No. 774,728. PATENTED NOV. 8, 1904.

P. L. CLARK.

# LIQUID CONTACT CHAMBER FOR ELECTRICALLY WOUND MECHANISM.

APPLICATION FILED DEC. 2, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

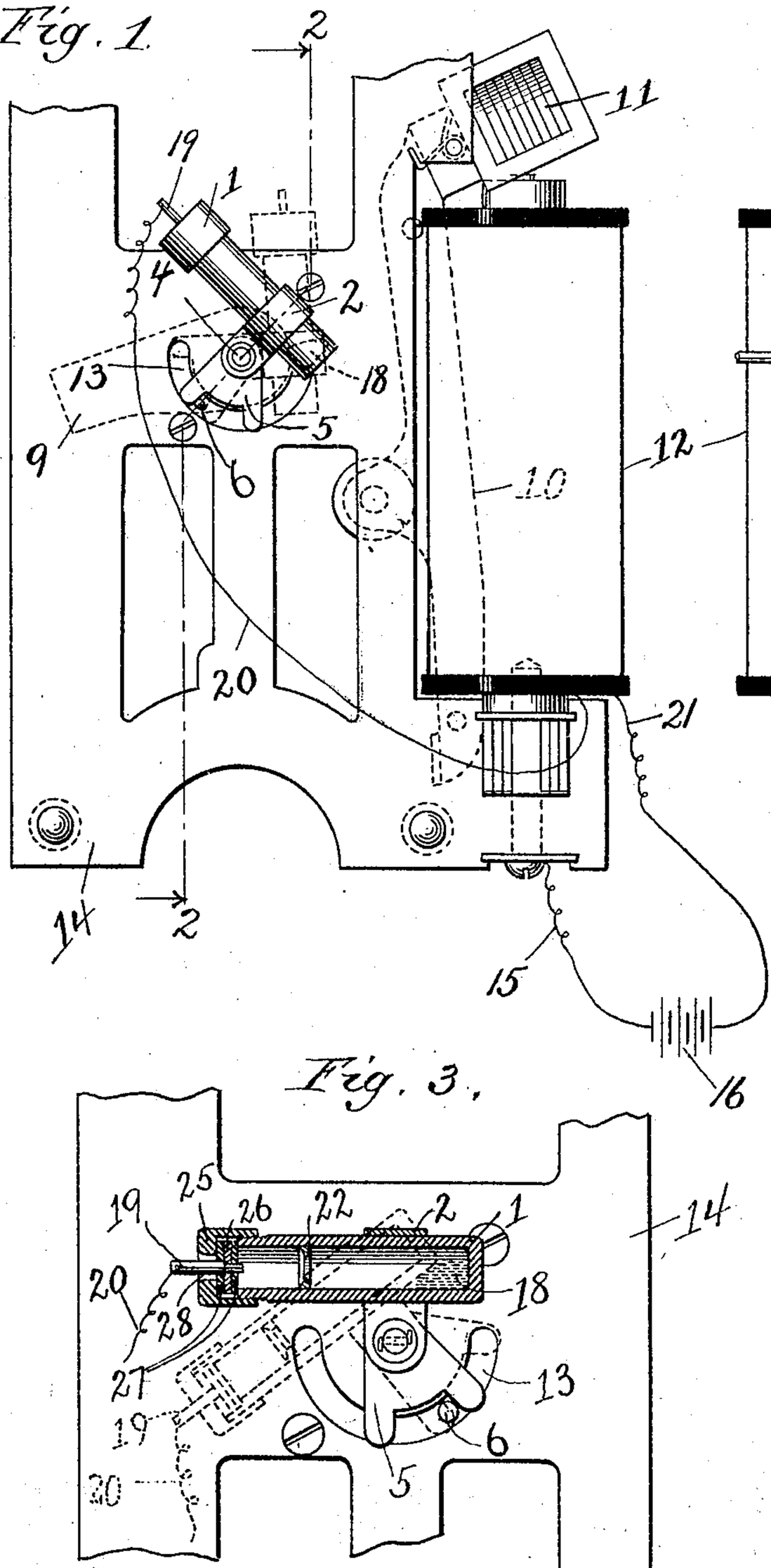


Fig. 2.

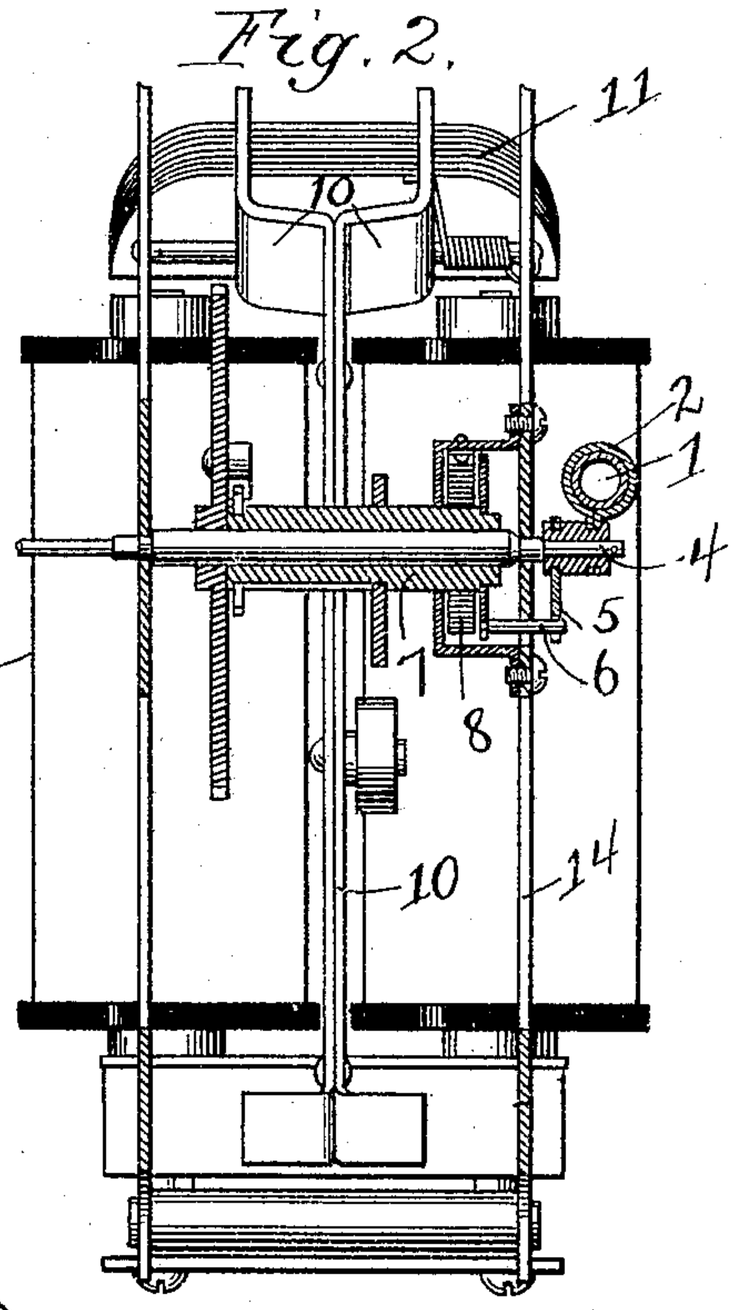


Fig. 3.




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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 4.

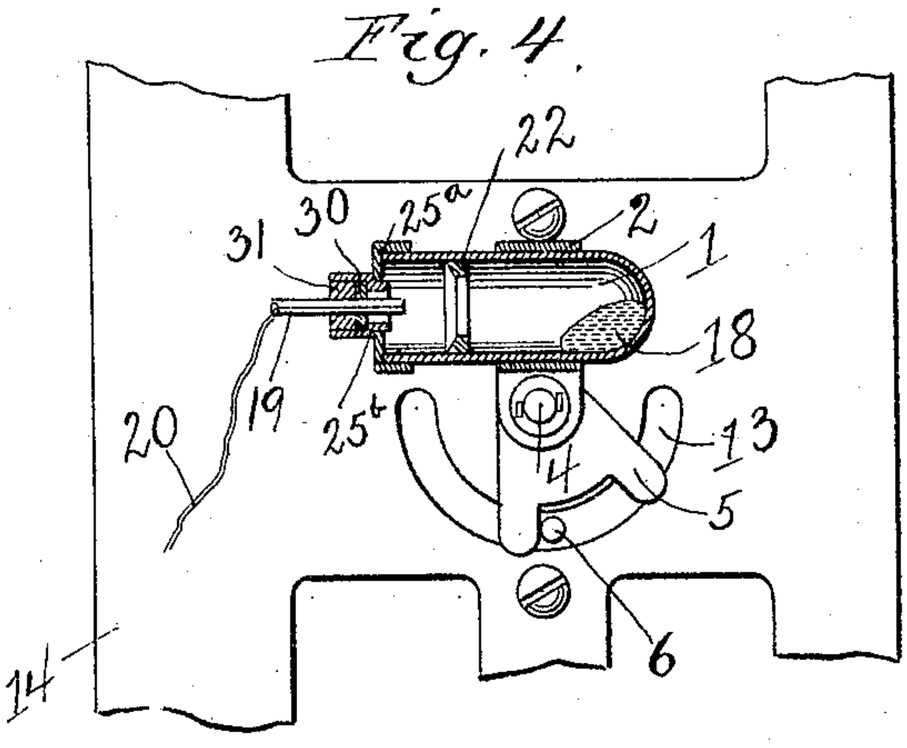



Fig. 7.

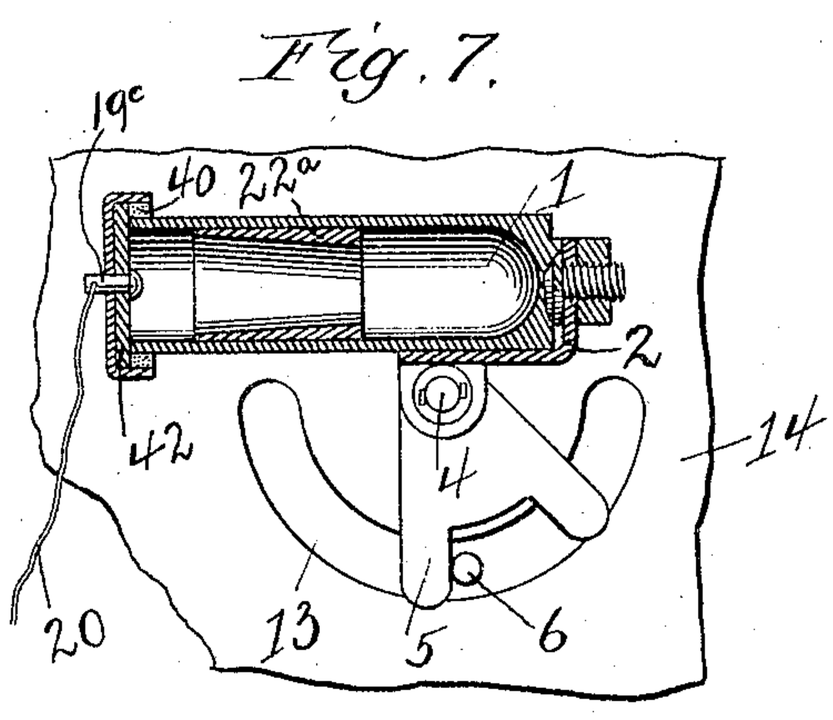



Fig. 6.

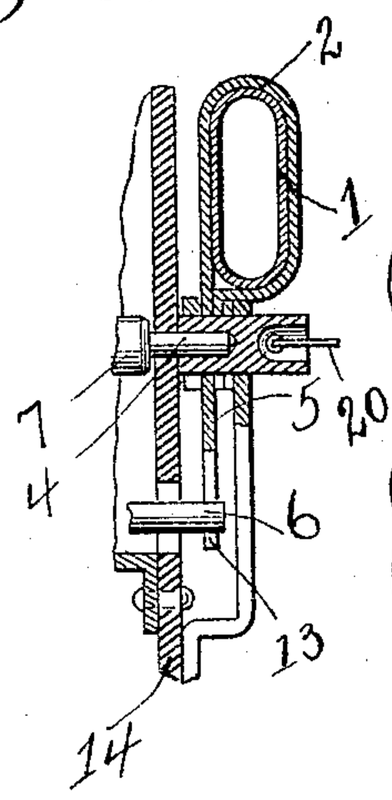
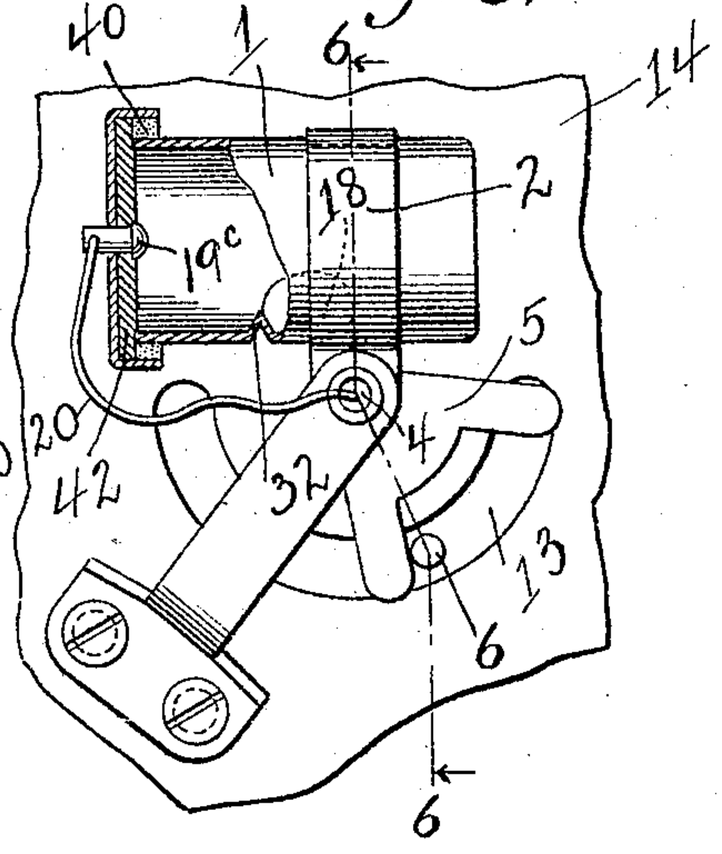



Fig. 5.

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No. 774,728. Patented November 8, 1904.

# UNITED STATES PATENT OFFICE.

PERCY L. CLARK, OF BRISTOL, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO A. L. CLARK, OF ELGIN, ILLINOIS.

## LIQUID-CONTACT CHAMBER FOR ELECTRICALLY-WOUND MECHANISM.

SPECIFICATION forming part of Letters Patent No. 774,728, dated November 8, 1904.

Original application filed October 13, 1902, Serial No. 127,014. Divided and this application filed December 2, 1903. Serial No. 183,451. (No model.)

*To all whom it may concern:*

Be it known that I, PERCY L. CLARK, a citizen of the United States, residing at Bristol, in the county of Hartford and State of Connecticut, have invented new and useful Improvements in Liquid-Contact Chambers for Electrically-Wound Mechanism, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

This application is a division of my application, Serial No. 127,014, filed October 13, 1902.

The purpose of this invention is to provide an improved liquid-contact chamber for opening and closing the magnet-energizing circuit of electric winding devices for clocks or similar trains.

It consists of the features of construction set out in the claims.

In the drawings, Figure 1 is a rear side elevation of a portion of a clock-frame and winding mechanism therein comprising a liquid-contact chamber embodying my invention. Fig. 2 is a section at the line 2 2 on Fig. 1. Fig. 3 is a detail sectional elevation of the parts of the circuit-closing devices outside the back plate of the clock, section being made axially through the liquid-contact chamber, which, with its connected parts, is shown in full line in one position and in dotted line in another position. Fig. 4 is a view similar to Fig. 3, showing a modified form of a liquid-contact chamber. Fig. 5 is a similar view showing a similar modification of the same. Fig. 6 is a section at the line 6 6 on Fig. 5. Fig. 7 is a view similar to Fig. 4, showing a modification different from both Figs. 4 and 5.

The liquid-contact chamber 1 is shown mounted on a carrier 2, which is pivotally mounted upon the rearwardly-protruding end of the shaft 4 and for actuation in one direction in the winding and in the opposite direction in the running of the train has the fork-arm 5, which is engaged by the finger 6, which is connected with the train so as to move in one direction in the winding and in the opposite direction in the running of the train. The particular construction of the clock-train in this respect is shown in patent to Charles M. Crook, No. 704,620, dated July 15, 1902, and in my above-mentioned application, Serial No. 127,014, and for the purpose of this divisional application it will be sufficient to notice the mere fact that the part which actuates the carrier for the contact-chamber is moved, as stated, in opposite directions in the winding and running of the train, as indicated by the attachment of that part to the sleeve 7 on the shaft 4, said sleeve being connected to one end of the motor-spring 8 for rotation in one direction as the spring uncoils from the winding action and also to the winding cam-lever 9, which is exposed to the action of the armature-lever 10 when the armature 11 is attracted by the magnet 12. The finger 6 in order to reach the lever-arm of the carrier protrudes through a slot 13 in the back plate 14, said slot being sufficiently extended to accommodate the entire oscillating movement of the finger in the running and winding. The specific matter to which this divisional application relates is the liquid-contact chamber 1, which is in and forms a part of the magnet-energizing circuit which comprises the wire 15, proceeding from one pole of the battery 16 to the clock-frame represented by the back plate, which continues the circuit through the several bearings to the body of the chamber 1, and from thence the liquid-contact element 18 continues the circuit through the contact-stud 19 and wire 20 to the coils of the energizing-magnet, from which the wire 21 leads to the opposite pole of the battery, completing the circuit. The liquid-contact chamber 1 is operated, as described in my said application, Serial No. 127,014, so as to be tilted from the position shown in full line in Fig. 1 to the position shown in dotted line in Fig. 3, passing intermediately through the horizontal position shown in full line in Figs. 3, 4, and 5, (which represent different forms adapted to have the same action,) such tilting having the purpose and effect of shifting the liquid-contact element from the end at which

the stud 19 is located and at which said liquid-contact element closes the circuit to the opposite end for breaking the circuit. In order to cause the mercury to be accumulated and pass with an instantaneous movement from a position out of contact with the stud 19 to a position in contact therewith, there is interposed in the tube which constitutes the body of the liquid-contact chamber a barrier consisting, in the form shown in Figs. 3 and 4, of a ring 22, which holds back the mercury in the movement of the tube while it is tilting over to the position for closing the circuit, so that the mercury does not flow immediately into circuit-closing position when the tube becomes horizontal or slightly passes that position, as it naturally would tend to do; but when the tube is tilted considerably past the horizontal position the mercury which has been accumulated back of the barrier formed by such ring breaking over the latter passes by a sudden movement into the contact end of the tube, which is at that time lower, and closes the circuit. In the reverse tilting action of the liquid-contact chamber the movement being caused by the blow of the armature-lever against the winding-motor is in any event a sufficiently sudden action to cause the circuit to be broken by the quick flow of the mercury away from the stud 19 when the tube has passed considerably beyond the horizontal position, and the barrier in this section prevents the mercury from rebounding or splashing back again into the circuit-closing position.

The specific construction of the liquid-contact chamber, as shown in Figs. 1 and 3, may be described. It comprises, with the body, which is a metal tube closed at one end, a cap 25 for closing it at the other end, screwed onto the body of the tube, the stud 19 being mounted in a disk 26 and bound between two insulating-washers 27 27, these washers being interposed at opposite sides of the disk between the body of the tube on one side and its cap 25 on the other side, the cap having a central aperture 28, through which the stud 19 protrudes without contact with the margins of the aperture, so that the disk and stud 19 are insulated from the cap and also from the body of the tube.

In Fig. 4 I have shown a modification of the liquid-contact chamber. In this form its body comprises a thin metal cup or bottle $1^a$, spun or otherwise formed integrally with the bottom and having a cap $25^a$ fitting it tightly and not requiring any threaded joints, but being made air-tight, if necessary, by suitable cement at the joint, such cement being so thin as not to be represented in the drawings. The cap $25^a$ has a neck $25^b$, through which the stud $19^a$ is inserted, being held in position out of contact with the neck by means of the insulating-disk 30, which is secured by non-conducting cement 31, made of material which has a low melting-point, so that it can be run into the neck and caused to secure the stud firmly in place.

In Figs. 5 and 6 I have shown a further modification, which has the purpose, in part, of producing the minimum fore-and-aft space required for the liquid-contact chamber and its connections and at the same time to afford widespread pivotal support to said chamber, so that it may be made very free at its bearings without tendency to lean sidewise. In this form the metal body is oblong in cross-section, with its longer dimension vertical. This makes it possible to prevent the splashing of the mercury without making the barrier completely encircle the chamber interiorly, and instead it may in this form be made by an interiorly-projecting boss or bead 32, formed at the lower side of the chamber by crimping or indenting the metal, as illustrated. The cap in this form is secured by cement 40 of non-conducting character having comparatively low melting-point. The circuit is closed by the mercury extending into contact with the screw $19^c$, which is set through the insulating-washer 42 into the metal cap. The washer also extends out so as to lap on the ends of the body of the chamber and further insure the insulation of the cap from the body. This construction permits the circuit-wire to be run from any point on the margin of the cap instead of requiring it to run from the center.

The form of the liquid-contact chamber shown in Fig. 7 is on some accounts preferable to any of the others. In this form the barrier in the chamber for holding back the mercury while the tube is tilting over to circuit-closing position, so that it shall move *en masse* and quickly to close the circuit when it is able to pass the barrier, is made in the form of a sleeve $22^a$, which is fitted tight in the tube, having an abrupt end facing toward the end of the chamber remote from the circuit-closing end and being interiorly conical, so that its inner surface slopes from the abrupt end gradually toward the circuit-closing end of the chamber, the sleeve extending substantially to that end. The special value of this construction is that when the mercury having accumulated back of the abrupt end of the sleeve finally by the tilting of the chamber is able to pass over the barrier thus formed into the cavity of the sleeve it passes onto a surface which is inclined more steeply than the axis of the chamber or than the inner wall of the chamber, onto which it would fall if the barrier were the mere ring 22, shown in other figures. The mercury is thus caused to move more quickly into contact after passing the barrier, and on this account the barrier itself may be located farther back from the contact end without any loss of promptness and with the advantage that the mercury which becomes lodged against the abrupt end of the

sleeve as soon as the chamber passes horizontal position is substantially over the fulcrum of the chamber. There is also an advantage in the reversing movement—that the mercury is not liable to be broken or splattered by being thrown against the ring, the reversing movement being a sudden one and somewhat liable to cause this result, as already pointed out. With the construction shown in said Fig. 7 the mercury lies upon the inclined surface of the sleeve while it is in position for closing the circuit, and upon the reversing of the position of the chamber it merely flows quickly along the bottom surface of the sleeve, which by the reversing is inclined toward the opposite end and falls over the abrupt end of the sleeve into position which renders it safe against accidental return by splattering.

I claim—

1. In combination with a magnet-energizing circuit, a liquid-contact chamber mounted for tilting, and means for tilting it to cause the liquid to flow from one end to the other, said chamber having a dam or barrier between the extreme positions of the liquid, adapted to cause the latter to accumulate during the initial tilting action, the cross-section of the chamber-cavity at the location of such obstruction and notwithstanding the same being such as to afford ample room for the passage of the liquid, the means for tilting the chamber being adapted to tilt it past the position at which the dam arrests the liquid to a position at which the liquid may move *en masse* over the dam.

2. In combination with a magnet-energizing circuit, a liquid-contact chamber mounted for tilting, and means for tilting it to cause the liquid to flow from one end to the other, said chamber having a dam or barrier between the extreme positions of the liquid, adapted to cause the latter to accumulate during the initial tilting action, the cross-section of the chamber-cavity at the location of such obstruction and notwithstanding the same being such as to afford ample room for the passage of the liquid, the means for tilting the chamber being adapted to tilt it past the position at which the dam arrests the liquid to a position at which the liquid may move *en masse* over the dam, such dam or barrier being formed so as to present an abrupt shoulder at the side remote from the contact end, and to present a sloping surface toward said contact end.

3. In combination with a magnet-energizing circuit, a liquid-contact chamber for closing such circuit, and means for tilting it toward circuit-closing position, such chamber being provided with an interior sleeve having its aperture or cavity conical or tapering, the end of the sleeve having the smaller opening being abrupt, and the sleeve being lodged in the chamber with said abrupt end facing away from the contact end of the chamber to form a barrier in the path of flow of the liquid toward the contact end, and a sloping unobstructed path for such flow away from the contact end.

4. In an electrically-wound mechanism, in combination with a magnet-energizing circuit, a liquid-contact chamber for closing the circuit, and means for tilting it toward circuit-closing position, the body of such chamber being metallic and constituting one of the electrodes, the other electrode being mounted on and insulated from said body.

5. In an electrically-wound mechanism, a magnet-energizing circuit, a liquid-contact chamber for closing the same, and means for tilting it to circuit-closing position, the body of such chamber being metallic and being pivoted on the frame, said frame being connected with one pole of the battery in the circuit, whereby the chamber becomes one electrode, the other electrode being mounted insulated on such chamber and having a circuit-wire connected to it for continuing the circuit toward the other pole of the battery.

6. In an electrically-wound mechanism, a magnet-energizing circuit, a liquid-contact chamber for closing such circuit, and means for tilting it into circuit-closing position, the body of such chamber being metallic and constituting one of the electrodes; a cap for closing one end of the chamber insulated from the body and having the second electrode mounted on it and exposed within the chamber.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Bristol, Connecticut, this 20th day of October, A. D. 1903.

PERCY L. CLARK.

In presence of—
FRANK E. DODGE,
FREDK. G. FISCHER.