber and having a check-valve therein for preventing a backflow of water from said chamber, an independent outlet of larger capacity than the pipe L leading from said

chamber, and means, such as the lever *m*, and a movable frame held normally in a given position by means of a flexible diaphragm in operative connection therewith and with a chamber of compressed air communicating with the distributing-pipes, whereby upon the escape of air from said pipes said frame may be permitted to fall, thus releasing said lever and opening said outlet, substantially as shown and described.

5. An automatic valve for normally preventing the water from entering the distributing-pipes of an automatic fire-extinguishing system, consisting of a chamber in communication with the supply-pipe, a normally-closed eduction-pipe, a flexible diaphragm in said chamber attached to the supply-pipe valve, an air-chamber communicating with the distributing-pipes, a weighted flexible diaphragm, a movable frame attached to said diaphragm, and means—such as a cap and lever—in operative connection with said frame for closing said eduction-pipe, whereby the movement of said frame upon the escape of air will release said lever, substantially as shown and described.

6. The combination, with the supply and distributing pipes of an automatic fire-extinguishing system, of the chambers C' G, the former in direct communication with the supply-pipe and the latter with the distributing-pipes, flexible diaphragms E D, in communication with said chambers respectively, an outlet-pipe connecting with the chamber C', means—such as a cap and lever—for closing the same, a movable frame attached to the diaphragm D, for normally holding said lever in position to close said pipe, and a valve attached to the diaphragm E, for normally closing the supply-pipe, substantially as shown and described.

In testimony whereof I have signed this specification, in the presence of two subscribing witnesses, this 8th day of August, 1888.

JOSEPH CLAPP.

Witnesses:

D. H. FLETCHER,
J. B. HALPENNY.