Feb. 7, 1928. 1,658,642

E. N. JACOBI

IGNITION AND LIGHTING SWITCH

Filed Dec. 16, 1921 3 Sheets-Sheet 1

FIG. 1

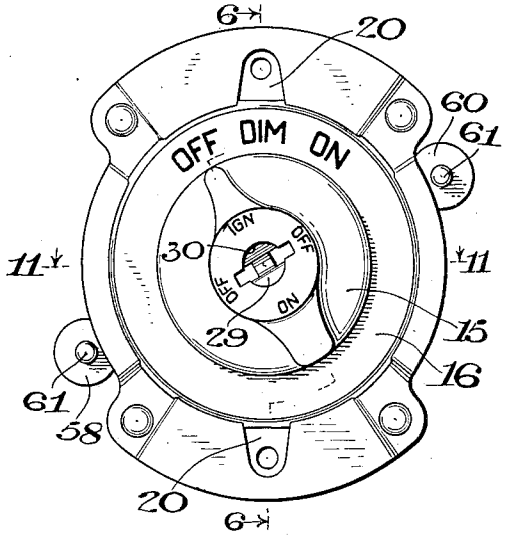


FIG. 2

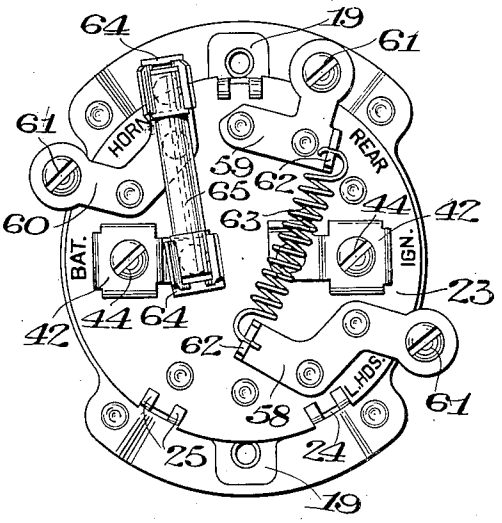


FIG. 3

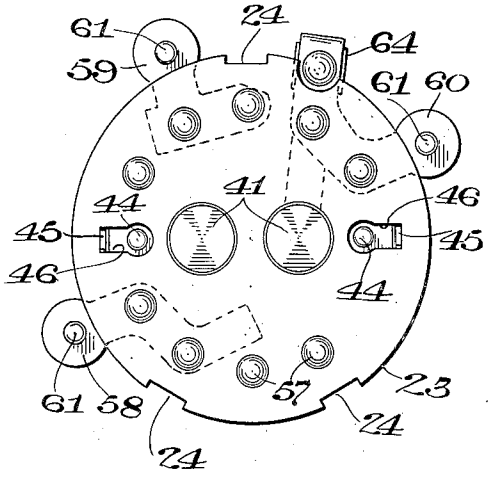
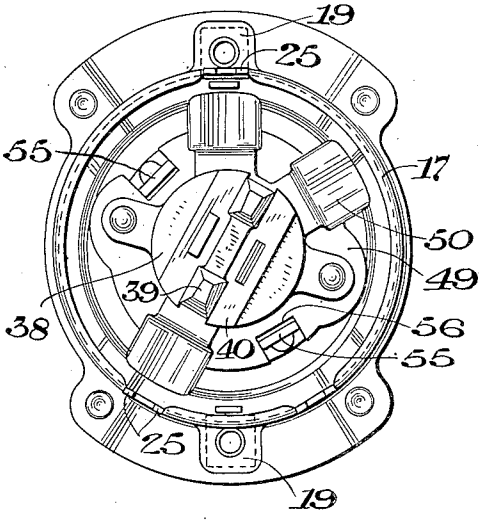


FIG. 4



WITNESSES

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Feb. 7, 1928. 1,658,642

E. N. JACOBI

IGNITION AND LIGHTING SWITCH

Filed Dec. 16, 1921 3 Sheets-Sheet 2

FIG. 7

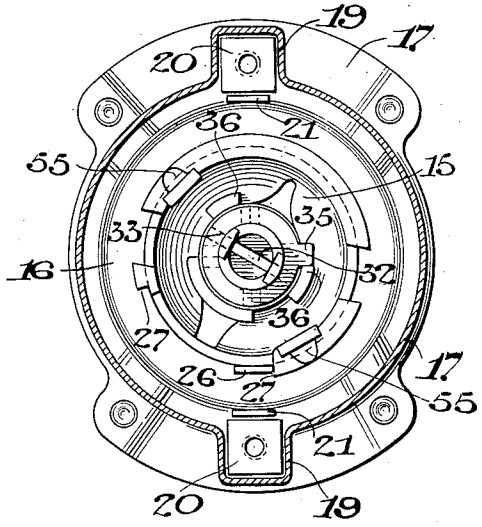


FIG. 6

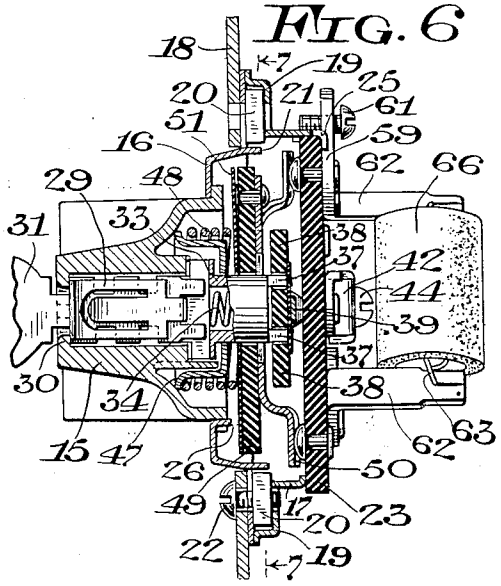


FIG. 5

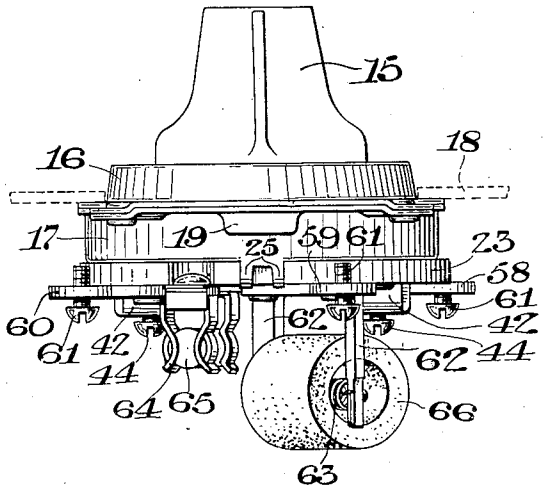


FIG. 8

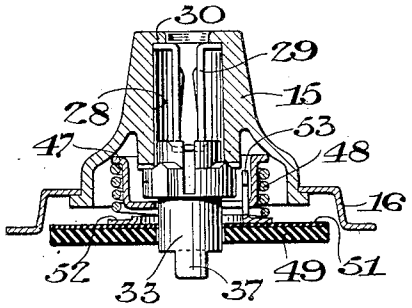


FIG. 9

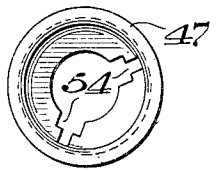
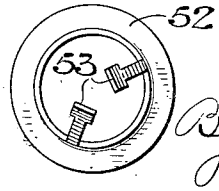


FIG. 10



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Feb. 7, 1928. 1,658,642

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IGNITION AND LIGHTING SWITCH

Filed Dec. 16, 1921 3 Sheets-Sheet

FIG. 11

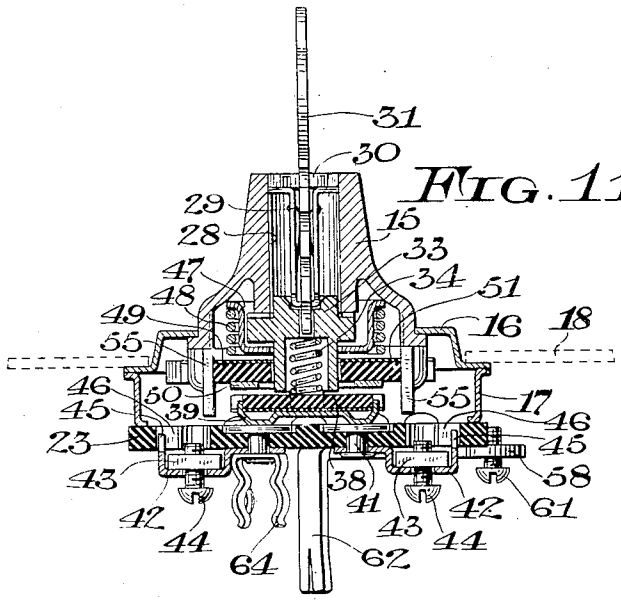


FIG. 12

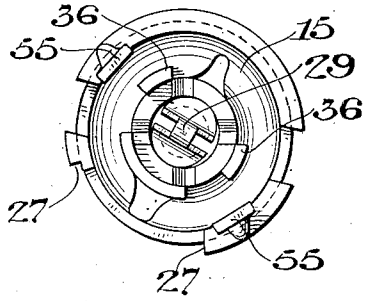


FIG. 14

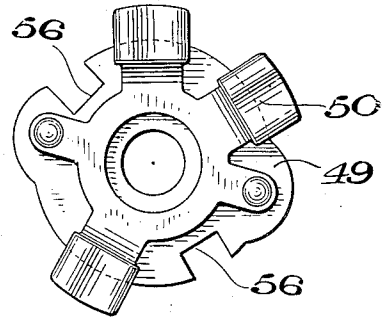


FIG. 13

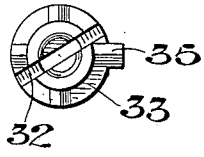


FIG. 16

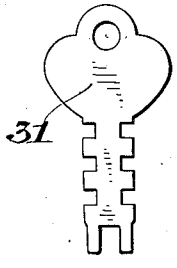
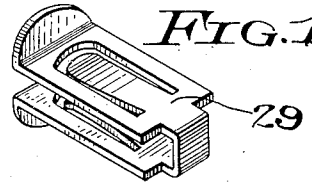


FIG. 15



WITNESSES

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Patented Feb. 7, 1928. 1,658,642

UNITED STATES PATENT OFFICE.

EDWARD N. JACOBI, OF MILWAUKEE, WISCONSIN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO BRIGGS & STRATTON CORPORATION, OF MILWAUKEE, WISCONSIN, A CORPORATION OF DELAWARE.

IGNITION AND LIGHTING SWITCH.

Application filed December 16, 1921. Serial No. 522,847.

This invention relates to combination ignition and lighting switches for use on automobiles and has for its object to simplify the construction thereof and reduce the cost of manufacture, making use of rivets to a large extent and dispensing with the necessity for the use of screws except for binding post purposes and attaching screws.

Another object of the invention is to provide a switch having a handle capable of movement to different positions for controlling the lighting and adapted to receive a key for controlling the ignition, the key operating through the handle to control the ignition throughout the range of movement of the handle.

Another object of the invention is to condense the switch structure as much as possible and to eliminate the use of leaf springs for switch contacts.

With the above and other objects in view the invention consists in the switch as herein claimed, its parts and combinations of parts and all equivalents.

Referring to the accompanying drawings, in which like characters of reference indicate the same parts in different views,

Figure 1 is a front view of a switch constructed in accordance with the present invention;

Figure 2 is a rear view thereof;

Figure 3 is a view of the inner face of the terminal head;

Figure 4 is a rear view of the switch with the terminal head removed;

Figure 5 is an edge view of the switch;

Figure 6 is a central sectional view thereof on the plane of line 6—6 of Figure 1;

Figure 7 is a rear view of the switch case sectioned through the nut pockets and having the handle and driver in place;

Figure 8 is a sectional view of the handle with the driver in place and showing a modified form of spring thrust cup;

Figure 9 is a detail view of such spring thrust cup;

Figure 10 is a detail view of the spring retainer therefor;

Figure 11 is a sectional view of the switch through the two ignition contacts and on the plane of line 11—11 of Figure 1;

Figure 12 is a rear view of the handle with the key guide in place;

Figure 13 is a detail view of the driver;

Figure 14 is a detail view of the lighting switch spider;

Figure 15 is a perspective view of the key guide, and

Figure 16 is a face view of the key.

In these drawings, 15 indicates a switch handle mounted to turn in a central opening in a front plate 16. The front plate is riveted at its top and bottom flanges to the corresponding parts of a somewhat similarly shaped back plate 17 and the two together constitute a cylindrical switch case with attaching flanges in an intermediate plane so as to be adapted to bear against the back of a sheet metal instrument panel 18 while the raised circular portion of the front plate protrudes through the switch opening of said panel in the manner shown in Figures 5, 6, and 11. In the back plate 17 are depressions forming nut pockets 19, in which nuts 20 are confined between the two plates by lugs 21 struck up from the front plate. Both plates have openings registering with the openings of the nuts to make the nuts accessible to attaching screws 22 that fasten the switch case to the switch panel. The ends of the flanges of the two plates are depressed to prevent the rivet heads interfering with the flanges bearing flatly against the back of the panel.

The rear edge of the cylindrical switch case is turned inwardly slightly to bear against the inner face of a terminal head 23 consisting of a disk of fiber or other insulating material. Suitable notches 24 are formed in the edge of the terminal head to receive bifurcated lugs 25 which are left standing on the edge of the switch case so that when the parts are assembled and the terminal head is in place these lugs may be bent over on the terminal head to lock it in place and rigidly secure the parts together.

The handle 15 is limited to an arc of movement that will include the three positions indicated on the front plate by the words "Off", "Dim", and "On", the shape of the handle being such that it constitutes a pointer indicating the condition of the switch by registering with these words. This limitation is produced by a lug 26 shown in Figures 6 and 7 bent up from the edge of the opening of the front plate into a gap formed

in the flange of the handle. It thus forms a stop engaged by shoulders 27 formed by the flange at the ends of said gap.

At the center of the handle is a tubular portion 28 in which is rotatably mounted a spring metal key guide 29 consisting of a strip of sheet metal bent to a U-shape with its ends turned outwardly to fit the cylindrical walls of the tube 28 and against the inturned flange 30 at the end of the handle. The flat key 31 may be entered through the key-hole in this flange and passed between the parallel sides of the key guide, where it engages spring tongues cut from said key guide and the pair of horns at the end of the key may then straddle the reduced bent portion of the key guide, as shown in Figure 6, and enter a slot 32 in the head of a driver 33 for turning same.

The driver 33, as best seen in Figure 8, has a cylindrical body portion with a flange of somewhat larger diameter forming a head thereon and an extension beyond the flange which rotatably fits in the end of the tubular portion 28 of the handle with a cavity receiving the reduced bent end portion of the key guide. A spring 34 contained within the tubular body portion of the driver and seated against shoulders thereof presses the flange against the end of the tubular portion 28 of the handle and V-shaped projections and notches in the flange and tubular portion of the handle respectively form detents for retaining the driver against accidental turning from the position in which its slot 32 registers with the key opening and from the position at an angle of 90° thereto. A lug 35 projecting from the flange of the driver plays between stop shoulders 36 of the handle, as best seen in Figure 7, to limit the turning movement of the driver to the 90° arc that changes it from one engagement of the detents to the other or from the position in which the key groove registers with the key opening to the position at right angles thereto.

The other end of the driver is provided with a pair of projecting lugs 37 which fit in openings of an insulating disk 38 carrying a contact strip 39 bearing on the terminal head 23 to constitute an ignition switch. The spring 34 bears on the insulating disk 38 to hold its contact strip in firm bearing against the terminal head, while at the same time serving the detents as before mentioned.

As best seen in Figures 4 and 11, the contact strip 39 consists of a thin strip of sheet metal, usually brass, embossed to form contact projections near its ends, which are bent upwardly and clinched in notches in the edge of insulating disk 38. Between the insulating disk and the contact strip is a thin sheet 40 of insulation with flaps cut therein at the points where the lugs 37 of the driver pass through the insulating disk. This insures against contact between the driver and the terminal head under any conditions. The contact strip extends between the lugs 37 of the driver so that it is fully insulated therefrom.

Two flat-headed inserts 41 are countersunk in the inner face of the terminal head with their stems passing through the terminal head and upset to form rivets engaging binding posts 42. These inserts, which lie flush with the surface of the terminal head, form the terminals of an ignition circuit and are bridged across by the contact strip 39 for completing said ignition circuit when the key is inserted and turned to its position across the key opening in register with the designation "Ign On" appearing on the end of the handle. When, however, the key is turned to the position in which it can be removed, or in register with the word "Off" appearing on the end of the handle, the contact strip lies between the contact 41 and the ignition circuit is interrupted. This is true of the switch when used for battery ignition, but, when used for magneto ignition, the parts will be so arranged as to make connection for grounding the magneto in the "Off" position and for breaking such connection in the "On" position. The large flat heads of the contacts 41 insure a contact in the "On" position of the key throughout the range of movement of the handle so that whether the lighting switch is in the "Off" position or either of the other positions, the ignition switch, though moving with the lighting switch handle, remains in bridging engagement with the contacts. Likewise, in the "Off" position of the key, the contact strip remains out of engagement with the contacts 41 throughout the range of movement of the handle. Thus the ignition switch, though moving with the lighting switch handle, is controlled by the key independently.

The binding posts 42 consist of strips of sheet metal bent to form rectangular pockets for containing ordinary nuts 43 and screws 44 pass through openings in the strips and are threaded in the nuts for clamping the terminal connectors therewith in the manner usual with binding posts. This dispenses with the necessity for forming screw-threads in the switch parts, the ordinary nuts and screws being much less expensive for the purpose. The metal strips forming the nut pockets have their ends riveted to the back of the terminal head by the upset ends of the contacts 41, while opposite ends thereof have projecting lugs 45 entering openings 46 in the terminal head to anchor the binding posts in place and prevent them from pivoting on the rivets. These open-

ings 46 also receive the ends of the screws 44 in the manner shown in Figure 3.

Loosely fitting on the cylindrical body portion of the driver 33 and surrounding the head portion of the driver is a spring thrust cup 47 with its edge turned outwardly and bearing on the handle with a coil spring 48 seated thereon. An insulating disk 49 is loosely mounted on said cylindrical portion of the driver and has riveted to it a rigid contact spider 50 with legs spreading from it in various directions to engage contacts on the terminal head. The opening through the spider is somewhat larger than the opening through the insulating disk to prevent electrical connection between the spider and the driver and the spring 48 forces the contact spider in firm bearing with the contacts on the terminal head. A thin sheet of insulation 51 is placed between the spring and the insulating disk 49 to prevent the spring from engaging the spider rivets.

In that form of the invention shown in Figures 8, 9 and 10, the spring 48, instead of bearing directly on the insulating sheet 51, engages a spring retainer ring 52, which, in turn, bears on the insulating sheet. The spring retainer ring 52 has T-shaped tongues 53 projecting from its inner edge and adapted to engage notches 54 in the spring thrust cup 47. Thus the separation of the ring 52 from the end thrust cup is limited to the distance of travel of the tongues 53 before their T-shaped ends engage the bottom of the spring thrust cup. This serves to hold the parts together and facilitate the assembling of the device.

The insulating disk 49 is caused to turn with the handle by reason of the handle having two downwardly projecting arms 55 fitting in notches 56 of the insulating disk. This is a sufficiently loose fit to permit the insulating disk to move toward and away from the handle as the lighting switch spider travels over its raised contacts 57 on the face of the terminal head 23. The lighting switch, however, is subject to the pressure of spring 48 to hold it firmly in its various positions, the contact legs of the spider 50 being slightly recessed to fit the raised round heads of the contacts to prevent accidental displacement of the switch.

The contacts 57 of the lighting switch constitute rivets passing through the terminal head 23, as shown in Figure 6, and are grouped by the common electric connections made therewith by metal tie-plates 58, 59 and 60 riveted by them to the back of the terminal head. These tie-plates have screws 61 threaded in them to constitute binding posts for the lead wires according to the designations appearing on the back of the terminal head, as shown in Figure 2, thus plate 58 is connected with the headlight circuit, plate 59 with the rear light circuit, plate 60 with the horn circuit, and the binding posts 44 with the battery and ignition circuit respectively. The plates 58 and 59, furthermore, have their ends bent out from the terminal head to form brackets 62. In the end of each bracket is a slit forming a pair of ears, and a coil of resistance wire 63 is suspended between the brackets by having its ends inserted between the ears, which are then pinched together to clamp it in place and establish electrical connection therewith. The other plate 60 and the battery binding post 44 have fuse clips 64 riveted to them, with a fuse 65 connecting them. Thus the battery connection continues from the battery binding post through the fuse to plate 60, placing the horn normally in circuit without depending on the switch except for the fuse connection, while the lighting and ignition circuits are established from the contacts 57, which secure said plate 60 in place and from the contact 41 which rivets the fuse clip in place, respectively. The lighting circuit is thus dependent on the fuse. In the "Off" position of the lighting switch, which is the position of the spider shown in Figure 4, there is no contact with either of the contacts 57 in connection with the plate 60 and therefore there is no lighting circuit established. In the "Dim" position the uppermost spider leg of Figure 4 will have engaged the first contact of plate 60 in connection with the battery and the right hand contact leg will have engaged the first contact of plate 59 connected with the rear lights, so that the rear light circuit will be established and, because of the resistor 63 connecting the rear light plate 59 with the headlight plate 58, the headlight circuit will be established with the resistor included so that the headlights will burn dim. In the "On" position the uppermost spider leg of Figure 4 will have engaged the second contact of plate 60 so as to still be in connection with the battery, the right hand spider leg of Figure 4 will have engaged the second contact of plate 59 so that the rear light circuit will be established and the left hand spider leg of Figure 4 will have engaged the first contact of plate 58 so that the headlight circuit will be established without the resistor in circuit, and consequently the headlights will burn brightly.

In any position of the lighting switch, the ignition switch contact strip 39 will be in engagement with contacts 41 to establish the ignition circuit if the key is inserted and turned to the "On" position, whereas it will be out of engagement with said contacts if the key is turned to the "Off" position or removed.

In order to protect the resistor coil, it is preferred to surround it with a tube 66

of insulating material, as shown in Figures 5 and 6.

It will be seen that the switch of this invention has been simplified in its construction to reduce the cost of manufacture by utilizing sheet metal stampings wherever possible and by the use of sheet insulation and die cast handle and driver. Also the cost of manufacture has been greatly reduced by the use of standard nuts and screws. Still the switch is strong and durable, no reliance being placed on leaf springs for contacts, but rigid contact bars being employed for both lighting and ignition with coil springs firmly holding them in engagement with their contacts. Nice adjustments are made unnecessary, thus facilitating the assembling of the switch and rendering it immune to derangement by reason of warping or shrinking of fiber insulation and making it possible to rely on rivets as the means for securing the parts together. At the same time the switch is neat and ornamental in its appearance, conforming with the current practice as to location of the switch case behind the panel and this without occupying much space and without making the terminal connections inaccessible.

What I claim as new and desire to secure by Letters Patent is:

1. In a combination switch, a rotatably mounted handle, a terminal head, a switch member bearing on the terminal head and controlled by the handle, a driver rotatably mounted on the handle and having a toothed engagement with the handle, a second switch member bearing on the terminal head and engaged by the driver, and a spring between the driver and the second switch member for holding the second switch member in its contact engagement with the terminal head and to hold the driver in its toothed engagement with the handle.

2. In a combination switch, a switch case, a handle mounted to turn therein, a terminal head on the switch case, arms projecting from the handle, a switch member engaging said arms and bearing on the terminal head, a driver mounted to turn on the handle and passing through the switch member and provided with a flange having a toothed engagement with the handle, a key passing through the handle and engaging the driver for turning it, a second switch member engaged and turned by the driver and bearing on the terminal head, and a spring between the second switch member and the driver.

3. In a combination switch, a handle mounted to turn, a switch member turned by the handle, a terminal head against which the switch member bears, a driver mounted to turn on the handle, a spring surrounding the driver and bearing on the handle at one end and on the switch member at the other end, and a second switch member engaged by the driver and bearing on the terminal head.

4. In a combination switch, a switch case, a handle mounted to turn therein, a terminal head secured to the switch case, arms projecting from the handle, an insulating disk slidably mounted on the arms, a contact spider secured to the insulating disk and bearing on the terminal head, a driver mounted to turn in the handle and passing through the insulating disk and provided with a toothed flange engaging the handle, stops on the handle, a projection on the driver playing between the stops, a key passing through the handle and engaging the driver for turning it, a spring thrust cup surrounding the driver and bearing on the handle, a coiled spring engaging the thrust cup at one end and the insulating disk at the other end, a second insulating disk loosely engaged by the driver, a contact strip thereon bearing on the terminal head, and a coiled spring within the driver bearing on the driver and on the second insulating disk.

5. In a combination switch, a handle mounted to turn, a switch member turned thereby, a driver mounted in the switch handle, a second switch member driven thereby, a flanged thrust cup surrounding the driver and bearing on the handle, a thrust ring bearing on the first switch member, a coiled spring surrounding the thrust cup and bearing at one end against the flange thereof and at the other end against the thrust ring, said thrust ring having arms passing through openings in the thrust cup with stop projections on them to limit the movement of the spring.

6. In a combination switch, a handle mounted to turn, a switch member turned thereby, a driver mounted to turn in the handle, a second switch member driven thereby, a flanged thrust cup surrounding the driver and bearing on the handle, a thrust ring having T-shaped arms bent up therefrom and entering notches in the thrust cup to limit the separation of the thrust ring and thrust cup, and a coiled spring surrounding the thrust cup and engaging the flange and the ring.

7. In a switch, a switch case comprising a front plate having a raised portion adapted to pass through an opening in a panel and having flanges to bear on the back of the panel, a rear plate having flanges riveted to the flanges of the front plate and having depressions in said flanges to form nut pockets, nuts contained in said nut pockets to receive the attaching screws, and a terminal head secured to the back plate.

8. In a switch, a suitably operated driver provided with a pair of driving lugs, an insulating disk fitting thereon, a spring bearing on the back of the insulating disk, a contact strip extending across the face of

the insulating disk and secured thereto to reenforce it against bending and embossed to form projections at its ends, a terminal head on which the projections of the contact strip bear, and contacts in the terminal head engaged by the projections of the contact strip.

9. In a switch, a suitably operated driver having a pair of driving lugs, an insulating disk having openings to receive the lugs, a contact strip secured across the face of the insulating disk between the openings, a sheet of insulation between the contact strip and the insulating disk and having flaps cut therefrom in line with the driving lugs, and a terminal head having contacts engaged by the contact strip.

10. In a switch, a handle, a driver operated by the handle, a stationary detent surface engaged by the driver, a rigid contact member having driving connection with the driver, stationary contacts engaged by the contact member, and a spring between the contact member and the driver for urging the contact member against the contacts and the driver against the detent surface.

11. In a switch, a terminal head, rivets passing therethrough forming switch contacts, metal plates secured to the back of the terminal head by said rivets and bent to form nut pockets, nuts contained in the nut pockets, and screws threaded in the nuts to form binding posts.

12. In a switch, a terminal head, rivets passing therethrough forming switch contacts, metal plates secured to the back of the terminal head by means of said rivets and bent to form nut pockets between them and the back of the terminal head, lugs on said nut pockets fitting in openings of the terminal head, nuts contained in the nut pockets, and screws threaded in the nuts to form binding posts.

13. In a switch, a handle, a driver operated by the handle, a detent surface engaged by the driver, a contact member having driving connection with the driver, contacts engaged by the contact member, and a spring between the contact member and the driver for urging the contact member against the contacts and the driver against the detent surface.

14. In a switch a suitably operated driver, a detent surface engaged by the driver, a contact member having driving connection with the driver, contacts engaged by the contact member, and spring means between the contact member and the driver for urging the contact member against the contacts and the driver against the detent surface.

15. In a multiple switch, a movable switch member, a second switch member mounted concentrically therewith and having ratchet connection with the first switch member to move with it but capable of independent movement, and stationary contacts engaged and disengaged by the second switch member in its independent movements, said second switch member remaining so engaged or disengaged during the movements of the first switch member.

16. In a multiple switch, a movable switch member, a second switch member movable therewith and having independent movement to positions determined by the first switch member, and stationary contacts engaged and disengaged by the second switch member during its independent movements, said second switch member remaining so engaged or disengaged during the movements of the first switch member.

17. In a multiple switch, a movable switch member, a second switch member movable therewith and relative thereto and having its relative positions determined by the first switch member, and contacts engaged and disengaged by the second switch member during its relative movements and remaining so engaged or disengaged throughout the range of the joint movements of the switch members.

18. In a multiple switch, a movable switch member, contacts engaged thereby, said switch member having a limited range of movement through positions determined by its engagement with the contacts, a second switch member having ratchet connection with the first switch member and having joint movement therewith and also capable of independent movement, and contacts engaged and disengaged by the second switch member.

19. In a switch, a casing member, a switch member mounted therein and limited in its movements by the casing member, a terminal head bearing against the edge of the casing member, contacts on the terminal head, means for positioning the contacts for engagement by the switch member comprising lugs on the edge of the casing member engaging notches in the edge of the terminal head, a second switch member mounted to turn in the first switch member and having ratchet engagement therewith so that both switch members may move together or the second switch member may have independent movement, and contacts on the terminal head engaged and disengaged by the second switch member during its independent movements but remaining so engaged or disengaged throughout the joint movements of the switch members.

In testimony whereof, I affix my signature.

EDWARD N. JACOBI.