Dec. 16, 1941. R. A. MACDONALD 2,266,468

ELECTRIC SWITCH

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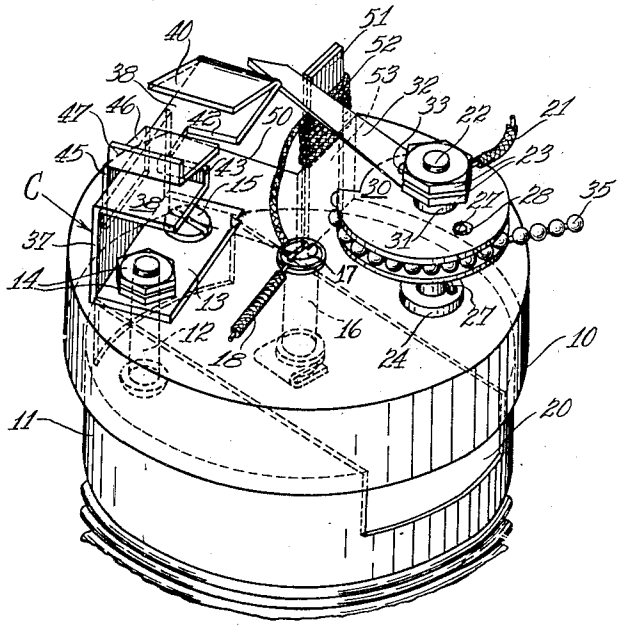


Fig. 1

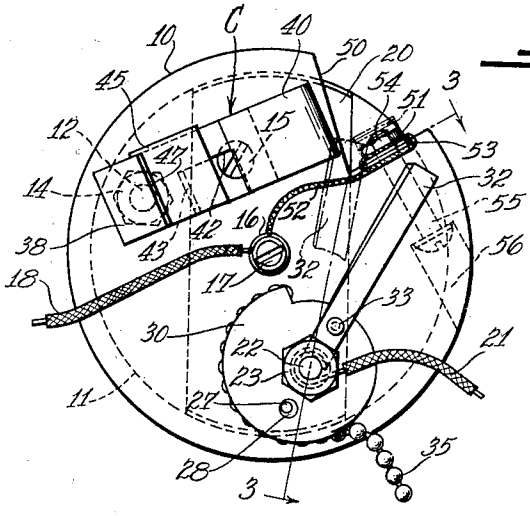


Fig. 2

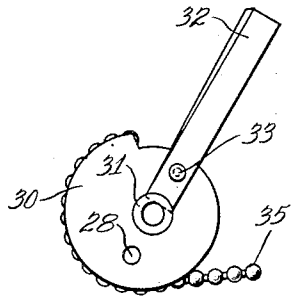


Fig. 4

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Fig. 3

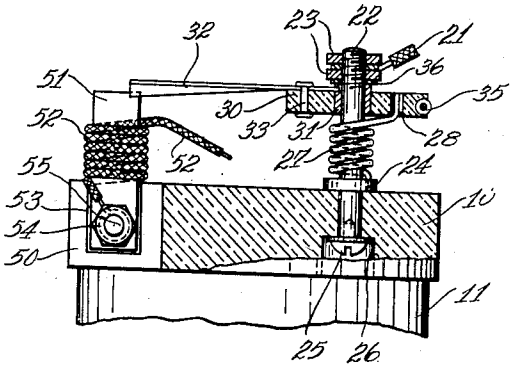
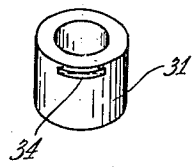


Fig. 5



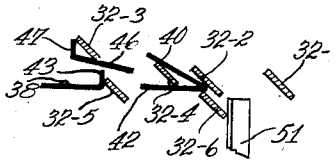


Fig. 6

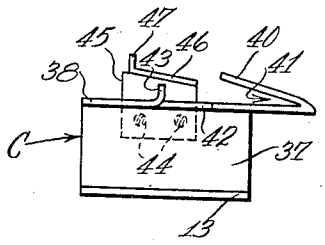


Fig. 7

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ELECTRIC SWITCH

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Application March 31, 1939, Serial No. 265,301

8 Claims. (Cl. 200—122)

The present invention relates to manually operable electric switches of the type having thermostatic timing controls. More particularly, my invention is concerned primarily with a device of this type associated with a lamp socket and designed in one of its positions to break the circuit through the lamp after a predetermined period.

Preferably, the parts of the switch and control mechanism are so designed and assembled that they may be incorporated readily within the usual two-piece external housing of a conventional pull-chain lamp socket; but it will be apparent as this discussion proceeds that the invention may be embodied in other forms of lamp sockets, and, in fact, in switches that are more or less remote from the lamp or other unit that is to be controlled.

It is the primary object of the present invention to devise an improved switch of this general character that is compact, sturdy, positive and reliable in operation, and yet that can be placed on the market for sale at low cost. An object is to provide a lamp socket switch with a thermostat control in such manner that the lamp does not become dimmed when a circuit is completed through the control unit. Another important object of my invention is to provide a lamp socket in which one or more of the switch elements are adjustable for obtaining and maintaining accuracy of relationship between movable parts. A further object is to so design the switch mechanism that the electrical connections for the wire terminals can be made conveniently.

Still another object of this invention resides in the provision of an upright thermostat unit that requires but a small part of the space above the switch-supporting block.

It is also an object to make the thermostat unit readily replaceable and, in fact, to devise a standard switch assembly that may be made for conventional use without thermostatic control but to which a control unit may be added readily at the factory or by the ultimate purchaser.

It is a further object of my invention to provide an improved switch mechanism per se, in which no pawl and ratchet mechanism is required, the manually actuated contact element being simply oscillatable to and fro.

The foregoing and other objects will clearly appear from a study of the following detailed description when taken in conjunction with the accompanying drawings and the appended claims.

In the drawings:

Fig. 1 is a perspective view of a preferred form of my improved switch and control mechanism as mounted upon a block for incorporation in a conventional internally insulated two-piece lamp socket shell;

Fig. 2 is a top plan view of the device of Fig. 1, with the movable contact element in another position;

Fig. 3 is a sectional view taken vertically substantially along the line 3—3 of Fig. 2;

Fig. 4 is a detail view of the oscillating unit of Figs. 1–3;

Fig. 5 is an enlarged detail view of an element of the oscillating unit;

Fig. 6 is a diagrammatic representation of the several circuit making and breaking elements, and depicts the positions or path of travel of the oscillating contact element as it goes through a complete cycle; and

Fig. 7 is a detail view of the fixed contact element.

In the drawings, wherein like characters are employed to designate like parts and wherein the two-part housing shell has been omitted for clarity and because its structure has become so well known, there is shown a switch and control mechanism mounted upon a cylindrical block 10 that carries a conventional copper socket 11 designed to receive the screw-shaped end of an electric lamp in the usual manner. The block must be an electrical insulator and may be formed of vitreous substance, a molded resin, or other suitable material. It has several special apertures and recesses that may be formed by molding, cutting or other operations, depending upon the chosen material of which it is made.

The socket 11 is attached to the bottom of the block by fastening elements, one of which consists of a conducting screw 12 of brass or the like that has its upper threaded end extending through a plate portion 13 of a contact assembly C which will be described in detail later. A pair of nuts 14 assist in anchoring the plate upon the block, the anchorage being completed by a screw 15. The plate 13 thus is in circuit with one end of the lamp filament when the lamp is screwed into the socket. The other side of the lamp filament is conventionally connected centrally of the socket 11 to an elongated conducting unit 16 that passes through the center of the block and includes a screw 17 for attaching the terminal of a lead wire 18 to its upper end. The socket is transversely slotted conventionally at

20 to avoid contact with the lower end of the unit 16.

The other lead wire 21 is brought like the lead 18 into the housing (not shown) in the usual way through a central aperture in the cap portion of the latter, and has its terminal connected to a metal post 22 by means of a pair of nuts 23 threaded onto the upper end of said post. Between its ends the post is provided with an integral collar 24 that is drawn firmly against the block by a screw 25 that engages the lower end of the post and the bottom of a recess 26 formed in the block 10. Provision of the recess assures absence of electrical contact between the post and the screw 25 and the socket 11.

The collar 24 has a hole, as shown, for reception of one end of a light coil spring 27 that surrounds the post, the other end of the spring extending into a hole 28 formed in a fibrous disc or plate 30. This disc snugly receives a metal conducting bushing 31 that is freely rotatable on a smooth cylindrical portion of the post. The bushing and the disc are rigidly united by a contact arm 32 that is riveted to the disc at 33 and locked at one square end to the bushing by means of a cross-cut slot 34 in the surface of the bushing. In this manner, the arm 32 is brought into electrical contact with the bushing while simultaneously holding the latter against rotation independently of the fibrous disc.

The spring 27 is under slight axial compression, and under sufficient torsion to tend to carry the arm 32 to its full line position of Fig. 2, where it may be in contact with a stop or with the insulating shell that conventionally lines the surrounding housing (not shown). The disc 30 has a peripheral groove, as shown, for reception of a conventional pull-chain 35 that has one end anchored to the disc and its other end designed to be pulled manually to oscillate the disc against the spring resistance. A conducting washer 36 (Fig. 3), is provided between the nuts 23 and the bushing 31.

The contact arm 32 has vertical spring or flexibility, and is of sufficient length to swing into circuit making and breaking cooperation with the upper structure of the contact assembly C. It will be perceived that when arm 32 contacts any part of this structure, a circuit will be established through lead 21, arm 32, assembly C, the socket 11, the lamp filament, the unit 16 and the lead 18; and that when such contact is eliminated the circuit is broken. The free end of the arm 32 is twisted about its axis as shown, for a purpose that will appear from the following description of the contact assembly C.

Above its anchoring plate 13, the assembly C comprises an integral upright wall 37 which in turn carries an integral horizontal platform 38 at about the level of the axis of the arm 32. The forward end of this platform is bent backwardly upon itself to form a cam 40 and a wedge-shaped pocket 41 (see also Fig. 7). To the rear of the cam 40 the platform is laterally slotted at 42 and bent on a transverse line to form a vertical upright wall 43. Preferably all of these parts are in one piece and the final shape is obtained by bending operations.

Secured to the wall 37, as by spot welding at 44, is the vertical wall 45 of an added guiding and abutment element comprising an integral sloping platform 46 and an integral vertical wall 47 that is parallel to the wall 43. For reasons about to appear, it is essential that the gap between parts 40 and 46 be less than the width of the free end of the arm 32, and that the length of the slot 42 be greater than the width of said free end.

When the chain 35 is pulled to oscillate the arm 32 counterclockwise, the leading or upturned edge of the outer end of the arm engages the lower part of cam 40 and causes the arm to deflect upwardly as it rides over the cam. The arm end drops onto the sloping platform 46 after over-riding the cam, and then is stopped by the abutment wall 47. The attendant or operator then releases the chain to permit the spring 27 to oscillate the arm 32 clockwise, and the arm end—due to its shape and deflection—then rides off the platform 46 and into the trapping pocket 41, where it will remain to maintain a lighting circuit until the chain is pulled again.

To turn off the light, the operator gives the chain a second pull, causing the arm end to move rearwardly against the vertical stop wall 43. In doing this, it passes the slot 42, which permits the arm end to drop slightly to its natural position or initial level, so that its trailing edge now is lower than the platform 38. Therefore, when the chain is released the arm will avoid the pocket 41 and travel below the latter and the platform 38, thus permitting the spring 27 to return the arm 32 toward its initial broken-circuit position. In the preferred and illustrated arrangement, however, automatic means is interposed in the path of the swinging arm to hold it from complete return for a predetermined time interval so that the lamp will not immediately be cut out of the circuit. This means comprises a thermostat constructed and arranged as follows.

A notch 50 is cut or otherwise formed in the block 10 so that the arm 32 must swing over the notch in passing to its "on" and "off" positions. A thermostat unit, in the form of an elongated bimetallic element 51 wrapped with a coil of resistance wire 52, is disposed in upright position against one wall of the notch within a rectangular recess 53 by means of a nut 54 that is received by the threaded end of a screw 55. The screw extends through a portion of the block and has its head disposed within a block recess 56. One end of the coil 52, which is covered with heat-resistant insulation, is secured in contact with the bimetallic element, and its other end is connected to the center terminal 16 of the lamp socket by the screw 17. Therefore, when the arm 32 engages both the assembly C and the element 51 (as in Fig. 1) the coil 52 is energized to heat the element 51, thereby causing the latter to bend away from the supporting wall at its upper end into the broken line position shown in Fig. 2.

The coil 52 may comprise bare wire surrounding an asbestos sheath enclosing the bimetallic element 51, and it is understood that any suitable or equivalent arrangement may be provided. Preferably the arm 32 remains in contact with the cam assembly C when its trailing edge engages the bimetallic element, and the coil 52 is wired in parallel with the lamp, so that the current for lamp illumination does not pass through the coil. Therefore, the lamp is not dimmed during the heating period. By notching the block to receive the bimetallic element and by securing the later to the block adjacent its lower end, vertical compactness of the device is assured without detracting from the deflection range of the upper end of said element. In other words, a desirably long element is utilized which readily flexes into its broken line position, when heated, to release the contact arm 32 and permit said arm to return to its initial position.

The operation of the described mechanism now should be fairly obvious, but it may be helpful to summarize it with reference to the diagrammatic view of Fig. 6, wherein the curved end of arm **32** is shown in six important positions. From its initial open circuit position 32—1 the contact arm clears or rides over the element 51 and reaches the position 32—2 where its upper or leading edge strikes the cam surface 40. It slides over the surface 40 and rides on the platform 46 into engagement with the stop 47, position 32—3. It has been deflected upwardly and accordingly, upon its return movement, it snaps into the pocket 41, position 32—4, where it will remain to keep the circuit closed indefinitely until the operating chain is pulled again.

The second pull on the chain throws the arm end into position 32—5, and when the chain is released said end moves to position 32—6, its lower edge clearing the platform 38 and its upper edge being in yielding contact with the platform. The lower edge also engages the element 51 with insufficient force to thrust the latter out of the way. However, a circuit through the shunted coil 52 now has been completed so that after a predetermined interval the latter has heated the element 51 sufficiently to cause it to flex and permit the arm end to return to its initial position 32—1.

It will be perceived that accuracy of relationship of the arm 32 to the other contacts may be obtained and maintained by varying the height of the bushing 31, which is freely slidable on its supporting post. This adjustment is effected by turning the nuts 23 a slight amount in the proper direction.

It is to be understood that the invention is not limited to the particular construction herein shown and described as various changes that may be made in the design, shape and relative arrangement of the parts fall within the spirit of my invention as set forth in the following claims.

I claim:

1. A lamp socket switch comprising a substantially cylindrical insulating block carrying a conventional lamp socket at one of its ends, an oscillating element arranged at the other end on an axis substantially parallel to that of the block, said element carrying a contact member that is connected to one side of a power line, a contact assembly mounted on said block in laterally offset relation to said element and electrically connected to said socket, means disposed substantially centrally of said block in connection with the other side of the line and designed to make contact with one end of the lamp filament, means yieldingly biasing said oscillating element to carry said contact member away from the contact assembly, and manually operable means for swinging said element to bring said contact member towards and into cooperation with said contact assembly, said assembly including means for trapping and holding said contact member on every alternate swing of said oscillating element against the resistance of said biasing means.

2. In the switch defined in claim 1, automatic timing means disposed below the path of said contact member in moving from the initial position thereof to said assembly, said switch assembly including means to depress said contact member into engagement with said automatic timing means as said contact member moves from said assembly towards its initial position, thereby to prevent immediate conductive disengagement of said contact member from said assembly and return of said contact member to initial position when freed from said trapping and holding means.

3. A thermostatically controlled electric switch comprising sets of line terminals and of load terminal members, a pair of contacts cooperable to close and open a main circuit through said line terminals and load terminal members, one of said contacts being movable and the other being stationary and designed to catch and hold said movable contact, means tending to separate the contacts, means operable to release said movable contact, and a thermostat device disposed in the path of said movable contact and designed to prevent complete separation of the contacts under normal temperature, said device including an electrical heating unit connected in parallel with the main circuit through the closed contacts.

4. A switch as claimed in claim 5, wherein said thermostat device includes a retractible temperature-responsive element positioned adjacent said stationary contact to maintain the movable contact temporarily in engagement with the stationary contact after said movable contact has been released.

5. A thermostatically controlled electric switch comprising a block carrying a stationary contact member and a second contact member movable into engagement therewith from an initial open-circuit position, a bimetallic element disposed substantially perpendicular to the path of said movable member with one end secured to said block and with the other end free and disposed substantially in said path, said contact members being so designed and arranged relative to the free end of said element that said movable member may readily pass said free end when approaching the stationary member but cannot immediately pass said free end when returning toward initial position, and means for heating said element electrically to cause it to move out of said path after a predetermined interval of engagement with said movable member.

6. A switch as claimed in claim 5, wherein said movable member comprises a spring arm having its free end twisted about the arm axis, and said stationary member engages said twisted end during return of the spring arm to initial position to force the spring arm into engagement with said bimetallic element.

7. An electric switch of the character described comprising an insulating block for carrying terminal connections and operating parts, a stationary assembly mounted on one side of said block and including a contact member spaced appreciably from the block, a post secured to the block in offset relation to said assembly and projecting beyond the latter in a direction away from the block, a second contact pivotally supported on said post to swing into and out of engagement with the first mentioned assembly, automatic timing means disposed in the path of said second contact between said stationary contact and the initial position of said second contact, and means for adjusting said second contact axially of said post.

8. An electric switch as claimed in claim 7, wherein said adjusting means comprises a spring urging said second contact outwardly of said post, and threaded means screwed onto the projecting end of the post.

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