Nov. 7, 1933. A. DE PAEMELAERE 1,933,717

TIME CONTROLLED SWITCH

Filed May 31, 1930

FIG. 1

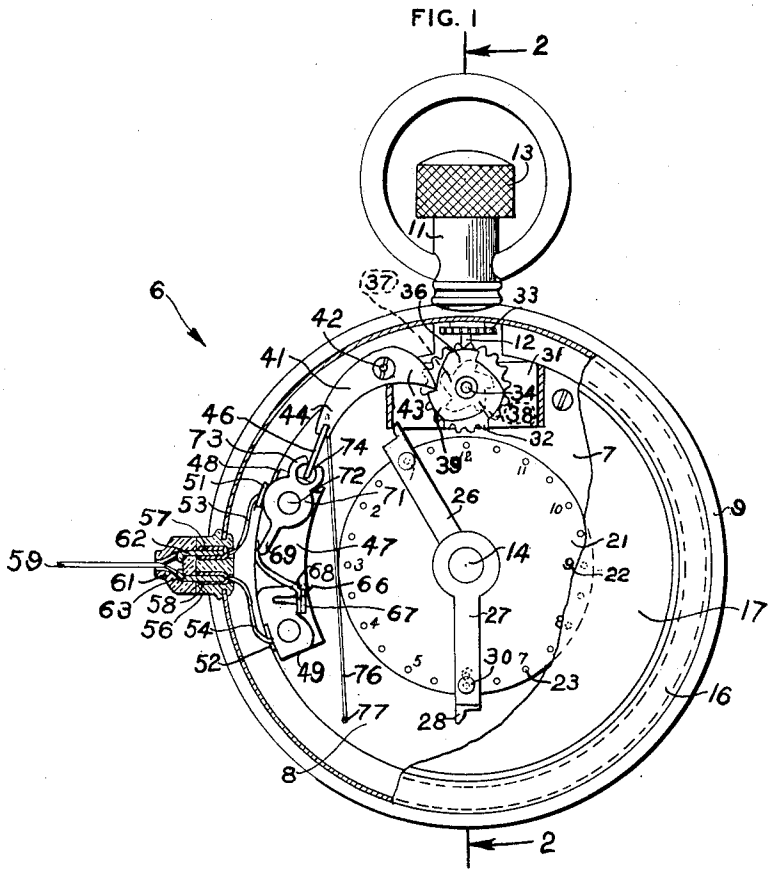


FIG. 2

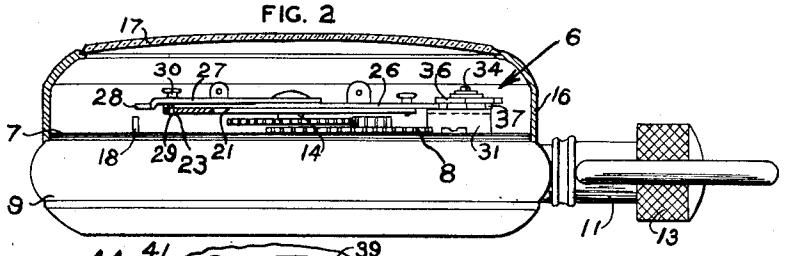
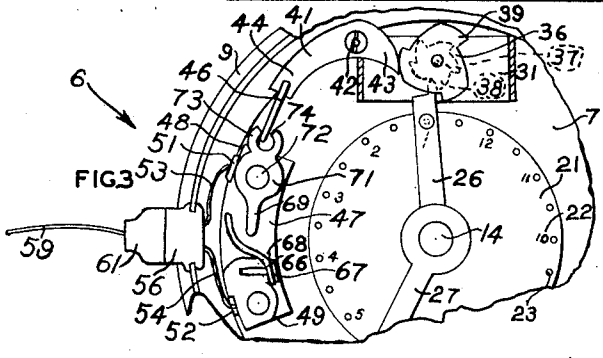


FIG3



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TIME CONTROLLED SWITCH

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2 Claims. (Cl. 200—38)

This invention relates to time switches.

An object of the invention is the provision of a time switch adapted to be mounted upon, and operated by a conventional watch movement.

Another object is to provide a time switch of such simple and relatively small construction that it is capable of being operated by a watch movement, and yet which is positive in operation and capable of turning on and off respectively, at predetermined times, a circuit whereby electrical energy is conducted to any suitable apparatus.

A further object is to so construct the time switch that adjustment thereof to vary the time at which the circuit is opened and/or closed, may be effected with the greatest ease.

The invention possesses other objects and advantageous features, some of which, with those enumerated will be set forth in the following description of the invention's particular embodiment which is illustrated in the drawing accompanying and forming a part of the specification.

Referring to the drawing:

Figure 1 is a front elevation of a time switch constructed in accordance with the principles of the present invention, portions of the figure being broken away and shown in section to better disclose the manner of construction.

Fig. 2 is a vertical, transverse sectional view taken upon the line 2—2 of Fig. 1, with the direction of view as indicated;

Fig. 3 is a detail view showing the operative parts of the switch in the opposite position from that shown upon Fig. 1, portions of the figure being broken away to reduce its size.

In its preferred embodiment, the time switch of the present invention comprises a circuit-controlling mechanism indicated in its entirety at 6, this mechanism being mounted upon the forward bearing plate 7 of a conventional and preferably inexpensive watch movement 8. This movement is contained within a conventional case 9 having a stem 11 through which a winding and setting shaft 12 extends. A knurled head 13 on the upper end of the shaft 12 is so connected to the mechanism of the movement 8, that rotation of the head 13 when in normal position, effects winding the main spring (not shown) whereby rotation of the head 13 subsequent to depression thereof, effects rotation of the shaft 14 upon which the hour hand of the watch would be mounted were such a hand provided. However, in order to accommodate the circuit-controlling mechanism 6, both the hour and the minute hand of the watch, must first be removed, and also the face. However, the only changes which must be made in the watch in order to accommodate the circuit-controlling mechanism 6, is to remove the hands and face and to provide an extended bezel 16 wherein the crystal 17 is mounted, the bezel 16 being of such depth that sufficient space is left between the crystal 17 and the forward bearing plate 7, to accommodate the circuit-controlling mechanism 6. Any suitable means may be employed for releasably retaining the bezel 16 in position upon the case 9. For example, a plurality of spaced pins 18 may be affixed rigidly to the case 9 in position to seat inside the bezel 16 and press outwards thereagainst, whereby the bezel 16 is firmly but releasably retained in position.

Subsequent to removal of the hands and face of the watch movement 8, a disc 21 is affixed to the shaft 14 which previously carried the hour hand. Consequently, the disc 21 is rotated through a complete revolution each twelve hours. It should be understood however, that the mechanism of the watch movement may be so altered that the rate of revolution of the disc 21 may be increased to twenty-four hours, or, in fact, it may be changed to any desired period. However, inasmuch as the disc 21 illustrated, is so coupled to the watch movement that it rotates once during each twelve hours, it is provided with twelve indicia 22 evenly spaced throughout the periphery of the disc 21, these indicia preferably being numerals indicating the successive hours between "1" and "12" inclusive. A hole 23 is formed adjacent each indicium 22 and preferably half way between each two adjacent indicia, thus dividing the periphery of the disc 21 into twenty-four equal arcs, each of these arcs representing the angular distance through which the disc 21 rotates during each half-hourly period.

A pair of hands 26 and 27 are pivoted upon the shaft 14 for rotational adjustment thereabout, these hands extending radially from the shaft 14 across the disc 21. However, each hand 26, 27 is slightly longer than the radius of the disc, with the result that it projects slightly beyond the periphery thereof. Preferably a point 28 is formed on the outer end of each hand. A pin 29 is formed on the under surface of each hand 26, 27, and a head 30 is formed upon the upper surface of each hand. Each of the hands 26 and 27 is constructed of material having a sufficient degree of resilience to permit the outer end thereof to be lifted away from the disc 21 a slight distance, by means of the associated head 30; and the pin 29 of each hand is at such a radial distance from the axis of the shaft 14, that it may be seated in any one of the holes 23 upon

release of the associated head 30, thus locking that hand to the disc 21 to be rotated thereby.

A bridge 31 is rigidly mounted upon the forward bearing plate 7 of the watch movement 8, in such position that it extends over the gears 32 with which the winding and setting shaft 12 is interconnected through the expedient of a gear 33 on the shaft 12, when the head 13 is depressed. This bridge 31 is so constructed and mounted that it interferes in no way with the normal operation of the setting gears 32 and 33. A short shaft 34 is journalled in this bridge 31 and extends forwards therefrom. A cam wheel 36 and a driving gear 37 are both rigidly secured to the shaft 34 for rotation together. The parts are so proportioned and arranged that one of the teeth 38 of the gear 37, always lies within the paths of the points 28 on the outer ends of the hands 26 and 27, whereby that tooth will be engaged by the next hand 26 or 27 as the case may be, which is carried past the plane including the axes of both shafts 34 and 14.

The cam wheel 36 is provided with a plurality of cams 39, preferably three; and the number of teeth 38 on the gear 37, is such that each engagement between one of the hands 26 and 27 with one of the teeth 38, causes rotation of the gear 37 and with it the cam wheel 36 through an angular distance equal to half the angular separation of each adjacent pair of cams 39. Consequently, a cam 39 will reach a given point adjacent the periphery of the cam wheel, only after each alternate engagement between one of the hands 26 and 27 and the gear 37. Therefore, in view of the fact that there are two hands 26 and 27, engagement between one of the hands and the gear 37, will bring a cam 39 into register with a given position, whereas engagement between the other hand 27 and the gear 37, will bring a space between two consecutive cams 39, into register with that space.

A lever 41 is pivotally mounted upon a pin 42 for rocking movement. One end 43 of the lever 41, cooperates with the cam wheel 36, and is adapted to be successively engaged by the cams 39. Each engagement of the end 43 of the lever 41 with one of the cams 39, causes the lever 41 to turn about the pin 42 in a clockwise direction as viewed upon Fig. 1. This causes the other end 44 of the lever 41 to move upwards and outwards, carrying with it a strip 46 of insulating material which is rigidly secured to the end 44 of the lever 41.

A block 47 of insulating material is secured upon the bearing plate 7, and a pair of plates 48 and 49 of conducting material, are rigidly secured to the block 47 of insulation. Ears 51 and 52 on the plates 48 and 49 respectively, provide means for easily connecting conductors 53 and 54 respectively, to the plates 48 and 49. Both conductors 53 and 54 lead to a receptacle 56 of insulation material in which socket members 57 and 58 are embedded, each of the conductors 53 and 54 being electrically connected to one of these sockets. Preferably a double conductor 59 is provided with a plug member 61 having contact prongs 62 and 63, each of which is adapted to be seated within one of the socket members 57, 58 so as to establish electrical connection between the individual conductors of the double conductor 59 and the conductors 53 and 54 which, as explained hereinabove, are electrically connected to the plates 48 and 49.

A contact 66 is mounted upon the plate 49 through the expedient of a pin 67 which extends parallel to the upper face of the block 47 and spaced therefrom, this pin being carried by a suitable ear 68 formed on the plate 49. The contact 66 fits the pin 67 sufficiently tightly to establish friction therebetween, whereby the contact 66 is retained in selected position upon the pin 67, but may be swung about the axis thereof, whereby the contact 66 may optionally be swung into or out of the path of a switch arm 69 carried by a movable contact 71. However, the contact 66 is fixed with respect to movement in the direction in which the contact arm 69 moves, with the result that the contact 66 is in effect, a fixed contact, whereas the contact 61 is a movable contact. The movable contact 61 is mounted for rocking movement upon a pin 72; and inasmuch as this pin as well as the contact 71, are both constructed of suitable conducting material, and in further view of the fact that the pin 72 is mounted upon the conductor plate 48, the conductor 53 is always in electrical connection with the switch arm 69. Similarly, the fixed contact 66 is in electrical connection with the conductor 54 through the ear 68 and plate 49.

A pair of opposed fingers 73 are formed on the movable contact 71 defining a socket 74 therebetween; and the strip 46 of insulation material carried by the lever 41, seats within this socket 74. Hence, upward and outward movement of the end 44 of the lever 41, produces similar movement of the fingers 73. Hence, turning of the lever 41 in a clockwise direction, effects rotation of the movable contact 71 in the opposite direction, which will cause the switch arm 69 to move out of engagement with the fixed contact 66 and into substantially the position indicated upon Fig. 3. This condition obtains when the end 43 of the lever 41 is riding upon one of the cams 39. However, when the cam wheel 36 is turned so as to bring a space between two consecutive cams 39 into register with the end 43 of the lever 41, the parts are returned to the position indicated upon Fig. 1, through the expedient of a spring 76 secured at one end to the bearing plate 7 by means of a rivet 77 or its equivalent, and pressing at its other end against the end 44 of the lever 41, and urging this end 44 downwards and inwards.

Operation

Whereas the time switch of the present invention may be used to control substantially any electrical circuit by turning the current therein, on and off respectively, at any selected time, it has been designed primarily for use in controlling the circuit whereby energizing current is supplied to a radio receiving set. The switch is particularly useful in this connection, inasmuch as such a piece of apparatus operates upon a relatively low amperage, with the result that the switch need not be constructed to have a very large capacity. It should be understood however, that the capacity may readily be increased by altering the dimensions of the contacts and the parts associated therewith.

Assuming that the parts of the switch are in the position indicated upon Fig. 1, electrical connection is established between the conductors 53 and 54, to complete the circuit with which they are associated, inasmuch as the switch arm 69 bears against the fixed contact 66. The hand 26, which is the one which will next be carried past the plane including the axes of the shafts 34 and 24, should be positioned at that point upon the disc 21 corresponding to the time at which it is desired to interrupt the circuit, say for ex-

ample, the selected time is one o'clock. The hand 26 is shown with the pin 29 thereof seated in the hole 23 adjacent the indicium "1". If the watch is properly set, i. e., if the indicium on the disc 21 corresponding to the correct time, is uppermost, the hand 26 will make engagement with one of the teeth 38 of the gear 37 at one o'clock. This will effect rotation of the gear 37 and the cam wheel 36, through a sufficient distance to bring one of the cams 39 into engagement with the end 43 of the lever 41, whereby the end 44 of the lever is moved upwards and outwards. This will cause rotation of the movable contact 71 in the direction opposite to that of the lever 41, moving the switch arm 69 out of engagement with the fixed contact 66. The parts will remain in this position with the circuit broken until the hand 27 comes into engagement with the next tooth 38 of the gear 37. The time at which this occurs, depends upon the point on the disc 21 at which the hand 27 has previously been positioned. As illustrated upon the figures, this hand has been positioned at the hole 23 adjacent the indicium 6, with the result that the switch parts will be moved back to circuit-closing position at six o'clock through the engagement of the point 28 of the hand 27 with the gear 37.

If it should be desired to disconnect the switch from the apparatus, the circuit of which it controls, and permit the apparatus to remain deenergized without stopping the movement of the watch, this may readily be effected either by disconnecting the plug member 61 from the receptacle 56, or by swinging the fixed contact 66 upwards out of the path of the switch arm 69.

It is to be understood that the details of the invention as herein disclosed, are subject to alteration within the spirit or scope of the appended claims.

I claim:

1. In a time-controlled switch, a shaft, means for rotating said shaft at a predetermined rate, a disc affixed to said shaft, time-indicating indicia on said disc, a pair of hands pivoted to said shaft and extending therefrom beyond the periphery of said disc, means for releasably securing each of said hands to said disc in predetermined position with respect to a selected indicium, a gear journalled adjacent said disc with the path described by its teeth intersecting the paths of the outer ends of said hands, each hand being adapted to rotate said gear through a predetermined arc by engagement therewith, a cam wheel coupled to said gear to be rotated therewith, cams on said cam wheel angularly spaced from each other, a distance substantially equal to twice said predetermined arc, an electric switch comprising a movable contact and a contact fixed against movement in the path of said movable contact but movable optionally into or out of said path, said movable contact being adapted to disengage said fixed contact when moved in one direction and to engage therewith when moved in the other direction, means lying in the path of said cams for moving said movable contact in one direction when engaged by a cam, and spring means for moving said movable contact in the other direction when said contact moving means and cam become disengaged.

2. The combination of a shaft, means for rotating said shaft at a predetermined rate, a pair of hands pivoted to said shaft, means for releasably securing each of said hands in a predetermined position with respect to said shaft, a gear journaled adjacent said hands with a path described by its teeth intersecting the path of said hands, each hand being adapted to rotate said gear through a predetermined arc by engagement therewith, an electric switch comprising a movable contact and a contact fixed against movement in the path of said movable contact but movable optionally into or out of said path, and means operated by said gear to open and close said switch.

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