EMERGENCY RELEASE LATCH MECHANISM

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Application September 27, 1955, Serial No. 536,826
4 Claims. (Cl. 292—92)

This invention relates to latch mechanisms, and, in particular, to a door latch mechanism having a conventional operating handle on the exterior of the door, and an emergency operating mechanism on the inside of the door, whereby to prevent one from being trapped inside of a room or other space served by the door.

Although the invention was inspired by the relatively numerous tragic deaths of children who have become trapped in discarded refrigerators, it is applicable to vaults, storage rooms, and the like, within which it may be extremely dangerous even for an adult to be trapped.

I am aware that numerous latch actuators have been proposed to permit a door to be opened from the inside in an emergency; but most of them appear to be characterized by structures which require substantial physical effort to operate, or have relatively small handles or pushbuttons which must be actuated by the occupant of the space.

Where adults are concerned, prior art devices with which I am familiar are quite satisfactory; but a device designed for immediate and fool-proof operation in the dark, by a panic stricken child, must require a minimum of physical effort for operation, with a release actuator arranged so that it covers a large area of the inside panel of the door, and actuable merely upon contact by any part of the body. It is desirable that the latch itself be of conventional construction, whereby the same latch mechanism may be used for a wide variety of cabinets, regardless of whether or not the cabinets are to embody the emergency release feature. By using a standard latch and latch operator, a considerable cost saving may be realized.

It is therefore an object of the invention to provide an improved emergency release latch mechanism.

It is another object of the invention to provide an emergency release latch mechanism in which the release mechanism requires very little physical effort to operate.

It is another object of the invention to provide an emergency release latch mechanism in which a conventional latch is used in association with a release mechanism which operates solely on the strike or latch engaging device mounted on the door jamb.

It is yet another object of the invention to provide an emergency release latch mechanism in which the release mechanism is of exceedingly simple nature and therefore certain of operation in the emergency.

Other features and advantages of the invention will best be understood from the following detailed description of a presently preferred embodiment thereof, read in connection with the accompanying drawings in which:

Fig. 1 is a front perspective view of a refrigerator with the door opened sufficiently to show a presently preferred arrangement of emergency release operator, keeper, and other associated parts;

Fig. 2 is a plan section taken through lines 2—2 of Fig. 1;

Fig. 3 is a somewhat schematic perspective view showing the emergency operator relative to the keeper release lever;

Fig. 4 is a somewhat schematic elevation of the emergency release mechanism, primarily to show the space relationship of the associated parts;

Fig. 5 is a side elevation showing the mechanism in a normal closed position and at the instant the release mechanism has been pressed;

Fig. 6 is a view similar to Fig. 5 showing the emergency release action at the instant of release; and

Fig. 7 is a view similar to Fig. 5 but showing the latch bolt in normal open position, about to engage the keeper as the door is being swung home.

The invention is illustrated in its application to a conventional refrigerator of the single vertical door type. The invention, as presently described, renders the door incapable of remaining shut when a release mechanism has been pressed.

The refrigerator comprises the usual insulated cabinet 1 and door 2; the door is of the shelf-equipped type in which the inner panel 3 of the door is recessed and provided with a plurality of shelves 4 for the storage of small articles, as is well known in the art. A side wall of the cabinet, corresponding to a door jamb of a room or other enclosure, is provided with a strike plate 5; a keeper fixed to said plate as later described, enters an opening 6 in a side wall of the door and within the door engages with the latch bolt mechanism of a latch disposed within the door. As usual, the door is fitted with a resilient gasket 7 about its margin. The gasket is maintained under substantial compression when the door is latched shut; the resilience of the gasket material is used to excellent advantage during the emergency release operation of the latch, as presently explained.

The latch mechanism itself is in all respects conventional; the keeper had been modified in simple fashion, as best shown in Fig. 5. The latch 8 comprises a channel body portion 9 formed from heavy sheet metal. The open front end of the channel faces the opening 6 in the door panel 3; the closed rear end 10 of the channel is suitably affixed to the door for permanent rigid attachment thereto. As best shown in Fig. 2, the method of attachment may be by way of ears 11 and screws 12 which enter tapped bosses provided on a backing plate 14 serving also to mount the housing 15 within which the latch operating handle 16 is pivoted.

A heavy metal latch bolt 17 is pivoted at 18 within the latch body. A mousetrap spring or equivalent 19 urges the latch bolt into a clockwise rotation, as viewed in Fig. 5. The latch bolt is provided with a notch 20 defined by the tongues 21 and 22; said tongue 22 being the longer. The latch bolt also is provided with a slot 23 having the angularly branching end portion 24. The latch bolt is embraced by a rigid actuating arm 25 pivoted at 26 within the casing 8. Wall portions of arm 25 straddle the latch bolt and mount between a roller 26 which rides within the slot 23, 24. A powerful coil spring 27 based on a wall 28 of the latch body portion 9 bears continuously against the arm 25 and urges it into counterclockwise rotation. It will be obvious that the action of spring 27 is also to urge the latch bolt into counterclockwise rotation. An actuating pin 30 slideably carried by the housing 9 and the handle housing 15 is arranged for operative association with a boss 31 formed on the handle 16, as shown in Fig. 2.

When the handle is rotated clockwise of Fig. 2, the boss 31 engages the headed end of pin 30 and drives it toward the adjacent end wall of arm 25, said wall being formed with a target 32 in registry with the pin. As the inwardly driving pin engages the arm 25, it rotates it clockwise of Fig. 5 and the roller moves along the
When the roller enters the branch slot 24, the biasing spring 19 of the latch bolt 17 rotates the same clockwise as permitted by the slot 24. The position of the latch bolt is then as in Fig. 7. The powerful spring 27 is held under compression and the latch bolt is maintained in its Fig. 7 position by the engagement of the walls of the slot 24 with the roller 26. The handle 16 may then be released, whereupon it returns to its initial position by spring means 29 and the pin 30 withdrawn from the arm 25 under the urging of its coil spring 33, Fig. 2.

The keeper 34 is securely bolted or otherwise fastened to the mounting plate 5 on the side wall of the cabinet, as shown in Fig. 1. Conventional keepers comprise a rigid channel-shaped body 35 carrying between its walls a roller 36. When the latch bolt is in its normally open position, as shown in Fig. 7 and the door is then swung shut, the tongue 22 engages the keeper roller 36 (the tongue 21 passes over said roller) and the latch bolt is rotated counterclockwise of Fig. 5 against the bias of the relatively light spring 19 until the roller 26 enters the slot portion 23 of the latch bolt, at which point the tongue 21 will have reached over the striker roller 36. The reaction of the powerful spring 27 completes the movement of the latch bolt which draws the door shut. The gasket 7 is compressed as the door comes to its closed position. The foregoing latch mechanism is in all respects conventional and familiar to those skilled in the art. Of itself, it forms no part of the present invention.

In the present invention, the keeper 34 is modified so that the roller 36 is not fixed to the body 35. For example, and as best shown in Figs. 2 and 5, roller 36 is carried by the walls of a generally triangular channel member 37 pivotally mounted within the body member 35, on pivot 38. A spring 39 urges the member 37 into counterclockwise rotation about its pivot 38, until the base portion 40 of the member 37 comes to rest against a base wall 41 of the keeper body 35. The keeper member 37 is held in its said rest position by means of a retainer or locking lever 42, pivotally mounted within the body 35 as on a pivot 43 and extending down through the open bottom of said body 35 as shown. Lever 42 has a tongue 44 struck outward therefrom to overlie the base portion 40 of the keeper element 37 to secure it in position. Lever 42 is biased by spring 45 to rotate into engaged position relative to member 37. Rotating the keeper member 37 from its Fig. 6 position counterclockwise to its home position will cause the end of base 40 to engage beneath the sloping tongue 44, whereupon the base 40 will be secured in its normal operating position.

Now it will be obvious that if the keeper member 37 is free to rotate on its pivot 38, it becomes entirely incapable of holding the door closed, for the reason that as the door moves away from the keeper, the tongue 21 of the latch bolt 17 effects a rotation of the keeper roller 36 out of the slot 20 of the latch bolt, whereupon the keeper and latch bolt are completely disengaged. The movement of the door away from the keeper can be induced by light physical effort on the part of one who might have been trapped in the enclosure served by the door. Coreering the enclosure to be a refrigerator, or other cabinet having a resilient seal similar to the gasket 7, the resilience of the gasket itself will move the door sufficiently away from the cabinet to disengage the latch bolt from the keeper element 37.

A preferred means of releasing the keeper element 37 by displacement of lever 42 relative thereto is best shown in Figs. 3 and 4. A vertical rock shaft 48 is mounted within the door adjacent the latch 8 by means such as the upper and lower support brackets 50 which journal the shaft 48 for rotation on a vertical axis. Pinned to shaft 48 for rotation therewith is a release member, such as the trip arm 51 which reaches into operative relationship with the lever 42, as best shown by comparison of Figs. 4 and 5. It should be understood that the trip arm is within the opening 6 in the door and that when the door is closed, the end portion of the keeper body enters the opening and the face of lever 42 is presented immediately in front of the opening. Normally, springs 52 rotate the shaft 48 counterclockwise, as viewed in Fig. 2, to withdraw the trip arm a quarter of an inch or so from the face of lever 42, thus preventing accidental release of the element 37 if the door is slammed shut. Also securely pinned to shaft 48 are a pair of pusher arms 53 which reach outwardly into registry with slots 54 formed in the inner panel 3 of the door.

The release operator is arranged to occupy a substantial area of the central portion of the door. In a preferred form, it comprises push bars 55 extending transversely of the door. In refrigerators having door shelves 4, it is preferable to mount the bars 55 immediately beneath the adjacent shelves 4. As shown in Fig. 2, the operator bar extends appreciably forward of the shelf wall. The respective upper and lower operator bars 54 the preferably interconnected by rigid flat strips 56 to increase the active area thereof. One end of each bar passes through an opening 57 at the left-hand side of the door panel 3, as viewed in Fig. 1, and within the door structure is suitably pivotally mounted for rotation in a horizontal plane. Such mounting may be by way of a bracket 58 for securement within the door as suggested by Fig. 4. The free end of each bar passes through the previously noted opening 54 in the door panel and, as best shown in Fig. 2, has a rounded head portion 59 which extends into relatively close relationship with the arm member 53. It will be understood that the opening 54 through which each bar projects is slot-like so as to guide the movement of the bar 55 without permitting substantial vertical play therein.

The free end of each bar is formed with a hook-like extension 60 which, when the bar is in position with its free end within the panel 3, overlies a portion of said panel just beyond the edge of the slot. The hook portion acts as a stop to prevent the end of the bar from swinging out of the panel 3 if the door 2 were slammed shut. It will be obvious that slamming the door shut will have no effect on the operation of the emergency release mechanism, for the natural movement of the operator bars in such a circumstance is away from the pusher arms 53. It takes only a very slight movement of the actuator bars in a counterclockwise direction, as viewed in Fig. 2, to cause the pressure of the bars against the arms 53 to rotate the shaft 48 sufficiently to bring the trip arm 51 into engagement with the end of lever 42, and it is obvious that a very small movement of said arm 51 after it has engaged lever 42 will rotate the latter to release the keeper member 37. Although even the light physical effort necessary to move the actuator bars will also be sufficient to swing the refrigerator door open after the keeper member 37 has been released, the reaction of the gasket 7 itself would exert a sufficient outward movement on the door to complete the release of the latch bolt from the keeper member.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

I claim:

1. An emergency latch release mechanism operable from within an enclosure having a hinged door, comprising a keeper having a fixed frame portion secured externally of said enclosure adjacent a margin of the door opening, a keeper member within said frame portion, latching means carried by said door and including a
latch bolt disposed within said door, said latch bolt having rigid wall members defining a forked portion, said door having an opening forming an entrance for said keeper member to bring the same into latching position within the forked portion of said latch bolt when the door is swung to closed position, means for mounting said keeper member for free pivotal movement whereby when the door is swung in opening direction one of said latch bolt wall members will engage and rotate said keeper member out of said forked portion, retainer means releasably securing said keeper member against such rotation, a release member disposed within said door for operating said retainer means to releasing position, and an operator carried by said door within said enclosure and adapted by manual effort applied against said operator in a door-opening direction, to operate said release member to its releasing position.

2. An emergency release mechanism for operation from within a compartment having a hinged door, comprising a keeper having a body portion fixed to wall means defining a portion of the door opening of said compartment, a keeper member carried by said body portion and including a transversely-extending rod-like element, a latch mechanism carried by said door and including a rotatably mounted latch bolt disposed within said door, said latch bolt having rigid wall elements defining a forked portion, said door having a passage communicating with said latch bolt and providing for the entrance of said keeper member into operative relation with said latch bolt as the door is swung closed, the rod-like element of said keeper member thereupon entering into said forked portion and engaging with one of the wall elements thereof to rotate said latch bolt to a position in which said wall elements embrace said rod-like element to secure the door in closed position, means for pivotally mounting said keeper element for rotation out of said forked portion upon being engaged by the other of said wall elements when the door is moved in opening direction, a locking lever pivotally carried by said keeper body portion and engageable with said pivoted keeper member to releasably secure the same against rotation, a trip arm carried by said door and engageable with said locking lever to actuate the same to free said keeper member for said rotation out of said forked portion, and an operator for said trip arm to effect the said actuation thereof upon pressure against said operator in door-opening direction, said operator being carried by the inner wall of said door in position for manual engagement by an occupant of said enclosure.

3. An emergency release mechanism for operation from within a compartment having a hinged door, comprising a keeper member carried by wall means defining a portion of the door opening of said compartment, said keeper member including a transversely-extending bar, a latch mechanism carried by said door and including a rotatably mounted latch bolt disposed within said door, said latch bolt having rigid wall elements defining a forked portion, said door having a passage communicating with said latch bolt and providing for the entrance of said keeper member into operative relation with said latch bolt as the door is swung closed, the bar of said keeper member thereupon entering into said forked portion and engaging with one of the wall elements thereof to rotate said latch bolt to a position in which said wall elements embrace said bar, means for mounting said keeper element for rotation out of said forked portion upon being engaged by the other of said wall elements when the door is moved in opening direction, a locking element supported relative to said keeper member and releasably engageable therewith to releasably secure said keeper member against said rotation, a trip member carried by said door and engageable with said locking element to actuate the same to release said keeper member for said rotation out of said forked portion, and an operator for said trip member to effect the said actuation thereof upon pressure against said operator in door-opening direction, said operator being carried by the inner wall of said door and occupying a substantial area thereof.

4. An emergency release mechanism for operation from within a compartment having a hinged door, comprising a keeper member carried by wall means defining a portion of the door opening of said compartment, a latch mechanism carried by said door and including a pivotally mounted latch bolt disposed within said door, said latching having rigid wall elements defining a forked portion, said door having a passage communicating with said latch bolt and providing for the entrance of said keeper member into operative relation with said latch bolt as the door is swung closed, a portion of said keeper member thereupon interengaging with said latch bolt to rotate said latch bolt to a position in which said wall elements embrace said portion to secure the door in closed position, means for mounting said keeper element for rotation of the said portion thereof out of said forked portion upon being engaged by said latch bolt when the door is swung in opening direction, a locking element pivotally carried by said keeper body portion and engageable with said keeper member to releasably secure the same against said rotation, release means disposed within said door and having a release member engageable with said locking member to actuate the same to free said keeper member for disengagement from said latch bolt, and an operator for said release member to effect the said actuation thereof upon pressure against said operator in door-opening direction, said operator comprising a plurality of interconnected levers carried by the inner wall of said door in position manually engageable by an occupant of said enclosure.

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