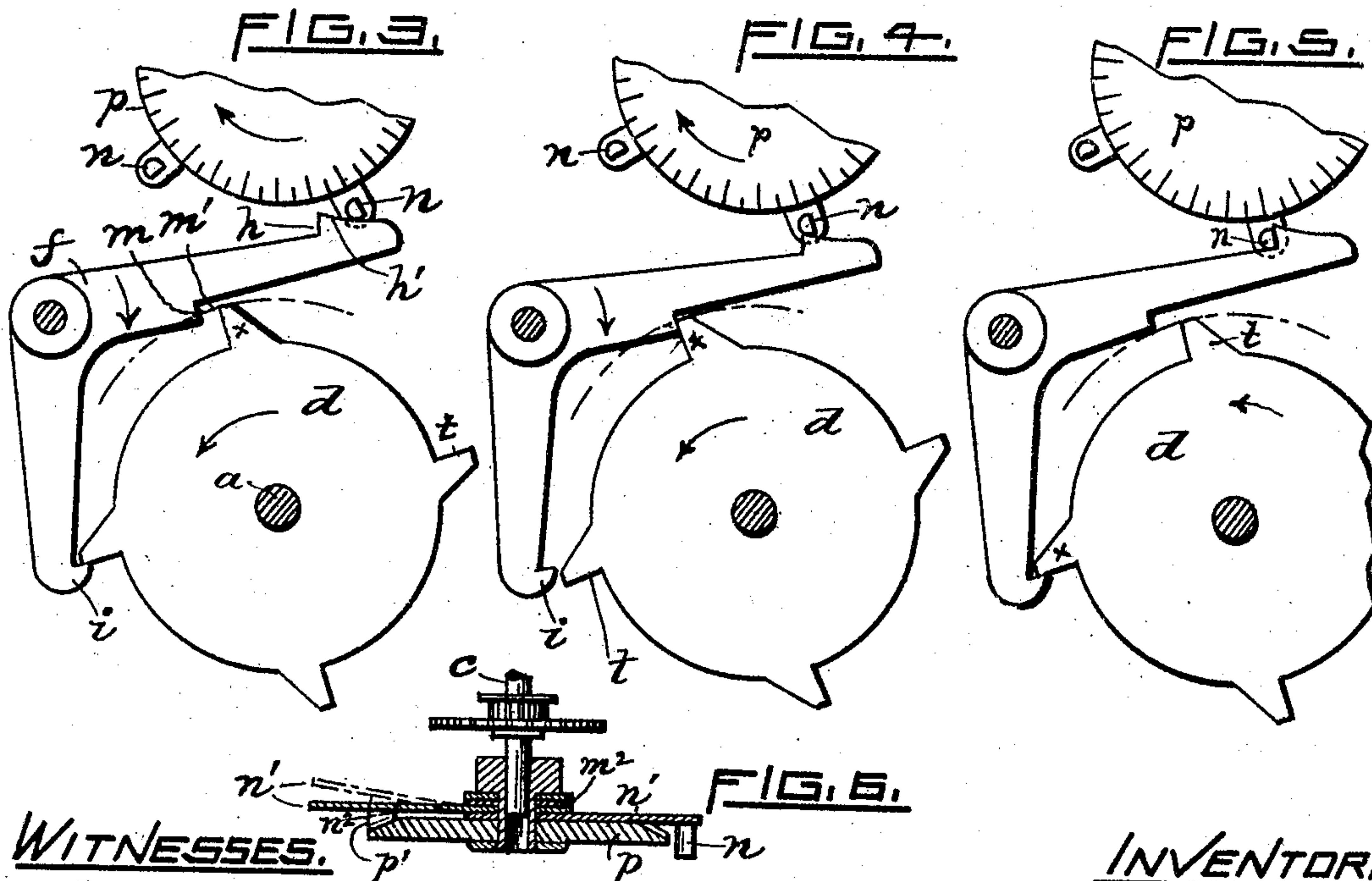
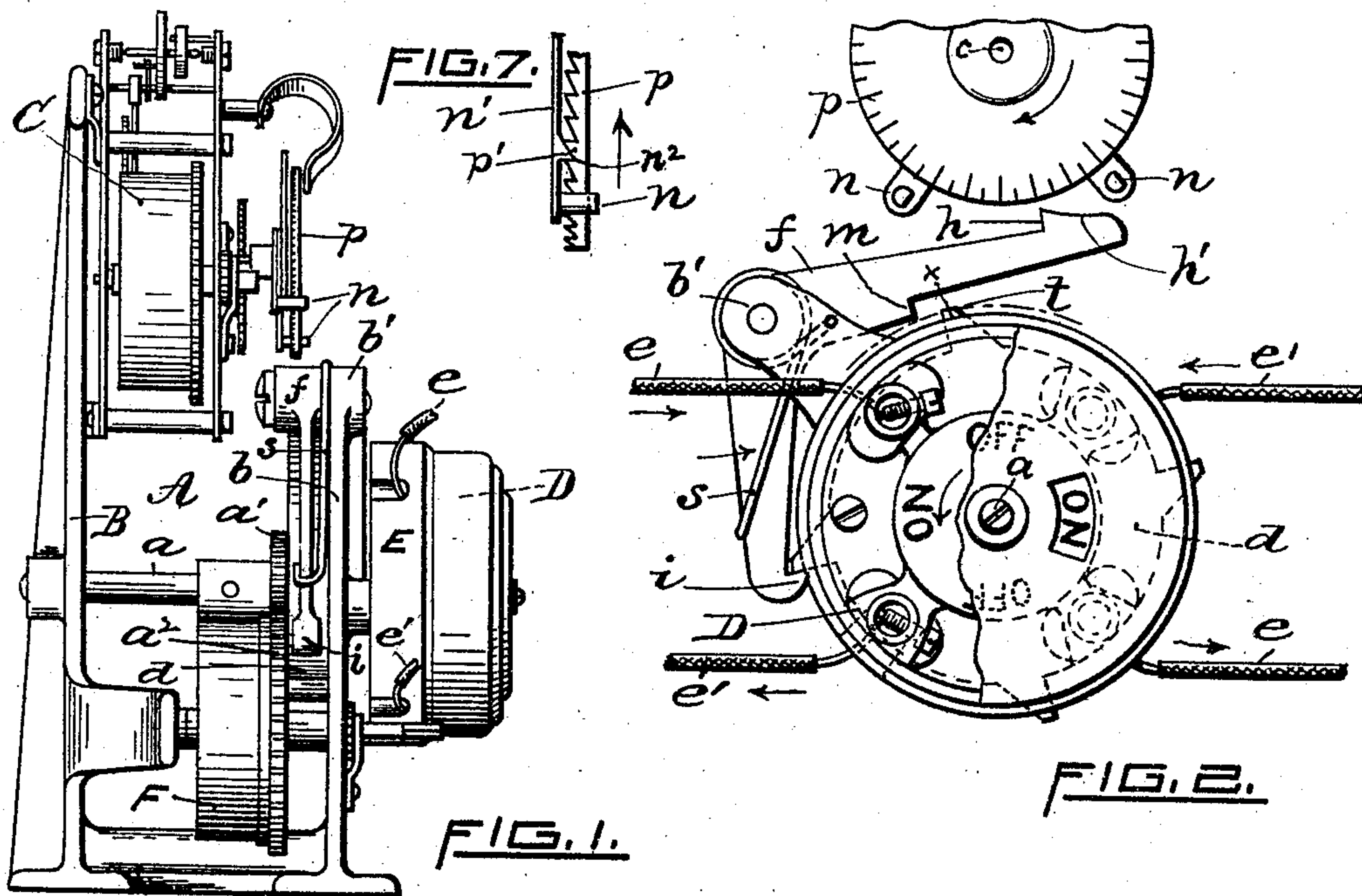


No. 775,005.

PATENTED NOV. 15, 1904.

H. K. GARDNER.
ELECTRIC TIME SWITCH.
APPLICATION FILED DEC. 21, 1903.

NO MODEL.



WITNESSES.

INVENTOR.

L. J. Hannigan.
Henry K. Gardner.
by Geo. H. Remington.

UNITED STATES PATENT OFFICE.

HENRY K. GARDNER, OF PROVIDENCE, RHODE ISLAND.

ELECTRIC TIME-SWITCH.

SPECIFICATION forming part of Letters Patent No. 775,005, dated November 15, 1904.

Application filed December 21, 1903. Serial No. 186,005. (No model.)

To all whom it may concern:

Be it known that I, HENRY K. GARDNER, a citizen of the United States of America, and a resident of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Automatic Electric Time-Switches, of which the following is a specification.

In United States Letters Patent No. 710,146, issued to me September 30, 1902, is shown and described certain novel improvements in automatic electric time-switches.

The object I have in view is to produce an automatic time-switch possessing a greater degree of simplicity, efficiency, and accuracy than may be found in apparatus in this class as heretofore employed.

To that end my present invention consists, essentially, in the novel construction and arrangement of the escapement or releasing mechanism, combined with a revoluble electric switch or cut-out capable of being intermittently actuated and a clock-movement provided with adjustably-mounted slowly-revoluble dogs or pins adapted to engage with and render operative the said releasing mechanism at any predetermined time or hour, all as will be more fully hereinafter set forth and claimed.

In the accompanying sheet of drawings, Figure 1 is a side view of an automatic electric time-switch or cut-out embodying my present improvement. Fig. 2 is a corresponding partial front view in enlarged scale, a portion of the switch-casing being broken away, the several parts being in the normal position. Fig. 3 is a front view showing the tripping dog or pin advanced sufficiently to depress the lower shoulder of the spring-pressed escapement-lever into the path of the motor-actuated escapement-wheel, the latter being restrained or held in check by the lower arm or hook of said lever. Fig. 4 shows the dog slightly advanced, thereby further depressing the lever, and thus disengaging the hook portion from the wheel, the latter then advancing a short distance until arrested by said shoulder. Fig. 5 shows the relative or normal position of the parts when the dog or pin passes the upper shoulder of the escapement-

lever and corresponding substantially with Fig. 2, the wheel meanwhile having moved one-quarter of a revolution. Fig. 6 is a transverse central section of the time-dial, &c., and Fig. 7 is a partial side view of the dial.

A, again referring to the drawings, designates an automatic electric time-switch embodying my present improvement. A suitable clock-movement C is mounted on an upright frame B, the lower portion of the latter also carrying a revoluble motor-actuated electric switch and the clock controlling device for automatically releasing the switch at predetermined intervals of time. The switch proper, D, represented in the drawings is well known and need not be described in detail. It has a fixed porcelain or other suitable non-conducting base E, to which are secured the terminals or poles of the current-conducting wires *e e'*, as usual. The switch member D is secured to a revoluble shaft *a*, the latter having a gear *a'* fastened thereto, in turn being driven by a larger gear *a''*, actuated by a spring-motor F in a well-known manner. The said frame B is provided with a front vertical extension *b*, adapted to form bearings for the switch and motor shafts. To the shaft *a* is secured a four-toothed escapement-wheel *d*, the same, as drawn, being located between the adjacent faces of said gear *a'* and frame portion *b*. (See Fig. 1.) To the upper end *b'* of the member *b* is pivoted the swinging spring-pressed bell-crank or escapement lever *f*. The upper side of the horizontal arm of said lever has a lug or shoulder *h* located at or near its free end and an inclined or beveled surface *h'* leading thereto, as clearly shown. The under side of said arm is provided with a shoulder *m*. The other arm of the lever has a hook *i* at its lower or free end. The said members *m* and *i* are located in the plane of travel of the teeth *t* of the escapement-wheel. When the device is in the normal stationary position, as in Fig. 2, the electric circuit being open or closed, as the case may be, the wheel *d* is arrested or kept in check by means of the hook *i*.

On the revoluble center spindle or shaft *c* of the clock mechanism is mounted a suitably-graduated time-dial *p*, arranged, say, to make

one revolution in twenty-four hours. Said dial is or may be located above and in substantially the same plane with the wheel d , the long arm of the lever f being adapted to swing freely between the peripheries of said members p and d . The rear face of dial p is provided with peripherally-arranged ratchet-shaped teeth p' . (See Fig. 7.) The said teeth may correspond in number with the number of divisions or graduations on the dial. The spindle c is further provided with one or more yielding frictionally-mounted arms n' , each having a dog or pin n projecting therefrom at its outer end. The pin-carrying arm is located immediately back of the dial and has a tooth n'' , adapted to engage the ratchet-teeth, thereby insuring that the dogs or pins n will move in unison with the dial. By means of this construction the relation of the pin or dog n to the time divisions of the dial may be readily changed or set by simply swinging the arm ahead in the arrow direction to the desired division, the latter corresponding to the time at which the switch mechanism is to be released or made operative. In thus swinging the arm the latter may be sprung backwardly, (see dotted lines, Fig. 6,) thereby temporarily disengaging its lug n'' from the ratchet-teeth. The arms may be supported between or resisted by suitable yielding friction-disks m'' in a well-known manner.

From the foregoing it is clear that whenever the pin n (previously set or adjusted to correspond with the hour or time at which the switch is to be actuated) in its movement engages and depresses the lever f and passes the shoulder h of the latter the escapement-wheel will be released and permitted to revolve one-quarter of a revolution, thereby automatically opening or closing the electric circuit—that is to say, the first action of the pin engages the beveled surface h' of the lever, thereby swinging the latter downwardly until the under shoulder m thereof lies in the circular path of the wheel's teeth t , the hook i at the same time being partly retracted from the corresponding tooth, as shown in Fig. 3. The further continued movement of the dial to the position shown in Fig. 4 depresses the lever to its limit, thereby releasing the hook from the wheel, at which instant the spring-motor F advances the wheel into engagement with said shoulder m , thus closing the short space m' and arresting the wheel's movement. Now when the pin or dog n passes over the shoulder h the spring s pressing upon the lever operates to instantly swing the latter upwardly to its limit, thereby also swinging the hook i into position slightly in advance of the wheel's movement, so that the tooth w , previously in engagement with shoulder m , is positively arrested by the hook already in position, thus insuring, say, one-quarter of a revolution of the wheel and switch, as shown in Fig. 5, the position of the lever being the

same as represented in Fig. 2, the shoulder m then being above the path or orbit of the wheel, thus completing the operation.

I make no claim, broadly, herewith to intermittingly-actuated time-switch mechanism, as devices of this type have been produced prior to my present invention.

By means of the construction and arrangement of the device represented herewith the switch is rendered more positive and reliable in opening and closing an electric circuit, it is more quickly and easily adjusted, and capable of being actuated with a less degree of operative force or power imparted from the clock or time mechanism employed.

As the members comprising the present invention are comparatively few and simple in construction, it follows that the cost of the same may be correspondingly reduced.

I claim as my invention—

1. In an automatic electric time-switch, the combination with a clock or time train, suitably-mounted tripping or releasing members traveling in unison therewith and a motor-actuated switch, located in an electric circuit, arranged with respect to said releasing members, of a toothed wheel d movable with the switch, and a two-arm spring-pressed escapement-lever f mounted on a fixed pivot, said arms being arranged at substantially right angles to each other, the upper arm being substantially horizontal and provided with oppositely-disposed shoulders and interposed between and arranged to be intermittingly engaged by said tripping members and the teeth of wheel d , the other arm being substantially vertical and having a hook at its lower or free end adapted to be swung into and out of operative engagement with the toothed wheel, substantially as described.

2. In an automatic electric time-switch, the combination with traveling adjustably-mounted pins or tripping-dogs n and a switch having a motor-actuated revoluble escapement-wheel d provided with teeth, of a swinging two-arm spring-pressed lever f arranged to engage said teeth and to be depressed by the action of said dogs; the free end of the upper arm of said lever having a beveled surface h' terminating in a shoulder h arranged in the path of said dogs, the under side of the arm having a shoulder m adapted when the lever is depressed to engage with a tooth of the wheel and arrest its forward movement, and having the other arm of the lever terminating in a hook i in normal engagement with a tooth of the wheel, substantially as hereinbefore described.

3. In an automatic electric time-switch, the combination with the motor-actuated toothed or escapement wheel d arranged to revolve in unison with the switch proper, of the spring-pressed bell-crank escapement-lever f having its lower arm provided with a hook i in normal engagement with a tooth of said wheel to

restrain the latter against rotation, and having the under side of the other or horizontal arm of the lever provided with a shoulder *m* adapted to engage the wheel and arrest its forward movement immediately succeeding the release of said hook from the wheel, a clock-actuated time tripping member *n* revolving in unison with the clock mechanism, and an inclined way *h'* formed on the upper side of the horizontal arm of said lever *f* located in the path of said member *n*, whereby the lat-

ter depresses the lever to place the shoulder *m* in position to be engaged by the wheel while the said hook is being released, substantially as described. 15

Signed at Providence, Rhode Island, this 18th day of December, 1903.

HENRY K. GARDNER.

Witnesses:

GEO. H. REMINGTON,
CALVIN H. BROWN.