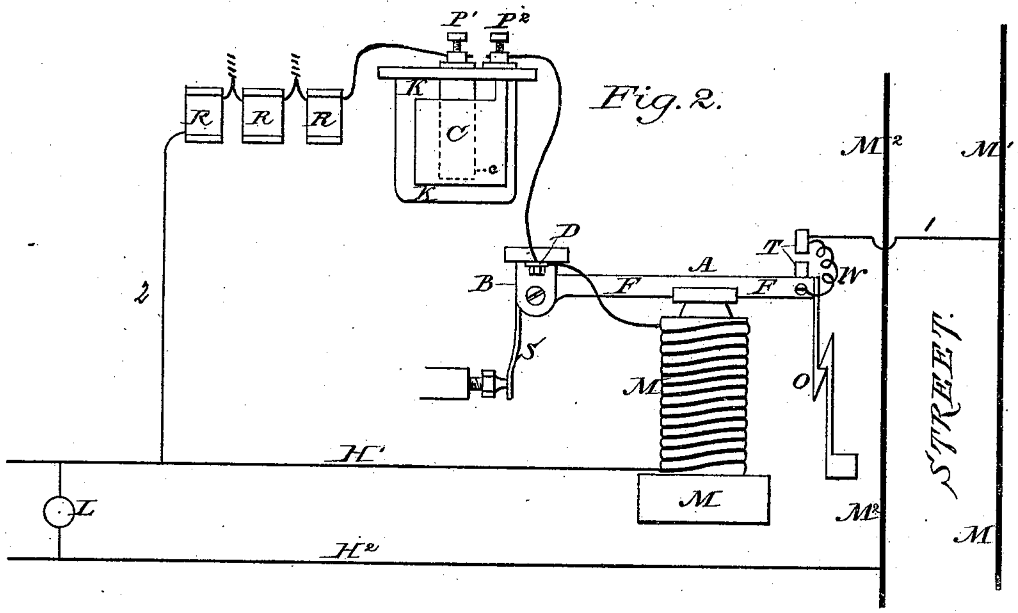
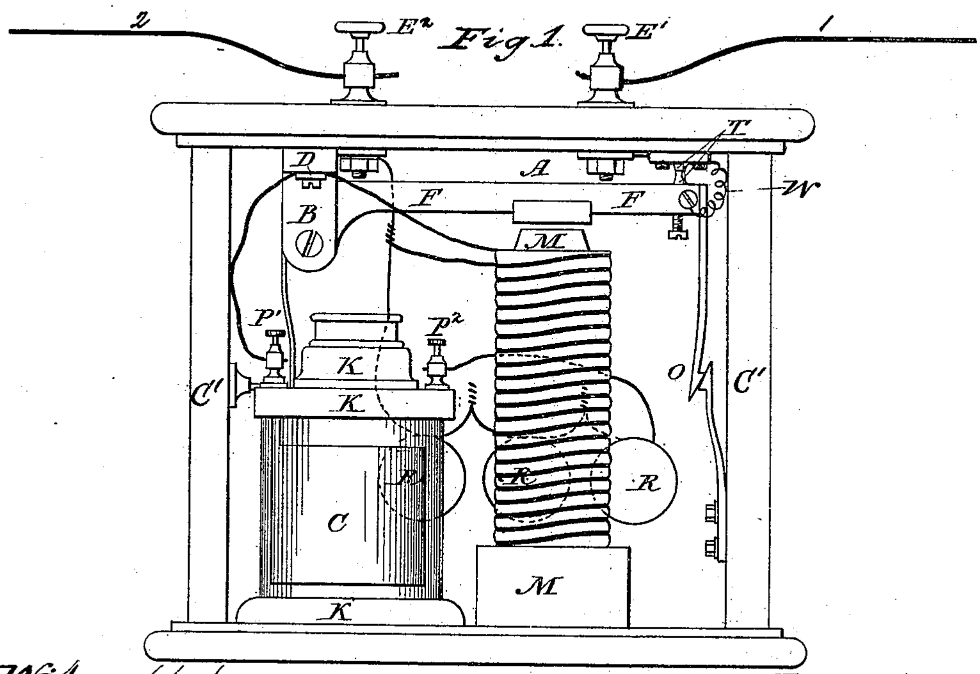
(No Model.)

# T. A. EDISON.

## ELECTRIC METER.

No. 251,545. Patented Dec. 27, 1881.




Witnesses:

F. W. Howard

H. W. Hall

Inventor:

T. A. Edison

per. Dyer & Wilber

Attys.

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY, ASSIGNOR TO THE EDISON ELECTRIC LIGHT COMPANY, OF NEW YORK, N. Y.

## ELECTRIC METER.

SPECIFICATION forming part of Letters Patent No. 251,545, dated December 27, 1881.

Application filed March 20, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented a new and useful Improvement in Electric Meters; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Hitherto the meters proposed in systems for distributing electricity to consumers have been registers of time only, being adapted to simply preserve a record of the time during which a current was flowing through one or several translating devices without regard to the amount used. Such do not afford as equitable a basis for charges as one which would record or register or indicate the amount of current used irrespective of the time.

My invention therefore relates to a meter which shall afford data for accurately determining the amount of current used. I make use of the known fact that a certain unit of current will cause the deposition of a definite amount of copper from a proper solution. The circuit passing to the translating devices of any given locality finds in the meter-box there stationed two paths, one, which is the main circuit, through apparatus to be hereinafter explained to the translating device, the other, which is a shunt-circuit, through an electrolytic cell to the translating devices. The resistance of this latter path is made exceedingly large compared with that of the first—for illustration, say as one hundred to one. At the commencement of some fixed period an exactly-weighed strip of copper is placed in the cell, which is filled with a proper copper solution. At the end of the period it is weighed, the difference being the amount deposited. This amount is due to the action of a hundredth part of the current used, and the actual amount used can be calculated with great ease. The relation existing between current and cubic feet of gas can be ascertained by allowing the current to flow through an electric light of a definite photometric power—say sixteen candles—for a few hours, noting the deposition of copper in the cell for same time. During the same period a gas-flame of equal photometric power is burned and the number of cubic feet consumed noted. From the data thus obtained the resistance in the circuit of the cell may be so adjusted that the deposition of one milligram shall represent a current equal in light-giving capacity to one cubic foot of gas, and bills may be rendered in cubic feet.

Within the meter-box I arrange an electromagnet in the circuit to the translating devices. This circuit passes through the back-contact point on the armature of the magnet, through the armature and the magnet, to the translating devices. The armature is held to its back-contact by a spring whose resilience is so adjusted that it may not be overcome upon the passage of ordinary currents through the coil of the magnet. When, however, a greater amount of current than usual is diverted through this circuit, owing to accidental short-circuiting, or any other cause, the armature is attracted and the circuit is broken. The armature is provided with a spring-latch, which locks it in position when once attracted and prevents the circuit being reopened. In order to prevent a spark upon the separation of the contacts, they are connected by a bit of very fine wire, which preserves the circuit for a moment after the contacts separate, when it is fused by the excess of current therethrough.

In the drawings accompanying and forming part of this specification, and showing a meter embodying my invention, Figure 1 is a view of the meter and adjuncts, and Fig. 2 shows more clearly the circuits.

$M'$ $M^2$ are the main conductors, from which proceeds and returns a circuit in which are the translating devices, whose consumption of current is to be measured, while in a shunt to such circuit is included the meter. These circuits are as follows: A conductor, 1, leads from $M'$ to the binding-post $E^2$, which is electrically connected to the contact-points T, one of which is carried by the armature F of the magnet M, whose armature-lever A is pivoted at B and is in the circuit. At D this circuit branches, one or the main branch passing around the magnet M and thence by $H'$ to the translating devices, (here typified by a lamp, L,) and thence by $H^2$ to $M^2$. The other is the branch or shunt circuit through the electroplating or depositing cell C and resistances R R R. These latter are adjustable, in order that desired definite proportions of the total current may be sent through each branch. The spring S of magnet M is so adjusted that the force exerted upon F upon the passage of ordinary currents through F shall not serve to attract it. When, however, the current through M becomes unduly strong M attracts F, breaking circuit at contact T. Upon such attraction the latches O catch and lock the armature, so as to prevent the circuit again closing at T until the cause of the disturbance may have been investigated. A very small wire, W, connects the contacts T, preventing a spark upon their separation, and keeping up a circuit around M sufficiently long for O to securely lock, when W burns away, leaving the meter and translating devices entirely disconnected from the mains.

*c* is the copper plate in the cell K, whose difference in weight, due to deposition, affords the current measurement.

In Fig. 2, for clearness, the meter and attachments are shown as not inclosed in a box or case, the wires 1 2, connecting the meter to M′ and H′, being shown as connected directly to T and R, while the electrolytic cell is connected in the circuit by means of suitable binding posts, P′ P². In practice, however, it is preferable to inclose the apparatus in a tight box or case, C′, the wires 1 2 leading to binding-screws E′ E² thereon, whence proper connections are made through the devices.

Having thus described my invention, what I claim is—

1. The combination of a main circuit, a shunt-circuit thereto containing an electrolytic cell and suitable resistances, a definite determinate fraction of the current passing through the main circuit being thereby diverted through the shunt-circuit and electrolytic cell, whereby data primarily for the measurement of the fraction shunted and ultimately for the measurement of the current passing through the main circuit are afforded, substantially as set forth.

2. The combination of a magnet, its armature and armature-lever and contact-points, one of the latter being upon the armature-lever, all arranged in an electric circuit, and a fusible wire connected to form a shunt around the contact-points, substantially as set forth.

3. The combination of a magnet and its armature, the latter and its back-stop forming normally part of the circuit to the magnet, a fusible circuit device maintaining c rcuit therethrough after the armature has been withdrawn from its back-stop, and a latch locking thereupon the armature against reclosure on its back-stop, the fusible circuit device itself being thereafter ruptured by the flow of current therethrough, substantially as set forth.

This specification signed and witnessed this 10th day of March, 1880.

THOS. A. EDISON.

Witnesses:

WM. CARMAN,

C. S. MOTT.