May 3, 1938. W. R. SCHLAGE 2,116,001

LOCK

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Fig. 1.

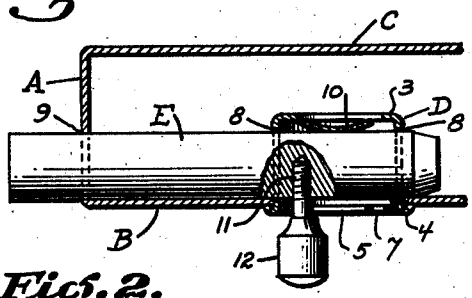


Fig. 2.

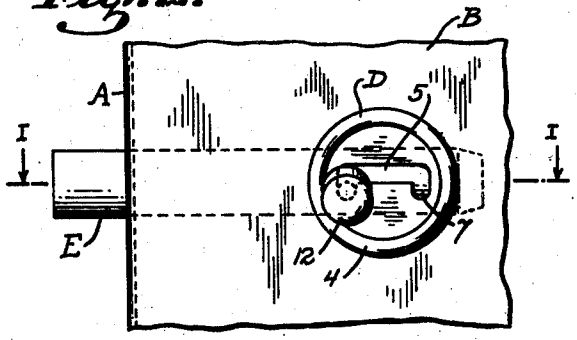


Fig. 3.

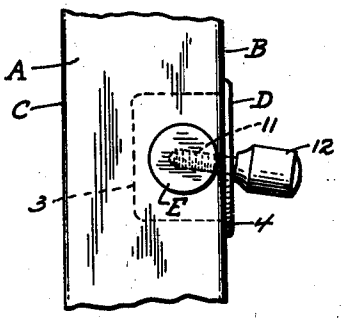


Fig. 4.

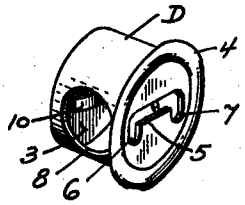


Fig. 5.

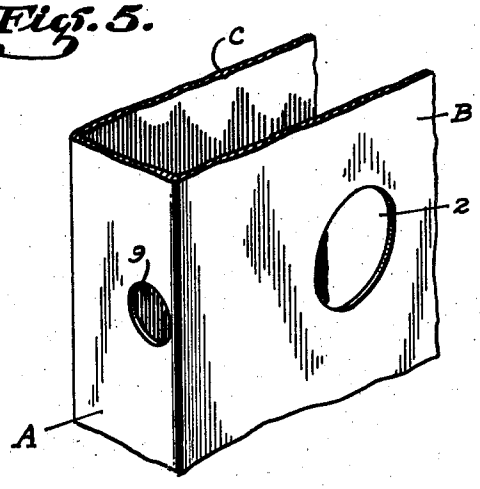
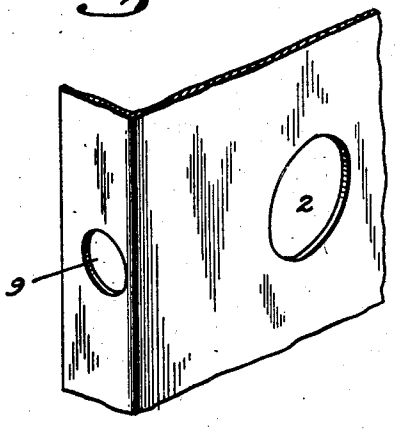


Fig. 6.



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Fig. 7.

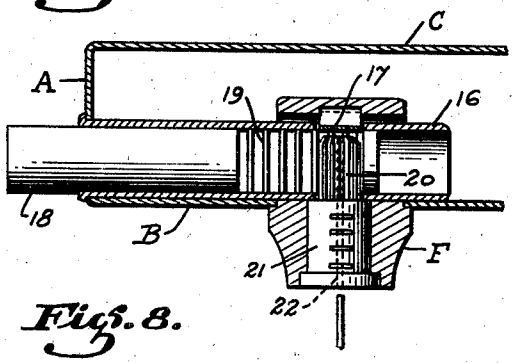


Fig. 8.

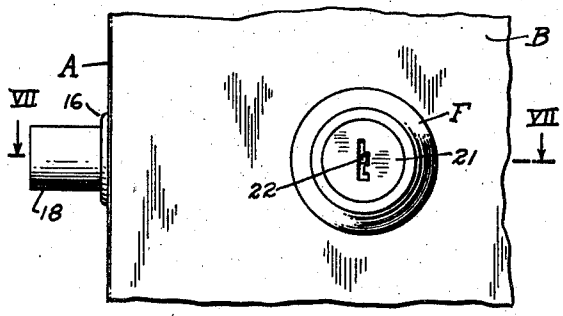


Fig. 9.

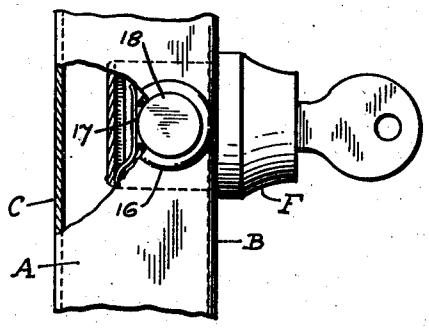


Fig. 10.

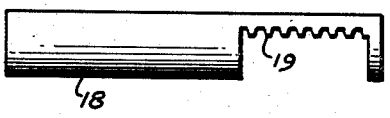


Fig. 11.

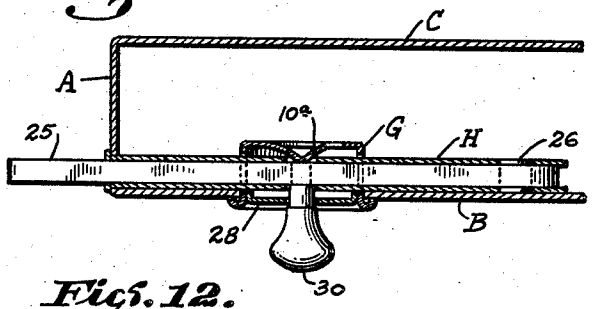


Fig. 12.

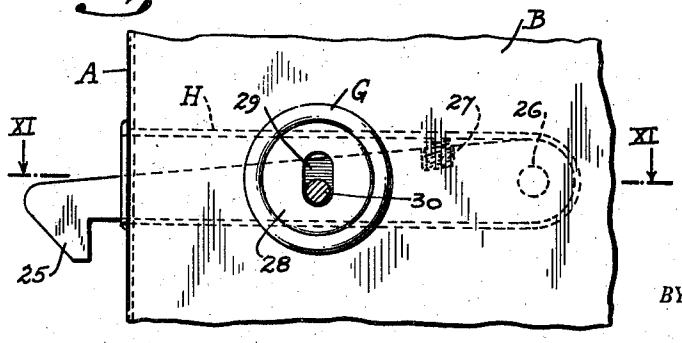
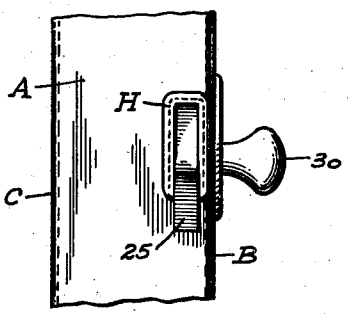


Fig. 13.



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Fig. 14.

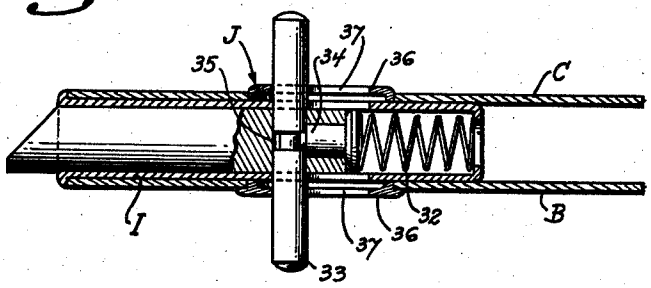


Fig. 15.

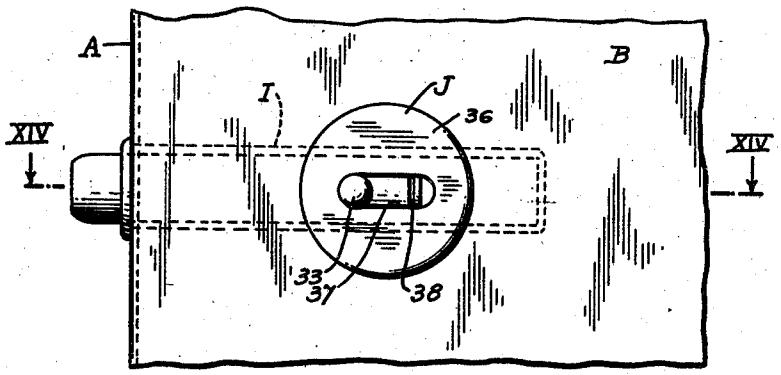


Fig. 16.

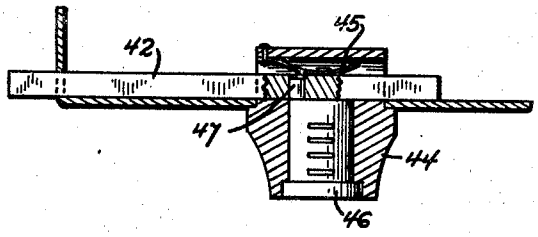
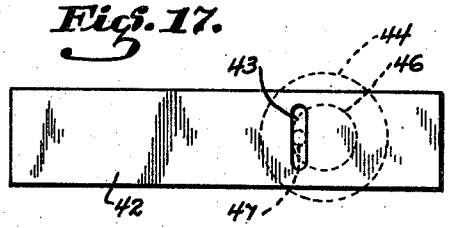


Fig. 17.



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Patented May 3, 1938 2,116,001

UNITED STATES PATENT OFFICE

2,116,001

LOCK

Walter R. Schlage, San Francisco, Calif., assignor to Schlage Lock Company, San Francisco, Calif., a corporation of California

Application January 9, 1935, Serial No. 979

11 Claims. (Cl. 292—451)

This invention relates to locks of the sliding bolt type, which are intended for hollow metal doors, metal locker doors, and the like, and particularly to a lock structure which can be readily and quickly installed.

The object of the present invention is generally to improve and simplify the construction and operation of locks of the character described; to provide a lock which consists of two main elements, to-wit, a latch bolt and a housing, said housing securing the latch bolt against removal, limiting its movement and forming a guide for one end thereof; to provide a lock in which the bolt secures the housing against removal and in which the housing is provided with spring tensioning means to compensate for variations in thickness of the metal forming the door and to take up all lost motion, rattle and play, said spring also functioning to interlock a pair of housings, one supporting the latch bolt and the other the latch bolt actuating mechanism; to provide a lock of the character described which may be either key or manually actuated and which may be actuated from one side of the door only or from both sides; and, further, to provide means for releasing the interlocking members if it becomes necessary to remove the lock from the door.

The lock is shown by way of illustration in the accompanying drawings, in which—

Fig. 1 is a horizontal section taken on line I—I of Fig. 2.

Fig. 2 is a side elevation of a portion of the stile of the door, showing the lock installed.

Fig. 3 is an end view thereof.

Fig. 4 is a perspective view of the housing supporting the inner end of the latch bolt and the mechanism whereby the latch bolt is actuated.

Fig. 5 is a perspective view of a portion of the stile forming the hollow metal door.

Fig. 6 is a similar view showing the portion of a metal door such as used in connection with lockers and the like.

Fig. 7 is a horizontal section taken on line VII—VII of Fig. 8, said view showing a modified form of the lock structure.

Fig. 8 is a side elevation showing the lock structure disclosed in Fig. 7 as installed in a hollow metal door.

Fig. 9 is an end view of Fig. 8, said view being partly broken away and being shown partially in section to disclose the interlocking spring.

Fig. 10 is a side elevation of the latch bolt shown in Fig. 7.

Fig. 11 shows another modified form of the structure, said view being a horizontal section taken on line XI—XI of Fig. 12.

Fig. 12 is a side elevation showing the mechanism disclosed in Fig. 11 installed in the stile of a hollow metal door.

Fig. 13 is an end view of Fig. 12.

Fig. 14 is a horizontal section taken on line XIV—XIV of Fig. 15, said view showing another modification of the lock structure; and

Fig. 15 is a side elevation of the portion of a stile of the hollow metal door, showing the lock structure disclosed in Fig. 14 installed.

Fig. 16 is a plan view in section showing another modification of the lock.

Fig. 17 is a side elevation of the latch bolt shown in Fig. 16, said view also showing the end of the cylinder lock in dotted lines.

Referring to the drawings in detail, and particularly Figs. 1 to 5, A indicates the edge, and B and C the opposite faces of the stile of a hollow metal door. Formed in the inner face of the stile is an opening 2 and adapted to be inserted therein is a housing D. This housing is cylindrical in form and is best shown in Figs. 1 and 4. The inner end is closed by a bottom section 3 and the outer end by a flange closure or face plate 4. Formed in the face plate is a slot 5 which terminates in notches 6 and 7, and formed in the cylindrical portion of the housing is a pair of aligning openings 8—8, which form a support and guide for a latch bolt generally indicated at E. This bolt is inserted through an opening 9 formed in the outer edge of the door, and when inserted the outer end will be guided and supported in said opening, while the inner end extending through the housing D will be supported and guided thereby.

In order to compensate for any variation in thickness of the metal forming the stile of the door, and also to prevent any play or rattle, a spring is provided as indicated at 10. In the present instance the spring is formed by cutting the inner end of the housing to form an arm which is bent inwardly. This arm engages the bolt and it exerts sufficient pressure to give the bolt a smooth action and to take up any play or rattle which might otherwise occur. The spring 10 does not only take up play between the bolt and the housing D but also between the housing and the stile, as the pressure of the spring against against the bolt pulls the flange 4 of the housing against the face of the stile.

To project or retract the latch bolt, a hole is drilled or tapped therein to receive the threaded shank 11 of a knob 12. The shank projects through the slot 5 and as such limits the movement of the bolt and it also permits dogging or dead-locking of the bolt both in its inner and outer position, by moving the shank into engagement with one or another of the notches indicated at 6 and 7.

The openings 2 and 8, with which the door is provided, are punched or otherwise formed during the manufacture of the door, and when the door is hung, it is ready for the reception of

the lock here illustrated. The insertion thereof is accomplished as follows:

The housing D is first inserted in the opening 2, with the openings 8 formed therein aligning with the opening 9 formed in the edge of the door. The bolt is then inserted through the opening 9 and through the openings 8—8 and the shank of the knob is screwed into the tap opening with which the bolt is provided. This completes the operation of installation and it is so simple that any unskilled mechanic can be employed. The spring 10 frictionally engages the bolt and as such makes the action thereof smooth and quiet and it, furthermore, compensates for the variation in thickness of the metal forming the door and takes up all rattle and play.

While the bolt is shown as mounted in the edge of the door it may obviously be mounted in the upper or lower edge, or at any other point desired, and while the bolt and housing has been shown and described in conjunction with the stile of a hollow metal door it is obviously equally applicable to locker doors of the type shown in Fig. 6.

In some instances key actuation of a latch bolt of this character is desirable. In such instances the structure shown in Figs. 7 to 10 will be employed. It will here be noted that the housing, generally indicated at F, is inserted in the opening 2 formed in the outer face of the stile and that the inner extension of the housing is provided with a single opening through which a tubular member 16 extends. This tubular member is inserted through the opening 9 in the edge of the door and its outer end is thus supported in said opening and the inner end is supported by the housing F. Means for interlocking the housing is provided by the insertion of a flat spring, such as shown at 17. This spring enters a notch formed in the side of the tubular housing member 16 and as such dogs or locks the housing 16 against removal through the opening 9. The spring also exerts pressure to allow for any variation in thickness of the metal forming the stile and it takes up all rattle and play between the two housing sections. The bolt generally indicated at 18 is slidably mounted in the tubular member and is insertable through the outer end thereof. The inner end of the bolt is cut away, as shown in Fig. 10, to form a gear rack 19 which is engaged by a pinion member 20. This pinion is carried by the inner end of a pin tumbler or similar cylinder lock, such as indicated at 21. This lock is key actuated and when the key is inserted the cylinder plug, together with the pinion 20 carried thereby, may be rotated and when rotated it will retract or project the bolt.

This structure is exceedingly simple and substantial and may be quickly and readily installed. It is a suitable bolt for locker doors, such as shown in Fig 6, and for hollow metal doors as shown in Fig. 5.

By referring to Figs. 7 and 8 it will be noted that a hole 22 is drilled through the cylinder plug and the pinion 20 and that by inserting a pin through this hole it is possible to apply sufficient pressure on the spring 17 to depress it and disengage it with the notch of the tubular housing 16; thus making it possible to release said housing when removal of the lock is desired for inspection, repair, or otherwise.

In Figs. 11 to 13 another modified form of the lock structure is shown. In this instance the housing G, similar to the housing shown in Fig. 3, is employed and is inserted through the opening formed in the inner surface of the stile. A second housing generally indicated at H is inserted through an opening formed in the outer edge of the door, the outer end of said housing being supported in said opening and the inner or intermediate portion by the housing G. A spring arm 10a serves to yieldably interlock the housing H against withdrawal and to take up lost motion, rattle and play and also allows for variation in the thickness of the metal. In place of a sliding latch bolt an ordinary pivoted latch bolt is employed and is indicated at 25. It is pivoted as at 26 to the inner end of the housing and is normally held depressed by a spring 27. The face plate 28 of the housing G is vertically slotted, as shown at 29, and an actuating knob or pin 30 projects therethrough, said pin being secured to the latch so that it may be readily raised or lowered when the latch is to be actuated.

In Figs. 14 and 15 a further modified structure is disclosed and is particularly intended for the stile of hollow metal doors which are comparatively thin. In this instance three openings are formed, one at each face of the door and one in the edge thereof. A cylindrical-shaped housing J is inserted through the openings formed in the faces of the door and a tubular housing I is introduced through the opening formed in the edge of the door. This tubular housing passes through the cylindrical housing and secures it against removal. The latch bolt is introduced in the tubular housing I through the outer end and a spring 32 is placed between the inner end of the tubular housing and the inner end of the latch bolt. An actuating pin 33 extends completely through the latch bolt and the respective housings and this pin is secured against removal by means of a latch pin 34 projecting into a central groove 35 formed in pin 33; the latch pin 34 being held in engagement with the groove 35 by spring 32, the spring also functioning to normally maintain the latch bolt in projected position. Face plates 36 are secured in opposite ends of the cylindrical housing J and horizontal slots 37 are formed therein for the guidance of the pin 33. If it is desired to remove the locking mechanism from the door, it is accomplished by introducing a sharpened pin or screw driver through the slot 37 at the point indicated at 38, see Fig. 15. The introduction of such an implement will pull the pin 34 out of the groove 35 and thereby permit removal of the cross pin 33, thus permitting removal of the latch bolt and the tubular housing I and the final removal of the cylindrical housing J.

In the lock structure shown in Figs. 1 to 5, inclusive, it will be noted that the latch bolt E secures the housing D against removal and that the shank on knob 12 projected through the face plate of the housing limits movement of the latch bolt and secures it against removal.

The same is true of the structures shown in Figs. 7 and 10; that is, the tubular housing 16 extending through the inner end of the housing F secures the housing F against removal. The spring 17 interlocks the housing and secures the housing 16 against removal, and as the bolt 18 has a rack bar formed at its inner end pinion 20 will secure the bolt against removal.

All of the structures are exceedingly simple and substantial in construction. They are all quickly and readily installed and removed when necessary and as all of the mechanism employed is housed within the door, or on the inner face

thereof, unsightly features are entirely eliminated, the only projecting member employed being the latch bolt actuating member and the key mechanism.

In Fig. 16 a locker type of door is shown in section. The bolt indicated at 42 consists of a flat bar in which is formed a vertical slot 43. The housing containing the latch bolt actuating mechanism is indicated at 44. A spring 45 is carried by this housing and frictionally engages the latch bolt. Any suitable type of key mechanism, such as shown at 46, is mounted in the housing and this actuates an eccentrically positioned pin 47. This pin extends into the vertical slot 43, hence when a key is inserted and rotated the pin 47 will either project or retract the latch bolt. When installing, the lock housing 44 is first inserted, then the bolt 42, and thereafter the key mechanism 46; the key mechanism employed being of the type that requires a special key to interlock with relation to the housing 44 and then employing an ordinary key to actuate the roll-back member 47.

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

1. In a lock of the character described a pair of housings disposed at right angles to each other and one extending through the other, and resilient interlocking connection formed between the housings when one housing is inserted through the other.

2. In a lock of the character described a pair of housings disposed at right angles to each other and one extending through the other, and an interlocking connection formed between the housings when one housing is inserted through the other, said interlocking connection being spring actuated and releasable.

3. A lock adapted for insertion in a door, said door having an opening formed in its edge and in one face thereof, comprising a housing insertable in the opening formed in the face of the door, a latch bolt insertable in the opening formed in the edge of the door and having its outer end supported and guided thereby and the inner end supported and guided by the housing, and a spring member interposed between the latch bolt and the housing to take up play and rattle between the latch bolt, the housing and the door.

4. A lock adapted for insertion in a door, said door having an opening formed in its edge and in one face thereof, comprising a housing insertable in the opening formed in the face of the door, a second housing insertable through the opening formed in the edge of the door and having its outer end supported thereby and the inner end extending through the first-named housing and supported thereby, said second-named housing securing the first-named housing against removal, spring actuated means securing the second-named housing against removal from the first-named housing and taking up play and rattle between the housing and the door, a latch bolt carried by the second-named housing, and latch bolt actuating means carried by the first-named housing.

5. A lock adapted for insertion in a door, said door having an opening formed in its edge and in one face thereof, comprising a housing insertable in the opening formed in the face of the door, a second housing insertable through the opening formed in the edge of the door and having its outer end supported thereby and the inner end extending through the first-named housing and supported thereby, said second-named housing securing the first-named housing against removal, other means securing the second-named housing against removal with relation to the first-named housing, a latch bolt carried by the second-named housing, and latch bolt actuating means carried by the first-named housing, said means also retaining the latch bolt against removal from the second-named housing.

6. A lock adapted for insertion in a door, said door having an opening formed in its edge comprising a housing insertable in the opening formed in the edge of the door, a latch bolt insertable in said housing and slidably mounted therein, means projecting through one face of the door for projecting or retracting the latch bolt, and spring actuated means for securing the housing against removal from the door.

7. A lock adapted for insertion in a door, said door having an opening formed in its edge comprising a housing insertable in the opening formed in the edge of the door, a latch bolt insertable in said housing and slidably mounted therein, means projecting through one face of the door for projecting or retracting the latch bolt, and spring actuated means for securing the housing against removal, said spring means being depressible and releasable by the insertion of a pin through an opening formed in the inner face of the door.

8. A lock of the character described, a latch bolt unit and a latch bolt actuating unit, said units being disposed at right angles to each other and one extending through the other, and a resilient interlocking connection formed between the units when one unit is inserted through the other.

9. A lock of the character described, a latch bolt unit and a latch bolt actuating unit, said units being disposed at right angles to each other and one extending through the other, and a resilient interlocking connection formed between the units when one unit is inserted through the other, said interlock being spring actuated and releasable.

10. A lock adapted for insertion in a door having an opening formed in its edge and in one face, said lock comprising a latch bolt actuating unit insertable through the opening in the face of the door, a latch bolt unit insertable through the opening in the edge of the door, the inner end of said latch bolt unit extending through the latch bolt actuating unit and securing said unit against removal through the opening in the face of the door, and a spring actuated means interposed between the two units and securing the latch bolt unit against removal through the opening in the edge of the door.

11. A lock adapted for insertion in a door having an opening formed in its edge and in one face, said lock comprising a latch bolt actuating unit insertable through the opening in the face of the door, a latch bolt unit insertable through the opening in the edge of the door, the inner end of said latch bolt unit extending through the latch bolt actuating unit and securing said unit against removal through the opening in the face of the door, and a spring actuated means interposed between the two units and securing the latch bolt unit against removal through the opening in the edge of the door, said spring actuated means being releasable by implement means insertable through the latch bolt actuating unit.

WALTER R. SCHLAGE.