

(No Model.)

B. E. WATERS.

TIME SWITCH.

No. 396,632.

Patented Jan. 22, 1889.

Fig. 1.

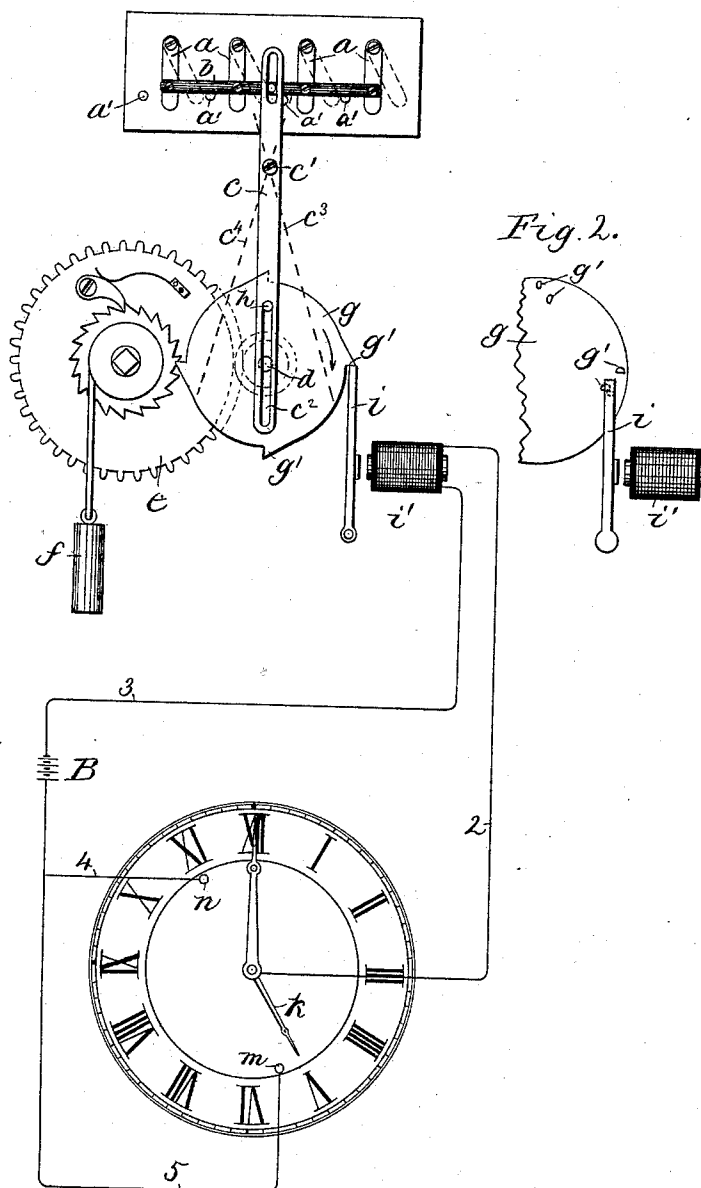


Fig. 2.

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UNITED STATES PATENT OFFICE.

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TIME-SWITCH.

SPECIFICATION forming part of Letters Patent No. 396,632, dated January 22, 1889.

Application filed April 9, 1888. Serial No. 270,066. (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 Time-Switches, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The object of my invention is to produce an electric switch or equivalent device that will be automatically opened or closed at definite times on each day, the operation of said switch being controlled by the hands of a clock.

When the hour-hand of a clock as commonly constructed is employed to close an electric circuit, it will produce such closure every twelve hours, and if it were arranged to produce certain changes in any given circuit it naturally repeats such changes every twelve hours.

The present invention consists, mainly, in a motor the operation of which is governed by an electro-magnet the circuit of which is controlled by the hour-hand of a clock, said motor operating an electric switch or equivalent device, and being constructed to change the position of the circuit controlled by the said switch at two consecutive operations, but to produce no substantial change in the said circuit at the next two operations of the motor, which are, as it were, idle movements. Thus by arranging the clock-circuit closers to close the circuit at two given moments—such, for example, as at the beginning and end of the evening—the first such closure will cause the switch to be closed, the next such closure at the clock will cause the switch to be opened, and the next two closures that take place in the next forenoon will be idle or produce no operative effect upon the switch, which will, however, respond in like manner to the two closures of the clock-controlled circuit occurring the following evening.

Figure 1 represents in diagram a sufficient portion of a time-switch or equivalent apparatus to illustrate this invention; and Fig. 2, a modification, to be referred to.

The apparatus is shown in this instance as intended to operate simultaneously a number of electric switches, *a*, all of which are me-

chanically connected by a bar, *b*, and each of which co-operates with a corresponding contact, *a'*. The switch-contacts *a'* are placed somewhat farther apart than the greatest movement of the corresponding ends of the switches, so that the whole movement of any given switch away from its contact will not bring such switch into engagement with the contact of its neighbor. The connecting-bar *b* is engaged by a lever, *c*, pivoted at *c'*, and arranged to be actuated by a rotating shaft, *d*, itself forming part of a motor or train of wheel-work, *e*, actuated by a weight, *f*, or equivalent.

The shaft *d* is provided with a stop-disk, *g*, having stop projections *g'* at four points around its periphery, and the connection between the lever *c* and the actuating-motor is shown in this instance as produced by a wrist-pin or projection, *h*, on the disk *g*, that enters a slot, *c''*, in the lever *c*, although it is obvious that this mechanical connection may be readily varied.

When the pin *h* is in the upper part of the slot *c''*, as shown in the drawings, a quarter-rotation of the disk *g* in the direction of the arrow upon it will swing the lever *c* to the position indicated by the dotted line *c''*, and such movement will cause all the switches *a* to make contact with their corresponding contact-pieces, *a'*. A further quarter-rotation of the disk *g* will bring the lever back to the position shown in full lines; but the pin *h* will now be at the lower-end of the slot *c''*. This movement of the lever *c* will open all the switches, as shown in full lines. The next quarter movement of the disk *g* will bring the lever to the position indicated by the dotted lines *c''*, and thus will move the switches *a* to the position shown in dotted lines, which will produce no effect on the circuits controlled by them, and may consequently be spoken of as an "idle movement" of the switches and motor. The next quarter movement will bring all the parts to the position shown in full lines, which will again produce no effect on the circuits controlled by the switches, and may consequently be called an "idle movement," and from this point the operation will begin again, as before described, the first movement closing the switches, the second opening them,

and the next two movements being idle. In other words, the switches are brought into operative position at every fourth movement of their actuating-motor. These four move-
 5 ments of the motor and switches may be repeated at the proper times each day, as follows:

The stop projections g' are controlled by the armature-lever i of an electro-magnet, i' , one terminal of which is connected by con-
 10 ductor 2 with the hour-hand k of the controlling-clock, and the other terminal of which is connected by conductor 3 with one pole of the battery B, the other pole of which is connected by wires 4 and 5 with contacts m n , that are
 15 each engaged by the hour-hand once in twelve hours, thus closing the circuit of the battery B and magnet i' . These contacts may be set in a position on the clock-dial corresponding to the times at which the switches a are to
 20 change the condition of the circuit controlled by them. For example, as shown in this instance, the contact m is set so that the circuit 2 3 5 will be closed at half-past five, and the contact n so that the circuit 2 3 4 will be
 25 closed at eleven. Then, with the parts arranged as shown in full lines, when the hour-hand k arrives at the point m , the disk g of the switch-operating motor will be released and permitted to make a quarter movement,
 30 which will, as before stated, close the switches a , and they will remain in this condition until the hand k arrives at the contact n five hours and a half later, when the circuit 2 3 4 will be closed, permitting the motor to make another movement, which will open the switches
 35 a , as before stated. Assuming that these movements had been made in the evening, the hand k will, on arriving at the point m the following morning, cause another movement of the motor, which will move the switches to the dotted-
 40 line position, Fig. 1, producing no effect on the circuit controlled by them, thus being an idle movement of the motor, and at eleven o'clock the circuit will again be closed and
 45 produce another idle movement, by which the switches are brought back to the position shown in full lines, ready to respond or to produce changes in the circuits controlled by them again, such changes being twenty-four
 50 hours later than the last similar change.

With a detent such as shown in Fig. 1 the motor should be made to run at such speed that a quarter-rotation of the disk g will occupy greater time than the time of closure of
 55 the circuit by the clock-hand k , so that the ar-

mature-lever i will be retracted in position to arrest the next stop projection to the one that was released by it; or, if necessary, the well-known form of double-stop detent might be employed, which requires a complete to-and-
 60 fro movement of the armature-lever in order to release the part controlled by it, as shown in Fig. 2.

The number of detent stop projections g' on the motor-disk g is double the number of
 65 contacts controlled by the hand k of the clock, so that one complete cycle of movements of the said stop-disk g occupies the time of two cycles of the hour-hand k of the clock. It results from this construction that the opera-
 70 tions or changes of condition that are to occur at certain definite moments once each day may be readily effected by the motor, which has an intermittent movement at said moments, and completes its entire cycle of move-
 75 ment once in a day, although controlled by the hour-hand, which revolves twice in a day, and by having the movements of the motor that take place during one cycle of the clock-
 80 hand idle the effective movements take place at the same moment on each day, or once in twenty-four hours, instead of being repeated every twelve hours, as would be the case if
 85 produced or controlled directly by the clock-hand. In other words, when, as in the present case, two changes are to be made at definite
 90 moments during one period of twelve hours in each day, two of the stop projections are arranged to control the required corresponding movements of the motor, and there are two
 95 other stop projections which simply act to prevent the motor from again coming to its effective position in the next twelve hours.

I claim—

The combination of a controlling-clock and
 95 electric contacts, as m and n , operated thereby, with a motor having a number of stop projections, as g' , which are double the number of said clock-controlled electric contacts, and a
 100 detent, as i , co-operating with the stops of the motor and governed by the clock-controlled electric contacts, substantially as 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,
 JAS. J. MALONEY.