

(No Model.)

2 Sheets—Sheet 1.

L. BELL & F. H. ROOT.
ELECTRO THERMOSTATIC VALVE.

No. 441,817.

Patented Dec. 2, 1890.

Fig. 1.

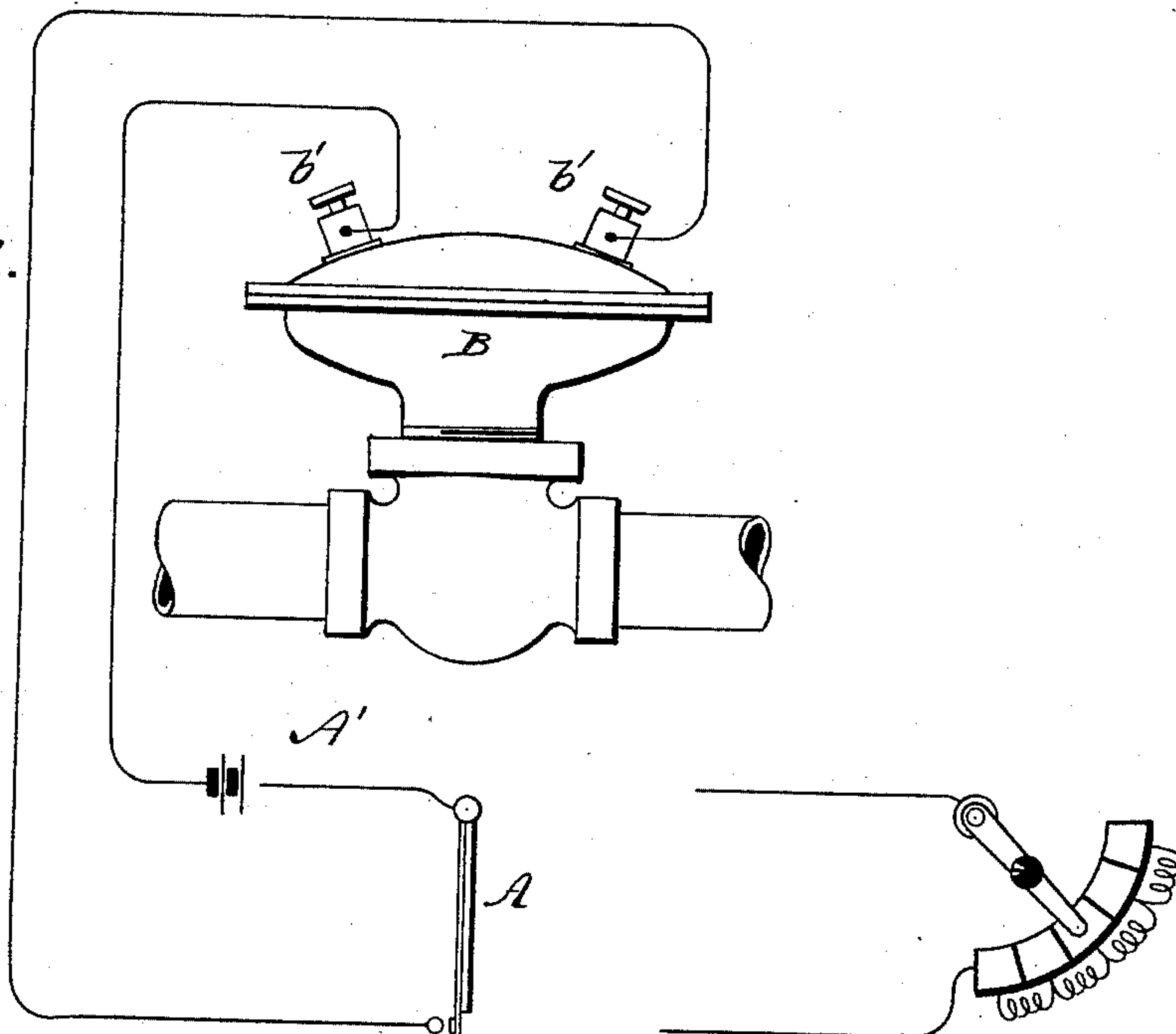
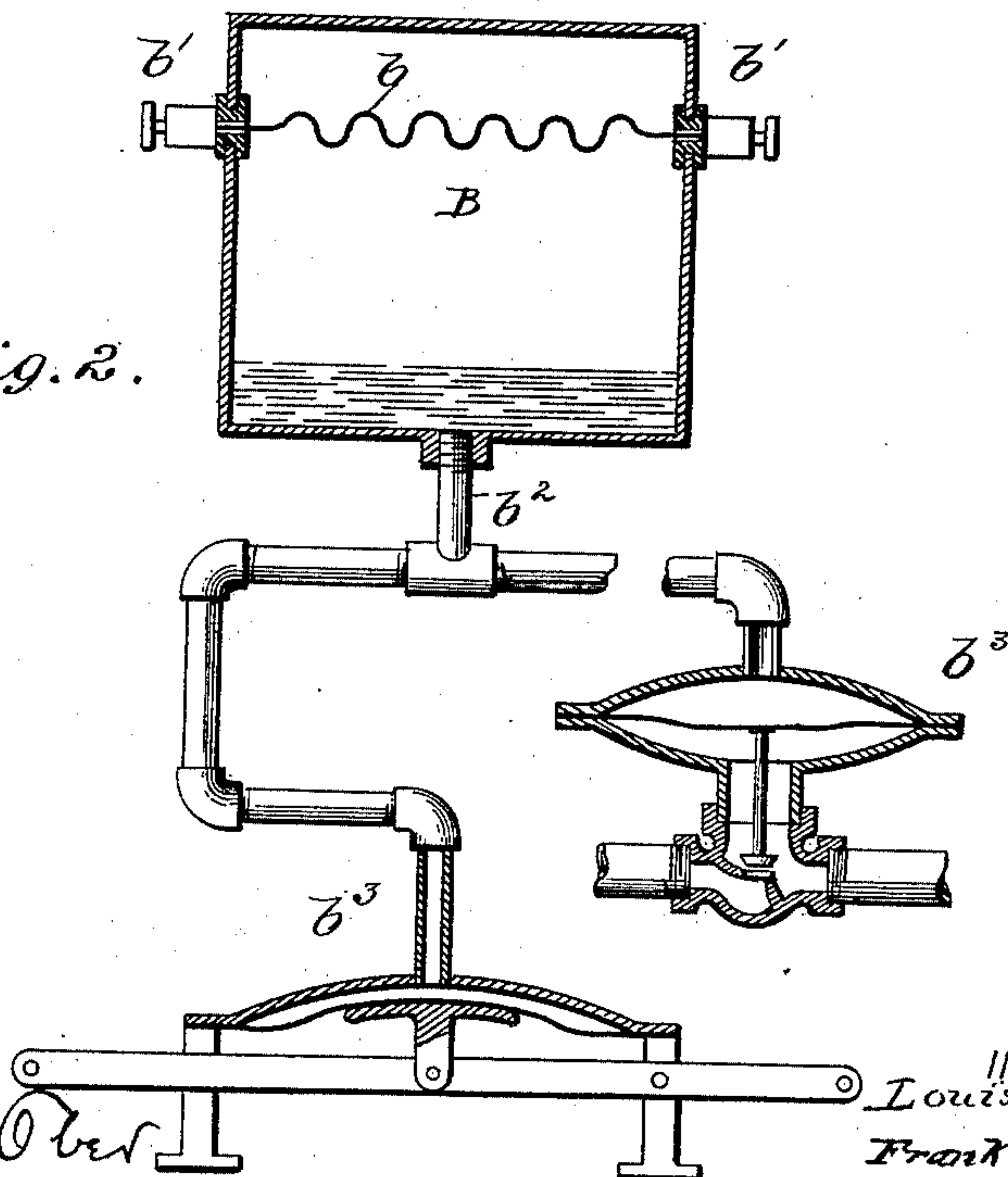


Fig. 2.



WITNESSES:

Mark S. Ober
Thomas K. Trenchard

INVENTORS
Louis Bell, and
Frank H. Root.

BY

W. B. Johnston
ATTORNEY.

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Fig. 3.

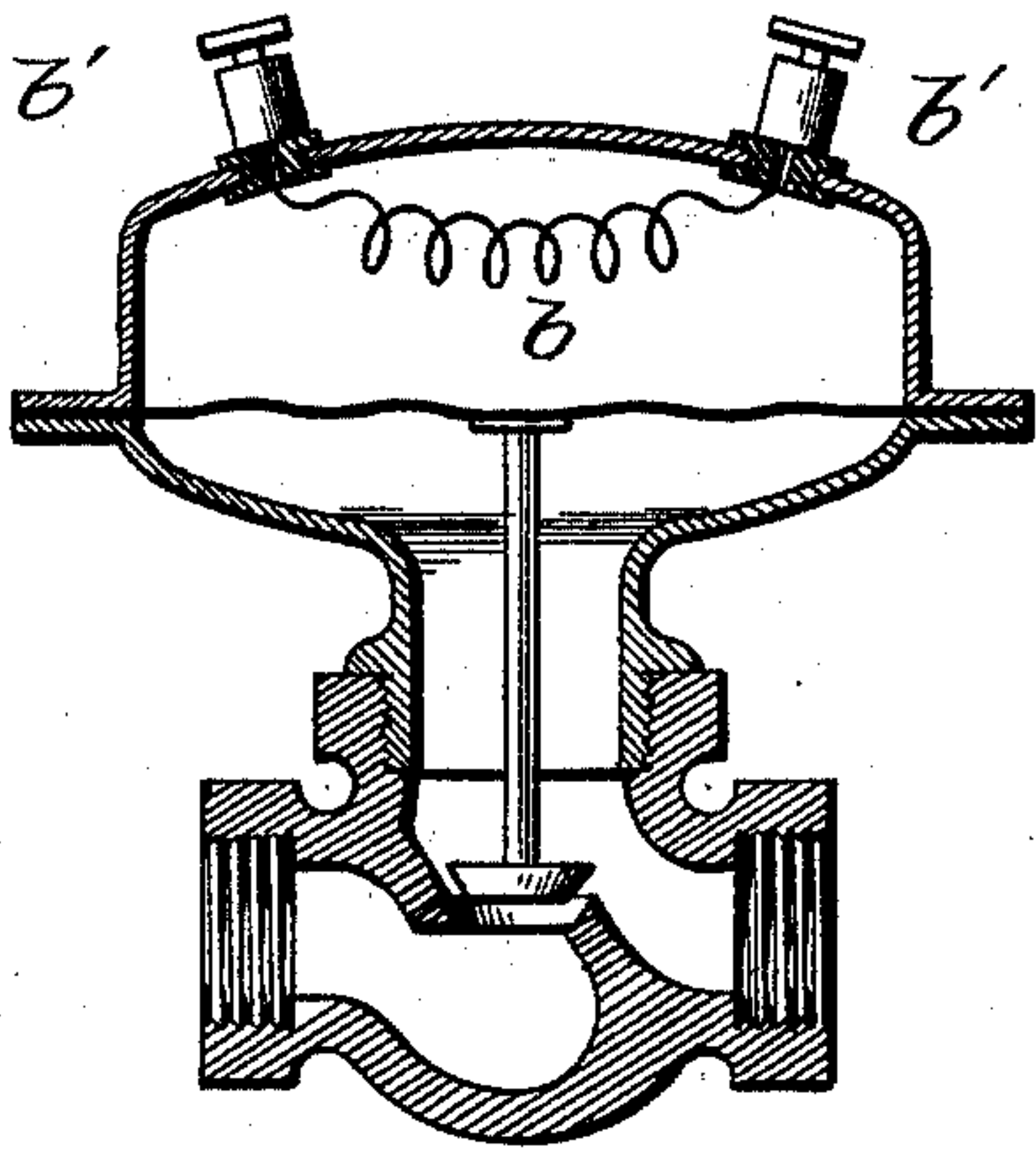


Fig. 4.

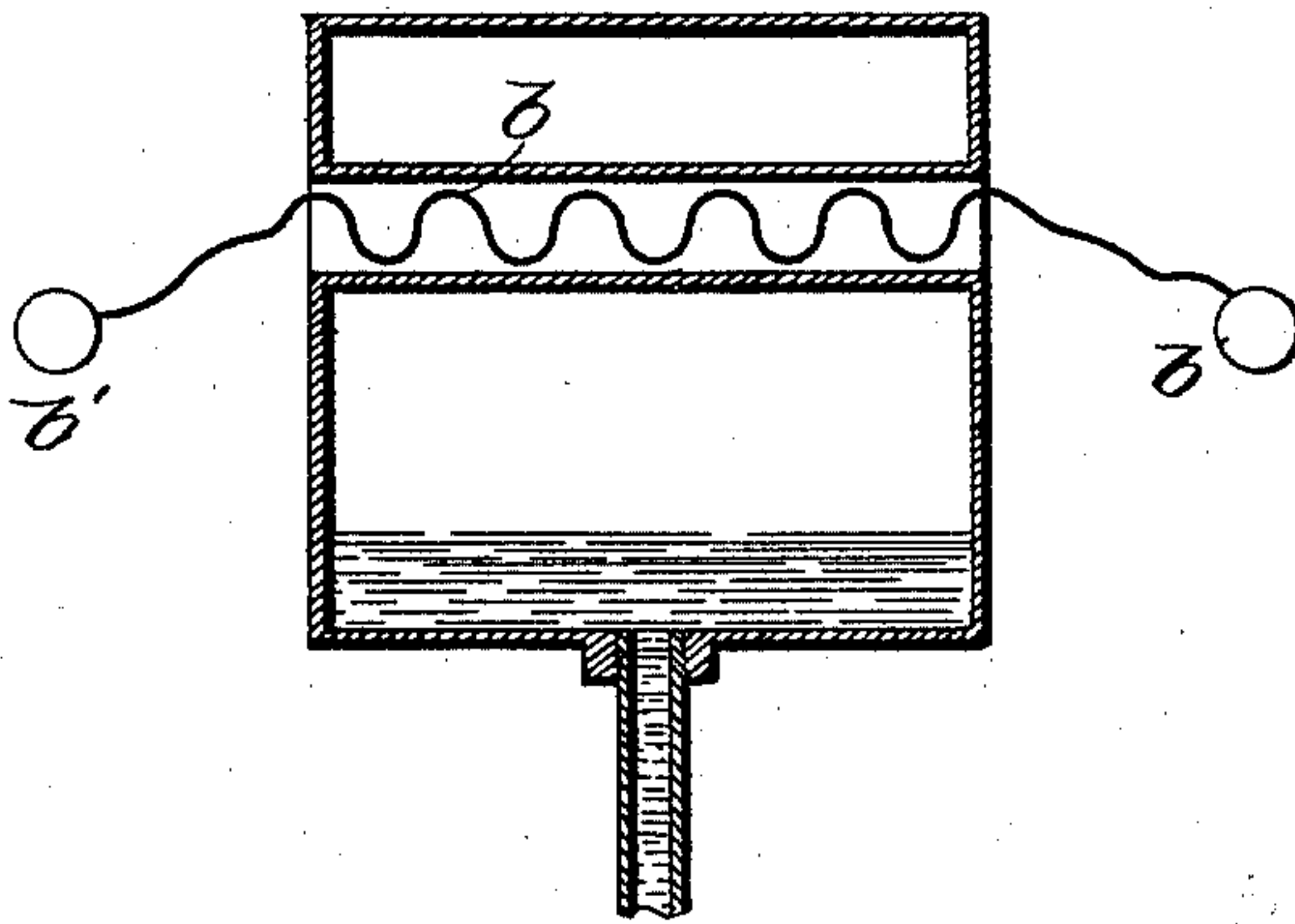
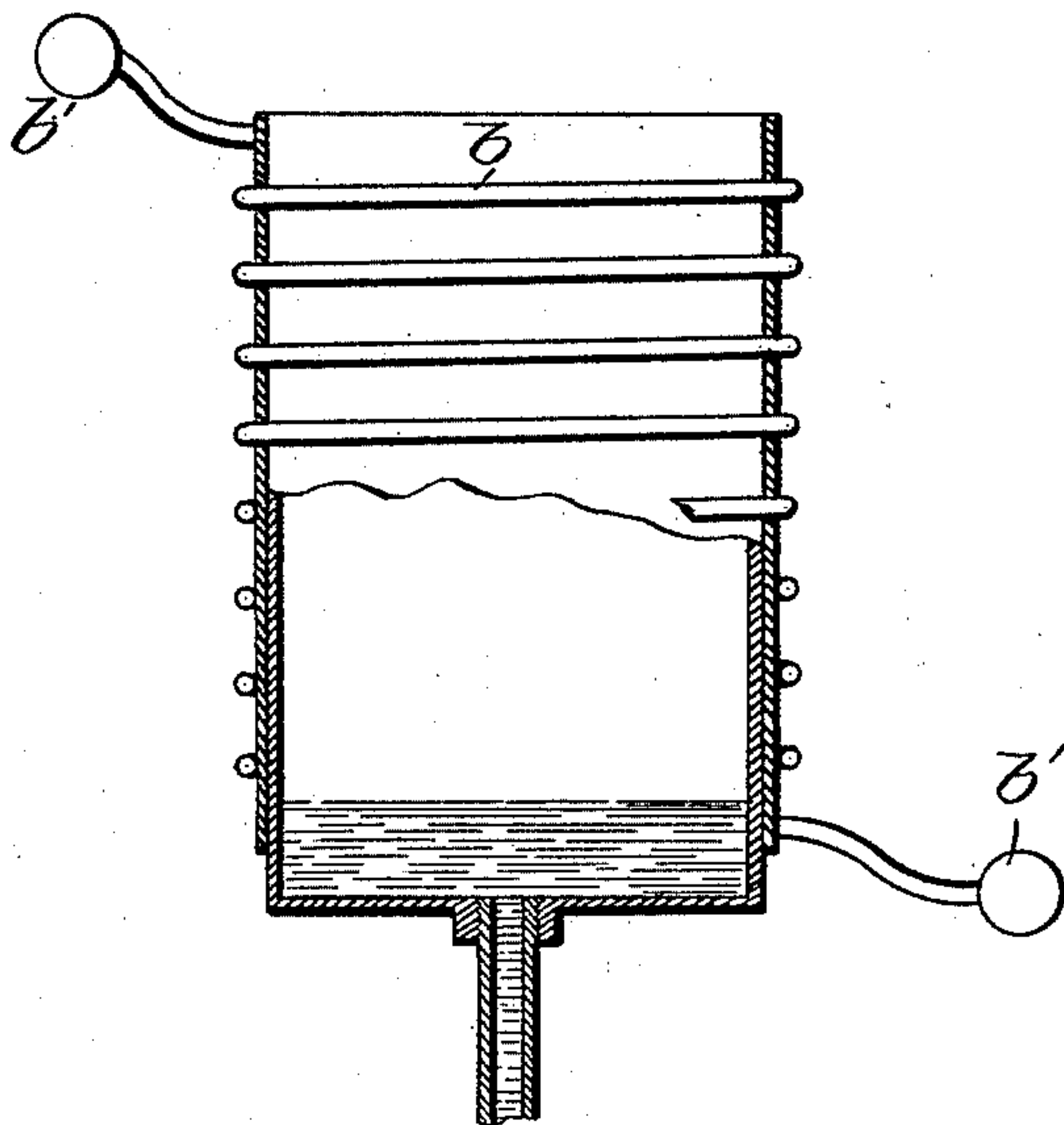


Fig. 5.



WITNESSES:

Grant S. Ober
Thomas K. Frenchard.

INVENTOR
Louis Bell and
Frank H. Root.
BY
[Signature]
ATTORNEY.

UNITED STATES PATENT OFFICE.

LOUIS BELL AND FRANK H. ROOT, OF CHICAGO, ILLINOIS.

ELECTRO-THERMOSTATIC VALVE.

SPECIFICATION forming part of Letters Patent No. 441,817, dated December 2, 1890.

Application filed July 5, 1890. Serial No. 357,727. (No model.)

To all whom it may concern:

Be it known that we, LOUIS BELL and FRANK H. ROOT, citizens of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electrical Thermostatic Apparatus, of which the following is a specification.

Our invention relates to electrical thermostatic apparatus, in which a thermostat is utilized to close an electrical circuit including a heating-resistance located within or adjacent to a chamber containing a highly-volatile fluid, the tension of which is varied by the opening and closing of the electric circuit.

The invention consists of the apparatus hereinafter described, with reference to the accompanying drawings.

Figure 1 represents a general diagram of the electric circuit and its connections with a thermostat and valve-chamber. Fig. 2 represents a sectional view of a chamber containing a volatile fluid and an electric resistance, and also showing its connection with valves. Fig. 3 represents a sectional view of valve and fluid-chamber; and Figs. 4 and 5 represent different forms of the fluid-chamber and methods of application of the electrical heating-resistance thereto.

A represents a thermostatic circuit-closer located in an apartment where the temperature has to be maintained constant. In the form shown it consists of a compound bar, which, when heated, will warp or twist and close an electric circuit; but we do not limit ourselves to this form of circuit-closer, inasmuch as an ordinary push-button or any similar device may be substituted. The electric circuit includes a battery A', and extends to a chamber B, located wherever it is most convenient. This chamber consists of a tight box containing a small quantity of ether or other highly volatile fluid. There is also placed inside of it a coil of German-silver wire *b*, which extends from side to side through the chamber, and is connected in the circuit of

battery A' through binding-post *b' b'*. The chamber communicates by a special passage *b²* with another chamber or chambers *b³* containing a flexible diaphragm connected to the valve-stem, as shown, and any variation of the vapor-tension in chamber B will cause a movement of these diaphragms and valves.

In Fig. 3 the vapor-chamber is connected directly with the valve-passage, one of its walls being a flexible diaphragm having the valve-stem attached to it.

The operation of the apparatus is as follows: When the circuit is closed at A, either automatically or by hand, a current of electricity is sent through the resistance *b*, which generates therein a certain amount of heat, which being communicated to the vapor in the chamber expands it, and causes a certain amount of pressure to act to either open or close the valve.

As above described, the current which passes through the resistance will always be the same, thus causing the valve to move with a certain degree of regularity and speed; but it is obvious that a thermostat or a manually-operated device may be used to gradually cut resistance out or into a circuit, and thus gradually raise or lower the temperature of the resistance-wire. This is shown in the small figure forming a part of Fig. 1.

In Fig. 4 we have shown the resistance passing through a tube extending diametrically through the chamber, and in Fig. 5 the resistance is coiled around the outside of the chamber after having properly insulated the same.

Our invention is of course subject to various changes of this kind, and we do not wish to be confined to the details of construction herein mentioned.

Having thus described our invention, we claim—

1. The combination, with a fluid-controlling valve, of a volatile-fluid chamber having a diaphragm connected to the valve and adapted to operate the latter, and an electric cir-

cuit including a resistance for heating the volatile fluid, and a circuit-closer, substantially as described.

2. The combination, with a fluid-controlling
5 valve, of a volatile-fluid chamber having a diaphragm connected to and adapted to operate the valve, an electric circuit including a resistance for heating the volatile fluid, and a thermostatic circuit-closer, substantially as
10 described.

In witness whereof we have hereunto

signed our names in the presence of two subscribing witnesses.

LOUIS BELL.
FRANK H. ROOT.

Witnesses as to Louis Bell:

WM. A. ROSENBAUM,
THOMAS K. TRENCHARD.

Witnesses as to Frank H. Root:

GEO. H. BLISS,
M. V. COUSINS.

441,817