W. R. COX.

LOCK.

APPLICATION FILED JUNE 10, 1916.

**1,334,292.**

Patented Mar. 23, 1920.

FIG. 1.

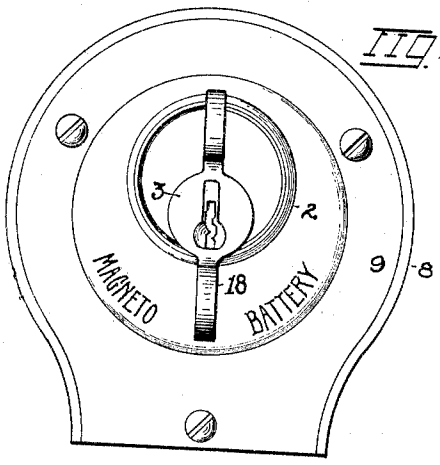



FIG. 2.

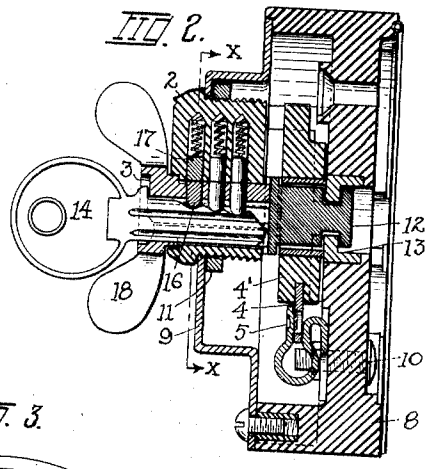



FIG. 3.

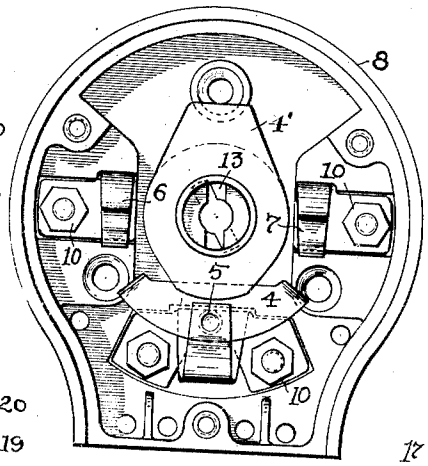



FIG. 4.

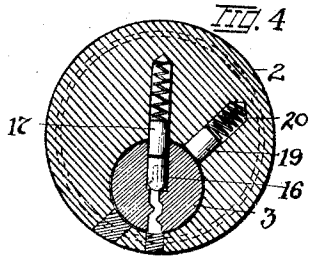



FIG. 5.

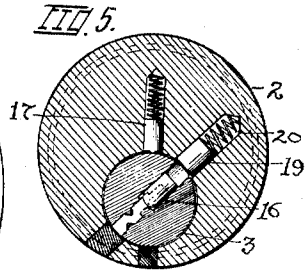



FIG. 6.

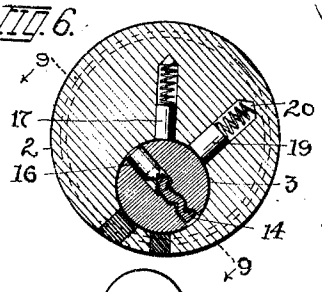



FIG. 8.

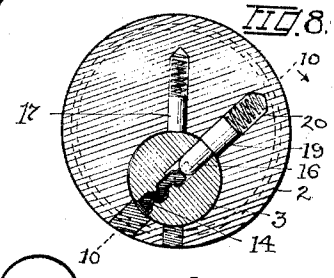



FIG. 7.

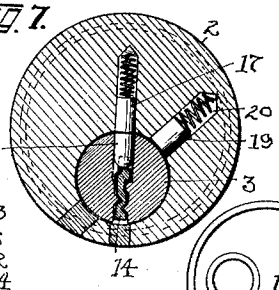



FIG. 9.

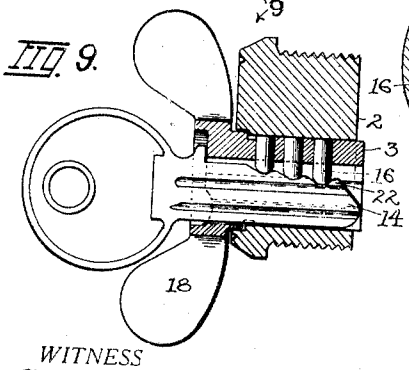
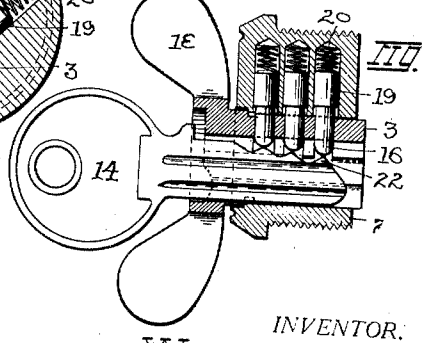



FIG. 10.




WITNESS

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# UNITED STATES PATENT OFFICE.

WARREN R. COX, OF CLEVELAND, OHIO.

## LOCK.

1,334,292. Specification of Letters Patent. Patented Mar. 23, 1920.

Application filed June 10, 1916. Serial No. 102,811.

*To all whom it may concern:*

Be it known that I, WARREN R. COX, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Locks, of which the following is a specification.

This invention comprises an improvement in locks, and the invention is of especial utility in combination with electrical switches adapted to control one or more electric circuits, for example a switch of the kind shown in my Letters Patent of the United States bearing date of January 23, 1912, No. 1,015,300.

In my patented lock and switch, a key is required to unlock and permit turning of the switch, either to the right or left, and the key could only be removed in the central position when the electric current was cut off. My present object is to provide a lock requiring a key to permit the switch to be turned on, but adapting the key to be removed in a closed or on position of the switch and permitting the switch to be turned off and locked automatically without the key.

In the accompanying drawing, Figure 1 is a front view of my improved lock switch, and Fig. 2 is a sectional view on the vertical center of the lock and switch, showing a key in place therein. Fig. 3 is a front view of the casing and switch therein, with the front plate or cover and lock removed. Figs. 4, 5, 6, 7 and 8 are similar transverse sections of the lock on line $x$—$x$, Fig. 2, showing various locking and unlocking positions of the parts with and without the key. Fig. 9 is a longitudinal section of the lock on line 9—9, Fig. 6. Fig. 10 is a longitudinal section of the lock on line 10—10, Fig. 8, but showing the key partially withdrawn to disclose the action of the pins and plungers.

Detailing the invention, the lock comprises a flanged shell 2 in which a cylindrical plug 3 is adapted to rotate to turn a switch member segment 4 either to the right or left into engagement with the spring contacts 5, 6 and 7 confined within the casing 8. In fact, the segment 4 is in constant engagement with contact 5 which is located on the median line of said casing beneath the axis of turning movement of the plug, and the segment bridges either gap between the contacts 6 and 7 to close one or the other of two electrical circuits. In the present device these circuits are indicated by the words "Battery" and "Magneto" on the front plate or cover 9, see Fig. 1, and the electrical connections to establish these circuits are made with the binding screws 10 for each contact, see Fig. 3.

Shell 2 is secured upon front plate 9 by a screw nut 11 or other suitable means, and the inner end of plug 3 carries a blade or extension having a T-shaped extremity 12 adapted to project through switch arm 4′ and interlock with a slotted plate 13 molded in the base of casing 8. Separability of the parts and removal of the cover 9 may be effected in one position only of the switch arm 4′, preferably when the said arm is turned subsequent to the introduction of and unlocking by a key 14 having a bitting and formation corresponding to the known cylinder or pin lock keys. Plug 3 is also formed with a key opening to receive a key of this type, and a series of radial bores in the plug hold plungers 16 of different lengths which co-act with corresponding spring-pressed pins 17 in shell 2 to lock the plug from turning when the key is withdrawn, assuming the pins and plungers to be alined or registered as shown in Fig. 4. In point of fact, pins 17 alone serve to lock the plug by entering the bores in the plug upon withdrawal of the key and the retirement of the plungers 16. Introduction of the proper key and its withdrawal also is dependent upon an axial alinement of the pins and plungers, and in the present device this proceeding may take place in two positions of the plug relatively to the shell, but locking of the plug can take place only in one of the two positions. As shown, such locking is effected on a median line vertically of the plug and shell, see Fig. 4, but when the proper key is inserted the plungers and locking pins are raised until their meeting ends are alined with the rounded surface of the plug and then the plug may be turned in either direction, see Figs. 2 and 7.

In the present device, if the plug be turned to project its plungers to the left into the "battery" position, it is impossible to withdraw the key, the plungers being rendered immovable by end engagement with the casing, see Figs. 6 and 9. This is an advantage in an electrical switch of the kind described as inability to withdraw the key and its presence in the lock indicates to the user that a battery connection is on, a con-

nection by the way, which is only temporary in the general use of a switch of this type. The more permanent position is on "Magneto" and this is obtained by turning the plug from "battery" position to "magneto" position, but convenience and safety make it desirable to withdraw the key at this time without locking the switch so that the magneto circuit may be cut off at will by returning the plug and its plungers to the median position by hand through the medium of the wings or levers 18 forming integral parts of the plug 3. Self-locking of the parts is immediately effected when the parts are returned to a central position, especially in the absence of the key, in this way making it possible to turn off the switch and to lock it in an off position without the aid of the key. Withdrawal of the key in the "magneto" position is made feasible by employing a second set of spring-pressed pins 19 adapted to co-act with the plungers 16 when turned into axial alinement therewith, said pins 19 being also spring-pressed and seated in bores 20 arranged radially opposite the plug and inclined relatively to the median line on which the locking pins 17 are set. Thus, when the plug is turned with the key therein to "magneto" position, the plungers 16 are placed opposite the second set of pins 19, see Fig. 8, and the key is free to be withdrawn because the pins 19 yield and permit the plungers 16 to ride over the edge elevations 21 of the key and to enter the bores 20 see Fig. 10. However, it is also essential to avoid self-locking of the plug in this turned position following withdrawal of the key, and the desired result is obtained by making the second set of pins 19 and bores 20 of larger diameter than the plungers 16 and the locking pins 17. Thus, when the key is withdrawn, the larger spring-pressed pins 19 will force the plungers 16 into the plug, but the pins 19 are effectively stopped at the round surface of the plug, that is, at the entrance of the smaller bores in the plug, see Fig. 5. Consequently, the plug may be turned back to the central position by means of the wings or levels 18, and when this has been accomplished, the spring-pressed locking pins 17 are forced into the bores in the plug, being of the same size and design for that purpose, see Fig. 4.

While the invention in its present form comprises locking pins to compel the use of a key in operating a switch, and auxiliary pins to permit release of the key in an "on" position of the switch and self-locking of the switch in an "off" position, the invention is capable of considerable modification and applicable also to various forms of switches and other devices. The use of a larger or different-shaped pin prevents the same from entering the plunger bore in the plug, but permits the plunger to enter the bore or recess in the shell when the key is withdrawn or entered.

What I claim is:

1. A lock comprising a shell, a rotatable plug therein having a key-way and plungers in said plug exposed to said key-way, a series of spring pressed locking pins in said shell coincident with said plungers and adapted to enter the plug over said plungers, and a series of auxiliary spring pressed pins radially disposed from within the bore of the shell at an inclination to the said locking pins and of a larger diameter and adapted to accommodate the withdrawal of the key.

2. A lock comprising a shell having a bore with two separate rows of cavities of different diameters open thereto and radially disposed at an inclination to each other and a set of spring pressed pins in each row of cavities, a plug having a key way and a set of plungers therein adapted to engage both said rows of pins successively.

3. A lock comprising a shell and a rotatable plug having a key-way and key-engaging plungers therein, and said shell having vertically disposed locking pins to co-act with said plungers and a separate row of auxiliary pins at an inclination to said locking pins and of a larger size and adapted to be retired by said plungers in effecting release of the key, said auxiliary pins being adapted to bear only against the surface of the plug.

4. A lock comprising a shell having spring-pressed locking pins adapted to be retired therein, a key-way member rotatably mounted in said shell having plungers adapted to retire said locking pins when alined therewith and engaged by a key, and auxiliary means to permit axial movement of said plungers by the key when the plungers and locking pins are placed out of alinement subsequent to a rotative movement of the key-way member, said auxiliary means consisting of a series of pins disposed at an inclination to said locking pins within said shell and of a size adapted to prevent the same from entering the plunger cavities in the plug.

In testimony whereof I affix my signature in presence of two witnesses.

WARREN R. COX.

Witnesses:
GEO. E. KRICKER,
F. C. HARROLD.