

March 12, 1940.

H. CATRON ET AL

2,193,268

LIGHTING SWITCH

Filed May 15, 1937

2 Sheets-Sheet 1

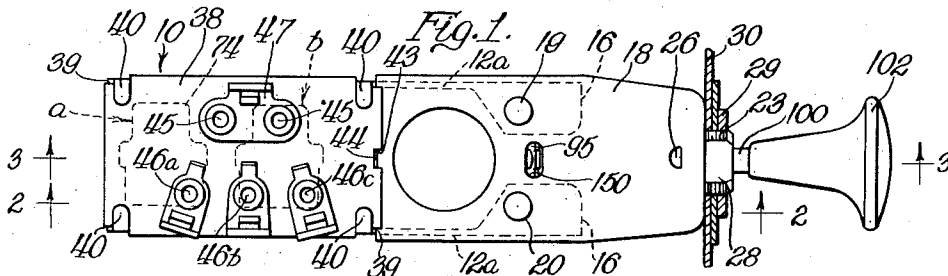


Fig. 5.

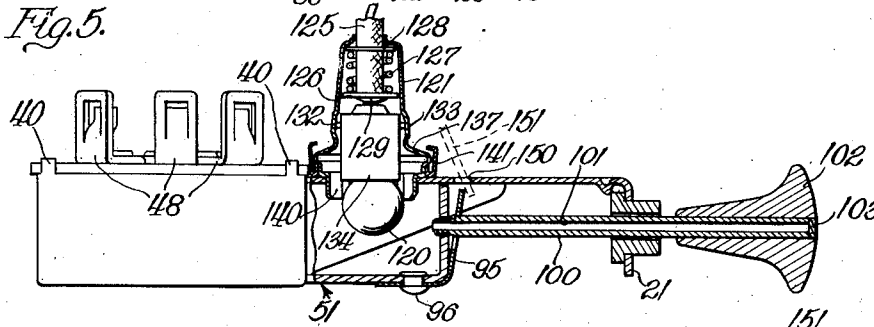


Fig. 6.

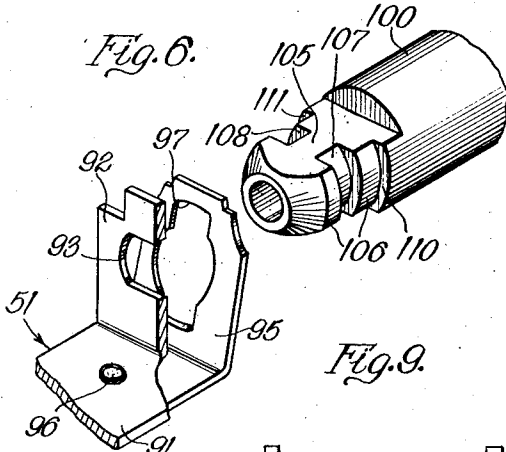
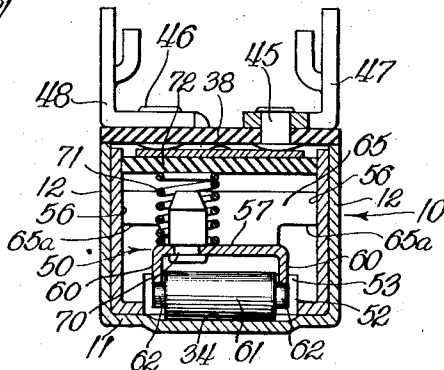


Fig. 9.



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Fig. 7.

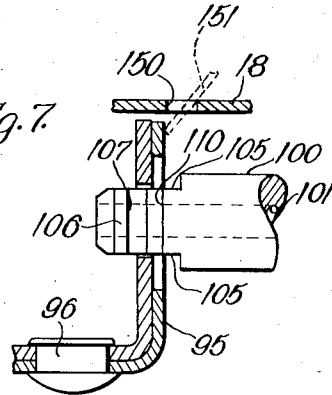
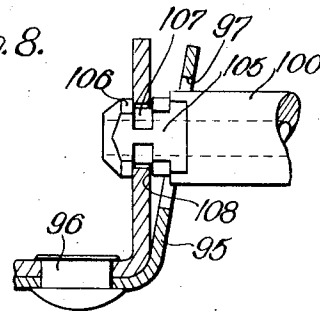


Fig. 8.



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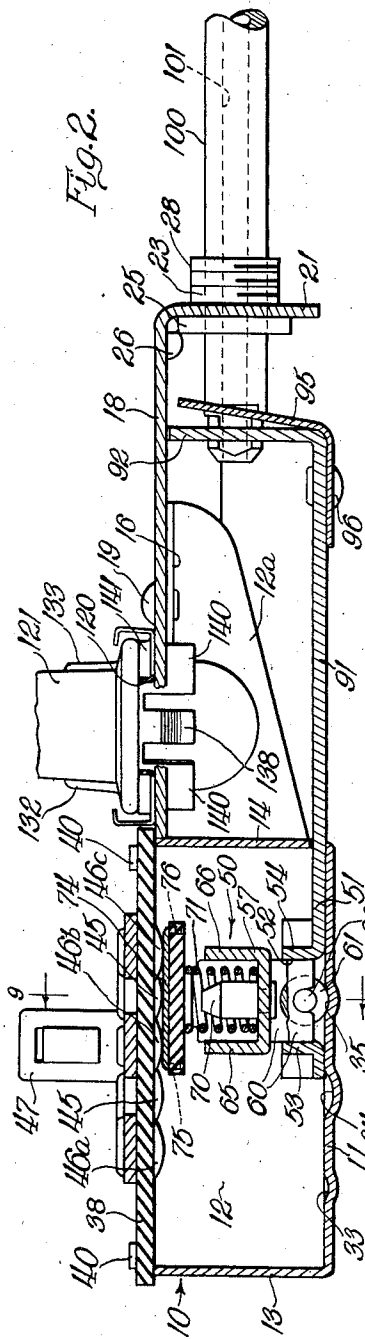
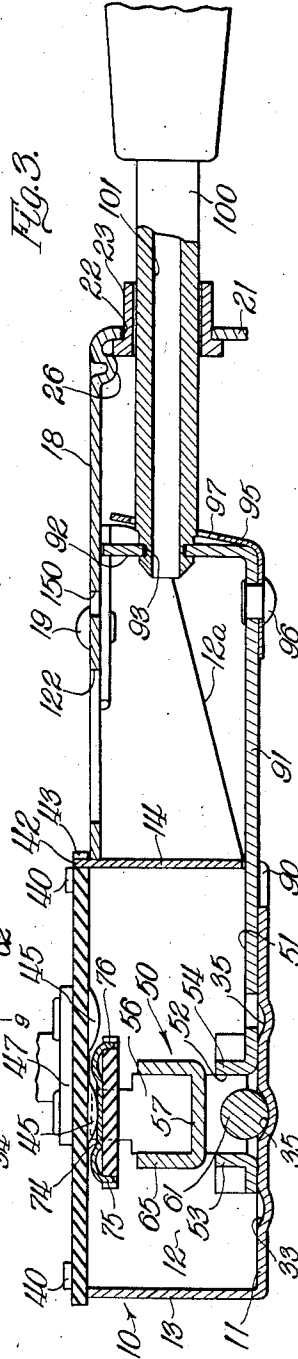
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,193,268

LIGHTING SWITCH

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11 Claims. (Cl. 200—16)

The present invention relates generally to lighting switches of the type in which the switch unit is mounted on the back side of a panel and is controlled by a member extending on the forward side thereof and in which the operating member is detachable from the switch mechanism, and in which the latter is capable of being disposed in a plurality of positions.

The principal object of the present invention is the provision of switch mechanism of this character in which a positive indication is afforded when the switch mechanism is in one of its positions and in which the operating rod or other member is conveniently detachable from the switch mechanism so as to facilitate mounting of the switch unit in position and the subsequent insertion and connection of the operating means with the movable part or parts of the switch unit.

Another object of the present invention is the provision of simple and convenient means for illuminating a portion of the operating knob, by which the switch unit is controlled, for indicating the position of some part, such as the usual foot dimming switch. Another object of the present invention in this connection is the mounting of the lamp on the bracket that holds the switch unit in position on the back side of a panel or the like and in such a position that light from the lamp passes through a hollow or axially bored operating member so as to furnish an indication on the forward side of the panel.

A further object of the present invention is the provision of a new and improved means for interconnecting the inner end of the operating rod with the movable part or parts of the switch unit after the latter has been installed in position, and it is a further object of the present invention in this connection to provide means whereby the connection between the operating rod and the switch unit may be disconnected easily and conveniently.

These and other objects and advantages of the present invention will be apparent to those skilled in the art after a consideration of the following detailed description, taken in conjunction with the accompanying drawings which illustrate the preferred structural embodiment of our invention.

Referring now to the drawings:

Figure 1 is a top view of a switch assembly embodying the principles of the present invention;

Figure 2 is a section taken along the line 2—2 of Figure 1, showing the movable switch contact

and associated parts in one of their "on" positions;

Figure 3 is a section taken along the line 3—3 of Figure 1, showing the movable contact in an intermediate position;

Figure 4 is a side view with parts broken away to show the switch parts in their "off" position;

Figure 5 is a side view with parts broken away to illustrate the manner in which the knob may be illuminated;

Figure 6 is a perspective view showing the relative positions of the shiftable contact carrier and the operating rod when the latter is to be attached to the carrier;

Figure 7 is a fragmentary sectional view showing the operating rod inserted in the opening in the outer end of the contact carrier but before it has been rotated into its interlocked position;

Figure 8 is a view similar to Figure 7 but showing the operating rod interlocked with the carrier; and

Figure 9 is a transverse section taken along the line 9—9 of Figure 2.

Referring now to the drawings, more particularly to Figures 1, 2 and 9, the reference numeral 10 indicates the switch case as a whole, which is generally of rectangular formation having a bottom wall 11, side walls 12, and end walls 13 and 14. The side walls are extended forwardly, as at 12a, and at their forward ends have inwardly bent lugs 16. A mounting or attaching bracket 18 of generally channel section is riveted, as at 19 and 20, to the side wall lugs 16 and has its forward end formed with a downwardly bent attaching lug 21 provided with a laterally elongated opening 22 in which a threaded collar 23 is disposed. The collar 23 has a head 25 formed thereon, and a downwardly projected portion 26 is formed in the forward end of the bracket 18 after the attaching collar or bushing 23 is in place, the projection 26 cooperating with the head 25, as best shown in Figure 3, to hold the collar 23 in position. The member 23 is flattened as indicated at 28 in Figure 1, so as to fit in the laterally elongated opening 22 and to be held against rotation therein. A nut 29 is screwed onto the threaded portion of the collar or bushing 23 and securely attaches the bracket 18 to a supporting panel 30 (Figure 1) or other part.

A bottom wall 11 of the switch case 10 is formed with a plurality of depressions 33, 34 and 35, one of which, 34, is larger than the others, as will be referred to later, and the upper portion of the switch case 10 is closed by an insulator terminal

block 38 the corners of which are notched, as at 39 (Figure 1) to receive ears 40 which are formed on the side walls 12 of the switch case 10 and are bent over to effectively secure the terminal block 38 to the switch case 10. The forward wall 14 of the casing 10 carries an upwardly extending lug 42 which is adapted to be received in a notch 43 formed in the forward central portion of the terminal block 38 for the purpose of insuring that the block will be mounted in the right position on the switch case 10. The terminal block 38 carries a number of stationary contacts of any suitable or desired type, and for purposes of illustration we have shown a pair of contacts 45 and three individual contacts 46a, 46b and 46c, each in the form of headed rivets mounted on the terminal block 38 and serving to fix the associated terminals 47 and 48 in place on the outer side of the terminal block 38. It is to be understood, however, that any suitable or desirable arrangement and number of contacts and terminals may be provided as required.

A shiftable contact unit, indicated in its entirety by the reference numeral 50, is disposed and shiftable in a switch case 10, and comprises a contact carrier 51 having its inner end formed with an opening 52 therein with flanges 53 and 54 extending upwardly on opposite sides thereof. The sides of the inner end of the contact carrier 51 are formed with upwardly extending generally parallel arms 56 between which a cage or saddle 57 is disposed. The saddle 57 is movable vertically between the arms 56 and has a pair of notched downwardly extending lugs 60 at opposite ends embracing and receiving a roller 61, the latter having reduced ends 62 disposed in the notched lugs 60. The cage or saddle 57 also has side sections 65 and 66 which are extended, as at 65a and 66a, so as to lie on opposite sides of the carrier arms 56 to thereby serve as guides for the vertical movement of the roller cage or saddle 57. The cage 57 carries a spring locating pin 70 which receives the lower end of a spring 71. The upper end of the spring 71 bears against a contact support block 72, the ends of which are notched, as at 73 (Figure 4), to embrace the upper reduced portions of the arms 56. A contact plate 74 is carried by the insulator block 72 and has ears 75 and 76 (Figure 2) embracing the block 72 and disposed in notches cut in the side thereof. Since the roller 61 is carried at the lower portion of the cage 57 and the spring 71 bears against the cage at its lower end and against the contact block 72 at its upper end, the spring 71 serves the dual purpose of urging the roller 61 downwardly into one of the notches 33, 34 or 35 and also forcing a contact plate 74 up into firm engagement with one or more of the contacts 45, 46, according to the position of the shiftable contact unit 50.

When the roller 61 seats in one of the depressions 33, 34 or 35 the shiftable switch unit 50 is yieldingly held in that position under the bias exerted by the spring 71. The intermediate depression 34 is purposely made somewhat larger than the other depressions in order to afford the user an indication as to the position in which the switch mechanism is disposed and also serves as additional resistance against the accidental displacement of the switch mechanism out of position. By having the first depression more shallow than the deeper intermediate one, it is easier to operate the switch, and also each po-

sition is distinct from the other. As is obvious, however, more than three depressions may be provided and any one or more of the depressions may be made larger than the others, according to the arrangement of contacts and function of the switch unit. For example, in a four position switch there may be two or more of the larger depressions.

The forward end of the bottom wall 11 and the lower portion of the front end wall 14 is formed with an opening 90 out of which extends the forward end 91 of the contact carrier 51. An upwardly bent arm or lug 92 is formed on the forward portion 91 of the contact carrier and has a laterally elongated opening 93 in line with the opening in the threaded attaching collar 23. A spring 95 is riveted, as at 96, to the forward end of the contact carrier section 91 and is biased to take a position at an angle to the lug 92. The end of the spring 95 is provided with a vertically elongated opening 97 (Figure 6) appreciably larger than the opening 93 but similarly in line with the axis of the collar 23.

The means for shifting the contact carrier unit from one position to another comprises an operating rod 100 having an axially extending bore 101 extending therethrough. The outer end of the operating rod or shaft 100 carries a knob 102 having a translucent section 103 (Figure 5) in line with the bore 101 in the rod 100. The outer end of the latter and the knob 102 carried thereby is disposed on the front side of the panel 30. The inner end of the operating rod or shaft 100 is flattened as at 105 and includes a portion 106 of reduced diameter, and the intermediate portion of the reduced portion 106 has slots 107 and 108 formed therein, as best shown in Figure 6. The flattened section 105 extends axially outwardly a short distance beyond the portion 106 of reduced diameter, which leaves axially projecting shoulders 110 and 111.

After the switch unit has been attached on the back side of the panel 30 and the fastening nut 29 tightened, the operating shaft or rod 100 is inserted from the front of the panel by passing the rod through the opening in the collar 23 and towards the forward end of the contact carrier 50. Initially, the rod 100 is brought toward the forward end 92 of the contact carrier in the position shown in Figure 6, that is, with the flattened sections 106 at the inner end of the rod 100 held in a horizontal position. The diameter of the central portion of the opening 97 in the spring 95 is large enough to admit the reduced end 106, and likewise the longer dimension of the opening 93 in the lug 92 is sufficient to admit the inner portion of the flattened forward end of the rod 100. In moving to this position, however, the shoulders 110 and 111 come up against the spring 95, but continued inward motion of the rod 100 bends the spring 95 backwardly until it lies against the front face of the lug 92, as best shown in Figure 7. This movement of the rod 100 forces the rear end of the contact carrier 50 up against the rear wall 13 of the switch case if the switch contact carrier 50 is not already in that position. As soon as the spring 95 has been brought substantially to the position shown in Figure 7, the slots 107 and 108 are in the same plane as the lug 92. This permits the rod 100 to be turned through 90° and causes the slotted sections 107 and 108 to engage the opposite sides of the opening 93 in the lug 92, which inter-

locks the operating rod with the forward portion 91 of the contact carrier 51. At the same time, the elongated opening 97 in the spring 95 snaps over the shoulders 110 and 111 and serves to prevent any accidental rotation of the operating rod 100 about its own axis, thereby locking the rod 100 in interengaged relation with the movable switch unit 50.

It will be noted that the connection between the operating rod on the forward side of the panel 30 and the movable switch unit 50 on the back side thereof is established simply by a forward and rotational movement of the member 100. Longitudinal movement of the rod 100 then serves to shift the movable switch unit 50 from one position to another, the unit being held in any selected position by the action of the spring 71 forcing the roller saddle or cage 57 and the roller 51 downwardly so as to cause the roller to seat in the associated depression in the bottom wall 11 of the switch case 10. In order to indicate when the movable switch unit 50 is in one of its positions, one of the associated depressions is made somewhat larger than the others so as to require the exertion of slight additional force in moving the switch out of position.

It may also be desirable to afford a visual indication of the condition, that is, whether or not it is on, or whether it is disposed in some particular position of the several positions available, of a switch, such as the usual foot dimming switch or any other switch including the above described switch, and to this end the present invention contemplates the disposition of a lamp 120 carried in a socket 121 supported in any suitable manner in an opening 122 in the rear portion of the mounting bracket 18, between the inner end of the tubular operating rod 100 and the front wall 14 of the switch case in the innermost position of the shiftable contact unit. The present invention is not particularly concerned with the construction of the lamp socket, but as best shown in Figure 5, the socket 121 consists of a sleeve-like member having an opening at one end surrounding a conductor 125 and receiving a washer 126 against which a spring 127 bears, the other end of the spring seating against an insulating washer 128 through which the conductor 125 extends. The conductor 125 terminates in a contact head 123. The center contact of the lamp 120 is adapted to engage the contact head 123, and the sleeve member 121 is provided with bayonet grooves 132 and 133 accommodating the conventional fastening studs carried on the base 134 of the lamp 120. The outer end of the socket 121 is formed with a shouldered section 137 and a plurality of spring arms 138 which serves to releasably hold the socket 121 in position. Preferably, although not necessarily, the spring arms 138 are formed in a flange 140 on the lower or outer end of the socket 121. If desired, a collar 141 may be provided to insure that the filament of the lamp 120 shall be in proper position with respect to the axial opening 101 extending through the operating rod 100 so that light therefrom will pass through the bore 101 and illuminate the knob section 103.

In operation, the shiftable switch unit 50 is moved from one position to another by pushing or pulling on the knob 102. In the innermost position of the latter, as shown in Figures 4 and 5, the unit 50 is in its "off" position, and the corresponding position of the contact plate 74

is shown at *a* in dotted lines in Figure 1. It will be noted that the contact plate 74 engages only the contact 45a and does not engage either of the other contacts 45. The roller 51 seats in the groove 33 and serves to hold the switch in this position but yields to permit the knob to be pulled out so as to provide for the movement of the switch unit 50 into an "on" position, such as the one shown in Figure 3. In this position the roller 51 seats in the largest depression 34 and connects the contacts 46a and 46b with the terminal 47 through one of the contacts 45. Since the depression 34 is larger than the others, it takes a somewhat stronger pull on the knob to shift the switch unit into its third position, shown in Figure 2, in which the contact plate 74 connects the contacts 46b and 46c with the terminal 47 through the other contact 45. The spring 71 biases the roller 51 to engage the notch or groove 35 so as to yieldingly hold the switch unit in this position. The position of the contact plate 74 corresponding to this position of the switch is indicated at *b*. The connector 125 may be so connected as to cause the lamp 120 to be illuminated when the switch unit is in one of its "on" positions, as desired. In Figure 3, the lamp 120 and associated parts have been eliminated for purposes of clarity.

When it is desired to remove the switch from the panel 30, it is necessary only to disconnect the knob at its operating shaft 100 from the switch unit and then remove the nut 29. In order to disconnect the operating rod 100, the attaching bracket 18 is provided with an opening 150 (Figures 5 and 7) adjacent the end of the spring 95 when the contact carrier 51 is in its innermost position, as shown in Figures 4 and 5. A tool, such as a small screw-driver, indicated in dotted lines by the reference numeral 151, is then inserted so as to engage the end of the spring 95 to pry the spring backwardly until it is in a position (Figure 7) to permit the operating rod 100 to be turned from this position shown in Figure 8 back to the position shown in Figure 7 with the flat portions 105 horizontal, and when the rod 100 is in this position it may be withdrawn from the contact carrier 51 and removed from the panel without interference. The nut 29 is then unscrewed from the threaded bushing 23 and then the switch can be detached from the panel.

While we have shown and described above the preferred structural embodiment illustrating the principles of our invention, it is to be understood that our invention is not to be limited to the particular details shown and described above, but that, in fact, widely different means may be employed in the practice of the broader aspects of our invention.

What we claim, therefore, and desire to secure by Letters Patent is:

1. A switch comprising a unit adapted to be mounted on the back side of a panel or the like and including a movable element and a bracket adapted to be mounted over an opening in the panel, an operating rod adapted to be inserted through said opening into said unit from the front of said panel, cooperating means on said movable element and the inner end of said rod for interconnecting said element and rod, and spring means carried by and movable with said element and engaging said rod for yieldingly holding the latter engaged with said element.

2. A switch comprising a unit adapted to be mounted on the back side of a panel or the like

and including a movable element and a bracket adapted to be mounted over an opening in the panel, an operating rod adapted to be inserted through said opening into said unit from the front of said panel, the inner end of said rod being flattened and having a slot, a lug carried by said movable element and having a non-circular opening shaped to accommodate the insertion and rotation of the inner end of said rod so as to interlock the slot of the latter with said movable element, and means carried by said element for yieldingly holding said rod against rotation relative thereto so as to retain said rod and element in interlocked relation.

3. A lighting switch having a switch case, a longitudinally shiftable contact carrier having an apertured section, an operating rod having its inner end reduced, flattened and formed with a slot, the aperture of said carrier section and the end of said rod being formed so that when the end is inserted into said aperture and turned, the slot in said rod engages the edge of said apertured section to provide for operating said carrier by shifting said rod, and a spring member carried by said carrier and having an elongated opening receiving, and accommodating rotation of, the reduced end of said rod and adapted to engage the flattened portion of said rod and prevent further rotation thereof after the rod has been rotated to cause said slot to interlock with said apertured carrier section.

4. A switch comprising a switch case having a plurality of elongated depressions in the bottom wall thereof, an insulating block carried by the switch case opposite the bottom wall, fixed contacts on said block, a carrier shiftable mounted in said switch case, a roller cage shiftable mounted in said carrier, a movable contact also shiftable mounted in said carrier, a roller having reduced ends, means on said cage receiving the reduced ends of said roller, and spring biased means acting between said movable contact and said roller cage for yieldingly holding said carrier in position.

5. A switch comprising a switch case having a plurality of depressions in the bottom wall thereof, a terminal block closing the upper portion of said switch case opposite the bottom wall and carrying fixed contacts, a carrier mounted in said switch case and movable over said depressions, said carrier having spaced arms thereon, a roller cage movably mounted on said arms and carrying a roller engageable in said depressions, a shiftable contact also mounted on said carrier arms and adapted to engage said fixed contacts, and spring means acting between said movable contact and said roller cage for maintaining said contacts in engagement and biasing said roller to enter each of the depressions in the bottom wall of the switch case for yieldingly holding said carrier in each of its positions.

6. A switch comprising a switch case, an attaching bracket secured to said case, a longitudinally shiftable contact carrier, means limiting the movement of said carrier in one position, an operating rod for actuating said carrier, and means for releasably connecting the inner end of said rod to said carrier, including a spring member fixed to said carrier and engageable with said rod to hold the latter in interengagement with said carrier, said bracket having an opening therein disposed adjacent said spring in said one position of the carrier and providing for the insertion of a tool to move said spring away from said biased position while said carrier is held by

motion limiting means in said one position to release said operating rod from the carrier.

7. A lighting switch comprising an attaching bracket, a switch case fastened to said bracket, a longitudinally shiftable contact carrier having an apertured section, an operating rod having its inner end reduced, flattened and formed with a slot, the aperture of said carrier section and the end of said rod being formed so that when the end is inserted into said aperture and turned, the slot in said rod engages the edge of said apertured section to provide for operating said carrier by shifting said rod, and a spring member carried by said carrier and having an elongated opening receiving and accommodating rotation of the reduced end of said rod and adapted to engage the flattened portion of said rod and prevent further rotation thereof after the rod has been rotated to cause said slot to interlock with said apertured carrier section, said bracket having an opening formed therein adjacent said spring member when the carrier is in its innermost position, providing for the insertion of a tool to bend said spring member out of engagement with the flattened portion of the rod so as to provide for rotation of the latter to release the slotted portion of the rod from the aperture in said carrier section.

8. A switch comprising an attaching bracket, a switch case fastened to the inner portion of said bracket at one side thereof, switch mechanism carried by said switch case and including an outer movable section extending outwardly from said case in spaced relation with respect to said bracket and having an arm, a hollow operating rod having its inner end connected to said arm and its outer end extending outwardly of said mounting bracket, and a lamp carried by said bracket in line with the axis of said operating rod and generally between the outer movable switch section and said switch bracket and protected on two sides by the latter and said section, and a knob having a central translucent section fastened to the outer end of said operating rod over the axial opening therein and in a position to receive light passing through said opening from said lamp.

9. A switch comprising a supporting bracket having an attaching lug at one end, a switch case at the other end and including shiftable contact means, a movable carrier spaced from the bracket and extending at one end into the switch case and having a lug at the other end extending toward the bracket, a hollow operating shaft extending through said attaching lug and connected at its inner end to the lug on said carrier, a lamp socket detachably carried by said bracket inwardly of said operating shaft, a lamp in said socket disposed generally in line with said shaft in the space between the movable carrier and the bracket, and a knob on the outer end of said shaft adapted to be illuminated by light rays from said lamp passing through said hollow shaft.

10. A switch according to claim 9 wherein said lug is provided with an elongated aperture therein and said operating shaft is provided with an axial opening extending therethrough and a flattened slotted section adapted to enter said elongated opening in the outer end of said shiftable element and to be interengaged therewith, and a spring extending in the same general direction as said lug and cooperating with the flattened portion of said operating rod for maintaining the latter in interlocked relation with said shiftable element.

11. A switch comprising a switch case having spaced side wall extensions, a mounting bracket fixed at one end to said extensions and having its other end turned at substantially right angles to the main body of the mounting bracket and provided with an aperture therein, a reciprocable switch contact means movably mounted in said switch case and having a section extending exteriorly thereof generally parallel to but spaced from the body portion of said mounting bracket and an end turned at substantially right angles and extending toward the mounting bracket adjacent the apertured end of the latter, a hollow operating rod for reciprocating said switch contact means movably disposed in the aperture of the end of said mounting bracket and detachably

connected to the said end of the switch contact means, the axis of said rod lying between the body portion of said mounting bracket and the body portion of the extended section of the switch contact means, means on said end for holding the operating rod in engagement therewith and preventing the latter from being pulled out of the aperture in said mounting bracket, and a lamp carried by the mounting bracket in a position between said side wall extensions and also between the extended section of said switch contact means and the body portion of the mounting bracket and in line with the axis of said rod.

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