P. F. KING.

Time-Lock for Safes, &c.

No. 200,312. Patented Feb. 12, 1878.

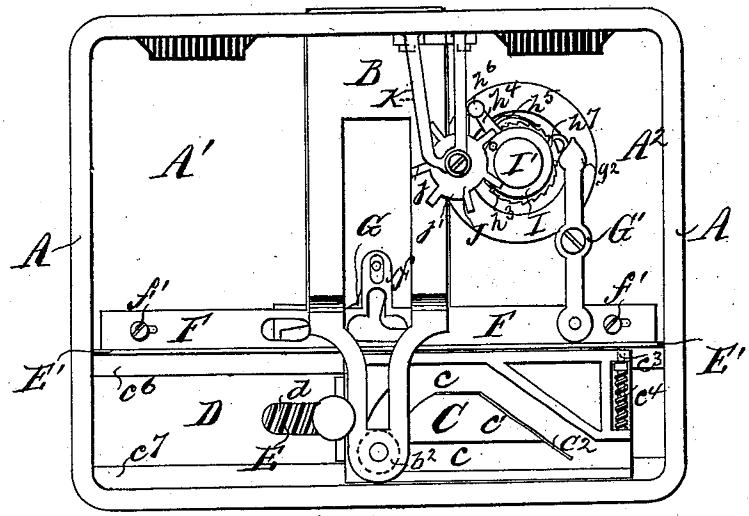

Fig. 1.

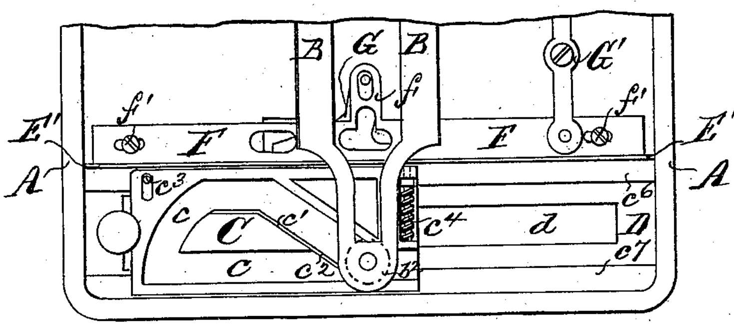

Fig. 2.

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N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

3 Sheets—Sheet 2.

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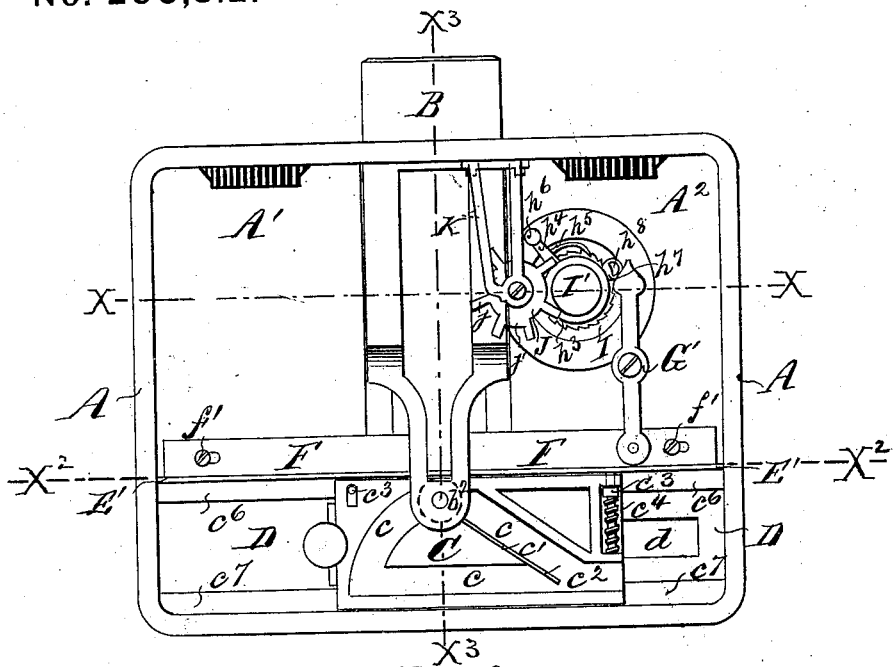

Fig. 3.

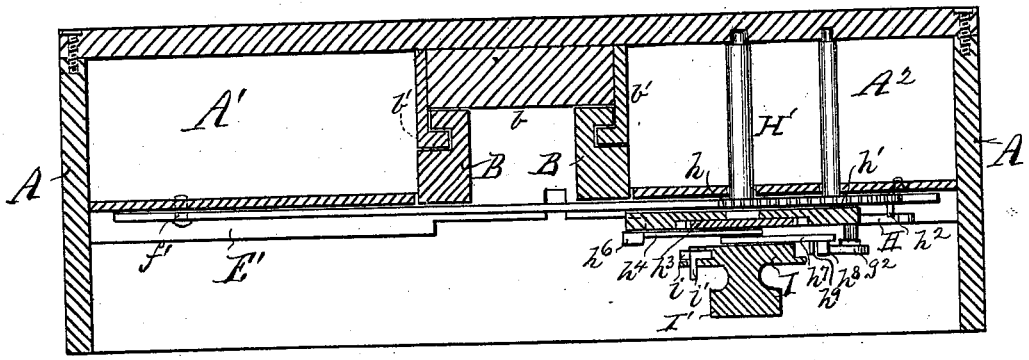

Fig. 4.

Fig. 5.

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3 Sheets—Sheet 3.

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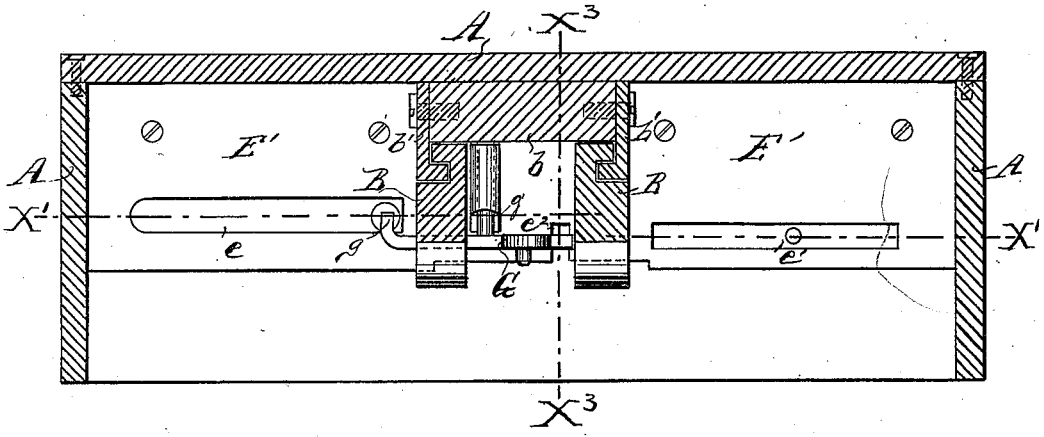
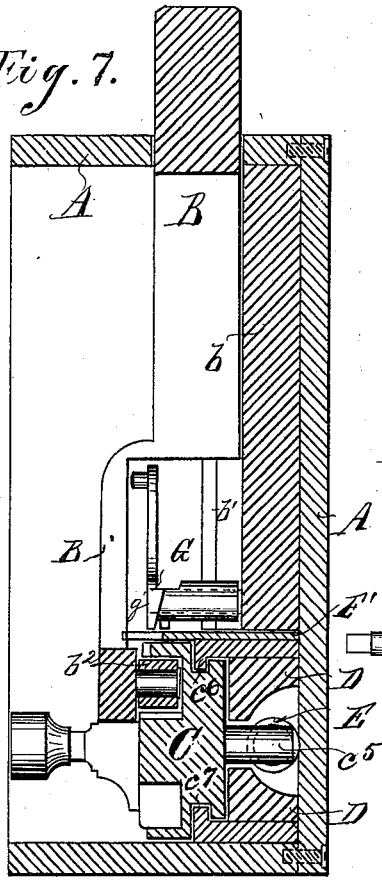


Fig. 6.

Fig. 7.



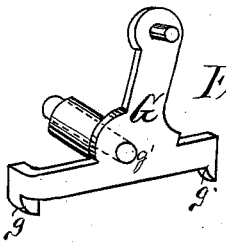


Fig. 8.

Fig. 10.

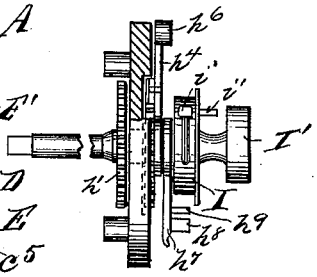
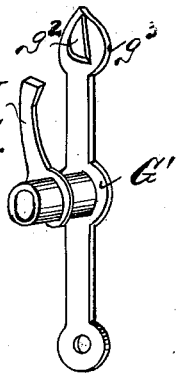


Fig. 9.



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UNITED STATES PATENT OFFICE.

PHINEAS F. KING, OF ST. LOUIS, MISSOURI, ASSIGNOR TO G. N. BEARD AND E. J. BEARD, OF SAME PLACE.

IMPROVEMENT IN TIME-LOCKS FOR SAFES, &c.

Specification forming part of Letters Patent No. **200,312**, dated February 12, 1878; application filed April 23, 1877.

To all whom it may concern:

Be it known that I, PHINEAS F. KING, of St. Louis, in the county of St. Louis and State of Missouri, have invented an Improved Time-Lock for Safes, &c., of which the following is a specification:

The object of this invention is to form a lock or bolting device for securing the doors of safes independent or in connection with the bolt-work on safe-doors, operating a vertical or upright bolt automatically, or by means of clock work or movements, either single or combined, and so arranged as to lock and unlock at any stated hour or minute, and also to allow the bolt to remain locked over Sunday, if desired, automatically, and further arranged to unlock or throw the bolt back unlocked automatically if the operator should neglect to wind up the movement, thus presenting a time-lock perfectly safe in its operation.

Having given the object of my invention, I will proceed to explain in detail the construction of this improved time-lock and its action as in practical operation.

Of the drawing, Figure 1 is an elevation of the lock, part of its casing being removed to show the interior construction. Fig. 2 is a similar elevation, in part, showing the operating parts adjusted in position preparatory for locking purposes. Fig. 3, Sheet II, is a like elevation of the lock, showing its parts adjusted when the bolt is in locked position. Fig. 4 is a top sectional plan on line X X of Fig. 3. Fig. 5 is a part sectional elevation on line X^1 X^1 of Fig. 6. Fig. 6, Sheet III, is a top sectional elevation on line X^2 X^2 of Fig. 3. Fig. 7 is a transverse sectional elevation on line X^3 X^3 of Figs. 3 and 6. Fig. 8 is a perspective view of the three-armed lever. Fig. 9 is a perspective view of one of the triggers and its pawl. Fig. 10 is a side elevation of the operating parts on the clock-spindle.

A represents the case or shell that contains the operating parts of my improved time-lock. A^1 A^2 represent the location of the clock or time movements within the case. B is the vertical bolt, made to operate upright in the center of the case and directly between the clock parts, for locking and unlocking purposes.

The bolt is guided in its operation by the face-block *b* and side guides b^1, each of the latter having a tongue engaging the grooves on the sides of the bolt. (See Figs. 3, 6.) The shank of the bolt is curved (see Figs. 1, 2, 3, 7) to bring its lowest point, containing an anti-friction roller, b^2, in line of operation with the incline slide.

C is what I term my "incline slide." The slide C consists of a metal block arranged to slide along the bottom of the case. The body of the slide C has the following constructive features: The passage or open channel *c*, in which the bolt by its roller travels when both the slide and bolt operate for locking and unlocking purposes. The passage *c* for this purpose extends in a horizontal direction from left to right, near the base of the slide; thence said passage takes an incline course to near top of the slide; thence its course is horizontally to the left, sufficient to form a bearing-surface; and, lastly, said passage curves downward to point of starting at the left-hand corner of the slide. (See Figs. 1, 2, 3.) The passage *c* thus made permits the slide C to be withdrawn sufficient to the left of the case in order to be acted upon by spring-power, and that without disturbing the position of the bolt. (See Fig. 2.) Said passage further permits the slide to be adjusted, by the force of spring-power, to the position shown in Fig. 3, in order to raise the bolt to a locked position; and, lastly, said passage permits the slide to be forced still farther to the right, in position shown in Fig. 1, in order to restore the bolt to original or unlocked position.

The body of the slide has, further, the incline c^1 and the spring c^2. The incline has its face provided with the flat spring c^2, (see Figs. 1, 2, 3,) the lower end thereof bridging the passage. The lower end of this spring gives way to the rigid position of the roller of the bolt in the act of drawing back the slide C to the left of the case; but said part of the spring bridges the opening, in order that the slide, when forced to the right, can cause the roller and bolt to be elevated to a locked position.

In the upper part, right and left, the slide C has pins c^3 and springs c^4. (See Figs. 1, 2, 3, 5.) These pins are for the purpose of retaining the slide C in its adjustable position, as will presently appear, the springs c^4 being to return the pins to an original position.

Projecting from the back of the slide C is a pin, c^5. (See Fig. 7.) The compressed spring E (see Fig. 1) contained between the casing and the plate D acts upon the incline slide C through the medium of its pin c^5, and this latter compresses the spring E when the operator draws back the slide to first position. It will therefore be noted that the body of the slide C has the following features—viz., the passage c, the incline c^1, the flat spring c^2, the pins and springs c^3 c^4, and the pin c^5—as essential parts. The slide C, with all its parts, I arrange between the top and bottom plates c^6 c^7; and, further, said slide can have its top and bottom faces provided with a groove, to engage the respective projecting edges of said plates c^6 c^7, as shown in Fig. 7, and for the purpose of guiding the sliding action of said slide.

E′ is a cap or plate placed directly over the slide C and fitted parallel with the bottom of case A, and extending from left to right of same. This plate E′ is provided with slots e e^1 and the center opening e^2. (See Figs. 5 and 6.) The slots e e^1 are elongated, the distance being sufficient to accommodate the movements of the incline slide, and said slots permit the pins c^3 free movement or play during the action of the slide when it is operated either to the right or left. The center opening e^2 permits the respective pins c^3 at proper times to engage, in order to retain the incline slide in the various positions shown in Figs. 1, 2, 3. Thus, when the slide C is in position shown in Fig. 1, the pin c^3 to the right plays freely in the slot e^1, while the pin c^3 to the left engages the center opening e^2. When the pin c^3, so holding the incline slide, is released from engaging the center opening e^2, and by the means hereinafter to appear, the incline slide can be drawn back to the left in position shown in Fig. 2. Then the left-hand pin c^3 plays in the elongated slot e, while the right-hand pin c^3 is in engagement with the center opening e^2. When the incline slide is in position shown in Fig. 3, the right-hand pin is free in the slot e^1, while the left-hand pin holds the said slide by having entered the said center opening e^2. In the movement of the incline slide from right to left, or vice versa, the spring c^4 of the pin c^3 that is in engagement with the center opening e^2 must be depressed, in order to release said pin and permit said action of the incline slide to take place. To operate the respective pins c^3 and their springs c^4 for the purpose just stated, I provide a reciprocating slide-bar, F, to actuate a three-armed lever, G.

The reciprocating bar F has a raised arm, f, and, further, at each end said bar has a slot and screw, f'. By means of the arm f the connection of the bar F with the three-arm lever G is made, while the slots and screws f' secure said bar F, and allow it to have a sliding motion. (See Figs. 1, 2, 3.)

The three-arm lever G is positioned directly back of the bar F, the two lower arms of G extending in opposite directions and parallel with the plate E, so that the outer ends g of the said lever G shall be exactly over the slots in said plate and in line with the pin c^3 of the incline slide C. (See Figs. 1, 2, 6.) The ends g of the three-armed lever G are points projecting down directly over pins c^3, and in other particulars the construction of said lever is as shown in Fig. 8. The lever G thus made is properly pivoted by its rear projecting spindle, (see Fig. 8,) so that it can oscillate. Its upright arm (see Fig. 8) may engage in any well-known way with the raised arm f of the slide-bar F, so that when the same is caused to reciprocate it imparts an oscillating movement to said three-arm lever.

It is the oscillation of G that at the required time causes its points g, respectively, to depress the pins c^3, in order that the incline slide C can be operated for locking and unlocking purposes.

G′ is the trigger that imparts the required reciprocation to the slide-bar F. The trigger G′ is secured, by studs or pins at its lowest end, to the slide-bar F, the centers of said trigger being properly pivoted. (See Figs. 1, 2, 3.) The head of the trigger G′ is formed with outer and inner bearing-edges, as shown at g^2 g^3, (see Fig. 9,) which latter features are for the purpose of being acted upon by the respective locking and unlocking arms, and as will hereinafter appear.

My safety or unlocking device consists of the parts now to be enumerated with relation to a safety pawl or lever, H, which forms part of the trigger G′. By "safety or unlocking device" I desire to be understood as referring to parts that unlock automatically the bolt B in cases where the operator has neglected to wind up the clock-spring, or which insure the unlocking of the bolt in case the clock-movement has run down. This safety or unlocking device consists of the safety-pawl H, a pinion, h, and gear h^1, and the clock-movement. The safety-pawl H is firmly attached to the inner projecting center bearing of the trigger G′, and projects diagonally upward, as indicated in Figs. 3 and 9. The pinion h is rigidly secured to the clock-spindle H′, and the gear h^1 is arranged alongside of said pinion, to gear with same. (See Figs. 3 and 10.) The gear h^1 can be made in proportion to the size of the pinion, as may be practical, or as may be in proportion to the mainspring of the clock-movement, allowing the movements to run a certain number of days or hours, or as near the end of the working of the mainspring as may be safe without winding. The gear h^1 is provided with a pin, h^2, (see Fig. 4,) projecting out from its face, to engage with the safety-pawl H, and, pressing this, to cause the slide-bar F to oscillate to one side the three-arm lever G, so that same causes the

pin c^3 to disengage to permit the incline slide C to slide and produce the unlocking of the bolt. The gear h^1 is four times the diameter of the pinion. This latter, being secured to the clock-spindle, revolves once around in twenty-four hours, thus causing the gear h^1 to revolve once around in ninety-six hours, or four days; and if the operator has neglected to wind up the clock-spring, when this time has arrived the engagement of the safety and unlocking device, as above stated, with the trigger slide-bar, three-armed lever, and incline slide, will cause the bolt B to be brought to an unlocked position.

h^3 (see Figs. 1, 3, 4, 10) is the ratchet-wheel, securely fastened to the clock-spindle. This ratchet-wheel is for the purpose of carrying around the locking-arm. h^4 is the locking-arm. It hangs loosely, so as to be free to turn upon the clock-spindle. (See Figs. 1, 3, 4, 10.) Forming part of the locking-arm h^4 is a pivoted pawl, with spring h^5, so arranged that the pawl engages with the ratchet-wheel h^3, and so that the rotation of said ratchet-wheel will carry the locking-arm along with it, to strike by coming in contact with the trigger G′ at g^2, and actuate the latter to produce, through the medium of the slide-bar F, three-arm lever G, and the disengagement of the incline slide C, the locking action on part of the bolt.

The adjustability of the locking-arm h^4 enables the operator to lock the bolt earlier or later, according to the requirements of the case. Thus, when the locking action takes place at a certain time, and it is desired to unlock the bolt earlier, the operator simply sets the locking-arm back in position, with relation to the trigger G′, so that the same is earlier operated upon by said locking-arm. The locking-arm h^4 has a raised hub, h^6. (See Figs. 1, 3, 11.) It is this part that at proper time (when the locking-arm comes in contact with the trigger G′) strikes against the outer edge g^2 of the trigger for locking purposes.

h^7 is the unlocking-arm, also fitted to turn freely upon the clock-spindle, and it is provided on its outer end with a hub, h^8, to engage with the trigger G′ on its inner edge g^3, to produce the unlocking of the bolt through the parts F G and incline slide C. For the purpose of actuating the unlocking-arm it is further provided on the inner edge of its hub (or outer end of the arm) with a pin, h^9, said pin being to engage at proper time with a pin on the dog-wheel, for forcing the unlocking-arm around for unlocking the bolt.

I is the adjustable dog-wheel, and is provided on its outer surface with a sliding pin, i, held in place by a spiral spring. (See Figs. 4, 10.) Said pin is made to engage with the pin just before mentioned on the unlocking-arm h^7 at the proper time for the latter to perform the action to unlock the bolt. On the face of the dog-wheel I is a slot cut through to the sliding pin, and a pin, i', set at right angles with the face of the wheel, (see Fig. 10,) passes through said slot and forms part of the sliding pin. It is the pin i' that operates the sliding pin, as will hereinafter appear.

I′ is a thumb-screw, and is attached to end of the clock-spindle, and can be so arranged that, in screwing it down hard, it will securely fasten the dog-wheel I in adjusted position.

J is the marker or seven-day wheel. This is constructed so as to allow the unlocking-arm h^6 to drop back or remain stationary for twenty-four hours, thus permitting the operator to leave the safe locked over Sunday, which said operation and result are done automatically by means of the clock-movement in combination with the dog-wheel I and said seven-day wheel. Hence, the seven-day wheel J is provided with seven arms, j, or spokes, which are so arranged that the pin i' will engage with each spoke in rotation until the wheel has revolved quite around. The spaces between the spokes j are all of sufficient depth to allow said pin i' to pass and rotate the wheel without depressing the sliding pin i of the dog-wheel. There is the exception of one or the seventh space, j'. This is made of less depth, and will not allow the pin i' to pass around without depressing the spring and pin i; and thus, by means of said action on part of the seven-day wheel and the pin i', the unlocking-arm is caused to drop back into a pendent position, which postpones the unlocking action of the bolt or the unlocking of the safe for twenty-four hours.

K is the hanger or support for the seven-day wheel, and is properly secured to top of the case. Both time-movements are provided with the same arrangement and operating parts that have just been described.

The construction and arrangement of the parts comprising my improved time-lock being as shown and described, I will now explain the practical operation of the same when setting the lock for locking and unlocking. Draw the slide back hard to the left until one of its pins engages with the opening or slot in the plate E′, thus holding said slide in position preparatory for locking the bolt. As the clock-spindle moves around by means of the clock-movements, the locking-arm is caused to engage at the proper time with the trigger, which, acting upon the slide-bar F, causes the three-arm lever G to depress the pin c^3 that holds the slide C, relieving same, which permits the compressed power of the main-spring, acting directly upon said slide to force it to the right a sufficient distance to elevate the bolt B to a locked position, and when it is at that precise point the other pin c^3 will engage with the opening in the upper plate, and thus both bolt and incline slide are held in locked position, and remain so until the unlocking-arm is forced around to perform the reverse action. The reverse action takes place by the dog-wheel causing the unlocking-arm at proper time to come in contact with the trigger, and this, operating the slide bar F and three-arm lever G, produces the unlocking action. At

the same time that the unlocking-arm is forced around, the right-angle pin on the dog-wheel will engage with a space or recess in the seven-day wheel. At each revolution this action will follow in rotation six times. As the revolution is made the seventh time (or representing the seventh day or Sunday) the space with the less depth on the seven-day wheel depresses the right-angle pin on dog-wheel, causing its sliding pin to release its hold on the unlocking-arm, which then drops to a pendent position, and remains so for twenty-four hours, or until the dog-wheel passes around to engage with said unlocking-arm. The bolt is therefore held in a locked position over Sunday automatically, and the unlocking of the bolt takes place at the proper time on Monday. My automatic safety device is actuated by gearing on the clock-spindle, and acts on the safety-pawl H.

The operation of the time-spindle sets the gearing in rotation, and this can be made to unlock at any time designed, or as in proportion to the running of the time-movements—say two, three, four days, or more. The action here represented is to throw the bolt back in four days, the spring of the time-movements being supposed to be in proportion. As the pinion is made to engage the wheel or gear four times its diameter, the pin on gear-wheel will engage at the end of each ninety-six hours after winding with the safety device or pawl H, and pressing it to the right-hand, by means of its attachment with the sliding bar and three-arm lever, will bring about the unlocking of the bolt.

What I claim is—

1. The elevating incline slide C, provided with its center piece and flat spring-pins c^3 c^4, the plate E′ having slots e e^1 e^2, the spiral mainspring, in combination with the vertical bolt B, substantially as and for the purposes set forth.

2. The elevating incline slide C, having pins c^3, springs c^4, in combination with plate E′, having slots e e^1 e^2, as and for the purposes set forth.

3. The horizontal plate E′, provided with its slots or openings, in combination with the elevating incline slide C, having the spring-pins c^3 c^4 and the bolt B, substantially as and for the purposes set forth.

4. The three-armed lever G, provided with the lower projecting points and center bearing, in combination with the reciprocating slide-bar F, substantially as and for the purpose set forth.

5. The vertical lever or trigger G′, provided with center bearing, flattened side edges g^2 g^3, in combination with the reciprocating slide-bar F, substantially as and for the purposes set forth.

6. The locking-arm provided with pawl and spring, and projecting hub at outer extremity, in combination with the ratchet or pawl wheel and vertical trigger, substantially as and for the purpose set forth.

7. The dog-wheel I secured to clock-spindle, and provided with a sliding pin, and pin at right angle, and slot, in combination with the unlocking arm and trigger, as and for the purpose set forth.

8. The diagonal safety-lever attached to vertical balance lever or trigger, in combination with the safety unlocking device, substantially as and for the purpose set forth.

9. The combination of the vertical bolt B, elevating incline slide C, plate E′, reciprocating slide-bar F, and three-armed lever or trip, substantially as and for the purpose set forth.

10. The combination of the ratchet-wheel, locking-arm, unlocking-arm, dog-wheel, marker or seven-day wheel, trigger, and reciprocating slide, as and for the purpose set forth.

11. The marker or seven-day wheel having spokes j and space j', in combination with dog-wheel having pin i', as and for the purpose set forth.

12. The combination of the safety unlocking device, diagonal lever, vertical trigger, reciprocating slide-bar, three-armed lever or trip, plate E′, elevating incline slide C, and vertical locking-bolt B, substantially as and for the purposes set forth.

In testimony of said invention I have hereunto set my hand.

PHINEAS F. KING.

Witnesses:

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ELEAZAR J. BEARD.