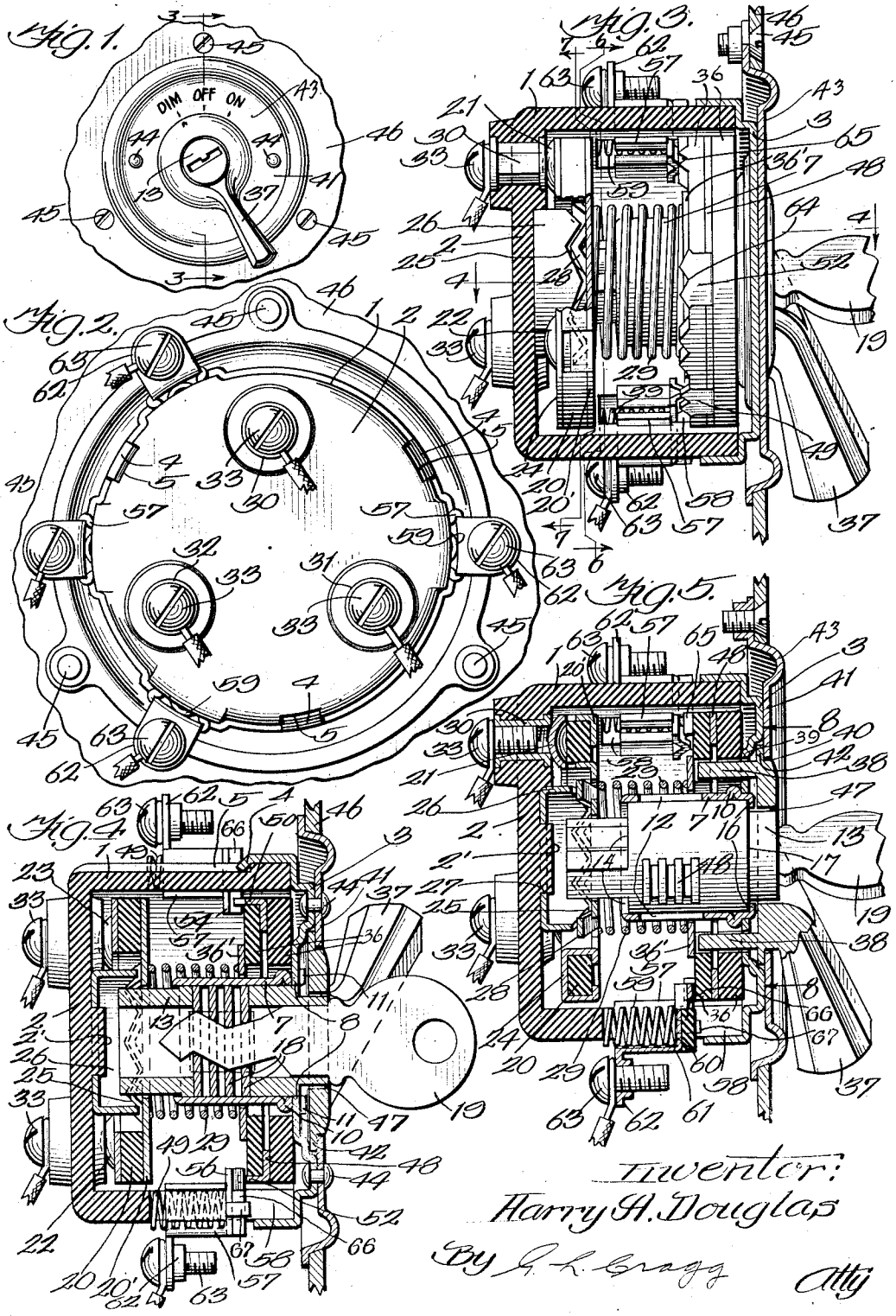
March 29, 1927. 1,622,707

H. A. DOUGLAS

COMBINED LIGHTING AND IGNITION SWITCH

Filed Jan. 27. 1926 2 Sheets-Sheet 1



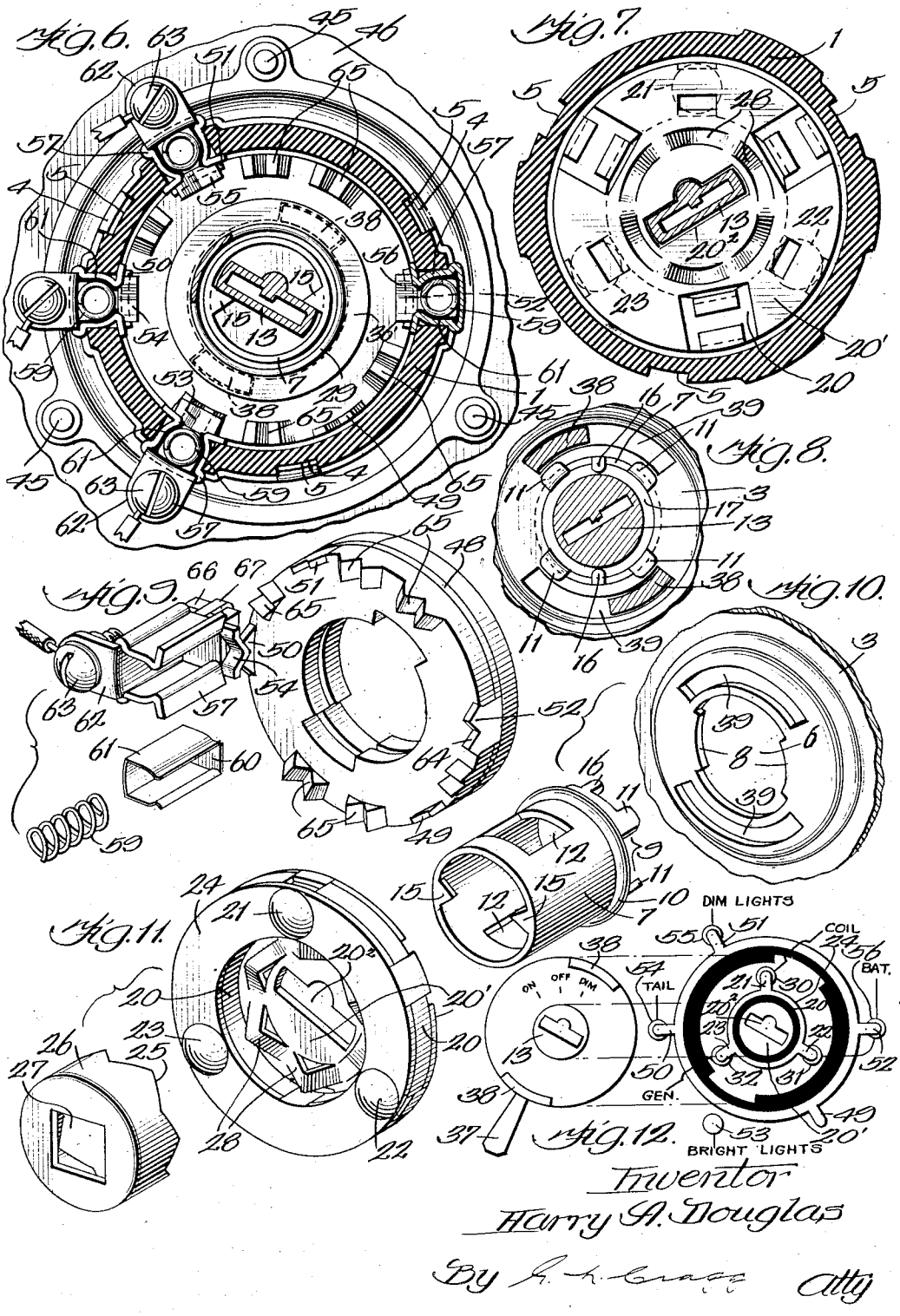
Inventor:
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By G. L. Gragg Atty

March 29, 1927. 1,622,707

H. A. DOUGLAS

COMBINED LIGHTING AND IGNITION SWITCH

Filed Jan. 27, 1926 2 Sheets-Sheet 2



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Patented Mar. 29, 1927. 1,622,707

UNITED STATES PATENT OFFICE.

HARRY A. DOUGLAS, OF BRONSON, MICHIGAN.

COMBINED LIGHTING AND IGNITION SWITCH.

Application filed January 27, 1926. Serial No. 84,094.

My invention relates to switches and is of particular service in connection with switch structures employed for governing the lighting and ignition circuits of automotive vehicles.

It is one of the objects of my invention to provide spring mechanism which will perform the mechanical function hitherto performed by the springs in such combined switches of the prior art but preferably so arranged that they will not carry any portion of the current and as to dispense with the contact carriers supplied in addition to the insulating contact actuating rings coupled with the handle and rotatable lock member. In carrying out this object of my invention, the insulating rings that are coupled with the handle and rotatable lock member for controlling the circuits, directly carry the contacts instead of serving to operate contact carriers supplied in addition thereto, spring mechanism being added which is out of the path of any current flowing in the controlled circuits and which merely performs the mechanical function of maintaining the contact carrying insulating rings or supports in proper assembly with the parts that serve to turn the same. In addition to this electrical advantage, my switch also has mechanical advantages, as will appear.

In carrying out my invention, novel switching means are employed in conjunction with the one of the contact carriers, preferably the contact carrier governed by the handle, the contact carrier governed by the lock being preferably equipped in accordance with the construction set forth in my copending application Serial No. 84,093, filed January 27, 1926. The contacts complemental to the contacts upon the selected carriers, are disposed in the zone between both carriers, being desirably received in openings in the side of the casing and projecting into the casing interior into the circle of rotation of the contacts to which they pertain. Additional advantages result from the location of the contacts carried by the casing among which is a marked distinction or segregation between these contacts and the contacts complemental to the contacts upon the other carrier and which are preferably carried upon the rear end wall of the casing.

I will explain my invention in all of its characteristics more fully by reference to the accompanying drawings in which Fig. 1 is a front view of the preferred embodiment of the invention; Fig. 2 is a rear view of the switch shown in Fig. 1; Fig. 3 is a sectional view, on a larger scale, on line 3—3 of Fig. 1; Fig. 4 is a sectional view on line 4—4 of Fig. 3; Fig. 5 is a sectional view of the central portion of the structure taken on the common axis of the casing handle and locking device, the rotatable lock member and key being shown in elevation; Fig. 6 is a sectional view on line 6—6 of Fig. 3; Fig. 7 is a sectional view on line 7—7 of Fig. 3; Fig. 8 is a sectional view on line 8—8 of Fig. 5; Fig. 9 is a perspective view of the handle controlled contact carrier, one of the adjacent stationary contacts and insulating liner, and a contact actuating spring pertaining to said adjacent contact; Fig. 10 is a perspective view of a portion of the front end wall of the casing and its tubular extension in separated relation; Fig. 11 is a perspective view, illustrating the ignition circuit controlling insulating contact carrying ring, and the cam member complemental to the cam member carried by this ring; and Fig. 12 is a diagram, illustrating the interrelation of the handle and lock with the circuits controlled thereby.

The casing employed is preferably inclusive of a body of insulation in the form of a cup having a side wall 1 and a rear or bottom wall 2 in integral formation. The front metallic end wall 3 of the casing constitutes a closure that is placed upon the rim of the cup and is held in assembly with the cup by means of the prongs 4 extending rearwardly from said end wall and projecting into the recesses 5 formed upon the exterior of the side wall 1 of the casing. The cup shaped body of the casing is desirably cylindrical and the front end wall 3 of the casing has a lock opening 6, generally circular and coaxial with the casing. The cylindrical hollow lock member 7 is carried by the front end wall 3 of the casing and projects into the casing interior. In the preferred embodiment of the invention, the wings 8, located upon the end wall 3 at the opening 6 through this end wall, project into spaces 9 formed in opposite sides of the lock member 7 in front of the bead 10 on this lock member whereby said lock member is held from rotation. The bead 10 engages the inner face of the casing end wall 3 and the ears 11 upon the front end of said lock member are clinched outwardy and back-

wardly against the front face of the casing wall 3, whereby said lock member is held from movement along the axis of the casing. The lock member 7, thus stationary or in fixed relation with the front casing end wall 3, is formed with openings 12 in opposite sides thereof. A rotatable lock member 13 is journaled by and within the hollow lock member 7, the lock member 13 having shoulders 14 which engage the ears 15 upon and projecting inwardly from the hollow lock member 7 to prevent inward movement of the rotatable lock member. Outward movement of the rotatable lock member 13 is prevented by means of the ears 16 upon and projecting inwardly from the front end of the lock member 7 and which engage the shoulder 17 upon the front end of the lock member 13. Tumblers 18 are radially movable in openings formed in the rotatable lock member 13, this member being thus a tumbler barrel. These tumblers are controlled by a suitable key 19. When this key is inserted, the tumblers are withdrawn sufficiently into the member 13 to clear the lock member 7 so that the tumblers may be bodily turned to turn the lock member 13 and close the ignition circuit, as will hereinafter more fully appear. When the lock member 13 is turned back by its keys to a position in which the tumblers are in register with the openings 12, the ignition circuit is opened, and is locked open by the tumblers when the key is withdrawn. The floating contact carrier 20 is preferably in the form of a ring of insulation fixedly carrying a metallic plate 20′ having an oblong bore 20^2 in which the oblong inner end of the lock member 13 is received so that this contact carrier is turned when the lock member 13 is turned by the key. This contact carrier has contacts 21, 22, and 23 thereon that are formed integrally with the metallic ring 24, said contacts being preferably rearwardly bulged portions of the sheet metal ring 24 carried upon the rear face of the insulating ring 20. A stationary cam member 25, in the nature of a serrated crown, is formed upon the rim of a metallic cup 26 fixed upon the rear casing end wall 2, the bottom of this cup having a square opening 27 which receives the square portion 2′ of wall 2 to keep the cup 26 and the cam 25 thereon from turning. The cam portion 25 of cup 26 is surrounded by the insulating ring 20 and engages the floating cam member 28 projecting rearwardly from the aforesaid metallic ring 20′ from which the cam 28 is stamped. A spring 29, abutting at its outer end, as will later appear, presses inwardly at its inner end against the floating cam member 28 to press this cam member against the cam member 25.

When the key is turned throughout its range from one alternative position to another, the contact carrier 20 is turned with the lock member 13, the cam member 28 turning with this contact carrier. In this turning movement, the floating cam member 28 and the carrier 20 supporting it are moved outwardly along the axis of the lock member 13 by the stationary cam member 25 and against the force of the spring 29 until the point of the engaging cams pass each other, whereupon the spring expands until finally the two cam members are brought into full engagement, a condition which obtains when the carrier 20 is turned from one circuit controlling position to another. The contacts 21, 22, and 23 either ride upon the contacts 30, 31, 32, complemental thereto or ride off of these contacts without touching the casing wall 2, and gathering insulating particles therefrom, the spring 29 maintaining the contacts upon the carrier 20 in firm engagement with their complemental contacts or maintaining the cams in engagement. The ignition circuit is thus opened or closed according to the adjustment of the rotatable lock member 13 as will be fully understood by reference to Fig. 12. The contacts 30, 31 and 32 are desirably in the nature of sleeves whose bores are threaded. These sleeves pass through the rear end wall of the casing and receive binding screws 33 whereby the sleeves are electrically connected with the ignition circuit wires. The spring 29 is out of the circuit or circuits established when the contacts upon the carrier 20 are engaged with their complemental contacts.

Another contact carrier is provided which is preferably composed of two coaxial insulating rings 36. The spring 29 presses the carrier 36 toward the front casing end wall 3 through the intermediation of a metallic ring 36′. The rings 36 and 36′ surround the outer ends of the lock members 7 and 13. A handle 37 is coupled with the contact carrier 36 by means of prongs 38 projecting inwardly from the handle and passing through openings 39 in the end wall 3 and through openings 40 in the metallic plate 41 secured to the contact carrying ring 36. The handle is confined to a substantially fixed plane of rotation by means of the flanges 42 that are snugly received in a space between the front casing end wall 3 and the plate 43 which is riveted upon the end wall 3 by means of the rivets 44 and which desirably serves as a mounting plate for the switch casing and its contents. To the latter end, the mounting plate is extended radially beyond the casing and is formed to receive mounting screws 45 at its peripheral portion, these mounting screws serving to assemble the plate 43 with the dash board or other mounting panel 46. The hub portion of the handle is coaxial with the lock member 13 and with a circular opening formed in the plate 43, the edge of this opening confining

the handle to an axis of rotation coincident with the axis of the rotatable lock member 13. The hub portion of the handle has a lock opening 47 freely receiving the outer end of the lock member 13. A sheet metal ring 48 is sandwiched between the insulating rings 36 and carries contact prongs 49, 50, 51 and 52 formed integrally therewith and extending longitudinally of the axis of the switch toward the rear casing wall 2. These contacting prongs are snugly received in notches formed in the inner ring 36 to prevent the ring 48 and the contacts thereon from turning. These contacts are engageable with and separable from complemental metallic contacts 53, 54, 55 and 56 that are movable and spring pressed longitudinally of the casing. The latter contacts are desirably inclusive of continuations in the form of metallic spring housings 57 which are received in openings 58 formed through the side or cylindrical casing wall 1. Said contacts 53, 54, 55 and 56 project into the interior of the of the casing transversely of the switch axis. Coiled springs 59 press longitudinally of the casing and are within the cylindrical wall 1 of the insulating casing, each spring abutting at its rear end against said wall and at its front end against the front portion 60 of an insulating liner 61 which is snugly received in the corresponding metallic housing 57 for the purpose of insulating this spring from its housing. Each housing has an ear 62 continued outwardly therefrom to the exterior of the insulating casing wall 1 to receive a circuit wire binding screw 63. Said housings 57, the portions 62, 63, etc., carried thereby and the springs 59 constitute the preferred contacts that are received in the side openings of the casing, these contacts extending laterally into the interior and to the exterior of the casing and being spring pressed longitudinally of the casing by their springs 59. All of the contact applying springs 29 and 63 are out of circuit with the contacts, by the construction and arrangement illustrated.

The contacts 49, 50, 51 and 52 are formed with wedge shaped notches 64, the engaging portion of the contacts 53, 54, 55 and 56 being correspondingly wedge shaped. The sides of the former contacts desirably slope inwardly toward the notches therein. Other notched prongs 65, but of insulation, are integrally formed with the inner insulating ring 36 and extend similarly to the contact prongs 49, 50, 51 and 52. The sides of the insulating prongs 65 also extend longitudinally of the axis of the switch toward the rear casing wall 2. All of the prongs are in one circle that is concentric or coaxial with the casing. The contacts 49, 50, 51 and 52 collectively form one cam member and all of the prongs collectively constitute another cam member. The cam member 53, 54, 55 and 56 moves rearwardly as it rides into and out of full engagement with the other cam member. The cam members thus cooperate to yieldingly hold the lighting switch in its various adjustments. Insulating blocks 66 are assembled with contacts 53, 54, 55 and 56 by clips 67 to reduce the spaces in the casing in which these contacts work.

Changes may be made without departing from the invention.

Having thus described my invention, I claim:

1. A switch structure including a casing; two contact actuators within the casing; a handle upon the exterior of the casing and mounted to turn, said handle having a connection joining it with one of said actuators and passing through an opening formed in an end wall of the casing and having its hub portion formed with a lock opening; a lock in line with said lock opening and having a rotatable member in turning connection with the other contact actuator; contacts upon said actuators; and contacts complemental to the aforesaid contacts, some of said complemental contacts being carried by the side wall of the casing and projecting laterally of the casing into the circle of rotation of the contacts to which they pertain and being spring pressed longitudinally of the casing.

2. A switch structure including a casing; two contact actuators within the casing; a handle upon the exterior of the casing and mounted to turn, said handle having a connection joining it with one of said actuators and passing through an opening formed in an end wall of the casing and having its hub portion formed with a lock opening; a lock in line with said lock opening and having a rotatable member in turning connection with the other contact actuator; contacts upon said actuators; and contacts complemental to the aforesaid contacts, some of said complemental contacts being carried by and received in openings provided in the side wall of the casing and projecting laterally of the casing into the circle of rotation of the contacts to which they pertain and being spring pressed longitudinally of the casing.

3. A switch structure including a casing; two contact actuators within the casing; a handle upon the exterior of the casing and mounted to turn, said handle having a connection joining it with one of said actuators and passing through an opening formed in an end wall of the casing and having its hub portion formed with a lock opening; a lock in line with said lock opening and having a rotatable member in turning connection with the other contact actuator; contacts upon said actuators; and contacts complemental to the aforesaid contacts, some of said complemental contacts being carried by the side wall of the casing and projecting laterally

of the casing into the circle of rotation of the contacts to which they pertain, and springs carried by the casing side wall and pressing upon these laterally projecting contacts longitudinally of the casing.

4. A switch structure including a casing; two contact actuators within the casing; a handle upon the exterior of the casing and mounted to turn, said handle having a connection joining it with one of said actuators and passing through an opening formed in an end wall of the casing and having its hub portion formed with a lock opening; a lock in line with said lock opening and having a rotatable member in turning connection with the other contact actuator; contacts upon said actuators; and contacts complemental to the aforesaid contacts, some of said complemental contacts being carried by and received in openings provided in the side wall of the casing and projecting laterally of the casing into the circle of rotation of the contacts to which they pertain and springs carried by the casing side wall and pressing upon these laterally projecting contacts longitudinally of the casing.

5. A switch structure including a casing; two contact actuators within the casing; a handle upon the exterior of the casing and mounted to turn, said handle having a connection joining it with one of said actuators and passing through an opening formed in an end wall of the casing and having its hub portion formed with a lock opening; a lock in line with said lock opening and having a rotatable member in turning connection with the other contact actuator; contacts upon said actuators; and contacts complemental to the aforesaid contacts, some of said complemental contacts being carried by and received in openings provided in the side wall of the casing and projecting laterally of the casing into the circle of rotation of the contacts to which they pertain and springs carried by the casing side wall and received in said openings and pressing upon these laterally projecting contacts longitudinally of the casing.

6. A switch structure including a casing; two contact actuators within the casing; a handle upon the exterior of the casing and mounted to turn, said handle having a connection joining it with one of said actuators and passing through an opening formed in an end wall of the casing and having its hub portion formed with a lock opening; a lock in line with said lock opening and having a rotatable member in turning connection with the other contact actuator; contacts upon said actuators; and contacts complemental to the aforesaid contacts, some of said complemental contacts being carried by the side wall of the casing and projecting laterally of the casing into the circle of rotation of the contacts to which they pertain and being spring pressed longitudinally of the casing, the other complemental contacts being carried upon the rear end wall of the casing.

7. A switch structure including a casing; two contact actuators within the casing; a handle upon the exterior of the casing and mounted to turn, said handle having a connection joining it with one of said actuators and passing through an opening formed in an end wall of the casing and having its hub portion formed with a lock opening; a lock in line with said lock opening and having a rotatable member in turning connection with the other contact actuator; contacts upon said actuators; and contacts complemental to the aforesaid contacts, some of said complemental contacts being carried by and received in openings provided in the side wall of the casing and projecting laterally of the casing into the circle of rotation of the contacts to which they pertain and being spring pressed longitudinally of the casing, the other complemental contacts being carried upon the rear end wall of the casing.

8. A switch structure including a casing; two contact actuators within the casing; a handle upon the exterior of the casing and mounted to turn, said handle having a connection joining it with one of said actuators and passing through an opening formed in an end wall of the casing and having its hub portion formed with a lock opening; a lock in line with said lock opening and having a rotatable member in turning connection with the other contact actuator; contacts upon said actuators; and contacts complemental to the aforesaid contacts, some of said complemental contacts being carried by the side wall of the casing and projecting laterally of the casing into the circle of rotation of the contacts to which they pertain, and springs carried by the casing side wall and pressing upon these laterally projecting contacts longitudinally of the casing, the other complemental contacts being carried upon the rear end wall of the casing.

9. A switch structure including a casing; two contact actuators within the casing; a handle upon the exterior of the casing and mounted to turn, said handle having a connection joining it with one of said actuators and passing through an opening formed in an end wall of the casing and having its hub portion formed with a lock opening; a lock in line with said lock opening and having a rotatable member in turning connection with the other contact actuator; contacts upon said actuators; and contacts complemental to the aforesaid contacts, some of said complemental contacts being carried by and received in openings provided in the side wall of the casing and projecting laterally of the casing into the circle of rotation of the contacts to which

they pertain and springs carried by the casing said wall and pressing upon these laterally projecting contacts longitudinally of the casing, the other complemental contacts being carried upon the rear end wall of the casing.

10. A switch structure including a casing; two contact actuators within the casing; a handle upon the exterior of the casing and mounted to turn, said handle having a connection joining it with one of said actuators and passing through an opening formed in an end wall of the casing and having its hub portion formed with a lock opening; a lock in line with said lock opening and having a rotatable member in turning connection with the other contact actuator; contacts upon said actuators; and contacts complemental to the aforesaid contacts, some of said complemental contacts being carried by and received in openings provided in the side wall of the casing and projecting laterally of the casing into the circle of rotation of the contacts to which they pertain and springs carried by the casing side wall and received in said openings and pressing upon these laterally projecting contacts longitudinally of the casing, the other complemental contacts being carried upon the rear end wall of the casing.

11. A switch structure including a casing; two contact actuators within the casing; a handle upon the exterior of the casing and mounted to turn, said handle having a connection joining it with one of said actuators and passing through an opening formed in an end wall of the casing and having its hub portion formed with a lock opening; a lock in line with said lock opening and having a rotatable member in turning connection with the other contact actuator; contacts upon said actuators; and contacts complemental to the aforesaid contacts, each contact actuator and the contacts pertaining thereto being located in a zone different from that containing the other actuator and the contacts pertaining thereto, the contacts upon the actuator connected with the handle and the contacts complemental thereto constituting cooperating cam members for holding these related contacts in engagement.

12. A switch structure including a casing; two contact actuators within the casing; a handle upon the exterior of the casing and mounted to turn, said handle having a connection joining it with one of said actuators and passing through an opening formed in an end wall of the casing and having its hub portion formed with a lock opening; a lock in line with said lock opening and having a rotatable member in turning connection with the other contact actuator; contacts upon said actuators; and contacts complemental to the aforesaid contacts, each contact actuator and the contacts pertaining thereto being located in a zone different from that containing the other actuator and the contacts pertaining thereto, the contacts upon the actuator connected with the handle and the contacts complemental thereto constituting cooperating cam members for holding these related contacts in engagement, this actuator also having other cam portions cooperating with these complemental contacts for holding these related contacts out of engagement.

In witness whereof, I hereunto subscribe my name.

HARRY A. DOUGLAS.