

July 1, 1930.

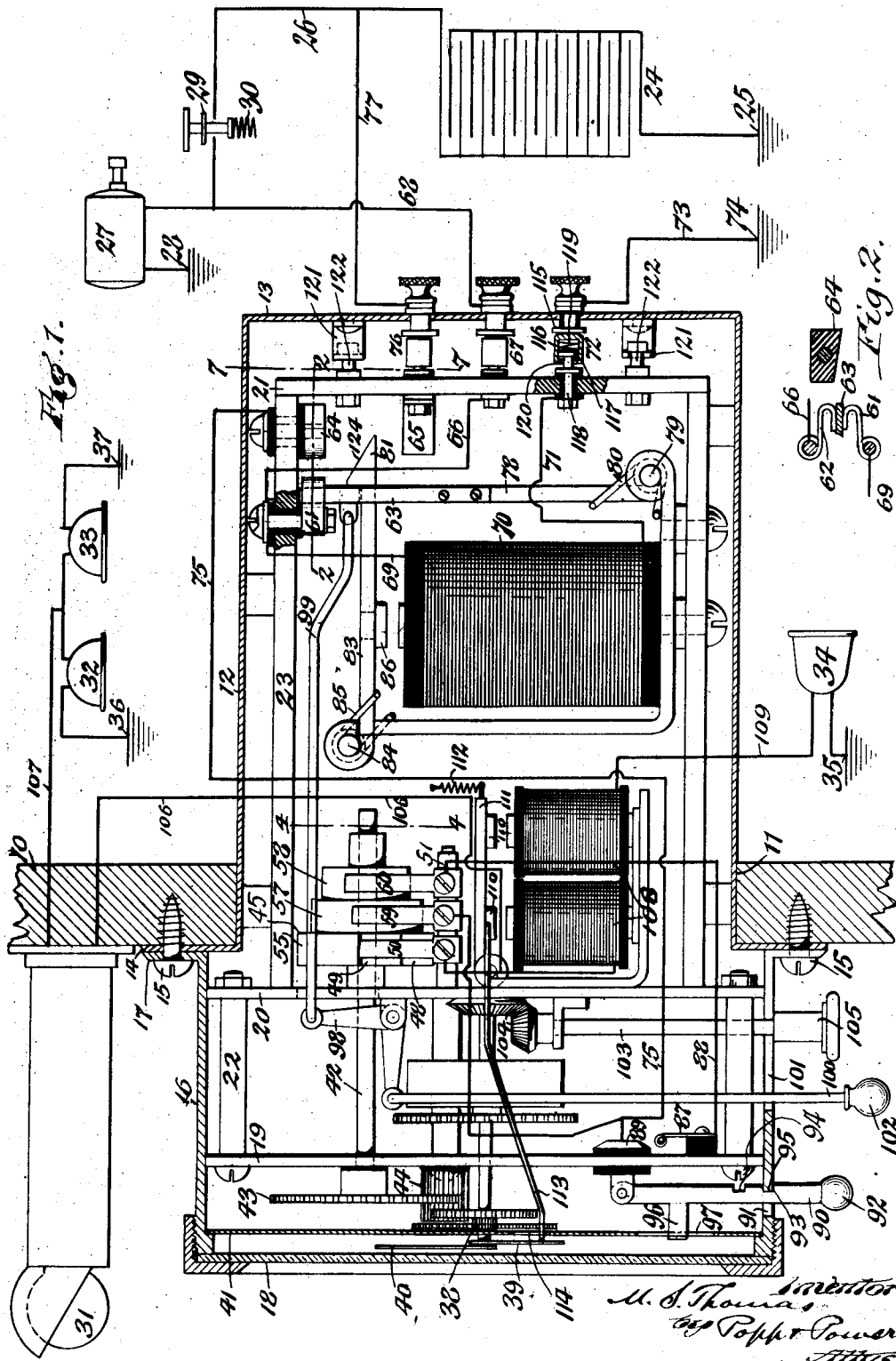
M. S. THOMAS

1,769,657

TIME SWITCH MECHANISM

Filed Dec. 17, 1924

2 Sheets-Sheet 1



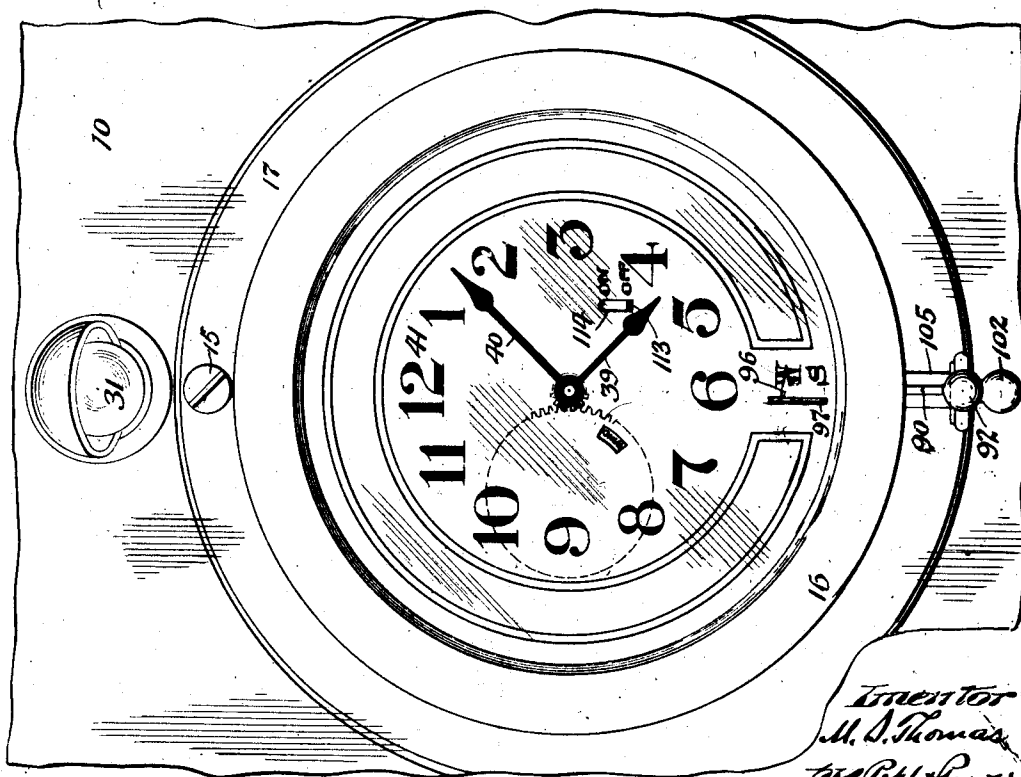
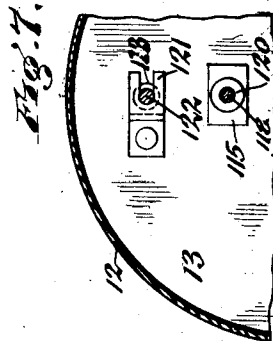
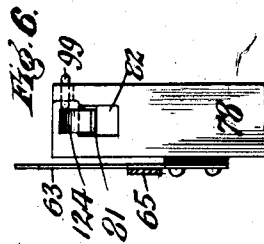
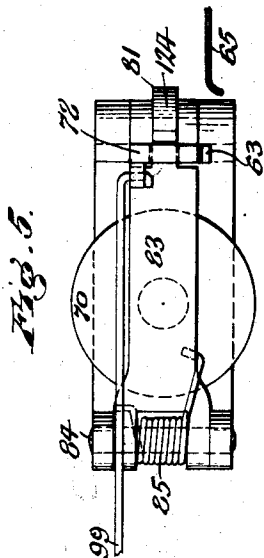
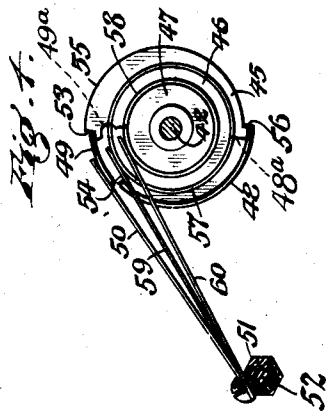
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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TIME-SWITCH MECHANISM

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This invention relates to a time switch mechanism for lighting an automobile at predetermined periods of the night.

It is, therefore, the object of this invention to provide a time switch mechanism for automobiles which will operate automatically to light the parking lamps of the car at a predetermined time in the evening and also extinguish the same again at a predetermined time in the morning, assuming that the car is left standing in the street or highway throughout the night.

A further object of this invention is to provide a time switch mechanism of this character which permits of being set so as to produce a long lighting period during the winter time, say from 5 p. m. on one day until 7 a. m. the following day and also enables this lighting period to be cut down to a shorter period during the summer time, say from 8 p. m. of one day to 6 a. m. of the following day.

In the accompanying drawings:

Figure 1 is a vertical longitudinal section of a practical embodiment of my invention, the electrical system of the same being shown in diagrammatic form.

Figure 2 is a fragmentary horizontal section on line 2—2, Figure 1.

Figure 3 is an elevation of the dash board of the automobile and the clock mechanism and pilot light mounted thereon.

Figure 4 is a fragmentary vertical cross section, taken on line 4—4, Figure 1.

Figure 5 is a top plan view of the electromagnetic transfer mechanism of the automatic lighting apparatus whereby the current from the source of supply is automatically shifted through a main circuit which contains a starting switch or through a shunt circuit which is arranged around said starting switch and is connected with the lighting system.

Figure 6 is a fragmentary rear elevation of this last mentioned mechanism.

Figure 7 is a fragmentary vertical transverse section taken on line 7—7, Figure 1.

Similar characters of reference indicate corresponding parts in the several figures.

The numeral 10 represents the dash board

of the automobile. Arranged within an opening 11 in this dash board and projecting rearwardly therefrom is the rear section of the housing which in this case consists of a cylindrical body 12, a transverse head or wall 13 forming a closure at the rear end of this head and a flange 14 at the front end of this body section which is secured to the front side of the dash board by means of screws 15. The front section of this housing comprises a cylindrical body 16 which is provided at its rear end with an external flange 17 fastened to the dash board by the screws 15 and a transparent pane 18 extending transversely across the front end of this front housing section and forming a closure therefor.

Within these two housing sections is arranged a frame upon which the various working parts of the time switch mechanism are mounted, which frame consists generally of a front crosspiece 19, an intermediate crosspiece 20, a rear cross piece 21, a plurality of short longitudinal bars 22 connecting the front and intermediate crosspieces 19, 20 and comparatively long longitudinal bars 23 connecting the intermediate crosspiece 20 and the rear cross-piece 21.

The numeral 24 represents a source of electricity such as the storage battery now commonly employed on automobiles for starting the motor and also lighting the lamps and operating the ignition mechanism of the engine. For this purpose one side of this battery is grounded at 25 and its other side is connected by means of a main line 26 with a starting motor 27 which is also grounded opposite to the main line, as shown at 28. Upon closing a switch 29 arranged in this main line the current from the battery 24 is caused to flow through the starting motor 27 and operate the engine in the usual way for starting the same. Upon releasing the pressure upon the switch 29 the same is automatically opened by means of a spring 30.

The numeral 31 represents the usual dash light or pilot light arranged on the front side of the dash board, 32, 33 the head lights which are usually mounted on opposite

sides on the front of the car for illuminating the road ahead, and 34 the usual tail light mounted on the rear of the car and adapted when lighted to serve as a protection against collision. This tail light has one side grounded, as shown at 35, and each of the head lights 32, 33 are also grounded on one side, as shown at 36 and 37. The numeral 38 represents part of an ordinary clock mechanism which may be of any usual and well known construction so as to give the time of the day, which mechanism is mounted on the front part of the main frame within the housing and provided with an hour hand 39 and a minute hand 40 which traverses the usual dial 41 which is visible through the glass pane 18 at the front end of the front housing section. Arranged lengthwise in the main frame and journaled in suitable bearings on the front and intermediate crosspieces 19 and 20 thereof is a longitudinal switch shaft 42 which is rotated at the rate of once during every twenty-four hours of the day by suitably gearing the same with the clock mechanism, which gearing in the present instance consists of a large gear wheel 43 arranged on the front end of the switch shaft 42 and meshing a small pinion 44 which is rotated by the clock works of this time switch mechanism.

At its rear end this switch shaft is provided with a circular body of insulating material which in its preferred construction has the form of a stepped cone which has three sections, a large section 45, an intermediate section 46 and a small section 47. The large section of this insulating body is provided circumferentially with two metallic segments 48, 49 which are arranged circumferentially, end to end, on about one-half of the peripheral part of this large section but are electrically disconnected from each other and the advancing segment 48 being comparatively long and representing about ten hours of the day and the rear or trailing segment 49 being comparatively short and representing about four hours of the day. As shown in Figure 4, the long metal segment 48 is connected by a metal line 48^a with the large metal band or ring 57, and the short metal segment 49 is connected by the metal line 49^a with the small metal band or ring 58. The uncovered portion 55 of the periphery of the large body section 45 which represents about one-half of the same, and the long and short segments, 48, 49 are adapted to be engaged successively by a brush 50 which is preferably constructed in the form of a flat spring and is mounted on an insulated support 51 carried by a metal rod 52 forming part of the main frame. At the rear end of the exposed or non-metallic surface of the large body section 45, the same drops abruptly

to the front end of the short metallic segment 49, as shown at 53. A similar drop occurs between the rear end of the short metallic segment 49 and the front end of the long metallic segment 48, as shown at 54. Another drop occurs between the rear end of the long metallic segment 48 and the uncovered or insulating surface 55 of the large section 45, as shown at 56, in Figure 4, thereby causing the make and break of the electric circuit, of which the metal parts 48 and 49 and the brush 50 form parts, to operate quickly and accurately at the proper time and without liability of prolonging the lighting period beyond the predetermined time or interfering with the accuracy of the instrument.

Upon the periphery of the intermediate section 46 of the insulating body is mounted an annular band or continuous ring of metal 57 and upon the small section 47 of this insulating body a similar endless metal band or continuous ring 58 is mounted. The intermediate metal ring 57 is engaged by the free end of a metal brush 59 and the metal ring 58 of the small section of the insulating body is engaged by the free end of a metal brush 60, these last mentioned brushes being also mounted on the insulating support 51.

In the summer time only the brush 50 and 59 are in circuit with the lighting system so that the current only passes through this circuit when the brush is in engagement with the long front metal segment 48 and, therefore, lights the lamps during a comparatively short part of the night, say for ten hours beginning at 8 o'clock in the evening of one day and terminating at 6 o'clock in the morning of the following day. When, however, the contact 60 is also included in the electric circuit then the rear short metal segment 49 becomes active so that the electric lighting circuit remains closed while the short rear segment 49 and long front segment 48 are passing successively in contact with the brush 50 and thereby extend the period in which the lamps remain lit from say ten hours to fourteen hours beginning at 5 o'clock of the evening of one day and terminating at 7 o'clock in the morning of the following day.

It follows from this construction that so long as the brushes 50 and 59 or the brushes 50, 59 and 60 are in circuit with the electric source, such as the storage battery 24 or the like and the switch shaft 42 is turned one complete revolution every day that any lamps which are in this electrical circuit will be illuminated and extinguished in accordance with the length of engagement of the long metal segment 48 with the brush 50, or the engagement of both the long segment 48 and the short segment 49 succes-

sively with this brush 50, as previously described.

Combined with this timing switch is an electric setting switch mechanism whereby the current from the electric source 24 may be either connected with the lighting system or cut off therefrom and shunted to an electro-magnetic mechanism which controls the operation of this setting or transfer switch. This setting or transfer switch comprises two fixed main contacts 61, 62 which form part of the main circuit and are mounted by means of insulated connections with suitable parts of the main frame, a movable main switch contact 63 adapted in its forward position to engage the main contacts 61, 62, and two auxiliary contacts 64, 65 mounted by means of insulated connections on the main frame and adapted to be engaged by the main contact 63 after the latter moves rearwardly out of engagement from the main contacts 61, 62. The contact 62 is connected by means of a wire 66, a binding post 67 and wire 68 with the main line 26 of the electric circuit so as to form a part thereof. The companion fixed contact 61 is connected by means of a wire 69 with a coil 70 of an electromagnet mounted on the main frame, the opposite end of this coil being connected by a wire 71, binding post 72 and wire 73 with the ground 74. The auxiliary contact 64 is connected by wire 75 with the brush 59. The other auxiliary contact 65 is connected through a binding post 76 and wire 77 with the main line 26 so as to form a shunt around the manually operated starting switch 29.

The movable main contact 63 is mounted by means of an insulated connection on the side of an upright rock arm 78 which is pivoted at its lower end by means of a pin 79 on the main frame and yieldingly moved rearwardly away from the electromagnet by means of a spring 80. When this arm 78 is free the spring 80 moves the latter rearwardly and shifts the movable main contact 63 out of engagement from the fixed main contacts 61 and 62 into engagement with the upper auxiliary electric contacts 64 and the auxiliary contact 65. The rock arm 78 is held in its forward position in which the movable contact 63 is disengaged from the upper and lower auxiliary contacts 64, 65 and engaged with the two main contacts 61, 62 by a vertically swinging latch 81 which is provided with a beveled face 124 and which passes through the opening 82 in the upper part of the rock arm 78 and is adapted to engage with the rear side of this arm, as shown in Figures 1, 5 and 6. This latch is formed on the rear end of a vertically swinging rock arm 83 which is pivoted at 84 on the main frame and yieldingly held in its elevated position by means of a spring 85 and adapted to be depressed

by energizing the coil 70 so that the upper end of the core of this coil will attract an armature 86 which is connected with the arm 83. When a depression of the armature 86 and rock arm 83 occurs the latch 81 is carried downwardly so as to disengage the shoulder of the latch from the rear side of the rock arm 78 and thereby permit the spring 80 to shift the vertical rock arm 78 so as to disengage the movable contact 63 from the fixed contact 61 and 62 into engagement with the auxiliary fixed contacts 64, 65. As the contact 63 moves rearwardly and is disengaged from the contacts 61, 62 the circuit through the electro-magnetic coil 70 is broken so far as its relation to the main circuit is concerned, but at the end of the rearward movement of the contact 63 it engages both the upper and lower auxiliary contacts 64 and 65 so that now the main circuit is connected by means of the shunt line 77 with the line 75 so that current is conducted to the central or intermediate brush 59 and the lighting system is in condition for use and will operate to light and extinguish the lamps of the car at the intervals previously determined upon.

For the purpose of throwing the winter brush 60 into and out of circuit a switch is provided which may be variously constructed but which, for illustrative purposes, as shown in Figure 1, may consist of a fixed contact 87 connected by a wire 88 with the winter brush 60 and a movable contact 89 connected with the wire 75 and adapted to be moved into and out of engagement with the fixed contact 87 by means of a shifting rod 90 extending downwardly through a slot 91 in the front section of the enclosing casing and provided at its lower end with a knob or handle 92 and providing this handle with two notches 93, 94, either of which may be engaged with an edge 95 of the adjacent part of the casing for holding the movable switch contact 89 in one position or the other. In order to enable the operator to observe from the front of the clock mechanism whether the switch mechanism has been set for effecting the long night lighting period during winter time or the short night lighting period during the summer time, an indicator 96 is mounted on the shifting rod 90, which indicator projects forwardly through a slot 97 in the dial of the clock so as to stand either in front of the initial "W" or the initial "S" which represents "winter" and "summer" respectively.

Forward movement of the rock arm 78 for again unsetting the lighting system and rendering the same inoperative may be effected manually in various ways, for instance, by means of an elbow lever 98 pivotally mounted on the main frame of the apparatus and having its upper arm con-

needed by means of a shifting rod 99 with the upper end of the upright arm 78, an upright hand rod 100 connected with the other arm of the elbow lever and projecting downwardly through a slot 101 in the bottom in the front section of the casing and provided at its lower end with a handle or knob 102 for manipulating the same.

For convenience in winding the clock, an upright winding shaft 103 is provided the upper end of which is connected by suitable gearing 104 with the clock mechanism while its lower part projects downwardly through the slot 101 and is provided with a thumb piece 105 for winding the clock. When the lighting circuit is in operation the current flows from the contact 50 through a wire 106 to one side of the pilot light 31 thence from the other side of this pilot light through a wire 107 to the bulb of the head light lamps 32, 33 and thence to the grounds 36, 37. It is desirable for the operator to be able to determine whether the lighting system has been set into operation, or unset so that it will no longer function. For this purpose an electromagnetic indicating mechanism is provided which comprises two electromagnetic coils 108 which are arranged in a line 109 extending from the wire 103 to the tail light 34, armatures 110 adapted to be attracted by the poles of the coils 108 and mounted on a vertically swinging rock lever 111, a spring 112 operating to hold the armatures 110, 110 yieldingly in an elevated position, and a pointer 113 mounted on the lever 111 and adapted to stand either opposite the word "on" at the top of the slot 114 in the dial or opposite the word "off" on the lower end of this slot so as to indicate whether the current is flowing through the lighting circuit or has been cut off, this being due to the fact that the coils 108 receive current or are cut off therefrom simultaneously with the lamps of the lighting system.

The numeral 115 represents a stationary contact mounted on the rear wall 13 of the housing but insulated therefrom and connected with the respective wire leading to one of the elements outside of the housing. This fixed contact 115 is engaged by a movable contact 116 which is yieldingly mounted on the rear cross bar 21 of the switch frame, this being preferably accomplished by constructing this contact in the form of a cup which embraces the head 117 of a supporting pin 118 mounted on the cross piece 21 but insulated therefrom and electrically connected with the respective element of the switch frame, the said contact being yieldingly held in a projected position by means of a spring 119 interposed between the interior of the same and head 117 of the guide pin, and the extent of projecting movement of this contact being limited

by means of a stop flange 120 formed on the inner end of this contact 116 and engaging with the underside of the head 117, as shown in Figure 1. In order to interlock the switch frame and the housing, the inner side of the rear housing head 13 is provided with one or more forks 121 and the rear crosspiece 21 of the switch frame is provided with a corresponding number of coupling pins each of which has a reduced neck 122 having an enlarged head 123.

When the automobile is stowed away, for instance when putting the same up for the night or when parking the same at a place for an extended time where there are no lighting restrictions, the time switch mechanism is unset or rendered inoperative although the clock mechanism may continue to run as usual. Assuming, therefore, that the clock has been properly wound by turning the thumb piece 105 and that the transfer rock arm 78 is held in its forward position by means of the latch 81 by reason of the operator having previously pulled down the handle 102 and that the device is used during the summer time when the nights are short and the movable contact 89, therefore, out of engagement with the fixed contact 87 of the season switch, the operation of this apparatus would be as follows:—

After the operator enters his car and wishes to start the engine he depresses the switch 29 in the usual manner with his foot, thereby closing the electric circuit from the battery 24 to the starting motor 27 during which time the current flows along the main wire 26 through the switch 29 and to the starting motor 27, thereby causing the gas engine to receive its initial starting impulses in the usual and well known manner and thereafter continues to run on its own resources independently of the starting motor 27. After the pressure on the starting switch 29 has been released, this switch is again opened automatically by the spring 30.

At the same time that the starting motor is operated by the closing of the switch 29 the current is also directed from the battery 24 through the setting mechanism for the purpose of automatically putting in operation the means which will produce an automatic lighting of the lamps and extinguishing of the same at the predetermined length of time. The current for thus setting the apparatus for automatic lighting at this time passes from the one side of the battery through the main wire 26, main switch 29, wire 68, binding post 67, wire 66, fixed contact 62, movable contact 63, fixed contact 61, wire 69, coil 70, wire 71, binding post 72, wire 73 to ground 74. The instant this occurs the coil 70 becomes energized and attracts the armature 86, 130

thereby disengaging the latch or catch 81 from the setting arm 78 so that the latter is released and its spring 80 is permitted to move the same rearwardly, thereby disengaging the movable contact 63 from the fixed contacts 61, 62 and engaging the same with the auxiliary contacts 64, 65. The circuit through the coil 70 now being broken by reason of the disconnection between the contacts 61, 62 and this coil deenergized and since it releases the armature 86 and permits the latter to be raised into its upper position together with the latch 81 no further function is performed by this coil at this time. Assuming now that the operator has released the pressure against the main switch 29 and that this switch is open and the starting motor is stopped, a new path for the flow of the current is still maintained from the battery along a part of the main line 26 and thence through the shunt wire 77, around the main switch 29, binding post 76, fixed contact 65, movable contact 63, fixed contact 64, wire 75, summer brush 59, intermediate ring 57, long metal segment 48, return brush 50, wire 106, dash light 31, wire 107 and head lights 32 and 33 to the ground.

A part of the current also flows from the return brush 50 through the electromagnet coils 108, wire 109 and tail light 34 to the ground. It, therefore, follows from this arrangement of the electric circuits that a turning of the main switch shaft 42 once in twenty-four hours of the day will cause all the lights above mentioned to be illuminated whenever the long metal segment 48 is in engagement with the return brush 50, but when the insulated peripheral portion 55 of the rotary body engages with this brush the lamps will be extinguished, this lighting period being of comparatively short duration and it being so timed that it extends, for example, over a period of ten hours beginning at 8 p. m. of one day and ending at 6 a. m. of the following day.

If it should now be winter time and the nights are considerably longer, the operator during this season of the year would pull down the movable season contact 89 into engagement with the fixed season contact 87, thereby placing the winter brush 60 also in the lighting circuit so that the current would flow from the wire 75 not only to the summer brush 59 but also from the wire 75 through the contacts 89, 87, wire 88, winter brush 60, metal ring 58 to the short metal segment 49. Under such an arrangement of the parts the short rear metal segment 49 will add its electrical conducting effect to the long front metal segment 48, whereby the combined duration of contact of the two segments 48, 49 with the return brush 50 will extend the

period of illumination of the lamps from, say ten to fourteen hours beginning, for example at 5 o'clock p. m. of one day and ending at 7 o'clock a. m. of the following day which is the usual dark period of the day during the winter season. When the summer period again arrives the operator can again shorten the lighting period to suit the long day light by again moving up the contact 89 out of engagement from the fixed contact 87 and thereby throwing the winter brush and its companion metal ring 58 and metal segment 48 out of commission.

I claim as my invention:—

A time switch mechanism comprising a rotary supporting body of insulating material, two metal segments arranged circumferentially end to end on said body, a main brush adapted to be engaged successively by said segments, two continuous metal rings mounted circumferentially on said body and connected electrically respectively with said segments, two auxiliary brushes engaging respectively with said rings, and a switch for placing one or both of said auxiliary brushes in circuit.

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