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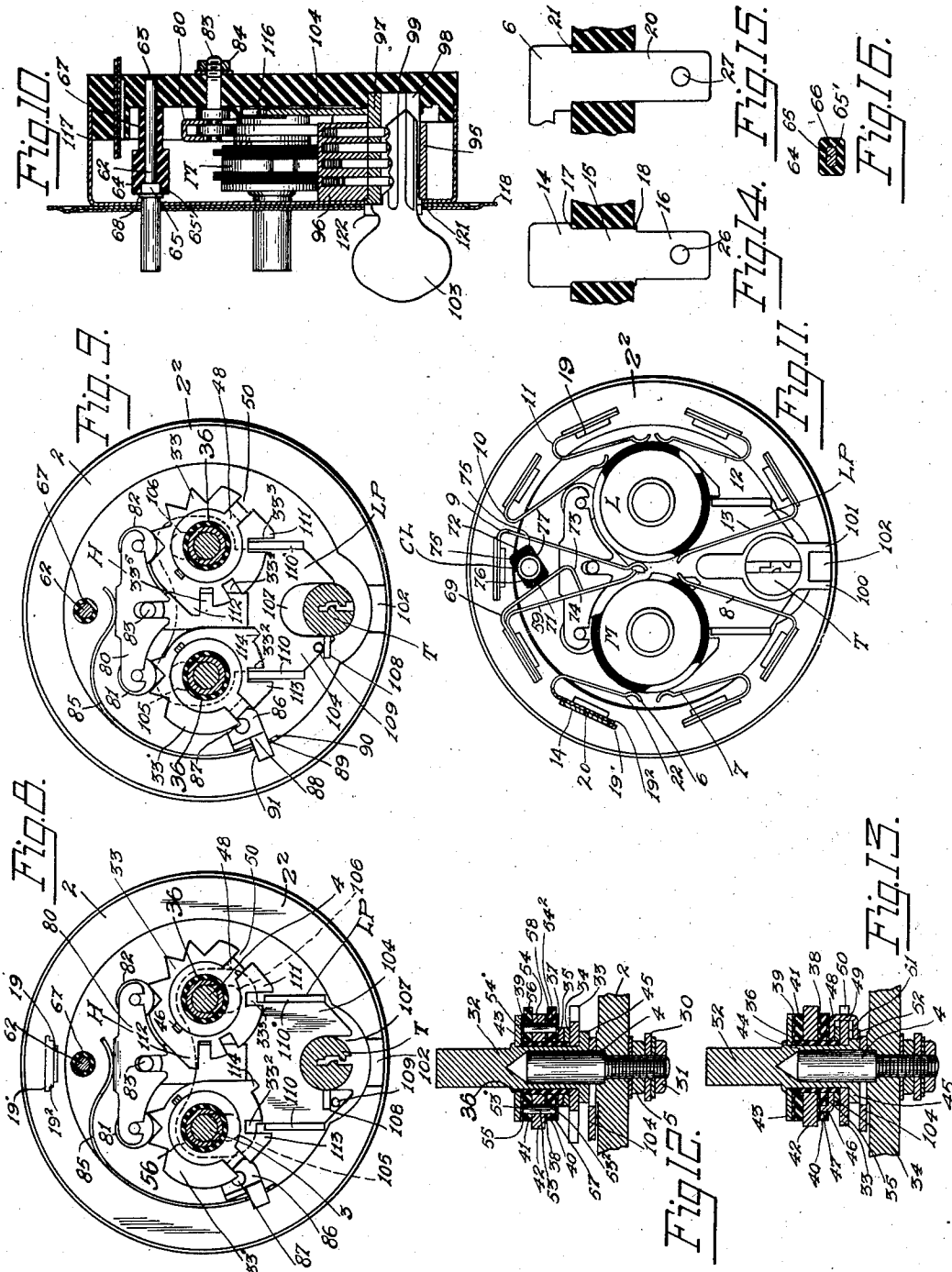
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A. H. WEISS

IGNITION AND LIGHTING SWITCH

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UNITED STATES PATENT OFFICE.

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IGNITION AND LIGHTING SWITCH.

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To all whom it may concern:

Be it known that I, ALFRED H. WEISS, a citizen of the United States of America, residing in Wilmette, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Ignition and Lighting Switches, of which the following is a specification.

My invention relates to electrical switches in general and has to do more particularly with so-called combination lighting and ignition switches, such as are used for controlling the lighting and ignition circuits of an automobile or the like. An object of my invention is to produce a device of the above character which contains novel features of construction and combination of parts, all of which produce a simple, efficient and economical switch structure.

Another feature consists of a combination contacting spring member and terminal in association with a terminal blade, which blade is permanently secured to the mounting plate. The contacting spring member is removably supported by the mounting plate in contact with the terminal blade and held in place against displacement by means of a terminal screw and saddle member. The arrangement of the blade terminal and contacting spring member in association with each other facilitates the assembly of the spring contact members, and also permits the removal of the spring contact member in case of repair.

A further feature of my invention is the arrangement of the button and spring combination which controls the circuit of a cowl lamp. It is understood that this device may be used to control any desired circuit.

The above features, as well as others, consist of novel details of construction and combination of parts hereinafter more particularly pointed out in the ensuing specification and appended claims.

For a more complete understanding of my invention, reference may be had to the accompanying drawings in which like reference characters, in the several views, denote like parts, and in which:

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

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

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

Fig. 4 is an interior face view of the switch

mechanism, the cap of the switch being removed;

Fig. 5 is a right side view of Fig. 4;

Fig. 6 is a left side view of Fig. 4;

Fig. 7 is a bottom view of Fig. 4;

Fig. 8 is an interior face view with parts of the apparatus omitted to more clearly show the locking arrangement, the operating levers being at normal and unlocked;

Fig. 9 is a view similar to Fig. 8, but showing the locking mechanism in operated position;

Fig. 10 is a sectional view along the line 10—10 of Fig. 1;

Fig. 11 is an interior face view of the switch mechanism showing the cowl light control button in its normal or inoperative position;

Fig. 12 is a sectional view along the line 12—12 of Fig. 4, illustrating the construction of the rotor element;

Fig. 13 is a sectional view along the line 13—13 of Fig. 4, illustrating the construction of the rotor element;

Fig. 14 is a fragmentary sectional view illustrating the method employed for securing the terminal blades to the mounting plate.

Fig. 15 is a fragmentary sectional view illustrating the method of supporting the contact springs in the mounting plate; and

Fig. 16 is a sectional view along the line 16—16 of Fig. 5.

Referring now in general to my invention as illustrated, it comprises a lighting switch unit L and an ignition switch unit M. The lighting switch unit L has a normal or "off" position A and three operative positions B, C and D. In position B the side lights of the automobile lighting system are connected in circuit, in position C the auxiliary lights are connected in circuit, and in position D the head lights are connected in circuit; but I do not wish to be limited to this particular arrangement, as different combinations can be used without departing from the invention.

The ignition switch unit M has a normal or "off" position E and an operative position F, in which position the ignition apparatus is rendered operative, as will be more fully hereinafter described. I also provide locking mechanism which consists preferably of a standard pin-tumbler, cylinder type lock

T, which controls a sliding locking plate LP, which is adapted to lock the lighting and ignition switch units L and M against actuation. The locking mechanism is so arranged
 5 that it operates only when the ignition switch unit M is in its normal or "off" position E, but will operate to lock the lighting switch unit L in its positions A, C and D; but when in position B the lock cannot be
 10 operated. When the ignition switch unit M is in its position F, the lock T can only be turned part way by the key. Now, if the operator attempts to operate the lock T, he is at once aware that the ignition switch unit
 15 M is in its operative or "on" position F or the lighting switch unit M is in its "D" position. The cowl light control button CL and its associated spring combination is provided for controlling the circuit of the cowl
 20 light.

Referring now more in detail to my invention as illustrated, it comprises, preferably, a mounting plate 2 made of any suitable insulating material, such as bakelite,
 25 and having studs 3 and 4 fastened to it in any suitable manner, as by means of the nuts 5, which nuts 5 have screw-threaded engagement with the threaded portions of the studs 3 and 4, which extend beyond the
 30 rear face of the plate 2. The plate 2 is provided with a peripheral ridge 2², extending upwardly from the plate proper. The plate is also provided with a flange upon which the cover-cap of the device rests. The stud
 35 3 is provided for the ignition switch unit M and the stud 4 is provided for the lighting switch unit L. Springs 6, 7 and 8 are associated with the ignition switch unit M, the springs 9, 10, 11, 12 and 13 are associated
 40 with the lighting switch unit L. Springs 6, 7, 8, 9, etc., are similarly constructed so that, by describing one of them, the construction of the others is readily apparent.

A terminal blade 14 of suitable conducting material is provided with an intermediate reduced portion 15 and an end reduced
 45 portion 16, the said reduced portions 15 and 16 of blade 14 forming shoulders 17 and 18. The peripheral ridge 2² of the mounting plate 2 is provided with openings 19, a portion 19' of the said opening 19 being of a
 50 size to receive the intermediate reduced portion 15, and when the said blade 14 is in place, the shoulder 17 engages the face of the ridge 2². The portion 15 of the blade 14 protrudes slightly beyond the bottom
 55 face of the plate 2, and this portion which forms the shoulder 18 is upset to hold the blade 14 against lateral movement, as clearly illustrated in Fig. 14. The contact spring 6 is formed out of spring metal and is provided
 60 with a tongue portion 20. The opening 19 is also provided with further reduced portions 19² of a size to receive the tongue 20 of the contact blade 6 and per-

mits the insertion of the contact spring 6 parallel to and in facial contact with the
 terminal blade 14. A shoulder 21 formed by the spring contact blade 6 and the tongue
 20 rests against the face of the peripheral
 70 ridge 2² of the mounting plate 2 when the said tongue 20 is in place in the portion 19² of the orifice 19. The free end 22 of the spring 6 is provided with a rounded or
 75 curved end portion which forms a contacting end which engages its associated rotor element. The portion 16 of the blade 14 which
 80 extends beyond the bottom face of the plate 2 forms a connecting terminal for the spring 6. The tongue 20 of the spring 6
 85 also extends beyond the face of the plate 2 and parallel with the portion 16 of the blade 14, and a saddle or clamping member 23
 90 forms means for securing an electrical conductor to the terminal formed by the portion 16 of the terminal blades 14. Screws
 95 24 are provided with washers 25, which screws pass through suitable openings 26 and 27 in the portion 16 and tongue 20, respectively, and have screw-threaded engagement
 100 with suitable tapped openings in the clamping members 23. The screw 24 passing through the opening 27 of the tongue 20 of the spring 6 holds the said spring 6 in
 105 position in the portion 19² of the slot 19 against displacement. The clamping member 23 in association with the screw 24 secures an electrical conductor between the
 110 portion 16 of the blade 14 and the said clamping member 23 and also holds the portion 16 of blade 14 and tongue 20 of spring 6 in facial contact. With the above spring
 115 assembly, I produce a two-piece construction which facilitates the spring assembly of the switch, and in case of repairs or renewing a spring member, the said damaged
 120 spring may be easily removed by withdrawing the screw 24 from the opening 27 of the tongue 20 of spring 6, which permits the withdrawal of the said spring from the
 125 portion 19² of the slot 19 and another put in its place and secured against movement by means of the screw 24, as already described.

Associated with the combination ignition switch as illustrated, I show an overload relay OR, which is used for purposes well
 130 understood. The relay OR is secured to the supporting plate 30 in any suitable manner, and said plate 30 is in turn secured to the studs 3 and 4 by means of the nuts 31, which
 135 nuts 31 have screw-threaded engagement with the threaded portions of the studs 3 and 4.

The lighting switch unit L and the ignition switch unit M are each provided with a rotor element, and as both are similar in construction, a description of one of them
 140 will suffice. The rotor element associated with the lighting switch unit L comprises

a supporting stud 32, a holding disc 33 for holding the lighting switch unit L in its different positions, as will be more fully hereinafter described, a washer 34, a retaining member 35, a sleeve 36 of suitable insulation material, insulation washers 37, 38 and 39, cams 40 and 41 of suitable insulation material, a cam 42 of suitable conducting material, and a washer 43, which members are all supported upon the stud 32. The disc 33 is provided with an orifice of a size to permit its being slipped over the body portion 44 of the stud 32 and when in place rests against the flanged portion 45 of the stud 32. The insulation sleeve 36 is provided with an orifice of a size to permit its being slipped over the body portion 44 of the stud 32, the said sleeve when in place rests against the member 33. The washer 34 is provided with an orifice of a size to permit its being slipped over the insulation sleeve 36, and the retaining member 35 is also provided with an orifice of a size to permit it being slipped over the insulation sleeve 36. Washers 37 and 38, cams 40 and 41 and cam 42 are also provided with orifices to permit them being slipped over the sleeve 36. Washer 37 is placed between the retaining member 35 and insulation cam 40, and the metal cam 42 when in place rests between the said insulation cams 40 and 41 with the insulation washer 38 resting between the said metal cam 42 and the cam 40. The washer 43 and insulation washer 39 are provided with orifices of a size to permit them being slipped over the body portion 44 of the stud 32, the said body portion 44 extending slightly beyond the face of the washer 43 for purposes as will presently be described. To hold the members 35, 37, 38, 39, 40, 41, 42 and 43 in fixed relation with each other and the stud 32, I provide the retaining member with a lug 46 which is bent at right angles to the plane of the member proper, the said lug 46 extending through openings 47 in the washer 37 and cam 40, its end resting against the insulation washer 38 to insulate the member 35 from the cam 42. A lug 48 integrally formed with the retaining member 35 and diametrically opposite the lug 46 is bent at right angles to the plate of the retaining member proper, the said angular portion 49 resting in a notch 50 cut in the periphery of the holding member 33. The end 51 of the lug 48 is bent parallel to the plate of the member proper and rests in a notch 52 cut in the flanged portion 45 of the stud 32.

The metal cam member 42 is provided with pins 53 and 54 diametrically opposite and suitably secured thereto, which are adapted to cooperate with the insulation cams 40 and 41 so as to hold the cams 40, 41 and 42 in fixed relation with each other. The pins 53 and 54 protrude beyond both

faces of the cam member 42, and its ends 53' and 54' extend into suitable orifices 55 and 56 in the cam member 41, the said ends of the pins abutting against the insulation washer 39 to insulate the said pins from the washer 43. The other protruding ends 53² and 54² of pins 53 and 54 extend through suitable orifices 57 and 58 in the cam member 40, the ends of the said pins 53 and 54 abutting against the insulation washer 37 to insulate them from the retaining member 35. When the members 33, 34, 35, etc., are in place upon the stud 32, the body portion 44 of the stud 32 protrudes beyond the face of washer 43 and this extended portion is upset or spun over, securing the said members upon the said stud 32 against displacement, and the lugs 46 and 48 of the retaining member 35 in association with the pins 53 and 54 of the cam member 42 prevents the said members 33, 34, 35, etc., from rotating on the stud 32 and holds them in fixed relation with each other.

The cowl light control unit CL comprises a leaf spring 59 provided with a tongue portion 60 which is of a size to permit it being slipped into the portion 19² of the slot 19 and held in place against displacement in the said slot 19² by means of screw 24, as previously described. A shaft 62 rotatably supported by the mounting plate 2 in a suitable bearing 63 supports a rectangular shaped cam member 64, which cam member 64 is held in place upon the shaft 62 against rotation by means of a rectangular shaped portion 65 of the shaft 62 resting in an orifice 65' shaped to conform with the contour of the portion 65 of the shaft 62. The cam member 64 is provided with a reduced cylindrical portion 67 whose end, when the said cam member 64 is in place upon the shaft 62 rests against the face of the mounting plate 2. The shaft 62 has a shoulder portion 68 which rests against the top face of the cam member 64 and when the shaft 62 is in place in its bearing 63 the shoulder 68 upon shaft 62 and the end of the cylindrical portion 67 of the cam member 64 resting against the face of the plate 2 prevents lateral movement of the cam member 64 upon the said shaft 62. To hold the cam member 64 in either its normal or operative positions against movement, I provide a leaf spring 69 provided with a tongue portion 70 which is of a size to permit it being slipped into the portion 19² of the slot 19 between the terminal blade 14 and the spring 59 and held in place against displacement by means of screw 24, as previously described.

When the cam member 64 is in its normal or inoperative position, the peripheral faces 71 or 72 of the said cam member 64 engage the leaf spring 69, depending in which direction it was last rotated, to place

the cam member 64 in its inoperative position, as illustrated in Fig. 11. The greatest width of the cam member 64 is at right angles to the face of the spring 69, and this forces the angular extension 73 into engagement with the free end 74 of the spring 59 to force it out of engagement with the spring 9 and holds the said spring 59 in this position until such time when the operator wishes to place the cowl unit CL in its operative position. The cam member 64 may be rotated either to the right or left. Upon the rotation of the shaft 62 and cam member 64, a cam apex 75 of the member 64 engages the face of the spring 69 and when the said apex 75 passes beyond its highest point in its rotation, the tension of the spring 69 is such that it causes further rotation of the shaft 62 and cam 64, producing a snap action. The cam 64 when in operative position has either its face 76 or 77 engaging the face of the spring 69, depending upon the direction of rotation. When the said cam 64 is in this position, as illustrated in Fig. 4, it places its smallest width at right angles to the face of the spring 69, permitting the free end 74 of the spring 59 to engage the free end of the spring 9 to close the cowl light circuit. Now to restore the cowl unit CL to its inoperative position, the shaft 62 and cam 64 are rotated as a whole to the right or left, causing a cam apex 75 to again engage the face of the spring 69, and when it passes beyond its highest point in its rotation, the tension of the spring 69 forces further rotation of the shaft 62 and cam 64, producing a snap action and again placing a peripheral face 71 or 72 of cam 64 in engagement with the face of the spring 69, and as the greatest width of the cam 64 is again at right angles to the face of the spring 69, the angular extension 73 of the said spring 69 engages the free end 74 of a spring 59 and forces it out of engagement with the free end of spring 9.

The holding member 33 is in the form of a notched or toothed disc, and to cooperate with the discs 33 and 33' to yieldingly hold the lighting and ignition switch units L and M, respectively, in any of their operated positions, I provide a holding device H which comprises a centrally pivoted member 80, which carries rotatable rollers 81 and 82 in its bifurcated ends, said rollers 81 and 82 operating in connection with their corresponding discs 33' and 33 of the ignition switch unit M and the lighting switch unit L. The member 80 is pivotally supported at its center by a stud 83, which is suitably fastened to the mounting plate 2 by means of a nut 84, which nut 84 has screw-threaded engagement with the threaded portion of the stud 83. A spring 85 for yieldingly holding

member H against the discs 33 and 33' of the switch units L and M, is provided, and a clamping bracket 86 secured to the mounting plate 2 by means of a screw 87 is provided with an angular extension 88 which rests in a notch 89 cut in the end 90 of the spring 85 to secure the spring 85 to the mounting plate 2 against displacement. The angular extension 88 of the bracket 86 rests in a notch 91 in the peripheral ridge 2' to prevent the said bracket from turning. When one of the switch members is operated, the teeth of its disc are rotated against its associated roller, due to the action of the spring 85, and as the disc advances the roller acts upon the next notch so as to give a snap action to the switch member and at the same time hold the actuating members of the switch in place.

A locking arrangement is provided whereby the lighting and ignition switch units L and M may be locked in their different positions. I provide a pin-tumbler cylinder lock T cooperating with a sliding locking plate LP. The cylinder lock comprises the usual lock case 95, which lock case is provided with the usual tumbler extension 96, and rotatably mounted in the casing 95 is the key barrel or cylinder 97. The key barrel 97 extends rearwardly from the casing 95, and this rearwardly extending portion 98 rests in a pocket or depression 99 in the mounting plate 2. The lock casing 95 is also provided with a pair of lugs 100 and 101, preferably integrally formed therewith, the said lugs 100 and 101 resting in a notch 102 cut in the ring portion 2' of the mounting plate 2, which ring portion 2' is formed by the inner circumferential edge of the cup-shaped portion of the plate 2 and the outer circumferential edge of the plate 2. The lock barrel 97 resting in the pocket 99, which forms a seat for the said barrel 97, in conjunction with lugs 100 and 101, which rest in the notch 102, centers said lock and prevents rotation of the same in the pocket 99 when the key 103 of the lock is turned. The sliding locking plate LP, which is provided for locking the switching units L and M so that they cannot be operated, consists of a plate 104 provided with elongated slots 105 and 106, through which the studs 3 and 4 extend. The plate 104 is also provided with a U-shaped notch 107 of a size to permit it to span the lock barrel 97 which rests in the pocket 99 in the mounting plate 2. The slots 105 and 106 and the U-shaped notch 107 in association with the studs 3 and 4 and the key barrel 97, form guiding means for the plate 104 when the said plate is moved to lock or unlock the switch units L and M, as the case may be. To permit movement of the plate 104 when the key 103 is rotated to lock or unlock the switch units L and M, I

provide a pin 108 which is secured to the rearwardly extending portion 98 of the key barrel 97, the said pin 108 cooperating with a pin 109, which is secured to the sliding plate 104 in any desired manner. The plate 104 is also provided with angular extensions 110 and 110', which extensions are preferably integrally formed with the said plate 104, the said extensions 110 and 110' cooperating with the discs 33' and 33 of the switching units M and L.

I have preferably arranged the ignition switch unit M so that it can only be locked in its normal or inoperative position, and I, therefore, provide a single slot 33² in the disc 33', while the disc 33 of the lighting switch unit L is provided with three slots 33³, 33⁴, and 33⁵, whereby the lighting switch unit L may be locked in its normal or two of its three operative positions. No slot is provided for the second operative position of the switch unit L, so that when the lighting switch unit L is in its position B and an attempt is made to lock the switch after the ignition switch unit is restored to its inoperative position, the key 103 can only be turned part way and the operator is at once notified that the switch lever must be turned back to one of its positions A, C or D to enable him to lock the switch. The discs 33 and 33' of the units L and M are provided with lugs 111 and 112, 113 and 114 to limit the movements of the switch units L and M in their normal and farthest advanced positions. The lugs 111 and 113 of the disks 33 and 33', respectively, limit the movement of the switch units L and M in their normal position by engaging the forward ends of the angular extensions 110' and 110 of the sliding locking plate 104, and the lugs 112 and 114 of the switch units L and M are limited in their farthest advanced positions by the engagement of the said lugs 112 and 114 with the forward ends of the angular extensions 110' and 110 of the sliding locking plate 104.

In Fig. 8 I have shown the locking mechanism and operating members of the lighting and ignition switch units L and M in their normal position and unlocked; and in Fig. 9 I show the locking mechanism operated to lock the switching units L and M against movement, but also showing the mechanism at normal. To lock the switch units L and M, the key 103 of the lock T is inserted and turned to the right until the pin 108 in the key barrel 97 engages the pin 109 in the plate 104. Continued rotation of the key 103 of the lock T moves the plate 104 in an upward direction into the position shown in Fig. 9. The extensions 110 and 110' enter the slots 33² and 33³ of the switching units M and L, respectively, preventing the movement of said units. To unlock the switch units L and M, the key is turned to the left until the pin 108 engages pin 109 to move the

plate 104 in a downward direction, and this downward movement of the sliding locking plate 104 withdraws the extensions 110 and 110' from the slots 33² and 33³.

To yieldingly hold the plate 104 in its locked or unlocked positions, I provide a flat spring 116 secured between the member 80 and the plate 2 by means of the stud 83, which holds the plate 104 in its different positions, the free end of the spring engaging the sliding plate 104. A cover or casing 117 is provided for enclosing the mechanism, and a top or name plate 118 is also provided, said cover 117 and name plate 118 being held together in any suitable manner and being provided with suitable openings to permit the passage of the studs 3 and 4. Handles 119 and 120 are secured to the studs 3 and 4 in any suitable manner, the said handles 119 and 120 being grasped by the operator to move the switching units L and M to their different operative positions. The cover 117 and plate 118 are also provided with a suitable opening 121 of a size to permit the passage of the forward end or head 122 of the key barrel 97, this opening 122 also forming a bearing for the head 122 of the key barrel 97 when it is rotated by the key. A knob 123 is also provided and secured to the shaft 62 of the cowl unit to permit the cowl unit CL to be rotated into either its operative or inoperative position.

While I have described a certain form of invention, it is to be understood that changes and modifications will readily suggest themselves to those skilled in the art, and I, therefore, do not wish to be limited to the exact structure as shown, but aim to cover all such changes and modifications as come within the spirit and scope of the appended claims.

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

1. A device of the character described including a mounting plate provided with an orifice, a rotatable contact control member supported by said mounting plate, a spring member adapted to fit into said orifice and secured to said mounting plate, a second spring member for cooperation with said rotatable contact control member and adapted to fit in said orifice, and means for securing said second spring member to said first spring member.

2. A device of the character described including a mounting plate provided with an orifice, a rotatable contact control member for said mounting plate, a spring adapted to fit into said orifice and firmly secured therein, a second spring for cooperation with said rotatable contact control member and adapted to also fit into said orifice, and clamping means for securing said first and second springs in contact.

3. A circuit controlling switch provided

with a mounting plate having an orifice, a movable contact control member supported by said mounting plate, a leaf spring extending into said orifice and firmly secured to said plate, a second leaf spring for co-
 5 operation with said movable contact control member whereby a circuit may be opened and closed, said second spring also extending into said orifice and held in position in
 10 said orifice in facial contact with said first spring by means of a force fit.

4. A circuit controlling switch including a mounting base, a movable contact control member supported by said base, a leaf spring
 15 extending into an aperture in said base and firmly secured to the base, a second leaf spring for cooperation with said movable contact control member for controlling a circuit and likewise extending into said aperture and held therein by means of a force fit,
 20 and means for securing said second spring to said first spring, thereby securing said second spring in position and in engagement with said first spring.

25 5. A circuit controlling switch of the character described including a mounting plate having an aperture, a rotatable contact control member supported by said mounting
 30 plate, a spring extending through said aperture and firmly secured to said mounting plate, a second spring for cooperation with said rotatable contact control member and likewise extending through said aperture and held therein by means of a force fit and
 35 in facial engagement with said first spring, terminal means for said extended ends of said springs and means for securing said terminal means to said springs, whereby the spring and the terminal means as a unit are
 40 secured to the mounting plate.

6. A circuit controlling switch of the character described including a mounting base, a cover for said mounting base, a contact spring extending through an orifice in
 45 said base and firmly supported by said mounting base, a second contact spring extending through an orifice and supported by said mounting base normally in contact with said first contact spring, a third contact
 50 spring extending through said second orifice, and operating means supported by said base and cover for moving said third contact spring to cause the second of said contact springs to disengage the first of said contact
 55 springs.

7. A circuit controlling switch of the character described including a mounting base, a cover for said mounting base, a contact spring extending through an orifice in
 60 said base and firmly supported by said mounting base, a second contact spring extending through a second orifice in said base supported by said mounting base and normally in contact with said first contact
 65 spring, a third spring extending through said second orifice and supported in said orifice by means of a force fit, a leaf spring associated with said second and third leaf springs extending through said second orifice and firmly secured to said base, means
 70 for securing said second and third contact springs to said first spring, and means supported by said base and cover for moving said third contact spring to cause the second contact spring to disengage the first said
 75 contact spring.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 20th day of May, 1920.

ALFRED H. WEISS.