Dec. 15, 1936. R. N. FRIEND 2,064,202

CLOSURE FASTENER FOR EMERGENCY DOORS

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Fig. 1.

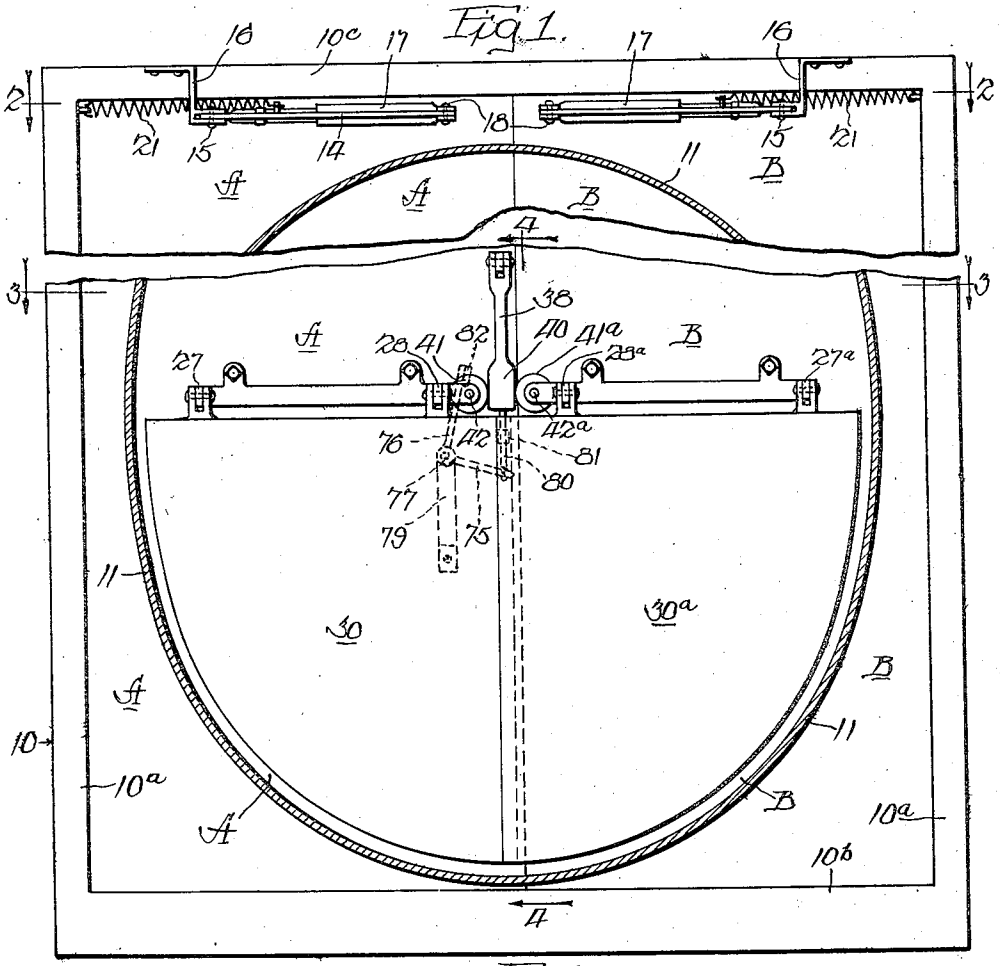

Fig. 2.

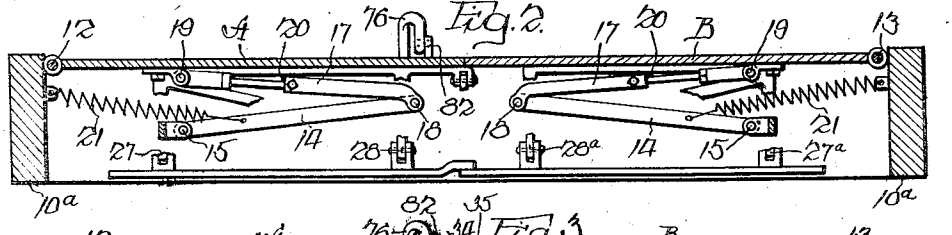

Fig. 3.

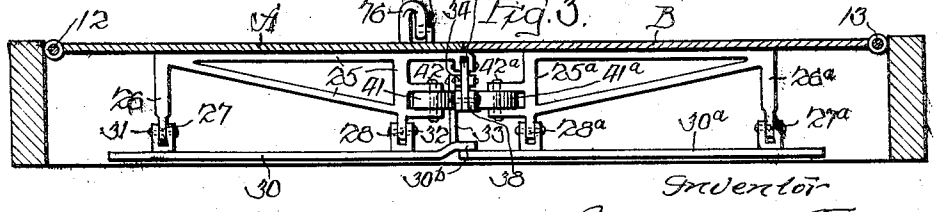

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Fig. 4.

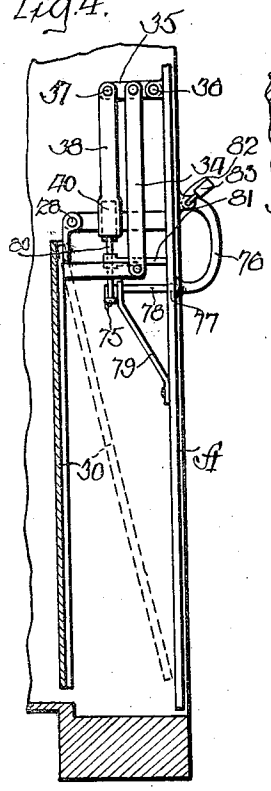


Fig. 5.

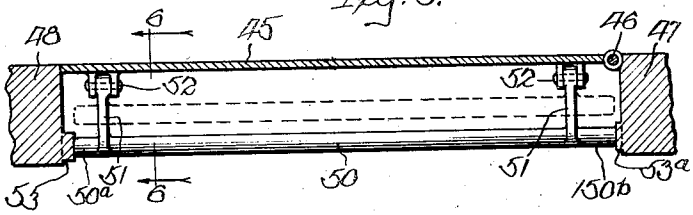


Fig. 6.

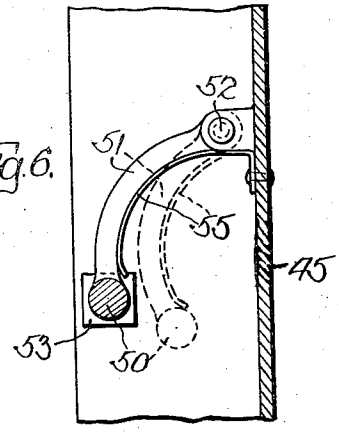


Fig. 7.

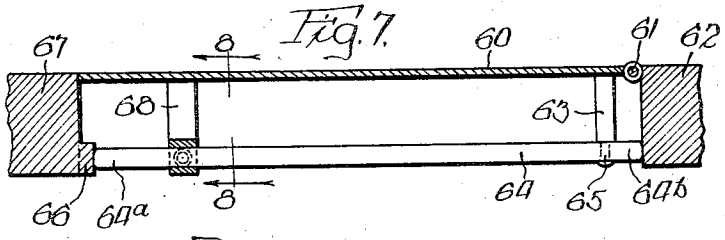
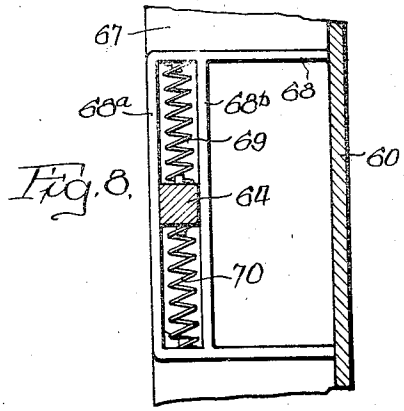


Fig. 8.



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CLOSURE FASTENER FOR EMERGENCY DOORS

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Application March 22, 1933, Serial No. 662,050

2 Claims. (Cl. 292—93)

These improvements relate to door fastener construction, with special reference and importance to what may be called emergency doors which should be operable rapidly, simply and reliably to permit the egress of persons from public buildings or particular devices such as chute-type fire escapes where a closure is desirable.

Emergency doors for buildings are well known, and various suggestions have been made of attachments which are variously called panic bolts, anti-panic bolts or fire-exit door bolts, all of which are operated, so far as I am aware, on the principle of a sliding bolt which positively locks the door, with means usually in the form of a movable cross bar near the rear surface of the door and which when moved by hand or pressed against by the body will cause the holding bolt or bolts to be retracted permitting either the single swinging door or the double swinging doors, as the case may be, to open.

The present invention in one aspect is such a panic bolt device applicable to doors generally. In another aspect the invention is in a door mechanism complete, although these improvements, in all of the forms herein shown, have the quality of an attachment feature since, in general at least, what is ordinary in swinging doors may be employed with but slight modification, if any, to make a door according to the improvements hereof.

One object of the present improvements is to provide door-locking-and-releasing means which may be peculiarly simple, of few parts, easy and certain in operation and which will promote safety and security at an emergency time of operation. These means are advantageous on ordinary occasions also.

In one form illustrated the principle, which I believe to be new, is embodied in a construction peculiarly advantageous in fire escapes. I have shown the application there in connection with the lower end of the fire escape, but substantially the same construction may also be used at the entrance passageway doors or door, with mere mechanical modifications and adaptations, and may be used also in the doors of theatres and other public buildings. In a fire escape of the chute type it is often highly desirable to close the lower end. If such a closure be used it must be such that in an emergency, as when persons are sliding down the chute, it will yield and open at once, certainly, and without danger to the occupant. In that same connection it is important also that means be provided for opening the door from the outside, and by means which may be locked against unauthorized entrance at the lower end, and one object of the invention is to provide those advantages in connection with fire escapes. Means for opening the door from the outside is often desirable in connection with doors used elsewhere. Other objects and advantages will appear hereinafter.

In the accompanying drawings Figure 1 is a fragmentary elevational view looking from inside the lower end portion of a chute-type fire escape toward the closed swinging doors thereof showing in such face view the preferred form of locking and releasing mechanism for the lower end of any sliding or chute-type of fire escape;

Fig. 2 is a horizontal sectional view on the line 2—2 of Fig. 1 with details of the lower mechanism shown in Fig. 3 broken away for clearness of illustration;

Fig. 3 is a horizontal section on the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary vertical cross-sectional view as on the line 4—4 of Fig. 1;

Figs. 5 and 7 are fragmentary horizontal sectional views of modified constructions; and

Figs. 6 and 8 are vertical sectional views on the lines 6—6 and 8—8 of Figs. 5 and 7 respectively.

Turning to Figs. 1 to 4 inclusive, the door frame marked as a whole 10 has side members 10*a*, a bottom member 10*b*, and a top member 10*c*. This frame surrounds the lower end of a tubular fire escape chute 11 shown sectionally in Fig. 1. A pair of swinging flat sheet metal doors A and B are hinged at 12 and 13 to the side members 10*a* respectively. There are spring-operated means shown at the top of Fig. 1 and in Fig. 2 for causing these doors A and B to swing outwardly when released. These means comprise two like devices, one for each door, each comprising an arm 14 hinged at 15 to a support 16 secured to frame part 10*c* and an arm 17 pivoted at 18 to the arm 14 and pivoted at 19 to the doors A and B respectively. The telescopic interfit at 20 (Fig. 2) is for adjusting the length of the arm 17. A coiled tension spring 21 secured to the side frame and to arm 14 moves the associated door open by straightening out the toggle arms 14—17.

Turning to the door-holding-and-releasing mechanism there is a triangular shaped frame work of metal 25, 25*a* secured to the doors A and B respectively, and arms 26, 26*a* extending from

these structures and terminating in pivot lugs 27, 27a, with similar pivot lugs 28, 28a extending from these triangular frames at their other end portions. Swinging plate 30 is hinged to lugs 27, 28 at 31, 32 and swinging plate 30a similarly to lugs 27a, 28a whereby these pendent plates may swing outwardly, meaning toward the doors A and B. A person descending the chute contacts generally involuntarily one or both of these plates 30, 30a and moves them toward the doors A and B respectively. Fig. 3 shows that pendent member 30 overlaps pendent member 30a at 30b whereby if the user should contact only member 30a the movement of that member would move the member 30 inward.

The mechanism for releasing the door is operated through pendent plate 30, by means of a rod 33 rigid with plate 30 and extending toward door A, there being a vertical link 34 pivoted to lever arm 33. At the top of link 34 is a lever 35 pivoted at 36 to door A and at 37 to a pendent member 38 which, at its lower end 40, is widened somewhat, and which element 40 is one of the several abutment members involved in the operation of the device according to the principle herein disclosed. It will be clear that when pendent member 30 is swung inward into its dotted-line positions in Fig. 4 the lever-and-link mechanism described will lift the abutment member 40 and the lift is such, as viewed in Fig. 1, that member 40 comes away from between the two rollers 41, 41a.

Turning to Fig. 3 it will be noted that these rollers 41, 41a are carried by the triangular-shaped members 25, 25a with the rollers pivoted at 42 and 42a respectively. These rollers 41, 41a are in a vertical plane considerably inward from the vertical plane passing through the hinges 12 and 13 of the doors A and B. When the abutment member 40 is between these rollers, as shown in Fig. 1, any tendency of the doors A and B to swing open causes the rollers to press upon the abutment member 40. There are three abutment members in this construction, two of them being the rollers, each of which abuts member 40, and member 40 abuts the rollers. Because of the abutment of these several members the doors A and B may not swing open, for such swinging movement demands that the inner surfaces of the roller contacting the member 40 shall move in an arc defined by the hinges 12 and 13, and the abutment member 40 prevents the rollers from moving closer to each other as called for by the arc of the opening movement of the doors. The doors A, B are thus locked in closed position so long as abutment member 40 is between the rollers; but when a person descending the chute impacts either one of the pendent plates 30, 30a the link and lever mechanism described and shown in Fig. 4 is operated to lift member 40 away from between the rollers, and thereupon the doors A and B may swing freely. In this connection I may observe that very little pressure is required upon the plates 30, 30a to release the mechanism. For example, rolling a handball down the chute will cause the doors to swing open.

The mechanism thus described is quite simple and is positive in action. A person sliding down the chute will be carried into contact with the doors by force of gravity and will automatically open the doors by impact, but even if he should come to the bottom very slowly and not impact a member 30 or 30a, still in turning or feeling about he would press against these elements causing the door to open.

Referring to Fig. 1 there is shown by dotted lines what appears to be a bell-crank having an arm 75 and an arm 76 pivoted at 77. Fig. 4 shows that arm 76 is a hand lever on the outside of door A, and has a shaft 78 extending through the door at 77, the shaft being pivotally supported by the bracket 79, and that arm 75 is at the inner end of shaft 78. A vertically-extending rod shown in dotted lines at 80 in Fig. 1 is loosely but securely mounted at the free end of arm 75, and extends to member 40, the rod being guided by a bracket 81. It is clear from this construction that when outer handle lever 76 is turned abutment member 40 will be raised from between the rollers, and thus means are provided for releasing the door for opening by a person outside the chute. At 82, in the path of the end of outer lever 76 is a stop having an eye or hole therein and the end of lever 76 has an aligning hole whereby a padlock 83 may be applied to lock the outer lever 76 in a position which leaves the inner mechanism free to be operated from the inside. This provision of means for opening the door from the outside by an authorized person is necessary for the periodical inspection of the mechanism within, cleaning the chute, sometimes for ventilation, and as a safeguard whereby under any circumstances the doors can be opened from the outside. The member 40 is also raised from the outside when the doors are being closed. It is highly desirable to maintain these doors closed against unauthorized entrance of the chute at the bottom. In this respect I have provided a device which may be opened from the outside and from the inside by means operating independently of each other, and according to which the releasing mechanism is operable from the inside when the outside opening means are locked. This is a feature which has highly commended itself to users of the device as solving difficulties and objections experienced heretofore.

Figs. 5 and 6 show a modified construction in which door 45 is hinged at 46 to door side frame 47. A cross bar 50 is rigid with a pair of arms 51 hinged at 52 on door 45. The end 50a of rigid cross bar 50 is an abutment member, and the small projection 53 extending outwardly from door frame 48 is another abutment member. These abutment members 50a, 53 are at a materially great distance inward from the vertical plane of door 45 passing through hinge 46, and, as in the other figures discussed, these abutment members are at the end of a diagonal from hinge 46 directed toward the opposite side of the door. Any improper attempt to open door 45 is defeated by the abutment of member 50a against member 53, because abutment 53 prevents the end of member 50a from describing the arc necessary to permit the door to swing open. If, however, bar 50 be so moved as to bring abutment member 50a away from abutment member 53 sufficient space will exist to permit the door to swing open. The view of Fig. 6 shows by dotted lines how, when bar 50 is pushed upon in the direction toward the door the bar is moved into the dotted-line position and away from abutment member 53. The same movement that releases the lock pushes the door open. Leaf springs 55 secured to the door press against the arms 51 to maintain the bar 50 in its normal position locking the door and the door-releasing

pressure is against the tension of spring **55**. It may be noted further that if one should pull upon bar **50** the release also would occur, and this is a feature of considerable importance since in time of confusion a person attempting to escape may be inclined to lift upward on the bar **50** instead of pushing down on it. The construction of Figs. 5 and 6 is preferred for use in connection with theatre doors and other public buildings, and is, I believe, the simplest form of a so-called panic bolt known. In this connection I point out that preferably the other end of bar **50**, marked **50***b*, will extend into abutment with the door frame or a shallow stop **53***a* thereon which is merely to relieve the strain on the arms **51** when end pressure occurs on bar **50** on an attempt to open the door without its normal release.

In Figs. 7 and 8 I have shown a construction in which the door **60** is pivoted at **61** to door side frame **62**. A stanchion, bracket or support **63** rigid with the door extends inwardly. The cross bar **64** is pivoted at **65** on this bracket to swing up and down at its free end. That free end **64***a* is an abutment member and cooperates with the abutment member **66** on door side frame **67**. There is a guide **68** rigid with the door, and bar **64** is mounted to move up and down between the outer part **68***a* and the inner part **68***b* and compression springs **69** and **70** above and below the bar normally maintain the bar in its locking position as shown in Fig. 7. The free end of bar **64** may be lifted or depressed to move its end **64***a* away from the small projection **66**, which projection may be considered in face view to be like the one **53** in Fig. 6. The bar **64** extends at **64***b* into close association with the frame **62**, the reason for which, as in Fig. 5, is merely to take the strain off of the bar-supporting means, as bracket **63** in Fig. 7.

In all of the devices illustrated the locking principle is the same, and is exemplified in a swinging door having means rearward of the vertical plane of the door passing through the vertical axis of the hinge connections and which rearwardly-disposed part abuts a rigid element so as to prevent that part from moving closer to the door frame opposite the hinge, or, in other words, preventing such part from moving so as to satisfy the transverse components of the arc determined by the door hinge, with means for moving one of the coacting abutment members, preferably one carried by the door, out of the way so that it no longer obstructs the swinging movement.

I contemplate as being included in these improvements all such variations, changes or departures from what is thus specifically illustrated and described as fall within the scope of the appended claims.

I claim:

1. In locking mechanism adapted for a hinged door particularly of the type where the locking mechanism is arranged to be operated in response to contact by a person seeking exit, said locking mechanism comprising an abutment member carried by the door in a plane inward of the plane of the door when the door is closed, a second abutment member carried by the door movable into engagement with the first-mentioned abutment member and simultaneously engageable with a third abutment member, said movable member when so engaged preventing approach of the first-mentioned and said third abutment members whereby the door is locked until the movable abutment member is moved out of said engagement, and means for moving the movable abutment member out of said engagement for permitting opening of the door, said means including a relatively large area contact plate hinged on the inside of the door to swing toward the door, said abutment members being within a compass transversely of the door substantially narrower than the door.

2. In door fastener construction of the type where the locking mechanism is arranged to be operated in response to contact by a person seeking exit, and having normally aligned relatively movable abutment members disposed in a plane parallel to and inwardly of the door for normally preventing opening of the door, the combination of an unlocking member having an arm on the exterior of the door and having a portion passing through the door into the plane of said abutment members and arranged for moving one of said abutment members out of alignment to permit opening of the door upon operation of the unlocking member, said abutment member which is adapted to be moved by the unlocking member being also movable independently of the unlocking member, and a lug on the exterior of the door engageable by the said arm in the position occupied by said arm when the unlocking member is inoperative to move said abutment member whereby the said arm and said lug may be secured together by a padlock or the like against unauthorized movement of the unlocking member to operative position while leaving the abutment members relatively movable.

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