

Sept. 9, 1941.

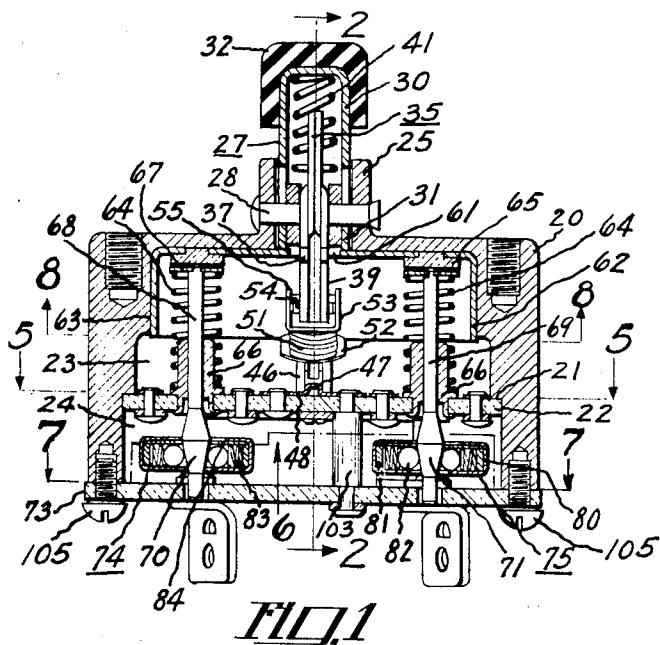
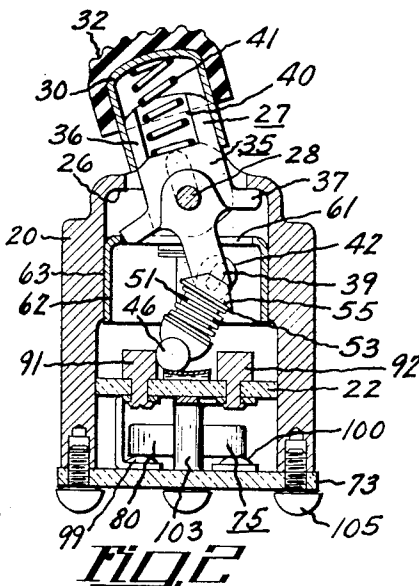
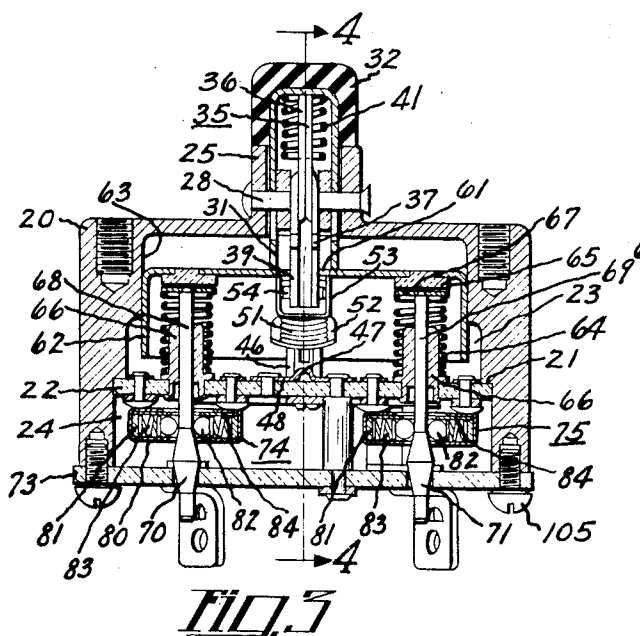
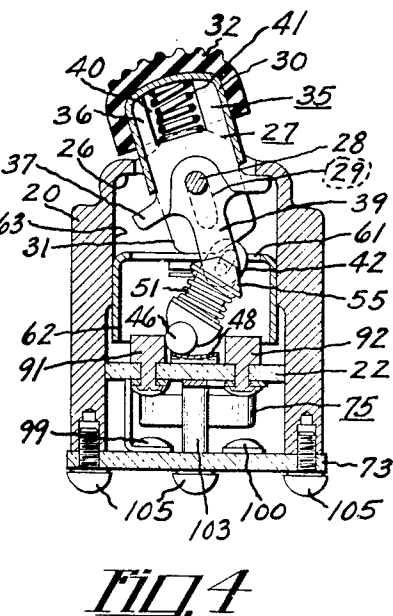
A. A. BLUEMLE ET AL

2,255,552

SWITCH MECHANISM

Filed March 21, 1938

3 Sheets-Sheet 1



INVENTORS
Arnold A. Bluemle.
William E. Brown.
 BY
Spencer, Hardman & Fehr
 their ATTORNEYS

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A. A. BLUEMLE ET AL

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SWITCH MECHANISM

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3 Sheets-Sheet 2

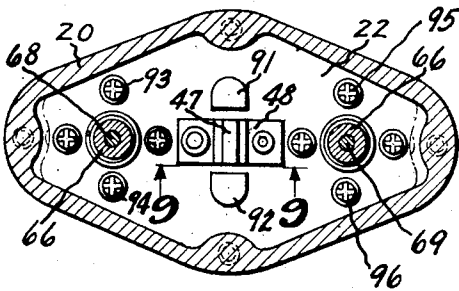


FIG. 5

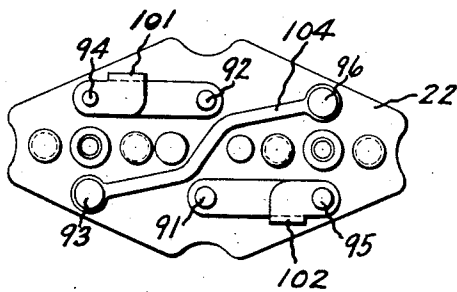


FIG. 6

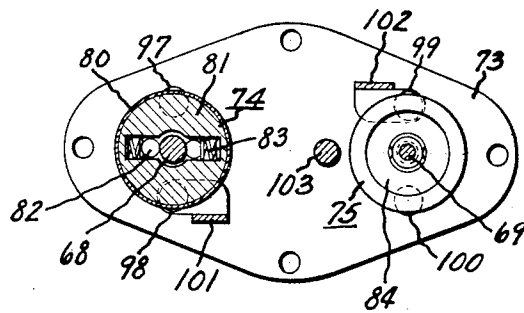


FIG. 7

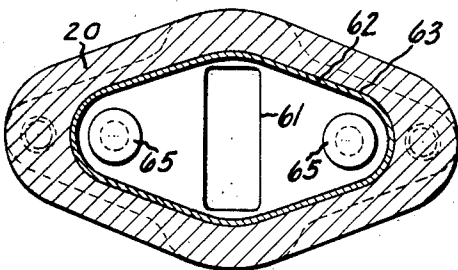


FIG. 8

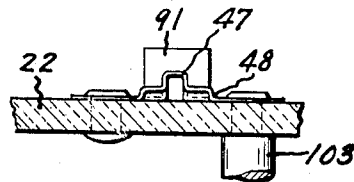


FIG. 9

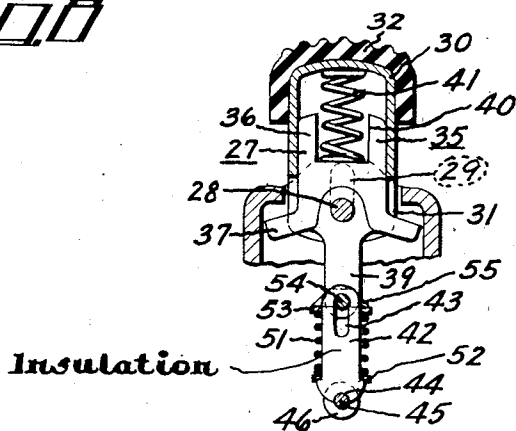


FIG. 10

INVENTORS
Arnold A. Bluemle.
William E. Brown.
 BY
Spencer, Hardman & Felt
 their ATTORNEYS

Sept. 9, 1941.

A. A. BLUEMLE ET AL

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SWITCH MECHANISM

Filed March 21, 1938

3 Sheets-Sheet 3

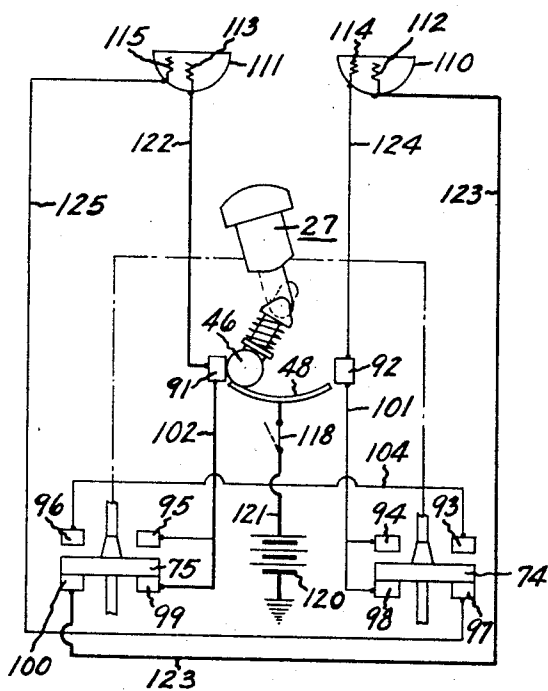


FIG. 11

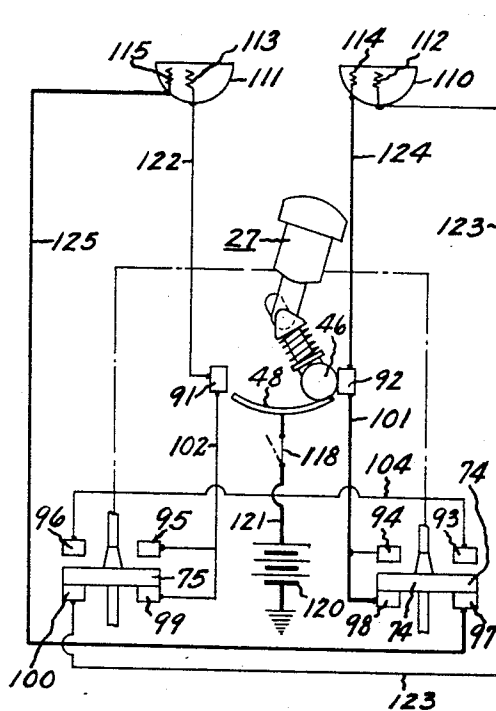


FIG. 13

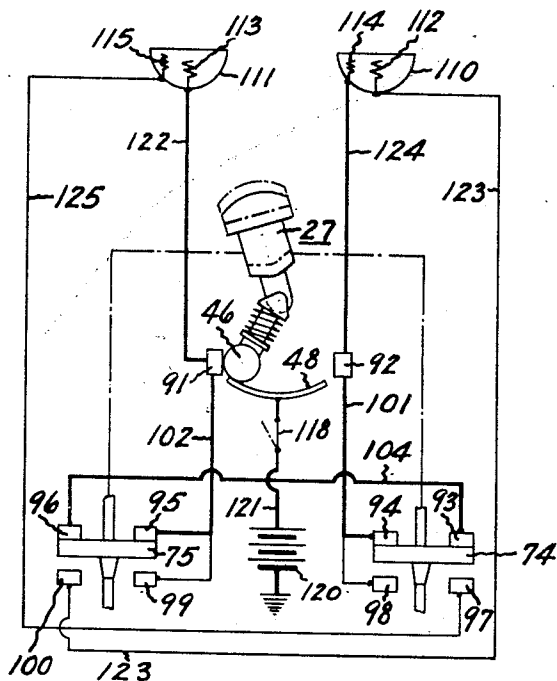


FIG. 12

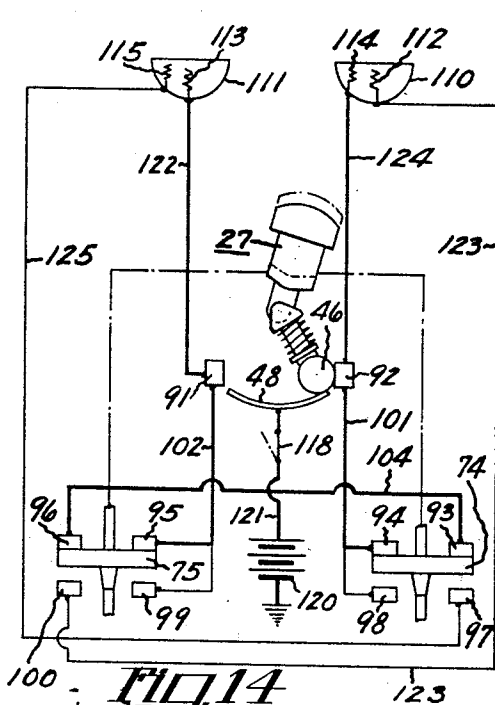


FIG. 14

INVENTORS
Arnold A. BlueMLE.
William E. Brown.

BY
Spencer, Hardman & Fehr
their ATTORNEYS

UNITED STATES PATENT OFFICE

2,255,552

SWITCH MECHANISM

Arnold A. Bluemle and William E. Brown, Anderson, Ind., assignors to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application March 21, 1938, Serial No. 197,163

5 Claims. (Cl. 200—4)

This invention relates to electric switches, and more particularly to snap switches adapted to selectively control a plurality of electric circuits.

An object of the present invention is to provide a switch structure or controlling device for head lights whereby three distinct degrees of brilliancy may be obtained at the will of the operator.

Another object of the present invention is to provide a unitary switch mechanism wherein two bridging members are movable to two alternative positions for effecting a change of circuit connection and wherein the bridging members are moved in different directions relative to each other and wherein a single operating element is employed to actuate the two bridging members.

Another object of the invention is to provide a unitary switch mechanism wherein two bridging members are movable to two alternate positions for effecting a change of circuit connection and wherein either one of the bridging members may be actuated to their alternate positions without affecting the relative position of the other bridging member.

Another object of the invention is to provide a unitary switch mechanism having a main bridging member movable to two alternate positions and wherein said bridging member is normally maintained in either of the two positions and auxiliary bridging members movable to two alternate positions and wherein the actuator and the auxiliary bridging members are automatically returned to their normal positions when released by the operator.

Another object of the present invention is to provide a unitary switch mechanism wherein a plurality of bridging members are movable to two alternate positions and moved out of engagement from their respective stationary contacts with a snap action.

Further objects and advantages of the present invention will be apparent from the following description reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is a sectional view of the switch embodying the present invention.

Fig. 2 is a sectional view taken on the lines 2—2 of Fig. 1.

Fig. 3 is a sectional view, similar to Fig. 1, but showing the parts in a different position of operation.

Fig. 4 is a sectional view taken on line 4—4 of Fig. 3.

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 1.

Fig. 6 is a plan view of the terminal support looking in the direction of the arrow 6 of Fig. 1.

Fig. 7 is a sectional view taken substantially on the line 7—7 of Fig. 1.

Fig. 8 is a sectional view taken on the line 8—8 of Fig. 1.

Fig. 9 is a fragmentary sectional view on a large scale taken on the line 9—9 of Fig. 5.

Fig. 10 is a sectional view thru the actuator to clearly illustrate the relation of the various elements of the actuator.

Figs. 11 to 14 inclusive are circuit diagrams showing the various combinations of a lighting system which may be had in the switch embodying the present invention.

Fig. 11 illustrates one of the completed circuits accomplished by the present switch suitable for country driving.

Fig. 12 illustrates a circuit when the switch is actuated for country passing.

Fig. 13 illustrates a circuit when the lighting switch is in condition for city driving.

Fig. 14 illustrates a circuit when the switch is in condition for city passing.

Referring to Figs. 1 to 4 inclusive, 20 designates a cup-shaped housing provided with internal shoulder 21 against which a plate 22 of insulating material is adapted to rest. The plate 22 divides the housing into two compartments, an upper compartment 23 and a lower compartment 24. The closed end of the cup-shaped housing is provided with a hollow projection 25 having inwardly extending portions 26 to form shoulders or stops for a rocking actuator member 27. The actuator is pivotally supported on a cross pin or rivet 28. In the present case the actuator comprises a sleeve 30 having a closed end and a pair of arms 31 provided with elongated slots 29 to receive the cross pin 28 and to allow the sleeve to move up and down relative to the tubular projection 25. The closed end of the sleeve 30 is covered with cap 32 of non-conducting material.

A pair of lever plates 35 are also pivoted on the pin 28. These plates are provided with a flat portion 36, ears or lugs 37 and an extension arm 39. The ears 37 are adapted to alternately engage the stop to positively arrest the plates 35 when the latter are in either of their normal positions. The flat portions are in the present case spot-welded together and are notched as at 40 to receive a coil spring 41. The spring operates to normally hold the sleeve 30 in its uppermost position with respect to the pin 28 as viewed in Fig. 1. The material about the pivot

portion of the plates 35 is deformed in this case, so that the extension arms will be spaced apart to receive a contact lever 42 of insulating material. The lever 42 is provided at one end with an elongated slot 43. The other end of the lever 42 is notched as at 44 to receive a central or reduced portion 45 of an anti-friction roller contact 46. The roller contact includes two cylindrical portions which are adapted to straddle the lever 42 and a raised portion 47 of a stationary battery contact 48 secured to the insulating plate. This construction prevents endwise movement of the roller contact 46.

The insulating lever 42 is surrounded by a coil spring 51 the lower end bearing against a washer 52 which rests upon a shoulder provided by the lever 42. The other end of the spring bears against a washer 53 having a slot through which the ends of the arms 39 and the upper end of the lever 42 project. The washer is yieldingly supported on the lever 42. The washer is maintained on the lever 42 by a pivot pin 54 which extends through apertures provided in the arms 39 and through the elongated slot 43 in the lever 42. The pin is maintained in its assembled relation with the arms 39 and lever 42 by ears 55 formed on the washer which engage the ends of the pin to prevent endwise movement thereof.

The switching mechanism, comprising the arms 39, insulating lever 42 and the contact 46 is adapted to extend through an aperture 61 of a cup-shaped member 62. This member has a sliding fit with a complementary reduced chamber portion 63 located within the upper compartment 23 of the housing 20. The cup-shaped member is normally held against the under side of the closed end of the housing 20 and adjacent the lower ends of the arms 31 of the sleeve 30 by coil springs 64 as viewed in Fig. 1. The closed end of the cup-shaped member 62 supports a pair of insulating plugs 65 having a reduced portion press fitted in suitable apertures in the closed end of the member 62 as clearly shown in Figs. 1 and 3.

The springs 64, which urge the cup-shaped member upwardly, are disposed between flanges 65 of guide bushings or sleeves 66, which are suitably attached to the plate 22, and washers 67 attached to the upper ends of reciprocable plunger rods 68 and 69. The rods 68 and 69 are slidably supported in their respective bushings 66 and are preferably provided at their lower ends, as viewed in Figs. 1 and 3, with integral cam members 70 and 71 respectively. The cam members have a configuration of a double frustrum positioned base to base. The lower ends of the rods, below the cam portions extend into suitable apertures provided in a closure 73 of insulating material for the housing 20. The cam members 70 and 71 are utilized to actuate movable contact assemblies 74 and 75 respectively from one position to another with a snap action. Since both contact assemblies 74 and 75 are preferably alike a description of one will apply to both.

The contact assembly 74 comprises a metal casing 80 supporting a metal disc 81 having suitable notches to receive metal balls 82 and springs 83 and an apertured disc 84 to maintain the balls and springs within their respective notches. The balls are adapted to be moved radially within the casing by the cam 70. Each contact assembly is adapted to bridge an upper set and a lower set of contacts carried by the plate 22 and closure 73 respectively.

Referring to Figs. 5 and 6, the plate 22 sup-

ports a plurality of sets of contacts, one set of contacts includes the battery contact and two main stationary contacts 91 and 92 exposed on the upper surface of the plate 22. These contacts are spaced from and located on opposite sides of the raised or guide portion 47 of the battery terminal contact 48, see Fig. 1, so that one or the other of the contacts 91 and 92 will be bridged with the contact 48 by the roller contact 46. The plate also carries two sets of auxiliary contacts 93, 94 and 95, 96. These sets are exposed on the lower side of the plate 22 and provide the upper sets of contacts in the lower compartment. These sets of contacts are so arranged that contacts 93, 94 and 95, 96 are in the path of movable contact assemblies 74 and 75 respectively.

The plate 73 carries two sets of contacts, 97, 98 and 99, 100 which are also located in the reciprocable path of the movable contact assemblies 74 and 75 respectively. These contacts 97, 98 and 99, 100 provide the lower sets of contacts in the lower compartment and are so arranged that they are in the path of the movable contacts 74 and 75 respectively.

The plates 22 and 73 are held together as one assembly unit but held in spaced relation by conducting brackets 101, 102 and a post 103. The conducting brackets 101 and 102 are so constructed that the contacts 92, 94 and 98 will be connected in series by the bracket 101 and the contacts 91, 95 and 99 are connected in series by the bracket 100. The post 103 is connected with the battery terminal contact 48. The contacts 93 and 96 are connected by a conducting strap 104. The assembly unit including the plates 22 and 73 is secured to the housing 20 by screws 105 passing through suitable apertures in the plate 73 and having screw threaded engagement with the housing 20.

In Fig. 2 the switch structure is shown in one of its normal positions with the roller contact 46 bridging the contacts 48 and 91. To move the roller contact from the position shown in Fig. 2 to a position where the contact 48 will engage the contact 92 the cap 32 together with the sleeve 31 is rocked in a clockwise direction or to the right upon the pivot 28, thus causing the arms 39 to move in an arc and carry the insulating arm with it. As the arms 39 are moved in a clockwise direction the washer 53 is forced downward by the pin which slides in the elongated slot in the arm 42, to compress the spring until the dead center of the switching mechanism is passed. When this occurs the spring will immediately expand and instantly move the switching mechanism with a snap action in a counterclockwise direction as viewed in Fig. 2 so that the roller contact 46 will engage the contact 92.

When it is desired to actuate the movable contact assemblies 74 and 75 from their normal positions shown in Fig. 2 to that shown in Fig. 4, the operator depresses the cap 32 and sleeve 31. In this instance sleeve 30 will slide downwardly over the plates due to the fact that the arms 31 of the sleeve are provided with the elongated slot. Thus by this arrangement the sleeve 30 can be reciprocated relative to the plate 35 without affecting the bridging engagement of the roller contact 46 with one or the other of the contacts 91 and 92. As the sleeve is depressed the ends of the arms 31 will engage the top surface of the cup-shaped member 62 which in turn forces the plungers 68 and 69 to compress the springs 64 downward. Since both plungers operate alike only the action of the plunger 68 will be here

described. As the plunger 68 moves downward the cam portion will pass through the contact assembly 74, which is at rest on contacts 97 and 98, and urge the balls 82 radially to compress the springs 83 and as the balls pass over the crest of cam 70 the spring will instantly expand causing the ball to slide upward along the upper portion of the cam 70 to move the contact assembly 74 with a snap action to bridge the upper contact set 93, 94 in the lower compartment. Upon release of the pressure on the cap 32 and the sleeve 30, the springs 64 will react to move plunger rod 68 upwardly to its normal position and cause the contact assembly 74 to move in the reverse direction with a snap action and the spring 41 also reacts to return the sleeve to its normal position.

This switch mechanism is particularly useful for controlling the head lamp circuits of an automobile. Generally the head lamp includes a "Bright" and a "Dim" filament bulb the filaments of the lamp being arranged so that the right head lamp filaments will throw a beam to the left side of the road and left head lamp will throw a beam to the right side of the road. While it is of great value in illuminating the roadway where it is necessary the bright filaments of the lamps have a blinding effect upon persons approaching the car carrying the head light with the bright filament connected and it is desirable that the brilliancy of the head light throwing the beam to the left side of the road be altered. This may be easily accomplished by depressing the actuator of the present invention to alter the switch connections so that the "Dim" filament of the right head lamp will be connected and remain connected only so long as the actuator is in its depressed position. It sometimes happens when driving in the city, with the "Dim" lights connected in a circuit that it is desirable to light the right side of the roadway, thus by depressing the actuator the circuit connections will be changed so that light combination will be that of country passing. Thus it will be seen that three distinct degrees of brilliancy may be obtained at the will of the operator and clearly shown in the circuit diagram as shown in Figs. 11 to 14 inclusive.

Referring to Fig. 11 when the roller contact is in one of its normal positions and in engagement with the contact 91 and the switch 118 is in the full line position current will be directed from the battery 120 and the following circuits will be completed: from the battery 120, lead 121, switch 118, contacts 48, 46 and 91, from whence the current is then divided a portion of the current will be directed to the "Bright" filament 113 of a lamp 111 thru lead 122. Another portion of the current is directed from the contact 91, thru the conducting bracket 102, contacts 99, 75, 100, lead 123 to the "Bright" filament 112 of a lamp 110. The circuits energized are clearly indicated by the heavier black line and may be traced without difficulty. This circuit arrangement gives what is known as a "country" driving condition.

When the actuator 27 is depressed the movable contact 46 is not affected but the contacts 74 and 75 will be shifted from the position shown in Fig. 11 to that shown in Fig. 12. The circuit arrangement in this figure is known as "country" passing condition. The circuit completed will be as follows: from battery 120, lead 121, switch 118, contacts 48, 46, 91, where the current is then divided a portion of the current will be directed from contact 91 to the "Bright" filament 113 of lamp 111 thru lead 122, another portion of the

current will be directed from the contact 91 thru the bracket 102, contacts 95, 75, 96 conducting strap 104, contacts 93, 74, 94, bracket 101, contact 92, lead 124, to the "Dim" filament 114 of lamp 110.

Referring to the wiring diagram shown in Fig. 13 the actuator 27 has been moved in a clockwise direction so as to shift the contact 46 into engagement with the contact 92. When this happens the circuit completed will be as follows: from battery 120, lead 121, switch 118, terminals 48, 46 and 92 from whence the current is then divided a portion of the current is directed from the contact 92 to the "Dim" filament 114 of the lamp 110 thru the lead 124. Another portion of the current will be directed from the contact 92 thru bracket 101, contacts 98, 74, 97, lead 125 to the "Dim" filament 115 of the lamp 111.

The circuits energized are clearly indicated by the heavier black lines and this circuit arrangement gives what is known as "city" driving condition.

In case the operator desires to depress the actuator 27 he will get a lighting arrangement similar to "country" passing. This is accomplished by depressing a lever 27 so as to shift the contacts 74 and 75 from their normal position to that shown in Fig. 14 to bridge the contacts 93 and 94. The circuit completed will be as follows: from battery 120, lead 121, switch 118, contacts 48, 46, 92, from whence the current will be divided. In this instance a portion of the current will be directed from the contact 92 to the "Dim" filament 114 of lamp 110 through lead 124. Another portion of the current will be directed from the contacts 92, bracket 101, contacts 94, 74, 93, conducting strap 104, contacts 96, 75, 95, bracket 102, contact 91, lead 122, "Bright" filament 113 of lamp 111.

While the embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. An electric switch comprising, in combination; a housing; a nonconducting block supported within the housing and dividing the housing into an upper and a lower switch compartment; conducting elements carried by the block certain of the elements providing a set of fixed switch contacts in the upper compartment and other elements providing a set of upper switch contacts in the lower compartment; a closure for the housing; conducting elements carried by the closure and providing fixed switch contacts exposed in the lower compartment and in alignment with the upper contacts within said compartment; means for electrically connecting a contact of each set of contacts in the lower compartment with a contact in the upper compartment; a swinging contact to alternately engage the contacts in the upper compartment; a movable contact slidably supported within the lower compartment to alternately engage the sets of contacts in the lower compartment; and a common actuator for moving the respective movable contacts into a selected position.

2. An electric switch comprising in combination; a housing; a nonconducting block supported within the housing and dividing the housing into an upper and a lower compartment; conducting elements and a terminal post carried by the block, said elements providing a set of switch terminals in the upper compartment and a plu-

rality of upper sets of switch contacts in the lower compartment; a closure for the housing; conducting elements carried by the closure and providing fixed switch contacts extending into the lower compartment to provide lower sets of contacts; means for electrically connecting a contact of each set of contacts in the lower compartment in series with a terminal in the upper compartment; a movable contact to alternately bridge the terminals with the post; a pair of movable contacts slidably supported between aligned sets of contacts in the lower compartment and adapted to alternately bridge their respective set of contacts; resilient means for normally holding each movable contact into bridging engagement with one set of contacts; and a common actuator for actuating the movable contacts into a selected position.

3. An electric switch comprising in combination; a housing; a nonconducting block supported within the housing and dividing the housing into an upper and a lower compartment; conducting elements and a terminal post carried by the block, certain of said elements providing a set of terminal contacts in the upper compartment and others providing a plurality of upper sets of switch contacts in the lower compartment; a closure for the housing; conducting elements carried by the closure and providing fixed switch contacts extending into the lower compartment to provide lower sets of switch contacts; means for electrically connecting a contact of each set of contacts in the lower compartment in series with a contact in the upper compartment; a movable contact to alternately bridge the terminal contacts with the post; resilient means for holding the movable contact in either of its bridging positions; a movable contact slidably supported between each upper and lower set of switch contacts and adapted to alternately bridge their respective sets of contacts; resilient means for normally holding each second mentioned movable contact in bridging engagement with one set of contacts; and actuating means for changing the bridging position of either movable contact without changing the bridging of the other movable contact.

4. An electric switch comprising in combination; a housing; a nonconducting plate support-

ed within the housing and dividing the housing into two compartments; a plurality of stationary contacts and a terminal post carried by the plate, certain of the contacts being exposed in the upper compartment and other contacts being exposed in the lower compartment to provide upper contacts therein; a closure for the housing; a plurality of contacts carried by the closure to provide lower contacts in the lower compartment; a movable contact in each compartment the upper movable contact normally bridging the terminal post with a stationary contact and the lower movable contact bridging a pair of stationary contacts and actuating means for changing the bridging position of either movable contact without changing the bridging of the other movable contact.

5. An electric switch comprising in combination; a housing; a nonconducting block supported within the housing and dividing the housing into an upper and a lower switch compartment; conducting elements carried by the block and providing fixed switch contacts exposed in the upper and lower compartment, said contacts being arranged to provide a set of contacts in the upper compartment and a set of contacts spaced from each other providing upper contacts in the lower compartment; a closure for the housing, conducting elements carried by the closure and providing fixed switch contacts exposed in the lower compartment, said contacts being arranged to provide two sets of lower contacts in alignment with the upper contacts in the lower compartment; means for connecting the contacts of the upper compartment with the sets of contacts in the lower compartment; a movable contact to alternately engage the contacts in the upper compartment; a movable contact independently supported within the lower compartment to alternately engage the two sets of contacts; and an actuator for oscillating and reciprocating movements to selectively change the positions of the movable contacts, said actuator controlling the movements of the upper contact in its oscillating movements and controlling the movements of the lower movable contact in its reciprocating movements.

ARNOLD A. BLUEMLE.
 WILLIAM E. BROWN.