(No Model.) 6 Sheets—Sheet 1.

A. KIRKS.

SAFE LOCK.

No. 454,971. Patented June 30, 1891.

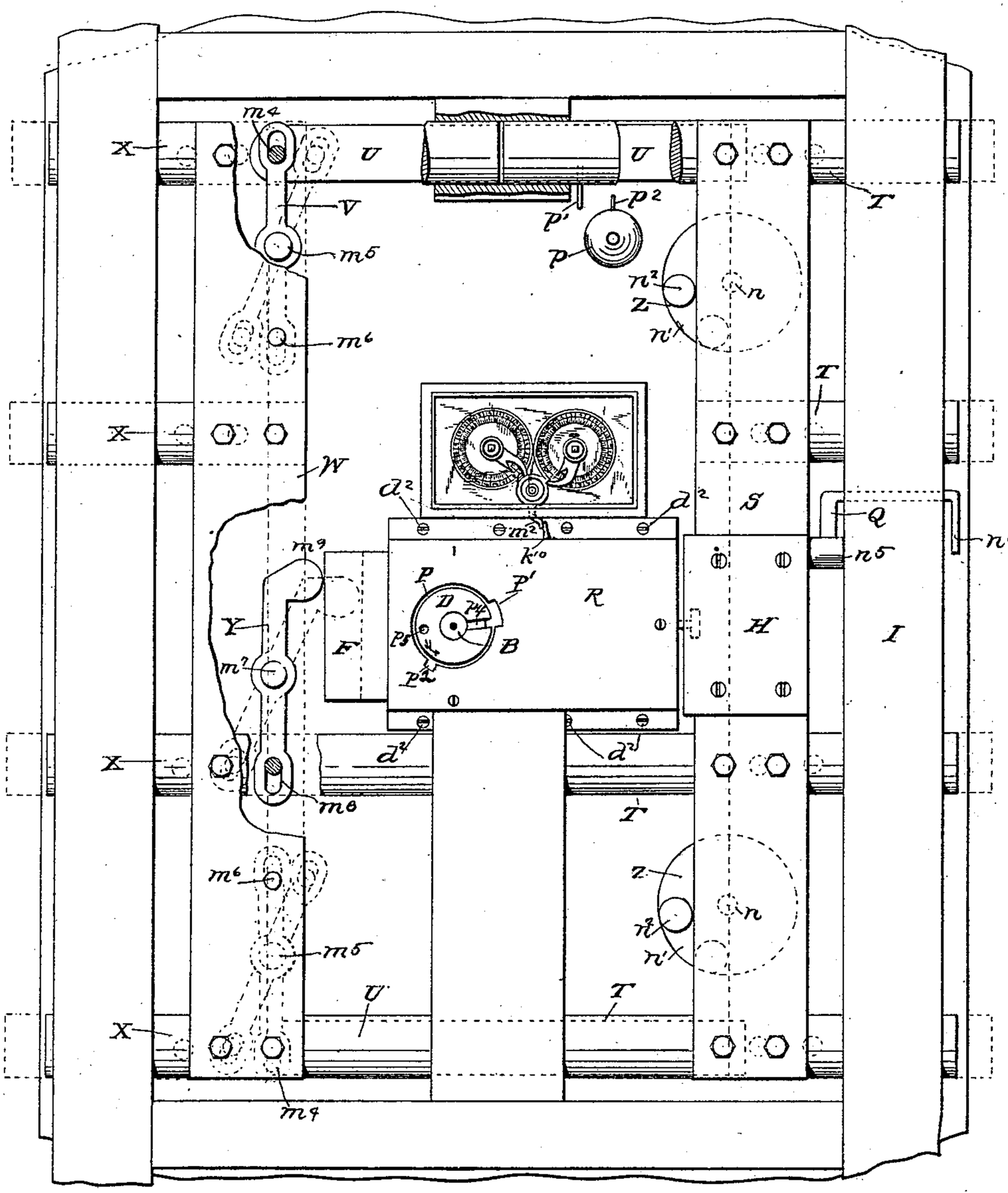

Fig. 1.

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(No Model.) 6 Sheets—Sheet 2.

A. KIRKS.

SAFE LOCK.

No. 454,971. Patented June 30, 1891.

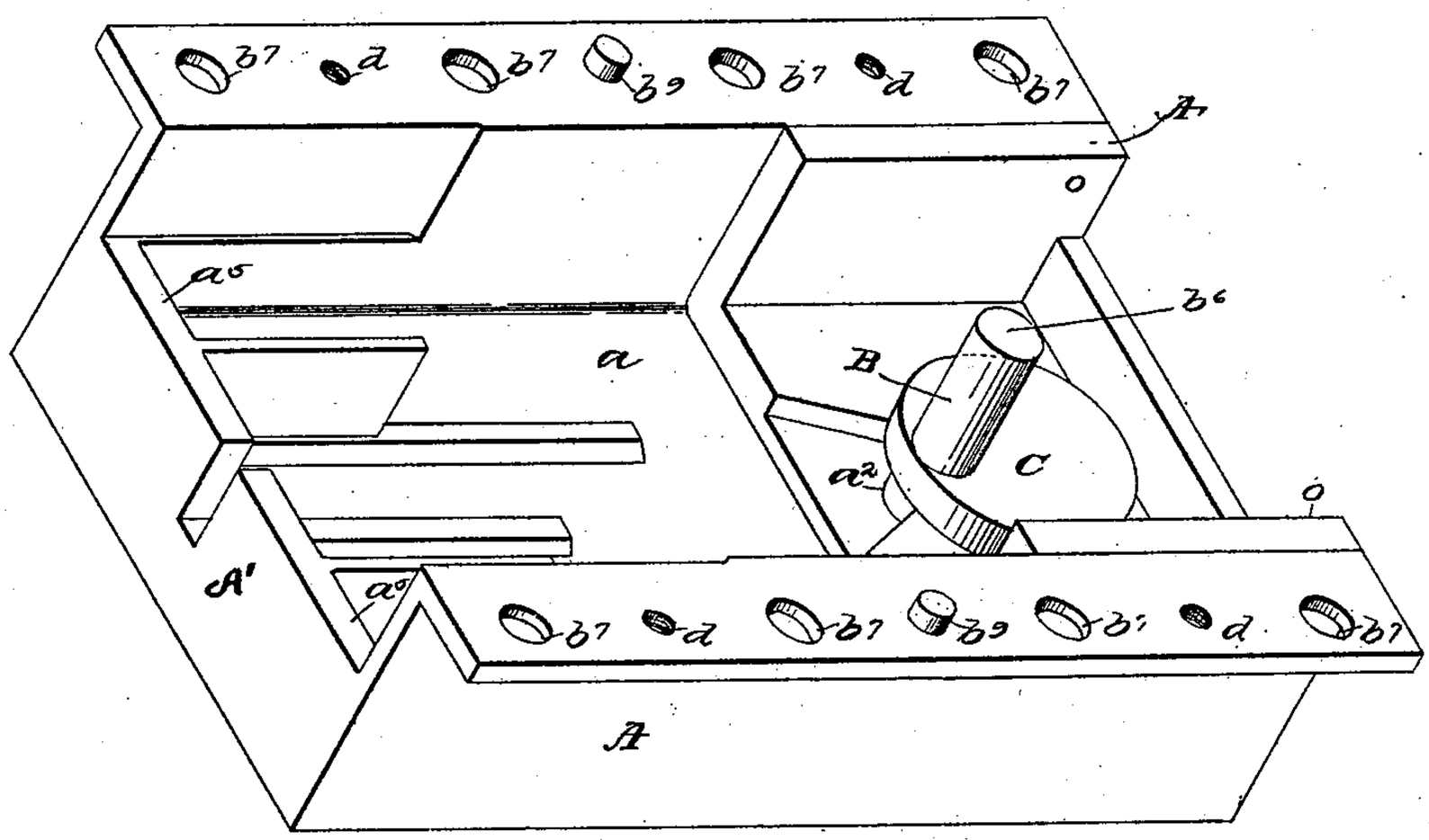

Fig. 2.

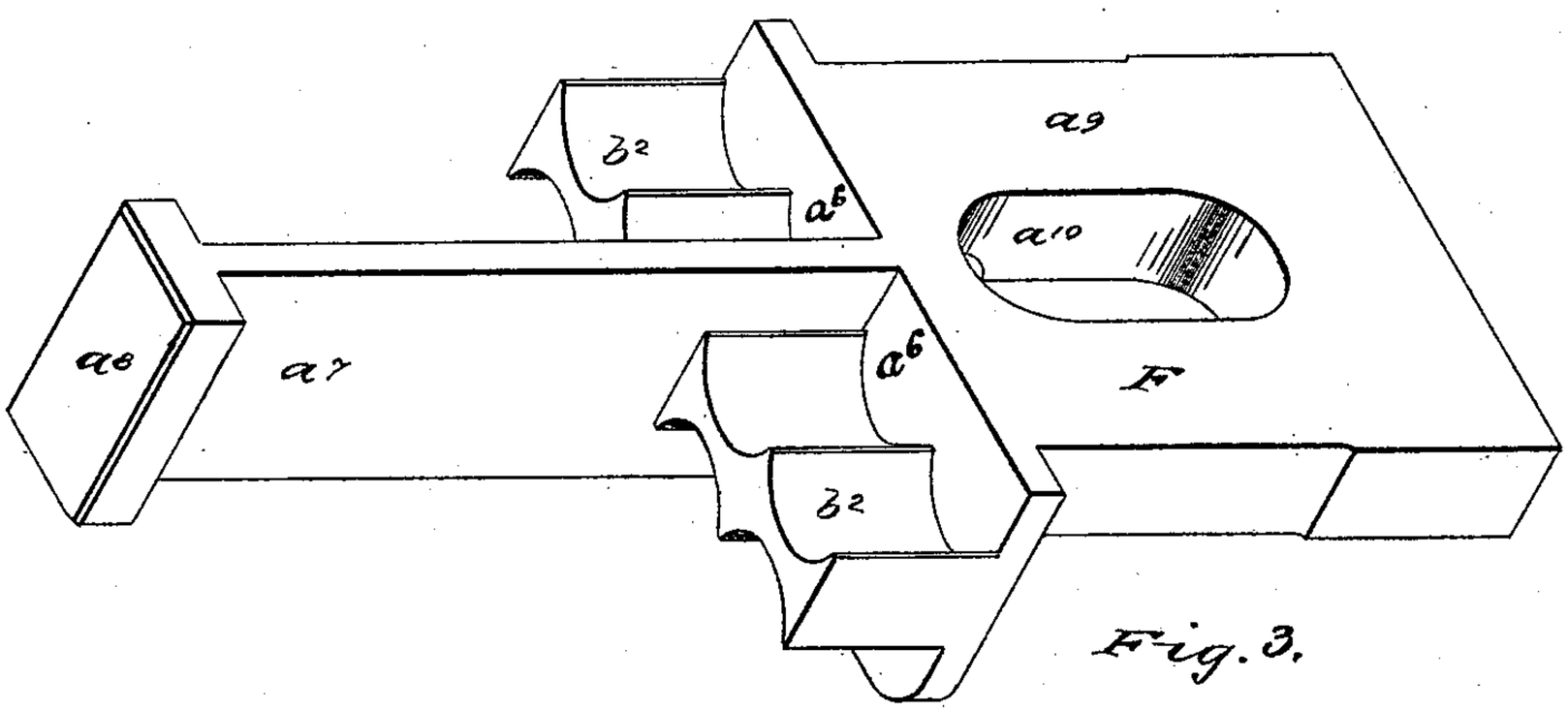

Fig. 3.

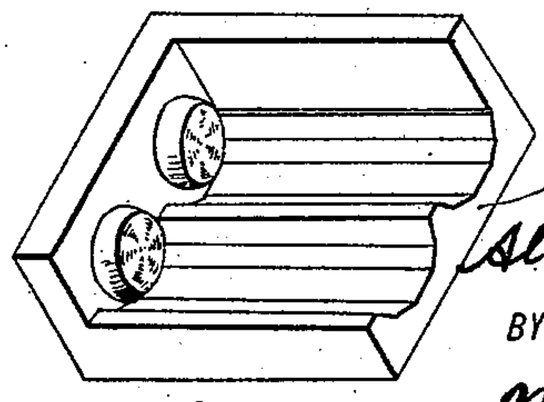

Fig. 4.

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(No Model.) 6 Sheets—Sheet 3.

A. KIRKS.

SAFE LOCK.

No. 454,971. Patented June 30, 1891.

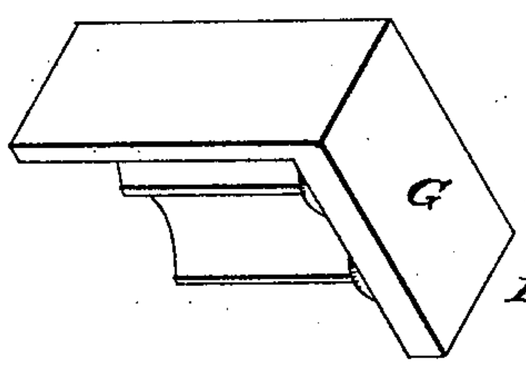

Fig. 5.

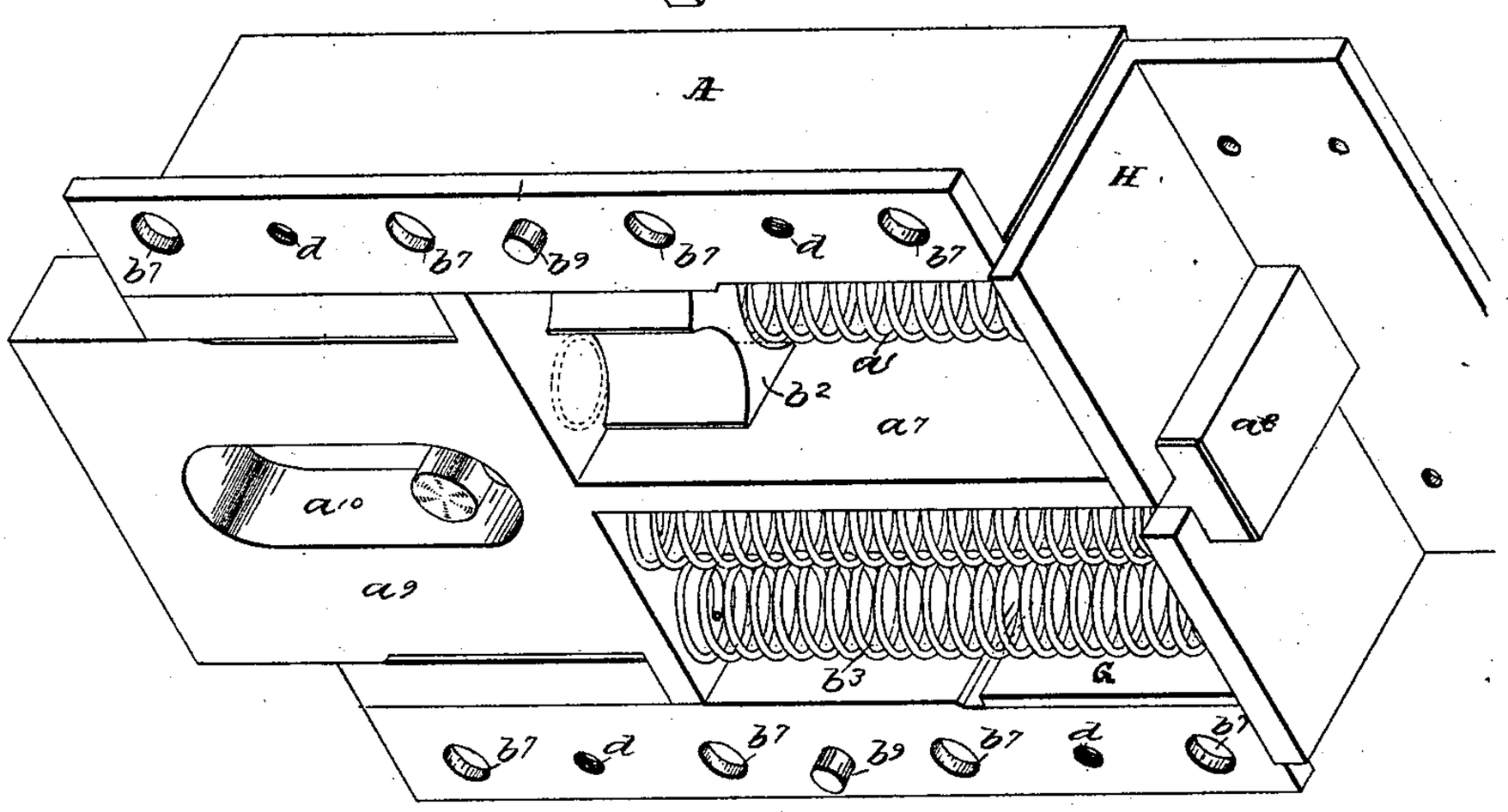

Fig. 6.

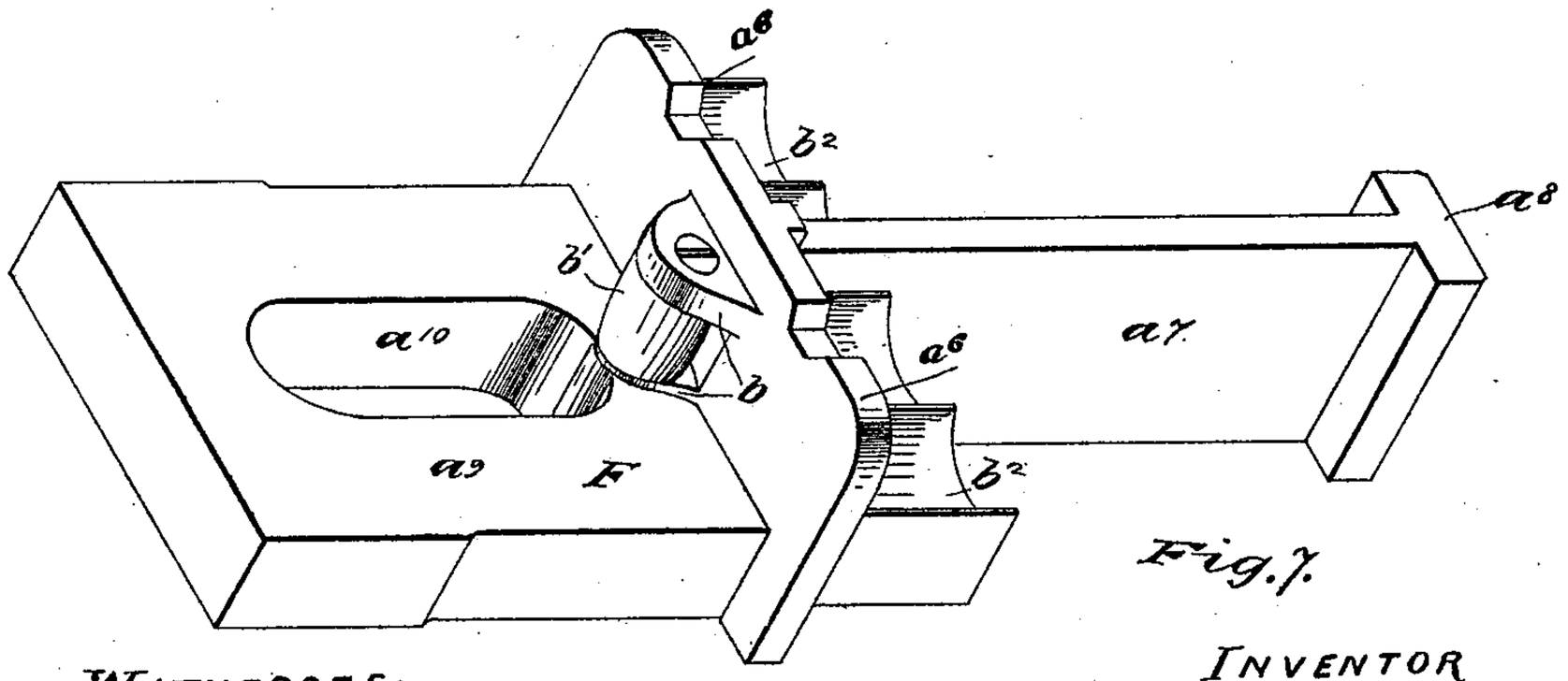

Fig. 7.

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(No Model.) 6 Sheets—Sheet 4.

A. KIRKS.

SAFE LOCK.

No. 454,971. Patented June 30, 1891.

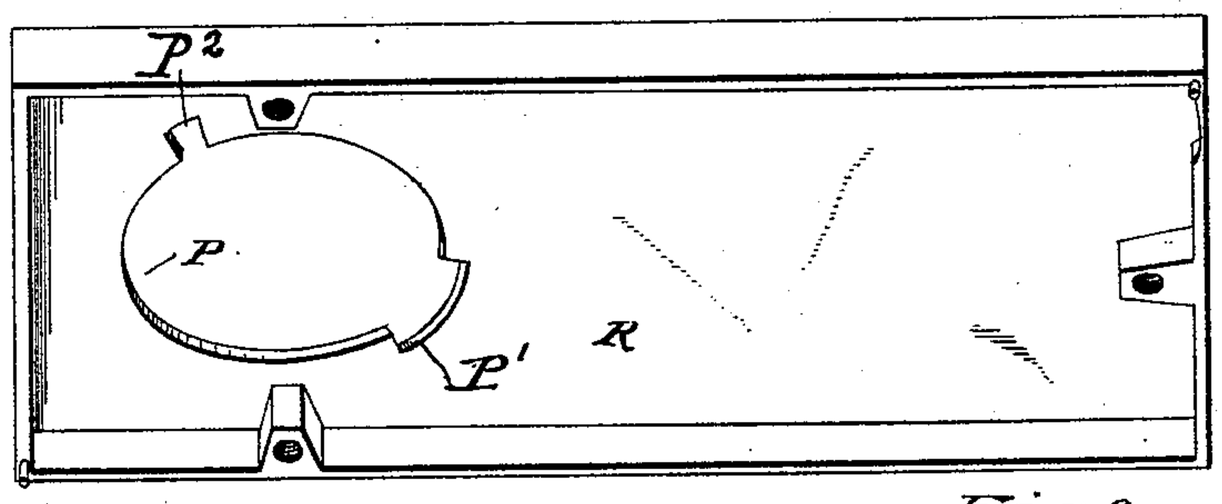

Fig. 9.

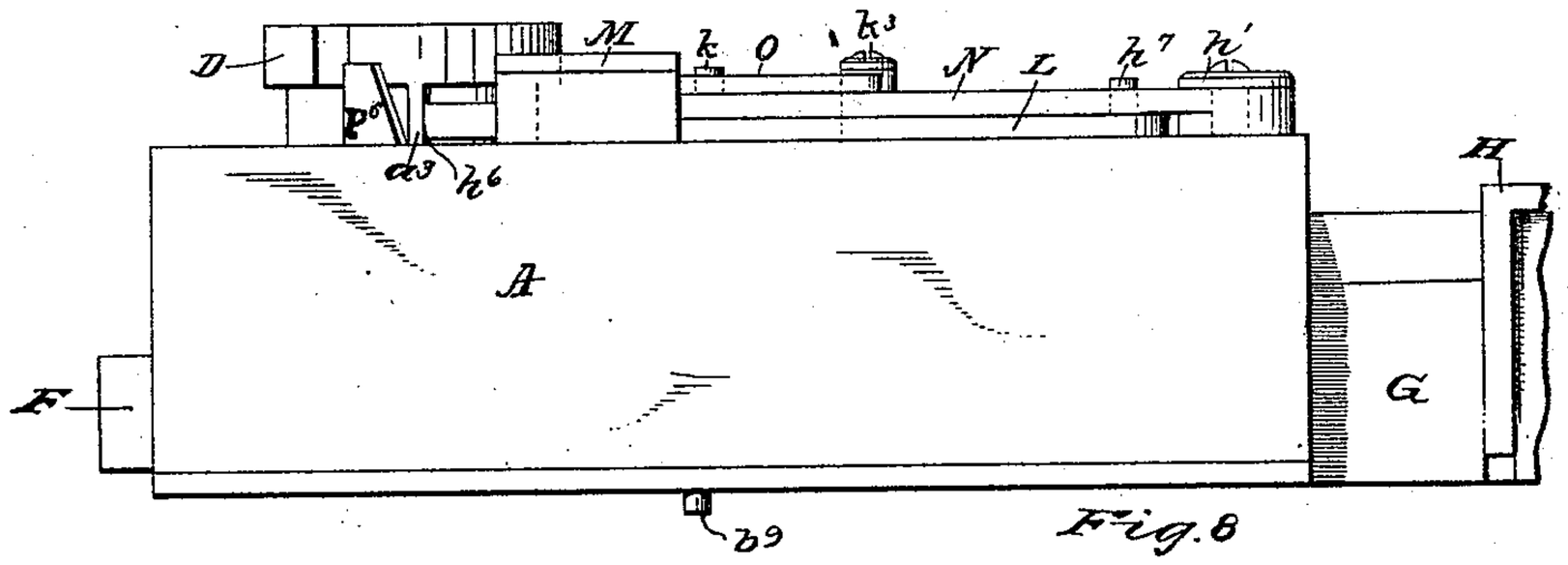

Fig. 8

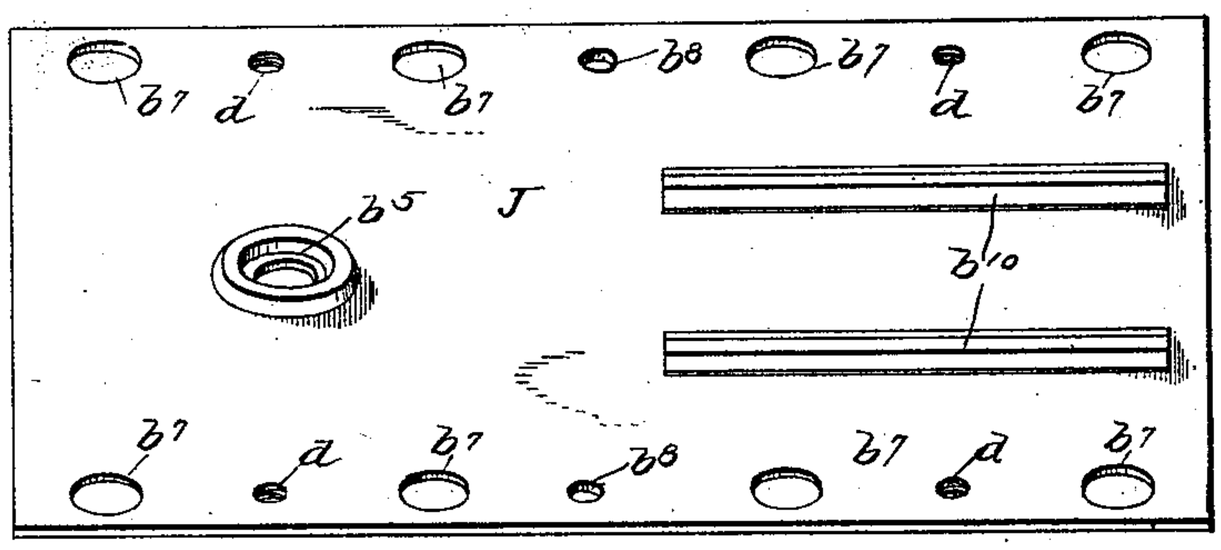

Fig. 9½.

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(No Model.) 6 Sheets—Sheet 5.

A. KIRKS.

SAFE LOCK.

No. 454,971. Patented June 30, 1891.

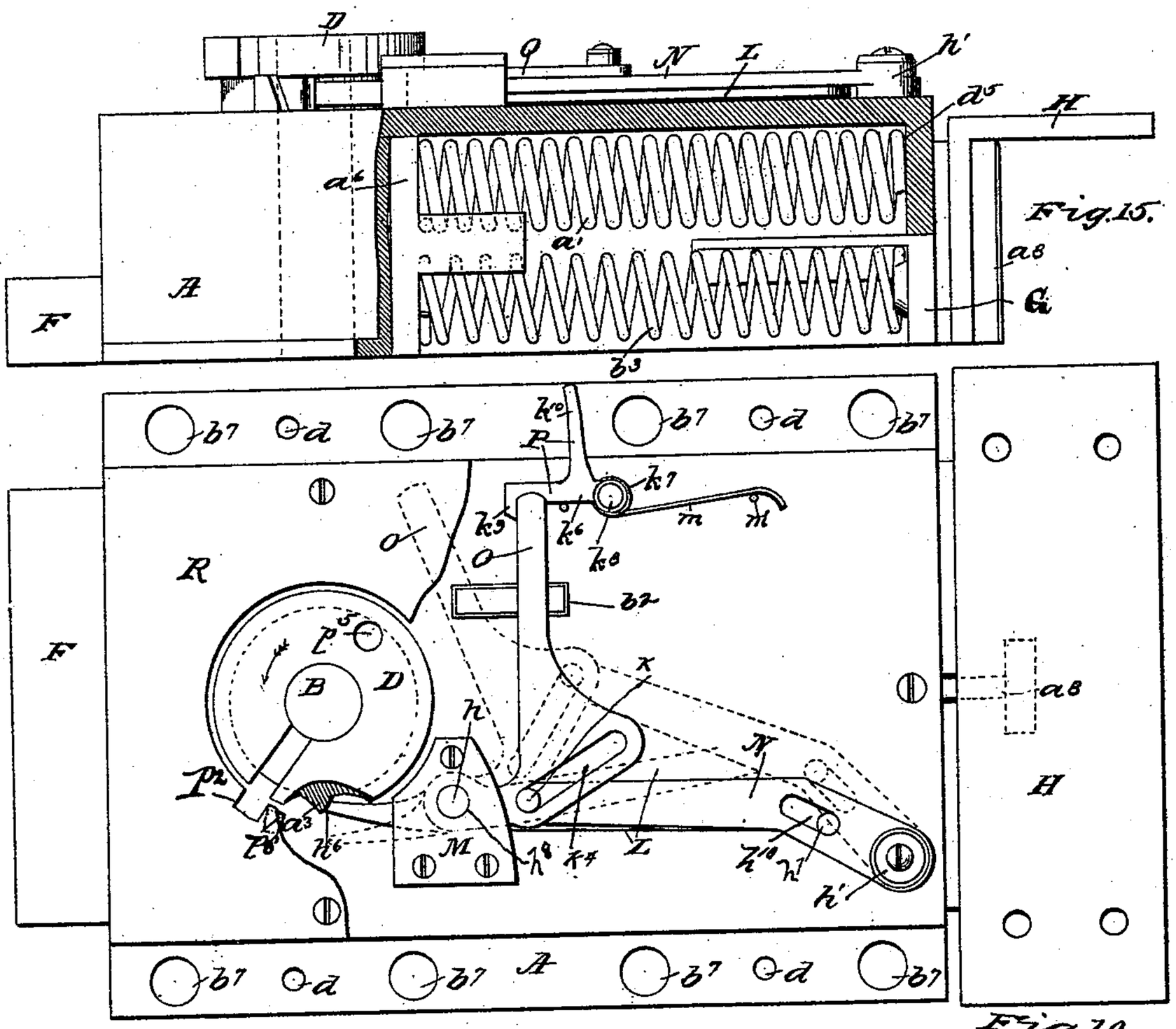

Fig. 15.

Fig. 10.

Fig. 11.

Fig. 13.

Fig. 12.

Fig. 14.

Fig. 10½.

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(No Model.) 6 Sheets—Sheet 6.

A. KIRKS.

SAFE LOCK.

No. 454,971. Patented June 30, 1891.

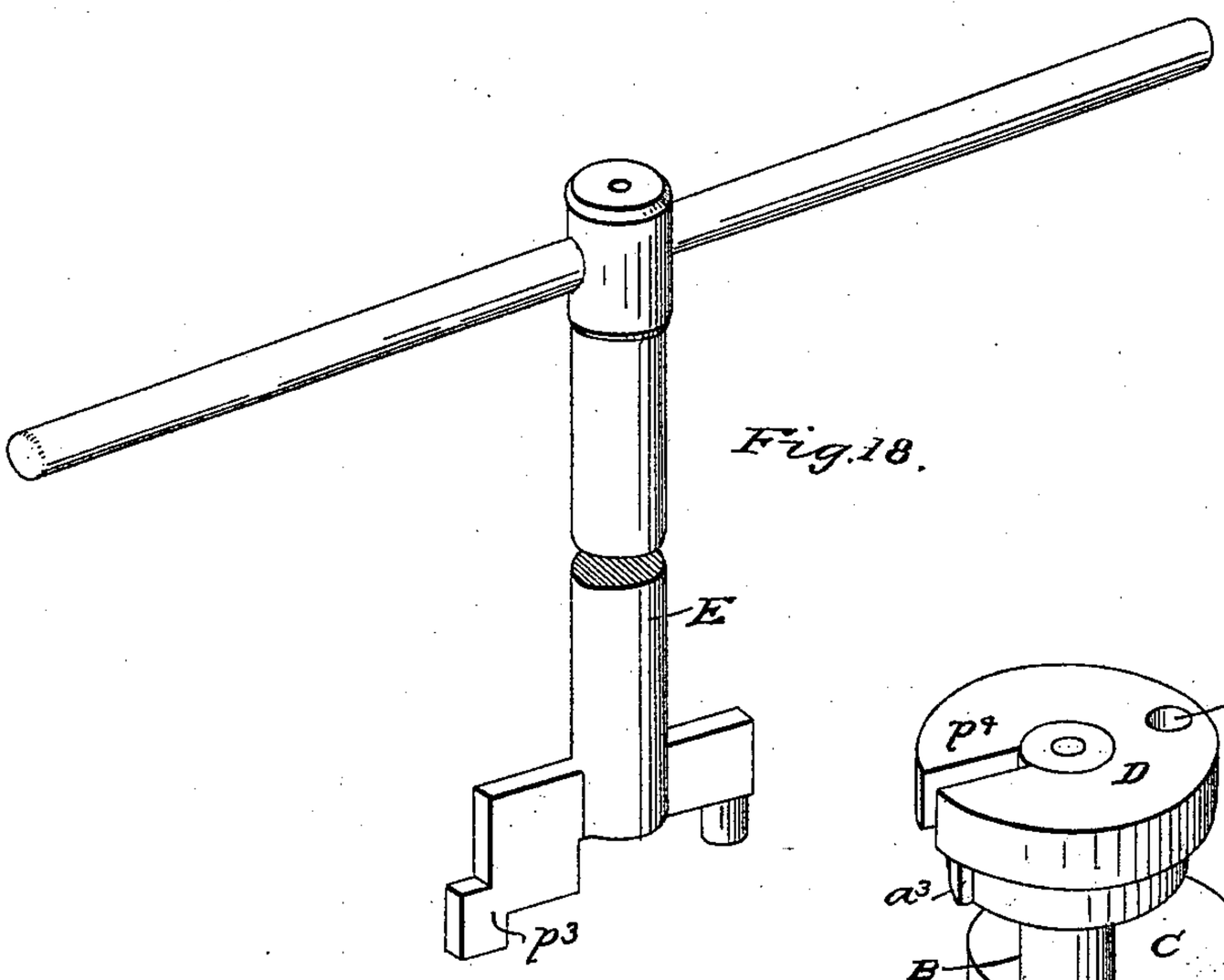

Fig. 18.

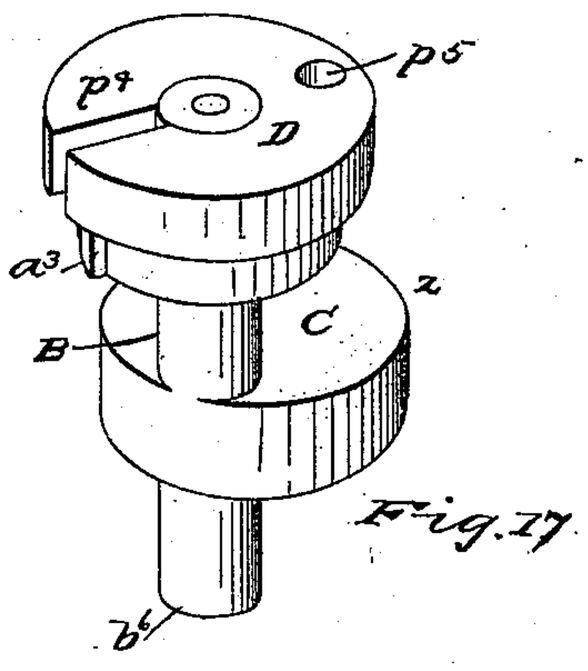

Fig. 17.

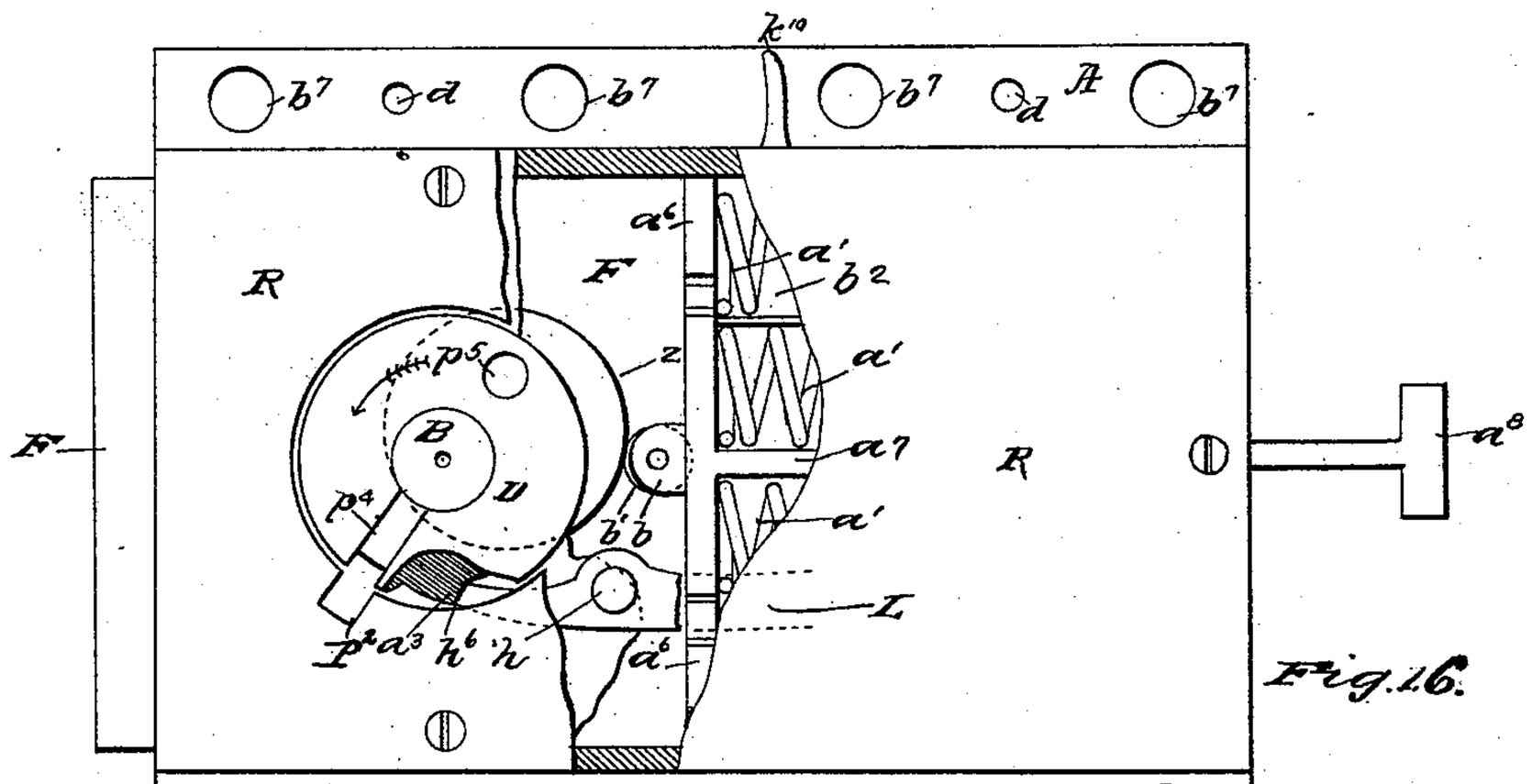

Fig. 16.

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UNITED STATES PATENT OFFICE.

ALBERT KIRKS, OF CANTON, OHIO, ASSIGNOR TO THE DIEBOLD SAFE AND LOCK COMPANY, OF SAME PLACE.

SAFE-LOCK.

SPECIFICATION forming part of Letters Patent No. 454,971, dated June 30, 1891.

Application filed February 20, 1890. Serial No. 341,237. (No model.)

To all whom it may concern:

Be it known that I, ALBERT KIRKS, a citizen of the United States, and a resident of Canton, county of Stark, State of Ohio, have invented a new and useful Improvement in Safe-Locks, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification.

My invention relates to improvements in safe-locks, and more particularly to that class of locks in which the locking-bolts are cast and retracted for locking and unlocking the safe-door by springs located inside of the safe.

My invention consists in certain features of construction and combination of parts, which will be hereinafter described, and pointed out in the claims.

With these ends in view my invention relates to and consists in certain features of construction and combination of parts, as will be hereinafter described, and pointed out in the claims.

Figure 1 of the accompanying drawings is an elevation showing the inside of a safe-door illustrating one application of my invention; Fig. 2, a perspective of lock-case, showing the construction of the interior of the same and the position of the eccentric provided for compressing the bolt-actuating springs; Fig. 3, a similar view of the sliding plate, showing the rear face; and Figs. 4 and 5, a portion of the detail; Fig. 6, a perspective of the lock-case, showing the sliding plate in position, with two of the four castings and one of the four retracting-springs in position, and an angle-plate by which the head of the sliding plate is secured to the door-bolts; Fig. 7, a perspective of the sliding plate, showing the rear face of the plate and anti-friction roller; Fig. 8, a side elevation showing the lower side of the case and detent-levers; Fig. 9, a plan view of a cap or cover for the detent-levers. Fig. 9½ is a plan view of the rear cap or cover for the lock, showing inside face of the same. Fig. 10 is an elevation of the lock, showing the front face of the lock-case with detent-levers in position. Figs. 11, 12, 13, and 13½ are perspectives of the detent-levers, and Fig. 14 a cap or keeper for same; Fig. 15, an elevation of the lower side portion of the lock, a portion of the case removed to show the casting and retracting springs. Fig. 16 is an elevation of the front face of the lock with cap partly removed to show interior detail. Fig. 17 is a perspective of the mechanism for compressing the springs; Fig. 18, a similar view of the key to wind the compressing mechanism.

In this case the detent-levers, excepting at the instant of releasing by the time mechanism, are always in locking position.

Having thus fully stated the object of my invention, I will now proceed with a brief description thereof without further referring to or calling attention to the state of the art.

A represents the lock-case proper, in which is provided a chamber a for the retracting-springs a' and a bearing a^2 for the spring-compressor. The compressor is composed of the shaft B, the circular portion C, placed eccentric to said shaft, a disk portion, as D, adapted to receive a winding-key E, (see Figs. 17 and 18,) and a detent-stud a^3. The retracting-springs a' are placed in the chamber a, one end of each resting against the inside end portion a^5 of the case A, the other end against a transverse abutment a^6 of the sliding plate F. The end portions A′ of the case A are cut away, as shown in Fig. 2, to form a channel for the sliding plate F, which is placed therein and extends therethrough, as shown in Fig. 6. The sliding plate F is formed substantially as shown in Figs. 3 and 7, having a neck portion, as a^7, and a head portion, as a^8, a body portion a^9, having therein an elongated perforation a^{10}, longitudinal with the body portion of the bolt, and transverse abutment portions a^6. On the face of the abutment is provided outwardly-projected lugs b, in which is secured a friction-roller b', hereinafter explained, and on the front face of said abutment a^6 are provided forwardly-projected portions b^2, by which the end portions of the casting and retracting springs are spaced apart. The sliding plate, as above described, and illustrated in Figs. 3 and 7, is now placed in the channel portion of the case A and extending therethrough, as shown in Fig. 6.

Between the walls of the lock-case A and on each side of the neck portion a^7 is placed a

sliding plate G, made in pairs, as shown in Figs. 4 and 5—*i. e.*, each figure shows the half-section of said plate. These plates rest against the plate H, as shown in Fig. 15. The casting-springs b^3 are now placed in position, one end resting on the semicircular projection b^2 and against the abutment a^6, the other end resting on the sliding plate G, as shown in Figs. 6 and 15. For the purpose of this case I have made provision for four casting-springs, by which the door-bolts are thrown into a locking relation to the door-jamb, and a similar number of retracting-springs, the expansion energy of the latter to be about one-third greater than that of the former, the former to cast the door-bolts, the latter to retract them. A rear lock-case cap J is provided, having a bearing-aperture b^5 for the end b^6 of the shaft B, and perforations b^7 to correspond with similar perforations in the lock-case A, and perforations b^8 for dowel-pins b^9, and horizontal downwardly-projected ribs b^{10}, that rest between the casting-springs. Fig. 9½ shows the inside face of the plate, which is secured to the lock-case by screws in perforations d and the lock to the safe-door by screw-bolts d^2 in the perforations b^7, as shown in Fig. 1.

Having completed my description of the lock-case and the devices contained therein for compressing the door-bolt-actuating springs, I will now proceed to describe the devices employed to detain the retracting-springs a'.

On the front face of the lock-case A is provided studs h and h', and pivoted in said casing is the spring-compressor shaft B, carrying the disk D.

A detent-lever L, as shown in Fig. 12, is provided, having at one of its ends a head portion h^3, having an annular perforation h^4, shoulder h^5, and a pawl portion h^6, and at the other end a stud-pin h^7. This lever is placed on the stud h, the stud passing through the perforation h^4 into a similar perforation h^8 in the securing-plate M, said plate resting on and secured to the case A over and above the head portion of the lever, leaving the said lever free to move about the stud h.

A compound lever N, Fig. 13, has at one of its ends an annular perforation adapted to rest on and rotate about the stud h' on the case and an elongated aperture h^{10} and at the other end a stud-pin k. The free end k' of said lever is formed on a line slightly oblique to the body of the lever, adapting it to rest on the shoulder h^5 on lever L to lock it against further downward movement. The said lever is placed on the stud h', the said stud entering and passing through the perforation h^9, the stud-pin h^7 on the end of lever L resting in the elongated aperture h^{10}.

A third lever O, of the form substantially as shown in Fig. 11, is provided, said lever having an outwardly-projected arm k^2, having an annular perforation k^3, and in the body portion of the lever an elongated aperture k^4, said aperture lying in a direction oblique to a line drawn longitudinally through the body of the lever, and at the free end portion of said lever is provided pin k^5, projected from the side of the lever, which will be hereinafter explained. The said lever is placed on the stud h above the lever L and under the securing-plate M, the stud passing through the levers L and O and into the plate M, the said levers L, N, and O overlapping each other, as shown in Figs. 8 and 15.

A locking detent-lever P, of the form shown in Fig. 13½, having a body portion k^6, one end of which is provided with a short sleeve portion k^7, by which the said lever is pivotally secured to the case A about the stud k^8 at the other end portion of said body portion, is provided with a latch or detent-hook k^9 to engage the pin k^5, hereinbefore mentioned, the free end k^{10} of said lever to engage a time mechanism, as shown in Fig. 1 of the drawings.

About the sleeve portion k^7 of the lever P is placed a spring m, the free end thereof resting on a pin m'. The energy of said spring is exerted to hold the catch k^9 in engagement with the pin k^5 at the free end of the lever O. I would call attention to the position of the apertures h^{10} and k^4 in this: that they are oblique to a line drawn from the supporting-studs h and h', by which engagement of the pins h^7 and k and the aforesaid apertures graded as they are shown, the levers may be held in locked engagement by a very slight power applied to the free end k^{10} of the lever P, and by reason of the grades shown in the apertures h^{10} and k^4 a slight pressure of the detent a^3 of the winding-disk C on the lever L, when the lever O is released from the detent k^9 by the action of the time mechanism, will throw the levers into position shown by the dotted lines and release the retracting-springs, when said levers instantly fall back by their own weight into their normal position, as shown in Fig. 10. The locking-face of the detent a^3 and the end of the pawl h^6 are beveled, so that the pressure of the detent will press outwardly on the end portion of the pawl h^6 to throw the levers out of engagement with the winding-disk C and into position shown by the dotted lines, as before stated.

R represents a cap or cover for the detent-levers, (shown in full in Figs. 1 and 9, a portion of which is cut away in Fig. 10 to disclose the detent-levers,) through which the end portion k^{10} of the locking detent-lever P is passed, as shown in Fig. 1, to engage the arm m^2 of the time-releasing mechanism. The under side or face of said plate is shown in full in Fig. 9, showing the aperture P, through which the winding-disk is exposed, said plate having about said aperture notches P′ and P² to admit the key E to engage the disk and to provide for disengagement.

The next feature to which I will call attention is the devices provided to retract the door-bolts. As heretofore constructed the

power required to retract the door-bolt has been limited to the strength of the neck portion a^7 of the sliding plate F, and not infrequently does it happen that the neck portion is broken from the body of the plate or the head a^8 from the neck a^7 by the violent movement of retracting-spring when exerted to retract the door-bolts, in which case the bolts remain engaged with the door-jambs and the safe in locked position. To avoid such accident, I have projected the body portion of the sliding plate F through the end portion of the case A, as shown in Fig. 1, to which I now call especial attention. The head portion a^8 of the plate F is secured to the plate H, as shown in several of the figures of the drawings, and the said plate secured to the plate S, to which the door-bolts T are secured. A plate U, secured to the bolt T, is extended across the safe-door, as shown in Fig. 1. The free end of said plate or bar is pivotally secured to the upper end of a sway-bar V, as shown at m^4, and said bar is pivotally secured at its middle portion to the inner face of the door, as shown at m^5, the other end of said sway-bar V having a pivotal connection with the vertical plate W, as shown at m^6, to which plate the door-bolts X are secured. A sway bar or bolt actuating lever Y is provided, which is pivotally secured to the safe-door, as shown at m^7. The other end of said sway bar or lever is pivotally secured to the plate W at m^8, (the plate cut away to show detail,) the free end m^9 of the lever Y engaging the end portion of the sliding plate F. To cushion or in measure arrest the violent movement of the door-bolts, weighted wheels Z are provided, as shown, which are supported on and rotate about spindles n. The inner half portion n' of said wheel is reenforced or made heavy by the addition of metal, and is provided with a stud-pin n^2 to engage the edge of the plate S. When the bolts are cast, the pins n^2 will follow the plate S to a point shown by the dotted lines, the weighted portion being at the bottom, and when the bolts are suddenly retracted the plate S, engaging the pin n^2, will cast the wheel and pin up and over the center of the spindle n, and the wheel will then fall with its own weight plus its momentum to meet the retracting-plate before it has completed its movement to retard or check said movement to the extent of raising the weight of the wheel to its normal position.

To give notice of the casting of the bolts I have provided an alarm p. In this case I have used a small gong, which may be sounded by a pin p' coming in contact with the sounder p^2 when the bolts are cast. The object of this arrangement of devices is to assure the person attending the safe that the bolts have been cast and the safe-door locked.

In operation Fig. 1 illustrates the door-bolts retracted and the safe-door unlocked, the detent Q having dropped into position, as shown, the head portion n^5 in front of the plate S in the line of its movement, and the tail portion n^6 projected outwardly to meet the door-jamb, by which the detent will be rocked in its pivotal connection with the supporting-plate I. The time mechanism wound, the detent-levers locked in engagement with detent-lever P, the winding-key E is placed in the winding-disk, the bit p^3 passing through the notch P′ in the plate R and into the mortise p^4 and the pin in the perforation p^5, the outer end portion of the bit p^3 to pass under the plate R, when the key is turned in the process of winding until the detent-stud a^3 engages the end h^6 of the lever L, when the winding-key may be withdrawn from the disk D, the end of the bit p^3 passing through notch P^2. As the key is turned, it carries with it the disk D, shaft B, and eccentric-wheel C in the direction indicated by the arrow, Fig. 10, the periphery of said wheel engaging the roller b' on the abutment of the sliding plate F. The said eccentric is turned about five-eighths of one revolution, or until the extreme point of the eccentric has passed a line drawn centrally through the shaft B, disk D, and sliding plate F, as shown in Fig. 16, at which point the course of the key E will be arrested by the stop p^6, (see Fig. 16,) at which point it can be withdrawn, the outer end portion of bit p^3 passing out through the notch P^2. By the winding or rotating of the eccentric against the roller b', before mentioned, the sliding plate F will be moved in and through the case A, the springs, both casting and retracting, compressed, the detent-stud a^3 resting on the pawl h^6 of the detent-lever L, the detent-levers locked in position to stop further rotation of disk D and eccentric C by detent-lever P. To release the levers O, N, and L, which will be thrown by the energy of retracting-springs through the eccentric and detent a^3 into position shown by the dotted line, Fig. 10, the detent a^3 having passed the pawl h^6, the detent-levers fall instantly back into their normal position to arrest the forward movement of the winding-disk and eccentric when the springs are compressed. By the retracting of the sliding plate F the eccentric will be thrown over to the position shown in Fig. 2, or place of beginning. The detents all in position, as before stated, the casting and retracting springs compressed, the time mechanism wound and set to act upon the mechanism of the lock at a desired time, the door is passed into the jambs. The tail n^6 of detent Q engaging the said jamb will swing the head n^5 out of engagement with the bar S, at which instant the casting-springs will cast or shoot the sliding plate forward, as shown in Fig. 8, to cast the door-bolts into locking engagement with the door-jambs to lock the door thereto and to sound the gong, the door to remain so locked until a time previously determined, when the time mechanism will release the detent-levers that are holding the retracting-springs under restraint, and the door-bolts retracted by the energy of the

retracting-springs exerted on the sliding plate F to move said bolts through the lock-case A, both ends of said plate having a retracting engagement with the door-bolts to draw said bolts from engagement with the door-jamb.

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

1. The combination, with the bolts of the safe-door, of springs for casting and springs for retracting the bolts, a sliding plate against which both sets of springs act, each end of said plate adapted to actuate the bolt-operating mechanism to retract the bolts, a detent to hold the retracting-springs under tension, and a time mechanism to release said springs, substantially as described, and for the purpose set forth.

2. The combination, with the bolts of a safe and bolt-operating mechanism, of an actuating device for the bolts, comprising a casing or shell, a movable plate, as F, to slide through said shell and with each end engage the bolt-operating mechanism, springs located between said movable plate and opposing part of the case, and the second set of springs between the said movable plate and a part attached to the bolts, and a spring-compressing device adapted to compress the spring, having an eccentric portion constructed to work with its periphery against the plate F interjacent its ends, and a hand-lever to operate the eccentric, and a plate adapted to receive the winding-key and prevent its withdrawal until after the springs have been compressed, substantially as described, and for the purpose set forth.

3. The combination, with the bolts of a safe, of an actuating device for said bolts, comprising actuating-springs, and a sounder to indicate the casting of the bolts when the door is closed, substantially as described, and for the purpose set forth.

4. The combination, with the bolts of a safe, of an actuating device for said bolts, comprising actuating-springs, a plate connecting said bolts, and rotary weights provided with stops for engaging said plate to check the sudden stop of the safe-bolts, substantially as described, and for the purpose set forth.

5. The combination, with the bolts of a safe-door, of an inclosing case A, a sliding plate F, mounted in the end portions of said case to move therethrough, said plate having intermediate its ends an abutment a^6, retracting-springs a', interposed between said abutment and the stationary or fixed end portion of the inclosing case, casting-springs b^3, interposed between said abutment and a sliding plate G, having engagement with the door-bolt mechanism, an elongated aperture intermediate the ends of the said plate F, a winding-shaft B, passed therethrough, having its end portions journaled in said case, and an eccentric portion C, secured to said shaft and adapted to engage the sliding plate intermediate its ends to compress the casting and retracting springs, detents to hold the said springs compressed, and means for actuating the said detents for releasing the casting and retracting springs, substantially as described.

6. The combination, with the bolts of a safe-door, of a lock-inclosing case A, a sliding plate F, mounted in said case to move therethrough, said plate having intermediate its ends a transverse abutment portion a^6, retracting-springs interposed between said abutment and the end portions of said case, casting-springs b^3, interposed between said abutment and a sliding plate G of said case, said sliding plate F having an engagement at both of its ends with the door-bolt mechanism, and means for compressing the casting and retracting springs, detents to hold the retracting-springs compressed, and means for actuating said detents to release the retracting-springs, substantially as described.

7. The combination, with the bolts of a safe-door, of a case A, sliding plate F, mounted in said case to slide therein and actuate the door-bolts, retracting-springs a' to engage said plate interjacent its ends and the stationary end of the lock-case, casting-springs b^3 to actuate said sliding plate, said plate having in its body portion an elongated through-perforation a^{10}, a spring-compressing mechanism comprising a shaft B, passed through said perforation and journaled in said case, having mounted thereon an eccentric portion C to engage the sliding plate F interjacent its ends, a disk or head D, adapted to engage a winding-key to turn the eccentric to and against the sliding plate to compress the springs; and a detent to hold said shaft and eccentric against rotation until released by the time mechanism, substantially as described.

8. The combination, with the bolts of a safe-door, of a case A, a sliding plate F, mounted therein to slide therethrough and to engage the bolt mechanism with each of its ends, springs to cast and to retract said bolts, an eccentric to slide said plate and compress said springs, a detent-stud a^3 on the disk D, detent-levers L, and levers N, O, and P to lock said eccentric against rotation until released by the time mechanism, substantially as set forth.

9. The combination, with the bolts of a safe-door, of a case A, having therein a sliding plate F, casting and retracting springs, a rotary winding mechanism to slide said plate to compress said springs, a detent-stud a^3 on disk D to engage a detent-lever L, pivotally secured to said case, said lever having at its free end a stud-pin h^7 to enter and engage the sides of an elongated perforation h^{10} in a second lever N, said lever pivotally secured to said case and having at its free end a stud-pin k to engage the sides of an elongated aperture k^4 in a third lever O, said lever having a pivotal connection with said case, and a de-

tent-lever P, and a time mechanism to trip said lever to release the retracting-springs, substantially as described.

10. The combination, with the bolts of a safe-door, of an inclosing case A, the end portions A′ of said case cut away to form a through-channel, a sliding plate F, placed therein to slide therethrough, said plate having a transverse abutment a^6 and anti-friction roller b', a winding-shaft B, an eccentric-wheel portion secured thereto to engage the roller b' to slide the plate F to compress the casting and retracting springs, a winding-head on said shaft adapted to engage a winding-key, a detent a^3, and detent-levers to hold said eccentric in engagement with the sliding plate to resist the energy of the said springs until released by the time mechanism, substantially as set forth.

11. The combination, with the bolts of a safe-door, of a case A, sliding plate F, of springs to cast and retract said door-bolts, of means to slide said plate F to compress said springs, of a detent-stud a^3 on disk D, a detent-lever L to engage said detent, a second lever M, overlapping and engaging the lever L, a third lever O, overlapping the levers L and N, and the detent-lever P, said levers N and O having elongated apertures h^{10} and k^4 oblique to a line drawn through the center of the studs h and h', substantially as described, and for the purpose set forth.

12. The combination, with the bolts of a safe-door, of a case A, a sliding plate F, said bolt having a retracting engagement at both of its ends, with the door-bolt mechanism, of casting and retracting springs to throw said bolts, a revolving eccentric to engage said plate between the ends to slide the plate and thereby compress the springs, a winding-disk and a detent-stud a^3, a detent-lever pivotally secured to the case to engage the detent a^3 to hold said detent and eccentric against rotation, said lever having a sliding engagement with locking-levers N and O, and a detent-lever P to hold said levers in a locking engagement with the detent a^3 until released by a time mechanism, substantially as described, and for the purpose set forth.

In testimony whereof I have hereunto set my hand this 4th day of February, A. D. 1890.

ALBERT KIRKS.

Witnesses:
CHAS. R. MILLER,
W. K. MILLER.