No. 654,770. Patented July 31, 1900.

E. F. VAN VECHTEN.

AUTOMATIC VALVE CLOSING MECHANISM.

(Application filed June 12, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 2.

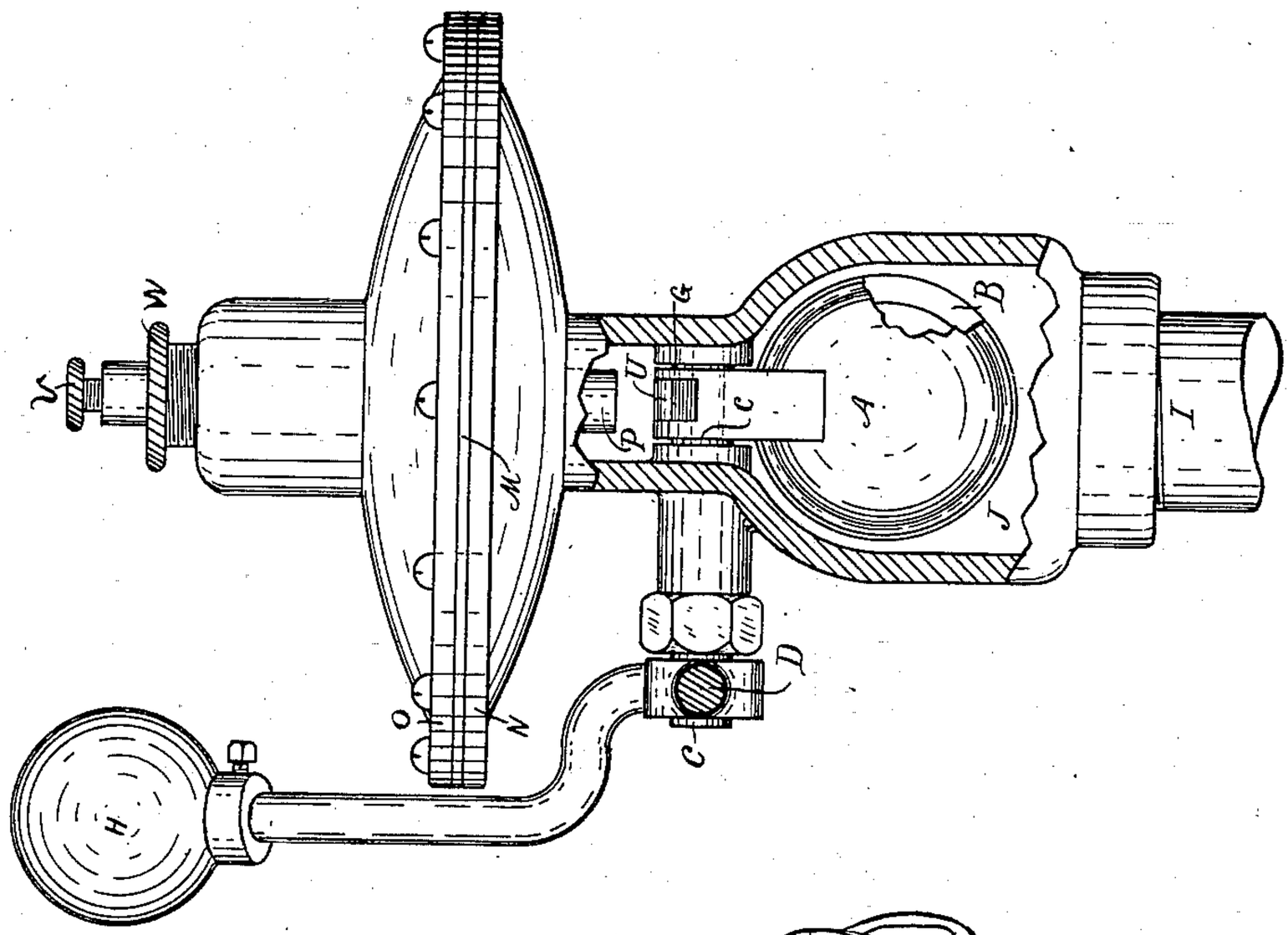

Fig. 1.

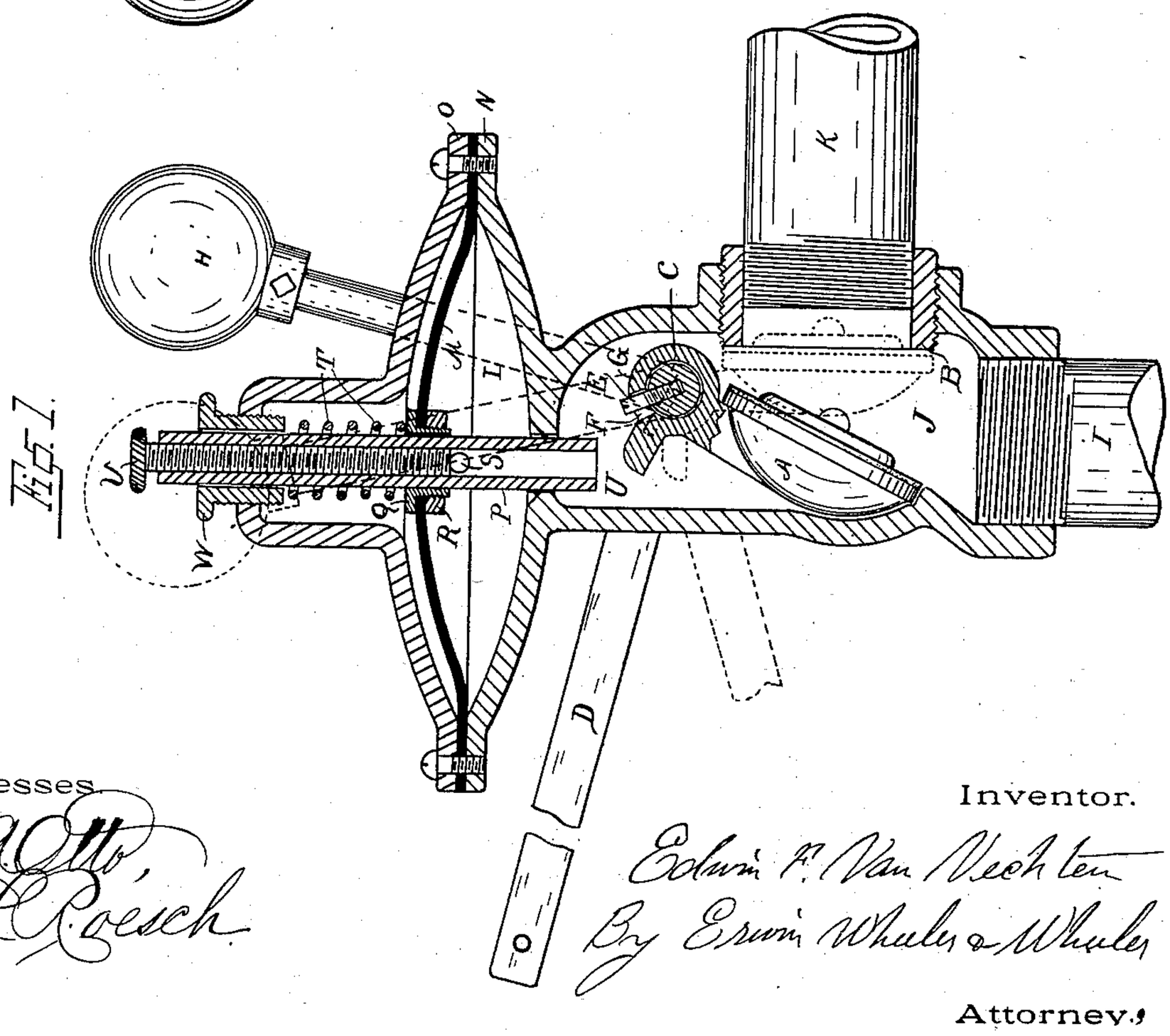

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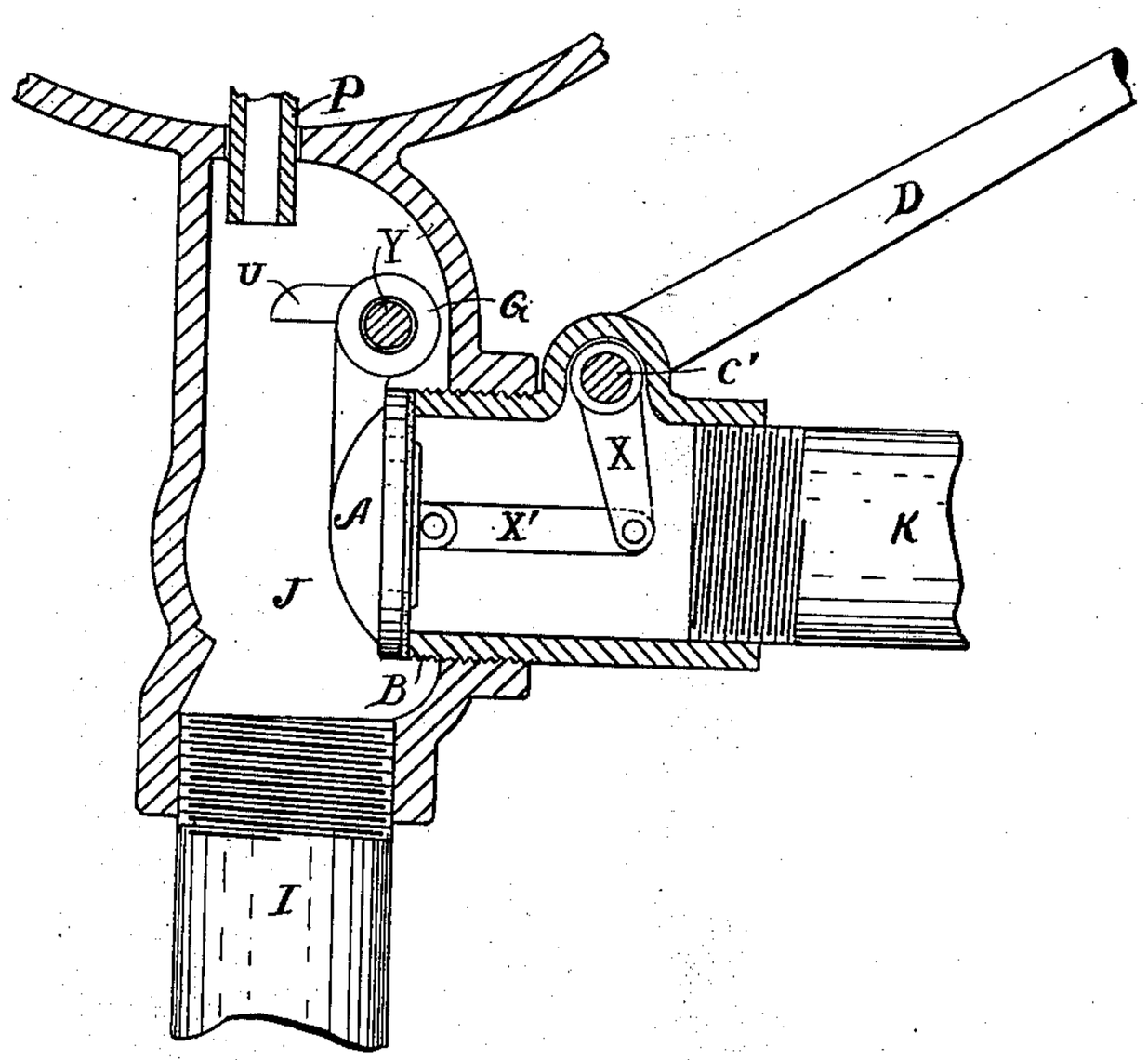
Fig. 3.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC VALVE-CLOSING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 654,770, dated July 31, 1900.

Application filed June 12, 1899. Serial No. 720,199. (No model.)

To all whom it may concern:

Be it known that I, EDWIN F. VAN VECHTEN, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Automatic Valve-Closing Mechanism, of which the following is a specification.

The objects of my invention are, first, to provide a device by which a valve when opened by the manual act of the user will remain in such open position until the desired quantity of water has passed through it, when it will then be automatically closed; second, to provide a device by which the quantity of water used may be regulated, and, third, to provide means for adjusting the valve-actuating mechanism as may be required by the various pressures of different water-mains.

My invention is further explained by reference to the accompanying drawings, in which—

Figure 1 represents a vertical section thereof, and Fig. 2 is a side view having parts broken away to show the interior construction. Fig. 3 is a detail sectional view illustrating a form of construction in which the valve-actuating shaft is located on the exhaust or discharge side of the valve.

Like parts are identified by the same reference-letters in all the views.

A represents the water-controlling valve, which is suspended above its seat B from the actuating-shaft C.

D is the operating-lever, which is rigidly affixed to the protruding end of the shaft. The valve A is loosely fitted to the shaft C in such a manner that it may when closed be brought more readily to its seat. Motion is communicated from the actuating-lever D to the valve A when desirous to open the same through the shaft C and stop E. The stop E is rigidly affixed at one end to the shaft C, and its protruding end passes up through a small recess F of the valve-sleeve G, whereby as said lever D is moved the stop E is brought to bear against one side of the slot F, thereby carrying the valve A with it. When the valve A has been thrown to the open position shown in Fig. 1 by the action of the lever D, it is retained in such open position by the counterpoise H, which by the opening of said valve is thrown to one side of the vertical. It will be understood, as stated, that the valve A is opened by the manual act of the user, when the water, which enters the duct I, will pass freely through the valve-chamber J and out through the duct K until said valve is closed. To the side of the valve-chamber J is connected a diaphragm-chamber L, provided with a flexible diaphragm M, which diaphragm is clamped at its periphery between the contiguous walls N and O of said chamber. Through the center of the diaphragm M is secured a tubular connection P by the clamping-nuts Q and R. The tubular connection P is provided with a side duct S, through which the water enters and escapes from said diaphragm-chamber as said diaphragm is raised and lowered. It will now be obvious that when the valve A is closed water will pass up through the tubular connection P and out through the duct S into the diaphragm-chamber L beneath the diaphragm M, whereby said diaphragm will be raised to the position shown in Fig. 1 and the spiral spring T will be compressed and said diaphragm and spring will remain in such position until relieved of the water-pressure by opening said valve A. When the valve A has been opened by the operator, as previously described, and the water permitted to pass freely through the exhaust-duct K, the pressure in the chamber L will be so diminished that said diaphragm M will be forced downward by the recoil of the spiral spring T above it, whereby said tubular connection P, which is secured to said diaphragm, will be brought to bear against the arm U of the valve and said valve will be forced downward and said counterpoise H be carried to and past the vertical, when said valve will be brought to its seat by the joint action of the water-pressure and the gravity of said counterpoise. The quantity of water which shall pass through the valve-chamber before the valve is closed depends upon the time required for the water to escape from the diaphragm-chamber L, and the escape of water from the diaphragm-chamber is regulated by the adjustment of the regulating-screw V in its relation to the side passage S. It will therefore be obvious that by turning down said screw V the side passage S is partially closed and the escape of water from the diaphragm-chamber L is retarded and also that by the reverse movement of the valve-screw said passage S is opened and the action of said diaphragm ac-

celerated. Thus it will be understood that the length of time the water is passing through said valve-chamber and the quantity of water which shall escape are governed by the relative position of the valve-screw V to the passage S.

The diaphragm M may be actuated with a uniform movement regardless of the variations of pressure of different water-supply mains by the adjustment of the tension-screw W. When used in connection with a high pressure, the tension-screw W may be turned down against the actuating-spring T, but when used with a low pressure said tension-screw may be turned upward and the valve thus adjusted to act uniformly.

While I have shown and would preferably use a counterpoise H for holding the valve in its open position, it is obvious that the valve-shaft C may, if desired, be so closely packed that the valve will remain open until closed by the action of the diaphragm and said counterpoise thereby dispensed with. It is also obvious that the position of said valve may be so changed in relation to its pivotal shaft that it will be retained in the open position by its own gravity, in which case the counterpoise H might be dispensed with.

While I have for convenience of construction formed a water-duct, which leads to the diaphragm-chamber, through the tubular connection, it may, if desired, be located elsewhere outside of said tubular connection and the passage of water controlled in any convenient manner. It is obvious that the shaft C may, if desired, be located on the exhaust side of the valve A, in which case any suitable means may be employed to connect said shaft and valve and to operate the same.

In Fig. 3 I have illustrated the valve-actuating shaft C as located in the discharge-duct, the valve being supported by a pivot-pin C′. Motion is communicated from the shaft C to open the valve by means of an arm X and connecting rod or link X′. It is also obvious that a cylinder and piston may, if desired, be substituted for a diaphragm-chamber for actuating the valve.

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

1. A valve-chamber provided with inlet and exhaust ducts; a valve; means for opening the same; a movable part adapted to be actuated against a counter-pressure, independently of the valve, when the latter is closed; means for applying such counter-pressure to the movable part; means for communicating motion from said movable part to actuate the valve when the latter is open; and means for controlling the motion of the movable part in one direction.

2. A valve-chamber provided with inlet and exhaust ducts; a valve; means for opening the same; a movable part adapted to be actuated in one direction independently of the valve, and to communicate motion to the latter when actuated in the opposite direction; means for actuating said movable part; and means for controlling the motion thereof.

3. A valve-chamber provided with inlet and outlet ducts; a valve; means for opening the same; a movable part adapted to be actuated against a counter-pressure by means of the pressure of the supply fluid; means for applying such counter-pressure to the movable part; and means for communicating the motion of said movable part when relieved of the pressure of the supply fluid, to actuate the valve toward its seat.

4. A valve-chamber provided with inlet and outlet ducts; a valve; means for opening said valve; a movable part adapted to be actuated against a counter-pressure by the pressure of the supply fluid; means for applying such counter-pressure to the movable part; means for communicating the motion of the movable part to actuate the valve in one direction; and means for regulating the motion of the movable part.

5. A valve-chamber provided with inlet and outlet ducts; a valve; means for opening the same; a movable part adapted to be actuated against a counter-pressure by the pressure of the supply fluid; a device for applying such counter-pressure; means for adjusting the same; means for communicating motion of the movable part to actuate the valve in one direction; and means for regulating the motion of the movable part.

6. A valve-chamber provided with inlet and exhaust ducts; a valve; a diaphragm-chamber communicating with the valve-chamber through a contracted passage; a diaphragm located in said chamber and adapted to be actuated by the fluid-supply entering the valve-chamber through said passage; mechanism, independent of the diaphragm, for opening the valve; and means for communicating motion from said diaphragm to actuate the valve in one direction.

7. In a self-closing valve mechanism, the combination of a valve-chamber having inlet and exhaust ducts; a valve, means for opening the same; a diaphragm-chamber in communication with the fluid-supply through a contracted opening; a diaphragm adapted to be actuated in one direction by liquid entering the diaphragm-chamber through said opening; a spring adapted to exert a counter-pressure upon said diaphragm and to actuate the same when the pressure of the supply fluid is relieved; and connections adapted to communicate the motion of the diaphragm to actuate the valve toward its seat when the pressure of the supply fluid is relieved.

8. In a self-closing valve mechanism, the combination of a valve-chamber having inlet and exhaust ducts; a valve; means for opening the same; a diaphragm-chamber in communication with the fluid-supply through a contracted opening; a diaphragm adapted to be actuated in one direction by liquid enter-

ing the diaphragm-chamber through said opening; a spring adapted to exert a counter-pressure upon said diaphragm and to actuate the same when the pressure of the supply fluid is relieved; means for regulating the tension of said spring; and connections adapted to communicate the motion of the diaphragm to actuate the valve toward its seat when the pressure of the supply fluid is relieved.

9. In an automatic valve-closing mechanism, the combination of a valve-chamber having an inlet and an exhaust duct; a valve closing the exhaust-duct; a valve-shaft; a valve-actuating lever secured to the projecting end of said valve-shaft; a diaphragm-chamber; a diaphragm located in said chamber; a water duct or passage communicating from said valve-chamber to said diaphragm-chamber; and a connection between said diaphragm and said valve.

10. In an automatic valve-closing mechanism, the combination of a valve-chamber having an inlet and an exhaust duct; a valve closing the exhaust-duct; a valve-supporting shaft protruding through the wall of said valve-chamber; a valve-actuating lever secured to the protruding end of said shaft; a diaphragm-chamber; a diaphragm located in said chamber; and a tubular connection between said diaphragm and said valve, forming a duct through which the water passes from said valve-chamber to and from said diaphragm-chamber.

11. In an automatic valve-closing mechanism, the combination of a valve-chamber having an inlet and an exhaust duct; a valve closing the exhaust-duct; a valve-supporting shaft protruding through the wall of said valve-chamber; a valve-actuating lever secured to the protruding end of said shaft; a diaphragm-chamber; a diaphragm located in said chamber; a tubular connection communicating between said diaphragm and said valve, forming a duct through which the water passes from said valve-chamber to and from said diaphragm-chamber; a regulating-screw located in said tubular connection and adapted to be adjusted so as to regulate the passage of water through the duct of said tubular connection.

12. In an automatic valve-closing mechanism, the combination of a valve-chamber having an inlet and an exhaust duct; a valve closing the exhaust-duct; a valve-supporting shaft protruding through the wall of said valve-chamber; a valve-actuating lever secured to the protruding end of said shaft; a diaphragm-chamber; a diaphragm located in said chamber; a tubular connection communicating between said diaphragm and said valve, forming a duct through which the water passes from said valve-chamber to and from said diaphragm-chamber; a regulating-screw located in said tubular connection and adapted to be adjusted so as to regulate the passage of water through the duct of said tubular connection; and a spring interposed between said diaphragm and the exterior walls of said diaphragm-chamber.

13. In an automatic valve-closing mechanism, the combination of a valve-chamber having an inlet and an exhaust duct; a valve closing the exhaust-duct; a valve-supporting shaft protruding through the wall of said valve-chamber; a valve-actuating lever; a diaphragm-chamber; a diaphragm located in said chamber; a tubular connection communicating between said diaphragm and said valve, forming a duct through which the water passes from said valve-chamber to and from said diaphragm-chamber; a regulating-screw located in said tubular connection and adapted to be adjusted so as to regulate the passage of water through the duct of said tubular connection; a spring interposed between said diaphragm and the exterior walls of said diaphragm-chamber; and a tension-screw supported from the walls of said diaphragm-chamber and adapted to bear against said tension-spring, whereby the tension of said spring is adjusted.

14. In an automatic valve-closing mechanism, the combination of a valve-chamber having an inlet and an exhaust duct; a valve closing the exhaust-duct; a valve-supporting shaft protruding through the wall of said valve-chamber; a valve-actuating lever and a counterpoise secured to the protruding end of said valve-shaft, said counterpoise being adapted to counterbalance the weight of said valve when open and prevent it from closing of its own gravity; a diaphragm-chamber; a diaphragm located in said chamber; a tubular connection communicating between said diaphragm and said valve, forming a duct through which the water passes from said valve-chamber to and from said diaphragm-chamber; a regulating-screw located in said tubular connection and adapted to be adjusted so as to regulate the passage of the water through the duct of said tubular connection; a spring interposed between said diaphragm and the exterior walls of said diaphragm-chamber; and a tension-screw supported from the walls of said diaphragm-chamber and adapted to bear against said tension-spring, whereby the tension of said spring is adjusted.

In testimony whereof I affix my signature in the presence of two witnesses.

EDWIN F. VAN VECHTEN.

Witnesses:

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