

C. O. YALE.

BOLTING MECHANISM FOR SAFE-DOORS.

No. 174,995.

Patented March 21, 1876.

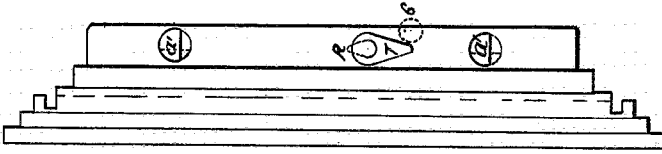


Fig. 3.

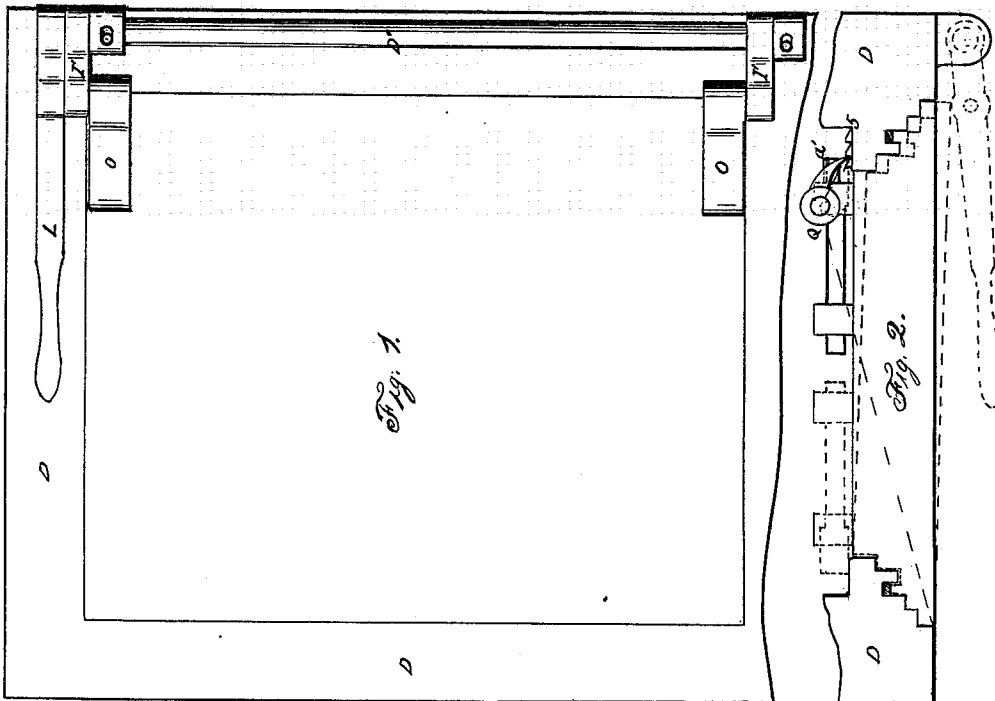


Fig. 1.

Fig. 2.

Witnesses.

John C. Bean

W. Hunch.

Chas. O. Yale
by Charles H. Smith
att'y.

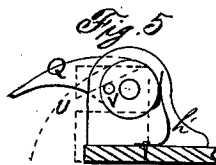
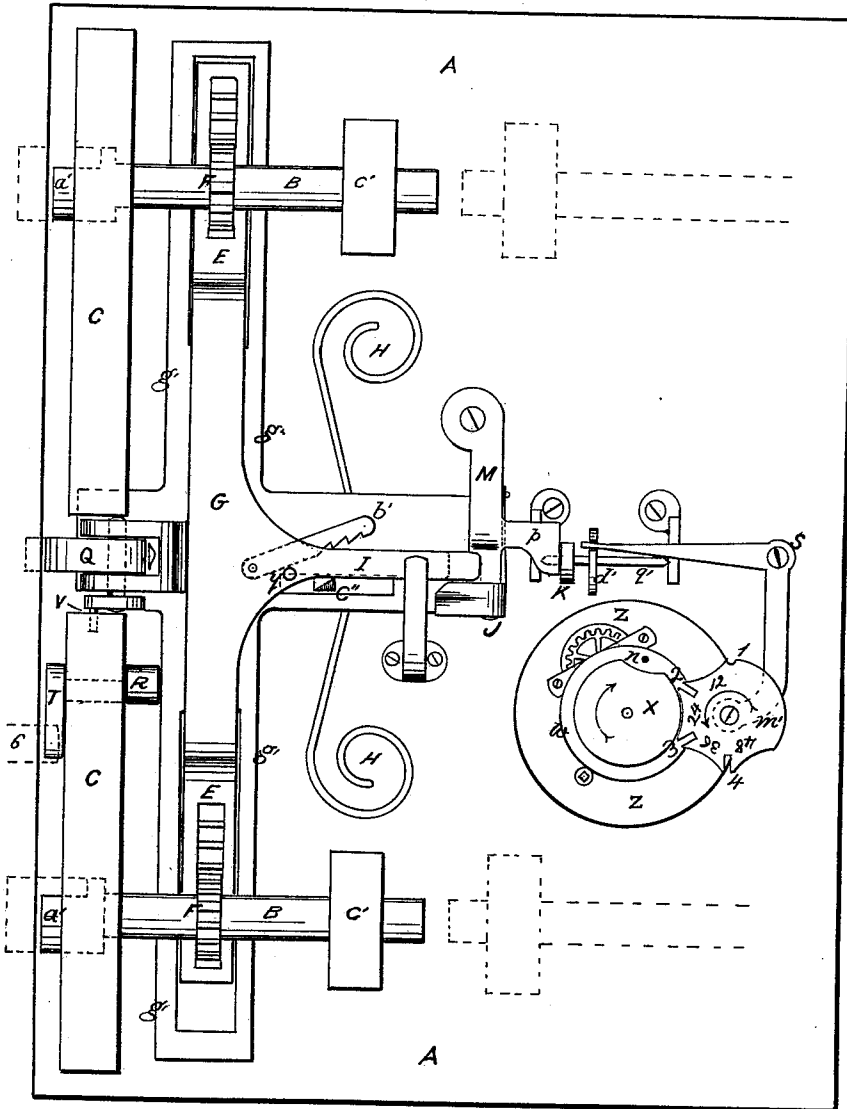
C. O. YALE.

BOLTING MECHANISM FOR SAFE-DOORS.

No. 174,995.

Patented March 21, 1876.

Fig. 4.



Witnesses,

Sam C. Bean

W. Munch.

Chas. O. Yale
by
Charles H. Smith
Atty.

UNITED STATES PATENT OFFICE.

CHARLES O. YALE, OF NEW YORK, N. Y., ASSIGNOR TO HERRING AND COMPANY, OF SAME PLACE.

IMPROVEMENT IN BOLTING MECHANISMS FOR SAFE-DOORS.

Specification forming part of Letters Patent No. **174,995**, dated March 21, 1876; application filed June 12, 1875.

To all whom it may concern :

Be it known that I, CHARLES O. YALE, of the city, county, and State of New York, have invented a new and useful Mechanism for Locking and Unlocking Safe Doors, and the following is a specification thereof:

This invention relates to doors of burglar-proof safes, constructed for opening and closing, locking and unlocking, by mechanism, operated without the use of a key, dial, knob-spindle or anything passing into or through the door, whereby all necessity for openings through the door is obviated, leaving the door whole and intact.

In carrying my invention into practice, I use a set of spring-thrown bolts, with trip and catch, for holding and for releasing them to bolt the door when required; and said bolts are also constructed and arranged for a change of position, to allow of a slight vibratory movement of the door in the jambs, such change being accomplished by a self-acting mechanism, having the time of its operation determined by a time-piece or time movement in connection therewith. By a vibratory motion of the door, in connection with suitably-arranged detents, ratchets, and pawls, the bolts are drawn or retracted, and the door may then be opened. The door is so vibrated, and is disengaged from the jamb to prepare it for opening by means of levers and a uniting-rod applied at the hinges, whereby the door is not only susceptible of two motions at its hinged side, an out and in motion additional to its swinging motion, but its operation is facilitated by the leverage obtained. The bolts are released and thrown out or projected by their driving spring or weight in and by the act of closing the door.

The first part of my invention consists in the combination, with a safe-door and bolt-work, of a pawl and ratchet, or their equivalent, for operating the bolts by a vibrating motion of the door. The second, in the combination, with the bolts and pawl and ratchet, of mechanism for changing their position, substantially as herein specified, so as to free them from their bearings and permit the door to vibrate. Third, in the combination, with such bolts and pawl and ratchet, of a changing mechanism and a time movement, to de-

termine the time of change, as herein set forth. Fourth, in the combination, with the bolts, of certain bars, hereinafter described, for projecting the bolts, and afterward changing their position through the force of springs or weights. Fifth, in the combination of a certain bar, provided with a projection or branch, operating in connection with a device termed a "catch-button," in the operations of the bolts, as hereinafter specified. Sixth, in combining with a safe-door, provided with bolts constructed and arranged for retraction by a vibrating door and pawl and ratchet, of two-motion hinges, as herein described, with or without a lever-power to assist in vibrating the door. Seventh, in the tripping-mechanism herein specified, working in connection with and by the time-piece, consisting of a rotating disk or plate and pin attached to a lever operating the tripping-block. Eighth, in certain special devices for controlling and managing the pawl, as herein described. Ninth, in the combination, with the pawl and with the bars with which the bolts are connected, of a suitable detent to hold the bolts during the operation of the pawl.

Referring to the annexed drawing, wherein I have shown a safe-door, bolt-work, and mechanism embodying my invention—

Figure 1 is a front elevation of a burglar-proof safe, door, hinges, and operating levers, such as I prefer to use. Fig. 2 is designed for such a sectional view (horizontal) as will serve to show the ratchet and pawl, and one of the bolts. Fig. 3 shows an upright view of the door, as seen from the edge thereof. Fig. 4 (on double the scale of Fig. 1) shows the inside face of the door and the bolt-work, and operating mechanism. Fig. 5 is a detail of pawl and appurtenances thereof.

A represents the safe-door, tongued and grooved all around, and fitted to corresponding tongues and grooves in the jamb or door-frame, after the manner of burglar-proof safes.

Upon the inside of the door are a set of bolts, B, or bolt-work, the set to include, if desired, bolts for the top, bottom, and sides, and all may be connected in "train," in any usual manner, so that with the outward or inward movement of one bolt all move, as now commonly practiced.

The bolts are arranged to slide in guides formed in ribs *c* and blocks *c'*, in which they are also free to turn as on their axes. The outer ends, when the bolts are thrown out to secure the door, take behind the door-frame or casing *D*, Fig. 2. They are cut away at one side so that when turned a quarter revolution, as indicated by the dotted line at *a'*, Fig. 3, there will be a space left between them and the casing, (seen in Fig. 2,) thereby allowing the door to be drawn out about the depth of the tongue and groove. The bolts are turned to change their position by cogged racks *E* engaging in pinions *F* on the bolts. Said racks are a part of a suitable weight, and for this purpose the bar itself, in a safe, is found sufficiently heavy.

The racks *E* are set into and guided by another like bar, *g'*, and the pinions enter the racks. The bar *g'* is susceptible of motion in the direction of the length of the bolts, and when thus moved will carry the pinions, and with them the bolts. Such motion, in throwing out the bolts to bolt the door, is produced, as shown in the drawing, by springs *H*, and the retraction of said bolts to unbolt the door is effected by a pawl and ratchet operated by giving the door a short vibrating motion when the bolts are in their unlocked position. Such vibrating motion operates the pawl *Q*, which is mounted on a part of the bar *g'*, and engages in a ratchet, 5, on the inside of the jamb or door-frame. As the bolts are moved back, notch by notch, they are held by a small swinging ratchet-bar, *b'*, that serves as a detent by catching over a stud or pin, *c''*, in the door, and passing up through a slot in a part of the bar *g'*, and when the door is swung open the bolts are found thus retracted.

When the locking mechanism is to be set for operation the pawl *Q* is raised, as indicated in Fig. 5, and a trip-lever, *T*, is drawn out, turning a cam-stop, *R*, in between the rib *C* and bar *g'*. The rack-bar *G* is then moved upward, rotating the bolts and bringing them into the locking position, which may be illustrated by the dotted lines of the bolts in Fig. 2, and is shown in full lines in Fig. 3. In so moving the bar a stud, *y*, projecting downward therefrom, lifts the ratchet or detent *b'* off the catch-pin *c''*, and a branch, *I*, of the bar *G* passes over and becomes engaged on the catch-button *J* pivoted to the end of a lever, *M*. This lever has a projection, *p*, resting against a tripping-block, *k*, on a shaft, *q'*, having a disk, *d'*, with a notch receiving the extremity of one arm of a bell-crank lever, *S*, the other arm carrying a scalloped disk, *m'*, having several slits in its circumference that are successively engaged by a pin, *n*, set in a circular plate, *w*, which, with another plate, *x*, is affixed to the hour hand of a time-piece, *Z*. When the door is closed the trip-lever *T* strikes a projection, 6, (dotted,) affixed to some part of the door-frame, turning out the cam-stop *R*, and releasing the bar *g'*, when the propelling-springs *H*, acting thereon, impart motion

to said bar, throwing or projecting the bolts *B*, and bringing the end of branch *I* to rest on the inclined corner of the trip-button *J*, as indicated by a small dotted line. The same movement pushes a cam-pin, *V*, set in a plate affixed to the shaft, carrying the pawl *Q* against the incline side of a cam-groove formed in a part of the rib *C*, (seen in dotted lines in Fig. 5,) and thus throws the pawl down on the ratchet 5 on the door-frame. The door is now bolted securely, the full portion of the end of the bolts resting against the inside of the jamb or door-frame. The time for opening the door depends on the previous adjustment of the tripping mechanism of the time-piece. If the safe is to be unlocked after an interval of twelve hours, that side of the scalloped disk marked 12 is placed opposite the plate *x*, and the pin *n* in the plate *w* on the time-piece started from the disk *m'* to make its circuit in the direction of the arrow at *x*. If in twenty-four hours, then the side marked 24 is placed opposite the plate *x*, and the pin *n* started as before, will, when it makes its first revolution of twelve hours, simply, engage the long slit 2, turn the disk until it can pass out of the slit and continue on; but when the pin, in its next revolution, comes around, it finds the short slit 1 at the point at which 2 is seen in the drawing, and engaging therein pushes the disk *m'* to the right, moving the bell-crank *s* and turning the tripping-block *k*. This block is circular, and has one side flattened off, so that when turned slightly it allows the lever *M* to swing on its pivot. At this juncture the downward tendency of the rack *G* causes the branch *I*, resting on the catch-button *J*, to force it and the lever *M* aside, and the rack-bar drops down, letting the detent *b'* fall on its catch-pin *c''*, and turning the bolts to the unlocking position before described. The door is hung on hinges made for allowing an out-and-in motion at the rear side, besides its ordinary swinging motion, such hinges consisting in this case of hinge-pintles set in short crank-arms *I* affixed to a rod, *D'*, and pivoted to the door-frame, as shown in Figs. 1 and 2. Hinges of this description—that is, “two-motion” hinges—admit of the use of a tongue and groove on every side of the door.

Affixed to one of the crank-arms *I* is a purchase-lever, *L*, by which the door is moved in and out of the jamb to disengage the tongue from the groove.

When my improvements are applied to safes having this arrangement, I employ the lever *L* and levers or arms *I'*, with their uniting-rod, as the means of vibrating the door to operate the pawl and ratchet, as before described, and in such case, they and their bolts are placed at the rear edge of the door; but when there is no such tongue and groove, they would be placed at the front edge.

When the time has elapsed at the expiration of which the said unlocking action takes place, the operator seizes the handle of the

lever L, connected with both hinges of the safe-door, and pulls it outward, drawing out the heel of the door bodily. This causes the pawl Q to push against one of the teeth of the ratchet 5, forcing back the bar *g'*, carrying with it the bolts, and the said bar is held by the detent *b'* and its catch-pin *c''*, while the door is forced in again by the lever; and this vibratory motion of the door in the jamb is continued, and by it the action of the ratchet, pawl, and detent, until the bolts are forced back sufficiently to free them from the jamb, when the door may be swung open from the front edge. Thus the door is locked and bolted, or unlocked and unbolted, all without the use of any device penetrating the door.

It will be understood that although the bolts which may be used at top, bottom, and sides, can be connected by suitable gearing in train, it is not necessary to have them all change their position to allow the door to vibrate; hence it is not requisite to have all the bolts cut away, as described, to allow of this motion.

In the above invention I shall substitute weights for springs, or vice versa, whenever it may prove convenient to do so.

I do not confine myself to round bolts, nor to bolts having their ends rabbeted off to allow of the vibratory motion of the door, as the same result may be obtained in other ways—for an example, the bolts may be shot out to rest behind and against protuberances formed therefor on the inside face of the jamb, and made to change position to allow the vibratory motion of the door by dropping the outer ends downward or off the protuberances, the latter to project about as much as the motion desired.

Instead of the kind of two-motion hinges specified, sliding hinges may be used; and for the ratchet and pawl, a suitable friction-clutch arrangement may be substituted.

In small safes, it is possible to vibrate the

door by means of a knob, as a substitute for the lever L.

I claim as my invention—

1. The combination, with a safe-door and bolt-work, of a pawl and ratchet, or their equivalent, for operating the bolts by a vibrating motion of the door.

2. In combination with the bolts and pawl and ratchet, a mechanism for changing their position to permit the door to be vibrated, for the purpose specified.

3. In combination with such bolts and pawl and ratchet, a changing mechanism and a time movement, to determine the time of change, in preparing the bolts for retraction.

4. The combination, with the bolts, of bars G and *g'*, actuated by spring or weight for projecting the bolts, and afterward changing their position, for the purposes set forth.

5. The bar G, having a branch, I, resting on a catch-button, J, on which it slides when the bolts are projected, and from which it is tripped and released when changing their position.

6. The combination, with a safe-door provided with bolts constructed and arranged for operation by vibrating the door, of two-motion hinges, as herein described, with or without a lever power to assist in vibrating the door.

7. In combination with the time-piece, the disks or plates *w* and *x*, the pin *n*, slitted disk *m'*, and lever *s*, operating the tripping-block K.

8. The vibrating lever M, in combination with the branch I of bar G, and with the tripping-block K.

9. In combination with the pawl Q, the pin *v*, operated by a cam-slot, for the purpose described.

10. In combination, the detent *b'*, the catch-pin *c''*, rack-bar G, and bar *g'*.

CHAS. O. YALE.

Witnesses:

EARLE H. SMITH,
W. MUNCH.