

No. 645,663.

Patented Mar. 20, 1900.

C. B. HAND.
DOOR LOCK.

(Application filed Nov. 22, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

Fig. 2.

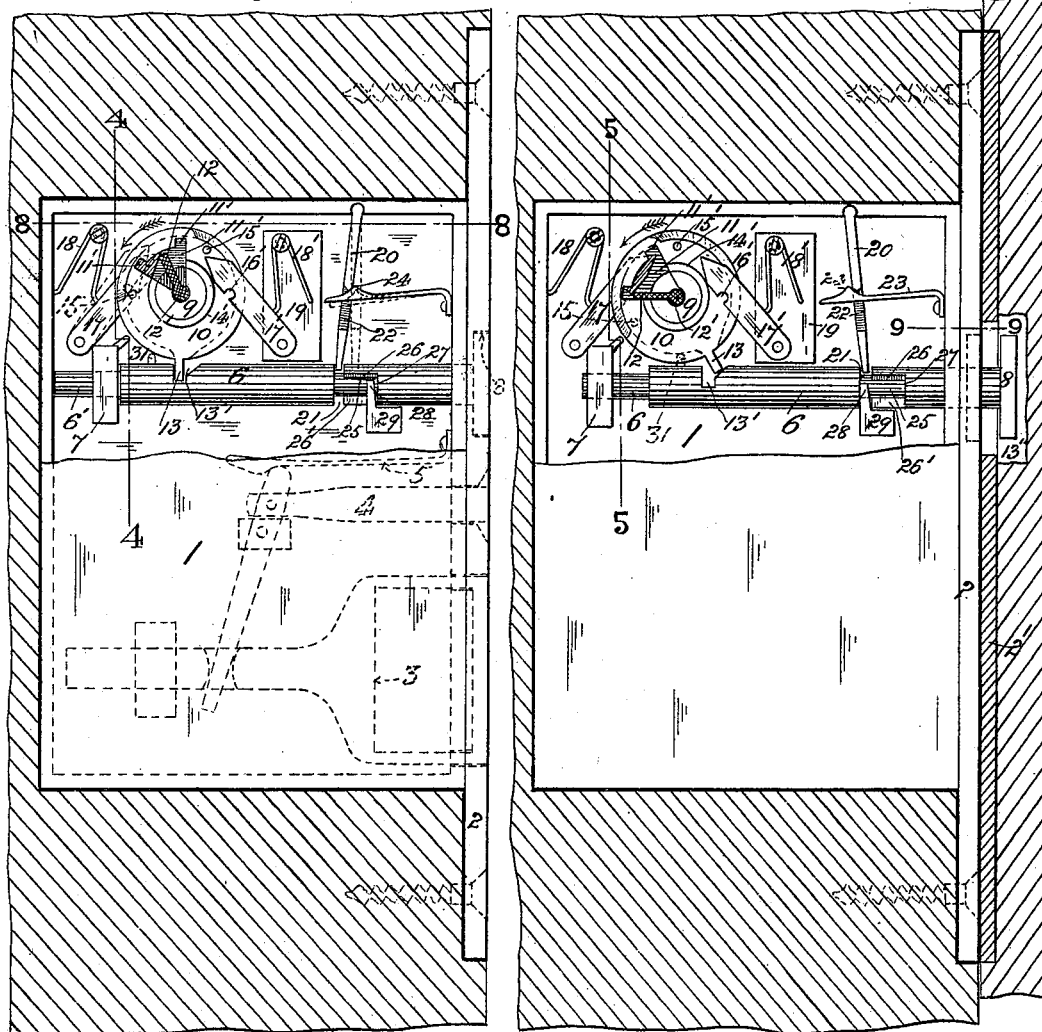
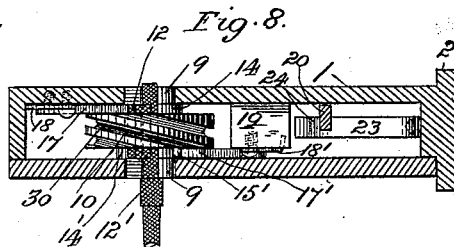
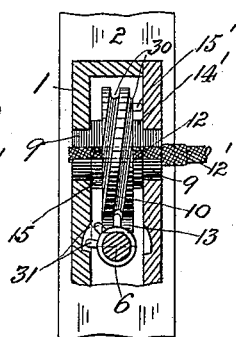
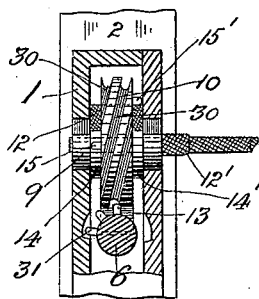


Fig. 4.

Fig. 5.

Fig. 8.



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2 Sheets—Sheet 2.

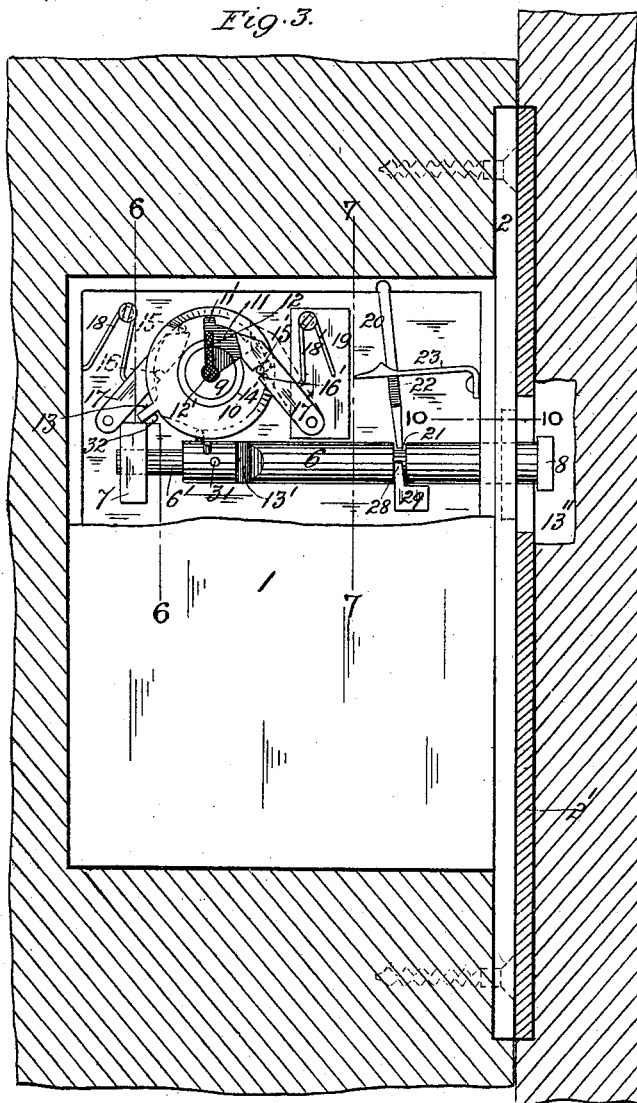


Fig. 6. *Fig. 7.*

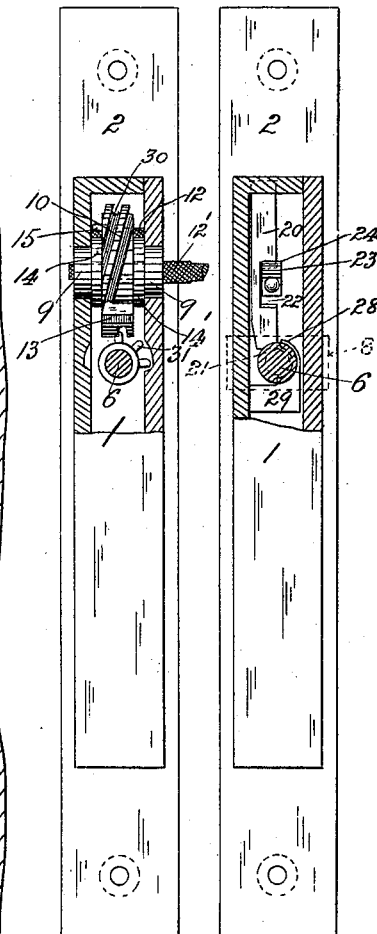


Fig. 9.

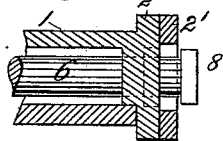


Fig. 10.

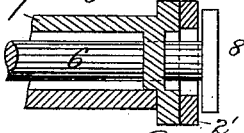
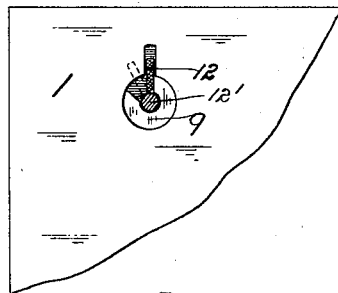


Fig. 11



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UNITED STATES PATENT OFFICE.

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DOOR-LOCK.

SPECIFICATION forming part of Letters Patent No. 645,663, dated March 20, 1900.

Application filed November 22, 1899. Serial No. 737,891. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE B. HAND, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Sliding-Door Locks, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

10 My invention has relation to improvements in door-locks; and it consists in the novel arrangement and combination of parts more fully set forth in the specification and pointed out in the claims.

15 In the drawings, Figure 1 is a side elevation of the casing of the lock, with the front wall partly broken away, showing my invention in plan and showing the first or unlocked position of the bolt. Fig. 2 is a similar view
20 showing the second position of the bolt. Fig. 3 is a similar view showing the third or locked position of the bolt. Fig. 4 is a vertical sectional detail on line 4 4 of Fig. 1, showing the worm-disk in its first position. Fig. 5 is a
25 similar view on section-line 5 5 of Fig. 2, showing the second position of the worm-disk. Fig. 6 is a similar view on line 6 6 of Fig. 3, showing the third position of the worm-disk. Fig. 7 is a section on line 7 7 of Fig. 3, showing
30 the trigger and bolt-ejecting arm controlled thereby. Fig. 8 is a horizontal section on line 8 8 of Fig. 1, showing a top or edge view of my invention. Fig. 9 is a sectional detail on line 9 9 of Fig. 2, showing the
35 head of the bolt before the latter has been turned to its third or locking position. Fig. 10 is a sectional detail on line 10 10 of Fig. 3, showing said head in its locked position; and Fig. 11 is a face view of the outer wall or plate
40 of the lock, showing the key inserted therein and the boss on which the worm-disk rotates.

The present invention has relation to locks for sliding doors, and has for its object to
45 overcome certain objections inherent in the prevailing forms of these locks. Notable among such objections is that should one of the doors settle or sag for any reason or the adjusting-screws of the hangers work loose
50 the locking-bolt carried by one of the doors strikes the keeper of the opposite door, thus preventing the locking of the doors. In the

majority of locks the size of the opening formed in the keeper of one door for the reception of the bolt of the opposite door is limited, and hence the adjustment in the hanging of the doors must be very exact. With my present device, however, the opening in the keeper which receives the bolt can be enlarged materially in length, and thus permit
55 of the reception of the bolt, no matter to what extent the doors have settled or worked out of perfect adjustment. In the present construction the outer end of the bolt carries a terminal oblong head, which is adapted to enter an elongated opening of corresponding
60 width in the keeper of the opposite door, and when the head has once entered the pocket behind the keeper the bolt is turned about its longitudinal axis, so as to revolve the head
70 substantially ninety degrees from its first position, the length of the head thus spanning the width of the opening of the keeper and lapping over the sides of such opening and positively locking the parts.

75 While the feature of the bolt carrying a terminal head is not new, my present invention is restricted to the mechanism for operating such bolt.

In detail the invention may be described as
80 follows:

Referring to the drawings, 1 represents the casing of the lock, the same being inserted into the door and held in place by the front plate 2, as usual. The door-pull 3 and push-
85 bolt 4 and spring 5 are old, and as they form no part of the present invention no particular description is necessary as to these parts except to state that they enter into the construction of the majority of locks.

90 Referring now to the features constituting my improvements, 6 represents the sliding locking-bolt, the rear reduced end or spindle 6' thereof being mounted in a bearing-block 7, the forward end passing through an opening of the front plate 2, as usual. The free
95 outer end of the bolt carries an elongated or oblong locking-head 8, which when the bolt is fully drawn into the casing (for the unlocked position of the doors) is snugly received by a corresponding opening of the
100 plate formed for its reception. (See Figs. 1, 3, 9, and 10.)

Rotatable about the bosses or trunnions 9,

revolving in suitable bearings formed in the front and rear plates or walls of the casing, is a key-operated worm-disk 10, the same being provided with a triangular opening 11 for the reception of the locking tooth or bit 12 of the key 12', the opening 11 having terminal recesses 11' adjacent to its opposite walls to facilitate the insertion of the key in locking or unlocking the doors. Projecting radially from the peripheral surface of the worm-disk 10 is an arm 13, adapted to enter a notch or recess 13', formed in the bolt 6. Upon turning the disk 10 in the direction shown by the arrow in Fig. 1 it is apparent that the arm 13 will eject or force out the bolt, causing the latter to assume the position shown in Fig. 2, the head 8 entering the pocket 13'', formed in the opposite door behind the keeper 2' thereof.

Disposed on one face of the worm-disk at a suitable point removed from the limiting-walls of the opening 11 and radially exterior to the circular collars or shoulders 14 14' (whose purpose will presently be defined) is a pin 15, which when the bolt occupies its first position, or that shown in Fig. 1, engages the notch 16 of a spring-actuated pawl or tumbler 17, pivoted at one end to the adjacent wall of the casing, the spring 18 forcing the tumbler into engagement with the said pin 15 and preventing the turning of the disk by unauthorized persons, the turning of said disk being possible only by the use of a key having a bit or tooth capable of disengaging the tumbler from the pin in the act of locking the door. The manner of disengaging said tumbler is best illustrated in Figs. 1 and 8. The tooth of the key is of sufficient length to extend a suitable distance beyond each face of the disk. When the key is first inserted, it is turned, as shown by the arrow in Fig. 1, the portion of the tooth projecting beyond the rear face of the disk riding over and engaging the inclined edge of the free end of the said tumbler, and as the tooth describes an arc in its rotation it will force the tumbler out of engagement, (see dotted position in Fig. 1,) permitting the key when its tooth has come in contact with the limiting-wall of the opening 11 to turn the disk, and thus force the bolt 6 outwardly to its second position. The tumbler when once disengaged and out of the influence of the key simply rides over the limiting ridge or shoulder 14 referred to until such time as the pin 15 presents itself for reengagement. The third position of the bolt is that which corresponds to the position shown in Figs. 3 and 10 when the locking-head is at right angles to or spans the opening of the keeper 2'. In this connection it may be stated that when the disk has been turned to effect the third position just referred to said disk becomes locked by the engagement of a similar tumbler 17', (pivoted to a block 19, carried by the casing-wall,) controlled by a spring 18', and having a notch 16', engaged by a pin 15' on the adjacent face of the disk, (the face opposite to that carrying the pin 15.) This

second tumbler becomes disengaged from its locked position (see dotted position thereof in Fig. 3) in precisely the same manner as the tumbler 17, except, of course, that the key is now turned in the opposite direction, and when once disengaged rides over the ridge or collar 14'. (See Fig. 1.) Before describing the manner in which the bolt is turned to its third position I shall describe the supplemental devices by which the bolt is assisted in being ejected to its second position, or that shown in Fig. 2.

Pivotaly secured to the top wall of the casing is an arm 20, whose free end operates between the walls of a circular peripheral groove 21, formed in the bolt 6, the said arm being recessed at a suitable point of its length, the said recess 22 allowing for the free passage and movement of the free end of a resilient spring arm or trigger 23, whose opposite end is secured to the outer end wall of the casing. The trigger has formed thereon a ridge or knob 24, having inclined faces meeting at a common edge or crown, the outer inclined face being in contact with the inner wall or edge of the recess. (See Fig. 1.) As the bolt is forced outward by the turning of the worm-disk under the action of the key, it is apparent that, the free end of the arm 20 being confined in the groove 21, the said arm will be swung outwardly about its pivot as a center, the inner edge of the recess riding up the outer inclined face of the knob 24, forcing the trigger outwardly (see dotted position in Fig. 1) until the crown of the knob is reached. The moment the arm 20 (or rather the edge of the recess riding over the same) is about to pass off the crown of the knob the resiliency of the trigger will cause the latter to snap back to its original position, the sudden return of the trigger to such position causing the arm 20 to ride down the inner inclined face of the knob of the trigger, assuming the position in Fig. 2, the bolt by this action having imparted thereto a sudden outward movement supplemental to that given to it by the initial turn of the key. Of course in pushing the bolt back into the casing a similar action takes place, the bolt being first pushed partially in by the key and the trigger completing the movement, the arm 20 first riding up the inner incline of the knob and then down the outer incline. The supplemental movement which the trigger imparts to the bolt is permissible by reason of the size of the keyhole or opening 11 of the worm-disk, for it is obvious that in this supplemental movement the bolt will rotate the worm-disk, being coupled thereto, and as the tooth of the key has considerable play in the said keyhole the said tooth will in no wise hinder the disk in its free rotation in conjunction with said supplemental movement which the trigger imparts to the bolt.

The bolt 6 being cylindrical (or at least rotatable about its longitudinal axis) care must be taken that no accidental rotation be im-

parted thereto during the longitudinal movement from its first to its second position. I therefore provide means for guiding the bolt against rotation until after the second position thereof has been reached. These means are the following: The bolt has formed thereon a peripheral notch or depression 25 to the same depth as the groove 21, the groove and notch communicating with one another. The notch is bounded by lateral longitudinal straight edges or walls 26 26' and a terminal wall 27. Between the wall 27 and the inner wall of the groove 21 is located a finger 28, forming a projection of a block 29, carried by the casing. As the bolt 6 moves from its first position to its second position the edge 26 bears against the end of the finger 28, the bolt being thus prevented from accidental turning in one direction. The finger is so situated (as fully apparent from the drawings) as to prevent the accidental rotation of the bolt in the, opposite direction, the wall 26' fouling the base of said finger with such opposite rotation. When, however, the bolt has once been ejected to its second position, the finger 28 will enter the continuous groove 21, permitting the bolt to be rotated about its longitudinal axis and turned to its third position, as seen in Fig. 3. This is accomplished as follows: It was stated above that the disk 10 was a worm-disk—that is, the periphery thereof is provided with a series of spiral grooves 30. Now by the time that the bolt has been ejected to its second position the worm-disk has been turned to bring its spiral grooves (three in number) into engagement with a series of spirally-arranged pegs 31 projecting from the periphery of the bolt. This spiral arrangement or disposition of the pegs 31 along the periphery of the bolt converts the latter into a worm-shaft so far as its relation to the worm-disk is concerned. As the turning of the key is continued in the direction indicated by the arrow in Fig. 1 the worm-disk will revolve the worm-shaft—that is, the bolt—until all the grooves have successively traversed the series of pegs, by which time the bolt will have been turned ninety degrees, and the terminal head 8 thereof will have spanned the width of the opening of the keeper and the doors are securely locked. At the same time the worm-disk is prevented from further rotation by the arm 13 thereof being intercepted by a limiting-lug 32 projecting from the bearing-block 7. In unlocking the doors the reverse of the several operations takes place—that is to say, by turning the worm-disk in the opposite direction the bolt is rotated back to its second position, and by further turning the bolt is drawn back to its first position, it being understood that by the time the bolt has assumed its second position the worm-disk has been turned sufficiently to cause the arm 13 thereof to reengage the notch 13', formed in the bolt for its reception.

With my present invention the longitudinal

opening formed in the keeper can be lengthened considerably to allow for any sagging or settling of the door, such settling in no wise affecting the successful operation of the lock, since the locking does not take effect until after the bolt has been rotated to its third position.

It is apparent of course that many minor changes can be made in the device without departing from the spirit of my invention.

Having described my invention, what I claim is—

1. In a lock, a suitable bolt, means for imparting an initial movement thereto longitudinally by the turning of a key, means for imparting an additional or supplemental movement to said bolt, and devices for subsequently rotating the bolt about its longitudinal axis by a further turning of the key, substantially as set forth.

2. In a lock, a casing, a sliding bolt rotatable about its longitudinal axis mounted in said casing, a worm-disk having a peripherally-projecting arm engaging said bolt, said disk being adapted upon a partial turning thereof to force the bolt outwardly, and upon further turning to rotate the bolt about its longitudinal axis, substantially as set forth.

3. In a lock, a casing, a sliding bolt rotatable about its longitudinal axis mounted in said casing, a locking-head carried at the outer end of the bolt, a worm-disk having a peripherally-projecting arm engaging said bolt, the disk being rotatable by the insertion therein of and turning of a key, and being adapted to drive the bolt longitudinally by a partial turn of the key, and to rotate the bolt by a further turn, substantially as set forth.

4. In a lock, a casing, a sliding bolt mounted within the same, means for imparting an initial longitudinal movement to the bolt upon the turning of a key, and a trigger for completely ejecting the bolt to the limit of its outward movement, substantially as set forth.

5. In a lock, a casing, a sliding bolt rotatable about its longitudinal axis mounted within the same, a rotatable worm-disk having a keyhole, an arm projecting radially from the periphery of the disk, a notch formed in the bolt for receiving said arm, spring-actuated pawls or tumblers for locking the disk in either of its extreme positions, the tooth of the key being adapted to release the tumblers in the turning thereof, the bolt being adapted to be pushed forward or advanced by the arm upon the turning of the disk, a trigger for imparting a final longitudinal movement to the bolt, a bolt-head carried at the free end of the bolt, a series of pegs arranged spirally along the periphery of the bolt and adapted to come into engagement with the peripheral grooves of the disk after the bolt has been pushed to its outward limit, whereby upon further turning of the disk rotation is imparted to the bolt, a peripheral groove formed in the bolt, a pivotal arm carried by the casing and having its free end engaging said groove, a trigger or

spring-arm having a knob engaging said arm, the latter riding along said knob, a recess formed in the bolt in continuation of the groove, a finger engaging one of the longitudinal walls of the recess, and a block from which said finger projects engaging the opposite longitudinal wall of said recess for preventing the rotation of the bolt during its longitudinal movement, the parts operating substantially as and for the purpose set forth.

6. In a lock, a sliding, axially-rotatable bolt, spirally-arranged pegs carried by the same, a notch formed in the periphery of the bolt, a suitable worm-disk having terminal bosses about which the same is rotatable, an opening formed therein for the insertion of a key,

annular shoulders formed about the bosses for the support of suitable tumblers, pins projecting from the opposite faces of the disk on either side of the center line of the recess for engaging the tumblers, peripheral spiral grooves formed in the disk, and an arm projecting radially from the disk between the adjacent ends of the terminal grooves, the parts operating substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CLARENCE B. HAND.

Witnesses:

EMIL STAREK,
GEO. L. BELFRY.