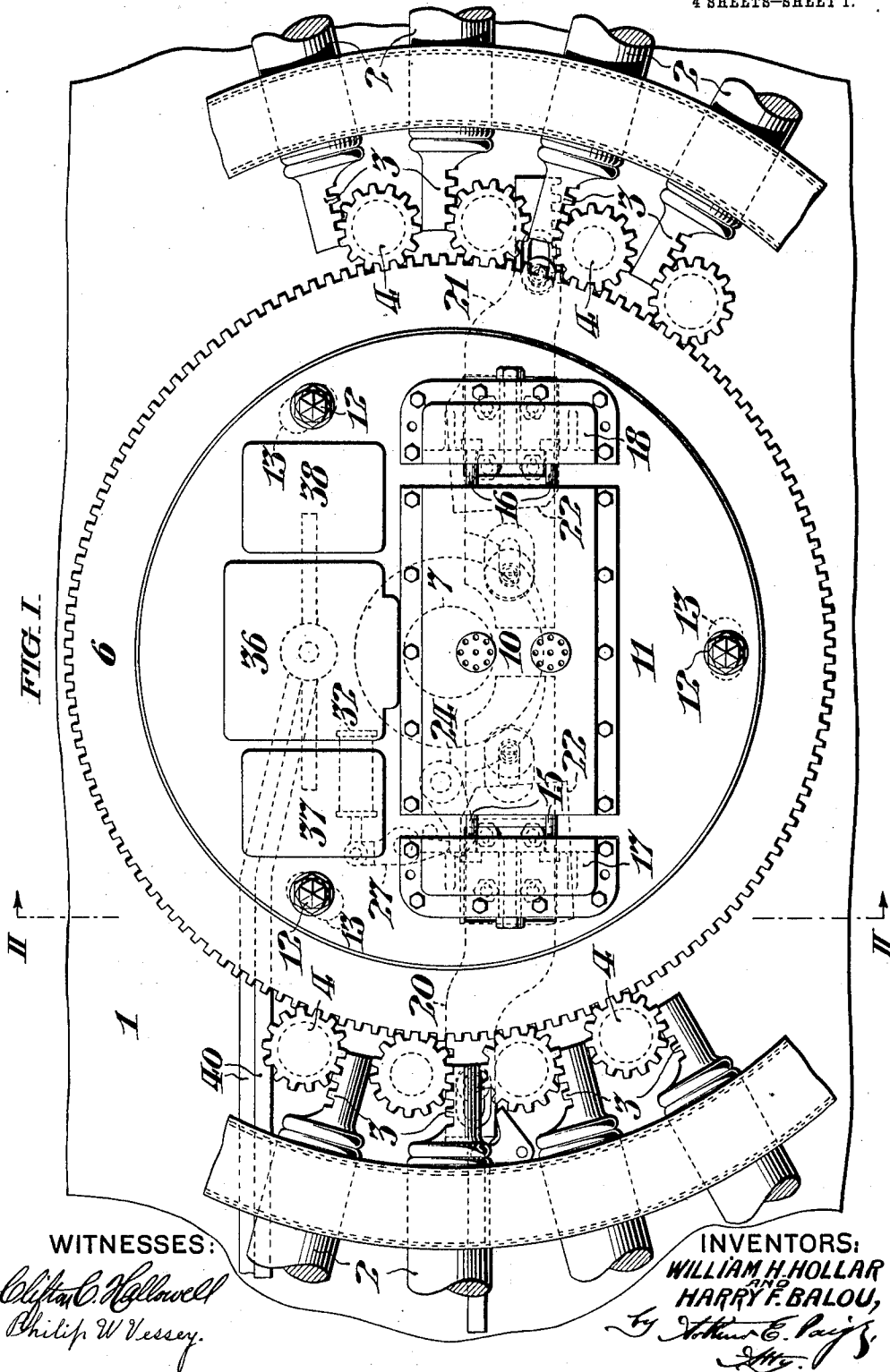


W. H. HOLLAR & H. F. BALOU.
ELECTRICALLY CONTROLLED LOCK.
APPLICATION FILED JUNE 3, 1909.

1,051,588.

Patented Jan. 28, 1913.

4 SHEETS—SHEET 1.



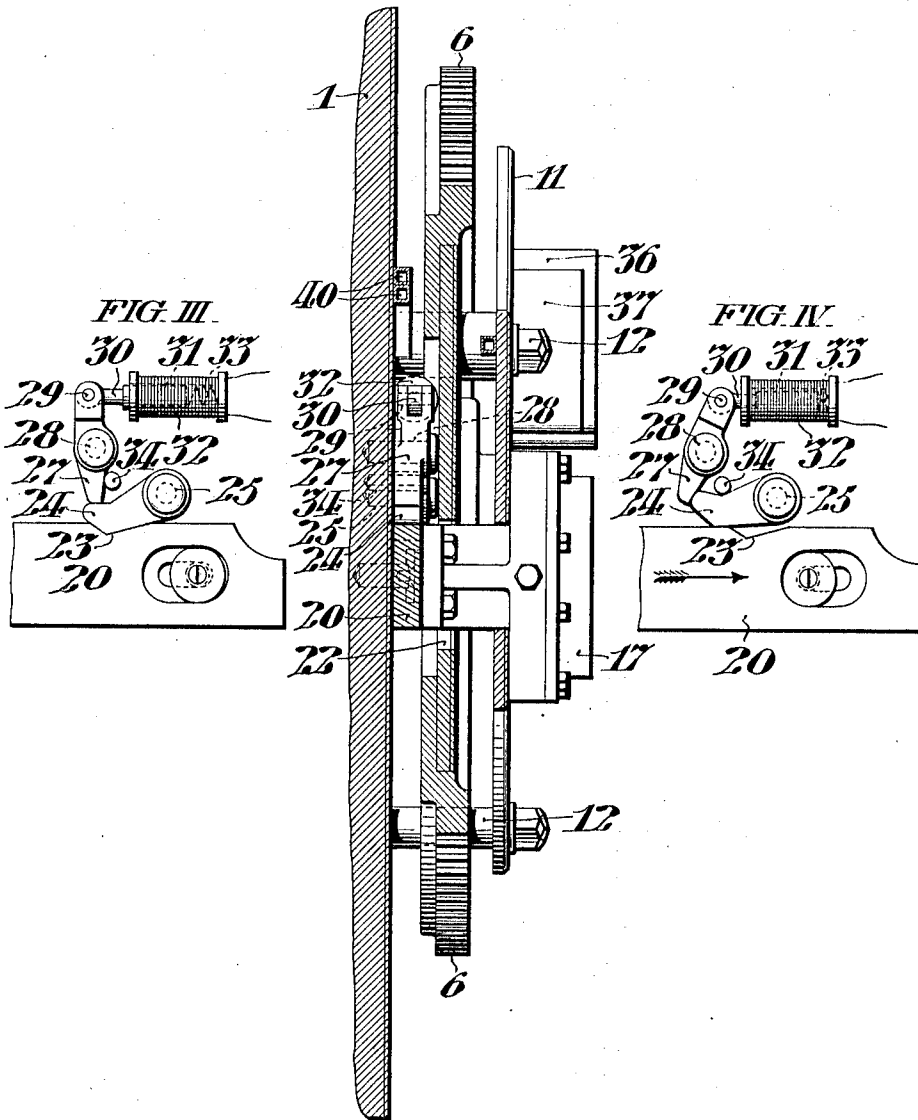
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4 SHEETS—SHEET 2.

FIG. II.



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4 SHEETS—SHEET 3.

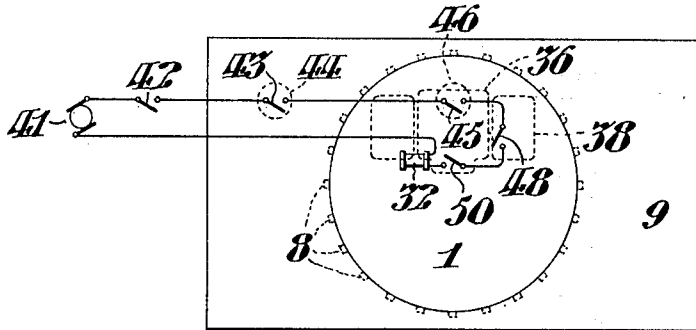


FIG. V.

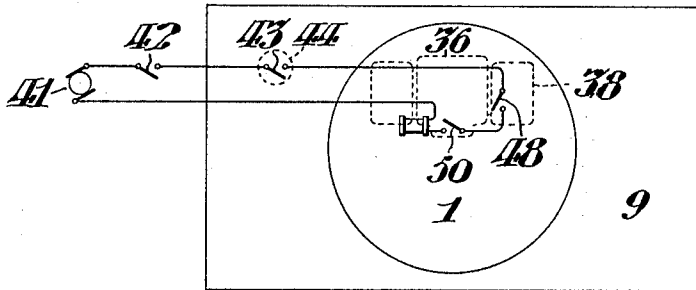


FIG. VI.

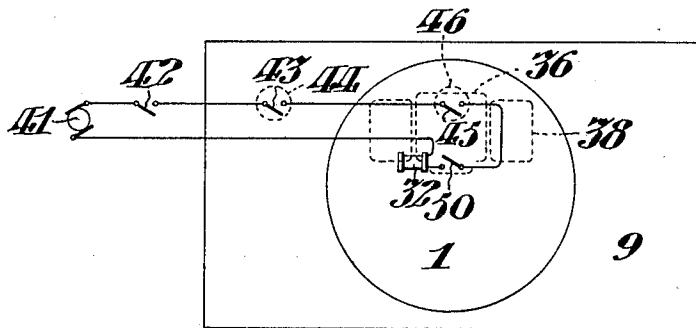


FIG. VII.

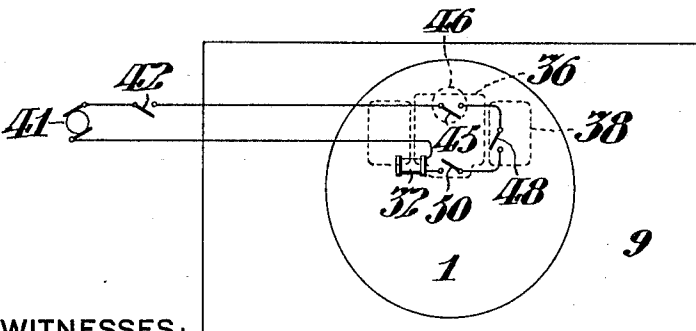


FIG. VIII.

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4 SHEETS—SHEET 4.

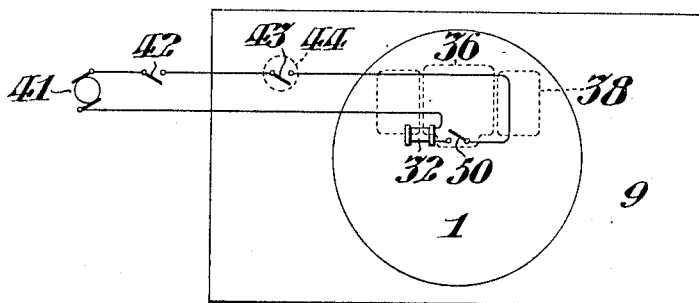


FIG. IX.

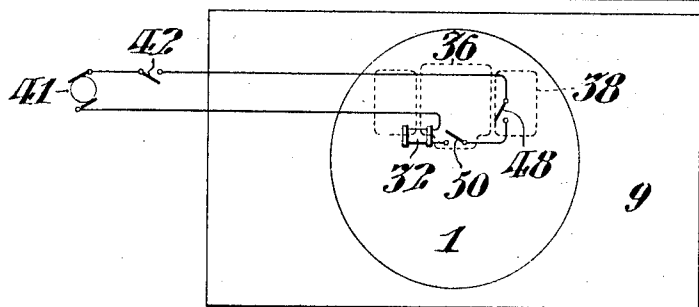


FIG. X.

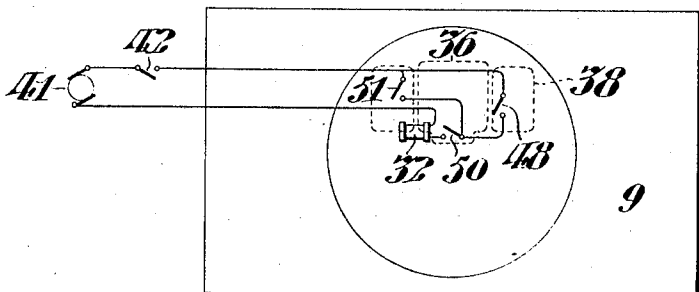


FIG. XI.

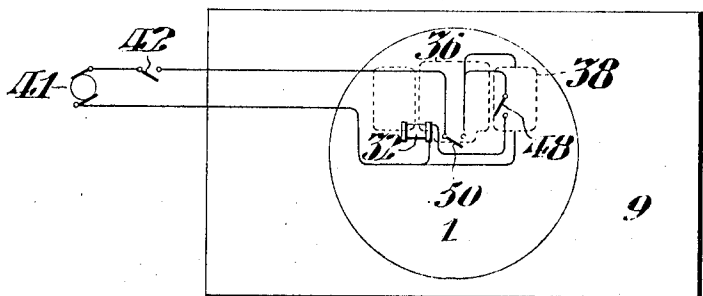


FIG. XII.

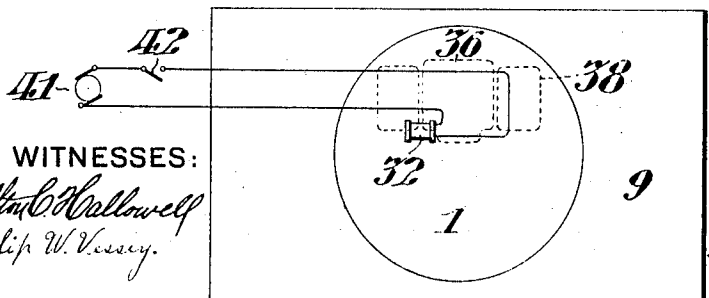


FIG. XIII.

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HARRY F. BALOU,
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Att'y.

UNITED STATES PATENT OFFICE.

WILLIAM H. HOLLAR AND HARRY F. BALOU, OF PHILADELPHIA, PENNSYLVANIA;
SAID BALOU ASSIGNOR TO SAID HOLLAR.

ELECTRICALLY-CONTROLLED LOCK.

1,051,588.

Specification of Letters Patent.

Patented Jan. 28, 1913.

Application filed June 3, 1909. Serial No. 499,903.

To all whom it may concern:

Be it known that we, WILLIAM H. HOLLAR and HARRY F. BALOU, of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Electrically-Controlled Locks, whereof the following is a specification, reference being had to the accompanying drawings.

Our invention is applicable to a safe or vault having a door and door frame provided with bolt work and a slide bar operatively connecting said bolt work with a spring or other motor arranged to unlock said bolt work by means of said slide bar, normally under control of a time lock.

It is the object of our invention to provide electrically controlled means distinct from said time lock and capable of preventing unlocking movement of said slide bar when the latter is released by the time lock or other device by which its motion is normally determined.

The form of our invention hereinafter described, comprises a detent pawl pivoted upon the door in such relation to said slide bar as to directly engage a recess in the latter; a tripping lever fulcrumed intermediate of its length, and arranged to normally hold the free end of said pawl in engagement with the recess in said slide bar and normally prevent its unlocking movement; a plunger operatively connected with the opposite end of said tripping lever; a magnet core carried by said plunger; a solenoid in operative relation with said core; a circuit including said solenoid and a source of current exterior to said vault; a switch in said circuit; a time lock on said door arranged to close said switch; and, another switch in said circuit; whereby the bolt work may be released for unlocking movement only when both of said switches respectively controlled by the time lock and by other means, are closed. As hereinafter described, the means other than the time lock adapted to control a switch in the electric circuit, may include a combination lock, so that said switch may only be operated by one who knows the combination, or other means may be employed for operating said auxiliary switch.

Our invention comprises the various novel features of construction and arrangement hereinafter more definitely specified.

In said drawings; Figure I is an inner face view of a fragment of a vault door con-

veniently embodying our improvement. Fig. II is a sectional view of said door, taken on the line II, II in Fig. I. Fig. III is a fragmentary elevation showing the engaged position of the unlocking bar and detent mechanism indicated in dotted lines in Fig. I. Fig. IV is a fragmentary elevation similar to Fig. III, but showing the disengaged position of said bar and detent mechanism. Figs. V to XIII inclusive are diagrams showing respective modifications of our invention.

Figs. I and II, show a fragment of a circular door 1, conveniently provided with bolt work of the type shown in Letters Patent of the United States #621,341 dated March 21, 1899, and comprising a circular series of radially reciprocatory lock bolts 2, having racks 3, at their inner ends respectively in mesh with pinions 4. All of said pinions 4 are in mesh with the spur wheel 6, which is mounted to turn on the stud 7, carried by the door, so as to simultaneously thrust all of said bolts 2 outwardly to lock the door, or draw them inwardly to unlock the door; said bolts being arranged to engage suitable sockets 8 in the door frame 9, indicated in Fig. V. The unlocking movement of said bolts 2 is conveniently effected by the spring motor 10, which is supported by the frame plate 11, rigidly connected with said door 1, by standards 12, extending through slots 13, in said spur wheel 6. Said spring motor 10, is of well known construction, having pairs of plungers 15 and 16, at its opposite ends, respectively connected with the reciprocatory cross-heads 17 and 18, which are respectively connected in rigid relation with the slide bars 20 and 21, having racks at their outer ends respectively in mesh with pinions 4. The dotted lines 22 shown in Fig. I, indicate openings in the spur gear 6, which permit the latter to turn with respect to the cross-heads 17 and 18. It is to be understood that said slide bars 20 and 21, are balanced in horizontal position, so that their weight does not at any time effect their movement. Said slide bar 20, has the recess 23 for the detent pawl 24, which is fulcrumed on the stud 25, projecting from the door 1. As shown in Fig. III, the free end of said pawl 24, is normally held in said recess 23, by the dead-locking lever 27, which is fulcrumed intermediate of its length, upon the stud 28, 110

projecting from said door 1. The opposite end of said deadlocking lever 27, is connected by the pivot 29, with the plunger 30, carrying the magnet core 31, within the solenoid 32, against the spring 33. When said solenoid is energized as hereinafter described, said core 31, and deadlocking lever 27, are shifted to the position shown in Fig. IV, thus permitting the pawl 24, to be raised to the position shown in said figure, by the unlocking movement of said slide bar 20, in the direction of the arrow shown thereon. The stud 34, which projects from said door 1, limits the movement of said pawl 24, and deadlocking lever 27. As indicated in Fig. I, said door is provided with an ordinary time lock 36, and with two electrically controlled combination locks 37 and 38, constructed and arranged as shown and described in Letters Patent of the United States #686,073 dated November 5, 1901, and comprising circuit connections extending through the conduits 40, to exterior switch mechanism, whereby said locks may be operated. Said time lock and electrically controlled combination locks on the door, may be employed to complete a circuit extending through said conduits 40, and including the solenoid 32, and an external source of current 41, so as to release the slide bar 21 as hereinafter described. Fig. V shows the most complex arrangement for energizing said solenoid 32, including a circuit which connects said solenoid with the generator 41, and includes five switches, viz:—the switch 42, local to the generator; the switch 43, arranged to be closed by manually setting the combination lock 44, which is on the door frame 9; the switch 45, arranged to be closed by manually setting the combination lock 46, on the door 1; the switch 48, arranged to be closed by the operation of the electrically controlled combination lock 38; and, the switch 50, arranged to be closed by the operation of the time lock 36.

Fig. VI shows circuit connections similar to Fig. V, but omitting the switch 45. Fig. VII shows circuit connections similar to Fig. V, but omitting the switch 48. Fig. VIII shows circuit connections similar to Fig. V, but omitting the switch 43. Fig. IX shows circuit connections similar to Fig. V, but omitting the switches 45 and 48. Fig. X shows circuit connections similar to Fig. V, but omitting the switches 43 and 45. Fig. XI shows a circuit similar to Fig. X, but having a shunt parallel with the switch 48, and including the switch 51, arranged to be closed by the operation of the electrically controlled combination lock 37. It may be observed that by this arrangement, when the switches 42 and 50, are closed, the circuit to energize the solenoid 32, may be closed by operation of either of the locks

37 or 38. Fig. XII shows circuit connections similar to Fig. X, but including a shunt circuit parallel with the switch 48, for the operation of said electrically controlled combination lock 38. Fig. XIII shows the simplest arrangement for energizing said solenoid 32, including a circuit which connects said solenoid with the generator 41, solely under control of the switch 42.

It may be observed that in all of the forms of our invention above described, the detent pawl is so arranged as to positively prevent the opening movement of the lock when the latter is released by the time lock or other device by which its motion is normally determined.

It is to be understood that the coils of said solenoid may be so connected and energized that the plunger 30, may be thereby shifted both in the direction described to release the detent pawl 24, and in the opposite direction to engage said detent pawl.

We do not desire to limit ourselves to the precise details of construction and arrangement above described, as it is obvious that various modifications may be made therein without departing from the essential features of our invention as defined in the appended claims.

We claim:—

1. In a vault, the combination with a door and door frame provided with bolt work; of a slide bar operatively connected with said bolt work; a spring motor arranged to unlock said bolt work by means of said slide bar; a detent pawl having an inclined end arranged to engage an inclined recess in said bar and prevent its unlocking movement; a deadlocking lever fulcrumed intermediate of its length and arranged to normally hold the free end of said pawl in said recess in said slide bar and normally prevent its unlocking movement; a plunger operatively connected with the opposite end of said deadlocking lever; a magnet core carried by said plunger; a solenoid in operative relation with said core; a circuit including said solenoid and a source of current exterior to said vault; and, a switch in said circuit; whereby said bolt work is detained in locked position until said switch is closed, and said pawl is automatically thrown out of said recess by movement of said bar.

2. In a vault, the combination with a door and door frame provided with bolt work; of a slide bar operatively connected with said bolt work; a spring motor arranged to unlock said bolt work by means of said slide bar; a detent pawl having an inclined end arranged to engage an inclined recess in said bar and prevent its unlocking movement; a deadlocking lever fulcrumed intermediate of its length and arranged to nor-

5 mally hold the free end of said pawl in said
 recess in said slide bar and normally prevent
 its unlocking movement; a plunger opera-
 tively connected with the opposite end of said
 10 dead-locking lever; a magnet core carried by
 said plunger; a solenoid in operative relation
 with said core; a circuit including said
 solenoid and a source of current exterior to
 said vault; a switch in said circuit; a time
 15 lock on said door, arranged to close said
 switch; and another switch in said circuit,
 independent of said time lock; whereby,
 said bolt work is detained in locked position
 until said tripping lever is tripped, and,
 20 said pawl is then automatically thrown out
 of said recess by movement of said bar.

3. In a vault, the combination with a door
 and door frame provided with bolt work; of
 a slide bar operatively connected with said
 25 bolt work; a spring motor arranged to un-
 lock said bolt work by means of said slide
 bar; a detent pawl arranged to engage a
 recess in said bar and prevent its unlocking
 movement; a deadlocking lever fulcrumed
 30 intermediate of its length and arranged to
 normally hold the free end of said pawl in
 said recess in said slide bar and normally
 prevent its unlocking movement; a plun-
 ger operatively connected with the opposite
 35 end of said deadlocking lever; a magnet
 core carried by said plunger; a solenoid in
 operative relation with said core; a circuit
 including said solenoid and a source of cur-
 rent exterior to said vault; a switch in said
 40 circuit; a time lock on said door, arranged
 to close said switch; a second switch in said
 circuit, independent of said time lock; and
 a combination lock arranged to operate said
 second switch; whereby said bolt work is
 45 detained in locked position until said
 switches are closed.

4. In a vault, the combination with a door
 and door frame provided with bolt work; of
 a slide bar operatively connected with said
 50 bolt work; a spring motor arranged to un-
 lock said bolt work by means of said slide
 bar; a detent pawl arranged to engage a re-
 cess in said bar and prevent its unlocking
 movement; a deadlocking lever fulcrumed
 intermediate of its length and arranged to

normally hold the free end of said pawl in
 said recess in said slide bar and normally
 prevent its unlocking movement; a plunger
 operatively connected with the opposite end
 of said deadlocking lever; a magnet core 55
 carried by said plunger; a solenoid in oper-
 ative relation with said core; a circuit in-
 cluding said solenoid and a source of cur-
 rent exterior to said vault; a switch in said
 circuit; a time lock on said door, arranged 60
 to close said switch; a second switch in said
 circuit, independent of said time lock; and
 an electrically controlled combination lock
 arranged to operate said second switch;
 whereby said bolt work is detained in locked 65
 position until said switches are closed.

5. In a vault, the combination with a lock
 slide bar having an obtuse angular recess in
 a longitudinal edge thereof; of a detent
 having an obtuse angular end fitted to the
 70 recess in said bar; a pivotal support for said
 detent; a stud limiting the movement of
 said detent; a deadlocking lever having
 one end arranged to removably engage the
 free end of said pivoted detent; a fulcrum 75
 intermediate of the length of said deadlock-
 ing lever; a solenoid core pivotally connect-
 ed with the opposite end of said deadlock-
 ing lever; a spring tending to shift said
 80 deadlocking lever into contact with said
 stud; a solenoid in operative relation with
 said core; and, an electric circuit including
 said solenoid, a source of current and a
 switch; whereby, unlocking movement of
 85 said bar is prevented by the engagement of
 said deadlocking lever with said detent,
 and, locking movement of said bar is per-
 mitted when said deadlocking lever is re-
 leased; movement of said detent to release
 90 said locking bar being effected solely by
 movement of the latter.

In testimony whereof, we have hereunto
 signed our names at Philadelphia, Pennsyl-
 vania, this 13th day of May 1909.

WILLIAM H. HOLLAR.
 HARRY F. BALOU.

Witnesses:

AL DOHERTY,
 RICHARD GILPIN.