(No Model.) 2 Sheets—Sheet 1.

O. E. PILLARD.

BOLT WORK FOR THE DOORS OF SAFES, VAULTS, &c.

No. 356,547. Patented Jan. 25, 1887.

Fig:1.

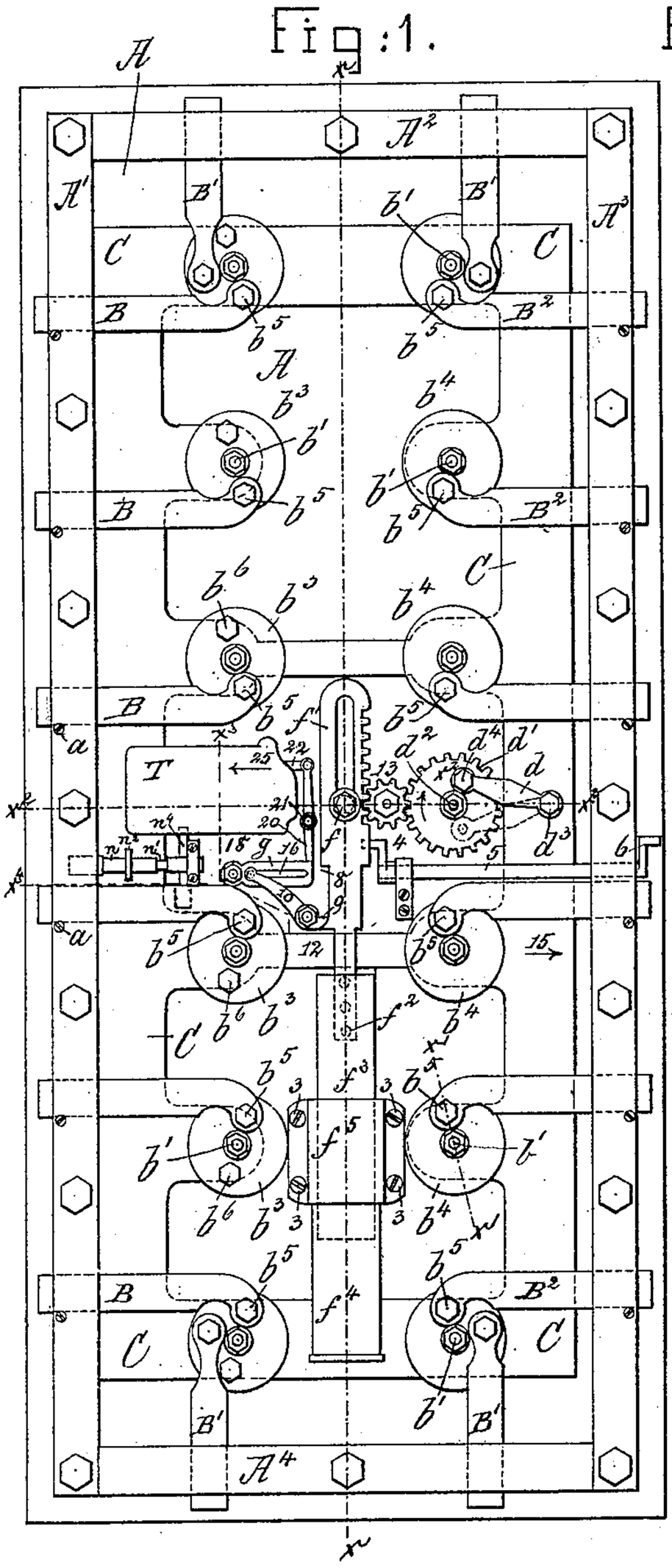


Fig:3.

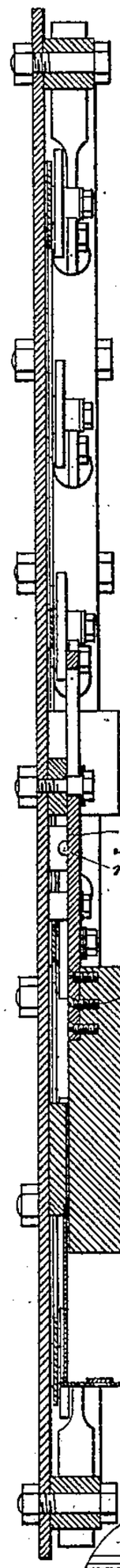


Fig:4.

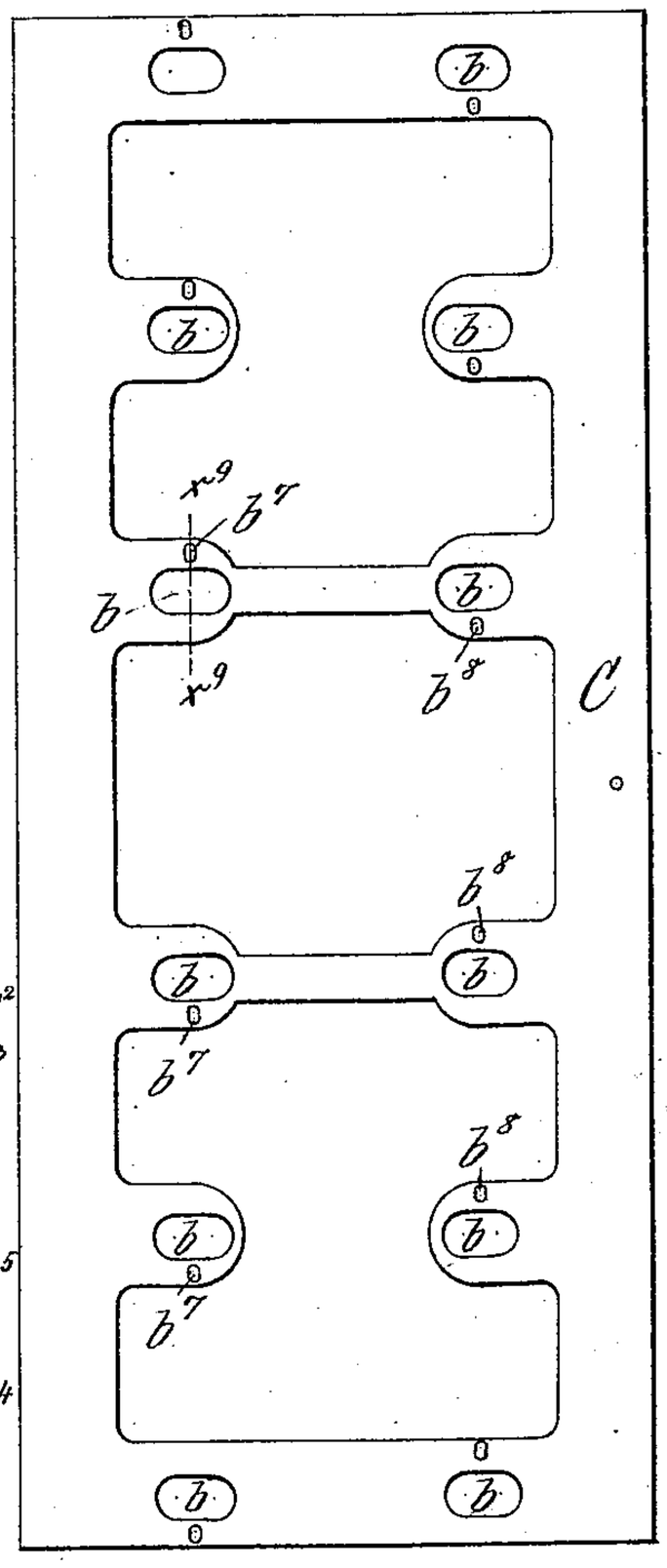


Fig:5.

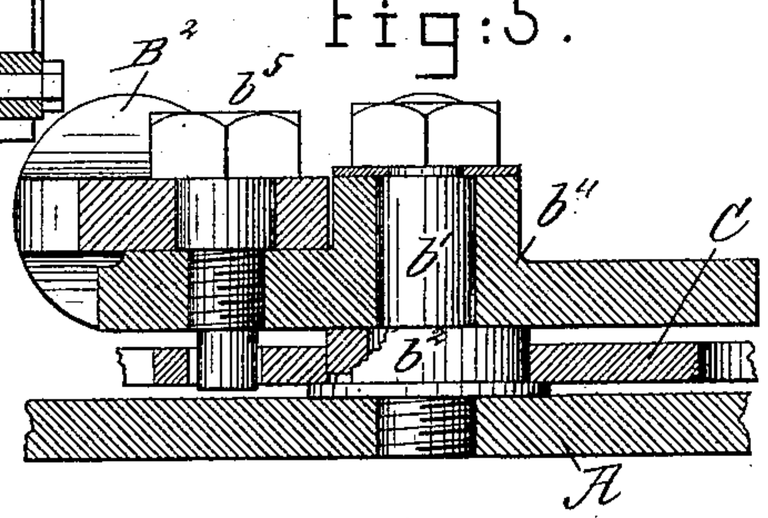
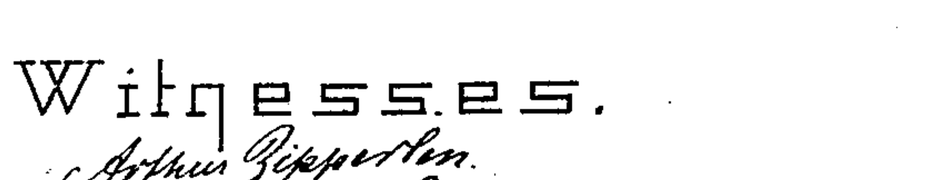


Fig:2.



Witnesses.

Arthur Zipperlen.

John A. Rennie

Inventor

Oliver E. Pillard

Per Crosby & Gregory

his Attys.

(No Model.) 2 Sheets—Sheet 2.

O. E. PILLARD.

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Fig: 6.

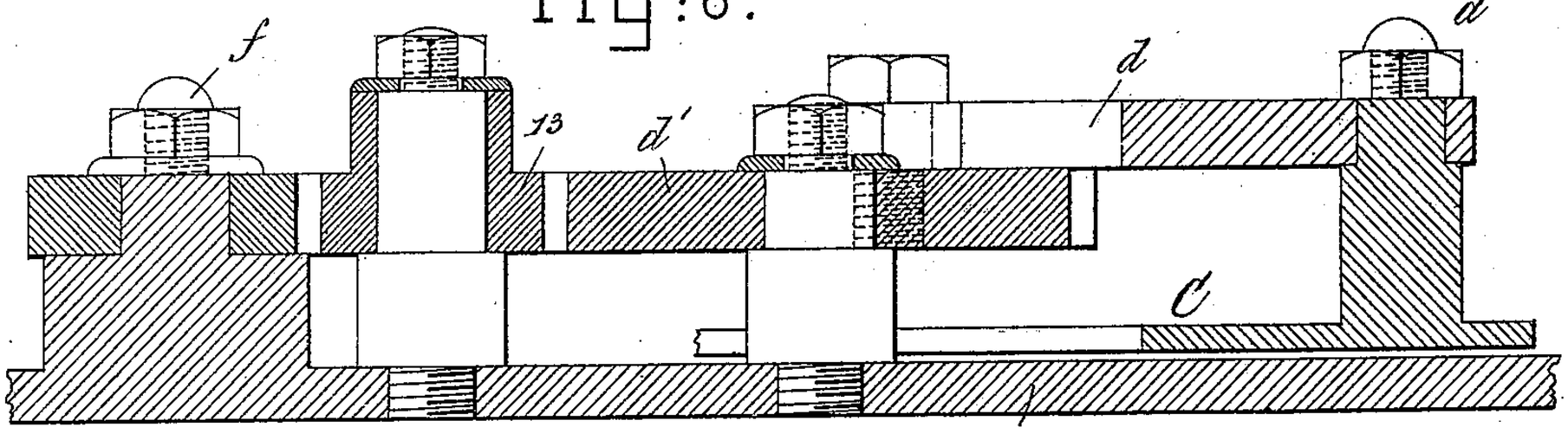


Fig: 7.

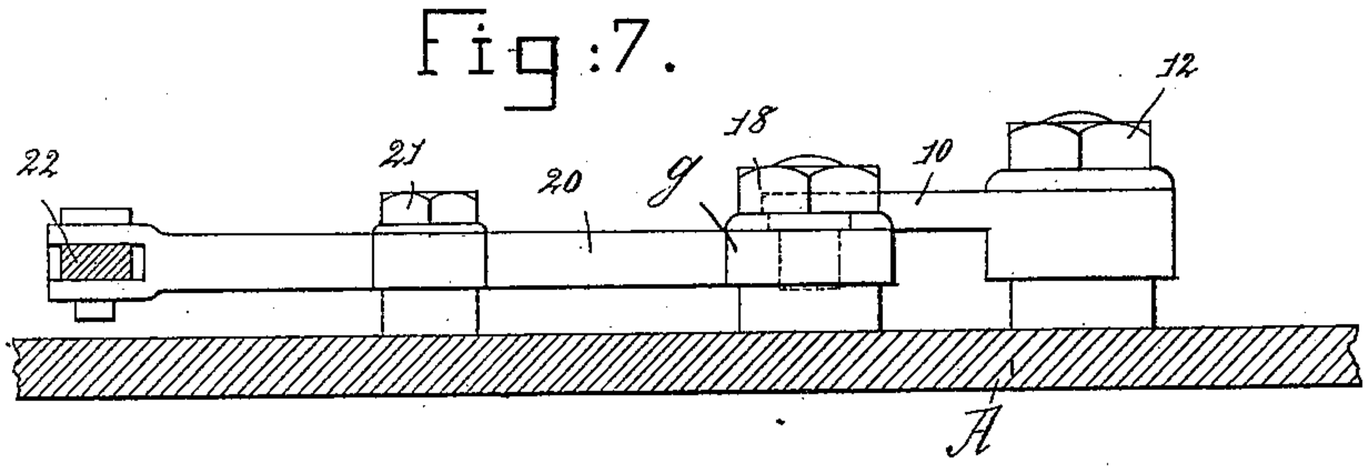


Fig: 8.

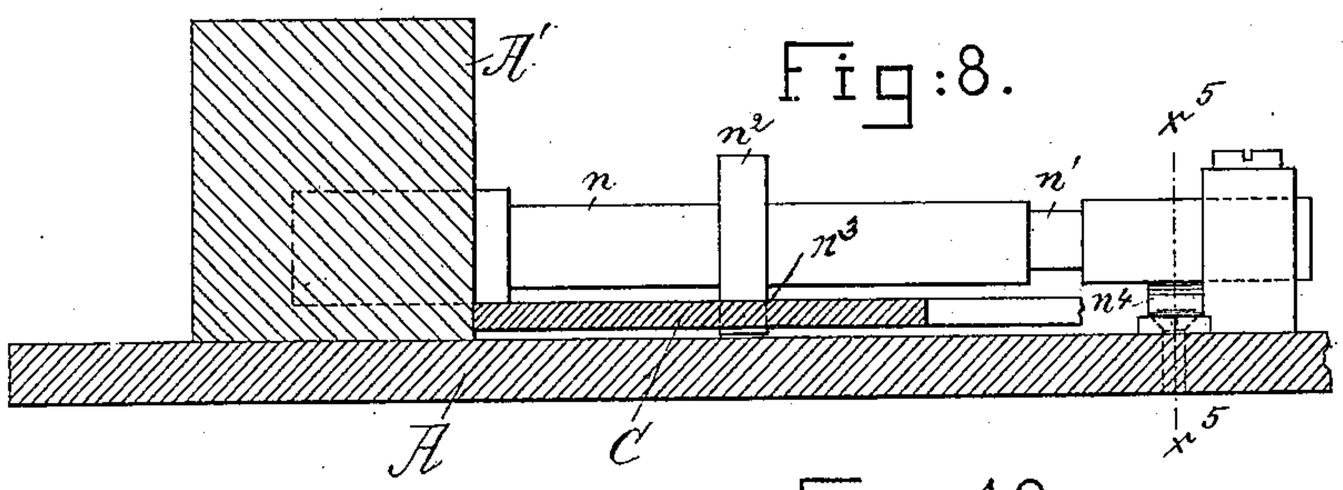


Fig 9

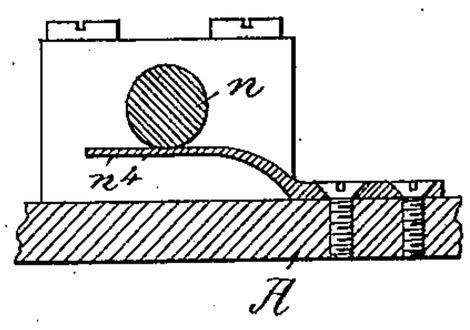


Fig: 12.

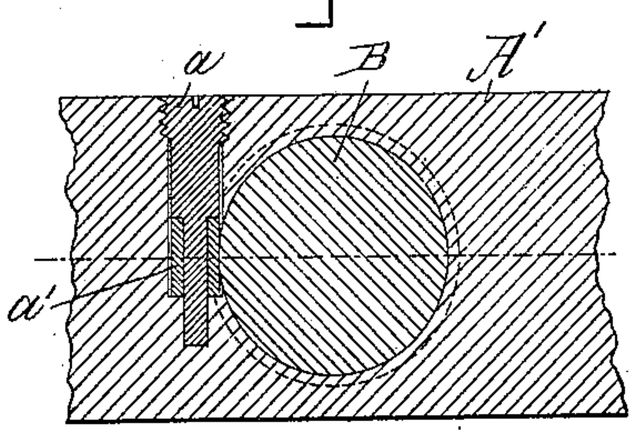


Fig: 11.

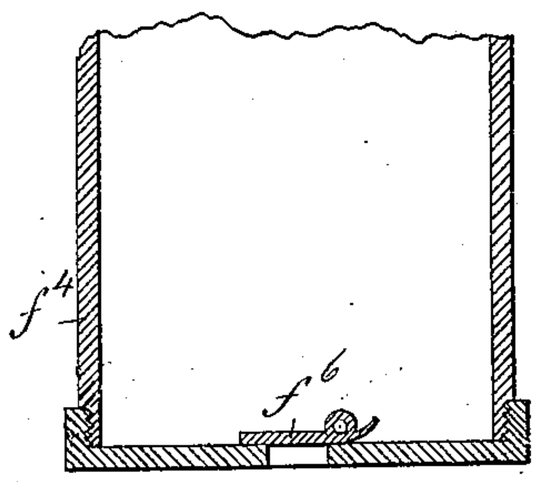


Fig: 10.

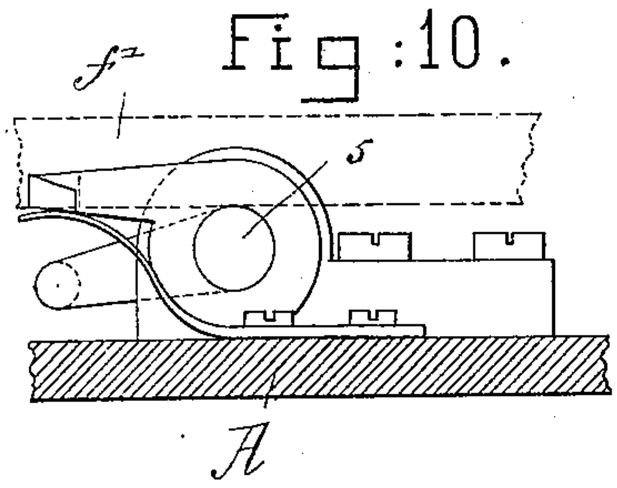
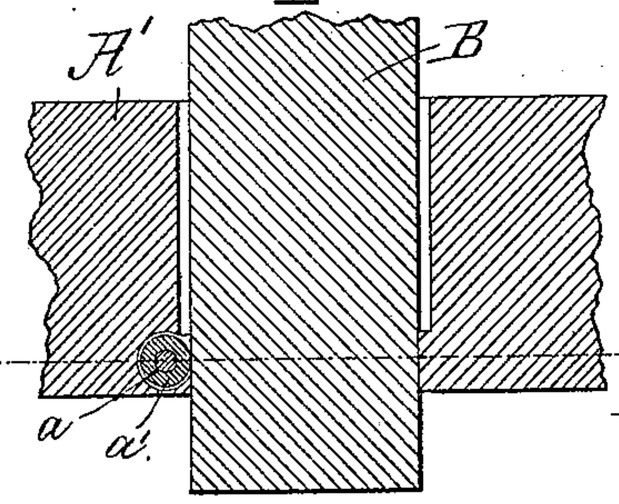


Fig: 13.



Witnesses.

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John A. Rennie

Inventor.

Oliver E. Pillard.

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his attys.

UNITED STATES PATENT OFFICE.

OLIVER E. PILLARD, OF CAMBRIDGE, ASSIGNOR TO GEORGE L. DAMON, OF BOSTON, MASSACHUSETTS.

BOLT-WORK FOR THE DOORS OF SAFES, VAULTS, &c.

SPECIFICATION forming part of Letters Patent No. 356,547, dated January 25, 1887.

Application filed November 30, 1885. Serial No. 184,309. (No model.)

To all whom it may concern:

Be it known that I, OLIVER E. PILLARD, of Cambridge, county of Middlesex, and State of Massachusetts, have invented an Improvement in Bolt-Work for the Doors of Safes, Vaults, &c., of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention has for its object to provide mechanism whereby, when a door is closed, a weight will be released, which will partially descend and will cause the bolts to be thrown out to lock the door, and thereafter the said weight will be again released through the agency of a time-lock, the last half of the descent of the weight withdrawing the bolts.

In the invention to be herein described the weight is fitted into a dash-pot, in order that the air therein may act as a cushion to prevent the usual shock or "jar" attendant upon the descent of the weight. In my improved apparatus the bolts, where they project through guides of the door-frame, are supported upon anti-friction rolls, thus preventing any clogging or sticking of the bolts.

My invention consists, essentially, in a door, a carrying-bar, and a series of cranks and attached bolts, combined with a crank and a link to attach the said crank and carrying-bar, and a bar and weight and intermediate mechanism, substantially as will be described, to operate the crank from or through the weight and bar.

I use the term "crank" in its broadest signification, but have herein illustrated disks having eccentric pins as cranks in effect.

My invention also consists in the combination, with a bar and weight to effect the movement of the carrying-bar, of a dash-pot to act as a cushion for the weight.

My invention also further consists in the combination, with a bar and weight to effect the movement of the carrying-bar, of a rock-shaft or weight-releasing device to support the weight in its most elevated position, the said rock-shaft being operated by the closing of the door to release the weight.

Other features of my invention will be hereinafter described and pointed out in the claims.

Figure 1 is an inner side view of a door with my improvements added, the said door being suitable for a safe or vault. Fig. 2 is a top view of Fig. 1. Fig. 3 is a vertical section thereof in the line $x\ x$, Fig. 1. Fig. 4 is a separate view of the carrying-bar. Fig. 5 is a section of Fig. 1 in the line $x'\ x'$. Fig. 6 is a section of Fig. 1 in the line $x^2\ x^2$. Fig. 7 is a section of Fig. 1 in the irregular line x^3, looking to the right, the lock being omitted. Fig. 8 is a section looking up from below the line x^4, Fig. 1. Fig. 9 is a section on the line x^5, Fig. 8. Fig. 10 is an end view of one arm of the weight-releasing device, which is operated by closing the door; Fig. 11, a detail in vertical section of the lower end of the dash-pot, and Figs. 12 and 13 are details showing the anti-friction rolls for supporting the bolts.

In the drawings, Figs. 5 to 13, inclusive, are on an enlarged scale.

The door A, of suitable size, shape, and material, has at its inner side a series of bars, A' A^2 A^3 A^4, through which are made suitable mortises or openings for the passage of the bolts B B' B^2. The bars A' A^3, that receive the rounded outer ends of the bolts B B^2, are bored to receive the screw-studs *a*, provided (see Figs. 12 and 13) each with an anti-friction roller, *a'*, the hole receiving the said stud being made to intersect the hole receiving the bolt B, so that the anti-friction rollers may be located at the under side of and be made to support the said bolts, in order that they may be easily and freely moved in the holes made for them in the bars A' A^3.

The carrying-bar C (shown separately in Fig. 4, and made as a rectangular open frame) has in it a series of openings, *b*, through which are extended studs *b'*, (shown in Fig. 1, and also in Fig. 5 on a larger scale,) the said studs being screwed into the door-plate A. Each stud will preferably have a roller, b^2, the diameter of which will be substantially equal to the width of the slot *b* in the dotted line x^9, Fig. 4, the said roller serving to guide the carrying-bar as it is reciprocated horizontally in the operation of moving the bolts out or drawing them in, the bolts, as represented in Fig. 1, being all drawn in. These studs *b'* have mounted loosely upon them disks b^3 b^4, each of

which has attached to it loosely by a screw, b^5, one of the bolts referred to, those disks marked b^3 also having extended through them screw-studs b^6, the inner ends of which enter loosely the openings b^7 in the carrying-bar, the said openings being a little longer one way than the diameter of the studs entering them. The screws b^5, which connect the bolts B^2 to the disks b^4, also have their inner ends entered loosely into elongated openings b^8 of the carrying-bar.

The carrying-bar, having a stud, d^5, is jointed by the link d with a pin or stud, d^1, of the toothed disk d', mounted on a stud, d^2, of the door-plate, the said link d at the opposite ends being held by the said studs d^3 d^4, the rotation in the direction of the arrow of the said toothed gear for nearly ninety degrees of a circle effecting the movement of the carrying-bar its full distance in one direction, the further rotation of the said toothed gear in the direction of the arrow on it for nearly ninety degrees drawing the carrying-bar in the opposite direction. To rotate this toothed gear a quarter-rotation, or nearly so, in succession for a semi-rotation thereof, and then to continue its rotation, thereby operating the carrying-bar to enable it in its movement to rotate the disks b^3 b^4 in the proper direction to thrust the bolts out and then draw them in, is effected by instrumentalities which I will now describe.

The door A at its inner side is provided with a stud, f, to act as a guide for a bar, f', herein shown as provided with teeth, thus constituting a rack-bar, and to the lower end of this bar is attached by a screw, f^2, a weight, f^3, the lower end of the weight (see Fig. 3) entering a dash-pot, f^4, supported by guide f^5, shown as attached by screws 3 (see Fig. 1) to the door.

The weight is of such diameter as to nearly but not quite fill the dash-pot, and when the weight ascends it traps the air under it in the dash-pot, so that the air acts as a cushion to gradually and easily let the weight down, the air escaping slowly from the dash-pot upward about the weight.

The dash-pot is provided with a clapper-valve, f^6, (shown in Fig. 11,) to supply air thereto when the weight is being lifted by hand or otherwise far enough to place a notch in the rack f', in position to be engaged by a projection, 4, on a rock-shaft, 5, having an arm, 6, located in such position with relation to the door and the casing of the vault or safe upon which the door is hinged that in the act of closing the door the said arm 6 will be caught between the door and casing and the rock-shaft be turned to release the arm 4 thereof from the notch in the said bar, the latter descending until the shoulder 8 thereof meets the toe 9 of the lever 10, pivoted to the stud 12. The rock-shaft constitutes a weight-releasing device.

Supposing the devices or the parts represented to be as in Fig. 1, now, if the rock-shaft 5 be turned far enough to enable its arm 4 to release the bar f' the latter will descend until the shoulder 8 meets the toe 9, and in so doing will rotate the small pinion 13 sufficiently to cause it to rotate the toothed disk d' until the link d is in such position that the studs d^2, d^3, and d^4 are in the same horizontal line, such movement of the toothed disk moving the carrying-bar in the direction of the arrow 15, Fig. 1, which turns the disks b^3 b^4 in such directions as to throw all the bolts connected with them outwardly, to effect the locking of the door.

The upper end of the lever 10 has a pin or stud which enters a slot, 16, in a lever, g, pivoted at 18, the said lever g, when the door is locked, being held in substantially horizontal position, as in Fig. 1, by a lever, 20, pivoted at 21, and having a link, 22, extended into a time-lock, (marked T,) it being of usual construction and provided with gearing, whereby, at a certain definite time, the link 22 will be moved in the direction of the arrow 25, to move the lower end of the upright lever 20 out of engagement with the lever g, permitting it to rise about its fulcrum 18.

Upon releasing the lever g the toe no longer acts to support the bar and its attached weight, and the bar and weight drop and complete their descent, and during such time the bar again acts to turn the toothed disk d' another quarter-turn, bringing the link d into the dotted-line position, Fig. 1, which effects the simultaneous withdrawal of all the bolts, thus unlocking the door.

The uppermost and lowermost disks in Fig. 1 are like those hereinbefore referred to; but, in addition, they carry or have pivoted to them the bolts B, which hold the top and bottom of the door.

At the inner side of the door, near the lock T, I have placed a short auxiliary bolt, n, held in suitable guideways, and the said bolt is provided with an annular groove, n', and a collar, n^2, (see Fig. 8,) which collar enters a groove, n^3, in the carrying-bar C, so that the said bolt is moved in unison with the said carrying-bar. Under the auxiliary bolt n, and secured to the door, I have placed a spring, n^4, the free end of the said spring being extended between the time-lock and the door, so that in case the time-lock is loosened or removed, as by violence from without, the spring is free to enter the annular groove n' in the bolt n and prevent the movement of the carrying-bar, thus preventing the unlocking of the door.

The link 22 (shown in the accompanying drawings) may be operated by attaching or jointing it directly to the bolt (marked C) of the time-lock shown in the United States Patent No. 262,095, to which reference may be had.

I claim—

1. The door, the carrying-bar, and the series of disks and attached bolts, combined with the disk d', and link to attach the said disk and carrying-bar, and the bar f', and weight

and intermediate mechanism, substantially as described, to operate the disk last named from or through the weight and bar, as set forth.

2. The door and the weight to effect the movement of the bolts, combined with the dash-pot to cushion the weight, substantially as described.

3. The door, the bar f' and its attached weight, and the dash-pot, combined with the weight-releasing device, operated by the closing of the door, substantially as described.

4. The door provided with the studs b' and the rolls b^2 thereon, combined with the carrying-bar slotted at b to embrace the said rolls, substantially as described.

5. The door, the bar f', and its attached weight, combined with the lever 10, the levers g and 20, and the link 22, to be operated by the time-lock, substantially as described.

6. The weighted sliding bar f', having a shoulder, 8, and the lever 10, provided with a toe, 9, to support said bar after it has partially descended, combined with a time-lock to release the lever 10 and permit the weight to complete its descent, substantially as described.

7. The door, its attached spring n^4, and the auxiliary bolt n, having an annular groove, combined with the carrying-bar to which the said bolt is connected, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

OLIVER E. PILLARD.

Witnesses:
G. W. GREGORY,
F. CUTTER.