

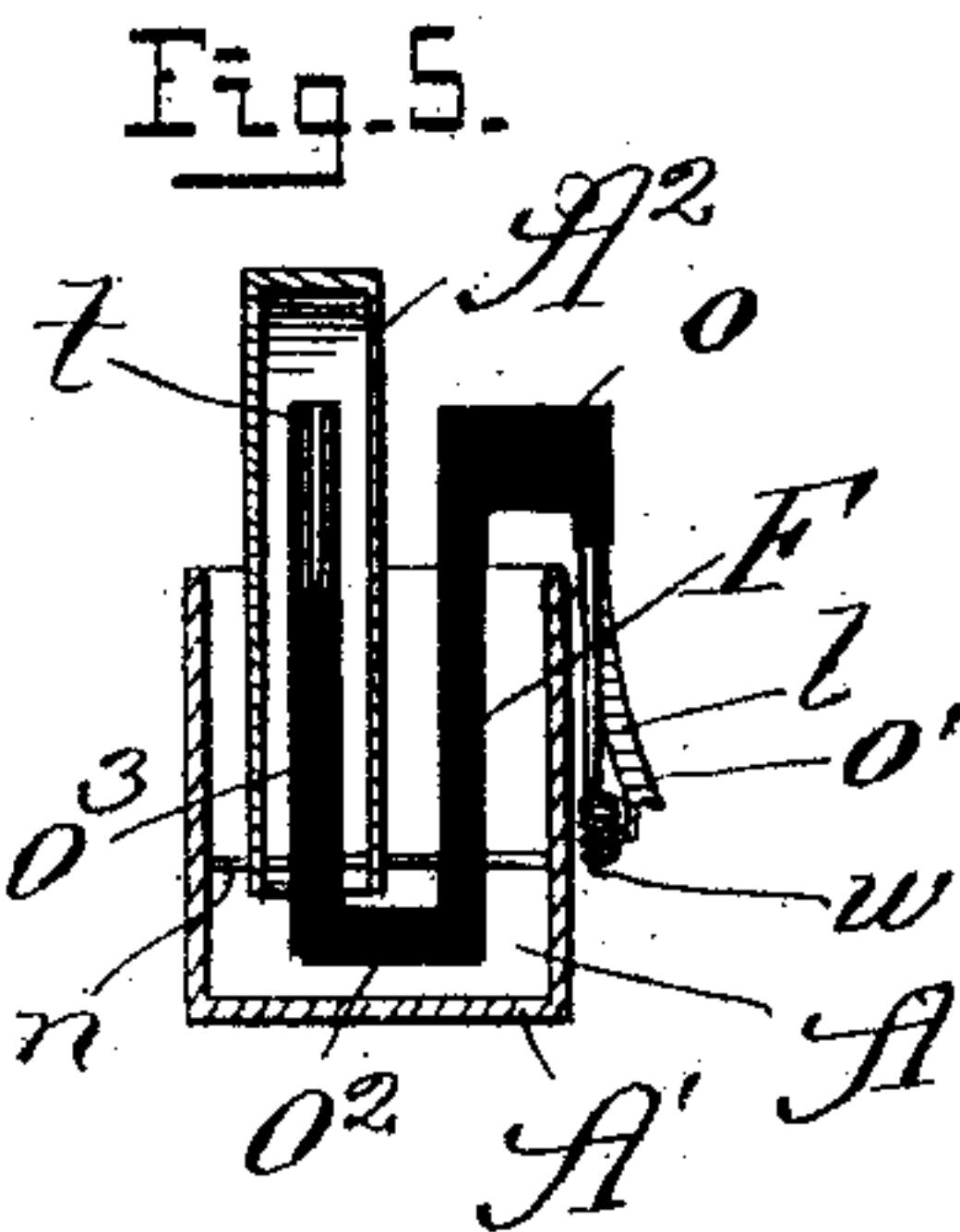
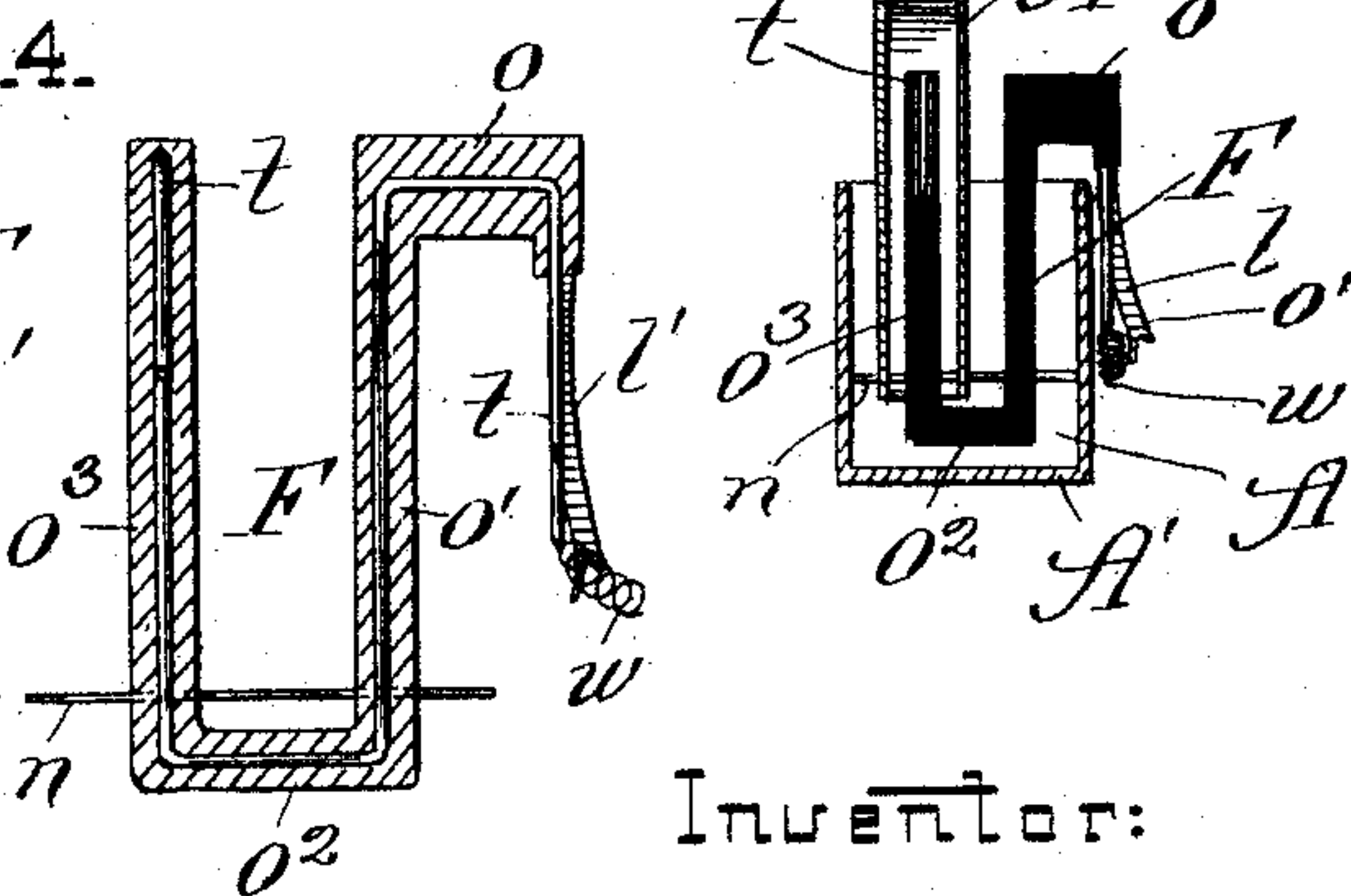
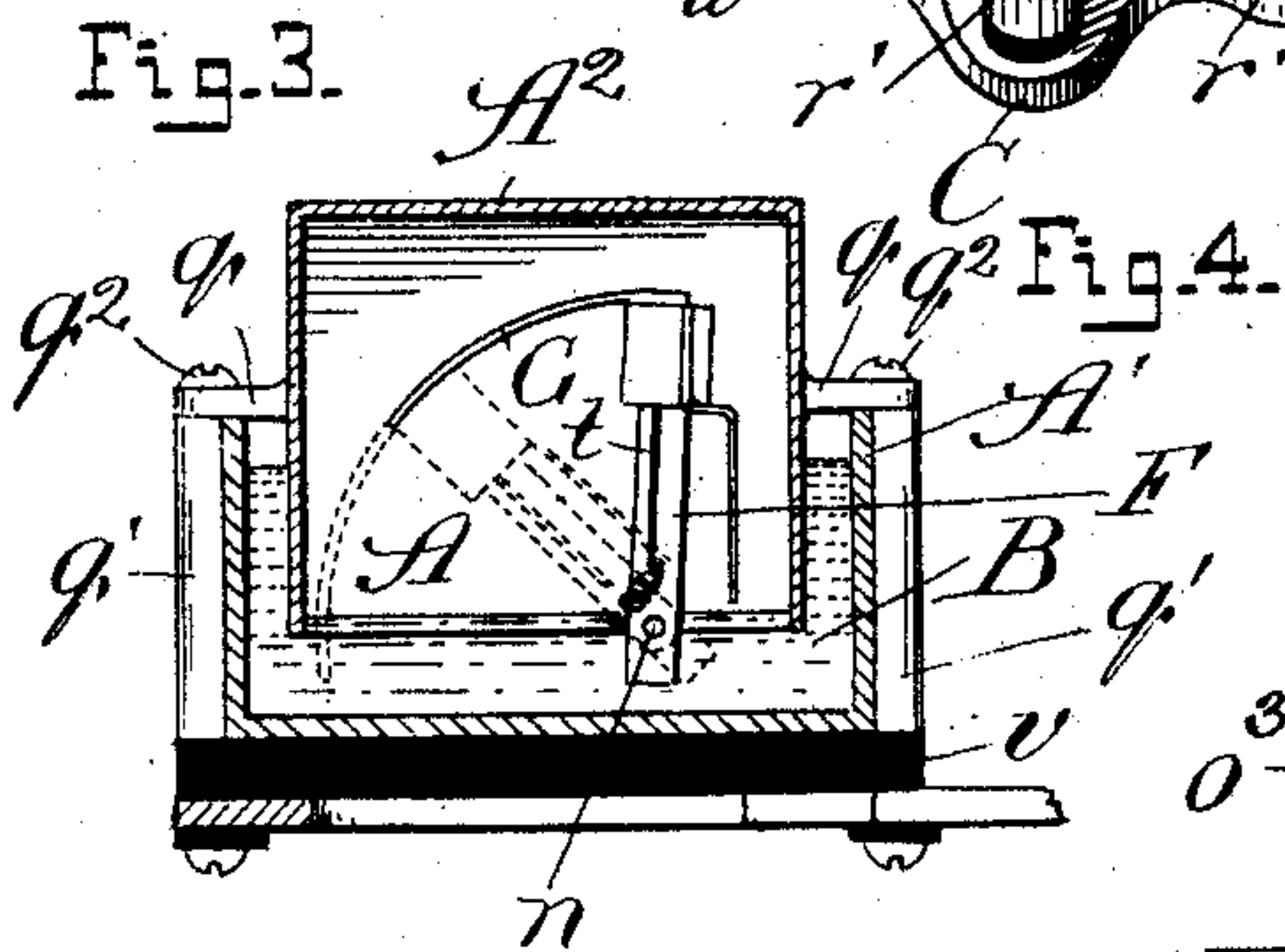
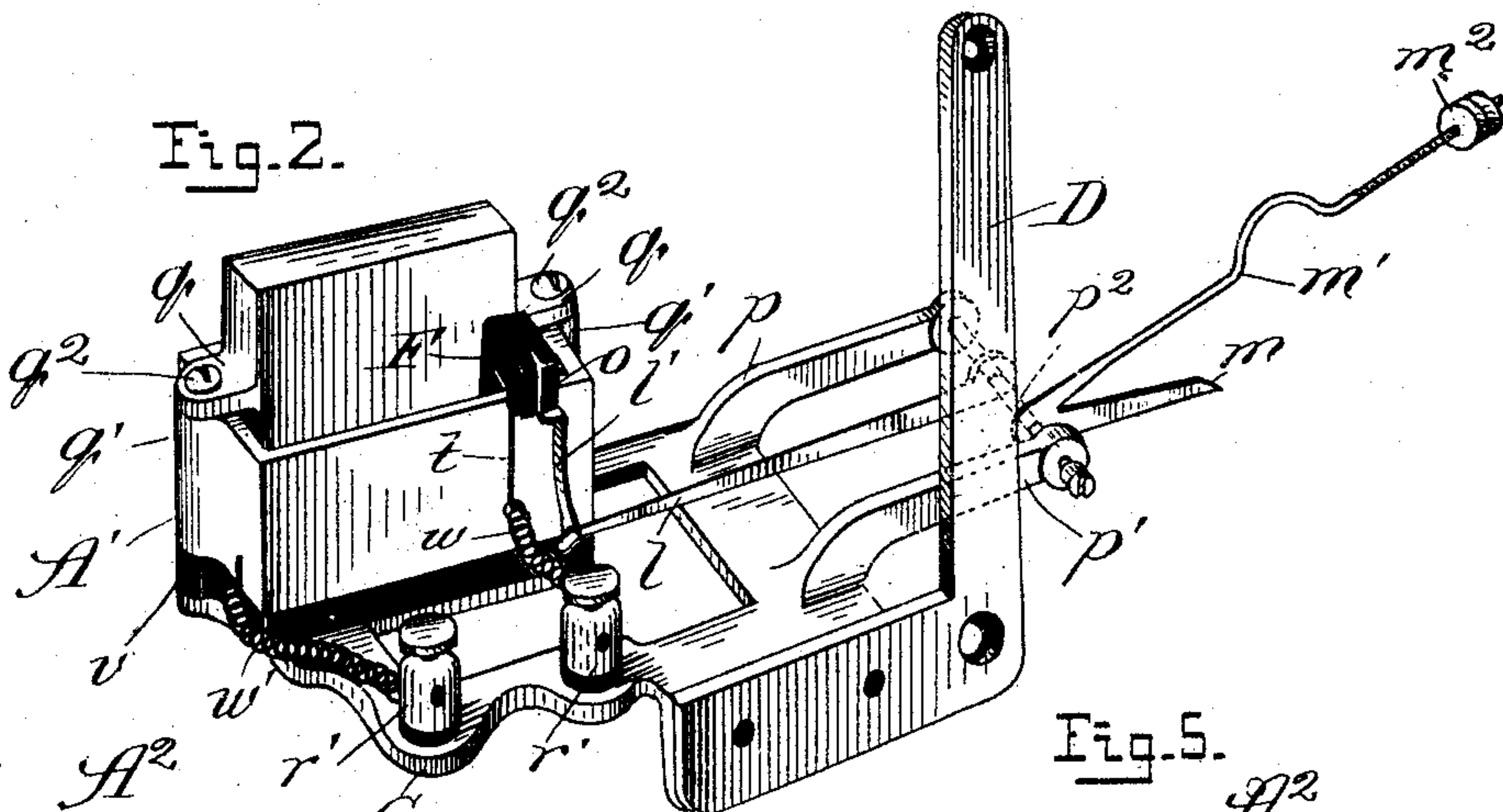
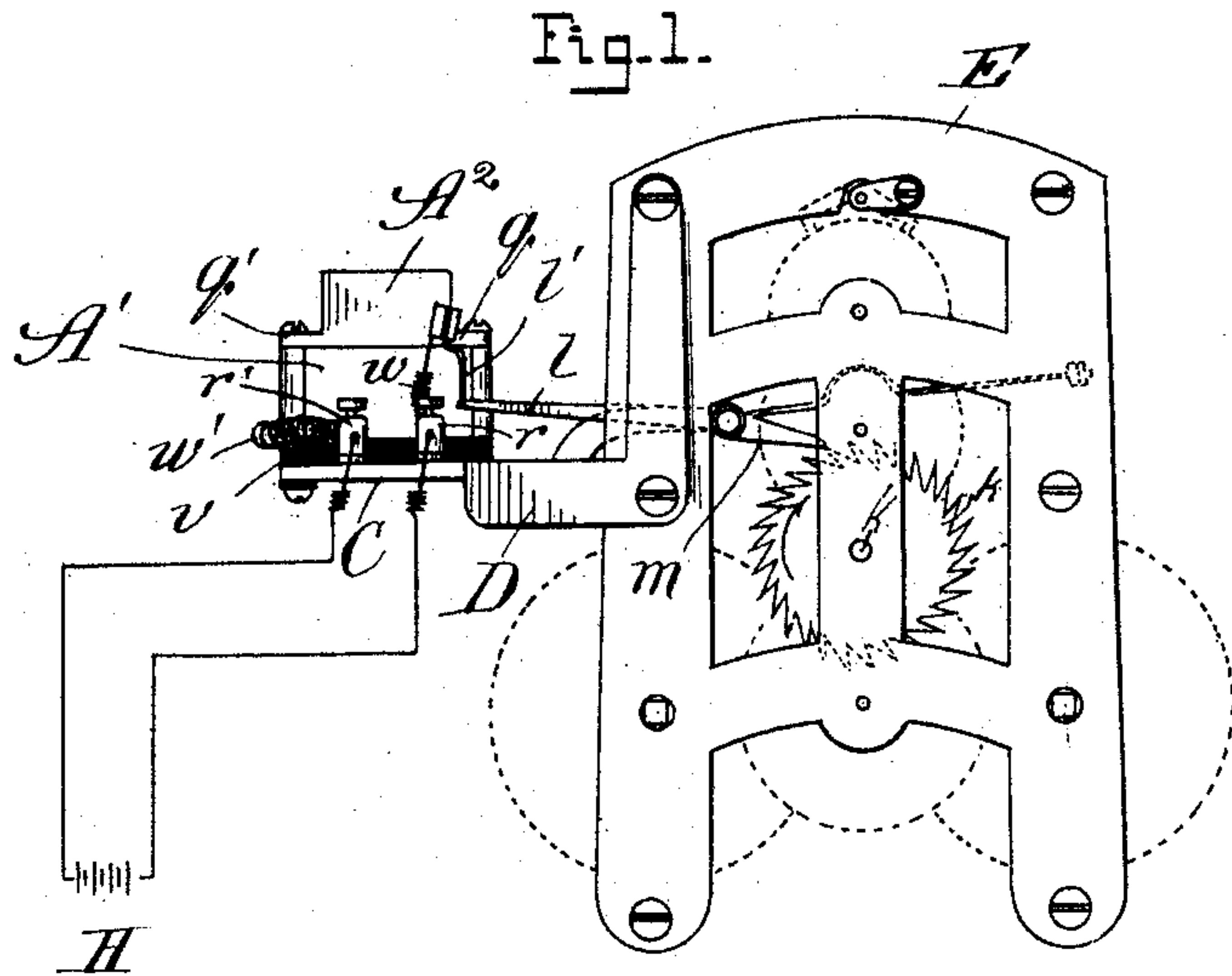
No. 619,936.

Patented Feb. 21, 1899.

J. J. BUSENBENZ.
ELECTRIC CIRCUIT CLOSER.

(Application filed Jan. 11, 1898.)

(No Model.)



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JACOB J. BUSENBENZ, OF CHICAGO, ILLINOIS.

ELECTRIC-CIRCUIT CLOSER.

SPECIFICATION forming part of Letters Patent No. 619,936, dated February 21, 1899.

Application filed January 11, 1898. Serial No. 666,273. (No model.)

To all whom it may concern:

Be it known that I, JACOB J. BUSENBENZ, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Electric-Circuit Closers, of which the following is a specification.

The object of my invention is to provide a sensitive circuit-closer which shall not be affected by oxidation or be otherwise impaired by use, but shall always be operative for the purpose for which it has been designed—namely, that of opening or closing a circuit at predetermined intervals, as for operating time-recorders and time-stamps and the like, for synchronizing clocks, and other purposes.

Referring to the accompanying drawings, Figure 1 is a view in front elevation, showing my improved circuit-closer operatively connected with the works of a clock; Fig. 2, a perspective view of the circuit-closer; Fig. 3, a longitudinal vertical section taken through the cups forming the chamber of the device; Fig. 4, an enlarged vertical sectional view of the insulated oscillating contact-carrier, and Fig. 5 a transverse section taken through the chamber.

A is a chamber containing a supply of mercury B, the chamber being supported on, but insulated, as shown at *v*, from a base C, carrying binding-posts *r* and *r'* and arms *p* and *p'*, in the ends of which is journaled a rock-shaft *p*². A bracket D is shown fastened to the base to afford means for securing the device to the frame of the works of a clock E. I prefer to construct the chamber A of two sections, shown as cups A' and A², which may be of metal and of the oblong rectangular shape illustrated, the shorter and narrower cup A² being inverted in the cup A' and supported therein to extend short of the bottom of the larger cup by flanges *q q*, resting on the upper edges of the ends of the cup A', provided with bosses *q'*, into which screws *q*² are inserted through the flanges *q* to fasten the cups together. The supply of mercury B in the chamber A, which is prevented from rising high in the cup A² by the air confined therein, is sufficient to reach always above the lower edges of that cup, outside the same, to afford a permanent seal against the ac-

cess of air to the mercury in and below the inner cup, thereby rendering the chamber A air-tight.

F is the contact-holder, formed, preferably, of insulating material and of the U shape illustrated, with the flange *o* extending toward one side from the upper end. A conducting-wire *t* extends lengthwise through the contact-holder, which is adjusted in place to cause the flange *o* to overlap the upper edge of one side of the chamber A', the branch *o'* to extend down into the supply of mercury between the adjacent sides of the two cups, the base *o*² to pass across the lower edge of the inner cup, inside the same, and the branch *o*³ to extend upward inside the cup A². The contact-holder is fulcrumed near its base on a rod *n*, passing through the branches and journaled at its ends in the sides of the cup A². From the end of the conductor *t*, within the chamber A, there projects a bent, preferably arc-shaped, contact extension G. The opposite end of the conductor *t* extends beyond the flange *o*, close to an end of the fulcrum *n*, where it is connected with a wire *w*, leading from the binding-post *r*, the other binding-post being connected by a wire *w'* with the cup A'. By thus terminating the conductor *t* near the fulcrum *n* the strain upon the connecting-wire *w* by the oscillatory movements, hereinafter described, of the contact-holder F is reduced to the minimum.

The rock-shaft *p*² carries a pawl *m*, having an arm *m'* extending from it and carrying an adjustable weight *m*². From the rock-shaft *p*² there also extends a spring-lever *l* of considerable length to engage with the notched lower end of a curved arm extending downward from one side of the flange *o* of the contact-holder F.

A battery H or other suitable generator has its opposite poles connected, respectively, with the binding-posts *r* and *r'*, as represented in Fig. 1, and in this connection may be included the device (not shown) to be controlled by the circuit-closer.

In operative position my improved circuit-closer is so situated with relation to the works of a clock that the pawl *m* shall engage with the teeth of the wheel *k* on the hour-shaft *k'* or, if desired, with those of the wheel on the

second-shaft, to be maintained in contact with the teeth by the gravity of the weight m^2 . Then as the wheel k rotates in the direction indicated by the arrow the pawl rides over its teeth, between each pair of which in passing from one tooth to the other it is dropped by the action of the weight, thus once in each two minutes where there are, as shown, thirty teeth on the hour-wheel k or once every minute where the wheel has sixty teeth or once for each tooth on any wheel of the clockworks with which the pawl m may be caused to engage. Each drop of the pawl turns the shaft p^2 to raise the lever l and by its engagement with the arm l' cause it to turn the contact-holder F in the direction to cause the contact G to dip into the mercury B and close the circuit. The length of the lever l and the length of the arc its end describes in rising and that of the adjacent end of the arm l' are such as to disengage them as soon as the contact with the mercury is made, whereby the spring-lever becomes disengaged from the notch in the lower end of the arm l' , permitting the flotation effect of the mercury on the contact-holder to right it, and thereby take the contact G out of the mercury to again open the circuit, and as soon as another tooth of the wheel k engages the pawl to lift it the free end of the lever l , which is normally against the curved side of the arm l' , is lowered down that side till it snaps into the notch at the lower end of the arm, thus into engagement therewith ready to raise it and tilt the holder F to produce the contact, as described, when the tooth passes the pawl and the weight m^2 causes the pawl to drop again.

My improved circuit-closer affords the advantages of being peculiarly reliable irrespective of the voltage or amperage of the current and of saving greatly in battery consumption, because it is highly sensitive, responding (that is, effecting flow of current after closure of the circuit) in about one-fortieth of a second, and as the mercury is protected against the access of air it is not subjected to oxidation, so that the device will remain perfectly operative for an indefinite period.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a circuit-closer, the combination of a chamber, formed of sections one inverted in the other, and sealed against the access of air, a mercury-contact confined in said chamber, and a contact movably supported to dip into the mercury, substantially as described.

2. In a circuit-closer, the combination of a chamber, formed of sections one inverted in the other, and sealed against the access of air, a mercury-contact confined in said chamber, and a holder supported to oscillate in

said chamber and carrying a contact to dip into the mercury by oscillating the holder, substantially as described.

3. In a circuit-closer, the combination of a mercury-contact, a chamber sealed against the access of air and in which said mercury-contact is confined, and a holder pivotally supported to oscillate in said chamber and passing through the mercury to be righted by flotation therein and carrying a contact to dip into the mercury by oscillating the holder, substantially as described.

4. In a circuit-closer, the combination of a chamber, formed of sections one inverted in the other, and sealed against the access of air, a mercury-contact confined in said chamber, a holder pivotally supported to oscillate in said chamber and carrying a contact to dip into the mercury by oscillating the holder, a lever engaging said holder, and a pawl for oscillating said lever at predetermined intervals by engagement with a clock-movement, substantially as described.

5. In a circuit-closer, the combination of a mercury-contact a chamber sealed against the access of air and in which said mercury-contact is confined, a holder supported to oscillate in said chamber and carrying a contact to dip into the mercury by oscillating the holder, an arm l' extending from said holder, and a rock-shaft carrying a lever l to engage said arm and a weighted pawl m to engage with a clock-movement for rocking the shaft, substantially as and for the purpose set forth.

6. In a circuit-closer, the combination of a chamber A comprising a cup A' and a cup A^2 inverted therein and containing mercury B forming a seal, a holder F fulcrumed near its base and having the branches o' and o^3 extending respectively between the adjacent sides of said cups and up into the inner cup, and a contact G on said holder operated by oscillating it to dip into the mercury, substantially as described.

7. A circuit-closer comprising, in combination, the cups A' and A^2 forming the chamber A containing mercury B affording a seal to the chamber, a U-shaped holder F having a flange o carrying an arm l' and supported on a fulcrum n to embrace a wall of the inner cup, a contact G extending from the holder in said cup, and a rock-shaft p^2 carrying a lever l to engage with said arm and a pawl m having a weighted arm m^2 and extending to engage with a clock-movement for rocking the shaft, substantially as and for the purpose set forth.

JACOB J. BUSENBENZ.

In presence of—

R. T. SPENCER,
DAN W. LEE.