E. S. PHELPS.

RECORDING TIME LOCK.

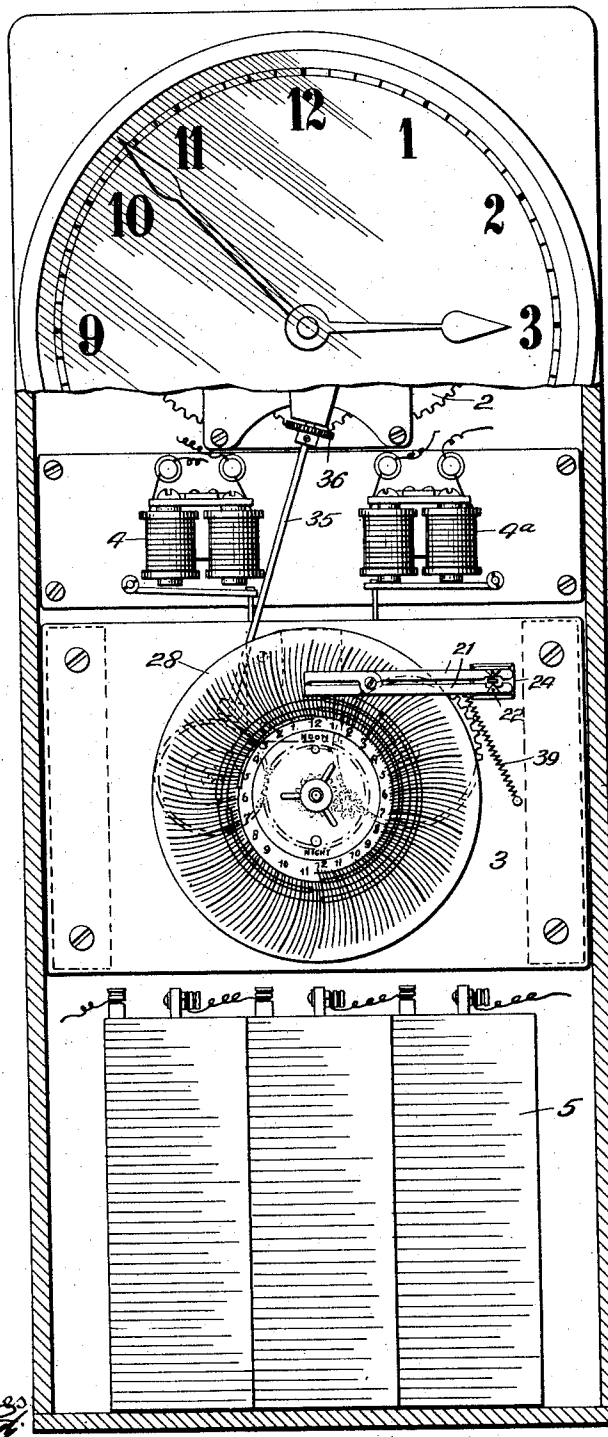
APPLICATION FILED JUNE 9, 1915.

1,314,427.

Patented Aug. 26, 1919.

5 SHEETS—SHEET 1.

Fig. 1.



Witnesses

Julius A. Ahrens

Inventor

Edwin S. Phelps.

By his Attorney

A. E. Henderson.

THE COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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5 SHEETS—SHEET 2.

Fig. 2.

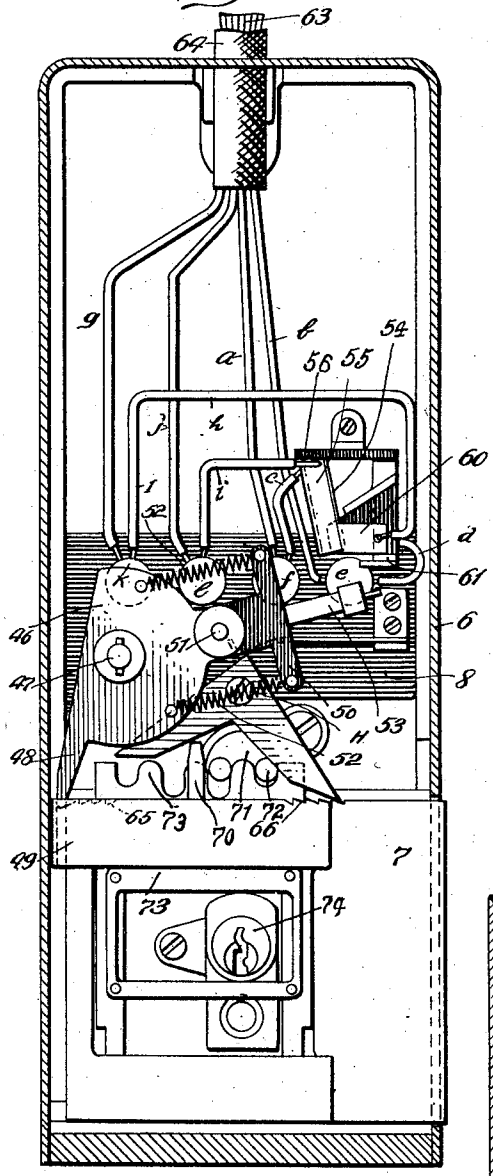
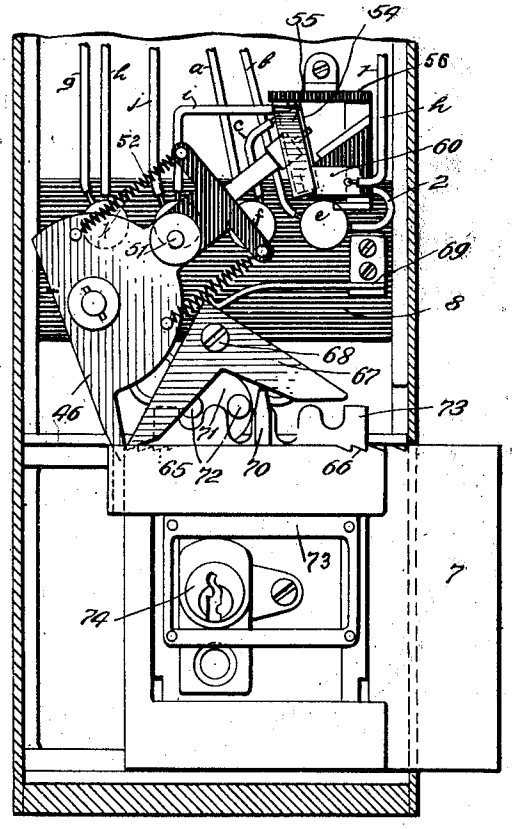


Fig. 3.



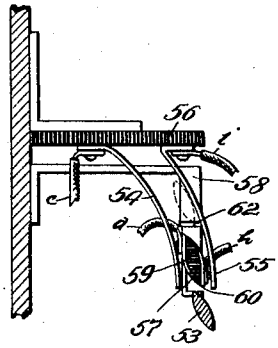


Fig. 4.

Witnesses:

Julia A. Fritz

Inventor

Edwin S. Phelps

By his Attorney

H. E. Thurman

THE COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

E. S. PHELPS.

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5 SHEETS—SHEET 3.

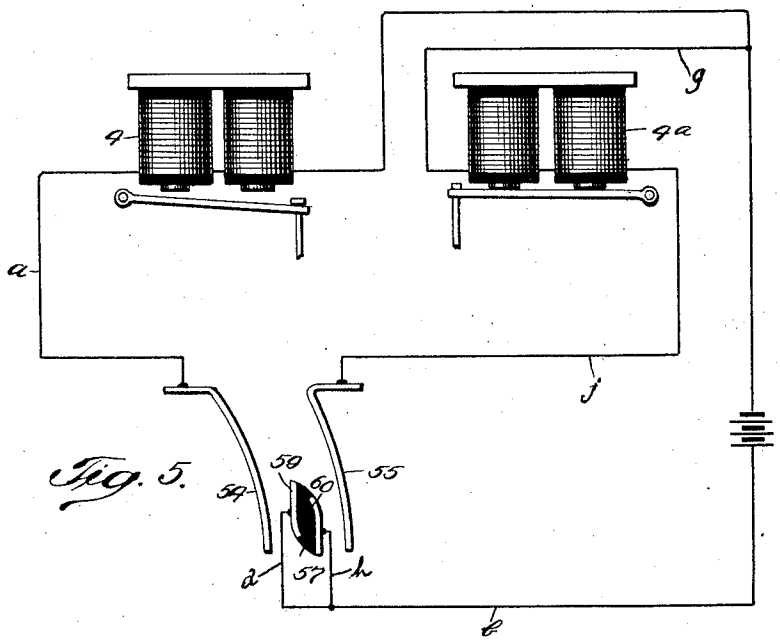


Fig. 5.

Fig. 6.

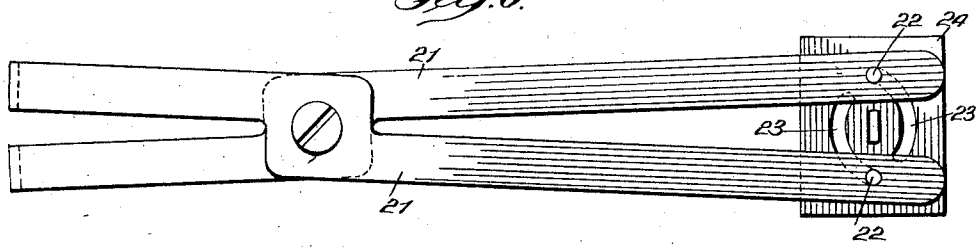
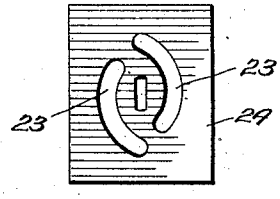


Fig. 7.



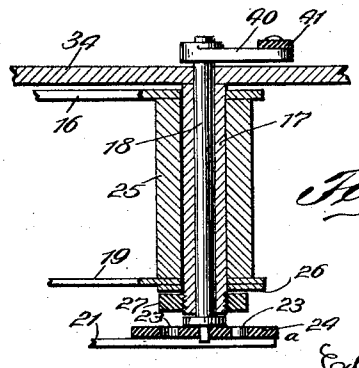


Fig. 8.

Witnesses:

Inventor
Edwin S. Phelps.

By his Attorney

THE COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

E. S. PHELPS.

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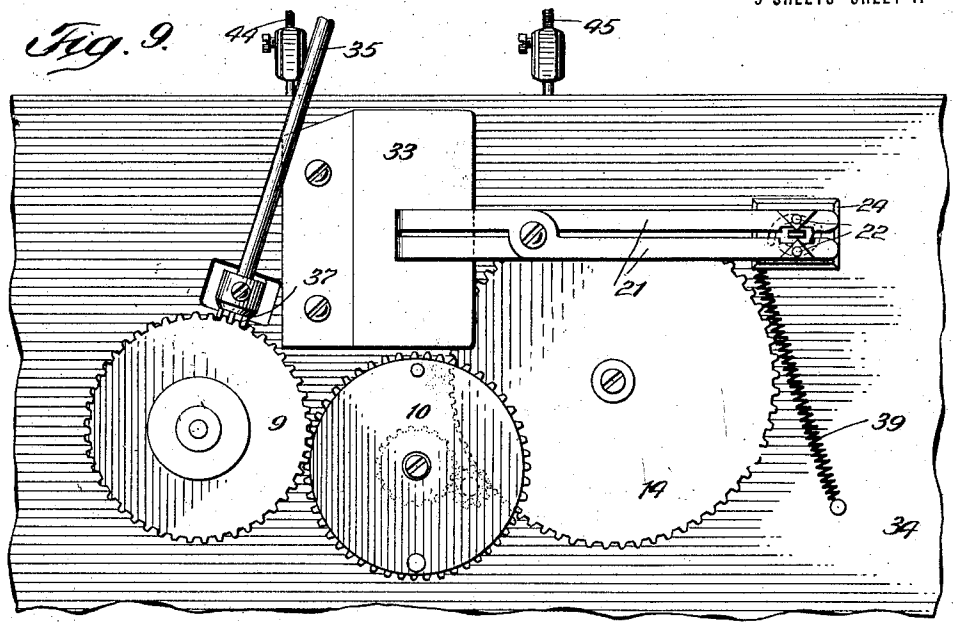
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5 SHEETS—SHEET 4.

Fig. 9.



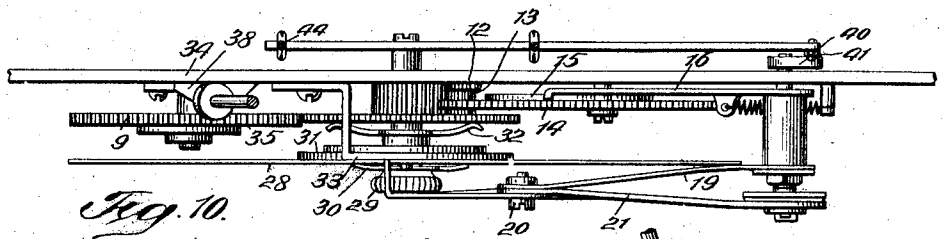
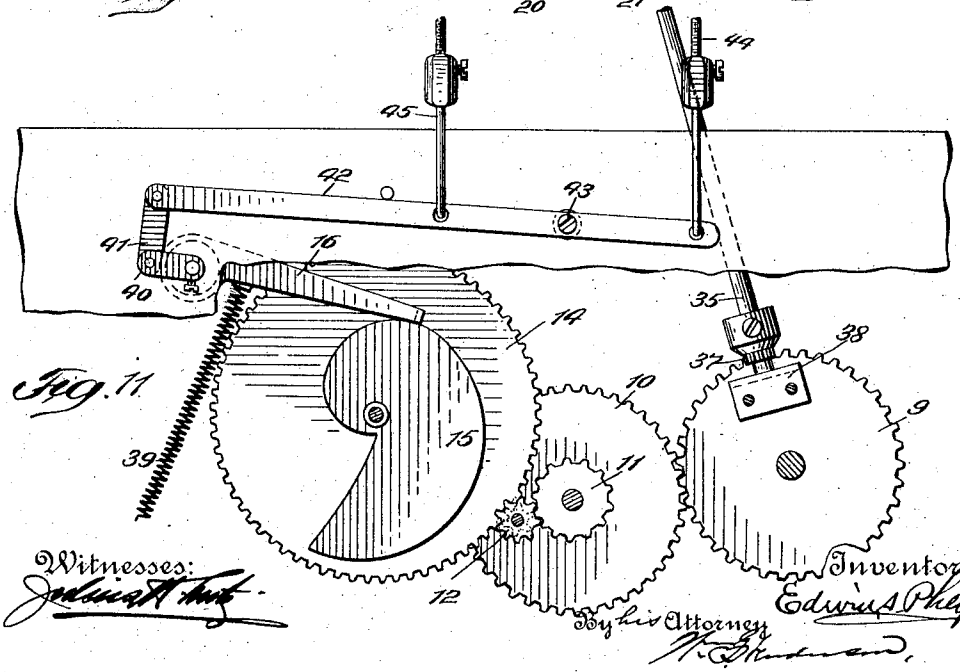


Fig. 10.

Fig. 11.



Witnesses:

Inventor
Edwin S. Phelps

By his Attorney

THE COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

E. S. PHELPS.

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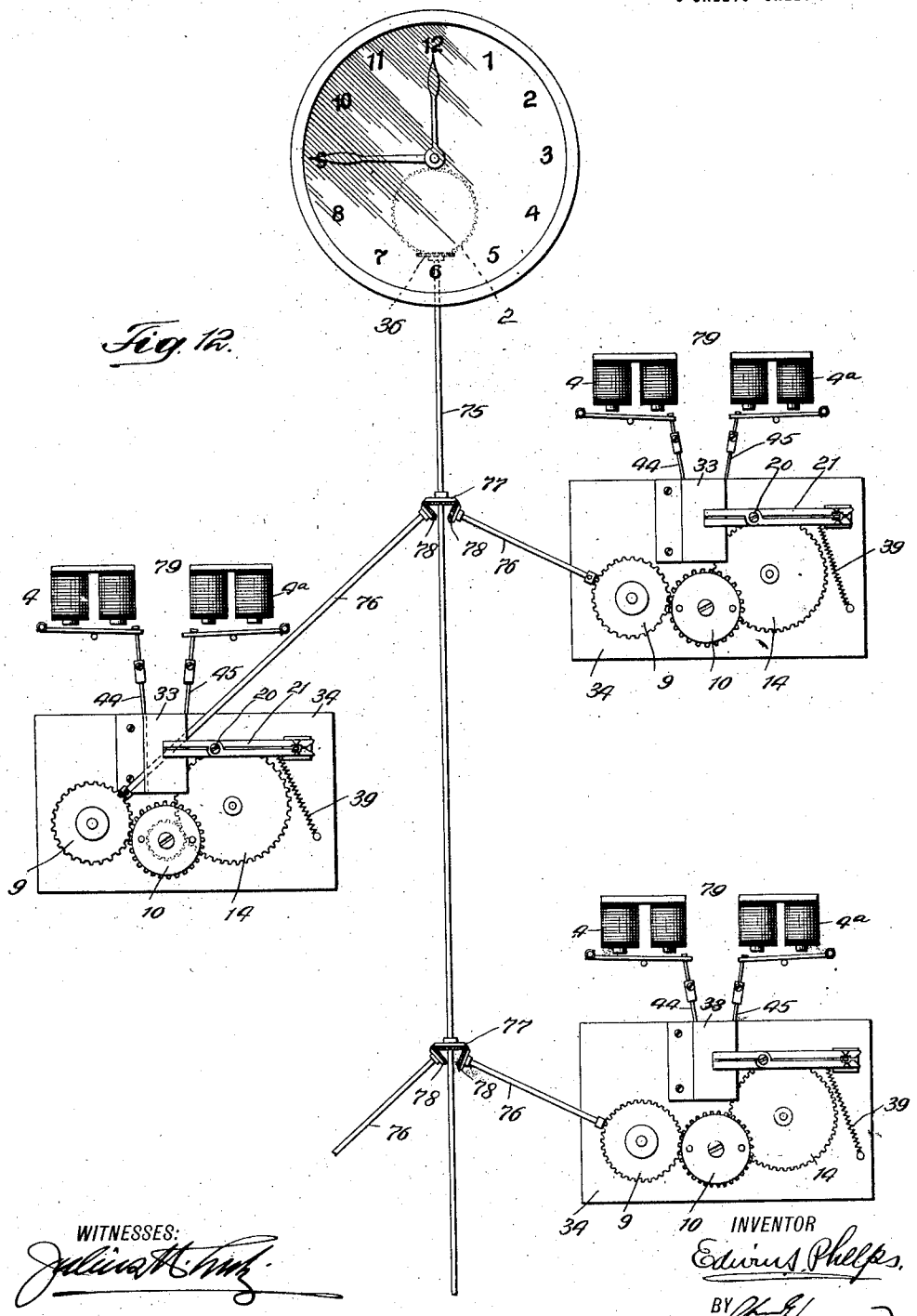
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5 SHEETS—SHEET 5.

Fig. 12.



WITNESSES:

INVENTOR

Edwin S. Phelps.

BY

ATTORNEY

UNITED STATES PATENT OFFICE.

EDWIN SANFORD PHELPS, OF ELIZABETH, NEW JERSEY.

RECORDING TIME-LOCK.

1,314,427. Specification of Letters Patent. Patented Aug. 26, 1919.

Application filed June 9, 1915. Serial No. 33,074.

To all whom it may concern:

Be it known that I, EDWIN S. PHELPS, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Recording Time-Locks; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to time-recording locks in which is made a record of throwing the lock-bolt in opening and also in closing the door as well as the length of time the door has remained unlocked and also locked, the dial upon which the record is made being divided into hours and fractions of hours of the day so that it will furnish a permanent and reliable record indicating to the proprietor or manager the time of closing the store at the end of business and the time of opening for business as well as furnishing a record whether the store has been opened between such times and the length of time it remained open.

One object of the present invention is to enable the recording mechanism to be located at a point remote from the door carrying the lock and whose movements are to be recorded so that the same opportunity is not afforded for tampering with the record as when it is carried on the door with the lock, and so as to relieve the recording mechanism from disturbances due to opening and shutting the door. It also makes it possible to have the recording mechanisms of a number of doors to be actuated or driven from a central motive power so that all the recording mechanisms will be driven in unison. It has also for its object to provide for shifting the marking stylus from one position to another to record the locking and the unlocking of the door by an electric circuit controlled by a switch operated by connections with the door bolt. It has further for its object to provide for the compulsory throwing of the door-bolt to the completion of its stroke in one direction before it can be retracted or thrown in the other direction thus positively insuring the making of a record of the locking as well as the unlocking movements of the lock-bolt.

To the accomplishment of the foregoing and such other objects as may hereinafter appear the invention consists in the features hereinafter particularly described and then sought to be clearly defined by the claims, reference being had to the accompanying drawings forming a part hereof, and in which—

Figure 1 is a front elevation of the casing which contains the clock-mechanism, recording mechanism, electro-magnets, and battery;

Fig. 2 a vertical section through the lock-casing, showing the lock-bolt and circuit controlling switch in the unlocked position of the bolt;

Fig. 3 a vertical section through a portion of the lock-case showing the lock-bolt and circuit controlling switch in the locked position of the bolt;

Fig. 4 is a detail view looking from the left of Fig. 2, showing the relation of the contact plates to one another;

Fig. 5 a diagrammatic view of the electrical circuit which includes the stylus and electro-magnets;

Fig. 6 is a detached view of the marking stylus, on an enlarged scale;

Fig. 7 is a detached view of the arc-slotted plate which spreads and contracts the marking stylus points;

Fig. 8 is a horizontal section through parts of the stylus operating means and snail-arm;

Fig. 9 is a front view of parts of the recording mechanism, enlarged scale;

Fig. 10 is a top plan view of the parts shown in Fig. 9;

Fig. 11 is a side view taken from the opposite side of Fig. 10, also on an enlarged scale, and with a portion of the base-plate broken away;

Fig. 12 is a diagrammatic view having a number of recording mechanisms for as many locks connected with the central clock mechanism from which power is transmitted to the several recording mechanisms.

In the drawings the numeral 1 designates a casing containing any preferred type of clock mechanism 2, a recording mechanism 3, electro-magnets 4, the armatures of which are connected as hereinafter described with the recording mechanism, and battery-cells

from which the electro-magnets derive their energy. This casing will be supported upon the wall or other suitable support in the room of the building where located.

Upon the door, the operation of whose lock in the act of locking and unlocking is to be recorded, is placed the lock-casing 6 which contains the lock-bolt 7 and its manipulating parts and also electric-circuit controlling switch mechanism 8 which will be electrically connected with the electro-magnets of the recording mechanism so that the movement of the lock-bolt in locking and unlocking the door will be reliably recorded by the recording mechanism. By locating the time mechanism and recording mechanism on a support independent of the door carrying the lock such mechanisms are removed from the disturbing conditions incident to opening and closing or slamming of the door and may be located at any remote point from the door. This also makes it possible to connect a number of door-locks and their several recording mechanisms with a central power-means for operating all of the recording mechanisms of the series of locks.

The recording mechanism proper comprises a train of gears consisting of a wheel 9 meshing with a wheel 10 to one side of which is a toothed drum 11 which meshes with a pinion 12 on the shaft of which is another pinion 13 in mesh with the teeth of a wheel 14 which has on one face a snail 15 upon the periphery of which bears one end of an arm 16 the other end of which is attached to a sleeve 17 mounted on a shaft 18 rotatable within the sleeve, said sleeve also having attached thereto an arm 19 upon the free end of which is fulcrumed by a pivot 20 a two-part stylus comprising the arms 21 and having their rear ends provided with pins 22 fitting in arc-shaped slots 23 formed in a plate 24 fitted to the angular end of shaft 18 so that as said shaft is partially rotated in one direction or another the marking ends of the stylus will be separated or be brought together to make a double or a single line upon the record-sheet to indicate the different positions of the door-bolt as hereinafter specified, one character of line indicating one position and the other character a different position of the bolt. The snail-arm 16 and stylus fulcrum-arm 19 are spaced from each other by a bushing 25, and a washer 26 and nut 27 may be used to hold the parts assembled. The record-receiving dial 28 may be of sensitized paper such as commonly used for the purpose and graduated radially into hours and fractions thereof as usual, and is held in place by a thumb-nut 29, spring clamp 30, plate 31 and adjustable friction-plate 32 as well known in the art. Back of the record-receiving dial where the stylus makes inscriptions thereon is a backing plate 33, which together with the other parts are attached to a base-plate 34 suitably secured to the casing 1. The train of gears mentioned is driven from the clock mechanism 2 through a connecting rod 35 which has at one end a toothed wheel 36 meshing with a wheel of the clock mechanism and at the other end a toothed wheel 37 meshing with the wheel 9 of the train of gears, the connecting rod being sustained by a bracket 38 secured to the base-plate 34. The record-receiving dial makes one revolution in 24 hours, and the snail moves the stylus radially proportionately to the seven days of the week as under previous constructions, and its arm 16 being held in contact with it by a spring 39.

The contraction as well as the expansion of the stylus for effecting a lighter or a heavier marking for indicating the locked or the unlocked position of the lock-bolt, for instance a single line for one position, which may be the locked position, and a double line for the other, or unlocked position, or vice versa, is electrically controlled, for instance by electro-magnets energized and de-energized by a circuit controlling switch shifted to its different positions in throwing the door or lock-bolt into its locked and its unlocked positions. A desirable construction for the purpose is as follows.

To the end of the shaft 18 is attached a crank arm 40 which is connected by a link 41 to one end of a lever 42 fulcrumed at 43. This lever is connected at one side of its fulcrum by a rod 44 to the armature of the pair of electro-magnets 4, and at the other side of its fulcrum by a rod 45 to the armature of the other pair of magnets 4^a so that when one pair of magnets is energized the shaft 18 will be turned in one direction so as to partially rotate the plate formed with the arc-slots to contract or draw the points of the stylus together to make a single mark or inscription on the dial, and when the other pair of magnets is energized the pull on the lever will be to the other side of its fulcrum so as to partially rotate the shaft 18 in the other direction and thus separate the marking points of the stylus and cause them to make a double or two marking lines as long as they so remain. One marking will indicate the lock-bolt in one position, and the other marking the other position. If the bolt be thrown partially quickly in one direction and then in the other, the stylus will make a short radial mark broader than a single line marking and not as broad as two lines, and thus indicate a manipulation of the bolt insufficient however to materially move the bolt to any practical extent.

The switch for controlling the circuits which include the magnets is carried by the lock-bolt casing and is connected with so as

to be actuated from the lock-bolt. A suitable construction for the purpose is a rocking member 46 mounted on a pivot 47 and having a dog 48 whose point fits in a recess formed in a part 49 of the bolt 7 so that as the bolt is thrown forward the member 46 will rock in one direction and as the bolt is thrown back it will rock in the other direction. The member 46 carries a member 50 which preferably is made of some insulating material and is attached to the member 46 by a pivot pin 51 so as to oscillate under the restraint of springs 52, and it carries a contact member 53 which has a reduced extremity and back thereof is preferably elliptical in cross section as shown best in Fig. 4. In the path of to and fro travel of the contact member 53 are two spring contact plates 54 and 55 spaced apart from each other and sustained from an insulated support 56, and between these contact plates, near the lower ends thereof, is a member 57 of insulating material supported by a bracket-arm 58 and having contact plates 59 and 60 attached to opposite faces thereof.

Contact plates 54 and 59 are in circuit with the battery 5 and electro-magnets 4^a through conducting wires *a*, *b*, *c*, *d*, and binding posts *e*, and *f*, the wire *a* leading from battery and *b* to the electro-magnets. Contact plates 55 and 60 are in circuit with battery 5 and electro-magnets 4 through conducting wires *g*, *h*, *i*, and *j*, and binding posts *k* and *l*, the wire *g* leading from battery and *j* to the electro-magnets.

In throwing the bolt 7 from its unlocked position shown in Fig. 2 to its locked position shown in Fig. 3, in its travel it pulls on the dog 48 so as to rock the member 46 which moves the member 50 and its contact member 53 upward in the arc of a circle. In its travel the extremity of the contact 53 strikes against a retarding member 61 which causes the contact 53 to lag while the member 46 continues to turn on its axis, the member 50 during such time turning on its pivot and the upper spring 52 being put under tension. The purpose of this lagging is to permit the lock-bolt to travel sufficiently to engage its keeper before the recording stylus will be actuated to record the locked position of the bolt. When the member 46 has turned far enough for the contact 53 to pass from engagement with the retarding member the contact member 53, will pass up between and in contact with the spring contact plate 54 and contact plate 59 on the member 57. When this contact is made the circuit including the pair of magnets 4^a is closed and the magnets energized so as to attract their armature and pull on the lever 42 through the rod 44 so as to close or contract the marking points of the stylus and thus cause the stylus to make a single inscription line on the record-receiving dial which will be the locked position of the bolt. The contact member 53 will pass from contact with the spring contact plate 54 and contact plate 59 before or by the time that the bolt has reached its full locking position, and as soon as it does the circuit will be broken and the pair of magnets deënergized, leaving, however, the contact member 53 of the switch standing in a raised position, shown in Fig. 3, in which it remains until the bolt is to be thrown into its unlocked position.

In retracting the bolt from its locked position shown in Fig. 2, the bolt carries with it the rocking switch member 46 which causes the contact arm 53 to move downward in an arc and as its extremity comes in contact with a retarding member 62 it lags until the member 46 has turned far enough to disengage the member 53 from the retarding member whereupon the recoil of the lever spring 52 will carry the contact member 53 between and in contact with the spring plate 55 and contact plate 60 on the member 57, thereby closing the circuit which includes the pair of electro-magnets 4 which then become energized and attract their armature so as to pull on lever 42 through the connecting rod 45 and rotate shaft 18 and its arc slotted plate 24 so as to expand or spread the marking points of the stylus to effect a record on the receiving dial of two inscribed marking lines which under this form of the invention will indicate the unlocked position of the lock-bolt, which inscription will continue to be made so long as the bolt is in its unlocked position. As soon as the contact member passes from the spring plate 55 and contact plate 60 the circuit will be broken and the pair of magnets deënergized and the parts will be in the position shown in Fig. 2 ready for the next locking operation of the bolt.

In order to prevent cutting or short circuiting of the electrical conductors between the recording mechanism and the switch mechanism with the view of tampering with the operative parts so as to avoid making a record of the manipulation of the bolt, the conducting wires *a*, *b*, *g*. *j*, are associated or inclosed with a bunch or number of other dummy or disconnected wires as shown at 63 and the whole incased with a covering 64 so that a person fraudulently inclined will not know which are the active and which the inactive wires, and thus additional protection afforded against fraudulent practices.

To make it impossible to move the bolt in an opposite direction after starting to move it in one direction and to compel a completion of its movement in the direction started so as to insure the making of a record of its throw to the locking as well as to the unlocking position and thus insuring a

reliable record of the bolt's manipulation, a part of the bolt, for instance the plate 49, is provided at one end with a series of ratchet teeth 65 and at the other end with ratchet teeth 66 so inclined that the engagement of a locking dog therewith will prevent retrogressive movement of the bolt. A dog suitable for the purpose is indicated by the numeral 67, which dog is free to rock or oscillate upon a pivot 68 and which will be held in the position to which it is thrown by a spring 69 adapted to bear against one face or the other of the dog according to the position into which the dog is thrown. This dog is oscillated so as to change its position and bring one leg or the other into operative relation to the ratchet of the bolt, by a pin or stud 70 carried by the bolt and positioned so that in throwing the bolt in one direction the pin will strike the underface of one of the legs of the dog and oscillate the latter so that its other leg will be depressed or lowered to engage the adjacent ratchet teeth of the bolt and prevent retrogression of the bolt. When the bolt has about completed its throw the finger or stud will strike the leg of the dog in engagement with the ratchet at that end and lift it out of engagement so that the other leg will engage with the ratchet teeth at the other end in which position it will be held by the spring 69 so that in the throw of the bolt the teeth will glide beneath the leg of the dog but prevented by the dog from being moved in the other direction. Figs. 2 and 3 of the drawing give a clear illustration of the operation described. The provision mentioned gives additional security against fraudulent manipulation of the bolt and recording mechanism.

The bolt 7 is thrown into locking and into unlocking position by a tumbler-lock 71 operable by a key from the outside and having studs 72 working in a slide rack 73 connected with the bolt, or by a key applied from the inside to the tumbler-lock 74 which in its movement will lower the slide rack 73 from engagement with the studs of the lock 71, as in an old and well known manner.

In Fig. 12 of the drawing is illustrated the application of the invention so that a series of recording mechanisms (one being employed for each lock) may be connected to the clock driving means so that the recording mechanism of as many locks as may be employed will all be driven from the same clock mechanism. To enable that to be done a main shaft 75 operatively connected with the clock mechanism 2 will have power transmitting rods 76 operatively connected therewith, for instance by bevel gears 77 and 78 and will extend to the recording mechanisms 79 to be actuated or driven by them. In the drawing only three recording mechanisms are illustrated, and the transmitting rod of a fourth one. As each of these recording mechanisms will be similar and like that one already particularly described it is only necessary to show them in a somewhat diagrammatic manner, and to the parts illustrated have been applied reference numerals corresponding to those for like parts in the figures previously described. It will also be understood that each lock will be connected to its appropriate recording mechanism in the same manner as has been described in connection with the other figures of the drawing and therefore a further illustration and description thereof is unnecessary. From this description it is obvious that any number of door-locks in a building may be connected up with a central power driving means for all the series of recording mechanisms the advantage of which will be apparent to those skilled in the art without further amplification.

I have illustrated and described the preferred construction of the various parts but it is to be understood that changes may be made in the details and the essential features of the invention retained.

The phrase "operably connected with the lock-bolt" when employed herein means any suitable connection with some suitable part of the lock mechanism by which movement of the bolt will be communicated to the recording mechanism.

Having described the invention and set forth its merits what I claim is:

1. In a time-lock, a lock-bolt mounted upon a door, recording mechanism mounted upon a support independent of the door and including a continuously moving record-receiving member and a record-making member, and means operatively connecting the record-making member with the lock-bolt for recording the movement of the bolt.

2. In a time-lock, a lock-bolt mounted upon a door, a continuously moving record-receiving member and a stylus mounted upon a support independent of the door, and means operatively connecting the stylus with the lock-bolt to move therewith for recording the movement of the bolt.

3. In a time-lock, a lock-bolt mounted upon a door, a record-receiving member and stylus mounted upon a support independent of the door, an electro-magnet operatively connected with the stylus, an electric-circuit in which the magnet is included, and a controlling switch for the circuit operatively connected with the lock-bolt for making a record of the change of position of the lock-bolt.

4. In a time-lock, a lock-bolt mounted upon a door, a continuously moving record-receiving member and a stylus mounted upon a support, independent of the door, a plurality of electro-magnets operatively connected with the stylus, an electric-circuit in

which the magnets are included, a controlling switch for the circuit operably connected to move with the lock-bolt, and electrical-contacts positioned for engagement of the switch therewith, the engagement of the switch with one set of contacts serving to influence one magnet for recording one position of the lock-bolt and engagement with the other set effecting a record of another position of the lock-bolt.

5. In a time-lock, a lock-bolt, a record-receiving member and stylus, an electro-magnet operatively connected with the stylus, an electric circuit in which the magnet is included, and a controlling switch for the circuit operably connected to move with the lock-bolt for making a record of the change of position of the lock-bolt.

6. In a time-lock, a lock-bolt, a record-receiving member and stylus, a plurality of electro-magnets operatively connected with the stylus, an electric-circuit in which the magnets are included, a controlling switch for the circuit operably connected with the lock-bolt, and electrical-contacts positioned for engagement of the switch therewith, the engagement of the switch with one set of contacts serving to influence one magnet for recording one position of the lock-bolt and engagement with the other set effecting a record of another position of the lock-bolt.

7. In a time-lock, a lock-bolt, a record-receiving member and stylus, an electro-magnet operatively connected with the stylus, an electric-circuit in which the magnet is included, and a controlling switch for the circuit operably connected to move with the lock-bolt for making a record of the change of position of the lock-bolt, said switch having a yielding contact-arm, and a retarding device for engagement with the yielding contact-arm to cause the latter to lag in the movement of the lock-bolt.

8. In a time-lock, a lock-bolt, a record-receiving member and stylus, an electro-magnet operatively connected with the stylus, electrical conductors forming part of an electric-circuit in which the magnet is included, a protecting shield for said conductors comprising a bunch of strands assembled about the conductors, and a controlling switch for the electric-circuit operably connected with the lock-bolt for making a record of the change of position of the lock-bolt.

9. In a time-lock, a lock-bolt, a recording mechanism including a continuously moving record-receiving member and a stylus, means operatively connecting the recording mechanism with the lock-bolt for recording a change of position of the bolt, and means for preventing retraction of the bolt until it has been moved to a predetermined position.

10. In a time-lock, a lock-bolt, a recording mechanism including a record-receiving member and stylus, means operatively connecting the recording mechanism with the lock-bolt for recording a change of position of the bolt, and an oscillating dog for engagement with a part of the lock-bolt to prevent its retrogression in one direction when moved in an opposite direction until it has reached a predetermined position.

11. In a time-lock, a lock-bolt, a recording mechanism including a record-receiving member and stylus, means operatively connecting the recording mechanism with the lock-bolt for recording a change of position of the bolt, an oscillating dog for engagement with a part of the lock-bolt to prevent its retrogressive movement, and a member carried by the bolt to disengage the dog from interlocking engagement with the bolt.

12. In a time-lock, a plurality of recording mechanisms including each a continuously moving record-receiving member and a stylus for coöperative connection with a corresponding number of lock-bolts for recording a change in position of each bolt, and a central power driving-means operatively connected with the several recording mechanisms for transmitting movement thereto.

In testimony whereof I affix my signature in presence of two witnesses.

EDWIN SANFORD PHELPS.

Witnesses:
LOUIS A. FLACK, JR.,
BELLA SCHMEELK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."