

(No Model.)

C. L. FORTIER.
ELECTRIC VALVE.

No. 560,703.

Patented May 26, 1896.

Fig. 2.

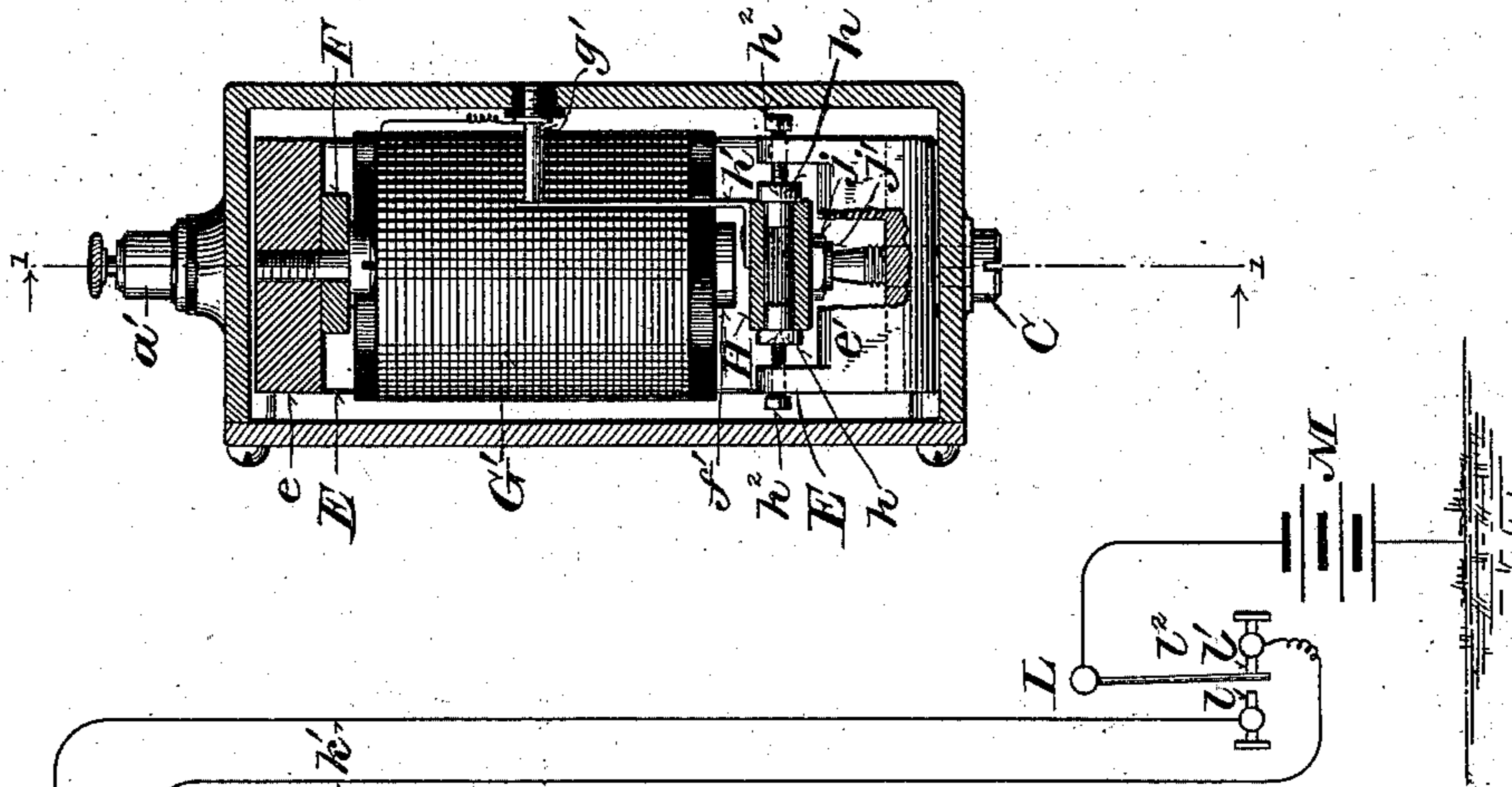
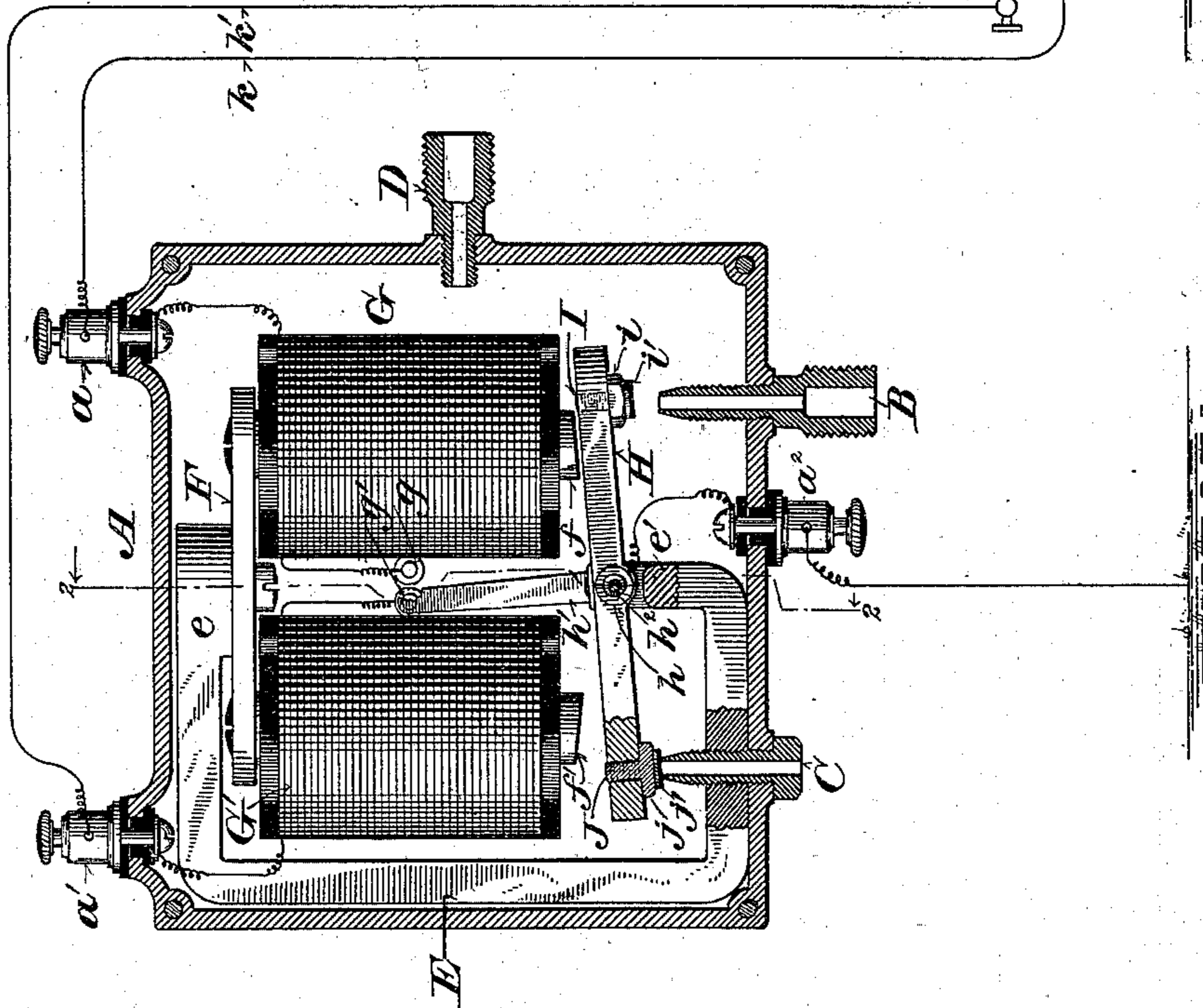


Fig. 1.



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES L. FORTIER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE JOHNSON ELECTRIC SERVICE COMPANY, OF SAME PLACE.

ELECTRIC VALVE.

SPECIFICATION forming part of Letters Patent No. 560,703, dated May 26, 1896.

Application filed October 10, 1892. Serial No. 448,316. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. FORTIER, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Valve-Controllers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My improvements relate to electrically-operated valves; and the main objects of my invention are to insure the proper seating and closing of the valves, and to prevent the sticking of the armature with which they are connected to the cores of the electromagnet, and generally to improve the construction and operation of devices of this class.

It consists of certain novel features in the construction and arrangement of component parts of the device, as hereinafter particularly described, and pointed out in the claim.

In the accompanying drawings like letters designate the same parts in both figures.

Figure 1 is a vertical section of an electro-pneumatic valve embodying my improvements; and Fig. 2 is a vertical cross-section of the same, taken at right angles to the section shown in Fig. 1.

A represents a valve-case, which may be made of any suitable material. It is provided with supply and exhaust connections B and C and a connection D with the diaphragm chamber or piston of the valve or mechanism to be operated by the medium controlled by my improved device.

E is a permanent magnet attached to and inclosed by the case A. To one of its poles *e* is secured the yoke F, connecting and supporting the cores *ff'* of an electromagnet G G'. To or in proximity with the other pole *e'* is pivoted at or near its center a soft-iron bar or armature H with its ends overhanging the openings at the inner ends of the supply and exhaust connections B and C. In the armature H, in line with the connections B and C, are threaded screws I and J, having squared

heads *i* and *j*, and attached thereto disks *i'* and *j'*, of leather or other suitable elastic packing material, constituting valves which are adapted to close the opening in the inner end of either of the connections B and C, according to the position of the armature. By means of these screws the valve in each end of the armature is adjusted so as to be seated and close the opening in the adjacent connection without permitting the other end of the armature to touch the pole-piece *f* or *f'*, toward which it is attracted. The effectual seating and closing of the valves are thus insured. To insure the free operation of the armature, I prefer to provide it with pivot-bearings *h h* of glass or other non-corrosive material, which receive and turn upon the points of the pivot-screws *h² h²*.

The coils G and G' of the electromagnet are wound on the cores *ff'* in opposite directions, one terminal of the coil G being connected with the binding-post *a* and the other terminal with an insulated contact-piece *g*, and one terminal of the coil G' being connected with the binding-post *a'* and with an insulated contact-piece *g'*.

The armature H is formed or provided with an arm or spring *h'*, which is arranged to engage with one or the other of the contact-pieces *g* and *g'*, according to the position into which it is moved and held by the magnets, and it is electrically connected with the valve-case or a binding-post *a²*, which has a ground or other connection with one pole of the battery M, supplying the instrument with current. The binding-posts *a a'* are connected by wires *kk'* with the opposite contact-points *ll'* of a thermostat L or other suitable circuit-controlling device. The expansion-strip or movable member *l²* of the thermostat is connected with the other pole of the battery M.

My improved valve operates as follows: The circuit having been closed through the coil G by the engagement of the movable part *l²* with the contact *l'* of the thermostat has left the armature in the position in which it is shown in the drawings, with the valve *i'* open, the valve *j'* closed, and the arm or spring *h'* in engagement with the contact *g'*. If now a change of temperature moves the part *l²*

into engagement with the contact l , the circuit will be closed through the coil G' , thereby increasing the strength of the core f' and its pull on the armature H and decreasing or
 5 neutralizing the effect of the pole f , or reversing its polarity, due to the permanent magnet E . The armature H having a polarity like that of the opposite pole e' of the permanent magnet, unlike the polarity of the core f' and
 10 like the polarity which the coil G' tends to induce in the core f , will be instantly shifted in position, closing the valve i' , opening the valve j' , and carrying the arm or spring h' out of engagement with the contact-piece g' into
 15 engagement with the contact-piece g . When the circuit is thus broken through the coil G' , the armature H will be held by the permanent magnet E in the position into which it has just been turned, the core f' , by reason
 20 of its closer proximity with said armature, acting with much greater effect than the core f thereon. The valves being thus shifted by the temporary action and change of polarity of the electromagnet G G' , and held in
 25 place when shifted by the constant action of the permanent magnet E , cut off communication between the supply connection B and the connection D and open communication between said connection D and the exhaust con-
 30 nection C , thereby permitting the discharge of compressed air or other actuating medium from the cylinder or diaphragm-chamber of the device operated or controlled by such air or other medium. The armature and valves
 35 will thus be held in the position last mentioned until a change of temperature in the building or apartment where the thermostat is located again shifts the movable part l^2 into engagement with the contact l' , thereby clos-
 40 ing the circuit through the coil G . The armature and valves will thereupon be instantly reversed or shifted, the exhaust connection C of the valve-chamber closed, and commu-

nication between the supply connection B and the connection D established.

In detail of construction and arrangement of parts my improved device may be variously modified within the intended scope and spirit of my invention. The armature H may be placed in contact with or removed more
 50 or less from the adjacent pole of the permanent magnet E , and in place of the differential winding of the coils of the electromagnet any other well-known arrangement or device
 55 may be employed to reverse or change its polarity. It is, however, of prime importance that the armature should move with perfect freedom, and that means should be provided for varying the proximity of the armature to the cores of the electromagnet, whereby the
 60 closing of the valves is insured and sticking of the armature to the cores of said magnet is avoided.

I claim—

In an electric valve the combination of a
 65 valve-case provided with connections having valve seats and openings within said case, an electromagnet, means for changing the polarity of said magnet, a polarized armature pivoted within said case in the field of said
 70 magnet and provided opposite the seats and openings in said connections with valves which are adjustably connected with said armature so as to admit of varying the distance
 75 between them and their seats, whereby sticking of the armature to the cores of the magnet is prevented and the closing of the valves is insured, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as
 80 my own I affix my signature in presence of two witnesses.

CHARLES L. FORTIER.

Witnesses:

ROBERT W. DAY,
 H. C. MALLORY.

It is hereby certified that the residence of the assignee in Letters Patent No. 560,703, granted May 26, 1896, upon the application of Charles L. Fortier, of Chicago, Illinois, for an improvement in "Electric Valves," was erroneously written and printed "of same place," (*i. e.* Chicago, Illinois) whereas said residence should have been written and printed *Milwaukee, Wisconsin*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 16th day of June, A. D. 1896.

[SEAL.]

JNO. M. REYNOLDS,
Assistant Secretary of the Interior.

Countersigned:

S. T. FISHER,
Acting Commissioner of Patents.