(Model.)

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4 Sheets—Sheet 1.

No. 383,041. Patented May 15, 1888.

Fig. 1.

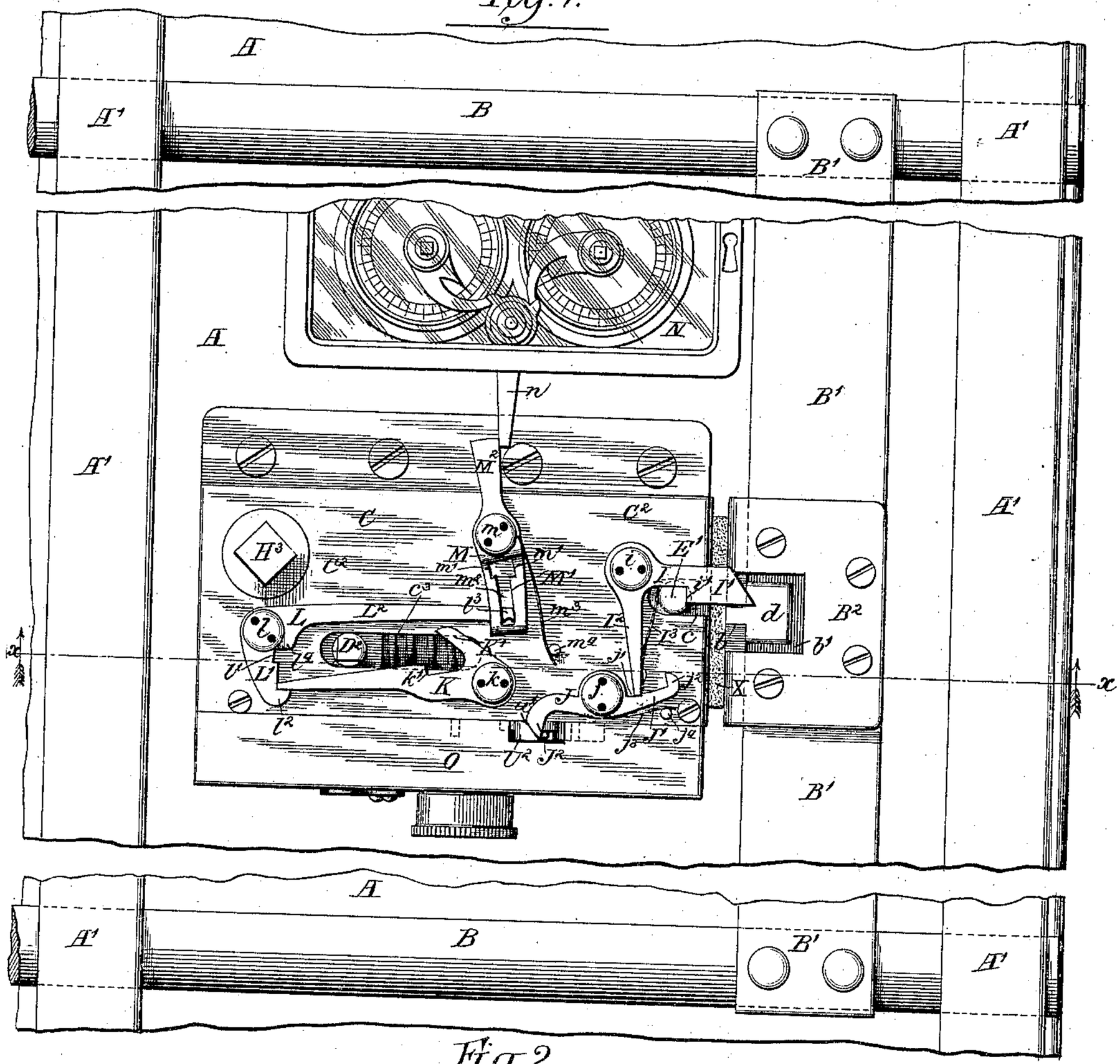
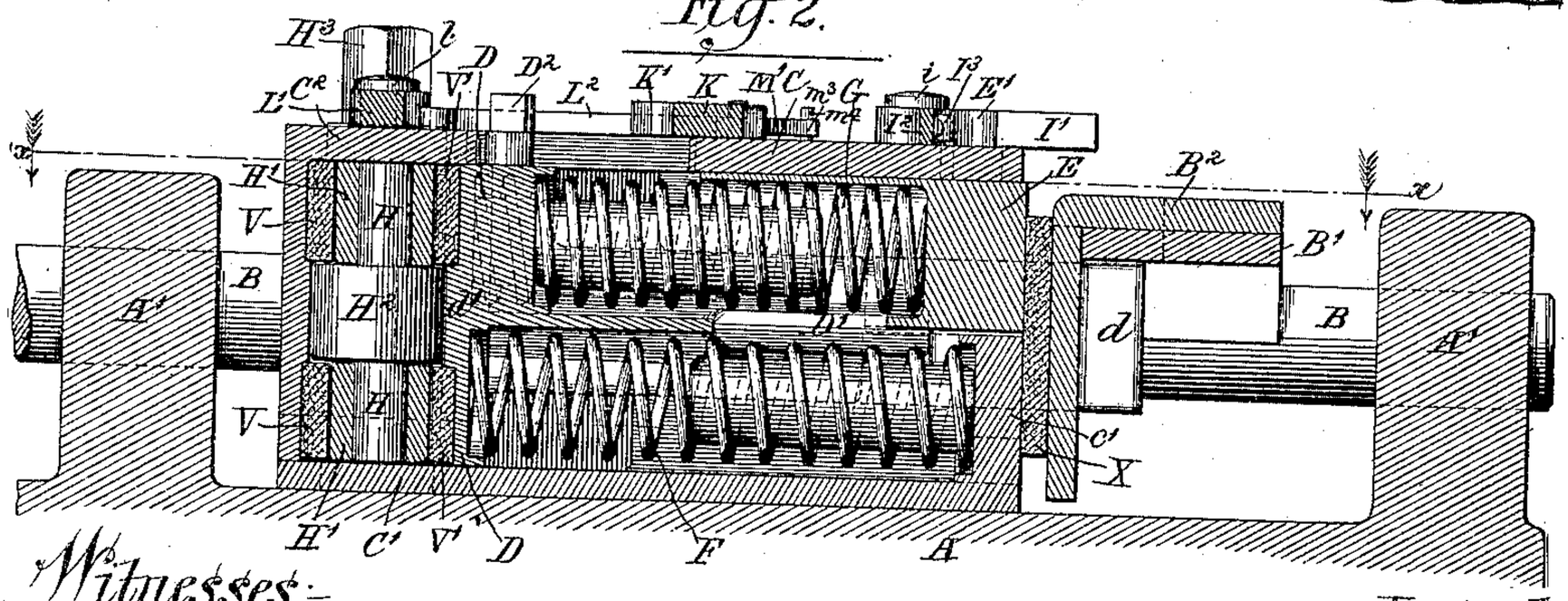


Fig. 2.



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by: Dayton & Poole.

Attorneys.-

(Model.)

4 Sheets—Sheet 2.

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Fig. 3.

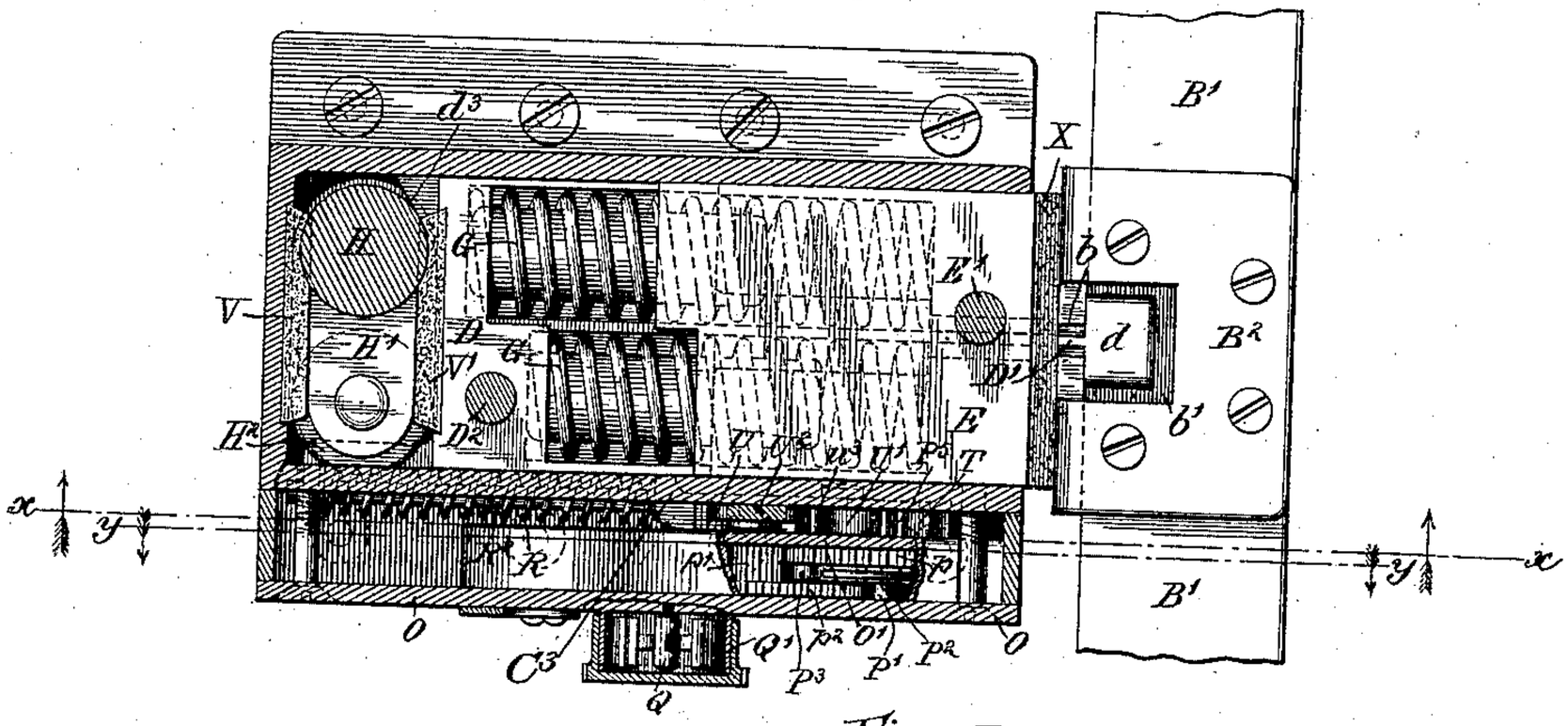


Fig. 4.

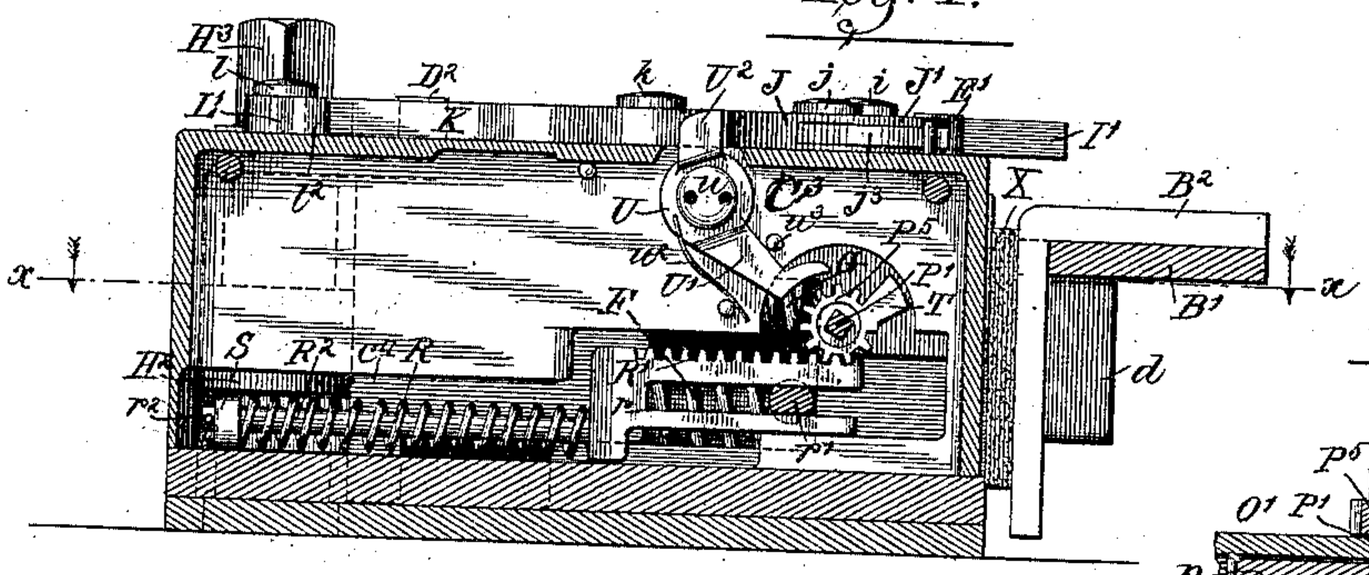


Fig. 5.

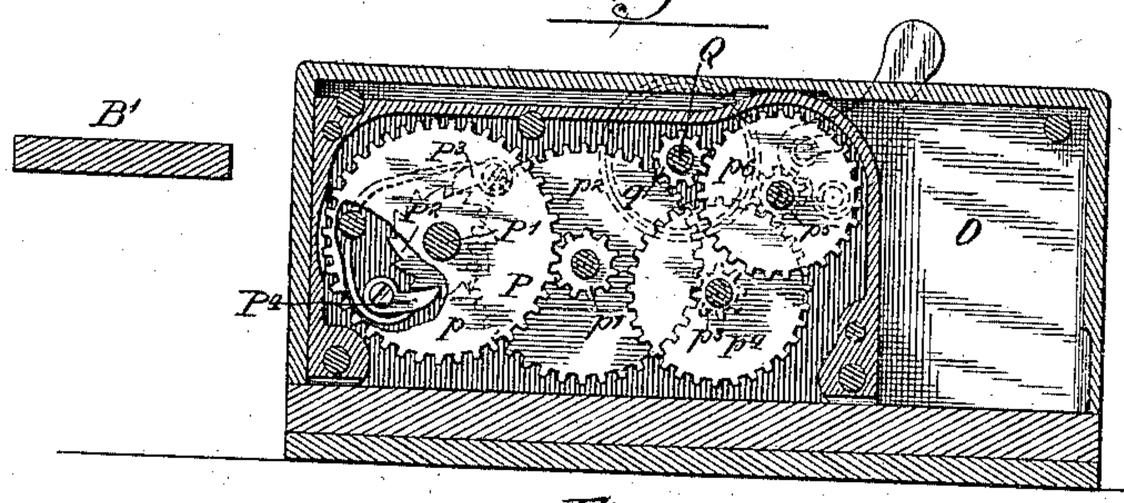


Fig. 6.

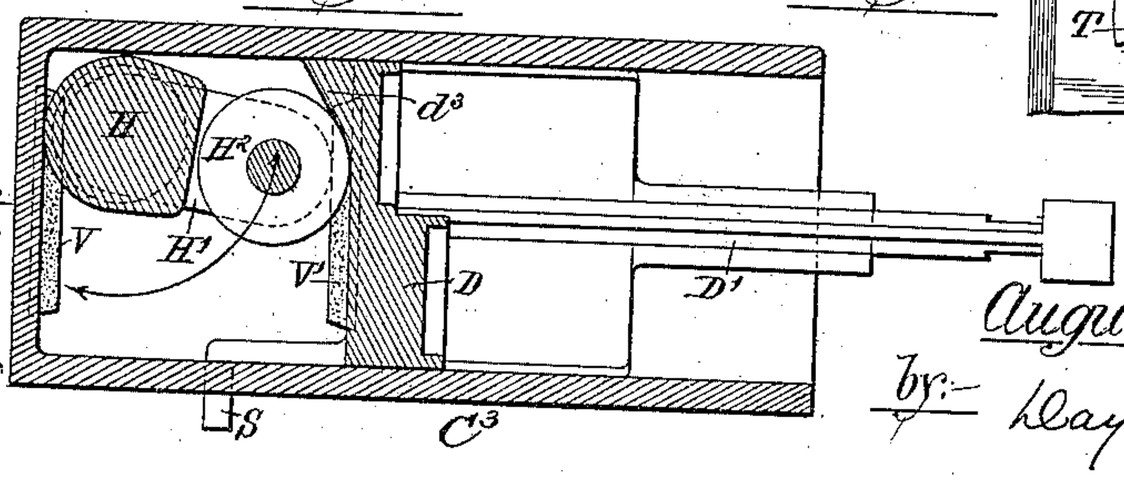


Fig. 7.

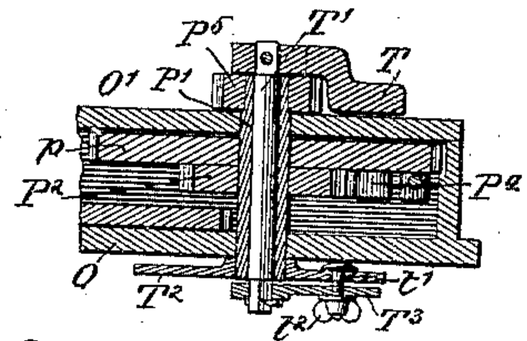


Fig. 8.

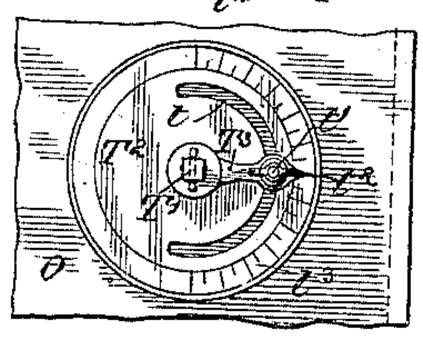
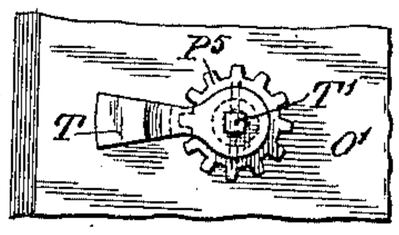


Fig. 9.



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(Model.)

4 Sheets—Sheet 3.

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Fig. 13.

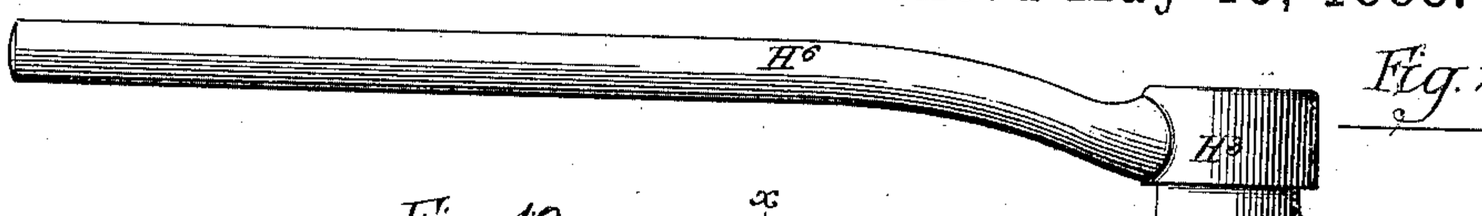


Fig. 10.

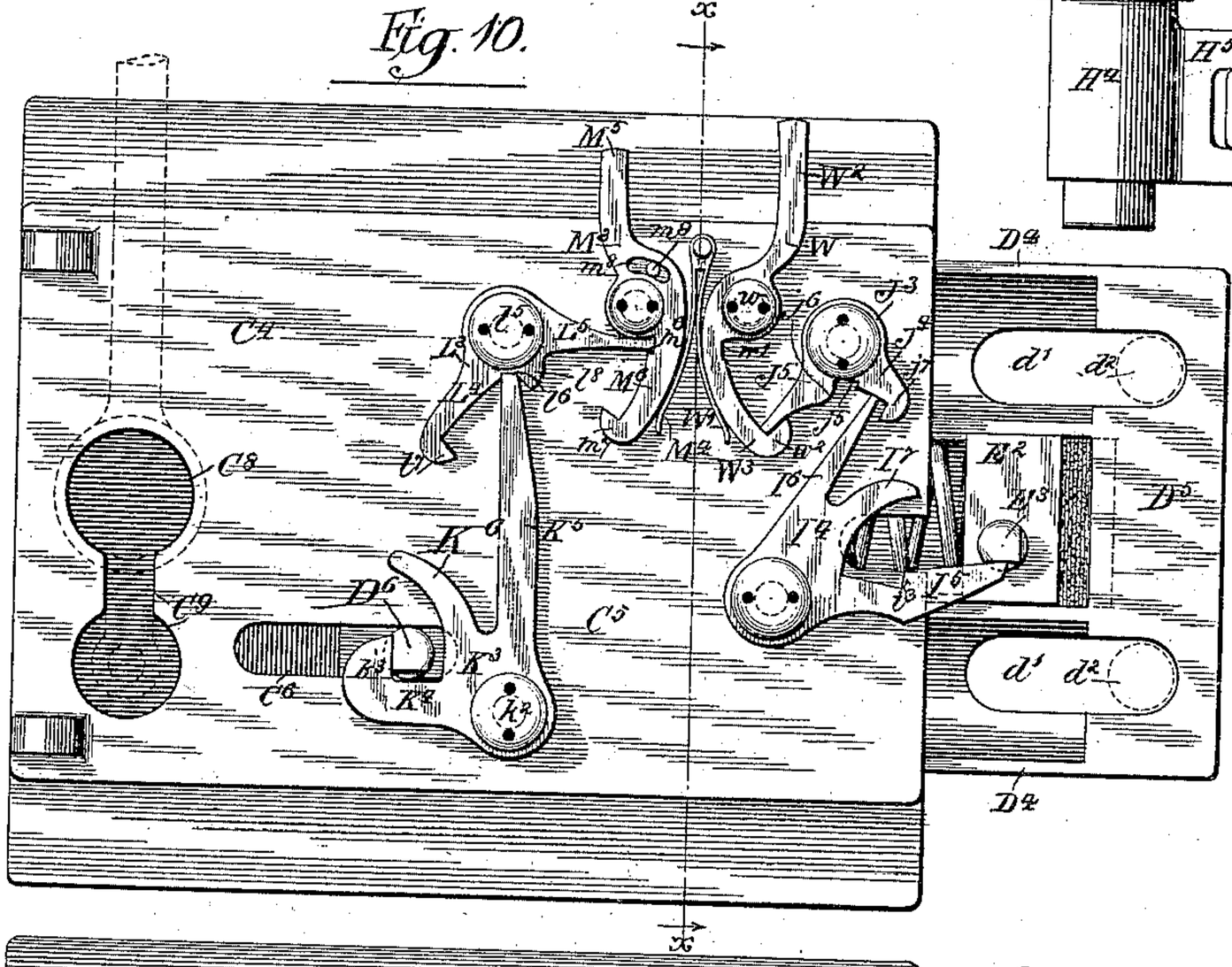


Fig. 11.

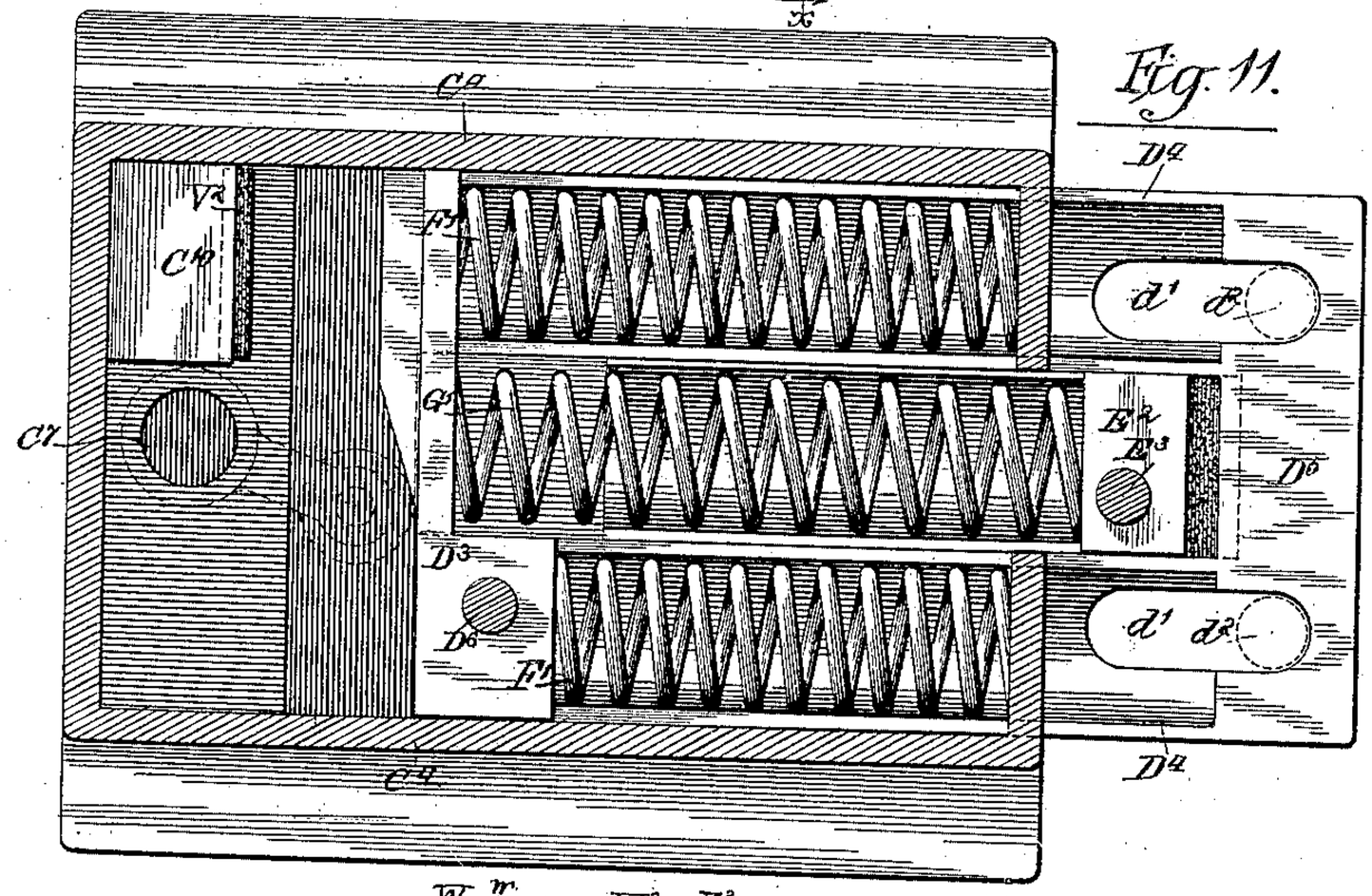
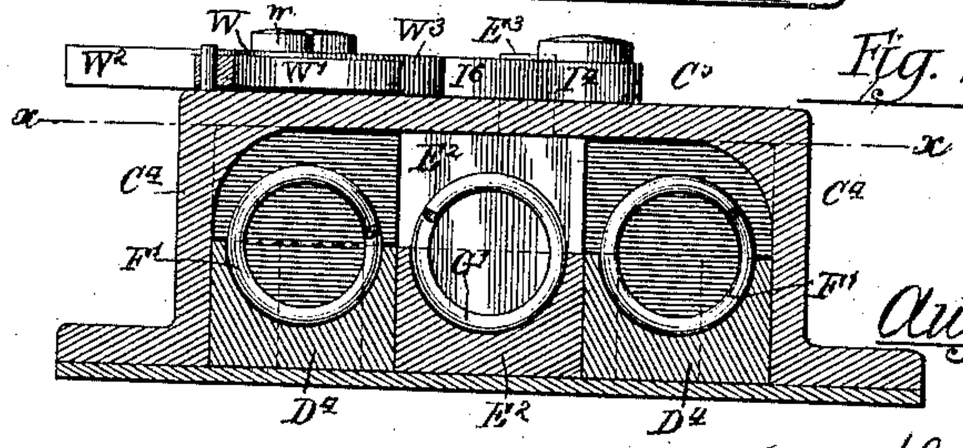


Fig. 12



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(Model.)

A. G. BURTON.

4 Sheets—Sheet 4.

SAFE LOCK.

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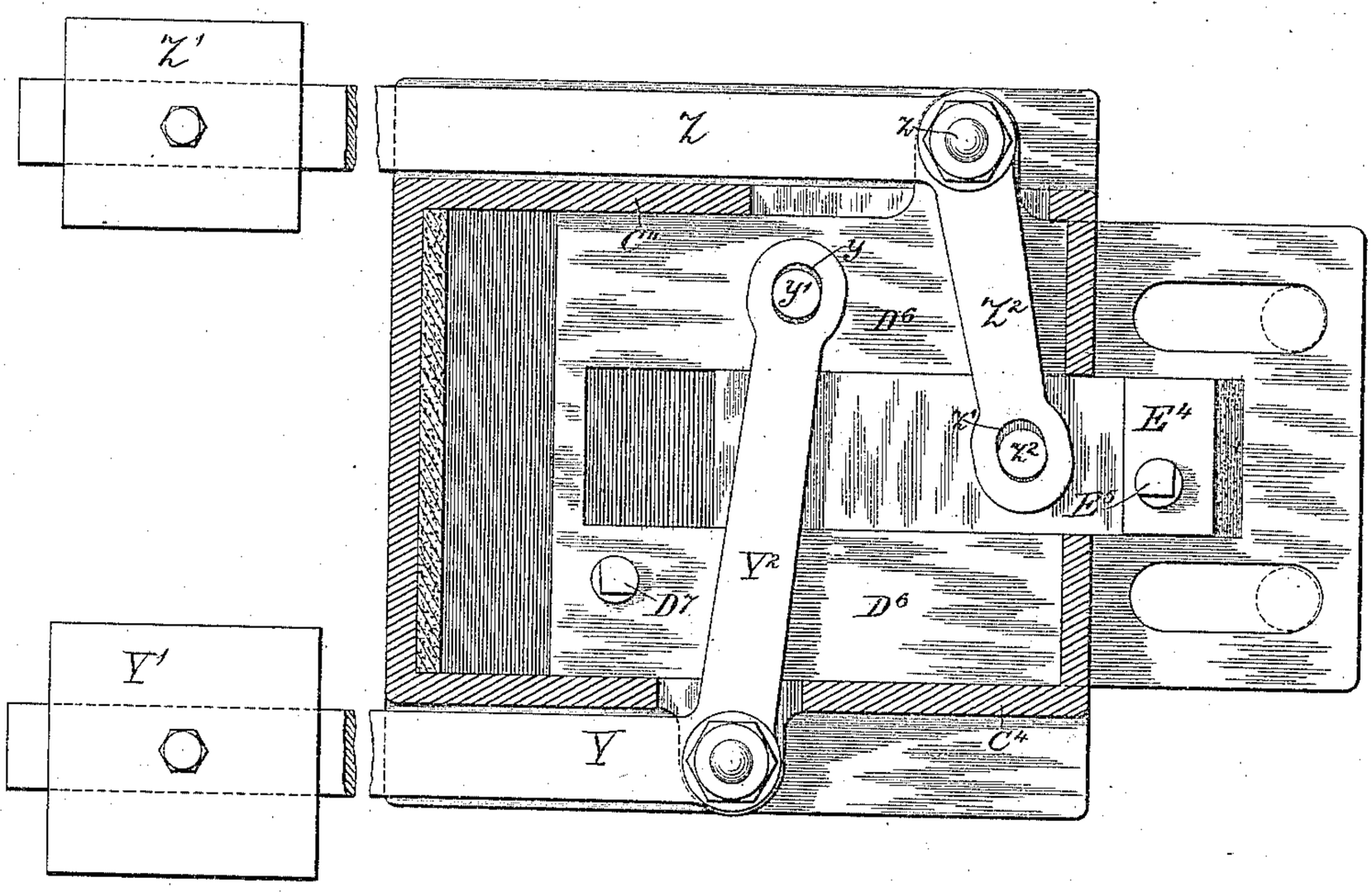
Fig 14.



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UNITED STATES PATENT OFFICE.

AUGUSTUS G. BURTON, OF CHICAGO, ILLINOIS.

SAFE-LOCK.

SPECIFICATION forming part of Letters Patent No. 383,041, dated May 15, 1888.

Application filed October 25, 1887. Serial No. 253,306. (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 means of 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 or any aperture therein.

The invention consists in the matters hereinafter 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, a bolt-actuating device embodying my invention, and a time mechanism. Fig. 2 is a sectional view of the same, taken upon line *x x* of Fig. 1. Fig. 3 is a sectional elevation taken upon line *x x* of Fig. 2. Fig. 4 is a horizontal section through the case of the lock, looking upwardly, taken upon line *x x* of Fig. 3. Fig. 5 is a similar section, looking downwardly, taken upon line *y y* of Fig. 3. Fig. 6 is a sectional view of the bolt-actuating mechanism, taken upon a plane parallel with the side of the door upon the line *x x* of Fig. 4. Fig. 7 is a detail section taken longitudinally through the winding-arbor of the train of gears, showing a construction thereof somewhat different from that illustrated in Figs. 4 and 5. Fig. 8 is a detail elevation of the dial-plates shown in Fig. 7. Fig. 9 is a detail view of the rotating stop or arm shown in said Fig. 7. Fig. 10 is a view in elevation of a bolt-actuating device differing somewhat from that shown in Figs. 1 to 6. Fig. 11 is a sectional elevation of the same, taken upon line *x x* of Fig. 12. Fig. 12 is a cross-section of the same, taken upon line *x x* of Fig. 10. Fig. 13 is a detail view of a spring-compressing lever or key. Fig. 14 illustrates weights applied in the place of springs for moving the bolts.

As illustrated in Figs. 1 to 6, inclusive, 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 in the said bars A′ A′.

B′ indicates a vertical carrier-bar which is attached to the bolts B B, and which serves to communicate 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 in the end of the case adjacent to the carrier-bar B′, and is connected with the latter by means of a head, *d*, upon the stem engaged with the L-shaped plate B^2, said plate B^2 being attached to the bar B′ and provided with a slot, *b*, Figs. 1 and 3, adapted to engage the shank or stem D′. At the end of the case C nearest the carrier-bar 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 act against the plate B^2 in such manner as to cast the bolts when the said plate E is thrust outwardly from the case. As herein shown, the said plate or casting E is adapted to press against a cushion or buffer, X, interposed between the said casting and the said plate B^2, in the manner clearly shown in Figs. 2, 3, and 4.

F F are springs interposed between the end wall, *c*′, of the case C and the sliding plate D. Said springs F F operate to retract the bolts, and are connected with the latter 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.

H is a heavy horizontal shaft having bearings at its inner and outer ends, respectively, in the inner wall, C′, and outer wall, C^2, of the

case C. Said shaft is located at a point adjacent to one of the side walls of the case—in the instance illustrated adjacent to the side wall which is uppermost when the lock is attached to the door. The said shaft is provided inside of the lock-case with a strong arm or wing, H′, in which is pivotally supported an anti friction roller, H^2, adapted to bear against or roll upon the rear or inner surface of the sliding plate D when the said shaft H is turned upon its axis. Said shaft H is further provided with a square head, H^3, upon its end exterior to the case, upon which a hand lever or wrench may be placed for rotating the shaft. When the sliding plate D is at the rearward limit of its movement and the springs F F and G G are expanded, the arm or wing H′ of the shaft H will stand vertical or parallel with the adjacent end wall of the case C, while the said plate D rests in contact with or adjacent to the shaft and the roller H^2. The purpose of the said shaft and arm or wing is to compress the casting and retracting springs preparatory to locking the door, and such compression of the springs is accomplished by turning the shaft H about its axis, so as to swing the roller H^2 upwardly and forwardly, and thereby press or force the sliding plate D forward. Said sliding plate D is shown as provided with an inclined surface, d^3, opposite the shaft H, to prevent the wing H′ being locked or caught in its forward position by turning said wing into a position perpendicular to the face of the plate. The same result may, however, be produced by a stop for the wing; but the use of the incline is desirable in the device shown, for the reason that in the latter provision is made for a movement of the sliding plate in excess of that necessary for compressing the springs, as will hereinafter appear.

The sliding plate E is held from forward movement at the time the springs G are compressed, in the manner above described, by devices as follows: In the front or outer surface of the said plate E is located a rigid stud, E′, which, when the said sliding plate E is at the rearward limit of its movement, rests within a notch, *c*, in said plate C^2. I is a detent which is pivoted by means of a stud, *i*, to the wall C^2 of the case C. Said detent is provided with a notched arm, I′, having a notch or shoulder, *i*′, adapted to engage the stud E′. The said detent is also provided with an arm, I^2, adapted for engagement at its free end with a locking-detent, J. Said locking-detent J is pivoted upon a stud, *j*, affixed in the wall C^2, and is provided with an arm, J′, having a notch, *j*′, which engages the said arm I^2 of the detent I in such manner as to hold the said detent-arm I′ engaged with the said stud E′. The engaging-surfaces of the stud E′ and the detent-arm I′ are slightly beveled or inclined, as shown, so that the pressure of the stud against the detent will tend to disengage said stud from the detent. The said arm J′ is shown as extended past the notch *j*′ and provided at its end with a lateral projection, j^2, adapted to engage the arm I^2, and to thereby limit the movement of said arm and of the detent I when the latter is moved to release the sliding plate. The said detent J is held in position for the engagement of the notch *j*′ with the arm I^2 of the detent I by means of a spring, j^3, (herein shown as affixed to the locking-detent and bearing against a stud, j^4, upon the lock-case.)

I^3 is a spring-arm affixed to the outer part of the arm I^2 and extending inwardly to a point at the rear of and in the path of the said stud E′. The contact of the said stud E′ with the spring I^3 when the sliding plate is thrown backwardly in retracting the bolts for unlocking the safe operates to swing the detent about its pivot in such direction as to engage the hooked arm with the stud and the extremity of the arm I^2 with the notch of the locking-detent, and thereby automatically accomplish the engagement of the detent with the stud at the time the bolts are thrown back or retracted.

The stud E′ is, for the purpose of actuating the detent I in the manner described, arranged to strike the spring I^3 at a point at one side of the pivotal axis of the detent. This may be accomplished when the stud is arranged to move approximately in a line passing through the pivotal axis of said detent by arranging the detent to engage one side of the stud while the spring engages the opposite side thereof, as illustrated, for instance, in another application for improvement in safe-locks, Serial No. 237,682, filed by me May 10, 1887. As herein shown, a construction in these parts is employed embracing a further improvement, wherein the stud is arranged to move in a line which passes at one side of the pivotal axis of the stud, and the engaging-surfaces of the stud and detent are upon the same line. In a construction of this kind the pressure of the stud upon the engaging-shoulder of the detent obviously tends to swing or throw the detent away from or out of engagement with the stud, so that the stud will free itself from the detent even when the engaging parts are not beveled or inclined in a manner to produce the same end, as herein illustrated.

The employment of a spring, I^3, upon the detent for engagement with the stud E′ is not essential to the actuation of the detent by the stud in such manner as to accomplish the engagement of said parts, for the reason that the same result may be produced by means of a rigid arm or projection upon the detent, as hereinafter fully set forth in connection with the form of device shown in Figs. 10, 11, and 12.

A detent provided with a spring or spring-arm, I^3, is specifically claimed in said application Serial No. 237,682, while a detent having an arm or surface located in the path of the stud is herein broadly claimed.

J^2 is a second arm upon the detent J, by means of which motion is communicated to

said detent for the purpose of releasing the detent I to permit the casting of the bolts at a desired time after the safe-door is closed.

The devices herein shown as employed to accomplish the release of the bolts in locking the safe will be hereinafter described.

For holding the sliding plate D at the forward limit of its movement, so as to retain the casting and retracting springs in their compressed condition after the said springs have been compressed by turning the shaft H in the manner above described, devices are herein provided as follows:

D^2 is a rigid stud affixed to the plate D and extending outwardly through a longitudinal slot, c^3, formed in the front wall, C^2, of the lock-case.

K is a detent-lever pivoted upon a stud, k, which is affixed in the wall C^2 of the case and provided with a notch, k', between its pivotal point and its free end, said notch being located in position to engage the stud D^2 when the sliding plate D is at the forward limit of its movement and the springs are compressed. The engaging-surfaces of the notch k' and of the stud D^2 are preferably slightly beveled or inclined in such manner that the pressure of the stud tends to release the detent-lever therefrom, as clearly shown in the drawings, Fig. 1.

L is a second detent-lever, which is pivoted upon a stud, l, affixed in the wall C^2 of the case. Said detent-lever L is provided with an arm, L′, having a notch, l', adapted to engage the end of the detent-lever K when said detent-lever is engaged with the stud D^2, and to thereby hold the detent-lever in engagement with the stud and retain the springs compressed. Said arm L′ of the lever L is herein shown as extended outwardly somewhat beyond the notch l', and is provided with a lug or projection, l^2, for limiting the downward movement of the detent-lever K when the latter is released and is swung away from the stud D^2 by the pressure of the latter. The said detent-lever L is provided with a second arm, L^2, which is adapted to engage a third detent-lever, M, which is immediately acted upon by the time mechanism. Said detent-lever M is pivoted upon a stud, m, affixed in the wall C^2, and is provided with a slotted arm, M′, in the slot of which is located the outwardly-turned extremity l^3 of the lever-arm L^2. The said detent-lever M is provided adjacent to its pivotal point with two notches, m' m', arranged at opposite sides of the slot m^2 of the said arm M′, either of which notches may be engaged with the part l^3 of the lever L^2 at the time the detent L is in position for the engagement of the lever K with the notch l'. The purpose of employing the two notches m' m' is to enable the lock to be so arranged that the lever-arm L^2 may be released by swinging the detent-lever M in either direction—that is to say, either to the right or to the left—as required by the particular form of time mechanism employed. This construction is obviously desirable, inasmuch as the time mechanisms of different makers are arranged to act in different directions.

m^3 is a spring attached to the detent-lever M and pressing against the stud m^4 upon the case. Said spring is arranged in the instance illustrated to swing the arm M′ of the detent toward the left for engaging the arm L^2 with the right-hand notch, m'. The spring will, however, be arranged to swing the detent in the opposite direction when it is desired to employ the left-hand notch for engaging the said lever-arm.

The detent-lever M is herein shown as provided with an upwardly-extending arm, M^2, adapted for engagement with the movable arm n of a time mechanism, which is indicated as a whole by N. The said time mechanism operates to move the said detent-lever M at a predetermined time, and thus release the several detents described and allow the action of the retracting-springs for retracting the bolts and opening the safe.

In the prior application, Serial No. 237,682, above referred to, a series of levers or detents holding the retracting-springs from operation are so arranged that said levers and detents will be set in position to hold the springs compressed in the act of compressing said springs, thereby rendering unnecessary the setting of said detents or levers by hand prior to closing the safe.

The detent-levers L and M herein shown are constructed for automatic operation in the same manner. For this purpose the detent-lever K is provided with an arm, K′, which is located in the path of the stud D^2, and in such position that as said stud is carried forward in compressing the springs it will strike the said arm K′ and swing the lever K about its pivot until the shoulder k' is in position to engage the rear surface of the stud. The movement of the detent-lever K in the manner described obviously brings its free end opposite the notch l' of the detent-lever L. To cause the engagement of the said notch l' with the lever K, said detent-lever L is provided with a projecting part or surface, l^4, arranged approximately at right angles to the arm L′ in which the said notch l' is formed, the parts being so arranged that as the lever K is swung into position for the engagement of the notch k' with the stud D^2 the free end of said lever will strike the projection or surface l^4, and thereby swing the detent L about its pivot until the notch l' engages the end of the lever K, and the free end of the arm L^2 of said detent-lever has swung through the slot m^2 of the detent-lever M and has come opposite the notch m' of said detent-lever, with which notch it will become immediately engaged by the action of the spring m^3. The stud and notch k' are, however, arranged in a line passing to one side of the pivot k of the detent, so that the stud will release itself from the detent even when the parts are not beveled, as above set forth in connection with the stud E′ and detent I.

The stud D^2 and detent K obviously operate in the same general manner as do the stud E′ and detent I, and the construction embraced in both of said studs and detents is herein broadly claimed as part of my invention.

In the separate simultaneous application, Serial No. 253,305, hereinbefore referred to, I have shown and described a spring-motor applied to actuate the detent which holds the casting-springs from moving the bolts, the actuating-spring of the motor being wound or compressed by the same act by which the actuating-springs for the bolts are compressed or wound. The bolt-actuating apparatus herein illustrated is provided with a spring-motor arranged and operating generally in the same manner as that shown in said prior application. The particular motor herein illustrated, however, embodies certain novel features, which are made the subject of claims in this application.

O is a shell or casing within which the spring-detent-actuating motor is located. In the particular instance illustrated the said casing and the motor contained within the latter are located against the side wall of the case C and beneath the said case, as the latter is located when secured to the door.

The operative parts of the motor are made as follows: P, Fig. 5, indicates a train of gears, which may consist of any desired number of wheels and pinions arranged to intermesh in the usual manner. In the particular construction shown P′ is the main or driving shaft of the train, upon which is mounted a main or driving wheel, *p*. Said driving-wheel is connected with the shaft by a backing-ratchet, P^2, upon the shaft, arranged to engage spring-pawls P^3 P^4 upon the main wheel *p*. The wheel *p* intermeshes with a pinion, *p′*, attached to a wheel, p^2, which latter wheel meshes with a pinion, p^3, rigidly connected with a wheel, p^4. The wheel p^4 intermeshes with a pinion, p^5, attached to a wheel, p^6, which meshes with and drives a pinion, *q*, upon a shaft, Q. The said shaft Q is provided with some suitable speed-regulating device. As herein shown, it extends through the wall of the case O into an annular box or chamber, Q′, Fig. 3, within which is placed friction-weights carried by spring-arms upon the shaft, in the manner fully illustrated and described in the said application Serial No. 253,305.

The prime mover employed for actuating the train of gears in the instance illustrated is a coiled spring, R, arranged to act by expansion upon a sliding rack, R′, which intermeshes with a pinion, P^5, affixed to the main shaft P′ of the train. Said pinion is herein shown as attached to the end of the shaft P′, which extends through the wall O′ of the case O nearest the side wall of the case C. As a means of guiding the rack-bar R′ and holding it in engagement with the pinion P^5, I have herein shown said rack-bar as provided with a longitudinal slot, *r*, constructed to embrace a headed pin, *r′*, affixed in the said wall O′ of the casing O. The spring R is herein shown as placed around a rod or plunger, R^2, which is rigidly attached to the rack R′. The outer end of the said plunger R^2 passes through a guide-aperture in an arm, S, which is rigidly attached to and moves with the sliding plate D, as more clearly shown in Fig. 6, said arm S being arranged to extend outwardly through a slot or opening, c^4, (shown in Fig. 4,) in the side wall of the case C in position to engage the end of the said plunger R^2, which latter, together with the rack R′, is shown as located in the space between the actuating-springs and the casing O of the train of gears, the plunger being located partially within the said slot or opening c^4. The spring R is located between the said arm S and the end of the rack-bar R′, and acts by expansion to move the said rack-bar in a direction away from the said arm S. When the several bolt-actuating springs are expanded and the plate D is at the rearward limit of its movement and adjacent to the rear end wall of the case, the extremity of the arm S, engaged with the plunger R^2, rests near the rear wall of the case, as clearly shown in Fig. 4, and the rack R′ will be drawn to the left by the engagement of a pin or head, r^2, upon the end of the plunger R^2 with the said arm S. At this time the spring R will be expanded to its greatest extent. If, when the parts are in this position, the plate D is thrown forward to compress the bolt-actuating springs, the arm S will be carried forward therewith into the position shown in Fig. 6, thereby compressing the motor-spring R between the arm S and the end of the rack, the plunger and rack of course remaining stationary in this movement of the arm S and the latter sliding over the said plunger. After the spring R has been compressed in the manner described, said spring will obviously tend to carry forward the rack R′; but said rack, being in mesh with the driving-pinion P^5 of the gear-train, will be prevented from moving forward at a speed greater than will be allowed by the train of gears and the regulating device thereof. It follows that the said spring R will expand slowly after the plate D has been moved forward, and that the pinion P^5 and the main shaft P′, to which it is attached, will be slowly rotated by the action of the spring during a considerable period of time and until the rack has reached the forward limit of its movement.

The motor comprising the actuating-spring and train of gears, constructed and operating in the manner described, may be arranged to move or actuate the detent which holds the casting-springs from movement by any suitable or preferred form of connecting devices between said motor and detent. In the particular construction illustrated, wherein the said springs are held from movement by means of a hooked detent, I, and a locking-detent, J, adapted to hold said hooked detent from movement under the pressure of the said springs, devices are provided for actuating the said detent J from the main shaft P′ of the train as

follows: Upon the inner end of the said shaft P′, inside of the plate O′, is located a revolving arm or wing, T. Said arm or wing is shown in Fig. 4 as made integral with the driving-pinion P^5. U is a lever pivoted by means of a stud, *u*, to the wall C^3 of the lock-case. Said lever is provided with an arm, U′, the free end of which is located in the path of the revolving stop T, and with another arm, U^2, which extends upwardly or outwardly beyond the front wall of the case C, and is provided at its end with a beveled surface, *u′*, engaging the end of the arm J^2 of the locking-detent J. The said oblique face of the arm U^2 is so arranged that when the lever U is swung about its axis by contact of the revolving arm T therewith the said locking-lever J will be swung or moved in a direction to release the detent I, and thereby allow the action of the casting-springs. Said lever U is herein shown as provided with a spring, u^2, arranged to hold the lever normally free from the locking-detent. The motion of the lever under the action of the spring is limited by a stop, u^3, as clearly shown in Fig. 4.

In the construction herein shown the shaft P′ and the arm T, moving therewith, are arranged to make one revolution or less than a revolution during the running of the motor, and the period of time between the starting of the motor and the action of the arm T upon the part by which the casting-springs are liberated is determined by the angular position of the arm upon the shaft at the time the shaft begins to revolve. When the said arm T is made integral with the driving-pinion P^5, as shown in Fig. 4, it becomes necessary to turn the arm, together with the pinion and shaft, by hand at the time that the rack-bar is disengaged from the pinion, so as to place the stop at a desired angular position when the rack-bar is retracted to give a desired time before the stop strikes the lever U in the forward movement of said rack-bar. The said stop is free to be shifted by reason of the presence of the backing-ratchet connecting the shaft P′ with the main driving-wheel *p*. The moving or shifting of the stop in the manner described, however, requires the taking apart of the lock to gain access to the stop and the disengagement of the rack from the said pinion.

The lock may of course be adjusted for a desired time of unlocking before it is placed in the safe and may never afterward require to be changed. In such case the construction above described, and shown in Fig. 4, is unobjectionable. In many instances, however, it may be wished by the owner of the safe to shift or change the time allowed for closing the door, and in such case some means for more conveniently shifting the stop upon the shaft is necessary. I have shown one convenient form of a device for this purpose in Figs. 7, 8, and 9. As shown in said figures, the shaft P′ is made hollow or tubular and within the same is placed a spindle, T′. The said spindle extends at its inner end past the inner end of said shaft and the pinion P^5, and to its end is affixed the arm T, which in this case is made separate from the said pinion P^5 and provided with a hub for attachment to the spindle. The said shaft P′ is in this case extended through the outer wall of the case O, and is provided upon its end which projects therefrom with a disk, T^2, rigidly affixed to the shaft. The spindle T′ extends somewhat beyond the end of the shaft and the face of the disk T^2, and has secured upon its end an arm, T^3, adapted to swing or move around over the face of the disk T^2. Said disk is provided with a concentric slot, *t*, which is engaged by a headed bolt, *t′*, which passes through an aperture in the arm T^3, and is provided with a thumb-nut, t^2, whereby the bolt may be tightened, to thereby hold or clamp the said arm T^3 firmly against the disk. Said disk is desirably provided with a scale or index, t^3, to serve as a guide in moving the arm T^3. It is entirely obvious that by moving the hand T^3 with reference to the disk T^2 the circumferential position of the arm T with relation to the shaft P′ and the pinion P^5 may be changed or shifted as desired, so that the said stop will encounter the lever U at a greater or less time after the starting of the motor. The said disk T^2 being located upon the exposed surface of the lock-case, the shifting of the said arm T may obviously be accomplished without the necessity of taking the lock apart or removing any of its parts, the scale or index t^3 being desirably marked to indicate the time of running of the motor, so that the motor may be set to release the casting-springs at the termination of any period desired by the person having control of the safe.

One important feature of novelty in the bolt-actuating mechanism herein described is embodied in the device for compressing the casting and retracting springs. In locks heretofore made of the character herein shown a toggle device has been employed for compressing the springs, consisting of a shaft mounted in the lock-case and having one arm of the toggle rigidly attached thereto, while the other arm of the toggle is pivoted to the end of the said rigid arm and to the sliding plate by which the springs are compressed. This construction is objectionable, for the reason that it occupies a considerable amount of space in the lock-case, while the positive connection between the sliding plate and the actuating-shaft of the toggle necessitates the moving or swinging of the parts with the plate at the time the latter is thrown forcibly backward by the springs, thereby giving a hammering or pounding action upon the joint of the toggle, tending to enlarge the pivot-bearings and otherwise injure the parts. In a prior patent, No. 364,922, granted June 14, 1887, to James C. Harris, is shown a lock-actuating device in which the springs are compressed by means of a revolving pinion intermeshing with a rack attached to the sliding plate, against which

the springs bear. The construction herein shown and claimed by me has several advantages over the prior constructions above referred to. An important one is that the compressing devices herein shown occupy very much less space within the lock-case than either of those before mentioned. This is clearly shown in Fig. 3, wherein the springs are shown in their expanded position, and wherein the swinging arm and roller rest parallel with the rear end wall of the case, while the sliding plate D rests adjacent to or in contact with the said arm and roller. There is thus no waste room whatever within the case at the time the springs are expanded. It may be here remarked that the saving of room in the lock-case is of great practical advantage in lock-actuating devices of the character shown, inasmuch as in most safes so much of the space upon the inner side of the door is occupied by the bolt-work that little room is left for the bolt-actuating device and the time-lock, and in order to make a bolt-actuating device adapted for use on a variety of safes the actuating mechanism must be put in the most compact form possible.

Another and important advantage gained by the employment of a swinging arm and roller as a means of compressing the actuating-springs is that such arm may be turned to a position parallel with the end wall of the case after the lock has been set for action, so that no movement of the compressing devices takes place at the time the retracting-springs are released. It follows that the only part of the actuating devices which is forcibly moved with the retracting-springs is the plate D itself and the detent-levers, which are moved to release said plate. The movement of as few parts as possible at the time the springs are released is obviously desirable, in order to avoid the wear upon and liability of injury to the operative parts when rapidly and forcibly moved and suddenly arrested.

In order to lessen the shock or jar produced by contact of the sliding plate D with the actuating arm H′ when said arm is arranged to swing backward in contact with the end wall of the case in the manner shown in Figs. 1 to 6, I have provided the said end wall with two buffers or cushions, V V, and have attached to the rear face of the said plate D at either side of the surface *d′*, against which the roller H^2 bears, buffers or cushions V′ V′. When the arm H′ and roller H^2 rest adjacent to the end wall of the case in position to allow the free backward movement of the sliding plate D, the portions of said arm H′ above and below the roller H^2 will rest in contact with the cushions V V, and when the said sliding plate D is thrown toward or against the said arm and roller the interposed cushions V′ V′ will strike the arm, and, together with the cushions V V, will gradually arrest the movement of the said plate.

As a separate improvement in bolt-actuating devices, I employ a connection between the bolts and the actuating mechanism, constructed for disengagement by a relative horizontal movement of the parts in a direction perpendicular to the plane of the safe-door, whereby the actuating device may become disconnected from the bolts without moving the latter in case the said actuating device is dislodged and thrown inwardly by concussive action caused by the action of a high explosive upon the exterior of the safe or otherwise. The sliding plate E, against which the casting-springs act, having a plane vertical face in engagement with the plate B^2 of the carrier-bar, is obviously adapted for disengagement from the latter in the manner stated. To provide means for the ready disconnection of the head *d* of the stem D′ from the part engaged thereby, I make said part with an outwardly-opening slot, in which the stem D′ is inserted. In the particular embodiment of this part of the invention herein illustrated the plate B^2 is provided in its front face with a notch or opening, *b′*, into which the slot *b* opens, so that the head *d* may pass outwardly through the opening, while at the same time the stem D′ may be thrust forward out of the slot. A connection between the actuating devices and bolts adapted for the disengagement of the parts in the manner described is of obvious value and importance, and is therefore herein claimed as part of my invention.

In Figs. 10, 11, 12, and 13 I have shown a somewhat different form of bolt-actuating mechanism, embracing the same general features of construction above described in devices for casting and retracting the bolts and in means for holding the casting and retracting springs from operation. The main difference between the device illustrated in the figures now to be described and those above referred to consists in the employment of a detachable actuating lever or key for compressing the springs, instead of the rotating shaft and arm or wing thereon permanently mounted in the case, such as is shown in Figs. 1 to 6.

As illustrated in said Figs. 10, 11, 12, and 13, C^4 is the casing or shell of the apparatus, and C^5 the front wall thereof. D^3 is a sliding plate located within said casing or shell; E^2, a second sliding plate located at the front end of the shell and constructed to bear against the carrying-bar or other part connected with the bolts. F′ F′ indicate retracting-springs located between the end wall of the case and the sliding plate D^3, and G′ a casting-spring located between said plate D^3 and the plate or casting E^2. In this instance the several springs F′, F′, and G′ are arranged side by side in the same plane, and the sliding plate D^3 is connected with the carrying-bar by means of two integral parallel bars, D^4 D^4, located beneath the springs F′ F′ and hollowed upon their surfaces adjacent to said springs to receive the latter, and a cross piece, D^5, connected with the ends of said bars D^4 D^4 and engaging the carrier-bar. In the particular construction illustrated the cross-piece D^5 and bars D^4 D^4

are provided with longitudinal slots d' d', which engage pins fixed in the carrier-bar, such pins being indicated by dotted lines at d^2 d^2, Figs. 10 and 11. The slots d' d' allow the carrier-bar to be moved independently of the plate D^3 in the same manner as before described in connection with the stem D′ and head *d*. (Illustrated in Figs. 1 to 6.) The plate E^2 is in this instance preferably extended beneath the spring G′ and recessed to receive said spring, said plate being located and guided between the bars D^4 D^4, attached to the plate D^5. The plate E^2 is provided with a stud, E^3, constructed to engage a pivoted detent, I^4, mounted upon the wall C^5 of the case. Said detent I^4 is in this instance provided with an arm, I^5, having a notch or shoulder, i^3, adapted to be engaged with the stud, and also with an arm, I^6, constructed to engage a second detent, J^3, the said detent I^4 being constructed generally in the same manner as the detent I. The means for accomplishing the automatic engagement of the stud E^3 with the detent I^4 in this case consists of a rigid arm or prong, I^7, located in the path of the stud in such position that in the forward movement of the stud the latter will strike the arm, and thereby swing the detent about its pivot, so as to bring the shoulder i^3 behind the stud and in position to engage and hold the latter from backward or outward movement. The said prong I^7 is preferably made with a forwardly-curved or cam face engaging the stud, and the detent will be moved by the action of the stud upon said cam-surface of the prong, which latter is located in advance and somewhat at one side of the pivotal axis of the detent. When the arm or prong upon the detent is made rigid, as last above described, the stud is arranged to pass inwardly some distance beyond the shoulder i^3, which engages said stud, this obviously being necessary in order to afford a sufficient movement in the detent to fully engage the shoulder therewith after the stud has passed inside of the shoulder. Such movement of the stud past the shoulder of the detent obviously requires a slight excess of movement in the plate E^3 over that necessary for suitably compressing the springs; but such excess of movement may be readily provided without changing the structure or operation of the device as a whole. The detent J^3 is in this instance provided with a notch or shoulder, j^5, for engagement with the arm I^6 of the detent I^4, and said detent is constructed for automatic actuation by the said arm I^6 at the time the detent I^4 is moved by the contact of the stud E^3 therewith in such manner as to cause the engagement of the said notch or shoulder with the said arm I^6. For this purpose the said detent is provided with an arm or surface, j^6, located in the path of the arm I^6 and in position to be encountered by the arm as soon as the latter has passed the notch or shoulder j^5, so that the detent will be moved by the arm in a direction to interlock the notch or shoulder j^5 with the end of said arm. The said detent J^3 is herein shown as provided with an arm, J^4, provided at its free or outer end with a shoulder or projection, j', for limiting the movement of the arm I^6 of the detent I^4 when said detent is released from the stud E^3. Said detent J^3 is also provided with an arm, J^5, constructed for engagement with a third detent, W, pivoted at *w* to the front wall of the case and provided with a notch, *w*′, to engage the end of said arm J^5, the detent being held in position to engage the said notch with the arm by means of a suitably-applied spring, W′. Said detent W is provided with an arm, W^2, located in a position convenient for actuation by the movable part or actuating-arm of a time mechanism, motor, or other device employed for releasing the bolt-casting springs at a desired time. For limiting the motion of the detent J^3 when thrown by the action of the detent I^4 thereon, at the time of releasing the springs said detent W is provided with an arm, W^3, having at its end a stop, w^2, to engage the free end of the arm J^5 of said detent J^3.

In the sliding plate D^3 is affixed a rigid stud, D^6, which extends through a horizontal slot, C^6, in the wall C^5 of the case, and is constructed to engage a pivoted detent, K^3, which is constructed generally in the same manner as is the detent K. (Shown in Figs. 1 to 6.) Said detent K^3 is pivoted upon a stud, k^2, and is provided with an arm, K^4, having a notch or shoulder, k^3, to engage the stud D^6, and with an arm, K^5, engaging a detent, L^3. Said detent K^3 is provided with a curved arm or prong, K^6, located in the path of the stud D^6 and operating to swing the lever K^3 about its pivot, and thereby engage the shoulder k^3 with the stud, when encountered by said stud, in the same manner as before described in connection with the detent I^4. The detent L^3 is pivoted to a stud, l^5, and provided with a shoulder, l^6, for engagement with the free end of the arm K^5. Said detent is also provided with an arm or prong, l^8, located in position to be encountered by the arm K^5 in such manner as to swing the detent about its pivot, and thereby bring the shoulder l^6 into engagement with the end of the arm. The detent L^3 is also shown as provided with an arm, L^4, having a prong, l^7, for limiting the movement of the arm K^5, and with an arm, L^5, engaging a detent, M^3, which is actuated by the time mechanism for releasing the retracting-springs. Said detent M^3 is provided with a notch or shoulder, m^6, which is held in position to engage the detent L^3 by a spring, M^4. Said detent M^3 is also provided with an arm, M^5, which is adapted for engagement with the movable part of a time mechanism, and with an arm, M^6, having a prong, m^7, for engagement with the end of the arm L^5 of the detent L^3 for limiting the movement of the latter when released from the notch m^6.

The operation of the detents holding the casting and retracting springs from movement is

generally similar to the corresponding parts illustrated in Figs. 1 to 6, and will be readily understood without further description.

The means illustrated in Figs. 10 to 13 for compressing the several bolt-actuating springs is generally similar to that before described, but embraces, instead of a shaft permanently mounted in the case and provided with an arm or wing acting upon the sliding plate, a separate or removable lever or key, H^3, Fig. 13, adapted to engage suitable bearings in the case or shell and having an arm or wing acting upon the sliding plate and a rigid arm or handle whereby it may be manipulated. As shown in said Fig. 13, the actuating lever or key comprises a short shank, H^4, a wing, H^5, rigidly connected therewith and carrying an anti-friction roller, h', and a hand-lever, H^6, attached to said shank. The shank is constructed to engage a bearing-aperture, C^7, formed in the inner wall of the shell or case, and an aperture, C^8, in the outer wall thereof, said aperture C^8 being provided with a lateral slot or extension, C^9, to admit the wing H^5 and its roller into the case. When a removable actuating lever or key such as above described is employed, a suitable stop or stops will be provided for limiting the backward movement of the plate D, so as to afford space behind said plate for the insertion of the said actuating lever or key when said plate is at the backward limit of its movement. I have for this purpose herein shown a stop, C^{10}, as located in the upper part of the shell and provided with a cushion or buffer, V^2, against which the upper part of the sliding plate is constructed to strike.

In the use of the actuating lever or key H^3 for compressing the bolts the shank and wing of the lever are inserted through the opening C^8 and slot C^9 until the inner end of said shank is properly engaged with the bearing-aperture C^7 of the shell, the wing H^5 being inserted in a vertical position or parallel with the rear wall of the case. After the key or lever has been thus inserted, it is rotated by pressure upon the handle H^6, so as to carry the end of the wing H^5 forwardly against the sliding plate D^3, thereby thrusting the latter forward and compressing the springs.

From the construction of the devices for compressing the springs above described, and shown in the several figures of the drawings, it is entirely obvious that the novel spring-compressing devices illustrated may embrce an actuating lever or key provided with an arm or wing adapted to act upon the sliding plate either when a part or the whole of such lever or key is permanently mounted in the shell or casing of the actuating devices or when the said actuating key or lever is removable bodily therefrom.

A detent for holding the casting or retracting springs in their compressed condition having a part, or arm, or prong located in the path of the stud or projection which engages the detent, whereby the detent is moved to cause its engagement with the said stud or projection in the manner hereinbefore described, I consider to be broadly new, and a detent or holding device thus constructed is herein claimed as applied either to the casting or retracting springs, and when the part, arm, or prong upon the detent for engaging the stud or projection is either rigid or yielding. The said arm or projection is shown as rigid in the case of the detent-lever K in Fig. 1 and as yielding in the case of the detent I of the same figure.

In another application, Serial No. 237,682, filed May 10. 1887, I have shown and described a detent embracing the same general features of construction last above referred to and containing a spring or yielding arm located in the path of the stud or projection which engages the detent. Said yielding or spring arm is specifically claimed in the said application No. 237,682, while a detent provided with either a rigid or spring arm or projection is broadly claimed herein.

The employment of the detent acting directly upon a part rigidly connected with the sliding plate D has great advantage over prior constructions heretofore used, in which the springs were held compressed by means applied to the rotating part which is turned for the purpose of compressing the springs, this construction not only being much more simple and less liable to get out of order, but giving many less parts which are forcibly moved in the expansion of the springs, as hereinbefore explained.

In Fig. 14 I have shown a lock similar to that shown in Figs. 10 and 11, wherein weights are employed in place of springs for casting the retracting-bolts. In this instance C^4 is a lock-case. E^4 and D^6 are sliding plates operating in the same manner as the corresponding plates, D^4, D^4, D^5, and E^2, shown in said Figs. 10 and 11. Said plates E^4 and D^6 are provided with studs D^7 and E^5, adapted to engage detents upon the lock-case, in a manner hereinbefore described.

Y is a lever pivoted in the lower side of the case C^4 and provided with a weight, Y'. Said lever is arranged in a horizontal position, and is provided with an upwardly-extending arm, Y^2, having a slot, y, at its upper end engaged by a pin, y', upon the plate D^6. The action of the weight Y' tends to draw said plate D^6 inwardly for retracting the bolts in the same manner as the spring F' operates in the device shown in Figs. 10 and 11.

Z is a second horizontally-arranged lever provided with a weight, Z', and pivoted at Z to the upper margin of the plate D^6. Said lever Z is provided with a depending arm, Z^2, having at its lower end a slot, Z', which engages a pin, Z^2, in the sliding bar E^4. The lever Z operates upon the sliding bar E^4 to cast the bolts in the same manner as does the spring G'. (Shown in Fig. 11.)

It will of course be seen that the lever Z moves with the plate D^6 when the latter is actuated by the lever Y in unlocking the safe.

It will be readily understood from the construction illustrated in Fig. 14 that, as far as the operation of the locking and unlocking devices is concerned, weights as well as springs may be employed as prime movers for giving motion to the bolt-work.

I claim as my invention—

1. The combination, with the bolts of a safe, of actuating devices for said bolts, comprising actuating-springs, a movable plate against which said springs act, and a spring-compressing lever or key engaging a bearing upon the door and embracing an arm or wing acting at its end against said movable plate, substantially as described.

2. The combination, with the bolts of a safe, of an actuating device for said bolts, comprising a movable plate, as D, against which the springs act, springs located between said plate and a stationary surface of or upon the door, a second set of springs interposed between said movable plate and a part attached to the bolts, and a spring compressing lever or key engaging a bearing upon the door and embracing a rigid arm or wing constructed to act at its free end against the said movable plate, substantially as described.

3. The combination, with the bolts of a safe, of an actuating device for the bolts, comprising an exterior casing or shell, a movable plate, as D, sliding in the said shell, springs located between the said movable plate and an opposing stationary surface of or upon the door, a second set of springs interposed between the said movable plate and a part attached to the bolts, and a spring-compressing lever or key adapted to engage a bearing upon the case and embracing a rigid arm or wing constructed to act at its free end against the said plate, substantially as described.

4. The combination, with the bolts of a safe, of an actuating device for the bolts, comprising a casing or shell, C, a sliding plate, D, mounted in the shell and connected with the bolts, springs located between the said sliding plate and a stationary surface or part of the shell, a second set of springs interposed between the said sliding plate and a part attached to the bolts, and a spring-compressing lever or key adapted to engage a bearing upon the shell adjacent to the rear end of the latter, and provided with a rigid arm or wing, and an anti-friction roller mounted in the end of said arm or wing and constructed to bear against the said sliding plate, substantially as described.

5. The combination, with the bolts of a safe, of springs for casting the bolts, springs for retracting the bolts, a sliding plate engaging both sets of springs, a detent upon the case engaging the said sliding plate for holding both sets of springs compressed, and means for actuating the detent to release the retracting-springs, substantially as described.

6. The combination, with the bolts of a safe, of actuating devices for the bolts, comprising a shell or casing, a sliding plate therein, springs for retracting the bolts bearing upon said plate and an opposing wall of the shell or casing, springs for casting the bolts bearing against said sliding plate and acting against the bolts, a detent upon the case engaging said sliding plate for holding both sets of springs compressed, and means for actuating the detent to release the retracting-springs, substantially as described.

7. The combination, with the bolts of a safe, of an actuating device for the bolts, comprising casting and retracting springs, a sliding plate against which said casting and retracting springs act, a spring-compressing lever or key engaging bearings upon the safe-door and embracing an arm or wing acting against said sliding plate, a detent engaging the said sliding plate and holding the springs compressed, and means for actuating said detent to release the retracting-springs for opening the door, substantially as described.

8. The combination, with the bolts of a safe, of an actuating device for the said bolts, comprising a sliding plate, as D, retracting-springs interposed between said plate and a stationary part or surface of the door, casting-springs bearing against said sliding plate D, a sliding plate, E, interposed between said casting-springs and a part of or connected with the bolts, a detent engaging the said sliding plate E for holding the springs compressed, another detent engaging the sliding plate D for holding the casting-springs from moving the bolts at the time the several springs are compressed, and means for actuating said detents for releasing the casting and retracting springs, substantially as described.

9. The combination, with the bolts of a safe, of an actuating device for the said bolts, comprising a sliding plate, as D, retracting-springs interposed between said plate and a stationary part or surface of the door, casting-springs bearing against said sliding plate D, a sliding plate, E, interposed between said casting-springs and a part of or connected with the bolts, a spring-compressing lever or key having bearings upon the door and embracing a rigid arm acting at its free end against said sliding plate, a detent engaging the sliding plate D for holding the springs compressed, another detent engaging the sliding plate E for holding the casting-springs from moving the bolts at the time the several springs are compressed, and means for actuating said detents for releasing the casting and retracting springs, substantially as described.

10. The combination, with the bolts of a safe-door, of a shell or casing, C, a sliding plate, D, mounted in said shell or casing, retracting-springs located between the said sliding plate and an opposing part or surface of the casing, casting-springs bearing at one end against said sliding plate D, a sliding plate, E, mounted in the casing and interposed between the said casting-springs and a part attached to and

moving with the bolts, a spring-compressing lever or key having bearings in the shell or casing and embracing a rigid arm adapted to bear at its free end against the said plate, a detent mounted upon the case and engaging the said sliding plate D, another detent mounted upon the case and engaging the said sliding plate E, and means for actuating the said detents, substantially as described.

11. 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 or weights and acting on the bolts, said sliding part or plate being provided with a projection or stud, and a pivoted detent provided with a shoulder to engage the stud, and with a part or 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.

12. 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 or weights and acting upon the bolts, said sliding part or plate being provided with a projection or stud, and a pivoted detent provided with a shoulder to engage the stud, and with a part or arm located in the path of the stud, said stud being constructed to move in a line passing at one side of the pivoted axis of the detent, substantially as described.

13. 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 or weights and acting upon the bolts, said sliding part or plate being provided with a projection or stud, and a pivoted detent provided with a shoulder to engage the stud, and with a rigid arm located in the path of the stud, substantially as described.

14. 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 or weights and acting upon the bolts, said sliding part or plate being provided with a projection or stud, and a pivoted detent provided with a shoulder to engage the stud, and with a rigid arm located in the path of the stud, the working-surface of said arm being bent or curved forwardly toward the stud and arranged obliquely with reference to the path of the latter, substantially as described.

15. 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 or weights and acting upon the bolts, said sliding part or plate being provided with a projection or stud, a pivoted detent-lever provided with a shoulder to engage the stud, and with an arm or prong located in the path of the stud, a second detent-lever provided with a notch or shoulder, and with an arm or surface located in the path of the detent-lever first mentioned, and a spring-detent engaging and holding from movement said second detent-lever, substantially as described.

16. The combination, with the bolts of a safe and springs applied to move the bolts, of a pivoted arm or detent-lever which holds the springs compressed and is moved in the act of compressing the same, a second detent-lever, as L, provided with a notch or shoulder, as l', with an arm or projection, as l^4, located in the path of the detent-lever first mentioned, and with an arm, as L′, provided with a prong forming a stop for limiting the motion of the said detent-lever first mentioned, and a spring-detent engaging said detent-lever, substantially as described.

17. The combination, with the bolts of a safe and actuating-springs for the bolts, of a plate moved by the springs and acting upon the bolts, a pivoted detent-lever, L, constructed to hold the said plate from movement, a detent, as M, provided with a notch or shoulder engaging said detent-lever, and with an arm, M′, engaging the free end of said detent-lever, a spring applied to said detent and acting to hold the arm in contact with the detent-lever and to cause the engagement of the notch or shoulder therewith, and means for actuating said detent, substantially as described.

18. The combination, with the bolts of a safe and actuating-springs for the bolts, of a plate moved by the springs and acting upon the bolts, a pivoted detent or detent lever, L, constructed to hold said plate from movement, a detent-lever, M, provided with a notch or shoulder engaging the said detent-lever L, and with an arm, M′, provided with a stop or projection at its free end for limiting the movement of the detent-lever, a spring applied to actuate the detent M to cause its engagement with the detent-lever L, and means for actuating said detent M, substantially as described.

19. The combination, with the bolts of a safe and actuating-springs for the bolts, of a plate moved by the springs and provided with a stud or projection, a detent, I, constructed to engage said stud or projection and provided with an arm, I^2, a detent, J, provided with a notch or shoulder to engage said arm I^2, and with an arm, J′, a spring applied to the lever J and holding the arm J′ thereof in contact with the arm I^2, and means for actuating said detent J, substantially as described.

20. The combination, with the bolts of a safe and actuating-springs for the bolts, of a plate moved by the springs and provided with a stud or projection, a detent, I, provided with an arm, I^2, a detent, J, provided with a notch, j', and with an arm, J′, having at its end a prong, j^2, a spring applied to actuate said detent J, and means for moving said detent J to release the casting-springs, substantially as described.

21. The combination, with the bolts of a safe, of retracting-springs, a sliding plate, D, engaged with the said springs and connected with the bolts, and a detent engaging said sliding plate, a pivoted detent-lever, M, for holding said detent from movement, said lever being provided with a slot, m^2, provided with two notches, m' m', either of which may be engaged

with the detent for holding the latter from movement, substantially as described.

22. The combination, with the retracting-springs and sliding plate D, provided with a stud, D^2, of a pivoted detent-lever, K, provided with a notch or shoulder engaging the said stud, and with an arm, K′, a second pivoted detent-lever, L, located in the path of the stud, provided with a short arm, L′, notched to engage the end of the detent-lever K, with a projection or arm, l^4, and with a long arm, L^2, and a pivoted spring-detent, M, provided with a notch adapted to engage the longer arm, L^2, of said lever L, substantially as described.

23. The combination, with the safe-bolts and retracting-springs, of a sliding plate, D, provided with a stud, D^2, a detent-lever, K, provided with a notch adapted to engage the said stud, and with an arm, K′, located in the path of the stud, and a detent-lever, L, engaging the said lever K, for holding the latter in engagement with the stud, said lever L being provided with a notch, l', engaging said lever K, with an arm, L′, provided with a prong, l^2, and having a projecting part or arm, l^4, located in the path of the free end of the lever K, substantially as described.

24. The combination, with the bolts of a safe, casting-springs for the bolts, a shell or case, C, inclosing said casting-springs, and a detent, I, mounted upon the case for holding the casting-springs from moving the bolts, of a detent, J, engaging the said detent I, a motor embracing a train of gears located at the side of the said case C, with the axes of rotation of its rotating parts parallel with the plane of rotation of the detents I and J, a revolving stop, T, moved by said motor, and a pivoted lever, U, mounted upon the case with one of its ends in the path of the said stop, and provided with a beveled surface upon its opposite end adapted to engage the said detent J, substantially as described.

25. The combination, with the bolts of a safe and actuating devices for casting and retracting the bolts, of interlocking parts connecting the said actuating devices and the bolts, said interlocking parts being engaged with each other solely by flat engaging-surfaces perpendicular to the plane of the safe-door, whereby the same may become disengaged in case the lock is detached and thrown inwardly away from the door, substantially as described.

26. The combination, with the bolts of a safe and an actuating device embracing a stem, D′, provided with a head, *d*, of a plate attached to the bolts and provided with a slot for engaging the stem, open at its end remote from the door, substantially as described.

27. The combination, with the bolts of a safe, of a carrying-bar attached thereto, a plate, B^2, attached to the carrying-bar and provided with a slot, *b*, and with an opening, *b*′, retracting-springs, and a plate, D, acted upon by said springs and provided with a stem, D′, having a head, *d*, engaging said plate B^2, substantially as described.

28. 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, embracing a rotating shaft and a revolving projection or stop upon the shaft constructed to act upon the said detent, a spindle passing through the said shaft and attached to the revolving projection or stop, an arm upon said spindle, and a disk upon the said shaft, and means adjustably connecting the arm with the disk, whereby the angular position of the stop with relation to the shaft may be changed, 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.