

(No Model.)

F. L. GREGORY.
ELECTRIC METER.

No. 503,595.

Patented Aug. 22, 1893.

Fig. 1

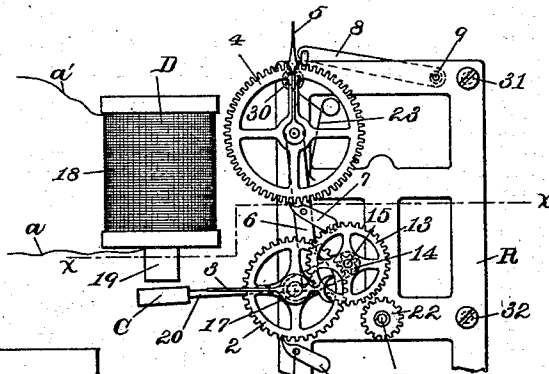


Fig. 6

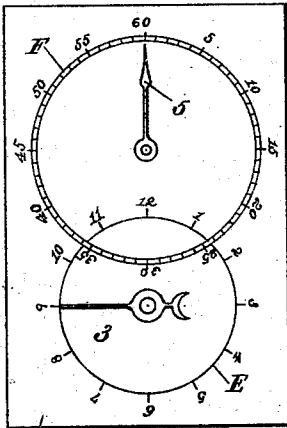


Fig. 2

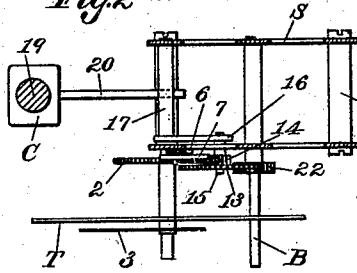


Fig. 7

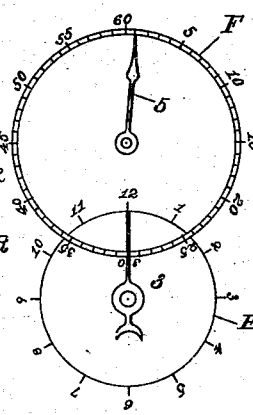


Fig. 3

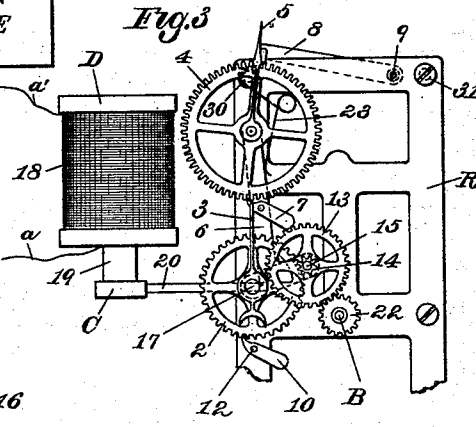


Fig. 4

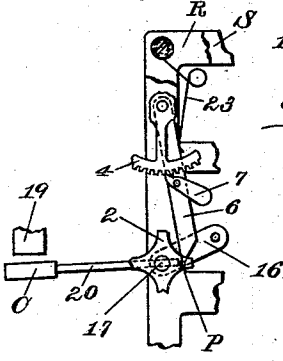
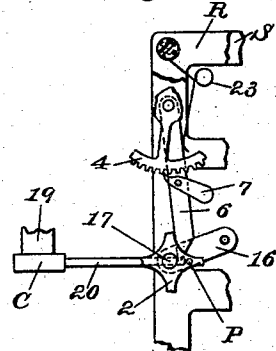


Fig. 5



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UNITED STATES PATENT OFFICE.

FRED L. GREGORY, OF NIAGARA FALLS, NEW YORK.

ELECTRIC METER.

SPECIFICATION forming part of Letters Patent No. 503,595, dated August 22, 1893.

Application filed May 14, 1892. Serial No. 432,984. (No model.)

To all whom it may concern:

Be it known that I, FRED L. GREGORY, a citizen of the United States, residing at Niagara Falls, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Electric Meters, of which the following is a specification.

This invention relates to electric meters for registering the duration of the successive electric currents, and thus giving the ampères of the same.

In the drawings accompanying and forming a part of this specification, Figure 1 is a front view of an electric meter embodying my present improvements, including a portion of the clock-mechanism for actuating the same. Fig. 2 is a sectional view on line $x x$ of Fig. 1, as seen from above said line. Fig. 3 is a view similar to Fig. 1, showing some of the parts in a different position. Figs. 4 and 5 are views similar to a portion of Fig. 3, and are illustrative of the operation of the meter mechanism. Figs. 6 and 7 are diagrammatic views of the dials and the register-hands, and illustrate the method of registration.

Similar characters designate like parts in all the views.

In my improved ampère meter, I use a continuously-running time-piece, a current-timing mechanism, mechanism for operatively connecting the current-timing apparatus with the continuously-running time-piece, and electrically-actuated means for throwing said connecting-mechanism into action and out of action. The time-piece for actuating the meter-hands may be the electric clock described in Letters Patent No. 455,532, granted to me July 7, 1891; and that clock may be actuated as described in said Letters Patent, by means of an independent electric battery, or by means of a current from a storage battery in whose charging circuit the meter may be located. In the drawings, I have shown the meter-mechanism carried by a framework consisting of the front-plate R, the back-plate S, and the studs, or "pillars," 30, 31 and 32, connecting said frame-plates as shown in my aforesaid Letters Patent, and after the manner of an ordinary metal clock-frame.

The time-piece in connection with which the meter mechanism is used is provided with the usual clock-hand-carrying staff B, which

may carry one of the hands of the clock, and, through the usual gearing, actuate the other of said hands. It is not necessary, of course, for the purposes of my improved meter, that said clock-staff shall be provided with a hand or pointer for indicating the time; but this can be done whenever so desired. The train of gearing usually employed for actuating said "staff," not being considered necessary to a proper understanding of my present invention, is not shown herein; but reference may be had for a description of the preferred form thereof, to my aforesaid Letters Patent.

My improved meter mechanism, in the complete form thereof herein shown and described, comprises two meter-hand wheels. The first meter-hand wheel, 2, carrying the "hand" 3, is supported at a convenient distance from the shaft or staff, B, of the time-piece, by its hub (or by a sleeve to which the wheel and hand 3 are fixed) carried upon the rock-shaft 17, which is journaled in bearings formed in said frames R and S. The hand wheel 2, together with its connected hand 3, are driven from the staff B through shiftable gearing connected to be actuated to engage and disengage said first hand wheel from the time-piece on the movement of an armature toward and from a magnet through whose coil the current to be measured is made to pass. Said shiftable gearing consists, in its preferred form, of the pinion 14 carried by a stud 15 fixed in the swinging arm 16; a gear-wheel 13 carried by said pinion and adapted to mesh with the driving pinion 22 on the staff B; and, the armature C connected by the arm 20 to said lever-arm 16 for swinging this arm from its position in Figs. 1 and 4 to that in Figs. 3 and 5. As a convenient means for connecting said arms, these are both fixed to the rock-shaft, 17, journaled in bearings formed in the framework.

The second meter-hand wheel, 4, carrying the "day-hand" 5, is intermittently actuated from the first meter-hand wheel by means of a lever and ratchet, and a cam or like device on the first meter-hand wheel for actuating said lever. This lever, designated by 6, may be constructed and arranged to be forwardly actuated by gravity, or it may be retracted by means of the cam or pin P, suitably fixed to the first meter-hand wheel 2, as

herein shown, and thrown forward by a spring, 23. For properly detaining the second meter-hand wheel on the retractive movement of the pawl 7, a suitable pawl, or detent, 8, is shown pivotally supported at 9 in position for acting upon the teeth of said wheel 4. For similarly detaining the first meter-hand wheel, 2, another detent-pawl, 10, is shown pivoted to the framework by a pivot, 12, and at the other end engaging the teeth of said wheel 2.

The dial-plate T is shown in Fig. 2 set in place in a fixed position relatively to the framework, being held by some suitable supports not shown. On the dial-plate are formed the two dials E and F, (see Fig. 6), for the two pointers, or hands, 3 and 5, respectively. These dials may, of course, be subdivided into any convenient number of divisions, but the proportions of the meter-hand-actuating gearing should be suitably adjusted to the system of dials adopted. The current or currents the duration of which is to be measured, are made to pass through the coil 18 of the magnet D, whose core or pole 19 is thereby energized and attracts the aforesaid armature C, which is operatively connected with the shiftable gearing.

The operation of the meter is as follows:
 Whenever the electric current is passed through the coil, 18, of the magnet, this is energized to draw the armature C toward the core 19 of the magnet, thus raising the lever 20 and turning the rock-shaft 17 to throw the arm 16 downward and thereby carry the gear-wheel 13 into engagement with the pinion 22 on the aforesaid shaft or staff, B, of the time-piece. After this, and so long as the armature remains drawn toward the magnet, the running of the time-piece continuously revolves the first meter-hand wheel, and thus indicates on the dial E the duration of the passage through the magnet-coil of the electric current. When the current is cut off, the weight of the armature (or some other weight or spring—not shown—arranged therefor) operates to shift the connecting gearing into its inoperative position, and the registration ceases. When the total registration reaches the highest number upon the dial E, the aforesaid pin P will have carried the lever 6 backward (see Fig. 4) so that the pawl 7 will engage another tooth of the second meter-hand wheel 4; and immediately on the passage of the first meter-hand 3 by said highest number on the first dial, as in Fig. 7, said cam P passes from under the lever 6, whereupon the spring 23 throws the lever forward to the position shown in Figs. 3 and 5, thus turning forward the second meter-hand one division of the second dial F, as illustrated in Fig. 7. By this method of registration, the duration of each successive current is added to the registration of those previously passing through the magnet-core. My improved electric meter is, therefore, particularly adapted for registering the electric current where this is of a constant

strength, and the current intermittent. The pointer-carrying wheels 2 and 4 being forwardly actuated by means substantially such as herein set forth, each of said wheels may, when the meter-case is unlocked, be turned forward to zero without detaching or disconnecting any of the parts of the mechanism.

My improved electric meter is especially designed for use, among other uses, in connection with storage systems for isolated lighting and power. According to this system, a switch (not shown) is provided for turning on and shutting off the current from the storage battery of the isolated system, and the magnet D is placed in the line connecting the supply line, *a a'*, with said battery. When the switch is closed, the current passes through said line *a a'*, energizes the magnet D, and sets in motion, as hereinbefore described, the meter mechanism to record the duration of the current of the storage battery, and when the switch is opened, the meter mechanism is stopped, thereby preserving the registration until the next time the switch shall be closed, when the meter mechanism will be again set in motion as before.

Having thus described my invention, I claim—

1. In an electric-meter, the combination with the magnet energized by the current to be measured, and with the time-piece having a meter-mechanism actuating-pinion, of a rock-shaft having a hand-wheel and hand connected together and loosely mounted thereon, an arm connected with said rock-shaft, gearing carried by said arm in mesh with the hand-wheel and adapted for engagement with and disengagement from the pinion of the time-piece, as described, an armature operable by the magnet and connected to swing said arm, and means for preventing the retraction of the hand-wheel, all combined and co-operating, substantially as and for the purpose described.

2. In an electric-meter, the combination with the frame, and the magnet energized by the current to be measured, of the clock-hand-carrying shaft B having a pinion thereon, the rock-shaft 17 located in a horizontal plane with relation to, and remote from said shaft B, and having the hand-wheel 2 and a hand 3 loosely mounted thereon, the gear-wheel 13 and pinion 14 carried by a stud secured to a swinging-arm 16 fixed at one end to the rock-shaft, and interposed between the hand-wheel 2 and pinion 22, and adapted for engagement therewith, the armature C connected by the arm 20 to the rock-shaft for swinging the arm 16, and connected gearing, into and out from operative engagement with the pinion 22, and means, as specified, for preventing the retraction of the hand-wheel, substantially as described.

3. In a meter of the class specified, the combination with a time-piece and a magnet, of the first meter-hand wheel, shiftable gearing

substantially as described intermediate to the
time-piece and said first meter-hand wheel,
means for connecting and disconnecting the
gearing, the second meter-hand wheel, a lever-
5 ver-and-ratchet device arranged to intermit-
tently actuate the second meter-hand wheel,
and a lever-actuating device substantially as
described carried by the first meter-hand
wheel for retracting said lever, substantially
10 as set forth.

4. In a meter of the class specified, the com-

bination with the meter-hand wheel 2 having
the cam P and carrying the meter-hand 3, of
the second meter-hand wheel 4 carrying the
hand 5, dials for said meter-hands respect- 15
ively, and the lever 6 and pawl 7, all organ-
ized and co-acting substantially as shown and
described.

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Witnesses:

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