Oct. 6, 1925.

1,555,830

W. J. CARROLL

LOCK

Filed Nov. 23, 1921

3 Sheets-Sheet 1

Fig. 1.

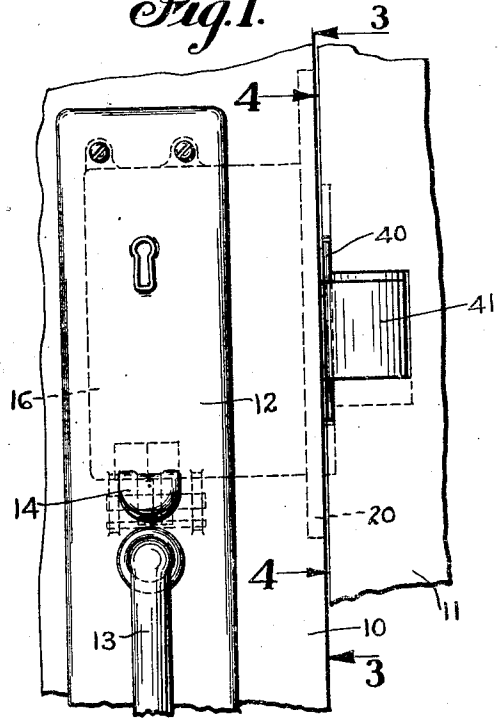


Fig. 2.

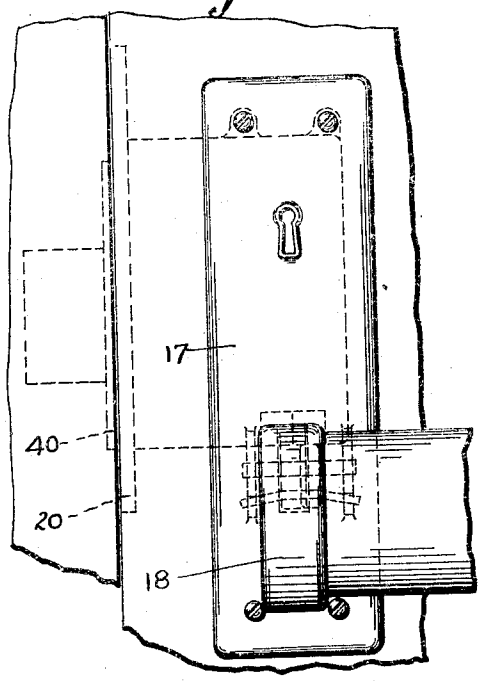


Fig. 3.

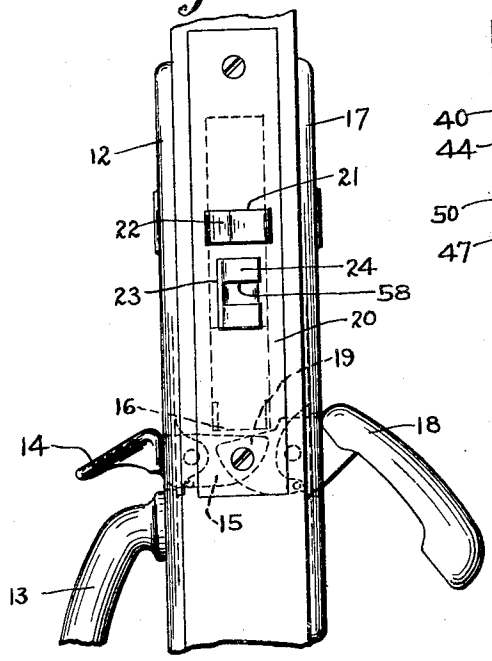


Fig. 4.

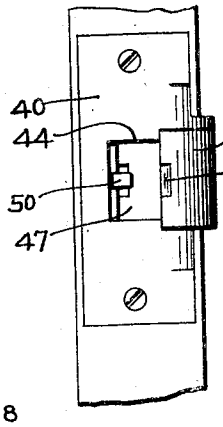
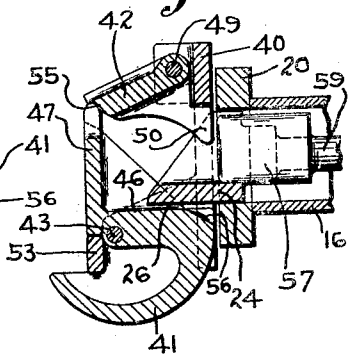


Fig. 14.



Inventor

William J. Carroll

By Henry E. Cockwell

Attorney

Oct. 6, 1925. 1,555,830

W. J. CARROLL

LOCK

Filed Nov. 23, 1921 3 Sheets-Sheet 2

Fig. 6.

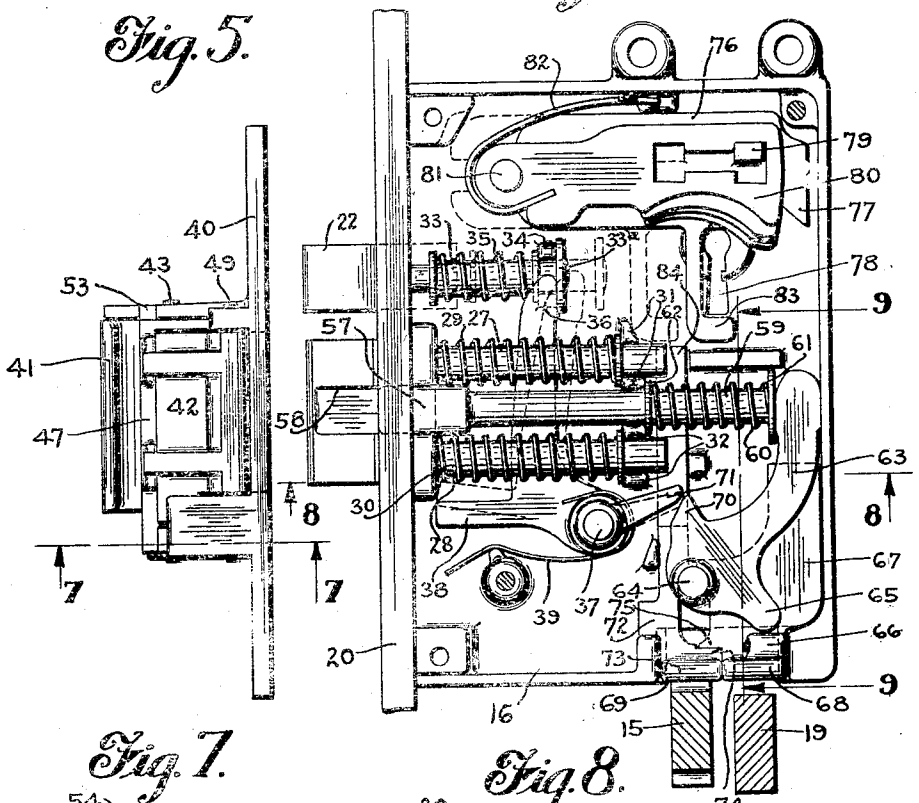


Fig. 5.

Fig. 7.

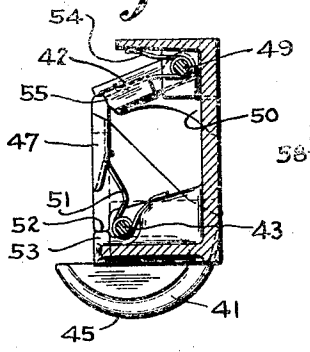
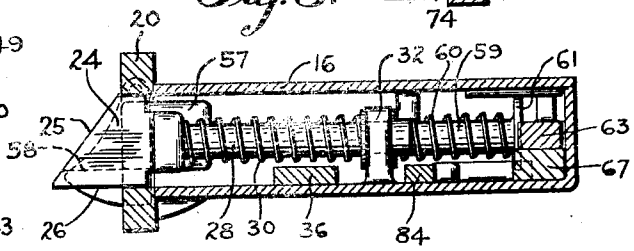


Fig. 8.



Inventor

William J. Carroll

By Henry E. Rockwell

Attorney

Oct. 6, 1925.

1,555,830

W. J. CARROLL

LOCK

Filed Nov. 23, 1921

3 Sheets-Sheet 3

Fig. 9.

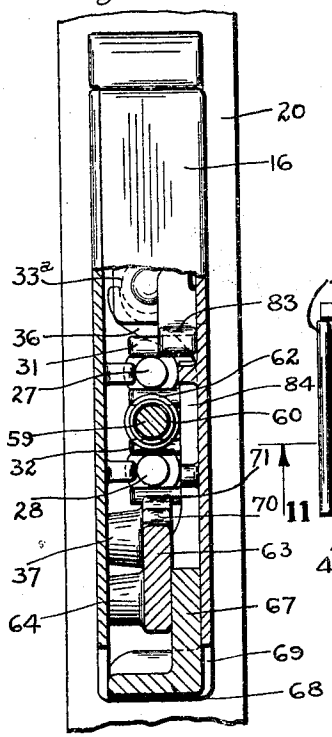


Fig. 10.

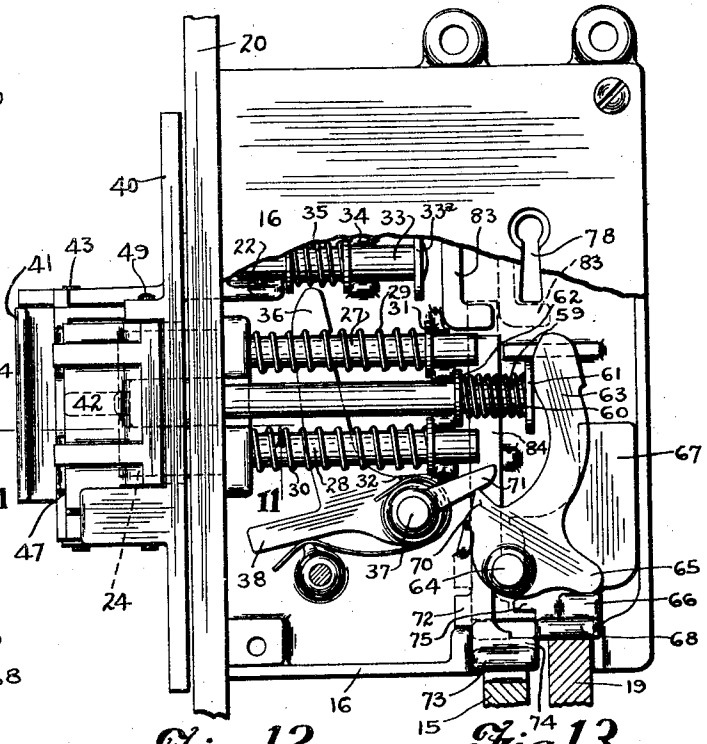


Fig. 11.

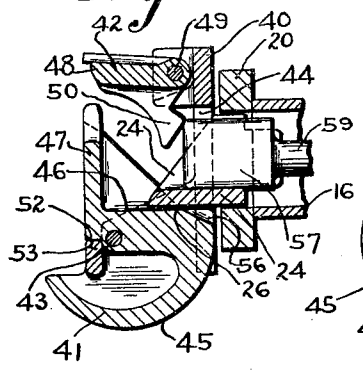


Fig. 12.

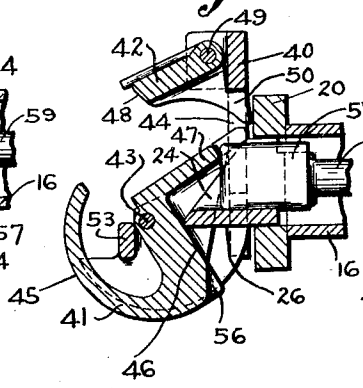
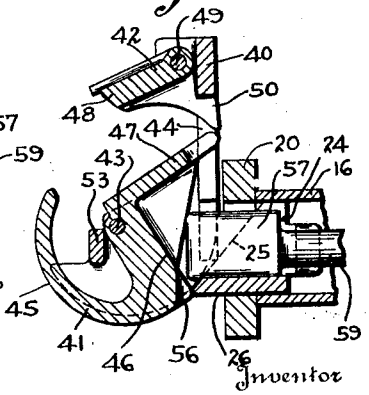


Fig. 13.



Inventor

William J. Carroll

By Henry E. Rockwell

Attorney

Patented Oct. 6, 1925. 1,555,830

UNITED STATES PATENT OFFICE.

WILLIAM J. CARROLL, OF WEST HAVEN, CONNECTICUT, ASSIGNOR TO SARGENT & COMPANY, OF NEW HAVEN, CONNECTICUT.

LOCK.

Application filed November 23, 1921. Serial No. 517,419.

To all whom it may concern:

Be it known that I, WILLIAM J. CARROLL, a citizen of the United States, residing in West Haven, county of New Haven, State of Connecticut, have invented certain new and useful Improvements in Locks, of which the following is a full, clear, and exact description.

This invention relates to locks and, more particularly, to a lock adapted to be used in connection with the doors of public buildings which, in the case of a fire or like emergency, should be arranged to open easily and without failure, even when considerable pressure is exerted upon them from the inside. Locks used on doors of this type are sometimes called panic bar locks as they are designed for use with a so-called panic bar which normally lies across the inner face of the door in such a manner that persons crowding against the same will automatically release the latch and allow the door to swing open.

Ordinarily, locks of this character have been so constructed that when the panic bar is depressed or pushed towards the door, the bolt is slidably retracted within the lock case and the door is then free to swing open. However, experience has shown that when a number of persons under the stress of exciting circumstances crowd against the door and exert considerable outward pressure upon the same, the friction between the latch or lock bolt and the strike plate becomes so great as to prevent the retraction of the bolt within the lock case and hence the opening of the door is impossible.

The present invention has for its object, therefore, the overcoming of the disadvantages above referred to and the provision of a lock or latch so constructed that the bolt and strike plate will be permitted to disengage without having to overcome a frictional force due to pressure against the door in an opening direction.

Another object of my invention is to provide a lock wherein the bolt will be caused to be retracted within the lock case by contact with a part of the strike plate upon a movement of the door in an opening direction.

A still further object of my invention is to provide the strike plate of a door lock with a movable keeper member which is permitted to swing away from the latch bolt when a force is applied to the door in a direction to open the same.

Still another object of my invention is to provide the strike plate of a door lock with a movable keeper member having a side face normally positioned to engage the bolt to hold the door closed, but which is movable to a position to cam the bolt to retracted position within the lock case upon an opening movement of the door.

My invention also contemplates the provision of a lock wherein an opening push imparted to the door first moves a keeper member upon the strike plate to a position in which it partially disengages the bolt and thereafter causes the bolt to be retracted to completely disengage it from the strike plate and permit the door to open.

More specifically, my invention has for its object the provision of a lock with a strike plate having a movable keeper member thereon normally held in position to engage the latch bolt to hold the door closed, but which is released by a movable plunger within the lock case to permit the keeper member to swing to a position in which the door will be allowed to open by a force applied to the same in an opening direction.

While my improvements may be particularly adapted, generally speaking, for a lock of the panic bar type, it will be understood that certain features thereof are broadly new and are applicable to and useful in locks or latches of many types.

To these and other ends, the invention consists in the novel features and combination of parts to be hereinafter described and claimed.

In the accompanying drawings,

Fig. 1 is a fragmentary elevational view of the outside of a door and casing, having my improvements applied thereto;

Fig. 2 is an elevational view of the inside of the door;

Fig. 3 is an edge view of the door when in open position;

Fig. 4 is a face view of the strike plate mounted in the door frame;

Fig. 5 is a side elevational view of the

strike plate when detached from the door frame;

Fig. 6 is an elevational view of the improved lock and lock case, the cover being removed to show the parts within;

Fig. 7 is a sectional view on line 7—7 of Fig. 5;

Fig. 8 is a sectional view on line 8—8 of Fig. 6;

Fig. 9 is a sectional view on line 9—9 of Fig. 6;

Fig. 10 is an elevational view showing the parts of both Figs. 5 and 6 in their cooperative relation;

Fig. 11 is a sectional view on line 11—11 of Fig. 10;

Figs. 12, 13 and 14 are sectional views similar to Fig. 11, but showing the parts in different positions of operation thereof.

To illustrate the present embodiment of my invention, I have shown in a fragmentary way a door 10, a casing 11, the door having applied to the exterior side thereof an escutcheon plate 12 of any approved form, provided with a handle 13 and a latch lever 14, the lever having a finger 15 projecting below a portion of the lock case 16 of a mortise lock mounted within the door. Upon the inside of the door is mounted a similar escutcheon plate 17, upon which is pivoted a panic bar 18 or opening lever of any preferred type, having a finger 19 which likewise projects under a portion of the lock case 16. The lock case is provided with the usual face plate 20, having in this case a pair of openings facing the door frame when the door is in closed position, one of which 21, accommodates a dog controlling plunger 22, while the other opening 23 accommodates a latch or lock bolt 24 of an improved type.

While I have shown my improvements as applied to a lock of the mortise type, it will be apparent that my improvements may be equally applicable to other locks, such as the ordinary rim lock. The latch bolt 24 may be of the usual type having a beveled face 25 and a straight side 26 normally engaged with the strike plate or keeper to hold the door closed. I have shown this bolt as provided with a pair of stems 27 and 28, surrounded by spiral springs 29 and 30 and guided between pairs of lugs 31 and 32 formed upon the lock case. The springs normally urge the bolt to protracted position without the case.

The dog controlling plunger 22 is provided with a similar stem 33 passing through the guide lugs 34 formed on the lock case and being normally urged to protracted position by a spring 35 in the usual way. The stem 33 is provided at its rear end with a crosshead 33a normally engaging one end 36 of a dogging lever pivoted in the case at 37 and having a second arm 38 urged into position to dog the bolt 24 by a spring 39. It will be apparent that when the door is closed and the dog controlling plunger is moved to the dotted line position shown in Fig. 6, the dogging lever will be permitted to be moved by its spring 39 into position to dog the latch bolt in protracted position as shown in dotted lines in this figure.

My improved lock is adapted to cooperate with a strike 40 of unique construction, this strike plate being provided with a movable keeper member 41 and a dogging lever 42 to dog the keeper in position to hold the door closed. In the usual position in which the parts are mounted upon a door and casing, the keeper is pivoted to swing about a vertical axis 43 within an opening 44 in the strike plate. This keeper member is of peculiar form and shape, having an outer face 45 substantially quadrantal in cross-section, and a bolt engaging face 46 which, in the normal position of the keeper, will be parallel to the straight face 26 of the bolt 24 and disposed substantially radially relatively to the quadrantal surface 45. This movble keeper member is provided with a tail portion 47 which is adapted to be engaged by an arm 48 of the lever 42 pivoted to the strike plate at 49 and having a trip 50 to be again referred to.

The movable keeper member is provided with a spring 51 normally urging this member in an anti-clockwise direction, as viewed in Fig. 7, about the pivot 43, to the position shown in this figure and in Fig. 11, where the edge 52 of this member makes contact with a fixed shoulder 53 of the strike plate. The keeper dogging lever 42 is provided with a spring 54 normally urging this member in an anti-clockwise direction as viewed in Fig. 7, to a position in which a shoulder 55 upon this lever engages the tail 47 of the keeper member to retain the latter in the position shown in this figure. A slot 56 is cut across the outer edge of the keeper at an intermediate portion thereof, as shown more particularly in Fig. 4, for a purpose to be described hereinafter. It will be apparent that in the normally closed position of the door, as shown, for instance, in Fig. 14, the straight side 26 of the bolt 24 will be engaged by the face 46 of the keeper and the door held in closed position as the keeper is retained immovably against the shoulder 53 of the strike plate by means of the keeper dogging lever 42. It will also be obvious that when the door is moved from open to closed position, the bolt 24 will first be cammed to retracted position by the engagement of its beveled face 25 with the cylindrical face 45 of the movable keeper member.

The mechanism for permitting the door to be opened will now be described. In order to trip the dogging lever 42, a plunger 57 is movably mounted within the lock case

and arranged to be protracted therefrom through an opening or groove 58 in the latch bolt. This plunger is provided with a stem 59 operating between the inner members of the pair of guides 31 and 32 and normally urged to retracted position, shown in Fig. 6, by means of a spiral spring 60 reacting against a crosshead 61 upon the rear end of the stem and a washer 62 loosely mounted upon the stem adjacent the guide lugs. To move this plunger to protracted position, I have shown a swinging lever 63 pivotally mounted in the case at 64 and having an arm 65 engaged by a laterally extending projection 66 upon an operating slide 67 mounted in the case and having a web portion 68 thereof projecting through an opening 69 in the lower part of the case, to be engaged by the finger 19 upon the panic bar 18. The lever 63 is also provided with an arm 70 adapted to engage an arm 71 upon the latch dogging lever to move this lever to inoperative position when the lever 63 is moved in a direction to permit the opening of the door.

In order to permit the opening of the door from the exterior of the building, I have provided a second operating slide 72 having a web portion 73 extending within the opening 69 in order to be engaged by the finger 15 upon the latch lever 14. The slide 72 is provided with a shoulder portion 74 adapted to engage a projection 75 upon the slide 67. It will be obvious that when the latch lever 14 is depressed, the finger 15 will be raised, thus raising the slide 72 which, by means of the shoulder 74 and projection 75, will also raise the slide 67, causing the swinging lever 63 to protract the plunger 57.

In order to lock the door against opening by an unauthorized person from the exterior, I have mounted in the upper portion of the case a sliding lock bar 76 having talons 77 adapted to be engaged by a key inserted through the opening 78, and provided with a lug 79 adapted to engage in the usual manner with a plurality of tumblers 80 pivoted in the case at 81 and controlled by the springs 82. The sliding lock bar 76 carries a depending finger 83, which is adapted to be moved, into a position above an upwardly extending stem 84 provided upon the slide 72, as shown in dotted lines in Fig. 6, and in full lines in Fig. 10. It will be apparent that when the depending finger 83 is moved to the left, it will prevent the slide 72 being raised to protract the plunger 57, and hence will prevent the opening of the door from the exterior until the sliding lock bar has been moved rearwardly, or to the right, as shown in Fig. 10, by the proper key. It will not, however, prevent the door being opened from the inside by the panic bar 18 at any time.

The operation of my improved lock is as follows. When the door is closed, the latch bolt 24 is first cammed to retracted position by contact with the face 45 of the keeper member 41 until it reaches a position opposite the opening 44 in the strike plate, when it will spring out into this opening under the impulse of the springs 29 and 30. The dog controlling plunger 22 will likewise be cammed to a retracted position (shown in dotted lines in Fig. 6) by contact with the strike plate and, being mounted opposite a solid portion of the strike plate, will be retained in this retracted position. The door will now be held in closed position, the latch and keeper occupying the position shown in Fig. 14, wherein the keeper is held against movement by the keeper dogging lever 42, the trip 50 of which lies within the slot 58 in the latch bolt. Should a pull be exerted upon the handle 13, it is apparent that the keeper member 41 would act as a fixed strike member and would not permit the opening of the door. When, however, pressure is applied to the panic bar 18 (or, if the door is unlocked, to the latch lever 14), the slide 67 will be raised by the finger 19, and by means of the operating lever 63, the plunger 57 will be protracted through the slot 58 to the position shown in Figs. 10 and 11. This plunger 57 will engage the trip 50, swinging the dogging lever 42 to the position shown in Fig. 11 and releasing the tail 46 of the keeper 41. The keeper will now be free to swing about the pivot 43, and continued pressure upon the panic bar 18, or upon the door in a direction to open the same, will cause this keeper to be swung to the position shown in Fig. 12, by the engagement of the bolt 24 therewith. It will be apparent that in this position the bolt is not entirely released from the keeper, as in the embodiment of my invention shown, the movable keeper is not provided with a sufficient range of movement to entirely free the latch bolt. This, however, is merely a matter of expediency and of the proportions of the parts of the mechanism and, if desired, the keeper may be permitted sufficient movement to entirely clear the latch bolt. However, when the parts have reached the position shown in Fig. 12, a continued pressure upon the door will now cam the latch bolt into retracted position, as shown in Fig. 13, by means of the engagement of the edge of the bolt with the now diagonally disposed face 46 of the keeper, the arm 38 of the dogging lever having been moved to inoperative position by the swinging lever 63, as shown in Fig. 10. The latch bolt, being then retracted within the lock case, will now clear the keeper and permit the door to be opened. If the operator, as is probable, continues to exert pressure upon the panic bar 18, the plunger 57

will be held in a protracted position. The small slot 56 is provided in the edge of the keeper member 41 so that this plunger will be cleared by the keeper when it is swung about to the position shown in Figs. 12 and 13.

It will be apparent that the operation just described is also followed when the door is opened from the outside by means of the latch lever 14. The locking slide 76 may be operated from either the outside or the inside of the door to prevent the operation of the slide 72 by the lever 14.

It will be apparent that I have provided a movable keeper member arranged to swing away from the latch bolt to permit disengagement of these two members and allow the door to open. This keeper member is provided with means which normally holds it in a fixed position, and this means is arranged to be moved to inoperative position by a part mounted upon the door. In other words, I have provided a strike plate to be mounted upon the door case and provided with a movable keeper controlled from means mounted upon the door itself.

While I have shown and described a preferred embodiment of my invention, it is not limited to the exact details shown, but is capable of many modifications and variations within the spirit of the invention and within the scope of the appended claims.

What I claim is:

1. In a door lock, a strike plate, a keeper member movably mounted thereon, said strike plate having a bolt opening formed therein, and means accessible for operation through said opening to limit movement of the keeper.

2. In a door lock, a strike plate, a keeper member movably mounted thereon, said strike plate having a bolt opening formed therein, and keeper controlling means having a part standing in said opening to prevent movement of the keeper.

3. In a door lock, a strike plate, a keeper member movably mounted thereon, said strike plate having a bolt opening formed therein, a pivoted detent operable through said opening engaging said keeper to prevent movement of the same and a member within the lock projectible through said strike plate opening to actuate said detent.

4. A strike plate for use with a door lock, having a keeper member pivoted thereon, intermediate its length, means engaging the tail of said keeper to prevent movement thereof and manually operable means upon the door to release said first named means.

5. In a door lock, a strike plate, a keeper member movably mounted thereon, said strike plate having a bolt opening formed therein, a spring pressed detent mounted in the bolt opening to engage said keeper to prevent movement of the same and accessible therethrough for disengagement with said keeper.

6. In combination, a door lock having a bolt, a movable keeper member engaging the bolt to keep the door closed, a manually engageable member mounted on the door and means to permit said keeper to be disengaged from the bolt by a pressure applied to said member.

7. In combination, a door lock having a bolt, a movable keeper member engaging the bolt to keep the door closed, a manually engageable member mounted on the door means to permit said keeper to be disengaged from the bolt by a pressure applied to said member, and resilient means to urge said keeper back to operative position after the door is opened.

8. In combination, a door frame, a door therein, a lock, having a bolt, mounted upon one of said members and a strike plate carrying a movable keeper member mounted on the other member, means to releasably hold said keeper in position to engage the bolt when the door is closed, and means mounted upon the lock carrying member to release said keeper from the control of its holding member and permit the opening of the door.

9. In combination, a door having a lock thereon provided with a reciprocable bolt, a door frame having a strike thereon provided with a movable keeper, keeper controlling means to hold the keeper in position to engage the bolt to hold the door closed, and means upon the door operable to release said keeper from its controlling means to permit opening of the door.

10. In combination, a door having a lock thereon provided with a bolt, a door frame having a strike plate thereon provided with a movable keeper adapted to be held in bolt engaging position to hold the door closed, and means upon the door to release said keeper, the latter being arranged to be moved to disengaging position by an opening movement of the door upon its release.

11. In combination, a door having a lock thereon provided with a bolt, a door frame having a strike plate thereon provided with a movable keeper member, means for holding said keeper in bolt engaging position, and means mounted upon the door for releasing the keeper from said holding means to permit opening of the door.

12. A door strike having a movable keeper member, means to hold said keeper against movement, and means mounted upon the door to move said holding means to release the keeper.

13. A door and door frame, the latter having a strike thereon provided with a movable keeper member, normally restrained

from movement, and means upon the door to release the keeper to permit movement thereof.

14. A door strike having a movable keeper member, the strike having an opening, a keeper dogging member mounted in the opening, a door lock, and means within the lock for operating the dogging member.

15. In combination, a door, and door frame, one of said members carrying a strike having a movable keeper and a keeper dogging member and the other a lock having a keeper dog controlling member mounted therein.

16. In combination, a door frame having a strike provided with an opening and a movable keeper member and a keeper dogging member, a door having a lock, and means in the lock to actuate the keeper dogging member through said opening.

17. In combination, a door frame having a strike provided with an opening and a movable keeper member releasably held against movement, a door having a lock, and means in the lock to release the keeper member.

18. In combination, a door and door frame, the latter carrying a strike having a movable keeper member, and means including a manually operable pivoted member carried upon the exterior surface of the door to control said keeper member.

19. In combination, a door frame having a strike provided with a movable keeper member, and a door carrying a lock having a keeper controlling member and a panic bar to actuate said member.

20. In combination, a door frame having a strike provided with a movable keeper member, a door having a lock case, a keeper controlling plunger slidably mounted in said case, and a panic bar mounted upon an exterior portion of the door for operating said plunger.

21. In combination, a door frame having a strike provided with a movable keeper member, a door having a lock case, a keeper controlling plunger slidably mounted in said case, and a panic bar mounted upon an exterior part of the door for protracting said plunger to control the movable keeper member.

22. In combination, a door frame having a strike provided with a movable keeper and a keeper dogging member, a door carrying a lock, and means in the lock to trip said dogging member.

23. In combination, a door frame having a strike provided with an opening, a movable keeper member and a keeper dogging member operable through said opening, and means within the lock to operate said dogging member.

24. In combination, a door frame having a strike provided with an opening, a movable keeper and a keeper dogging member having a trip portion extending into said opening, a door, a lock mounted thereon and carrying a plunger protractable into said opening to engage the trip.

25. In combination, a door frame having a strike provided with a bolt opening, a movable keeper member forming one side of said opening, a door having a lock thereon, and means within the lock protractable into said opening to control said keeper member.

26. In combination, a door frame having a strike provided with a bolt opening, a movable keeper forming one side of said opening, a keeper dogging member having a portion accessible through said opening, a door provided with a lock, and means movably mounted in the lock to engage said dogging member to release the member.

27. In combination, a door frame having a strike provided with a bolt opening, a movable keeper forming one side of said opening, a keeper dogging member having a portion accessible through said opening, a door carrying a lock provided with a bolt extending into said opening, and means in addition to said bolt protractable into said opening to engage said dogging member and release the keeper.

28. In combination, a door frame having a strike provided with an opening, a movable keeper forming one side of said opening, a door carrying a lock having a bolt extending into said opening, said bolt being provided with a slot, and a keeper controlling member mounted in said lock and protractable into said opening through said slot.

29. In a door lock, a case, a bolt reciprocably mounted therein, a controlling plunger mounted in said case, and means operable exteriorly of the case to operate said plunger by a pressure thereon in a direction to open the door.

30. A door lock comprising a case, a bolt operably mounted therein, and controlling means for the bolt including a manually operable member and a plunger adapted to be protracted from the lock case thereby by pressure on said member in a direction tending to open the door.

31. A door lock comprising a case, a bolt operably mounted therein, and controlling means for the bolt including a manually operable member, a slide mounted within the lock operable thereby, and means to protract said plunger upon movement of the slide.

32. A door lock including a case, a bolt operatively mounted therein, and a bolt controlling means including a plunger and pressure operated means upon the exterior of the

door to protract said plunger, said means being operated by a pressure applied in a direction tending to open the door.

33. A door lock including a case, a bolt operatively mounted therein, and having an opening formed therethrough, a plunger protractable from the lock case through said opening, and a door-strike having a keeper controlled by said plunger.

34. A door lock including a case, a bolt operatively mounted therein and having an opening formed therethrough, a bolt controlling plunger protractable from the lock case through said opening, and manually operable means to protract said plunger.

35. A door lock including a case, a bolt operatively mounted therein and having an opening formed therethrough, a bolt controlling plunger protractable from the lock case through said opening, and manually operable means to protract said plunger, including a slide reciprocably mounted within the case.

36. A door lock including a case, a bolt operatively mounted therein and having an opening formed therethrough, a bolt controlling plunger protractable from the lock case through said opening, and manually operable means to protract said plunger, including a slide reciprocably mounted within the case and an operating member engaged by said slide and, in turn, engaging said plunger.

37. In combination with a door lock having a bolt, a strike plate provided with a keeper normally engaging said bolt to hold the door closed, said keeper being movable to a position to cam said bolt toward retracted position upon the application of an opening pressure to the door.

38. In combination with a door lock having a bolt, a strike plate having a movable keeper, said keeper being provided with a bolt engaging surface normally holding the door closed, a member mounted on the door, said keeper being movable, upon the application of a pressure to said member in a direction to open the door, to a position wherein said engaging surface becomes a camming surface to move the bolt toward retracted position.

39. A door strike having a bolt opening and a movable keeper member mounted therein, a keeper dogging member provided with tripping means, a door, and a pressure operated member on the door to actuate said tripping means.

40. A door strike having a bolt opening and a movable keeper member mounted therein, and a keeper dogging member provided with a trip portion extending into the bolt opening.

41. A door strike provided with a bolt opening, a movable keeper member, a pivoted dogging member engaging a portion of the member to hold the same against movement, a door, and a pressure operated member on the door to actuate the dogging member.

42. A door strike having a swinging keeper member and provided with an opening and a keeper dogging member mounted in the opening.

In witness whereof, I have hereunto set my hand on this 17 day of November, 1921.

WILLIAM J. CARROLL.