June 29, 1937. M. W. MORRIS 2,085,539

SWITCH

Filed Aug. 18, 1934 2 Sheets-Sheet 1

Fig. 1.

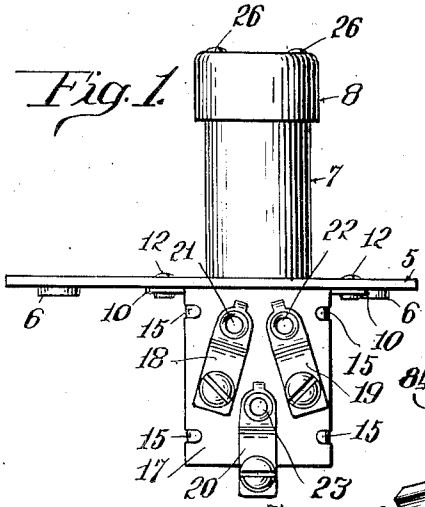


Fig. 4.

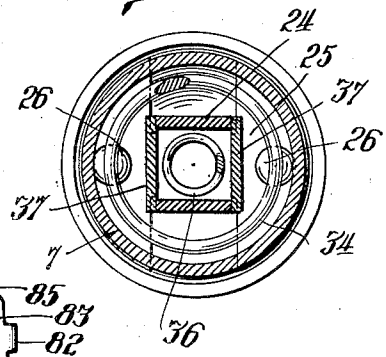


Fig. 9.

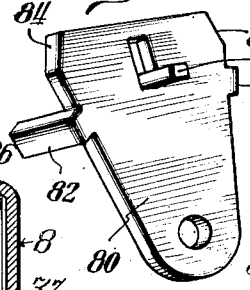


Fig. 2.

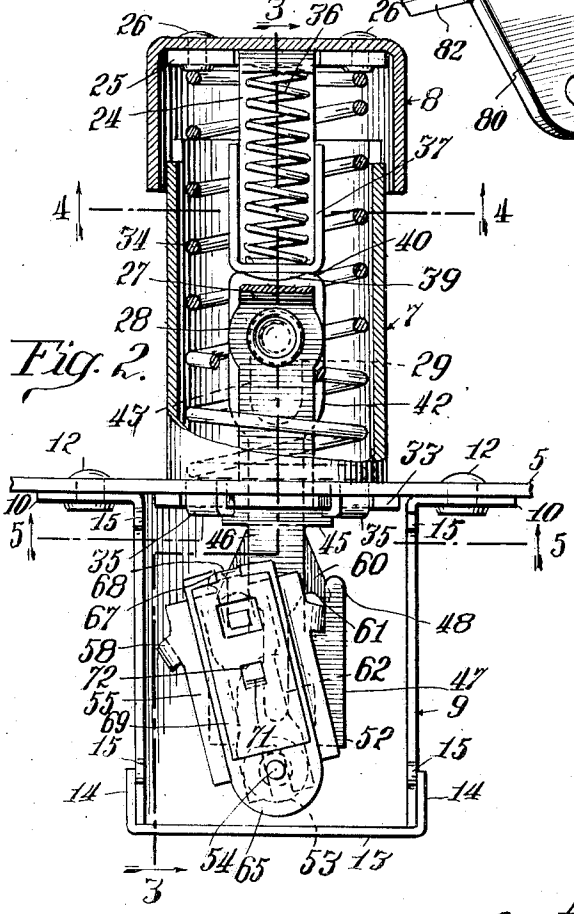
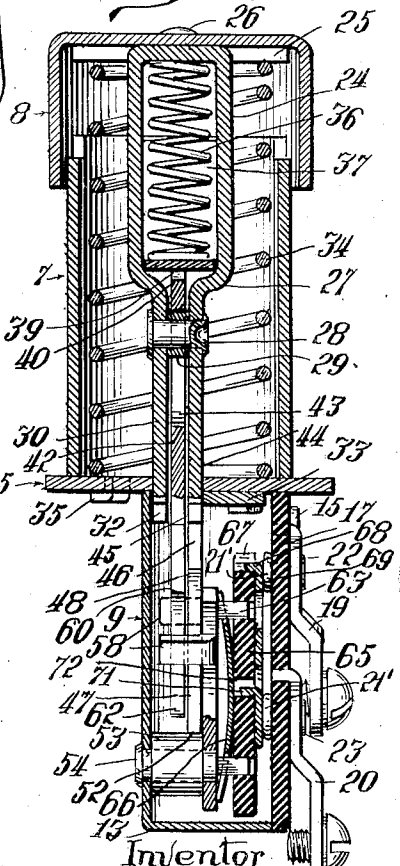


Fig. 3.



Inventor
Marion W. Morris.
By Brown Jackson Boettcher, Dienner
Attorneys.

June 29, 1937. M. W. MORRIS 2,085,539

SWITCH

Filed Aug. 18, 1934 2 Sheets-Sheet 2

Fig. 5.

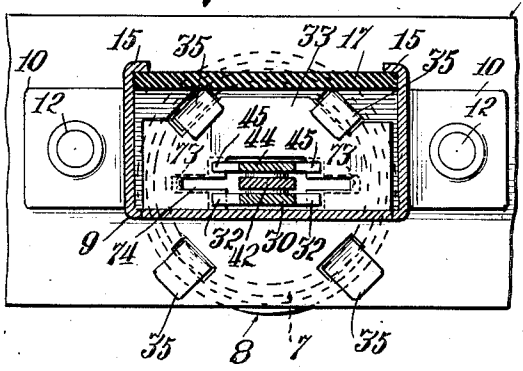


Fig. 6.

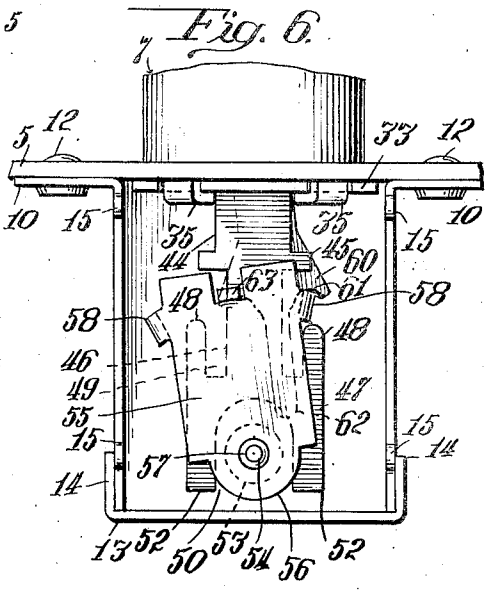


Fig. 7.

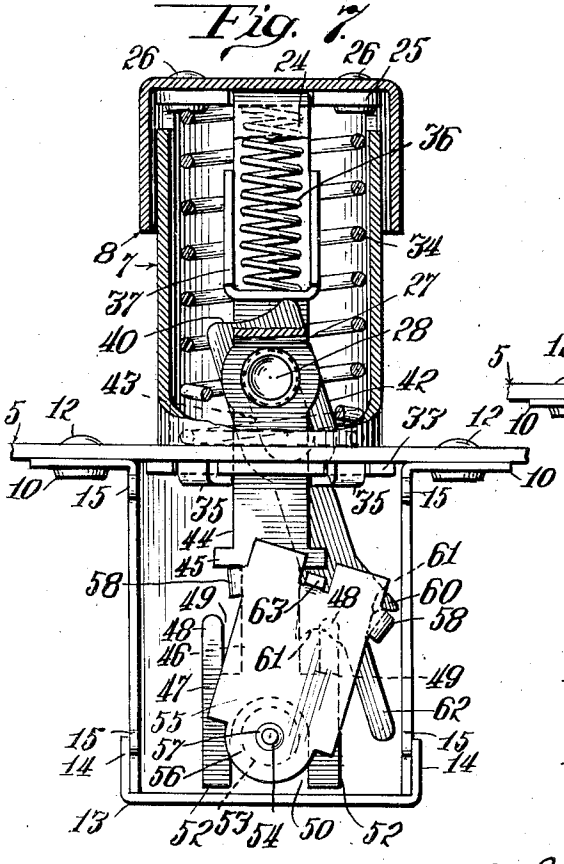
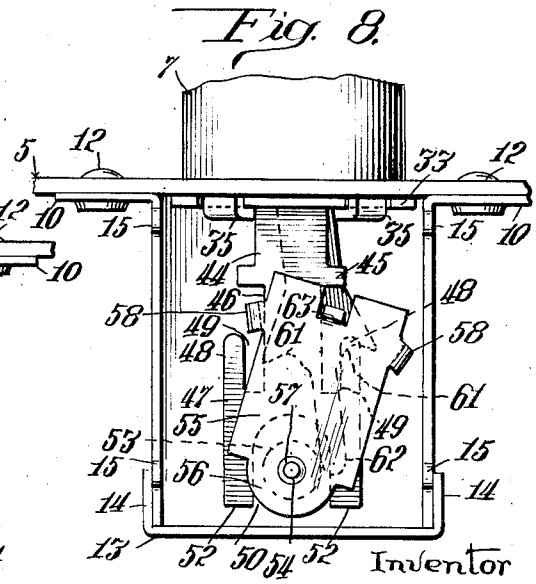


Fig. 8.



Inventor

Marion W. Morris

By Mauro Jacobson Bouleau & Dienner

Attorneys.

Patented June 29, 1937

2,085,539

UNITED STATES PATENT OFFICE

2,085,539

SWITCH

Marion W. Morris, Logansport, Ind., assignor to R-B-M Manufacturing Company, Logansport, Ind., a corporation of Indiana

Application August 18, 1934, Serial No. 740,375

19 Claims. (Cl. 200—11)

This invention relates to switches, and more particularly to dimming switches for automobiles or the like, in which the headlights of the vehicle are controlled by operation of the switch, the switch preferably being operated by pressure of the driver's foot. However, the principles underlying the construction and operation of this switch structure are equally applicable to switch structures employed for other purposes, such as wall switches for lights and the like.

In dimming switches of the type now in use with which I am familiar, the operation has been secured by rotation of a contact assembly, whereby contact is effected by alternating engagement of the contact assembly with terminals connected to the circuits controlling operation of the light. Rotation of the assembly has been secured by depression of a plunger member under control of the driver's foot, there being a ratchet mechanism or similar motion transmitting means providing for the successive step by step rotation of the contact assembly upon successive depression of the plunger. Such switch structures are subjected to rapid wear, and consequent faulty operation, since jamming of the ratchet mechanism is likely to occur, with consequent slippage of the plunger therepast, producing no actuation of the switch.

Further, the cost of manufacture and assembly of such switches is considerable, due to the necessity of precision in forming the ratchet mechanism, the machined shaft and supporting bearings, and other portions of the structure required by reason of the mode of construction and operation of that type of switch.

One of the primary objects of the present invention is the provision of a relatively cheap and economical switch structure of the plunger-operated type, which may be readily assembled, and the parts of which are almost entirely formed from sheet metal stampings requiring no machining or finishing operations.

Another object of the present invention is the provision of a switch of this type having relatively few parts, which are simple in design, and which operates in a positive and efficient manner.

Switches of this type are subject to hard and rough usage, due to the fact that they are foot operated, and are also subjected to considerable vibration, being mounted on the floor board of the vehicle. The present invention is adapted to provide a switch of rugged and sturdy design, which is snap-actuated from one position to the other, and which is positively locked in each of its operated positions to prevent displacement or disruption of the contact engagement due to vibrations or the like. This, together with the wiping action of the contact member across the contact terminals, provides a positive acting and efficient switch mechanism.

An additional advantage secured by the present invention is the separation, by means of suitable insulation, of the electrical circuit and contact terminals from any portion of the switch operating mechanism.

A further feature of the present invention is the provision of a contact bridging member which is spring-pressed into engagement with the contact terminals, to secure a positive wiping action thereacross during actuation of the switch, thus maintaining the contact surfaces clean and bright.

Another advantage secured by the present invention is the provision of a spring-controlled cam lever having a lost motion knuckle or toggle connection with the actuating plunger and carried thereby, the lever snapping the contact switching member positively from one of its operating positions to the other.

Other objects and advantages of the present invention will appear more fully from the following detailed description, which, taken in connection with the accompanying drawings, will disclose to those skilled in the art the particular construction and operation of a preferred form of my invention.

In the drawings:

Figure 1 is an elevational view of the switch structure of the present invention;

Figure 2 is an enlarged view, corresponding to Figure 1, and partly in section, with the terminal plate for the switch mechanism removed;

Figure 3 is a vertical sectional view of the switch structure, taken substantially along the line 3—3 of Figure 2;

Figure 4 is a cross-sectional view of the plunger structure, taken on line 4—4 of Figure 2;

Figure 5 is a cross-sectional view taken on line 5—5 of Figure 2, showing the manner of supporting the plunger upon the base plate;

Figure 6 is a fragmentary view of the switch operating mechanism, showing the mechanism passing through a position intermediate its operating positions, when the switch is being snapped from the position shown in Figure 2 to the other of its operating positions;

Figure 7 is a vertical sectional view of the plunger mechanism and switch housing, showing

the movement of the mechanism from the position shown in Figure 6 toward its other operating position.

Figure 8 is a fragmentary view showing the switch mechanism disposed in the other of its operating positions, with the plunger being returned into normal position to lock the switch mechanism in said other position; and

Figure 9 is a perspective view of a modified type of actuating plate.

Referring now in detail to the drawings, I provide a mounting plate for the switch structure, which plate is indicated at 5, and is provided with extruded openings 6, which are preferably threaded, for receiving means to secure the mounting plate to the floor board of a vehicle or in a similar operating position. Extending from one side of the plate 5 is the cylindrical member 7, which is secured by means to be described hereinafter to the plate 5, and which serves as a containing housing for the plunger mechanism.

An inverted cup-shaped operating cap 8 is provided, and extends coaxially of the cylindrical housing 7. The cap 8 is adapted to be engaged by the driver's foot, or by a similar actuating means, and is depressed or moved downwardly with respect to the cylindrical housing 7 to provide for actuation of the switch.

Disposed upon the opposite side of the base plate 5 is a switch housing, formed of a sheet metal stamping or the like, and indicated generally at 9, which housing has outwardly extending lug portions 10 adapted to be secured to the base plate 5 by means of rivets 12.

The housing 9 is substantially rectangular in form, being provided with an end closure wall 13 having wing portions 14 which engage the side walls of the housing, and may be spot welded or otherwise secured thereto. The housing 9 is also provided with upstanding ear portions 15, which are adapted to extend through the notched portions of an insulating terminal plate member 17, and are adapted to be bent over the same for securing the plate 17 in position over the open face of the housing 9, as shown in Figure 1.

The terminal plate 17 is adapted to carry terminal lugs 18, 19, and 20, which are secured in fixed position upon the plate 17 by means of rivets 21, 22, and 23, the rivets extending through the terminal plate, as shown in Figure 3, and on their inner ends providing contact surfaces 21' adapted to be engaged by the contact bridging member. The contact terminal lugs 18 and 19 are adapted to be connected to the control circuits for the headlights, while the terminal lug 20 is connected to the battery circuit for supplying the electrical energy to the head light controlling circuits.

The cap member 8 is provided with a plunger member 24, which has normally extending semicircular flange portions 25 secured to the inner surface of the cap 8 by means of rivets 26. The plunger member 24 has parallelly extending arms, which are bent inwardly toward each other, as indicated at 27 and provided with a headed rivet 28 extending therethrough, the rivet 28 carrying a collar 29 thereon between the parallel arms. One of the arms, indicated at 30, is provided at its end with outwardly extending lugs 32, which preferably engage a retaining plate 33 to prevent outward movement of the cap 8 with respect to the cylindrical housing 7, although the plate may be omitted, if desired.

The cap is normally biased outwardly by means of a helically coiled spring member 34, which seats at one end against the securing lugs 25 of the plunger 24, and at its other end against the surface of the plate member 5 at the lower end of the cylindrical housing 7. The spring, urging the cap 8 outwardly, forces the lugs 32 against the surface of the retaining plate 33, thus limiting the outward movement of the cap 8.

The cylindrical housing 7 is provided with a plurality of depending tongue members which are adapted to extend through suitable openings formed in the plate 5, these members being indicated at 35, and which are then bent over to secure the member 7 rigidly in position with respect to the plate 5.

A second coiled spring member, indicated at 36, is disposed within the space between the parallel arms of the plunger 24, and is biased at one end against the upper connecting end of the plunger. At its opposite end, the spring 36 is biased against a U-shaped knuckle member 37, which member has the leg portions thereof extending upwardly in a direction normal to the plane of the arms of the plunger 24, serving to complete a substantially box-like housing for retaining the spring 36 in position. The lower connecting portion of the member 37 is extruded, as indicated at 39, to provide a boss portion which engages the upper camming surface 40 formed at the end of a lever 42.

The surface 40 is formed so that the member 42 normally maintains a substantially aligned position with respect to the legs of the plunger 24, the knuckle portion 39 engaging the camming surface 40. The member 42 is carried upon the collar 29 between the arms thereof, and is provided with a slot 43 providing for reciprocal and angular movement thereof with respect to the member 24. The spring 36 normally forces the member 37 downwardly to engage the extruded boss 39 in the cam surface 40 to retain the member 42 in its lowermost position with respect to the plunger. The other arm 44 of the plunger 24 is provided with corresponding outwardly extending lugs 45 adapted to engage the retaining plate 33 for preventing outward movement of the cap 8 with respect to the plate 5 under the pressure of spring 34, and is provided with an integral extension of the form shown in detail in Figures 6, 7, and 8, having a narrowed portion 46, which is provided, adjacent the ends thereof, with outwardly extending integral ear portions 47 having upwardly extending tongues 48 defining lateral grooves 49 between the narrowed portion 46 and the tongues 48, and having, at its outermost end, a substantially semicircular recess 50 defined by the outwardly extending shoulders 52.

The recess 52, when the plunger is depressed, is adapted to engage about the collar 53 carried by the pin 54 extending through the rear wall of the housing 9, the collar 53 serving as a support for an actuating plate 55 of the form shown in detail in Figures 6, 7, and 8.

The plate 55 is provided with a bearing portion 56 engaging about a reduced portion 57 formed on the collar 53, and is rotatable with respect to the collar.

The plate 55 is provided, adjacent the end opposite the pivotal portion 56, with normally extending angularly turned lugs 58, which are adapted to have engagement, alternately, within the grooves 49 formed between the shoulders 48 and reduced portion 46 of the arm 44.

The cam lever or member 42 is provided, adjacent its lower end, with diverging wing portions

60, which are provided with camming surfaces 61, separated by an extending tongue member 62.

The plate 55 is provided with an upwardly extending tongue 63, which projects from the surface of the plate 55 oppositely to the direction in which the lugs 58 extend. This tongue 63, together with the post 54, provides supporting means for the insulating carrier 65, which is mounted for oscillation about the pin 54, and which is engaged by the lug 63 to provide for movement of the carrier 65 conjointly with movement of the plate 55. A curved spring member 66, having recessed portions at its opposite ends for engagement about the lug 63 and the pin 54, is inserted between the plate 55 and the carrier 65, normally urging the carrier 65 outwardly from the plate 55, and providing for limited universal movement of the carrier 65 with respect to the plate 55.

The carrier 65 is provided with a recessed portion at one end thereof, indicated at 67 in Figure 3, which forms a notch for receiving the downturned tongue 68 of a contact bridging member 69, the bridging member 69 being formed of an electrically conductive material, and being provided with a second downturned tongue 71 adapted to engage in a recess 72 formed in the carrier 65. The bridging member 69 is adapted to have wiping contact across the contact surfaces 21' of the contact terminals 18, 19, and 20. It is to be noted that the contact surface 21' for the terminal 20 is disposed in such position that the bridging member 69 will have a slight amount of rotative movement, as well as lateral movement across the surface thereof, thus maintaining this contact clean and free from dirt particles or the like. The contact bridging member 69 is moved from the position effecting contact between terminals 20 and 18, to a position effecting contact between terminal 20 and terminal 19, for controlling the two circuits to the headlamps. When the plate 17 is mounted across the open face of the housing 9 by means of the ears 15, the contact surfaces 21' force the contact bridging member 69, together with the carrier 65, toward the plate member 55, thus placing a stress upon the spring member 66, which results in pressure engagement between the contact surfaces.

Considering now the operation of the switching member, the switch as shown in Figure 2 is in one of its operated positions, corresponding to a position when the bridging member 69 bridges between contacts 18 and 20. The plunger, with the cap 8, is, in this position, biased outwardly by the spring 34 to its outermost position, the lugs 32 and 45 bearing against the surface of the retaining plate 33 within the housing 9. Upon initial depression of the plunger 8, the arms 30 and 44 are moved inwardly with respect to the housing 9, or downwardly from the position shown in Figure 2, and move toward the position shown in Figure 6. As they move in this direction, the shoulders 48 move downwardly, and at the same time, the camming surface 61 of the member 42 engages one of the lugs 58 of the plate 55, the engaged lug being the lug which is confined within the groove 49 formed between the shoulder 48 and the reduced portion 46 of the arm 44.

It will be noted that during normally unactuated position of the switch, the engaged lug 58 of the plate 55 is locked within the groove 49, the end of the groove being closed by the diverging wing portion 60 of the lever 42. Upon depression of the plunger, however, the shoulder 48 moves downwardly with respect to the lug 58, and at the same time, after the camming surface 61 of the arm 42 engages the lug 58, the arm is held against further downward movement, and remains stationary, due to the pin and slot connection about the collar 29, so that upon continued downward movement of the shoulder 48 due to downward movement of the arm 44, the groove becomes opened, as shown in Figure 6, and the lug 58 is forced outwardly over the upper end of the shoulder 48, due to the fact that the off-center engagement between the camming surface 61 of the lever 42 and the pivot 28 serves to throw the lever outwardly, forcing the camming surface 40 across the extruded boss portion 39, against the pressure of the spring 36.

The angular movement imparted to the lever 42 by reason of its throwing the lug 58 to the position shown in Figure 7 results in the camming surface 40 thereof bearing against the extruded portion 39 of the member 37, and pressing the same upwardly within the plunger 24 to compress the spring 36, thereby putting pressure upon the arm 42. The movement of the plate 55 from the position shown in Figure 6 to that shown in Figure 7 is a snap action, obtained by the spring pressure of the spring 36 upon the arm 42, and results in snapping the plate over into a position limited either by the engagement of the opposite lug 58 with the reduced portion 46 of the arm 44, or by engagement of plate 55 with the side wall of housing 9, the lug 58 thereby being placed in alignment with the other groove 49 formed by the shoulder 48. The plunger is now in its depressed position.

Upon relatively slight upward movement of the plunger, the camming surface 61 is moved upwardly with respect to the first mentioned lug 58, and consequently the spring pressure transmitted through the boss 39 on the camming surface 40 returns the member 42 to the position shown in Figure 8, in which the tongue portion 62 thereof bears against the collar 53. This clears the diverging wing 60 from engagement with the lug 58, and at the same time, the engagement of the tongue 62 with the collar 53 prevents the opposite wing portion 60 from throwing the second lug 58 out of its position adjacent the reduced portion 46 of the arm 44. Upon further upward movement of the plunger, the shoulder 48, as shown in Figure 8, passes up on the opposite free side of the lug 58, locking the same within the groove 49, and as the adjacent diverging wing portion 60 of the lever 42 passes beyond the lug 58, the spring pressure upon the knuckle surface 40 thereof moves the member into its normal position aligned with the arms 30 and 44, in which position the camming surface 61 engages over the upper end of the groove 49, locking the second lug 58 securely within the groove and thus preventing displacement of the switch from this actuated position, except upon reactuation of the plunger.

The movement of the plate 55 from the position shown in Figure 2 to the position shown in Figures 7 and 8 results in moving the bridging member 69 from engagement between contacts 18 and 20 to engagement between contacts 19 and 20, the bridging member wiping across the surface 21' of the contact 19 to provide electrical engagement between the contact 19 and the contact 20. Thus actuation of the plunger shifts the circuit connections of the switch.

It is thus apparent, that by depression of the plunger due to pressure upon the cap 8, the actuating plate is locked in position until after the

camming surface 61 has restricted downward movement of the arm 42 to an extent such that considerable pressure is placed thereon due to the spring 36, and as the shoulder 48 passes below the lug 58 of the plate, the camming surface 61 snaps the plate outwardly through the opening between the shoulder 48 and the diverging wing portions 60 of the plate, and the plate 55 is thus snapped over to its other actuated position. The plunger, at this time, has reached its lowermost position, and as it begins to rise under the action of spring 34, the lever 42 is first withdrawn from engagement with the lug, and by reason of its knuckle or toggle engagement at the upper end is returned toward normal position, being retained from assuming normal position by reason of the tongue 62. As the plunger nears its uppermost position, however, the tongue 62 clears the collar 53, and allows the lever to pass into its normal aligned position. At this time, the diverging wing surface 60 is above the opposite lug 58 of the plate 55, and moves into a position closing the end of the groove 49 to prevent displacement of the plate except by a second depression of the plunger.

It will be apparent that the circuit controlled by the bridging member 69 and contact surfaces 21' is electrically insulated from any portion of the switch operating mechanism by reason of the insulating carrier plate 65 and the terminal plate 17. In addition, the spring pressure upon the bridging member serves to provide for positive and effective wiping action of the contact bridging member, reducing the internal resistance of the switch.

The plunger 24, the member 37, the lever 42, the plate 55, the housing 9, the plate 5, the cap member 8, the retaining plate 33 and the cylindrical housing 7 may all be formed from sheet metal stampings, which may be economically produced, and therefore provide a cheap and simplified type of switch. The retaining plate 33 is provided with integral ear portions 73 which engage within the opening 74 formed in the plate 5 for definitely aligning the plate 33 with respect to this opening to provide proper engagement of the ears 32 and 45 with the plate 33.

The assembly of the switch is secured by the bending over of the tongues 35, the tongues 17, and the use of the rivets 12 and 26. It is thus apparent that assembly of the switch is simplified, and is easily facilitated by the use of the securing means shown and described.

In Figure 9 a modified type of actuating plate is shown at 80, having lugs 82 corresponding to lugs 58, and upstanding tongue 83 corresponding to tongue 63. However, the plate is so shaped that its snapping position is limited by engagement of surfaces 84 and 85 with opposite side walls of housing 9, instead of by engagement of lugs 58 with the portion 46 of arm 44.

While I have described my invention in connection with its application as a foot dimming switch for control of the headlights of an automotive vehicle or the like, it is apparent that the principles underlying the operation, construction and use of the present switch are not limited to this particular situation, since the switch may be used as a wall switch for controlling a light in a room or the like, or can be used for controlling any desired type of circuit, in which only one push button is required for control of the circuit. The positive snap operation of the switch assures that it will operate in the desired manner at all times, while its simple construction prevents it from becoming worn or getting out of order. In addition, by the use of sheet metal stampings, no delicate machining or finishing operations are required, and a sturdy and rugged switch structure is provided.

I therefore do not intend to limit my invention to the switch structure as shown and described, since many modifications and variations of the same may be made without departing from the scope of the present invention, and the invention is therefore to be limited only as covered by the scope and spirit of the appended claims.

I claim:

1. In combination, a switch housing, a terminal plate secured thereto, contact terminals carried by said plate, a contact bridging member movable across said terminals, an actuating member carrying said bridging member, a reciprocatory plunger having an integral portion at one end thereof engaging said actuating member for normally holding the same in locked position, and camming means having lost motion connection with said plunger and including means for successively snapping said actuating member from one circuit closing position to another upon predetermined movement of said plunger sufficient to unlock said actuating member.

2. Actuating means for a circuit controlling member of the class described comprising a reciprocatory plunger, spring means normally holding said plunger in one position, means integral with one end of said plunger for locking said circuit controlling member against movement in said position, cam means pivotally mounted on said plunger and movable with respect thereto to engage said circuit controlling member, and an actuating member carried by said plunger and bearing against said cam means for actuating the same and including a spring to snap said circuit controlling member into circuit closing position after predetermined movement of said plunger has released said locking means.

3. A switch comprising a supporting plate, a switch housing on one side of said plate, a reciprocating plunger supported on the opposite side of said plate and extending through said plate into said housing, means carried by said plunger and engaging said plate for limiting outward movement of said plunger with respect to said housing, a circuit controlling member pivoted in said housing and having laterally spaced cam fingers, and means carried by said plunger for snapping said member in opposite directions about its pivot from one position to another within said housing upon movement of said plunger inwardly of said housing, said means having lost motion connection with said plunger and having camming portions alternately engaging said cam fingers.

4. A switch comprising a supporting plate, a switch housing on one side of said plate, a reciprocating plunger supported on the opposite side of said plate and extending through said plate into said housing, a retaining member on said plate, means carried by said plunger and engaging said retaining member for limiting outward movement of said plunger with respect to said housing, a circuit controlling member pivoted in said housing, means carried by said plunger for snapping said member from one position to another within said housing upon movement of said plunger inwardly of said housing, and means carried by said plunger and operable upon movement of said plunger toward its out-

ward limiting position to lock said circuit controlling member in each of its actuated positions.

5. A switch of the class described including a switch housing, an actuating member pivoted within said housing, an insulating member carried by said actuating member, resilient means between said members normally urging said insulating member away from said actuating member, a contact bridging member carried by said insulating member, an insulating terminal plate secured in said housing, contact terminals carried thereby and extending into said housing, and plunger means extending into said housing for racking said actuating member in opposite directions from one position to a second position to effect contact engagement between said terminals through said bridging member.

6. A switch of the class described comprising a switch housing, a terminal plate mounted thereon and having contact terminals extending thereinto, a contact bridge member in said housing, plunger means having integral means at one end thereof normally locking said bridging member in fixed position and adapted to release said bridging member for movement upon movement of said plunger means inwardly of said housing, and means pivotally mounted on said plunger means and having lost motion connection therewith for snapping said bridging member into engagement with said contact terminals upon further inward movement of said plunger.

7. A switch of the class described comprising a switch housing, a terminal plate closing said housing, contact terminals carried by said plate, a contact member pivoted within said housing and adapted to be rocked into alternate engagement with selected ones of said terminals, a reciprocable plunger extending into said housing, integral means on said plunger for locking said member in each of its alternate positions, and means carried by and having lost motion connection with said plunger for snapping said member from one to the other of its alternate positions upon reciprocation of said plunger, said locking means momentarily releasing said contact member for snapping movement.

8. Actuating means for a switch of the class described including a contacting member, comprising a first reciprocable member having means for locking said contacting member in alternate actuated positions, a second reciprocable member carried by said first member and having pin and slot connection therewith, a spring carried by said first member and engaging said second member to normally maintain said members in alignment, and cam means carried by said second member for snapping said contact member from one to the other of said alternate positions upon predetermined movement of said first member releasing said locking means from engagement with said contacting member.

9. In combination, a switch having terminal studs, circuit closing means therefor, and plunger means for rocking said circuit closing means into alternate engagement with selected ones of said studs, said plunger means comprising a reciprocatory plunger member having means at one end thereof for normally locking said circuit closing means in each of its actuated positions, a camming lever pivotally mounted on said plunger for snapping said circuit controlling member into alternate actuated positions upon predetermined reciprocation of said plunger member sufficient to release said locking means from engagement with said circuit closing means, and a spring controlled knuckle member between said plunger member and said camming lever providing for angular displacement therebetween during snap actuation of said circuit closing means and providing for return of said camming lever to normal position upon return of said plunger member to locking position.

10. In combination, a switch housing, terminal studs carried thereby, circuit closing means for selectively engaging said studs, and plunger means for actuating said circuit closing means, said plunger means comprising a reciprocable U-shaped plunger member extending into said housing, one leg of said member having means operable in the normal position of said member for locking said circuit closing means in each of its actuated positions, a spring biased at one end against the base of said plunger member, a spring-controlled member slidably carried between the legs of said plunger member and urged outwardly thereof by said spring, a snap actuated member having a pin and slot connection with said plunger member between the legs thereof outwardly of said spring controlled member and maintained in alignment with said legs by said spring controlled member, and off-center camming means on said actuating member engageable with said second closing means upon predetermined movement of said plunger member for snapping said circuit closing means into selected actuated positions.

11. In combination, a plurality of switch contacts, a contact bridging member pivotally mounted at one end thereof for oscillation between selected ones of said contacts, a reciprocatory plunger, means carried by said plunger at one end thereof for normally locking said bridging member in each of its oscillated positions, and releasable upon reciprocation of said plunger for allowing free rocking movement of said member, an actuating member having lost motion connection with said plunger and pivoted thereon, said actuating member having off center engagement with said bridging member upon initial reciprocation of said plunger to snap said bridging member into the other of its oscillated positions when said plunger has been moved sufficiently to effect release of said rocking means, and spring means engaging said actuating member and operable to snap said member into aligned position with respect to said plunger upon movement of said plunger into locking position.

12. In a switch of the class described, a pair of circumferentially spaced contacts, a bridging member for selectively engaging each of said contacts, a carrier plate for said bridging member having a pair of spaced normally extending ears, means resiliently supporting said bridging member in insulated relation on said plate, a fixed pivot for said plate, and plunger means having integral portions receiving one of said ears in each position of said bridging member for locking the same in fixed position, said plunger means also having a spring-controlled actuating lever for engaging the other of said ears to snap said plate about its pivot upon disengagement of said locking means.

13. In a switch of the class described, a pair of circumferentially spaced contacts, a bridging member for selectively engaging each of said contacts, a carrier plate for said bridging member having a pair of normally extending laterally spaced ears, means resiliently supporting said bridging member in insulated position on said plate, a fixed pivot for said plate, and reciprocatory plunger means alternately engaging each

of said ears and releasing the other of said ears for snapping said plate in opposite directions about its pivot to move said bridging member into selective engagement with each of said contacts.

14. In combination, in a switch having reciprocatory plunger means for actuating the same, of circuit controlling means engaged by said plunger means and comprising a carrier plate pivoted at one end and having a pair of laterally spaced ears extending normal thereto, an upstruck tongue projecting normal to said plate between said ears, an arched leaf spring having its ends guided between said tongue and the pivot of said plate, an insulating block having recesses receiving said tongue and pivot and resiliently supported on said plate by said spring, and contact bridging means carried on the face of said block and out of contact with said spring and plate.

15. In a switch, a plurality of switch contacts, circuit controlling means for selectively engaging said contacts comprising a carrier plate pivoted at one end and having a pair of laterally spaced ears extending normal to the surface thereof, an upstruck tongue projecting normal to said plate between said ears, an arched leaf spring having its ends guided between said tongue and the pivot of said plate, an insulating block having recesses receiving said tongue and pivot and resiliently supported on said plate by said spring, and contact bridging means carried on the face of said block and out of contact with said spring and plate.

16. In a switch, a plurality of switch contacts, means mounted for rocking movement into selective engagement with said contacts, and means for actuating said last named means comprising a plunger member having a U-shaped portion, a U-shaped bracket mounted in inverted position in said portion, spring means biased therebetween, a cam lever having pin and slot connection with said plunger and maintained in normal position by said bracket engaging one end thereof, and means at the opposite end of said lever for snapping said contact engaging means into said selective engagement with said contacts.

17. In a switch, a plurality of switch contacts, means mounted for rocking movement about a fixed pivot for selective engagement with said contacts, and means for actuating said rocking means including a reciprocatory plunger, a cam lever having lost motion connection with said plunger, means carried by said plunger for locking said rocking means in each of its rocked positions in the normal inoperative position of said plunger, said cam lever having lost motion connection with said plunger for engaging said rocking means upon initial reciprocation of said plunger and for actuating said rocking means into another of its rocked positions when said plunger has been moved sufficiently to effect release of said locking means.

18. In a switch, a pair of spaced contacts, circuit closing means having a pair of laterally spaced normally extending ears, a pivot for said circuit closing means, a plunger having reciprocal movement toward and away from said pivot, locking means carried by said plunger and normally engaging one of said ears to hold said circuit closing means against movement and releasable upon predetermined movement of said plunger, and actuating means pivotally mounted on said plunger and alternately engaging said ears to snap said circuit closing means into alternate engagement with said contacts upon said predetermined movement of said plunger.

19. Actuating means for a circuit closing member adapted to be rocked about a pivot into alternate positions, comprising a reciprocal plunger, locking means at one end of said plunger and holding said member normally in alternate positions, said means being releasable upon predetermined movement of said plunger, and an actuating lever pivotally mounted on said plunger and engageable with said member for alternately snapping said member into said positions upon said predetermined movement of said plunger.

MARION W. MORRIS.