United States Patent

[11] **3,563,585**

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Division of Ser. No. 394,275, Sept. 3, 1964, Patent No. 3,324,692.
[45] Patented **Feb. 16, 1971**

[73] Assignee **Emhart Corporation**
Bloomfield, Conn.

[54] **A LATCH UNIT FOR A DOOR LOCK**
7 Claims, 30 Drawing Figs.

[52] **U.S. Cl.** **292/92,** 292/234, 292/332
[51] **Int. Cl.** **E05c 3/16**
[50] **Field of Search** ..... 292/92, 240, 241, 222, 230—237; 70/92

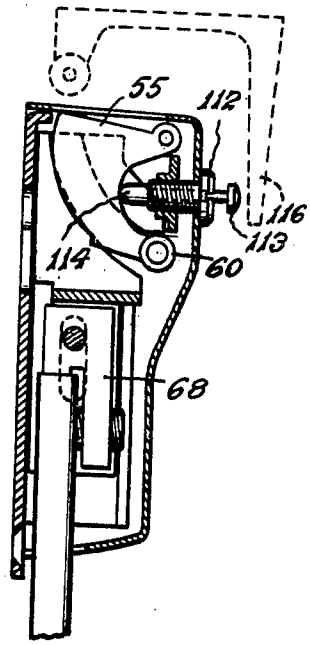
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Primary Examiner—Richard E. Moore
Attorney—Robert E. Lucia

ABSTRACT: This invention relates to door locks of the type generally referred to in the trade as "emergency exit locks," and more specifically to emergency exit locks of the vertical rod type such as generally include a top and a bottom latch unit and an intermediate, panic bar-actuated mechanism that is operatively connected to said latch units by rods disposed vertically on the door.



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Fig. 1.

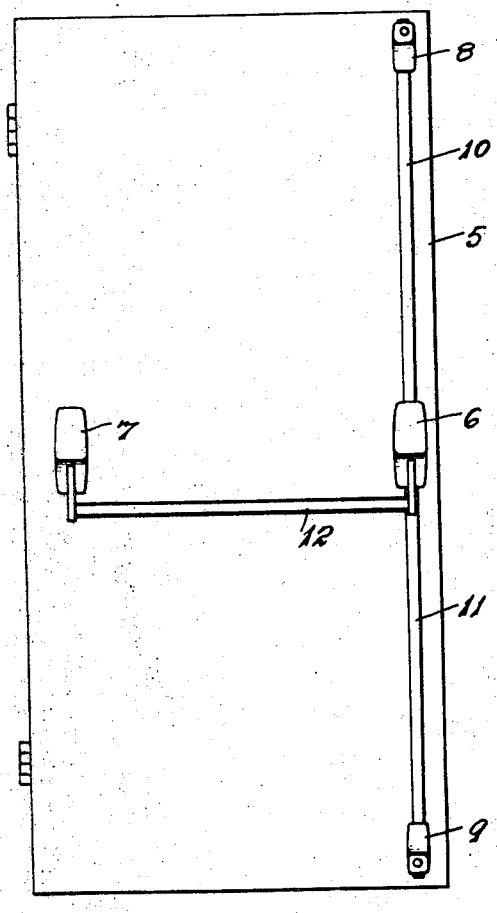


Fig. 4.

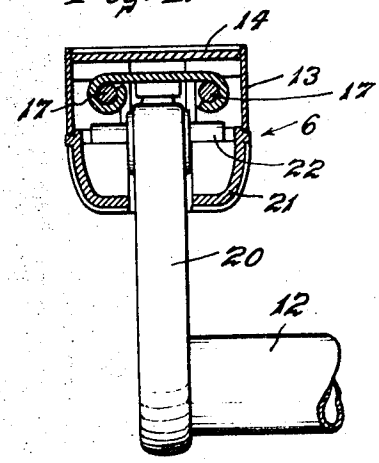


Fig. 2.

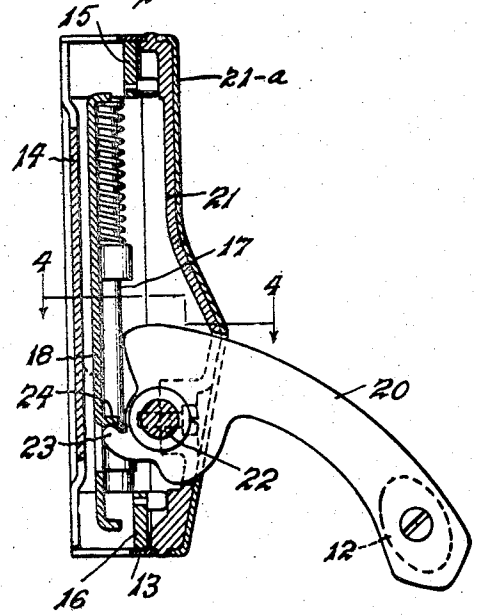
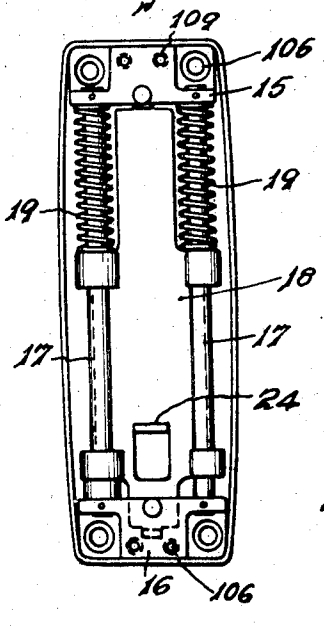


Fig. 3.



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Fig. 7.

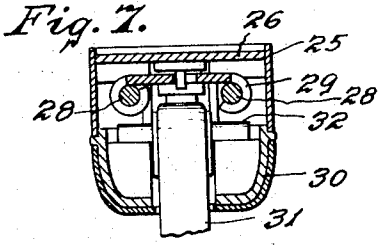


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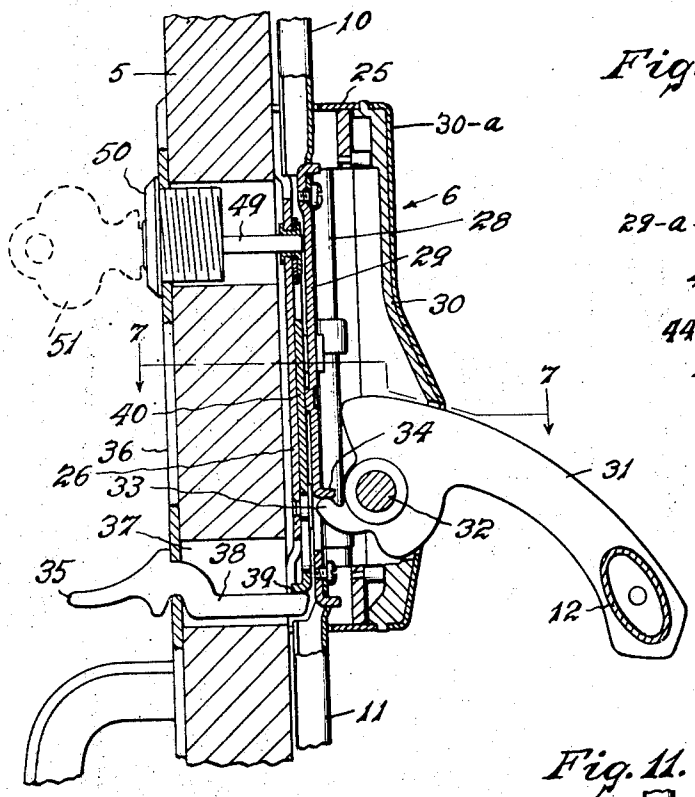


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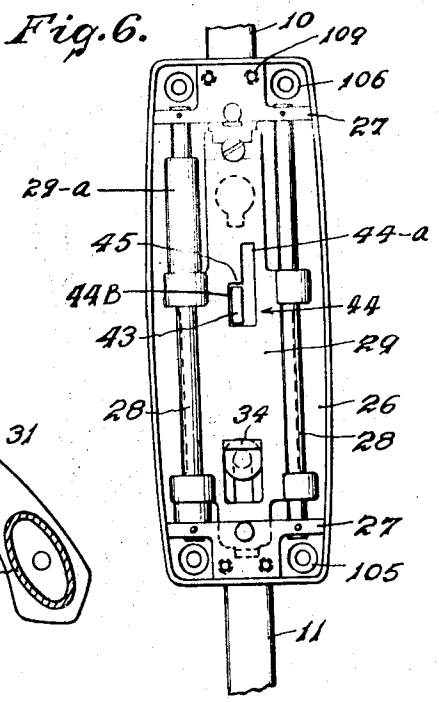


Fig. 11.

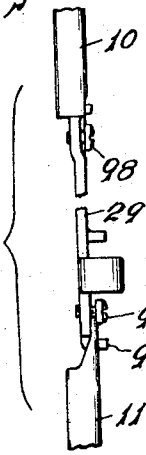


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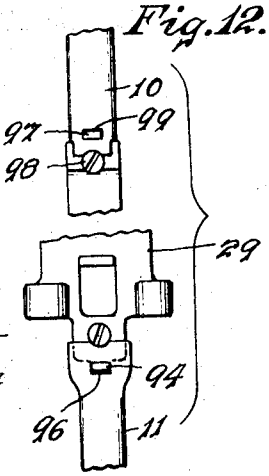


Fig. 10.



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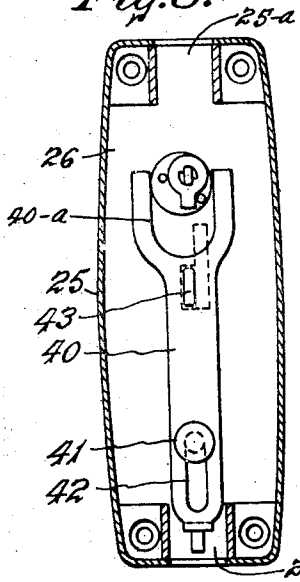
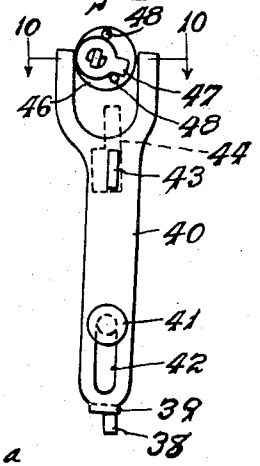


Fig. 9.



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Fig. 13.

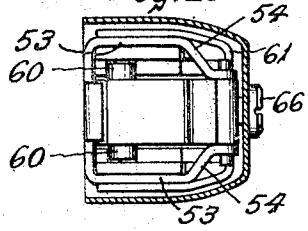


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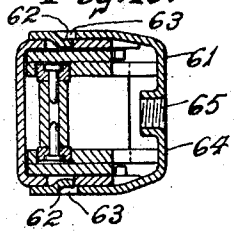


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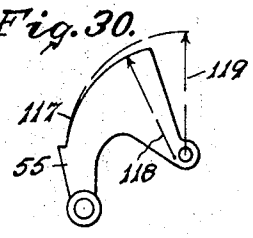


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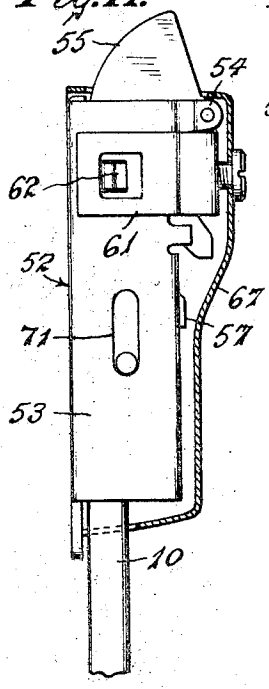


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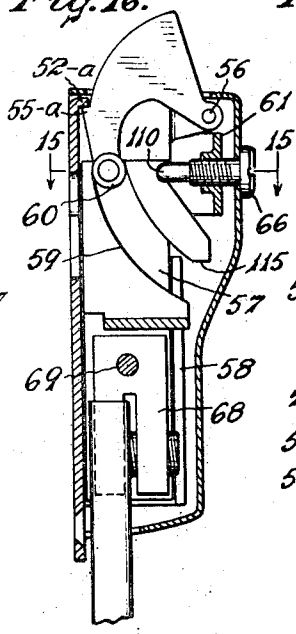


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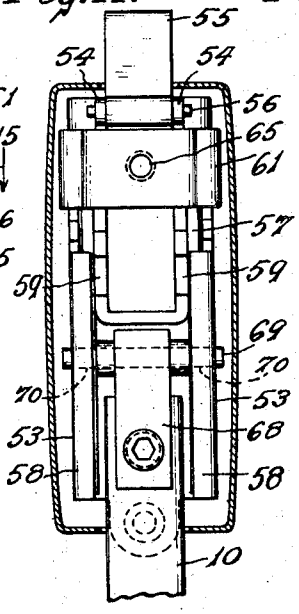


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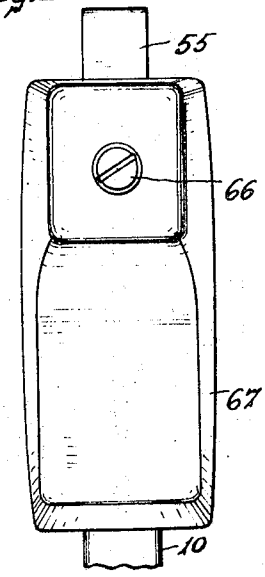


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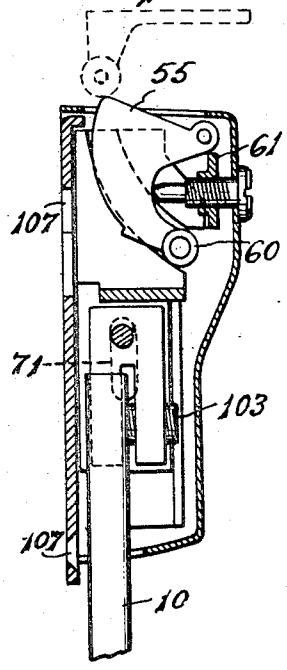


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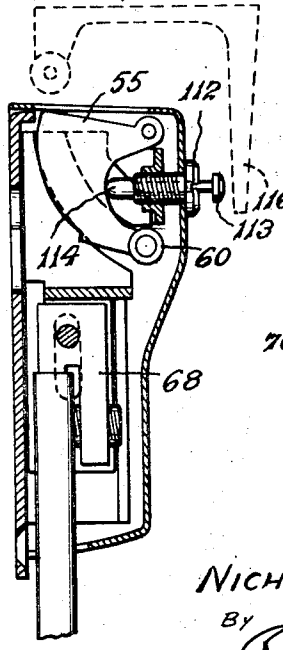


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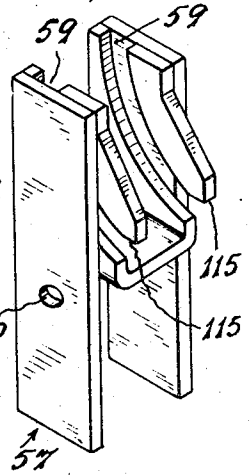


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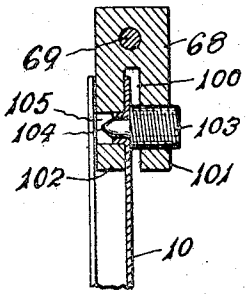
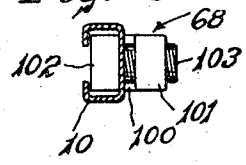


Fig. 23.



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Fig. 24.

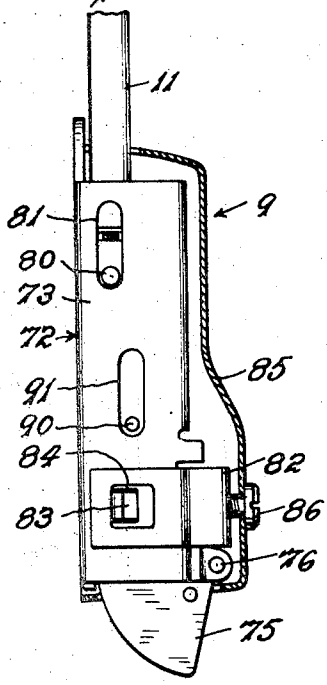


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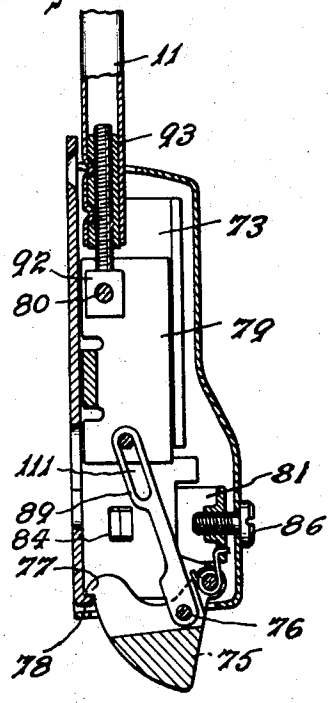


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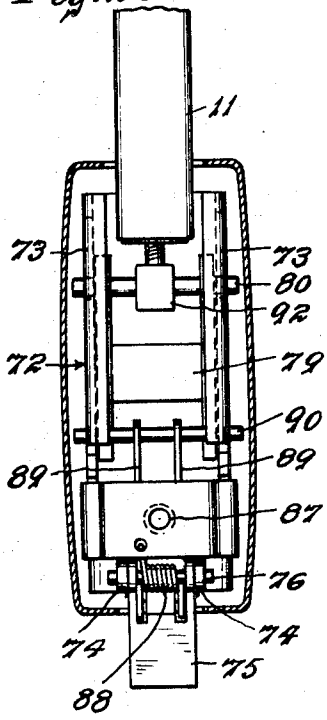


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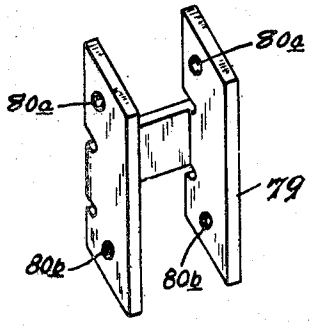


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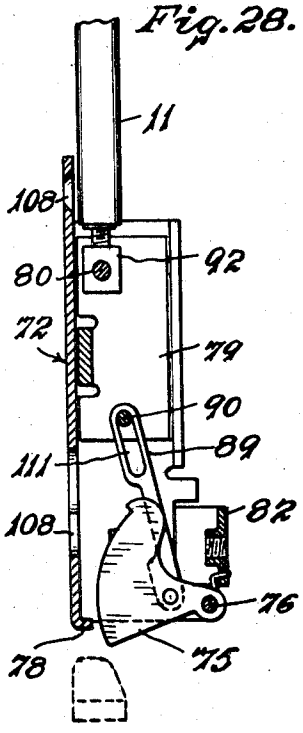
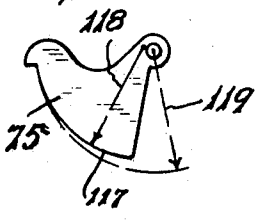


Fig. 29.



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A LATCH UNIT FOR A DOOR LOCK

PARENT APPLICATION

This is a division of Ser. No. 394,275, filed Sept. 3, 1964, now U.S. Pat. No. 3,324,692, issued on Jun. 13, 1967.

BACKGROUND OF INVENTION

Locks of the present type are most commonly used on outwardly opening exit doors of public buildings, such as schools, hospitals, theatres and the like, where large numbers of people can be expected to gather, to permit quick and easy egress from the building at all times and particularly in the event of panic resulting from fire or similar causes. Such locks are especially intended for application to single doors where top and bottom latching is desired and to a pair of doors not equipped with a mullion or an astragal. They are also commonly applied to the inactive leaf of a pair of doors where the active leaf carries an astragal and is equipped with an emergency exit fixture of the mortise type such as shown and described in my copending application Ser. No. 390,906 filed Aug. 20, 1964. Of course, such locks also have other practical applications, but the foregoing examples represent the most common types of installations.

The latchbolt retracting mechanism of such locks is, for reasons of safety, operable at all times by means of the panic bar. Said panic bar extends horizontally across the inner side of the door and is supported by a pair of operating levers, one of which is pivotally mounted on an "active" lock case, that is, the lock case which carries the latchbolt retracting mechanism, and the other of which is pivotally mounted on an "inactive" or supporting case which is secured to the inner side of the door opposite the active case. Preferably, the latchbolts are retracted by depressing the panic bar since this will insure automatic retraction of the latchbolts should people crowd against the inside of the door.

In addition to the basic function which merely provides for panic bar retraction of the latchbolts from the inner side of the door, it is generally necessary to furnish emergency exit locks of the present type with mechanism permitting retraction of the latchbolts from the outer side of the door by manually operable means. The manually operable means is usually in the form of a knob or a thumbpiece which is mounted on the outer face of the door, and in functions including a knob or a thumbpiece, key operated means such as a conventional pin-tumbler lock cylinder are usually provided on the outer side of the door for selectively rendering the manually operable means operable or inoperable. In any event, it is important to provide an emergency exit lock which can easily be adapted to a variety of different functions.

It is also extremely important that the emergency exit lock be readily adaptable to doors of either hand and easily reversed in the field if necessary. If the lock is not reversible—in other words, if the lock is "handed"—it is necessary to provide two distinct types of active cases for the lock, one for right-hand doors and another for left-hand doors. Not only does this materially increase the cost of manufacture, but it also complicates the factory assembly of the lock and its installation in the field.

In addition, it is important to provide emergency exit locks of the vertical rod type with means for holding the latchbolts in retracted position while the door is open. This is especially true for installations where there is no threshold plate at the bottom of the door since if the bottom latchbolt were allowed to project, it would drag along the floor as the door swings toward closed position and eventually cause an unsightly mark on the floor. It is also desirable to have the latchbolts remain in retracted position so that they will not interfere with the closing movement of the door. However, means should be provided for readily rendering the holdback means inoperable.

PURPOSE OF THE INVENTION

Accordingly, it is a principal object of the present invention to provide an emergency exit lock which can be used on both right- and left-hand doors.

Another important object of the present invention is to provide an emergency exit lock which permits quick and easy reversal of the active and inactive cases in the field, even by unskilled persons.

Still another object of the invention is to provide an emergency exit lock in which the active and inactive mechanisms can be reversed relatively to the operating levers on the panic bar, thereby permitting facile adaption of the lock to either a right- or a left-hand door.

Another and very important object of the invention is to provide an emergency exit lock in which reversal does not require removal of the operating levers from their pivotal mountings.

Another object of the present invention is to provide an extremely novel latchbolt retracting mechanism for emergency exit locks which is adapted for panic bar operation alone and with which other components may be used to obtain a variety of different functions.

An additional object of the invention is the provision of an emergency exit lock of the vertical rod type in which the latchbolts may be retracted from the outer side of the door by a knob or a thumbpiece and in which key operable means are provided for selectively disabling the knob or thumbpiece when it is desired to prevent retraction of the latchbolts thereby.

Still another object of the invention is to provide an emergency exit lock of the vertical rod type wherein the top and bottom latch units may easily be adjusted for use on doors with or without a threshold plate.

A further object is to provide such a lock having selectively operable holdback means for holding the latchbolts in retracted position and in which said holdback means, if effective, are automatically released to permit the latchbolts to engage their respective keepers when the door reaches its substantially fully closed position.

Another object of the invention is to provide a vertical rod emergency exit lock incorporating means which permit the top and bottom rods to be both cut to the proper length and assembled on the job and wherein novel means are provided for attaching the upper rod to the top latch unit.

A very important object of the invention is to provide top and bottom latch units for the lock in which the latchbolts are adapted to gradually move into projected position and wedge themselves tightly against their respective keepers to minimize latching noises and prevent the door from rattling.

Another, but by no means final, object of the invention is to provide a vertical rod emergency exit lock in which many of the same components may be used for the active and the inactive cases.

BRIEF DESCRIPTION OF DRAWINGS

The foregoing and other objects and advantages of the invention will be apparent from the following description and the accompanying drawings in which:

FIG. 1 is an elevational view of the inside face of a door having an emergency exit lock embodying the present invention mounted thereon.

FIG. 2 is a sectional side view of the inactive case of said lock.

FIG. 3 is an elevational front view of the base section of said inactive case with the cover thereof removed.

FIG. 4 is a sectional plan view on line 4–4 of FIG. 2.

FIG. 5 is a sectional side view of the active case of said lock, showing the same mounted on a door equipped with a thumbpiece and an outside cylinder.

FIG. 6 is an elevational front view of the base section of said active case with the cover thereof removed.

FIG. 7 is a sectional plan view on line 7–7 of FIG. 5.

FIG. 8 is a sectional front view of the base section of the active case further illustrating the mechanism contained therein.

FIG. 9 is an elevational front view illustrating the operation of the key controlled means provided in said active case for disabling the thumbpiece.

FIG. 10 is a sectional plan view on line 10–10 of FIG. 9.

FIG. 11 is a fragmentary elevational side view illustrating the manner in which the vertical rods are attached to the mechanism of said active case.

FIG. 12 is an elevational front view of the assembly shown in FIG. 11.

FIG. 13 is a plan view of the top latch unit with the cover thereof shown in section.

FIG. 14 is a side view of said top latch unit, also with the cover thereof shown in section.

FIG. 15 is a sectional plan view of said top latch unit taken on line 15–15 of FIG. 16, but with the cover thereof removed.

FIG. 16 is a sectional side view further illustrating said top latch unit.

FIG. 17 is a front view thereof with the cover shown in section.

FIG. 18 is an elevational front view of said top latch unit.

FIG. 19. is a sectional side view of said top latch unit showing the latchbolt thereof in the retracted position which it occupies when the holdback means is inoperable.

FIG. 20 is a similar view of said top latch unit illustrating the operation of said holdback means.

FIG. 21 is an isometric view of the slide for said top latch unit.

FIG. 22 is a sectional side view illustrating the means I have devised for attaching the end of the upper vertical rod to said top latch unit.

FIG. 23 is a sectional bottom view thereof.

FIG. 24 is a side view of the bottom latch unit showing the cover thereof in section.

FIG. 25 is a side view of said bottom latch unit in central vertical section.

FIG. 26 is a front view of said bottom latch unit showing the cover thereof in section.

FIG. 27 is an isometric view of the slide for said bottom latch unit.

FIG. 28 is a sectional side view further illustrating said bottom latch unit.

FIG. 29 is a diagrammatic side view illustrating the formation of the latchbolt for said bottom latch unit.

FIG. 30 is a similar view of the latchbolt for the top latch unit.

DESCRIPTION OF SPECIFIC EMBODIMENTS

Briefly stated, this invention contemplates an emergency exit lock of the vertical rod type in which the active and inactive cases each consist of a base section which is adapted to be fastened to a door and a cover member which is detachably secured to the base section. The cover members form part of the operating unit for the lock which includes, in addition, a pair of operating levers pivotally mounted one on each of said covers and an elongated panic bar which is affixed at its opposite ends to said levers.

The base section of the active case carries the latchbolt retracting mechanism of the lock and said mechanism is connected to top and bottom latch units adapted to be mounted, respectively, adjacent the upper and lower edges of the door by a pair of vertical rods. Means are provided in said mechanism for selective engagement by a finger on each of the operating levers to effect retraction of the latchbolts when the panic bar is depressed. The mechanism in the active base section also includes means adapted for operation from the outer side of the door by a knob or a thumbpiece to effect retraction of said latchbolts and means operable by a key to render said knob or thumbpiece inoperable.

The base section for the inactive case carries spring means for biasing the operating levers and the panic bar toward their normal positions and said spring means are also adapted to be engaged with either of the fingers on the operating levers.

Except for the mechanism carried thereby, the active and inactive base sections of the present lock are substantially identical to the active and inactive base sections of the lock shown and described in my copending application Ser. No. 389,108, filed Aug. 12, 1964. This is also true of the case covers, operating levers and panic bar which go to make up the operating unit of the lock. Hence the case structure of this lock will be only briefly described herein. It should be stated, however, that each of said case covers is adapted to be assembled to either the active or the inactive base section and each of said operating levers is adapted to operatively engage either the latchbolt retracting mechanism or the biasing spring, as the case may be. Stated conversely, the base sections for the active and inactive cases are adapted to be interchanged between the covers and the operating levers carried thereby to adapt the lock to a particular hand of door, thereby obviating the necessity of disassembling the operating levers or the latchbolt retracting mechanism to reverse the lock as in prior devices of this type. This extremely novel feature greatly simplifies the manufacture and assembly of the lock, thereby effecting considerable savings in manufacturing costs, and permits facile installation or reversal of the lock in the field.

Referring now to the drawing, in FIG. 1 I have illustrated a right-hand reverse bevel door 5 having mounted on its inner side one of my improved emergency exit locks. Said lock includes an active case 6, an inactive case 7, a top latch unit 8, a bottom latch unit 9, upper and lower vertical rods 10 and 11, respectively, which connect the latch units to the active case and a panic bar 12 which extends transversely across the face of the door. The said active and inactive cases are substantially identical, with the exception of the mechanism contained therein, and can be assembled for application to either side of the door without alteration of said mechanism due to the improvements provided by my present invention.

As shown in FIGS. 2, 3 and 4, the said inactive case includes a base section 13 having a base plate 14 on which are mounted upper and lower brackets 15 and 16, respectively. These brackets carry a pair of spaced, vertically extending, parallel bars 17–17 which slidably support a slide 18 that is biased downwardly by a pair of springs 19–19, one of which surrounds each of said bars and is anchored against the bracket 15. An operating lever 20, which is secured to one end of the panic bar 12, is pivotally mounted on a supporting cover 21 by a shaft 22 and has a finger 23 which engages an abutment 24 on the slide 18 and through which the springs 19–19 act to bias the lever 20 and the panic bar 12 to normal raised position.

The active case 6 (see FIGS. 5 to 8) includes a base section 25 which is identical in shape to the base section 13 and contains a base plate 26 having mounted thereon brackets 27–27 which support spaced, vertically disposed, parallel bars 28–28. Said bars slidably support a slide 29 in the form of a substantially flat plate 29 to the upper and lower ends of which are attached the ends of the upper and lower vertical rods 10 and 11, said rods passing through openings 25-*a*–25-*a* formed in the base section. The slide is biased downwardly by its own weight and the weight of the elements which are connected to it. However, an auxiliary weight 29-*a* is preferably provided on one or both of the rods 28 to insure proper operation of the slide. A supporting cover 30 identical to the cover 21 is mounted on the base section 25 and carries an operating lever 31 which is identical to the lever 20, but of the opposite hand. Said lever 31 is pivotally mounted on said cover by a shaft 32 and is also connected to the panic bar 12. Said operating lever has a finger 33 which engages the underside of an abutment 34 on the slide 29 for lifting said slide and the rods 10 and 11 when the panic bar is depressed to cause actuation of the top and bottom latch units 8 and 9, as will be hereinafter described.

The manually operable means that I have shown for retracting the latchbolts from the outer side of the door 5 include a

thumbpiece 35 which is pivotally mounted in an escutcheon 36 that is secured to the outer face of the door. Said thumbpiece extends through a hole 37 in said door and has a stem portion 38 which underlies an abutment 39 on a rocker member 40 that is pivotally and longitudinally slidably mounted on the base plate 26 behind the slide 29 by means of a stud 41 which is secured to said base plate and extends through a longitudinal slot 42 in said rocker. Said rocker member is provided with a detent 43 that projects therefrom into an opening 44 in the slide 29. Said opening has a vertically elongated portion 44-*a* and a shorter, laterally offset portion 44-*b* defining a downwardly facing shoulder 45 on said slide that is engageable by said detent 43 to connect the slide 29 to the rocker member 40 for simultaneous movement therewith. The rocker member 40 is shifted between its effective position shown in FIGS. 6 to 8, wherein the detent is engageable with the shoulder 45, and its ineffective position shown in FIG. 9, wherein the detent 43 is disposed in alignment with the elongated portion of the opening 44, by means of an eccentrically mounted, circular cam 46 that is disposed in a notch 40-*a* formed in the upper end of said rocker member. Said cam is rotatably mounted on the shank of an operating finger 47 that is, in turn, rotatably mounted in the base plate 26 and arranged to engage spaced studs 48–48 on said cam to effect rotation thereof in opposite directions. The operating finger 47 is adapted to be rotated by a connecting link 49 extending from the key plug of a conventional lock cylinder 50, said key plug being operable from the outer side of the door by a suitable key 51. The studs 48–48 provide a lost motion connection between the finger 47 and the cam 46 which permits the key plug of the lock cylinder to be returned to shed position without moving the cam after the rocker member has been shifted to either its effective or ineffective position.

The top latch unit illustrated in FIGS. 13 to 21, includes an elongated casing 52 having sidewalls 53–53 with forward extensions 54–54 at the top thereof between which a latchbolt 55 is pivotally mounted by means of a pivot pin 56, the said latchbolt having a stop 55-*a* which engages an abutment 52-*a* on the casing to limit movement of said latchbolt to its projected position. A slide 57 is slidably retained in said casing by flanges 58–58 and has opposed cam grooves 59–59 in the sidewalls thereof which receive rollers 60–60 projecting from the opposite sides of the latchbolt. A yoke 61 straddles the sidewalls of the casing 52 and is detachably secured thereto by means of prongs 62–62 which snap into openings 63–63 in said sidewalls. The front portion 64 of said yoke has a centrally located threaded hole 65 to receive a screw 66 for securing the cover 67 of said latch unit to the casing 52.

The slide 57 of said top latch unit carries a connector 68 that is secured to the slide by a pin 69 which extends through holes 70–70 in the opposite sidewalls of said slide and through slots 71–71 in the sidewalls of the casing 52, said connector being provided for securing the upper vertical rod 10 to the slide in the manner hereinafter fully described.

As shown in FIGS. 24 and 28, the bottom latch unit 9 includes an elongated casing 72 having sidewalls 73–73 with forward extensions 74–74 at the bottom thereof between which a latchbolt 75 is pivotally mounted by means of a pivot pin 76 that extends through said extensions, the said latchbolt having a stop 77 which engages an abutment 78 on the casing 72 for limiting movement of the said latchbolt to its projected position as clearly shown in FIG. 25.

A slide 79 is slidably mounted between the sidewalls of the casing 72 and is connected to the lower vertical rod 11 by means of a pin 80 which extends through openings 80-*a*–80-*a* in the sidewalls of said slide and through slots 81 in the sidewalls of said casing. A yoke 82 is detachably connected to the said casing by prongs 83 which engage holes 84 in the sidewalls thereof, and a cover 85 is secured to said casing by means of a screw 86 which is threaded to a hole 87 disposed centrally in the front wall of said yoke.

The latchbolt 75 is biased toward its projected position, shown in FIG. 25, by a spring 88 which is anchored on said yoke 82, and the said latchbolt is pulled against the tension of said spring into its retracted position by a pair of links 89–89 which are pivotally secured to the latchbolt and slidably connected to said slide 79 by means of a pin 90 which extends through holes 80-*b*–80-*b* in the sidewalls thereof and slots 91 in the sidewalls of the casing 72.

It is desirable that said mechanism be supplied to the ultimate user in such a condition that it can easily be installed on a door. To this end, the lower vertical rod 11 is supplied in a standard length and has provided on its lower end a connector 92 which is secured to the slide 79 by the pin 80 and is threaded into an insert 93 that is secured in the lower end of the said rod so that the effective length of the rod may be adjusted to conform to the distance between the active case 6 and the bottom latch unit 9 by rotating the said connector 92 in the proper direction before it is secured to the slide 79.

Reverting to FIGS. 11 and 12, the slide 29 in the active base section 25 has a projection 94 at the bottom thereof and a screw 95 threaded thereto adjacent said projection. The upper end of the lower rod 11 has a hole 96 to receive said projection 94 whereby said rod may be readily attached to the slide by merely placing said rod over the projection 94 and tightening the screw 95 against its end portion, as shown. The upper end of the slide 29 has a similar projection 97 and a screw 98 adjacent thereto and the lower end of the upper rod 10 has a hole 99 whereby it can be fastened to the slide 29 in the same manner as the upper end of the lower rod 11.

In order to fasten the upper end of the upper rod 10 to the top latch unit, the connector 68 is provided with a slot 100 defining thereon a pair of spaced legs 101 and 102, as shown in FIGS. 22 and 23. A socket-type screw 103 is threaded to the leg 101 and has a point 104 which extends into a hole 105 in the leg 102, but is of a smaller diameter than said hole. The upper end of said upper rod is secured to the top latch unit by first cutting it to the proper length to conform to the distance between the active case 6 and the top latch unit 8 and then inserting the said upper end of the rod into the slot 100 and rotating the screw 103 until the point 104 thereof penetrates the front wall of said rod and forms an eyelet which extends into the hole 105. This firmly secures the rod to the connector 68 as clearly illustrated in FIG. 22.

To mount the lock on the door, in the position illustrated in FIG. 1 for example, the active and inactive base sections 13 and 25 are first secured to the door by screws inserted through holes 106 in the brackets 15–15 and 27–27 thereof, and the top and bottom latch units are then secured to the door in their proper positions by screws inserted through holes 107–107 and 108–108 in the casings 52 and 72 thereof, respectively. In order to facilitate the assembly and installation of the latch units, the pins 69, 80 and 90 are adapted to be readily removed or installed through the respective slots in the sidewalls of the casings 52 and 72 and once installed are retained in their assembled positions by the covers 67 and 85.

After the active and inactive base sections and the top and bottom latch units have been mounted on the door as above described, the upper and lower vertical rods 10 and 11, respectively, are secured to said latch units and active case in the manner also above described. The operating unit, consisting of the supporting covers 21 and 30, the operating levers 20 and 31 and the panic bar 12, is then simply mounted in position on said base sections with the fingers 23 and 33 of the respective operating levers engaged with the abutments 24 and 34 on the slides 18 and 29, respectively, and the said covers are then secured to their respective cases by screws, not shown, which are threaded into holes 109 in the brackets 15–15 and 27–27. Decorative scalps 21-*a* and 30-*a* are provided for concealing the covers 21 and 30 and these scalps are then installed in the manner fully described in my copending application Ser. No. 389,108, filed Aug. 12, 1964, to complete the installation.

As will be evident from the foregoing description and from the disclosure of my above-identified copending application, the base sections **13** and **25** are adapted to receive either of the cover members **21** or **30** and the mechanism contained in said base sections is adapted for operative engagement with either of the fingers **23** or **33** on the levers **20** or **31**, respectively. This extremely novel arrangement renders the emergency exit lock of this invention readily adaptable to doors of either hand and permits facile reversal thereof in the field.

For example, when applying the lock to a right-hand door, the active base section **25** is mounted adjacent the right-hand or free edge of the door and the inactive base section **13** is mounted adjacent the left-hand or hinged edge as shown in FIG. **1**. The operating unit, which consists of the cover members **21** and **30**, their scalps **21**-*a* and **30**-*a* and operating levers **20** and **31** and the panic bar **12** is then assembled to the base sections as previously described, the right-hand cover member of FIG. **1** being applied to the base section **25** to form the active case and the left-hand cover member being applied to the base section **13** to form the inactive case.

For a left-hand door, the base sections **13** and **25** are reversed with respect to the cover members **21** and **30**. In this instance, however, it is not necessary to invert the active base section as in the lock of said copending application. Both the base section **13** and the base section **25** are adapted to operate in the position shown in FIGS. **3** and **6** irrespective of the hand of the door.

After the installation has been completed, the force exerted by the springs **19–19** in the inactive case on the finger **23** through the slide **18** will bias the operating lever **20** and the panic bar **12** to normal raised position. This will also retain the operating lever **31** of the active case in its raised position and thus permit the slide **29** of the active case to normally assume its lowermost position, as shown in FIG. **5**. When the said slide **29** moves into its normal position, the upper rod **10** and the slide **57** will move downwardly therewith and cause the latchbolt **55** to be pivoted into its projected position by cooperation between the cam grooves **59–59** in said slide and the rollers **60–60** on the latchbolt, as shown in FIGS. **14** to **18**. Movement of the slide **29** to its lowermost position will also be accompanied by downward movement of the lower vertical rod **11** and the slide **79** of the lower latch unit and thereby permit the latchbolt **75** to be pivoted to its projected position by the spring **88**, as illustrated in FIGS. **24** and **26**.

When pressure is applied to the panic bar **12**, against the tension of the spring **19–19**, the operating lever **31** will pivot downwardly, whereupon the finger **33** thereof will raise the slide **29** of the active case and therewith also raise the upper and lower vertical rods **10** and **11**. The upper rod will then raise the slide **57** of the upper latch unit and cause the latchbolt **55** thereof to be retracted by the action of the cam grooves **59–59** upon the rollers **60–60**, while the lower rod will raise the slide **79** of the lower latch unit to pull on the links **89–89** and thereby pull the lower latchbolt **75** into its retracted position so that the door may be swung open.

In some installations where there is a threshold plate at the bottom of the door, it is desirable that the latchbolt of the top and bottom latch units remain in their projected positions when the door is open so that they will be retracted as they engage their respective keepers and then be projected back, by gravity, into locking engagement with said keepers as the door reaches its closed position. For this purpose, the screw **66** of the upper latch unit is provided with a projection **110** forming an abutment which will engage the latchbolt **55**, as shown in FIG. **19**, and stop it short of its fully retracted position so that, upon the panic bar being released, it will return to its projected position, whereupon the lower latchbolt will also do the same by virtue of its connection with the upper latchbolt through the said vertical rods and the slide **29** of the active case. It will also be noted that the abutment **34** of the slide **29** is normally free to move away from the finger **33** of the operating lever **31**. This will permit free upward movement of the slide **57** and thereby permit the said slide to be raised independently of said operating lever as the latchbolt **55** is forced into its retracted position by engagement with its keeper. The raising of said slide by retraction of the latchbolt **55** will also cause the slide **79** of the bottom latch unit to be raised and thereby, through the links **89–89**, cause retraction of the latchbolt **75** of said bottom unit. However, the said links are each provided with a slot **111** to permit said links to move relatively to the pin **90** and thereby permit retraction of the latchbolt **75** independently of the slide **79** and the latchbolt **55** of the top latch unit.

In installations where there is no threshold plate at the bottom of the door, it is usually desirable that the bottom latchbolt be held in retracted position until the door is fully closed so that said bolt will not mar the floor. For this purpose, instead of the screw **66** in the top latch unit there is substituted a threaded sleeve **112** for securing the cover **67**, and a plunger **113** is provided which is slidable in said sleeve and has a stem **114** to engage the latchbolt **55**, as clearly shown in FIG. **20**. The said stem **114** is shorter than the projection **110** of the screw **66** whereby the latchbolt **55** is permitted to reach its fully retracted position so that the rollers **60–60** engage flats **115–115** at the lower ends of the cam grooves **59–59**. Thus, when the latchbolt **55** is moved to its fully retracted position, illustrated in FIG. **20**, by operation of the panic bar, the rollers **60–60** thereof will come to rest below the flats **115–115**, in which position the axes of the rollers will be substantially in line with their points of contact with the flats and the pivotal axis of said latchbolt **55** whereby, when the panic bar is released, the slide **57** will be supported by said rollers and retain the latchbolt in its fully retracted position. This will also retain the lower latchbolt **75** in its retracted position by reason of the slide **79** being held in its raised position through its rigid connection with the slide **57**.

When the door substantially fully closed, the plunger **113** will strike an abutment **116** on the keeper for the latchbolt **55**, shown in dotted lines in FIG. **20**, and swing the latchbolt so that the rollers **60–60** move away from the abutments **115–115** into the cam grooves **59–59** and allow the entire vertical rod assembly, to move downwardly and thereby raise the latchbolt **55** to its projected position and also lower the bottom latchbolt **75** to its projected position, whereby said latchbolts will engage their respective keepers just as the door reaches its fully closed position.

In the function illustrated in FIG. **5**, the top and bottom latchbolts may be retracted independently of the panic bar by means of the manually operable thumbpiece. When the rocker member **40** is in its effective position shown in FIGS. **6** and **8**, wherein the detent **43** is in register with the shoulder **45**, depression of the thumbpiece **35** will lift the rocker member and the slide **29** to effect retraction of the latchbolts **55** and **75** in the same manner as when the panic bar is depressed. However, retraction of the latchbolts from the outer side of the door may be prevented by inserting the key **51** into the key plug of the lock cylinder **50** and rotating said plug in a counterclockwise direction. This will rotate the link **49** and the finger **57** which will, in turn, rotate the cam **46** and tilt the rocker member to its ineffective position shown in FIG. **9** wherein the detent **43** is in register with the elongated section **44**-*a* of the opening **44** in the slide **29**. Hence, should the thumbpiece now be operated, the rocker member will move idly up and down relatively to said slide. The rocker member may, of course, be returned to its effective position by reverse rotation of the key plug.

Referring now to FIGS. **29** and **30**, it will be seen that the arcuate, keeper engaging face **117** of each of the latchbolts **55** and **75** moves away from the pivotal axis of the bolt as it approaches the stop thereon. This slight eccentricity is achieved by forming each of said faces on a radius **118** that is smaller than the radius **119** on which said face would normally lie and extends from a center spaced from the pivotal axis of the bolt. Thus, as the latchbolts move toward projected position they will engage their respective keepers with a wiping action which will retard the movement of the bolts slightly and

thereby minimize the latching noises which have heretofore been the source of numerous complaints with emergency exit locks of the vertical rod type. Moreover, the eccentric faces on the bolts will cause them to cam the door tightly into closed position and thereby eliminate rattles.

While I have herein shown and described my invention in what I have conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of my invention which is not to be limited to the details disclosed herein, but is to embrace any and all equivalent structures.

I claim:

1. In an emergency exit lock, a latch unit comprising:
a. means pivotally mounting a latchbolt on a casing;
b. said latchbolt being movable between projected and retracted positions;
c. a slide movably mounted in the casing;
d. means connecting the latchbolt to the slide to effect movement of the latchbolt to a retracted position;
e. said latchbolt being movable to a retracted position independently of the slide;
f. a spring member to bias the latchbolt toward a projected position;
g. a yoke member detachably connected to the casing and anchoring the spring member; and
h. screw means threaded to the yoke member to secure a cover member for the latch unit.

2. In an emergency exit lock, a latch unit comprising:
a. means pivotally mounting a latchbolt on a casing;
b. said latchbolt being movable between projected and retracted positions;
c. a slide slidably mounted in the casing;
d. said slide having sidewalls and opposed cam grooves in said sidewalls;
e. projections on the latchbolt extending into the cam grooves for causing movement of the latchbolt upon movement of the slide;
f. a keeper engageable by the latchbolt;
g. operating means for moving the slide to cause retraction of the latchbolt to release it from the keeper;
h. the slide being movable by the latchbolt upon retraction of the latchbolt through engagement with the keeper; and
i. abutment means for limiting the movement of the latchbolt toward a retracted position to retain said projections in said cam grooves.

3. In an emergency exit lock, a catch unit comprising:
a. means pivotally mounting a latchbolt on a casing;
b. said latchbolt being movable between projected and retracted positions;
c. a slide slidable in the casing;
d. said slide having opposed parallel walls and opposed cam grooves in the walls;
e. projections on opposite sides of the latchbolt extending into the cam grooves for causing movement of the latchbolt into retracted and projected positions;
f. operating means for moving the slide to cause operation of the latchbolt;
g. abutment means on the slide engageable with the projections to retain the latchbolt in a retracted position; and
h. means for initially moving the latchbolt when the door nears the closed position to cause disengagement of the projections from the abutment means and projection of the latchbolt into engagement with its keeper.

4. In an emergency exit lock, a latch unit comprising:
a. means pivotally mounting a latchbolt on a casing;
b. said latchbolt being movable between projected and retracted positions;
c. a slide slidably mounted in the casing;
d. said slide having opposed parallel walls with opposed cam grooves therein;
e. projections on opposite sides of the latchbolt extending into said grooves for operating the latchbolt upon sliding movement of the slide;
f. abutments on said slide adapted to engage the projections when the latchbolt is fully retracted for retaining the latchbolt in its retracted position; and
g. an abutment on the casing engageable by the latchbolt to prevent it from reaching its fully retracted position and thereby prevent engagement between the abutments on the slide and the projections.

5. The subject matter set forth in claim 4 wherein said abutment on the casing is removable to permit movement of the latchbolt to its fully retracted position and engagement of said projections with said abutments on the slide for retaining the latchbolt in its retracted position and means are provided which are operable when the door nears its closed position to disengage said latchbolt from said abutments on the slide and permit projection thereof.

6. In an emergency exit lock, a latch unit comprising:
a. a latchbolt mounted on a casing;
b. said latchbolt being movable between projected and retracted positions;
c. a member movable in the casing for operating the latchbolt;
d. a rod of thin wall construction for operating the member;
e. a connector secured to the member for connecting the rod thereto;
f. said connector having a slot to receive the thin wall of the rod;
g. a leg portion at each side of the slot, one of said leg portions having a hole therein, the other of said leg portions having a screw threaded thereto in axial alignment with said hole; and
h. a point on said screw adapted to pierce the wall and enter the hole to thereby connect the rod to the connector.

7. The subject matter set forth in claim 6 wherein the diameter of said hole is larger than the diameter of said point whereby an eyelet portion is formed in said thin wall by said point, said eyelet portion extending into said hole and thereby securing said rod to the connector.