(No Model.)

F. A. MATTHEWS.

ELECTRO MAGNETIC APPARATUS FOR OPERATING STOP WATCHES.

No. 450,966. Patented Apr. 21, 1891.

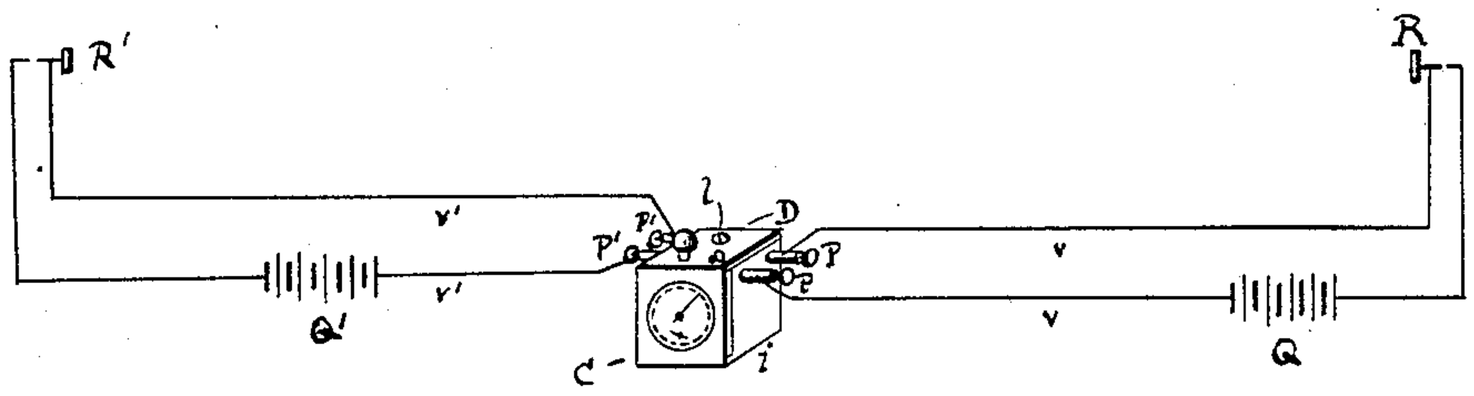

FIG. 1.

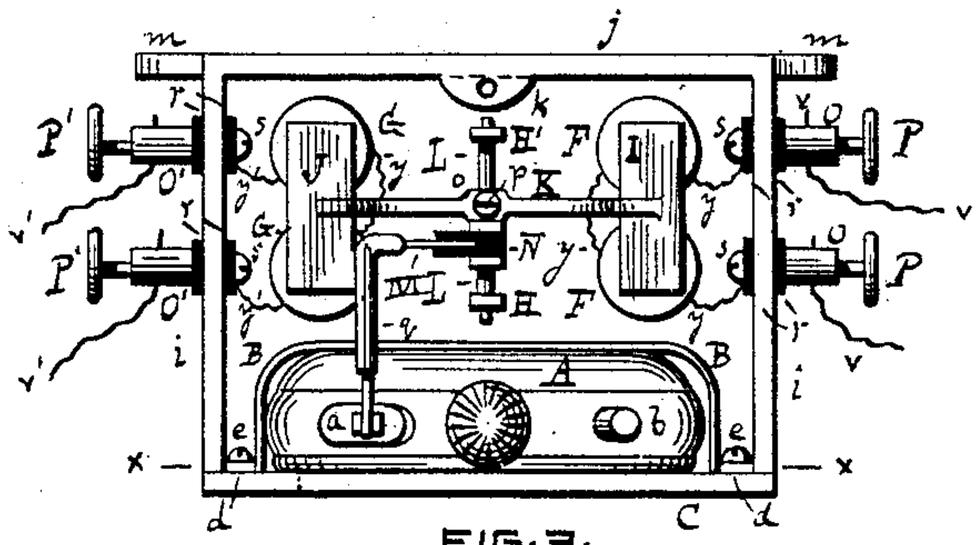

FIG. 3.

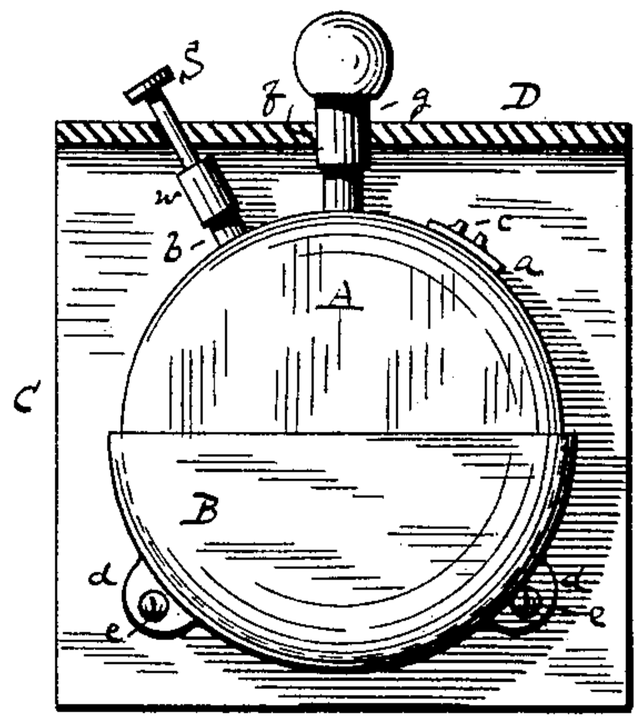

FIG. 4.

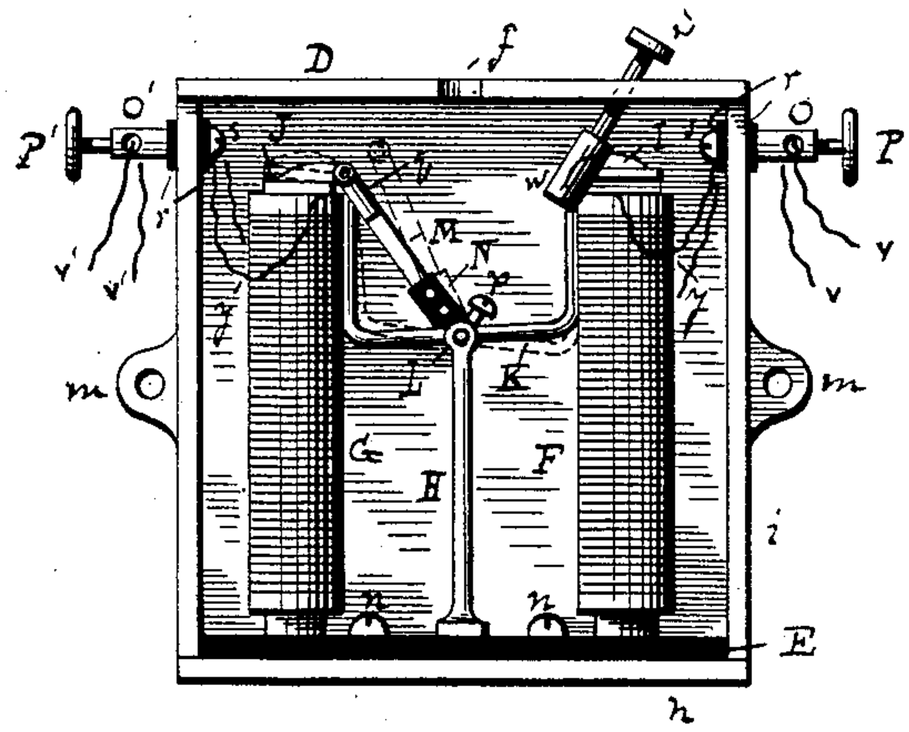

FIG. 2.

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ELECTRO-MAGNETIC APPARATUS FOR OPERATING STOP-WATCHES.

SPECIFICATION forming part of Letters Patent No. 450,966, dated April 21, 1891.

Application filed February 7, 1891. Serial No. 380,644. (No model.)

To all whom it may concern:

Be it known that I, FRANK A. MATTHEWS, of the city and county of Providence, in the State of Rhode Island, have invented a certain new and useful Improvement in Electro-Magnetic Apparatus for Operating Stop-Watches; and I declare the following to be a specification thereof, reference being had to the accompanying drawings.

Like letters indicate like parts.

Figure 1 shows the exterior of my device in perspective view, together with the electrical circuits by which it is operated. Fig. 2 is a front elevation of my invention with the face-plate and watch removed to expose the interior portion of the device. Fig. 3 is a top plan of my invention with the top plate removed for the same purpose. Fig. 4 is a rear elevation of the face-plate with the watch in position thereon, the top plate being in section on line *x x* of Fig. 3.

My invention relates to that class of watches commonly called "stop-watches," used in fixing the exact time of an occurrence; and it consists in combining with such a watch an electro-magnetic device to start and stop the mechanism of the watch by closing electrical circuits, as hereinafter particularly described.

As my invention does not relate to the internal mechanism of a stop-watch, it is unnecessary to describe that mechanism. I use a stop-watch A of the usual construction, having the common slide *a*, movable on and through the rim of the watch-case to start or stop the balance-wheel, as may be desired, and also the rod *b* to move the hands of the watch back to the zero-point in the well-known manner. The only change in the watch which I make is to form a nick or slot *c* in the knob of the slide *a*. This watch is set in a pocket B of the face-plate C. The pocket is preferably made of sheet metal, properly shaped and secured to the face-plate by ears and screws *d e*. The face-plate has a central circular opening to expose the dial, as seen in Fig. 1. The top plate D has the slot *f*, through which the stem *g* of the watch passes, Figs. 2 and 4.

The case which incloses the watch and the apparatus to operate it consists of a box-like structure having the bottom *h*, the sides *i*, the rear wall *j*, the face-plate C, and the top plate D. The plates C D are detachable and the other portions of the case may be integral, as shown in the drawings, or made of separate plates united, as may be desired. I show the top plate as attachable to the box by the ear-piece *k* and screw *l*, the engagement of the stem *g* of the watch in the slot *f* keeping the plate from lateral displacement. The box may be fastened to a wall or other support by screws passing through the ear-pieces *m*.

Within the box at the bottom is an insulating-plate E, preferably of india-rubber, and two pairs of electro-magnets F G, having the usual coils of wire *y y'*. The plate E is secured to the bottom *h* of the box by the screws *n*. Standards H H' are erected on the plate E.

The armatures I J are mounted, respectively, on the bent ends of the tilting lever K, which has as its fulcrum a collar *o*, by which it is held on the rock-shaft L, the latter being loosely pivoted in the standards H H'. The collar *o* is secured upon the rock-shaft L by the set-screw *p*.

A bent lever or arm M is fastened to an insulator-bar N by rivets, and the insulator N is mounted on the rock-shaft L. This arm M is bent, as seen in Fig. 3, to form a forward extension and is protected by an insulating-tube *q* from direct contact with the armature J.

Tubes O O', having insulating-washers *r r*, are secured to the sides *i i* by screws *s s* and receive through transverse holes the electric wires *t t'*, respectively, which are fastened in position therein by the screws P P'. The wires which connect said tubes O O' with the electro-magnets F G, respectively, are shown at *y y'*.

In Fig. 1 I illustrate the electric circuits. Q Q' indicate batteries, and *v v'* the wires. R R' are the push-buttons to close the circuits.

The forward end of the bent arm M is inserted in the nick or slot *c* of the slide *a* of the stop-watch.

A pusher S, having an end *w*, made of an insulating material, extends angularly through the top plate D, and when the parts are assembled the lower end of the insulating-tip *u* of said pusher bears against the outer end of the rod *b* of the stop-watch, as fully shown in Fig. 4.

The operation of my device is as follows: When the parts are in the position shown in solid lines in Fig. 2, the watch is not running. By pressing the button R the circuit of the wires *v v* is closed, and the electric current generated in the battery Q flows through the wires *v v y y* and tubes O O, causing the armature I to close upon the magnets F in the well-known manner. This downward movement of the armature I carries down that end of the lever K, and said lever K thus rocks the shaft L, and the arm M, which is connected to said shaft by the insulating-bar N, is moved from the position shown in solid lines in Fig. 2 to the position indicated by dotted lines in said figure; but as the forward extension of said arm M is engaged in the nick *c* of the slide *a* of the stop-watch said slide is carried by said movement toward the stem of the watch, thus releasing the balance-wheel of the watch in the usual manner and setting the works running. When it is desired to stop the watch, I press the button R′, thus closing the circuit of wire *v′ v′*, and the electricity generated by the battery Q′ flows through the wires *v′ v′ y′ y′* and tubes O′ O′, causing the armature J to close on the magnets G, which downward movement of said armature depresses that end of the lever K and by the consequent rocking of the shaft L moves the arm M, so as to carry the slide *a* of the stop-watch in a direction away from the stem of the watch. This movement of the slide stops the watch in the usual manner. To bring the hands to the zero-point, the pusher S is depressed, which operates the rod *b* of the stop-watch in the usual manner.

The uses to which my invention may be applied are various. I will illustrate by reference to a single one. In fire departments of our cities where the electrical fire-alarm is used it is very desirable to ascertain and record the length of time which elapses between the sounding of the alarm and the leaving of the fire-engine from the station-house. In such a case the circuit of the wires *v v* is closed by the electric current which sounds the alarm, and the watch is thereby instantly set going. The button R′ may be so located that the engine in passing out of the station will strike against it or run over it, thus closing the circuit *v′ v′* and stopping the watch, thus indicating the exact length of time which has passed since the alarm was first given.

It is of course understood that the watch when started will continue to run by its own mechanism until stopped by the reverse movement of the slide. Therefore the push-buttons are operated only for an instant, respectively. Only one circuit is to be used at a time.

I claim as a novel and useful invention and desire to secure by Letters Patent—

1. In combination with a stop-watch having a slide to start or stop the operation of its mechanism, an arm engaging at one end with said slide and adapted to move it by such engagement, a rock-shaft connected with the opposite end of said arm by an intervening insulator and mounted in suitable bearings to allow a partial rotation of said shaft, a tilting lever having its fulcrum fixed upon the rock-shaft, an armature at each end of said lever, electro-magnets to operate said armatures, respectively, and means for generating and conducting electricity to said magnets, substantially as specified.

2. In combination with a case having an insulating-plate and central standards, the stop-watch having the usual internal mechanism and a movable slide *a* to set said mechanism in operation, the bent arm M, engagable with said slide, the rock-shaft L, having said bent arm attached to it by an intervening insulator and mounted on said standards, the lever K, secured to the rock-shaft and having the armature I, the electro-magnets F F, and the wires *v v y y*, tubes O O, and battery Q, all arranged and co-operating to set in motion the mechanism of said stop-watch, substantially as described.

3. In combination with a case having an insulating-plate and central standards, the stop-watch having the usual internal mechanism and a movable slide *a* to stop the operation of said mechanism, the bent arm M, engageable with said slide, the rock-shaft L, having said bent arm attached to it by an intervening insulator and mounted on said standards, the lever K, secured to the rock-shaft and having the armature J, the electro-magnets G G, and the wires *v′ v′ y′ y′*, tubes O′ O′, and battery Q′, all arranged and co-operating to stop the operation of the watch mechanism, substantially as described.

4. The combination of the electro-magnets and armatures and means of operating the same by electricity, the lever K, the rock-shaft L, standards H H′, the stop-watch having the rod *b*, the case having a top plate, and the pusher S, extending through said top plate and abutting against said rod, substantially as set forth.

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