(No Model.)

3 Sheets—Sheet 1.

A. G. BURTON.

SAFE LOCK.

No. 383,040. Patented May 15, 1888.

Fig 1.—

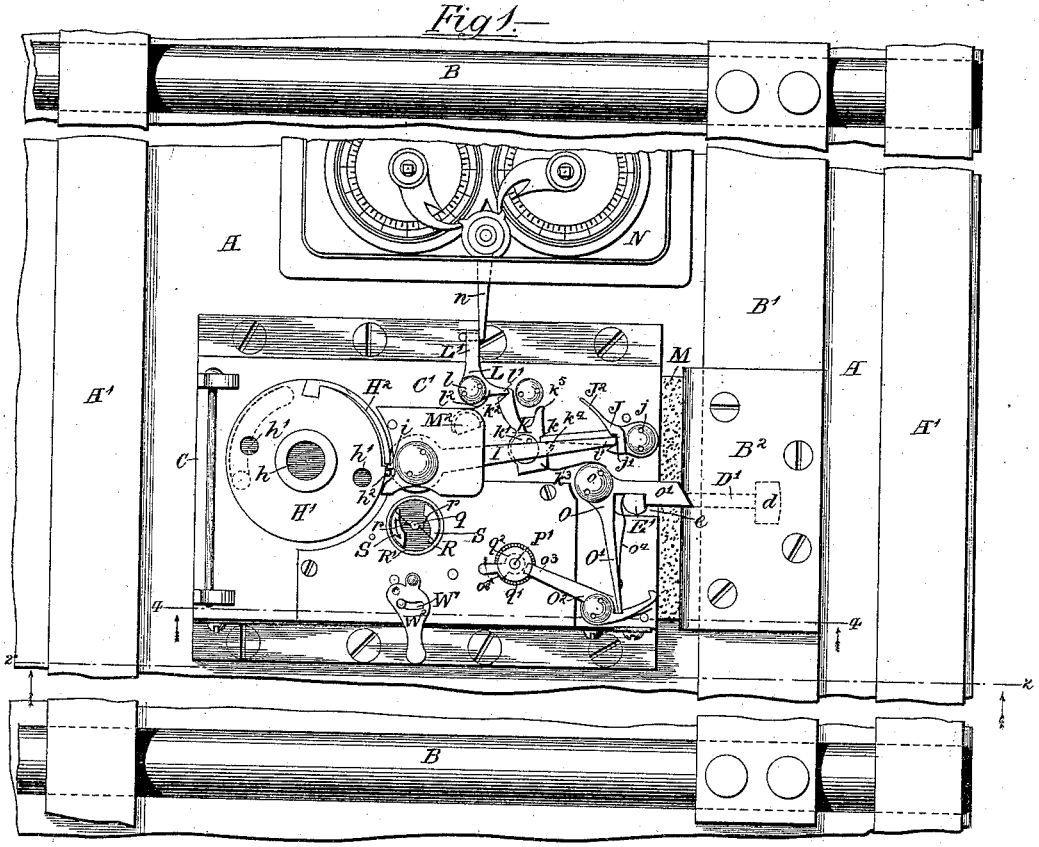


Fig 2.—

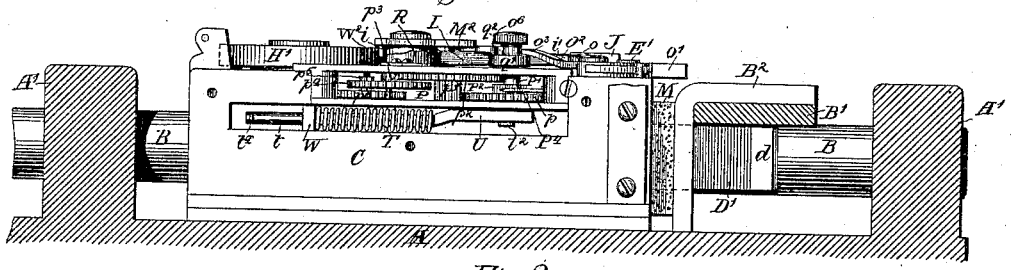
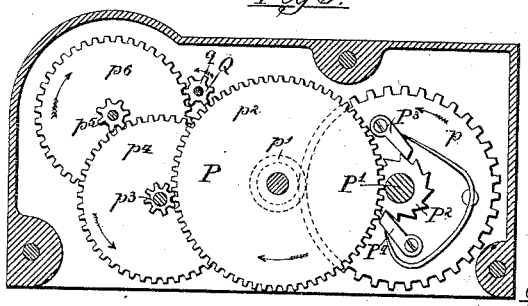


Fig 3.—



Witnesses.—
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(No Model.) 3 Sheets—Sheet 2.

A. G. BURTON.

SAFE LOCK.

No. 383,040. Patented May 15, 1888.

Fig 4—

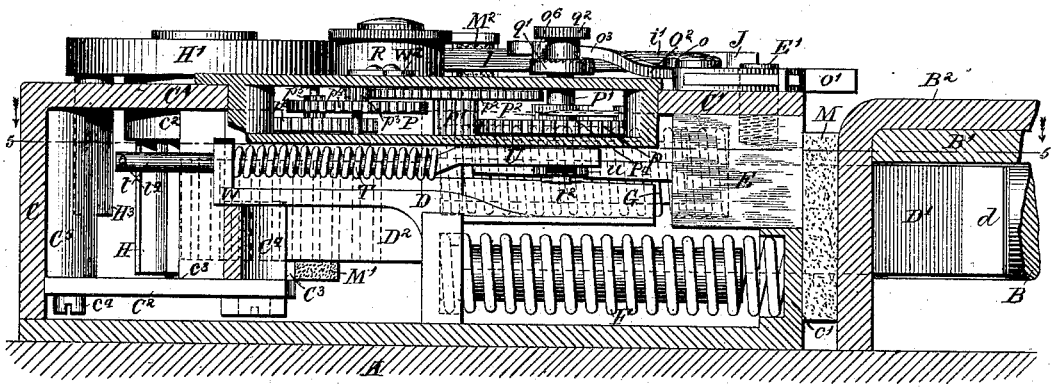


Fig 5—

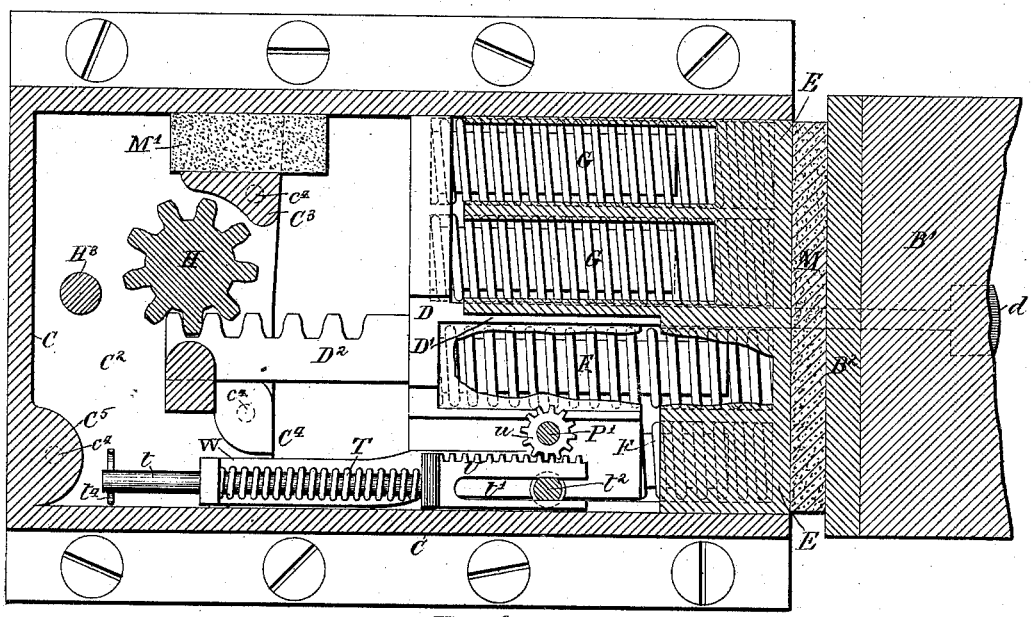
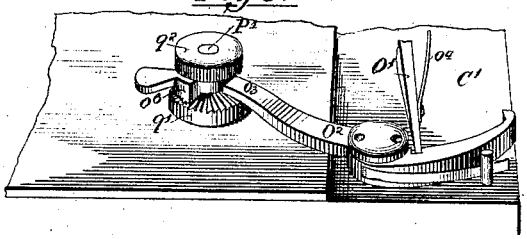


Fig 6.—



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(No Model.) 3 Sheets—Sheet 3.

A. G. BURTON.

SAFE LOCK.

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Fig 7—

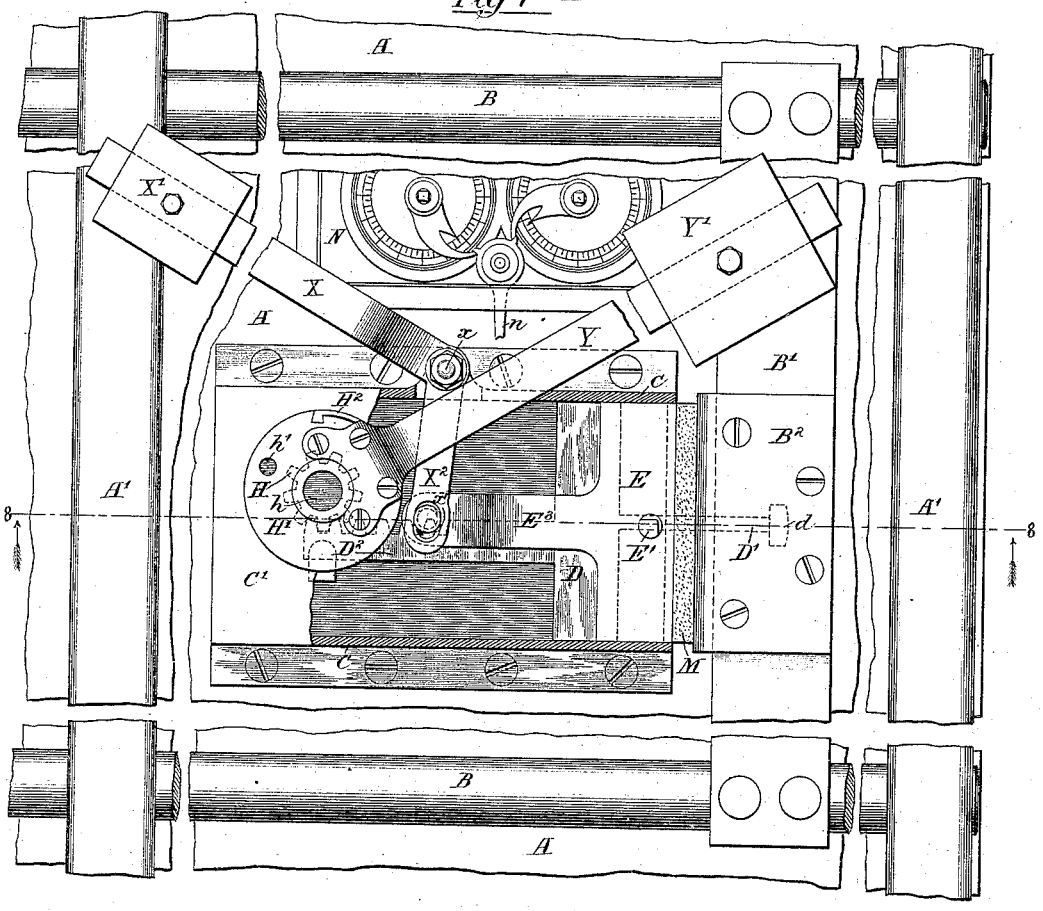
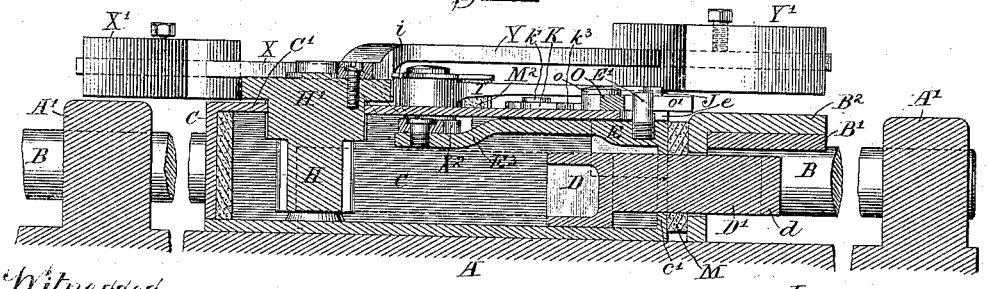


Fig 8—



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UNITED STATES PATENT OFFICE.

AUGUSTUS G. BURTON, OF CHICAGO, ILLINOIS.

SAFE-LOCK.

SPECIFICATION forming part of Letters Patent No. 383,040, dated May 15, 1888.

Application filed October 25, 1887. Serial No. 253,305. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTUS G. BURTON, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Safe-Locks; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of safe-locks in which the lock-bolts are cast and retracted for locking and unlocking the safe by springs or weights located inside of the same, whereby the bolts may be actuated without the employment of any spindle-arbor passing through the door or other part of the safe. In safe-locks of this kind as heretofore made springs or weights have been provided for casting and retracting the bolts in locking and unlocking the safe, and in connection with the casting weights or springs a movable detent or other similar device has been provided for holding the casting-springs from moving the bolts while closing the door, and in connection with such detent means have been provided for releasing the said springs or weights to allow the casting of the bolts after the door is fully closed. Several different devices have been heretofore employed for this purpose. One of such devices has consisted of an attachment to a time mechanism operated to release the detent at a predetermined time after the door is closed. It has also been proposed to employ a detent for holding the bolts from moving under the action of the casting-springs, such detent being adapted to strike a stationary part of the safe in the act of closing the door in such manner as to move the detent and release the bolts. In a prior application for Letters Patent made by James C. Harris, November 15, 1886, another device for releasing the bolts is shown and described, consisting of a detent acting to hold the bolts in their retracted position and a spring-motor consisting of an actuating-spring and a train of gears adapted to move the detent and release the bolts at a desired time after the door is closed.

One of the principal objects of my invention is to provide an improved construction in that class of automatic safe locking and unlocking devices which embraces a detent holding the casting springs or bolts from movement while the door is being closed, together with a motor comprising a spring or weight and suitable means for controlling the speed of movement of the spring or weight, which motor is employed to release the said detent at a desired time after the door is closed. A device embodying this part of the invention comprises springs for casting the bolts, a detent holding the casting springs or bolts from movement, and a spring-motor for moving said detent, together with a device for winding or compressing the springs by which the bolts are actuated and the spring which actuates the motor, whereby both the bolt-actuating devices and devices by which the bolts are released after the door is closed may be placed in position for operation by a single act on the part of the person using the safe. A device of this kind may be employed as well in connection with the detent-releasing device shown and described in the said application to James C. Harris, filed November 15, 1886, as to the particular form of detent-actuating device herein illustrated. In this connection it will be understood that the term "motor," as herein used, covers as well the motor comprising an actuating spring or weight and train of gears as the dash-pot detent-actuating device forming the subject-matter of another application for Letters Patent, Serial No. 237,682, filed by me May 10, 1887, since said dash-pot, by causing the spring to act slowly or for a considerable period of time as it expands, also produces the continuous motion incident to and indicated by the term "motor" as used.

The invention also embraces other improvements in bolt-actuating devices, as well as novel features of construction and arrangement, which will be hereinafter fully described, and pointed out in the appended claims.

In the accompanying drawings illustrating my invention, Figure 1 is a view in elevation of the inner side of a safe-door, showing the bolt-work, bolt-actuating devices embodying my invention, and a time mechanism for determining the time of unlocking the safe. Fig. 2 is a sectional view on line 2 2 of Fig. 1. Fig. 3 is a detail view of the train of gears forming part of the motor for releasing the

casting-springs. Fig. 4 is an enlarged sectional view on the line 4 4 of Fig. 1. Fig. 5 is a view on the line 5 5 of Fig. 4 and on the same scale, a portion thereof being broken away to show one of the lower set of springs. Fig. 6 is a detail view showing the motor-actuating tripping device controlling the release of the casting-springs. Fig. 7 is a face view, partially in section, of the bolt-actuating device, embracing weights as a means of moving the bolts. Fig. 8 is a section of the same, taken upon the line 8 8 of Fig. 7.

As illustrated in the several figures of the drawings, A indicates the safe-door, provided with the usual vertical bars or frame-pieces, A′ A′, which are rigidly attached to the inner surface of the said door.

B B are bolts arranged to slide horizontally upon the door, said bolts being mounted in the said bars A′ A′.

B′ indicates a vertical carrier bar, which is attached to the bolts B B, and which affords a means of communicating motion from the actuating device to the said bolts.

C indicates an outer case, which incloses the springs by which the bolts are actuated.

D is a sliding plate or casting located within the case C, and provided with a stem, D′, which extends through a slot at the end of the case adjacent to the carrier-bar B′, and is connected with the latter by means of a head, *d*, on the stem D′, engaged with an L-shaped plate, B^2, which plate is attached to the bar B′, and is provided with a notch adapted to engage the shank or stem D′. At the end of the case C nearest the carrier B′ a part of the end wall, *c*′, of said case is absent, and the opening thus formed is occupied by a sliding plate or casting, E, adapted to press against a suitable cushion or buffer, M, interposed between the casting E and the end wall, *c*′, and resting against the plate B^2, in the manner clearly shown in Figs. 4 and 5.

F F are a series of springs interposed between the end wall, *c*′, of the case C and the sliding plate D. Said springs F F are retracting-springs, and operate on the bolts through the medium of the plate D, the stem D′, the plate B^2, and the carrier-bar.

G G are a second series of springs for casting the bolts, said springs being located between the plate D and the sliding plate E. The springs G G operate by their expansion to thrust the plate E toward the plate B^2, and thereby move the bolts outwardly to engage the bolt-apertures of the jamb.

D^2 is a horizontal rack-bar cast upon or attached to the plate D and extending toward the rear end of the case C, and H is a revolving toothed pinion mounted to rotate in the said case C and arranged to intermesh with the rack-bar D^2. The pinion H is, as herein shown, provided with a bearing, c^2, in the front wall, C′, of the case C, and a bearing, c^3, for the inner end of the pinion is formed in a plate, C^2, which is secured by screws c^4 c^4, Fig. 5, to projecting parts or lugs C^3 C^4 C^5, cast in the case C. At its outer end, exterior to the wall C′ and the case C, the pinion H is attached to a metal disk, H′, said disk being provided with a central orifice, *h*, and with apertures *h*′ near its periphery, for engagement with studs or projections upon a hand-lever, whereby the pinion may be turned for moving the plate D and compressing the springs F F and G G. For holding the pinion from rotation after the springs have been compressed, the disk H′ is provided at its edge with a spring strip or tooth, H^2. This strip or tooth is adapted to stand at its free end normally outside of the peripheral surface of the disk, so as to form a shoulder adapted to engage the short arm *i* of a lever, I, which lever is pivoted to the case C at a point adjacent to the disk, and is constructed to engage at the end of its opposite or longer arm, *i*′, a pivoted lever, J, which is actuated from or by the time mechanism, in the manner hereinafter set forth. The disk H′ also carries a stop-pin, H^3, extending from its inner side through a circular slot in the wall C′ of the case, said stop serving to limit the rearward movement of the pinion under the influence of the retracting-springs F F.

M′ is a cushion or buffer located within the case C in position to engage both the plate D and the pin H^3 when they reach the inward limit of their movement. A cushion, M^2, is located on the outer wall, C′, of the case, and serves to arrest the movement of the lever I when released by the action of the time mechanism. As herein shown, said cushions consist of blocks of rubber held in recesses or sockets formed in the case for their reception. The cushion M′ is exposed at its opposite sides, so as to engage the upper end of the plate D and the pin or stud H^3 upon the disk H′, the movement of both being arrested at the desired time by the pin H^3 and plate D striking opposite sides of said cushion simultaneously. The lever J is pivoted at *j* to the wall C′ of the case, and is provided near its pivotal point with a notch, *j*′, adapted to engage the lever I when said lever is in position to engage the spring-strip H^2, the short arm *i* of said lever I being arranged to hold the said disk from rotation and to retain the casting and retracting springs in their compressed condition, in the same manner as set forth in the said prior application of James C. Harris. The said lever J is constructed to engage at its free end with a notch, *k*, in another lever, K, which is pivoted upon the case C by means of a stud, *k*′. The notch *k* is located adjacent to the pivot *k*′ of the lever K, and is adapted to engage at its free end with a detent-lever, L, which detent-lever is pivoted at *l* to the case, and is adapted for engagement with the actuating-arm of the time mechanism. The engagement of the lever K with the lever L is accomplished by means of an undercut notch, k^2, in the end of the lever K, adapted to receive a beveled or sloping tooth, *l*′, upon the detent-lever L.

The position of the several levers I, J, and K and the detent L, when the several springs

are compressed, is shown in Fig. 1, the end of the lever I being engaged with the notch j' of the lever J, and the lever J being engaged with the notch k of the lever K, while the latter lever is engaged with the tooth l' of the detent L. The parts being in this position, if the detent-lever L is moved so as to release the tooth l' from the notch k^2, the lever K will be allowed to swing about its pivot, and thereby release the lever J, which in turn is permitted to swing about its pivot and allow the free end of the lever I to swing upwardly for the release of the disk H'. The detent L is shown as provided with an upwardly-extending arm, L', adapted to be actuated by a time mechanism of the particular kind shown. The said detent-lever may of course be shaped in any manner required for properly engaging the actuating-arm or movable part of the time mechanism employed.

N in the drawings indicates a time mechanism which is provided with a movable arm, n, the lower end of which engages the detent-arm L' in such manner as to move the said detent L at a predetermined time, and thus release the several levers described and allow the action of the retracting-springs for throwing the bolts for opening the safe.

As fully set forth in my said prior application, the system of levers just described is by reason of their arrangement and connection with the disk H' rendered self-setting—a feature of great value with locks of the kind described, since it obviates all necessity for a consecutive number or order of movements on the part of the person setting the device for action, all the necessary manipulation being reduced to a single act. As shown herein, as well as in my said prior application, I make the several levers self-setting, or, in other words, I so arrange them that when the disk H' or other rotating part to which power is applied for actuating the compressing-springs is turned for compressing said springs the levers will be placed in position for holding the disk from turning backwardly by the power applied to turn the disk. In the form of device for this purpose herein shown the disk H' is provided with a pin, h^2, Fig. 1, which is adapted to engage the under surface of the small arm or projection i of the lever I in such manner as to swing the long arm i' of the said lever downwardly when the disk is turned sufficiently to fully compress the springs.

The lever J is provided with a curved arm, J^2, adapted to engage the end of the lever I when the latter is moved, Fig. 1, and in connection with the cushion M^2 to thus retain the said lever J in position for the entrance of the end of the lever I into the notch j' when the free end of the said lever is swung downwardly. When the said lever I is actuated by contact of the pin h^2 with its short arm i in the manner described, the said lever I will enter the notch j', and in its further downward movement will operate to throw downwardly the free end of the said lever J until the latter enters the notch k of the lever K. This latter lever K is held in position for the entrance of the end of the lever J into the notch k by means of a spring, k^3, and said lever K is provided with an arm, k^4, located adjacent to the notch k, and so arranged that as the lever J swings downwardly and enters the notch k it will in striking the arm k^4 turn the lever K about its pivot, and thus bring its free end into engagement with the detent-lever L, said detent-lever L being held normally in position to engage the lever K by means of a spring, l^2.

It follows from the construction described that when the lever I is placed in position for engagement with the disk H' by the rotation of the latter in setting the lock for operation said lever I will act upon the lever J and the lever J will in turn act upon the lever K until said lever K engages the detent-lever L, when the several parts will be held from movement until the detent is actuated by the time mechanism at the time of opening the safe.

The lever K is herein shown as provided with an arm, k^5, which engages the end of the lever J, whereby the said lever K is held in position for the engagement of its notch with the lever J in the same manner that said lever J is held with the notch j' in position for engagement with the free end of the lever I. When the arm k^5 is present, the spring k^3 may be omitted, the said lever K being so arranged that it tends to gravitate into position to allow the engagement of the end of said lever J with its notch.

The tooth or projection l' of the detent L and the notch k^2, that engages the said projection, are, as herein shown, constructed in a novel manner, calculated to give additional safety to the lock. For this purpose the bearing-face of the projection l' is made inclined or oblique with reference to a radial line passing through the pivotal axis of the detent, and the bearing-edge of the notch k^2 is similarly shaped—that is to say, undercut. It follows from this construction that pressure upon the lever K tending to move the free end of said lever toward the pivot of the detent will have no tendency to disengage the projection l' and notch k^2.

Attempts are sometimes made to open safe-locks of the character herein shown (in which the bolts are held from unlocking by a movable detent engaged with a lever or other movable part holding the retracting-springs from movement) by means of percussive action upon the exterior of the safe-door, calculated to jar or shake the detent out of engagement with the part held from movement thereby. When the engaging-surfaces of the lever K and detent L are inclined, substantially as in the manner above set forth, such jarring or percussive action can have no effect to release the parts from engagement with each other, but will tend rather to carry the projection l' farther into the notch.

O is a spring-detent pivoted by means of a stud, o, to the wall C' of the case C, and provided with a notched arm, o', adapted to en-

gage a rigid stud, E′, which is fixed in the sliding plate E, and with an arm, O′, for engagement with a locking-detent, O^2. The wall C′ is, as shown, provided with an open slot or notch, *e*, in which the stud E′ enters when the plate E is retracted, as clearly shown in Fig. 1. The detent O is adapted to engage the stud E′, and to thereby hold the plate E from outward movement when the springs are compressed prior to closing the safe-door.

o^4 is a spring-arm attached to or bearing against said detent O in such manner that it will be encountered by the stud E′ as the bolts or the casting E are thrown backwardly by the retracting-springs, and thereby turn or swing the detent in a direction to engage the notched arm *o′* with the said stud and the extremity of the arm O′ with its locking detent. The engagement of the detent with the stud is thus automatically accomplished at the time the bolts are thrown back or retracted. The stud E′ and detent O are provided with inclined faces, so that when the said detent is released they will become disengaged.

For the purpose of releasing the detent O, so as to release the stud E′ and allow the movement of the plate E under the action of the casting-springs G G after the door is closed, I employ a motor the construction of one form of which is as follows: On the under side of the wall C′ of the shell or case C is located a train of gears, P, which may consist of any desired number of wheels and pinions arranged to intermesh in the usual manner. A main wheel, *p*, is mounted upon a driving-shaft, P′, being connected therewith by means of a backing ratchet, P^2, on said shaft, and engaging spring-pawls P^3 P^4, secured to the said main wheel *p*. The main wheel *p* meshes with a pinion, *p′*, driving the wheel p^2, which meshes with a pinion, p^3, rigidly connected with a wheel, p^4, and the latter meshes with the pinion p^5 of a wheel, p^6, which meshes with and drives a pinion, Q, mounted upon a spindle, *q*. The spindle *q* passes through the wall of the case C, and is surrounded by a metal part or rim, R, having an interior annular friction-surface, R′, which is shown as attached to, but may be formed in, the wall C′, or may have the form of an annulus contained within the case C. The spindle *q* carries oppositely-placed flexible arms *r* at its outer extremity, herein shown as made of spring metal. To the end of each of said arms is connected a segmental weight, S, the outer bearing-face of which conforms to the friction-surface R′. Upon the outer extremity of the driving-shaft P′ is secured an adjustable stop comprising a serrated collar, *q′*, an arm, o^6, pivoted upon the reduced outer extremity of said shaft and serrated at its under side for engagement with the serrations of the collar *q′*, and a screw-threaded cap or washer, q^2, arranged to be screwed down upon said adjustable arm to secure it to any desired radial position. The extremity of the arm o^3 of the locking-detent O^2 extends into the path of the stop o^6, so that said arm will be moved when encountered by the said stop as the latter revolves during the movement of the motor.

The above-described motor may be actuated by a spring or weight. As herein shown, it is actuated by a spring, T, mounted upon a plunger, *t*, carrying at its inner end a rack, U, meshing with the pinion *u* upon the shaft P′ of the main wheel *p*. As a means of guiding the rack, I have shown it as formed with a longitudinal slot, *t′*, embracing a headed pin, t^2, by which it is guided and held in mesh with the pinion *u*. The outer end of the plunger *t* passes through an aperture formed in an arm, W, which extends over and is integral with or rigidly attached to the sliding plate D. The rack, being always in mesh with the driving-pinion of the gear-train, is prevented from forward movement at a speed greater than that determined by the train of gears and speed-regulator, and when the pinion H is rotated to compress the bolt-actuating springs the arm W will also be moved forward, acting to compress the motor-spring T between the outer extremity of said arm and the end of the rack. The subsequent expansion of said spring slowly rotates the driving-pinion, gear-train, and regulator until the adjustable stop o^6 is moved around and into contact with the arm o^3 of the locking-detent O^2, and by releasing the arm O′ of the detent O releases the stud E′ and liberates the casting-springs. The movement of the motor has at this time ceased, further forward motion of the plunger *t* being prevented by a pin, t^4, in its outer end coming into contact with the arm W.

One revolution of the driving-shaft P′ is the extent of the movement of the motor, and the stop o^6 may be set at any point upon the collar *q′*, so as to actuate the detent O^2 at any desired time after the door is closed. When the bolts are retracted, the rearward movement of the plate D and the arm W, acting upon the plunger *t* through the medium of the pin t^4, draws said plunger and the rack backwardly, thereby rotating the shaft P′, (which turns independently of the train of gears, owing to the presence of the backing-ratchet,) thereby turning the movable stop o^6 backwardly into its original position.

The object of the gear-train and frictional speed-regulator is to serve as an escapement for the power stored in a spring or weight at the same time that the bolt-actuating springs are compressed, its function being to sufficiently delay the action of said spring, and to thereby constitute a motor which will act to release the detent at the end of the short time necessary for closing the door.

When power is applied to the gear-train by the compression of the spring, the spindle *q* and weights S will be rotated with constantly-increasing speed until, by centrifugal action, both weights are brought into contact with the friction-surface and the speed of the motor kept constant until its action ceases. In the operation of the novel form of speed-regulator

shown, at the beginning of the rotary movement of the weights only the free ends thereof come in contact with the friction-surface. As the speed increases the centrifugal power of the weights S S becomes greater, causing the flexible arms r to bend or yield in such manner as to allow the entire outer surface of said weights to come into contact with the friction-surface, thereby giving a large area of frictional surface in contact when the highest desired rate of speed has been reached.

It may sometimes be desired to keep the door open for some time after the lock has been set for action, and for this purpose I provide a stop device in connection with the motor for temporarily holding the latter from movement. Such stop device is desirably applied to one of the more rapidly moving parts of the motor, and, as herein illustrated, it consists of a lever having the form of a flat plate pivoted upon the case C, and secured thereto by a headed pin fixed in the wall of the case and passing through a radial slot, W′, in the said lever. When moved on its pivot, the under side of the lever W^2 slips over and rests forcibly in contact with the pivot of one of the train of gears, (as shown, the pivot of the rapidly-rotating pinion p^3,) and thereby prevents rotation thereof. When it is desired that there should be an interval of time between the setting of the springs and the operation of the motor, the stop-lever may be placed in operative position before the compression of the actuating-springs, thereby preventing the immediate starting of the motor, which would otherwise occur. The movement of the lever and the liberation of the motor-train and the subsequent release of the casting-springs may thus be deferred until it is desired to close the door.

No particular form of bolt-actuating mechanism being essential to the operativeness of the motor embraced in the present invention, such mechanism may be varied without in any way departing therefrom. The operation of the releasing-motor is not dependent upon the particular form of the automatic bolt-actuating mechanism described, and a bolt-actuating mechanism of any well-known or preferred form may be used in connection therewith. Furthermore, said motor may be located in any convenient position with respect to the bolt-actuating mechanism controlled thereby.

So far as the broad claim relating to the winding by a single act of both the bolt and motor-actuating springs is concerned, it makes no difference what kind of spring or other prime mover for the motor is used. The particular construction in the motor herein shown and described is, however, specifically referred to in certain of the appended claims.

Instead of employing springs for casting and retracting the bolts, weights may be used for these purposes without material change in the devices for holding the parts from movement and releasing the same in locking and unlocking the door.

In Figs. 7 and 8 I have shown a lock constructed like that illustrated in the other figures of the drawings, with the exception that the springs F and G are dispensed with and weights employed in their places. In said Figs. 7 and 8 the several parts of the lock, with the exception of the parts now to be described, are constructed and lettered in the same manner as hereinbefore set forth.

In place of the casting-springs G, I employ a lever, X, pivoted at x at the upper part of lock-casing and provided with a weight, X′. Said lever is provided with a depending arm, X^2, having a slot, x' at its lower end, which engages a rearwardly-extending arm or stem, E^3, upon the sliding plate E. The action of the weight X′ X′ tends to force the said sliding plate E toward the carrying-bar B′, so as to cast the bolts when the said plate E is released, in the same manner hereinbefore described.

For retracting the bolts, I attach a lever, Y, to the disk H′, which is connected with the sliding plate D by means of the rack-bar D^2 and pinion H, in the manner hereinbefore set forth. Said lever Y is provided with a weight, Y′, which tends to turn the disk H′ in a direction to retract the said plate D, together with the carrying-bar connected with said plate by the stem D′. In the construction illustrated the weight Y′ will be heavier than weight X′, so as to overcome said weight X′ in unlocking the safe. This latter feature of construction is not essential, however, and two weights of approximately the same size may be employed, as in the device illustrated in the application, Serial No. 253,306, filed simultaneously herewith, wherein the retracting-weight is shown as pivoted upon a sliding plate, which plate and the weight supported thereby are moved bodily by the retracting-weight in the act of withdrawing the bolts.

I claim as my invention—

1. The combination, with the bolts of a safe and a spring or weight for casting the bolts, of a detent for holding the casting spring or weight from moving the bolts, a spring or weight motor for moving said detent, and means for winding, compressing, or lifting the bolt-actuating spring or weight and the actuating spring or weight of the motor, such winding, compressing, or lifting device being common for both the bolt-actuating and motor spring or weight, substantially described.

2. The combination, with the bolts of a safe and springs applied to actuate the bolts, of a detent for holding the casting-springs from moving the bolts, a motor arranged to act upon and release said detent at a desired time after the bolt-actuating springs have been compressed, said motor comprising a spring, a train of gears, and a speed-regulator, and means for compressing or winding the bolt-actuating springs, constructed to also compress or wind the actuating-spring of the detent-controlling motor, substantially as described.

3. The combination, with the bolts of a safe, of casting and retracting springs, a detent

holding the casting-springs from moving the bolts, a motor embracing an actuating-spring adapted to engage and move the said detent at a predetermined time after the compression of the bolt-actuating springs, and a sliding part, as plate D, the movement of which compresses the casting and retracting springs, said sliding part being adapted to also engage and compress the actuating-spring of the motor, substantially as described.

4. The combination, with the bolts of a safe and casting-springs, of a rack-bar, a sliding plate attached to the rack-bar and acting upon said springs, a pinion intermeshing with the rack-bar, a detent holding the casting-springs from moving the bolts, a motor arranged to actuate the said detent at a predetermined time, and a spring for actuating the motor, said spring engaging the sliding plate, whereby the motor-actuating spring is compressed with the casting-springs, substantially as described.

5. The combination, with the bolts of a safe, of a bolt-actuating device comprising a metal shell or case, a sliding plate mounted in the case and acting against the bolts, actuating-springs for casting the bolts, located therein and acting against said sliding plate, a detent engaging said sliding plate, a spring-motor mounted upon the case and operating to move the said detent, and means for compressing the said bolt-actuating springs, constructed to also compress or wind the actuating-springs of the spring-motor, substantially as described.

6. The combination, with the bolts of a safe, of a bolt-actuating device comprising a metal shell or case, a sliding plate mounted in the case and acting against the bolts, actuating-springs for casting the bolts, located therein and acting against said sliding plate, a detent engaging said sliding plate, a motor comprising an actuating-spring, a train of gears, and a speed-regulator mounted upon the case and operating to move the said detent, and means for compressing the said bolt-actuating springs, constructed to also compress or wind the actuating-spring of the spring-motor, substantially as described.

7. The combination, with an actuating-spring and train of gears, of a regulator comprising a rotating driving-spindle, an annular friction-surface surrounding the driving-spindle, weights for frictional contact with the friction-surface, and flexible arms connecting the spindle and weights, substantially as described.

8. The combination, with the bolts of a safe and springs or weights applied to actuate the bolts, of a detent for holding the springs from moving the bolts, a motor arranged to act upon and release said detent, and a stop mechanism for preventing the movement of the motor, substantially as described.

9. The combination, with the bolts of a safe, of bolt-actuating devices comprising a sliding plate acting against the bolts, and suitable springs for actuating said plate, a detent engaging the sliding plate and a motor embracing an actuating-spring and train of gears, adapted to engage and move the detent, and a rack-bar engaging the motor-actuating spring and the driving-pinion of the train of gears, the said spring being interposed between the rack-bar and the sliding plate, substantially as described.

10. The combination, with the bolts of a safe, of bolt-actuating devices comprising a sliding plate acting against the bolts, springs for moving said plate, a detent engaging the sliding plate, and a motor embracing a spring and train of gears and arranged to act upon the detent, a rack-bar engaging the motor-actuating spring and the driving-pinion of the train of gears, and having a guide-rod engaging the sliding plate, said motor-actuating spring being interposed between said sliding plate and the rack-bar, and a guide-surface upon the rack-bar engaging a stationary support, whereby the rack-bar is held in mesh with the pinion, substantially as described.

11. The combination, with the bolts of a safe, of bolt-actuating devices comprising a sliding plate acting against the bolts, springs for actuating the plate, a detent engaging the sliding plate, and a motor embracing an actuating-spring and train of gears provided with a backing-ratchet, said motor being adapted to engage and move the detent, and a rack-bar engaging the motor-actuating spring and the driving-pinion of the train of gears, said spring being interposed between the rack-bar and the sliding plate, substantially as described.

12. The combination, with the bolts of a safe and springs or weights applied to actuate said bolts, of a detent for holding the bolt-actuating springs from moving the bolts, means for holding the detent, comprising an arm the movement of which effects the release of the bolts, and a rotating stop acting upon said arm, substantially as described.

13. The combination, with the bolts of a safe and springs or weights applied to actuate the bolts, of a detent for holding the bolt-actuating springs from moving the bolts, means for holding the detent, comprising an arm the movement of which effects the release of the bolts, and a rotating stop acting upon said arm to release the detent, said stop being arranged to be adjusted about its axis, and thereby to engage the detent-releasing arm at any desired point during its rotation, substantially as described.

14. The combination, with the bolts of a safe and springs for actuating the bolts, of a detent holding the bolts from movement under the action of the springs, a motor for releasing the detent, and a revolving projection or stop actuated by the motor and acting upon the detent, said revolving projection or stop being constructed to engage and move the detent without passing the same, whereby it may be turned backwardly to its original position without interfering with the said detent, substantially as described.

15. The combination, with the bolts of a safe and springs for actuating the bolts, of a detent

holding the bolts from movement under the action of the springs, a motor for releasing the detent, and a revolving stop actuated by the motor and acting upon the detent, said stop being connected with a part moved by or with the retracting springs or bolts in the rearward motion of the latter, whereby the stop or projection is restored to its original position when the bolts are retracted, substantially as described.

16. The combination, with the bolts of a safe and springs for actuating the bolts, of a detent holding the bolts from movement under the action of the springs, and a motor embracing a train of gears and a prime mover for releasing the detent, said motor embracing also a shaft driven by the prime mover and connected with the train of gears by a backing-ratchet and engaging a part which is moved when the bolts are retracted, whereby the said shaft may be turned backward independently of the train of gears when the bolts are retracted, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

AUGUSTUS G. BURTON.

Witnesses:

C. CLARENCE POOLE,

O. N. WILLIS.