W. J. NEWTON.

MULTIPLE SWITCH LOCKING MECHANISM.

APPLICATION FILED NOV. 18, 1918.

1,317,382.

Patented Sept. 30, 1919.

2 SHEETS—SHEET 1.

Fig. 1

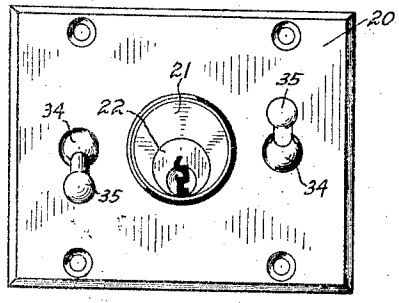


Fig. 2

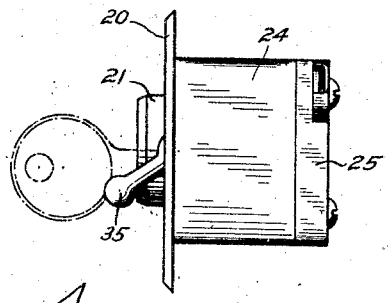


Fig. 3

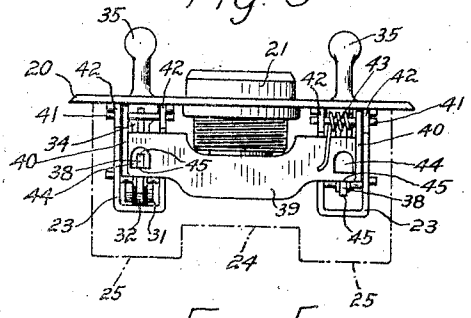


Fig. 4

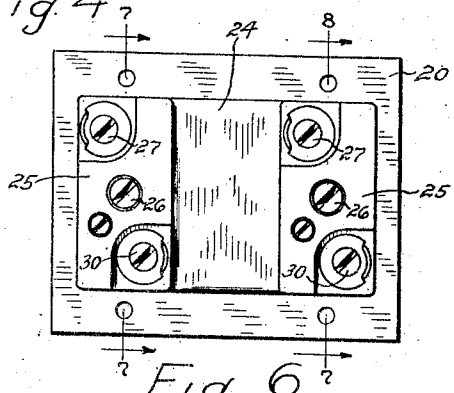


Fig. 5

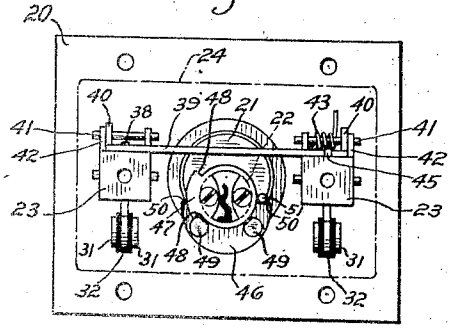


Fig. 6

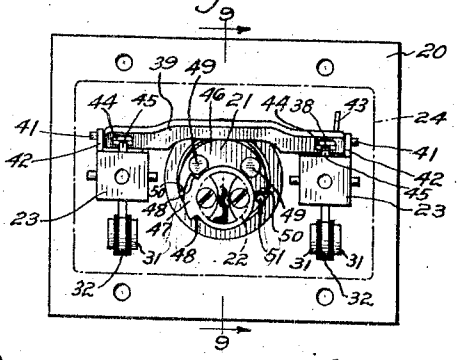


Fig. 7

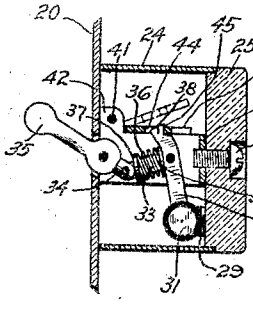


Fig. 8

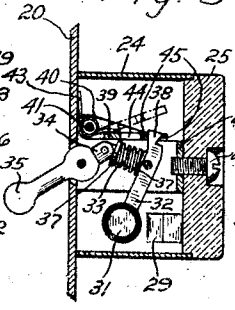


Fig. 9

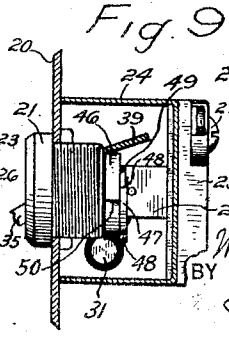
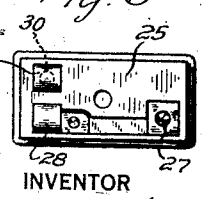


Fig. 9a.



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2 SHEETS—SHEET 2.

Fig. 10

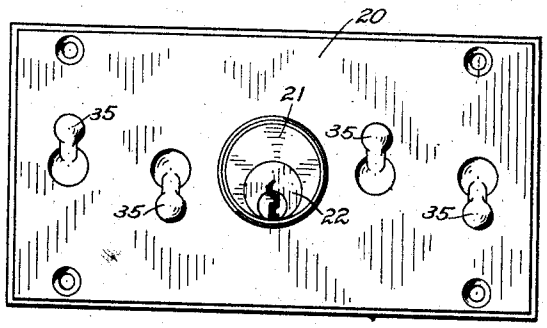


Fig. 11

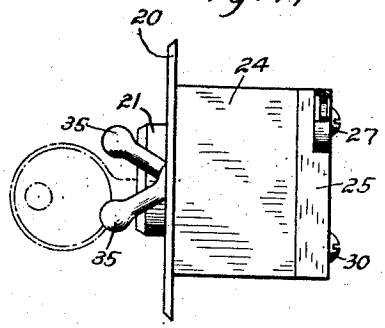


Fig. 12

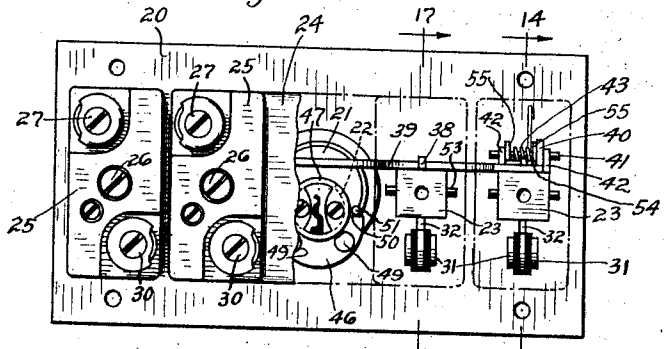


Fig. 14

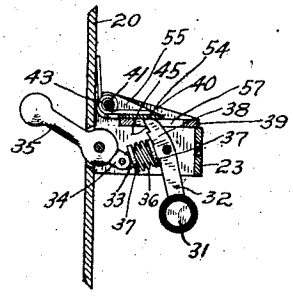


Fig. 13

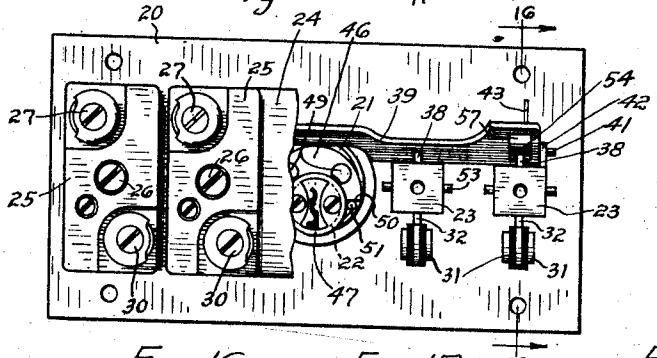


Fig. 15

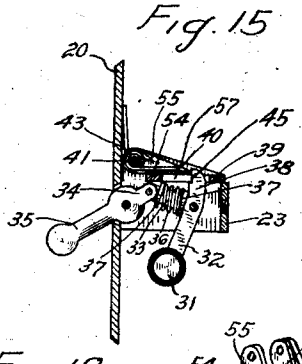


Fig. 16

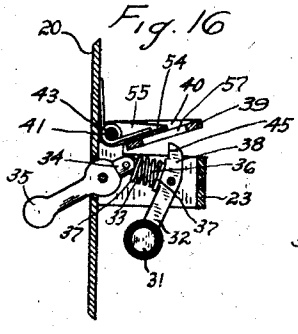


Fig. 17

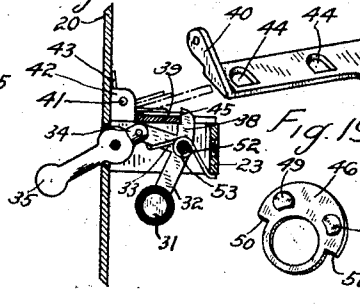


Fig. 18

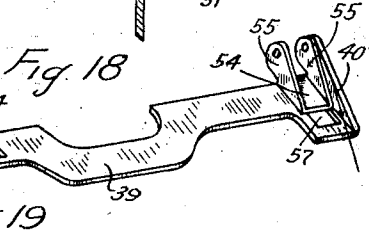


Fig. 19

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UNITED STATES PATENT OFFICE.

WILLIAM J. NEWTON, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO HARVEY HUBBELL, INCORPORATED, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF CONNECTICUT.

MULTIPLE-SWITCH-LOCKING MECHANISM.

1,317,382. Specification of Letters Patent. Patented Sept. 30, 1919.

Application filed November 18, 1918. Serial No. 262,956.

To all whom it may concern:

Be it known that I, WILLIAM J. NEWTON, a citizen of the United States, residing at Bridgeport, county of Fairfield, State of Connecticut, have invented an Improvement in Multiple-Switch-Locking Mechanism, of which the following is a specification.

This invention has for its object to provide mechanism for locking and unlocking a plurality of switches by means of a single key, and is especially adapted for use upon automobiles in locking the various switches which control elements and attachments of the car, as for example the magneto, and the starting and the light switches.

With this and other objects in view I have devised the novel locking mechanism which I will now describe referring to the accompanying drawings forming a part of this specification and using reference characters to indicate the several parts.

Figure 1 is a front elevation of a form of the invention in which two switches only are locked, as for example a head and tail light switch and a side and tail light switch;

Fig. 2 an end elevation corresponding therewith;

Fig. 3 a plan view;

Fig. 4 a rear elevation;

Fig. 5 a similar view with the housing removed and showing the locking bar in the locking position;

Fig. 6 a similar view showing the locking bar in the unlocking position;

Fig. 7 a section on the line 7—7 in Fig. 4, looking in the direction of the arrows;

Fig. 8 a section on the line 8—8 in Fig. 4, looking in the direction of the arrows;

Fig. 9 a section on the line 9—9 in Fig. 6, looking in the direction of the arrows;

Fig. 9ª an inverted plan view of one of the insulating bases;

Fig. 10 a front elevation of a form of the invention in which four switches are locked simultaneously, as for example two light switches, a magneto switch, and a starting switch;

Fig. 11 an end elevation corresponding therewith;

Fig. 12 a rear elevation, the housings being partly broken away and showing the locking bar in the locking position;

Fig. 13 a similar view showing the locking bar in the unlocking position.

Fig. 14 a section on the line 14—14 in Fig. 12 looking in the direction of the arrows, the parts being in the closed circuit position;

Fig. 15 a similar view, the parts being in the open circuit position, and locked;

Fig. 16 a section on the line 16—16 in Fig. 13 looking in the direction of the arrows;

Fig. 17 a section on the line 17—17 in Fig. 12 looking in the direction of the arrows, the switch being of the self returning type and locked in the open circuit position;

Fig. 18 a perspective view of the locking bar of the second form of the invention, detached, and

Fig. 19 is a plan view of the lifting cam, detached.

20 in both forms denotes the face plate, 21 the hub of a lock projecting therefrom, 22 the barrel of the lock, 23 U-shaped frames which are secured to the face plate, 24 housings which rest against the inner side of the face plate, 25 insulating bases which close the other sides of the housings and 26 screws which pass through the bases and engage the frames, thereby securing both bases and housings in place. The current in each switch passes from binding screw 27 to a base contact 28 and from a corresponding base contact 29 to a binding screw 30. The circuit is closed between contacts 28 and 29 by means of a contact 31 which is carried by the contact arm 32 of a bell crank contact lever which is pivoted between the side pieces of the frame. The other arm of the bell crank contact lever, indicated by 33, I term the toggle arm. This arm is loosely pivoted to the inner arm of an operating lever 34, itself pivoted between the side pieces of the frame, and being provided with a hand piece 35 which extends through a hole in the face plate. The toggle arm and the inner arm of the operating lever comprise a toggle joint which is retained in either the open circuit or closed circuit position by means of a compression spring 36, which is carried by the toggle arm, washers 37 being preferably interposed between the ends of the spring, and the contact arm and the inner arm of the operating lever respectively.

The locking of the switches is effected as follows: The contact arm 32 of each switch is provided with an extension which I term the locking arm and have indicated by 38. This locking arm is adapted to be engaged by a locking plate 39, which is pivoted above the frames and is adapted to be swung

toward the frames into position to be engaged by the locking arms and away from the frames to unlock the locking arms. In the present instance the locking plate is shown as provided with ears 40 which are pivoted on pins 41 extending between pairs of ears 42 extending from the side pieces of the frame. The locking plate is normally retained in the locking position by means of a spring 43 coiled about one of the pins and having extended ends, one of which bears upon the locking plate and the other upon the inner side of the face plate. It is of course immaterial whether one or both ends of the locking plate are provided with springs.

In the form illustrated in Figs. 1 to 9 inclusive, the locking plate is shown as provided with locking recesses 44 into which the locking arms pass when it is required to lock the switches in the closed circuit position, the locking arms being shown as provided with locking faces 45 adapted to engage walls of the locking recesses. When locking the switches in the open circuit position the locking faces of the locking arms engage the edge of the locking plate.

The locking plate is raised to the unlocking position by means of a lifting cam 46 which is rotatably mounted on the inner end of the lock barrel and is retained in place by an actuating plate 47 which is secured to the end of the barrel. The actuating plate is provided with shoulders 48 which are adapted to engage bosses 49 on the face of the cam to impart rotary movement thereto, and the cam is provided with shoulders 50 which are adapted to engage a pin 51 which projects from the inner end of hub 21 and serves as a stop to limit the movement of the cam at the end of each half rotation in either direction.

In Figs. 3 and 5 the left switch is in the closed circuit position and the right switch in the open circuit position, and both switches are locked. In Fig. 6 the locking plate is shown as raised leaving both switches unlocked. Both switches may be locked in either the open circuit or closed circuit position or either may be locked in the open circuit position with the other in the closed circuit position. The preferable arrangement is to have the switches in the open circuit position when the operating levers are down, as at the left in Fig. 1, and in the closed circuit position when the levers are up, as at the right in Fig. 1. It will be noted in Fig. 3 that the left locking arm lies in the left locking recess, the locking face being in engagement with a straight wall of said recess, and that the locking face of the right locking arm is in engagement with the edge of the locking plate. Starting with the locking plate in the locking position, to unlock the switches, the key is applied to the lock in the usual manner and the barrel is given an entire rotation. When the actuating plate has made a half rotation from the position shown in Fig. 5, the forward shoulder thereon will engage the right boss on the cam and completion of the rotation of the barrel will carry the cam to the position shown in Fig. 6, the cam having engaged the locking plate and swung it upward to the unlocking position. The rotation of the barrel and of the cam will be stopped by the engagement of one of the shoulders on the cam with pin 51. In swinging the cam backward to the locking position again, its movement will commence at the end of the first half rotation of the barrel and will be stopped at the completion of the rotation by the engagement of the other shoulder on the cam with the pin, as in Fig. 5. It will be understood that the raising of the locking plate is against the power of the spring which will return said plate to the locking position as soon as the cam is turned from the unlocking position, as in Fig. 6, to the reverse position, as in Fig. 5. When the locking plate swings down to the locking position it will lock both switches in either the open circuit or closed circuit position as they may happen to be. If in the closed circuit position the end of the locking arm will pass into the corresponding locking recess in the locking plate, and if in the open circuit position the locking face of the locking arm will engage the edge of the locking plate.

The form illustrated in Figs. 10 to 18 inclusive differs from the form just described in that the locking and unlocking of two additional switches, each of a different type is controlled by the same locking plate and cam. It will of course be obvious that other switches of either of the three types may be added without departing from the principle of the invention. For convenience in description I will refer to one of the additional switches as a starting switch and the other as a magneto switch, although it should be understood that it is wholly immaterial to what special uses the switches are applied.

The starting switch, see Fig. 17, is of the self returning type, that is self returning to its normal position when operated. In the present instance a spring 52 carried by the pivot pin 53 of the bell crank contact lever and having arms bearing respectively against the frame and the toggle arm, acts to retain the switch in the open circuit position and to return it to that position when the operating lever is released after being operated to close the circuit. In addition to this function spring 52 has an additional function in that it takes the place of the compression spring which is shown in the other forms. With this form of switch it is not required to lock it in the closed cir-

cuit position but only in the open circuit position. Consequently no recess is provided in the locking plate to receive the locking arm in the closed circuit position. The circuit is only closed while the operator retains the operating lever in the closed circuit position. The instant he releases the operating lever the spring returns the contact lever and contact arm to the open circuit position and when the locking plate is permitted to return to the locking position, through operation of the cam, the switch will be locked in that position through the engagement of the locking face of the locking arm with the edge of the locking plate.

In connection with the magneto switch I have provided means for locking said switch in the open circuit position only while each of the light switches (so called for convenience in description) may be locked in either the open circuit or closed circuit position, said means also providing for leaving the magneto switch in the closed circuit position and locking each of the light switches in either the open circuit or closed circuit position, and for automatically locking the magneto switch in the open circuit position, when its operating lever is swung to that position, without an operation of the locking cam. This is effected by means of a supplemental locking plate 54, see Figs. 14, 15, 16 and 18, which is provided with ears 55 adapted to be pivoted between the corresponding pair of ears 42 on one of the frames 23. The supplemental locking plate is normally retained in close engagement with the locking plate by means of the spring 43 carried by the corresponding pin 41 and having ends bearing respectively against the inner side of the face plate and the supplemental locking plate. The locking plate is provided with a recess 57 through which the corresponding locking arm passes and which is long enough to permit full swing of said locking arm. This recess is partly covered by the supplemental locking plate, the forward portion of said recess, however, is not covered by the supplemental locking plate leaving an opening into which the end of the locking arm may pass freely when the switch is in the open circuit position and the locking plate is swung to the locking position, the edge of the supplemental locking plate being now in locking relation to the locking face of the locking arm, as clearly shown in Fig. 15, which compare with Fig. 16, the latter view showing the locking plate in the unlocking position. Suppose now that the magneto switch is in the closed circuit position and that it is desired to lock the other switches in the open circuit position leaving the magneto switch in the closed circuit position. The locking plate would be returned to its normal or locking position as in Fig. 14 and the supplemental locking plate would lie in contact with, or in close proximity to, the end of the locking arm. Should it be required to throw off the magneto switch, that is open the circuit, the operating lever would be swung from the position shown in Fig. 14 to that in Fig. 15. This would cause the end of the locking arm, which is preferably rounded in this form, to raise the spring controlled supplemental locking plate slightly and then swing past it. The supplemental locking plate will then snap down in front of the locking face of the locking arm leaving said arm and the switch locked in the open circuit position.

Having thus described my invention, I claim:

1. In a mechanism of the character described, the combination with a plurality of switches having locking arms, of a locking plate adapted to be placed in locking relation to said arms, a rotatable lock barrel, a cam loosely mounted on said barrel and adapted to raise the locking plate, and connections between said barrel and said cam whereby the cam is given a half rotation corresponding with each rotation of the barrel, and the locking plate is caused to lock or release the locking arms.

2. In a mechanism of the character described, the combination with a plurality of switches having bell crank contact levers provided with locking arms, of a pivoted spring controlled locking plate which is normally in locking relation to said arms, and key controlled means for swinging said plate to the unlocking position.

3. In a mechanism of the character described, the combination with a plurality of switches having bell crank contact levers provided with locking arms, of a pivoted spring controlled locking plate which is normally in locking relation with said arms, and means for swinging said plate to the unlocking position.

4. In a mechanism of the character described the combination with a plurality of switches having locking arms, of a spring controlled locking plate which is normally in locking relation to said arms, a rotatable lock barrel, a cam loosely mounted on said barrel and adapted to engage the locking plate, and connections intermediate said barrel and said cam whereby a rotation of the barrel will impart a half rotation to the cam and swing said locking plate to the unlocking position or permit its return to the locking position.

5. In a mechanism of the character described the combination with a plurality of switches having locking arms, of a locking plate, means for normally retaining said plate in locking relation to said arms, a rotatable lock barrel, a cam loosely mounted on said barrel, said cam being adapted to raise the locking plate and being provided

on its face with bosses, an actuating plate secured to the barrel and having shoulders adapted to engage the bosses and impart rotary movement to the cam, and means for stopping the cam at the end of each half rotation in either direction.

6. In a mechanism of the character described the combination with a plurality of switches having bell crank contact levers provided with locking arms, of a spring controlled locking plate normally in locking relation to said arms, the edge of said plate being adapted to be engaged by said arms when the switches are in the open circuit position and said plate being provided with recesses adapted to receive the ends of said arms to lock the switches in the closed circuit position, and key controlled means for moving said plate to the unlocking position.

7. In a mechanism of the character described, the combination with a plurality of switches having locking arms, of a locking plate having an edge normally in locking relation to said arms when in the open circuit position and having recesses adapted to receive and lock said arms in the closed circuit position, said plate being provided with another recess which is adapted to receive the corresponding locking arms in either the open circuit or closed circuit position, and a spring controlled supplemental locking plate partly covering said recess, so that the corresponding switch may remain unlocked in the closed circuit position when the locking plate is moved to the locking position, said supplemental locking plate permitting the locking arm of the corresponding switch to be swung to the open circuit position and then snapping down and locking said arm in that position.

8. In a mechanism of the character described, the combination with a plurality of switches having locking arms, of a locking plate having recesses adapted to receive the corresponding locking arms in the closed circuit position and another recess adapted to receive the corresponding locking arm in either the open circuit or closed circuit position, and a spring controlled supplemental locking plate which partly covers the last mentioned recess and permits the corresponding locking arm to remain in the closed circuit position when the locking plate is moved to the locking position and is adapted to lock the corresponding locking arm in the open circuit position.

In testimony whereof I affix my signature.

WILLIAM J. NEWTON.