

S. C. STICKLE.

AUTOMATIC LIGHTING OR EXTINGUISHING APPARATUS.

No. 553,198.

Patented Jan. 14, 1896.

Fig. 9.

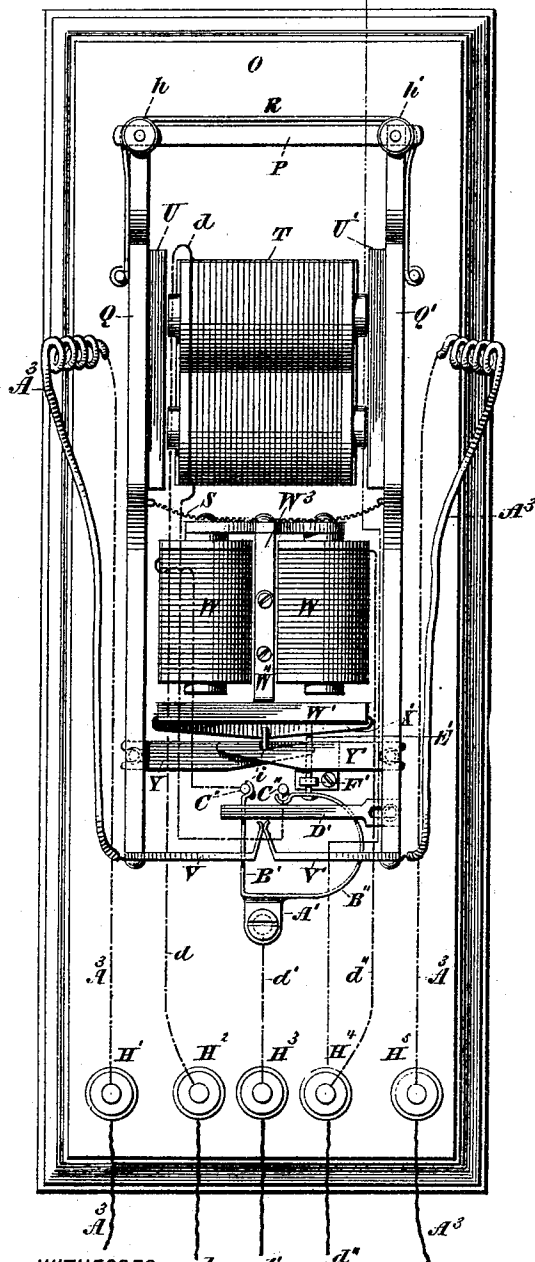
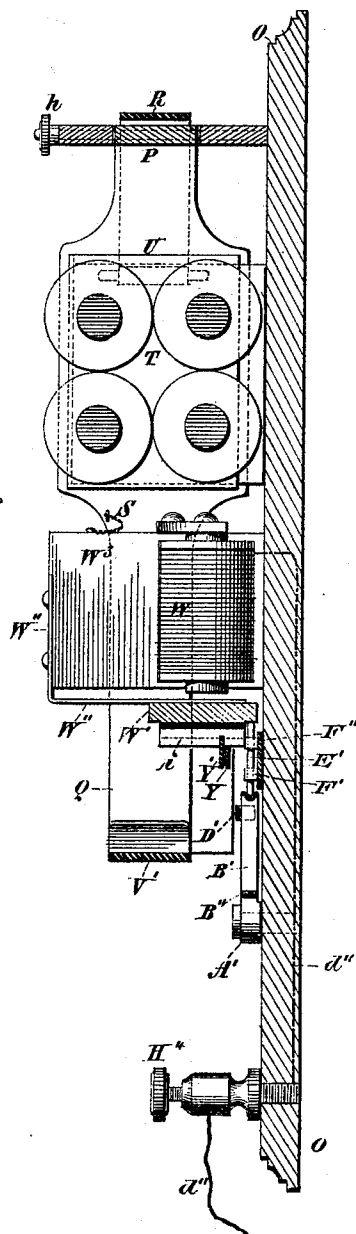


Fig. 10.



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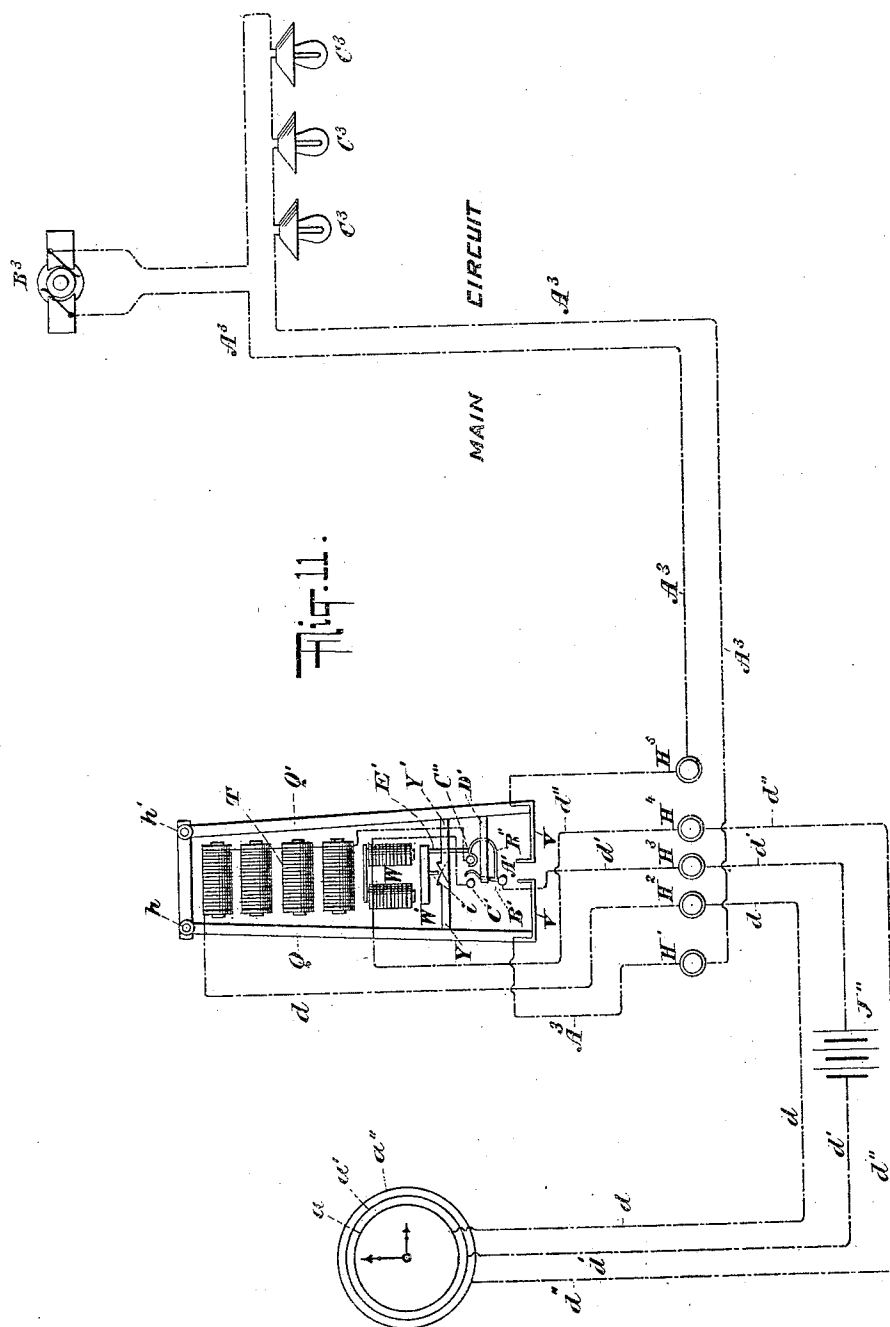
Spruill Harmer & Spruill
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(No Model.)

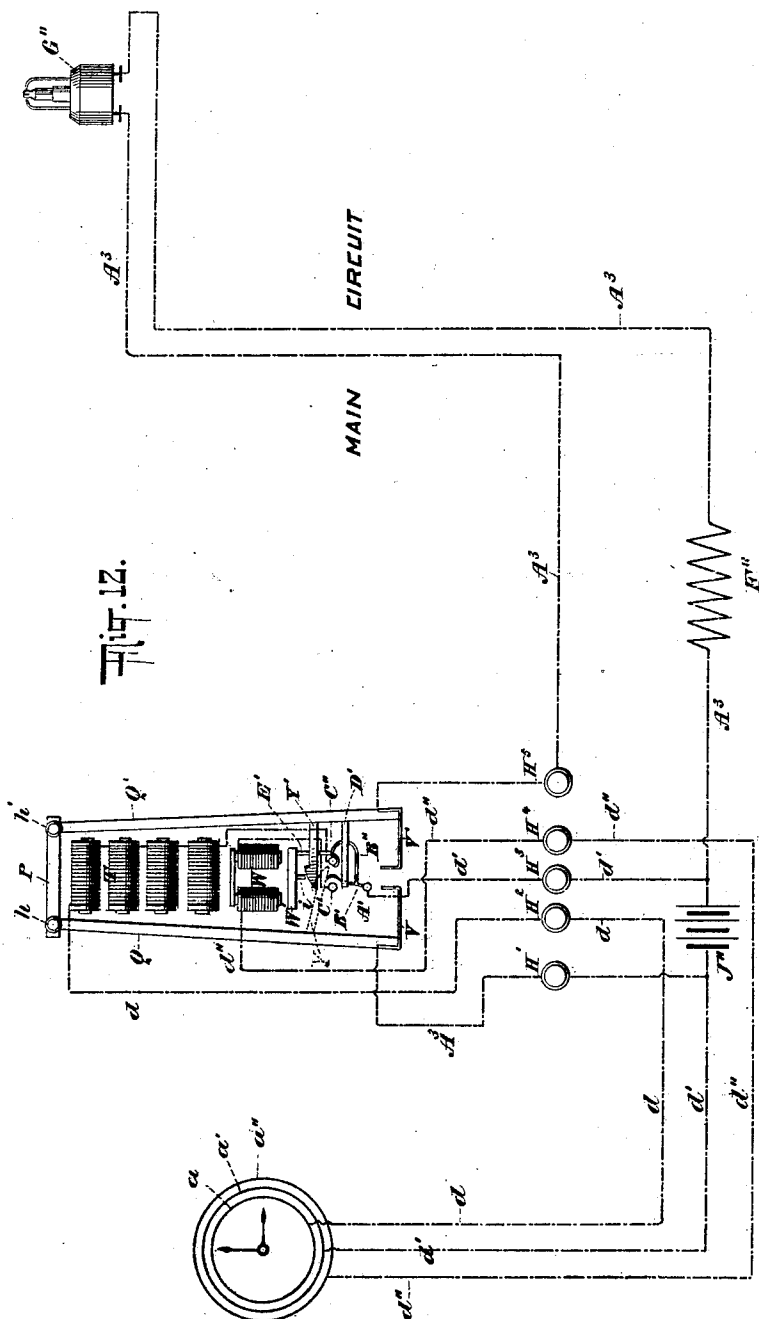
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WITNESSES:
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UNITED STATES PATENT OFFICE.

SAMUEL C. STICKLE, OF NEW YORK, N. Y., ASSIGNOR OF TWO-FIFTHS TO SPROULL, HARMER & SPROULL, OF SAME PLACE.

AUTOMATIC LIGHTING OR EXTINGUISHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 553,198, dated January 14, 1896.

Application filed May 10, 1895. Serial No. 548,812. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL C. STICKLE, a citizen of the United States, residing at the city of New York, in the county and State of New York, have invented certain new and useful Improvements in Automatic Lighting and Extinguishing Apparatus, of which the following is a full, clear, and exact description.

My invention relates to improvements in apparatus for successively operating various forms of devices, or for causing the same to be automatically thrown into operation and permitted to remain operative for a stated time and then be again thrown out of operation.

The object of my invention is to provide a simple apparatus which may be operated in conjunction with an ordinary clock, and whereby lights in a building or elsewhere may be automatically lighted at a predetermined hour of the day or night and permitted to remain lighted for a given period of time, and then, at the expiration of said period, be automatically extinguished. This object I am enabled to obtain by means of my apparatus, the particular nature of which, together with a detailed description of its component parts and the mode of its operation, will be herein-
after more fully set forth.

In the accompanying drawings, forming part of this specification, wherein like letters of reference indicate like parts, Figure 1 is a front view of a clock having the annular conductors and the automatic circuit-closers operated by the clockwork arranged thereon. Fig. 2 is a detail top view of one of the circuit-closers, showing the hour-hand of the clock as passing beneath the switch-point of the circuit-closer in the course of its first circuit of the dial and at the same time setting said switch-point in order that the cam on the hour-hand may ride above the same to operate the circuit-closers in the course of its second circuit of the dial. Fig. 3 is a section thereof taken on the line 3 3. Fig. 4 is a view similar to Fig. 2, showing the hour-hand as having made the second circuit of the dial, passing above the switch-point and operating the circuit-closer. Fig. 5 is a section thereof taken on the line 5 5. Fig. 6 is a detail per-

spective view of the annular contact-strip, the same being partly in section and taken on the line 6 6 of Fig. 2, and showing the position of one of the contact-brushes in its relation to the annular conductors. Fig. 7 is a detail sectional view of the annular strip, taken on the line 7 7, Fig. 1, showing the form of the annular conductors and the manner in which the same are embedded in said strip. Fig. 8 is a detail perspective view of the adjustable contact-block. Fig. 9 is a front view of the main-circuit opening and closing device. Fig. 10 is a section thereof taken on the line 10 10 of said figure. Fig. 11 is a diagram showing the various circuits in the apparatus when used for operating electric lights, and Fig. 12 is a diagram showing the circuits in the apparatus when adapted to gas-lighting.

In the drawings, A designates an ordinary clock having secured upon the dial thereof, by screws or other suitable means, an annular strip of insulating material B, having embedded in the outer side thereof three annular conductors *a a' a''*, substantially triangular in cross-section, with their projecting apexes rounded, as shown in Fig. 7. Upon said strip B is arranged a sliding block C consisting of a small plate of insulating material D, which is secured to a piece of thin metal E bent in the form of a staple and provided with downwardly-projecting tongues or clamps *b*. On the inner side of plate D adjacent to the outer side of the annular strip B are three contacts *c c' c''*, corresponding to and forming an electrical connection with the annular conductors *a a' a''* respectively. To the contact *c* is connected a wire *d* leading to the electromagnets T of the main-circuit opening and closing device. To the contact *c'* is connected a wire *d'*, which leads to the switch A' of the circuit opening and closing device and includes the battery J'', and to the contact *c''* is connected a wire *d''*, which leads to the electromagnet W of said circuit opening and closing device.

F and G are the circuit-closing devices, which are adjustably arranged upon the annular strip B, each of said circuit-closing devices consisting of a block of insulating material H secured to a flat staple I, which

straddles the block H and strip B, a brush J secured to the outer side of the staple I, and provided near its free end with an eye or loop *e*, a lever K pivoted to the top of the staple I, having its outer end extending through the eye or loop *e* of the brush J and its inner end arranged at an angle to the main portion, so as to form the arm L, which overlaps the strip B on the inner side thereof, and a balanced switch-point M pivoted to the inner side of the staple I, having its rear end recessed so as to accommodate the stop *f* secured to the staple I for limiting the movement of the said point M. It is to be observed that two of these circuit-closing devices are necessary to operate the apparatus, viz., one to light the lamps and the other to extinguish them. They are both alike in construction except that the brush J must be so arranged in one to form a contact with the annular conductors *a a'* and in the other to form a contact with the annular conductors *a' and a''*.

To the point of the hour-hand of the clock is attached a tip of insulating material N, the same being preferably of ivory, as a dark substance would be likely to lead to a confusion of the hour-hand with the minute-hand. The end of said tip N is cut away for about one-half of its thickness and provided with a cam-face *g*, which is adapted to wipe against the projecting arm L of the lever K when said tip N on the hour-hand passes above the switch-point M to operate the brush J in the course of the second circuit of the dial.

In Figs. 9 and 10 I have shown the circuit opening and closing device by means of which, together with the circuit-closers operated by the clock mechanism, the lamps will be automatically lighted and extinguished. In said figures O designates the base, having an upright support P near the top thereof; Q Q', a pair of vibrating arms made of wood, pivotally secured to the support P by means of screws *h h'*. R is a spring passing above the support P, having its ends secured to the arms Q Q' and adapted to maintain the same in a normally separated position, and S is a chain secured to the inner sides of the arms Q Q' to limit the outward movement thereof. T represents a group of what I term "double-draw" electromagnets, secured to the base O between the arms Q Q'. U U' are soft iron armature-plates, secured upon the inner sides of the arms Q Q', opposite to the ends of the group of electromagnets T, and are adapted to be simultaneously attracted toward said magnets when the same are energized. V V' are contacts secured to the lower ends of the arms Q Q', by means of which the lamps are alternately lighted and extinguished as the arms Q Q' and the contacts V V' are forced into contact and separated.

Beneath the electromagnets T is secured a yoke of electromagnets W, having a vibrating armature W', supported before the same by means of a spring W², attached to a standard W³ secured to the base O between the

electromagnets T. Upon the outer side of said armature W' is secured a plate of insulating material X, having a catch *i* therein adapted to engage with the detents Y Y', secured opposite to each other on the arms Q Q', and hold said arms in their attracted position until released by the electromagnet W.

A' is a switch connected to one pole of the battery J'' by the wire *d'*, having arms B' B'' normally in contact with the points C' C'', the arm B' being thrown out of contact with the point C' by the hook D', secured to the arm Q', and the arm B'' thrown out of contact with the point C'' by the pin E', operated by the armature W and working in ways F' F'', secured to the base O.

H', H², H³, H⁴, and H⁵ are the binding-posts attached to the lower end of the base O.

The operation of the apparatus and the various circuits therein will be best understood by referring to the diagram Fig. 11, in which the apparatus is shown as applied to electric lights. In said diagram I have shown the annular conductors flattened out and the conductor *a'* having a wire *d'* connected thereto, which includes the battery J'', binding-post H³, and terminates at the switch A'. To the point C' of said switch is connected a wire *d''*, which includes the electromagnet W, binding-post H⁴, and terminates at the annular conductor *a''*, thereby forming the circuit for extinguishing the lamps, and to the point C'' of said switch is connected a wire *d*, which includes the electromagnet T, binding-post H², and terminates at the annular conductor *a*, thus forming the circuit for lighting the lamps.

A³ is the main or dynamo circuit, which includes the dynamo B³, lamps C³, binding-posts H' and H⁵, and contacts V and V', by means of which it is completed and broken.

The operation of the apparatus is as follows: It is apparent that as the hour-hand of the clock must make two complete circuits of the dial in every consecutive twenty-four hours the lamps would be lighted and extinguished twice in every twenty-four hours unless some provision were made to prevent the second operation. This I accomplish by means of the novel construction of the circuit-closers operated by the clock mechanism, and by said devices I am enabled to cause the respective circuits for lighting and extinguishing the lamps to be completed only once in every consecutive twenty-four hours. For example, if we desired the electric lamps to be lighted at five o'clock in the afternoon and permit the same to remain lighted until eleven o'clock at night, when the same should be extinguished, we would shift the circuit-closer F on the strip B until its projecting arm L would be directly opposite the numeral V, and then shift the circuit-closer G until the projecting arm thereof shall be opposite the numeral XI, as is shown in Fig. 1. If we assume the above adjustment to have been made after eleven o'clock at night, and that we do

not wish the lamps to become lighted before five o'clock in the afternoon of the following day, we must set switch-point M of each circuit-closer in the position shown by the section, Fig. 5. This will then permit the tip N on the hour-hand to pass beneath the point M of the circuit-closer F in the course of its first circuit of the dial at five a. m. of the following day and at the same time cause it to assume the position shown in Fig. 3; at eleven o'clock in the forenoon the same operation will take place with the circuit-closer G. As the hour-hand of the clock approaches the numeral V, in the course of its second circuit of the dial at five o'clock in the afternoon, it will pass above the switch-point M and cause the cam face of the tip N to wipe against the projecting arm L of the circuit-closer F, and in so doing bring the brush J in contact with the annular conductors $a' a''$, thereby completing the circuit which energizes the electromagnets T, attracts the arms Q Q' toward the same, the detents Y Y' to become engaged by the catch i , and the contacts V V' to complete the main or dynamo circuit and thereby light the lamps. Simultaneously therewith the arm B'' of the switch A' will be released of its engagement with the pin C'', the lighting-circuit of the apparatus broken, and the arm B' caused to form a contact with the point C', and shortly thereafter the tip N of the hour-hand will have become released of its engagement with the projecting arm L of the circuit-closer F and the brush J become disengaged from the annular conductors $a' a''$. The course of the said lighting-circuit is as follows: From battery J'', through the wire d' , annular conductor a' , brush J of the circuit-closer F, annular conductor a'' , wire d'' , binding-post H², electromagnets T, point C'', arm B'' of switch A', wire d' , binding-post H³, and thence to battery J'', or vice versa. At eleven o'clock at night the lamps which have been burning continuously since five o'clock in the afternoon will be extinguished as the tip N of the hour-hand operates the circuit-closer G, opposite the numeral XI, and causes the brush J to complete the extinguishing-circuit by forming a contact with the annular conductors $a' a''$. With the completion of said circuit the electromagnets W will become energized, the armature W' attracted toward the same, and in so doing release the catch i , carried thereby, of its engagement with the detents Y Y', and permit the arms Q Q' to fly apart and the main or dynamo circuit to be broken by the separating of the contacts V V'. At the same time the hook D', attached to the arm Q', will draw the arm B' of the switch A' away from the point C', and the pressure of the armature W' against the pin E ceasing will permit the arm B'' of the switch A' to form an electrical connection with the point C'' and switch the battery J'' into the lighting-circuit again.

The course of the extinguishing-circuit is as follows: From the battery J'', through the

wire d' , annular conductor a' ; brush J of the circuit-closer G, annular conductor a'' , wire d'' , binding post H⁴ to electromagnet W, point C', arm B' of switch A', and thence by wire d' and binding-post H³ to the battery J'', or vice versa.

When the apparatus is to be employed in connection with gas-lighting it simply becomes necessary to dispense with the dynamo B³ and include in the main circuit A³, (formerly the dynamo-circuit,) the battery J'' and a spark-coil F'' and equip the gas-lights with what are known to the trade as the "automatic burners" G'', and then drop the detent Y of the circuit opening and closing device, so that it will not be engaged by the catch i of the armature W'. The operation of the apparatus in this connection will be the same as where it is applied to electric lamps, except that the main circuit A³ will be closed only so long as the electromagnets T are energized and the series of sparks necessary to ignite the gas-flame of the burner G'' are being produced. As soon as the brush of the circuit-closer F for completing the lighting-circuit is released the arm Q of the circuit maker and breaker will spring outwardly, as the detent Y does not engage with the catch i of the armature W', and main circuit A³ is again broken. The switch A', however, remains unaltered, as the arm Q', which operates the same, is locked by the catch i and detent Y', and is only released when the brush of the circuit-closer G completes the extinguishing-circuit, which then energizes the electromagnet W, releases the detent Y', and operates the switch A'.

It is to be observed that I have shown the circuit-closers F and G as operated by the hour-hand of the clock only. I do not, however, limit myself thereto, as the same may be operated by divers portions of the clock mechanism without departing from the spirit of my invention, and that where desirable the clock mechanism may be wholly dispensed with and the apparatus be operated by hand by means of an ordinary double push-button.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of a main or lighting circuit, a main circuit closing device included therein, a circuit having a circuit closer and an electro-magnet of the main circuit closing device included therein adapted to close the main or lighting circuit, a circuit likewise having a circuit closer and an electro-magnet of the main circuit closing device included therein adapted to open said main or lighting circuit, and clock mechanism for operating the circuit closers aforesaid, and cause the same to make and break their respective circuits, substantially as specified.

2. The combination of a main circuit, a circuit adapted to operate the main circuit to light the lamps, and a circuit adapted to operate the main circuit to extinguish the lamps,

and clock mechanism provided with annular conductors connected to opposite poles of an electric battery, and the lighting and extinguishing circuits, and circuit closing devices adjustably arranged upon said annular conductors adapted to be operated by the clock mechanism to complete and break the lighting and extinguishing circuits, substantially as specified.

3. The combination of a main circuit, a circuit adapted to operate the main circuit to light the lamps, a circuit adapted to operate the main circuit to extinguish the lamps, a clock having annular conductors secured upon the dial thereof connected to the opposite poles of an electric battery, and in circuit with the lighting and extinguishing circuits, and a cam secured to the hour hand of the clock with the circuit closing devices adjustably arranged upon the annular conductors, aforesaid, adapted to be engaged and operated by the cam on the hour hand in the course of its first circuit of the dial without causing the same to complete their respective circuits, and be again engaged and operated by said cam in the course of the hour hand's second circuit of the dial, and then cause the same to complete their respective circuits and operate the main circuit, substantially as specified.

4. The combination of an annular strip of insulating material having annular conductors embedded therein, and circuit closing devices adjustably arranged thereon having contact brushes adapted to form an electrical connection with said annular conductors, pivoted brush operating levers, and balanced switch points with clock mechanism having a cam affixed to the hour hand adapted to pass beneath said switch points in the course of one revolution of the hour hand and set said switch points in an operative position so that with the following revolution of the hour hand the cam will ride above the same, engage with the projecting ends of the brush operating levers, and cause the contact brushes to complete their respective circuits, substantially as specified.

5. The combination with the annular strip of insulating material and conductors embedded therein, of the adjustable contact consisting of a block of insulating material having a series of metal contacts embedded therein, secured to a strip of metal bent in the form of an inverted U and provided with depending spring fingers for clamping said block against the annular strip and the contacts therein against the conductors embedded in said annular strip, substantially as specified.

6. A circuit closing device comprising a flat metal clamping staple, a block of insulating material secured within the same, a contact brush secured to said clamping staple provided with a loop at its free end, a lever pivotally secured to said clamping staple having its outer end extending through the loop in the contact brush, and its inner end

bent at an angle to the outwardly projecting end, and mechanism for operating said brush in the course of each alternate revolution of the hour hand of the clock, substantially as specified.

7. A circuit closing device comprising a flat metal clamping staple, a block of insulating material secured to the inner side of the outer leg of said staple, a contact brush secured to the outer side of said leg provided with a loop at its free end, a lever pivotally secured to the top of said staple having its outer end extending through the loop in the contact brush, and its inner end arranged at an angle to the outwardly projecting end and overlapping the inner leg of said staple, a balanced switch point pivoted to said inner leg beneath the overlapping end of the lever having its rear end recessed, and a stop likewise secured to said leg adapted to fit into the recessed portion of the switch point to limit the movement thereof, substantially as specified.

8. In a main circuit opening and closing device, the combination of a pair of pivoted arms having contacts secured to their free ends, and armature plates upon their inner sides, electro-magnets for attracting said arms toward each other and forcing the contacts into engagement, a catch and detents for locking said arms in their attracted position, an electro-magnet and armature adapted to unlock said detents, and a spring for throwing said arms apart when the detents are released by the electro-magnet and armature, last mentioned, substantially as specified.

9. In a main circuit opening and closing device, the combination with a pair of pivoted arms having contacts secured to their free ends, and armature plates upon their inner sides, an electro-magnet included in the lighting circuit for attracting said arms toward each other and causing the contacts secured thereto to complete the main circuit, a catch and detents for locking said arms in their attracted position, an electro-magnet and armature included in, and operated by the extinguishing circuit adapted to unlock said detents, a spring for throwing said arms apart and breaking the main circuit when the detents are released of their engagement with the catch by the last mentioned electro-magnet, and a switch for alternately including the battery in the lighting and extinguishing circuits of the apparatus, substantially as specified.

10. In a main circuit opening and closing device, the combination with a base having a standard secured thereon, a pair of vibrating arms pivotally supported thereby having contacts at their free ends, and armature plates upon their inner sides, an electro-magnet for attracting said arms toward the same and each other, and the contacts at their free ends into engagement, an electro-magnet provided with an armature pivotally supported

in front thereof having a plate of insulating material secured thereon provided with a catch, detents secured to said vibrating arms adapted to lock with said catch, a spring passing over said standard having its ends secured to said vibrating arms near the tops thereof to throw said vibrating arms apart, a chain likewise secured to said arms to limit the outward movement thereof, and a two point switch for alternately including the battery in the lighting and extinguishing circuits, having arms adapted to form contacts with the points thereof, one of said arms being adapted to be thrown out of engagement

with its respective point by a hook secured to one of the vibrating arms, and the other released of its engagement with its respective contact point by means of a pin working in ways secured to the base, and operated by the armature of the electro-magnet last mentioned, substantially as specified.

Signed at the city of New York, in the county and State of New York, this 8th day of May, 1895.

SAMUEL C. STICKLE.

Witnesses:

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ANNIE B. WALTERS.