

L. L. LEDUC.
ELECTROMAGNETIC LOCK.
APPLICATION FILED NOV. 29, 1912.

Patented Jan. 27, 1914

1,085,347.

2 SHEETS—SHEET 2.

FIG. 3.

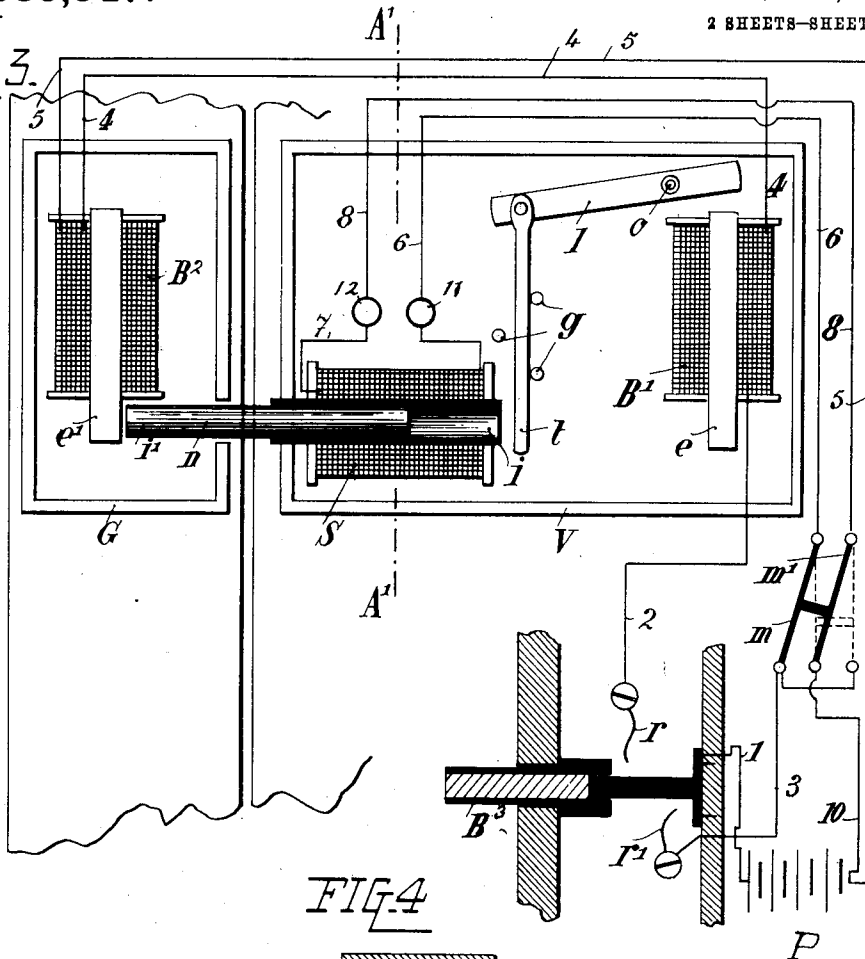
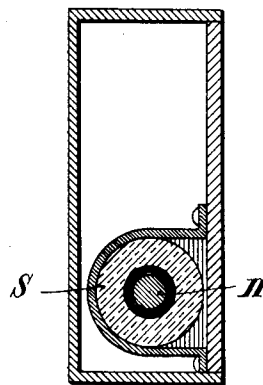


FIG. 4



Witnesses
McRoche
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Inventor:
Louis L. Leduc
by C. Singer
Att'y

UNITED STATES PATENT OFFICE.

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ELECTROMAGNETIC LOCK.

1,085,347.

Specification of Letters Patent.

Patented Jan. 27, 1914.

Application filed November 29, 1912. Serial No. 734,135.

To all whom it may concern:

Be it known that I, LOUIS LÉANDRE LEDUC, a citizen of the French Republic, resident at Paris, in France, have invented certain new and useful Improvements in Electromagnetic Locks, of which the following is a specification.

This invention relates to an electro-magnetic lock for all kinds of closures for use for instance with strong boxes, doors, cupboards or any other kind of furniture or the like which operate with a single solenoid and which can be conveniently combined with a suitable current reverser.

The preferred form of my invention is illustrated by way of example in the accompanying drawings in which:

Figure 1 is a section through an electro-magnetic lock and its keeper along the axis of the movable core forming the closing device, and Fig. 2 is a cross-section on line A—A of Fig. 1. Fig. 3 shows a modification of my device in section along the axis of the movable core, and Fig. 4 is a cross-section on line A'—A' of Fig. 3.

The characters of reference employed in Figs. 3 and 4 differ from those used in Figs. 1 and 2.

Referring first to Figs. 1 and 2, the device comprises a lock case *a* to the wall *b* of which the coil *c* is secured by means of a collar *d*. This coil surrounds a copper tube *e* in which a cylinder of soft iron *f* is arranged to slide with ease. The keeper of the lock is shown at *g*. In the base of the lock and of the keeper two angular magnets *h* and *i* are provided, the poles N and S of which are arranged so that the poles N for instance are in alinement with the ends of the tube *e*. Rollers *k* are preferably placed near the opening *j* of the keeper so as to facilitate the sliding of the cylinder *f*. This device operates as follows: After the lock *a* has been secured to a door and the keeper *g* to the door case, a current is sent into the coil through terminal X and a south pole is thus produced in the soft iron cylinder at B and a north pole at C. The magnet *h* at the base of the lock will then repel the end C and the middle part M of the soft iron core will be drawn into the center of the coil, but owing to its speed it will go beyond the center and the south pole will then be attracted by the north pole of the magnet at the side of the keeper and will cling to this magnet, the

lock bolt being then projected (Fig. 1 in dotted lines). If the current is reversed by introducing the same at the terminal Y, a south pole will be produced at C and a north pole at B. The north pole of the magnet in the keeper will repel the soft iron core and the latter will then assume the position shown in full lines in Fig. 1, so that the lock bolt is retracted. In order to effect the reversion of the current any well known reversing means may of course be used for instance such as the apparatus described in my co-pending application filed November 29, 1912, Serial No. 734,136.

It is clear that the above described apparatus can be just as well used as a switch.

The apparatus may also be arranged as illustrated in Figs. 3 and 4 in which Fig. 3 shows the same combined with a current reverser. In this case the apparatus consists of the following parts: A push button *B*³ permanently connected to a source of current P and coming successively in contact with springs *r*, *r'*, a current reverser *m*, *m'*, two electro-magnets *B'*, *B*², the soft iron bars of which are intended to act upon the core *n* of the solenoid and are made to extend beyond the coils as shown at *e* and *e'* in Fig. 3. *l* is an armature adapted to be rotated around the axis *o*. At the end of this armature a copper rod *t* is secured so as to slide freely between stationary pins *g* limiting the lateral movement of said rod. S is the solenoid in which a soft iron core *n* is slidable with ease. The connections between the different parts of the device and the source of current are made by wires 1 to 10 as shown in Fig. 3. It will be observed that the electro-magnets *B'* and *B*² are quite independent of the reverser *m*. Thus the current will always flow in the same direction through the coil *B'*, *B*² and will always produce poles of the same kind at *e* and *e'*, for instance a positive pole. By pressing the button B until it meets the spring *r* the current will be made to pass from the source of current P to the coil *B'*, through wire 2 and will go through wire 4 to coil *B*² and return to the battery through wire 5. The soft iron core *e* of coil *B'* will attract the armature *l* and raise the rod *t*. If the button is pushed in farther, it comes in contact with springs *r'* and the electric current then passes into the solenoid S. The electro-magnets *B'* and *B*² will then still be actuated

while spring r will remain in contact with the button. Before reaching the solenoid the current passes from the battery P to the button and then to spring r' , to one of the
 5 arms of the customary reverser n , through wire 3 to wire 6 and through the same to the terminal 11 of the solenoid S , through wire 7 to the terminal 12, through wire 8, the other arm of the reverser and then back
 10 to the battery through wire 10. If a positive pole is produced in the core of the solenoid at i' , the two positive poles e' and i' will repel each other. As the action of the solenoid moreover tends to bring the centers of the core n and of the coil S together,
 15 core n will then be submitted to the action of two forces tending to move this core from left to right. At the same time a negative pole will be produced at i and as at e a positive pole exists the core referred to will be
 20 submitted to the action of a third force which acts in the same direction as the former and will enable the core to strike against e and release the keeper G . In order to prevent a contact of the core n with the soft iron e and e' and in order to prevent said core from sticking to said soft
 25 irons the ends of this core are provided with a cap of copper of about half a mm. in thickness. When the current reverser returns to the position shown in dotted lines in Fig. 3, the current passes into the solenoid S , terminal 12, terminal 11, and now the soft iron e in coil B' will repel the core
 30 n instead of attracting it so that after the attraction by the solenoid the soft iron of coil B^2 will attract pole i' of the core n and then the locking device formed by this core will again engage with the keeper. The
 35 rod t will fall back by its own weight and

will prevent the core n from leaving the keeper without the concurrent action of the electric current.

I claim:

1. An electromagnetic lock of the character described comprising a case, a solenoid within said case secured to the same, a copper tube within said solenoid, a soft iron core sliding within said tube and constituting the locking bolt, a keeper for the reception of said locking bolt, magnets within said case and said keeper at opposite sides thereof, and means for supplying current to said solenoid, said means including a current reverser for sending current in either direction through said solenoid and thereby changing the polarity of the sliding soft iron core.

2. An electromagnetic lock of the character described comprising a case, a solenoid within said case, secured to the same, a copper tube within said solenoid, a soft iron core sliding within said tube and constituting the locking bolt, a keeper for the reception of said locking bolt, electromagnets within said casing and said keeper, means for sending current in either direction through said solenoid and thereby changing the polarity of the sliding soft iron core thereof, and means for energizing said electromagnets simultaneously with the changes in the polarity of said iron core for locking and unlocking the lock.

In witness whereof I have hereunto set my hand in presence of two witnesses.

LOUIS LÉANDRE LEDUC.

Witnesses:

HANSON C. COXE,
 GEORGE RIGOT.