

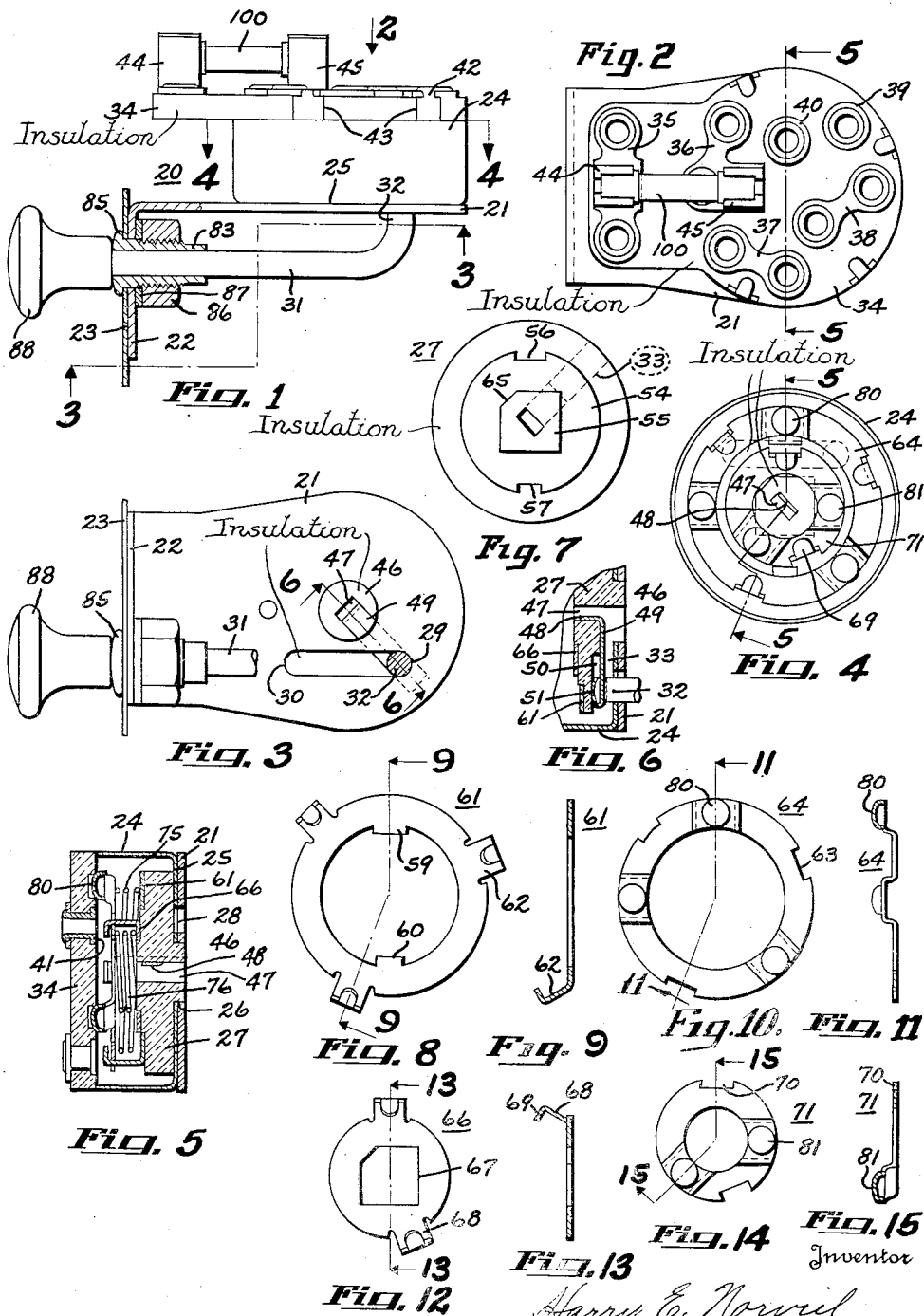
July 16, 1935.

H. E. NORVIEL

2,008,293

ELECTRIC SWITCH

Original Filed April 13, 1932 3 Sheets-Sheet 1



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ELECTRIC SWITCH

Original Filed April 13, 1932 3 Sheets-Sheet 2

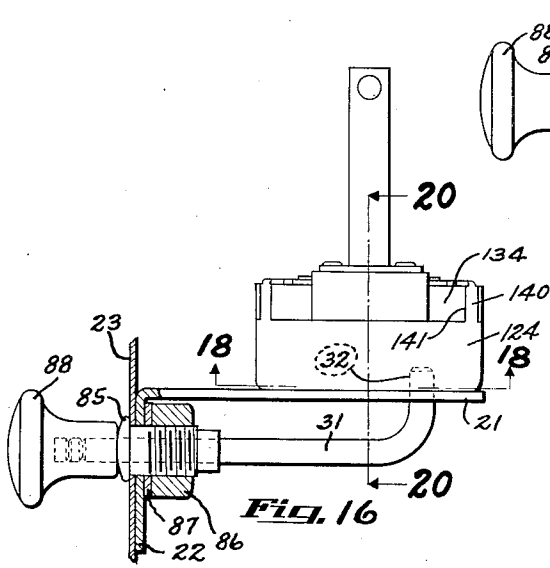
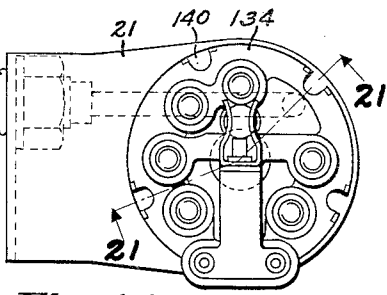


Fig. 17

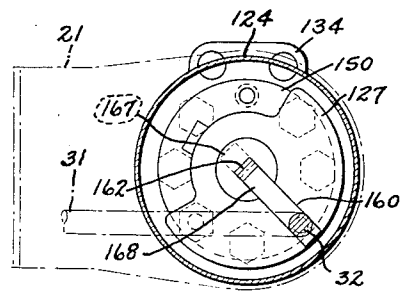


Fig. 18

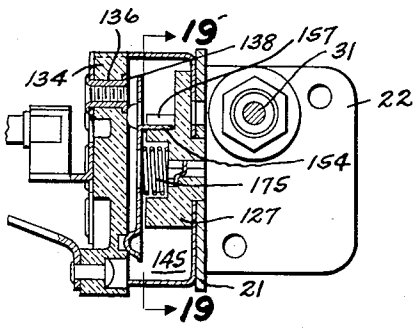


Fig. 20

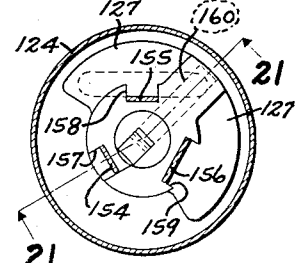


Fig. 19

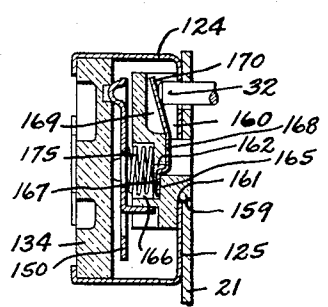


Fig. 21

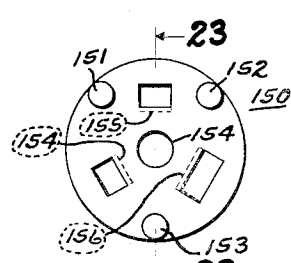


Fig. 22

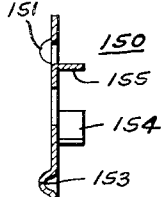


Fig. 23

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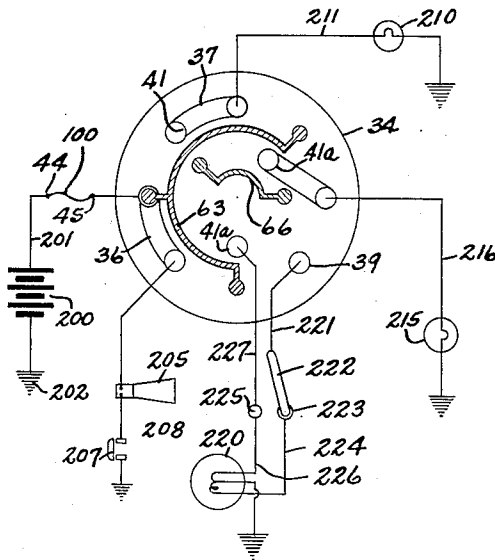
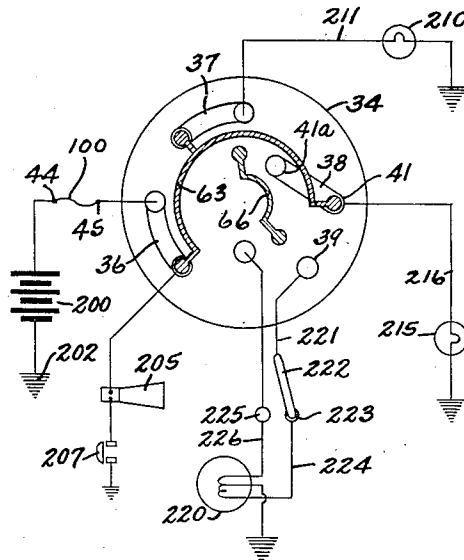
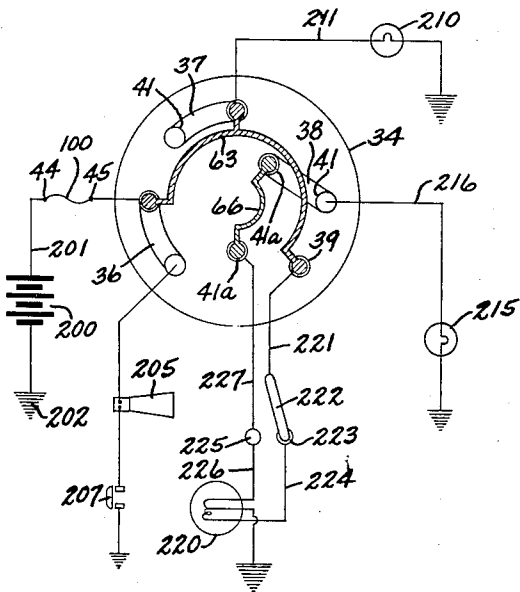
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H. E. NORVIEL

2,008,293

ELECTRIC SWITCH

Original Filed April 13, 1932 3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,008,293

ELECTRIC SWITCH

Harry E. Norviel, deceased, late of Anderson, Ind.,
by Anderson Banking Company, executor, An-
derson, Ind., assignor, by mesne assignments, to
General Motors Corporation, Detroit, Mich., a
corporation of Delaware

Application April 13, 1932, Serial No. 605,090
Renewed November 28, 1934

12 Claims. (Cl. 200—11)

This invention relates to electric switches for automotive vehicles and more particularly to those switches of the rotary or oscillatable type operated by a push and pull actuating member for controlling a plurality of electric circuits.

One of the objects of the invention is to provide a switch structure of the rotary or oscillatable type, that may be manufactured at a low cost and that will be efficient in its operation to move a circuit completing assembly into a plurality of positions.

Another object is to provide resilient means adapted for assembly with a circuit closing means within a housing that cooperates with the push and pull actuating member to prevent rattles and unnecessary noises.

Another object of the present invention is to provide an improved lighting system for automobile vehicles, and aims to provide a novel and improved controller and connections with an auxiliary controller to control the side and headlight circuit, whereby the controller in being moved to one position the side lights will be lighted, and on movement of the controller to another position the headlights may be made bright and the side lights will be disconnected, and on actuating the auxiliary controller, operable independently, the head lights will be made dim and the side lights will be connected with the head light dim circuit.

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 one form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a side elevation of one form of a switch structure in accordance with the present invention.

Fig. 2 is a rear view of a switch structure substantially as indicated by the arrow 2 of Fig. 1.

Fig. 3 is a view taken on the line 3—3 of Fig. 1.

Fig. 4 is a sectional view through the switch structure taken on the line 4—4 of Fig. 1.

Fig. 5 is a sectional view taken substantially on the lines 5—5 of Figs. 2 and 4.

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 3.

Fig. 7 is a plan view of a driving member shown in section in Figs. 5 and 6.

Fig. 8 is a detail plan view of a driving washer used in one form of the present invention.

Fig. 9 is a sectional view taken on the line 9—9 of Fig. 8.

Fig. 10 is a detail plan view of a movable contact or circuit completing means.

Fig. 11 is a sectional view taken on the line 11—11 of Fig. 10.

Fig. 12 is a detail plan view of another driving washer used in the present invention.

Fig. 13 is a sectional view taken on line 13—13 of Fig. 12.

Figs. 14 and 15 are plan and sectional views respectively, of a circuit completing means, Fig. 15 being taken on the line 15—15 of Fig. 14.

Fig. 16 is a side elevation of a switch showing a modified form of the present invention looking in the direction of arrow 16 of Fig. 17.

Fig. 17 is a rear end elevation of the switch structure substantially as indicated by the arrow 17 of Fig. 16.

Fig. 18 is a sectional view taken on the line 18—18 of Fig. 16.

Fig. 19 is a sectional view taken on the line 19—19 of Fig. 20.

Figs. 20 and 21 are sectional views taken on the lines 20—20 and 21—21 of Figs. 16 and 19 respectively.

Fig. 22 is a plan view of a circuit completing means shown in Figs. 20 and 21.

Fig. 23 is a sectional view taken on the line 23—23 of Fig. 22.

Figs. 24, 25 and 26 are circuit diagrams showing the different positions of the switch parts disclosed in Figs. 1 to 5 inclusive.

Referring to Figs. 1 to 15 inclusive of the drawings, 20 indicates a mounting bracket of sheet metal or the like that is provided with a leg or shelf 21 and an apertured ear or leg 22. The leg 22 provides means for attaching the bracket 20 to a support or instrument panel 23 of an automobile by suitable bolt and nut device, not shown. To the leg 21 of the bracket 20 is secured a cup-shaped housing 24 that has a back wall 25, the wall being secured to the leg 21 of the bracket in any preferred means, as by spot welding or the like. Coaxial with the center of the cup-shaped housing, the bottom wall thereof and the leg 21 are provided with aligned apertures 26 to provide a journal bearing for a non-conducting drive member 27. The wall and the leg 21 are also provided with aligned elongated apertures or guide openings 28 having edges 29 and 30 to form stops for a push and pull rod 31. The rod has an end 32 bent transversely to the main portion of the rod, the end 32 extending through the guide openings 28 and into a radial slot or channel 33 formed in the drive member 27. The diameter of the rod end 31 substantially corresponds to the

width of the openings 28 and the channel 33 so as to eliminate lost play between same to a minimum. The end 31 cooperates with the stops 29 and 30 for limiting the rotation or oscillation of the drive member 27 within the housing and the linear movement of the push and pull rod 31.

The switch back 34 is provided with terminal connections 35, 36, 37, 38, 39 and 40 exterior of the back, and the fixed contact points 41 and 41a flush with the interior surface of the back within the housing. The terminal connections 35 and 36 may include fuse supporting brackets 44 and 45 respectively for retention of a fuse 100. The back 34 operates to close the housing 24 and may be secured thereon by tanks 42 circumferentially spaced about the housing and received in corresponding grooves or notches 43 of the switch back 34.

Within the housing provided by the cup 24 and the back 34, there is a contact actuating assembly or circuit completing means mounted for rotatable or oscillatable engagement with the fixed contact points 41 on the switch back 34. The assembly has a driving engagement with the member 27. This assembly comprises the drive member 27 of disc formation and is provided on one side thereof with a hub 46 that forms a shaft portion journaled within the apertures 26 of the switch casing wall 25 and the leg 21 of the bracket 20. This disc 27 is provided with the radial slot 33 which terminates in an aperture 47 and adapted to receive an end 48 of an anti-rattle spring 49. The end 48 is bent at an angle forming an anchoring means for retaining the spring within the radial slot 33. The slot is gauged as at 50 to receive the other end 51 of the spring. The end 51 is bent underneath the main portion of the spring and is held under tension when the end 32 of the rod is placed into the slot 33 so as to prevent rattles between the rod and the switch structure due to vibrations or other agencies. The other side of the disc 27 is provided with raised portions on hubs 54 and 55. The portion 54 is provided with notches or recesses 56 and 57 to receive tongues 59 and 60 respectively of a driving washer 61. The driving washer 61 has tangs 62 to be received within notches 63 of a ring contact plate 64, the tangs 62 are bent toward the axis of the washer 61 and into their respective notches provided by the plate 64. The tangs are of a less dimension than the notches so as to permit a sliding axial movement of the contact plate 64 relative to the washer 61.

The portion 55 is of square shape having one corner chamfered as at 65. The portion 55 is adapted to receive a driving washer 66 having an aperture 67 corresponding to the formation of the portion 55. The washer 66 is provided with tangs 68 having an ear 69 bent at an angle as shown in Fig. 13. These tangs 68 are received by notches 70 of a contact ring 71. The tangs are bent inwardly over the plate 71, there being sufficient play between tangs and the plate to permit slight axial movement of the contact plate 71 relative to the washer 66.

Upon assembling the switch structure disclosed, the member 27 with the spring 49 located within the radial channel 33 are first placed within the cup 24 so that the hub portion 46 is received within the journaling apertures 26 and the channel 33 will have communication with the elongated guide openings 28 to receive the end 32 of the rod 31. Contact springs 75 and 76 are interposed between the elements 61, 64 and 66, 71 respectively within the confines of the respective

tangs of the washers 61 and 66 substantially as illustrated in Fig. 5. The circuit completing means, or in other words the contact rings 64 and 71 respectively, are placed in mating engagement with their hub portions 54 and 55 respectively, on the member 27, so that the tongues 59 and 60 of the driving washer 61 are within the notches 56 and 57 respectively, and the square shaped aperture 67 is about the hub portion 55. Thus, the washers 61 and 66 are moved in unison with the member 27, and which in turn drives the contact rings 64 and 71 respectively. The switch back 34 is next assembled with the case 24 so that the tongues 42 are received by the notches 43 of the switch back. These tongues and notches are so arranged about the peripheries of the case and back so as to provide only one relation of correct assembly. By this arrangement the fixed terminal contacts 41 and 41a supported by the back will be always in cooperable engagement with the contact bosses 80 and 81 respectively, of the circuit completing means, that is, the fixed contacts 41 will always be in the path of movement of one or the other of the bosses 80 of the contact ring 64 and the fixed contacts 41a will always be in the path of movement of the bosses 81 of the contact ring 71 when the circuit completing means as a whole is rotated by the actuating means.

The actuating means for the switch includes the push and pull rod 31 having the end 32 extending through the apertures 26 and into the radial slot 33 that bears against the spring 49. The end 32 is guided by the elongated openings 28 in a linear movement to rotate the disc 27 in its bearing 26. The other end of the rod 31 extends through a bushing or sleeve 83 extending through an aperture of the leg 22. The bushing has a shoulder 85 that bears against the panel 23 when a screw-threaded shank of the bushing is secured by a nut 86 tightly drawn against a spacer 87 adjacent the inner wall of the panel 23 so as to keep the rod portion 31 substantially in a parallel relation with the leg 21 and at the same time retain the end 32 in the radial slot 33. The rod is provided with a knob 88 which facilitates in the movement of same to rotate the circuit completing assembly with the housing 24.

The extreme movement of oscillation permitted by the circuit completing means is controlled by edges 29 and 30 of the aperture 26 cooperating with the end 32. It will be readily seen from the reference to Figs. 1 to 15 that the push and pull movement of the rod 31 will cause the end 32 to oscillate the member 27 about its pivot formed by the hub 46 journaled in the apertures 26. This oscillation of the member 27 will in turn oscillate the circuit completing assembly, so that the bosses 80 and 81 may be brought into electrical engagement with their respective contact terminals 41 and 41a, whereby electrical circuits may be completed through various ones of the terminals 41 and 41a as the circuit completing assembly is moved from one position to another.

Referring now to Figs. 16 to 23 inclusive, a modified form of the switch structure is illustrated comprising a switch back 134 having terminal contacts 136 arranged in a circular row and provided with contact surfaces 138 within the housing. The back operates to close a housing 124 and is secured to the housing by the tangs 140 that are received by corresponding notches or grooves 141 of the back 134. The housing 124 is secured to the leg 21 in a similar manner as hous-

ing 24 is secured to the leg 21 disclosed in the first form.

Within the housing 124 there is a contact actuating assembly 145 for rotatable or oscillatable engagement with the contact surfaces 138 of the terminals 136 fixed in switch back 134. The contact actuating assembly comprises a drive member 127 supporting a movable contact plate or circuit completing member 150 which may be of a disc shape as illustrated in Fig. 22. The plate has contact bosses 151, 152 and 153 arranged in triangular formation about a central opening 154. At points intermediate the contact points 151, 152 and 153 the plates are provided with tongues or projections 154, 155 and 156 punched therefrom to engage notches 157, 158 and 159 respectively in the drive member 127. The arrangement and dimensions of the driving plate and the contact closing member are so proportioned and arranged that the member 150 will have a relatively loose driving engagement with the member 127 and will be capable of slight axial movement along the common axis thereof.

The member 127 is provided with a hub or boss 159 and has a radial slot or channel 160. The hub 159 forms a shaft portion journaled with an aperture 161 of the bottom wall 125 of the housing 124. The aperture 161 is in alignment with the aperture 26 of the leg 21 of the bracket 20. The channel 160 communicates with an aperture 162 provided in the hub portion 146 and said channel extends radially to the circumferences of the member 127 as shown in Fig. 18. The aperture 162 communicates with a channel 165 formed in the bottom of an annular recess 166 in the member 127. The channel 165 forms an anchoring means for one end 167 of a spring 168 located in the radial slot 160. The channel 160 is gauged as at 169 to receive a free or flexible end 170 of the spring 168. This end 170 is put under tension by the end 32 of the rod 31 so as to prevent rattles or noises between the rod and the switch structure.

Upon assembling the modified form of the switch structure, the member 127 is placed within the cup-shaped housing 124 so that the hub portion 159 is received within the journalling apertures 161 and 26 and the channel 160 will have communication with aligned elongated openings to receive the end 32 of the rod 31. A spring 175 is interposed between the contact plate 150 and the member 127. One end of the spring 175 rests on the bottom of the annular recess 166 and the other end bears against the plate 150 as illustrated in Figs. 20 and 21. The member 150 is placed upon the member 127 so that the extensions 154, 155 and 156 are received by the notches 157, 158 and 159 respectively. The dimensions of the extensions and the notches are so measured that the plate will have an axial movement relative to the member 127. It will be noted that the notch 159 and extension 156 are larger than the other notches and extensions. This arrangement provides a one-way mating engagement between the contact plate and the member 127, which assures that the contact plate 150 will always be assembled in proper relation with the member 127. The switch back 135 is next assembled with the case 124 in a manner similar to the assembly of the back 34 to the housing 24. By these provisions the fixed contacts supported by the back 135 will always be in cooperable engagement with the contact bosses 151, 152 and 153 of the circuit completing member 150, that is, the fixed contacts will be in the path of movement of one or the

other of these contact bosses when the circuit completing member 27 is rotated by the rod 31. The terminal members may include fuse supporting brackets 180 and 181 for retention of a fuse 182.

In the use of the switch shown in Figs. 1 to 15 inclusive, the same is preferably embodied in a system of electrical distribution as disclosed in Figs. 24, 25 and 26.

In these figures 200 represents a battery or other source of electrical energy from which current will flow from one of its terminals to a lead 201 thence to the bracket 44 through the fuse 100 and the bracket 45 to the connector 36. The other terminal of the electrical energy is connected to ground 202.

The normal circuit for the horn will be obvious from Figs. 24, 25, and 26 and it will be seen that a horn 205 is connected to the connector 36 fixed to the switch back through a lead 206. A switch 207 is normally held in open position by a spring 208. Therefore, when the operator exerts enough pressure to the switch 207 to overcome the influence of the spring 208 the switch 207 will be closed to operate the horn.

The different lamp circuits are connected through the switch by the various terminal connectors located on the exterior of the back 34 and connected to the contacts 41 and 41a which cooperate with the circuit completing means which include the contact plates 63 and 66. Thus, when the switch mechanism is actuated from the position shown in Fig. 24 to that shown in Fig. 25 the following circuits are completed to the tail and side lamps in the following manner, from the battery 200 to the lead 201, terminal 45, fuse 100, terminal 44, connector 36, contact ring 63 and then the current is divided, a portion of the current flowing from ring 63 through terminal 37, lead 211, lamp 210 and back to the battery through ground, while another portion of the current will be directed from the ring 63 to the connector 38, lead 216, side lamp 215 and back to the battery through a ground connection.

When the switch mechanism is moved to the position shown in Fig. 26 to connect the "bright" side of the head lamps in a circuit together with the tail lamp circuit which has been disclosed, the following circuit to the "bright" lamp is as follows: from the battery 200 through wire or lead 201, bracket terminal 44, fuse 100, bracket terminal 45, terminal 36 cooperating contact ring 63, terminal 39, lead 221, a supplemental switch 222, terminal 223 a lead 224 passing through the "bright" circuit of the lamp 220 back to the battery through ground. It is to be understood that the contact ring 63 controls the open and closed condition of the circuit.

When it is desired to dim the headlights 220 and to simultaneously light or cut in the side light when the main switch is in the position shown in Fig. 26, the operator manually shifts the blade 223 to close the dim circuit or in other words the blade is connected with a terminal 225. It will be noted that the contact ring 66 which moves in unison with the contact ring 63 has bridged the terminal contacts 40 and 41a, the terminal 41a is connected with one of the terminals 41 by the connector 38. Therefore, when the blade 222 is connected with terminal 225 as shown in Fig. 26, current will flow from the battery 220, lead 201, terminal 44, fuse 100, terminal 45, connector 36, ring 63, terminal 39, lead 221, blade 222, a terminal 225, from thence the current will be divided, a portion passing through a lead

226 to the dim circuit of the lamp 220, to ground back to battery, and another portion of current will be directed from the terminal 225 to a lead 227, terminal 41a, ring 66, another terminal contact 41a, connector 38, terminal 41, lead 216, side lamp 215 and back to battery 200 through ground. This condition of the lights and the side lamps will be maintained as long as the blade 222 is in contact with terminal 225. As soon as the operator desires to connect the bright circuit he merely shifts the blade 222 to connect the terminal 223, which automatically disconnects the side lamps from the circuit.

To close the various circuits as viewed in Figs. 24, 25 and 26, the circuit completing means, namely, contact rings 63 and 67, are rotated in unison in a clockwise direction.

While the form of 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. In an electric switch, the combination comprising an angle bracket, a switch housing mounted upon one leg of said bracket, a driving member having a hub portion and a radial slot, said hub portion journaled in an aperture of said housing, said housing having an elongated guide slot in communication with said radial slot; a guide member mounted upon the other leg of said bracket; an operating rod passing through said guide member and extending through said elongated guide slot and into said radial slot; and a resilient member located in said radial slot engaging said rod for maintaining the mechanism quiet in its operation.

2. In an electric switch, the combination comprising a casing, a driving member within said casing having a hub portion journaled in said casing and having a radial slot for receiving an actuating member without said casing, said casing having a longitudinally extending slot affording communication between said slots; and an actuating rod substantially corresponding in diameter to the widths of said respective slots, said actuating rod having an offset portion extending through said longitudinal slot and into said radial slot to oscillate said driving member within said casing.

3. In an electric switch, the combination comprising a casing, a driving member within said casing having a hub portion journaled in said casing and having a radial slot for receiving an actuating member without said casing, said casing having a longitudinally extending slot affording communication between said slots; and an actuating rod substantially corresponding in diameter to the widths of said respective slots, said actuating rod having an offset portion extending through said longitudinal slot and into said radial slot to oscillate said driving member within said casing; and resilient means anchored in said radial slot engaging said rod for maintaining said mechanism quiet in its operation.

4. In an electric switch, the combination comprising an angle bracket; a switch housing mounted upon one leg of said bracket; a driving member having a hub and a channel, said hub journaled upon said housing, said housing having a guide opening in communication with said channel; a sleeve mounted upon the other leg of said bracket; an operating rod slidably supported by said sleeve, said rod having a transverse portion extending through said opening

and into said channel whereby said driving member may be oscillated upon actuation of said rod; and resilient means anchored in said channel engaging the end of said transverse portion for maintaining said mechanism quiet in its operation.

5. In an electric switch the combination comprising, a cup-shaped housing having a flat wall provided with a bearing surface and an elongated guide opening; a supporting plate having a boss and a radial slot, said boss journaled in said bearing surface and said slot communicating with said guide opening; circuit completing means coupled with said plate; a bracket supporting said housing; and a control rod slidably supported by said bracket, said rod having an end passing through said opening and into said slot whereby said end will oscillate said circuit completing means upon movement of said rod.

6. In an electric switch the combination comprising, an angle supporting bracket, a switch case mounted upon one leg of said bracket and providing a bearing for switch mechanism within said case, said case having a longitudinal guide opening, and a switch controller mounted for reciprocation through the other leg of said bracket, said controller having an end extending through said opening and coupled with said switch mechanism to actuate same in a rotary movement while said rod is moving in a longitudinal direction.

7. In an electric switch, the combination comprising; a cup-shaped casing having an aperture to provide a bearing and having a guide opening; a driving member within said casing said driving member having a boss and a radial slot on one side thereof, said boss being journaled within the bearing of said casing and said guide opening communicating with said slot; a circuit closing means coupled with said driving member; a switch back having fixed contacts for closing the casing and cooperating with said circuit closing means to maintain said boss within the bearing; and means outside of said casing extending through said opening and into said slot to actuate said circuit closing means concentric to said boss while said means is moved in said guide opening.

8. In a switch of the class described, the combination comprising; a cup-shaped casing having an elongated opening; a dielectric driving member having a hub portion journaled on said casing and providing a recess; a switch back closing the casing; circuit closing means carried by said driving member, said means cooperating with the back to maintain the hub portion upon the bearing; and an actuator slidably supported outside of the casing and having an end extending through the elongated opening and into the recess for oscillating the driving member.

9. In an anti-rattle device, the combination comprising; a cup-shaped housing having a flat wall provided with an opening; a rotatable member journaled within the housing and provided with a slot transverse to the opening; a bearing; a rod slidably supported in the bearing and movable in a plane substantially parallel to the plane of the flat wall; a support for the bearing to maintain the parallel relation between the rod and wall; means associated with the rod protruding through the opening and into the slot, said means adapted to rotate the movable member on movement of the rod; and a leaf spring anchored in the slot and having one end bearing against the protruding means to urge same

outwardly so as to bias the rod within the bearing to eliminate rattles between the rod and its associated elements.

10. In an anti-rattle device, the combination
 5 comprising; a plate provided with an opening;
 a movable member journaled on the plate, said
 member having a slot adjacent the opening; an
 actuator movable in a plane substantially parallel
 10 to the plane of the plate; a bearing for the
 actuator; a support for the bearing; an extension
 projecting from the actuator and extending
 loosely through the opening and into the slot,
 said extension adapted to rotate the movable
 15 member on movement of the actuator; and a leaf
 spring within the slot pressing against the extension
 to bias the actuator within the bearing
 for maintaining the actuator quiet in all positions
 thereof.

11. In an actuated device having a part rotatable
 20 over a plane surface and a push-pull actuator
 movable in a plane substantially parallel to the
 plane surface and having an angular extension
 loosely coupled to the rotatable part, anti-rattle
 means for the coupling comprising in com-

bination; a leaf spring; and means including a
 recess in the rotatable part for confining the
 spring, said spring having a part interposed between
 the actuator and the rotatable part, and
 5 flexed to eliminate rattling of the coupled relation
 of the actuator and the rotatable part.

12. In an actuated device having an actuated
 part and a reciprocating actuator movable in substantially
 parallel spaced planes, and a support
 for maintaining that relation, coupling means between
 the actuator and the actuated part, comprising
 10 in combination; an angular extension provided by
 the actuator; means including a radial slot in the
 actuated part to receive the angular extension;
 and a leaf spring located in the slot and operable
 15 on the angular extension to eliminate undesirable looseness
 in the coupling means.

ANDERSON BANKING COMPANY,
Executor of the Estate of Harry E. Norviel,
 Deceased.

By LINFIELD MYERS,
President.