(No Model.)

2 Sheets—Sheet 1.

G. F. GOODWYN.

ELECTRIC TIME SWITCH.

No. 598,864. Patented Feb. 8, 1898.

FIG. 1.

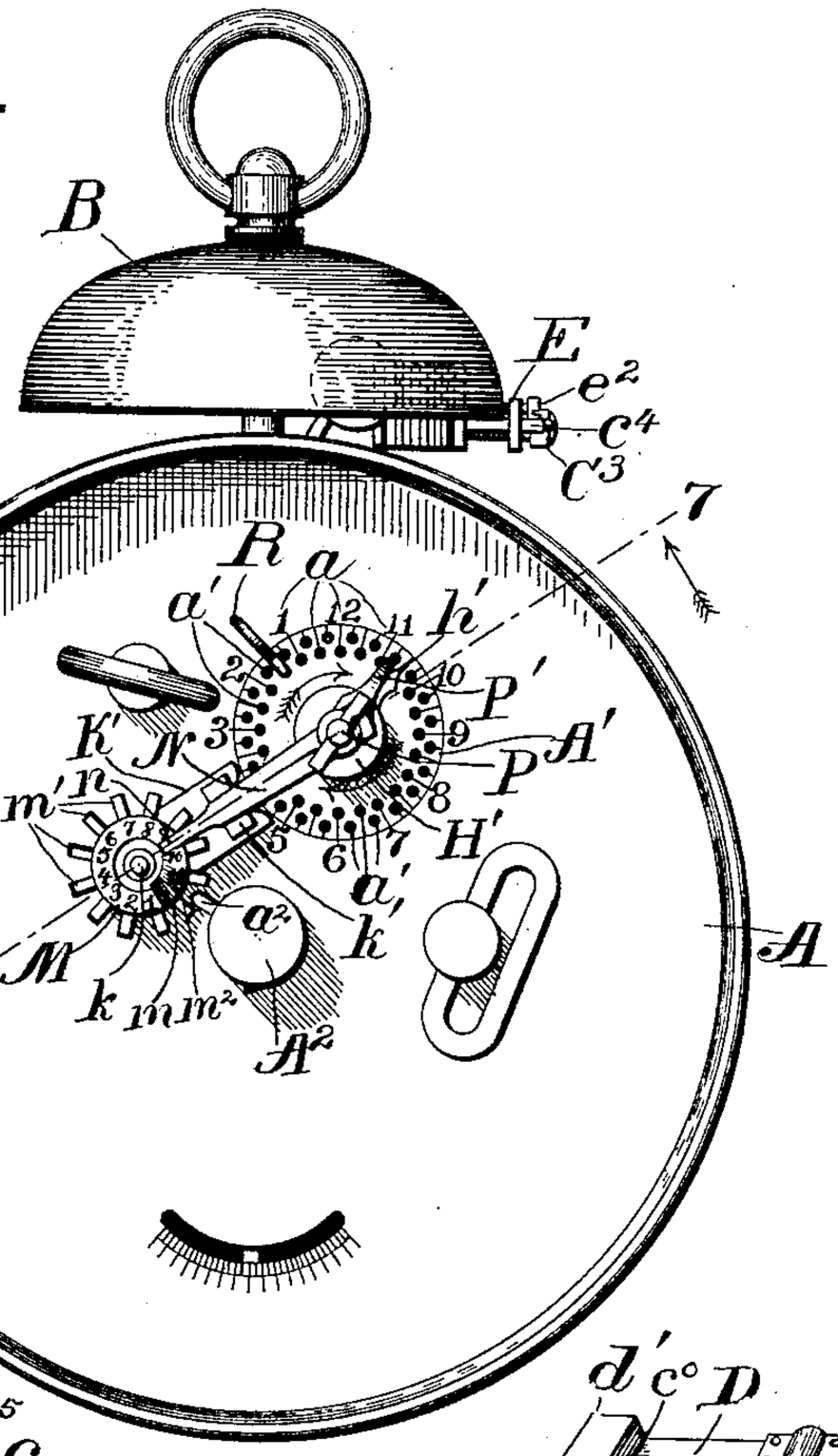

FIG. 4.

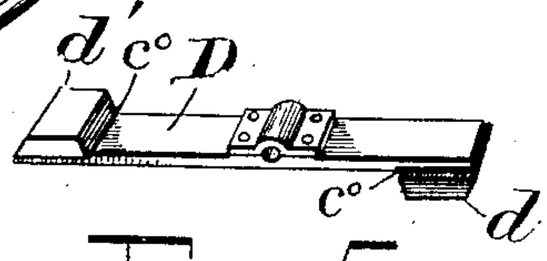

FIG. 5.

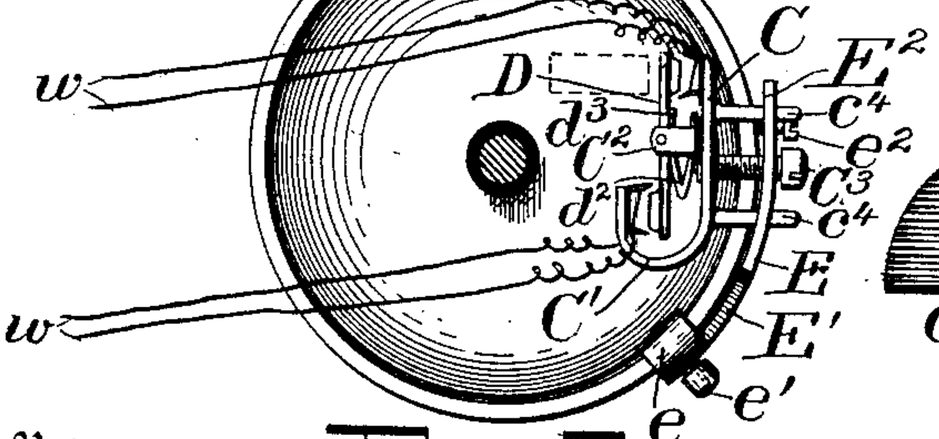

FIG. 2.

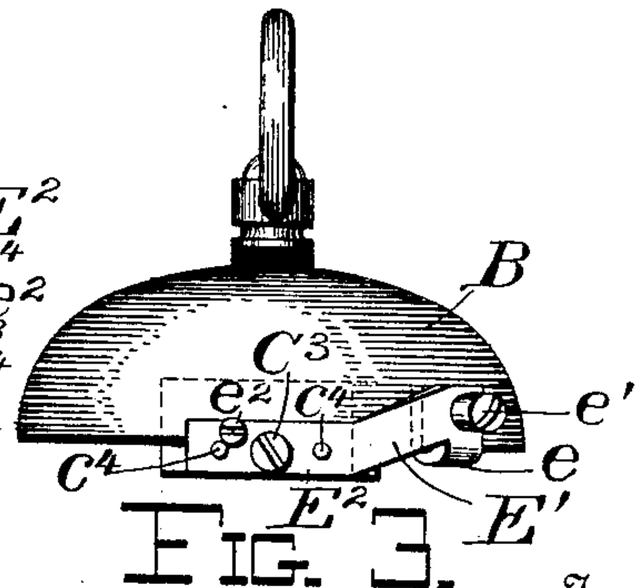

FIG. 3.

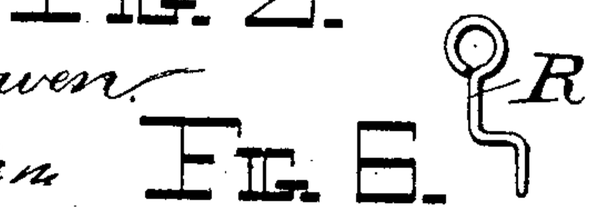

FIG. 6.

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(No Model.)

2 Sheets—Sheet 2

G. F. GOODWYN.

ELECTRIC TIME SWITCH.

No. 598,864. Patented Feb. 8, 1898.

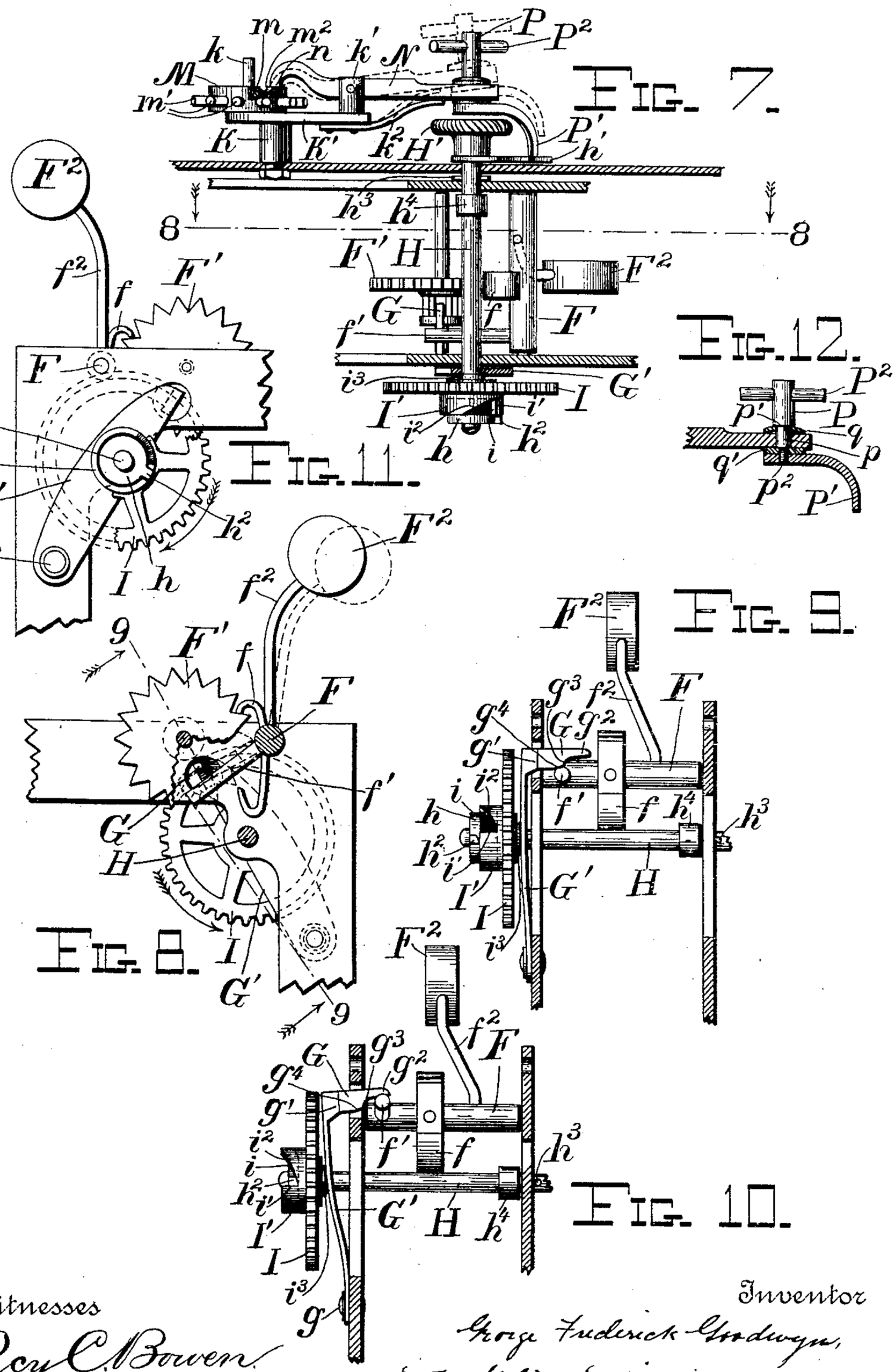

FIG. 7.

FIG. 11.

FIG. 12.

FIG. 8.

FIG. 9.

FIG. 10.

Witnesses

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UNITED STATES PATENT OFFICE.

GEORGE FREDERICK GOODWYN, OF ARNPRIOR, CANADA.

ELECTRIC TIME-SWITCH.

SPECIFICATION forming part of Letters Patent No. 598,864, dated February 8, 1898.

Application filed April 26, 1897. Serial No. 633,993. (No model.)

To all whom it may concern:

Be it known that I, GEORGE FREDERICK GOODWYN, a subject of the Queen of Great Britain, residing at Arnprior, in the county of Renfrew, Province of Ontario, Dominion of Canada, have invented certain new and useful Improvements in Electric Time-Switches; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in time-switches for electrical circuits; and it consists of a switch so constructed as to be placed on the bell of an ordinary alarm-clock and which will be opened or closed by the action of the usual alarm-hammer of the clock; and it further consists of such modifications of the alarm-striking mechanism of the clock as will cause the hammer to close the circuit with one stroke at a predetermined time and to be withdrawn and open the circuit after holding it closed for whatever length of time the mechanism may be set.

The said invention further consists of the novel construction and arrangement of parts, which will be hereinafter fully described and claimed.

Reference is had to the accompanying drawings, in which like parts are designated by the same letters of reference throughout the several views.

Figure 1 represents a rear elevation of an alarm-clock with my invention applied thereto. Fig. 2 represents an inverted view of the bell with my improved switch applied thereto. Fig. 3 represents a side elevation of the same. Fig. 4 is a perspective view of the base of the switch proper, showing the insulated contact-plates thereon. Fig. 5 is a similar view of the switch-lever, showing the other contact-plates secured thereto. Fig. 6 is a detail view of the pin for setting the mechanism at the proper time for opening the circuits. Fig. 7 is a sectional view on an enlarged scale, taken on the line 7 7 of Fig. 1, looking in the direction of the arrows and showing the mechanism for operating the alarm-hammer of the clock. Fig. 8 is a sectional view of the same, taken on the line 8 8 of Fig. 7, with part of the escapement-wheel broken away. Fig. 9 is a similar view taken on the line 9 9 of Fig. 8, showing the several parts in the position to hold the hammer away from the switch. Fig. 10 is a similar view showing the parts in the position they will assume when the hammer is released to allow it to close the switch. Fig. 11 represents a side elevation of the parts shown in Fig. 9, looking at the left-hand side of the latter view, part of the gear-wheel being broken away. Fig. 12 is a detail view in section of a part of the mechanism for holding and releasing the alarm-shaft.

A designates the clock, which may be an alarm-clock of the usual construction, and B designates the bell thereon.

The switch consists of a base-plate C, bent over at one end, as at C′, and provided with two pairs of contact-plates $c\ c'$ and $c^2\ c^3$, one pair, $c\ c'$, being secured upon the flat end of the said base and the other pair, $c^2\ c^3$, being secured to the lower side of the bent-over portion C′. All of the said contact-plates are insulated from the base and from each other, as at c^0, the insulation being shown in black in the drawings. To these contact-plates $c\ c'$ and $c^2\ c^3$ are connected the ends of the circuit-wires w, the negative wires being connected to one of each pair of contact-plates, and the positive wires to the other plate of each pair, as indicated in Fig. 4. Near the middle of the base-plate C is secured a bracket C^2, insulated from the plate, as at c^0, and in the same bracket is pivoted the switch-lever D, having contact-plates $d\ d'$ secured to its ends on opposite sides thereof and insulated therefrom, as at c^0.

When the lever D is in its proper position in the bracket C^2, it may be turned about its pivot to bring the contact-plates d and d' into contact with the pairs of contact-plates $c\ c'$ and $c^2\ c^3$, respectively, thus closing the circuit from c to c' and from c^2 to c^3, as will be readily understood. The said contact-plates are preferably provided with spring-lips c^5 to make better contact with the plates $d\ d'$.

E designates a bracket having at one end a lateral arm e, bent upon itself in the form of a U and to receive the edge of the bell B, the said end being provided with a clamp-screw e', by means of which the bracket E may be clamped to the edge of the bell B at

any desired position. The bracket E is bent downwardly, as at E′, to bring its lower edge below the edge of the bell B, and is curved to correspond with the curvature of the said bell. The said bracket then extends parallel with the edge of the bell for a short distance, as at E^2, and is provided with a set-screw e^2 to rest against the edge of the bell and thus steady the bracket E. The horizontal portion E^2 of the said plate is perforated to receive the two guide-rods c^4 c^4, secured to the base C of the switch, and also provided with a threaded perforation to receive a screw C^3, which is swiveled in the base C between the guide-rods c^4 c^4, and which serves to adjust the said base C to or from the bracket E and the edge of the bell, and also to hold the said base at the desired position.

A spring d^2 is placed in the bracket C′ beneath the switch-lever D, and arranged so that when the lever is approximately parallel to the base C—*i. e.*, when the switch is open—the outer leaf of the springs will press against the under side of the switch-lever directly beneath and a little distance on each side of its pivotal point, thus holding the said lever balanced in the open position, as shown in Fig. 2.

When the switch is properly adjusted in the bell, the alarm-hammer will strike the outer end of the lever D and press the same toward the contact-plates c c' against the tension of the end d^3 of the spring d^2. This will bring the contact-plates d and d' against the contact-plates c and c' and c^2 and c^3, thus closing the circuit at these plates.

The alarm-hammer arbor F is provided with the usual escapement f, actuated by an escapement-wheel F′ in the usual manner. The hammer F^2 is supported upon a stem f^2 above the arbor in the proper position to strike the switch-lever in the bell, and the arbor is further provided with an arm f', extending inwardly and downwardly in position to engage a retaining-pawl G. The shaft H, which controls the alarm mechanism, is provided at its outer end with the usual milled disk H′ and pointer h' and on its inner end with a disk h, having a lug h^2, and the said shaft is held from longitudinal movement by the pin h^3 and collar h^4.

On the inner end of the shaft H, adjacent to the inner face of the disk h, is mounted a toothed wheel I, having a hollow cylindrical hub I′, the interior diameter of which is sufficient to slide over the disk h, but not large enough to take in the lug h^2 with it. This cylindrical hub I′ is provided with a notch i, having one side, i', straight and parallel with the axis of the shaft H and the other side, i^2, inclined, as shown in Figs. 9 and 10.

The toothed wheel I is mounted to rotate and slide freely on the shaft H and is geared to the clock mechanism to rotate in unison with the hour-hand of the clock and in the direction indicated by the arrow in Fig. 11. As this is the usual form of gearing in this class of clock it is not deemed necessary to illustrate the same in the drawings. The said toothed wheel I is provided on the side opposite to the cylindrical hub with a small hub i^3, which forms a bearing-surface of the spring G′, which carries the retaining-pawl G.

The spring G′ is secured to the framework of the clock, as at g, and is perforated to allow the shaft H to pass through. The free end thereof is bent down, as at g', and to this bent end is secured the retaining-pawl G, made of tempered steel to reduce the wear, and which serves to hold the arm f' on the alarm-hammer arbor.

The tendency of the spring G′ is to press the edge of the cylindrical hub I′ of the toothed wheel I against the lug h^2 on the disk h, and when, as the toothed wheel revolves, the notch i comes beneath the lug h^2 the pressure of the said spring G′ will cause the cylindrical hub I′ to slip over the disk h, and thus allow the spring to move the retaining-pawl G away from the arm f' of the hammer-arbor, thus releasing the hammer and allowing it to strike the switch-lever D.

The retaining-pawl G is formed with a finger g^2, at the base of which is a curved portion g^3, corresponding to the curve of the cross-section of the arm f', and terminating at the beginning of an inclined portion g^4, which latter incline is for the purpose of retaining the arm f' of the hammer-arbor to hold the hammer away from the switch-lever, this being the normal position of the device, as shown in Figs. 8 and 9.

As the wheel I is rotated in the direction indicated by the arrows in Fig. 11 by the movement of the clockworks, if the shaft H be held from turning, the straight side of the notch i will pass the lug h^2 on the disk h and the spring G′ will throw the cylindrical hub over the disk h, allowing the said spring to move the retaining-pawl outward and release the arm f' of the alarm-arbor, allowing the escapement-wheel which is actuated by the usual spring to throw the hammer F^2 against the switch-lever.

The movement of the retaining-pawl G is only far enough to allow the arm f' to move off the curved portion g^3, but not far enough to allow it to pass the finger g^2, as shown in Fig. 10, and the adjustment of the hammer and switch-lever is such that the switch will be closed just before the said arm strikes the said finger g^2. Should the shaft H continue to be held from rotation, the rotation of the wheel I and the hub I′ will cause the lug h^2 to ride up the inclined edge i^2 of the notch i in the said hub and force the wheel I against the tension of the spring G′. As the said spring is moved inwardly the curved portion g^3 of the pawl G will be forced against the arm f' of the hammer-arbor, and will press against the said arm until the pressure of the bearing-hub i^3 on the wheel I has bent the spring G′ sufficiently to cause the said curved portion g^3 to spring over the said arm and force

the latter suddenly downward beneath the inclined portion g^4, thus causing the hammer F^2 to spring suddenly away from the switch-lever and allow the latter to make an instantaneous break in the circuit.

The shaft H is free to rotate by frictional contact of the lug h^2 with the hollow hub I′, and while the said shaft H and wheel I, with its hub I′, all rotate together there will be no change in the position of the pawl G. If, however, the shaft H be prevented from rotating and the wheel I continues to turn from the movement of the clockworks, the retaining-pawl G will release the arm f' each time the lug h^2 passes into the notch i, thus allowing the hammer to strike the switch-lever, and will withdraw the said arm f' and the hammer F^2 as the lug h^2 passes out of the said notch i. On the back of the clock, as shown in Fig. 1, a dial A′ is arranged concentrically around the end of the shaft H, where it projects through the said back, and the said dial is divided, as at a, to correspond with the hours and quarter hours on the face of the clock, and at each of these divisions is bored a small hole a'. The pointer h' on the shaft H is arranged to move around over the said holes a' as the said shaft revolves.

A post K is secured to the back of the clock adjacent to the place where the hand-arbor comes through, and to the top of this post is secured a flat plate K′, having at one end a spindle k and at the other end a pair of lugs k'. On the spindle k is loosely mounted a disk M, having a notch m on one side thereof and twelve studs m' arranged at equal distances around its periphery and numbered to correspond with the hours on the face of the clock.

Between the lugs k' on the plate K′ is pivoted a lever N, one end of which is curved, as at n, and rests upon the side of the disk M. The other end of the lever N extends over the end of the shaft H and is perforated in line with the center of the said shaft to receive a stem P, which is reduced, as at p, to fit snugly in the said perforation.

A spring-washer q is placed on the reduced part p of the stem P, the convex side of which bears against the shoulder p' on the stem, and the other side rests upon the upper side of the lever N. The lower end of the stem P is still further reduced, as at p^2, and is screw-threaded, and on the latter reduced portion is placed a washer q' and a curved finger P′, which latter is screwed down upon the washer q', (see Fig. 12,) thus holding the several parts together and causing sufficient friction to prevent the stem P and finger P′ from being turned easily in the end of the lever N.

The stem P is provided with a cross-bar P^2, by means of which it may be turned by hand when necessary to set the switch. The finger P′ is curved, so that its free end will project near enough to the dial A′ to intercept the pointer h' when the lever N is in the position shown in Fig. 7, and thus hold the shaft H from rotation.

A spring k^2 is secured to the plate K′ and presses against the under side of the lever N, between its pivotal point and the end carrying the stem P, and tends to press the curved end n upon the side of the disk M and to cause the said end to drop into the notch m when the said notch passes under the end n of the lever as the said disk is rotated, and thus throw the opposite end, carrying the lever P′, upward out of the way of the pointer h', as shown by dotted lines in Fig. 7. The arbor of the minute-hand extends through the back of the clock and is provided with milled head A^2, as is usual in clocks of this class; but in this instance the milled head A^2 is provided with a stud a^2, which will engage the studs m' on the disk M, and thus turn the said disk one-twelfth of a revolution for each revolution of the minute-hand of the clock.

The operation of the device is as follows: If, for instance, it is desired to set the clock to close the circuit at 10.30 o'clock and to open it again at 3.30, the stem P is turned until the finger P′ is in position to intercept the pointer h' when it arrives at ten and a half on the dial A′, as shown in Fig. 1. Then noting the number of hours from the time of setting the clock to the time it is desired to close the switch the disk M is turned until the stud corresponding to that number is beneath the end n of the lever N. The pin R (shown in Fig. 6) is then placed in the hole a' in the dial A′ two hours in advance of the time it is desired to have the circuit open, in the present instance in the hole at one and a half to cause the circuit to open at 3.30. Both the clock-mainspring and the alarm-spring should be wound up. When the pointer h' is intercepted by the finger P′, the shaft H will be held from motion, and, the wheel I continuing to turn, the hollow hub I′ will drop over the disk h when the notch i arrives below the lug h^2, the works being adjusted so that this will take place at the hour at which the pointer is held, as indicated on the dial A′. This will allow the spring G′ to withdraw the retaining-pawl G and release the arm f', allowing the hammer, by the force of the alarm-spring, to strike the switch-lever and close the switch, as hereinbefore described. The adjustment of the switch is close enough to the alarm-hammer to prevent the latter from vibrating, and the alarm-spring will hold the hammer against the said switch-lever, thus holding the switch closed. Before the lug h^2 will have time to ride up the inclined side i^2 of the notch i the end n of the lever N will drop by the pressure of the spring k^2 into the notch m in the disk M, and thus raise the finger P′ above the pointer h', as shown by dotted lines in Fig. 7, leaving the latter free to rotate and allowing the shaft H to rotate with the wheel I. As long as these parts rotate together the retaining-pawl G will not engage the arm f', and the hammer will bear upon the switch-lever,

holding the switch closed. The pointer h' will move around the dial A' at the same speed that the hour-hand moves around the face of the clock until it comes in contact with the pin R, which is in the opening a' at one and a half. This will again stop the pointer h' and shaft H and cause the lug h^2 to ride up the inclined edge i^2 of the notch i. This will force the hub I' and wheel I against the spring G', causing it to force the curved portion g^3 of the retaining-pawl G against the arm f' until the spring G' has bent sufficiently to cause the said curved portion g^3 to spring over the said arm f' and force the hammer F^2 suddenly away from the switch-lever against the tension of the alarm-spring, and thus allow the switch to open suddenly, as will be readily understood.

The time required for the lug h^2 to pass up the inclined side i^2 of the notch i and force the hammer e^2 away from the switch after the pointer h' has been stopped by the pin R is two hours. Thus the switch will open two hours after the pointer h' is stopped by the pin R. For this reason when setting the switch the pin R is placed in the hole a' two hours in advance of the time at which it is desired to have the circuit open. It will therefore be evident that when it is required to keep the circuit closed for two hours only the finger P' need not be used, as the pin R will answer to stop the pointer at the time the switch is to close and to hold it until the switch is open two hours later. If the pin R remains in the opening a', it will hold the pointer until the hour-hand has made one complete revolution, when the switch will again close and open in two hours. The side m^2 of the notch m is made of such inclination that after the end n of the lever N falls into it each time the disk M is turned by the stud a^2 the end n of the said lever will ride only part way up the inclined side m^2, and as soon as the said stud a^2 has passed the stud m' on the disk M the spring k^2 will cause the end of the lever to slide down the inclined side m^2 to the bottom of the notch m, thus turning the disk M back to the position it occupied when the end n of the lever N first dropped into the said notch m, so that the disk M will not revolve far enough to lift the said end of the lever N entirely out of the said notch m. When the pin R is used to stop the pointer h' to close the switch, the end n of the lever N is allowed to remain in the notch m and keep the finger P' out of the way of the said pointer a'.

It will be evident that the usual alarm-spring and escapement may be dispensed with and a simple spring to press the hammer against the switch-lever may be used in place thereof, as it is not necessary for the hammer to vibrate as in ringing the ordinary alarm-bell. As this and other slight modifications may be used without departing from the spirit of the invention, I do not wish to limit myself to the precise details of construction as herein described.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In an electrical time-switch, the combination with a base, contact-plates secured to the said base, and a switch-lever pivoted to and insulated from the said base; of a clock, a bracket secured to the said clock, a screw through the said bracket to support and adjust the said switch-base, means for guiding the said switch-base during its adjustment and means connected with the works of the said clock to press the said switch-lever against the said contact-plates and to release the same at predetermined times, substantially as described.

2. In an electrical time-switch, the combination with a base, contact-plates secured to and insulated from the said base, a bracket also secured to and insulated from the said base, and a switch-lever pivoted in the said bracket; of a clock, a bracket secured to the said clock, a screw through the said bracket to support and adjust the said switch-base and means for guiding the said switch-base during its adjustment, a hammer connected with the works of the said clock and means for causing the said hammer to strike the said switch-lever at predetermined times, substantially as described.

3. In an electrical time-switch, the combination with a base having guide-rods secured thereto, and adjusting-screw swiveled to the said base, contact-plates secured to and insulated from the said base, a bracket also secured to and insulated from the said base, a switch-lever pivoted in the said bracket, and a spring to hold the said lever away from the said contact-plates; of a clock, a bracket secured to the said clock and perforated to receive the said guide-rods, and tapped to receive the said adjusting-screw to support the said switch-base, a hammer connected with the works of the said clock, and means for causing the said hammer to strike the said switch-lever at predetermined times, substantially as described.

4. In an electrical time-switch the combination with a base, contact-plates secured to and insulated from the said base, a bracket also secured to and insulated from the said base, and a switch-lever pivoted in the said bracket; of a clock, a bracket secured to the said clock to support the said switch-base, a hammer actuated by the mechanism of the said clock, an arm connected with the said hammer, a spring-actuated pawl, having curved and inclined edges to engage the said arm, and means for causing the said pawl to release the said arm, and again engage the same at predetermined times, substantially as described.

5. In an electrical time-switch, the combination with a base, contact-plates secured to

and insulated from the said base, a bracket also secured to and insulated from the said base, and a switch-lever pivoted in the said bracket; of a clock, a bracket secured to the said clock to support the said switch-base, a spring-actuated hammer, an arm connected with the said hammer, a spring-actuated retaining-pawl having curved and inclined edges adapted to engage the said arm, a shaft mounted in the frame of the clock, a disk having a lug secured upon the said shaft, a toothed wheel having a notched hollow hub loosely mounted on the said shaft and adapted to control the spring-actuated pawl, the said toothed wheel receiving motion from the works of the clock, and means adapted to hold the said shaft against rotation at a predetermined time, to cause the said hollow hub to drop over the said disk and allow the said retaining-pawl to release the said arm, and to cause the said lug to pass out of the said notch and force the pawl again into engagement with the said arm, substantially as described.

6. In an electrical time-switch, the combination with a base, contact-plates, secured to and insulated from the said base, a bracket also secured to and insulated from the said base, and a switch-lever pivoted in the said bracket; of a clock, a bracket secured to the said clock to support the said switch-base, a spring-actuated hammer, an arm connected with the said hammer, a spring-actuated retaining-pawl, having curved and inclined edges adapted to engage the said arm, a shaft mounted in the frame of the clock, a disk having a lug secured upon the said shaft, a toothed wheel having a notched hollow hub loosely mounted on the said shaft adapted to control the spring-actuated pawl, the said toothed wheel receiving motion from the works of the clock, a dial on the back of the clock, a pointer on the end of the said shaft, a lever pivoted on the back of the clock, an adjustable finger on the end of said lever adapted to intercept the said pointer at a predetermined time, and hold the said shaft against rotation, to cause the said hollow hub to drop over the said disk and allow the said retaining-pawl to release the said arm, and means for lifting the said finger above the said pointer after the said retaining-pawl has released the said arm, substantially as described.

7. In an electrical time-switch, the combination with a base, contact-plates secured to and insulated from the said base, a bracket also secured to and insulated from the said base, and a switch-lever pivoted in the said bracket; of a clock, a bracket secured to the said clock to support the said switch-base, a spring-actuated hammer, an arm connected with the said hammer, a spring-actuated retaining-pawl having curved and inclined edges adapted to engage the said arm, a shaft mounted in the frame of the clock, a disk having a lug secured upon the said shaft, a toothed wheel having a notched hollow hub loosely mounted on the said shaft, a disk having a lug secured upon the said shaft, a toothed wheel having a notched hollow hub loosely mounted on the said shaft adapted to control the spring-actuated pawl, the said toothed wheel receiving motion from the works of the clock, a dial on the back of the clock, a pointer on the end of the said shaft, a lever pivoted on the back of the clock, an adjustable finger on the end of the said lever adapted to intercept the said pointer at a predetermined time, and hold the said shaft against rotation, a notched disk beneath the other end of the said lever, the said disk being geared to the works of the clock and receiving motion therefrom and a spring to cause the said lever to drop into the notch in the said disk and raise the said finger above the said pointer, substantially as described.

8. In an electrical time-switch, the combination with a base, contact-plates secured to and insulated from the said base, a bracket also secured to and insulated from the said base, and a switch-lever pivoted in the said bracket; of a clock, a bracket secured to the said clock to support the said switch-base, a spring-actuated hammer, an arm connected with the said hammer, a spring-actuated retaining-pawl having curved and inclined edges adapted to engage the said arm, a shaft mounted in the frame of the clock, a disk having a lug secured upon the said shaft, a toothed wheel having a notched hollow hub loosely mounted on the said shaft, adapted to control the spring-actuated pawl, the said toothed wheel receiving motion from the works of the clock, a perforated dial on the back of the clock, a pointer on the end of the said shaft, a lever pivoted on the back of the clock, an adjustable finger on the end of the said lever adapted to intercept the said pointer at a predetermined time, and hold the said shaft against rotation to cause the said hollow hub to drop over the disk, on the said shaft and allow the said retaining-pawl to release the said arm, means for lifting the said finger above the said pointer after the said arm has been released, and a stop-pin adapted to be inserted in one of the perforations in the said dial to again intercept the said pointer and cause the said lug to pass out of the notch in the said hub and force the pawl again into engagement with the said arm, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE FREDERICK GOODWYN.

Witnesses:
A. CAMERON,
JOS. O. DAZÉ.