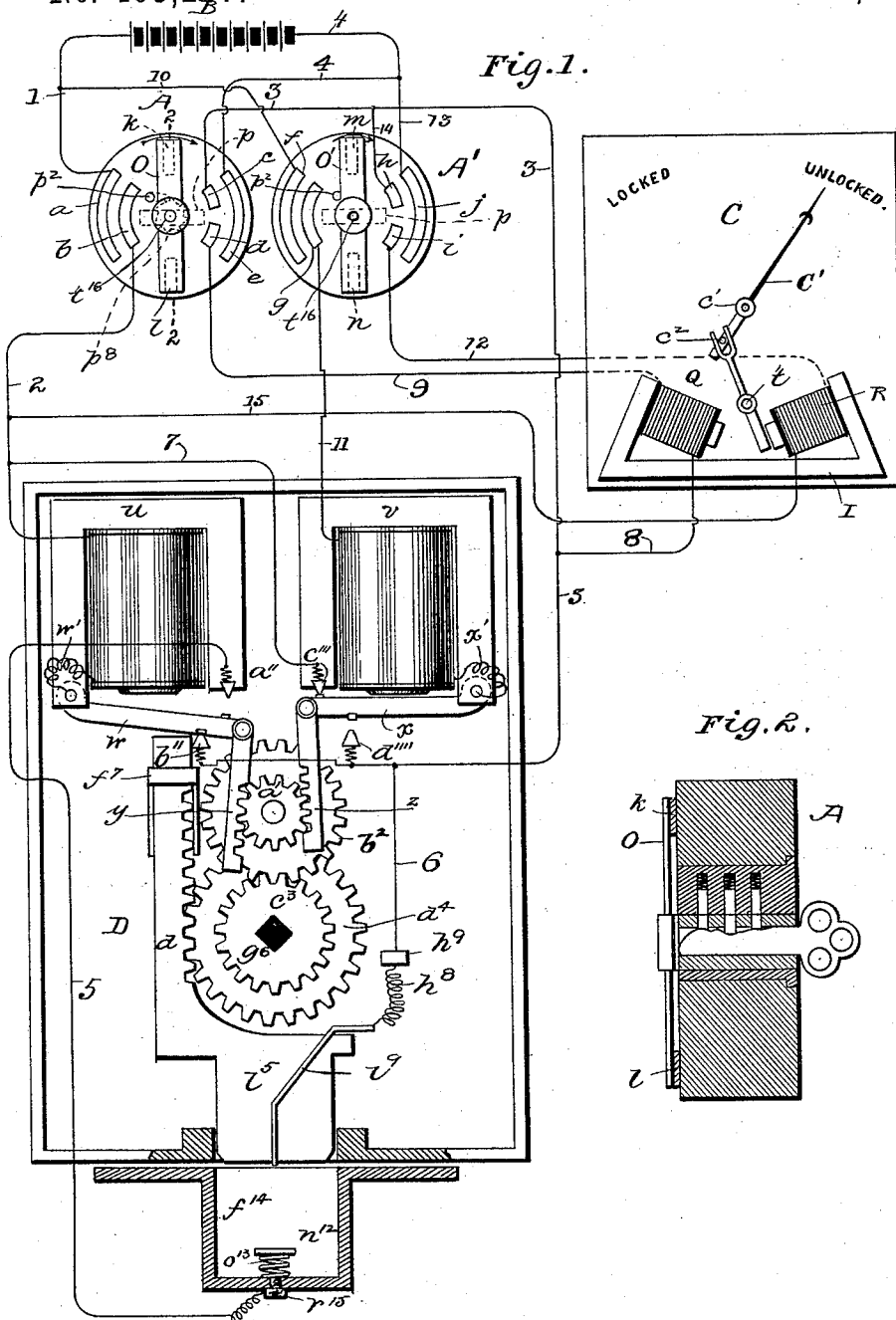


(No Model.)

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ELECTRIC LOCK.

No. 463,297.

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WITNESSES:

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ELECTRIC LOCK.

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To all whom it may concern:

Be it known that I, FLOYDE H. STARRETT, a citizen of the United States, residing in Clinton, county of Lenawee, and State of Michigan, have invented certain new and useful Improvements in Electric Locks, of which the following is a specification.

My invention relates to devices for electrically operating lock-bolts; and the object of my invention is to produce efficient and inexpensive mechanism and connections whereby one or a series of locks may be electrically operated and simultaneously show by an indicator or indicators that the lock bolt or bolts have moved as desired.

My invention consists in the construction and combination of parts, as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a view showing my complete invention, partly in plan and partly in elevation, some parts being shown broken out or partly in section to more clearly illustrate their construction; and Fig. 2 is a sectional view of one of the switches for locking or interlocking the bolt, and showing how a key may be used to operate the switch.

A and A' indicate, respectively, the locking and unlocking switches; B, the battery; C, the indicator, and D the lock proper.

The switch A consists of a block of insulating material having on one side two concentrically-curved metal plates *a* and *b*, with a space between them, and diametrically opposite thereto similarly-placed plates, the outer one of which *e* is the length of plate *a*, while the inner one is divided to form two short curved plates *c* and *d*, insulated from each other. The unlocking-switch A' is similarly constructed and provided with plates *f*, *g*, *h*, *i*, and *j*, and to the centers of the base-blocks of the switches are pivoted at *t*¹⁶ the switch-bars O and O', respectively, of which the former carries contact-feet *k* and *l* on its ends, and the latter carries contact-feet *m* and *n*. These contact-feet may consist of spring metal and are adapted to engage and electrically connect the curved metal plates, as hereinafter further described.

The indicator consists of a pointer C', pivoted at *c'* and provided with a pin *c*², adapted to be engaged by the forked upper end of the

armature *t*, pivoted at *t'*. The pointer is adapted to indicate either of the words "Locked" or "Unlocked," suitably secured to the base-board of the indicator.

I is a yoke, of brass, supporting the magnets Q and R, with their poles on opposite sides of the lower end of the armature *t*.

In the case of lock D are mounted two magnets *u* and *v*, with their pivoted armatures *w* and *x* respectively in connection with the coils of said magnets at *w'* and *x'*. Above the armatures *w* and *x*, respectively, are secured spring-mounted contact-points *a''* and *c'''*, and below them are secured spring-mounted contact-points *b''* and *d'''*, and depending from the ends of said armatures are racks *y* and *z*, engaging both sides of pinion *a'*, which is fixed to a larger pinion *b*². This pinion engages a pinion *c*³, which is fixed to a larger pinion *d*⁴, that engages the rack *d* of bolt *t*⁵, having a suitable guide *f*⁷ for its upper end.

The bolt *t*⁵ has an insulated conductor *i*⁹ passing through it and projecting slightly from its end and adapted when the bolt is shot to make contact with the plate *n*¹² inside the bolt-socket *f*¹⁴, said plate being preferably mounted on a spring *o*¹³, which is electrically connected through a hard-rubber screw *r*¹⁵ with the wire *5*, hereinafter referred to.

The conductor *i*⁹ has a flexible connection *h*⁸ with block *h*⁹, fixed in the lock-case.

At *g*⁶ a square hole is represented in the pinions *c*³ and *d*⁴, by means of which and a square key the bolt can be operated otherwise than by the electrical connections; but of course the opening to such square hole should be only on the inside of a door to which the lock is applied.

In Fig. 1 the handle *p* of the switch-bar O and O' is indicated by dotted lines only, this being because the said handle projects from the side of the block opposite that on which the contact-plates *a*, *b*, &c., are shown.

In Fig. 2, which is a section on line 2-2 of Fig. 1, when the bar O is turned to the line of said section, the construction on the inside of the block or that side on which the plates are fixed is the same as shown in Fig. 1; but in said sectional view instead of the handle *p* an ordinary lock of the Yale pattern is indicated for the purpose of illustrating

how the switches may be constructed so as to be operated by a special key. The construction of such ordinary lock is well known and needs no detailed description. It is only necessary, if any kind of key-lock is used, to connect the plug or other part turned by the key to the bar O or O'.

A pawl-and-ratchet mechanism is indicated at p^8 and p^2 to prevent the switch-bar from being turned in the wrong direction.

Connections are made as follows: battery and metal plate a by wire 1, plate b and magnet u by wire 2, magnet u and armature w by wire w' , contacts b'' d'''' and metal plate c by wire 3, plate e and battery by wire 4, contact a'' and contact n^{12} by wire 5, block h^9 and wire 3 by wire 6, wire 2 and contact-point c''' by wire 7, wire 3 and coil of magnet Q by wire 8, coil of magnet Q and plate d by wire 9, wire 1 and plate f by wire 10, plate g and coil of magnet v by wire 11, coil of magnet v and armature x by wire x' , plate i and coil of magnet R by wire 12, plate j and wire 4 by wire 13, plate h and wire 3 by wire 14, and wire 2 and coil of magnet R by wire 15. The contact-points a'' , c''' , b'' , and d'''' are mounted on springs of a slight length or expansive power, so as to cause the said contacts to follow the motion of the armatures a short distance, preferably so that an armature will leave one contact just after it reaches and presses back the opposite one.

The operation is as follows: As shown in Fig. 1, the bolt is unlocked, and to lock it the switch-bar O will be turned in the direction of the arrow. As soon as the contact-feet k and l connect plates c e and a b , respectively, the electric circuit is complete from the battery through wire 1, plates a , l , and b of the switch, wire 2, magnet u , wire w' , armature w , contact-point b'' , wire 3, plates c , k , and e of the switch, and wires 4 to battery. This energizes magnet u and attracts armature w , which, by lifting rack y , operates to shoot the bolt by means of the train of gear-wheels or pinions and the bolt-rack. At the same time the rotation of the pinion a' moves the rack z and armature x downward and causes the latter to rest against contact-point d'''' . The momentum acquired by the bolt and gearing before contact is made at b'' and broken at a'' causes the parts to continue to the full extent of motion. The operation so far described takes place at once upon the first contact resulting from the turning of the switch-bar and before the continued turning of said bar breaks the connection between plates c and e . Immediately after the plate or foot k connects plates d and e , while still making connection between plates a and b , and this completes a circuit from the battery through wire 1, switch, wire 2, magnet u , armature w , contact-point a'' , wire 5, spring o^{13} , plate n^{12} , conductors i^9 and h^9 , wires 6, 3, and 8, magnet Q, wire 9, switch-plates d , k , and e , and wire 4 to battery. This energizes mag-

net Q, which attracts armature t and causes the pointer to indicate the word "Locked," and since this circuit cannot be completed until the bolt has been shot, so as to make contact at i^9 and n^{12} , the indicator positively shows that the bolt is locked. Now, in order to understand the description of the unlocking operation, the movable parts must be imagined as in the position the reverse of the illustration in Fig. 1, but, of course, with the switch-bar O in a vertical position or out of place for making any electrical connections. The bar O' of the unlocking-switch is turned in the direction indicated by the arrow, and when the feet n and m respectively connect plates f g and h j the current passes from the battery by wires 1 and 10, through switch-contacts f n g , wire 11, magnet v , wire x' , armature x , contact-point d'''' , wires 3 and 14, switch-contacts h m j , and wires 13 and 4 to the battery. This energizes magnet v , which causes the armature x to lift rack z and withdraw the bolt by means of the train of gearing or pinions and break the contact at i^9 and n^{12} . The use of the armature then makes contact at point c''' . The continued motion of switch-bar O' brings the foot m into contact with plates i and j , which sends the current from the battery through the same connections as just above described until the armature x is reached, from which it passes through contact-point c''' , wires 7, 2, and 15, magnet R, wire 12, switch-plates i m j , and wires 13 and 4 back to the battery. This circuit energizes magnet R, which causes the armature t to throw the indicator-pointer over to the word "Unlocked," and this cannot take place until the armature x has risen to make contact at c''' and has consequently operated the lock-bolt. The pivot of armature t and of the pinions should have sufficient friction to avoid accidental movement when no electric current is passing through their operating-magnets. After either switch-bar has been operated and accomplished the purpose described, it should be turned far enough to leave all circuits broken, and of course the feet k l and m n may at any time be left in positions the reverse of those shown in Fig. 1. Said feet are duplicates, and of course operate alternately on the plates on opposite sides of the blocks. Two or more locks, as described, may be connected by running a wire from the switch-board on which all the small switches and indicators would be placed and connecting all the locks to it and by running two wires from each lock back to the switch-board. It will be seen that the arrangement of pinions connecting the armature-racks and the bolt-rack forms a multiplying gear, whereby the slight motion of the armature will cause the bolt to travel a greater distance; but the number of pinions might be decreased or increased. The pinion a' and racks y and z serve to connect the two armatures, whereby

the motion of one in one direction causes the other to move in the opposite direction, the pinion *a'* acting as a lever, and the entire system of pinions or gears and the racks serve as my preferred means for communicating motion from either armature to the bolt.

Having now described my invention, what I claim is—

1. In an electric lock, the combination, with the bolt thereof, of two electro-magnets, each having an armature, the said armatures being connected together for alternate motion, and connections therefrom to the bolt for operating the latter, substantially as described.

2. In an electric lock, the combination, with the bolt thereof, of two electro-magnets, each having an armature, the said armatures being connected by lever mechanism, and connections between said armatures and the bolt for operating the latter, substantially as described.

3. In an electric lock, the combination, with the bolt having a rack, of two electro-magnets, each having an armature, the said armatures provided with racks, a pinion engaged by both of the armature-racks, and another pinion operated by the first and engaging the bolt-rack, substantially as described.

4. The combination, with a lock-bolt and electro-magnets for positively operating it in both directions, of an indicator and electro-magnets for operating it, and switches and connections for alternately energizing the

magnets which operate the said bolt and indicator, substantially as described.

5. The combination, with a lock-bolt and electro-magnetic apparatus for operating it, of an electro-magnetic indicator and contacts carried by the bolt and bolt-socket, said contacts being included in the circuit of the indicator-magnet, whereby operation of the indicator is positively dependent upon operation of the bolt, substantially as described.

6. In combination with the magnets of an electric lock, an indicator consisting of electro-magnets having their coils connected in series with the coils of the lock-magnets, a pivoted armature located between the indicator-magnets and having a slot in its upper end, and a pivoted pointer provided with a pin fitting said slot, substantially as described.

7. In combination with an electric lock, a switch therefor consisting of a block having a pivoted bar provided with a contact at each end, said block having a pair of plates on each side of its center, one of the plates of one pair being divided into two insulated plates, substantially as and for the purpose described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

FLOYDE H. STARRETT.

Witnesses:

E. B. ROSE,
S. W. DEMUTH.