March 18, 1930. H. E. NORVIEL 1,750,683

LIGHTING AND IGNITION SWITCH

Filed April 15, 1925 3 Sheets-Sheet 1

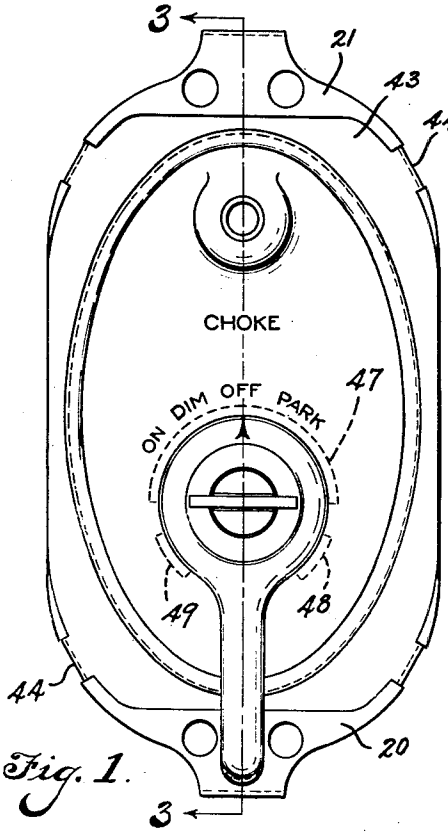

Fig. 1.

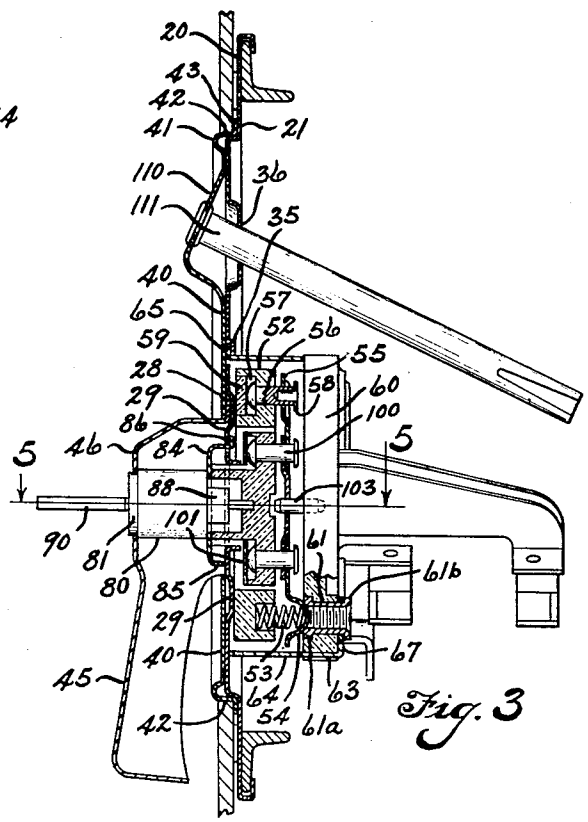

Fig. 3.

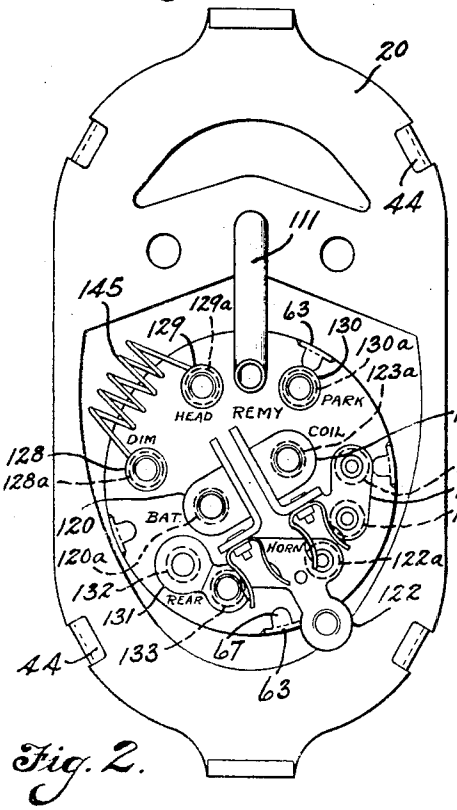

Fig. 2.

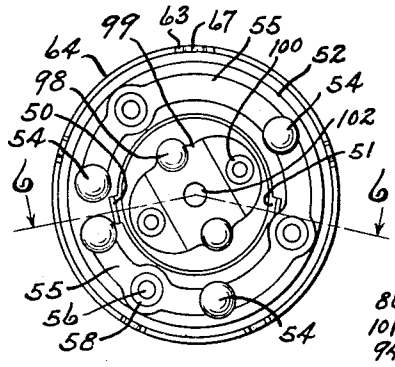

Fig. 4.

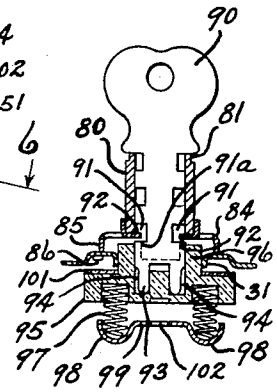

Fig. 5.

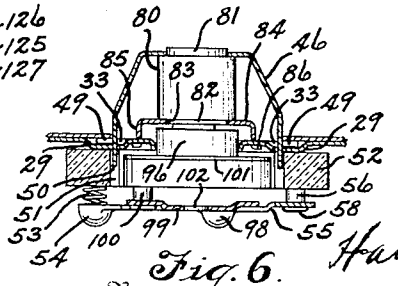

Fig. 6.

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March 18, 1930. H. E. NORVIEL 1,750,683

LIGHTING AND IGNITION SWITCH

Filed April 15, 1925 3 Sheets-Sheet 2

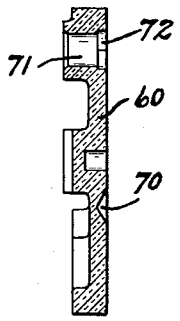

Fig. 7.

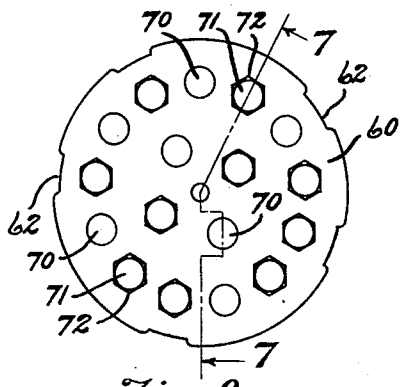

Fig. 8.

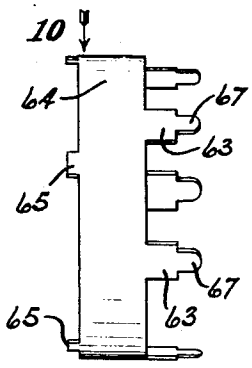

Fig. 9.

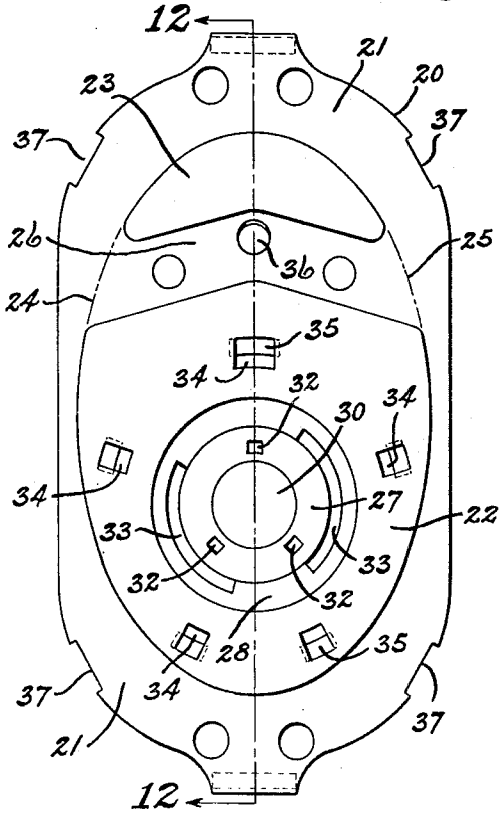

Fig. 11

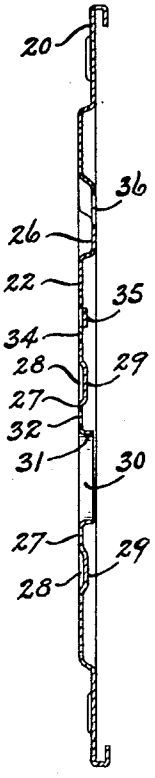

Fig. 12.

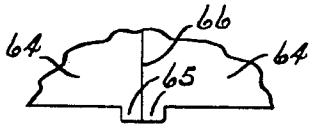

Fig. 10

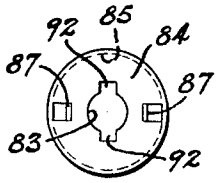

Fig. 13.

Fig. 14.

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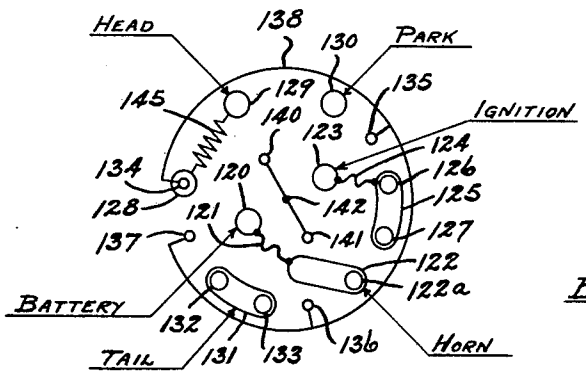
March 18, 1930. H. E. NORVIEL 1,750,683

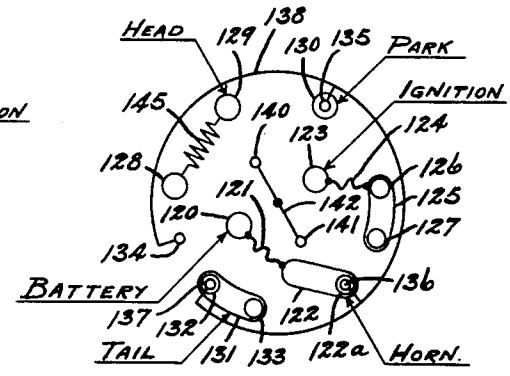
LIGHTING AND IGNITION SWITCH

Filed April 15, 1925 3 Sheets-Sheet 3



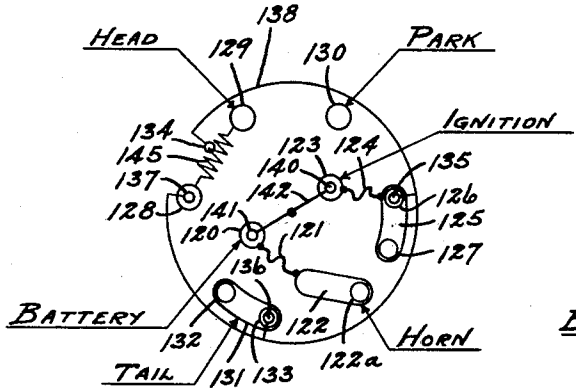
OFF

Fig. 15.



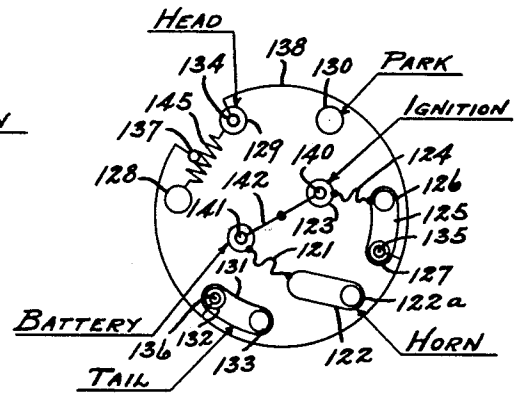
PARKING.

Fig. 16.



DIM.

Fig. 17.



BRIGHT.

Fig. 18.

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Patented Mar. 18, 1930 1,750,683

UNITED STATES PATENT OFFICE

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LIGHTING AND IGNITION SWITCH

Application filed April 15, 1925. Serial No. 23,245.

This invention relates to electrical switches particularly for controlling the electrical circuits of an automobile.

One object of the invention is to prevent burning certain lamps when the ignition is turned off.

Another object of the invention includes reducing the manufacturing cost while maintaining the durability and reliability required of such switches.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein preferred embodiments of one form of the present invention are clearly shown.

In the drawings:

Fig. 1 is a front view of the switch involving the present invention.

Fig. 2 is a rear view thereof.

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

Fig. 4 is a view of the interior of the switch case with the switch back removed.

Fig. 5 is a sectional view on the line 5—5 of Fig. 3 showing the plug operated mechanism for controlling one of the switch contact members.

Fig. 6 is a view substantially on the line 6—6 showing the lever operated mechanism for controlling another of the switch members.

Fig. 7 is a sectional view on the line 7—7 of Fig. 8 of the switch back member.

Fig. 8 is an inside face view of the switch back.

Fig. 9 is a side view of the switch case before assembled on the switch mounting bracket.

Fig. 10 is a fragmentary view thereof in the direction of the arrow 10 in Fig. 9.

Fig. 11 is a front view of the switch mounting bracket before other parts have been assembled thereon.

Fig. 12 is a sectional view on the line 12—12 of Fig. 11.

Fig. 13 is a front view of one of the bearing members for the plug shaft.

Fig. 14 is an inner end view of the plug shaft.

Figs. 15 to 18 are circuit diagrams illustrating the use of the switch.

The bracket 20 which is shown in Figs. 11 and 12 may be described as being a plate which has a marginal portion 21 and a shield shaped boss 22 and substantially crescent shaped boss 23 which extend outwardly from the margin as viewed in Fig. 11. Taken together the contours of the bosses 22 and 23 are portions of an ellipse as will be readily apparent with the aid of the dot and dash lines 24 and 25. Or in other words the bosses 22 and 23 may be described as being the result of dividing an elliptical boss by a channel 26 which lies in the same plane with the margin 21. The boss 22 encloses a circular boss 27 which is spaced from the boss 22 by a circular groove 28 which provides a boss 29 on the reverse side of the bracket. The central opening 30 in the boss 27 is surrounded by an annular flange 31. Three holes 32, located in a circular row concentric with the hole 30 are punched through the boss 27. The boss 29 is provided with arcuate slots 33 concentric with the hole 30. The boss 22 is provided with a circular row of openings 34 concentric with the hole 30. Adjacent each hole 34 the metal of the bracket is punched partly away to provide a bridge portion 35 which extends across the hole 34 and merges into the metal at the side of the hole. The hole 36 extends obliquely through the channel portion 26. The edges of the bracket are provided with notches 37.

The bosses 22 and 23 are adapted to be engaged by a switch dial plate 40 having an elliptical bead 41 merging into an elliptical flange 42 which is telescopically engaged by the bosses 22 and 23. The flange 42 merges into a flat marginal portion 43 adapted to be located against the flat marginal portion 21 of the bracket 20. The portion 43 is provided with tangs 44 which are received by the notches 37 in the bracket 20 and are bent over against the rear side of the bracket 20 as shown in Fig. 2. However, before the bracket 20 and the plate 40 are assembled the switch handle 45 having a hollow hub 46 is assembled with the bracket 20 as shown in Figs. 1 and 3. The arcuate flanges 47, 48 and 49 extending outwardly from the hub 46 are lo-

cated in the recess 28 and fit snugly between the switch dial 40 and the annular boss 29. The hub 46 is provided with tangs 50 which project through arcuate slots 33 provided in the annular boss 29, and are received by notches 51 provided in a driving ring 52 of non-conducting material.

The ring 52 is provided with sockets for receiving a plurality of springs 53 each of which is received by a hemi-spherical recess within a boss 54. The bosses 54 are connected by and formed integrally with an arcuate metallic conductor 55. The conductor 55 is driven by ring 52 through a plurality of rivets 56 each having its head received within a recess 57 provided in the ring 52. The tubular shank of each rivet 56 is flared to provide a flange 58 after the rivet has been inserted through the ring 52 and the conductor 55. The head of the rivet and the flange 58, therefore, limit the separation of the conductor 55 from the ring 52. Each recess 57 receives a non-conducting disc 59 which prevents electrical connection between the rivet 56 and the mounting bracket 20. The springs 53 yieldingly urge the driving ring 52 against the circular boss 29 which therefore, guides the ring 52 during its movements. The springs 53 also yieldingly press the bosses 54 into engagement with the swith back 60 or into engagement with one or more of the switch contacts 61 carried thereby.

The switch back 60 is constructed preferably of molded insulating material and is provided with a plurality of notches 62 at its periphery for receiving the tangs 63 which extend from a cylindrical case 64. The case 64 is provided with tangs 65 which are inserted through the openings 34 of the switch bracket 20 before dial plate 40 and the bezel ring 41 are attached. As shown in Fig. 3 the tangs 65 are bent so that the switch case 64 will be retained in position by the portions 35. The switch case 64 is formed by punching from flat sheet material a blank which includes an oblong strip from which the tangs 63 and 65 extend. This strip is bent into cylindrical form and the ends are brought together in a butt joint 66 indicated in Fig. 10. The joint 66 extends through one of the tangs 65. Each tang 63 carries a finger 67 which is bent against the rear side of the switch back 60 to hold the latter in position as shown in Fig. 3.

The switch back 60 is provided with a plurality of conical depressions 70 and a plurality of holes 71 each including a hexagonal countersunk portion 72. These depressions and holes are arranged in concentric circular rows as shown in Fig. 8. A hole 71 with its hexagonal countersunk portion is located wherever it is desired to mount a switch contact upon the back 60. Each switch contact is in the form of a tubular rivet having a hexagonal head 61A adapted to be received by the hexagonal countersunk portion of a hole 72. The shank of the rivet is flared as indicated at 61B in Fig. 3 against the outer surface of the switch back 60. The rivet is provided with a central threaded hole for receiving a screw which attaches a wire to the contact.

The plug operated switch mechanism comprises a shaft 80 having a portion 81 rotatably supported by the hub 46 of the handle 45 and having a portion 82 which is received by the central opening 83 in the shaft bearing plate 84. Plate 84 includes a circular flange 85 which is located against the boss 27 of the bracket 20. Tangs 86 extend from the flange 85 through the holes 32 in the boss 27 and are bent over against the bracket as shown in Fig. 3. The bearing plate 84 is provided with lugs 87 which co-operate with a lug 88 provided on the shaft 80 in order to limit rotation thereof to approximately 90 degrees. The shaft 80 is provided with a slot 89 for receiving a plug 90 which is provided with notches 91 which are located adjacent the opening 83 in the plate 84 when the plug 90 is inserted in the shaft 80 as shown in Fig. 5. The diameter of the opening 83 in the plate 84 is less than the greatest width of the plug 90 and is greater than the width of the metal between opposite notches 91. In order that the plug 90 may be inserted through the plate 84 when the shaft 80 is in a certain position the plate 84 is provided with notches 92 extending from the opening 83. Obviously if the plug be inserted through the notches 92 and then be turned 90 degrees it cannot be removed from the switch until it is turned again to bring it into alignment with the notches 92.

The end of the plug 90 is provided with tangs 93 which are received by recesses 94 provided in a non-conducting disc 95 having a shank 96 which is received by the hole 30 in the bracket 20 and journalled within the circular flange 31 surrounding the hole. The disc 95 is provided with sockets for receiving springs 97 each extending into a hemi-spherical recess provided by a boss 98. The bosses 98 are formed in a conducting plate 99 which is driven by the disc 95 through rivets 100 similar to the rivets 58. The heads of the rivets 100 are covered by a non-conducting washer 101 which surrounds the shank 96 of the disc 95. The plate 99 is provided with an opening 102 coaxial with the shaft 80 and receives a bearing pin 103 carried by the switch back 60. The springs 97 yieldingly urge the contact bosses 98 against the switch back or contacts carried thereby and also yieldingly urge the disc 95 toward the bearing plate 84. When the plug 90 is inserted in the shaft 80 and is turned so that the notches 91 will be out of alignment with the notches 92 of the bearing plate 84, the surfaces 91A of the plug adjacent the notches 91 will be pressed by the springs 97 against the

inside surface of the bearing plate 84. In this manner the plug 90 is kept from rattling while being retained by the switch.

The holes through the heads 61A of the contacts 61 are slightly countersunk to provide recesses for receiving the contact bosses 54 or 98; therefore the bosses 54 and 98 and the switch contacts and the depressions 70 co-operate to provide means for yieldingly maintaining the movable switch contacts in different operation positions.

The dial plate 40 is formed to provide an oblique wall 110 which supports a choke rod guide tube 111 which extends through the hole 36 in the switch bracket 20.

Referring to Figs 2, 15, 16, 17 and 18, the battery terminal 120 is connected with a stationary contact 120^a, and by a fuse 121 with a horn terminal 122 which is connected with a contact 122^a. The ignition terminal 123 is connected with a contact 123^a, and by a fuse 124 with a plate 125 connected with terminals 126 and 127. The dimmer terminal 128, head lamp terminal 129 and side lamp terminal 130 are connected respectively with contacts 128^a, 129^a and 130^a. The rear or tail lamp terminal 131 is connected with stationary contacts 132 and 133. The contacts 54 shown in Fig. 6, are represented by the small circles 134, 135, 136 and 137, and the arc 138 designates the conductor which connects them. The arc 138 in the diagrams is the conductor 55 in Fig. 4 which is operated by lever 45. The contacts 98 in Fig. 5 are numbered 140 and 141 in the diagrams, and line 142 designates the plate 99 connecting them as shown in Fig. 4. Resistance unit 145 is attached to contacts 128 and 129.

It is apparent from these diagrams that the battery terminal 120 can be connected through fuse 121 with the tail lamp terminal 131 and with the parking lamp terminal 130 independent of operation of the plug 90 for controlling the ignition, but that the head lamps cannot be burned either "bright" or "dim" by operation of the switch handle 45 unless the plug 90 be turned to move the contacts 140 and 141 so as to connect the battery and ignition terminals.

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

I claim:

1. An electric switch comprising, in combination, a case including a nonconducting member carrying a battery terminal, a plurality of lamp terminals and an ignition terminal, stationary contacts connected with said terminals, a movable contact for connecting the battery and ignition terminals, and a movable contact for connecting certain of the lamp terminals with the battery terminal independent of movement of the first movable contact, and for connecting other of the lamp terminals with the battery terminal only when the first movable contact connects the battery and ignition terminals and is so maintained.

2. A device for controlling a plurality of circuits including lighting devices and an ignition device for a motor vehicle comprising in combination, means adapted to be operated to close the ignition circuit; means adapted to complete circuits including certain of the lighting devices when the ignition circuit closing means is in its circuit-open position, said means being dependent upon the operation of the ignition controller for completing circuits to the other lighting devices.

3. A device for controlling a plurality of circuits including lighting devices and an ignition device for a motor vehicle comprising in combination, an ignition circuit controller having an on and off position, a controller for the circuits including the lighting devices, said controller being dependent upon the operation of the ignition controller to its on position for closing certain of the circuits including the lights.

4. A device for controlling a plurality of circuits including lighting devices and an ignition device for a motor vehicle comprising in combination, an ignition circuit controller having an on and off position, a controller for the circuits including the lighting devices, said light circuit controller being dependent upon the operation of the ignition circuit controller to its on position and its maintenance of on position, for closing certain of the circuits including the lighting devices.

5. A device for controlling a plurality of circuits including lighting devices and an ignition device for a motor vehicle comprising in combination, an ignition circuit controller having an on and off position, a removable handle for operating said controller, means for preventing removal of the plug from the controller when it is in its on position, a controller for the circuits including the lighting devices so constructed and arranged as to be dependent upon the operation of the ignition controller into its on position and the maintenance of said controller in this on position, for closing certain of the circuits including the lighting devices.

6. A device for controlling a plurality of circuits including lighting devices and an ignition device for a motor vehicle comprising in combination, an ignition circuit controller having an on and off position and including means requiring the use of a removable handle to operate the same, a controller for the circuits including the lighting devices so constructed and arranged, as to be operable at all times throughout its entire range of travel but capable of closing only certain of its light circuits while the ignition controller is in its off position, the said

ignition controller being adapted in addition to closing the ignition circuit to co-operate with the controller for the lighting circuits to complete other of its circuits.

7. A switch, comprising in combination, a bracket provided with apertures one of which is flanged; a dial plate secured to the front side of the bracket and providing a cover therefor, said dial plate being apertured coaxially with the flanged aperture of the bracket; an operating lever including a hub portion journalled in the aperture in the dial plate and ears extending into a space formed between the bracket and dial plate for maintaining the lever in position on the dial plate; a switch housing secured to the rear side of the bracket by ears extending through apertures in said bracket and bent over, said bent ear portions being covered and held in position by the dial plate; a contact carrying disc in said housing, journalled in the flanged aperture of the bracket; a centrally apertured bearing plate secured to the bracket; a plug receiving cylinder rotatably supported by the lever hub portion and the bearing plate; and a plug insertable in said cylinder to engage the said contact carrying disc to operate it.

8. An electric switch comprising contacts, a rotatable member for closing and opening the contacts, a removable plug for operating the member, said plug and member having clutch provisions which are engageable by movement of the plug axially with respect to the member, a plug shaft rotatable coaxially with respect to the member and having a longitudinal aperture through which the plug extends from the exterior of the switch to the member, a case enclosing the contacts and member, and means carried by the case for supporting the shaft for rotation independently of the member and for enclosing all but one end of the shaft.

9. An electric switch comprising contacts, a rotatable member for closing and opening the contacts, a removable plug for operating the member, said plug and member having clutch provisions which are engageable by movement of the plug axially with respect to the member, a plug shaft rotatable coaxially with respect to the member and having a longitudinal aperture through which the plug extends from the exterior of the switch to the member, a case enclosing the contacts and member, means supported by the case for supporting the shaft for rotation independently of the member, and means for preventing the turning of the plug to turn the member substantially unless the plug has been moved axially a certain distance relative to the member although the plug may have been drivingly connected with it.

10. An electric switch comprising contacts, a rotatable member for closing and opening the contacts, a removable plug for operating the member, said plug and member having clutch provisions which are engageable by movement of the plug axially with respect to the member, a plug shaft rotatable coaxially with respect to the member and having a longitudinal aperture through which the plug extends from the exterior of the switch to the member, a case enclosing the contacts and member, means supported by the case for supporting the shaft for rotation independently of the member, a stationary part located adjacent that portion of the plug located between the plug shaft and the member when the plug is inserted, and received by a notch in the side of the plug a predetermined distance from the end of the plug which may be drivingly connected with the member, the portions of the side of the plug adjacent to the notch cooperating with the lug to prevent rotation of the plug unless the plug has been moved a certain distance axially relative to the member although the plug may have been drivingly connected with the member.

11. An electric switch comprising contacts, a rotatable member for closing and opening the contacts, a removable plug for operating the member said plug and member having clutch provisions which are engageable by movement of the plug axially with respect to the member, a plug shaft rotatable coaxially with respect to the member and having a longitudinal aperture through which the plug extends from the exterior of the switch to the member, a case enclosing the contacts and member, and apertured bearing members supported in spaced relation by the case coaxially with respect to said member and providing bearings for the ends respectively, of the shaft, one of said bearing members providing a lug adapted to be received by a notch in the side of the plug a predetermined distance from the end of the plug which may be drivingly connected with the member, the portions of the side of the plug adjacent to the notch cooperating with the lug to prevent rotation of the plug unless the plug has been moved a certain distance axially relative to the member, although the plug may have been drivingly connected with the member.

12. An electric switch comprising contacts, a rotatable member for closing and opening the contacts, a removable plug for operating the member, said plug and member having clutch provisions which are engageable by movement of the plug axially with respect to the member, a plug shaft rotatable coaxially with respect to the member and having a longitudinal aperture through which the plug extends from the exterior of the switch to the member, said plug shaft having at least one end reduced in diameter to less than the width of the plug which passes through the shaft, a case enclosing the contacts and member, spaced bearing members

carried by the case coaxially of the switch operating member and providing bearings for the ends of the shaft, the reduced end of which providing a shaft journal in one of the bearings, the aperture in the bearing member for receiving said journal of reduced diameter being shaped to permit passing the plug through the bearing when located in a certain angular position relative thereto, the plug having notches located a certain distance from the end of the plug which is drivingly connected with the switch operating member, said notches being in the plane of the journal receiving portions of the said bearing member only when the plug has been moved a certain distance axially relative to the switch operating member.

13. An electric switch comprising contacts, a rotatable member for closing and opening the contacts, a removable plug for operating the member, said plug and member having clutch provisions which are engageable by movement of the plug axially with respect to the member, a plug shaft rotatable coaxially with respect to the member and having a longitudinal aperture through which the plug extends from the exterior of the switch to the member, said plug shaft having at least one end reduced in diameter to less than the width of the plug which passes through the shaft, a case enclosing the contacts and switch operating member and providing a bearing for the operating member, a bearing plate supported by the case in spaced relation to the bearing for the operating member, and receiving the shaft journal provided by the portion thereof of less diameter, the bearing plate having an aperture so shaped as to provide bearing portions which receive the shaft journal provided by the portion thereof of less diameter, said bearing portions being spaced by diametrically opposite notches to permit passing a flat plug through the shaft and bearing, the bearing portions of the plate being received by notches in the sides of the plug, and located a certain distance from the end of the plug which is drivingly connected with the switch operating member, said notches being in the plane of the journal receiving portions of the said bearing member only when the plug has been moved a certain distance axially relative to the switch operating member.

14. An electric switch comprising contacts and two coaxial, rotatable contact operating members, a case for enclosing the contacts and operating members, a handle on the exterior of the case and rotatably supported by the case coaxially with respect to said members, a plug shaft rotatably supported by the handle coaxially with respect to said members and rotatable independently thereof, said plug having a longitudinal aperture extending therethrough, a plug adapted to be inserted through the shaft, said plug and one of the contact operating members having coaxially engageable clutching provisions, and means for connecting the handle through the case with the other contact operating member.

15. An electric switch comprising a case having an end wall carrying a bearing, a handle rotatably supported by the case coaxially of said bearing and providing a bearing in alignment with the bearing of the case, a plug shaft supported by the bearings of the handle and case and rotatable independently of the handle, a plug insertable through a longitudinal opening in the shaft and extending within the case, coaxial switch operating members within the case, one being operable by the handle and the other member being operable by the plug, said other member and the plug having cooperating axially engageable clutching provisions, and means for connecting the handle with a switch operating member.

16. An electric switch comprising a case having an end wall supporting spaced, axially aligned bearings, a handle rotatably supported by the case coaxially of the bearings and providing a third bearing in alignment with the other bearings, a plug shaft supported between the handle-bearing and the case-bearing nearest thereto, a switch operating member within the case and rotatably supported by the other case-bearing, a plug insertable through the plug shaft and within the case, said member and plug having axially engageable clutching provisions, another switch operating member within the case, and means connecting said other member with the handle.

17. An electric switch comprising a cylindrical case having a centrally apertured end wall, the aperture being surrounded by a flange to provide a bearing, two concentric coaxial, non-conducting, contact actuating members within the case and carrying movable contact elements, a case cover carrying stationary contacts, a lever rotatably supported by the case coaxially of said bearing and connected through the case end wall with the outer one of the concentric contact actuators and having in its hub a bearing coaxial with the end wall bearing, a bearing intermediate the lever-bearing and end-wall-bearing and supported by the end wall, a plug shaft supported by the lever-bearing and intermediate bearing, a plug insertable through the shaft and within the case, and axially engageable clutching means provided by the plug and the inner one of the two contact actuators.

18. Electric switch according to claim 17 in which the intermediate bearing is provided with an aperture shaped to receive a journal portion of the plug shaft formed to reduce it to a diameter less than the width of the plug receiving aperture of the shaft, the

bearing portions of the intermediate bearing being separated by diametrically opposite notches which permit passing the key through the bearing when the plug is turned into alignment with said notches, said bearing portions being received by notches in the sides of the plug to permit the plug to turn only when it has been moved axially a certain distance relative to the switch case although it may have been connected with a contact actuator.

19. A switch of the character described including a set of stationary terminals, a contact actuator oscillatory with respect to said terminals, a contact element of cruciform shape and provided with divergent arms, limiting means connecting two of opposite arms to said actuator and contact elements carried by the other two arms, a rotatable member for closing and opening the contacts, a removable plug for operating the member, said plug and member having clutch provisions which are engageable by movement of the plug axially with respect to the member, a plug shaft rotatable coaxially with respect to the member and having a longitudinal aperture through which the plug extends from the exterior of the switch to the member, a case enclosing the contacts and member, and means carried by the case for supporting the shaft for rotation independently of the member and for enclosing all but one end of the shaft.

20. A switch of the character described including a set of stationary terminals, a contact actuator oscillatory with respect to said terminals, a contact element of cruciform shape and provided with divergent arms, limiting means connecting two of opposite arms to said actuator and contact elements carried by the other two arms, a rotatable member for closing and opening the contacts, a removable plug for operating the member, said plug and member having clutch provisions which are engageable by movement of the plug axially with respect to the member.

21. In a switch, a switch member, headed pivot pins thereon, a sheet metal contact member loosely and pivotally mounted on the pivot pins, a pair of contacts formed on the contact member in a line at right angles to the contact pins, and springs confined between the contacts and the switch member, a rotatable member for closing and opening the contacts, a removable plug for operating the member, said plug and member having clutch provisions which are engageable by movement of the plug axially with respect to the member, a plug shaft rotatable coaxially with respect to the member and having a longitudinal aperture through which the plug extends from the exterior of the switch to the member, a case enclosing the contacts and member, means supported by the case for supporting the shaft for rotation independently of the member, and means for preventing the turning of the plug to turn the member substantially unless the plug has been moved axially a certain distance relative to the member although the plug may have been drivingly connected with it.

22. An electric switch comprising a case having an end wall carrying a bearing, a handle rotatably supported by the case coaxially of said bearing and providing a bearing in alignment with the bearing of the case, a plug shaft supported by the bearings of the handle and case and rotatable independently of the handle, a plug insertable through a longitudinal opening in the shaft and extending within the case, coaxial switch operating members within the case, one being operable by the handle and the other member being operable by the plug, said other member and the plug having cooperating axially engageable clutching provisions, and means for connecting the handle with a switch operating member, one of said switch operating members being dependent upon the operation of another switch operating member.

23. An electric switch comprising a case having an end wall supporting spaced, axially aligned bearings, a handle rotatably supported by the case coaxially of the bearings and providing a third bearing in alignment with the other bearings, a plug shaft supported between the handle-bearing and the case-bearing nearest thereto, a switch operating member within the case and rotatably supported by the other case-bearing, a plug insertable through the plug shaft and within the case, said member and plug having axially engageable clutching provisions, another switch operating member within the case, and means connecting said other member with the handle, one of said switch operating members being dependent upon the operation of another switch operating member.

In testimony whereof I hereto affix my signature.

HARRY E. NORVIEL.