

Aug. 10, 1948.

W. SCHMID

2,446,789

ELECTRIC SWITCH

Filed June 16, 1944

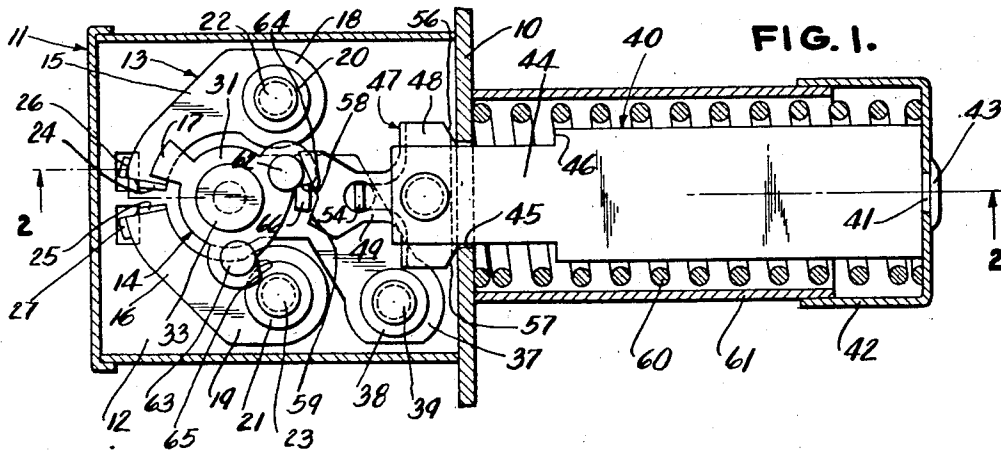


FIG. 1.

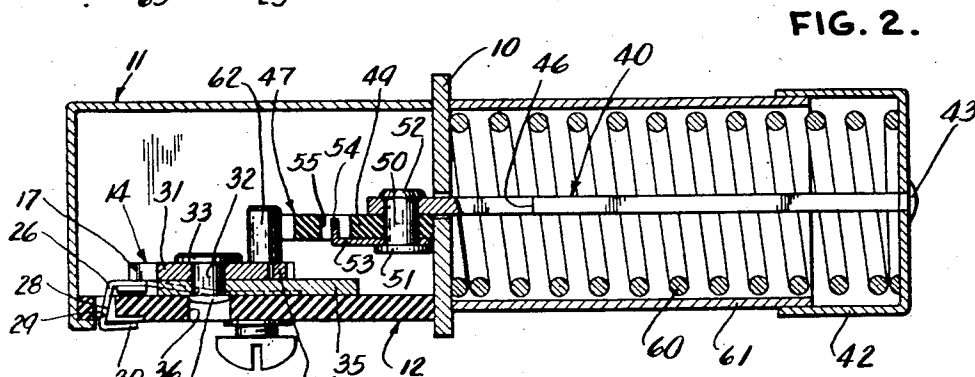


FIG. 2.

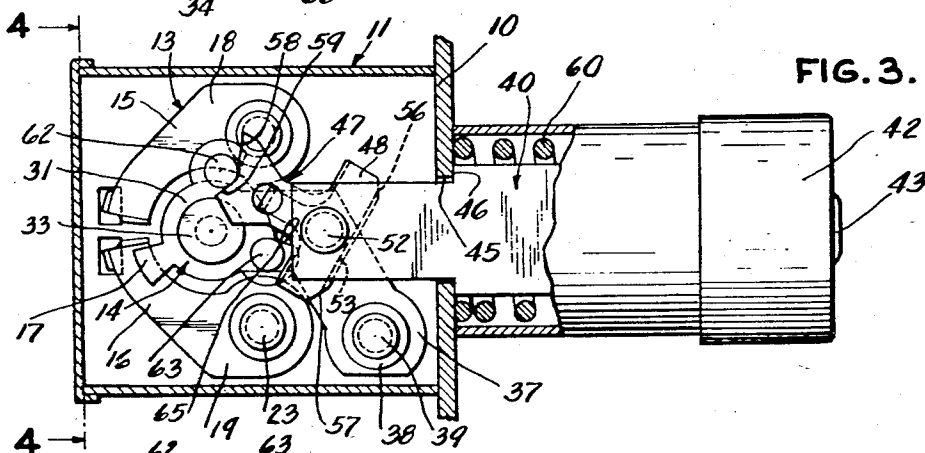


FIG. 3.

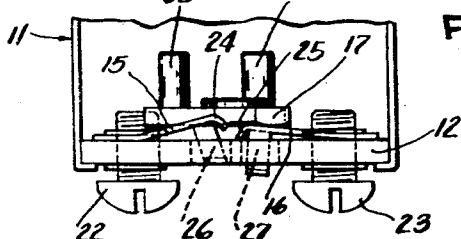


FIG. 4.

WILLIAM SCHMID
INVENTOR
BY *Treman, Sweet, Albrecht and Williams*
ATTORNEYS

UNITED STATES PATENT OFFICE

2,446,789

ELECTRIC SWITCH

William Schmid, Bronson, Mich.

Application June 16, 1944, Serial No. 540,642

5 Claims. (Cl. 200—6)

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This invention relates to electric switches, and is particularly adapted for embodiment in foot-operated switches such as are used for controlling the headlights of an automotive vehicle. The principal object of the invention is the provision of new and improved electric switches of these types.

In the drawing accompanying this specification and forming a part of this application, there is shown, for purposes of illustration, one embodiment of the invention and in this drawing:

Figure 1 shows a foot-operated switch embodying the invention, the casing and certain other parts being in section, to show the switch proper and its operating mechanism in elevation;

Figure 2 is a section taken on the line 2—2 of Figure 1, looking in the direction of the arrows;

Figure 3 is a view similar to Figure 1 but with the parts in an operating position; and

Figure 4 is a fragmentary view, taken on the line 4—4 of Figure 3, looking in the direction of the arrows, a part of the switch casing having been removed.

The switch may comprise a metal plate 10, fragmentarily shown, which may be fastened to the footboard of an automotive vehicle, or other support. The switch proper is contained in a casing 11 fastened in any suitable way to the plate 10. Suitably supported by the casing 11, and in this instance forming a wall thereof, is an insulating base 12 which carries relatively stationary contact means 13 and relatively movable contact means 14.

The relatively stationary contact means 13 comprises two spring contacts 15, 16, here shown as of arcuate form, extending toward each other from their places of support on the insulating base 12. The contacts 15, 16 are so bent or formed that the free ends thereof tend to spring away from the base 12. The relatively movable contact means 14 comprises a contact 17 adapted to cooperate with the contacts 15, 16. The under side of the contact 17 is desirably slightly rounded, as may be seen in Figure 4.

The relatively stationary contacts 15, 16 are here shown as having enlarged terminal parts 18, 19 which are tightly held to the base by tubular rivets 20, 21. Each rivet is internally threaded for receiving the respective screws 22, 23 whereby connecting wires (not shown) may be held in mechanical and electrical contact with the respective tubular rivets, and hence electrically connected to the respective contacts 15, 16. It will be understood that any other suitable form of connector may replace the screws 22, 23.

The relatively stationary contacts have beveled end portions 24, 25 to facilitate movement of the

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relatively movable contact 17 from one relatively stationary contact to the other, as will more fully appear. The contacts 15, 16 have stop portions 26, 27 each comprising an integral tongue having a part 28 bent approximately at right angles to the contact and extending through respective apertures 29 in the base 12, the terminal end 30 of each tongue being bent at approximately right angles to the part 28. With the relatively movable contact 17 in engagement with the relatively stationary contact 15, as shown in Figures 1 and 2, the contact 15 is flexed toward the base 12, so that the part 28 of the stop means 26 is moved through the aperture 29, and the part 30 is moved out of engagement with the base, as shown in Figure 2.

The relatively movable contact means 14 is here shown as comprising a central metal portion 31 on which the contact 17 forms an integral radial projection. The central portion 31 has an aperture through which is disposed a pivot pin 32 having a head 33 bearing against the central portion 31. The pin 32 is disposed through an aperture in a metal plate 35, and the end 34 of the pin is peened over. The base 12 may be provided with a hole or recess 36 for accommodating the peened over end 34. The pin 32 is desirably, but not necessarily, sufficiently peened over so that the movable contact means 14 is pulled against the plate 35 enough so that movement of the relatively movable contact means about the pivot pin 32 is frictionally restrained to the desired extent.

The plate 35 is here shown as formed with a portion 37 which has an aperture through which is disposed a tubular rivet 38 for fastening the plate to the base. Electrical connection may be made to the plate 35 by a screw 39 cooperating with an internal thread in the tubular rivet 38, as in the case of the tubular rivets 20, 21. Movement of the plate 35 about the tubular rivet 38 is prevented by engagement of the end 34 of the pin 32 with the sides of the aperture 36, or any other suitable means may be provided for that purpose.

The switch is provided with reciprocable operating means, here shown as including an elongated plate 40, one end of which has a tongue 41 extending through an aperture in the end of a cylindrical cap 42, the tongue having its end 43 riveted. The other end 44 of the elongated plate 40 is here shown as of reduced width and extending through an aperture 45 in the plate 10. The reduction in width provides a shoulder 46, adapted to engage the plate 10.

Pivotally mounted on the end 44 of the operating plate 40 is actuating means 47 comprising

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a generally T-shaped member of insulating material including a cross-bar portion 48 and a stem portion 49. The cross-bar 48 has an aperture through which is disposed the shank 50 of a pivot pin having a head 51. The end 52 of the shank 50 is peened over or riveted, the actuating means 47 being, however, left free to swing about the pivot pin 50. Desirably a metal plate 53 is interposed between the head 51 and the cross-bar 48, to reduce wear. The plate 53 may have a projection the end 54 of which is bent into a hole 55 in the stem 49, to prevent turning of the wear plate 53. The cross-bar 48 preferably has beveled corners 56, 57. The end of the stem 49 of the T-shaped actuating means for a V-shaped notch having surfaces 58, 59.

Means is provided to bias the operating means into the position shown in Figure 1, this means being here shown as a helical spring 60 surrounding the operating plate 40 and at one end engaging the inside of the end of the cap 42, and at the other end, the plate 10. Desirably the spring 60 is disposed in a tube 61 fastened in any suitable way to the plate 10. The cap 42 fits slidably over the free end of the tube 61. It will be evident that the spring 60, in biasing the operating plate 40 to the position shown in Figure 1, also holds the flat end surface of the cross-bar 48 of the actuating means 47 in engagement with the plate 10, and hence holds the actuating means 47 in the position shown in that figure.

Means is provided so that successive movements of the operating plate 40 from the normal position shown in Figure 1 into operating position causes the actuating means 47 successively to move the relatively movable contact means 14 from one of its positions to the other, this means comprising a pair of pins or projections 62, 63 secured on the relatively movable contact means 14 in any suitable way and extending away therefrom in the general direction of the axis of the pivot pin 32. The pins 62, 63 extend into the path of movement of the actuating means 47 as may be most clearly seen in Figure 2, and are circumferentially, desirably equally, spaced from a diameter defining the center of the contact 17.

The pins 62, 63 are here shown as disposed on a pair of projections extending radially outwardly from the central portion of the relatively movable contact means 14 and providing stop surfaces 64, 65 which are adapted to engage a stationary stop 66 suitably carried by the plate 35 and extending laterally therefrom.

The operation of the switch is as follows. If the parts are in the position shown in Figure 1 and the cap 42 is moved toward the left, as viewed in that figure, against the bias of the spring 60, the operating plate 40 will move the actuating means 47 toward the left and the surface 58 of the notch in the stem 49 will engage the pin 62. Further movement of the cap 42 will cause the actuating means 47 to swing clockwise about the pivot pin 50 until the pin 62 is in engagement with both of the surfaces 58, 59, and still further movement will cause the actuating means to move the relatively movable contact means 14 about its pivot pin 32 in a counter-clockwise direction. As the relatively movable contact 17 wipes counter-clockwise along the relatively stationary contact 15 it presses that contact downwardly slightly against the upward bias of the contact, and then engages the beveled portion of the relatively stationary contact 16 and presses that contact downwardly against the upward bias of the contact. In the mid-position of the rela-

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tively movable contact 17 it engages both of the relatively stationary contacts 15, 16. As the relatively movable contact 17 moves still further in a counter-clockwise direction, it leaves the relatively stationary contact 15 which then springs into the position shown in Figure 4, in which the stop portion 30 engages the base 12.

The counter-clockwise movement of the relatively movable contact 17 continues until the parts assume the position shown in Figures 3 and 4. In this position further movement of the operating plate 40 is stopped by engagement of the shoulder 46 with the plate 10.

The desired movement of the switch having been accomplished the cap 42 is released whereupon the spring 60 returns the operating plate 40 toward the right as viewed in Figure 3, and when the beveled surface 56 engages the plate 10 the actuating means 47 will be returned to the position shown in Figure 1, the relatively movable switch means 14 of course remaining in the position shown in Figures 3 and 4.

If now the cap 42 is again moved against the bias of the spring 60, the surface 59 of the notch in the actuating means 47 will engage the pin 63 and the relatively movable contact 17 will be moved clockwise from the position shown in Figure 3, into the position shown in Figure 1.

It will be apparent that when the relatively movable contact 17 is in the position shown in Figures 3 and 4, clockwise movement (as viewed in Figure 3) is frictionally resisted, and, on the other hand, there is a tendency of the relatively stationary contact 16 to move the relatively movable contact 17 counter-clockwise, so that vibration of the switch will not tend to move the relatively movable contact 17 off of the relatively stationary contact 16 toward the relatively stationary contact 15. Movement of the relatively movable contact 17 in the counter-clockwise direction in Figure 3 (toward the right as viewed in Figure 4) is stopped by engagement of the surface 65 with the stop 66. In like manner, when the contact 17 is in the position shown in Figure 1, counter-clockwise movement is frictionally resisted by the contact 15, and, on the other hand, the relatively stationary contact 15 tends to move the relatively movable contact 17 clockwise, and such movement is stopped by engagement of the surface 64 with the stop 66. Hence, the relatively movable contact 17, having been moved into either the position shown in Figure 1 or in Figure 4, will remain in these respective positions until moved by the actuating means 47. This construction eliminates the need for a separate spring and other cooperating parts for holding the relatively movable contact 17 in its respective positions, thus greatly simplifying the switch. The only spring required is the spring 60 for returning the operating means to its normal position.

The electrical connections of the switch for controlling the headlights of an automotive vehicle have not been shown, for the reason that those skilled in art will understand that when the contact 17 is in one of its positions the connections are such that the headlights will be dim, or the beam tilted, and in the other position the headlights will be bright, or the beam straight ahead.

It will be evident that the present construction provides a switch whereby the headlights are never out during the change from one condition to the other, since the contact 17 bridges the contacts 15, 16 in its mid-position.

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It will of course be apparent that a switch embodying the present invention may be used for any other desired purpose.

From the foregoing it will be apparent to those skilled in the art that the illustrated embodiment of the invention provides a new and improved electric switch, of few parts, easily and cheaply made and assemblable, and yet efficient, and accordingly, accomplishes the principal object of the invention. On the other hand, it also will be obvious to those skilled in the art that the illustrated embodiment of the invention may be variously changed and modified, or features thereof, singly or collectively, embodied in other combinations than that illustrated, without departing from the spirit of the invention, or sacrificing all of the advantages thereof, and that accordingly the disclosure herein is illustrative only, and the invention is not limited thereto.

I claim:

1. An electric switch, comprising: relatively stationary contact means; cooperating relatively movable contact means constructed and arranged for movement about a pivot from a first position to a second position; projections on said relatively movable contact means extending therefrom in the general direction of the axis of the pivot thereof; reciprocable operating means mounted for movement from a normal position into an operating position; actuating means, including a cam member pivotally carried by said operating means, so constructed and arranged that it has an intermediate position between two operating positions; and said actuating means and said projections being relatively so constructed and arranged that successive movements of said operating means into operating position causes said cam member successively to engage said projections respectively successively to move said relatively movable contact means from one of its positions to the other.

2. An electric switch, comprising: relatively stationary contact means; cooperating relatively movable contact means constructed and arranged for movement about a pivot from a first position to a second position; projections on said relatively movable contact means extending therefrom in the general direction of the axis of the pivot thereof; reciprocable operating means mounted for movement from a normal position into an operating position; actuating means, including a cam member pivotally carried by said operating means, said cam member having a V-shaped notch and being so constructed and arranged that it has an intermediate position between two operating positions; and said actuating means and said projections being relatively so constructed and arranged that successive movements of said operating means into operating position causes said V-shaped notch successively to engage said projections respectively successively to move said relatively movable contact means from one of its positions to the other.

3. An electric switch, comprising: relatively stationary contact means, including leaf spring contacts; cooperating relatively movable contact means, including a contact constructed and arranged for sliding engagement with said leaf spring contacts from a first position in which said relatively movable contact is in engagement with one of said leaf spring contacts to a second position in which said relatively movable contact is in engagement with the other of said leaf spring contacts; and said leaf spring contacts and said relatively movable contact being so constructed

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and arranged that as said relatively movable contact moves away from either of said positions the leaf spring contact with which it is in engagement is flexed to increase the force of engagement between said relatively movable contact and the respective leaf spring contact.

4. An electric switch, comprising: relatively stationary contact means, including leaf spring contacts; cooperating relatively movable contact means, including a contact constructed and arranged for sliding engagement with said leaf spring contacts from a first position in which said relatively movable contact is in engagement with one of said leaf spring contacts to a second position in which said relatively movable contact is in engagement with the other of said leaf spring contacts; said leaf spring contacts and said relatively movable contact being so constructed and arranged that as said relatively movable contact moves away from either of said positions the leaf spring contact with which it is in engagement is flexed to increase the force of engagement between said relatively movable contact and the respective leaf spring contact; reciprocable operating means mounted for movement from a normal position into an operating position; actuating means, carried by said operating means, so constructed and arranged that it has an intermediate position between two operating positions; means whereby successive movements of said operating means from normal position into operating position causes said actuating means successively to move said relatively movable contact means from one of its positions to the other; biasing means; and said biasing means and said operating means and said actuating means being relatively so constructed and arranged that said biasing means biases said operating means to said normal position and biases said actuating means to said intermediate position by movement of said operating means into normal position.

5. An electric switch, comprising: relatively stationary contact means, including a leaf spring contact; cooperating relatively movable contact means, including a contact constructed and arranged for sliding engagement with said leaf spring contact and movable in a first direction from a first position in which said relatively movable contact is in engagement with said leaf spring contact to a second position in which said relatively movable contact is out of engagement with said leaf spring contact; and said leaf spring contact and said relatively movable contact being so constructed and arranged that when said relatively movable contact is in said first position said leaf spring contact tends to cause movement of said relatively movable contact in a second direction opposite from said first direction; and means for stopping movement of said relatively movable contact in said second direction.

WILLIAM SCHMID.

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