

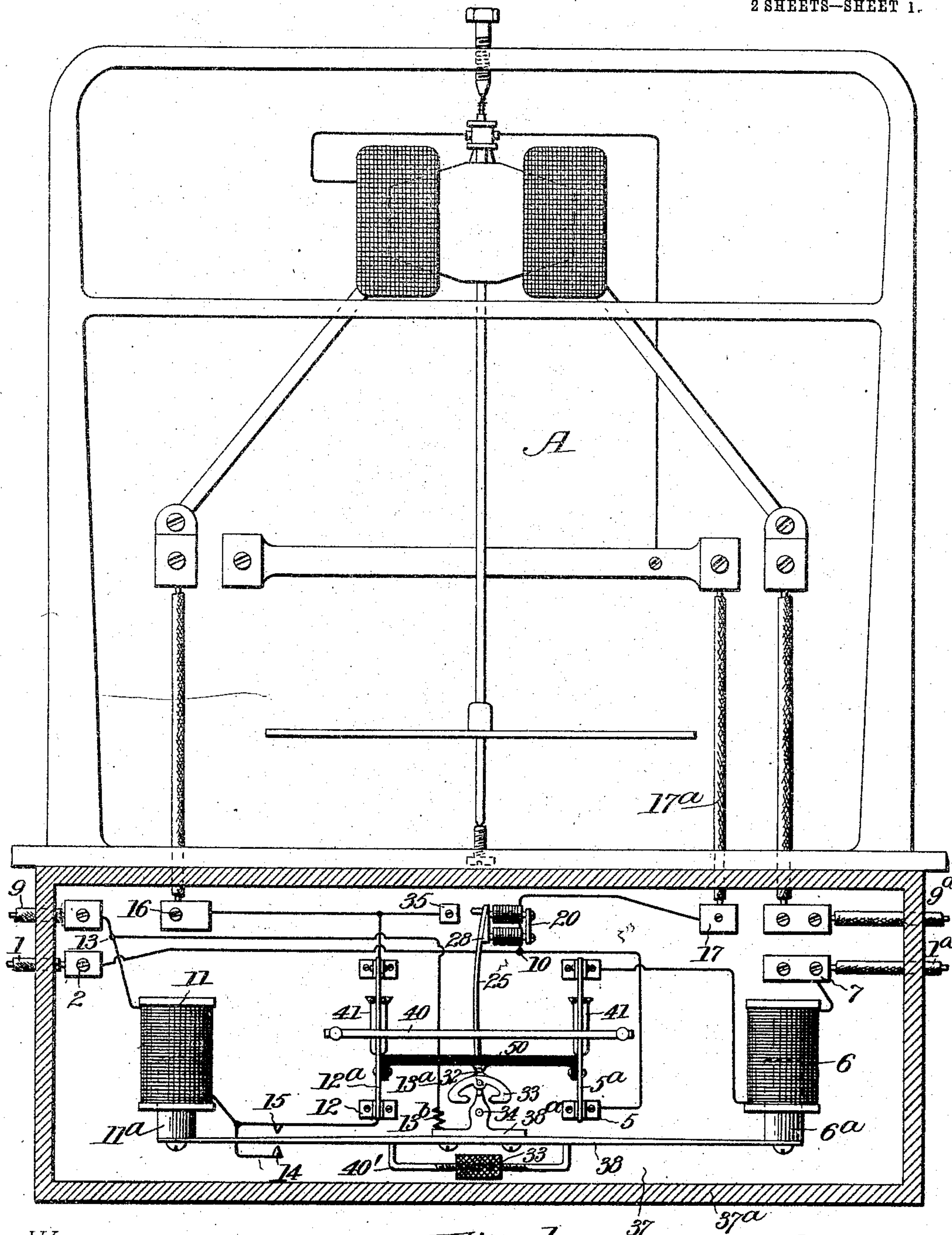
No. 782,386.

PATENTED FEB. 14, 1905.

W. W. FULLER.
FRAUD DETECTOR FOR ELECTRIC METERS.

APPLICATION FILED MAY 20, 1904.

2 SHEETS—SHEET 1.



WITNESSES:

C. Y. Walker.
Geo. E. Tew.

Fig. 1.

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Fig. 3.

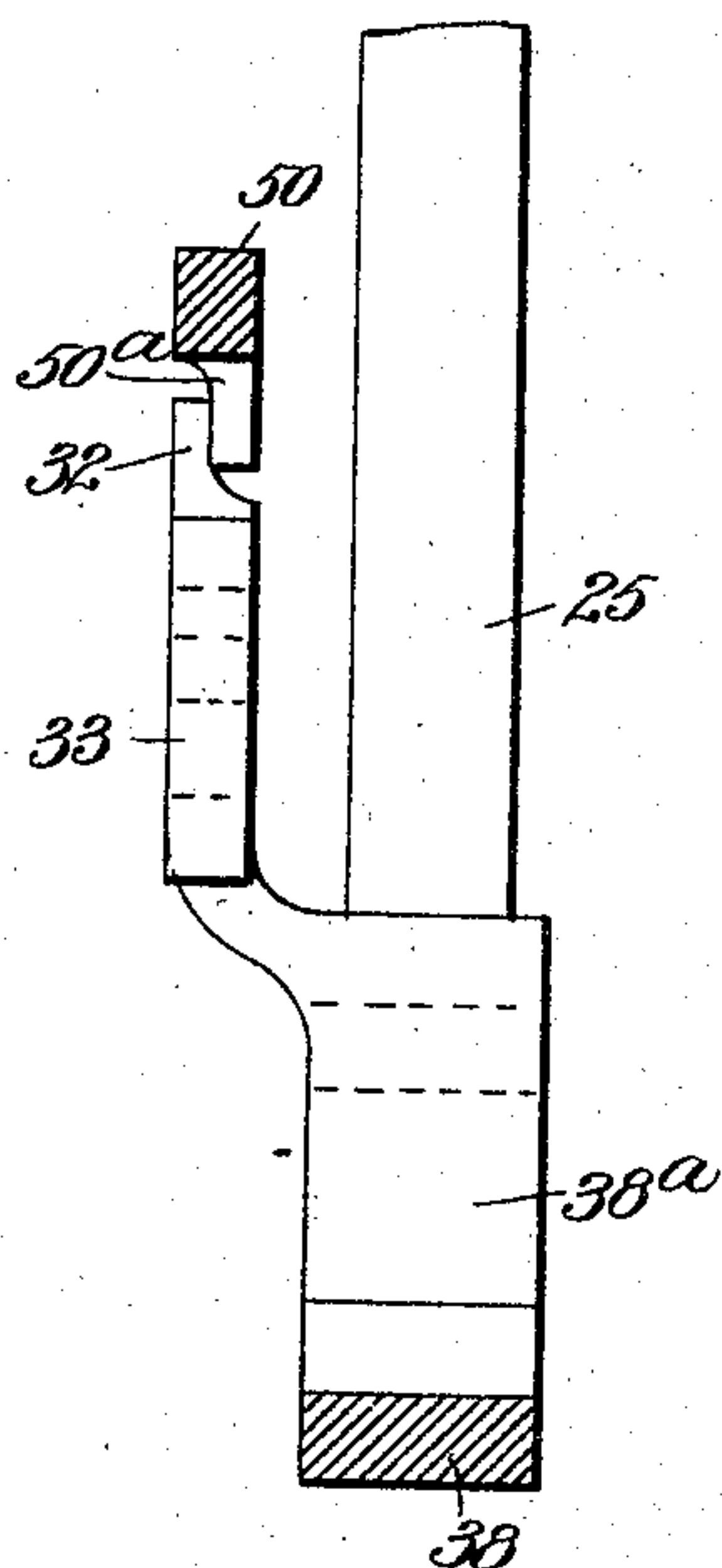


Fig. 2.

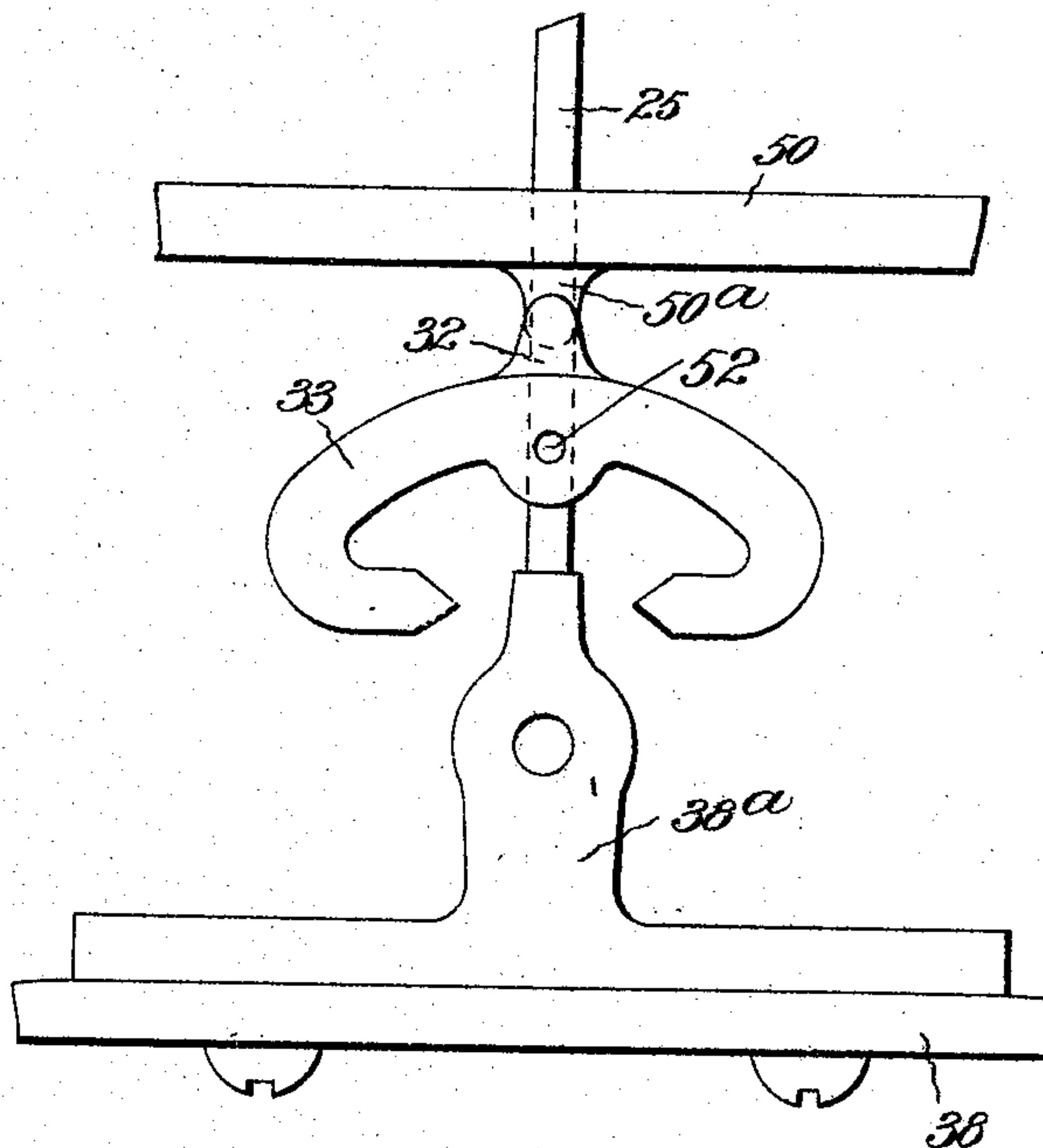
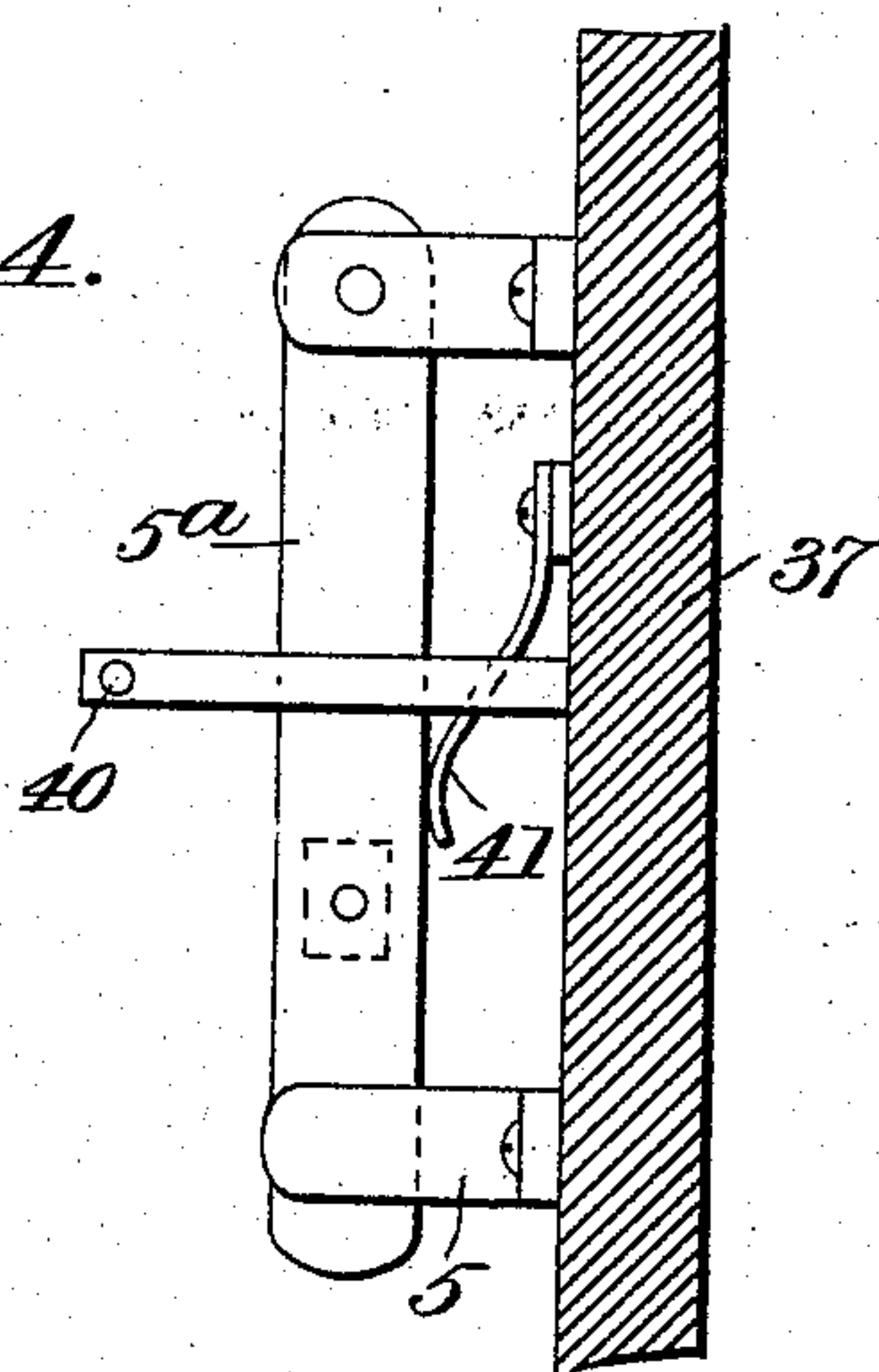


Fig. 4.



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UNITED STATES PATENT OFFICE.

WALLACE W. FULLER, OF CHARLESTON, SOUTH CAROLINA.

FRAUD-DETECTOR FOR ELECTRIC METERS.

SPECIFICATION forming part of Letters Patent No. 782,386, dated February 14, 1905.

Application filed May 20, 1904. Serial No. 208,851.

To all whom it may concern:

Be it known that I, WALLACE W. FULLER, a citizen of the United States, residing at Charleston, in the county of Charleston and State of South Carolina, have invented new and useful Improvements in Fraud-Detectors for Electric Meters, of which the following is a specification.

This invention is a detector for electricity-meters; and its purpose is to detect, expose, and prevent frauds on the meter. It especially prevents frauds by such means as are commonly employed, such as by passing the circuit around the meter, by throwing meter out of level, by removing the shunt-wire, by making a hole in the meter-cover and sticking a needle or piece of wire into the armature-winding to prevent it from running, or by breaking down the armature-winding, so that it will not run when the needle is removed.

The operation of the device depends upon or is controlled by a balanced current, with the effect that at any attempt to tamper with the meter the balance is disturbed and the device acts to release a switch which opens the main circuit, thus both exposing the attempted fraud and cutting off the supply. The switch is controlled by a latch which in turn is actuated by a pivoted bar carrying cores of solenoids in both lines of the main circuit. These solenoids normally balance each other. Tampering with the line or meter shunts one solenoid and releases the latch, permitting a spring to open the switch. The construction is such that all working parts may and preferably should be immersed in oil, whereby the device may be used to open heavy direct currents of high voltage, and the oil will also prevent undue vibration.

In the accompanying drawings, Figure 1 is an elevation of the device with casing in section as applied to a known wattmeter. Fig. 2 is an enlarged detail in elevation, showing the catch which holds the switch. Fig. 3 is an edge view of the parts shown in Fig. 2. Fig. 4 is a side or edge view in detail, showing the switch-blade and spring thereunder.

Referring specifically to the drawings, a wattmeter of suitable or desired construction

is indicated at A, and the detector is shown in a casing 37^a, secured to the under side of the meter-casing, 37 being a slate base on which the parts are mounted. The leading-in wires on the supply side are indicated at 9 and 1 and the leading-out or load wires at 9^a and 1^a, respectively. The current entering at supply-wire 9 passes to a vertically-disposed solenoid 11 and thence to the jaws 12 of a knife-switch 12^a, to terminal 16, through meter, and out the load-wire 9^a. Starting at supply-wire 1, current passes to terminal 2, switch-jaws and blade 5 and 5^a, through solenoid 6, terminal 7, and out at 1^a to the load. Suitable electrical connections between these elements are provided and are indicated in the drawings.

A shunt-wire 17^a from the coil of the meter enters a terminal 17, which is connected to coil of electromagnet 20, the coil being of very few turns and little resistance, so little, in fact, that it may be inserted in series with the armature of a meter already calibrated without disturbing the accuracy thereof. From coil of 20 a connection is made at 10 with the opposite side line. The armature of the electromagnet is indicated at 28 and is supported by a spring 25, projecting from the pivot-piece 38^a (see Figs. 2 and 3) of a spring-beam 38, which is pivoted at 34 to vibrate in a vertical plane. The armature 28 is arranged between its magnet and a contact 35, which is connected to the wire leading to meter from the switch 12^a and lead 9. The beam 38 is made of spring metal and is delicately poised. It carries under its pivots a screw-rod 40', on which is a small weight 33, which may be screwed along the rod to balance the beam between contacts 14 and 15. These contacts are both connected to the wire leading from coil 11 to switch 12^a and the meter. At its ends the beam carries the cores 11^a and 6^a of the solenoid-coils 11 and 6, respectively, and said beam is also connected by wire 13^a to point 13 between the leading-in wire 9 and coil 11, a flexible connection being provided at 13^b to permit vibration of the beam.

The blades 12^a and 5^a of the knife-switches are connected by an insulating-bar 50, which

has a small tongue 50^a, (see Figs. 2 and 3,) caught by a lip 32 on a yoke 33, which is pivoted at 52. The arms of the yoke hang on opposite sides in the way of the upper end of the pivot-piece 38^a of the beam. The blades are pressed from behind by springs 41, and in front of the blade is a short-circuiting stop-bar 40, which extends across both blades and is supported on the base-plate 37. If and when the yoke is swung by vibration of the beam 38, throwing the lip 32 from in front of the tongue 50^a, the springs 41 immediately lift the blades and open the switches, opening the main circuit and short-circuiting the wires of the load side.

When the current of the lights or other translating devices is turned on, the balancing pull of the solenoids 11 and 6 holds the beam out of contact with 14 and 15, and at the same time when the current is turned on meter the magnet 20 attracts armature 28 and holds it in contact against the tension of spring 25. If the meter be by-passed, one or the other of the coils 11 and 6 will be weakened or short-circuited and the excess of pull of the other coil will vibrate the beam 38 and close one or the other of the contacts 14 or 15, shunting the circuit of coil 11, releasing the catch at 32 and the switch, thereby opening the main circuit. Furthermore, if for any reason the meter-armature winding or shunt-wire 17^a be broken, or opened the magnet 20 will release armature 28 and the spring 25 will cause the same to contact with 35, which thereby closes the shunt-circuit of the coil 11, destroys the balance, releases the switch, &c. These actions may be illustrated, viz: When 28 contacts with 35, the circuit is from 13 to 13^b through 38, 25, and 16 to meter, thereby cutting out coil 11. When 38 contacts with 15, circuit is from 13 to 38, 15, 12, and 12^a to 16 and meter, and similarly when 38 contacts with 14, the effect in either case being to shunt coil 11 and allow coil 6 to pull up that end of the beam and release the switch. The contacts 14 and 15 are intended only to make it necessary that the meter be placed and kept level. The beam 38 is made to spring to some extent to relieve the pull or stress of the coils 11 and 6. When once the switch is opened, it must remain so until an authorized person shall have opened the casing, which, as will be understood, will be locked or sealed, and restore the initial arrangement; also, if the contact of the brushes of the meter-armature should become poor, the spring 25 will pull the armature 28 away from its magnet and cut off the current, with resulting notice from the consumer to the producer or supplying company.

The use of solenoids is advantageous, since they may be operated with safety and under great variations of load. They should be of large wire of size sufficient to carry the load. The apparatus is especially useful with di-

rect-current motor-meters. If used in connection with alternating-current induction-meters, the coil 20 and its connections may be omitted.

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

1. In an apparatus of the kind stated, the combination with a circuit having a meter therein, of a switch in each side of the circuit, and means controlled by balance of current on opposite sides of the circuit to operate said switches.

2. In an apparatus of the kind stated, the combination with a circuit having a meter in one side thereof, of connected switches in each side of the circuit tending to open the same, a catch normally holding said switches closed, and electrically-actuated means in opposite sides of the circuit, to release the catch, said means being connected to the catch and constructed to nullify each other when the current through the meter and the opposite side of the circuit is balanced.

3. In an apparatus of the kind stated, the combination with a circuit having a meter therein, and a switch on each side of the meter, of balancing-solenoids in each side of the circuit, and means controlled by said solenoids to open the switches when the balance is destroyed.

4. In an apparatus of the kind stated, the combination with an electric circuit and a meter and switch therein, the tendency of the switch being to open, of a poised beam having a catch holding the switch closed, and oppositely-acting electrically-operated devices in each side of the circuit, tending to swing the beam and release the catch, said devices being constructed to counterbalance each other when the current through the meter and the opposite side of the circuit is equal.

5. In an apparatus of the kind stated, the combination with an electric circuit having in one side thereof a switch, a meter, and a solenoid receiving the same current as the meter, and having in the other side thereof a switch and opposed solenoid, of means actuated by the solenoids to open said switches, said means being constructed to counterbalance each other when the current through both solenoids is equal.

6. In an apparatus of the kind stated, the combination with an electric circuit having a meter and a switch therein, of a shunt-circuit extending from the meter to the opposite side of the line, and means governed by said circuit to open the switch.

7. In an apparatus of the kind stated, the combination with an electric circuit having a meter and a switch therein, of means to open the switch, a spring controlling said means and tending to permit the same to operate, and a shunt-circuit extending from the meter-coils and having therein an electrically-operated device opposing said spring.

8. In an apparatus of the kind stated, the combination with a circuit having a meter therein, of a short-circuiting switch in the circuit, and means controlled by balance of current on opposite sides of the circuit to operate said switches.

9. In an apparatus of the kind stated, the combination with a circuit having a meter and load connections therein, of switches in the circuit, on opposite sides of the meter and load, means controlled by balance of current

to operate said switches, and a short-circuiting device, actuated by said switches when opened, to cut out the meter and load.

In testimony whereof I have signed my name 15
to this specification in the presence of two subscribing witnesses.

WALLACE W. FULLER.

Witnesses:

C. C. PLENGE,
WM. AUSTIN.