

(No Model.)

B. E. WATERS.
TIME SWITCH FOR ELECTRIC CIRCUITS.

No. 478,180.

Patented July 5, 1892.

Fig. 1.

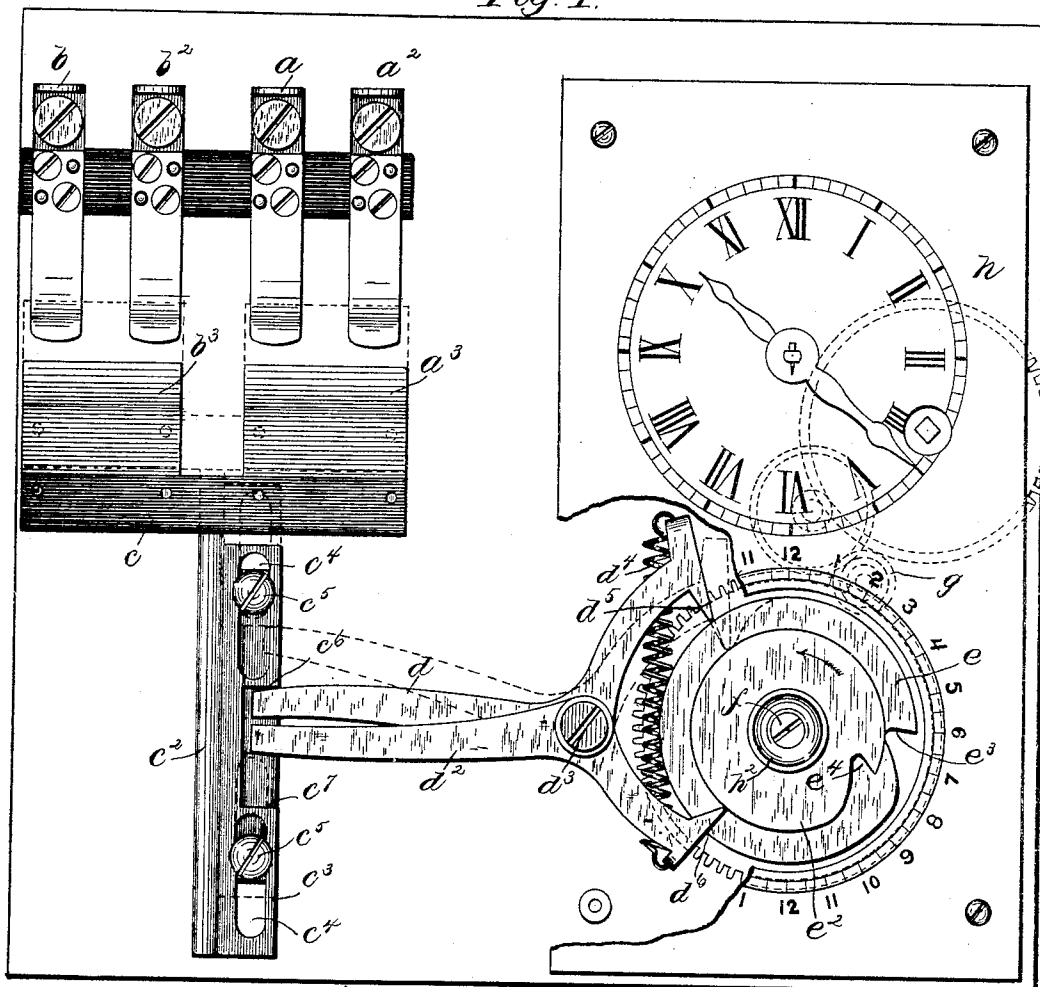


Fig. 2.

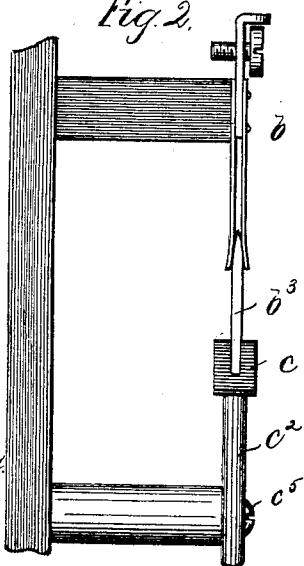
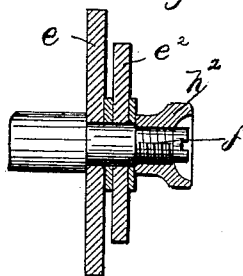


Fig. 3.



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UNITED STATES PATENT OFFICE.

BENJAMIN E. WATERS, OF BROCKTON, MASSACHUSETTS, ASSIGNOR TO THE
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TIME-SWITCH FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 478,180, dated July 5, 1892.

Application filed June 11, 1891. Serial No. 395,899. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN E. WATERS, of Brockton, county of Plymouth, State of Massachusetts, have invented an Improvement in Automatic Time-Switches for Electric Circuits, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to an electric switch and mechanism for operating the same automatically at a predetermined hour and minute of the day, the said apparatus being useful, for example, in places where it is desired to throw one or more electric lamps into operation at a certain time and to throw them out of operation at another predetermined time from day to day.

The apparatus comprises a movable contact maker and breaker by which the desired circuit connections are made or severed at the desired time, and two independently-operated actuators, one for moving the said contact-maker in the direction for making a change of one character in the circuit connections—as, for example, to close a circuit connection—and the other for moving said contact-maker in the direction to produce the reverse change—as, for example, to open the electrical connection closed by the previous movement. The said actuators are shown as impelled by the force of a spring to perform each its own operation on the contact-maker, and the operation of said actuators is controlled by cams—one corresponding to each—moved by a clock-work or time-motor, so that the said cams rotate once in twenty-four hours. The actuators engage and move the contact-maker only in the movement of said actuators produced by their spring, and in the return movement by which the actuating-spring is strained preparatory for the next operation no effect is produced upon the contact-maker. The cams are provided with notches or recesses that permit the actuators to move suddenly under the action of their springs when the cam in its movement arrives at the proper position with relation to said cams, which are adjustable with relation to their connection with the actuating time-

motor, so that each may release the corresponding contact-actuator at any given time for which it is set.

Figure 1 is a face view of an automatically-operated time electric switch embodying this invention; Fig. 2, a sectional detail view showing the contacts in side elevation, and Fig. 3 a sectional detail showing the connection of the cams with their actuating-shaft.

The specific construction of the contacts and the relation of the circuits controlled by them is immaterial, as the apparatus may be employed to produce changes of any desired character that can be made by moving an electric contact-maker intermittingly. As shown in this instance, the contacts are so arranged as to make and break connection between each terminal of a loop or circuit to be supplied with the current and the corresponding members of the current-supplying circuit or to sever such connections.

The switch proper is shown as comprising a pair of contacts a a^2 and another pair of contacts b b^2 , all supported in such manner as to be electrically insulated from one another, each of said contacts comprising a pair of spring-fingers, between which a corresponding wedge-shaped contact-maker a^3 or b^3 may be wedged, so that the said contact-maker a^3 will place the contacts a a^2 in electrical continuity when the said contact-makers a^3 b^3 are wedged between the spring-fingers of said contacts, as shown in Fig. 2. The two portions a^3 b^3 of the contact-maker are carried by a bar c of insulating material, itself supported upon a slide-bar c^2 , having a longitudinal movement on suitable guides by which the contacts a^3 b^3 are moved toward and into contact with the contacts a a^2 b b^2 or away from and out of contact therewith. As shown in this instance, the slide-bar c^2 is composed in part of a plate c^3 , having slots c^4 , moving on the shanks of screws c^5 , which thus guide the contact-carrier properly, the said slide-bar also having shoulders c^6 c^7 , that co-operate with the actuators d d^2 , shown as levers or arms pivoted at d^3 and acted upon by a spring d^4 , which tends to separate the ends of the arm d d^2 , that lie between the shoulders c^6 c^7 —in other words, tending to move the arm

d upward or toward the dotted-line position thereof (shown in Fig. 1) and to move the lever d^2 downward.

The contact-maker $a^3 b^3$ is shown in Fig. 1 in the position in which it was placed at the last movement downward of the actuator d^2 , in which position it will remain until thrown by the actuator d into dotted-line position.

The actuators d d^2 are caused to act alternately and each at the desired hour and minute of the day by the following means: The actuator d has a controlling-finger d^5 , that rests upon the surface of a cam e , and the actuator d^2 has a similar controlling-finger d^6 , that rests upon the surface of a controlling-cam e^2 . The said cams e e^2 are mounted upon a spindle f , connected by gearing (shown in dotted lines at g) with a time motor or clock h , the said gearing being such that the spindle f and the cams e e^2 thereon rotate once in twenty-four hours. The position of said cams with relation to the shaft f may be changed, as desired, to make them operate at the proper time, and when properly adjusted they may be clamped or otherwise firmly fastened upon the said shaft, as by the clamping-screw h^2 . (See Fig. 3.) The said cams are each composed, mainly, of a circular disk, the periphery of which supports the controlling-fingers d^5 d^6 with the actuator-arms d d^2 in full-line position and the spring d^4 under strain; but each of said disks is provided with a shoulder or notch e^3 e^4 , one side of which is about radial and the other inclined from the bottom of the radial portion toward the unnotched part of the periphery.

The operation is as follows: Assuming that the parts are in the position shown in Fig. 1, the cams e e^2 turn slowly in the direction of the arrow, and at a certain time of the day, dependent upon the position at which the cam e is set on the shaft f , the notch e^3 arrives at the controlling-finger d^5 of the actuator d , permitting the said actuator to be thrown suddenly by the spring d^4 into the dotted-line position. At this time the finger d^6 of the other actuator d^2 is still upon the periphery of the cam e^2 , and thus remains in its full-line position, so that the actuator d in its sudden spring-impelled movement engages the shoulder e^4 and throws the contact-carrier into position to produce electric connection between contacts a a^2 and between contacts b b^2 . Then as the cams e e^2 continue their slow movement the inclined side of the notch in the cam e gradually presses the actuator d back to its full-line position; but inasmuch

as the actuator does not engage the contact-maker in this movement the said contact-maker remains in the position in which it was thrown by the actuator d , which may be called the "closed position." Then at a predetermined later time the notch e^4 of the cam e^2 arrives at the finger d^6 of the opening-actuator d^2 , which is then moved suddenly by the spring d^4 in the direction to restore the contact-makers to full-line positions, and thus open the circuit between a and a^2 and between b and b^2 . Then in the further movement the inclined side of the notch e^4 in the cam e forces the actuator d^2 back to the full-line position without further movement in the contact-maker, which remains in the open position until again operated by the closing-actuator d . Thus the circuit controlled by the instrument is shifted from one to the other condition at the desired moment in the day, and such movements are repeated each day as long as the time-motor is kept running without any care on the part of the attendant.

It is obvious that the details of construction can be varied without departing from the essential features of the invention, it being unnecessary, for example, that the actuators should have a pivotal or rocking movement, and also being unnecessary that both should be operated by the same spring, the essential feature being that the said actuators are moved promptly by a suitable force, their actuating movement being controlled but not produced by the time-motor and the movement of each being independent of the other and capable of independent adjustment as to its time of occurrence.

I claim—

The combination, with the stationary contacts, of the movable contact-maker and its supporting and guiding slide-bar provided with engaging projections or shoulders, and pivoted spring-actuated levers each having one arm arranged to co-operate with one of said shoulders of the slide-bar, and a time-motor and cams operated thereby controlling the other arms of said actuating-levers, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BENJAMIN E. WATERS.

Witnesses:

JOS. P. LIVERMORE,
M. E. HILL.