June 18, 1963 G. R. WALLMANN 3,094,199

HEAT LATCH FOR FIRE DOORS

Filed Feb. 3, 1961 2 Sheets-Sheet 1

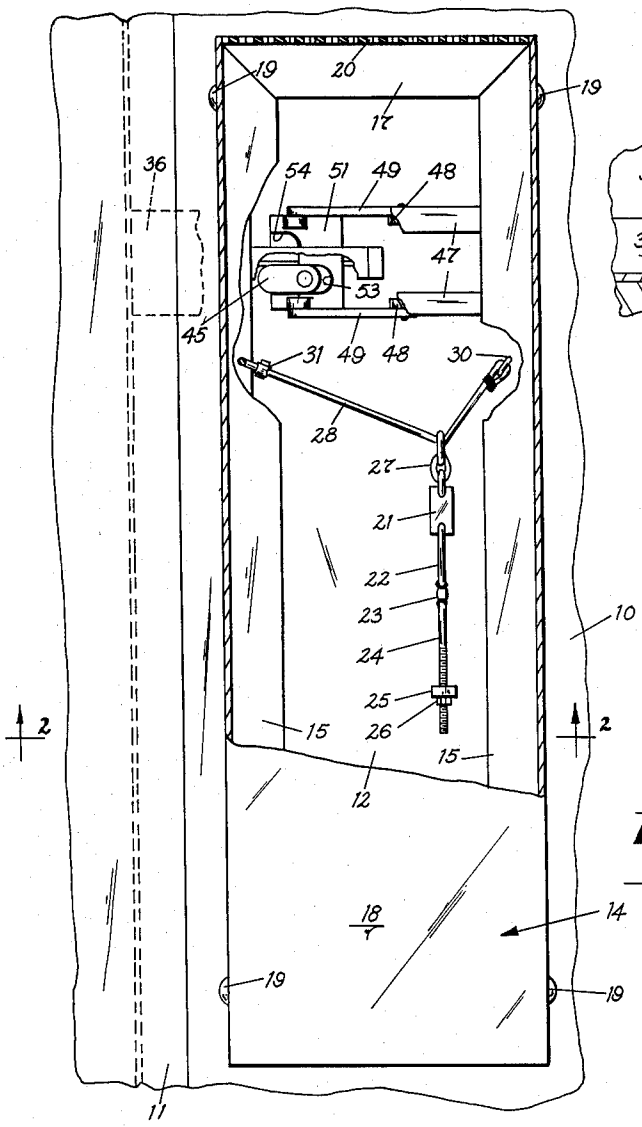


Fig. 1

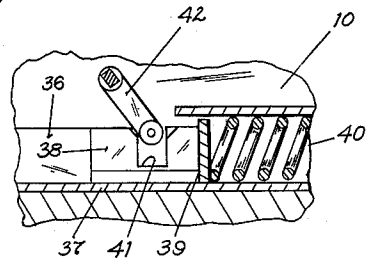


Fig. 3

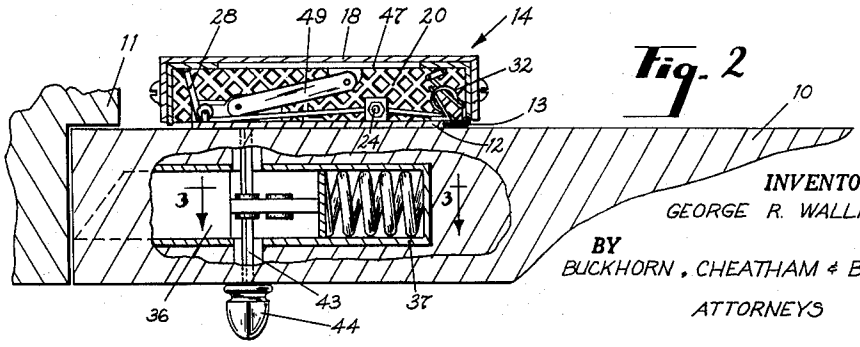


Fig. 2

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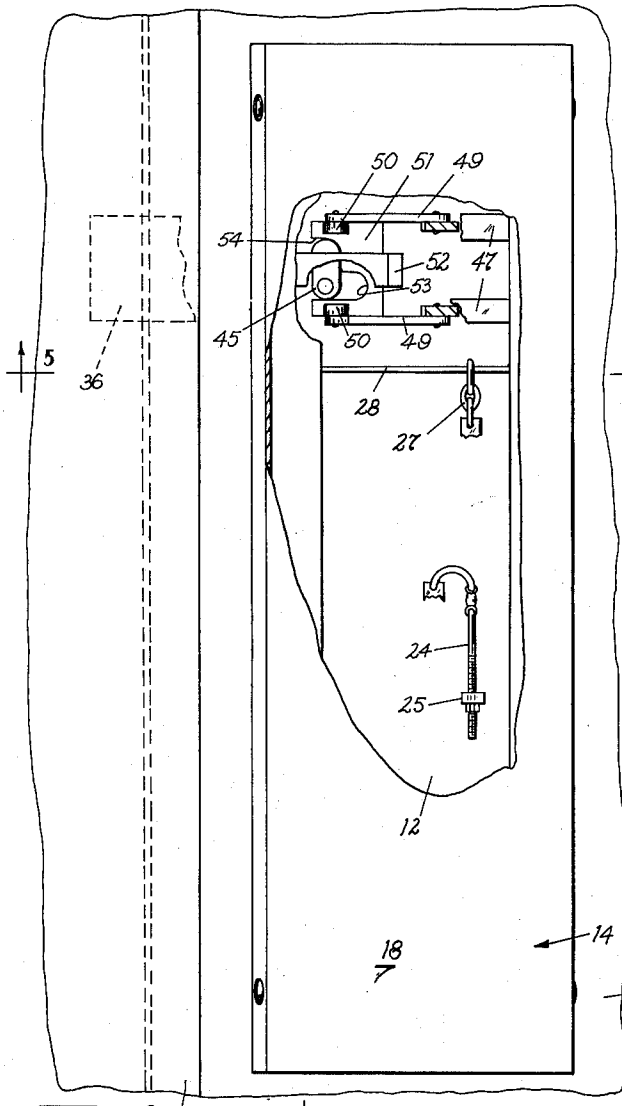


Fig. 4

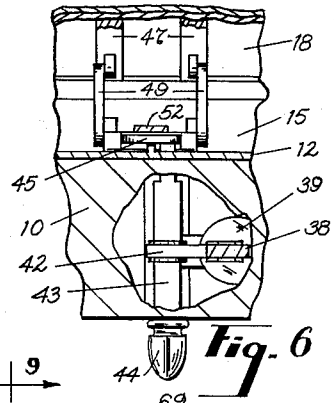


Fig. 6

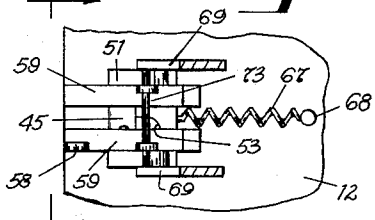


Fig. 8

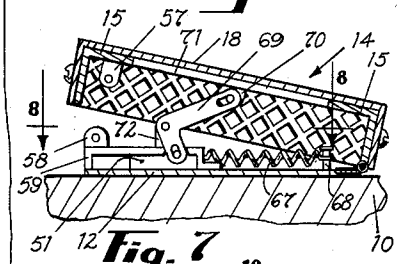


Fig. 7

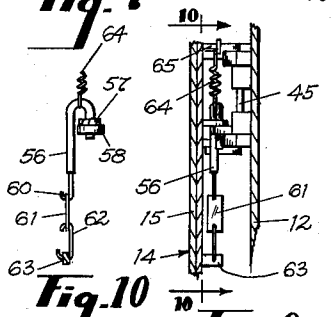


Fig. 10

Fig. 9

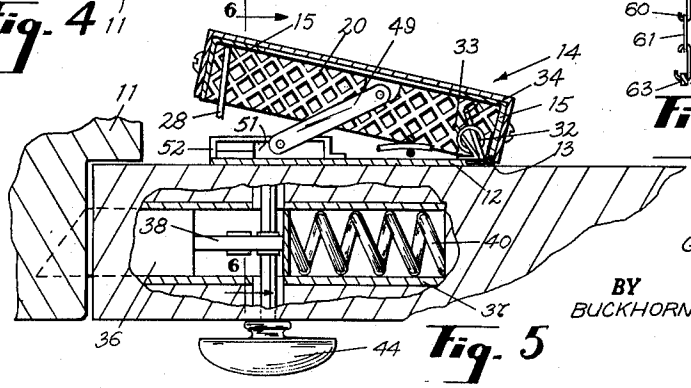


Fig. 5

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HEAT LATCH FOR FIRE DOORS

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14 Claims. (Cl. 189—46)

The present invention comprises a heat latch and safety release for fire doors.

The present invention is designed to be used in conjunction with fire doors which are adapted to seal off a space in a building from a stairwell, exit passage or the ground level exterior of a building. Building codes in most areas require that such doors be provided with means automatically to latch them against being opened by fire induced drafts. The present invention provides means whereby such latching is accomplished as soon as the interior temperature rises above a predetermined point, indicating that a fire exists. It is usually desirable that such doors, particularly those opening onto interior stairwells or passages, be normally held closed by spring means so that during normal periods of activity the door may be utilized without turning a knob or otherwise withdrawing a latching or bolting means. The present invention provides for such normal activities, while maintaining a spring-bolt or the like in constant readiness for latching the door when the temperature rises beyond the predetermined temperature.

A principal object of the present invention is to provide means of the foregoing character including a "panic" operating means whereby persons trapped in an interior area may open the door merely by pressure, rather than requiring the trapped persons to locate and rotate a knob or other latch or bolt withdrawing handle.

A further object of the present invention is to provide means of the foregoing character which are shielded against accidental damage or mischievous tampering, yet which may be easily inspected, lubricated and adjusted.

A further object of the present invention is to provide a heat latch release means for fire doors whch may be associated with a wide variety of different types of latches or bolts.

A further object of the present invention is to provide a device of the foregoing character which may be easily mounted in position of operativeness, and which will provide an attractive, inconspicuous operating plate upon the portion of a door against which a person normally pushes when he wishes to open the door.

The objects and advantages of the present invention will be more readily apparent from inspection of the accompanying drawings taken in connection with the following specification, and in which like parts are referred to by like numerals throughout.

In the drawings,

FIG. 1 is a view in elevation of a portion of a door having the present invention mounted thereon, with parts broken away;

FIG. 2 is a horizontal section looking upward from the plane of the line 2—2 of FIG. 1, with parts broken away;

FIG. 3 is a partial vertical section taken substantially along line 3—3 of FIG. 2;

FIG. 4 is a view corresponding to FIG. 1, showing the apparatus in the condition of parts after a fire has occurred and the door has become bolted against fire drafts;

FIG. 5 is a horizontal section looking upward from the line 5—5 of FIG. 4, with parts broken away;

FIG. 6 is a partial vertical section taken substantially along line 6—6 of FIG. 5, with parts broken away;

FIG. 7 is a view, correspondnig to FIG. 5, of a modified form of the invention;

FIG. 8 is a partial vertical section taken substantially along line 8—8 of FIG. 7;

FIG. 9 is a partial vertical section taken substantially along line 9—9 of FIG. 8 but showing parts in their normal positions; and

FIG. 10 is a partial vertical section taken substantially along line 10—10 of FIG. 9.

Referring to FIGS. 1 to 6, inclusive, the present invention is illustrated and mounted upon a fire door 10 which is held in closed position against a vertical doorstop 11 by any suitable closing means (not shown), the device being mounted on the inner vertical surface of the fire door. The device comprises a mounting plate 12 adapted to be affixed to the vertical surface of the door by suitable means such as screws (not shown). The mounting plate is of a convenient size, such as approximately five by sixteen inches, and is mounted with its long dimension vertically and adjacent the free edge of the door. Suitable hinge means 13 are mounted along the vertical edge of the mounting plate remote from the free edge of the door and hingedly attach a channel assembly 14 to the mounting plate. The channel assembly is conveniently formed by a pair of vertical angle bars 15 with their ends connected by flat bars 17 welded to the inwardly turned flanges of the channel bars. A pressure plate 18 is removably mounted upon the frame thus provided, the pressure plate preferably being formed as a shallow, wide channel member having its inwardly turned narrow legs attached to the vertical legs of the channel bars 15 by screws 19. The construction provides a channel assembly movably mounted upon the mounting plate and normally forming therewith a vertical air passage closely adjacent the vertical surface of the door. The upper and lower ends of the passage thus formed are preferably closed by means of screens 20 which prevent objects from falling into the interior of the passage, and prevent mischievous persons from damaging the mechanism.

The channel assembly is normally held inward against the mounting plate by means including a fusible link 21 formed of a low melting point metal which is designed to fuse when the temperature of the air passing through the channel assembly exceeds a predetermined temperature. The link 21 is attached to a lower flexible connector 22 provided with a swivel member 23 joining the connector to an adjusting bolt 24. The bolt may be screwed into a threaded lug 25 fixed to the mounting plate, and may be held in adjusted position by a lock nut 26. The link 21 is connected also to an upper flexible connector such as a short length of chain 27, the upper end of which is slidably connected to a cable 28 extending transversely across the surface of the mounting plate 12. The inner end of the cable is connected to an eye 30 mounted on the mounting plate, and the outer portion thereof passes through a guide 31 mounted on the outer edge of the mounting plate, and then passes vertically with respect to the mounting plate and is attached to the adjacent angle bar 15. When the pressure plate 18 is removed, the bolt 24 may be adjusted to draw the free edge of the channel assembly toward the mounting plate.

Suitable spring means are biased between the mounting plate and the channel assembly for urging the channel assembly outward from the mounting plate. A suitable device is illustrated in FIG. 5 comprising a slit cylinder spring 32 having associated therewith a pair of levers 33 and 34, one of which is fixed to the mounting plate 12 and the other of which is connected to the channel assembly. Such arrangements of cylindrical springs and levers are commonly used on clip boards or are separately used for holding together a sheaf of papers. When the fusible link 21 is ruptured as illustrated in FIG. 4, the spring means causes the channel assembly to spring

outward away from the mounting plate and the surface of the door, the movement being limited by cable **28**.

A spring-bolt **36** is mounted in the door and is normally held retracted against operation, so that the door may be swung open toward the outside of the room by pressure alone, until the fusible link is ruptured. It is to be particularly appreciated that the form of spring-bolt herein shown is schematically representative of all such devices. Such spring-bolts are usually mounted in a metal box or other enclosure **37** which is provided with suitable guides for the bolt. As schematically represented herein, the bolt is provided with an extension **38** having a spring follower plate **39** at its inner end bearing against a compression spring **40**. The extension **38** is provided with a notch **41** in which there is engaged an operating lever **42**. The operating lever is perforated to receive an operating shaft **43**, to the outer end of which there is removably associated a knob **44**, or equivalent means by which the bolt may be retracted from the outside when desired. The operating shaft extends through the door in the normal fashion, but at its inner end is affixed to an oval crank **45**.

A pair of laterally extending straps **47** are fixed between the angle members **15**, extending transversely across the space between the inwardly turned legs thereof. Each strap is provided with a downwardly depending lug **48** to which is pivotally connected an operating link **49**. The other ends of the links are pivotally connected to lugs **50** on an operating slide **51** which is restrained against movement toward and away from the mounting plate **18** by a strap **52** affixed thereto. The forward edge of the slide **51** is provided with a horizontally extending notch **53** and a vertical notch **54** communicating therewith. The notches are so proportioned and arranged that when the slide is forward the crank **45** is held immobile in a horizontal direction, in which position the bolt **36** is held retracted. This condition will be maintained as long as the fusible link **21** remains entire. When the link **21** is disrupted, the spring **32** raises the channel assembly, thereby releasing the crank **45** so that it may rotate into the notch **54** under the force of the bolt projecting spring **40**. The bolt may be retracted by operation of the knob **44** without affecting the slide **51**, or if the slide **51** is pushed forward by inward pressure on the channel assembly, the crank **45** will thereby be rotated to retract the bolt.

In the modification disclosed in FIGS. 7 to 10, inclusive, the channel assembly **14** is held against the mounting plate **12** by a U-shaped link **56** which normally has one leg passing through an apertured ear **57** on the channel assembly and an apertured ear **58** on one of a pair of straps **59** which guide and restrain the slide **51**. The link **56** is provided with a hook **60** adapted to engage a perforation in a fusible link **61**. The opposite end of the link **61** is held by a double hook **62**, the lower part of which is hooked through an apertured ear **63** fixed to the channel assembly. When the link **61** fuses, the U-link **56** is retracted by a spring **64** tensioned between the U-link and a pin **65** on the channel assembly. When this occurs the slide **51** is retracted by means of a spring **67** connected to the slide and to a pin **68** on the mounting plate **12**. The retraction of the slide **51** not only releases the bolt **36**, but elevates the channel assembly as well through the medium of L-shaped levers **69** connected through pin and slot connections to lugs **70** on crossbars **71** in the channel assembly, and connected through their other arms, through pin and slot connections, to the slide **51**. The levers are pivotally mounted on lugs **72** rising from the straps **59**. The straps **59** limit the outward swinging movement of the channel assembly, just as the cable **28** limited the outward swinging movement of the channel assembly in the first modification.

During normal use of the door the channel assembly **14** is held toward the door surface by the link **56**. In this position the levers **69** have forced the slide **51** toward the edge of the door, so that the oval crank **45** is locked in position within the horizontal slot **53**, and the bolt **36** is thus maintained in retracted position. If the link **61** fuses, the spring **64** retracts the U-shaped link **56**, permitting the spring **67** to retract the slide **51** and causing the bolt **36** to be projected to lock the door in closed position. The crank **45** now extends vertically into the notch **54**. Therefore, any person trapped inside of the room may push against the channel assembly **14** causing the levers **69** to project the slide **51** toward the edge of the door and rotating the crank **45** to cause retraction of the bolt **36**. As soon as the door is reclosed by its closing means, the bolt **36** will be retracted by its beveled end striking the striker in the usual manner until it may snap into locking position again.

In both forms of the invention the fusible link constitutes a member responsive to a rise in temperature of the air passing through the air passage to a predetermined point for unlatching the pressure plate and permitting its outward movement away from the mounting plate by the springs **32** or **67**.

Having illustrated and described several modifications of the present invention, it should be apparent to those skilled in the art that the same permits of other modifications in arrangement and detail. I claim as my invention all such modifications as come within the true spirit and scope of the following claims.

I claim:

1. A heat latch safety release for fire doors comprising a mounting plate adapted to be mounted on a vertical surface of a door, a pressure plate movably mounted on said mounting plate for movement toward and away from said mounting plate, resilient means biased between said pressure plate and said mounting plate for urging said pressure plate away from said mounting plate, means including a heat-fusible link for normally holding said pressure plate toward said mounting plate, means to limit outward movement of said pressure plate away from said mounting plate upon fusing of said link, and means for operativley connecting said pressure plate to a latching mechanism of the door to lock the door when said pressure plate is moved away from said mounting plate and unlock the door when said pressure plate is moved toward said mounting plate.

2. A heat latch safety release for fire doors comprising a mounting plate adapted to be mounted on a vertical surface of a door, a pressure plate movably mounted on said mounting plate for movement toward and away from said mounting plate, said pressure plate and mounting plate forming an open passage through which air may circulate, resilient means biased between said pressure plate and said mounting plate for urging said pressure plate away from said mounting plate, means in said passage including a heat-fusible link for normally holding said pressure plate toward said mounting plate, means to limit outward movement of said pressure plate away from said mounting plate upon fusing of said link, and means operable by the movement of said pressure plate for actuating a locking mechanism of the door.

3. A heat latch safety release for fire doors comprising a mounting plate adapted to be mounted on a vertical surface of a door, a pressure plate pivotally mounted on said mounting plate for swinging movement toward and away from said mounting plate, said pressure plate and mounting plate forming an open-ended passage, resilient means biased between said pressure plate and said mounting plate for urging said pressure plate to swing away from said mounting plate, means in said passage including a heat-fusible link for normally holding said pressure plate toward said mounting plate, means to limit outward swinging movement of said pressure plate away from said mounting plate upon fusing of said link, and means operable by movement of said pressure plate away from said mounting plate to actuate a latching mechanism of the door to lock the door and operable by movement of

said pressure plate toward said mounting plate, to actuate the latching mechanism to unlock the door.

4. A door comprising a mounting plate mounted on a vertical surface of the door, a pressure plate movably mounted on said mounting plate for movement toward and away from said mounting plate, resilient means biased between said pressure plate and said mounting plate for urging said pressure plate away from said mounting plate, means including a heat-fusible link for normally holding said pressure plate toward said mounting plate, means to limit outward movement of said pressure plate away from said mounting plate upon fusing of said link, a normally retracted bolt mounted in said door, a spring biased between said door and said bolt for projecting said bolt into its door-latching position, and means operatively connecting said pressure plate and said bolt for releasing said bolt for projection into its door-latching position by said spring upon fusing of said fusible link and for thereafter retracting said bolt upon movement of said pressure plate toward said mounting plate.

5. A door and heat latch safety release means therefor comprising a mounting plate mounted on a vertical surface of the door, a pressure plate movably mounted on said mounting plate for movement toward and away from said mounting plate, said pressure plate and mounting plate being arranged to provide a vertical passage for air next to said vertical surface, resilient means biased between said pressure plate and said mounting plate for uring said pressure plate away from said mounting plate, means in said air passage including a heat-fusible link for normally holding said pressure plate toward said mounting plate, means to limit outward movement of said pressure plate away from said mounting plate upon fusing of said link, a normally retracted bolt mounted in said door, a spring compressed between said bolt and said door for projecting said bolt into its door-latching position, and means operatively connecting said pressure plate and said bolt for releasing said bolt for projection into its door-latching position by said spring upon fusing of said fusible link and for thereafter retracting said bolt upon movement of said pressure plate toward said mounting plate.

6. A heat latch safety release fire door comprising a mounting plate mounted on a vertical surface of the door, a pressure plate pivotally mounted on said mounting plate for swinging movement toward and away from said mounting plate, said pressure plate and mounting plate forming a vertical passage for air next to said vertical surface, resilient means biased between said pressure plate and said mounting plate for urging said pressure plate to swing away from said mounting plate, means in said air passage including a heat-fusible link for normally holding said pressure plate toward said mounting plate, means to limit outward swinging movement of said pressure plate away from said mounting plate upon fusing of said link, a normally retracted spring-bolt mounted in said door, and means operatively connecting said pressure plate and said spring-bolt for releasing said spring-bolt into its door-latching position upon fusing of said fusible link and for thereafter retracting said spring-bolt upon movement of said pressure plate toward said mounting plate.

7. A heat latch safety release for fire doors comprising a mounting plate adapted to be mounted on a vertical surface of a door, a channel assembly movably mounted on said mounting plate for movement toward and away from said mounting plate, said channel assembly comprising a web of large area and relatively narrow legs turned inwardly toward said mounted plate whereby to provide therewith an air passage, resilient means biased between said mounting plate and said channel assembly for urging said channel assembly away from said mounting plate, means in said air passage including a heat fusible link for normally holding said channel assembly toward said mounting plate, means to limit outward movement of said channel assembly away from said mounting plate upon fusing of said link, and means operable by said channel assembly as it is moved away from said mounting plate to actuate a locking mechanism of the door to lock the door and operable by said channel assembly as said channel assembly is moved toward said mounting plate to actuate the locking mechanism of the door to unlock the door.

8. A heat latch safety release for fire doors comprising a mounting plate adapted to be mounted on a vertical surface of a door, a channel assembly pivotally mounted on said mounting plate for swinging movement toward and away from said mounting plate, said channel assembly comprising a web of large area and relatively narrow legs turned inwardly toward said mounting plate whereby to provide therewith an air passage, resilient means biased between said mounting plate and said channel assembly for urging said channel assembly to swing away from said mounting plate, means in said air passage including a heat fusible link for normally holding said channel assembly toward said mounting plate, means to limit outward swinging movement of said channel assembly away from said mounting plate upon fusing of said link, and means operable by said channel assembly as it is swung outwardly from said mounting plate to actuate a latching mechanism of the door to lock the door and operable by said channel assembly as it is swung toward the said mounting plate to actuate the locking mechanism of the door to unlock the door.

9. A heat latch safety release fire door comprising a mounting plate mounted on a vertical surface of the door, a channel assembly movably mounted on said mounting plate for movement toward and away from said mounting plate, said channel assembly comprising a web of large area and relatively narrow legs turned inwardly toward said mounting plate and arranged vertically, said channel assembly and mounting plate thereby forming a vertical air passage next to said vertical surface, resilient means biased between said mounting plate and said channel assembly for urging said channel assembly away from said mounting plate, means in said air passage including a heat fusible link for normally holding said channel assembly toward said mounting plate, means to limit outward movement of said channel assembly away from said mounting plate upon fusing of said link, a normally retracted spring-bolt mounted in said door, and means operatively connecting said channel assembly and said spring-bolt for releasing said spring-bolt into door-latching position upon fusing of said link and for thereafter retracting said spring-bolt upon movement of said channel assembly toward said mounting plate.

10. A heat latch safety release fire door comprising a mounting plate mounted on a vertical surface of the door, a channel assembly pivotally mounted on said mounting plate for swinging movement toward and away from said mounting plate, said channel assembly comprising a web of large area and relatively narrow legs turned inwardly toward said mounting plate and arranged vertically, said channel assembly and mounting plate thereby forming a vertical air passage next to said vertical surface, resilient means biased between said mounting plate and said channel assembly for urging said channel assembly to swing away from said mounting plate, means in said air passage including a heat fusible link for normally holding said channel assembly toward said mounting plate, means to limit outward swinging movement of said channel assembly away from said mounting plate upon fusing of said link, a normally retracted spring-bolt mounted in said door, and means operatively connecting said channel assembly and said spring-bolt for releasing said spring-bolt into door-latching position upon fusing of said link and for thereafter retracting said spring-bolt upon movement of said channel assembly toward said mounting plate.

11. A heat latch safety release for fire doors comprising a mounting plate, a pressure plate pivotally mounted on said mounting plate for movement toward said mounting plate toward a closed position and away from said mounting plate toward an open position, said pressure plate and mounting plate forming an open passage, resilient means biased between said pressure plate and said mounting plate for urging said pressure plate away from said mounting plate, latching means in said passage including a heat responsive member normally holding said pressure plate in said closed position and releasing said pressure plate upon a rise in temperature of the air in said passage to a predetermined point, and means operatively connecting said pressure plate to a latching mechanism of such a fire door.

12. A door comprising a mounting plate mounted on a vertical surface of the door, a pressure plate movably mounted on said mounting plate for movement toward and away from said mounting plate, resilient means biased between said pressure plate and said mounting plate for urging said pressure plate away from said mounting plate, latching means between said pressure plate and said mounting plate normally holding said pressure plate toward said mounting plate, said latching means including a heat responsive member for releasing said mounting plate upon a rise in temperature to a predetermined point, means to limit outward movement of said pressure plate away from said mounting plate upon release by said latching means, a normally retracted bolt mounted in said door, a spring biased between said door and said bolt for projecting said bolt into its door-latching position, and means operatively connecting said pressure plate and said bolt for releasing said bolt for projection into its door-latching position by said spring upon release of said mounting plate and for thereafter retracting said bolt upon movement of said pressure plate toward said mounting plate.

13. In a heat latch safety release for a fire door having a latching bolt movable between an operative position and a retracted position and a bolt-actuating mechanism,

a pressure plate,

means mounting the pressure plate pivotally on such a fire door for pivotal movement between a closed position lying along the door and an open position extending away from the door,

means urging the pressure plate toward the open position thereof,

temperature responsive means covered by the pressure plate when the pressure plate is in its closed position and normally latching the pressure plate in the closed position and adapted to release the door for movement to its open position when the temperature responsive means is heated to a predetermined temperature,

and means coupling the pressure plate to the bolt-actuating mechanism of the door to move the latching bolt to its operative position when the pressure plate is moved to its open position and move the latching bolt to its retracted position when the pressure plate is moved to its closed position.

14. The construction of claim 13 wherein the pressure plate is in the shape of a channel open at the ends thereof to provide an air passage therethrough.

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