

UNITED STATES PATENT OFFICE.

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SLIDING-DOOR LOCK.

973,990.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, AXEL H. STONE, citizen of the United States, residing at Marshalltown, in the county of Marshall and State of Iowa, have invented new and useful Improvements in Sliding-Door Locks, of which the following is a specification.

My present invention has to do with sliding door locks; and it has for its general object to provide a sliding door lock in which the headed locking bolt is advanced, turned about its axis to properly position its head relative to the keeper of an opposite door, and retracted to draw its head snug against the inner side of said keeper.

The invention also contemplates the provision in a lock of the character described, of simple, efficient and durable means for accomplishing the ends stated.

Other objects and advantageous characteristics of the invention will be fully understood from the following description and claims when the same are read in connection with the drawings, accompanying and forming part of this specification, in which:

Figure 1 is a sectional view taken through a sliding door and illustrating my improvements as the same appear when the cover plate of the lock casing is removed. Fig. 2 is a fragmentary view illustrating the manner in which the lock fastens the door by which it is carried to an opposite door. Fig. 3 is a detail cross-section taken in the plane indicated by the line 3—3 of Fig. 1. Fig. 4 is a detail horizontal section, taken in the plane indicated by the line 4—4 of Fig. 2. Fig. 5 is a fragmentary view illustrative of one of the sub-grooves intermediate the spiral portion of one of the grooves and the straight portion of the groove behind the mentioned groove, with reference to the direction in which the bolt is turned and showing the manner in which the forward end of said sub-groove is made shallow.

Similar letters designate corresponding parts in all of the views of the drawings, referring to which:

A is a sliding door in which my novel lock is carried.

B is an opposite door equipped with a keeper plate C in which is a vertically oblong opening D, and E is the casing of my novel lock; the same being shown in Fig. 1 and Fig. 2 without its cover plate F, which, however, is shown in Fig. 3.

The casing E is provided at *a* with a

keyhole, and in its wall *b*, which is designed to be opposed to the keeper plate C of door B, is formed a vertically oblong opening *c*. This opening *c* is designed to receive the oblong head *d* of the bolt for locking, G, which bolt has a shank, of circular form in cross-section in which are formed a plurality of equidistant grooves *e* having forward straight portions and rear spiral portions which latter are preferably made at their inner ends to gradually merge into the periphery of the shank. The said bolt shank is movable rectilinearly and about its axis in a guide block H fixed in the casing E, and said guide block H also serves to carry a gravitating and vertically movable pin I, the lower end of which is reduced, as indicated by *f*, in Fig. 2, and is adapted to enter and coöperate with the before-mentioned grooves *e*.

At its inner end the shank of the bolt G is provided with a head *g* and a circumferential groove *h*, and consequently said bolt is connected in a swiveled manner with a follower J which is guided on a horizontal rib K in the casing E, after the manner shown in Figs. 1 to 3. By comparison of Figs. 1 and 4, it will be noted that the said follower J is provided at its forward end with a bifurcation *i* which straddles the bolt shank immediately in front of the head *g*, and that the said head *g* is free to turn immediately back of the abutments afforded by the sides of the said bifurcation, this in order to assure the bolt moving rectilinearly with the follower while permitting movement of the bolt about its axis independently of the follower. It will also be noted by comparison of Figs. 1 and 3, that the follower J is provided at its lower edge with a shoulder L, and on its upper edge has beveled teeth M. These latter are for the engagement of complementary teeth *j* on the lower edge of a tumbler P, which tumbler is also provided with a depending skirt *k* which rests in front of the follower J, and is preferably reduced in thickness adjacent its lower edge, as indicated by *l*. The said tumbler P is pivoted at *r* and hence is adapted to gravitate to the position shown in Figs. 1 and 2, being assisted in such movement by the bowed spring *s* which exerts downward pressure against it at a point above and adjacent its center of movement.

R, in Figs 1 and 2, is a spring against the action of which the bolt G is advanced or

moved forwardly so that the spring is put under tension and is adapted to subsequently retract or draw the bolt rearward. The said spring bears at its lower end against a fixed post *t*, and, at an intermediate point of its length against a lug *u*, shown by dotted lines in Fig. 1, while its upper end is arranged in front of and is designed to cooperate with the forward end of the follower J.

S in Fig. 1 is the key complementary to my novel lock, and by reference to said figure it will be understood that when the key S is turned in the direction indicated by arrow its portion *w* will first act against the lower edge of the skirt *k* on the tumbler P to release the follower J from said tumbler, and will then act against the shoulder L of the follower J to move said follower J and the bolt G forward. The said forward movement of the bolt G will carry the head *d* of said bolt through the opening D in the keeper plate C of the opposite door B, and when the spiral portion of the particular groove *e* that is engaged by the gravitating pin I reaches the said pin I, the bolt will be turned to a position at a right angle to that shown in Fig. 1. At this time the key portion *w* passes out of engagement with the skirt of the tumbler P, and the shoulder L of the follower J, whereupon the spring R which is then under tension serves to retract the follower and the bolt G, and by so doing tends to draw the head *d* tight against the opposed plate of the door B. It will also be here noted that at said time the tumbler P gravitates to the position shown in Fig. 1, in which position it is calculated to prevent forward movement of the follower J and the bolt G.

When it is stated that the bolt G is always turned in the direction indicated by the arrow on the bolt head *d* in Fig. 1, and that a straight sub-groove *e*³ extends forwardly from the spiral portion of each groove *e* and has a gradually tapered forward portion near and in alinement with the straight portion of the groove *e* in rear of the first-named groove *e*, with reference to the direction in which the bolt G is turned, it will be understood that when the said bolt G is retracted, as stated, the sub-groove *e*³ that communicates with the spiral portion of the first-named groove *e* will receive the pin I, after which the straight portion of the groove *e* behind the first-named groove *e* will receive said pin I. It will also be understood that the mentioned sub-groove *e*³ will pass out of engagement with the pin I before the straight portion of the second-named groove *e* passes into engagement with said pin, for a reason hereinafter set forth.

To unlock the door the portion *w* of key S is moved in the same direction as before—*i. e.*, the direction indicated by arrow in Fig.

1, to raise the tumbler P and disengage the same from the follower J, and to move the follower J and the bolt G forward so as to enable the pin I by cooperating with the groove *e* behind that first mentioned to turn the bolt about its axis so as to place the bolt head *d* in registration with the openings D and *c*, and then when the key portion *w* passes out of engagement with the shoulder L, the spring R will serve to draw the bolt rearward until its head *d* is seated in the opening *c*, as shown in Fig. 1. Incidental to the latter retraction of the bolt G the spiral portion of the second-named groove *e* will pass out of engagement with the pin I, and then a second sub-groove *e*³ and the straight portion of a third groove *e* will engage the pin I, in the order named, and permit retraction of the bolt G without turning thereof.

The forward ends of the sub-grooves *e*³ are not arranged in full communication with the straight portions of the grooves *e*. This provision is made in order to assure the spiral portion of each groove *e* engaging the pin I after the straight portion of said groove, during forward movement of the bolt. In other words said provision, on the forward movement of the bolt, prevents the sub-groove *e*³ in rear of the particular straight portion of a groove that is in engagement with the pin I, from engaging the pin I after said straight portion of groove *e*.

In addition to the elements enumerated I prefer to equip the casing E with the door-pull W, push-bolt X, and lever Y, pivoted at *x* to the bolt X and fulcrumed against the post *t* and bearing against the abutment *y* of the door-pull, this in order to transmit motion from the push-bolt to the door-pull and vice versa. I do not desire, however, to be understood as confining myself to the employment of the said elements W, X and Y.

While I have shown and described one form of my invention, it is to be understood that I am not limited to the details or the form or relative arrangement of parts disclosed, but that modifications may be made therein, without departing from the spirit thereof.

Having described my invention, what I claim and desire to secure by Letters Patent, is:

1. In a door lock, the combination of a casing containing a guideway, of circular form in cross-section, and also containing a horizontal rib, and having a keyhole and also having a vertically extending oblong opening in its forward wall; a suitably guided gravitating pin having a reduced lower end extending into said guideway; a locking bolt having a shank, of circular form in cross-section, extending through said guideway, and also having an oblong

head at the forward end of the shank, and a swivel head at the rear end thereof, and further having equidistant grooves in the shank, each groove comprising a forward straight portion and a rear spiral portion, and straight sub-grooves, each connected with and extending forward from the spiral portion of one groove and arranged in alignment with the straight portion of the groove behind said first-named groove; a follower guided on the said rib of the casing and having a bifurcated forward end connected to the swivel head of the bolt and also having beveled teeth on its forward edge and a shoulder at its lower edge; a tumbler pivoted near one end in the casing and arranged above the follower and having beveled teeth opposed to those of the follower and also having a skirt that hangs in front of the follower; and a spring that is put under tension by forward movement of the follower and subsequently serves to move said follower rearward.

2. In a lock, the combination of a casing containing a guideway, of circular form in cross-section, a pin extending into said guideway, a suitable bolt, of circular form in cross-section, extending through said guideway and having grooves the forward portions of which are straight and the rear portions spiral and also having sub-grooves, each connected with and extending forward from the spiral portion of one groove and arranged in alignment with the straight portion of the groove behind said first-named groove, a follower connected in a swiveled manner to the bolt and having a portion for the engagement of a key and also having beveled teeth on its upper edge, a tumbler located above the follower and having beveled teeth opposed to those of the follower and also having a skirt that hangs in front of the follower for the engagement of the said key, and a spring cooperating with the follower.

3. In a lock, a suitable bolt, means for imparting an initial longitudinal and forward movement thereto by the turning of a key, means for subsequently rotating the bolt about its axis by a further turning of the key, and a spring that is put under tension by forward movement of the bolt and serves, subsequently to the turning of the

bolt and the release of the same, to retract said bolt.

4. In a lock, a suitable bolt, means for imparting an initial longitudinal and forward movement thereto by the turning of a key, means for subsequently rotating the bolt about its axis by a further turning of the key, yielding means for subsequently retracting the bolt after the turning and release thereof, and means for again rotating the bolt about its axis by a further turning of the key in the same direction.

5. In a lock, the combination of a bolt, a follower connected therewith and having a portion for the engagement of a key and also having beveled teeth on its upper edge, and a tumbler located above the follower and having beveled teeth opposed to those of the follower and also having a skirt that hangs in front of the follower and is designed for the engagement of the key.

6. In a lock, the combination of a follower and a tumbler complementary thereto, both operable by a key, a rectilinearly movable and rotatable bolt, movable by the follower and having grooves each of which comprises a forward straight portion and a rear spiral portion, and straight sub-grooves, each of which is connected with and extends forward from the spiral portion of one groove and is arranged in alignment with the straight portion of the groove behind said first-named groove, and means for cooperating with the grooves of the bolt.

7. In a lock, the combination of a rectilinearly movable and rotatable bolt having grooves, each of which comprises a forward straight portion and a rear spiral portion, and straight sub-grooves, each of which is connected with and extends forward from the spiral portion of one groove and is arranged in alignment with the straight portion of the groove behind said first mentioned groove, means for cooperating with the grooves of the bolt, and means for moving the bolt longitudinally.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

AXEL H. STONE.

Witnesses:

C. H. VAN LAW,
LUELLA MENDENHALL.