

M. MARTIN.
ELECTROPROTECTIVE SYSTEM FOR LOCKS.

No. 520,795.

Patented June 5, 1894.

Fig-1-

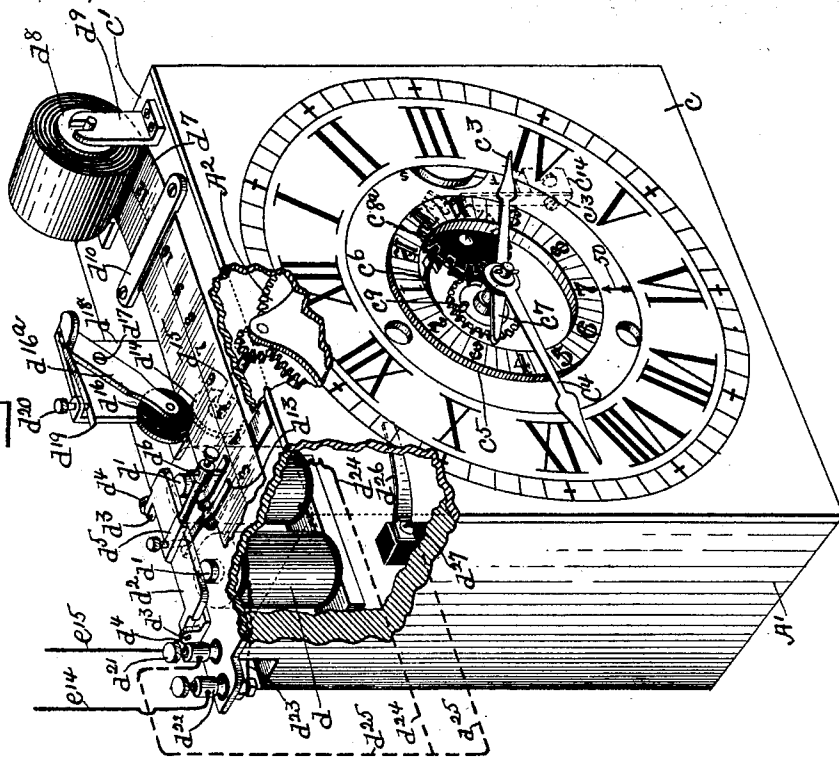
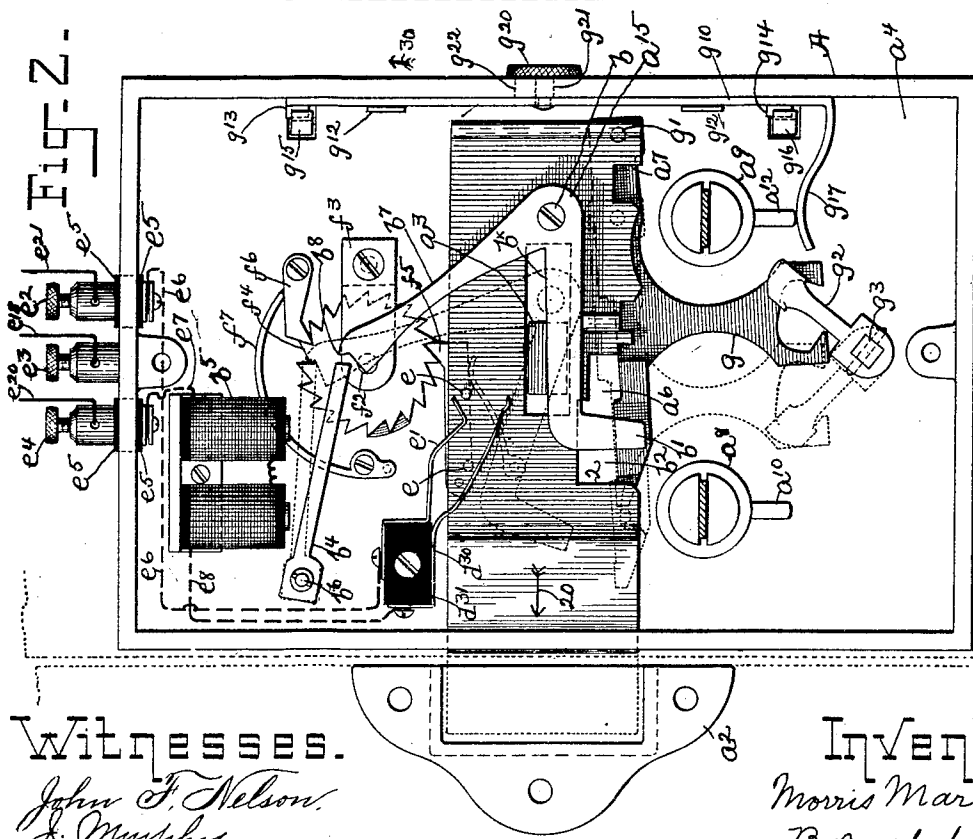


Fig-2-



Witnesses.
John F. Nelson.
J. Murphy.

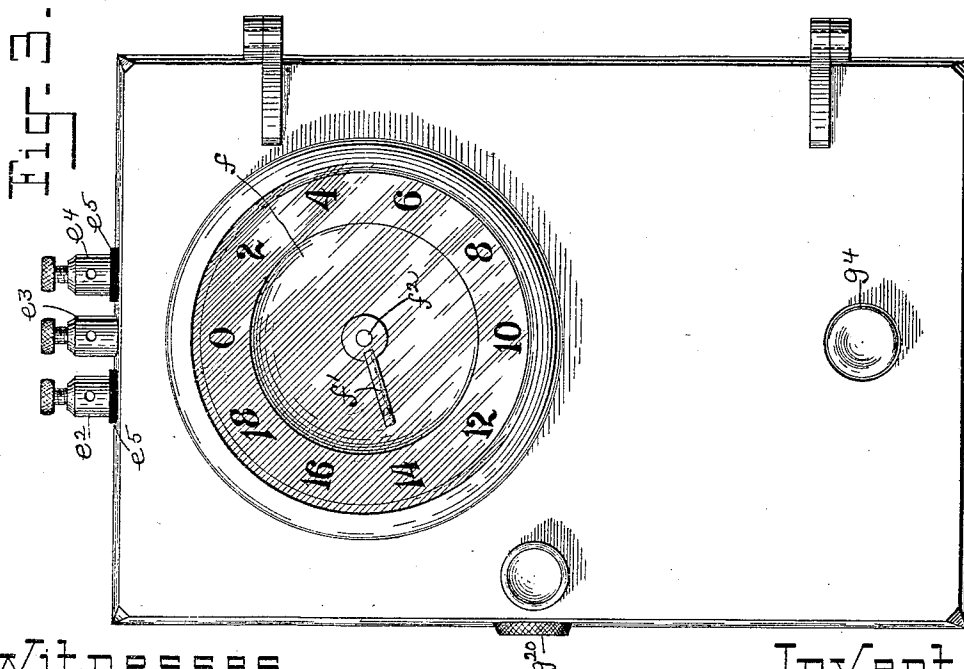
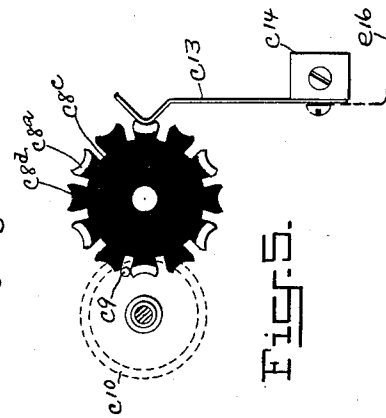
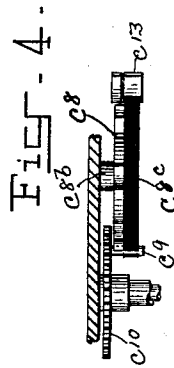
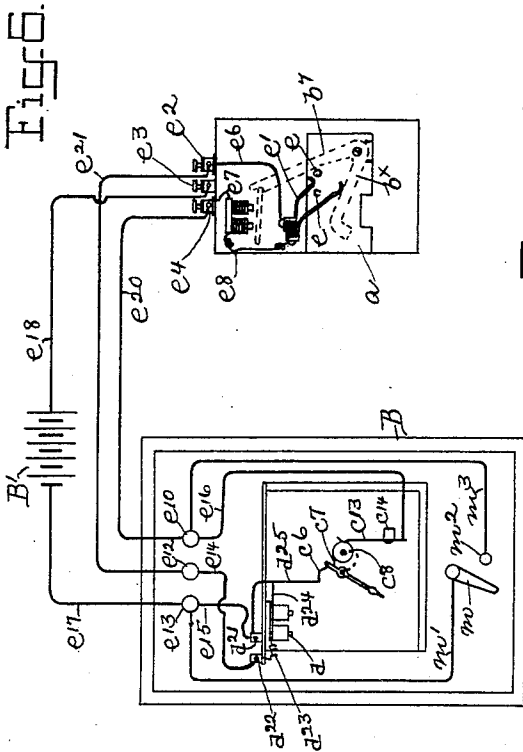
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UNITED STATES PATENT OFFICE.

MORRIS MARTIN, OF MALDEN, ASSIGNOR OF ONE-HALF TO BENJAMIN W. WELLS, OF BOSTON, MASSACHUSETTS.

ELECTROPROTECTIVE SYSTEM FOR LOCKS.

SPECIFICATION forming part of Letters Patent No. 520,795, dated June 5, 1894.

Application filed November 23, 1893. Serial No. 491,720. (No model.)

To all whom it may concern:

Be it known that I, MORRIS MARTIN, residing in Malden, in the county of Middlesex and State of Massachusetts, have invented an
5 Improvement in Electroprotective Systems for 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.

10 This invention relates to an electro-protective system for the locks of doors, and is more especially designed and adapted for stores and like places. The doors of stores and like
15 places are now commonly provided with a lock, which is operated by a key usually intrusted to the clerk, whose duty it is to open the store in the morning, the store-door being closed and locked by the same person or
20 by the employer or another employé provided with a duplicate key. The lock of the store-door from the time of closing in the evening to the time of opening in the morning, may be operated to unlock the door by either of these duplicate keys.

25 This invention has for its object to provide an electro-protective system for stores and like places, including a novel lock for the door comprising a bolt mechanism, constructed to be operated by two keys of different
30 make or design, one of which may be designated the "employé's key," and the other the "master-key," which in practice, will usually be in the possession of the proprietor of the store. The lock in one condition, to be
35 hereinafter described, is preferably electrically controlled, so that during the time the lock is so controlled, the employé's key is rendered inoperative for the purpose of unlocking the bolt mechanism. The system also
40 preferably includes a registering or recording mechanism, operatively connected to the lock and preferably located in the office of the store or like place and accessible only to the proprietor or other duly authorized person, the said registering mechanism, for purpose
45 of this invention, being designated as the central office message receiving instrument.

50 The system may and preferably will further include, an indicating device or mechanism at the lock, operatively connected to

the said lock to indicate the number of times the bolt mechanism has been operated, the said lock indicating mechanism preferably being constructed, so that when the lock is
55 lawfully operated, it will agree with the register or recording mechanism of the system, and also so constructed to indicate the operation of the lock independent of the register or recording mechanism. The lock indicator
60 is also preferably constructed to be responsive for a predetermined number of operations of the lock, but which becomes inoperative when the highest indication is reached, and remains inoperative at the highest indi-
65 cation until reset or brought to starting position by the employer or his duly authorized agent, as will be described. These and other features of this invention will be pointed out in the claims at the end of this specification. 70

Figure 1 is a perspective view partially broken out of a central office receiving instrument or registering mechanism employed in a system embodying this invention; Fig. 2, a
75 front elevation of a lock embodying this invention, the face plate of the lock being removed to more clearly show the interior construction, the door being represented by dotted lines; Fig. 3, a rear elevation of the lock
80 shown in Fig. 2; Figs. 4 and 5, details to be referred to; Fig. 6, a diagram of circuits to enable the operation of the system to be more clearly understood.

The lock for the door may and preferably will be made substantially as shown in Fig. 85 2, wherein A represents a frame or casing of metal or other suitable material, containing within it a lock mechanism, consisting, as herein shown, of a bolt *a* adapted to be moved through a suitable slot or opening in the side
90 *a'* of the casing and into a suitable socket *a²* fastened to the jamb *a³* of the door, represented by dotted lines.

The bolt *a* may be guided in its movements in any suitable manner, and is herein shown
95 as supported by means of a stud or projection *a³*, secured to or forming part of the rear plate *a⁴* of the casing A, the said stud extending into a substantially long slot *a⁵* in the bolt *a*. The bolt *a*, in the present instance, 100 is provided on its lower portion or edge with two notches or recesses *a⁶ a⁷*, the notch *a⁶* be-

ing made much longer than the notch a^7 , for a purpose as will be described.

The bolt a in accordance with this invention is designed to be operated from the outside of the door by two keys, not herein shown, but which may be of the well known Yale type of key, one of the said keys in the present construction of the lock, actuating a supplemental key a^8 and the other key actuating a supplemental key a^9 , the keys a^8 a^9 being pivotally fastened to the back plate a^4 of the casing A . The supplemental keys a^8 a^9 are provided, as herein shown, with bits a^{10} a^{12} respectively, the bit a^{10} being adapted to enter the notch a^6 in the bolt a , and the bit a^{12} to enter the notch a^7 . The outside key, which operates the supplemental key a^8 , I prefer to designate as the employé's key, and that which operates the supplemental key a^9 as the master key. The master key is designed to operate the bolt a at any time and under all conditions, while the employé's key is designed to be rendered non-operative on the bolt a under certain conditions as will be hereinafter explained. To effect this result in the present construction of the lock, the notch a^6 in the bolt a is made of such length, that the key a^8 might be turned either to the right or left without engaging the sides of the said notch, if provision were not made to practically divide or shorten the length of the notch a^6 , so as to enable the bit a^{10} of the key a^8 to move the bolt. This may be accomplished, as herein shown, by means of a movable device or tumbler, shown as an elbow lever a^{15} pivoted as at b to the bolt a , and having one arm b^x provided with a finger b^7 , normally projecting by the notch a^6 , as shown in Fig. 2, in which position, the said finger forms with one side 2 of the notch, a smaller notch or receptacle b^2 , into which the bit a^{10} is adapted to enter, when the key a^8 is turned to operate the bolt, the said bit engaging the side 2 of the notch to move the bolt into its socket a^2 to lock the door, and engaging the finger b^7 to move the bolt backward to unlock the door. The finger b^7 is adapted to be moved from its normal or operative position shown by full lines, Fig. 2, out of the path of movement of the bit a^{10} of the key a^8 and into its dotted line position, by a suitable device, shown in the present instance as the armature b^4 of an electro-magnet b^5 suitably supported within the case A , the said armature being pivoted as at b^6 , and normally lying beyond the field of its magnet and in the path of movement of the arm b^7 of the elbow lever a^{15} . The arm b^7 is shown as provided at its end with a shoulder or projection b^8 adapted to engage the end of the armature b^4 . In the normal or full line position of the tumbler a^{15} , the bolt may be moved into its socket a^2 by the employé's key, the bit a^{10} engaging the side 2 of the notch forming one wall of the chamber b^2 , and on the forward movement of the bolt a , the shoulder b^8 strikes the armature b^4 , which being fixed by its pivot b^6 , causes the elbow le-

ver a^{15} to turn on its pivot b on the continued forward movement of the bolt a , so that by the time the bolt has entered its socket, the elbow lever will be turned into its dotted line position Fig. 2, and the finger b^7 will be withdrawn from the path of movement of the employé's key, or in the present instance, from the path of movement of the bit a^{10} of the supplemental key a^8 . When the finger b^7 is raised as described, the employé's key is rendered useless or inoperative until the finger b^7 is released from its abnormal or dotted line position, which is accomplished in the present instance, by energizing the electro-magnet b^5 , as will be described.

The lock mechanism shown in Fig. 2 may and preferably will form part of an electrical system, including a main or central station apparatus, preferably of the construction shown in Fig. 1, wherein A' represents the inclosing case of a clock mechanism A^2 , of any usual or suitable construction, the casing A' being made of wood or other insulating material and having as represented, a face plate c and top plate c' of metal or other conducting material, the face plate c being thus electrically separated from the clock movement A^2 . The face plate c is provided, as shown, with the usual graduations or numbers indicative of hours and minutes, and is provided at its center with an opening through which the hour and minute arbors of the clock are extended, and are provided outside the face plate with the usual hour hand c^3 and minute hand c^4 . The face plate c has movably attached to it in any suitable manner, a ring c^5 provided with graduations or numbers corresponding to the numbers or graduations on the face plate, the said ring having secured to it one member of a circuit controller, which member is shown in the present instance as a flat spring or pen c^6 , secured to the inner circumference of the ring c^5 and co-operating with a second member of the said circuit controller, shown as an arm or projection c^7 movable with the hour hand c^3 . The arm c^7 may be secured to the arbor of the hour hand or to the hour hand itself. The casing A' also contains within it a second circuit controller, one member of which may be made as herein shown, it consisting of a metal disk or wheel c^8 provided with teeth or peripheral projections c^{8a} and mounted upon a shaft or arbor c^{8b} supported by the framework of the clock A^2 , the said arbor also having mounted on it a second disk or wheel c^{8c} of insulating material and provided with teeth or projections c^{8d} corresponding to the teeth c^{8a} , the alternate metal teeth c^{8a} being made shorter than the alternate teeth c^{8d} , for a purpose as will be described. The toothed disks or wheels c^8 , c^{8c} are rotated, as herein shown, by means of a stud or projection c^9 on the face of a disk or wheel c^{10} , fast on the hour shaft or arbor of the clock mechanism A^2 . The teeth of the wheels or disks c^8 , c^{8c} are preferably made concaved on their outer surface

and have co-operating with them a terminal pen or brush c^{13} (see Fig. 5) secured to an insulating support c^{14} within the casing A' , and forming the other member of the said circuit controller, for a purpose as will be described. The casing A' , as represented in Fig. 1, also contains within it an electro-magnet d having its pole pieces d' , as herein represented, extended through the top plate c' of the casing and co-operating with an armature d^2 , shown as pivoted as at d^3 to lugs or brackets d^4 erected upon the top plate c' . The armature d^2 as represented in Fig. 1 has secured to it an arm d^5 , provided at its front end with a prick point or stylus d^6 , adapted to be brought in contact with and puncture a recording surface shown as a strip or tape d^7 , provided with suitable graduations to indicate different intervals of time, the graduations as herein represented indicating hours. The recording tape d^7 in the present instance is shown as mounted on a drum or reel d^8 having bearings in uprights d^9 erected from the top plate c' , and as shown, the said recording strip is passed beneath a guide bar d^{10} fastened to the top plate, and the said strip is also passed through holding jaws or arms d^{11} . The recording strip d^7 is adapted to be fed forward under the marking pen or stylus d^6 by means of a feed mechanism, which may be of any usual or suitable construction, and which is represented in Fig. 1 as a toothed feed wheel d^{14} mounted upon a shaft d^{15} of the clock mechanism, the said shaft being geared to the clock mechanism so as to feed the recording strip d^7 in unison with the hour hand of the clock. The recording strip d^7 in the present instance is shown as held in engagement with the feed roll or wheel d^{14} by means of a presser roll d^{16} mounted on a lever d^{16a} , pivoted as at d^{17} to an upright or bracket d^{18} erected from the top plate c' , the said lever having its rear arm provided, as represented in Fig. 1, with a spring arm d^{19} engaged by an adjusting screw d^{20} , by means of which the pressure of the roll d^{16} upon the paper may be regulated. As represented in Fig. 1, the top plate c' is provided with two binding posts d^{21} d^{22} , both of which are insulated from the said top plate. The electro-magnet d , which may be hereinafter termed the register or recording magnet, has one end of its coil connected by wire d^{23} to the binding post d^{22} and the other end of its coil connected by wires d^{24} d^{25} to the binding post d^{21} . The binding post d^{21} is also electrically connected with the face plate c , which may be accomplished as represented in Fig. 1, by connecting the said binding post by the wire d^{25} to a contact pen or spring d^{26} , secured to an insulating support d^{27} located within the casing, the spring d^{26} being adapted to bear against the face plate c .

The circuit of the lock magnet b^5 as above described, is governed in part by two circuit controllers operated from the hour arbor or shaft of the clock movement or mechanism

A^2 , and preferably the said circuit is also governed by a third circuit controller located at the lock mechanism and comprising two members, one member of which is shown in Fig. 2 as a contact spring or brush d^{30} secured to an insulating block d^{31} , and adapted to be engaged by the arm b^x of the elbow lever or tumbler, which constitutes the other member of the circuit controller located in the lock. It will thus be seen that to complete the circuit of the lock magnet b^5 , three circuit controllers are required to be closed in the present arrangement, namely, the circuit controller located in the lock and the two circuit controllers operated by the clock mechanism of the central office apparatus, as will be hereinafter more fully explained.

The register magnet d is included in circuit with a circuit controller at the lock, which may be directly or indirectly governed by the movement of the lock mechanism, and which in the present instance is shown as composed of two members, one member being represented as a stud e on the bolt a , and the other member as a contact pen e' secured to the insulating support d^{31} , the said contact pen being extended into the path of movement of the stud e , so that when the bolt a is moved forward or in the direction indicated by arrow 20, Fig. 2, to lock the door, the said stud will be momentarily brought in contact with the pen e' , and will thereby momentarily close the circuit of the register magnet d , as will be more fully described, and on the further movement of the bolt in the direction indicated by arrow 20, the stud e will pass by and out of contact with the pen e' and substantially into the position indicated by dotted lines Fig. 2, so that, when the bolt a is moved backward or in the direction opposite to that indicated by arrow 20, the stud e will be again brought in contact with its co-operating pen e' , to again close the circuit of the register magnet d . In this manner, it will be seen that the register magnet d is energized on each movement of the bolt a , that is, when it is moved in one direction to lock the door and when it is moved in an opposite direction to unlock the door, the purpose of which will be hereinafter more fully set forth.

Referring to Fig. 2, the casing A is represented as having mounted upon it three binding posts e^2 , e^3 , e^4 , the binding posts e^2 e^4 being electrically separated from the casing A as by insulating washers e^5 , and the binding post e^3 being represented as electrically connected with the casing A . The binding post e^2 is connected by wire e^6 to the contact member or terminal e' , while the binding post e^4 has connected to it one end e^7 of the coil of the electro-magnet b^5 , the other end e^8 of the said coil being electrically connected to the contact pen or terminal d^{30} .

The operation of the electrical circuits, as thus far described, may be more clearly comprehended by referring to the diagram, Fig. 6, wherein the registering apparatus is rep-

resented as located within a case B, which in practice will preferably be provided with a door having a lock, the key of which is designed to be retained in the possession of the proprietor or his duly authorized agent, so that only the proper parties may have access to the registering apparatus.

The case B is represented as provided with three binding posts or terminals e^{10} , e^{12} , e^{13} , the binding post e^{12} being connected by wire e^{14} to the binding post d^{22} , and the binding post e^{13} being connected by wire e^{15} to the binding post d^{21} , while the binding post e^{10} is connected by wire e^{16} to the contact pen or member c^{13} of one of the circuit controllers in the clock mechanism above referred to. The binding post e^{13} is shown as connected by wire e^{17} to one pole of a battery B', herein shown as the negative pole, the positive pole of which is connected by wire e^{18} to the binding post e^2 of the lock mechanism. The binding post e^{10} is connected by wire e^{20} to the binding post e^4 of the lock, and the binding post e^{12} is connected by wire e^{21} to the binding post e^2 of the lock.

In order that the invention may be more clearly comprehended, I will describe the circuits including the magnets b^5 and d with the circuit controllers governing them in their closed position, and will hereinafter more specifically describe the manner of bringing the circuit controllers into their operative position. As above described, the register magnet d is governed by the circuit controller comprising the members e and e' , and for purpose of illustration, let it be supposed that the member e has been brought into contact with the member e' , and when in this condition, the circuit of the register magnet d is complete, which circuit may be traced in the diagram, Fig. 6 as follows:—from the positive pole of the battery B' by wire e^{18} to the binding post e^8 , thence through the metallic framework of the lock to the stud e , thence by the contact spring e' , wire e^6 to the binding post e^2 , which, as above described, is insulated from the casing A of the lock. From the binding post e^2 , the circuit continues by the wire e^{21} to the binding post e^{12} of the casing B containing the registering mechanism, and from the binding post e^{12} , the circuit is continued by the wire e^{14} , binding posts d^{22} , wire d^{23} , through the register magnet d and wires d^{24} , d^{25} to the binding post d^{21} , thence by wire e^{15} , binding post e^{13} and wire e^{17} to the negative pole of the battery B'. As soon as the circuit of the magnet d is completed as above described, the said magnet attracts its armature d^2 and effects a marking on the recording surface d^7 . The circuit of the lock magnet b^5 as above described, is dependent in the present arrangement upon the closure of three circuit controllers, namely, one in the lock and two in the recording apparatus.

I have represented in the diagram, Fig. 6, the circuit as closed at the various circuit

controllers, the arm b^x of the elbow lever or tumbler being in contact with the spring d^{30} , the pen c^{13} being in engagement with a metallic tooth on the wheel c^8 , and the arm c^7 being in engagement with the terminal spring c^6 . In this case, the circuit may be traced as follows:—from the positive pole of the battery B' by wire e^{18} to binding post e^8 , thence by the metallic portion of the lock mechanism to the tumbler arm b^x , thence by the contact spring d^{30} , wire e^8 , through the magnet b^5 , wire e^7 , to the binding post e^4 , thence by wire e^{20} to the binding post e^{10} of the case B, thence by wire e^6 to the contact pen c^{13} , the wheel or disk c^8 , thence to the clock movement and arm c^7 to the terminal spring c^6 , thence by wire d^{25} to the binding post d^{21} , thence by wire e^{15} , binding post e^{13} and wire e^{17} to the negative pole of the battery.

The lock is provided with a mechanism to indicate the operation of the bolt mechanism and this indicating mechanism may and preferably will be made as herein shown, it consisting of a dial f mounted on the back of the lock and provided with graduations or numbers preferably indicating two or multiples of two, the highest number in the present instance being eighteen. The dial f has co-operating with it an index or pointer f' mounted on a shaft f^2 extended into the case A and having bearings, as herein shown, in the said case and in a bracket f^3 fastened to the back plate of the said case. The shaft f^2 has fast on it a ratchet wheel f^4 , with which co-operates a push pawl f^5 and a holding pawl f^6 , the push pawl f^5 being shown as secured to the bolt a and operating on the backward movement of the bolt to rotate the ratchet wheel the distance of two teeth, to thereby move the index or pointer f' the distance of two graduations, the holding pawl f^6 acting to keep the ratchet wheel from rotating when the bolt a is moved forward. The holding pawl f^6 may be kept in engagement with the ratchet wheel, as represented, by a spring f^7 . To permit the bolt a to be operated at will from inside of the store or other place, the bolt a may be provided with a tumbler g pivoted as at g' and provided with a fork at its lower end, which is engaged by a dog g^2 on a shaft g^3 extended through the back plate of the lock and provided, as herein shown, with a head or thumb piece g^4 (see Fig. 3) by turning which the dog g^2 may be oscillated to operate the bolt in either direction. The back plate a^4 of the lock is preferably hinged to its casing, and in order to prevent the said plate being opened by unauthorized persons, a locking device is provided which is under control of the master key of the lock. The locking device referred to, is shown in Fig. 2 as a bar g^{10} vertically movable in guides g^{12} attached to the side of the case A, the said bar being provided with lugs g^{13} , g^{14} to engage fingers or lugs g^{15} , g^{16} , on the back plate a^4 , the said bar being provided at its lower end with a substantially long arm g^{17} , adapted to

engage the bit a^{12} of the supplemental key operated by the master key, so that the locking bar g^{10} cannot be moved upward to disengage its locking projections or lugs g^{13} , g^{14} from the fingers g^{15} , g^{16} , until the bit a^{12} is turned by the master key out of engagement with the arm g^{17} , and when so turned, the bar g^{10} may be moved upward or in the direction indicated by arrow 30, Fig. 2, by the thumb piece g^{20} on the outside of the lock, the said thumb piece having a stem or shank g^{21} extended through a slot g^{22} in the case A and fastened to the bar g^{10} .

The system as above described is designed for the protection of stores and like places from being entered between predetermined intervals of time, except by the person holding the master key of the lock. After a given hour, which may be supposed to be the hour of closing, say for instance, six o'clock p. m., the employé's key is rendered inoperative, and the bolt mechanism cannot be operated by the employé's key from this time until the time of opening in the morning, which may be supposed to be seven o'clock. When the person, who closes the store and locks the door, operates the bolt mechanism, which may be effected with either the master key or the employé's key, the tumbler a^{15} on the forward movement of the bolt is removed out of the path of movement of the employé's key as above described, it being moved into the dotted line position shown in Fig. 2. If now an attempt should be made by a person having an employé's key to unlock the door after it has been locked, the key would turn in the substantially long notch a^6 of the bolt and would not operate the bolt. When the door is locked, the circuit controller or stud e is brought into engagement with the contact pen e' and closes the circuit of the magnet d as above described, thereby effecting upon the recording strip or surface d' , a record of the locking of the door and the time at which the same was locked. While the tumbler a^{15} is in its elevated position, the bolt still remains under the control of the master key and, if after the hour of closing, the master key should be used to unlock the door, a record of this fact would be made upon the recording surface, for the stud e on its movement backward from its dotted line position Fig. 2 into its full line position, would again close the circuit of the register magnet d . The locking mechanism is designed to be again placed in condition to be operated by the employé's key after the lapse of a predetermined interval of time, which may be from six o'clock at night, the hour of closing, until seven o'clock the following day, the hour of opening. The hour at which it is desired to again place the lock in condition to be operated by the employé's key, may be selected by turning the graduated ring c^5 so as to have, for instance, the hour seven register with the arrow 50 on the face plate shown in Fig. 1, when it is desired to open the store or like

place at seven o'clock a. m. When the graduated ring c^5 is placed so that its graduation 7 is in line with the arrow 50, the member c^6 of the circuit closer will be brought into proper position to have the arm or member c^7 , which co-operates with it, make contact with the terminal pen c^8 at seven o'clock a. m. and at the same time, the stud c^9 on the disk or wheel c^{10} will have moved the disks c^8 c^{8c} so as to bring a raised or circuit closing tooth of the same into engagement with the terminal pen c^{13} , and when the circuit closers of the registering mechanism are in this condition, the magnet b^5 is automatically energized, which attracts its armature b^4 from its dotted line position shown in Fig. 2 toward its pole pieces, thereby removing the said armature from engagement with the arm b^7 of the tumbler a^{15} , and permitting the said tumbler to fall by gravity into its full line or operative position, thereby placing the bolt mechanism in condition to be operated by the employé's key. The alternate teeth on the insulating disk c^{8c} , which project beyond the corresponding teeth of the disk c^8 , are designed to break or open the circuit of the magnet b^5 once in twelve hours, so that the circuit of the magnet b^5 is closed or put in operative condition only once in twenty-four hours, that is, when the arm c^7 is in contact with the pen c^8 , and the pen c^{13} is in contact with a conducting tooth on the disk c^8 , which prevents the magnet b^5 releasing the tumbler at seven o'clock in the evening. For instance, the proprietor may want the store to be opened at seven o'clock a. m., and during the day, for instance at noon-time, he may set the graduated ring c^5 so that the number 7 on the ring registers with the arrow 50. It will be seen that the circuit controlling member c^7 at seven o'clock in the evening would make contact with the terminal spring c^6 and would energize the magnet b^5 , if the circuit was not broken at some other point. In the present arrangement, the circuit is broken by having the pen c^{13} engage an insulated tooth c^{8a} at seven o'clock in the evening, and when seven o'clock in the morning is reached, the arm c^7 will make contact with the spring c^6 , and the pin c^{13} will at such time be in contact with a conducting tooth of the wheel c^8 .

In order to prevent the battery running down while the arm c^7 is in engagement with the pen c^6 and while the pen c^{13} is in engagement with a conducting tooth on the disk c^8 , I prefer to employ the tumbler arm b^7 as one member of a circuit controller, the other member of which is the spring d^{30} , so that as soon as the tumbler is released by the energizing of the lock magnet b^5 , the circuit of said magnet will be opened substantially in an instant after the said circuit has been completed as above described.

When the bolt is moved backward to unlock the door, the ratchet wheel f^4 is moved the distance of two teeth so as to turn the index or pointer f' the distance of two gradua-

tions on the lock indicator or dial f , whereby the employer may have a record or indication at the lock that the said lock has been operated after the hour for closing.

5 The lock indicator is especially advantageous in that it prevents short circuiting or cutting the circuit wires, &c., for the lock cannot be opened without showing it on the dial, even though no record is made at the
10 central station, and if the door is opened while the electric circuits remain intact, the lock indicator will agree with the number of indications or marks on the recording surface d' .

In order to prevent an employé from short
15 circuiting the register and then operating the lock indicator a sufficient number of times to cause it to agree with the registration on the recording surface d' at the central office, the ratchet wheel f^4 is rendered inoperative after
20 the lock has been opened and closed a sufficient number of times, to bring the pointer or index f' in register with a predetermined indication on the dial, herein shown as 18. The ratchet wheel f^4 may be rendered inoperative as represented in Fig. 2 by securing
25 to it a blank or guard h , which prevents the push pawl f^5 from engaging the teeth of the ratchet after the ratchet wheel has been turned to bring the index to the predetermined indication on the dial, and as a result,
30 a further movement of the bolt mechanism will cause the push pawl f^5 to push back and forth on the blank or guard h , thus preventing the lock indicator from being turned beyond the highest registration by movement
35 of the bolt and requiring the said indicator to be reset to zero by the employer.

At certain times, say for instance when taking account of stock in the store, it may
40 be desired to render the employé's key operative at any time during specified hours, and to effect this result, a circuit controller included in a shunt around the central office apparatus is arranged so as to render the employé's key operative for any desired time.
45 This may be effected as shown in Fig. 6, by means of a circuit controller having its movable member m , shown as a pivoted lever, joined by wire m' to the binding post e^{13} , and
50 its co-operating member, shown as a stud m^2 , joined by wire m^3 to the binding post e^{10} , so that when the member m is moved into engagement with the member m^2 , the shunt circuit around the receiving apparatus is closed, the bolt a , at such time, being supposed to be
55 in its socket. By an inspection of Fig. 6, it will be seen that as soon as the tumbler arm b^x is brought into engagement with the contact pen d^{30} , on the forward movement of the bolt a to lock the door, the shunt circuit will be closed in the lock and the magnet b^5 energized to release the said tumbler and permit it to drop in position to be operated by the employé's key from outside the door. This
60 shunt circuit may be traced as follows:—viz:—from the positive pole of the battery B' by wire e^{18} , binding post e^3 , lock mechanism

and tumbler arm b^x to contact pen d^{30} , thence by wire e^8 , magnet b^5 , wire e^7 , binding post e^4 , wire e^{20} to binding post e^{10} , thence by wire m^3 ,
70 contact stud m^2 , lever m , wire m' to binding post e^{13} , thence by wire e^7 to the negative pole of the battery B' .

At the expiration of the predetermined time, the switch or circuit controller m may
75 be moved to open the shunt circuit and thereby render the employé's key inoperative on the locking of the door until the regular opening hour. This circuit controller just referred to, may be in itself a time movement
80 operated by a clock, but is herein shown as a manually operated switch.

I may prefer to use the construction of lock indicator herein shown and described, but I
85 do not desire to limit my invention in this respect, as it is evident I may employ instead thereof, a continuous counter after the manner of the ordinary gas meter indicator or such as commonly employed for recording
90 the revolutions of shafting.

For convenience in construction, I prefer to make the toothed disks or wheels c^8 , c^{8c} as
95 herein shown, but it is evident that the same may be made in other ways, for instance, a single metal disk may be used having its alternate teeth made of insulating material.

I claim—

1. In an electro-protective system, the combination of the following instrumentalities, viz:—a lock provided with a circuit controller,
100 and a registering apparatus provided with an electro-magnet in circuit with said circuit controller and energized by the operation of the said lock, substantially as described.

2. In an electro-protective system, the combination of the following instrumentalities, viz:—a lock constructed to be operated by
105 either of two keys in one condition and to be operated by only one of said keys in another condition, an armature in said lock to hold it in its second condition, an electro-magnet to operate said armature to restore the lock into its first condition, and a circuit controller to govern the operation of said electro-magnet,
110 substantially as described.

3. In an electro-protective system, the combination of the following instrumentalities, viz:—a lock constructed to be operated by
115 either of two keys in one condition and to be operated by only one of said keys in another condition, an armature in said lock to hold it in its second condition, an electro-magnet to operate said armature to restore the lock into its first condition, a clock mechanism, a circuit controller for said electro-magnet operated by said clock mechanism to close the circuit at a predetermined interval of time, and
120 a second circuit controller operated by the clock mechanism to close the circuit including the electro-magnet at a predetermined interval of time less than the first interval of time, substantially as described.

4. In an electro-protective system, the combination of the following instrumentalities,

viz:—a lock provided with a circuit controller, and a registering apparatus provided with a recording surface, a marking device to operate thereon, and an electro-magnet in circuit with said circuit controller and energized by the operation of said lock, substantially as described.

5. In an electro-protective system, the combination of the following instrumentalities, viz:—a lock constructed to be operated by either of two keys in one condition and to be operated by only one of said keys in another condition, an armature in said lock to hold it in the second condition, an electro-magnet to operate said armature to restore the lock into its first condition, a registering apparatus provided with an electro-magnet, a circuit controller in the said lock actuated by the operation of the lock to energize the register electro-magnet, and a circuit controller at the registering apparatus to energize the lock magnet, substantially as described.

6. In an electro-protective system, the combination of the following instrumentalities, viz:—a lock constructed to be operated by either of two keys in one condition and to be operated by only one of said keys in another condition, a device in said lock to hold it in its second condition, an electro-magnet to operate said device to restore the lock into its first condition, a registering apparatus provided with an electro-magnet, a circuit controller in the said lock actuated by the operation of the lock to energize the register electro-magnet, a circuit controller at the registering apparatus to energize the lock magnet, and an indicator at the lock actuated by the operation of the lock, substantially as described.

7. A lock provided with a bolt mechanism and with a movable tumbler co-operating with the said bolt mechanism to permit the said bolt to be operated by either of two keys of different design or make, means rendered effective by the movement of the bolt to move said tumbler out of the path of movement of one of said keys to render said key inoperative, and means to restore the said tumbler to its normal position in the path of movement of its co-operating key to render the latter key again operative, substantially as described.

8. In an electro-protective system, the combination of the following instrumentalities, viz:—a lock constructed to be operated by either of two keys in one condition and to be operated by only one of said keys in another condition, a device in said lock to hold it in its second condition, an electro-magnet to operate said device to restore the lock into its first condition, a registering apparatus provided with an electro-magnet, a circuit controller in the said lock actuated by the operation of the lock to energize the register electro-magnet, and a circuit controller to energize the lock magnet, substantially as described.

9. In an electro-protective system, the combination of the following instrumentalities, viz:—a lock constructed to be operated by either of two keys in one condition and to be operated by only one of said keys in another condition, a device in said lock rendered effective by the movement of the bolt to hold it in its second condition, and means to operate said device to restore the lock into its first condition, substantially as described.

10. A lock provided with a bolt mechanism, and with a device to permit the said bolt mechanism to be operated by either of two keys of different make or design, means rendered effective by the movement of the bolt to operate said device to render one of said keys inoperative, and means to operate said device to render the said key again operative, substantially as described.

11. A lock provided with a bolt mechanism, and with a device to permit the said bolt mechanism to be operated by either of two keys of different make or design, means rendered effective by the movement of the bolt to operate said device to render one of said keys inoperative, and means to operate said device to render the said key again operative, and an indicating device to denote the number of operations of the lock to a predetermined number, substantially as described.

12. In an electro-protective system, the combination of the following instrumentalities, viz:—a lock provided with a circuit controller, a registering apparatus provided with an electro-magnet in circuit with said circuit controller and energized by the operation of said lock, a shunt circuit for said register magnet and a circuit controller for said shunt circuit, substantially as described.

13. The combination with a lock of an indicator responsive to the operation of the lock for a predetermined number, and means to render the said indicator non-responsive to the operation of the lock and yet permit the said lock to be operated after the said predetermined number of operations at which the indicator is rendered non-responsive, substantially as described.

14. The combination with a lock provided with a removable cover or plate, of a locking device for said cover or plate under the control of the key for the lock, substantially as described.

15. In an electro-protective system, the combination of the following instrumentalities, viz:—a lock constructed to be operated by either of two keys in one condition and to be operated by only one of said keys in another condition, an armature in said lock to hold it in one of said conditions, an electro-magnet to operate said armature to place the lock in the other of said conditions and a circuit controller to govern the operation of the said electromagnet, substantially as described.

16. In an electro-protective system, the combination of the following instrumentalities, viz:—a lock provided with a circuit controller,

a registering apparatus provided with an electromagnet in circuit with the circuit controller and governed thereby, substantially as described.

- 5 17. A lock constructed to be operated by two keys of different make or design, means rendered effective by the act of locking with either key to render the lock inoperative to be unlocked by one of said keys, and means
10 to restore the lock to an operative condition

to enable the inoperative key to again become operative, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MORRIS MARTIN.

Witnesses:

JAS. H. CHURCHILL,

J. MURPHY.