

Sept. 10, 1929.

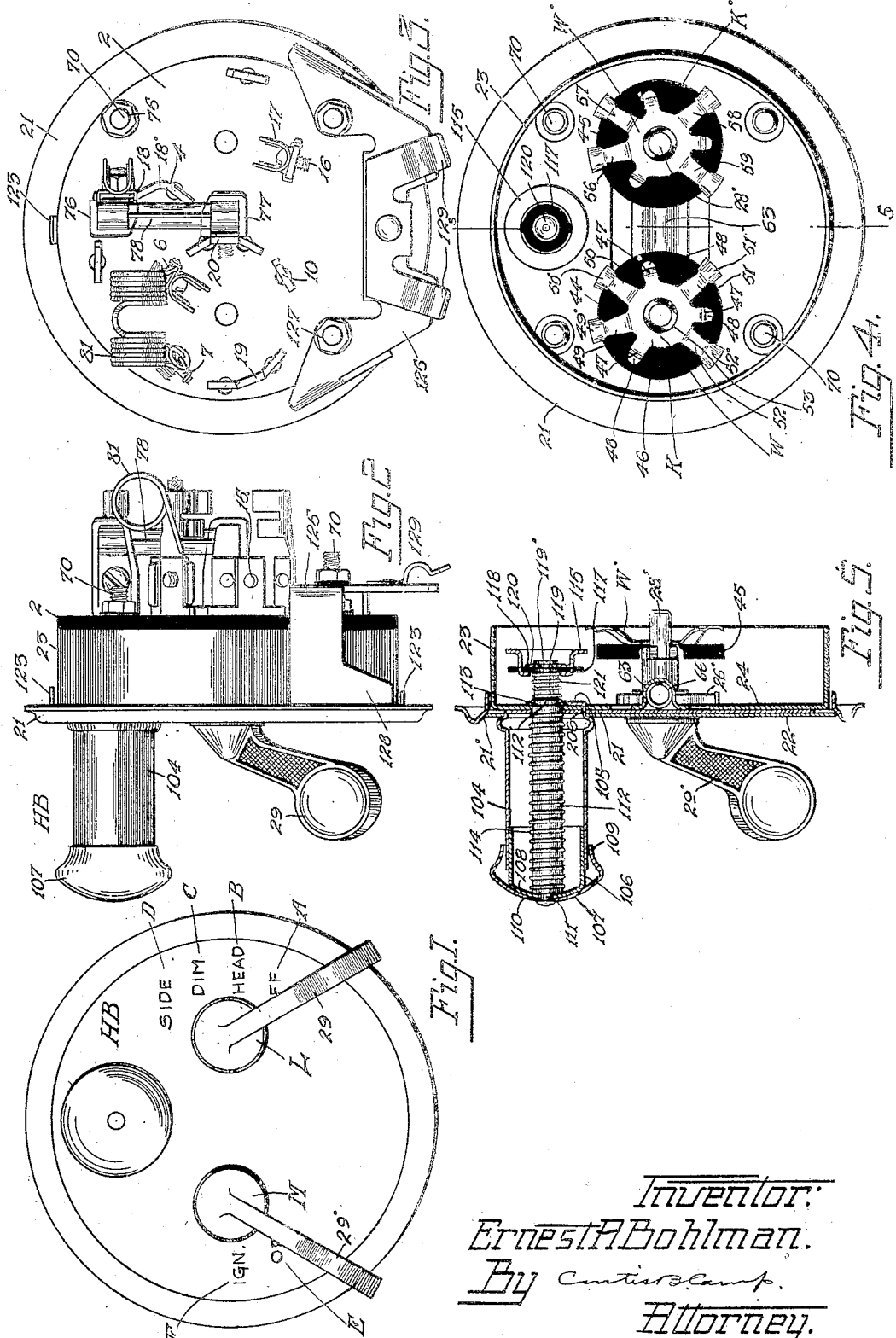
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1,727,957

LIGHTING AND IGNITION SWITCH

Filed March 9, 1925

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

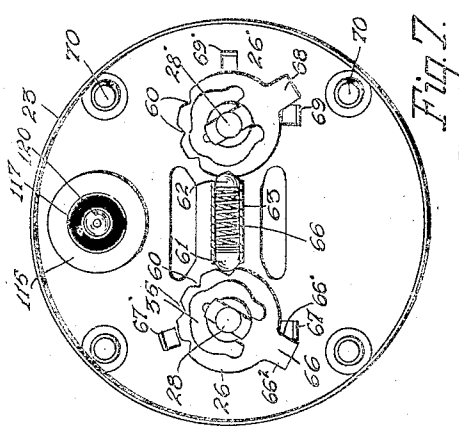


Fig. 7.

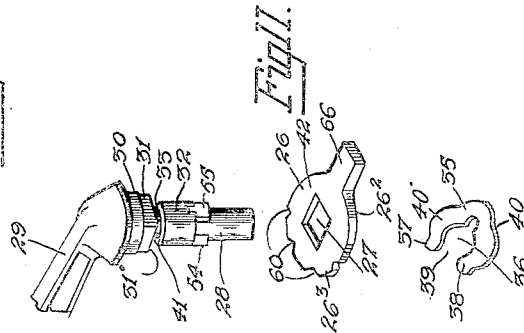


Fig. 11.

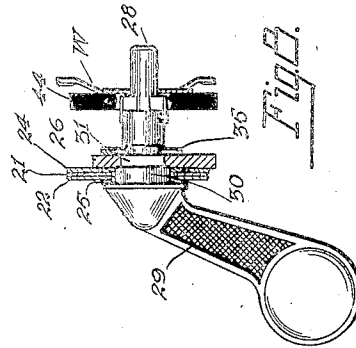


Fig. 8.

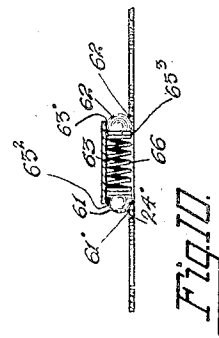


Fig. 10.

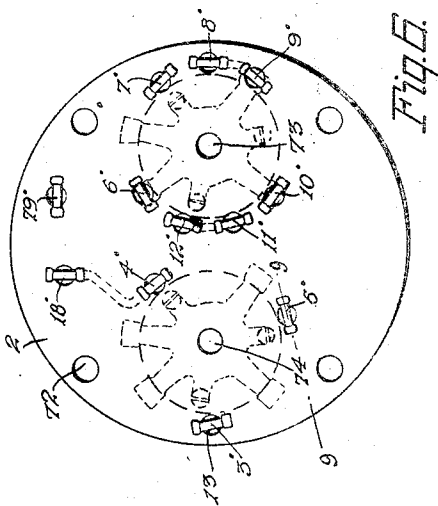


Fig. 6.

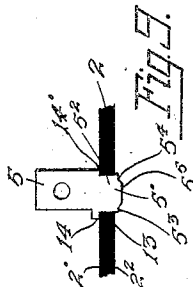


Fig. 9.

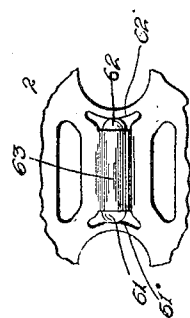


Fig. 12.

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UNITED STATES PATENT OFFICE.

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LIGHTING AND IGNITION SWITCH.

Application filed March 9, 1925. Serial No. 13,942.

My invention relates to electrical switches in general but more particularly to switches for controlling a plurality of circuits. The present embodiment of my invention is for use in connection with ignition and lighting circuits of automobiles or the like.

It is an object of my invention to produce an improved device of the class described which embodies desirable features and advantages, all in a simple and efficient manner; and a feature of my invention is the provision of novel means for associating the actuating levers of the lighting and ignition units of the switch with the rotor elements of the lighting and ignition units and to secure them against lateral movement; and to secure the parts which comprise the rotor elements that form the rotatable units, together without the aid of complicated fastening means such as nuts and threaded members.

Another feature of my invention is the provision of a novel method of holding the rotor elements of the lighting and ignition units in their different operative positions which means provides a snap action for the rotor elements as they are moved to their different operative positions.

A feature of my invention is the provision of a simple horn button, mounted and operating in association with the lighting and ignition switch.

The above features, as well as others, will be more fully described hereinafter, and for a more complete understanding of my invention reference may be had to the accompanying drawings, in which like reference characters in the different views denote like parts and in which:

Fig. 1 is a face view of the combination switch of my invention;

Fig. 2 is a right side elevation of Fig. 1;

Fig. 3 is a rear view of Fig. 1;

Fig. 4 is an interior view of the mechanism with the base removed;

Fig. 5 is a sectional view along the line 5-5 of Fig. 4;

Fig. 6 is a face view of the base illustrating the contact arrangement of the ignition and lighting units of the switch;

Fig. 7 is a view of the interior mechanism,

part of the apparatus being removed to show, more clearly, the method and means used for holding the lighting and ignition units in any of their operative positions;

Fig. 8 is a sectional view of the actuating lever, of one of the switch units, and its associated parts;

Fig. 9 is a sectional view along the line 9-9 of Fig. 6;

Fig. 10 is a partial sectional view illustrating the retaining means for the spring and balls which yieldingly hold the units in their operative positions;

Fig. 11 is a disassembled perspective view of the actuating lever and its associated parts, and;

Fig. 12 is a fragmentary plan view of the support for the ball members which are associated with the disks of the rotor elements.

In referring to my invention in general, as it is illustrated in the accompanying drawings, it comprises a lighting switch unit L, an ignition switch unit M, and a horn button unit HB. The lighting switch unit L has a normal or off position A, and three operative positions B, C and D. The switch unit L when in these different operative positions will close circuits to effect the lighting of certain lamps of the automobile. The ignition switch unit M has a normal or off position E, in which position the ignition apparatus is rendered inoperative, and an operative position F, in which position the ignition circuit is closed and thus rendered operative.

Referring now more in detail to the switch of my invention, I will first describe the back structure of the same. The back structure comprises, preferably, a circular mounting disk or base 2 made of any suitable insulating material such as fibre. A number of suitable contact members 3', 4', 5', 6', 7', 8', 9', 10', 11' and 12' are provided and secured in suitable slots 13 provided in the base 2. Contact members 3', 4' and 5' are associated with the ignition switch unit M and contacts 6', 7', 8', 9', 10', 11' and 12' are associated with the lighting switch unit L. As all the contact members are secured to the base in the same way a description of the means employed to secure one will suffice for all. Assume that

the contact member shown in Fig. 9 is 5', it is stamped out of suitable conducting material such as brass. The base 2 which carries the contact members is provided with a slot 13 of a size to receive the reduced portion 5² of the member. The reduced portion 5² of the member 5' is inserted in its respective slot 13 with the shoulders 14 and 14', formed by the reduced portion 5², resting against the face 2' of the base 2. The reduced portion 5² protrudes slightly beyond the face 2² of the base 2 and, by means of a suitable tool this protruding end is swaged to form edges 5³ and 5⁴, which secure the member 5' in its slot 13 against lateral movement. The intermediate portion is formed to present an arcuate portion 5⁵, which forms the contact surface adapted to be engaged by the wipers W and W'. The terminals, as shown in Fig. 3, which extend up from the face 2' of the base 2 are provided with suitable means to permit the connection of external conductors and for this purpose I provide a suitable tapped orifice 15. The screw 16, which has screw threaded engagement with the tapped orifice 15, secures a clip 17 in position for holding an external conductor in place. A terminal 18, secured to the base 2 in the manner as already described, is provided with an integrally formed laterally extending portion 18' which is provided with a depending member 4 that fits into a slot 13 and has its protruding portion shaped to form the contact 4'. The terminal 18 is connected with the contact 4' by this laterally extending portion 18', which thus connects the contact 4' of the ignition switch unit M to this terminal 18 which is the battery terminal as will be more fully described hereinafter.

The terminals 6, 7 and 10 integrally formed with the contacts 6', 7' and 10' extend up from the face 2' of the base 2 and form terminals to which external conductors are connected as already described. The terminal 19 which is integrally formed with the contacts 8' and 9' serves as a terminal for contacts 8' and 9'; and the terminal 20, integrally formed with the contacts 11' and 12', serves as a terminal for contacts 11' and 12' and these two terminals form connecting means for external conductors.

An enclosing casing for housing the rotor circuit closing elements K and K', associated respectively with the lighting unit L and the ignition unit M, comprises a plate member 21 provided with a dished portion 21' which is adapted to receive an escutcheon or designating plate 22 which bears the names of the different positions to which the ignition and lighting switch units L and M may be moved. A cup shaped member 23 is also provided and the bottom 24 of this member 23 is provided with a pair of orifices, in alignment with similar orifices in the plate member 21 and the escutcheon plate 22, which are adapted to re-

ceive ferrules 25 to secure the plate 21 and the escutcheon 22 together.

Rotor circuit closing elements K and K' are provided for the ignition and lighting switch units M and L and are adapted to be rotatably supported within the cup shaped member 23. As the rotor elements K and K' are similar in construction and assembly a description of one will suffice for both. The rotor element K, associated with the lighting switch unit L, comprises an adjusting lever 29 for rotating the rotor circuit closing element K. The lever 29 is provided with a shaft 28 which is provided with a cylindrical portion 30 adapted, when in position, to rest in the ferrule opening of its associated unit. A disk 26 associated with the lever shaft 28 is provided with a square orifice 27 of a size to permit it being slipped onto the square portion 31 of the shaft 28 next to the cylindrical portion 30, and when thus positioned on the lever shaft 28, it is rotated by means of the actuating lever 29.

With the lever 29 and its lever shaft 28 in position as just described the same may now be locked to prevent lateral movement and to this end I provide a novel locking arrangement to prevent the shaft 28 from moving laterally in the ferrule 25 and the square orifice 27 of the disk 26. The reduced portion 32 of the lever shaft 28 that protrudes through the disk 26 is provided with a slot or annular groove 33 located just below the square portion 31. The combined length of the cylindrical portion 30 of the shaft 28 and the square portion 31 is such so as to bring the face 31' of the square portion 31 approximately flush with face 26² of the disk 26. After the lever shaft 28 has been positioned with the square portion 31 in the square orifice 27 of the disk 26 a U shaped member 35, provided with a central opening 36 and of a thickness slightly smaller than the width of the annular groove 33 of the lever shaft 28, is placed on the shaft 28 in such a way that the central opening 36 is around the reduced circular portion of the lever shaft 28. The distance 39 between the ends 37 and 38 of the member 36 is slightly smaller than the diameter of the reduced portion of the shaft 28 in the groove 33 and this necessitates a forcing apart of the ends 37 and 38 when the member 36 is placed in position on the lever shaft 28. The ends 37 and 38 are forced apart to permit the insertion of the U shaped member 35 into the groove 33 and when in position the ends 37 and 38 will spring back and as the space 39 is slightly less than the diameter of the reduced portion of the shaft in the groove 33, the member 35 will be held in its proper position. The face 40 of the member 35 rests against the face 41 of cylindrical portion 32 of the shaft 28 and the other face 40' of the member 35 rests against the face 26² of the disk 26 which disk has its other face 48 rest-

ing against the bottom 24 of the cup member 23. This method of mounting and locking the rotor element K and its associated parts prevents the same from rocking and having lateral movement but enables it to be rotated as a whole to any of its predetermined desired positions.

The rotor elements K and K', with which are associated the levers 29 and 29', are adapted to be rotated, through the agency of the levers 29 and 29', to their different operative positions, and to connect the contact combinations of the switch units L and M to close particular circuits in their different operative positions I provide contact wiper carrying disks 44 and 45 associated respectively with the lighting and ignition switch units L and M and as both of the wiper carrying disks 44 and 45 are of similar construction, a description of one will suffice.

The contact wiper carrying disk 44, associated with the lighting switch unit L, comprises a disk 44 of suitable insulating material such as fibre upon which the wiper member W is supported. The wiper member W comprises a disk shaped member 46 provided with three angularly displaced integrally formed tongue extensions 47 which are adapted to enter aligned orifices 48 in the disk 44 by means of a force fit to secure the same to the disk 44 against displacement or movement. The disk shaped member 46 is provided with radially disposed wiper arms 49, 50, 51 and 52 which are integrally formed therewith and are provided with flared end portions 49', 50', 51', and 52' which are adapted to engage the contacts 6', 7', etc., of the lighting switch unit L, secured in the base 2.

To associate the disk 44 and its supported wiper arms 49, 50, 51 and 52 with the lever shaft 28 I provide a slot 53 in the disk 44 which receives the integrally formed lugs 54 and 55 located on the cylindrical portion 32 of the lever shaft 28 and diametrically opposite each other, to support the disk 44 on the lever shaft 28. The slot 53 in association with the lugs 54 and 55 prevents movement of the disk 44 on the shaft 28. When the lever 29 is moved to any of its operative positions the disk 44 being supported as just described is rotated with the lever shaft 28 which causes the wiper arms 49, 50, 51 and 52 to engage the contacts 6', 7' etc., of the lighting switch unit L in the base 2. The ignition switch unit is also provided with a disk 45 carrying wiper arms 56, 57, 58 and 59 which, when mounted on the shaft 28', in a manner similar to the mounting of disk 44, is adapted to engage with the contacts 3', 4', and 5' of the ignition switch unit, in the base 2.

In order to maintain the rotor elements K and K' in the positions to which they may be moved I provide a plurality of notches 60 located in the peripheral edges of the disks 26 and 26' associated with the rotor elements K

and K' adapted to be engaged by a pair of balls 61 and 62 spring pressed into engagement with the peripheral faces of the disks 26 and 26' as will now be described. The central portion of the base 24 of the cup shaped enclosing casing 23 lying between the orifices through which ferrules 25 pass is sheared and stamped out as clearly illustrated in Fig. 12 and this portion of the base is shaped by means of a suitable drawing operation to form a semi-circular shaped channel 63 which lies between the two orifices in the base 24 through which the ferrules 25 of the respective elements K and K' extend. The semi-circular channel 63 is adapted to receive the two balls 61 and 62 which cooperate respectively with the notched disks 26 and 26' of the rotor elements K and K'. The depth of the channel 63 between its inner face 63' and the face 24' of the base 24 of the casing 23 is slightly larger than the diameter of the balls 61 and 62 and when they are positioned in the opposite ends of the channel 63 a coil spring 66 is placed between them which forces them outward until they engage respectively the edges 61' and 62' of the sheared portion of the base 24. The balls 61 and 62 when thus positioned in engagement with the edges 61' and 62' protrude slightly beyond the respective end openings 63² and 63³ of the channel 63 to permit them to engage the peripheral notched faces of the disks 26 and 26'. From the above description it is readily apparent that the balls 61 and 62 are held in yielding position by means of the spring 66 in association with the edges 61' and 62', and the plate 21 which rests against the face 24' of the base 24 of the casing 23 is held in position by the ferrules 25 and prevents the balls 62 and 63 from being dislodged when the balls 61 and 62 are moved laterally.

The balls 61 and 62 when in position as just described rest respectively in notches 60 in the disks 26 and 26' and assuming that the lever 29 is actuated the disk 26 associated with it is also rotated as before described and causes the notch 60 in which the ball 61 rested to move away from the ball 61 and bring the peripheral edge 26² of the disk 26 into engagement with the ball 61, and causes it to be forced inward against the tension of the spring 66. After the apex of the peripheral face 26³ of the disk 26 between the succeeding notch has passed the summit of the ball 61 the spring 66 which was placed under additional tension by reason of the ball 61 being forced inward now forces the ball 61 into the next notch 60. The normal tension of the spring 66 is such as to maintain the balls 61 and 62 in the notches 60 of the disks 26 and 26' to maintain the rotor elements K and K', with which they are associated, in any of their adjusted positions. The tension of the spring 66 is increased sufficiently, when one of the balls 61 or 62 is forced inward by the

rotation of the cam 26 or 26' associated with it to cause a snap action when the next notch 60 comes in alignment with the ball 61 or 62.

To limit the degree of rotation of the rotor element K I provide the disk 26 with an integrally formed arm 66 so arranged to cooperate with tongue extensions 67 and 67' struck up from the base 24 of the casing 23. When the lever 29 is in its normal or A position a face 66' of the extension member 66 of the disk 26 engages the tongue 67. When the lever 29 is moved to its D position the face 66², of the extension 66 of the disk 26, enters into engagement with the tongue 67'. The rotor element K' is prevented from excessive movement by an integrally formed extension member 68 and two tongues 69 and 69' which perform a service for the rotor element K' similar to that performed by the members 66, 67 and 67' of the rotor element K.

The plate 21 and the cup shaped enclosing member 22 are secured together by means of studs 70. These four studs 70 also provide means for securing the base 2 to the enclosing casing member 23. The escutcheon 22 is secured, to the plate 21 and casing member 23, by means of the ferrules 25 as before described to form a unit enclosing member.

The studs 70 extend rearwardly into the casing member 23 and the base 2 is provided with orifices 72 through which the studs 70 pass to permit the base 2 to rest against the peripheral edge of the casing 23. A pair of orifices 73 and 74 are adapted to receive the ends of the lever shafts 28 and 28' and serve as bearings when the lever shafts are rotated. Nuts 75 have screw threaded engagement with the ends of the studs 70 which protrude through the orifices 72 in the base 2 and are screwed down to clamp the base 2 against the peripheral edge of the casing member 23. With the base 2 clamped in this position the operating levers 29, 29' of the rotor elements K and K' are rotatable in the bearings formed by the ferrules 25 and the orifices 73 and 74 in the base 2.

The contacts 6', 7' etc., of the rotor element K are now in position to be engaged by the wiper arms 49, 50, 51 and 52 on the disk 44 supported on the lever shaft 28 of the rotor element K. The contacts 3', 4' and 5' of the rotor element K' are in position to be engaged by the wiper arms 56, 57, 58 and 59 on the disk 45 supported on the lever shaft 28' of the rotor element K'. The actuating levers 29 and 29' of the rotor elements K and K' when rotated to their different positions cause the wiper arms of the respective elements K and K' to engage certain combinations of contacts in the base 2 to close the circuits for the different lights of the automobile and the ignition system of the engine as is well understood by anyone familiar with the art.

As illustrated in Fig. 2 of the accompany-

ing drawings I provide fuse clips 76 and 77 secured respectively to the terminals 18 and 20 by means of suitable screws which have screw threaded engagement with suitable tapped orifices 15 in the said terminals 18 and 20. The terminal 18, to which the fuse clip 76 is secured, is the terminal to which the external battery lead is connected and through the agency of the fuse 78, which is inserted in the terminals or clips 76 and 77, battery current is extended to the terminal 20 of the lighting switch unit L so that battery current, which is extended to the different light circuits by the manipulation of the switch lever 29, passes through the fuse 78 for the usual protective purposes.

I also provide a horn button unit which comprises a cylindrical member 104 provided with integrally formed prongs 105 adapted to be inserted in suitable aligned orifices 206, in the plate 21, and casing base 24. The portions of the prongs 105 that extend through the casing base 24 are upset to hold the cylindrical member 104 in a rigid position. The movable member of the horn button unit HB comprises a cup shaped member 106 of a size to fit in the inside of the cylindrical member 104 where it is slidable longitudinally. A member 107 shaped to fit upon the arcuate shaped bottom 108 of the member 106 extends slightly beyond the sides of said member 106 but with its end 109 tapered down until it is of a size to fit loosely around the cylindrical member 104. Suitable orifices 110 are provided in the members 106 and 107 to allow a reduced portion 111 of a stem 112 to be inserted in said orifices 110. The protruding portion of 111 is then riveted to secure the cap 106 in association with the stem 112 and cylindrical member 104. The stem 112 extends through the member 104 and aligned orifices in the plate 21, and casing bottom 24 of the casing 23. A coil spring 114 is placed around the stem 112 and its end rest against the member 106 and the plate 21 respectively to maintain the stem 112, and its associated parts, in their normal position. A stop 113 in the form of a washer is secured to a reduced portion 112' of the stem 112 and acts as a stop for the button HB in its upward movement to its normal position under the influence of the spring 114. A cup shaped member 115, made of any suitable conducting material such as brass, is fastened to an insulating disk 117 by having portions 118 inserted into suitable orifices provided in the disk 117. These portions 118 are then upset to maintain the disk 117 and brass cup 115 in the proper association to form a unit structure. The disk 117 is provided with a suitable central orifice through which a reduced portion 119 of the stem 112 is inserted and washer 120 is then placed over the further reduced portion 119' of the stem 112 which protrudes through the orifice in the disk 117

and which is then spun over to maintain the washer 120 on the end of the stem 112 and at the same time slidably maintain the disk 117 and its cup shaped member 115 on the reduced end portion 119 of the stem 112. The orifice provided in the disk 117 is large enough to allow the disk 117 and its supported cup 115 to abide on the reduced portion 119 of the shaft 112. A coil spring 121 is placed around the portion 119 and rests between the stop 113 and disk 117 and maintains the disk 117 in its normal position against the washer 120. The circular cup shaped brass member 115 is provided to engage with contacts 18' and 79' to close circuit for the actuation of a motor horn. When it is desirous to operate the horn the operator depresses the button 107 which, by reason of its construction, slides down on the cylindrical member 104 and this movement causes the stem 112, the disk 117 and brass cup 115 to be moved in a downward direction as a whole and the movement imparted to the brass cup 115 causes it to engage with the contacts 18' and 79' to complete the circuit for the motor horn. Any additional pressure on the button 107 after the member 115 has engaged the contacts 18' and 79' will cause the stem 112 to continue its downward movement and due to the fact that the member 115 is engaging the contacts 18' and 79' this additional movement of the stem 112 causes the stop 113 to compress the spring 121 and permit the reduced portion 119 of the stem 112 to slide through the orifice in the disk 117 which supports the member 115. This movement of the stem 112 after the member 115 has engaged the contacts 18' and 79' will prevent undue pressure being placed upon the member 115 and thus prevent the damage of contacts 18' and 79' and the member 115. When the pressure is released the spring 121 will again force the disk 117 and its supported member 115 against the washer 120 and the depressed spring 114 around the stem 112 will force the button 107 and the stem 112 back to normal position.

The lighting and ignition switch as a whole is adapted to be mounted in the cowl of the automobile and to accomplish this the cowl of the automobile is provided with a suitable orifice in which the body of the switch rests and a tongue extension 123 integrally formed with the plate 21 registers with a notch provided in the orifice in the cowl of the automobile to prevent the switch from turning around. A bracket 125 provided with a pair of orifices register with two of the studs 70 which protrude through the base 2 of the switch and enter the orifices in the bracket 125. Nuts 127 which have screw threaded engagement with the studs 70 clamp the bracket 125 in position with the leg extensions 128 of the bracket 125 engaging the rear face of the cowl to thus clamp the switch as

a whole against movement in the cowl. Spring members 129 are secured to the bottom of the bracket 125 for holding additional fuses for reserve use. I also provide a resistance coil 81 one end of which is fastened to the terminal 6 and the other end to terminal 7. This coil 81 is provided for the usual light dimming purposes as will be understood by anyone skilled in the art.

While I have described and illustrated a preferred embodiment of my invention it is to be understood that I do not wish to be limited to the exact structure as shown and described but aim to cover all such changes and modifications as may come under the spirit and scope of the appended claims.

Having described my invention what I claim as new and desire to secure by United States Letters Patent is:

1. A switch of the character described including a front plate, a back plate, a pair of rotatable elements mounted between said plates, operating levers for said elements, a shaft for each of said levers extending through said front plate, said rotatable element and said back plate, spring pressed ball members, located in a channel integrally formed in said front plate and adapted to engage serrations on said rotatable elements to maintain the said rotatable elements in any adjusted position, and means intermediate of the ends of said shafts including U-shaped members in association with said means on said shafts for locking said shafts against longitudinal movement.

2. A switch of the character described including a front plate, a base, a pair of rotatable elements mounted between said plate and base, operating levers having shafts for rotating said rotatable elements, a pair of disks associated with said rotatable elements, a groove in said shafts, U-shaped members adapted to be inserted in said grooves to cooperate with said pair of disks to prevent the longitudinal movement of said shafts, and housing means integral with said front plate and a pair ball members and a helical spring supported in said housing means, said spring yieldingly holding said balls against said rotatable elements for maintaining said rotatable elements in their adjusted positions.

3. A switch of the character described including a front plate, a base, a rotor element mounted between said plate and said base, an operating lever for said element, a shaft having a groove for said lever, extending through said front plate, said rotor element and said base, and a disk associated with said rotor element having an integrally formed extension member for limiting the degree of rotation of said element, a U-shaped member adapted to be inserted in said groove to maintain said disk in position on said shaft and to cooperate with said disk to prevent longitudinal

movement of said shaft, a plurality of notches in the peripheral edge of said disk, housing means containing a helical spring and a ball member, said spring yieldingly holding said ball in engagement with the edge of said disk to maintain the said rotor element in any of its adjusted positions.

4. In a switch of the character described including a front plate, a base, a rotor element mounted between said plate and base, a positioning lever for said rotor element, a shaft for said lever extending through said front plate, said rotor element and said base, a disk supported on said shaft and means thereon for limiting the rotation of said rotor element, means including a spring pressed ball member positioned in a channel integrally formed with said front plate and associated with said disk for maintaining the adjustment of the said lever, a groove in said shaft, and means associated with said groove and said shaft for securing said shaft against longitudinal movement and said disk upon said shaft.

5. A switch of the character described including a front plate and a casing, a base, a cylindrical member extending upward from said plate and supported by said casing, a pair of contacts in said base, a stem in said cylindrical member, extending through said front plate and said casing, a button for operating said stem comprising two members engaging the inner and the outer circumferences respectively of said cylindrical member, said member serving as guide member for said button, a cup member supported on said stem adapted to engage said pair of contacts, and means for slidably supporting said cup member on said stem.

6. A switch of the character described including a front plate, an enclosing casing secured to said front plate, a base, a cylindrical member secured to said casing and extending upward from said plate, a stem in said cylindrical member and extending through said front plate and said casing, an operating button for said stem consisting of two portions adapted to serve as guiding means by respectively engaging the inner and outer circumferences of said cylindrical member, a disk of insulating material, a cup member secured to said disk, said disk and its cup member being slidably supported on said stem and tiltable in relation thereto between said front plate and said base, a pair of contacts in said base adapted to be engaged by said cup member, and means including a coil spring for maintaining said cup member in its normal position.

7. A switch of the character described including a front plate, a base, a cylindrical member extending upward from said front plate, a stem in said cylindrical member and extending through said front plate, a button secured to said stem for actuating said stem,

said button consisting of two portions secured to said stem by a rivet and adapted to serve as guiding means by respectively engaging the inner and outer circumferences of said cylindrical member, a cup member insulated from and slidably supported on said stem and tiltable in relation thereto, and adapted to engage a pair of contacts in said base, and means for allowing movement of the stem after said cup member engages with said pair of contacts without affecting said cup member.

8. A switch of the character described including a front plate, a base, a cylindrical member extending upward from said front plate, a stem located in said cylindrical member and extending through said front plate, a button associated with said stem and said cylindrical member to actuate said stem, said button consisting of two portions secured to said stem by a rivet and adapted to serve as guiding means by respectively engaging the inner and outer circumferences of said cylindrical member, a cup member insulated from and slidably supported on said stem between said front plate and said base and adapted to engage a pair of contacts in said base, a coil spring adapted to return said stem and associated parts to normal, and means secured to said stem for limiting the return movement and preventing excess movement of said stem.

9. A switch of the character described including a front plate, a base, a cylindrical member extending upward from said front plate, a stem located in said cylindrical member and extending through said front plate, an operating button for said stem consisting of two portions adapted to serve as guiding means by respectively engaging the inner and outer circumferences of said cylindrical member, a cup member insulated from and slidably mounted on said stem, a washer for maintaining said cup member on said stem, and means adapted to normally maintain said cup member in position against said washer.

10. A switch of the character described including a front plate and a base, a pair of rotor elements, each having a plurality of operative positions and being supported between said plate and base, operating levers having shafts for rotating said rotor elements, a disk associated with each rotor element, grooves on said shafts, U-shaped members adapted to be inserted in said grooves to cooperate with said disks to prevent the longitudinal movement of said shafts, and means formed in the said front plate and a pair of ball members positioned therein and spring pressed into engagement with notches in said disks to maintain said rotor elements in any of their operative positions.

11. A switch of the character described including a front plate and a base, a pair of rotor elements supported between said plate and base, each having a plurality of opera-

tive positions, operating levers for said elements having shafts provided with grooves for moving said rotor elements to any of their operative positions, a disk associated with each rotor element, U-shaped members adapted to be inserted in said grooves to cooperate with said disk members to prevent the longitudinal movement of said shafts, means formed in the said front plate and a pair of ball members positioned therein and spring pressed into engagement with said disks, a plurality of notches in said disks, said ball members engaging notches in the respective peripheral edges of said disks to maintain said rotor elements in their normal or operative positions.

12. A switch of the character described including a front plate and a base, a pair of rotor elements supported between said plate and base, each element having a normal and an operative position, operating levers for said rotor element, a disk associated with each rotor element, a pair of ball members yieldingly supported by said front plate, a plurality of notches in said disks, said ball members engaging notches in the respective peripheral faces of said disks, and spring means between said ball members for pressing said ball members into engagement with notches in the respective disks of said rotor elements.

13. A switch of the character described including a front plate and a base, a pair of rotor elements supported between said plate and said base, each element having a normal and an operative position, operating levers for said rotor elements, a disk associated with each rotor element, a pair of ball members yieldingly supported by said front plate, a plurality of notches in said disks, said ball members engaging notches in the respective peripheral faces of said disks, spring means between said ball members for pressing said ball members into engagement with said notches in the respective disks of said rotor elements, a group of contacts for each rotor element in said base, and wiper elements associated with each actuating lever to be moved into engagement with said contact groups, said ball members maintaining the wiper elements of said rotor elements in their adjusted positions.

14. A switch of the character described including a front plate and a base, a rotor element mounted between said plate and said base, an operating lever for said element, a shaft for said lever extending through said front plate, said rotor element and said base, a groove on said shaft, a U-shaped member adapted to register with said groove to lock said lever against longitudinal movement, spring pressed ball members positioned in a channel integrally formed with said front plate and adapted to engage serrations on said rotatable elements to main said rotatable elements in any adjusted position, and means

integral with said U-shaped member for holding said U-shaped member in locked position.

15. A device of the character described including a plate member, a shaft extending through said plate member, a disk having a serrated edge secured to said shaft, a U-shaped member inserted in a groove in said shaft for maintaining said disk in position on said shaft and to cooperate with said disk to prevent the longitudinal movement of said shaft, a housing formed integrally with said plate member, and a spring pressed ball member in said housing yieldingly engaging the serrated edge of said disk for positioning the same.

16. A device of the character described including a plate member, a rotatable shaft extending through said plate member, a disk having a serrated edge secured to said shaft, a U-shaped member inserted in a groove in said shaft for maintaining said disk in position on said shaft and to cooperate with said disk to prevent the longitudinal movement of said shaft, a housing member formed integrally with said plate member, a spring pressed ball member contained in said housing yieldingly engaging the serrated edge of said disk, and means for limiting the movement of said disk.

17. A device of the character described including a plate member, a rotary shaft extending through said plate member, a disk mounted on said shaft having a serrated edge, a channel formed in said plate, a second plate mounted against said first plate forming a housing for said channel, and a spring pressed member in said housing for engaging the serrations of said disk.

18. A device of the character described including a plate member, a shaft extending through said plate member, a disk through which said shaft extends, spring pressed ball members located in a channel integrally formed with said plate member and adapted to engage serrations on said disk to maintain the said disk and shaft in any adjusted position, a groove in said shaft, and a U-shaped member adapted to fit into said groove to prevent movement between said disk and said shaft.

19. A device of the character described including a plate member, a shaft extending through said plate member, a disk through which said shaft extends, spring pressed ball members located in a channel integrally formed with said plate member and adapted to engage serrations on said disk to maintain the said disk and shaft in any adjusted position, a groove in said shaft, a U-shaped member adapted to fit into said groove to prevent movement between said disk and said shaft, a base member having contacts, and a contact maker rotatable by said shaft for engagement with said contacts.

20. A device of the character described including a plate member, a shaft extending through said plate member, a disk through which said shaft extends, a groove in said shaft, a U-shaped member adapted to fit into said groove to prevent movement between said disk and said shaft, a base member having contacts, a contact maker rotatable by said shaft for engagement with said contacts, spring pressed ball members positioned in a channel integrally formed with said plate member and adapted to cooperate with a serrated edge of said disk to maintain the said contact maker in its adjusted position, and means formed on said plate member for cooperation with said disk to limit the movement of said shaft.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 6th day of March, 1925.

ERNEST A. BOHLMAN.

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