Dec. 19, 1939. J. A. HJULIAN 2,183,886

TIME SWITCH

Filed March 28, 1938

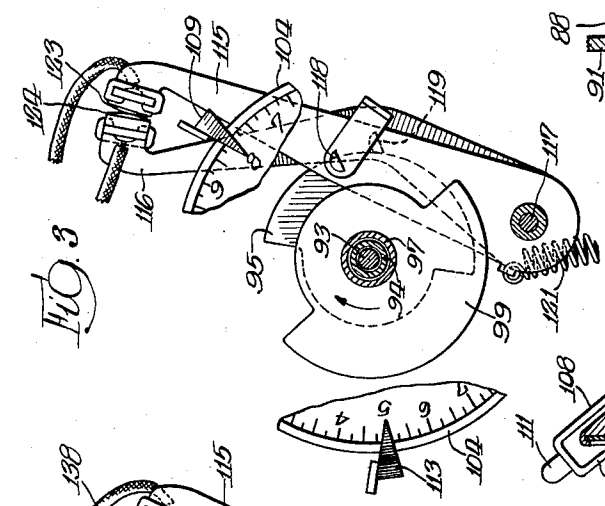

Fig. 3

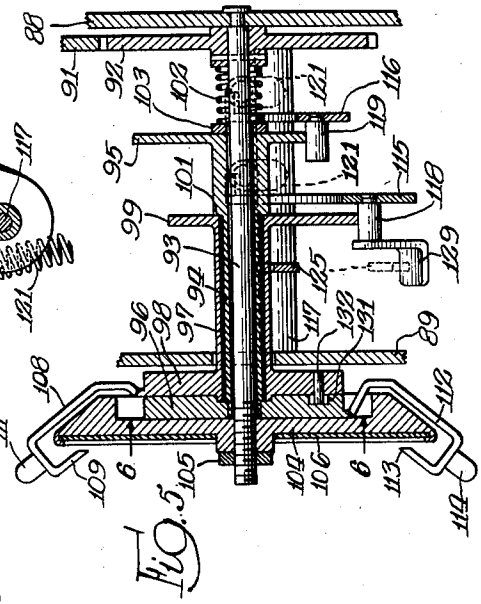

Fig. 5

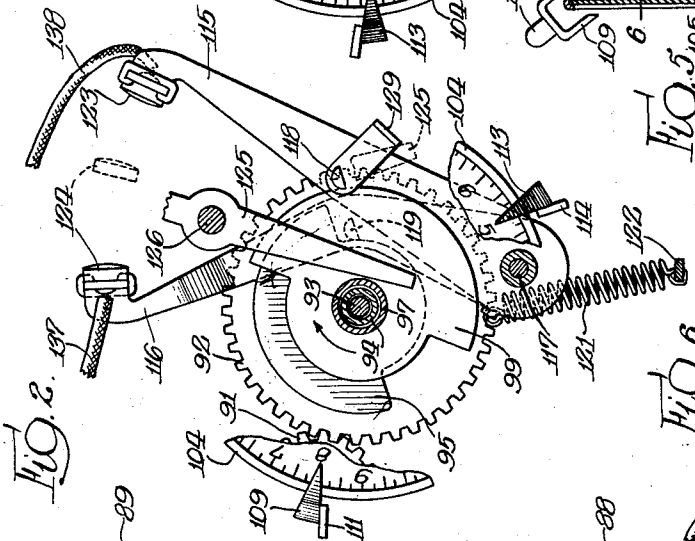

Fig. 2

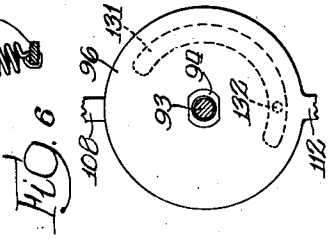

Fig. 6

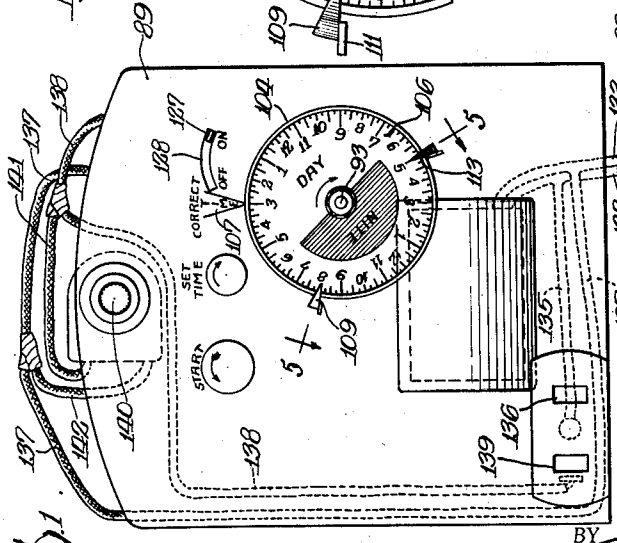

Fig. 1

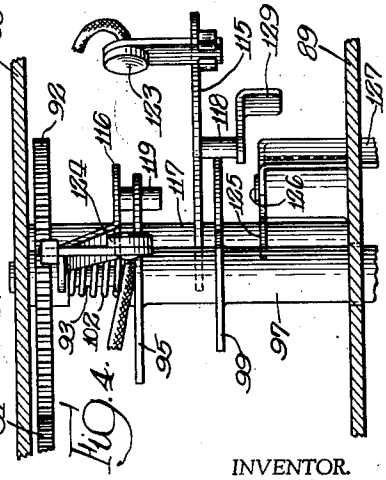

Fig. 4

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TIME SWITCH

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4 Claims. (Cl. 200—38)

This invention relates to electric circuit control devices, and more particularly to a switch mechanism adapted for use in connection with a clock, either mechanically or electrically operated, and by which an electric circuit may be opened and closed at predetermined time intervals.

One of the primary purposes of my invention is to provide a switch mechanism for the purpose indicated which can be readily and easily set or adjusted to cause the opening and closing of the circuit at any predetermined times, so that at any time of the day or night the switch may be set to close the circuit, for instance, at some future predetermined hour and to automatically open the circuit at a predetermined later hour, and when once set the closing and opening of the circuit will thereafter be performed every twenty-four hours at the exact times determined by the setting or adjustment.

One of the commercial uses of the invention is for turning on an electric advertising sign at a predetermined time each evening and for turning it off at a later desired time. It may also be used for turning on and turning off lights in a show window or display cabinet or it may be employed for sounding an alarm or turning on a radio at a certain time each twenty-four hours, or it may be utilized for many other purposes which will be obvious to those familiar with the invention.

Another purpose is to provide a switch which will be simple in construction, economical to manufacture, and reliable and durable in operation and one which may be constructed as a component part of a commercial clock or may be made as an accessory to be attached to a clock of standard construction.

Other purposes and advantages of my invention should be readily appreciated as the same becomes better understood by reference to the following description when considered in connection with the accompanying drawing.

Referring to the drawing:

Fig. 1 is a rear elevation of a clock equipped with a preferred form of my invention;

Fig. 2 is a view similar to Fig. 1 with the clock case and some of the parts removed or broken away to more clearly disclose the parts desired to be illustrated;

Fig. 3 is a view similar to Fig. 2 showing the parts at a later time period when the switch is in closed position;

Fig. 4 is a plan view of the parts in the position assumed in Fig. 2;

Fig. 5 is a sectional view on the line 5—5 of Fig. 1; and

Fig. 6 is a fragmentary sectional view on the line 6—6 of Fig. 5.

Referring now to the form of the invention illustrated which, because of certain features including the rapid making and breaking of the circuit which prevents arcing, I consider to be the preferred commercial embodiment of the invention, it will be apparent that the invention is embodied in an electrically operated clock. The clock case comprises the front wall 88 and the rear wall 89.

The clock mechanism includes an electric motor and a driving gear train of well known character, the hour hand shaft being connected through a reducing train including the pinion 91 and the gear 92 to drive a shaft 93, to which gear 92 is pinned, at a one to two ratio with the hour hand shaft so that shaft 93 makes one complete revolution in twenty-four hours.

A hollow shaft or sleeve 94 surrounding shaft 93 has a cam shaped control member 95 fixed to one end thereof and a friction disk 96 splined to the other end, the end of the shaft for this purpose and the opening in the disk into which it projects being polygonal in shape, as shown in Fig. 6, whereby the shaft and the disk are drivingly connected but relative axial movement is permitted for purposes which will be later explained. Surrounding the shaft 94 is a sleeve 97 provided at its outer end with a friction disk 98 engaging disk 96 and at its inner end with a control member 99 having a cam contour. A shoulder 101 formed on shaft 94 abuts the end of shaft 97 so that under the influence of a spring 102 interposed between the hub of gear wheel 92 and a washer 103 engaging the end of shaft 94, the disk 98 is urged into frictional engagement with the opposed face of disk 96 which, in turn, is frictionally urged against the inner face of a dial member or disk 104 which is fixed upon and rotated by the shaft 93. The tension of spring 102 may be regulated by adjusting member 104 longitudinally of shaft 93, a lock nut 105 being provided to lock the member in adjusted position.

The outer face of member 104 is equipped with a dial 106 provided with indicia in the form of twenty-four major graduations arranged in two series of twelve each with suitable intervening half and quarter hour markings, as will be apparent from Fig. 1. For convenience, the dial is also preferably differently colored or marked on opposite sides of a radius intersecting the numerals 6 to indicate that one-half represents daytime

and the other half nighttime. Since the dial is driven by shaft 93 from the hour hand shaft of the clock at a one to two ratio, the actual time is always disclosed by the dial in conjunction with a pointer or indicator 107 marked for convenience "correct time." In the position of the parts illustrated on the drawing, the time shown is 3:00 P. M.

The disks 96 and 98 and with them the respective cam-shaped control members 99 and 95 are independently rotatably adjustable relatively to the dial member 104. For this purpose, disk 98 is provided with an extension or arm 108 terminating in a finger or pointer 109 disposed in proximity to the face of the dial 106 and with a hand grip 111 adapted to be grasped to facilitate manual adjustment of the disk. Likewise, disk 96 is provided with an extension or arm 112 terminating in a pointer 113 in proximity to the face of the dial, and with a hand grip 114 through which adjustment of the disk may be effected. Since dial member 104 is positively connected with the clock train, its position will not be affected by the adjusting movements of the disks 96 and 98, but these disks being frictionally driven from the member 104 may be adjusted to bring their control members 95 and 99 into any desired adjusted position by grasping the hand grips 111 and 114 and turning both disks or either of them to the desired position of adjustment.

Switch members 115 and 116 are independently rotatably mounted side by side upon a stationary shaft 117 extending between the front and rear walls of the clock case. Member 115 is equipped with a laterally projecting semi-circular cam follower 118 adapted to ride upon the perimeter of the control member 99, and member 116 is provided with a similar follower 119 adapted to ride upon the perimeter of controller 95. The followers are urged toward their respective controllers by the tractile springs 121 each connected with its respective switch member at one end and at its opposite end with a stationary part 122 carried by the clock case. Switch member 115 carries at its extremity a contact member 123, and switch member 116 similarly carries a contact member 124, the two contact members being positioned in alignment so that they may be brought into contacting relation, as illustrated in Fig. 3, to thereby close an electric circuit. The time at which the circuit will be closed and opened will be determined by the setting of the control members 95 and 99.

The operation of this form of the invention will be briefly explained. Assuming that at 3:00 P. M., which is indicated on the dial 106 by the pointer 107, the user desires to set the clock so that the circuit will be closed at 8:00 P. M. and subsequently opened at 5:00 A. M. Grasping the hand grips 111 and 114, the user sets indicator 109 to the position 8:00 P. M. on the dial 106 and the indicator 113 to the position 5:00 A. M. on the dial. This operation positions the controllers 95 and 99 in the position shown in Fig. 2 with the circuit open. Shortly after the time of setting, controller 95 rotating in a clockwise direction viewing Fig. 2 will move switch member 116 to the right to dispose contact member 124 in the position indicated by the dotted lines in this figure The circuit, however, is still open, and follower 119 will continue to ride upon the perimeter of control member 95. When, however, follower 118 rides off the high portion of controller 99 at 8:00 P. M., switch member 115 under the influence of its spring 121 will be snapped in a counter-clockwise direction to bring contact 123 into engagement with contact 124, thereby closing the circuit. The circuit will remain closed until follower 119 rides off the end of the high portion of controller 95 at 5:00 A. M. whereupon switch member 116 will reassume the full line position illustrated in Fig. 2, thereby quickly opening the circuit without arcing.

The above operation will be repeated every twenty-four hours unless the device be locked against circuit closing. For the purpose of so locking the circuit open, I have provided a control lever 125 fulcrumed upon a supporting shaft 126, the upper end 127 of the lever being extended outwardly through a slot 128 in the rear wall of the clock case into accessible position, as shown in Fig. 1. When the lever is in "on" position, illustrated in Fig. 1 and in full lines in Fig. 2, it performs no operative function, and the switch will automatically operate at predetermined periods, as previously described. When, however, the lever 125 is swung to "off" position, its lower end will be brought into holding relation with a bracket 129 fixed on switch member 115 to hold the switch member in the open circuit position irrespective of the position of the control member 99. The position of the lower end of lever 125 when set to hold the switch member in open circuit position is shown in dotted lines in Fig. 2.

Since it is probably never desirable that the circuit be closed for more than a twelve hour period, I have made provision for restricting the closing of the circuit to that length of time, although it should be manifest that this feature may be eliminated without affecting the principles of my invention. The restriction of circuit closing is accomplished by providing in a face of disk 96 an arcuate groove 131 of substantially 180° in length into which a pin 132 projects from disk 98. Relative rotation between disks 98 is obviously limited by this pin and groove connection to a movement through an arc of substantially 180°.

If my switch mechanism be employed in a home, for instance, for turning on the radio at a predetermined time, it may be turned off if desired at any time during the closed circuit setting of the switch by manipulating the lever 125 from the full to the dotted line position shown in Fig. 2. It may sometimes, however, be desirable to turn on the radio when the switch mechanism is in circuit open position, and to enable this to be done I have included in the circuit a hand operable switch 140 of any preferred construction, the wiring hook-up for which may be as follows:

From the power wires 133 and 134, which will connect with the clock motor to operate the same, one lead 135 is connected with one of the contacts 136 of a switch plug. Another lead 137 is connected with the contact 124 of the switch, and a second lead 138 returns from contact 123 to the contact 139 of the plug switch. The apparatus to be controlled whether it be a radio or other device is plugged into the plug switch in the usual manner, and when hand switch 140 is open, the circuit to the instrument to be controlled will be automatically opened and closed by the time switch mechanism in the manner previously explained. If, however, it should be desired to close the circuit when the time switch is in circuit open position, this may be accomplished by simply closing the switch 140, one side of which is connected with lead 138 through a wire 141 and the other side of which is connected with lead 137

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through a wire 142. Closing of switch 140 will therefore close the circuit to the instrument to be operated entirely independently of the time switch mechanism.

It will be apparent from the foregoing that my invention provides a time switch construction embodying a plurality of control members which through their conjoint action when adjusted to predetermined positions relatively to the clock mechanism closes an electric circuit at a predetermined time and at a predetermined subsequent time again opens the circuit. Without further adjustment or attention, such predetermined timed opening and closing of the circuit will be repeated each twenty-four hours. My switch mechanism is simple in construction, economical to manufacture, and positive, reliable and durable in operation. It may be used for a variety of commercial purposes and may be embodied in or made as an attachment to a clock mechanism of standard or of preferred type, either mechanically or electrically driven.

While I have shown and described that embodiment of my invention which at present seems preferable, it should be understood that the structural details shown and described are illustrative merely and that a considerable variation in their structure may be resorted to without departing from the spirit of my invention as defined in the following claims.

I claim:

1. In a circuit controlling device, the combination of a rotatable shaft, a dial fixed thereon, a plurality of control members each including a friction disc carried by said shaft, said discs being arranged to receive friction drive from said shaft to rotate said control members with said shaft, a pointer arm carried by each of said discs and associated with said dial whereby the position of said switch members may be individually adjusted relative to the dial to determine the periods of circuit opening and closing, and a switch member for each control member, said switch members being provided with opposed contact elements adapted to contact each other to close the circuit.

2. In a time switch, the combination of a rotatable shaft, a dial fixed thereon and rotatable with said shaft, a plurality of control members carried by said shaft, friction discs carried by said control members and adapted to be frictionally driven by said dial to rotate their respective control members with said shaft, means for adjusting the position of said control members individually relatively to the dial to determine the periods of circuit opening and closing and a switch member for each control member, said switch members being provided with opposed contact elements adapted to contact each other to close the circuit.

3. In a circuit controlling device, the combination of a rotatable shaft, a dial fixed thereon, a plurality of cam shaped control members each including a friction disc carried by said shaft, said discs being arranged to receive friction drive from said shaft to rotate said cam shaped control members with said shaft, means for adjusting the position of said cam shaped control members individually relatively to the dial to determine the periods of circuit opening and closing, and a switch member for each control member, said switch members being provided with opposed contact elements adapted to contact each other to close the circuit, said cam shaped control members each comprising a high portion and a low portion of equal lengths so that a circuit closure may be maintained during any selected interval not exceeding one-half of the revolution of said control members.

4. In a circuit controlling device, the combination of a rotatable shaft, a dial fixed thereon, a plurality of control members each including a friction disc carried by said shaft, said discs being arranged to receive friction drive from said shaft to rotate said control members with said shaft, means for adjusting the position of said control members individually relatively to the dial to determine the periods of circuit opening and closing, a switch member for each control member, and spring means for urging the switch members into cooperative relation with their respective control members, said control members being movable toward and away from a common circuit closing position, one of said switch members being moved toward said position by its control member and away from said position by its spring means and another switch member being movable toward said circuit closing position by its spring means and away from said position by its control member.

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