J. C. VAN SLYKE.

SELF WINDING TIME SWITCH CLOCK.

APPLICATION FILED MAR. 7, 1921.

1,413,075. **Patented Apr. 18, 1922.**

3 SHEETS—SHEET 1.

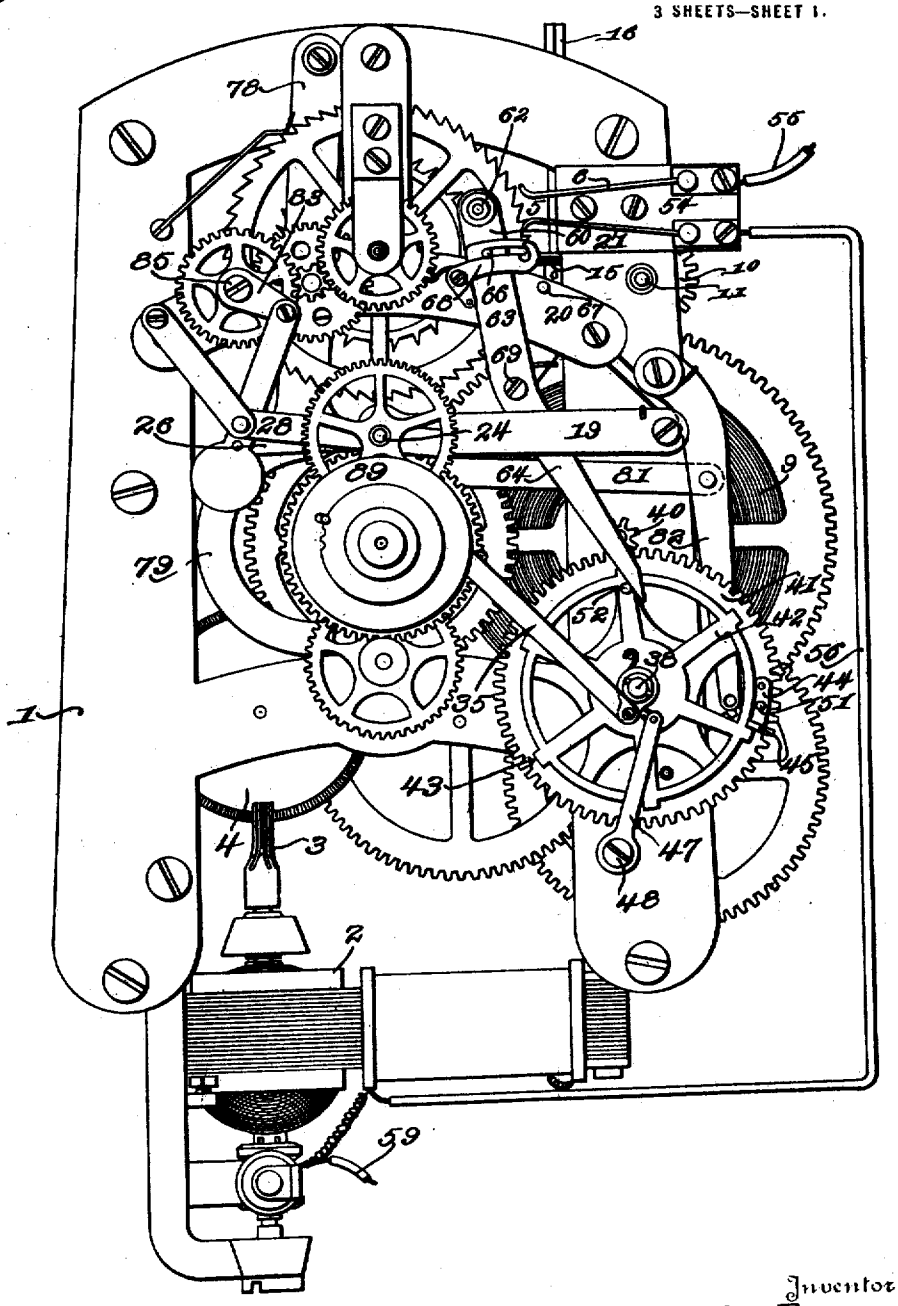


Fig. 1.

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Witnesses

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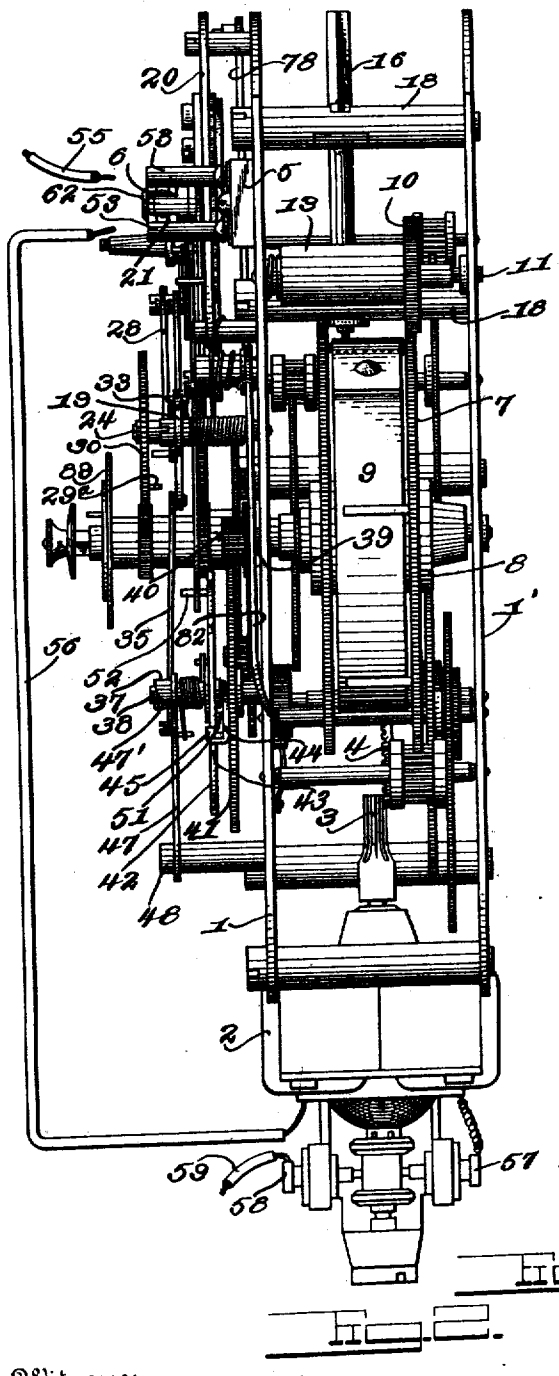
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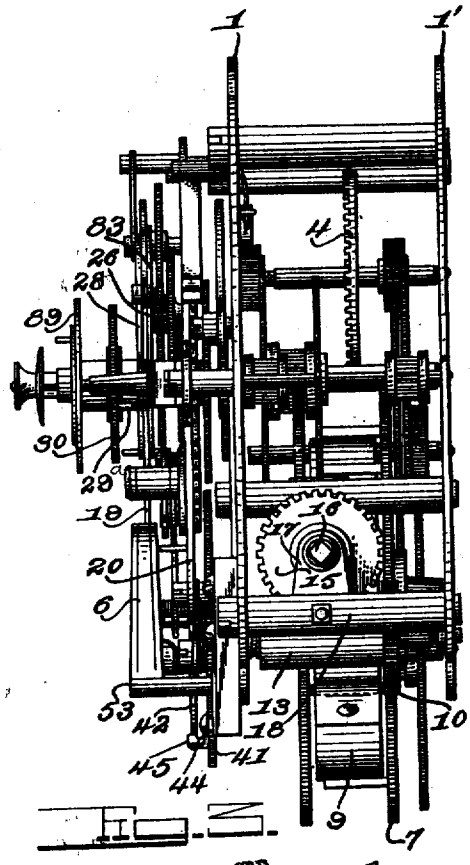
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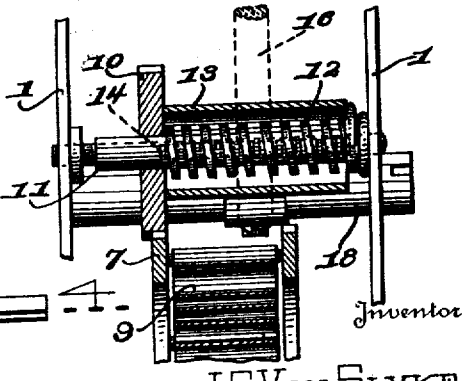
1,413,075.

Patented Apr. 18, 1922.

3 SHEETS—SHEET 2.







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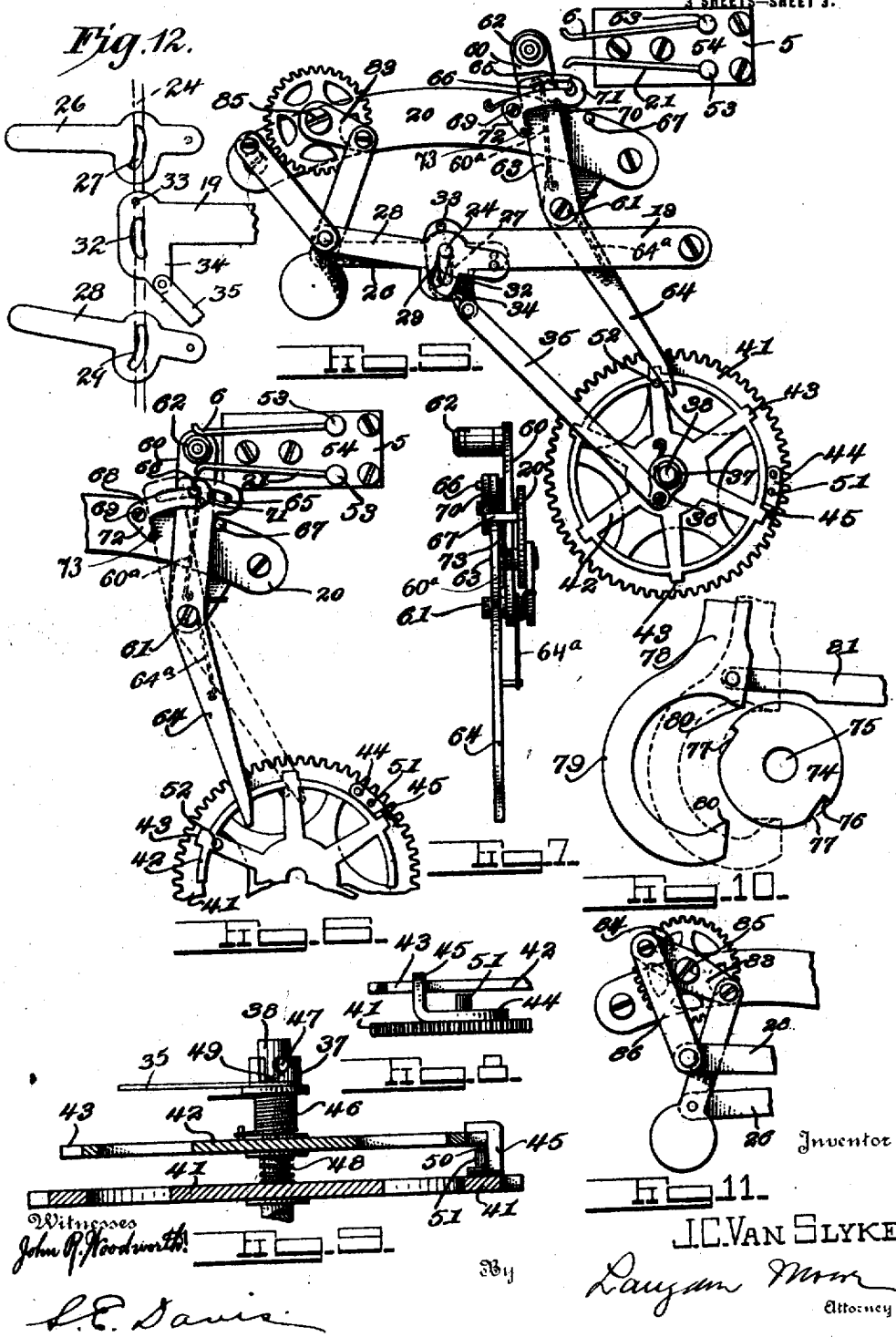
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3 SHEETS—SHEET 3.

Fig. 12.



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SELF-WINDING TIME-SWITCH CLOCK.

1,413,075. Specification of Letters Patent. Patented Apr. 18, 1922.

Application filed March 7, 1921. Serial No. 450,471.

To all whom it may concern.

Be it known that I, JOHN C. VAN SLYKE, a citizen of the United States of America, residing at Washington, in the District of Columbia, have invented a Self-Winding Time-Switch Clock, of which the following is a specification.

This invention relates to improvements in clocks and more particularly to a self-winding time-switch clock.

It is the object of this invention to provide a clock with mechanism that will switch on and off at predetermined times the lamps of an electric lighting system and that will at the same time utilize the current of the electric lighting system to intermittently wind the clock. It is the object of this invention to so construct the mechanisms that the time train of the clock, operated by the main spring, will at predetermined times make an electric contact between the electric lighting system and the clock motor, the clock motor when so energized will operate the switch controlling the lamps, during the operation of the switch, wind the clock main spring, and at the end of the switch operation, break the contact between the motor and the lighting system. It is a still further object of this invention to so construct the mechanism that upon failure of the electric current of the lighting system the clock will continue its operation and function or service and immediately upon the return of the current will wind the clock main spring to compensate for the number of windings lost during the failure of the current at the predetermined times the contact was made between the motor and the dead lighting system. It is also an object of this invention to provide means for setting the minute hand of the clock manually operable from the exterior of the clock case or at a distance therefrom.

The advantages of a clock provided with mechanisms for automatically opening and closing the circuit of an electric lighting system at predetermined times and particularly closing the circuit at sun-set of each day irrespective of the season of the year have been set forth in the Patent 1,080,603 of December 9th, 1913. This invention is an improvement over said patent and possesses the following additional advantages. When once set to close the circuit of the lighting system at sun set and open the circuit at some predetermined time thereafter the clock will run indefinitely as long as the clock remains in circuit with the lighting system and the current of the system does not fail for more than four days at any one time. The hand set being manually operable from the exterior of the clock case does not require the opening of the case for the accurate setting of the clock upon any hour. When the clock is first set the main spring is placed under sufficient tension to operate the clock for four days without rewinding, however, under normal conditions the motor winds the spring a certain amount twice in each twenty-four hours so that the main spring under normal conditions will never run down and may be said to be under substantially equal and continuous tension. The only work of the main spring in addition to operating the time train is the releasing twice in twenty-four hours of the spring contact maker between the motor and the current of the lighting system. It is therefore seen that besides the advantages of the lamp control features a reliable, accurate and self-winding clock is hereby provided.

While the preferred form of this invention is illustrated upon the accompanying sheets of drawing yet it is to be understood that minor detail changes may be made without departing from the scope thereof.

Figure 1 is a view in front elevation of a clock, circuit closing and switch operating mechanism constructed in accordance with this invention, removed from the clock case, and omitting the verge and hands of the clock mechanism.

Figure 2 is a view in end elevation of the same.

Figure 3 is a top plan view of the same.

Figure 4 is an enlarged detail vertical sectional view illustrating the lamp switch operating mechanism.

Figure 5 is a view in front elevation of the details of the make and break switch actuating and controlling mechanism, illustrating the parts in position when the switch is open.

Figure 6 is a similar view illustrating in full lines the position of the parts when the switch is closed and in dotted lines the position of the actuating blade during the opening movement before the switch is opened.

Figure 7 is a view in side elevation of the parts illustrated on Figure 6 omitting the switch.

Figure 8 is an enlarged detail view in side elevation of the control disc stop.

Figure 9 is an enlarged fragmentary view illustrating the stud and stop of the control disc in side elevation.

Figure 10 is a detail taken in front elevation of the hand setting device.

Figure 11 is a detail view in front elevation of a modification to the time controlled mechanism.

Figure 12 is an expanded view showing certain parts illustrated on Figure 5.

In carrying out this invention a clock mechanism of usual construction, preferably of the type that would conform to a thirty-day key winding movement, is employed. The clock mechanism is supported between the usual front and back frame plates 1 and 1 and contains all the usual parts of a clock, with the exception that the key engaging arbor for winding the main spring does not extend through the clock face.

An electric motor 2 is secured to the frame below the clock mechanism with its driving shaft provided with a pinion 3 meshing with a gear 4 forming one of a train to the main spring arbor, so that the operation of the motor will wind the main spring. One pole of the motor is connected to one pole of the electric light circuit and the other pole of the motor is connected to a binding post of one jaw 21 of a switch 5 carried by and insulated from the front plate 1 of the clock frame, the other jaw 6 of which is connected to the other pole of the lighting system. This switch for convenience hereafter will be referred to as the make and break switch.

The gear 7 on the winding wheel 8 of the main spring 9 meshes with a gear 10 carried upon a transverse shaft 11 mounted thereabove in bearings in the clock frame plates which is provided with a worm 12 enclosed in a stationary casing 13 between the gear 10 and the frame plate 1. The sides of the casing facing the interior of the clock mechanism are provided with a longitudinal slot 14 through which the periphery of a horizontal gear 15 enters and meshes with the worm. The horizontal gear 15 is carried upon a vertical shaft 16 mounted in bearings 17 extending from transverse pillars 18 secured between the clock plates, which shaft extends above the clock frame and is provided at its upper end with means for engaging and operating a switch for opening and closing the circuit through the lamps of the system to be controlled by this device. It is therefore seen that when the motor is energized it will wind the main spring of the clock and at the same time operate the switch controlling the desired lamps of the lighting circuit.

The closing of the circuit through the motor by the make and break switch 5 upon the front plate 1 of the clock frame is controlled by a mechanism hereinafter to be described, actuated by a lever 19 operated by a time controlled mechanism fully described in Patent 1,080,608 of December 9th, 1913, and therefore needs only to be briefly referred to here. This time controlled mechanism is carried upon a plate 20 supported upon the front clock plate 1 and comprising a train of gears and connections actuated by a gear upon the hour arbor of the clock mechanism to rotate a gear upon a stud 24 upon the front frame plate above the hour hand arbor carrying a pin at right angles to the surface of the gear adapted at predetermined times to engage the adjacent end of a link 26 of time controlled mechanism which is provided with a curved slot 27 through which the stud 24 passes and lifts that end of the link to engage the actuating lever 19 of the make and break switch control.

As the time controlled mechanism is constructed as described in said Patent 1,080,608 to cause the pin to engage the link at sun set each day irrespective of the season of the year it will in this device operate the make and break switch, as will be hereinafter described, at sun set of each day to close the circuit through the lamps of the system controlled by this device.

The construction of the time controlled mechanism to operate the make and break switch 5 controlling mechanism to open the circuit through the lamps of the lighting system at a later predetermined time is slightly changed in this device but operates in the same manner as in said Patent 1,080,608. In this instance, a second pivoted link 28 having at one end a curved slot 29 through which the stud 24 passes is provided. The end of this link adjacent the stud is engaged and lifted by a pin 29^a depending from a gear 30 mounted thereover on the stud 24. Gear 30 is operated by a gear meshing therewith, which may be set upon the hour hand arbor to bring the pin 29^a in engagement with the link 28 at any predetermined time as described in said Patent 1,080,608.

The make and break switch controlling mechanism comprises a substantially horizontal lever 19 pivoted at one end to the front frame plate of the clock with the other end enlarged and provided with a curved slot 32 through which stud 24 passes. This end of the lever is mounted upon the stud 24 between the two time controlled links 26 and 28 and is provided with a pin 33 extending on both sides through the portion above the curved slot which pin is engaged by the enlarged portions of the time controlled links when lifted by the time controlled mechanism to lift this end of the horizontal lever 19. The horizontal lever adjacent its enlarged end is provided with a projection 34 depending in the plane of the lever to which is pivoted one end of a connecting link 35 pivoted at its other end to a projec-

tion 36 from a sleeve 37 mounted upon a stud 38 extending from the front frame plate 1. The arbor 39 of the main spring winding wheel 8 is extended through the front plate 1 and is provided with a pinion 40 on the exterior thereof meshing with a gear 41 mounted to turn freely upon the stud 38. A make and break switch controlling disc 42 is loosely mounted upon the stud 38 above the gear 41, having a bushing extending thereabove and supporting the under side of the sleeve 37, which disc is provided with a plurality of spaced apart teeth 43 upon its periphery, preferably six in number. A stop in the form of a plate 44 having a radial extension 45 at right angles to the gear surface is secured to the gear 41 in the path of the teeth 43. A spring 46 secured at one end to the disc 42 is wound about the bushing between the disc and the sleeve and is secured at its upper end to an arm 47 extending over the disc from a stud 48 upon the front frame plate 1. This spring 46 imparts a counterclock-wise movement to the disc which is normally prevented by the engagement of a tooth thereof with the stop 45. The sleeve 37 is secured upon the stud 38 by a transverse pin 47′ passing through the end of the stud against which the upper end of the sleeve 37 is held by a coil spring 48 surrounding the stud between the disc 42 and gear 41. The upper end of the sleeve 37 is provided with oppositely disposed inclined cam surfaces 49, the lower portions of which are normally engaged by the pin 47′. Upon a rotation or turning of the sleeve by the link 35 the inclined cam surfaces riding over the transverse pin will depress the sleeve 37 and also the disc 42. The stop 45 engaging a tooth 43 of the disc 42 is provided below such engagement with a notch 50 of such size as to allow the tooth to pass therethrough when the disc is depressed and the plate 44 is provided with a stud 51 to engage the tooth and hold it after it has passed through the notch until the sleeve has returned to normal and the spring under the disc freed the tooth from the pin. The upper surface of the disc 41 is provided with a pin 52 adapted to engage and trip the tail of a contact actuating lever for the make and break switch.

The actuating lever is normally held by its spring 64ª in position to close the circuit of the make and break switch but as its tail is normally engaged by the disc pin 52 in the open position with the contact broken and the spring 46 of the disc holds a tooth 43 against the stop 45 on the gear 41 meshing with the pinion 40 on the main spring winding wheel arbor 39, all of the parts will remain stationary. When the time controlled mechanism lifts the horizontal lever and connecting link to turn the sleeve and depress the disc, the tooth engaging the stop passes through the notch allowing the pin of the disc to turn counterclock-wise until the next tooth engages the stop as the links 26 and 28 of the time controlled mechanism return to normal position after having been lifted whereby the sleeve is turned back to normal allowing the disc to ascend to its normal plane as soon as the tooth engaging the stop has passed therethrough. This counterclock-wise movement of the pin allows the spring-pressed contact lever to close the circuit through the make and break switch.

The motor 2 is thereby energized and by the train of gears connecting its driving shaft to the main spring wheel 8 will turn said wheel. The pinion 40 on the wheel arbor will turn the gear 41 on the stud in a clock-wise direction. The disc 42 will be likewise turned in a clock-wise direction as one of its teeth is engaged by the stop on the gear. This movement of the disc will cause the pin 52 thereon to approach the tail of the contact actuating lever and will continue to turn in that direction until the pin overcomes the spring of the actuating lever and breaks the contact through the make and break switch. The current being cut off the movements of the parts actuated by the operation of the motor ceases.

During the movement of the motor the main spring 9 is being wound as one end is secured to the main spring winding wheel 8, and the movement of the main spring wheel 8 is transmitted from the gear 7 through the gear 10 and worm 12 to the lamp switch operating shaft 16.

The make and break switch 5 comprises two converging slitted resilient jaws 21 and 6 each carried upon a stud 53 extending at right angles from a base 54 of insulating material secured to the front frame plate 1 with each stud provided with a binding post, one of which forms a contact with one pole 55 of the electric lighting circuit and the other with an electric connection 56 to the one pole 57 of the motor 2, the other pole 58 of the motor having a contact with the other pole 59 of the electric lighting circuit.

The contact actuating lever comprises a contact blade 60 pivoted to a stud 61 on the time controlled mechanism plate 20 carrying on its free end and insulated therefrom a cylindrical contact member 62 adapted to enter between the jaws 21 and 6 of the switch and make an electric contact therethrough.

An actuating blade 63 is pivoted at the same stud 61 above the contact carrying blade terminating short of the contact member and extending at an angle therefrom on the further side of the pivot terminating in a tail 64 to be engaged by the controlled disc pin 52. The upper end of the actuating blade 63 is enlarged transversely and is

provided with a transverse slot 65 through which passes a pin 66 carried upon the contact blade 60. A spring 60ª normally exerts a tension on the contact blade 60 to move it away from the jaws of the switch and a spring 64ª exerts a tension upon the actuating blade 63 to move the upper end of that lever in the direction of the switch. A stud 67 is provided upon the plate 20 to limit the movement of both blades in the direction of the switch and form a stop when the contact member is in proper contact.

A bell crank lever 68 is pivotally mounted upon a stud 69 on the plate 20 on the side of the blades furthest from the switch, one end 70 of which is provided with a hook 71 adapted to engage the contact blade pin 66 when the contact member engages the jaws of the switch and holds it in that position against the tension of the contact blade spring as the actuating lever moves away from the switch. The other end 72 of the bell crank lever is provided with a pin 73 depending therefrom and arranged in the path of the actuating blade as it moves away from the switch, so that when the actuating blade is moved against the pin it will turn the bell crank lever upon its pivot to release the hook form engagement with the pin and release the contact blade so that its spring will snap it out of contact. A spring about the bell crank lever pivot stud normally exerts a pressure upon the hook arm in the direction of the contact blade pin.

The manually operable hand set is illustrated on Figure 10, in which a disc 74 secured to the minute hand arbor 75 is provided with oppositely disposed notches each having one radial wall 76 and the other walls 77 upon the same side converging and curved into the periphery of the disc. An operating lever 78 is pivoted at its upper end to the front frame plate 1 and is provided at its free end with a curved extension 79 terminating in two contact points 80 adapted to engage in the notches of the disc. The operating lever 78 is connected by a link 81 to an intermediate portion upon a pivoted actuating lever 82 carried upon the front frame plate 1, to the free end of which may be connected a cord leading to the exterior of the clock case. A spring is provided normally maintaining the contact points 80 at a distance from the periphery of the disc, however, and upon a pull on the actuating cord the contact points will be brought into engagement with the periphery of the disc or one point will be brought into contact with one of the curved walls 77 of one notch, depending upon the position of the minute hand and disc.

The notched disc is so secured to the minute hand arbor and the operating lever is so pivoted that when the minute hand registers with the hour mark on the clock dial both contact points will engage the radial walls 76 of both notches if then moved in the direction of the disc. The converging walls 77 are so curved into the periphery of the disc as to allow an engagement of a contact point upon actuation of the operating lever therewith which will turn the disc until the radial wall 76 is reached for only a predetermined number of minutes before or after the hour to cause the minute hand to register with the hour mark upon the clock face and at other times engage the periphery of the disc without effecting the disc or minute hand. The clock may be set accurately at any time during the predetermined space of operation of the set when the minute hand is adjacent the hour mark on the dial. As the space of operation of the hand set is a predetermined number of minute spaces, for instance, three, on each side of the hour mark and it is found that the clock is running within three minutes fast or slow, as soon as the minute hand has entered the space of operation of the hand set the hand may be advanced or retired the required number of spaces by pulling slowly upon the actuating cord without waiting for the exact hour to arrive.

The time controlled mechanism for operating the lamp switch to close the circuit of the controlled lamps at sun set each day, irrespective of the season, and at a later predetermined time to open the circuit is fully described in Patent 1,080,608 of December 9th, 1913, and its application to this device has been described above. If it is desired to open the circuit through the controlled lamps at sun rise each day irrespective of the season of the year the sun set controlling arm 83 of the time controlled mechanism is provided with a similar extension 84 upon the further side of its stud 85 and the link 86 of mechanism for opening the switch is pivoted thereto, as shown in Figure 11. This will cause a constant change of the position of engagement of the link 28 with the pin upon the operating gear therefor so that when the disc 89 of this gear is set for opening the circuit at the hour of sun rise the change of movement of this link will correspond with the change of movement of the sun set operating link 26.

Upon installing this device the main spring is placed under proper tension, the hands of the clock set to indicate the correct time, the time controlled mechanism set in accordance with the day and month to close the lamp switch at sun set, the lamp switch opening mechanism set at the predetermined time, the lamp switch placed in circuit with the lamps to be controlled thereby and the make and break switch and motor connected to opposite poles of the electric lighting system outside of the circuit of the controlled lamps. The device will

operate indefinitely to close the circuit through the controlled lamp at sun set of each day, irrespective of the season of the year, open the circuit through the controlled lamps at the predetermined time thereafter, and at each operation of the lamp switch automatically rewind the main spring of the clock. The relations between the pinion 40 upon the winding wheel arbor and gear 41 carrying the make and break switch controlling disc 42 and the train of gears from the main spring winding wheel 8 to the lamp switch operating shaft 16 are such that as soon as the lamp switch operating shaft has revolved a sufficient distance to open or close the switch the make and break switch controlling disc will have opened said latter switch, thereby cutting off the motor which immediately discontinues the rotation of the lamp switch shaft and rotation of the main spring winding wheel.

A failure of the electric lighting system current at any time between the automatic operations of the lamp controlling switch in no way effects the operation of this device as long as the current is resumed before the next normal predetermined time of operation. Should the current fail and remain dead during the periods of the normal operation of the lamp controlling switch by the time controlled mechanism, the first period of operation after the failure of the current will through the lever, link, and sleeve release the controlling disc from its stop and close the circuit through the make and break switch. If the lamp controlling switch is closed when the current fails and the current remains dead until after the predetermined time for opening the lamp switch has passed but returns before the next period of operation of the lamp switch, the motor will be energized immediately and as the make and break switch is closed it will operate to wind the main spring and open the lamp controlled switch, thereby compensating for the operation and function of this device during the failure of the current. Should the current remain dead for more than one normal operation of the lamp controlling switch, as the first period of normal operation passes the make and break switch will be closed, as above described, and upon each succeeding periods of operation during the failure of the current the operation of the time controlled mechanism at its regular period will depress the controlling disc and allow it to move counterclock-wise one step at each period, so that when the current returns the motor will be energized and will continue to operate until the pin on the controlling disc engages the tail of the contact actuating lever and breaks the circuit through the make and break switch. The motor will therefore operate during the time necessary to return the pin upon the controlling disc to its normal position and in so doing will wind the main spring of the clock and operate the lamp controlling switch to compensate for the movements lost during the failure of the current.

As the time controlled mechanism operates twice in twenty-four hours to close the make and break switch the number of days through which the current may remain dead and be compensated for upon its return depends upon the number of teeth on the make and break switch controlling disc, and the relation between the pinion upon the winding wheel arbor and the gear below the controlling disc. In the present instance, the device as illustrated will allow the current to remain dead for four days and immediately upon its return compensate for the functions and operations lost during that time.

It is to be understood that the winding of the main spring during the operation of the lamp switch compensates for the unwinding of the spring in operating the clock mechanism between the periods of automatic winding and in the construction illustrated take about one minute's time.

While the exact construction of the time controlled mechanism for actuating the make and break switch controlling mechanism as employed in this device does not form a part of this invention yet its application to this mechanism and with the mechanism for winding the main spring of the clock while at the same time operating the lamp controlling switch together with the means for controlling such operations as hereinabove described is a new departure in this art. As never before has a device been disclosed that will perform the services and functions of the constructions hereinabove described, this invention and the patent issuing thereon is deemed basic, it being the first of its kind in the art to which it relates.

What I claim is:—

1. A self-winding time-switch clock comprising a clock mechanism having a main spring and a time controlled mechanism, in combination with a lamp switch operating mechanism, an electric motor, and means actuated by the time controlled mechanism for intermittently operating the motor to simultaneously operate the lamp switch and wind the clock spring at every operation of the switch.

2. A self-winding time-switch clock comprising a clock mechanism having a main spring and a time controlled mechanism, in combination with a switch operating mechanism for controlling the lamps of an electric lighting system, an electric motor, means actuated by the operation of the time controlled mechanism to connect the motor in circuit with the lighting system, and means actuated by the operation of the motor to si-

multaneously operate the lamp switch and wind the clock spring at every operation of the switch.

3. A self-winding time-switch clock comprising a clock mechanism having a main spring and a time controlled mechanism, in combination with a switch operating mechanism for controlling lamps, of an electric lighting system, and an electric motor, means actuated by the operation of the time controlled mechanism to connect the motor in circuit with the lighting system to simultaneously wind the clock spring and operate the lamp switch, and means actuated by the operation of the motor to disconnect the motor after the operation of the lamp switch.

4. A self-winding time-switch clock comprising a clock mechanism having a main spring and a time controlled mechanism, in combination with a switch operating mechanism for controlling lamps for an electric lighting system, an electric motor, means actuated by the operation of the time controlled mechanism to connect the motor in circuit with the lighting system to simultaneously wind the clock spring and operate the lamp switch at successive predetermined times, and means actuated by the motor to disconnect the motor after the operation of the lamp switch.

5. A self-winding time-switch clock comprising a clock mechanism having a main spring, in combination with an electric motor, an electric circuit, a main spring winding wheel, a gear upon the main spring winding wheel, an electric switch operating mechanism including a gear meshing with the winding wheel gear, said winding wheel gear having a connection to the motor driving shaft, and means actuated by the clock mechanism to intermittently connect the motor in circuit to simultaneously wind the main spring and operate the switch.

6. A self-winding time-switch clock comprising a clock mechanism having a main spring, in combination with an electric motor, an electric circuit, a main spring winding wheel, a gear upon the main spring winding wheel, an electric switch operating mechanism including a gear meshing with the winding wheel gear, said winding wheel gear having a connection to the motor driving shaft, and means actuated by the clock mechanism to intermittently connect the motor in circuit to simultaneously wind the main spring and operate the switch, and means actuated by the winding of the main spring to disconnect the motor.

7. A self-winding time-switch clock comprising a clock mechanism having a main spring, in combination with an electric motor, an electric circuit, a main spring winding wheel, a gear upon the main spring winding wheel, a worm shaft, a gear thereon meshing with the winding wheel gear, a switch operating shaft, a gear thereon meshing with said worm shaft, said winding wheel gear having a connection to the motor driving shaft, and means actuated by the clock mechanism to intermittently connect the motor in circuit to simultaneously wind the main spring and operate the switch shaft.

8. A self-winding time-switch clock comprising a clock mechanism having a main spring, in combination with an electric motor, an electric circuit, a main spring winding wheel, a gear upon the main spring winding wheel, a worm shaft, a gear thereon meshing with the winding wheel gear, a switch operating shaft, a gear thereon meshing with said worm shaft, said winding wheel gear having a connection to the motor driving shaft, means actuated by the clock mechanism to intermittently connect the motor in circuit to simultaneously wind the main spring and operate the switch shaft, and means actuated by the winding of the main spring to disconnect the motor.

9. A self-winding time-switch clock comprising a clock mechanism having a main spring, in combination with an electric motor, an electric circuit, a main spring winding wheel, a gear upon the main spring winding wheel, an electric switch operating mechanism including a gear meshing with the winding wheel gear, said winding wheel gear having a connection to the motor driving shaft, means actuated by the clock mechanism to intermittently connect the motor in circuit to simultaneously wind the main spring and operate the switch, a pinion on the winding wheel arbor, and means operable thereby to disconnect the motor.

10. A self-winding time-switch clock comprising a clock mechanism having a main spring, in combination with an electric motor, an electric circuit, a main spring winding wheel, a gear upon the main spring winding wheel, an electric switch operating mechanism including a gear meshing with the winding wheel gear, said winding wheel gear having a connection to the motor driving shaft, a pinion on the winding wheel arbor, means in connection therewith operable by the clock mechanism to intermittently connect the motor in circuit to turn the winding wheel and simultaneously wind the main spring and operate the switch, and means operable by said winding wheel arbor pinion to disconnect the motor.

11. In a device of the character described, a clock mechanism, a rotary electric motor, a make and break switch in circuit with said motor having a movable contact member, a contact actuating lever, a controlling mechanism for the actuating lever, means operated by the clock mechanism to actuate the controlling mechanism to close the switch.

12. In a device of the character described, a clock mechanism, an electric motor, a make

and break switch in circuit with said motor having a movable contact member, a contact actuating lever, a controlling mechanism for the actuating lever, means operated by the clock mechanism to actuate the controlling mechanism to close the switch, and means operated by the motor to actuate the controlling mechanism to open said switch.

13. In a device of the character described, a clock mechanism, an electric motor, a make and break switch in circuit therewith, and including a movable contact member, a spring-pressed lever normally maintaining the contact member in circuit, a controlling disc having a lever engaging means normally maintaining the lever with the contact member out of circuit, a stop engaging said disc, means actuated by the clock mechanism to release the disc from the stop allowing the contact member to close the circuit and thereby wind the main spring.

14. In a device of the character described, a clock mechanism having a main spring winding wheel, an electric motor, a make and break switch, in circuit therewith, and including a movable contact member, a spring-pressed lever normally maintaining the contact member in circuit, a controlling disc having a lever engaging means normally maintaining the lever with the contact member out of circuit, a stop engaging said disc, a connection between the winding wheel and motor driving shaft, means actuated by the clock mechanism to release the disc from the stop allowing the contact member to close the circuit and thereby wind the main spring, and means actuated by the winding wheel to rotate the controlling disc to open the circuit.

15. In a device of the character described, a clock mechanism having a main spring winding wheel, an electric motor, means operable thereby to wind the main spring, a make and break switch in circuit with the motor, and including a movable contact member therefor, a spring-pressed contact actuating lever normally maintaining the contact in circuit, a rotatable controlling disc, a pin thereon, a tail upon the actuating lever extending in the path of the pin, a stop for the disc normally maintaining the pin in contact with the lever tail to hold the contact member out of circuit, means actuated by the clock mechanism to intermittently release the disc from the stop and the pin from the lever tail to allow the contact member to close the circuit, and means actuated by the winding of the main spring to rotate the disc to bring the pin to engage and move the lever tail to cause the lever to move the contact member to open the circuit.

16. In a device of the character described, a clock mechanism having a main spring winding wheel, an electric motor, means operable thereby to wind the main spring, a make and break switch in circuit with the motor, and including a movable contact member therefor, a spring-pressed contact actuating lever normally maintaining the contact in circuit, a rotatable controlling disc, a pin thereon, a tail upon the actuating lever extending in the path of the pin, a plurality of teeth extending from the periphery of the disc, a stop adapted to be engaged by a tooth of the disc normally maintaining the pin in contact with the lever to hold the contact member out of contact, means actuated by the clock mechanism to intermittently release the engaged tooth from the stop, means to rotate the disc to bring the next tooth in engagement with the stop and release the lever tail to allow the contact member to close the circuit, and means actuated by the winding of the main spring to rotate the stop and disc to bring the pin to engage and move the lever tail to cause the lever to move the contact member to open the circuit.

17. In a device of the character described, a clock mechanism having a main spring winding wheel, an electric motor, means operable thereby to wind the main spring, a make and break switch in circuit with the motor, and including a movable contact member therefor, a spring-pressed contact actuating lever normally maintaining the contact in circuit, a stud, a controlling disc loosely mounted thereon, a gear loosely mounted upon the stud under the disc, a sleeve loosely mounted upon the stud above the disc, said disc movable upon the stud between the gear and sleeve, a spring normally maintaining the disc in contact with the sleeve, a plurality of teeth upon the periphery of the disc, a radial stop plate on the gear extending in the path of the teeth and in the normal position of the disc engaged by a tooth, said stop plate having a notch therein through which the engaging tooth may pass upon the depression of the disc, a spring maintaining a tooth engagement with the stop plate, a pin upon the disc, a tail upon the actuating lever extending in the path of the pin and normally engaged thereby to hold the contact member out of circuit, means actuated by the clock mechanism to intermittently operate the sleeve to depress the disc, release the engaged tooth from the stop and cause the stop to be engaged by the next tooth of the disc, whereby the tail is released and the circuit closed causing the winding of the main spring.

18. In a device of the character described, a clock mechanism having a main spring winding wheel, an electric motor, means operable thereby to wind the main spring, a make and break switch in circuit with the motor, and including a movable contact member therefor, a spring-pressed contact actuating lever normally maintaining the

contact in circuit, a stud, a controlling disc loosely mounted thereon, a gear loosely mounted upon the stud under the disc, a sleeve loosely mounted upon the stud above the disc, said disc movable upon the stud between the gear and sleeve, a spring normally maintaining the disc in contact with the sleeve, a plurality of teeth upon the periphery of the disc, a radial plate on the gear extending in the path of the teeth and in normal position of the disc engaged by a tooth, said stop plate having a notch therein through which the engaged tooth may pass upon the depression of the disc, a spring maintaining a tooth in engagement with the stop plate, a pin upon the disc, a tail upon the actuating lever extending in the path of the pin and normally engaged thereby to hold the contact member out of circuit, means actuated by the clock mechanism to intermittently operate the sleeve to depress the disc, release the engaged tooth from the stop and cause the stop to be engaged by the next tooth of the disc, whereby the tail is released and the circuit closed causing the winding of the main spring, and a pinion upon the winding wheel arbor engaging said gear to rotate the stop thereon and thereby rotate the disc during the winding of the main spring to engage and move the lever tail to open the circuit.

19. In a device of the character described, a clock mechanism having a main spring winding wheel, an electric motor, means operable thereby to wind the main spring, a make and break switch in circuit with the motor, and including a movable contact member, a spring-pressed contact actuating lever normally maintaining the contact in circuit, a stud, a controlling disc loosely mounted thereon, a gear loosely mounted on the stud under the disc, a sleeve loosely mounted on the stud above the disc having upper cam surfaces, a transverse pin passing through the stud above the sleeve engaging the cam surfaces, said disc movable upon the stud between the gear and sleeve, a spring normally maintaining the disc in contact with the sleeve, a plurality of teeth on the periphery of the disc, a radial plate upon the gear extending in the path of the teeth and in the normal position of the disc engaged by a tooth, said stop plate having a notch therein through which the engaged tooth may pass upon the depression of the disc, and a stud adjacent the notch in the path of the tooth passing therethrough, a spring maintaining a tooth in engagement with the stop plate, a pin upon the disc, a tail upon the actuating lever extending in the path of the pin and normally engaged thereby to hold the contact out of circuit, means actuated by the clock mechanism to intermittently oscillate the sleeve to depress the disc to release the engaged tooth from the stop, said stud holding the released tooth during the completion of the oscillation of the sleeve, the stop engaging the next tooth of the disc, whereby the tail of the actuating lever is released and the circuit closed causing the winding of the main spring, and a pinion upon the winding wheel arbor engaging said gear to rotate the stop thereon and thereby rotate the disc during the winding of the main spring to engage and move the lever tail to open the circuit.

20. In a device of the character described, a clock mechanism, an electric motor, a make and break switch in circuit with said motor, and including a movable contact therefor, a spring-pressed blade carrying said contact normally out of circuit, a a spring-pressed actuating blade pivoted therewith under tension in the opposite direction, a lost motion connection between the free ends of the blades, a controlling mechanism for said actuating blade, means actuated by the clock mechanism to intermittently operate the controlling mechanism to allow the actuating blade to close the circuit, and means to releasably hold the contact blade in that position against the tension of its spring.

21. In a device of the character described, a clock mechanism, an electric motor, a make and break switch in circuit with said motor, and including a movable contact, a spring-pressed pivoted blade carrying said contact normally out of circuit, a spring-pressed actuated blade pivoted therewith under tension in the opposite direction, a lost motion connection between the free ends of the blades comprising a pin upon the contact blade passing through a curved slot provided therefor in the actuating blade, a controlling mechanism for said actuating blade, means actuated by the clock mechanism to intermittently operate the controlling mechanism to allow the actuating blade to hold the contact blade in position to close the circuit, means to detachably hold the contact blade in that position comprising a pivoted bell-crank lever having a hook at the end of one arm detachably engaging the contact blade pin, means operated by the motor to actuate the controlling mechanism to move the actuating blade, means actuated by the movement of the actuating blade to release the contact blade and break the circuit comprising a pin upon the other arm of the bell-crank lever engaged by the actuating blade to depress the hook.

22. In a device of the character described, a clock mechanism, an electric motor, a make and break switch in circuit with said motor, and including a movable contact, a spring-pressed blade carrying said contact normally out of circuit, a spring-pressed actuating blade pivoted therewith under

tension in the opposite direction, a lost motion connection between the free ends of the blades, a controlling mechanism for said actuating blade, means actuated by the clock mechanism to intermittently operate the controlling mechanism to allow the actuating blade to hold the contact blade in position to close the circuit, means to releasably hold the contact blade in that position against the tension of its spring, means actuated by the operation of the controlling mechanism to move the actuating blade, and means actuated by the movement of the actuating blade to release the contact blade and break the circuit.

23. In a device of the character described, including a clock mechanism and a time controlled switch operating mechanism with means actuated by the clock mechanism to operate the time controlled mechanism to close the switch at sun set each day irrespective of the season of the year and to open the switch at a later predetermined time, said sun set operating mechanism including a pivoted compensating arm and a switch actuating lever pivoted thereto, in combination with a second compensating arm formed by a similar extension on the opposite side of the first named arm pivot, and a second switch actuating mechanism lever pivoted thereto to open the switch at sunrise each day irrespective of the season of the year.

In testimony whereof I have hereunto signed my name.

JOHN C. VAN SLYKE.