

(No Model.)

4 Sheets—Sheet 1.

H. BEZER.
ELECTRIC LOCK.

No. 582,615.

Patented May 18, 1897.

Fig. 2,

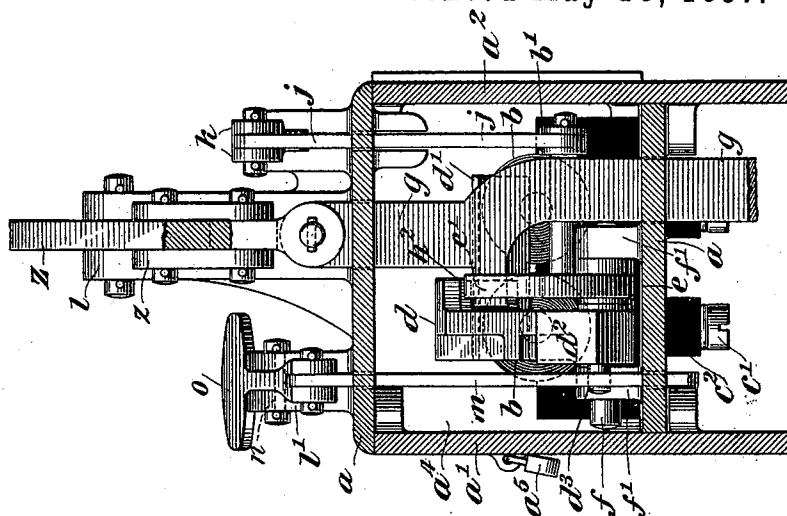
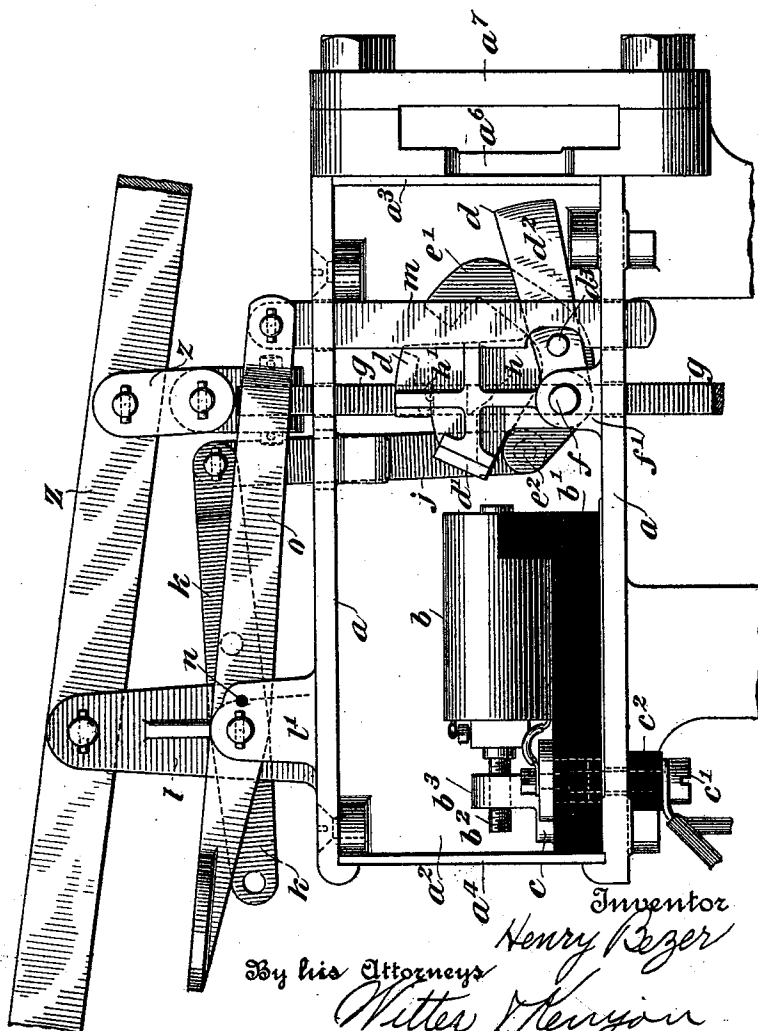


Fig. 1,



Witnesses

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By his Attorneys

Walter Henry

Inventor

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(No Model.)

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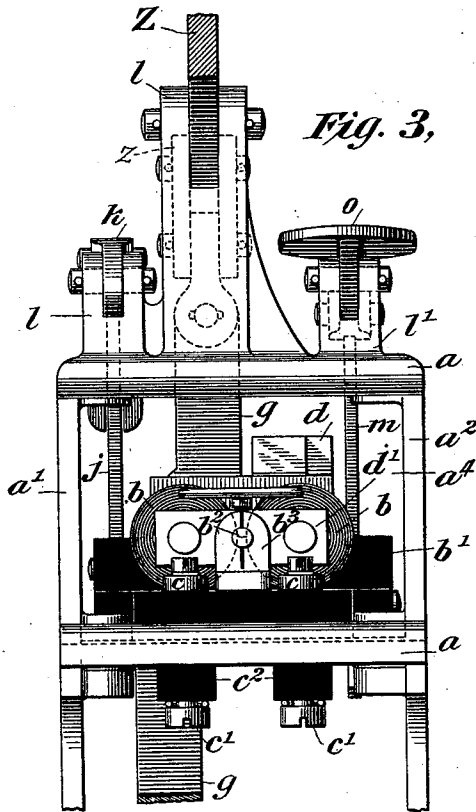


Fig. 3,

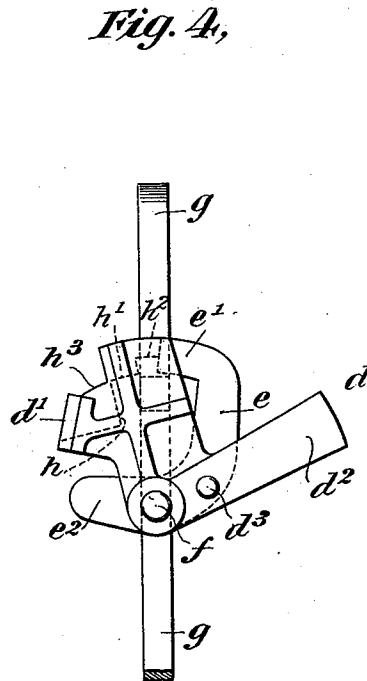


Fig. 4,

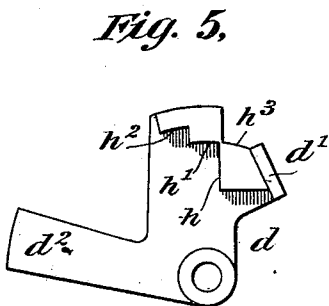


Fig. 5,

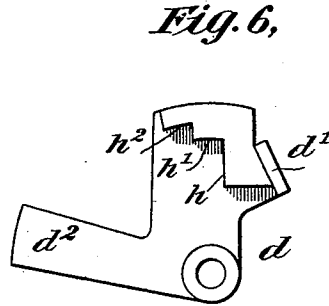


Fig. 6,

Witnesses
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Fig. 7.

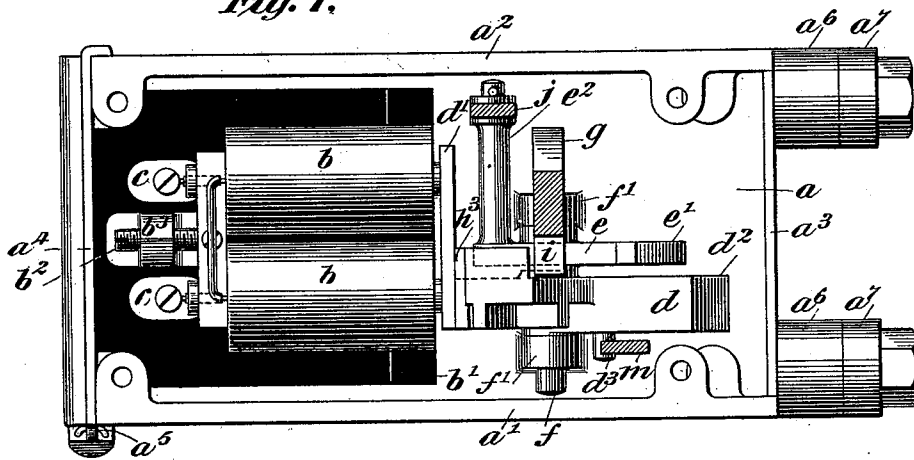


Fig. 8,

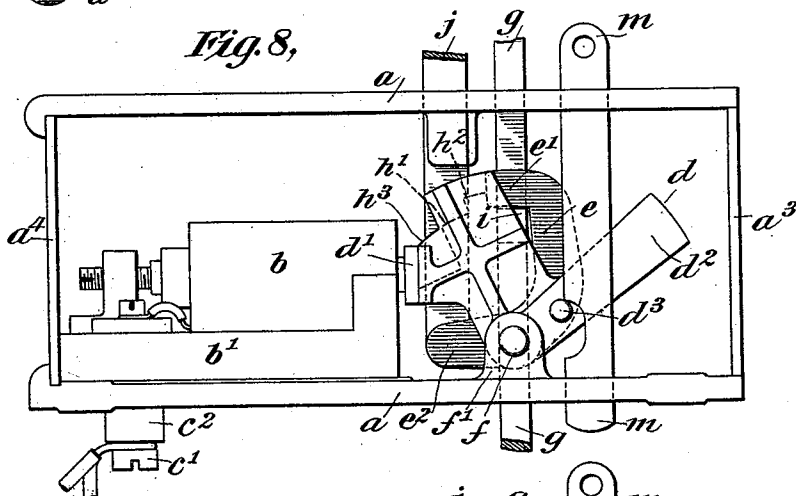
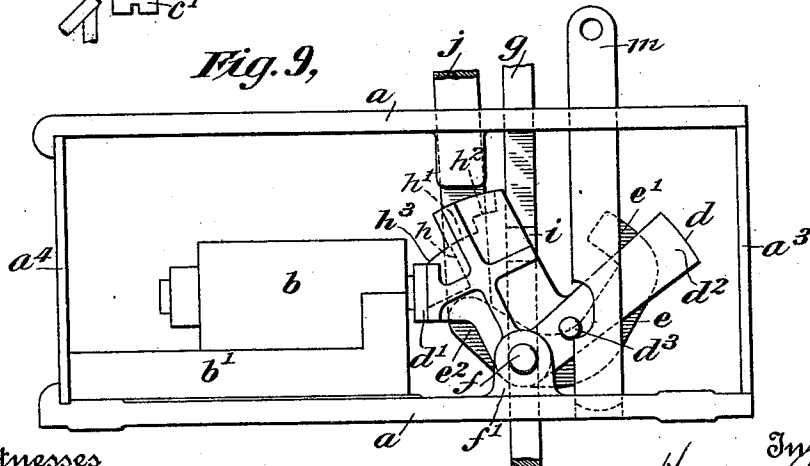


Fig. 9,



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Fig. 10,

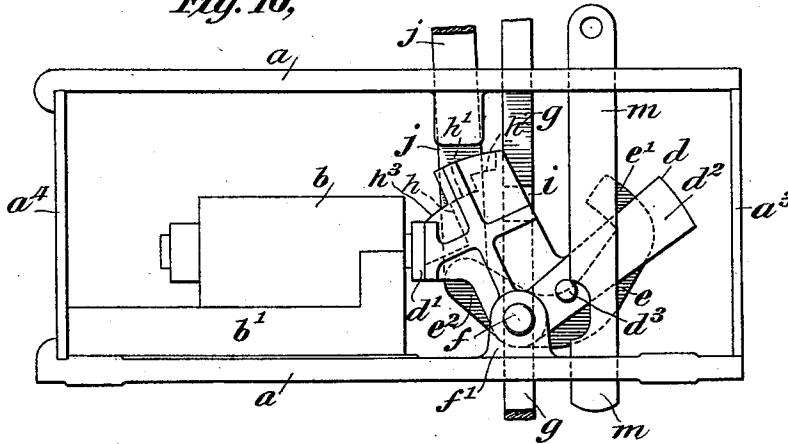


Fig. 11,

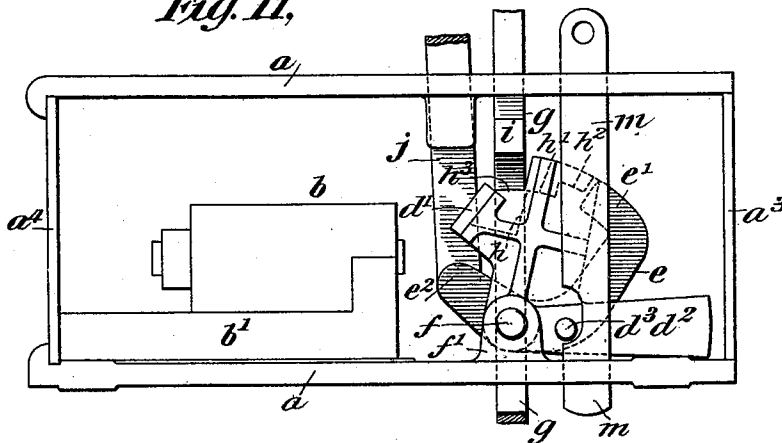
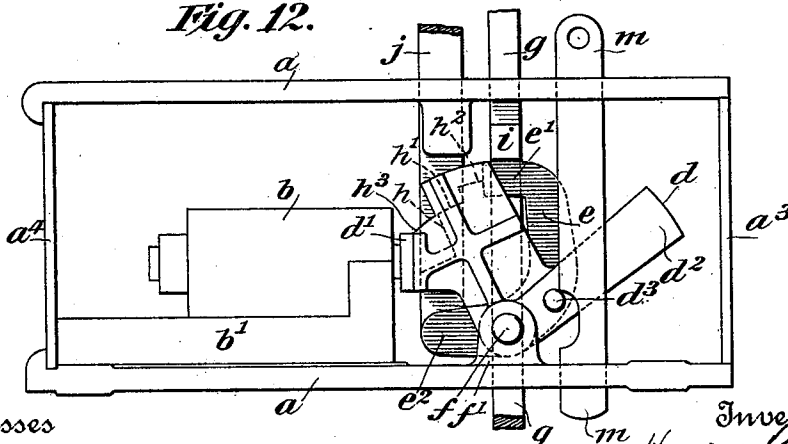


Fig. 12.



Witnesses

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UNITED STATES PATENT OFFICE.

HENRY BEZER, OF NEW ROCHELLE, NEW YORK.

ELECTRIC LOCK.

SPECIFICATION forming part of Letters Patent No. 582,615, dated May 18, 1897.

Application filed October 25, 1892. Serial No. 449,949. (No model.)

To all whom it may concern:

Be it known that I, HENRY BEZER, a subject of the Queen of Great Britain, residing at New Rochelle, in the county of Westchester, State of New York, have invented certain new and useful Improvements in Electric Locks, which improvements are fully set forth in the following specification and the accompanying drawings, which form part hereof.

This invention consists of an electric lock especially designed for levers of interlocking railway-signals, but generally applicable wherever it is intended that the lock shall not be released until a certain change of position has occurred in some device other than the lock, such as a railway-train upon the line, or a device forming part of clockwork mechanism.

The invention comprises, broadly, a lock normally held by some force or means in locking position, means for moving the lock out of locking position, and remotely-controlled means for retaining the lock out of locking position.

The invention also comprises a lock normally held by some force or means in locking position, means for moving the lock out of locking position, and electrically-controlled means for retaining the lock in locking position, whether remotely controlled or not. There are many advantages resulting from this feature of my invention, among which may be mentioned the fact that the parts are not of delicate construction or liable to failure from the effects of frictional resistance, careless maintenance, or wear and tear, since the operative power employed and required to bring the parts into juxtaposition is ample to overcome any such resistances. A light electric current can, moreover, be employed, and such will hold and control a heavily-loaded armature. Another advantage of this feature of my invention is that an accidental current will not operatively affect the lock.

It further comprises an auxiliary lock held normally out of locking position by some force and adapted to be thrown into locked position before the main lock is out of locking position and to remain there as long as the main lock is out of locking position and unaffected by its retaining means.

In the practical construction and operation

of my lock I preferably employ gravity as the force for normally holding the main lock in locking position and the auxiliary lock out of locking position and preferably employ manual means for mechanically moving the main lock out of locking position and the auxiliary lock into locking position. I may employ any remotely-controlled means for retaining the main locking-piece out of locking position—electrical, pneumatic, mechanical, or other means—but have shown and prefer to employ electrically-controlled means in the form of a magnet for this purpose acting upon an armature with which the main lock is provided. This magnet has no effect upon the main lock until it has been moved out of its locking position. There are many ways of carrying out the spirit of my invention as thus broadly stated, differing more or less in the construction and arrangement of means from those I have shown and described, which are still within the limits of my invention. I do not therefore wish to be limited to the particular construction herein shown and described as the preferred embodiment of my invention.

My invention also includes a sealed connection which can be used in cases of emergency to disengage the lock after breaking the seal. It also includes various features of construction, comprising a safety device which insures a continuance of the locking, notwithstanding tampering with the instrument; also, a construction which permits a half-way backward movement of the latch after it has been unlocked; also, various features of construction hereinafter particularly described in connection with the accompanying drawings.

In the accompanying drawings, Figure 1 is a side elevation with the side of the box removed, showing an electric lock embodying my invention with the parts in normal position. Fig. 2 is a rear end elevation of Fig. 1 with the back of the box removed. Fig. 3 is a front end elevation of Fig. 1 with the front of the box removed. Fig. 4 shows the main lock, auxiliary lock, and the sliding latch detached from the other parts of the apparatus in the position where the auxiliary lock is about entering into or passing out of engagement with the sliding latch. Fig. 5 is a de-

tail of the main lock, showing the reverse side to that of Fig. 4. Fig. 6 is a view similar to Fig. 5, showing a modified form of main lock. Fig. 7 is a plan view of my electric locking device, showing the armature in contact with the magnet, the top of box being removed and the upwardly-extending latch and links being shown in section. Fig. 8 is a side elevation showing the main lock moved over so that its armature has come in contact with the electromagnet, while the auxiliary lock holds the latch. Figs. 9, 10, 11, and 12 are also similar side elevations with the parts in various positions.

The lock is placed within a protecting casing or box, of suitable construction to prevent tampering with the working parts of the lock. The box shown in the drawings has the top and bottom pieces a , the side pieces a' a'' , the back piece a^3 , and the front piece a^4 . The front piece a^4 is fitted to slide and is held in place by a lock a^5 . This casing or box is shown in Figs. 1 and 7 provided at its rear end with means for clamping it to a rectangular bar. It is evident that it may be held by any suitable means. The means shown consist of the recessed blocks a^6 a^6 and the clamping-plates a^7 a^7 .

An electromagnet b is placed within the casing or box, being preferably mounted upon an insulating-block secured on the bottom of the box. The conducting-wires leading to the coils of this electromagnet are insulated from the parts of the box and extend outward and are suitably connected with external current-supplying devices. As shown, these wires are respectively secured to two metallic plates c c , and these plates c c are respectively connected with the two binding-screws c' , each of which is adapted to clamp one of the leading-in wires against an insulated washer c^2 . The electromagnet is fitted to slide upon its insulating support-block b' , and can be adjusted by manipulating the screw b^2 . This screw b^2 has its end secured in the iron bridge-piece of the electromagnet and passes through the lug b^3 , secured to the insulating-block b' .

The main lock or locking-piece d and the auxiliary lock or locking-piece e are mounted, as shown, upon a shaft f , having its bearings in the box or casing, while the sliding latch g is fitted to slide in the said casing. Lugs f' f' , projecting from the box, provide bearings for the shaft f , and it is prevented from moving out of said bearings by its ends abutting against the side a' of the casing and against the latch g .

The main lock d has secured to or forming part of it the armature d' . Projections extend from one of the faces of the main lock d and are provided with the locking-faces h h' h^2 h^3 , which engage with the latch. These projections and locking-faces are clearly shown in Fig. 8. The latch g has a projection i , which is the part of such latch engaged by the locking devices. The main lock d is also provided with a weight-arm d^2 , which insures

that the lock will always be in extreme right-hand rearward or locking position when not held from such position by the electromagnet or some other part of the apparatus, and with a projecting pin d^3 , which works in a groove or depression in the link m , hereinafter described.

The lock proper of the auxiliary lock e is the projection e' , which in the extreme left-hand or forward position of the auxiliary lock e engages with the projection i on the sliding latch g , and also has an arm e^2 , to which the link j is pivotally joined. This link j is arranged to be moved by the operator either by a handle or a treadle, but any suitable means may be employed for operating this auxiliary lock e . In Figs 1, 2, and 3 it is shown connected to a pivoted lever k , which lever k may be connected with the desired device for operating the auxiliary lock. The lever k is preferably pivoted to a standard or bearing l , carried by the box or casing a , and this standard also, by preference, affords bearing or fulcrum for the lever z , which connects (through the link z) the locking mechanism here treated of with the other mechanism (not shown) of the system.

The parts above described in detail constitute the working parts of the lock under ordinary conditions. A sealed lever o is provided for directly operating the locking device under extraordinary conditions. This lever is sealed by a suitable device, such as a stamped wire n , passing through a hole in such lever, which hole is located in the lever o , preferably near its pivotal point, as shown in Fig. 1, (or such seal may be in the link m , just below the bottom of the box, or some other suitable part of the apparatus.) Said lever o may be operated by the hand or foot of the operator. It is shown pivoted in a bearing l' on the casing, although it may be otherwise arranged.

The link m is provided with a groove or depression in which works the projecting pin d^3 of the main lock d . Under ordinary conditions this pin d^3 works freely in the depression of the link m , and the sealed lever therefore does not interfere with the ordinary operation of the lock.

In the normal position of the parts of the lock, as shown in Fig. 1, the projection i of the latch g is below the locking-face h' of the main lock d and is engaged by the said locking-face h' , while the locking-face h of the main lock is engaged against the projection i of the latch, so that the main lock is held by the latch from further movement to the right, while the latch is held against upward movement by means of the locking-face h in engagement with the projection i . The latch g is in its lowest position and to be released must be moved upward, but as this upward movement is prevented by the main lock acting by its locking-face h' it is evident that the latch g is securely locked.

To release the lock, the auxiliary and main

lock are thrown forward simultaneously, the former engaging the latch before the latter releases it. As shown in the drawings, the auxiliary lock as it moves forward engages the main locking-piece and moves it forward toward its magnet, but the parts need not necessarily, of course, be so arranged. They might be arranged to move independently of each other, but operated from a common source, if desired. The various parts will then be in the position shown in Fig. 8. In this position the main lock has moved over clear of the projection *i* on the latch, while the projection *e'* of the auxiliary lock is above this projection *i* and holds the latch *g* securely locked. Moreover, it will be noted that the projection on the main lock is followed by the projection *e'* on the auxiliary lock in passing over the projection *i*, and that therefore at no period during the movement just described can the latch *g* be unlocked. Further, if the operator, by mistake or in endeavoring to prevent the proper operation of the instrument, attempts to lift or unlock the latch *g* during this movement, he can at best only succeed in moving the projection *i* against the locking-face *h*², where it will effectually stop further operation of the instrument. If now the projection *e'* is allowed to recede, the locking-face *h*² will nevertheless safely lock the latch, and as soon as the latch is moved or allowed to move down to lower position the parts will again assume the normal position. (Shown in Fig. 1.)

The locking-face *h*² is not only so arranged that it will safely lock the latch *g*, but is also so arranged that there is considerable clearance between this locking-face and the top of the projection *i* of the latch, so that this locking-face will certainly lock the latch, notwithstanding efforts to lift or unlock it. It will likewise compensate for wear and tear.

After the auxiliary lock has been caused to move the main lock to forward position and placed the armature *d'* against the poles of the electromagnet *b*, as above described, the auxiliary lock is moved back again to normal position. If the electromagnet is energized, it will hold the armature *d'* firmly against its poles, and will continue to hold the armature so long as the current continues. Under these conditions the main lock will be retained in forward or disengaged position, as shown in Fig. 10, and the latch *g* will be unlocked as soon as the projection *e'* of the auxiliary lock has moved clear of it. If, however, the electromagnet *b* is not energized or not sufficiently energized to counterbalance the weight-arm *d*² and hold the armature *d'* against its poles, the main lock *d* will recede with the auxiliary lock *e* and the parts return to the normal position. (Shown in Fig. 1.) If the operator during this receding movement of the auxiliary and main locks attempts to lift or unlock the latch *g*, the latch will be securely held by the projection *e'* of the auxiliary lock until the pro-

jection *e'* has passed back clear of the projection *i*. At this point the operator may succeed in lifting the latch slightly, but its upward movement will be certainly and safely checked by the locking-face *h*², and a safe lock will thereby be still maintained. The main lock will be pressed by its weight-arm *d*² toward the normal or dead-locked position, and therefore as soon as the latch *g* is released it will fall and will be locked by the locking-face *h'*. It is also to be noted that should the adjustment of parts be inaccurate or have been disturbed, so that the projection *i* will not in lower position pass under the locking-face *h'*, the locking-face *h*² will nevertheless securely hold the latch.

When the electromagnet retains the armature that has been placed against it, and thus holds the main lock *d* in disengaged position, and the auxiliary lock has been returned to normal position, there is no impediment to the upward movement of the latch *g*, and it can be moved to the upper or unlocked position. (Shown in Figs. 11 and 12.) If the main lock is now released by a cessation of current flowing through the electromagnet *b*, it will fall over into extreme backward position, as shown in Fig. 11, with its weight-arm *d*² resting against the stop formed by the bottom of the casing and its locking-face *h*³ under the projection *i* of the latch, but a sufficient distance below it to permit of a half-way backward movement of the latch. In this position of the parts the latch cannot be returned to locked or normal position until a current is caused to flow through the coils of the electromagnet. Should the requirements be such that this half-locked position would not be of particular service, it is evident that with the piece *d* made as shown in Fig. 6 the latch *g* will be locked either in its highest extreme or normal position. The manipulation of the auxiliary lock when the electromagnet is not energized can only result in putting the auxiliary and main locks in extreme forward position, as shown in Fig. 8, from which they will again return to the position shown in Fig. 11 when the auxiliary lock is receded. When, however, the electromagnet *b* is energized, and the armature manually or otherwise placed against it, as shown in Fig. 12, the main lock will be retained in disengaged position, and when *e'* is returned to normal position there will be no impediment to the return of the latch *g* to normal position. If after the return of the latch *g* to normal position the current ceases to flow through the electromagnet, the main lock will be released and will return to the normal position, as shown in Fig. 1.

The half-way backward movement of the latch, which is permitted by the parts of my apparatus when the latch is in upper or unlocked position and the main lock is in extreme backward position, (shown in Fig. 11,) is in some cases very advantageous—as, for instance, where the latch *g* is connected to or

forms part of the latch of a railway signal-lever. In this case it may be necessary to put the signal to "danger" after the "clear" signal has been given, but before the parts of the lock can be returned to normal locked position. This half-way backward movement will allow sufficient play to the latch to permit the signal to be set at "danger."

When an emergency arises that makes it necessary to unlock or lock the latch without regard to the operation of the electromagnet, the operator can lift the sealed lever *m*, thereby cutting the sealing-wire *n* and directly lifting the main lock *d*. So long as this lever *m* is held up the lock is off and there is no impediment to the operation of the latch *g*. Nevertheless, the cutting of the stamped wire *n* has left an undeniable indication of the breaking of the seal, and a new wire has to be inserted by proper inspectors or other authorities. This mechanism, which is normally sealed when in operative position, provides the operator with independent means for actuating the main locking-piece and unfastening the lock.

It will be readily understood that a circuit would be provided for causing a cessation of the current flowing through the electromagnet *b* when the latch arrives at its upper position and also when the latch arrives at its lower position.

What I claim, and desire to secure by Letters Patent, is—

1. In a lock, the combination of a locking-piece normally held in locking position, means for moving said locking-piece out of locking position, said locking-piece and said means being both pivoted on the same axis and independently movable and electrically-controlled means for retaining said locking-piece out of locking position, substantially as set forth.

2. In a lock, the combination of a locking-piece normally held in locking position, means for moving said locking-piece out of locking position, said locking-piece and said means being both pivoted on the same axis and independently movable means for holding said locking-piece out of locking position comprising a normally-deenergized electromagnet and an armature, substantially as set forth.

3. In a lock, the combination of a latch, a locking-piece provided with means for engaging the latch when the latch is in its full normal position and adapted to also engage the latch when the latch is only partially returned to its normal position, means for moving said locking-piece out of locking position, and electrically-controlled means for retaining said locking-piece out of locking position, said locking-piece when released from said electrically-controlled means arranged to automatically assume the position in which the latch is locked, substantially as set forth.

4. In a lock, the combination of a piece to be locked, locking means for locking said

piece to be locked, and normally engaging the same, a magnet to control the disengagement of the piece to be locked from its locking means, mechanical means for bringing the locking-piece under the control of the magnet, all so arranged that the piece to be locked may be disengaged from its locking means only when the magnet is energized, but when the magnet is not energized the piece to be locked remains securely locked, substantially as set forth.

5. In a lock, the combination of a locking-piece normally held in locking position, means for moving said locking-piece out of locking position, electrically-controlled means for retaining said locking-piece out of locking position, and an auxiliary locking-piece adapted to be moved into locking position before the main locking-piece moves out of locking position, substantially as set forth.

6. In a lock, the combination of a locking-piece, means tending to constantly hold said locking-piece in locking position, means for moving said locking-piece out of locking position, electrically-controlled means for retaining said locking-piece out of locking position, and an auxiliary locking-piece adapted to be moved into locking position before the main locking-piece moves out of locking position, substantially as set forth.

7. In a lock, the combination of a locking-piece, normally held in locking position, mechanical means for moving said locking-piece out of locking position, electrically-controlled means for retaining said locking-piece out of locking position, and an auxiliary locking-piece adapted to be moved into locking position before the main locking-piece moves out of locking position, substantially as set forth.

8. In a lock, the combination of a locking-piece, means tending to constantly hold said locking-piece in locking position, mechanical means for moving said locking-piece out of locking position, electrically-controlled means for retaining said locking-piece out of locking position, and an auxiliary locking-piece adapted to be moved into locking position before the main locking-piece moves out of locking position, substantially as set forth.

9. In a lock, the combination of a locking-piece, means tending constantly to hold said locking-piece in locking position, means for moving said locking-piece out of locking position, an electromagnet, an armature subject to the control of said electromagnet and operating when under the influence of the electromagnet to hold said locking-piece out of locking position, and an auxiliary locking-piece adapted to be moved into locking position before the main locking-piece moves out of locking position, substantially as set forth.

10. In a lock, the combination of a locking-piece, means tending constantly to hold said locking-piece in locking position, means for moving said locking-piece out of locking position, means for holding said locking-piece out of locking position, comprising a nor-

mally-deenergized electromagnet and an armature, and an auxiliary locking-piece adapted to be moved into locking position before the main locking-piece moves out of locking position, substantially as set forth.

11. An electric lock comprising a latch, a main locking-piece, an electromagnet adapted to operate upon the main locking-piece, an auxiliary locking-piece, means for engaging and disengaging the latch and said locking-pieces, said locking-pieces being so arranged that the auxiliary locking-piece engages the latch before the main locking-piece disengages it, substantially as set forth.

12. An electric lock comprising a latch, a main locking-piece, an electromagnet adapted to operate upon the main locking-piece, an auxiliary locking-piece, means for engaging and disengaging the latch and said locking-pieces, said locking-pieces being so arranged that the auxiliary locking-piece engages the latch before the main locking-piece disengages it, and the main locking-piece when unoperated upon by the electromagnet reengages the latch before the auxiliary locking-piece disengages it, substantially as set forth.

13. In a lock, the combination of a locking-piece normally held in locking position, means for moving said locking-piece out of locking position, electrically-controlled means for retaining said locking-piece out of locking position, an auxiliary locking-piece adapted to be moved into locking position before the main locking-piece moves out of locking position, and means for independently actuating the lock normally sealed in inoperative position, substantially as set forth.

14. In a lock, the combination of a locking-piece, means tending to constantly hold said locking-piece in locking position, means for moving said locking-piece out of locking position, electrically-controlled means for retaining said locking-piece out of locking position, an auxiliary locking-piece adapted to be moved into locking position before the main locking-piece moves out of locking position, and means for independently actuating the lock normally sealed in inoperative position, substantially as set forth.

15. In a lock, the combination of a locking-piece, means tending to constantly hold said locking-piece in locking position, mechanical means for moving said locking-piece out of locking position, electrically-controlled means for retaining said locking-piece out of locking position, and an auxiliary locking-piece adapted to be moved into locking position before the main locking-piece moves out of locking position, and means for independently actuating the lock normally sealed in inoperative position, substantially as set forth.

16. In a lock, the combination of a locking-piece, normally held in locking position, means for moving said locking-piece out of locking position, remotely-controlled means for retaining said locking-piece out of locking position, and an auxiliary locking-piece adapted

to be moved into locking position before the main locking-piece moves out of locking position, substantially as set forth.

17. In a lock, the combination of a locking-piece, means tending to constantly hold said locking-piece in locking position, means for moving said locking-piece out of locking position, remotely-controlled means for retaining said locking-piece out of locking position, and an auxiliary locking-piece adapted to be moved into locking position before the main locking-piece moves out of locking position, substantially as set forth.

18. An improved electric lock, consisting of a latch, a main locking-piece arranged to engage such latch, an armature connected to such main locking-piece, an electromagnet, and an auxiliary locking-piece, said auxiliary locking-piece being arranged to disengage the main locking-piece from the latch and itself temporarily engage such latch, substantially as set forth.

19. An improved electric lock, consisting of a latch, a pivoted main locking-piece arranged to engage such latch, an armature connected to such main locking-piece and a suitable retractile device also connected thereto so as to tend to hold the main locking-piece in position to oppose the movement of the latch, an electromagnet, and an auxiliary locking-piece arranged to disengage the main locking-piece from the latch and itself temporarily engage such latch, substantially as set forth.

20. An improved electric lock, consisting of a latch, a pivoted main locking-piece having a locking-face in position to deadlock such latch and another locking-face in position to more loosely but safely lock such latch, an armature connected to such main locking-piece and a suitable retractile device also connected thereto, an electromagnet, and an auxiliary locking-piece arranged to disengage the locking-faces of the main locking-piece from the latch and itself temporarily engage such latch, substantially as set forth.

21. An improved electric lock, consisting of a latch, a pivoted main locking-piece having a locking-face in position to lock such latch against motion from one extreme position and another locking-face in position to permit a part backward movement of the latch from the other extreme position, an armature connected to such main locking-piece and a suitable retractile device also connected thereto, an electromagnet, and an auxiliary locking-piece arranged to disengage the locking-faces of the main locking-piece from the latch and itself temporarily engage such latch, substantially as set forth.

22. The electric lock consisting of the latch *g*, having projection *i*, the main locking-piece having the locking-faces *h*, *h'*, *h*², *h*³, the armature *d'* and a suitable retractile device connected to the main locking-piece, the auxiliary locking-piece *e* having projection *e'*, means for operating said auxiliary locking-

piece, a shaft and bearings therefor upon which shaft the main and auxiliary locking-pieces are pivoted, and an electromagnet against which the armature d' is placed by the auxiliary locking-piece e , substantially as set forth.

23. The electric lock consisting of the latch g having projection i , the main locking-piece d having the locking-faces h, h', h^2, h^3 , the armature d' and the weight-arm d^2 , the auxiliary locking-piece e having projection e' , means for operating said auxiliary locking-piece, a shaft and bearings therefor upon which shaft the main and auxiliary locking-pieces are pivoted, and an electromagnet against which the armature d' is placed by the auxiliary locking-piece e , substantially as set forth.

24. The electric lock consisting of the electromagnet b , adjusting-screw b^3 , the latch g having projection i , the main locking-piece

having the armature d' and suitable locking-faces, means for retracting such main locking-piece, the auxiliary locking-piece arranged to work against said main locking-piece, and means for operating such auxiliary locking-piece, substantially as set forth.

25. The electric lock consisting of a suitable latch, the locking-piece d having the locking-faces h, h', h^2, h^3 arranged to engage with the latch, said locking-piece being also provided with the armature d' and weight-arm d^2 , a suitable pivotal bearing for said locking-piece, means for operating said locking-piece, and an electromagnet against which the armature is placed when the locking-piece permits free movement of the latch, substantially as set forth.

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Witnesses:

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ROBT. A. NEELAND.