

(No Model.)

H. S. MAXIM
ELECTRICAL METER.

No. 255,306.

Patented Mar. 21, 1882.

Fig. 1.

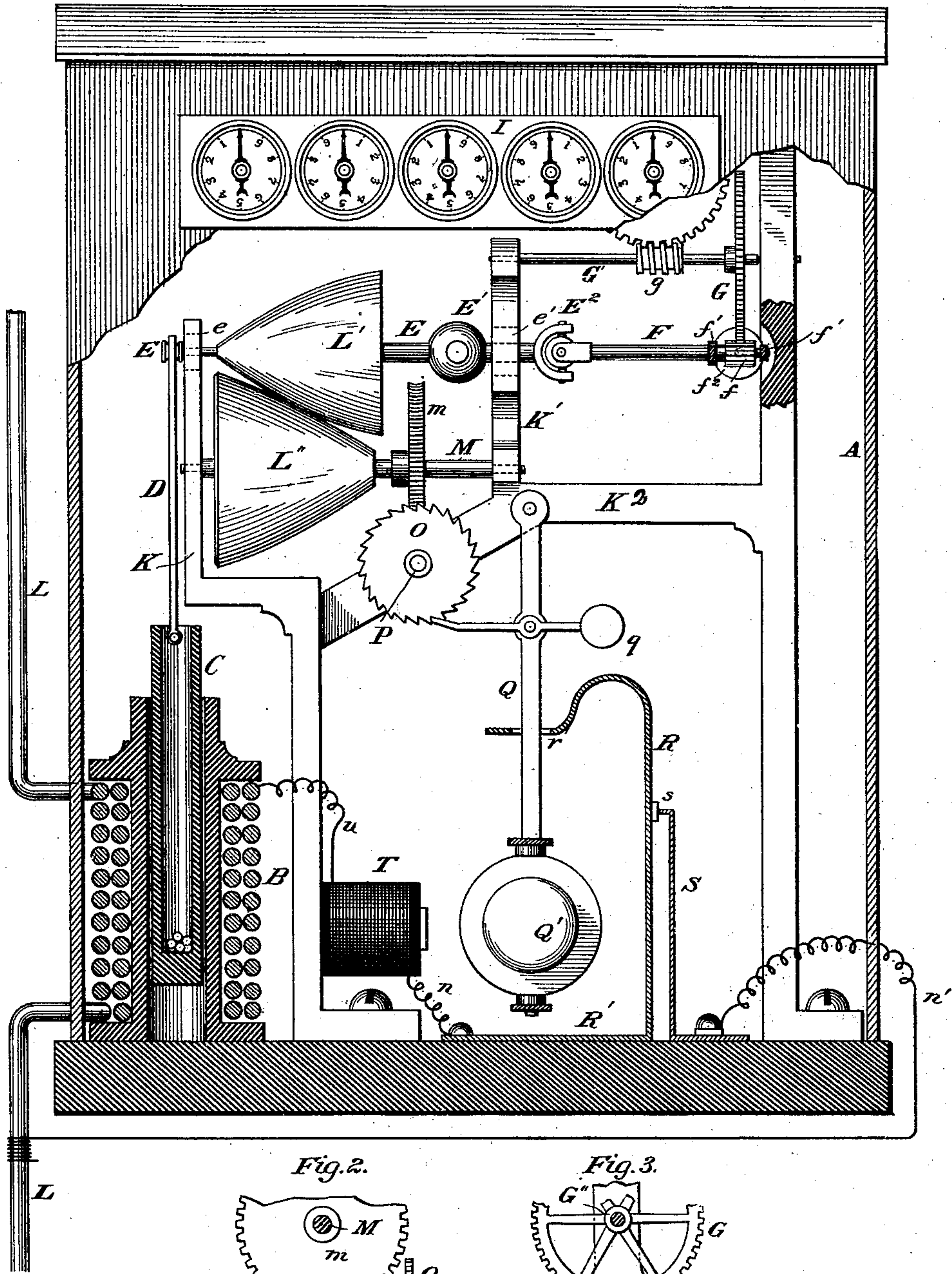


Fig. 2.

Fig. 3.

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ELECTRICAL METER.

SPECIFICATION forming part of Letters Patent No. 255,306, dated March 21, 1882.

Application filed July 20, 1881. (No model.)

To all whom it may concern:

Be it known that I, HIRAM S. MAXIM, of the city of Brooklyn, county of Kings, and State of New York, have invented certain new and
5 useful Improvements in Electrical Meters, of which the following, taken in connection with the accompanying drawings, is a specification.

The object of my invention is to ascertain
10 the amount of current that has passed over or been withdrawn from a main line from a central station in a system of supply to various points of current for running electric lights, electric motors, and other analogous purposes; and it consists in certain novel combinations
15 of devices through which the electric current is caused to control a registering apparatus, as will be hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings, Figure 1
20 represents the apparatus inclosed in a suitable case, and Figs. 2 and 3 details of the mechanism employed in the construction of the same.

The letter A designates the inclosing-case
25 of the meter, its front wall being partially removed to expose to view the interior parts. The main electro magnet is shown in section.

The letter B designates the main electro-
30 magnet, provided with an axially-movable core, C, and having the opposite terminals of its coil respectively connected with the main line L, the wire of said coil being of the same resistance as that of the main line. The axially-
35 movable core C is connected by a link, D, with the end of a shaft, E, provided with an adjustable weight, E', and connected by a universal joint, E², with a shaft F, carrying the pinion
40 f, meshing with a gear-wheel, G, fixed upon a shaft, G', carrying the worm g, which engages with the prime motive gear-wheel of a registering apparatus I. The end of shaft F is jour-
naled in bearings f' f'', forming part of a bar or frame, f², pivoted to the frame K², so that
45 the said shaft may be capable of a short radial movement in a vertical plane corresponding to that of shaft E, as will presently be explained.

The free end of the shaft E has a vertical
50 movement in a slot (indicated by the dotted lines e) in the standard K, and the inner por-

tion of said shaft has a similar movement in a slot (indicated by the dotted lines e') in the standard K'. Said shaft E has fixed upon it a conoid, L', the surface of which is curved in the direction from its base to its apex, and the
55 surface of said conoid rests upon the surface of a similar conoid, L'', carried by a shaft, M, which has its bearings in standards K and K', and has also fixed upon it a worm-wheel, m, which engages with a worm behind a ratchet-
60 wheel, O, which is mounted on the forwardly-projecting end of the shaft P, which carries said worm.

The letter Q designates a pendulum, pivoted to a supporting-bar, K², and having at its
65 lower end a heavy adjustable armature, Q', and near its upper end a gravity-pawl, q, the tongue of which engages with the teeth of the ratchet-wheel O. The pendulum Q vibrates within a slot, r, formed in a laterally-project-
70 ing arm of a vertical spring, R, which has a laterally-projecting base, R', secured to the base of the inclosing-case. A spring, S, rising also from the base of the case, has a lateral finger, s, projecting from its top and normally in
75 contact with the spring R.

The letter T indicates an electro-magnet, supported by the standard K, and arranged to act upon the armature Q' of the pendulum. The coil of said magnet is included in a de-
80 rived circuit, indicated by the wires n and n', and connected with the main line.

It will be observed that the rising and fall-
ing of the core C will, through link D and the shaft E, oscillate vertically the conoid L', and
85 thus vary the point of contact between the conoids L' and L'', this variation of the point of contact causing a corresponding variation of speed in motion communicated from the lower conoid to the upper—that is, as the upper co-
90 noid rocks longitudinally upon the lower when the core C draws the conoid L' downward, its smaller portion or part, near its apex, will be brought in contact with its larger portion or part, near the base of conoid L'', and then the
95 rotation of said conoid L'' will communicate a relatively rapid motion to the conoid L' and its shaft E, and vice versa. From this it will be understood that as the greater the energy
100 of the current over the main line the farther

inward will the magnet draw its core C, so the rotation of the conoid L' will be relatively rapid when a current of great energy flows over the line, and correspondingly slower as the energy of the current is less, the speed of the registering devices being controlled by the intermediate connections, as described, with the shaft E, and therefore corresponding with the energy of the current, registering more rapidly as the energy is greater. The weight E' is so adjusted as to hold the shafts E and F normally in a horizontal position and to return them to this position when the shaft E is not drawn downward by the action of the core C.

The derived circuit of the electro-magnet T emanates at one end, as indicated by the wire u, from one of the coils of the magnet B, so that when the circuit is closed over the main line a derived current will immediately flow over the circuit of the magnet T, causing the core of said magnet to attract the armature Q' of the pendulum and the pawl q to impel the ratchet-wheel O through a rapid rotation, thus communicating motion to the worm on the same shaft as said ratchet-wheel, and through said worm and the worm-wheel m to the shaft M of the conoid L'', which by frictional contact communicates motion to the conoid L'.

As the armature Q' is attracted by the magnet T, the pendulum Q strikes the wall of the slot r in the arm of a spring, R, drawing said arm to the left and breaking contact between it and the finger s of the spring S. The derived circuit of the magnet being thus broken, said magnet loses its power, and the armature Q consequently moves by gravity to the right, permitting the spring R to again come in contact with the finger s, re-establishing the circuit, when the armature will again be attracted, a continuous vibration of the pendulum being thus produced as long as the main circuit remains closed. At each movement of the pendulum to the right the pawl q engages a fresh tooth of the ratchet-wheel O, and in each movement to the left impels said ratchet-wheel through a partial rotation. The force of gravity, acting upon the pendulum and its heavy armature, steadies the movement of the pendulum under the influence of the magnet T, so that a very steady intermittent rotary motion

is communicated to the conoid L'', and thence through the other connections, as described, through the registering apparatus, the registration of said apparatus being rapid as the energy of the current on the main line is greater and relatively slow as the energy of said current is less.

Having now described my invention and explained the operation thereof, I claim—

1. In an electric meter, the combination, with the axially-movable core of the magnet B, of the universally-jointed shaft E, connected thereto by an intermediate link, and also connected by intermediate gears with a registering apparatus, and carrying the conoid L', arranged to rock longitudinally upon the conoid L'', mounted upon a shaft journaled in fixed bearings and rotated by armature mechanism, substantially as described.

2. In an electric meter, the combination, with a registering apparatus, of a conoid L', mounted upon a universally-jointed shaft in gear with said registering apparatus, a conoid L'', mounted upon a shaft rotating in fixed bearings and supporting the first-named conoid upon its surface, suitable devices for varying the point of contact between said conoids by the influence of an electric current over the main line, and automatic mechanism for rotating said conoid L'' under the influence of a current derived from said main line, substantially as described.

3. The combination, with the registering apparatus and the electro-magnet B, arranged for connection with a main line and provided with an axially movable armature, of the universally-jointed oscillating shaft E, in connection with said apparatus and carrying the conoid L', a link connecting said shaft with said armature, the conoid L'', mounted upon shaft M, carrying a worm-wheel, the ratchet-wheel O, fixed upon a shaft, carrying a worm meshing with said wheel, an electro-magnet in a circuit derived from the main line, a pendulum adapted to be oscillated thereby and provided with a pawl, q, substantially as described.

In testimony whereof I have hereunto set my hand this 14th day of July, 1881.

HIRAM S. MAXIM.

Witnesses:

PARKER W. PAGE,
CLAYTON KNEELAND.