

H. GROSS.

LOCK MECHANISM FOR SAFES.

No. 315,612.

Patented Apr. 14, 1885.

Fig. 1.

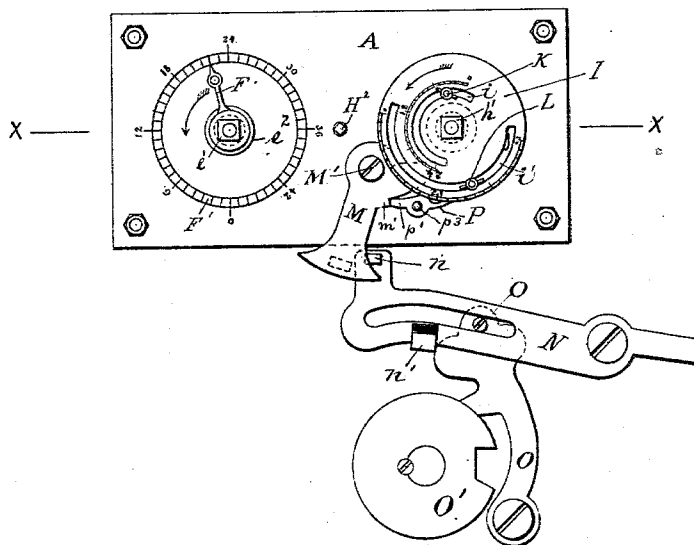


Fig. 2.

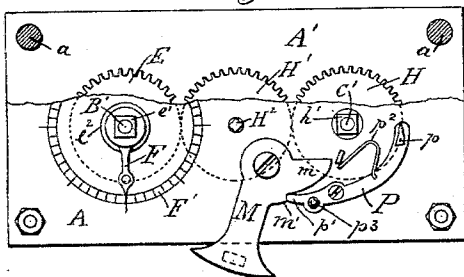


Fig. 3.

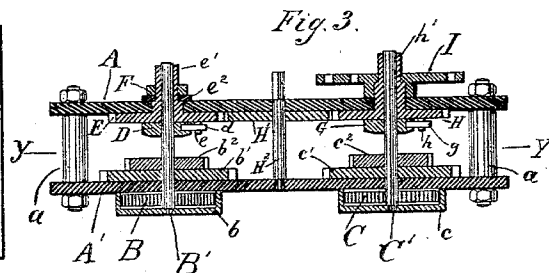


Fig. 4.

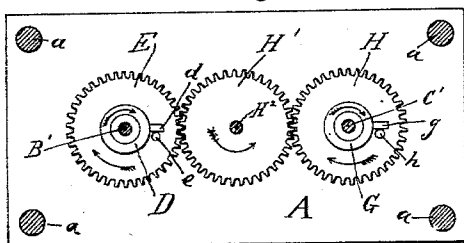
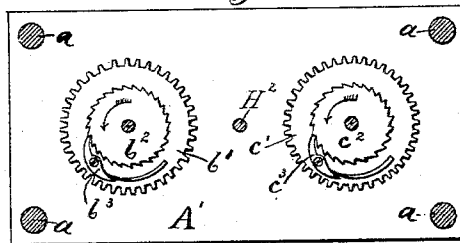
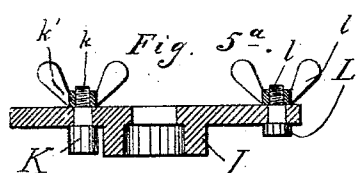


Fig. 5.



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Fig. 6.

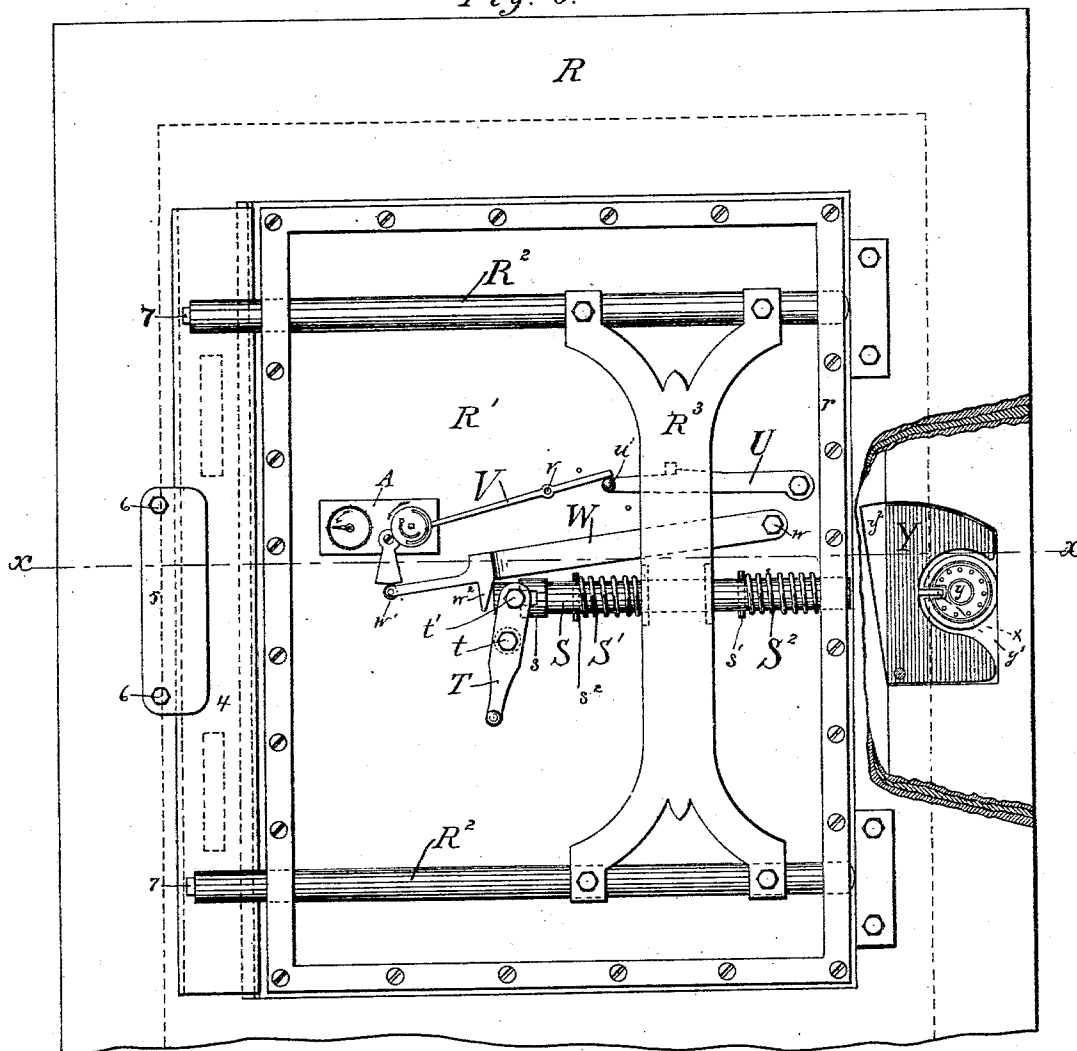
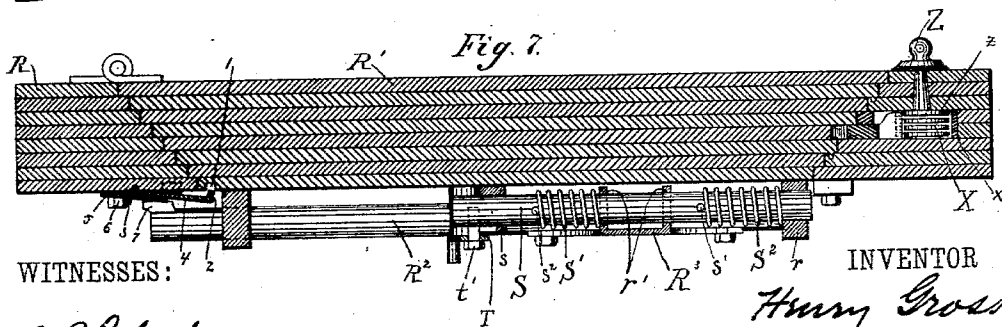


Fig. 7.



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Patented Apr. 14, 1885.

Fig. 8.

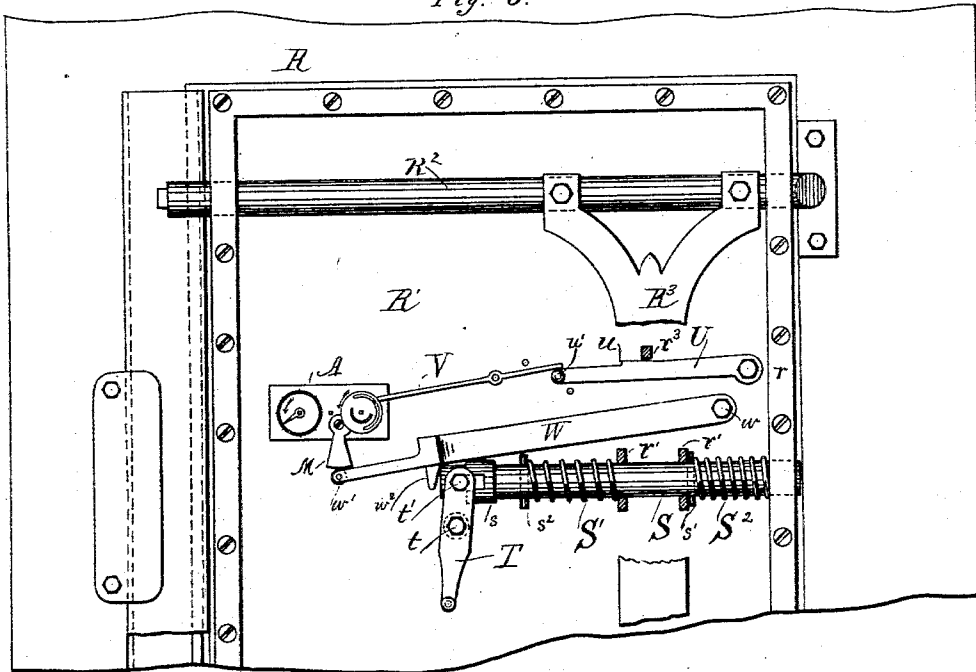


Fig. 9.

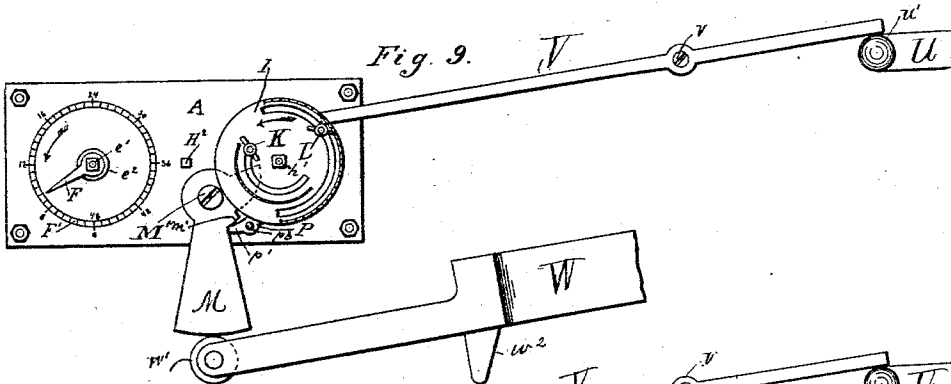


Fig. 10.

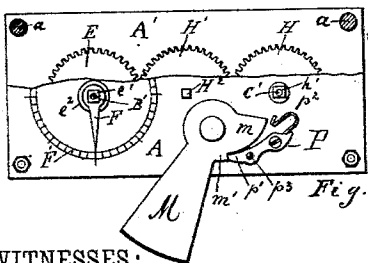
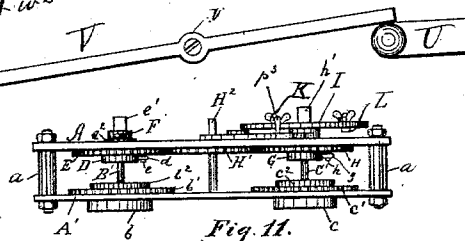


Fig. 11.



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HENRY GROSS, OF CHICAGO, ILLINOIS.

LOCK MECHANISM FOR SAFES.

SPECIFICATION forming part of Letters Patent No. 315,612, dated April 14, 1885.

Application filed April 3, 1884. (No model.)

To all whom it may concern:

Be it known that I, HENRY GROSS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have
5 invented certain new and useful Improvements in Lock Mechanism for Safes, of which I do declare the following to be a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this
10 specification.

In the construction of lock mechanism for the doors of burglar-proof safes or vaults as at present commonly practiced, it is customary to provide the permutation or other suitable
15 lock controlling the movement of the bolt-work with a time-lock upon the inside of the safe, which acts as a guard to prevent the operation of the bolt-work of the safe during a predetermined period and until the time-lock is automatically released and ceases to act as a guard.
20

In lock mechanism of this description a number of serious difficulties are encountered. For example, it sometimes happens that in setting the time-lock the hand of the dial or the indicator-pointer is moved too far, and in such
25 case, as this hand cannot be turned back, the safe must necessarily remain locked longer than is desired, thereby occasioning serious inconvenience.

One of the objects of my present invention is to provide means whereby mistakes of this kind can be corrected and the delay in the opening of the safe can be avoided. In the time-locks at present employed it is also customary to provide two separate clock-movements, each with a tripping device for releasing at the desired time the guard that checks the operation of the bolt-work, so that in case
35 either of said movements stops, the other will release the guard. As these separate clock-movements are independent of each other, it is necessary to set each separately, and if, through carelessness or accident, one is not set and the other stops, it becomes necessary to
40 drill or break open the safe.

My present invention has for its further object to provide means whereby the two clock-movements can be simultaneously set and will move in unison, so that in case the spring of
50 either movement fails to act that of the other movement will with certainty operate the guard-releasing device.

In an invention heretofore made by me, on which a patent was granted of the 8th day of February, 1876, provision was made whereby
55 the guard of the time-lock could be brought into action to check the operation of the bolt-work at a time subsequent to the setting of the time-lock, so that in case it was desired to use the safe a short time after the setting of the
60 time-lock, as in the evening, the bolt-work could be operated until such hour as the guard of the time-lock should be automatically thrown into action. In such construction, however, the two clock-movements were in-
65 dependent of each other, so that in case of any accident to the movement that carried the tripping device for automatically bringing the guard into action the time-lock would serve no useful purpose. By the present inven-
70 tion the tripping device that throws the guard of the time-lock into action at any desired hour subsequent to the setting of such lock, is caused to operate with certainty so long as either of the clock-movements is effective.
75 Again, in the usual construction of lock mechanism the arbors or spindles of the permutation-lock, and of the knob for operating the bolt-work, extend through the door or wall of the safe and constitute its weakest point, as
80 by knocking off or driving in or drilling these arbors the burglar obtains a ready opening, through which explosives can be introduced into the safe, or the bolt-work can be moved. To overcome this last difficulty it has been pro-
85 posed to apply to the inner face of the safe-door lock mechanism the bolts of which shall be shot the instant the safe-door is closed, and shall be automatically retracted at the desired hour by the action of the time-lock. With this
90 kind of lock mechanism it is evident that the safe, when closed, must remain locked until such time as the time-lock shall operate to retract the bolts, after which the safe will be open. This form of lock mechanism is notice-
95 ably defective in two particulars. In the first place, it is frequently desirable to use the safe in the evening, in which case the time mechanism must not come into operation until after such use, a result that cannot be attained by
100 this last-described mechanism without leaving the safe open until the evening, or by setting the time-lock for a short period with the expectation of resetting it thereafter. It is

evident, however, that neither of these ways of using such lock mechanism is secure, as it may happen that from some cause no one will return to use the safe and set the time-lock, in which event the safe will remain open all night. It will therefore be seen that it is desirable to provide mechanism whereby, without forming any weak point in the door or wall of the safe by running an arbor through the same, the safe can be locked independently of the time-lock, which shall be automatically thrown into operation to guard the bolt-work at some predetermined time subsequent to its setting, and to accomplish this is one of the objects of my present invention.

My invention, therefore, consists in providing improved mechanism whereby the time-lock may cease to check the operation of the bolt-work before the expiration of the time for which the time-lock has been set, so that any mistake in setting the time-lock may be thus corrected and all delay in opening the safe by reason of such mistake may be avoided.

My invention further consists in providing mechanism whereby the bolt-work of the safe may be automatically thrown by the time-lock to lock the safe.

My invention also consists in providing means whereby the bolt-work of the safe may be automatically thrown and retracted by the time-lock to lock and unlock the safe.

My invention also consists in various details of construction, which will be hereinafter described, and particularly pointed out in the claims at the end of this specification.

In the accompanying drawings, Figure 1 is a view in elevation of a time-lock of my improved construction. Fig. 2 is a similar view of the time-lock, a portion of the top plate being broken away, and the plate or disk that carries the tripping devices being removed for better illustration of subjacent parts. Fig. 3 is a view in horizontal longitudinal section on line *x x* of Fig. 1. Fig. 4 is a view in longitudinal vertical section on line *y y* of Fig. 3, showing in inverted elevation the mechanism on the under side of the top plate. Fig. 5 is also a sectional view on line *y y* of Fig. 3, showing in elevation the mechanism on the face of the bottom plate. Fig. 5^a is an enlarged sectional view in detail of the plate carrying the tripping devices. Fig. 6 is a view in elevation of the inner face of the safe door and frame having my improved time-lock mechanism applied thereto, parts being broken away for better illustration. Fig. 7 is a view in horizontal section on line *x x* of Fig. 6. Fig. 8 is a view in elevation of the inner side of a portion of a safe door and frame, parts being broken away, and parts being shown in section. Fig. 9 is a detail front view (somewhat enlarged) of the time-lock in connection with the parts directly operated thereby. Fig. 10 is a view in elevation of a somewhat modified form of time-lock, a part of the top plate being broken away, and the plate that carries the tripping devices being removed. Fig. 11

is a plan view of this last form of time-lock detached.

In Fig. 1 my improved time-lock is shown as applied in connection with a permutation-lock, and in Figs. 6, 8, and 9, in connection with mechanism that co-operates therewith to automatically shoot and retract the bolt-work of the safe.

A designates the top plate, and A' the bottom plate, of the time-lock, these plates being suitably connected together by posts or standards *a*. In this time-lock two distinct clock-movements are employed, and these movements are provided with driving-springs B and C, that serve, respectively, to operate the indicator-pointer or dial-hand and the tripping devices for controlling the guard of the time-lock. The driving-springs are covered, as shown, by the caps *b* and *c*, attached to the under side of the bottom plate.

To the springs B and C are connected the driving-arbors B' and C', that pass through the top and bottom plates, A and A', and have loosely held thereon the gear-wheels *b'* and *c'*, that will be placed in gear with suitable escapement mechanism and will receive movement from their driving-arbors through the medium of the ratchet-wheels *b''* and *c''* and ratchets *b'''* and *c'''*, in manner well known in the art.

To the arbor B' is keyed the ring D, having an arm, *d*, adapted to strike the stud *e* on the under side of the gear-wheel E, that has an extended hub, *e'*, passing through the top plate, A, and fitting loosely on the arbor B'. The reduced upper portion of the hub *e'* is squared and receives the washer *e''* and the indicator-pointer F, which, in connection with the hour-dial F', serves to determine the length of time for which the lock shall be set.

The driving-arbor C' is provided with a ring, G, having an arm, *g*, adapted to strike the stud *h*, depending from the face of the gear-wheel H, the extended hub *h'* of which passes through the top plate, A, fits loosely on the arbor C', and is provided with a squared end that carries the slotted revolving plate or disk I, that sustains the tripping devices K and L for throwing the guard M of the time-lock respectively into and out of operation.

The tripping device K, which serves to throw the guard M out of action, is adjustably held beneath the circular slot *i* of the plate I by means of the threaded shank *k*, which passes through the slot, and is furnished with the small clamp-nut *k'*, by which the tripping device may be fixed at any desired point along the slot, its position being determined by the scale or dial at the side thereof. The guard M is pivotally held on the top plate, A, by means of the journal screw or pin M', and is provided with the lug or shoulder *m* that extends a sufficient distance beneath the plate I to be struck by the tripping device K as the plate revolves. The lower portion of the guard M is furnished upon its inner side with a lug, (shown in dotted lines, Figs. 1 and 2,)

which, when the guard is swung downward, will catch beneath the stud n of the pivoted latch bar or lever N , that is provided with the angle-bar n' , adapted to drop into the ordinary notched tumblers of a permutation-lock. The latch N is slotted, as shown, to receive the pin o of the driving-lever O , by which movement is imparted from the drive-wheel O' to the bolt-work of the permutation-lock.

Beneath the circular slot i' of the plate I the tripping device L , which throws the guard M into operation to check the bolt-work, is held by means of its threaded shank l , which extends through the slot and is provided with the clamp-nut l' , that retains this tripping device at any desired position along the slot.

Pivotally connected to the top plate, A , is the dog or pawl P , the rear end of which is provided upon its upper side with the cam-faced lug p , that projects beneath the slot i' , and in position to be struck by the tripping device L as the plate revolves. The forward end, p' , of the pawl is held by the spring p'' normally in position to engage with the shoulder m' of the guard, and serves to temporarily retain the guard in a retracted position, so that it will not affect the operation of the bolt-work until the pawl is released by the tripping device L striking the lug p . A knob, p^3 , projecting from the face of the pawl P , serves to retract this pawl by hand, as will herein-after appear.

Between the gear-wheels E and H and meshing therewith is placed the gear-wheel H' , keyed to the winding-post H^2 , journaled in the top and bottom plates, and having a squared projecting end, over which the winding-key will fit. By means of this gear-wheel the two clock-movements are caused to work in unison, and are simultaneously wound and set.

The operation of the mechanism thus far defined is as follows: Let it first be assumed that the tripping devices K and L are at the zero-points of their respective slots i and i' , that the indicator-pointer is at the zero-point of its hour-dial, and that the guard M is turned down so that its lug catches under the stud n of the latch-bar N , and holds the same suspended and the bolt-work out of operation. If, now, a winding-key be applied to the post H^2 and be turned toward the left, the driving-springs of the two clock-movements will be wound and the indicator-pointer F and plate I may be simultaneously set for the desired number of hours. The indicator-pointer and the plate will then move in the direction of the arrows, Figs. 1, until the tripping device K strikes the lug or shoulder m of the guard M , and causes this guard to swing backward, so that the latch-bar N will be released and the bolt-work of the permutation-lock can be operated. At this time the indicator-pointer will have returned to the zero-point of the hour-dial.

It is evident that if the tripping device K is moved forward in the slot i of the plate I and there clamped, it will strike the shoulder

m of the guard sooner than if it were at the zero-point of such slot, and will retract said guard before the indicator-pointer reaches its zero-point; hence it will be seen that, if in the operation of setting the time-lock, the indicator-pointer has by mistake been turned too far it is only necessary in order to correct such mistake to move forward the tripping device K a distance in the slot i corresponding to the number of hours the indicator-pointer has been overset. For example, if it is desired to close the safe at three o'clock in the afternoon, so that it cannot be opened until nine o'clock the following morning, the indicator-pointer should be turned to the point "18" on the hour-dial, but, if through mistake it has been turned too far—as to the "24" point—the mistake can be readily corrected, and the delay in opening the safe can be avoided by fixing the tripping device K at a position in its slot i opposite the point "6" of the slot-scale, as by this means the tripping device will throw back the guard M six hours sooner than were it in at the zero-point of the slot, and hence in eighteen hours after the time the time-movement started.

If it is desired that the time-lock shall automatically come into operation to check the bolt-work at a time subsequent to the setting of the time-lock—for example, if it is desired to close the safe at three o'clock in the afternoon and have the time-lock automatically come into operation at nine o'clock in the evening, the bolt-work of the permutation-lock being unchecked in the interim—the indicator-pointer will be set, as usual, for the hour at which the safe is to be opened the next morning, but the guard M will be swung back and held by pawl P , as shown in Figs. 1 and 2, and the tripping device L will be moved forward and fixed at such point in the slot i' that at six hours after the starting of the clock-movement it will strike the cam-lug p , and by so doing will release the pawl P and allow the guard M to swing forward to catch the stud n of the latch-bar, and thus check the operation of the bolt-work until the guard is forced backward by the tripping device K at the end of the period for which the time-lock has been set.

In Fig. 1 of the drawings the guard M is shown as held back by the pawl P , the indicator-pointer has been set for twenty-two hours, the tripping device K is fixed in its slot opposite the point 4, and the tripping device L is fixed in its slot opposite the point 16. With the parts in this position (assuming the clock-work to start at three p. m.) the bolt-work of the permutation-lock will remain free until the tripping device L strikes the lug p and allows the guard M to swing forward, (which will occur at eleven p. m.) and will then remain checked by the guard until the tripping device K throws back the guard at nine o'clock in the morning, or four hours earlier than the time for which the indicator-point was set.

In Figs. 6 to 11 of the drawings my invention is shown as applied for automatically throwing and withdrawing the bolt-work of a safe.

R designates the front wall of the safe, and R' denotes the door, upon the inner face of which is the usual frame, *r*, for sustaining the bolt-work, consisting of the bolts R², connected together by the tie-plate R³. Upon the inner face of this tie plate are formed the bearing-flanges *r'*, through which passes the sliding rod S, that carries the coiled springs S' and S², and is loosely held in a suitable seat in the bolt-frame *r* and the bearing-sleeve *s* that is bolted to the door. A hand-lever, T, pivotally held upon a stud, *t*, and connected to the rear end of the rod S by the pin *t'*, serves to move forward the rod, and it will be seen that as this rod is forced forward by the action of the hand-lever, the pin *s'* bearing upon the spring S² tends to compress this spring, while at the same time the pin *s* of the rod bearing upon the end of the spring S' forces the same against the rear flange *r'* of the tie-plate, and tends to force this tie-plate and its connected bolt-work forward. Upon the inner face of the tie-plate is formed a stop or lug, *r*³, as shown by dotted lines in Fig. 6 and full lines in Fig. 8, and this stop is so placed upon the tie-plate as to catch against the square shoulder *u* of the pivoted trigger or stop-lever U when the latter is in elevated position, as shown in Fig. 6. If, therefore, the trigger be elevated at the time the sliding rod S is thrust forward by the hand-lever T, the spring S² will be pressed by the pin *s'* against the frame-work *r*, and the spring S² will be pressed by the pin *s* against the rear flange *r'* of the tie-plate as this tie is prevented from moving forward by the resistance of the trigger, and the only effect of the sliding rod under such condition will be to compress the springs without moving the bolt-work.

Pivotally connected to the door at the point *v* is the releasing-lever V, the short arm of which rests upon the arm *u'*, projecting from the trigger U, and the long arm of which projects within the path traversed by the tripping device L of the time-lock. From this construction it will appear that if, after the springs S' and S² have been compressed by the sliding rod S, as just above described, the tripping device L strikes the lever V, it will force the long arm of this lever upward, which will in turn depress the trigger U, thereby causing it to release the tie-plate R³ and allow the compressed spring S' to force the bolt-work forward to automatically lock the safe.

At a suitable point, as *w*, on the door is pivoted the latch-bar W, the free end of which is provided with the small friction-roller *w'*, adapted to bear against the bottom edge of the time-lock guard M when the latter is in position to check the operation of the bolt-work after it has been thrown forward.

Upon the under side of the latch-bar W is the depending lug *w*², the inclined face of

which bears against the rear end of the sliding rod S, and serves to hold this rod pressed forward so long as the end of the latch-bar is beneath the guard.

It will be seen by reference to the detail, Figs. 9, 10, and 11, that the time-lock forming part of this last-described automatic bolt-working mechanism is the same as that heretofore described, with the exception that the lug on the inner side of the guard and the rear end of the pawl P and its lug are dispensed with as unnecessary in this construction, although it will be readily understood that the form of lock having such features may be employed in both cases.

The operation of this last-described time-lock mechanism is as follows: Let it be assumed that the parts are in the position shown in Fig. 6, the safe-door being shut and locked by an independent permutation jam-lock, to be presently described, the indicator-pointer F and the revolving plate I will turn backward in the direction of the arrows. The tripping device L will, after a predetermined period, depending upon its position in the slot *i'*, strike the end of the releasing-lever V, which in turn will depress the trigger U, thereby allowing the compressed spring S' to shoot the bolt-work to lock the safe, and bringing the front flange *r'* of the tie-plate R³ against the pin *s'* of the sliding rod, as seen in Fig. 8. The bolt-work remains thus in its forward position until the tripping device K of the time-lock strikes the lug *m* and releases the guard M, at which moment the compressed spring S² will force backward the sliding rod S, (no longer held by the lug *w*² of the latch-bar,) which will carry with it the bolt-work, and hence leave the safe free to be opened save for the permutation jam-lock. It will be seen that by this last-described mechanism the main bolt-work can be automatically thrown forward to lock the safe at any desired hour subsequent to the setting of the time-lock, and after remaining guarded for a predetermined period can be automatically withdrawn to unlock the safe. The advantages of this construction have been hereinbefore set out.

The jam-lock, forming as it does the subject-matter of another application for Letters Patent filed of even date herewith, needs be but briefly described here. It consists, essentially, of a series of tumblers, X, of usual construction, carried by the casing *x*, that is removably held within a suitable recess of the door-jam of the safe. To the casing *x* is pivoted, as at *y*, the bolt-plate Y, which is provided with the angle bar or catch *y'*, adapted to enter the notches of the tumblers and the notch of the drive-wheel *z*, formed on the end of the tapering arbor of the dial-knob Z. The bolt-plate Y, when thrown forward by the drive-wheel, enters the space *y'*, formed in the front edge of the safe-door, and securely locks this door. It will be noticed that the arbor of this permutation-lock does not extend through the wall of the safe, and hence an

opening for the introduction of explosives or moving the main bolt-work cannot be obtained by drilling the arbor, as is possible with safes having arbors extending through the wall.

5 In order to provide a tighter joint between the rear edge of the safe-door and the frame, so as to prevent the introduction of explosives, I form a long groove, 1, in the inner face of the door near its rear edge, and a like groove
10 in the inner face of the door-frame, into which grooves will snugly fit the flanged edges 2 and 3 of the protecting-plate 4, pressed normally outward by the flat springs, shown in dotted lines. A retaining-plate, 5, sustained by the
15 screws 6, bears against the rear portion of the plate 4, and holds the flange 2 within its slot. On the rear ends of the bolts R² are formed the cam-lugs 7, which, when the bolt-work is shot, will bear upon the forward portion of
20 the plate 4 and force the flange 3 into the groove 1. In this position the protecting-plate 4 covers the joint between the rear edge of the safe-door and the door-frame, and will securely guard against the introduction of ex-
25 plosives through such joint into the safe.

It is obvious that the details of construction above set out may be varied within wide limits without departing from the spirit of my invention, and that some of the features of the
30 invention may be employed without the others or in connection with other forms of lock mechanism. I wish it distinctly understood, therefore, that the scope of my invention is not restricted either to the details of construction or
35 arrangement above set out.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

40 1. In a time-lock for safes, the combination, with a guard for checking the operation of the bolt-work and a suitable indicator-pointer, of a revolving adjustable tripping device for releasing said guard, and gear-wheels connect-
45 ing said tripping device with the pointer, substantially as described.

50 2. In a time-lock for safes, the combination, with a guard for checking the operation of the bolt-work and a suitable indicator-pointer, of a revolving plate in gear with said pointer and a tripping device for releasing the guard
adjustably held in said plate, substantially as described.

55 3. In a time-lock for safes, the combination, with a guard for checking the operation of the bolt-work, of an indicator-pointer, a slotted revolving plate in gear with said pointer, a tripping device for releasing said guard, and means, substantially as described, for adjust-
60 ing the tripping device at different points along the slot of said plate, substantially as set forth.

65 4. In a time-lock for safes, the combination, with a guard for checking the operation of the bolt-work, of an indicator-pointer, a driving-spring for said pointer, a tripping device for releasing the guard in gear with said
pointer, and a separate driving-spring for

said tripping device, substantially as described.

70 5. In a time-lock for safes, the combination, with a guard for checking the operation of the bolt-work, of an indicator-pointer, a driving-spring for said pointer, a tripping device in gear with said pointer, a separate spring
75 for said tripping device, and a key-post common to both the pointer and tripping device whereby they may be simultaneously set, substantially as described.

80 6. In a time-lock for safes, the combination, with a guard for checking the operation of the bolt-work, of an indicator-pointer, a supplemental adjustable tripping device or catch for throwing the guard into action, and gear-
85 wheels connecting said tripping device with the indicator-pointer, substantially as described.

90 7. In a time-lock for safes, the combination, with a guard for checking the operation of the bolt-work, of a dog for holding said guard temporarily out of action, an adjustable sup-
95 plemental tripping device for throwing the dog out of engagement with the guard, a main tripping device for throwing the guard out of action, a driving-spring for said tripping devices, and an indicator-pointer and
100 gear-wheels connecting said tripping devices with the pointer, substantially as described.

105 8. In a time-lock for safes, the combination, with a guard for checking the operation of the bolt-work, of a dog or pawl for temporarily holding said guard out of action, an indicator-pointer, a supplemental tripping device for throwing the dog out of engagement
110 with the guard having a supporting-post separate from that of the indicator-pointer, a main tripping device for throwing the guard out of action, and gear-wheels connecting the tripping devices and the pointer, substantially
115 as described.

120 9. In a time-lock, the combination, with a guard for checking the operation of the bolt-work and an indicator-pointer, of a dog or pawl for holding the guard temporarily out of action, an adjustable supplemental tripping device for throwing the dog out of en-
125 gagement with the guard, a main tripping device for throwing the guard out of action, and a revolving plate or disk for carrying said tripping devices, substantially as described.

130 10. In a time-lock for safes, the combination, with a guard for checking the operation of the bolt-work and a dog for holding said guard out of action, of a single indicator-
135 pointer, a revolving plate having two slots therein, two tripping devices—one for the guard and one for the dog—adjustably held in said slots, two clock-movements, and gear-wheels for connecting said pointer and revolving plate, substantially as and for the purpose set forth.

140 11. In time-lock mechanism for safes, the combination, with the main bolt-work of the safe, of mechanism for throwing the main bolt-work to lock the safe and clock mechan-

ism for automatically releasing said bolt-throwing mechanism, substantially as described.

12. In time-lock mechanism for safes, the combination, with the bolt-work, of a spring for throwing said bolt-work to lock the safe, a trigger or stop for temporarily restraining the action of said spring, and a tripping device operated by suitable clock-work to release said trigger and automatically lock the safe, substantially as set forth.

13. In time-lock mechanism for safes, the combination, with the bolt-work, of a spring for automatically throwing said bolt-work to lock the safe, a spring for automatically withdrawing the bolt-work to unlock the safe, a trigger or stop for temporarily restraining the action of said locking-spring, a guard for

temporarily checking the action of the unlocking-spring, and tripping devices for said trigger and guard whereby the safe can be automatically locked and unlocked, substantially as set forth.

14. In time-lock mechanism for safes, the combination, with the bolt-work, of the sliding rod connected with the bolt-work, the coiled springs upon said sliding rod, the trigger for temporarily checking the movement of the bolt-work, the releasing-lever for said trigger, the latch-bar, the guard, and tripping devices for acting upon said guard and the releasing-lever, substantially as described.

HENRY GROSS.

Witnesses:

GEO. P. FISHER, Jr.,
JAMES H. PEIRCE.