Oct. 27, 1925. 1,558,705

J. H. MILLIGAN

ELECTRIC LOCK

Filed April 5, 1924

Fig.1

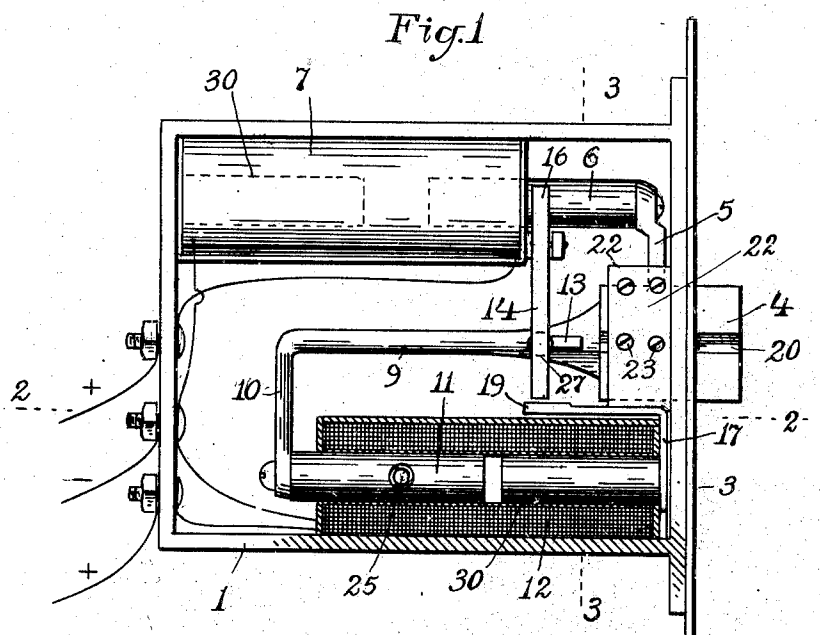


Fig.2

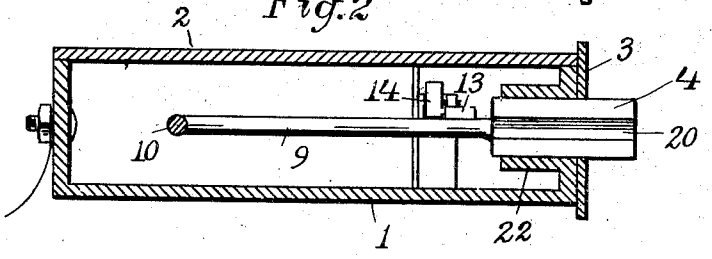
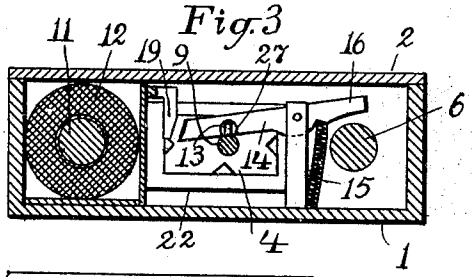


Fig.3



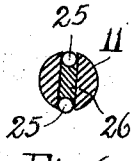


Fig.6

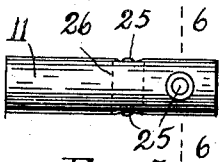


Fig.5

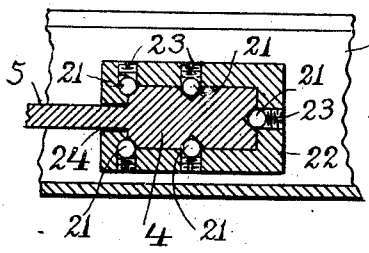


Fig.4

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UNITED STATES PATENT OFFICE.

JOSEPH H. MILLIGAN, OF EAST HOLLISTON, MASSACHUSETTS.

ELECTRIC LOCK.

Application filed April 5, 1924. Serial No. 704,394.

To all whom it may concern:

Be it known that I, JOSEPH H. MILLIGAN, a citizen of the United States, and a resident of East Holliston, in the county of Middlesex and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Electric Locks, of which the following is a full and exact specification.

This invention relates to locks actuated by electricity, and it has for its object the effecting of means for retaining the bolt against unwarranted dislodgment from either of its set positions; and also to improvement in general details of construction. In carrying out my invention I connect the bolt with two solenoids for moving it in and out, and with a latch adapted for retaining the bolt in place, but to release it as soon as either solenoid is energized.

In the drawings forming part of this specification, Fig. 1 is an elevation with its cover-plate removed, of a lock embodying my invention. Fig. 2 is a sectional view thereof through the line 2—2 in Fig. 1. Fig. 3 is a section on the line 3—3 in Fig. 1. Fig. 4 is a sectional view of the bolt and surrounding plate. Fig. 5 is an enlarged side view of one of the solenoid plungers. Fig. 6 is a cross section of the same on the line 6—6 in Fig. 5.

The lock-case is of well known construction, consisting of a rectangular box 1 closed by a cover-plate 2. Through the end-plate 3 is a suitable opening slidably receiving the bolt 4 which is rigidly connected through an arm 5 with the plunger 6 of a solenoid 7, whereby upon the energizing of the latter the bolt is retracted from its locking position.

An arm 9 having an elbow 10 attached to an end of the plunger 11 of a solenoid 12 serves to throw the bolt into its locking position when energized. Rising from the arm 9 is a lug 13 adapted to be engaged by a latch 14 yieldingly pressed against the arm by a helical spring 15. The lug is so disposed that when the latch is against the arm at one end of the lug 13, the bolt 4 is held in its locking position, while the location of the latch at the other end of the lug holds the bolt in its inner position.

For automatically releasing the latch, its tail 16 is near the plunger 6 which is composed of soft iron, whereby the instant the solenoid 7 is energized, the plunger also becomes magnetic and attracts the tail 16 and removes the latch from its interference with the bolt, while at the same time the plunger is retracted and the bolt drawn inward.

Attached to the solenoid 12 is an iron finger 17 whose end 19 is supported close to the end of the latch 14 and is adapted when magnetized by the energizing of the solenoid to attract the latch and thereby to release the bolt.

To render easier the movement of the bolt, its surfaces are each formed with a groove 20, as shown in Fig. 4, in which are two balls 21 each retained in a hole in the sleeve 22 by a small screw 23, this sleeve being preferably integral with the wall or plate 3, and the arm 5 reaching through a slot 24 in the sleeve. These ball-bearings are provided for the purpose of making the bolt slide more easily.

For the same object, the plungers 6 and 11 are each provided with ball bearings 25 mounted in the ends of terminally concave brass plugs 26 transversely introduced into the plungers, as shown in Figs. 5 and 6. Likewise the latch 14 is provided with a ball 27 at the side adjacent the lug 13 when the bolt is in both its locked and unlocked positions; such ball being inserted in a small hole drilled through the latch and retained loosely therein by pressing inward the edges of the hole just enough to hold the ball in place but not enough to interfere with its rotation. It is only necessary to have this one ball since both when the bolt is locked and unlocked there is danger of friction upon the bolt to hold its lug 13 too tightly against the side of the latch and thereby to prevent the latter's rising through the magnetic attraction of the plungers 6 and 11, and so failing to release the bolt.

As shown in Fig. 1, the plungers 6 and 11 do not extend much more than half way into the solenoids 7 and 12, respectively, the remainder of the space within each of the latter being occupied by an iron core 30, for the purpose of aiding in the final pull of the solenoids upon the plungers; thereby making it certain that the bolt will be thrown to its extreme limits and the latch 14 will engage the lug 13.

What I claim as my invention is:

1. An electric lock comprising a bolt, a solenoid having a plunger therein adapted when the solenoid is energized to throw the bolt, and a pivoted latch adapted to engage

and retain said bolt at an end of its throw, a portion of said latch being adapted to be attracted by said plunger when the solenoid is energized and thereby to release the bolt from the latch.

2. An electric lock comprising two solenoids each having a plunger therein, a bolt controlled by said plungers, and a latch adapted to engage said bolt and to retain it at each extreme position, one extremity of said latch being adapted to be attracted by one of the plungers and thereby to release the bolt from the latch, and the other end of said latch being adapted to be attracted and to release the bolt when the other solenoid is energized.

3. An electric lock comprising a bolt, a solenoid, a plunger in said solenoid connected with said bolt, a latch disposed transversely over said plunger and bolt, and a spring yieldingly retaining said latch normally in engagement with said bolt to prevent its movement, said latch being pivotally supported at an intermediate point and having its end opposite that engaging the bolt located near the periphery of said plunger, whereby when the plunger is rendered magnetic by the energizing of its solenoid it attracts the adjacent end of said latch and releases said bolt.

In testimony that I claim the foregoing invention, I have hereunto set my hand this 3rd day of April, 1924.

JOSEPH H. MILLIGAN.