

DEVICE FOR THE RELEASE OF EXIT DOORS

5 This invention relates to devices for the emergency release of exit doors, and is particularly concerned with an exit device having an improved dead latch arrangement and actuator assembly of the rim or surface-mounted type.

10 Exit devices, sometimes known as panic bolts, are generally known in the art, as disclosed, for example, in U.S. patent no: 3,877,262. In some of the earlier exit devices, dead latches have been provided, usually with the addition of a number of parts which have been required to assure their efficacy. These prior devices have been subject to breakdown, and have been expensive to manufacture and maintain.

15 According to the present invention, an exit device comprises a horizontal panic bar for mounting waist-high on a swinging door and a latch housing for securing at the edge of the door adjacent an end of the panic bar, the latch housing holding a vertically reciprocable slide having similar but oppositely inclined
20 cam surfaces thereon converging to a minimum point, normally engaged by a follower on a latch bolt which has a lateral projection parallel to the axis of the latch bolt and is pivotally mounted in the housing about a vertical axis and movable from an extended
25 position corresponding to engagement of the follower with the minimum point of the cam surfaces to a retracted position, and a two-armed lever pivotally mounted in the housing on a horizontal pin, the end of one arm of the lever being held captive in the slide and the
30 other arm extending out beyond the housing

at an angle for engagement by the panic bar whereby the movement of the panic bar toward the door in an exit movement causes the lever to move the slide vertically, thus moving the cam to drive the follower inwardly of the housing to retract the latch bolt, the device further including an auxiliary bolt spaced from the latch bolt which is pivotal between extended and retracted positions about the same axis as the latch bolt, and has an outer rim which extends further from its axis at its inner end than at its outer end, and a blocking leg having a portion for engaging the projection on the latch bolt and generally aligned with the auxiliary bolt, the leg being pivotally mounted in the housing on an axis parallel to the latch bolt axis and having its distal end biased towards and normally engaging the outer rim of the auxiliary bolt at its inner end when the auxiliary bolt is extended, so that the projection-engaging portion clears the lateral projection, but when the auxiliary bolt is held retracted, engages adjacent the outer end of the auxiliary bolt so as to move to a position in which the projection-engaging portion blocks the retraction of the latch bolt.

An example of exit device in accordance with the invention will now be described with reference to the accompanying drawings, in which:-

Figure 1 is a front view of an exit device mounted on a door and embodying the invention;

5 Figure 2 is an enlarged fragmentary view taken on line 2 - 2 of Figure 3 of a latch and actuator assembly with a cover and panic bar removed;

10 Figure 3 is a fragmentary sectional view taken on the line 3 - 3 of Figure 2 with the latch assembly removed for simplicity;

Figure 4 is a bottom fragmentary plan view of the latch and actuator assembly with the housing partly broken away;

Figure 5 is a front end view;

15 Figure 6 is a view taken on the line 6 - 6 of Figure 5;

Figure 6a is a fragmentary sectional view taken on the line 6a - 6a of Figure 6, but showing a

U-shaped element as it appears with an auxiliary bolt held in by the strike;

Figure 6b is a view similar to Figure 6a but showing the U-shaped element after the panic bar has been pressed down;

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Figure 7 is a greatly enlarged sectional view taken on the line 7 - 7 of Figure 6, showing a safety fire locking feature of the assembly intact; and

Figure 8 is a sectional view similar to Figure 7 showing the assembly after it has been subjected to fusing temperatures as in a fire.

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An exit device embodying the invention is generally designated 10 in Figure 1 and mounted on a door D. Shown in Figure 1 is a latch actuator housing cover 12 and an elongated bar skirt 14 in which a flat panic bar 16 is mounted for depression. A cosmetic end cover 18 hides the end of the skirt and panic bar 16. Extending outward from the cover 12 is a latch bolt 20 and a pivoted auxiliary bolt 22.

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With the cover 12 removed from its mounting clips 23 as shown in Figure 2 there is exposed a housing 24 for the latch and actuator. The box-like housing comprises a base member 26 having an upstanding front panel 28, side panels 30 and 32 and rear panel 34. A latch bolt spindle 36 (Figure 4) is disposed in aligned openings in side panels 30 and 32. The ends of the spindle protrude through the side panels and are fixed in position by press nuts 38 and the latch bolt 20 and auxiliary bolt 22 are journaled thereon to comprise a latch assembly.

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A cover panel 40 (Figure 4) joins the side panels 30 and 32 and a depending web 42 is disposed parallel to the rear panel 34. Aligned openings in depending web 42 and rear panel 34 receive a stub shaft 44 comprising the fulcrum of an L-shaped lever 46 (Figure 3). In the preferred embodiment the lever 46 is in the form of packed-together steel laminants giving the structure great strength and wear resistance.

As shown in Figures 2 and 3, the unit further comprises a slidable vertical yoke element 50 which rests against the base member 26 and includes a rightward extension (Figure 6) which presents a pocket 52 entrapping the lower end of the L-shaped lever 46. The upper and lower ends of the yoke element can engage the conventional upper and lower latch rods for three point latching if desired. As best shown in Figure 6, the yoke element 50 is formed with a downward rib 54 which is received into a vertical slot 56 in the base plate 26. This arrangement guides the yoke element as it moves up and down in the housing. The rib 54 may provide an operative connection between the latch and an operator external of the door, such as a thumb piece or lock cylinder lever as is well known in the art. Figures 2 and 6 also show the cam surfaces 58 and 60 on the yoke 50 which converge toward a point an equal distance between the ends of the yoke and adjacent the front wall 28 of the housing.

As shown in Figure 6, the latch bolt 20 is formed with a downward pin 62 which is projected in dotted lines in Figure 2 at the convergence of the

cam surfaces 58 and 60. As a result, when the yoke in Figure 2 is raised or lowered, the pin 60 is driven inward of the housing by one of the converging surfaces 58 and 60 causing the latch bolt 20 (Figure 6) to retract. The return of the yoke to its central position shown in Figure 2 permits the latch bolt to extend as shown in Figure 6.

The panic bar 16 (Figure 4) is mounted for reciprocation toward and away from the door by conventional means not shown. It is spring-biased away from the door. Figure 4 shows the leftward extension plate 62 which is riveted or otherwise secured to the bar 16 and extends over the upward arm 46a of the lever 46. Resulting from this structure, when the bar is pressed toward the door the arm 46a of the lever 46 is moved inward of the housing causing the arm 46b which extends into pocket 52 of the yoke 50 to move upwardly and thus move the entire yoke. Such movement results in the upward movement of the cam 60 to drive the pin 62 to the right in Figures 2 and 6, retracting the latch 20, permitting it to clear the strike (not shown) and allowing the door to open.

An axial spring 64 surrounds the spindle 36 (Figure 5) and at one end engages a pin 65 on the latch bolt 20 and on the other end engages the housing. The spring, therefore, drives the latch bolt to its extended condition when the panic bar 16 is dis-engaged, causing the yoke 50 to return to the position shown in Figure 2.

The auxiliary bolt 22 is also pivotally mounted on the spindle 36 (Figure 6) and includes a

downward projecting lobe 70. The opposite ends of an axial spring 72 engage the housing 24 and the auxiliary bolt 22 respectively to drive the auxiliary bolt in the extended position.

5. An auxiliary latch-operating means will now be described, which is an important feature of this invention.

10. A secondary spindle is provided at 76 and is journaled between the side walls 30 and 32 of the housing and held in place by press nuts 38. A U-shaped bracket 80 is provided with aligned openings in the legs of the "U" as at 82, such openings receiving the spindle 76. A spacer or bushing 84 keeps the bracket from moving laterally on the spindle. The lower leg 86 of
15. the bracket extends outward and terminates angularly in a follower pad 88 which engages the lobe 70 of the auxiliary bolt 22.

20. As can be readily envisioned, the pad 88 is normally held downward (Figure 6) by the lobe 70 on the auxiliary bolt 22. However, when the auxiliary bolt is retracted as by contact with the door frame strike, the lobe moves inward or to the right in Figure 6 and the pad 88 in the absence of the lobe 70 moves upward to engage the periphery 22a of the auxiliary bolt. This
25. places the notch 90 on bracket leg 86 clearly in the path of a blocking pin or projection 92 extending outward from the side of the latch bolt 20 blocking any attempt to retract the latch bolt by force directly upon it.

30. Referring more particularly to the U-shaped

5. bracket 80, its bight 80a (Figure 6a) is formed with an irregularly shaped opening 100, the margin of which features a downward U-shaped projection 100a. As shown the stub shaft 44 extends beyond the web 42 and terminates in a shape having a groove 44a. This structure results in a cammed raising of the bight 80a when the stub shaft 44 is turned by the lever 46. When the movement of the panic bar is initiated, the raising of the bight as shown in Figure 6b results in a pivotal
10. lowering of the leg 86 to a position comparable to that shown in Figure 6 even though with the door closed the auxiliary bolt 22 is held retracted. This downward movement of the leg 86 moves the notch 90 out of the way of the blocking pin 92 to permit the free movement of
15. the latch 20.

It should be understood that the ample lower portion of the opening 100 on the bight 80a permits lowering of the wing or leg 86 as the lobe 70 of the auxiliary latch 22 moves to its extended position.

20. Thus, it should be clear that the lowering of the leg 86 with its surface 90 to permit the free passage of pin 92 and retraction of the main latch bolt 20 may be accomplished either

- (1) by the lobe 70 of the extended auxiliary latch
25. 22 holding the leg downward through engagement with pad 88 to permit the free retraction of the latch upon hitting the strike as in the normal closing of the door; or

- (2) by the rotation of the stub shaft 44 (Figure
30. 6a) as the opening of the door by panic bar is initiated.

As stated, the unlatching of the door by panic bar in normal opening is accomplished by the upward movement of the arm 46b of lever 46 which moves yoke 50 up causing the surface 60 to drive the pin 62 inward retracting the latch bolt 20. Continued pressing of the panic bar, of course, opens the door.

A feature of the latch shown in the accompanying drawings is shown in Figures 7 and 8 and comprises a locking pin 110 disposed in a bore 112 in the main latch 20. As shown, there is an inward shelf 114 at the lower end of the bore and a fusible spool 116 is disposed against the inside of the shelf 114. The pin is formed with a central enlargement 118 which rests on the top of the spool 116. A second fusible spool 120 superposes the enlargement 110 and surrounds the pin, and a non-fusible retainer ring 122 is press-fitted into the top of the bore 112. As a result of this structure, high heat as in the case of a fire will cause the fusible spool 116 to melt permitting the pin 110 to drop so that its enlargement 118 rests on the inward shelf 114. This causes the lower end of the pin 110 to extend downward and lie on the outside of the front panel 28 blocking the retraction of the latch so that the door cannot be opened accidentally or otherwise to permit the spread of the fire. The purpose of the ring 122 is to duplicate the shelf 114 so that the latch can be inverted for doors of opposite hand.

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C L A I M S

1. A device for the release of exit doors comprising a horizontal panic bar for mounting waist-high on a swinging door and a latch housing for securing at the edge of the door adjacent an end of the panic bar, the latch housing holding a vertically reciprocable slide having similar but oppositely inclined cam surfaces thereon converging to a minimum point, normally engaged by a follower on a latch bolt which has a lateral projection parallel to the axis of the latch bolt and is pivotally mounted in the housing about a vertical axis and movable from an extended position corresponding to engagement of the follower with the minimum point of the cam surfaces to a retracted position, and a two-armed lever pivotally mounted in the housing on a horizontal pin, the end of one arm of the lever being held captive in the slide and the other arm extending out beyond the housing at an angle for engagement by the panic bar whereby the movement of the panic bar toward the door in an exit movement causes the lever to move the slide vertically, thus moving the cam to drive the follower inwardly of the housing to retract the latch bolt, the device further including an auxiliary bolt spaced from the latch bolt which is pivotal between extended and retracted positions about the same axis as the latch bolt, and has an outer rim which extends further from its axis at its inner end than at its outer end, and a blocking leg having a portion for engaging the projection on the latch bolt and generally aligned with the auxiliary bolt, the leg being pivotally mounted in the housing on an axis parallel to the latch bolt axis and having its distal end biased towards and normally engaging the outer rim of the auxiliary bolt at its inner end when the auxiliary bolt is extended, so that the projection-



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engaging portion clears the lateral projection, but when the auxiliary bolt is held retracted, engages adjacent the outer end of the auxiliary bolt so as to move to a position in which the projection-engaging portion blocks the retraction of the latch bolt.

2. A device as claimed in claim 1, wherein the horizontal pin on which the two-armed lever is pivoted turns with the lever and is associated with the blocking leg so that the initial movement of the panic bar moves the blocking leg into a position in which its projection-engaging portion does not block the retraction of the latch bolt.

3. A device as claimed in claim 2, wherein the blocking leg is U-shaped and includes an irregularly shaped window in its bight, the horizontal pin also having an irregularly shaped end butting into and cooperating with the window in such a way that when the pin rotates as the panic bar moves, it engages the window to drive the blocking leg into the position in which it does not block the retraction of the latch bolt.

4. A device as claimed in any one of the preceding claims wherein the latch bolt has a vertical bore there-through with inward retaining shoulders disposed at its respective ends and a high temperature activated locking pin having a central enlargement is disposed in the bore with fusible spools surrounding the respective ends of the pin and holding the enlargement spaced inward from the shoulders, whereby in the event of a fire the spools melt and the pin drops, a portion extending downward out of the bore and being held by the engagement of the enlargement with one of the shoulders, the extending pin portion blocking retraction of the latch bolt by engaging the latch housing.

5. A device for the release of exit doors, substantially as described and as illustrated with reference to the accompanying drawings.