

UNITED STATES PATENT OFFICE.

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ELECTRIC TIME-METER.

SPECIFICATION forming part of Letters Patent No. 396,645, dated January 22, 1889.

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To all whom it may concern:

Be it known that I, GEORGE F. CARD, a citizen of the United States, residing in Covington, in the county of Kenton and State of Kentucky, have invented a certain new and useful Improvement in Electric Time-Meters, of which the following is a full, clear, and exact description.

My invention relates to an improvement in electric time-meters, and is designed to be attached to an electric circuit supplying a current of electricity for mechanical or other purposes—such, for instance, as electric lights, motors, and so forth—to measure and record the number of hours or amount of time that the electric current is in use.

It consists in a clock mechanism, in combination with an electro-magnet attached to the electric circuit and so arranged that the electric current will control the movements of the clock, so as to record the time the current is in use. It may be arranged so that when the current of electricity is flowing the clock will stop, a dial being connected with the clock which records the time during which the clock is going; or the electro-magnet may be so arranged that the clock will go only when the current is on.

In my drawings I have illustrated the former arrangement as being in some respects more desirable to users of the meter; but I do not limit myself to the particular arrangement, as it is apparent that either may be used, as circumstances suggest.

The details of my invention will be more fully hereinafter described, reference being had to the accompanying drawings, forming part of this specification.

Figure 1 is a front elevation showing the clock-face, electro-magnet, and attachment. Fig. 2 is a front elevation with the clock-face removed. Fig. 3 is a cross-section of the spindle carrying the hand of the clock and finger for rotating the registering-plate.

Like letters of reference indicate identical parts in all the figures.

A is an ordinary clock-face provided with an hour-hand, *a*, on the spindle E.

B B are the wheels of an ordinary clock-movement. Of course any desired movement

may be used with or without pendulum. The one shown is an ordinary spring-movement without pendulum.

C is the escapement-wheel and D the escapement.

On the spindle E, which revolves once in twelve (12) hours, and carries the hand *a* which indicates the hour, is a finger or lug, *e*.

Pinioned on the frame-work of the clock in any convenient manner is a plate or dial, F, revolving on the pivot *f*. This plate F is provided with any convenient number of teeth, *g*, and on the plate opposite the teeth are printed numbers to correspond with the number of teeth, beginning at 1. In the drawings teeth are shown numbered consecutively from 1. This plate F is so located that as the finger *e* revolves it will catch one of the teeth *g* and revolve the plate F a distance equal to the space occupied by one tooth, leaving the next tooth in position to be caught upon the next revolution of the hand *a* and finger *e*.

H is a spring engaging with the teeth on the plate F, and has sufficient tension to hold the plate in position, but not to prevent its movement by the finger *e*. The hand and finger *e* revolve once in twelve hours.

If the plate F is set at any selected point—say at 1—its position at any time will indicate the number of revolutions the hand *a* has made, thus recording the number of periods of twelve hours each that the clock has been running, while the hand *a* will indicate the fractions of such period.

K is an electro-magnet properly insulated and secured to the frame-work or support of the device.

k k are the wires leading to and from the electro-magnet, bringing the electro-magnet within the electric circuit attached to the motor, electric-light plant, or whatever electric appliance may be used.

L is a bent arm pivoted at *l* and weighted, as at *i*, so as to occupy in its normal condition the position shown in Fig. 1. Attached to this arm L is a piece of soft iron, *V*, or any substance possessing the proper magnetic qualities to form an armature. This armature is so located with reference to the electro-magnet that it will be readily acted upon

by the electro-magnet, so that when the electric current is turned on, the arm L is attracted, and the parts *l'* and *l''* brought in contact, bringing the arm L to the position shown in Fig. 2. When the current is turned off, the attraction ceases, and the arm falls back into its normal position, as in Fig. 1.

i' is a stop to prevent the arm falling too far from the electro-magnet.

To the opposite end of the arm L is a link, M, connecting the arm L to the weighted lever N. This lever is fulcrumed at O. As the opposite end of it is lowered, it rests upon one arm of the escapement D, holding it in engagement with the escapement-wheel C and stopping the clock. The moment the lever N is raised and the escapement-wheel released the clock will go again. Where a pendulum is used instead of a spring mechanism, the pendulum is held by the escapement suspended on one side, so that when the escapement is released the pendulum swings back and starts the clock. Thus by the simple turning on of the electric current and passing it through the electro-magnet the clock is stopped, and by turning off the current the clock is at once started. The clock mechanism being arranged to run for any fixed period—say thirty days, or for sixty revolutions—by deducting the number of hours registered on the plate F—that is, the number of hours the clock has been running—from the number that have elapsed since the clock was started we have the number of hours the clock was not running or the number of hours the electric current was used.

If the weight *i* is made so as just to overbalance the weight of the lever N, a very slight power in the electro-magnet will be sufficient to draw the armature *l'* into contact with the electro-magnet, and the device may be made as delicate as desired.

It will be readily seen that by changing the

shape of the arm L or the operation of the lever N the clock may be stopped only when the current is off and run only when the current is on, so that whichever arrangement is found most convenient for reckoning the time measured may be used. For instance, if the arm L is bent in the opposite direction and the lever N attached to it, as indicated by dotted lines in Fig. 2, the clock will run only when the electric current is flowing and be stopped when the current stops.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an electric meter, a clock mechanism the arbor of the hand-wheel of which is provided with a finger, *e*, a toothed and numbered dial, F, arranged to be engaged by the finger *e* and have imparted to it an intermittent rotary motion upon the rotation of said finger, combined with an electro-magnet and devices intermediate of the electro-magnet and clock mechanism for starting or stopping the operation of the clock upon the action of the electro-magnet, substantially as set forth.

2. In an electric meter, a clock mechanism the arbor of the hand-wheel of which is provided with a finger, *e*, a toothed and numbered dial, F, and a spring, H, engaging said wheel to hold it from accidental rotation, the said wheel being arranged to be engaged by the finger *e* and have imparted to it an intermittent rotary motion upon the rotation of said finger, combined with an electro-magnet and devices intermediate of the electro-magnet and clock mechanism for starting or stopping the operation of the clock upon the action of the electro-magnet, substantially as set forth.

GEORGE F. CARD.

Witnesses:

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