

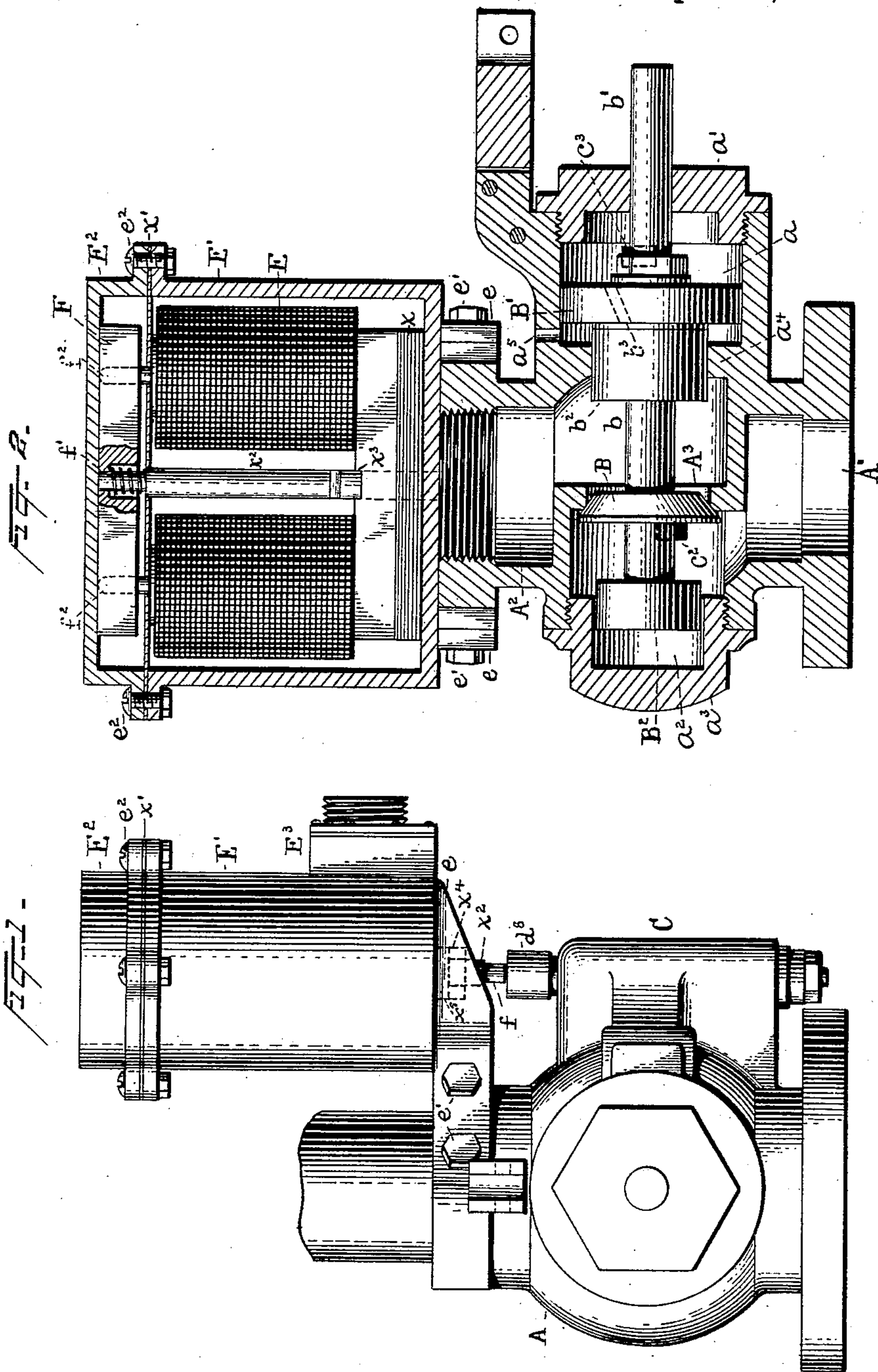
(No Model.)

2 Sheets—Sheet 1.

A. E. COLGATE.
VALVE CONTROLLER.

No. 602,429.

Patented Apr. 19, 1898.



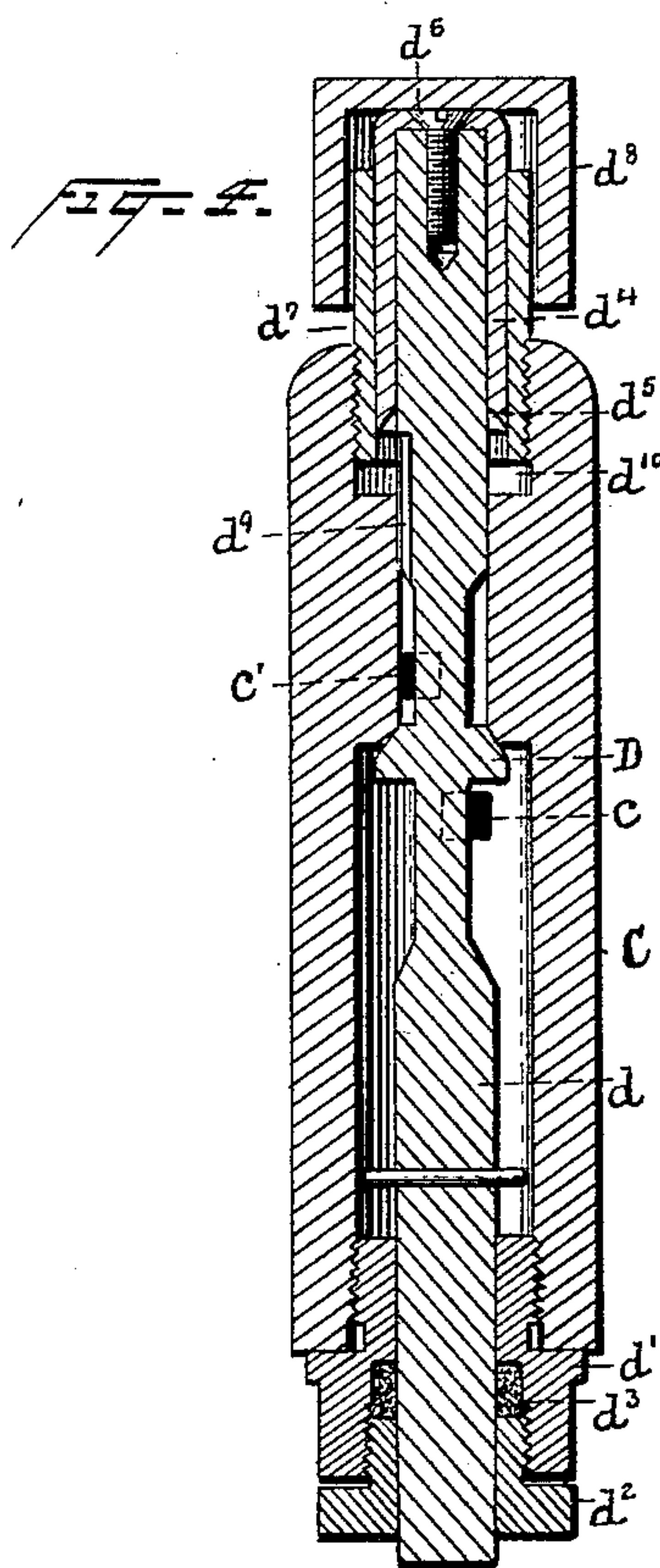
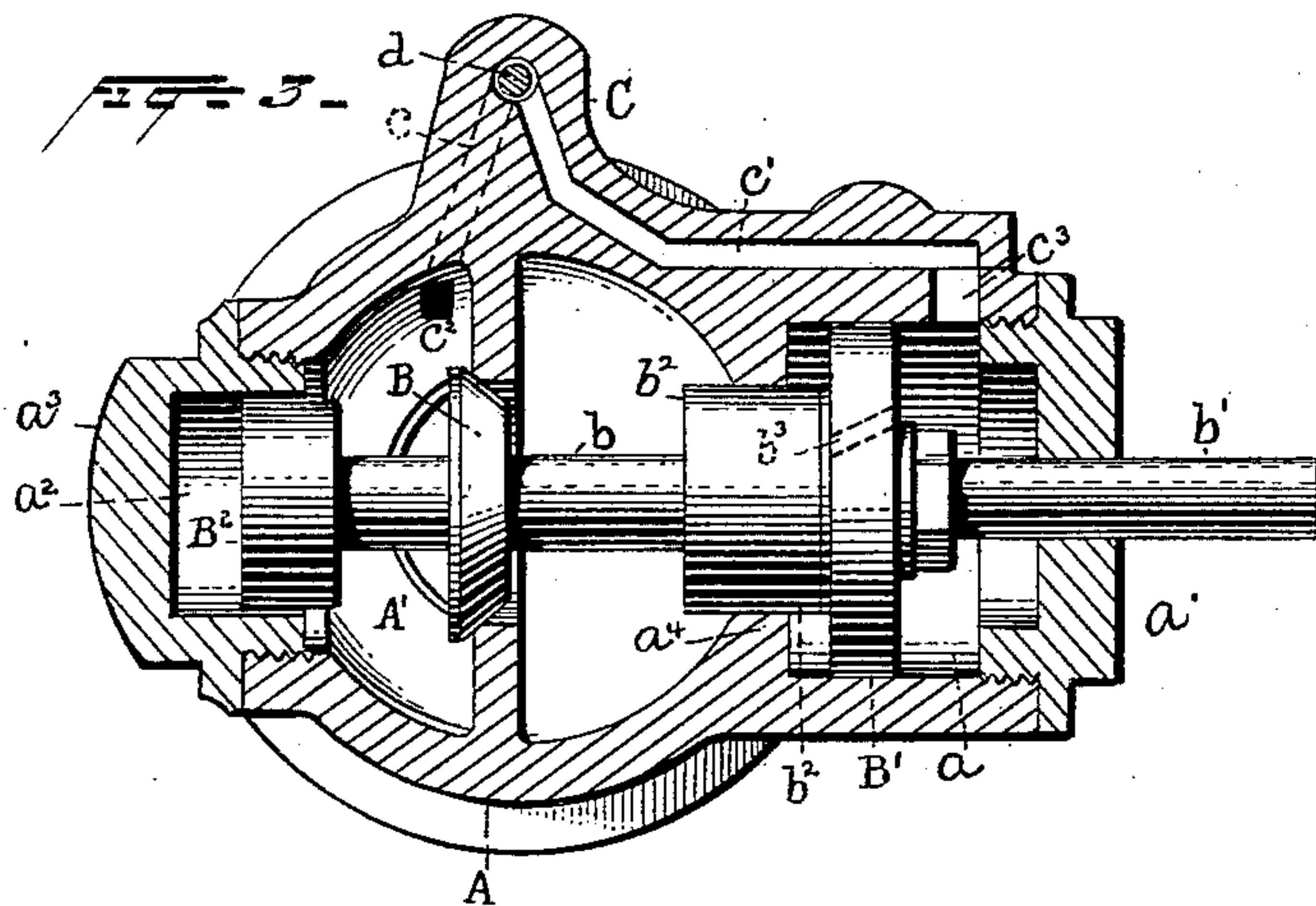
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2 Sheets—Sheet 2.

No. 602,429.

Patented Apr. 19, 1898.



Witnesses
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Arthur E. Colgate Inventor
By his Attorneys Nyer & Russell

UNITED STATES PATENT OFFICE.

ARTHUR E. COLGATE, OF NEW YORK, N. Y., ASSIGNOR TO THE SIGNAL
CONTROL COMPANY, OF BROOKLYN, NEW YORK.

VALVE-CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 602,429, dated April 19, 1898.

Application filed September 19, 1896. Renewed October 1, 1897. Serial No. 653,747. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR E. COLGATE, a citizen of the United States, residing at New York city, in the county and State of New York, have invented a certain new and useful Improvement in Valve-Controllers, of which the following is a specification.

The object of my invention is to produce a reliable main valve controlled by an auxiliary valve, particularly one in which the auxiliary valve is controlled electrically, and more particularly a main valve adapted to be controlled directly by hand or indirectly by the auxiliary valve electrically controllable either at will or automatically. Such a valve may be used for various purposes, but I have designed the same mainly for controlling the flow of steam to a whistle.

In carrying my invention into effect I employ a main valve, which is held to its seat by the pressure from the inlet and which is opened by the pressure from the inlet actuating a piston working in a separate chamber and carried at one end of the valve-stem. At the other end of the valve-stem I provide a piston, which works in a chamber to cushion the opening stroke of the valve. The passage from the inlet to the chamber containing the valve-actuating piston is controlled by an auxiliary valve, which is held to its seat by the pressure from the inlet and is opened by an electromagnet. The stem of the main valve is arranged to be actuated directly by hand by any suitable device. As shown, the main valve is adapted to be actuated manually by an ordinary pivoted lever.

I also employ certain devices and combinations of devices hereinafter referred to.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is an end elevation of the apparatus, showing the relative positions of the main-valve casing, the auxiliary-valve casing, and the casing for the electromagnet for opening the auxiliary valve. Fig. 2 is a central vertical section through the main-valve casing and through the electromagnet-casing. Fig. 3 is a central horizontal section through the main valve, showing the passage controlled by the auxiliary valve; and Fig. 4 is

an enlarged central vertical section through the auxiliary valve.

Referring to the drawings, A is the main-valve casing, having an inlet A', an outlet A², and a valve-seat A³.

B is the main valve, carried by a valve-stem *b* and having an actuating-piston B' near one end of the valve-stem and a piston B² at the other end to cushion the opening stroke of the valve. Piston B' works in a chamber *a*, which is closed by a cap *a'*, through which passes the end *b'* of the valve-stem. Piston B² works in a chamber *a*², formed in the cap *a*³. The valve-stem has its bearings within the caps *a'* and *a*³ and within the annular flange *a*⁴, at which point the valve-stem is provided with a cylindrical enlargement *b*². The chamber *a* is connected with the inlet A' by passages *c c'*, the passage *c* having an opening *c*² at the inlet and the passage *c'* an opening *c*³ at the chamber *a*. The passages *c c'* enter the auxiliary-valve chamber C, as shown in Fig. 4, and communication between the two is controlled by the auxiliary valve D. To relieve the pressure upon the piston B' in closing the main valve, the piston is provided with a port *b*³, and the valve-casing is provided with an exhaust-opening *a*⁵.

The enlargement of the stem *b* provides an additional surface upon which the pressure within the valve-chamber acts to close the valve. When the valve is closed, the pressure upon the valve overbalances the pressure upon the inlet side of piston B² and the valve is firmly held to its seat. When the auxiliary valve is opened, the pressure on the inlet side of piston B' overbalances the pressure upon the valve B and opens the valve. The opening of the valve B permits the pressure to act upon the surface *b*²; but the pressure upon B and *b*² from the inlet is not sufficient to overbalance the pressure upon B' and B² and the valve B remains open. When, however, the valve D is closed, the pressure upon B and *b*² overbalances the pressure upon B² and effects a rapid closing of the valve.

The valve D is held to its seat by the pressure within the valve-chamber C. The valve-stem *d* at its lower end works through a collar *d'*, screwed into the lower end of the

valve-chamber and through a packing-ring d^2 , screwed into the collar d' , and between the packing-ring and the collar is a suitable packing material d^3 . The upper end of the valve-stem d is enlarged by means of a hood or thimble d^4 to afford a surface in addition to that of the piston upon which the pressure may act to effect a rapid closing of the valve D. To further increase the area of the surface presented by the end of the thimble, its end is beveled, as shown at d^5 . The object in employing the thimble for the purpose of increasing the area against which the pressure acts to close the valve is to enable the valve to be readily inserted in the valve-chamber. A collar might be substituted for the thimble; but the thimble affords a better bearing-surface for the valve-stem and it can be more readily secured in position without interfering with its working, as shown by the screw d^6 . The valve-stem d is grooved or beveled off at d^9 to permit the steam or other fluid to enter the chamber d^{10} . By locating in a separate chamber the additional surface upon which the pressure from the inlet acts to effect a rapid closing of the auxiliary valve I do not increase the resistance to the opening of the valve, and hence in employing an electromagnet for opening the valve I considerably reduce the battery-power required. The pressure in the valve-chamber C, acting upon the lower part of valve-stem d , almost balances the pressure upon the valve D, the difference being only sufficient to hold the valve D closely to its seat. By almost balancing the valve D, I am enabled to open said valve by means of an electromagnet with little battery-power. The upper end of the valve-stem works in a tube or sleeve d^7 , screwed into the upper end of the valve-chamber C, the valve-stem projecting a sufficient distance above the tube to permit the proper downward movement of the valve by means of the actuating-electromagnet E. A cap d^8 is placed over the upper end of the valve-stem and the upper end of the sleeve d^7 . The object of this cap is to prevent paint and other matter working in between the sleeve d^7 and the thimble d^4 on the upper end of the valve-stem and thus prevent its becoming clogged.

The actuating-electromagnet E is mounted within a case E' of non-magnetic metal to reduce the extra or self-induced currents upon the discharge of the magnet. The magnet-case is supported upon the valve-casing by two arms e , projecting from the lower end of the magnet-case and which are bolted to the valve-casing by bolts e' . The magnet-case may be made in any desired number of parts to facilitate manufacture. In the drawings I have shown it in two parts—that is, the body portion and the cover E^2 , which is firmly secured by screws e^2 . The circuit connections to the magnet are made by suitable contacts carried within the box E^3 , to which the coup-

ling of a cable is adapted to be screwed to form a water-tight joint.

The magnet is inserted in the case with its yoke at the bottom resting upon a plate x and secured by means of bolts (not shown) which are screwed through the bottom of the casing and into the yoke. In practice the interior of the magnet-case is not finished smooth, and in order to afford a firm and even seat for the magnet-yoke the plate x is made of a material which will yield and allow the burs to enter the plate and thus afford a solid and rigid support. For this purpose the plate x is preferably made of a material which under ordinary temperatures is quite hard, but which when heated becomes somewhat softer, so that when the plate is heated and placed in position the burs will readily become embedded therein, and on cooling becomes hard and unyielding and affording a solid bearing. Above the poles of the magnet and in close proximity thereto is a brass plate x' , which is secured between the body and cover of the magnet-case, and rigidly attached thereto in the center is a brass tube x^2 , which passes through the yoke of the magnet, the plate x , and the bottom of the casing. This tube is provided with a shoulder x^3 , which is seated in a recess upon the upper side of the magnet-yoke, and the free end of the tube, which extends through the bottom of the casing, is screw-threaded and receives a rubber washer x^5 and a nut x^4 , Fig. 1.

The armature F of the magnet E is rigidly mounted upon the upper end of a rod f , which passes through the tube x^2 and stands directly over and in line with the valve-stem d . The armature is recessed to receive a spiral spring f' , Fig. 2, which is coiled around the rod f and moves the armature away from the poles of the magnet. A brass pin f^2 projects from each magnet-pole through holes in the armature F and serves to guide the armature in its movements toward and away from the magnet, and also serves to prevent axial movement of the armature.

It is important to prevent the entrance of moisture to the magnet-case, and the only place where moisture can enter is at the point where the rod f of the armature projects through the case, and to prevent its affecting the magnet the plate x' with tube x^2 , rubber washer x^5 , and nut x^4 are provided. If necessary, a layer of rubber or other packing material may be placed on both sides of plate x' , along the edge, so as to form a good water-tight joint between the case E' and the cover E^2 . Thus it will be seen that the magnet is in a practically air-tight and water-tight case and that the only moisture which can enter will be through tube x^2 to the upper side of plate x' , where it cannot affect the magnet.

What I claim is—

1. The combination with a main valve designed to be held to its seat by the pressure

from the inlet, of a valve-stem provided with an actuating-piston working in a separate chamber and adapted to be actuated by the pressure from the inlet to open the main valve, another piston on said valve-stem working in a chamber to cushion the opening stroke of the main valve, a passage from the inlet to the chamber of the actuating-piston, and an auxiliary valve for controlling said passage, substantially as set forth.

2. The combination with a main valve designed to be held to its seat by the pressure from the inlet, of a valve-stem provided with an actuating-piston working in a separate chamber and adapted to be actuated by the pressure from the inlet to open the main valve, another piston on said valve-stem working in a chamber to cushion the opening stroke of the main valve, a head or enlargement on the outlet side of said valve-stem, a passage from the inlet to the chamber of the actuating-piston, and an auxiliary valve for controlling said passage, substantially as set forth.

3. The combination with a main valve designed to be held to its seat by the pressure from the inlet, of a valve-stem provided with an actuating-piston working in a separate chamber and adapted to be actuated by the pressure from the inlet to open the main valve, another piston on said valve-stem working in a chamber to cushion the opening stroke of the main valve, a passage from the inlet to the chamber of the actuating-piston, an auxiliary valve for controlling said passage, and an electromagnet for operating said auxiliary valve, substantially as set forth.

4. The combination with a main valve designed to be held to its seat by the pressure from the inlet, of a valve-stem provided with an actuating-piston working in a separate chamber and adapted to be actuated by the pressure from the inlet to open the main valve, another piston on said valve-stem working in a chamber to cushion the opening stroke of the main valve, a passage from the inlet to the chamber of the actuating-piston, an auxiliary valve for controlling said passage, said valve being held to its seat by the pressure from the inlet, and an electromagnet for opening said auxiliary valve, substantially as set forth.

5. The combination with a main valve designed to be held to its seat by the pressure from the inlet, of a valve-stem provided with an actuating-piston working in a separate chamber and adapted to be actuated by the pressure from the inlet to open the main valve, means for permitting the operation of said main valve manually, a piston at the other end of the valve-stem working in a chamber to cushion the opening stroke of the main valve, a passage from the inlet to the chamber of the actuating-piston, and an auxiliary valve for controlling said passage, substantially as set forth.

6. The combination with a main valve, of a valve-stem provided with an actuating-piston working in a separate chamber and adapted to be actuated by the pressure from the inlet to open the main valve, a passage from the inlet to said chamber, and an auxiliary valve for controlling said passage, said auxiliary valve being slightly overbalanced and held to its seat by pressure from the inlet, substantially as set forth.

7. The combination with a main valve, of a valve-stem provided with an actuating-piston working in a separate chamber and adapted to be actuated by the pressure from the inlet to open said valve, a passage from the inlet to said chamber, and an auxiliary valve for controlling said passage, said auxiliary valve having a surface upon which the pressure within the valve-chamber acts to produce a rapid closing of the auxiliary valve and located so as not to affect the opening movement of said valve, substantially as set forth.

8. The combination with a main valve, of a valve-stem provided with an actuating-piston working in a separate chamber and adapted to be actuated by the pressure from the inlet to open the main valve, a passage from the inlet to said chamber, and an auxiliary valve for controlling said passage, said auxiliary valve on the inlet side being slightly overbalanced to hold it to its seat, and having a surface on the outlet side which greatly overbalances the valve to produce a rapid closing thereof, substantially as set forth.

9. The combination with a main valve, of a valve-stem provided with an actuating-piston working in a separate chamber and adapted to be actuated by the pressure from the inlet to open the main valve, a passage from the inlet to said chamber, an auxiliary valve for controlling said passage and whose valve-stem projects through the valve-casing, means engaging with said valve-stem to open the auxiliary valve, and a hood or thimble d^8 on said valve-stem, substantially as and for the purpose set forth.

10. The combination with a main valve, of a valve-stem provided with an actuating-piston working in a separate chamber and adapted to be actuated by the pressure from the inlet to open the main valve, a passage from the inlet to said chamber, an auxiliary valve for controlling said passage and whose valve-stem projects through the valve-casing, means engaging with one end of said valve-stem to open the auxiliary valve, a hood or thimble d^8 on that end of the valve-stem, and a collar d' packing d^3 and packing-ring d^2 through which the other end of said valve-stem works, substantially as and for the purpose set forth.

11. The combination with a main valve, of a valve-stem provided with an actuating-piston working in a separate chamber and adapted to be actuated by the pressure from the

inlet to open the main valve, a passage from
the inlet to said chamber, an auxiliary valve
for controlling said passage, an electromag-
net for operating said auxiliary valve, a prac-
5 tically water-tight casing for said magnet, a
plate x' and connected tube x^2 through which
extends a rod from the armature to the stem
of the auxiliary valve, and a packing at the

outer end of said tube x^2 , substantially as and
for the purpose set forth. 10

This specification signed and witnessed this
16th day of September, 1896.

ARTHUR E. COLGATE.

Witnesses:

W. PELZER,
EUGENE CONRAN.