S. F. BRIGGS AND E. N. JACOBI.

PUSH LOCK SWITCH.

APPLICATION FILED MAY 9, 1917.

1,434,769. Patented Nov. 7, 1922.

3 SHEETS—SHEET 1.

FIG. 1.

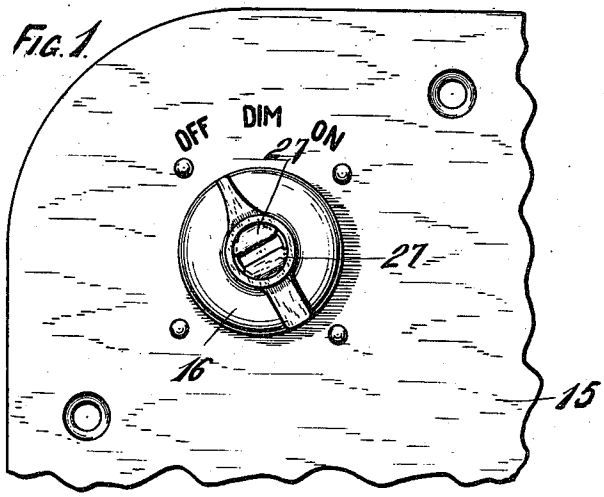


FIG. 7.

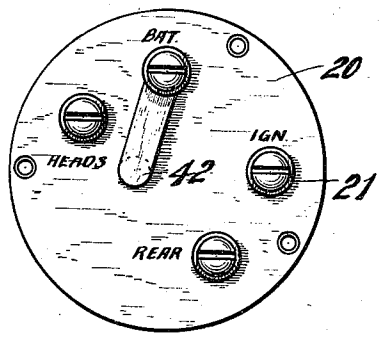


FIG. 6.

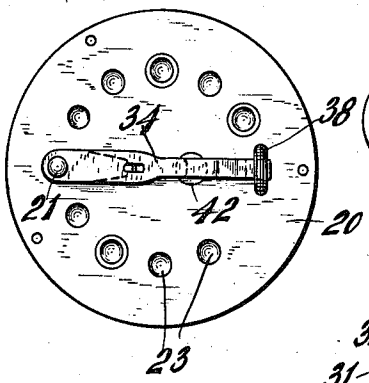


FIG. 8.

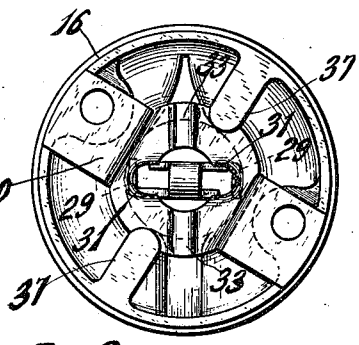


FIG. 2.

WITNESSES.

L. J. Theurer

H. D. Chase

INVENTORS.

Stephen F. Briggs

Edward N. Jacobi.

By R. S. & E. C. Caldwell.

ATTORNEY

S. F. BRIGGS AND E. N. JACOBI.

PUSH LOCK SWITCH.

APPLICATION FILED MAY 9, 1917.

1,434,769.

Patented Nov. 7, 1922.

3 SHEETS—SHEET 2.

FIG. 4.

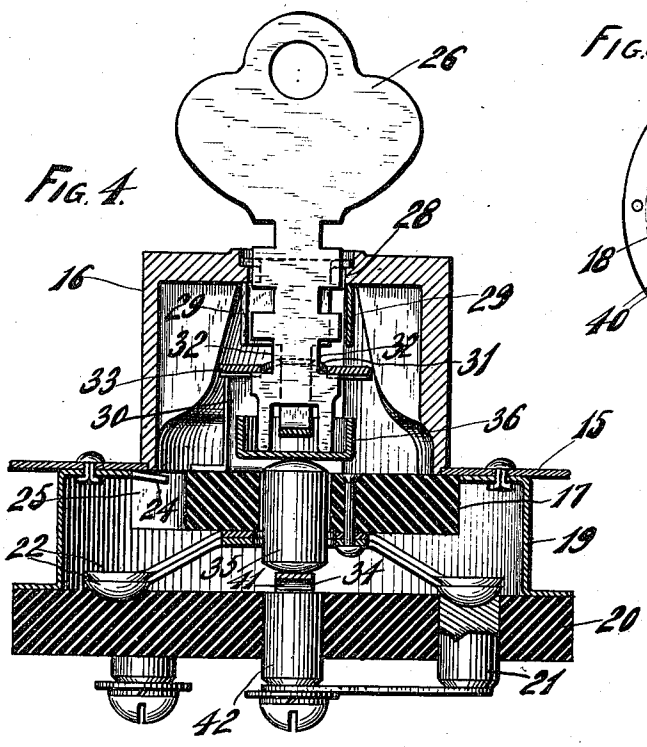


FIG. 5.

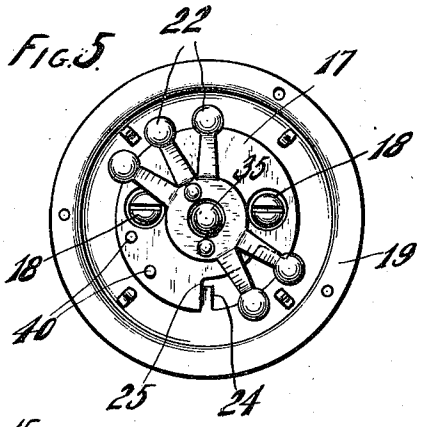


FIG. 9.

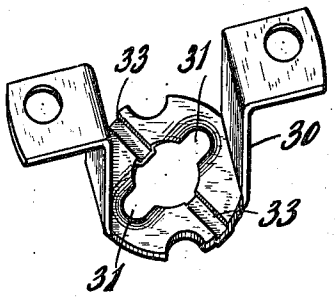
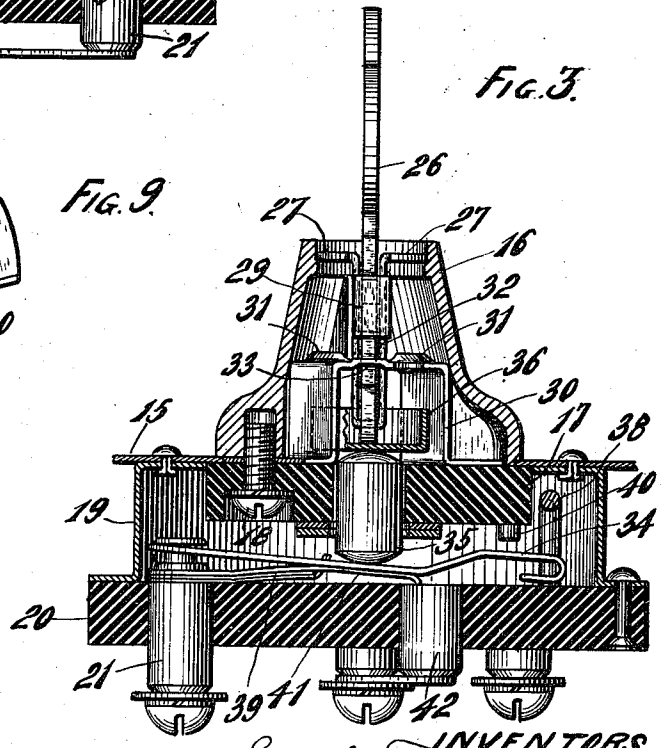


FIG. 3.



WITNESSES.

L. B. Thurman

H. D. Chase

INVENTORS.

Stephen F. Briggs &

Edward N. Jacobi,

By R. S. C. Caldwell,

ATTORNEY.

S. F. BRIGGS AND E. N. JACOBI.

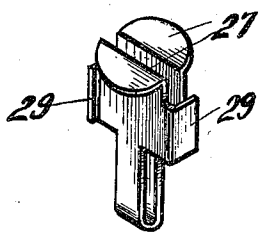
PUSH LOCK SWITCH.

APPLICATION FILED MAY 9, 1917.

1,434,769. Patented Nov. 7, 1922.

3 SHEETS—SHEET 3.

FIG. 10.



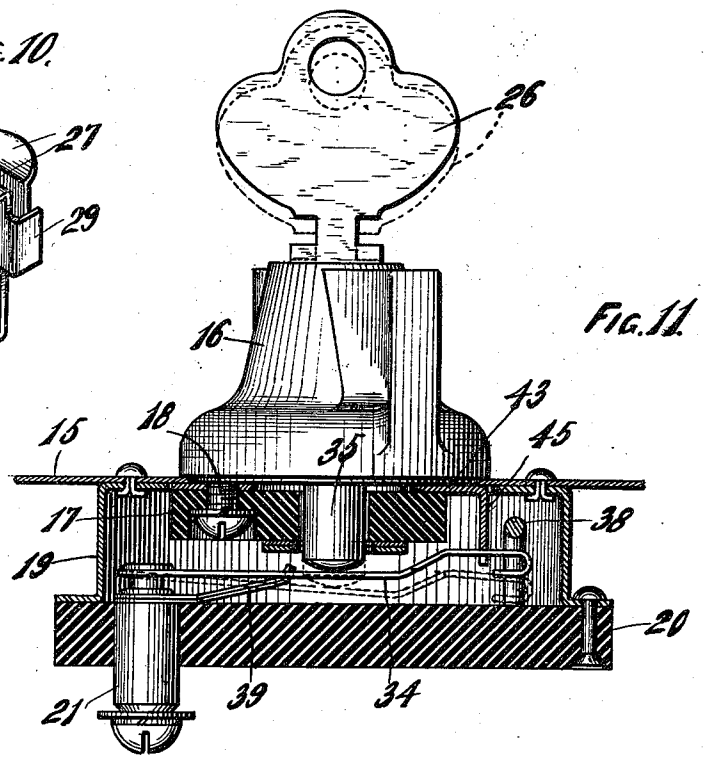


FIG. 11.

FIG. 12

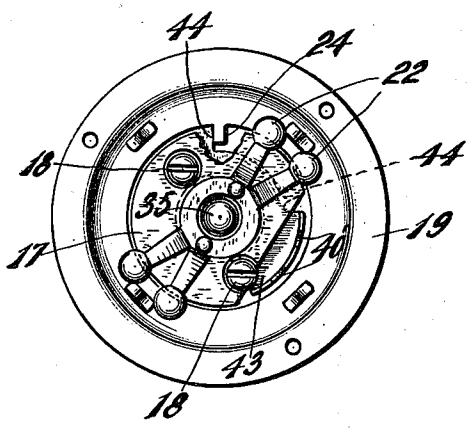
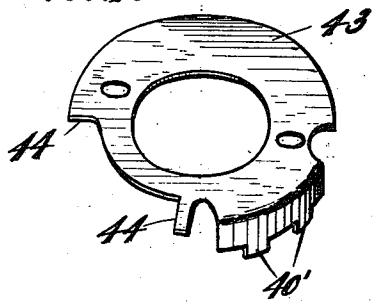


FIG. 13



WITNESSES.

L. C. Thurer

H. D. Chase.

INVENTORS.

Stephen F. Briggs

Edward N. Jacobi.

By R. S. C. Caldwell.

ATTORNEY.

Patented Nov. 7, 1922. 1,434,769

UNITED STATES PATENT OFFICE.

STEPHEN F. BRIGGS AND EDWARD N. JACOBI, OF MILWAUKEE, WISCONSIN, ASSIGNORS TO BRIGGS & STRATTON COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

PUSH LOCK SWITCH.

Application filed May 9, 1917. Serial No. 167,476.

To all whom it may concern:

Be it known that we, STEPHEN F. BRIGGS and EDWARD N. JACOBI, citizens of the United States, and residents of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Push Lock Switches, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention relates to a lock switch of the type in which the insertion of a key and the turning thereof incident to its retaining engagement causes it to be forced inwardly. An object of the invention is to utilize such longitudinal movement of the key to disable the lock, or to effect the operation of a switch supplemental to the locked switch, or to accomplish both purposes.

Another object of the invention is to provide a key guide of novel and inexpensive construction capable of retaining itself in place within a hollow switch handle and serving to guide the key against edgewise displacement as well as against lateral displacement and which will prevent the insertion of a screw driver or knife blade or other similar implements.

Another object of the invention is to provide a key thrust cam for forcing the key when turned to move longitudinally and to relieve the switch handle from the wear of the key.

Another object of the invention is to so construct the switch locking means as to minimize the cost of manufacture while increasing the strength and durability.

With the above and other objects in view the invention consists in the push lock switch as herein claimed and all equivalents.

Referring to the accompanying drawings in which the same characters of reference indicate like parts in the several views:

Fig. 1 is a front view of a switch constructed in accordance with this invention mounted on a panel or front plate;

Fig. 2 is a central sectional view of the switch in its locked condition with the key in the act of being inserted;

Fig. 3 is a similar view thereof with the switch in the unlocked condition;

Fig. 4 is a central sectional view of the switch in the unlocked condition taken on a plane at right angles to the sectional plane of Fig. 3;

Fig. 5 is a rear view of the switch case with the terminal head removed;

Fig. 6 is a view of the inner face of the terminal head;

Fig. 7 is a view of the rear face of the terminal head;

Fig. 8 is a rear view of the switch handle with the key thrust cam and the key guide in place;

Fig. 9 is a perspective view of the key thrust cam inverted;

Fig. 10 is a perspective view of the key guide;

Fig. 11 is a sectional view of a modified form of the invention;

Fig. 12 is a rear view thereof with the terminal head removed; and,

Fig. 13 is a perspective view of the thrust plate lock ring thereof.

In these drawings 15 indicates a switch panel or front plate through an opening in which is rotatably mounted a switch handle of the switch mechanism of this invention. The switch may be used for controlling the lighting circuits of an automobile, in which case the position of the switch handle with respect to suitable designations on the front plate will preferably indicate the positions of the switch for the various conditions of the lighting circuit effected thereby.

The switch handle 16 is preferably a hollow shell die casting with an annular rabbet fitting the opening of the front plate. A contact disk 17 of insulating material and of larger diameter than the opening of the front plate is secured to the handle 16 by screws 18. The switch handle is thus rotatably mounted on the front plate with the edges of the front plate opening held between it and the contact disk.

A metal switch casing 19 has an in-turned flange riveted to the back of the front plate and an out-turned flange secured to the in-

sulating disk 20. The disk 20 constitutes a terminal head by having contact studs 21 forced therethrough and serving as stationary contacts engaged by spring contact arms 22 secured to the contact disk 17. The ends of the contact arms 22 are spherically convex and bear on the surface of the terminal head which is provided with a series of notches 23 to receive said ends of the contact arms in the different positions of the switch handle. Some of the notches are located in the ends of the plugs 21 so that in some positions of the switch electrical connections are established by the engagement of the contact arms with the stationary contacts, the latter being provided with binding posts for convenience in making wiring connections.

In order to limit the turning movement of the switch handle a lug 24 projects from the in-turned edge of the switch case 19 into a recess 25 cut in the edge of the contact disk 17, the engagement of the lug with the end walls of the recess forming a stop for producing such limitation.

There is a circular opening in the end of the switch handle within which a suitable key 26 may turn and this opening is partially closed by means of a key guide 27 with a central slot forming the key opening. The key guide consists of a strip of sheet metal bent to a U-form with its bent portion narrower than its upper portion to form a stirrup which is straddled by the spaced lugs at the end of the key, as seen in Fig. 4, and with its upper ends bent outwardly and of approximately semi-circular shape to bear upon a flange 28 of the circular opening of the switch handle. Each of the broad upper portions of the key guide has an extension 29 bent up at an angle thereto and engaging the bottom of the flange 28, thus cooperating with the outwardly bent upper ends of the key guide to hold the key guide in place on the flange. The key when being inserted is directed in its movements within the hollow handle by its engagement with the broad upper parts of the key guide and by its engagement with the extensions 29 so that the key cannot be improperly inserted either by tilting it laterally or edgewise.

A U-shaped sheet metal key thrust cam 30 has its outwardly turned ends countersunk in grooves in the bottom of the switch handle and openings through said ends receive the screws 18 so that the cam is rigidly held between the contact disk and the handle and is arched above the contact disk. At its raised portion the cam has an elongated slot 31 with an enlarged middle portion. The reduced bent lower end of the key guide turns within the enlarged portion of the slot and the key may enter the slot and because of notches 32 in its edges may turn so as to lie across the slot in grooves 33 depressed in the cam. Between the edges of the slot 31 and the groove 33 the surfaces of the cam which are engaged by the shoulders of the key slope downwardly compelling the key to move downwardly by their cam action thereon as it turns from the position in which it is inserted through the slot 31 to the position in which it engages the groove 33.

The longitudinal movements of the key are transmitted to a locking member 34 through the intervention of an insulating pin 35 loosely passing through the contact disk 17 and having a metal cup 36 resting thereon to receive the spaced lugs on the end of the key. The locking member 34 is held upwardly with spring pressure, as will be more particularly described and the pin 35 therefore normally holds the cup 36 against the end of the key guide, as shown in Fig. 2. The cup is confined between the opposite surfaces of the parallel parts of the key thrust-cam 30 and between a pair of parallel ribs 37 formed on the inner walls of the switch handle for the purpose.

The locking member 34 consists of a stiff metal strip pivotally mounted on one of the terminal studs 21 by having an opening in its end through which the reduced portion of the terminal stud passes with its extremity upset forming a head for confining the strip. The outer end of the strip is guided within a staple 38 driven in the terminal head 20 and spring tongues 39 similarly mounted on the reduced portion of the same contact stud 31, but without play, have reduced upturned ends passing through an opening in the strip 34 to press it upwardly against the end of pin 35. In the normal position of the strip 34 it bears against the contact disk 17 and prevents the turning of the switch handle by engaging shoulders on pins 40 which project from said contact disk. When the key 26 is forced by the cam action of the thrust cam 30, it forces the cup 36 against the pin 35 and causes the latter to move the locking strip 34 downwardly out of engagement with the pins 40, thus unlocking the switch and permitting the turning of the switch handle. The pins 40 are so positioned that the locking engagement may be effected in any of the operative positions of the switch.

Mounted on the terminal stud 21 with the spring tongues 39 is a contact spring 41 which is longer than said spring tongues and has an opening through which their upturned ends pass while its outer end is bent downwardly to engage a contact stud 42 when the locking member is depressed, said contact stud 42 being in electrical connection with one of the terminal studs so that the engagement of the spring contact therewith may be relied on to establish a cir-

cuit, such as the ignition circuit of the gas engine of an automobile, while the other terminal studs in their engagement with the contact arms 22 may control the various lighting circuits of the automobile.

In operation the switch handle controlling the main switch mechanism is locked against movement whenever the key is removed and the supplemental switch at such times is open and can only be closed by the insertion of the proper key for unlocking the main switch mechanism. Thus when applied to the circuits of an automobile as mentioned the lights may be left in any desired condition as controlled by the various positions of the main switch mechanism and may not be changed by an unauthorized person tampering with the switch, while the ignition circuit may not be closed to permit the engine to be operated. The mere act of inserting and turning the key, however, closes the ignition circuit and unlocks the lighting switch. The key is effectively held in place by its shoulders fitting in the grooves 33 of the thrust cam where they are held by the pressure of the springs of the locking member 34. This key thrust cam 30 is of hard metal and takes the wear incident to the key thrust instead of the wear being taken by the comparatively soft metal of the molded handle member.

The key guide formed by a single piece of sheet metal bent into shape serves to hold itself in place by engaging above and below the annular flange 28 around the key hole opening and effectively guides the key against lateral or edgewise displacement and at the same time prevents the depression of the ignition switch by a tool such as a screw driver or the like.

In that form of the invention shown in Figs. 11, 12 and 13 a thrust plate lock ring 43 is held between the contact disk and the switch handle, the screws 18 passing through openings thereof so that it forms a part of the movable switch mechanism. Instead of shoulders being formed on the contact disk to limit the movements of the switch handle, the edge of the lock ring 43 is recessed to form stop shoulders 44 for engaging the lug 24 of the switch case. This lock ring, furthermore, is provided with a downwardly extending flange 45 at one portion thereof and said flange has spaced lugs 40′ thereon to take the place of the pins 40 for engaging the locking member 34 for locking the switch. This lock ring not only forms a bearing engagement with the front plate 15 that will relieve the contact disk from wear, but by bearing with the pressure of the locking member springs against the edge of the front plate, it assures an electrical contact therewith which may be utilized in the event of the switch being employed with the magneto ignition system for disabling the magneto when the key is removed, the locking member 34 serving to ground the magneto by its engagement with the flange 45 of said lock ring, it being understood that the front plate is provided with a suitable ground connection not shown.

The entire switch mechanism is exceedingly strong and durable and inexpensive to manufacture.

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

1. In a lock switch, a movable switch member, a locking means therefor, a removable rotatable key, and a cam engaged by the key in its rotary movements for moving the key endwise to move the locking member.

2. In a lock switch, a movable switch member, a removable key rotatably mounted therein, a cam in the path of the key for giving it longitudinal movement, and a locking member for the switch member moved into and out of position by the longitudinal movements of the key.

3. In a lock switch, a movably mounted switch member, a key removably fitting therein and adapted to turn, a cam on the switch member engaged by the key when it is turned and forcing the key to move longitudinally, means passing through the switch member engaged by the key and transmitting the longitudinal movements thereof, and a locking member engaged by said means and operated by such longitudinal movements.

4. In a lock switch, a movably mounted switch member, a detachable key mounted to turn therein, a cam engaged by the key for giving it a longitudinal movement, means passing through the switch member for transmitting the longitudinal movement of the key, a switch case surrounding the switch member, a locking member pivotally mounted on the switch case and engaged by the said means, and a shoulder on the switch member engaged by the locking member.

5. In a lock switch, a rotatably mounted handle having an opening therethrough, a key adapted to pass through said opening, a cam plate within the handle engaged by the key for causing longitudinal movements of the key, a contact disk secured to the handle, a pin passing through the contact disk, means bearing on the pin and engaged by the key, a switch case surrounding the contact disk, and a locking member connecting the contact disk with the switch case and engaged by the pin and moved out of its locking engagement by the longitudinal movements of the key.

6. In a lock switch, a handle having a flanged opening, a key guide engaging the opposite sides of the flange of said opening and having flat side walls with flanges bent

therefrom to form end walls and with a reduced bent connecting portion at its lower end, a key fitting within the key guide and guided by the walls thereof and provided with projections on its end to pass beyond the bent end portion of the key guide, a cam within the handle having a slotted opening through which the reduced end portion of the guide passes and adapted to have the key passed therethrough, said cam having the edges of its opening inclined to force the key longitudinally when turned in engagement therewith, a contact disk carried by the handle, means engaged by the key and passing through the contact disk, and a locking member for the contact disk engaged by said means.

7. In a lock switch, a handle, a contact disk secured thereto, a cam plate secured between the handle and the contact disk and having a slotted opening, a key passing through the handle and into the slotted opening of the cam and provided with opposite shoulders to engage the edges of said opening of the cam, the edges of the opening of the cam being inclined to produce a longitudinal movement of the key when turned in engagement therewith, there being a groove in the cam engaged by said shoulders of the key, and spring pressed locking means for the contact disk engaged by the key and forced out of its locking engagement by the longitudinal movement of the key.

8. In a lock switch, a hollow handle having a flanged opening, a key guide within the handle engaging the flange of the opening and having a reduced bent inner end, a contact disk secured to the handle, an arched cam plate within the handle with its ends held between the handle and the contact disk, there being a slotted opening in the cam plate receiving the reduced bent end of the key guide and having its edges inclined to form cams, a key passing through the key guide and the slotted opening of the cam plate and having opposite shoulders to engage the cam edges of the cam plate and provided with projections on its end passing beyond the bent portion of the key guide, a cup within the handle and between the parallel portions of the cam plate and adapted to receive the end projections of the key, a pin passing through the contact disk and bearing on the cup, and a locking member for the contact disk bearing on the pin with spring pressure.

9. In a lock switch, a switch handle, a contact disk secured thereto, key controlled means movable through the contact disk, a switch case surrounding the contact disk, a stud thereon with an upset end, a locking member loosely mounted on the stud, a spring bearing on the locking member and holding it against said key controlled means, a guide for the free end of the locking member and shoulders on the contact disk engaged by the locking member.

10. In a lock switch, a switch handle, a contact disk secured thereto, key controlled means movable through the contact disk, a switch case surrounding the contact disk, a stud thereon having a reduced portion, a leaf spring fitting on the reduced portion of the stud and secured thereto by having a part of the reduced portion of the stud upset thereon, a metal strip pivotally mounted on the stud by fitting over the reduced portion of the stud and confined thereon by the end of said reduced portion being upset and held by the pressure of the spring against the key controlled means, a guide for the free end of the metal strip, and shoulders on the contact disk engaged by the metal strip.

11. In a lock switch, a switch handle, a contact disk secured thereto, key controlled means movable through the contact disk, a switch case surrounding the contact disk, a stud thereon having a reduced portion, a leaf spring and a contact spring fitting on the reduced portion of the stud and secured thereto by having a part of the reduced portion of the stud upset thereon, the end of the spring being reduced and passed through an opening in the contact spring, a metal strip pivotally mounted on the stud by fitting over the reduced portion of the stud and confined thereon by the end of said reduced portion being upset and having an opening to receive the upturned end of the spring, the pressure of the spring serving to hold the metal strip against the key controlled means, a guide for the free end of the metal strip, shoulders on the contact disk for engaging the metal strip, and a contact engaged by the contact spring.

12. In a lock switch, a switch handle, a front plate in which the handle is mounted, a switch case secured to the front plate, a contact disk within the switch case and secured to the switch handle, a lock ring between the contact disk and the switch handle, and bearing on the front plate and provided with a downwardly turned flange with locking lugs on its edge, a key controlled means movable through the contact disk, and a locking member on the switch case bearing thereon and adapted to engage the lugs of the flange of the locking ring.

13. In a lock switch, a switch handle, a front plate in which the handle is mounted, a switch case secured to the front plate, a contact disk within the switch case and secured to the switch handle, a lock ring between the contact disk and the swich handle and bearing on the front plate and provided with a downwardly turned flange with locking lugs on its edge, a key controlled

means movable through the contact disk, a locking member on the switch case bearing thereon and adapted to engage the lugs of the flange of the locking ring, a lug projecting from the edge of the lock case, and shoulders on the locking ring for engaging the lug to limit the movements of the switch handle.

In testimony whereof we affix our signatures, in presence of two witnesses.

STEPHEN F. BRIGGS.
EDWARD N. JACOBI.

Witnesses:
R. S. C. CALDWELL,
H. D. CHASE.