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TIME RETARDED CUT-OFF SWITCH.

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1,328,477. Patented Jan. 20, 1920.

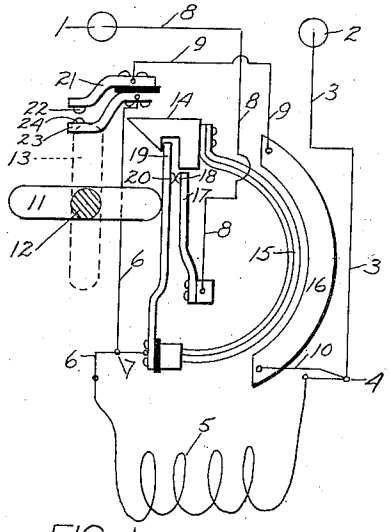


FIG. 1.

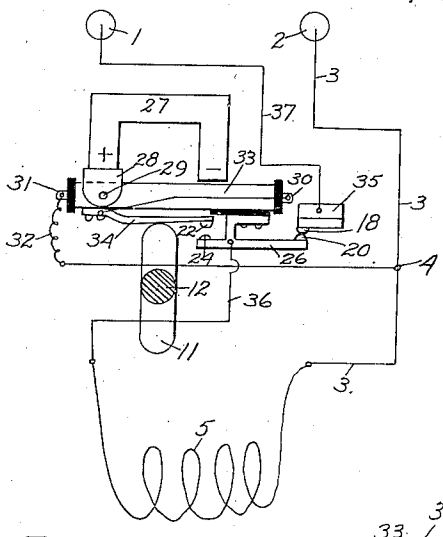


FIG. 2.

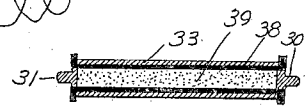


FIG. 3.

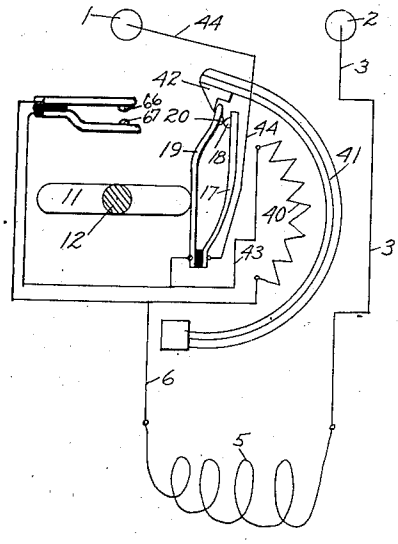


FIG. 4.

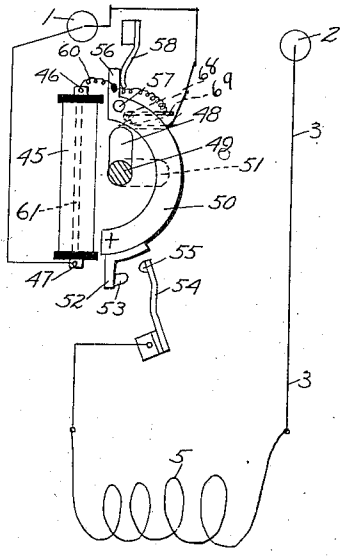


FIG. 5.

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TIME-RETARDED CUT-OFF SWITCH.

1,328,477. Specification of Letters Patent. **Patented Jan. 20, 1920.**

Application filed March 29, 1915, Serial No. 17,805. Renewed April 14, 1919. Serial No. 290,081.

To all whom it may concern:

Be it known that I, MALCOLM H. BAKER, a citizen of the United States, and a resident of Braintree, in the county of Norfolk and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Time-Retarded Cut-Off Switches, of which the following is a specification.

My invention relates in general to electric switches adapted for various purposes and in the specific form illustrated relates to switches for governing electric lights of the incandescent type. In particular, my invention has reference to a form of switch that may be incorporated within an incandescent lamp socket.

The object of the invention as applied to a light-controlling switch is to provide means associated operatively with the switch, whereby the light is caused to continue, preferably (but not necessarily) with unimpaired brilliancy, for a predetermined interval of time (such as a minute or more) after the switch control means are actuated in the usual manner for the purpose of extinguishing the light.

In many cases, such as in leaving a room depending for illumination upon an incandescent lamp, or upon retiring for the night, the immediate loss of light that follows the "turning off" of the lamp at the socket is a source of serious annoyance. My present invention provides an improved and effective remedy for this condition, and resides, in its preferred form, in a novel and extremely simple form of delayed-acting, automatic, electric cut-out, or circuit breaker, that may operatively be incorporated in the switch-controlled circuit, and that for convenience and compactness may, if desired, be associated structurally in self-contained form with the mechanism of the light-governing switch itself;—thus providing in a socket switch, wall switch, or other conventional type of light-controlling switch, a new feature of automatic control for the purpose described,—such feature preferably being introduced without otherwise disturbing the normal use and operation of the switch.

In carrying out my invention, disclosed herein specifically in forms suitable for embodiment as a socket switch, I provide a switch mechanism that includes a pair of main switch contacts of suitable electrical capacity and mechanical design to make and break the lighting circuit. For convenience, these contacts are provided with a single switch-actuating element (such as a thumb key or pull chain) whereby said contacts may be closed directly for normal and continuous transmission of current to the lighting circuit as usual, and whereby said contacts may also be tensioned for automatically delayed opening. As a means to delay such opening, a thermo-dynamically retractable detent is provided and normally arranged to prevent the tension-caused movement of said contacts, but to permit their opening (in one form of my invention) after the slow thermostatic retraction of said detent. A flexing thermostat may conveniently (though not necessarily) be employed for retracting the detent, such thermostat being thermally energizable for this purpose by manipulation of the switch-controlling element as customary for extinguishing the light. In the preferred form of my invention, the movement of said element responsive to such manipulation operates through auxiliary circuit-governing means to divert current flowing through said main contacts to a resistance unit that is arranged in heating relation to the thermostat.

I have illustrated several of the many possible embodiments of my invention in the annexed drawings, which are largely diagrammatic, for clearness, it being obvious that the elements, co-acting as shown, can be arranged in a socket or wall switch casing in many ways.

In the drawings, Figure 1 indicates a preferred embodiment of my invention wherein a thermostat, or mechanical thermo-couple of metals, is employed to finally extinguish the light, said thermostat being operatively heated only after the lamp has been normally burning and the key then turned to the "off" position. Fig. 2 indicates a modification, employing a thermo-magnetic device in place of the thermostat. Fig. 3 is a detail sectional view, of the heater of Fig. 2, and Fig. 4 is a modifica-

tion of Fig. 1 showing the heater in a series arrangement, whereby it is constantly energized during burning of the lamp. Fig. 5 is a similar modification of Fig. 2.

In Fig. 1, the shank of the key appears at 12, the thumb key itself being omitted. This shank carries a cross bar 11 which engages a spring 19 carrying a master contact 20 thus closing and holding closed said contact 20 against a master contact 18 carried by the member 17. This closes the main circuit by way of terminal 1, wire 8, member 17, master contacts 18, 20, spring 19, wire 6, lamp filament 5, wire 3, to terminal 2. The lamp now operates in the usual manner till desired time of extinguishment arrives. To extinguish the key is thrown to the "off" position, indicated by the broken lines 13, of the bar 11, when the said bar engages a spring 23 having an auxiliary contact 24, closes this contact with an auxiliary contact 22 carried by member 21, and thus completes a shunt circuit across the lamp, from junction 4, through wire 10 to heater resistance shown at 16,—through this, by way of wire 9 to member 21, contacts 22, 24, spring 23, wire 6, and junction 7. The heater now raises the temperature of the thermostat shown at 15, which thermostat has after movement of bar 11 to its broken line position been retaining the contacts 18, 20 closed by means of a catch 14 which normally is positioned to engage the end of the spring 19, causes the said thermostat to bend outwardly, to release spring 19 from catch 14, and to thus permit the said spring to break contacts 18, 20 and extinguish the lamp. This automatic separation of master contacts 18 and 20 also breaks the circuit through the heater 16, so that the latter is entirely dead and the thermostat returns to its normal position, ready to engage the end of the spring 19 by means of catch 14 the next time the said spring is thrown forward by the turning on movement of the key. The placing of the master contacts 18, 20, in series with the auxiliary contacts 22, 24 is an important and novel feature of my improved cut-off switch, for by such arrangement auxiliary contacts 22 and 24 may be made small and need not necessarily make and break with a quick snap action, since they are required to transmit merely the small amount of current used for energizing the heating unit 16; and further, these auxiliary contacts need not be under automatic government to effect their opening, and thus are capable of embodiment in a much simpler and more compact form of switch mechanism than would otherwise be possible.

As a heating element I may employ carbon cemented by a non-conductive cement, or resistance coil, or other suitable material as desired.

The positions of parts shown in Fig. 1 is that assumed when the lamp is normally burning, the key being turned to the "on" position. It will be noted that, when the key is turned to the "off" position, both the lamp filament and heater in parallel or shunt circuit relation are energized for the brief period, usually about one minute, which elapses before the thermostat turns off the light.

The only contacts at which sparking may occur are 18, 20, and these are given a quick break action by the spring 19 as it is released by the catch 14.

In Fig. 2, a small permanent magnet 27 is fitted at one end with a bracket 28 which carries an armature 33 pivoted at point 29.

The armature 33 consists of a square tube of some metal which becomes non-magnetic at a low temperature,—such as Monel metal which reaches this state at about 100° centigrade. This tube is filled with carbon cemented to form a resistance in the usual manner, the said tube also having a lining of some non-conductive refractory material to prevent a short-circuiting of the said carbon. Connection is made to the carbon by means of insulated end plugs 30, 31. The tube, or armature, 33 also carries an insulated bracket 26 having contacts 20 and 24. The contact 20 engages a second contact 18, carried by the fixed member 35, when the armature is adjacent the magnet poles. The contact 24 is normally engaged by a contact 22 carried by a spring 34 attached to the said armature. In this figure, the lamp is shown in normal operation, the key bar 11 being in the "on" position, engaging the spring 34, holding the contacts 22, 24, open and the contacts 20, 18, closed, these latter being so maintained not only by the pressure of the bar 11 against the armature 33 but also by the attraction between the magnet 27 and the said armature. Under these conditions the filament 5 is energized, but the heater circuit through 33 is open. When the key is turned to the "off" position, the contacts 22, 24, close, the contacts 20, 18, also being retained closed by magnetic attraction above described. The armature 33 is now heated, reaches the non-magnetic state, is released by the magnet 27, and falls, opening the contacts 20, 18, and cutting out of circuit both the lamp and the armature 33. In Fig. 3, the carbon filler of the armature 33 appears at 39, the insulating lining at 38, and the Monel, or other paramagnetic, metal tube at 33.

In Fig. 4, the thermostat is so arranged as to cause the catch 42 to normally be free from the end of the spring 19. When the key is turned on, the bar 11 causes closing of the contacts 20, 18,—the resistance 40, in series with the lamp filament circuit, then heats, the thermostat bends inwardly and

the catch 42 engages the spring 19. The parts are shown in this relation in this figure. When the lamp is turned off, a shunt circuit is formed around the resistance 40 by the closing of the contacts 66, 67, the said resistance cools, the thermostat unbends and the catch 42 releases the spring 19, causing rupturing of the circuit at 20, 18.

In Fig. 5 the action is practically the same save that the heated element is thermo-magnetic. Here the parts are shown in the "off" relation, the magnet 50, which pivots at a point 57, being swung into proximity to the fixed armature 45 by magnetic attraction. When the key is turned to the "on" position, indicated by the dotted lines 51, the said armature is swung back by the key bar 48, the contacts 53, 55, are closed, and the lamp is lighted. Current also flows through the resistance wire 61 carried inside the armature 45, heats the said armature, which is here also preferably composed of Monel metal, renders it non-magnetic and thus independent of the attraction of the magnet 50. When the key is turned to the "off" position, the shunt contacts 68, 69, shown in broken lines, largely, are closed establishing a shunt circuit of low resistance around the heater unit from terminal 1, to shoulder 56 of the magnet 50, thus permitting the wire 61 to cool. The armature 45 now becomes magnetic, is attracted by the magnet 50, the said magnet swings forward, and the contacts 53, 55, are broken extinguishing the lamp. This form gives a long time period for cutting off the light, for the reason that the armature 45 is generally heated considerably above the non-magnetic temperature, especially when Monel metal is used, and thus takes quite a time to cool sufficiently. A light, leaf spring supported upon an abutment is shown at 58 bearing on the shoulder 56 of the magnet 50 so as to maintain contacts 53, 55 closed, upon retraction of the key bar 48 from its broken line position 51, and until magnetic attraction between the armature 45 and the magnet 50 becomes strong enough to open these contacts against this spring action.

It is here to be noted that the form of circuit arrangements disclosed in Figs. 4 and 5, wherein the electric heat-producing unit is operatively energized by being switched into series relation with the lamp (rather than in shunt thereto as in the arrangement shown in Figs. 1 and 2), is likewise characterized by the before-mentioned novel principles of arrangement comprised in the series relation of the master contacts 18, 20 to the auxiliary contacts 68, 69.

It will therefore be seen that my invention embodies several novel and advantageous features of construction and circuit arrangement pertaining to combination of a switch (and particularly to combination of a switch having relatively movable contact members tensionable for quick-snap, circuit-breaking action) with slow-acting, automatic cut-out devices to govern such action.

As one feature it provides an arrangement wherein the load circuit is made and broken through the customary main-contacts, of ample size, electrical conductivity and quick-action, to prevent excessive arcing, and permits the use of contacts of smaller size and non-automatic action for governing the relatively small current flow that energizes the automatic circuit-breaking device. This permits of compactness in design and simplification of electrical insulation and connections.

As an important principle underlying the feature just mentioned, my invention incorporates, in a preferred form as herein illustrated, a circuit arrangement novel to this class of apparatus and embodying main and auxiliary current paths both connected to be supplied with current through the same pair of main contacts, and constituting, in the particular form disclosed (although not necessarily so arranged), a divided portion of the main circuit entirely in series with said contacts, which renders possible a more convenient and compact operative arrangement and construction of the necessary electrical elements than would otherwise be possible.

This broadly novel principle in circuit arrangement, as before stated, not only characterizes the system of electrical connections, shown in Figs. 4 and 5, of the drawings (where the heating resistance is energized by connecting the same in series with the switch-governed load) but further is a necessary basis for the different, and highly advantageous, system of electrical connections shown in Figs. 1 and 2, where the resistance is arranged to be energized by being connected in shunt to, or as a bridge across, the load.

The operative advantages to be had from this last-described system of shunt connections is obviously that energization of the resistance for controlling the automatic circuit-breaking action of the switch is effected without electrical disturbance of the circuit through the load. One advantage of this condition in practice is that, in case of a light connected to be controlled through my improved delayed cut-out switch, no dimming or other change occurs in the light at the time the extinguishment-governing resistance is energized, as would occur in the series system of connections in Figs. 4 and 5. Another advantage is that the resistance will always be subjected to the full and constant line voltage to effect its energization whereas, in the said series form, voltage impressed on said resistance will be cut down

to a degree varying with the ohmic resistance of the switch-governed electric load.

A feature of purely structural novelty included within the scope of my invention resides in the mechanical arrangement of the thermostat in its form and position relative to the current switching mechanism that it automatically controls. Especially in socket switches is it necessary that this mechanism be comparatively small, and thus for economy of space and general compactness it is a highly advantageous arrangement partially to encircle the switch mechanism with a laminated bowed type of leaf thermostat as shown, particularly as such thermostat in order to do its work must be of appreciable length and comparatively large as related to the switch mechanism. In the preferred form of this disposition of the thermostat, its plane of curvature and of flexural movement is parallel with and may, to advantage, be coincident with, the planes of movement and general disposition of the other movable elements of the switch. The mounting of a detent catch directly on the thermostat itself for engaging the switch contacts is, in combination with the features above-described, still further novelty conducive of the greatest possible compactness in practical construction.

While I have specifically described my invention as related to incandescent lamps, it is of course applicable to any type of load or circuit wherein the described conditions are to be met.

It will also be clear that the broad principle of my invention may be embodied in thermal and mechanical elements arranged in many other ways than the precise operative combination herein described only for the sake of illustration.

I claim as my invention,—

1. The combination of an electric switch, an electric load connected to be governed thereby; an auxiliary circuit connected in shunt to said load; an automatic circuit breaker arranged in said circuit for opening said switch and having a time limit,—the current through said auxiliary circuit producing mechanical energy for releasing the circuit breaker; and means automatically to deënergize said auxiliary circuit when said switch is opened by said circuit breaker.

2. The combination of an electric switch, an electric load connected to be governed thereby; an auxiliary circuit connected in shunt to said load; an automatic circuit breaker arranged in said circuit for opening said switch and having a time limit, the current through said auxiliary circuit producing mechanical energy for releasing the circuit breaker; and means automatically to deënergize said auxiliary circuit when said switch is opened by said circuit breaker; together with common control means for closing said switch and for thereafter individually governing said auxiliary circuit.

3. In an electric circuit, a pair of normally separated contacts in series with the said circuit; a second pair of contacts comprised in a circuit in shunt to the said first circuit; a heating device comprised within the said shunt circuit; means to close the said first named contacts; means, controlled by the said heating device, to retain the said first named contacts closed; and means whereby closing the said first named contacts opens the said shunt contacts and whereby further movement of the said closing means closes the said shunt contacts.

4. In an electric switch, means to control the said switch; contacts in series with the electric circuit; normally separated but adapted to be closed by the said controlling means; means, released by an electric heat actuated device, to retain the said contacts closed; and means operated by separate movement of the said controlling means, to energize the said heat actuated device and release the said contacts.

5. In an electric switch, a pair of contacts in series with the electric circuit; a controlling device to close the said contacts when actuated in a definite direction; an electric heat actuated device to retain the said contacts closed; circuit contacts governing the said heat actuated device,—and means to close the said latter contacts when the controlling device is actuated in the opposite direction; whereby the said heat actuated device is energized and the said first named contacts opened after a predetermined time.

6. In an electric switch, contacts in series with the electric circuit and normally separated; a second set of contacts, in series with the said first contacts, and also normally open; and means whereby the said first contacts are closed when the said second contacts are opened; together with means to retain the said first contacts closed, said means being controlled by a heat actuated device governed by the said second contacts; and means to close the said second contacts upon additional movement of the means adapted to close the said first contacts.

7. In an electric switch, a circuit including a translating device and also including in series therewith normally separated contacts: an electric heat actuated device to retain the said contacts closed; a second circuit comprising the said heat actuated device and also comprising normally separated contacts in series therewith; and controlling means for the switch adapted, when actuated, to cause closing of the said first contacts and to permit opening of the said second contacts, and when subsequently actuated to cause closing of the said second con-

tacts; whereby the said heat actuated device is energized and said first contacts opened after a predetermined time.

8. In an electric switch, master contacts in series with an electric circuit; mechanism for closing said master contacts, and arranged also to tension the same automatically to cause their opening; auxiliary contacts in series with said master contacts; means whereby said auxiliary contacts are opened upon closure of said master contacts; slow-acting devices electrically governable through said auxiliary contacts when said master contacts are closed, and normally operative to prevent said automatic opening of the latter; and means to close said auxiliary contacts upon movement of said mechanism additional to the movement thereof designed to close said master contacts, whereby said devices are rendered inoperative after a predetermined time.

9. In an electric lamp socket switch including a lamp, a normally open supply circuit; a circuit in shunt to the said supply circuit at a point between the lamp and the opening in the said circuit; a resistance heating device included in the shunt circuit; means to close the supply circuit; means, independent of the said closing means, to retain the said supply circuit closed; and heat governed means, operated by the resistance, to release the said retaining means after a predetermined time; the said shunt circuit being adapted to be closed by additional movement of the means acting to close the supply circuit.

10. In an electric lamp socket switch, a manually controlled key therefor; normally open contacts in series with the lamp circuit and adapted to be closed by the key; heat actuated means to retain the said contacts closed independent of the said key; a shunt circuit to the lamp at a point between the said contacts and the lamp, and including a resistance heater; and means for energizing the said shunt circuit upon retraction of the key from the closing position thereof; whereby the said retaining means are released and the said contacts opened after a predetermined time.

11. In switch mechanism, a pair of resilient contact members adapted normally to separate; controlling means to position and maintain said members in contact by pressure on one of them;—coöperating means arranged and positioned to permit said members to move into contact under the action of said controlling means, said coöperating means being further arranged and disposed to retain said members in contact upon retraction of said controlling means;—and electrically actuated means arranged to be energized by the retraction of said controlling means and further arranged operatively to retract said coöperating retaining means, thereby to free said members for relative separating movement thereof.

12. A thermostatically-controlled circuit cut-out, embodying main circuit contacts arranged normally to open the circuit; controlling means adapted to close and hold closed the circuit through said contacts;—thermostatically-controlled means adapted normally to hold said circuit contacts in closed relation when said controlling means are moved from main circuit closing position, said last mentioned means being further adapted upon thermal energization thereof to release said contacts for normal opening movement thereof; and an energizing circuit for said thermo-means arranged in normally open shunt to the main circuit and coöperatively arranged to be closed by movement of the controlling means away from said main circuit closing position thereof.

13. An electric switch having in combination with means for electrical connection to a supply circuit and to the switch-governed load; separable main contacts adapted to close and open the circuit through said load; a controlling member arranged upon suitable control movement to close said contacts; and a normally inactive, electrically operated contact-governing device arranged in a parallel circuit with said switch-governed load and adapted to be energized by further movement of said controlling member thereby to cause a delayed opening of said contacts.

14. An electric switch having in combination with means for electrical connection to a supply circuit and to the switch-governed load; separable main contacts normally adapted to break the circuit through said load; a controlling member arranged upon suitable control movement to close, and to maintain closed, said contacts; detent means arranged normally to prevent the opening of said contacts; and a normally inactive, electrically operated device arranged in a parallel circuit with said switch-governed load and adapted to be energized by retraction of said controlling member from its main contact closing position, thereby to release said contacts from said detent means.

15. An electric switch having in combination with means for electrical connection to a supply circuit and to the switch-governed load, separable main contacts normally adapted to break the circuit through said load; a controlling member arranged upon suitable control movement to close and to maintain closed said contacts; detent means arranged normally to prevent the opening of said contacts; and a thermostat arranged, when thermally energized, to move said detent means and release said contacts; together with a normally inactive electric heating device for the thermostat,

said device being arranged in a parallel circuit with the switch-governed load and adapted operatively to be energized by retraction of said controlling member from its main contact closing position.

16. In an electric circuit in combination; a cut-out, a two-branch divided circuit in series with said cut-out; a constantly connected electrical load in one of said branches; a heat generating device and independent circuit controlling means therefor arranged in the other of said branches; and manually-governed, automatically-acting instrumentalities, including said heat-generating device, operatively related thereto; said cut-out to govern the circuit-breaking action thereof.

17. An automatically governed switch structure, embodying in combination with a centrally disposed switch mechanism including a movable contact member, and means to tension the same for automatic circuit-governing movement; a resilient laminated leaf thermostat formed on an arc and positioned partially to surround said switch mechanism; and a catch carried on a free and movable part of said thermostat and adapted by flexure of the latter to be moved into and out of the path of said member, thereby to control its said automatic movement.

18. An automatically governed switch structure, embodying in combination with a centrally disposed switch mechanism including a contact member, and means to tension the same for automatic circuit-governing movement; a resilient laminated leaf thermostat formed on an arc and positioned partially to surround said switch mechanism; and a catch arranged to be operated by a free and movable part of said thermostat and adapted by flexure thereof to be moved into and out of the path of said members, thereby to control its said automatic movement.

19. A thermostatically-controlled switch embodying a normally bowed resilient bimetallic thermostat having an abutment mounting at one end; a pair of resilient contact members mounted for movement in the plane of thermostat movement and disposed substantially on the chord of the bowed thermostat; and means movable in said plane and adapted to govern the operative movement of said members;—the thermostat carrying a latch formation cooperatively arranged and positioned to permit contacting movement of said members as controlled by said means, to retain said members in contact upon withdrawal of said means from contact making position thereof, and to release said members upon designed thermal change in said thermostat.

20. A thermostatically-controlled switch embodying a normally bowed resilient bimetallic thermostat having an abutment mounting at one end; a pair of resilient contact members mounted for movement in the plane of thermostat movement and disposed substantially on the chord of the bowed thermostat, one of said members being also mounted on said abutment; and means movable in said plane and adapted to govern the operative movement of said members;—the thermostat carrying a latch formation cooperatively arranged and positioned to permit contacting movement of said members as controlled by said means, to retain said members in contact upon withdrawal of said means from contact making position thereof, and to release said members upon designed thermal change in said thermostat.

21. In a thermostatically controlled switch, in combination; a composite thermostatic-detent structure embodying a resilient bimetallic thermostat mounted on an abutment at one end and having a contact-member latching formation on its free portion, together with a pair of contact members mounted for correlative movement in the plane of thermostat movement, one of said members being tensioned for movement, when unrestrained, to open the contacts;—the said structure and last mentioned member being coöperatively positioned and arranged so that said latch directly retains said members normally in contact and is operatively retracted upon designed thermal change in the thermostat.

22. In an electric switch, in combination; circuit-controlling contacts, a control member arranged to close said contacts, thermostatic means arranged normally to retain said contacts closed and adapted by heat-caused flexure to release the same;—said contacts, member, and thermostatic means being positioned and arranged for relative movement in substantially parallel planes.

23. In combination, an electric switch adapted for continuous current transmission through a pair of relatively movable contacts, and a delayed-acting, automatic cut-out therefor, arranged to be energized by the contact-conducted current and to open the switch a substantial time interval after such energization, embodying said relatively movable contacts for the switch and governing a load circuit;—automatic means adapted, when rendered operative, to separate said contacts,—a normally inactive, electrically-actuatable, slow-acting device to control the operation of said means and so arranged to be energized by current conducted through said contacts; a circuit path through said contacts to the load independent of said means;—and adjustable means to control the actuation of said device by said current.

24. In combination, an electric switch adapted for continuous current transmission through a pair of relatively movable con-

tacts, and a delayed-acting, automatic cut-out therefor, arranged to be energized by the contact-conducted current and to open the switch a substantial time interval after such energization, embodying said relatively movable contacts for the switch and governing a load circuit;—automatic means adapted, when rendered operative, to separate said contacts;—a normally inactive, electrically-actuatable, slow-acting device to control the operation of said means and so arranged to be energized by current conducted through said contacts;—a circuit path through said contacts to the load independent of said means;—and common control means arranged by one movement thereof to close the switch and by a further movement to render said device operative.

25. An electric circuit arrangement including a load, a pair of automatically separable contacts, and electrically operable devices adapted to govern the automatic separation of said contacts,—said circuit arrangement further comprising controlling instrumentalities whereby said load alone, or said load together with said devices, may be connected to be energized by current conducted through said contacts.

26. An electric circuit arrangement including a load, a pair of automatically separable contacts, and electrically operable devices adapted to govern the automatic separation of said contacts,—said circuit arrangement further comprising controlling instrumentalities whereby said load alone, or said load together with said devices, may be connected to be energized by current conducted through said contacts; and a common means for actuating said contacts and said controlling instrumentalities, arranged by one movement to close said contacts and by further movement to place said contacts under control of said devices to effect said automatic separation thereof.

27. In combination with an automatic cut-out arrangement embodying a pair of relatively movable main contacts and auxiliary current control means; an electro-motive device connected for operative energization by current conducted through said main contacts, the flow of said current to said device being subordinately governable by said auxiliary current control means; an electric load element connected to be energized by current also conducted through said main contacts; a direct circuit path through said contacts to said element for said latter current and leading around said device; and mechanism adapted automatically to separate said main contacts and arranged to be rendered operative therefor by energization of said electro-motive device.

28. In combination with an automatic cut-out arrangement embodying a pair of relatively movable main contacts and auxiliary current control means; an electro-motive device connected for operative energization by current conducted through said main contacts, the flow of said current being subordinately governable by said auxiliary current control means; an electric load element connected to be energized by current also conducted through said main contacts; a direct circuit path through said contacts to said element for said latter current and leading around said device; and mechanism adapted automatically to separate said main contacts and arranged to be rendered operative therefor by energization of said electro-motive device; together with common control means adapted by one movement to close said main contacts, and upon subsequent movement individually to actuate said auxiliary current control means for energizing said device.

29. An electric switch, automatic, cut-out arrangement embodying in combination with a pair of relatively movable contacts for making and breaking the switch-controlled main circuit;—means adapted automatically to separate said contacts;—a divided circuit portion of said main circuit including two parallel branches, each of said branches being connected to be energized by current conducted through said contacts; and an electrically-actuatable device arranged to be energized by current in said divided circuit portion, thereby to govern the action of said means.

30. An electric switch, automatic cut-out arrangement embodying, in combination with a pair of relatively movable contacts for making and breaking the switch-controlled main circuit;—means adapted automatically to separate said contacts;—a divided circuit portion of said main circuit including two parallel branches, each of said branches being connected to be energized by current conducted through said contacts; and an electrically actuatable device arranged to be energized by current in said divided circuit portion, thereby to govern the action of said means; together with common control means adapted upon one movement thereof to close said contacts, and upon subsequent movement to place said contacts under operative control of said means and of said device to effect their automatic opening.

31. An electric switch, automatic cut-out arrangement embodying, in combination with a pair of relatively movable contacts for making and breaking the switch-controlled main circuit;—means adapted automatically to separate said contacts;—a divided circuit portion including two parallel branches, said portion being connected in said main circuit so that each of said branches is in series with said pair of contacts; an electrically-actuatable device arranged to be energized by one of said

branches and to govern the action of said means;—and a load element connected to be energized by current conducted through said contacts and through a part of said divided circuit portion.

32. An electric switch, automatic cut-out arrangement embodying, in combination with a pair of relatively movable contacts for making and breaking the switch-controlled main circuit;—means adapted automatically to separate said contacts,—a divided circuit portion including two parallel branches, said portion being connected in said main circuit so that each of said branches is in series with said pair of contacts; an electrically-actuatable device arranged to be energized by one of said branches and to govern the action of said means; and a load element connected to be energized by current conducted through said contacts and through a part of said divided circuit portion; together with common control means adapted upon movement thereof to close said contacts, and upon subsequent movement to place said contacts under operative control of said device to effect their automatic opening.

33. In combination; a switch-governed electric load; a pair of automatically separable master switch contacts for directly governing said load; electrically operable devices adapted to govern the automatic separation of said master contacts; a pair of auxiliary switch contacts in series with said master contacts and connected to govern the operative energization of said devices; and means to open and close said two pairs of contacts in predetermined relation to govern the load circuit.

34. In an apparatus for causing the automatic circuit-breaking separation of two switch contacts to cut out a load circuit a substantial interval of time after said apparatus is operatively energized, the combination, with said switch contacts, of a current translative device adapted operatively to energize said apparatus; and an auxiliary circuit controller separately adjustable for individually governing current supplied to said device after said switch contacts are closed,—said controller and said device both being connected to receive and to transmit current that is also conducted through said switch contacts, whereby separation of said latter contacts deënergizes said device independently of the operative adjustment of said controller.

35. In an apparatus for causing the automatic circuit-breaking separation of two switch contacts to cut out a load circuit a substantial interval of time after said apparatus is operatively energized, the combination, with said switch contacts, of a current translative device adapted operatively to energize said apparatus; and an auxiliary circuit controller separately adjustable for individually governing current supplied to said device when said switch contacts are closed,—said controller and said device both being connected to receive and to transmit current that is also conducted through said switch contacts, whereby separation of said latter contacts deënergizes said device independently of the operative adjustment of said controller; together with a common actuating extension for operating both said switch contacts and said controller.

36. An electric cut-out embodying a pair of master contacts arranged in series with a divided circuit having two branches; a cut-out governing device operatively related to said contacts and energizable by a flow of current in one of said branches; the other branch of said divided circuit being connected to conduct current around said device directly to the load when said contacts are closed; and means for separately controlling the operative energization of said device.

37. In an electric lamp switch including a pair of resiliently mounted contact members in series with the lamp circuit, one of said members tending normally to separate from the other member, and said other member tending slightly to follow up said first mentioned member during such separation, manually controlled means adapted to move said first mentioned member into contact with said other member and to maintain such contact, a thermostatic detent adapted to maintain such contact after said manually controlled means have been withdrawn, an electric resistance to govern said thermostatic detent, and connections actuated by the said withdrawal of said manually controlled means, to place said resistance in shunt across the lamp terminals.

MALCOLM H. BAKER.

Witnesses:
SILVIO AMOROSO,
WM. H. MITCHELL.