(No Model.)

A. S. WILEY.

ELECTRIC LOCK.

No. 456,182. Patented July 21, 1891.

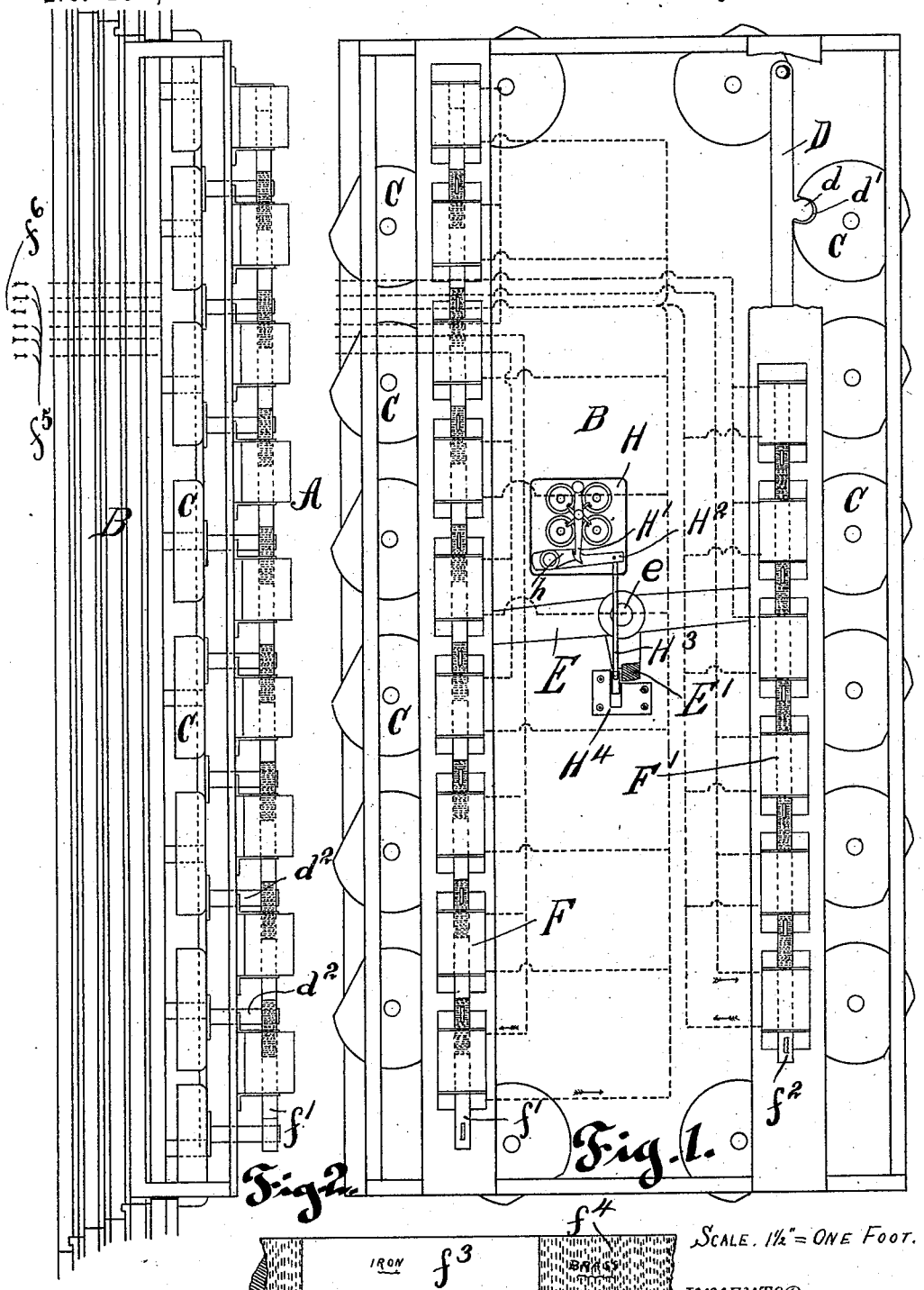

Fig. 2.

Fig. 1.

SCALE. 1½" = ONE FOOT.

SECTION OF ARMATURE. HALF SIZE

Fig. 3.

WITNESSES

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ELECTRIC LOCK.

SPECIFICATION forming part of Letters Patent No. 456,182, dated July 21, 1891.

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To all whom it may concern:

Be it known that I, ABRAHAM S. WILEY, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Safes or Vaults; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

In the drawings, Figure 1 is a front elevation upon the interior of a safe or vault door, illustrating my improved door-locking mechanism. Fig. 2 is a side elevation of the same. Fig. 3 is a separate view of one of the solenoid-rods made of alternate sections of magnetic and diamagnetic metal.

In the construction of burglar-proof doors for safes and vaults it has been the custom to provide an arbor with which to operate the bolt-work, the said bolt-work being located on the inside of the door and the arbor projecting through the door. It has also been customary to place a lock upon the inside of the door, actuated by another arbor passing through the door. Thus the door has been pierced by two or more round holes through which the arbors have passed. Many successful attempts have been made to burglarize such doors by drilling the arbors, by forcing them out, or by introducing explosives through the space around them, and having succeeded in introducing a sufficient quantity of explosive to the interior of the safe its doors have been burst open.

I have in view to provide adequate means of throwing the bolts of a door into the locked position and to subsequently retract these bolts by the employment of electro-magnets back of the door, either fastened upon the inside of the said door or upon any suitable support independent of the said door, which shall be actuated by an electric current conveyed through the spools of said magnets, thereby wholly obviating the evils associated with the use of arbors projecting through the door, the door being wholly without holes of any character leading through it. Then, again, since a burglar might direct an electric current through the said magnetic circuits it becomes necessary to include within the system mechanism such as a time-lock or similar appliance and a dog for dogging the bolts in their locked position against an unlocking motion until at a predetermined hour the said dog may be released or be brought into a condition to be released by the operator upon the outside of the safe.

My invention therefore consists, essentially, first, in providing the door with one or more locking-bolts and one or more electro-magnets located either on or behind the door and adapted when the circuit is closed through them to throw the said bolts into their bolted or unbolted position, and in connection therewith a separate dog adapted to prevent the unbolting movement of the bolts, and means for disengaging said dog prior to the unlocking movement of the bolts; second, in connection with the foregoing a time mechanism adapted to control the disengagement of said dog, whereby the dog is or may be disengaged at a predetermined time; also, in special features of construction, which will be hereinafter specified and claimed.

In carrying out my invention, A represents a safe or vault, and B its door.

C represents a series of bolts, which in the instance shown are in the nature of rotary bolts or buttons.

D represents bars having projections *d*, which work in corresponding orifices *d'* in the bolts C, so that by the longitudinal movement of the bar D all the bolts connected therewith will be simultaneously actuated.

E represents a cross-bar pivoted at *e* and engaged at the extremities with the bars D, so that through this pivoted bar E any movement of either of the bars D is necessarily communicated to the other, and all the bolts are thereby caused to act in unison.

F F′ represent series of electric coils or helices. f' and f^2 represent common shafts extending along the axes of the said helices, respectively. Each shaft is made up of magnetic sections f^3, with interposed diamagnetic sections f^4. Thus the sections f^3 may be of soft iron, and the sections f^4 may be of brass, thus constituting a series of solenoids with a continuous or connected series of cores. d^2 represents arms projected out from the bars D and engaging the said core-shaft f' or f^2,

whereby any movement of the cores of the solenoids is communicated directly to the said bars D, and through them to the bolts C.

The operation of this portion of the mechanism will now be understood. We will presume the solenoids F′ on the right-hand side of the door to be all connected into a circuit, the terminals of which are at the exterior of the safe, and those at the left-hand side of the door at F connected in like manner with another circuit, the terminals of which are also on the exterior of the door. It is apparent that by sending a current of electricity through the last-named circuit the left-hand solenoids operate to force upwardly the core-shaft f', and this serves to simultaneously throw all the bolts into their unbolted condition, permitting the door to be opened. It also serves at the same time through the bar E to drop the solenoid-shaft f^2 of the right-hand helices into their lowermost positions out of their respective cores, so that by subsequently disconnecting the current from the solenoids F and sending an electric current through the said last-named helices F′ this core-shaft is forced upwardly and the bolts are all again thrown into their bolted position.

While the arrangement of solenoids as shown is convenient and desirable, I would have it understood that any suitable arrangement of electro-magnets, whether in the form of solenoids or ordinary armature-magnets, might be employed, and instead of the rotary bolts any other suitable arrangement of bolts might be used. These solenoids might be grouped into several circuits, and each group be provided with exterior terminals, so that if any particular circuit is deranged the others may suffice to actuate the bolts. I show the left-hand magnets arranged in groups of three and the right-hand magnets also in groups of three, their admission terminals being represented at f^5, and a common return-circuit f^6 for all of them. Of course this may be varied to suit the circumstances.

H represents a time-lock of any usual type, so organized that at a predetermined time its hook H′ might be withdrawn from the lever H^2 and permit the same to drop.

H^3 is a dog suspended from the lever H^2, so that when this dog is raised up and held by the hook H′ the dog will be interposed between the stationary block H^4 and the arm E′, which projects from the lever E. It is manifest that when the dog is in this position the bolts cannot be moved into their unbolted position, and that this dog will remain in place until the latch or hook H′ is tripped by the time-lock mechanism at a predetermined hour. When the bolts thereafter are moved into their unbolted position and it is desired to lock the door, the following construction is provided:

h is an independent lever held contiguous to the lever H^2 by a spring located between them and adapted when either lever is raised or lowered to spring the other lever to a contiguous position to the one moved. This permits the lever h to be raised and engaged with the hook H′ prior to closing the door. Then when the bolts are thrown into their locked or bolted position the movement serves to open the space between the block H^4 and the arm E′, and as soon as the space is sufficient the spring lifts the lever H^2 up contiguous to the lever h, where it remains until the time-lock disengages the hook and permits both levers to drop down together, as before described.

I do not of course limit myself strictly to a time-lock which shall operate to drop the dog out of place, but the time-lock might serve simply to leave the apparatus in shape, so that by any provided means the dog might be subsequently removed from its place.

I am aware that an electro-magnet has been employed to unlatch or unbolt a door, but am not aware that such mechanism has ever before been made to bolt or unbolt a door in combination with a dog for blocking or preventing an unlocking movement of the bolts until the said dog was released by a time-lock or other means.

What I claim is—

1. In a safe or vault, the combination, with one or more locking-bolts, of one or more electro-magnets adapted when the electric circuit is closed through the same to move said bolts into or out from their locked or bolted position, and a dog adapted to prevent the unbolting movement of the bolts, and means adapted to disengage said dog prior to unbolting the door, substantially as described.

2. In a safe or vault, the combination, with one or more locking-bolts, of one or more electro-magnets adapted when the electric current is closed through the same to move said bolts into or out from their locked or bolted position, a dog adapted to dog said bolts against an unbolting movement, and a time mechanism adapted to withdraw or permit the withdrawal of said dog at a predetermined time, substantially as described.

3. The combination, with a safe or vault door, of one or more locking-bolts and one or more electro-magnets in the form of solenoids, the cores of said solenoids engaged with the bolt-throwing mechanism, whereby they may serve to throw the bolts into their bolted or unbolted position, substantially as described.

4. The combination, with a safe or vault door, of one or more locking-bolts and a series of solenoids adapted to actuate said bolts, said solenoids arranged in line with each other and having a connected series of cores, substantially as and for the purposes described.

5. The combination, with a safe or vault door, of one or more locking-bolts and a series of solenoids adapted to actuate said bolts, said solenoids arranged in line with each other and provided with a common core-shaft composed of alternate core-sections of magnetic mate-

rial and interposed sections of diamagnetic material, substantially as described.

6. The combination, with a safe or vault door, of a series of rotary bolts C and a series of solenoids F, said solenoids each engaged by common connecting-bars with the said bolts, whereby the motion of the core of any solenoid is communicated to each and all said bolts, substantially as described.

7. The combination, with a safe or vault door, of a series of bolts engaged by connecting-bars D and E, and two series of solenoids, one adapted by the inward movement of its cores to throw the bolts into their locked condition and simultaneously retract the cores of the other series of solenoids, and said latter series adapted by their subsequent action to throw the bolts into their unlocked condition and simultaneously restore the cores of the first solenoids to their initial position, substantially as and for the purposes described.

In testimony whereof I sign this specification in the presence of two witnesses.

ABRAHAM S. WILEY.

Witnesses:
MARION A. REEVE,
FRANK P. HAINES.