(Model.) 3 Sheets—Sheet 1.

A. G. BURTON.

SAFE LOCK.

No. 382,071. Patented May 1, 1888.

Fig 1.—

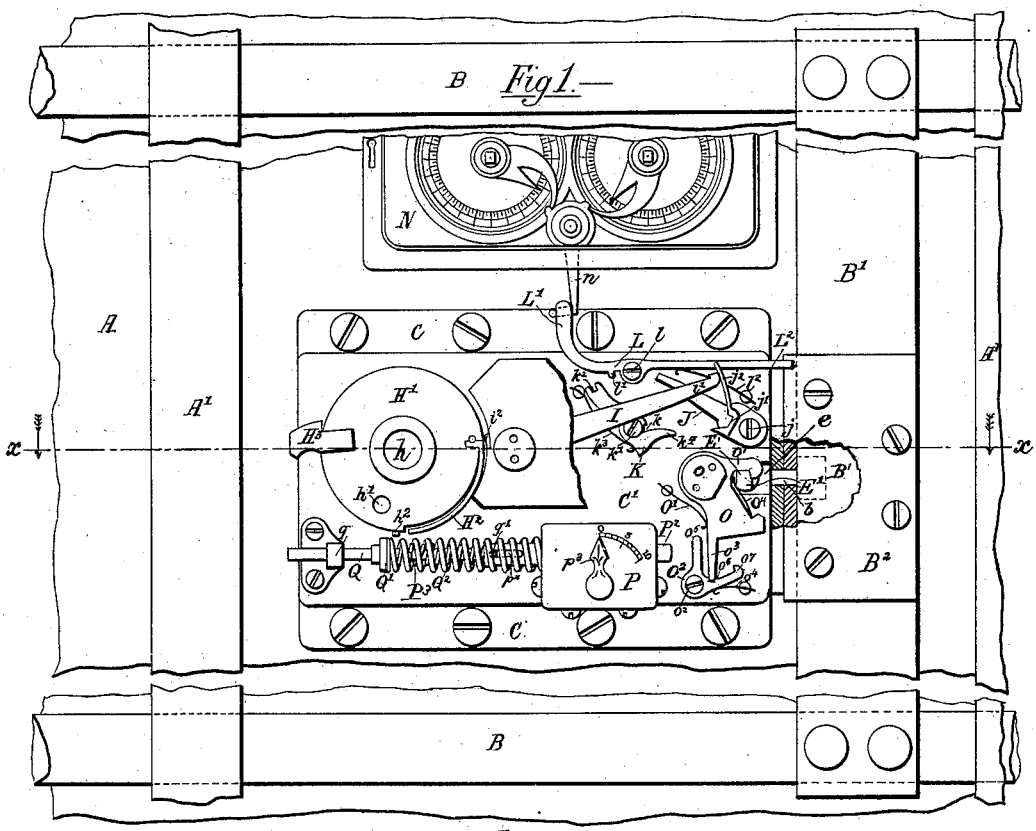


Fig 2.—

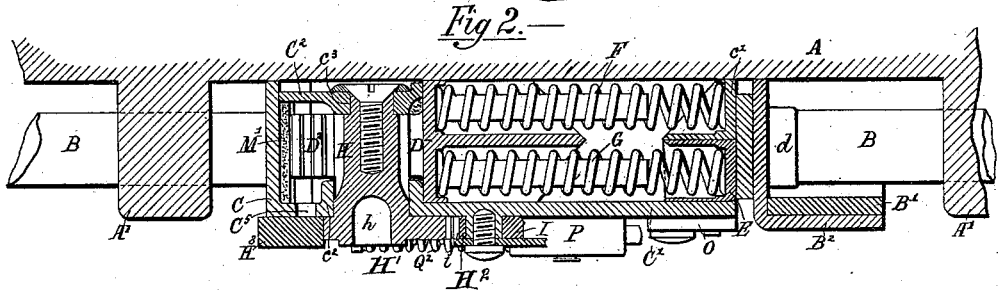
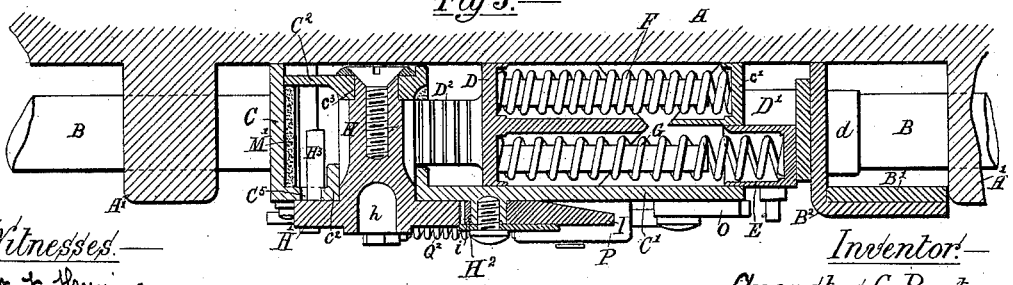


Fig 3.—



Witnesses.—
Wm. T. Fenning.
Chas. T. Laing.

Inventor.—
Augustus G. Burton.
by— Dayton + Poole Attorneys.—

(Model.)

3 Sheets—Sheet 2.

A. G. BURTON.

SAFE LOCK.

No. 382,071. Patented May 1, 1888.

Fig 4.—

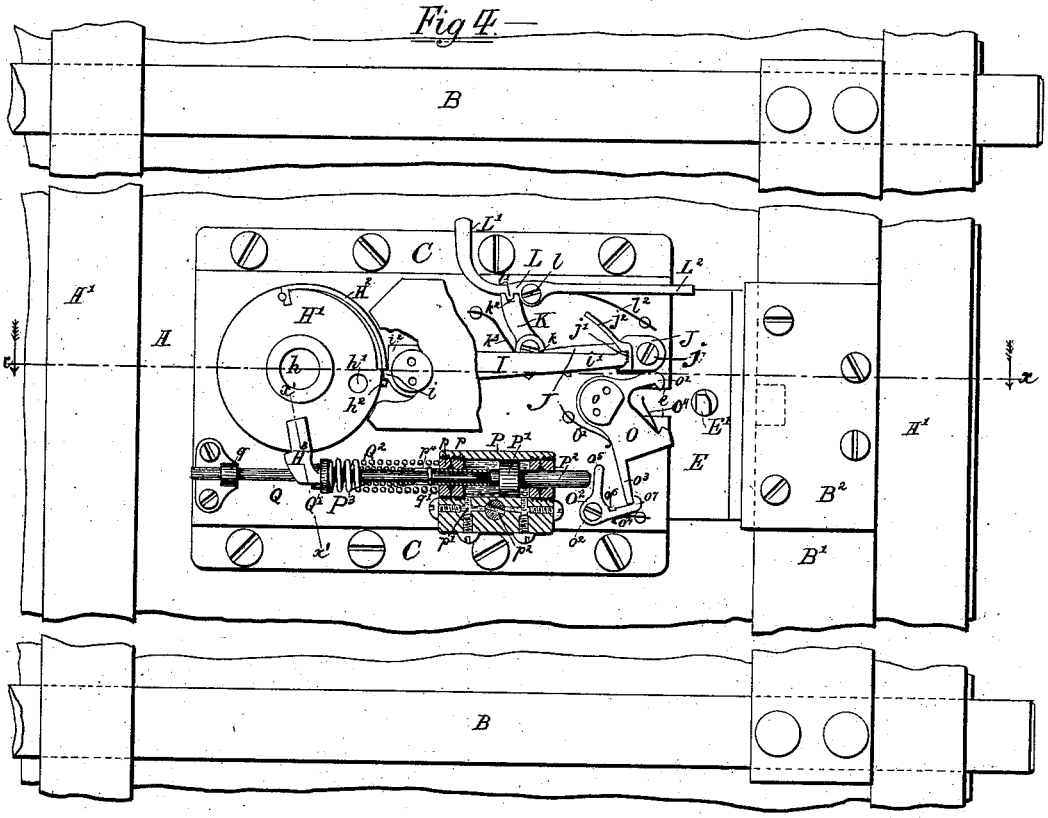


Fig 5.—

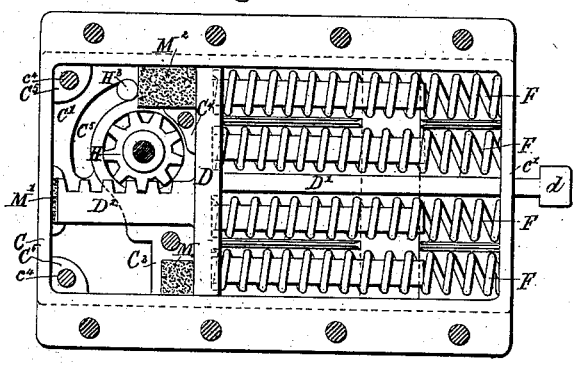
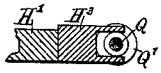


Fig 6.—



Witnesses.—
Wm. T. Fenning.
Chas. T. Lewis.

Inventor.—
Augustus G. Burton—
by— Dayton & Poole
Attorneys.—

(Model.)

3 Sheets—Sheet 3.

A. G. BURTON.

SAFE LOCK.

No. 382,071. Patented May 1, 1888.

Fig 7.—

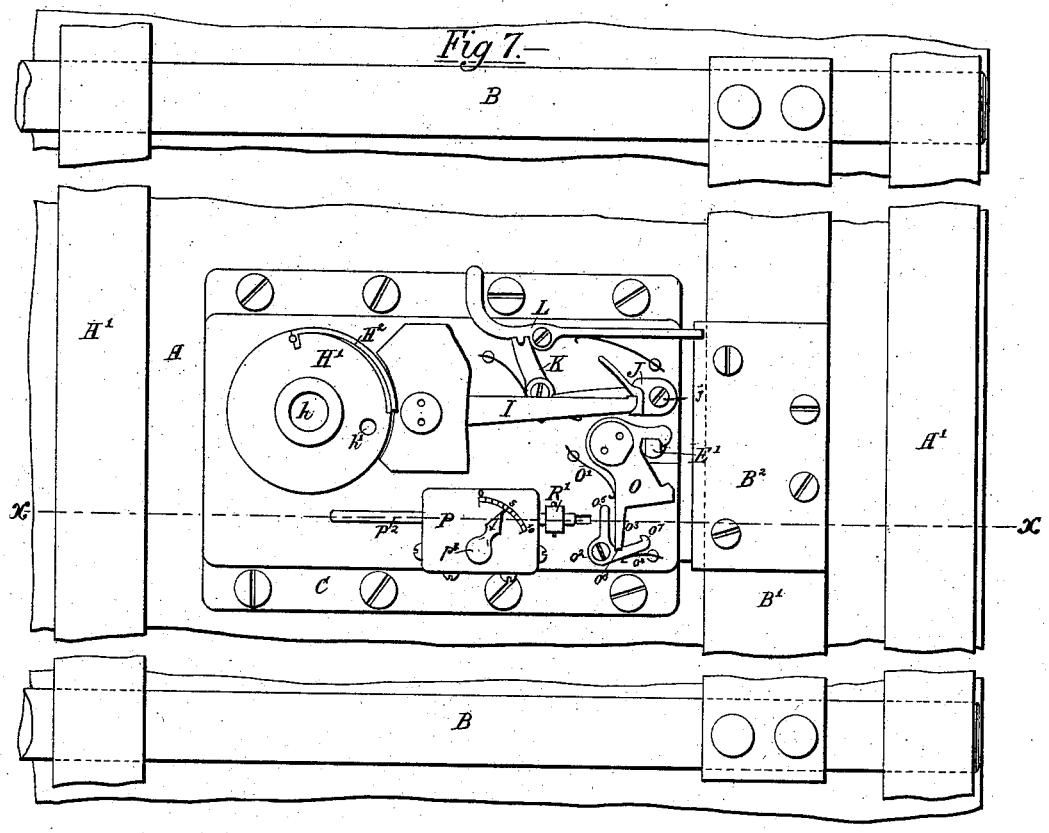


Fig 8.—

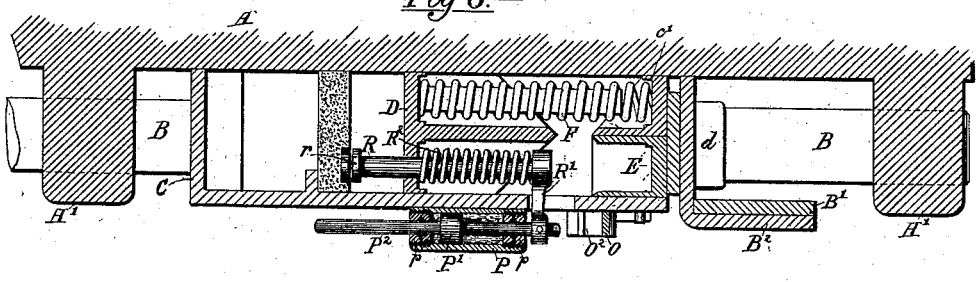
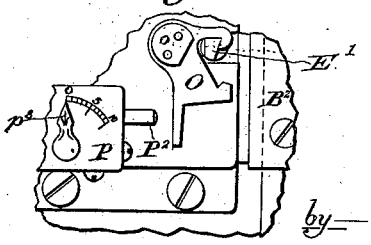


Fig. 4ª



Witnesses.—
Wm. H. Fleming.
Chas. N. Young.

Inventor.—
Augustus G. Burton.
by— Dayton & Poole
Attorneys.—

UNITED STATES PATENT OFFICE.

AUGUSTUS G. BURTON, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO JAMES C. HARRIS, OF DAYTON, OHIO.

SAFE-LOCK.

SPECIFICATION forming part of Letters Patent No. 382,071, dated May 1, 1888.

Application filed May 10, 1887. Serial No. 237,682. (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 safe, whereby the bolts may be actuated without the employment of any spindle or arbor passing through the door or other part of the safe.

In safe-locks of this kind springs or weights are 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 is provided for holding the casting-springs from moving the bolts while the door is being shut, and in connection with such detent means is provided for releasing the said springs or weights to allow the casting of the bolts after the door is fully closed.

One main object of my invention is to provide in a safe-lock of the kind above referred to an improved means for releasing the bolts or the casting-springs after the door is closed. Several different devices have been heretofore employed for this purpose. One of such devices has consisted of an attachment to a time mechanism operating 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 movement 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. As it concerns the means for releasing the bolts or the casting-springs after the door is closed, my invention comprises, in connection with a detent for holding the bolts retracted, or casting-springs under tension, a dash-pot and a spring or weight applied to actuate the movable part of the dash-pot, which movable part is arranged to act upon the detent, so as to move the same and release the bolts or the casting-springs. In a device consisting of these parts ample time may be afforded for closing the door before the bolts are released and allowed to enter the apertures of the door-jamb by giving a suitably slow movement to the movable part of the dash-pot.

Another main object of my invention is to provide a construction in the devices for connecting the retracting-springs with the detent, which is controlled by the time mechanism or other spring-releasing apparatus, whereby such devices may be placed in position for holding the springs compressed or under tension in the act of compressing or winding the actuating-springs. In automatic bolt actuating devices as heretofore made a series of levers have been employed for the purpose of holding the springs compressed, while at the same time enabling them to be released by a very slight exertion of force by the time mechanism, and these levers have been set or placed for holding the springs compressed by hand preparatory to compressing or winding the actuating-springs.

My invention as it concerns the devices last mentioned embraces an improved construction in a lever or levers and detent of the kind described, whereby all of the levers and the detent will be set or placed in position for holding the springs under tension by the movement of the part which serves to compress the said springs, thus enabling the entire bolt-actuating device to be placed in position for operation prior to closing the door without any attention upon the part of the operator, except to see that the actuating-springs are compressed or wound to a suitable extent.

In bolt-actuating devices of the character above referred to when embracing a detent for temporarily holding the bolts from movement under the action of the casting-springs while

the door is being closed the detent has commonly been arranged to act upon a part rigidly connected with the bolts. This construction in some instances has been employed in connection with actuating devices connected with the bolts in such manner that the bolts are necessarily both cast and retracted in the operation of winding or compressing the springs preparatory to closing the door. In other cases—as, for instance, in the apparatus illustrated in the said prior application made by James C. Harris, the detent and device for moving the same have been made separate from the actuating devices proper and mounted on the door or upon a part attached and moving with the bolts. As a novel and improved construction, I have provided the bolt-actuating device herein shown with a sliding plate, which is mounted in the case containing the actuating-springs, and have provided a detent engaging the said sliding plate for holding the latter from movement under the action of the casting-springs, such sliding plate being adapted to rest against the carrier-bar or other part attached to the bolts, while being unattached to same. By this construction I am enabled to place all the operative parts of the device in or upon a single case or shell and thus avoid the use of other and separate attachments to the safe-door or bolt-work. In other words, I provide an automatic bolt-actuating mechanism embracing a detent for holding the casting-springs temporarily from movement, together with means for releasing said detent, which mechanisms are separate from the bolt-work and adapted for the actuation of the latter when attached to the safe without the necessity for making any other attachments or connections than those commonly used for connecting the actuating-springs alone with the bolt-work.

The invention also embraces other improvements in bolt-actuating devices, as will hereinafter appear.

In the accompanying drawings, illustrating my invention, Figure 1 is a view in elevation of the inner side of the safe-door, showing the bolt-work, a bolt-actuating device embodying my invention, and a time mechanism for determining the time of unlocking the safe. Fig. 2 is a sectional view of the same taken upon line *x x* of Fig. 1. Fig. 3 is a sectional view taken upon line *x x* of Fig. 4. Fig. 4 is a view similar to Fig. 1, but showing the parts in the position which they occupy when the bolts are cast. Fig. 4ª illustrates a somewhat different construction of the spring-releasing devices shown in Fig. 4. Fig. 5 is a view of the bolt-actuating devices as viewed from the rear when the case containing the same is removed from the safe-door. Fig. 6 is a detail section taken upon line *x' x'* of Fig. 4. Fig. 7 is a view in elevation of the inner side of a safe-door with a bolt-actuating device thereon, illustrating a modified form of the parts constituting my invention. Fig. 8 is a sectional view taken upon line *x x* 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 devices 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, engaged with an L-shaped plate, B^2, which plate is attached to the bar B', and is provided with a notch, *b*, 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 rest against plate B^2, in the manner clearly shown in Figs. 2 and 3.

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 the 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' of the case C, the pinion H is attached to a metal disk, H', said disk being provided with a central orifice, *h*, and with an aperture, *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 a manner hereinafter set forth.

M M' M² are cushions or buffers located within the case C in position to engage the plate D when the latter reaches the inner limit of its movement. As herein shown, said cushions consist of blocks of rubber held in sockets or recesses formed in the case. The block M is located at the bottom of the case and is held in a recess formed in the integral projection or lug, C³, in position for engagement with the lower end of the plate D. The cushion M' is held in a recess in the case in position to engage with the end of the rack-bar D². The cushion M² is located in a recess or opening formed between the top wall of the case and the lug or projection C⁴ adjacent thereto, said cushion being exposed at its opposite sides, so as to engage the upper end of the plate D and a pin or stud, H³, upon the disk H'. Said pin or stud H³ passes inwardly through a curved slot, C⁶, Fig. 5, in the wall C' of the case, and is adapted to strike the cushion M² as the pinion H is turned at the same time that the plate D strikes the opposite face of said cushion.

As far as above described, the actuating device shown is made in the same manner as is the device illustrated and described in a prior application for patent, Serial No. 218,860, filed by James C. Harris, November 15, 1886, and hereinbefore referred to.

The lever J is pivoted at *j* to the wall C' of the casing, 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 H², 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 a time mechanism. The engagement of the lever K with the lever L is accomplished by means of a notch, *k²*, in the end of the lever K, adapted to receive a tooth, *l'*, upon the detent-lever L. The position of the several levers I, J, and K and the detent-lever L when the several springs are compressed is shown in Fig. 4, the end of the lever I being engaged in the notch *j'* of the lever J, and the lever J being engaged in the notch *k* of the lever K, while the latter lever is engaged with a 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 *k²*, 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, and with another arm, L², adapted for engagement with the actuating-arm of another kind of time mechanism now commonly used. 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 withdrawing the bolts for opening the safe.

In holding and releasing devices for the actuating springs of a safe of the kind herein shown as heretofore made it has been necessary to set by hand the lever I and the other parts or levers connected therewith at the time of compressing the springs. This is necessary, for instance, in the device shown in the said Harris application hereinbefore referred to, the lever which engages the revolving disk shown in said application being placed in engagement with the movable stop, which is actuated by the time mechanism before the disk is turned for compression of the springs. As an improved construction in devices of the kind referred to, 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 devices for this purpose herein shown the disk H' is provided with a pin, *h²*, (Figs. 1 and 4,) which is adapted to engage the under surface of the short arm or projection *i* of the lever I in such manner as to swing the long arm *i'* of said lever downwardly when the disk is turned sufficiently to fully compress the springs.

The lever J is provided with a curved arm, *j²*, adapted to engage the end of the lever I when the latter is moved, (Fig. 1,) and to thus retain the said lever J in position for the entrance of the end of the lever I when the free end of said lever is swung downwardly. When the said lever I is actuated by contact of the pin *h²* with its short arm *i* in the manner described therefor, the said lever I will enter the notch *j'*, and in its further downward movement will operate to throw downwardly the free end of said lever J until the latter enters the notch *k* in 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 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.

It is entirely obvious that the lever J may be made like the lever K as far as means for holding it in position for engagement of the lever I with its notch j' is concerned. That is to say, in place of the arm j^2, a spring, like the spring k^3, may be applied to hold said lever J with the notch j' in position for engagement with the free end of the lever I, instead of relying upon the said arm and the gravity of the lever to accomplish this end. It will be understood, furthermore, that the lever K may be moved by gravity in place of a spring such as is shown.

The tooth or projection l' of the detent L, and the notch *k*, 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-edge 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, the inclination of the engaging-surfaces being such as to make the tooth l' of hook shape. It follows from this construction that pressure upon the lever K, tending to move the free end of said lever away from the pivot of the detent, will not operate to cause the projection to slip out of the notch, but, on the contrary, will force the projection into the notch by the sliding of the inclined surfaces of the notch and projection upon each other. 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 shake or jar 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 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. This way has been shown experimentally in a lock made as herein shown, by moving the detent L until it is nearly disengaged from the lever K, and then repeatedly striking upon the lock-case or a part connected therewith, when the jarring of the parts will cause the said detent L to gradually move until the projection l' has fully entered the notch. This movement of the parts is of course facilitated by the spring l^2, which bears upon the detent in the manner above set forth.

As illustrated in said prior application of James C. Harris, the retracting-springs, corresponding with the springs F, herein shown, are arranged nearest the front plate, C', of the case C, while the casting-springs, corresponding with the springs G G, are located adjacent to the inner surface of the safe-door. In the device herein illustrated the position of the casting and retracting springs in the case C is the reverse of that stated—that is to say, the retracting-springs F are placed nearest the door, while the casting-springs G and the sliding plate E are located adjacent to the front wall, C', of the case. This reversal of the position of the springs produces no material change, however, in the general operation of the parts in casting and retracting the bolts, but it is desirable in a lock provided with the novel releasing devices for effecting the casting of the bolts, which are hereinafter described.

O is a spring-detent pivoted, by means of a stud, *o*, to the wall C' on the case C, and provided with a hooked arm, *o'*, adapted to engage a rigid stud, E', which is fixed in the sliding plate E. The wall C' is, as shown, provided with an open slot or notch, *e*, into which the stud E' enters when the plate E is retracted, as clearly shown in Fig. 4. 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' is a spring applied to hold the detent O normally free from the stud E', and O^4 is a spring-arm attached to the detent in such position that it will be encountered by the stud E' as the bolts and the sliding plate E are thrown backwardly by the retracting-springs, and thereby turn or swing the detent in a direction to engage the hooked arm *o'* with the said stud. The engagement of the detent with the stud is thus automatically accomplished at the time that the bolts are thrown back or retracted. For the purpose of moving said 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 devices as follows:

P is the shell or cylinder of a dash-pot, which is, as herein shown, formed in or by a rectangular block or casting secured to the wall C' of the case C. Within the shell P is placed a piston, P', Fig. 4, to which is attached a piston-rod, P^2, passing through apertures in both

ends of the shell P. In the particular construction shown the cylinder of the dash-pot is formed by boring a cylindric hole in the casing P and inserting two screw-plugs, *p p*, in each end of the hole. Said plugs are centrally apertured for the passage of the piston-rod P^2, annular recesses being formed at the meeting surfaces of each pair of plugs *p p*, in which is placed fibrous material, to form stuffing boxes or glands, in the manner shown. Opposite ends of the dash-pot are connected by a passage, *p'*, within which is placed a regulating-valve, p^2, having upon it, outside of the shell P, an arm, p^3, Fig. 1, which may be moved to give a larger or smaller opening through the valve p^2, as desired. The piston-rod P^2 of the dash-pot is actuated by means of a spring, P^3, and is arranged to operate upon and move the detent O, (either directly or through suitable intermediate parts,) and thereby release the plate E at the end of the desired time after the parts are set for operation, such time depending upon the speed at which the piston moves within the dash-pot.

In the particular construction shown the engaging surfaces of the hooked arm *o'* of the detent O and the stud E' are inclined in such manner that the detent tends to disengage itself from the stud by the pressure of the casting-springs, and a second detent, O^2, pivoted at o^2 upon the frame, is employed to hold the detent O in engagement with the said stud E', the piston-rod P^2 being arranged to immediately act upon the second detent O^2.

The detent O^2 is provided with an arm, o^5, the free end of which is located in the path of the piston-rod P^2, and with a notch or shoulder, o^6, adapted for engagement with the arm o^3 of the detent O, said detent O^2 being held in engagement with the detent O by means of a spring, o^4. The detent O^2 is also desirably provided with an arm, o^7, provided with a hooked end to limit the outward throw of the arm o^3 of the detent O when the latter detent is released.

Fig. 1 shows the detent O^2 engaged with the detent O, while Fig. 4 shows the parts in their position after the said detent O has been released, the arm o^5 having been moved by the action of the piston-rod sufficiently to disengage the said detent O^2 from the detent O. It is to be understood, however, that the particular construction described in the detent O and means for holding and releasing the same is only one of the many ways in which these parts may be arranged—as, for instance, the construction shown in Fig. 4^a may be used, in which the detent O positively engages the stud E', instead of being made with an inclined face for engagement with the said stud, and in which the piston-rod P^2 of the dash-pot may act directly upon the said detent O. The particular construction illustrated in Figs. 1 and 4 is preferred, in order that little power may be required for actuating the parts to release the detent O, thus enabling the spring P^3 for actuating the piston-rod to be made of relatively small size. For retracting the piston-rod P^2 after it has accomplished its work, and for compressing the spring P^3, by which the piston-rod is moved, means are shown in Figs. 1 to 6, as follows:

Q is a sliding rod held at one end in a guide, *q*, upon the case C, and sliding at its opposite end in the piston-rod P^2, which is made hollow to receive the end of said rod Q. Upon the said rod Q is placed a collar, Q', between which collar and the end of the piston-rod P^2 the spring P^3, before described, is placed.

Q^2 is a spiral spring surrounding the spring P^3 and located between the end wall of the dash-pot and the collar Q'.

H^3 is a forked arm or spur attached to the disk H' and arranged to engage the collar Q', so as to thrust said collar and the rod to which it is attached endwise toward the dash-pot when said disk is turned to compress the casting and retracting springs. The arm H^3 is forked, as clearly shown in the detail, Fig. 6, for the purpose of engaging opposite sides of the collar Q', to give an even pressure upon the latter. The longitudinal motion of the rod Q with relation to the piston-rod P^2 is limited by suitable stops, herein shown as formed by means of a pin, *q'*, inserted through the said rod Q and engaging longitudinal slots p^4 p^4 in the tubular portion of the piston-rod, as clearly shown in Fig. 4.

The operation of these parts is as follows: After the bolts have been cast the releasing devices occupy the relative positions shown in Fig. 4; but shortly thereafter the piston of the dash-pot is carried backwardly to the rear end of the dash-pot by the action of the spring Q^2, and after the bolts have been retracted and the door opened the parts will maintain the relative positions shown in Fig. 1. The parts of the dash-pot are placed in position for operation prior to closing the door by the act of turning the disk H', for the purpose of compressing the main casting and retracting springs of the lock. This rotation of the disk H' brings the arm H^3 into contact with the collar Q' and moves said collar, together with the rod Q, to which it is attached, endwise toward the shell or casing P of the dash-pot, so as to compress the spring Q^2 between the said collar and the dash-pot casing, and to also compress the spring P^3 between the said collar and the end of the piston-rod. When the piston and piston-rod are in their retracted position, as shown in Fig. 1, the pin *q'* occupies a position at the outer ends of the slots p^4 p^4 in said piston-rod, and when the said rod Q is moved by the arm H^3, in compressing the springs in the manner above stated, said pin *q'* moves through the said slots p^4, thereby allowing the piston and piston-rod to remain immovable. As soon as the springs P^3 and Q^2 have been compressed in the manner described, the spring P^3, acting upon the piston rod P^2, will immediately begin to move the piston and rod, and the latter will continue to slowly move as fast as allowed by the passage of the fluid from one end to the

other of the dash-pot until the piston-rod comes in contact with the detent O^2, when the latter will be actuated by the rod to release the detent O, in the manner before described. When the piston has reached the forward limit of its movement and the detent O and casting-springs have been released in the manner stated, the piston will remain at the forward limit of its movement until such time as the disk H′ is released to allow the expansion of the retracting-springs and the backward movement of the bolts. The backward rotation of the disk H′, which occurs when it is released, carries the arm H^3 away from the collar Q′, and said collar and the rod Q are then moved backwardly by the action of the spring Q^2, the piston-rod P^2 being also carried backwardly at the same time by the engagement of the pin q' with the rear end of slot p^4 of the piston-rod.

As an improved construction in bolt actuating devices of the particular kind herein shown, and embracing a disk, H′, which is provided with a spring-strip, H^2, forming a shoulder to engage a lever, I, I provide the said lever I at a point adjacent to the short arm or projection *i* of said lever with a projecting part or tooth, i^2, which is adapted to engage the outer surface of the said strip as the arm *i′* of the lever I is swung upwardly, in such manner as to press inwardly the free end of said spring-strip, and thus release it from the said tooth or projection *i*. By the employment of such projection or tooth i^2 the spring-strip is released from the projection *i* by relatively short upward movement of the free end of the lever I, so that a much shorter throw in the said lever I is required to enable the said strip H^2 to become disengaged from and pass the said projection or tooth *i*. The shortening of the throw of the said lever I is of great importance, for the reason that it lessens the space required for containing the device, and also lessens the impetus acquired by the said lever in its forcible upward movement, the said upward movement of the lever being obviously counteracted by the pressure of the tooth or projection i^2 against the spring-strip H^2 at the same time that the lever is moved or swung by the pressure of the end of said strip H^2 against the projection or tooth *i*.

In Figs. 7 and 8 I have illustrated a device embodying my invention which differs in some respects from that shown in the figures of the drawings above referred to. In this instance the dash-pot and all of the operative parts of the casting and retracting devices are like those above described, with the exception that the springs for advancing the piston of the dash-pot are located within the case C, and said piston is retracted by the action of the main retracting-springs of the lock, movement of the parts under the action of the retracting-springs in this instance being checked, or controlled by the dash-pot, so that the bolt-work is caused to move slowly, and any shock or jar to the operative parts by the sudden stoppage of rapidly-moving bolt-work is prevented.

As shown more clearly in Fig. 8, R is a sliding rod arranged within the case C parallel with the piston rod P^2 and connected with the latter by means of a rigid arm, R′. The arm R′ is attached at the front end of the rod R, and the latter has a sliding bearing at its rear end in the sliding plate D, against which the retracting-springs F and casting-springs G bear. As shown in the drawings, the rod R occupies the space which is filled by one of the casting-springs G, (shown in Figs. 2 and 3,) so that the particular lock shown in Fig. 8 contains only three casting-springs, while it is provided with four retracting-springs. Upon the end of the rod R, outside of the plate D, is formed a head, *r*, and about said rod, between the plate D and the arm R′, is placed a coil-spring, R^2.

The drawings, Figs. 7 and 8, show the piston P′ of the dash-post at the rearward limit of its movement, and they show the plate D advanced and the springs F and G compressed, these being the relative positions of the parts at the moment after the springs have been compressed preparatory to shutting the door. When the parts are in the position described and shown, the spring R^2 will obviously tend to move the rod R and arm R′ in a direction to carry the piston-rod forward and to thereby release the detent O in the same manner as before described. When, however, the piston and piston-rod reach the forward limit of their movement, the head *r* of the rod R will be brought into contact with the plate D, and the parts will remain in this position until the retracting-springs are released after retracting the bolts.

It is of course understood that the action of the springs for casting the bolts produces no effect whatever upon the rod R or spring R^2, inasmuch as the plate D is not moved when the bolts are cast. When the devices holding the said plate D from movement (in this instance the disk H′) are released, so as to allow the movement of the said plate under the action of the retracting-springs F, said plate D will carry with it the rod R and the piston of the dash-pot, and inasmuch as the piston can only be moved as permitted by the passage of the fluid from one end to the other of the dash-pot, the said plate D and the bolts will be given a relatively slow movement, instead of being cast or thrown suddenly and forcibly backward by the springs.

The particular construction in the parts shown in Figs. 7 and 8, inasmuch as it is more simple than that shown in the other figures, is herein specifically claimed as part of my invention.

It is not essential, as far as the main points of novelty in my invention are concerned, that the spring for actuating the piston of the dash-pot should be compressed by the act of compressing or winding the casting and retract-

ing springs of the lock; but inasmuch as a construction of the apparatus by which the winding of the springs automatically places all parts of the lock in position for operation without further attention on the part of the operator possesses important and obvious advantages in practice, a device in which the spring for actuating the dash-pot is compressed in the act of winding the springs is herein claimed as part of my invention.

It is obviously immaterial, so far as the operation of the several novel features of the bolt-actuating devices above described are concerned, as to what particular means is used for releasing the retracting-springs for opening the safe—as, for instance, instead of a time mechanism such as is herein illustrated, an electric actuating device of any well-known or preferred construction may be employed for moving the detent L, or other movable stop or lever, by which the retracting-springs are held from action during the time the safe is locked.

One feature wherein the bolt-actuating apparatus herein shown differs from others heretofore used is that by which the casting-springs are held from moving the bolts by a detent engaging the plate, which is immediately actuated by the said casting-springs, instead of by a detent engaging the bolts or carrier-bar, or any part directly connected therewith. This construction, aside from the general advantage of enabling all of the operative parts to be placed in a single shell or casing, makes the bolt work entirely independent of the actuating mechanism at the time the casting and retracting springs are compressed, so that at such time the bolts may be moved by hand to test the smoothness of their working. By reason of the advantages gained by making the bolts independent of the detent by which the casting-springs are held retracted, this construction is herein claimed as a separate and further improvement in automatic bolt-actuating apparatus.

The construction whereby the detent O is moved by the stud E', together with other features of construction herein shown in the levers or detents, whereby the casting and retracting-springs are held from moving the bolts, are claimed in another application for patent, Serial No. 253,306, filed by me in the United States Patent Office, October 25, 1887.

One novel feature of construction embraced in the apparatus herein illustrated—namely, the safe locking and unlocking device embracing a detent for holding the casting-springs from movement while the door is being closed, a motor comprising a spring or weight and means for controlling the speed of movement of the spring or weight, (in the instance illustrated a dash-pot,) together with a device for winding or compressing the springs by which the bolts are actuated, and at the same time winding or compressing the spring which actuates the motor, is broadly claimed in another application for patent, Serial No. 253,305, filed October 25, 1887, wherein the motor has the form of an actuating spring, a train of gears, and a speed-regulator. Specific claims are, however, herein made to cover the particular construction herein illustrated in the devices for accomplishing the winding or compression of the bolt-actuating springs and the actuating-spring of the dash-pot by a single act on the part of the operator.

I claim as my invention—

1. The combination, with the bolts of a safe, and springs or weights applied to actuate the bolts, of means for holding the casting-springs or weights from moving the bolts, comprising a detent, a dash-pot, and a spring or other means for actuating the movable part of the dash-pot, substantially as 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 dash-pot, the movable part of which acts upon the said detent, a spring applied to move the said movable part of the dash-pot, and means for compressing or winding the bolt-actuating springs, constructed to also compress or wind the spring which moves the movable part of the dash-pot, 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 dash-pot, the movable part of which is adapted to engage and move the said detent, a spring-actuating said movable part of the dash-pot, 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 spring which actuates the movable part of the dash-pot, 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 dash-pot, the movable part of which is adapted to actuate the said detent, and a spring for actuating said movable part of the dash-pot and engaging said sliding plate, whereby the said spring which actuates the movable part of the dash-pot is compressed with the casting-springs, substantially as described.

5. The combination, with the bolts of a safe and casting-springs, of a detent for holding the casting-springs from moving the bolts, a dash-pot, the movable part of which acts upon the said detent, a spring for advancing the movable part of the dash-pot toward the detent, and another spring applied to retract the said movable part of the dash pot, substantially as described.

6. The combination, with the bolts of a safe and retracting springs, and a sliding plate, D, against which the retracting-springs act, of a dash-pot comprising a casing, P, a piston and a piston-rod, P^2, a rod, R, connected with the

said piston-rod and provided with a collar or shoulder, and a spring for actuating the said piston applied between the said shoulder of the rod R and the plate D, substantially as described.

7. The combination, with the bolts of a safe and springs for moving the bolts, of one or more levers for holding the springs under tension, a detent for engaging the lever or levers when the springs are compressed, a time mechanism or other device acting upon the said detent to release the levers and springs at a desired time, and means for winding or compressing the springs constructed to automatically place the lever or levers and detent in position for holding the springs compressed or under tension, substantially as described.

8. The combination, with the bolts of a safe and actuating-springs for moving the bolts, of an arm or lever by means of which the springs are held compressed and which is moved or swung about its pivot in the act of compressing the springs, a second lever provided with a shoulder to engage the lever first mentioned, and with an arm or projection located in the path of the said lever first mentioned, whereby the second lever will be moved or turned by said first lever into position for the engagement of its shoulder with the said lever first mentioned, a detent engaging said second lever, and a time mechanism or other device acting upon said detent to release the levers and springs at a desired time, substantially as described.

9. The combination, with the lever I and detent L, of a lever or levers, as J and K, located between said lever I and detent L and provided with notches to receive the ends of the levers engaged therewith, said levers being provided with means for holding said notches in position to receive the ends of said lever or levers which enter said notches, substantially as described.

10. The combination, with the bolts of a safe, weights or springs applied to retract the bolts, and a part or plate connected and moving with the bolts, of a lever, as K, provided with a notch or shoulder engaging said part or plate for holding the bolts from movement under the action of the springs or weights, a detent engaging said lever, and means for actuating the detent to release the lever, the engaging surfaces of the said detent and lever being inclined or oblique, substantially as and for the purpose set forth.

11. The combination, with the bolts of a safe and casting-springs and a revolving disk or arm, as H′, the turning of which compresses the said springs, said disk being provided with a projection or shoulder, of a lever, I, provided with a projection or arm, *i*, engaging said projection or shoulder, a movable part, detent, or lever engaging the free end of said lever I, and a time mechanism or other means for actuating the said movable part or lever at the time it is desired to unlock the safe, the said disk or revolving part H′ being provided with a pin or stud, h^2, adapted to engage said arm *i*, substantially as described.

12. The combination, with the bolts of a safe and casting-springs, of a revolving disk or arm, as H′, the turning of which compresses the said springs, a spring strip, H^2, attached to said disk or arm, a lever, I, provided with a projection or arm, *i*, engaging the end of said strip, and provided, also, with a projection, i^2, adapted to engage the outer face of the strip, substantially as described.

13. 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, springs for casting the bolts located in said shell or case and acting against said sliding plate, a detent engaging said sliding plate, and means for releasing said detent after the door is closed, substantially as described.

14. 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 in said case and acting against said sliding plate, a detent engaging said sliding plate, and a spring-actuated motor mounted upon the said case and adapted to engage and move the detent, substantially as described.

15. The combination, with the bolts of a safe, of a bolt-actuating device comprising casting-springs and a moving part or plate against which said springs act, arranged to bear against the bolt-work, and a detent engaging said moving part or plate independently of the bolts, substantially as described.

16. The combination of casting and retracting springs and a shell or casing inclosing the same, the casting-springs being adjacent to the outer or exposed wall of the shell, a sliding plate or casting mounted in the said shell and acting against the bolts, and a detent mounted upon the said outer wall of the case and engaging said sliding plate, substantially as described.

17. The combination, with the bolts of a safe and springs or weights applied to move the bolts, of a sliding part or plate actuated by the springs and acting on the bolts, said sliding part or plate being provided with a projection or stud, and a pivoted detent provided with a notch or shoulder to engage the stud, and with a spring-arm located in the path of the stud, whereby the detent will be automatically engaged with the stud by contact of the latter with said part or arm, 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,

CHARLES T. LORING.