

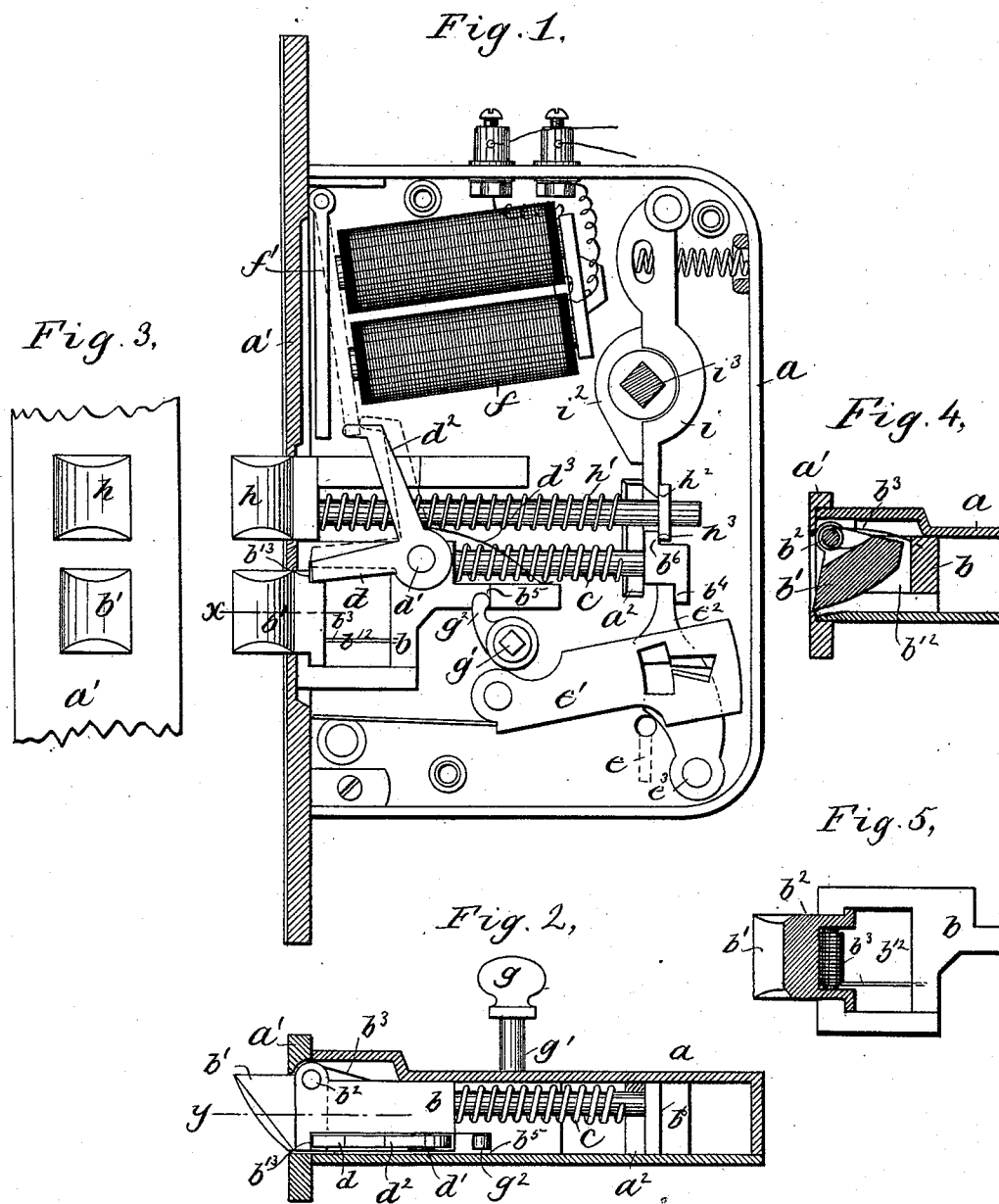
(No Model.)

2 Sheets—Sheet 1.

C. H. CROCKETT & C. C. ALLEN.
ELECTRIC LOCK.

No. 473,061.

Patented Apr. 19, 1892.



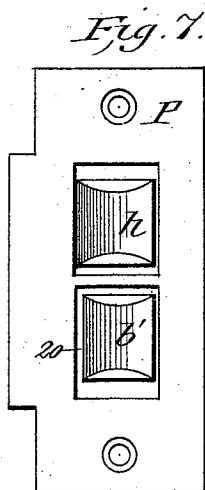
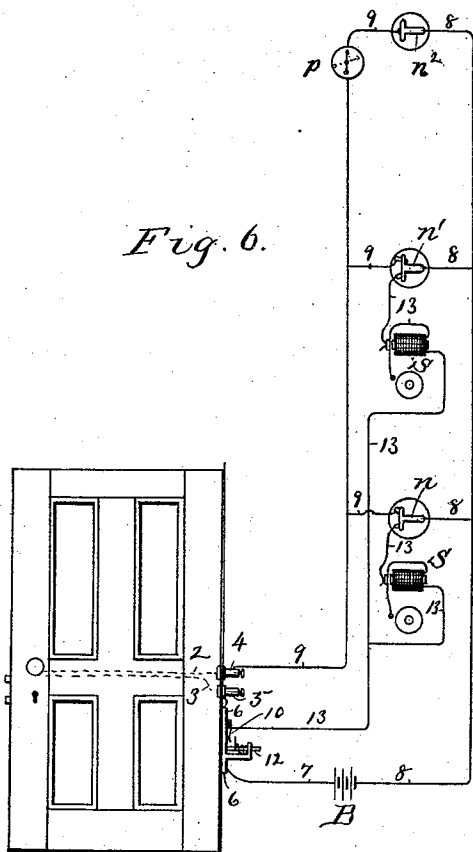
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UNITED STATES PATENT OFFICE.

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ELECTRIC LOCK.

SPECIFICATION forming part of Letters Patent No. 473,061, dated April 19, 1892.

Application filed May 5, 1888. Serial No. 272,944. (No model.)

To all whom it may concern:

Be it known that we, CHARLES H. CROCKETT and CHANCELLOR C. ALLEN, of Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Electric Locks, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

The object of our invention is to produce a door-lock which can be operated from a distant point by an electric circuit so as to permit the person at the outside of the door to enter. Locks of this kind are especially useful for the outer doors of apartment-houses, banks, and offices, as they enable a person on any floor to admit the person at the door. Locks for this purpose have been made which were intended to be normally in such condition as to fasten the door so that a person could not enter unless provided with a key, but which could be set by a person at a distant point so as to be opened by turning the door-knob at the outside, and the act of turning the knob and opening the door reset the lock so that when shut it could not be opened by the next person arriving until again set by the closing of the circuit at a distant point. Such locks are objectionable for the reason that when once set so as to permit a person to enter if the person should for some reason not enter the lock would remain set and the door thus unfastened, so that an unauthorized person might subsequently enter, and it is impossible in locks of this kind to know whether or not the lock is in such condition as to fasten the door.

The present invention is embodied in a lock which may be placed by the action of an electro-magnet in condition to permit the door to be opened, but if the door is not opened will cause the door to be fastened again the moment the condition of the magnet is changed, or, in other words, when the magnet is restored to its normal condition.

The invention consists, mainly, in details of construction, to be hereinafter described, in a lock which contains the usual knob-operated spring-bolt, and also a two-part bolt having a projecting bevel-faced end which is piv-

oted with relation to the shank portion of the bolt so that the said bolt may be retired into the lock-case by the pivotal movement of the projecting end relative to the shank portion or by the sliding motion of the shank portion, while the pivoted end is restrained from pivotal movement with relation thereto. This two-part bolt is intended to be operated, with its sliding movement, by the usual latch-key inserted from the outside; but otherwise than this a person at the outside of the door is unable to produce the sliding movement of the bolt and can only be admitted by the retirement of the projecting end of the bolt by its pivotal movement with relation to the shank portion. The pivotal movement is controlled by a bolt-holder consisting of a two-armed lever pivoted on the shank portion of the bolt and having one arm normally in position to engage the pivoted end of the bolt so as to prevent its pivotal movement. An electro-magnet fastened in the case of the lock is provided with an armature pivoted independently of said bolt-holding lever, but in such position that when moved by the attraction of the armature it engages the other arm of the bolt-holding lever than the one engaged with the bolt end, and turns the said lever on its pivot, so that the arm normally engaged with the bolt end is for the time being—that is, so long as the magnet remains energized—disengaged therefrom, so as to permit pivotal movement of the bolt end, by which it may be retired into the lock-case, so as to permit the door to be pushed open.

A person at the outside of the door will turn the usual knob, throwing back one bolt, but will be unable to open the door until the obstruction to the pivotal or yielding movement of the other bolt is removed, when he will be able to push the door open. The controlling-magnet is, as shown in the instance, in normally-open circuit and is energized to remove the obstruction to the yielding portion of the bolt; but the moment the magnet is again demagnetized the obstruction returns and the bolt is again fastened or rendered unyielding. It follows that the magnet must be retained energized until the person has pushed the door open; and the inven-

tion further consists in the combination, with the lock and its controlling magnet and circuit, of an indicator at each of the points where the circuit of the magnet is controlled, which shows by the change of condition in the circuit produced by opening the door when the door has been opened, so that the person operating the circuit-closer will know when the person at the door has been admitted and that the magnet may be restored to its normal condition.

Figure 1 is a side elevation of a door-lock embodying this invention with the side plate of the inclosing case removed; Fig. 2, a sectional view showing the two-part bolt and co-operating device in plan view; Fig. 3, a detail showing a portion of the face of the lock as seen looking toward the edge of the door; Fig. 4, a sectional detail on line x of Fig. 1, showing the operation of the yielding portion of the two-part bolt; Fig. 5, a section on line y , Fig. 2, of the electrically-controlled bolt; Fig. 6, a diagram showing the circuit by which the electro-magnet that controls the lock is operated and the opening of the door indicated to the person that controls the circuit, and Fig. 7 a detail illustrating the position of the bolts with relation to the openings or sockets in the striker-plate.

The operative parts of the lock are inclosed in a case a , which is shown as mortised into the door in the usual manner; the face a' standing in the edge of the door and the bolts projecting from the said face to engage a striker-plate on the door-jamb in the usual manner. The said lock is provided with a two-part bolt $b b'$, the portion b of which is contained wholly within the case a and is acted upon by a spring c , bearing at one end against a stationary projection a^2 in the lock-case and tending to throw the entire bolt $b b'$ forward, so as to keep the portion b' projecting from the face a' of the lock in the position to engage the striker-plate and fasten the door in the usual manner. The projecting end b' of the bolt is beveled in the usual manner, as clearly shown in Fig. 2, and thus causes the entire bolt $b b'$ to slide back against the stress of the spring c , when the door is closed in the usual manner. The projecting portion b' is pivoted, as shown at b^2 , Fig. 2, in the inner portion b , so that it can be turned back into a recess b^{12} in the inner portion b , as shown in Fig. 4, in which position the portion b' will not project beyond the face a' of the lock, and consequently will not hold the door, although the portion b may be in its most forward position. A spring b^3 tends to turn the portion b' of the bolt into its normal position in which it projects from the face of the lock, as shown in Figs. 1 and 2; but said spring is insufficient to hold the portion b' in this position against a moderate pressure tending to turn it to the position shown in Fig. 4. The portion b' of the bolt is, however, normally held in the position with relation to the portion b (shown in Figs. 1 and 2) by a

brace or holder d , shown in this instance as consisting of an arm pivoted at d' upon the main or internal portion b of the bolt and extending so as to engage a shoulder b^{13} on the portion b' , so as to prevent the said portion b' from turning on its pivot b^2 to the position shown in Fig. 4 as long as the arm d remains in the position shown in full lines in Fig. 1, and consequently so long as the holder d remains in such position the bolt $b b'$ fastens the door unless the entire bolt $b b'$ is thrown back against the action of the spring c .

The entire bolt $b b'$ cannot be thrown back by a person at the outside of the door except by a key inserted in the key-hole, (indicated in dotted lines at e , Fig. 1), the said key operating on the usual tumblers e' , which are properly raised up by the key as it is turned, after which the key acts upon a lever e^2 , pivoted at e^3 , which, by its engagement with a shoulder b^4 , throws the entire bolt $b b'$ back, thus withdrawing the end b' by a sliding movement in the usual manner.

In order to enable a person at a distant point to admit the person at the outside of the door not having a key, such as last referred to, the lock is provided with an electro-magnet f , having an armature f' , which when the said magnet is energized acts on an arm d^2 of the bolt-holder d , moving the said holder to the position shown in dotted lines, Fig. 1, so that it no longer engages the shoulder b^{13} and obstructs the yielding movement of the portion b' of the bolt, so that if the door is otherwise unfastened and pushed slightly by the person at the outside, the portion b' of the bolt will turn aside as shown in Fig. 4, permitting the door to open; but if the door should not be opened the moment the magnet f is demagnetized the holder d will return to its normal position by the action of gravity, assisted, if required, by a spring d^3 , and will thus again obstruct or prevent the yielding movement of the portion b' of the bolt.

The armature f' of the magnet f is shown as pivoted at its upper end, so that it normally hangs in retracted position by the action of gravity, and some space is left between it and the co-operating portion of the holder, so that when the magnet is energized the armature will move and strike against the holder instead of merely pressing against it, thus insuring the release of the holder, even if the person is pressing against the door, and thus forcing the shoulder b^{13} of the bolt with considerable pressure against the end of the holding-arm d .

The entire bolt $b b'$ may be operated with its sliding movement by means of a knob or handle g (see Fig. 2) at the inside of the door, the spindle g' of which (see Fig. 1) is provided with an arm or finger g^2 , that bears against a shoulder b^5 on the bolt, so that when the said handle g is turned the entire bolt $b b'$ will be thrown back with its sliding movement against the stress of the spring c . This one

bolt $b\ b'$ is sufficient to constitute an effective lock for the door; but it is desirable to employ in addition a second bolt h , acted upon by a spring h' and operated by a lever i , that engages a shoulder h^2 on said bolt and is itself operated by a T-shaped hub i^2 , operated by the usual squared knob-spindle i^3 at the outside of the door, and also at the inside, if desired.

The spring h' of the bolt h bears at one end against the stationary projection a^2 , which also serves to limit the forward movement of both bolts, and the projection h^3 of the bolt h is engaged with a shoulder b^6 of the bolt b in such manner that the said bolt b cannot be slid back to unfasten the door without also carrying the bolt h with it, so that the single operation of turning the key, before described, at the outside of the door or of turning the handle g at the inside of the door, will throw back both bolts with their sliding movement and thus permit the door to be opened as with common latch-bolts. The turning of the knob, on the other hand, will throw back the bolt h by the action of the hub i^2 and lever i , but will not produce any sliding movement of the bolt $b\ b'$, and consequently the mere turning of the door-knob will not unfasten the door, which is thus effectually locked against a person at the outside not having a key until such person is permitted to enter by any one who may operate the circuit-changer and cause the magnet f to be energized.

The holding-shoulder of the bolt h is set a little at one side of that of the bolt b' , as shown in Figs. 3 and 7, so as to allow a clearance between the bolt b' and the socket of the striker-plate P , as shown at 20, Fig. 7, thus giving the bolt b' greater freedom of movement than the bolt h , so as to insure that it will be thrown wholly forward, so that the arm d^2 of the bolt-holder will be within range of the armature f' of the controlling-magnet. The same result might be effected by widening the part of the opening in the striker-plate that co-operates with the bolt b' , and such construction is regarded as an equivalent for the arrangement of the bolts relative to one another. (Illustrated in Fig. 3.)

Locks of this kind are commonly used in connection with speaking-tubes and call-bells at the different floors of the building occupied by different persons, and when a person desires to enter the proper signal is sounded, calling the person to the speaking-tube, at which is also located the push-button or circuit-changer by which the magnet f is controlled, so that the person in the building, by operating such push-button, will admit the person at the door, who merely has to turn the usual door-knob, which will throw back the bolt h and open the door, the bolt b' then yielding. The person at the push-button will, however, have to keep the circuit closed until the person at the door has entered, and it is consequently desirable that the person at the push-button should know when the door has

been opened. This may be effected by the means indicated in diagram, Fig. 6, which also illustrates the circuit connections employed.

The terminals of the magnet f are connected by wires 2 3, which pass through the door to the hinged side thereof and are there connected with contact-plates, which when the door is closed rest against corresponding contacts 4 5, from which the circuit may be extended to the various points from which the lock is to be operated. As shown in this instance, the terminal 5 on the door-jamb is connected with another metallic piece 6, also on the door-jamb and connected, as shown at 7, with one pole of the battery B , by which the apparatus is operated. From the other pole of said battery a conductor 8 is extended to the various points from which the lock is to be operated, each of which is provided with a circuit-changer or push-button n , n' , and n^2 . From the terminal 4 another wire 9 is also extended to the points from which the lock is to be operated, and is connected with another member of each of the push-buttons n , so that when one of said buttons is operated the wires 8 and 9 are connected, closing the circuit of the battery B through the magnet f and energizing the same. When the door is opened, this circuit 8 9 will be broken at 4 5, and consequently any indicating-instrument placed in said circuit that will be affected by the presence or absence of current—such, for example, as an ordinary galvanometer (indicated at p , Fig. 6)—may be employed. A simple circuit-closer having merely two contacts is then sufficient. For a modified form of indicating-instrument the plate 6 may be provided with an insulated contact 10, which is touched by a movable contact 12, connected with the plate 6 when the door is opened. The said contact 10 is connected by wire 13 with an indicating-instrument—such, for example, as a vibrating bell S —from which it continues to a second contact co-operating with the push-buttons $n\ n'$. Thus when one of said push-buttons is depressed to close the circuit of the magnet f between the wires 8 9, as before described, it also connects the wire 8 with the wire 13 through the signal S ; but said circuit 8 13 is still open at 10 12, so that the signal S is not operated. As soon, however, as the door is open the contacts 10 12 are closed, thus completing the circuit 8 13 10 12 6 7 through the particular signal at which the push-button is depressed, thus sounding the said signal and informing the person who is holding the push-button closed that the door has been opened and the person there admitted.

An indicator such as described will show at any time to a person operating the push-button whether or not the door is open, and with the herein-described mechanical controlling-lock the door can never be unfastened when closed except while one of the push-buttons is retained closed, while with all other locks, so far as known to us, the door will remain

unfastened after a push-button has been once operated until such time as the door has been opened and again closed, so that if the person for whom it was unfastened should decide
5 not to enter the door would still remain unfastened unless the person who unfastened it went to the door and reset the locking mechanism.

We claim—

- 10 1. The combination of a lock provided with two bolts with an electro-magnet and its armature co-operating with one of said bolts and a knob co-operating with the other of said bolts, the said magnet-controlled bolt having
15 clearance between it and the striker-plate when the knob-controlled bolt is engaged with the striker-plate, substantially as described.
2. The combination of a door and lock and electro-magnet controlling said lock with an

electric circuit extending from said lock to various points, and a circuit-changer in said circuit at the door, and circuit-changers at different points, and indicating-instruments in said circuit in proximity to said circuit-changers, whereby the operation of a distant circuit-changer permits the door to be opened and the opening of the door operates the indicating-instrument in proximity to the circuit-changer that was operated, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

CHARLES H. CROCKETT.
CHANCELLOR C. ALLEN.

Witnesses:

JOS. P. LIVERMORE,
M. E. HILL.