Dec. 16, 1930. J. HOLTZMAN 1,785,381

LOCK

Original Filed May 12, 1925

Fig. 1.

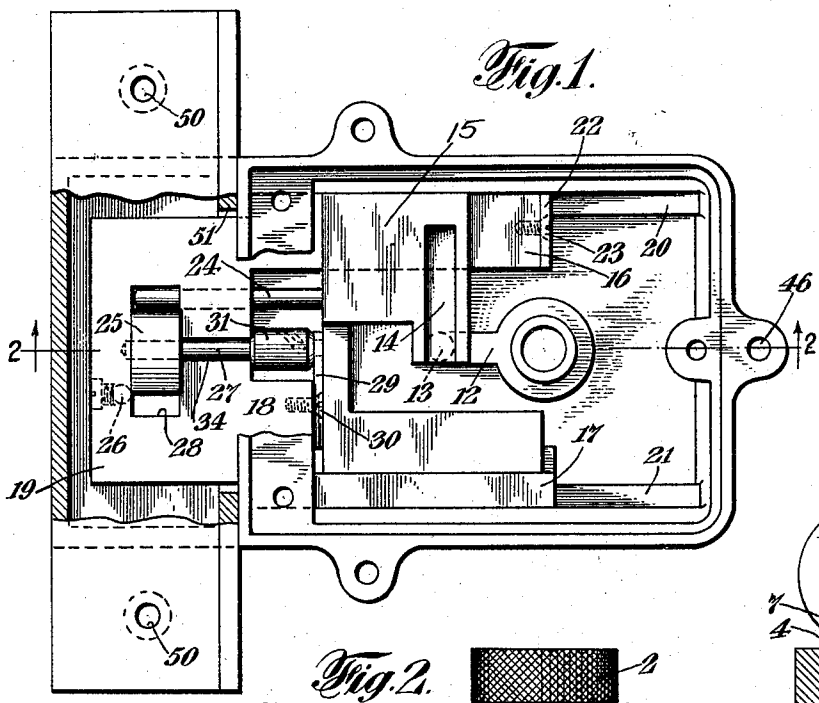


Fig. 4.

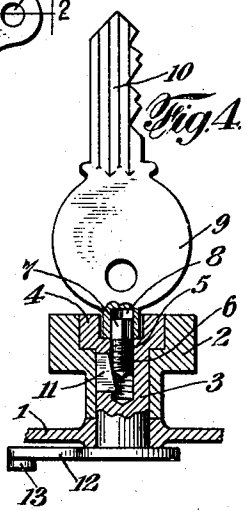


Fig. 2.

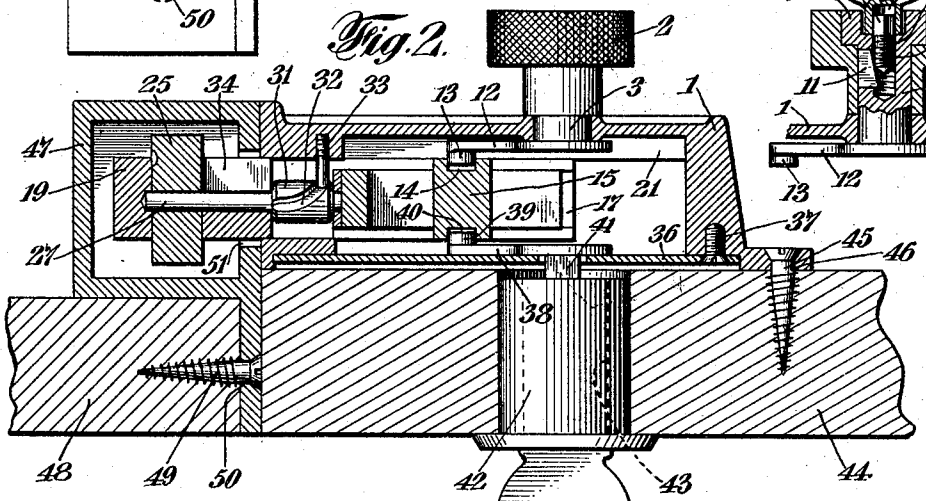
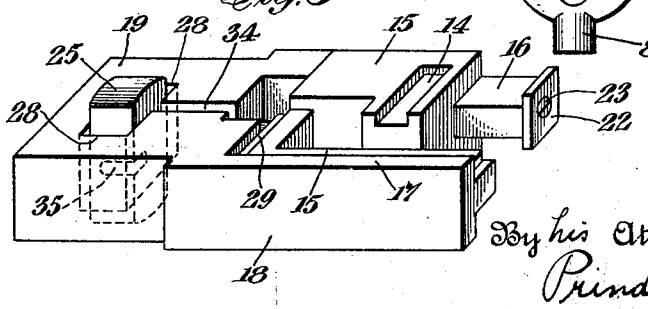


Fig. 3



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UNITED STATES PATENT OFFICE

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LOCK

Original application filed May 12, 1925, Serial No. 14,980. Divided and this application filed June 13, 1925. Serial No. 36,801.

This invention relates to lock construction. One of the objects thereof is to provide a lock which is strong and rugged and highly efficient, affording great security.

A further object of this invention is to provide a lock which affords dependable protection against attempts to force the lock by means of tools or otherwise. Another object is to provide a lock of the above nature having a bolt provided with a part which is thrown out of alinement with the keeper opening when the bolt is in locking position. Another object is to provide a lock of the above nature having means for dependably holding in operative position the part which is thrown out of alinement. Another object is to provide a lock of the above nature having a handle by means of which the lock may be operated from one side thereof and which may be adjusted so that the handle is rendered inoperative if desired. Another object is to provide a lock of the above nature which is simple and inexpensive to manufacture. Other objects will be in part obvious or in part pointed out hereinafter.

This application is a division of my application, Serial No. 14,980, filed May 12, 1925.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing in which is shown one of the various possible embodiments of the several features of this invention,

Figure 1 is an elevation showing the lock with a portion of the casing removed to disclose the inner parts thereof, and showing the keeper partially broken away;

Figure 2 is a section taken substantially as indicated by the line 2—2 of Figure 1, but showing the lock and keeper mounted in position upon a door and door frame respectively;

Figure 3 is a perspective view of a portion of the mechanism removed from the lock casing, and

Figure 4 is a sectional view of the knob or handle construction, this view showing also a key for operating the lock.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Referring now to the drawing in detail, there is shown a lock casing 1 which, in Figure 2, is shown mounted in position upon a door 44, being secured upon the door as by means of screws 45 passing through openings 46 of the lock casing. The side of the casing 1 which rests against the door, and which hence may be called the rear side, is closed by a removable cover plate 36 held in place as by means of screws 37. Mounted to slide into and out of the casing 1, through the left end wall thereof, as viewed in the drawing, is a bolt member 19 which is shown herein as substantially rectangular in cross-section. Mounted upon the door frame 48, as shown in Figure 2, is a keeper 47 provided with an opening 51 to receive the bolt 19. The keeper is secured in position upon the door frame by means of screws 49 passing through openings 50 in the flanges of the keeper.

The bolt member 19 is shown in detail in Figure 3 and, as clearly seen in Figure 3, it is provided with a pair of spaced rearwardly projecting parts 16 and 17 which, as shown in Figure 1, extend along the side wall of the casing 1. Supported by these two portions 16 and 17 of the bolt member is a sliding member 15 which embraces the part 16, as shown in Figure 3, and has an arm resting against an undercut portion of the part 17. This member 15 is thus supported upon the bolt member 19 for sliding movement relative thereto in a direction lengthwise of the movement of the bolt. The rearward sliding of the member 15 upon the member 19 is limited by means of a plate 22 which is secured to the end of the arm 16 by means of a screw 23. In assembling the mechanism, the member 15 is mounted in position, as shown in Figure 3, and the plate 22 is thereupon secured in position. The arm 17 of the bolt member slides along a track 21 (Figure 1) formed on the inner side of the casing, and

the edge surface of the sliding member 15 rides along a corresponding track 20.

The sliding bolt member 19 has mounted therein a rotatable bolt member comprising a shank portion 27 having a head 25. The part 27 extends lengthwise of the bolt member 19 and is rotatably supported in a slot 34; at its inner end the member 27 is supported by a suitable plate 29 secured to the bolt member 19 by means of a screw 30, as shown in Figure 1; the forward end of the member 27 extends through a transverse opening 28 in the bolt member and is supported at its outer end in the outer portion of the bolt member 19, as clearly shown in Figure 2. The head or transversely projecting part 25 of the rotatable bolt member is positioned within the opening 28 which, as shown in Figure 1, is substantially rectangular in shape. The part 25 of the rotatable bolt member is also preferably substantially rectangular in shape. In the drawings the bolt member 19 and the rotatable bolt member 27—25 are shown in final locking position. The rotatable projection or head 25 projects outwardly beyond the side surfaces of the bolt member 19, as shown in Figure 2, and the bolt members cannot be retracted or withdrawn through the opening 51 of the keeper 47 until the part 25 is turned through substantially 90° to bring it into line with the bolt member 19.

The inner end portion of the rotatable member 27 has an enlarged part 31 in which is formed a spiral cam groove 32. Fixed to a wall of the casing 1 is a pin 33 which cooperates with the cam groove 32 to rotate the bolt member 27, and with it the head or projection 25, as the bolt member 19 is moved.

Secured to the sliding member 15, as shown in Figure 1, is a forwardly projecting rod or bar 24 which, in the position of the parts shown in the drawing, passes through a passage provided therefor in the bolt member 19 and enters into the opening 28 closely adjacent to a surface of the rotatable bolt part 25. Thus, in the locking position of the parts shown in the drawing, the member 25 is dependably locked against rotating movement and cannot be turned until the member 24 is withdrawn from the opening 28 by movement of the slide 15 rearwardly relatively to the bolt member 19.

From one side of the lock, ordinarily the inner side of the door upon which the lock is mounted, the lock is operated by means of a suitable handle 2 which is journaled in a wall of the lock casing 1 and has connected thereto upon the inner side of the casing a crank arm 12. As shown in Figure 2, the crank arm 12 has at its outer end a crank pin 13 which engages with a transverse groove 14 formed in the sliding member 15. From the other side of the door the lock is operated by means of a key. As shown in Figure 2, there is fitted into an opening in the door 44 a barrel 42 containing a rotatable cylinder 43. The barrel 42 contains the usual tumblers for controlling the rotation of the cylinder 43 by means of a proper key 9. When the proper key is inserted into the barrel and is turned, the cylinder 43 is turned and rotates a projecting bar 41. This bar 41 engages with a crank arm 38 which is rotatably mounted in the rear cover plate 36 of the lock casing. The crank arm 38 has a crank pin 39 which engages with a transverse groove 40 formed in the surface of the sliding member 15 on the side thereof opposite to that having the groove 14.

Considering now the action of the lock, starting from the locking position of the parts shown in Figures 1 and 2, when the crank arm 12 is turned in a clockwise direction, as viewed in the drawing, or when the crank arm 38 is turned in a corresponding direction by means of the key 9, the sliding member 15 first slides to the right relative to the bolt member 19 until it comes against the plate member 22. This movement draws the detent arm or bar 24 out of the path of rotation of the rotatable bolt member 25. Thereupon, upon continued rotation of the crank arm, the member 15 and the bolt member move together to the right and in a direction to retract the bolt 19. As soon as the retracting movement of the bolt member 19 starts, the action of the pin 33 in the cam groove 32 rotates the rotatable bolt member 27 and its part 25, bringing the part 25 into line with the bolt member 19; the bolt member 19 and the rotatable bolt member therewith then move through the opening 51 of the keeper and are retracted into final position in the lock casing 1. As the bolt member 19 moves into the lock casing, the pin 33 registers with the slot 34 in the bolt and, as the parts reach final retracted position, the pin 33 enters into engagement with a notch 35 (Figure 3) formed in the rotatable bolt member 25 for receiving the pin.

When the lock mechanism is moved from its inoperative or retracted position into its extended or operative position, the action of the crank arm first moves the bolt member 19 and the sliding member 15 together toward the left, the end of the detent arm 24 bearing against the rotatable bolt part 25 and thereby preventing relative movement between the bolt member 19 and the number 15. As the bolt member is advanced toward operative position, the pin 33 enters into engagement with the cam groove 32, rotating the rotatable bolt member into the position shown in the drawing, the bolt member 19 being substantially fully extended when the rotation of the rotatable bolt member is completed. When the rotatable bolt member is thus rotated into final locking position, it moves out of the path of the detent bar 24

and the sliding member 15 thereupon moves toward the left relative to the bolt member 19 and into the position shown in the drawing, the member 24 entering into the opening 28 and into the path of rotation of the part 25 to lock the rotatable bolt member against further rotation in either direction.

From the foregoing, it will be seen that this lock provides great security. The sliding bolt member 19 cannot be withdrawn from the keeper without first rotating the rotatable bolt member carried thereby. Rotation of the rotatable bolt member is dependably guarded against by means of the detent arm 24 positioned in its path of rotative movement. It will be seen, furthermore, that the crank arm 12 and the crank arm 38 move to dead center position with respect to the direction of movement of the bolt member 19, when the bolts are in final locking position, and the crank arm thus effectively opposes any attempt to force the bolt member 19 out of the keeper. As shown in Figure 1, there is provided in the bolt member 19 a spring pressed ball 26, and the rotatable bolt part 25 is provided with a recess, as shown in Figure 2, for cooperating with the spring pressed ball. When the rotatable bolt part 25 is rotated out of the position shown in the drawing and into line with the sides of the bolt member 19, the recess thereof comes into engagement with the spring pressed ball 26 to yieldingly hold the rotatable bolt member in its inoperative or unextended position. This spring pressed detent insures that the rotatable bolt member will not turn in the bolt member 19, during the movement of the bolt member 19, except when properly actuated by the spiral cam means, and it holds the rotatable bolt member in position with respect to the sliding bolt member 19 for proper engagement between the cam groove 31 and the pin 33 as the parts move toward locking position. As the bolt member 19 moves toward locking position, the spring pressed detent 26 holds the rotatable bolt member against rotation until the cam groove 32 engages with the pin 33.

Considering now more particularly the construction of the handle or knob 2, reference is had to Figure 4. The crank arm 12 is secured to the inner end of a spindle or short shaft 3 which is journaled in the lock casing 1 and has at its outer end an enlarged portion or head 4. The knob 2 is rotatably mounted upon the spindle 3 and is held against removal by means of the head 4, the shank portion of the knob also fitting between the casing 1 and the head 4 to hold the spindle in place in conjunction with the crank 12 secured to the spindle on the inner side of the casing. The outer end of the spindle 3 is centrally recessed and, entering axially into the spindle from the base of this recess, is a threaded recess 6. A slot is formed in the wall of the spindle 3, communicating with the recess 6, and in this slot is positioned a small wedge-shaped piece of metal 11. Threaded into the recess 6 is a screw 5 having a squared head 7 which rests in the recess in the outer end of the spindle. The screw 5 bears against the wedge-shaped piece 11 and, jamming this metal piece outwardly against the inner surface of the knob 2, locks the knob and the spindle together.

The key 9 is provided with a suitable projection 8 which fits into the recess in the outer end of the spindle 3 and which has a squared recess to fit over the squared head 7 of the screw 5. The key thus serves as a wrench for turning the screw. By threading the screw inwardly to tightly engage the piece 11, the knob 2 is locked upon the spindle 3 so that the lock mechanism may be operated by means of the knob. By loosening the screw 5 the connection between the knob 2 and the spindle 3 is loosened and, when the knob 2 is turned, it rotates loosely upon the spindle 3 and relative thereto. Thus, by means of the key 9 the operating knob 2 may be rendered inoperative, if desired, so that the lock cannot be operated thereby.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A lock having a bolt, a rotary bolt member carried by the bolt, adapted to be thrown out of the path of movement of the bolt when the bolt is in locking position, and a detent adapted to be moved into the path of movement of the rotary bolt member to prevent the movement of said rotary bolt member.

2. A lock having a bolt, a rotary bolt member carried by the bolt, adapted to be thrown out of the path of movement of the bolt when the bolt is in locking position, and a detent pin adapted to be moved into the path of movement of the rotary bolt member to prevent the movement of said rotary bolt member.

3. A lock having a bolt, a rotary bolt member carried by the bolt, adapted to be thrown out of the path of movement of the bolt when the bolt is in locking position, a detent pin adapted to be moved into the path of movement of the rotary bolt member to prevent the movement of said rotary bolt member and a sliding plate for operating first the bolt and then the detent in the locking operation.

4. A lock having a rotary bolt, a bolt member carried by the bolt, adapted to be rotated and thereby thrown out of the path of movement of the bolt when the bolt is in locking position, and a spring pressed detent carried

by said bolt so as to be in holding engagement with the rotary bolt member to hold the latter against rotation during the movement of the bolt until the bolt has entered its locking position.

5. A lock having a bolt, a bolt member carried by the bolt, adapted to be thrown out of the path of movement of the bolt when the bolt is in locking position, and a spring pressed ball detent carried by said bolt so as to be in holding engagement with the bolt member during the movement of the bolt until the bolt has entered its locking position.

6. A key operated lock comprising a casing, a sliding bolt, a keeper in which said bolt may enter, and a rotary means positively rotated by said bolt in the first complete rotation of said key to lock said bolt within the keeper, said means being rotatable about an axis extending in the direction of sliding of said bolt.

7. A lock having a bolt, a spindle for actuating the bolt, a knob on said spindle and means for locking the knob on the spindle comprising a wedge-shaped engaging member and a screw bearing on the wedging surface of the same to lock the knob on the spindle, said screw extending axially into the spindle and having its head recessed in the knob.

8. A lock having a bolt, a spindle for actuating the bolt, a knob on said spindle adapted to turn relative thereto and means for locking the knob on the spindle comprising a wedge-shaped engaging member adapted to permit or prevent rotation of the knob relative to the spindle according to the position of the wedge-shaped engaging member, and a tapered screw for moving the same.

9. In a lock having a bolt, a barrel lock having a key to actuate said bolt, a spindle on the opposite side of the lock to operate said bolt, a knob on said spindle and means for operatively engaging said spindle within said knob, said means being operable by a part of said key and comprising a wedge-shaped engaging member adapted to permit or prevent rotation of the knob relative to the spindle according to the position of the wedge-shaped engaging member, and a screw bearing on the wedging surface of the same to lock the knob on the spindle.

10. In a lock having a sliding bolt, a barrel lock having a key to actuate said bolt, a spindle on the opposite side of the lock to operate said bolt, a knob on said spindle and means for operatively engaging said spindle within said knob, said means being operable by a part of said key, and comprising a wedge-shaped engaging member adapted to permit or prevent rotation of the knob relative to the spindle according to the position of the wedge-shaped engaging member, and a screw bearing on the wedging surface of the same to lock the knob on the spindle.

11. In lock construction, in combination, a sliding bolt, a rotatable bolt member carried by said sliding bolt, means for moving said sliding bolt, and means actuated in response to actuation of said last means adapted to rotate said rotatable bolt member in the sliding bolt member and including a spiral cam means.

12. In lock construction, in combination, a sliding bolt, a rotatable member carried by said bolt comprising a member extending through said bolt in a direction substantially lengthwise of the direction of movement of said bolt and rotatable therein about its longitudinal axis and having an enlarged head at its outer end portion, and means including a spiral slot and a pin engaging therewith cooperating with an inner end portion of said rotatable member and adapted to rotate said member when said bolt is slid.

13. In lock construction, in combination, a sliding bolt, a rotatable member carried by said bolt comprising a member extending through said bolt in a direction substantially lengthwise of the direction of movement of said bolt and rotatable therein about its longitudinal axis and having an enlarged head at its outer end portion, means for sliding said bolt to move the same into and out of locking position, and means adapted during the latter portion of the movement of said bolt toward locking position to rotate said rotatable member carried thereby.

14. In lock construction, in combination, a sliding bolt, a swinging bolt member carried by said sliding bolt, means mounting said bolt member relative to said sliding bolt to permit pivoting thereof about an axis extending in the direction of sliding of said bolt, means for moving said sliding bolt into and out of locking position, means for holding said swinging bolt member against swinging during a first portion of the movement of said sliding bolt toward locking position, and means adapted during a later portion of the movement of said bolt toward locking position to swing said swinging bolt member carried thereby.

15. In lock construction, in combination, a lock casing, a bolt slidable into and out of locking position through a wall of said casing, a keeper having an opening for receiving said bolt, a rotary bolt member rotatably mounted in said sliding bolt for rotation about an axis extending in the direction of sliding of said bolt, said bolt member having a projecting part adapted to swing out of line with said keeper opening when said rotary bolt member is rotated, means for moving said sliding bolt member into said keeper, means for holding said rotatable bolt member against rotation during a first portion of the movement of said bolt toward locking position, and means adapted to rotate said rotatable bolt member in said sliding bolt after said sliding bolt has been moved to

bring said projecting part within the keeper and during the latter portion of the movement of said bolt into locking position.

16. In lock construction, in combination, a lock casing, a bolt slidable into and out of locking position through a wall of said casing, a keeper having an opening for receiving said bolt, a rotary bolt member mounted in said sliding bolt having a projecting part adapted to swing out of line with said keeper opening when said rotary bolt member is rotated, means for moving said sliding bolt member into said keeper, means for holding said rotatable bolt member against rotation during a first portion of the movement of said bolt toward locking position, and means adapted to rotate said rotatable bolt member in said sliding bolt after said sliding bolt has been moved to bring said projecting part within the keeper and during the latter portion of the movement of said bolt into locking position, said means for rotating said bolt member comprising a spiral cam means cooperating with an inner end portion of said rotary bolt member.

17. In lock construction, in combination, a lock casing, a bolt slidable into and out of locking position through a wall of said casing, a keeper having an opening for receiving said bolt, a rotary bolt member mounted in said sliding bolt having a projecting part adapted to swing out of line with said keeper opening when said rotary bolt member is rotated, means for moving said sliding bolt member into said keeper, means for holding said rotatable bolt member against rotation during a first portion of the movement of said bolt toward locking position, means adapted to rotate said rotatable bolt member in said sliding bolt after said sliding bolt has been moved to bring said projecting part within the keeper and during the latter portion of the movement of said bolt into locking position, and means coming into position subsequent to the final movement of said sliding bolt into locking position adapted to oppose reverse rotation of said rotatable member.

18. In lock construction, in combination, a lock casing, a bolt slidable into and out of locking position through a wall of said casing, a keeper having an opening for receiving said bolt, a rotary bolt member mounted in said sliding bolt having a projecting part adapted to swing out of line with said keeper opening when said rotary bolt member is rotated, means for moving said sliding bolt member into said keeper, means for holding said rotatable bolt member against rotation during a first portion of the movement of said bolt toward locking position, and means adapted to rotate said rotatable bolt member in said sliding bolt after said sliding bolt has been moved to bring said projecting part within the keeper and during the latter portion of the movement of said bolt into locking position, said means for rotating said bolt member comprising a spiral cam means actuated by the movement of said sliding bolt into its final locking position.

19. In lock construction, in combination, a slidable and rotatable bolt member, means for projecting and rotating said bolt member into final locking position, and means adapted to move into the path of rotating movement of a portion of said bolt member to lock said bolt member against reverse rotation after it has been rotated into final locking position.

20. In lock construction, in combination, a slidable and rotatable bolt member having a lateral projection, means for projecting and rotating said bolt member into final locking position, and a slidable member adapted to move into the path of rotating movement of said lateral projection to lock said bolt member against rotating out of final locking position.

21. In lock construction, in combination, a slidable and rotatable bolt member, and a sliding plate member for moving said bolt member having a projecting part, said plate moving with said bolt member to move said bolt member into locking position and thereafter moving relative to said bolt member, said projecting part of said plate member moving into engagement with said bolt member during said relative movement to lock said bolt member against rotating movement out of final locking position.

22. In lock construction, in combination, a slidable and rotatable bolt member having a laterally projecting part thereon, a sliding plate member for moving said bolt member, said sliding plate member having a part adapted in one position to abut against said projecting part of said bolt member and to cause movement thereof with said plate member, and means for rotating said bolt member to move the projecting part thereon out of the way of said part carried by said plate, continued movement of said plate relative to said bolt being thereby permitted and said part moving into the path of rotating movement of said lateral projection to lock said bolt member against rotating.

23. In lock construction, in combination, a slidable and rotatable bolt member having a lateral projection, said lateral projection having a rotary path of movement upon rotation of said bolt member, a device movable lengthwise of said bolt member and projectable into the path of rotary movement of said lateral projection, means for moving said device in the direction of sliding of said bolt, and means for controlling the projection of said device into the path of movement of said projecting part on said bolt member.

24. In lock construction, in combination, a slidable and rotatable bolt member car-

rying a laterally projecting device having a rotary path of movement about the axis of said bolt member, a device mounted for movement substantially at right angles to the plane of rotary movement of said projecting device, said device being arranged so that one is projectable into the path of the other, and means for controlling the projection successively of said devices into the path of movement of each other.

In testimony that I claim the foregoing, I have hereunto set my hand this 28th day of May, 1925.

JOHN HOLTZMAN.