Nov. 22, 1955 F. J. McCONNELL 2,724,258

FIRE-EXIT LOCK

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FIG. 1.

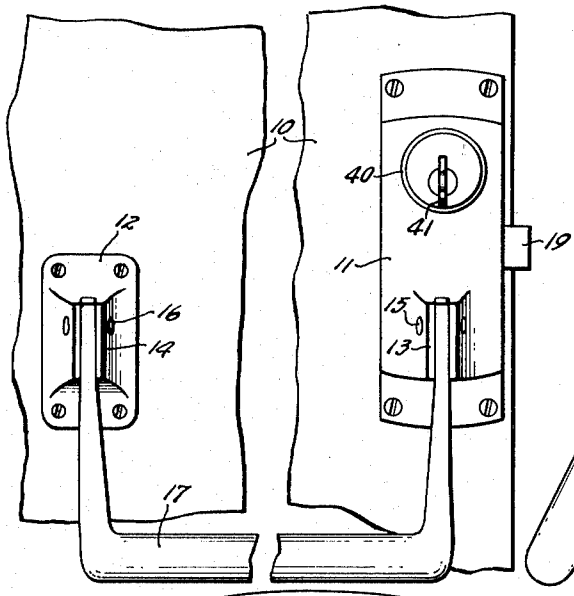
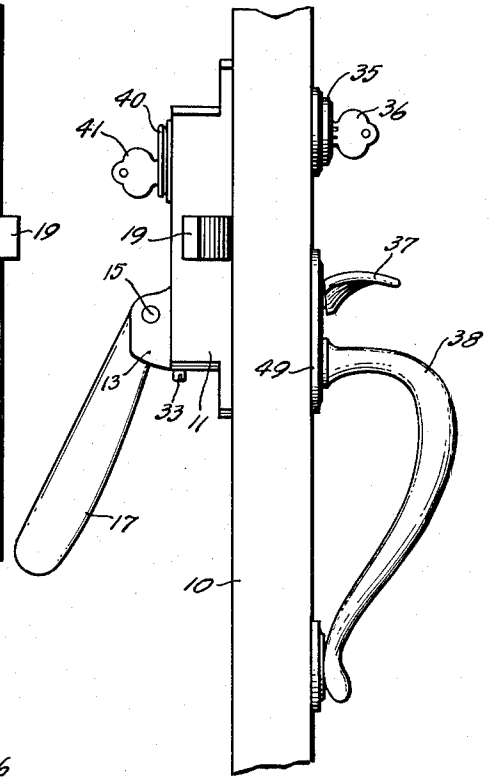



FIG. 2.



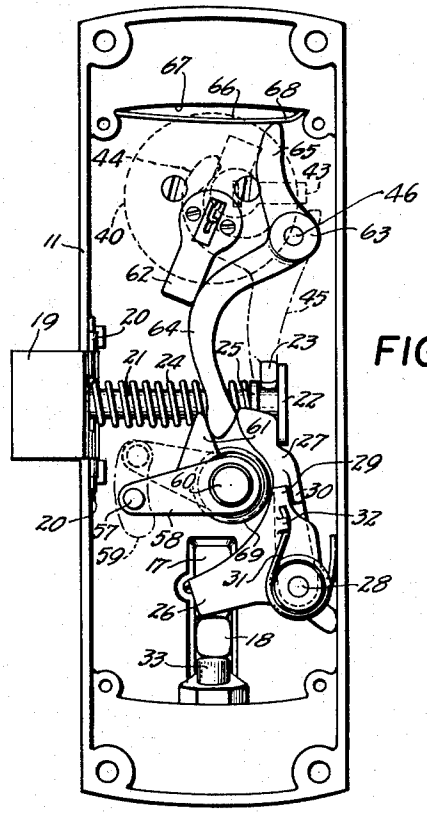




FIG. 5.

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FIG. 4.

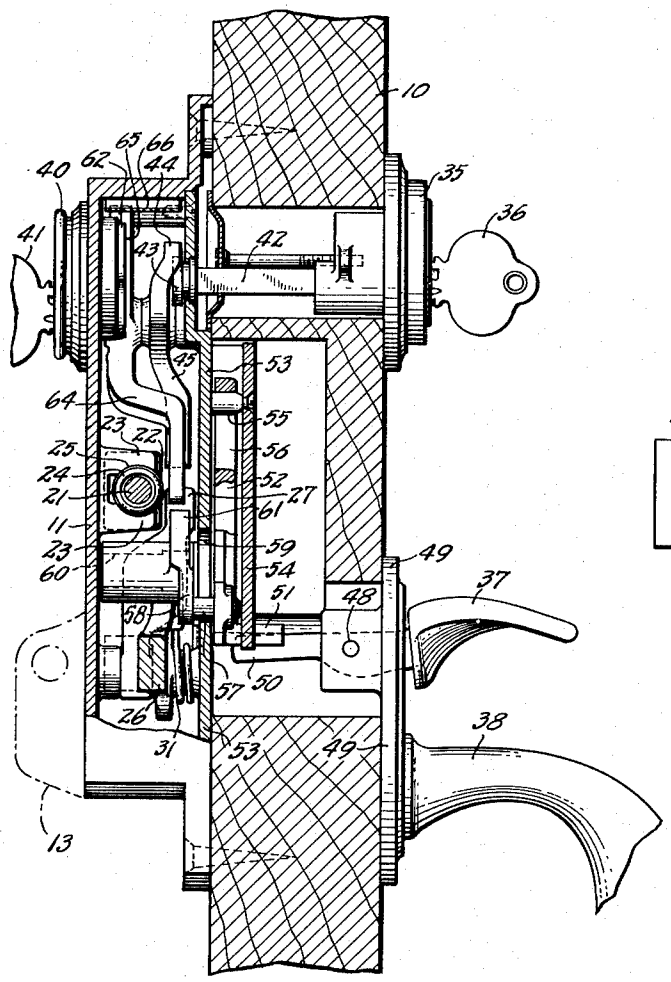
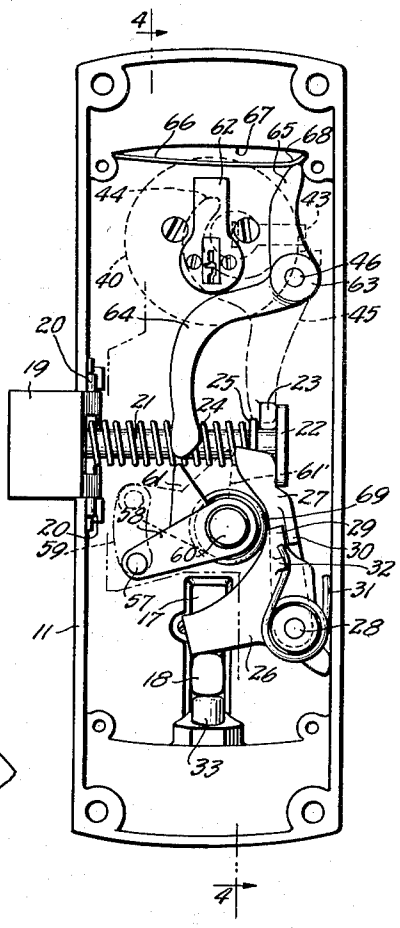



FIG. 3.




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# FIRE-EXIT LOCK

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Application September 21, 1950, Serial No. 185,953

9 Claims. (Cl. 70—149)

My invention relates to safety locks and in particular to so-called fire-exit locks.

In fire-exit locks, as used on doors in schools and in other public buildings, safety requires that the inside-operated manual actuating means for the lock shall always be directly associated with the bolt retratcor, so that, regardless of the locked or unlocked condition of the mechanism, the door may always be opened from the inside. In such locks, it is customary to provide a key-operated means on the outside for retracting the bolt independently of the inside-operated means; also, outside manual-operating means may be provided. When the door is to be locked so as to bar entrance, it has been customary to dog the outside manual-operating means, but it has been a juvenile practice to attempt a manual actuation of the lock from the outside, even though the same is quite obviously dogged. Under certain circumstances, a repeated juggling of the outside manually actuated member may retract the bolt sufficiently to permit entry. Whether or not entry is achieved, such tampering may cause damage to the outside manually actuated member.

It is, accordingly, an object of the invention to provide an improved lock construction of the character indicated.

It is another object to provide an improved lock mechanism, which will not be subject to damage upon tampering from the outside.

It is a further object to provide such a lock mechanism wherein key operation from the outside is the only means whereby entrance is possible when the mechanism is otherwise locked.

It is a specific object to provide a means for selectively disabling the outside manual-operating means of a fire-exit lock of the character indicated.

It is a general object to meet the above objects with a relatively simple construction involving as little change as possible from existing arrangements.

Other objects and various further features will be pointed out or will become apparent to those skilled in the art from a reading of the following specification in conjunction with the accompanying drawings.

In said drawings, which show, for illustrative purposes only, a preferred form of the invention—

Fig. 1 is a partly broken-away fragmentary view in elevation of a door upon which a lock mechanism of the invention has been mounted, all as seen from the inside side of the door;

Fig. 2 is a right-end view of the door and lock of Fig. 1;

Fig. 3 is an enlarged view of the lock mechanism of Fig. 1, as seen from the back side, and with the coverplate and certain other parts removed;

Fig. 4 is a sectional view, taken substantially in the plane 4—4 of Fig. 3; and

Fig. 5 is a view similar to Fig. 3, with the parts shown in a different relationship.

Briefly stated, my invention contemplates a lock mechanism including a bolt and means for retracting the same. The retraction means may include a plurality of parts to



cooperate in driving one another when retracting the bolt. When it is desired that such retraction shall not be possible, as for example when it is desired that the lock shall not be manually actuated from the outside, then my mechanism makes possible the dislocation or removal of one of the parts in the retraction mechanism so that there is no longer the necessary cooperation between parts, and a manual actuation from the outside results in purely wasted motion, having no driving relationship with the bolt.

In the form to be described, the removable member is a pivoted lever having an enlarged end to be removably interposed between an outside driven member and some part directly related with the bolt. When thus interposed, a direct driving relationship is established between the outside actuating member and the bolt; but when the lever is cranked to its other position, the enlarged end thereof is no longer thus interposed, and outside actuation results merely in wasted motion involving no displacement of the bolt.

Referring to the drawings, my invention is shown in application to a so-called fire-exit lock, which may be mounted on the inside of a door **10**. The lock may comprise a lock case **11** and a bracket **12**, each formed with ears **13—14** carrying aligned pivot means **15—16** for a push-bar **17** pivoted thereon. Inside the lock case **11**, the push-bar **17** may include a driving arm **18** (Fig. 3) for operating suitable retractor mechanism for the latch-bolt **19**. The bolt **19** may be of the so-called Pullman type and pivoted inside the case **11**, as on studs **20**. The retraction mechanism for the bolt **19** may include a tail member **21** connected to the bolt by means (not shown) and having an enlarged end **22** to be limited by abutment lugs **23**, which may be formed in or carried by the case **11**. Spring means **24** coiled in compression about the tail **21** may normally urge the bolt **19** to an outwardly extending position, as shown in the drawings. A washer **25** may receive spring thrust and directly abut the lugs **23**.

Normal push-bar retraction of the bolt may be effected through two cooperating cranks or levers **26—27**, both of which may be pivoted in the casing **11**, as on a common pin **28**. The crank member **26** may include a portion to receive the thrust of the push-bar lug **18**, and a driving projection **29** may strike the lug abutment **30** on the other crank member **27** in a retraction of the bolt. A torsion spring **31** may be coiled about the boss for one of the levers **26—27** and abut a lug **32** on the crank member **26** so as to urge the same at all times resiliently against the driving arm **18** of the push-bar **17**. A stop member **33** may be carried by the casing **11** and threaded therein for adjustment to intercept arm **18** and thus to limit normal outward displacement of the push-bar **17**; and, if it should be desired that the bolt **19** shall be retained in a retracted position, then the threaded stop member **33** may be advanced fully into the casing so as to drive the push-bar arm **18** against crank members **26—27** in a retained retraction of the bolt **19**.

As indicated generally above, my lock mechanism may include outside key-operated means such as a cylinder lock **35** to be actuated by a key **36** for retracting bolt **19**, as well as outside manual-actuating means, such as a finger or thumb-piece **37**. The finger-piece **37** may form part of the conventional outside trim, including a pull handle **38**.

In accordance with the invention, both the outside key-operated means **35** and the outside manually operated means **37** are independently and directly related to the retracting means for the bolt **19**, and these relationships are also independent of the described push-bar retraction of the bolt **19**. Also in accordance with the invention, the outside operated manual means **37** may be disabled or effectively disconnected from its bolt-retraction mech-

anism by means of an inside operation, and, for security against tampering, the inside means for this purpose may be key-operated; I have shown a cylinder lock **40** and key **41** to enable and to disable the outside manually operated means **37**.

As explained, normal outside key operation, such as a manipulation of the key **36**, may be effective directly to retract the bolt **19**. In the form shown, the lock **35** includes a spindle **42** passing through the door **10** and engaging a suitable socket in a drive crank **43**. When the lock **35** is set, as when the key is removed, the crank **43** may be in the generally horizontal position shown in Figs. 3 and 5. However, upon key operation, the crank **43** may be moved counterclockwise in the sense of Figs. 3 and 5, and when substantially erect, the crank **43** will engage and drive one end **44** of a retractor-crank member **45**, pivoted to the case **11**, as on the pin **46**. The other end of the crank **45** may directly engage the enlargement **22** at the tail of the bolt member **21**, and it will be appreciated that such actuation is entirely independent of push-bar actuation of the bolt **19**.

As indicated, outside manual actuation is achieved by depressing the thumb or finger-piece **37**. The piece **37** may be pivoted, as at **48**, in a part of the escutcheon **49**, and may include an inwardly projecting end **50** (Fig. 4) for engagement with the underside of a lug **51** on a vertically reciprocable slide **52**. The slide **52** may be guided between the back face of the cover-plate **53** for the lock case **11** and an outside retaining plate **54** appropriately spaced from the plate **53**, as by means of a boss **55**. The slide **52** may be slotted at **56** for guided retention by the boss **55**, as will be clear. At its lower end, the slide **52** may receive or carry a transverse pin **57** connecting the same to a crank or actuating member **58**. The pin **57** may pass through the back cover-plate **53**, as in a slot **59**, so as to permit a full reciprocation of the slide **52** and a cranking of the member **58** about its pivot **60**. The crank member **58** may additionally include an actuating lug **61** to be used in retracting the bolt **19** when the mechanism has been suitably enabled.

As indicated generally above, the enabling mechanism for the outside manually actuated means may be key-operated from the inside, as by rotation of the key **41**. In the form shown, the plug of the cylinder lock **40** carries a crank member or roll back **62** in suitable actuating alignment with a movable member to be shifted into and out of a position between the actuating lug **61** and the bolt-retraction mechanism. This movable member may be a lever **63**, comprising two arms **64**—**65** and pivoted on the same pin **46** as the lever **45**, but otherwise in no way related to the movement of the lever **45**. The end of the arm **64** may be so formed as to be interposed between the actuating lug **61** and the crank **27** when in a first position (see Fig. 5), but when in a second position, the said end of the crank arm **64** may be out of possible engagement with the actuating lug **61**. The part of lever **63** which is to be selectively interposed between lug **61** and crank **27** is preferably of an effective thickness of substantially the full stroke of lug **61**; thus, when in the enabling position (Fig. 5) substantially a full stroke of lug **61** may be translated into substantially a full stroke of the bolt **19**, but when in the disabled position (Fig. 3) a full stroke of lug **61** results in wasted motion.

The other arm **65** of the lever **63** may form part of a suitable detent mechanism for holding one or the other of two selected positions of lever **63**. The detent mechanism may include a flat spring **66** arched between spaced corners of a recess **67** in the case **11**, and a dimple or notch **68** in the spring **66** may provide the point about which detent action takes place. It is preferred that this point be located so that detent action may be effective when the lever **63** is substantially in the described second position (Fig. 3); that is, detent retention of the second or disabled position occurs preferably only when the end of arm **64** may not be engaged by the actuating lug **61**.



The invention may perhaps be better understood from a description of several operations. If the door is to be locked, the key **41** will be actuated so as to set the lever **63** in the so-called second or disabled position, as in Fig. 3. Such actuation will call for a clockwise rotation of the key **41** in the sense of Figs. 3 and 5, and the disabled position will have been selected when the crank **62** engages the arm **65** to drive it to the right side (in the sense of Figs. 3 and 5) of the detent point **68**. When the mechanism has thus been locked, it will be appreciated that there is no possible manual actuation of the bolt by the thumb piece **37** from the outside. Attempted manual actuation, as by depressing the thumb or finger-piece **37** however many times, will only result in idle cranking of the member **58**, and, if desired, this action may be opposed by a weak spring **69** twined about the hub or boss of member **58** and urging the same in the downward or counterclockwise direction. During such wasted finger actuation, the actuating lug **61** will merely move through space, as to the dotted position **61'**, shown in Fig. 3. Since such finger actuation is accompanied by relatively little resistance, no damage to the thumb-piece **37** can result from the usual juvenile tampering with the mechanism. At the same time, it will be appreciated that the mechanism may be operated from the outside upon insertion of the proper key **36**, so as to drive the actuating crank **45** in a retraction of the bolt **19**; at the same time, unhampered exit is permitted upon depression of the push-bar **17**—both functions being available without changing the locked setting of crank **63**.

When it is desired that manual operation shall be permitted from the outside, the key **41** may again be placed in the lock **40**, but this time it should be rotated counterclockwise so as to drive the crank **62** against the knee or the lower arm **64** of lever **63**. In this way, the lever **63** may be actuated counterclockwise so as to place the upper arm **65** to the left of the detent point **68**, with the enlarged end of arm **64** interposed between the actuating lug **61** and the crank **27**. The mechanism will then be enabled for outside manual actuation by thumb piece **37** and the key **41** may be withdrawn and kept separately. With the mechanism thus enabled, actuation of the thumb-piece **37** will serve to drive the actuating lug **61** against the lower end of arm **64**, and arm **64** will bear against the upper end of crank **27** in a retraction of the latch-bolt **19**. If for any reason the mechanism should be damaged when thus set, key operation from the outside, by way of the key **36**, will at all times be possible because of the direct connection of lever **45** to the retraction mechanism. Also, free exit by way of push-bar actuation will be permitted at all times for the same reason.

It will be appreciated that I have described a simple and ingenious means for improving the function of lock mechanisms, such as fire-exit locks. Not only may the functioning be improved, but the mechanism may be rendered less susceptible to malfunctioning in the presence of juvenile or other tampering. These results are achieved with a minimum of modification from generally conventional mechanisms.

While the invention has been described in considerable detail and a preferred form illustrated, it is to be understood that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

I claim:

1. In a door lock of the character indicated, a bolt including rollback-abutment means, key-operated rollback means movable into and out of driving relation with said abutment means, and manually movable means in aligned actuating abutment relation with said rollback means when said rollback means is in position for driving relation with said abutment means, said manually movable means clearing said rollback means when the latter is positioned out of driving relation with said abutment

means, said rollback-abutment means including separate and independent actuating means accessible for manual retracting actuation of said bolt at all times and regardless of the actuation of said manually movable means.

2. A door lock according to claim 1, and including inside accessible screw means selectively positionable in dogging relation with said rollback means to hold said bolt in open position.

3. In a door lock of the character indicated, a bolt including rollback-abutment means, a first rollback in direct driving relation with said abutment means and manually actuable from one side of the door, a second rollback movable into and out of direct driving relation with said first rollback, separate manually actuable means for actuating said second rollback, whereby said separate manually actuable means may actuate said bolt, a third rollback in driving relation with said second rollback only when said second rollback is positioned in driving relation with said first rollback, and further manually actuable means for said third rollback.

4. A door lock according to claim 3, in which said separate manually actuable means is key-operated.

5. A door lock according to claim 3, and including resilient detent means resiliently holding said second rollback when positioned out of driving relation with said first rollback.

6. In a door lock of the character indicated, a bolt including retractor means therefor, inside-operated means including a rollback at all times aligned with and free to retract said retractor means upon actuation of said inside-operated means, outside-operated means including an actuating member for said rollback and having a normal movement of stroke basically sufficient to retract said bolt, said actuating member being out of engagement with said rollback for at least enough of said stroke, that direct contact of said member with said rollback will be insufficient to fully retract said bolt, whereby actuation of said outside-operated means alone may be insufficient to retract said bolt, and independently manipulable means including an enabling member movable to a first position between and to a second position clear of the path of movement of said actuating member and of said rollback relatively to each other, said enabling member being of sufficient width when in said first position to permit bolt retraction upon an actuation of said outside-operated means.

7. A lock according to claim 6, in which the effective width of said enabling member subtends a distance equivalent substantially to a full stroke of said actuating member, whereby when in said first position a stroke of said actuating member may be effective to retract said bolt.

8. In a door lock of the character indicated, a bolt including retractor means therefor, resilient means urging said bolt to an outwardly extended position, inside-operated means including a rollback at all times aligned with and free to retract said retractor means upon actuation of said inside-operated means, outside-operated means including an actuating member for said rollback and having a normal movement of stroke basically sufficient to retract said bolt, said actuating member being out of engagement with said rollback for at least enough of said stroke, that direct contact of said member with said rollback will be insufficient to fully retract said bolt, whereby actuation of said outside-operated means alone may be insufficient to retract said bolt, independently manipulable means including an enabling member movable to a first position between and to a second position clear of the path of movement of said actuating member and of said rollback relatively to each other, said enabling member being of sufficient width when in said first position to permit bolt retraction upon an actuation of said outside-operated means, and inside-operated dogging means in actuating relation with said rollback and dogging said rollback in the actuated position thereof, whereby said bolt may be held in retracted position.

9. A lock according to claim 8, in which said inside-operated means includes a screw in driving relation with said rollback and having sufficient threaded stroke to actuate said rollback.

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