

S. G. RHODES & A. B. RYPINSKI.

ELECTRIC TIME SWITCH.

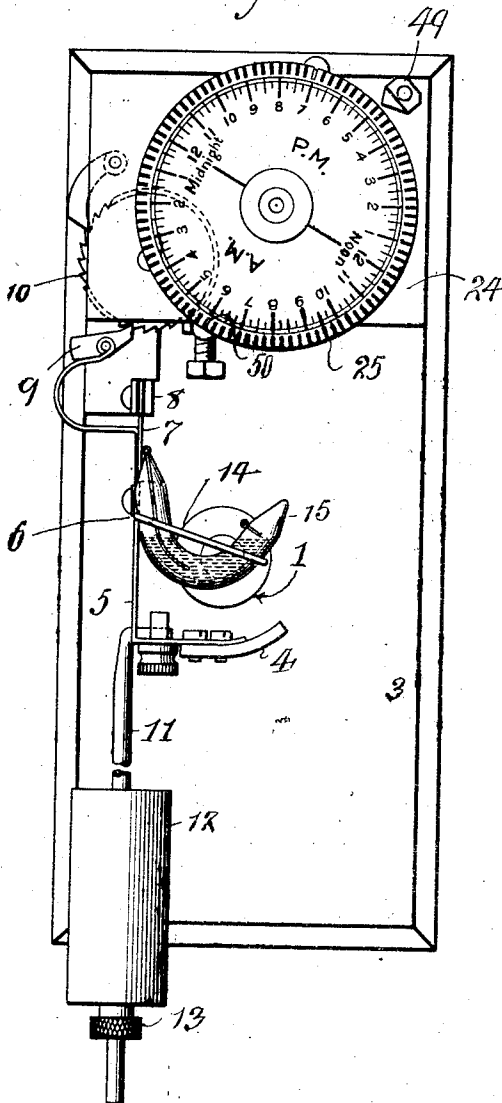
APPLICATION FILED OCT. 9, 1912.

1,060,630.

Patented May 6, 1913.

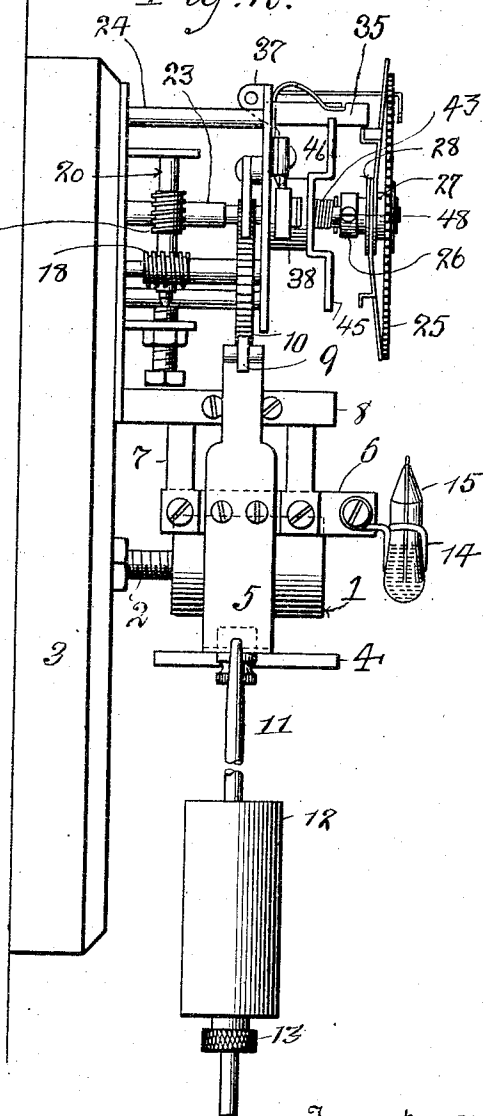
3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
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Fig. 2.



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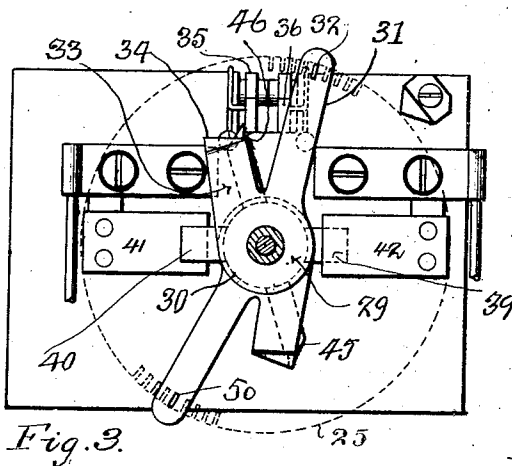


Fig. 3.

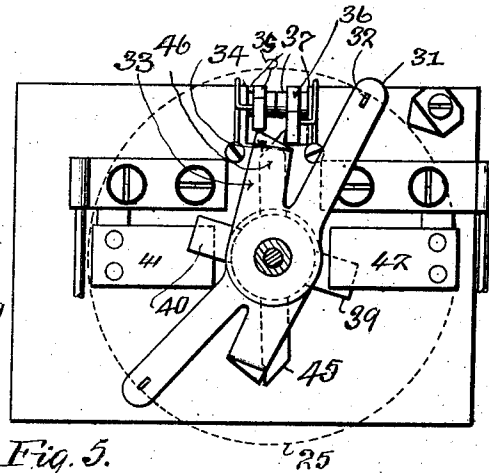


Fig. 5.

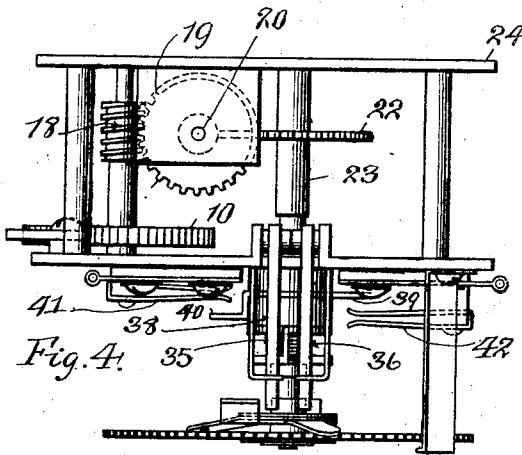


Fig. 4.

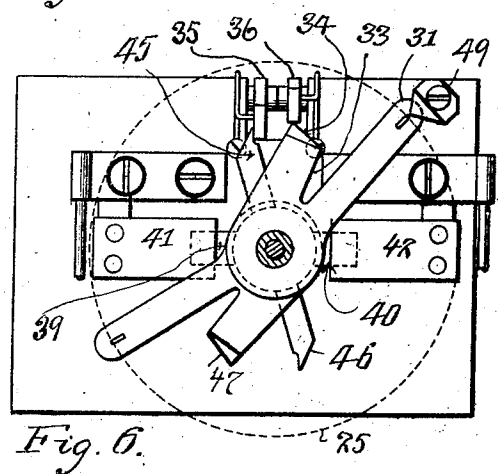


Fig. 6.

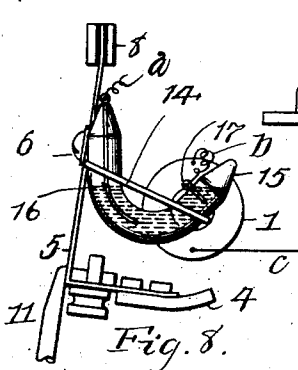


Fig. 8.

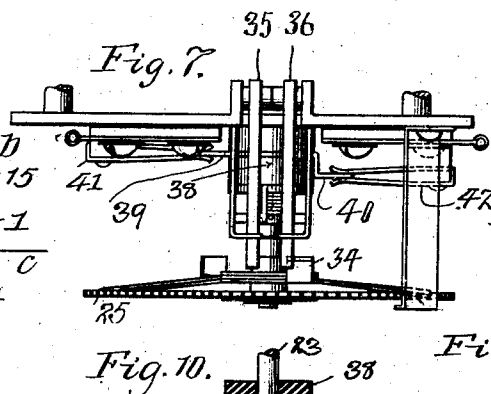


Fig. 7.

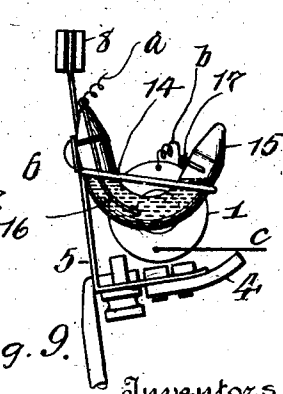


Fig. 9.

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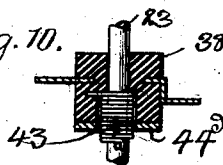


Fig. 10.

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3 SHEETS—SHEET 3.

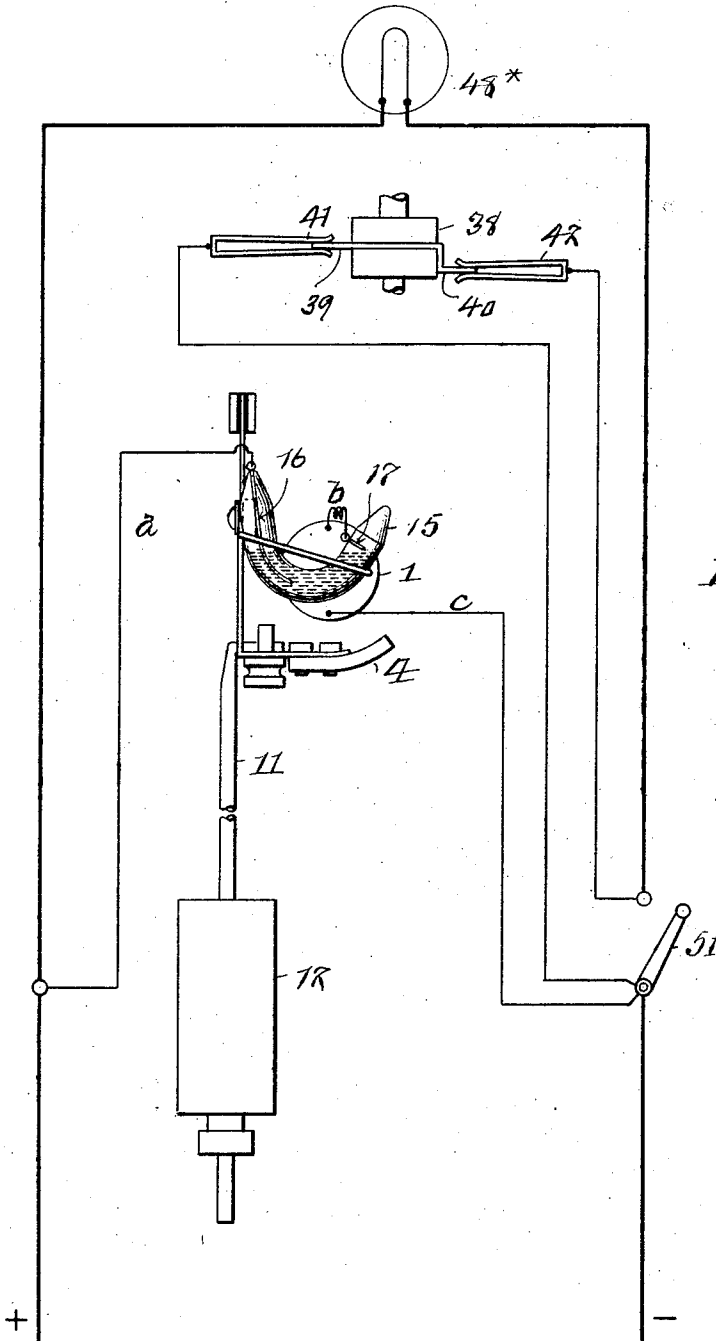


Fig. 11.

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UNITED STATES PATENT OFFICE.

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ELECTRIC TIME-SWITCH.

1,060,630.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed October 9, 1912. Serial No. 724,703.

To all whom it may concern:

Be it known that we, SAMUEL G. RHODES and ALBERT B. RYPINSKI, citizens of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Electric Time-Switches, of which the following is a specification.

The invention is an electric time switch, which acts automatically at any predetermined time in the twenty-four hour day to set in operation a translating device—such as an installation of glow-lamps—and at a later time to terminate said operation.

The invention consists more particularly in the construction whereby the movement of a switch member actuated by the time mechanism is arrested and then released either to open or close circuit, as the case may be, to the translating device.

In the accompanying drawings—Figure 1 is a front, and Fig. 2 is a side elevation, of our electric time switch. Figs. 3, 5 and 6 are detailed front views of the switch and the motion arresting and releasing devices in three successive positions. Fig. 4 is a side view of the same mechanism in the position of Fig. 3, the switch being then open. Fig. 7 is a side view of the same mechanism in the position of Fig. 6, the switch being then closed. Figs. 8 and 9 are detailed views showing in two positions the mercury circuit-breaker associated with the electro-magnet which actuates the pendulum. Fig. 10 is a section of the sleeve on shaft 23, which sleeve carries the switch arms 39, 40. Fig. 11 is a diagram showing the electrical circuits.

Similar numbers of reference indicate like parts.

The motor electro-magnet 1 is adjustable on the threaded rod 2, projecting from the supporting back-board 3. The curved plate armature 4 of the magnet is disposed below the same, and is carried by a bent arm 5, which is secured to a bar 6 of insulating material, which bar 6 is suspended by leaf springs 7 from a bar 8 protruding from the back-board 3.

The bent arm 5, above its point of fastening to bar 6, is curved outwardly to clear the bar 8, and at its upper end carries a pawl 9 which engages with a ratchet wheel 10. Near the lower bent over end of arm 5

there is an opening to receive a clamping screw to secure the turned over extremity of the pendulum rod 11 on which is received the bob 12, movable up and down on said rod and adjustable thereon by means of the nut 13.

When the electro-magnet 1 is energized, it moves its armature 4, to the right, from the position shown in Fig. 8, to that shown in Fig. 9, thus causing the pawl 9 to engage with a tooth of ratchet wheel 10 and turn said wheel. When the electro-magnet 1 is deenergized, the backward swing of the pendulum causes pawl 9 to run over the ratchet teeth.

The intermittent energizing of the magnet is accomplished by the following means: Supported on the bar 6 is a wire frame 14, in which is placed a curved glass tube 15, containing mercury. A circuit terminal 16 enters said tube at one end for a considerable distance. A circuit terminal 17 enters said tube near the other end. A branch wire *a* from the plus main lead connects to terminal 16. Terminal 17 is connected by wire *b* to one terminal of magnet 1, the other terminal of said magnet being connected by branch wire *c* to the negative main lead. When the pendulum bob hangs vertically as in Figs. 1, 2 and 11, the mercury is out of contact with terminal 17, and the magnet is not energized. When the bob is swung to the left, as shown in Fig. 8, circuit is established at terminal 17, and when said bob is swung to the right by the attraction of magnet 1 upon its armature 4, as in Fig. 9, circuit is broken at said terminal 17. The ratchet wheel 10 operates the switch mechanism in the manner now to be described. On the shaft of said wheel is a worm 18, Figs. 2 and 4, which engages a gear 19 on a vertical shaft 20. On shaft 20 is a worm 21 which engages a gear 22, Fig. 4, on the shaft 23. The gear train described is suitably journaled and supported in a frame 24. On the outer end of shaft 23 is the dial 25, marked for the twenty-four hours of a day, and toothed around its circumference. The hub 26, Fig. 2, of said dial receives and is secured to said shaft 23. On said hub and between a shoulder 27 and a fixed plate 28 are pivoted two cam plates 29, 30, each of which plates may be rotated on said hub independently of the other. These two cam

plates are alike, so that a description of one and its associated mechanism applies equally to the other.

Referring to Figs. 3, 5, 6, the cam plate 29 is integrally formed of metal and has two arms, one of which, 31, extends to the circumference of dial 25 and has a projection 32 which engages with notches on said circumference. The other arm 33 carries at its end a cam 34. The function of the cam 34 is to raise successively two spring latches or stops 35, 36, which are pivoted in lugs 37, Figs. 2 and 5, on the rear side of the front member of frame 24.

On the shaft 23 is a rotatable sleeve 38, Figs. 1, 4, and 7, of insulating material, which carries a plate, from which project two oppositely disposed switch levers 39, 40, which cooperate with two contact clips 41, 42, secured on said front member. These clips are disposed in different vertical planes, and the switch levers 39, 40 are similarly disposed. When the shaft 23 is turned so that the levers 39, 40 do not register with the clips 41, 42, as shown in Figs. 3 and 4, then said levers do not close contact between said clips. When the levers 39, 40 do register with clips 41, 42, as shown in Figs. 6 and 7, then said levers do close contact between said clips. Surrounding shaft 23 and seated in a countersink in sleeve 38, is a helical spring 43, Fig. 10. One end of this spring is connected to shaft 23, and the other end, to sleeve 38. Fast on the outer end of sleeve 38 is a plate 44, Fig. 10, carrying two arms 45, 46.

Considering now simply the sleeve 38, with its switch levers 39, 40, and radial arms 45, 46, it will be obvious that when the shaft 23 is rotated by the motor mechanism described, the motion of said shaft will be transmitted through helical spring 43 to sleeve 38, unless said sleeve be prevented from rotating, in which case the effect of rotation of shaft 23 will be to wind up spring 43. If afterward the sleeve 43 be released, then the sleeve will be rapidly turned by the wound spring until its motion is again mechanically arrested.

The function of the radial arms 45, 46 is to prevent rotation of the sleeve 38 until released. Consider the position of the parts shown in Fig. 3: The helical spring 43 has rotated sleeve 38 until arm 46 has encountered pivoted stop 35, which arrests further movement of said arm, and hence further rotation of sleeve 38. Shaft 23, continuing to turn, winds up spring 43. The switch levers 40, 39 do not register with their clips 41, 42. The cam 34 is just moving into position to raise stop 35. As it does so, it frees arm 46 from said stop. The helical spring 43, now turning the sleeve 38, throws arm 46 forward to engage the next stop 36, Fig. 5. The cam 34 continuing to move on-

ward raises stop 36. The helical spring 43 now turns sleeve 38 until arm 45 engages stop 35, Fig. 6. The switch levers have thus been turned 180° from their original position of Fig. 3. They therefore now register with their clips and close circuit, as shown in Figs. 6 and 7, from plus main feed, to lamp, and to negative main feed, Fig. 11. In this position they remain until the cam 47 on cam plate 30 meets and raises stop 35, when the operation already described is repeated, the parts returning to their original position, as shown in Fig. 3, and circuit at the switch levers being again interrupted.

The actual setting and operation of the device is as follows: The lamp 48*, Fig. 11, merely represents translating apparatus or installation of any kind, to which it is desired to provide a supply of current over a certain period of time in the twenty-four hour day. The device is first regulated as a time piece, by a suitable adjustment of the pendulum bob 12 and by turning the dial (the set screw 48, Fig. 2, which connects its hub to shaft 23, being loosened for the purpose,) until the scale indication which comes opposite the fixed index 49 (Fig. 1) corresponds to clock time. Thus in Fig. 1, the number 5 on the dial is opposite the fixed index, the dial being so adjusted at the hour of 5 p. m., as shown by the standard clock. Circuit is open at the switch levers 39, 40. It is desired, for example, to close circuit to the lamp at 7 p. m. The projection 32 on arm 31 of cam plate 29 is inserted in the notch on the circumference of dial 25 which is opposite to the number 7. Just before the dial has rotated sufficiently to the right of Fig. 1, to bring the number 7 in front of the fixed index 49, the cam 34 on arm 33 of cam plate 29 first raises the stop 35 and then the stop 36. The switch levers 39, 40 being now freed (and, as already described, at the instant of 7 o'clock) are swung around into the position shown in Figs. 6 and 11, to close circuit to the lamp 48*. We have thus determined the moment when the current supply will be started. We have now to fix the instant of cutting off that supply. All that is required is to set the cam plate 30 so that its projection 50, Fig. 3, will enter the notch on the dial periphery, indicating the desired time of stoppage. Thus in Fig. 1, said projection 50 engages with the notch opposite the hour mark 6 a. m. In the manner already described, and just before the hour mark 6 a. m. comes opposite the fixed index 49, the cam 47 will release the two stops 35, 36, as before, and the switch levers will be rotated to interrupt circuit. As here shown, the device may be set to establish current supply at any time during the twenty-four hour day, and to continue for any given length of time within that period; but, of course, the dial can be

marked for any desired time units and intervals. The switch 51, Fig. 11, serves to cut in and out the apparatus, as may be desired.

5 We claim:

1. An electric time switch, comprising a time mechanism, a shaft actuated thereby, a sleeve loose on said shaft, a switch member on said sleeve, a radial arm on said sleeve, a spring interposed between said sleeve and said shaft, a movable stop in the path of revolution of said radial arm, and a cam plate on said shaft: the said cam plate coöperating with said stop to move the same out of engagement with said radial arm.

2. An electric time switch, comprising a time mechanism, a shaft actuated thereby, a sleeve loose on said shaft, a switch member on said sleeve, a radial arm on said sleeve, a spring interposed between said sleeve and said shaft, a movable stop in the path of revolution of said radial arm, and a cam plate rotatably adjustable on said shaft: the said cam plate coöperating with said stop to move the same out of engagement with said radial arm.

3. An electric time switch, comprising a time mechanism, a shaft actuated thereby, a sleeve loose on said shaft, a switch member on said sleeve, a radial arm on said sleeve, a spring interposed between said sleeve and said shaft, two movable stops successively disposed in the path of revolution of said radial arm, and a cam plate on said shaft: the said cam plate coöperating with said stops to move the same successively out of engagement with said radial arm.

4. An electric time switch, comprising a time mechanism, a shaft actuated thereby, a sleeve loose on said shaft, a switch member on said sleeve, a radial arm on said sleeve, a spring interposed between said sleeve and said shaft, a movable stop in the path of revolution of said radial arm, a cam plate rotatably adjustable on said shaft, and means for holding said plate in adjusted

position: the said cam plate coöperating with said stop to move the same out of engagement with said radial arm.

5. An electric time switch, comprising a time mechanism, a shaft actuated thereby, a sleeve loose on said shaft, a switch member on said sleeve, a radial arm on said sleeve, a spring interposed between said sleeve and said shaft, a movable stop in the path of revolution of said radial arm, a cam plate rotatably adjustable on said shaft, a dial on said shaft, and means for detachably securing said cam plate to said dial: the said cam plate coöperating with said stop to move the same out of engagement with said radial arm.

6. An electric time switch, comprising a time mechanism, a shaft actuated thereby, a sleeve rotatable on said shaft, a switch member on said sleeve, two radial arms on said sleeve, a spring interposed between said sleeve and said shaft, and two mutually independent cam plates, each rotatably adjustable on said shaft: said cam plates coöperating with said stops to move the same successively out of engagement with said radial arms.

7. An electric time switch, comprising a time mechanism, a shaft actuated thereby, a sleeve rotatable on said shaft, a switch member on said sleeve, two radial arms on said sleeve, a spring interposed between said sleeve and said shaft, two mutually independent cam plates, each rotatably adjustable on said shaft, a dial on said shaft, and means for detachably securing said cam plates to said dial: the said cam plates coöperating with said stops to move the same out of engagement with said radial arms.

In testimony whereof we have affixed our signatures in presence of two witnesses.

SAMUEL G. RHODES.
ALBERT B. RYPINSKI.

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MAY T. MCGARRY.