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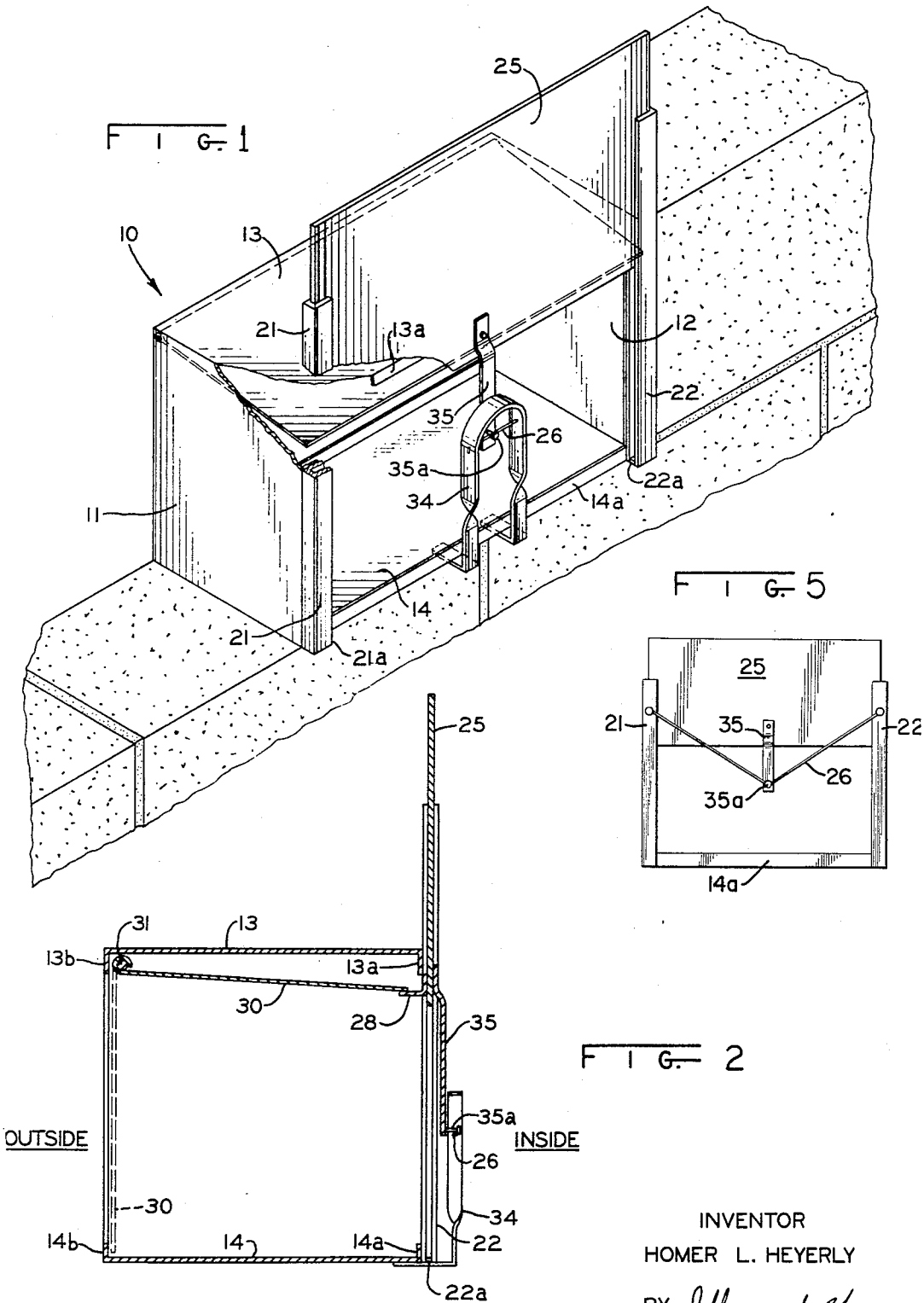
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3,487,419

FIRE DOOR

Filed April 26, 1968

2 Sheets-Sheet 1



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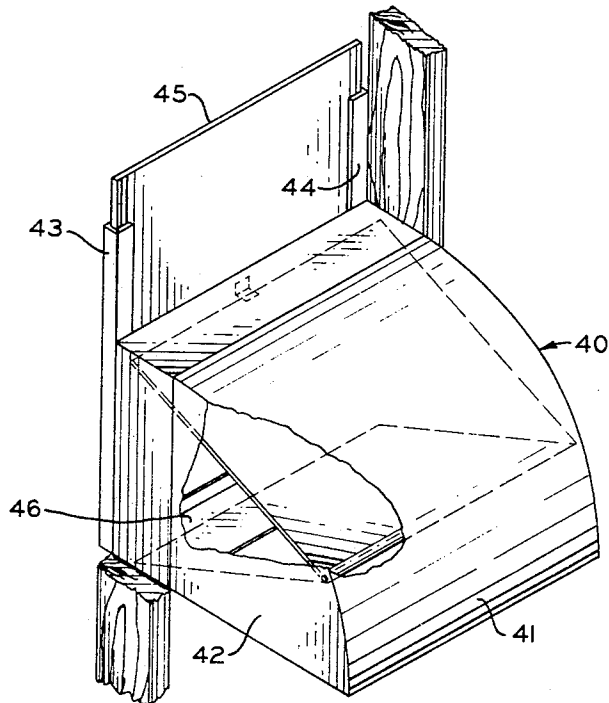


FIG. 3

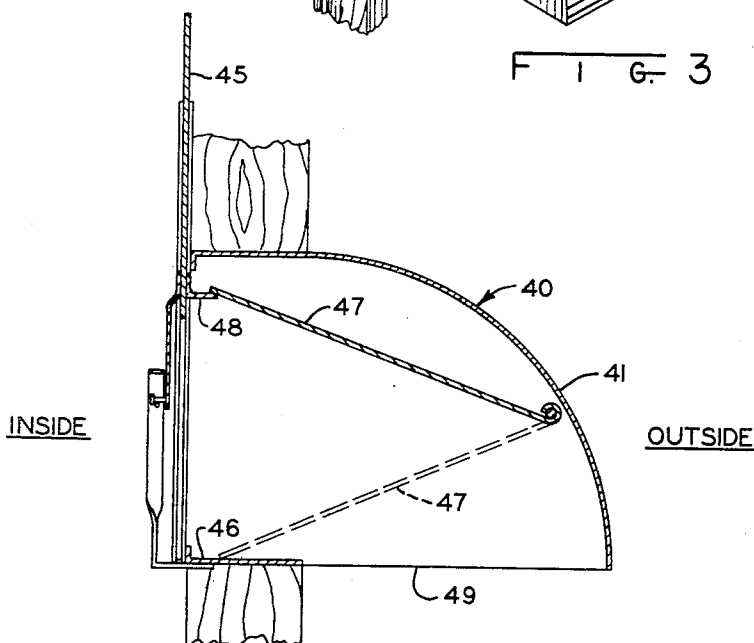


FIG. 4

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FIRE DOOR

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8 Claims

ABSTRACT OF THE DISCLOSURE

A fire door is provided with a vertically slidable inside plate and a pivoted outside plate. The inside plate is held in an open position by fusible material, and the outside plate is held open by resting on a bracket on the inside plate. When the fusible material melts, the inside plate slides downward to close the fire door on the inside, and the outside plate pivots downward to close the fire door on the outside.

BACKGROUND OF THE INVENTION

My invention relates to a fire door, and particularly to a new and improved fire door having two plates which close in response to heat or fire.

Fire doors are frequently required by insurance companies or by underwriters in installations such as boiler rooms and other locations having a potential fire or explosion hazard.

Accordingly, an object of my invention is to provide a new and improved fire door that operates reliably and quickly in response to heat or fire.

Another object of my invention is to provide an improved self-operating fire door having inner and outer plates that close in response to heat or fire.

Another object of my invention is to provide an improved fire door that is relatively simple and inexpensive to manufacture, but that is safe and reliable in operation.

When a fire or an explosion occurs, power sources, such as steam or electricity, are often disrupted or destroyed. Hence, a fire door should close without the aid of such power sources or a person.

Accordingly, another object of my invention is to provide an improved fire door that is closed by gravity in response to heat or fire.

When a building or structure is planned, fire doors are usually held to a minimum so that the building or structure is as safe and fireproof as possible. However, after a building or structure has been completed, it has often been found that the building or structure tends to get excessively hot. Where people must remain in the building or structure, the conditions may be uncomfortable or unbearable. Then, it is necessary to provide ventilation with the necessary fire doors which can close in case of accident, fire, or explosion. Such fire doors are difficult to provide after a building has been constructed, and results in increased expense.

Accordingly, another object of my invention is to provide a new and improved fire door which can be easily placed in a wall of a completed building or structure.

Another object of my invention is to provide an improved fire door which is simple to manufacture and simple to install, either during construction or in a completed structure.

Another object of my invention is to provide an improved fire door that has two operable plates and that can be easily constructed in a variety of sizes and shapes.

SUMMARY OF THE INVENTION

Briefly, these and other objects are achieved in accordance with my invention by a fire door having first and second vertical slide members positioned in a spaced

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relation to form an opening. A first plate is slidably positioned in the slide members, and is adapted to be held in an upper and open position in the slide members by a fusible material that is at least partially positioned in the opening. The first plate slides to a lower and closed position when the fusible material melts. A first support member is attached to the first plate. A second plate is pivotally mounted outside of the first plate. This second plate is arranged to be held in an upper and open position by the first support member when said first plate is in its upper and open position. When the fusible material melts and the first plate slides to its lower and closed position, the first support member falls away from the second plate so that the second plate can pivot to a lower and closed position. Thus, the ventilation opening is closed by both the first and second plates.

BRIEF DESCRIPTION OF THE DRAWING

The subject matter which I regard as my invention is particularly pointed out and distinctly claimed in the claims. The structure and operation of my invention, together with further objects and advantages, may be better understood from the following description given in connection with the accompanying drawing, in which:

FIGURE 1 shows a perspective view, with portions broken away, of one embodiment of my fire door;

FIGURE 2 shows a side cross sectional view of the fire door of FIGURE 1;

FIGURE 3 shows a perspective view, with portions broken away, of another fire door in accordance with my invention;

FIGURE 4 shows a side cross sectional view of the fire door of FIGURE 3; and

FIGURE 5 is a front elevational view of a modification of my invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGURES 1 and 2 show a fire door 10 constructed in accordance with my invention to be utilized in a concrete block or cinder block construction. The inside and outside are indicated in FIGURE 2. The fire door 10 is generally rectangular in shape, and preferably, but not necessarily, may have the same dimensions as a concrete block or cinder block in order to facilitate its placement in a wall of such concrete block or cinder block. The fire door 10 comprises ends 11, 12 which are mounted or held in a spaced relation to provide a ventilation opening. Preferably, the ends 11, 12 are held by a top 13 and a bottom 14. The ends 11, 12, the top 13, and the bottom 14 may be made of a single piece of suitable material such as steel, or may be formed of individual pieces of suitable material such as steel that are welded together. The top 13 and the bottom 14 may be provided with respective front and back vertical flanges 13a, 13b, 14a, 14b to provide support and better sealing. First and second metallic slide members 21, 22 are respectively fastened to the inner edges (which face to the inside of the building) of the ends 11, 12. The slide members 21, 22 have a generally U-shaped or channel cross section to provide grooves or channels, and are preferably positioned vertically to extend from the bottom 14 upward and above the top 13 as shown in FIGURE 1.

A first rectangularly shaped, metallic plate or door 25 is slidably positioned in the slide members 21, 22. The first plate 25 is held in an upper position as shown in FIGURE 1 by a piece of wire or string of fusible material 26 having a relatively low melting temperature. Such material may, without limitation, include an alloy of 50% tin and 50% lead by weight to provide a melting or fusing temperature of approximately 361° F.; or an alloy of 50% tin, 30% lead, and 20% cadmium by weight

to provide a melting or fusing temperature of approximately 293° F. These alloys may be in the form of wire having, for example, a gauge between 8 and 12. The fusible material 26 is preferably attached at its ends to a bracket 34, and passes beneath a projection 35a on a strut 35 on the first plate 25. The bracket 34 is preferably U-shaped with the closed part of the U positioned at the top. The legs of the bracket 34 may be bent and attached to the bottom 14 so that the bracket 34 forms spaced supports but does not obstruct movement of the first plate 25. The strut 35 extends downward from the first plate 25. The bracket 34, the strut 35, and the fusible material 26 are preferably arranged so that the fusible material 26 beneath the projection 35a is near the center of the ventilation opening. When the fusible material 26 is melted by heat, fire, or other means, the first plate 25 slides downward in the slide members 21, 22 by the force of gravity. The lower position of the first plate 25 is limited by stops 21a, 22a positioned at the bottom of the slide members 21, 22, or by the lower part of the bracket 34.

A second rectangularly shaped, metallic plate or door 30 is pivotally mounted near the top 13, by any suitable pivoting or hinge means such as a pivot rod 31 which extends between the ends 11, 12. The second plate 30 is normally held in an upper position as shown in FIGURES 1 and 2 by a projection or bracket 28 fastened near the bottom inner face of the first plate 25. As shown in FIGURE 2, the second plate 30 is resting on the bracket 28, but is not fastened or attached to the bracket 28.

The fire door 10 as described may be placed in any suitable opening such as the concrete block or cinder block wall partially shown in FIGURE 1. When the first plate 25 and the second plate 30 are in their upper positions as shown, almost all of the area or volume of the fire door 10 is open and available for ventilation. However, the fusible material 26 extends or is positioned in this ventilation area or opening. If heat, fire, or an explosion reaches the fire door 10, the fusible material 26 melts so that the first plate 25 falls or slides to a lower and closed position. The first plate 25 is sealed at its sides by the slide members 21, 22 and at its top and bottom by the flanges 13a, 14a. As the first plate 25 falls, its bracket 28 also falls, and quickly reaches the point where it is outside of the radial pivot length of the second plate 30. This permits the second plate 30 to pivot to a lower position (clockwise as seen in FIGURE 2) and to occupy a lower and closed position indicated by the dashed lines in FIGURE 2. Thus, the fire door 10 is quickly and reliably closed by the two plates 25, 30 to quickly seal off fire and any hazards. The heat or pressure inside the building tends to speed up the closing of the second plate 30, since this heat or pressure is in the direction to cause the second plate 30 to pivot to its lower position. The second plate 30 is sealed at the top and bottom by the flanges 13b, 14b, and may also be sealed at its sides by similar flanges (not shown) on the ends 11, 12.

In some constructions, the rectangular arrangement of the fire door 10 may be undesirable or impractical. Accordingly, I have provided another embodiment of a fire door 40 as shown in FIGURES 3 and 4. The fire door 40 is intended to be used in a stud wall which is not as thick as a concrete block or cinder block wall. The fire door 40 provides both a fireproof and weatherproof covering. The inside and outside are indicated in FIGURE 4. The fire door 40 comprises a hood 41 which curves along an arc between a generally horizontal direction and a generally vertical direction. The hood 41 is provided with appropriately shaped ends, one of which is visible in FIGURE 3 as indicated by the reference numeral 42. First and second slide members 43, 44 are provided to slidably receive a first plate or door 45. The first plate or door 45 slides in and may be held in an upper position in the same manner described in connection with the

first door 25 of FIGURES 1 and 2. Hence, details of this first plate 45 will not be discussed in connection with FIGURES 3 and 4. The ends of the fire door 40 are joined by a bottom 46 which provides support for the fire door 40. A second plate or door 47 is pivotally attached to the hood 41 and rests in an upper position on a bracket 48 which is attached to the first plate 45.

When the fire door 40 is in its open or ventilating position, the first plate 45 is positioned as shown, and the second plate 47 is positioned as shown in solid lines. Hence, good ventilation is provided because of the downwardly facing opening 49 beneath the hood and outside of the wall. When the fusible material melts, the first plate 45 falls or slides downward to its lower and closed position under the force of gravity. As the first plate 45 moves downward, the second plate 47 pivots in a counterclockwise direction as viewed in FIGURE 4 to its lower and closed position as indicated by the dashed lines. Thus, the fire door 40 is quickly and reliably closed by two doors or plates.

It will thus be seen that my fire door has a new and improved construction and operation. My fire door is relatively simple in construction, and hence may be easily and inexpensively manufactured. My fire door does not require power for its operation. My fire door may have a number of shapes or configurations, and can be used in a variety of structures and walls. While I have shown only two embodiments of my fire door, persons skilled in the art will appreciate that modifications may be made. For example, the various plates and slide members may take various shapes and forms, the pivots for the second plates may take a variety of forms, and any suitable fusible material may be used. The fusible material 26 may be suspended across the ventilation opening by attaching the ends of the fusible material 26 to the slide members 21, 22, instead of to the bracket 34 as shown in FIGURE 5. However, less fusible material 26 is needed with the bracket 34. Therefore, while my invention has been described with reference to particular embodiments, it is to be understood that modifications may be made without departing from the spirit of the invention or from the scope of the claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An improved fire door arrangement for providing a ventilating opening in a wall and for closing said ventilating opening in response to heat and fire, comprising:

- (a) first and second end members held in fixed spaced relation to define a ventilating opening therebetween;
- (b) first and second slide members respectively and correspondingly fastened to said first and second end members on a portion thereof that faces inward when said first door is installed in a wall, said first and second slide members providing spaced and substantially vertical portions for slidably receiving a first plate;
- (c) a first plate slidably positioned in said first and second slide members;
- (d) said first plate being adapted to be held in an upper position in said slide members by a fusible material that is at least partially positioned in said ventilating opening, and being adapted to fall to a lower and closed position in response to melting of said fusible material;
- (e) a first support member attached to said first plate;
- (f) and a second plate pivotally attached at corresponding locations on an upper portion of said first and second end members;
- (g) said second plate being arranged to be held in an upper position by said first support member in response to said first plate being in its upper position, and being adapted to pivot to a lower and closed position in response to said first plate falling to a lower position, thereby providing a double closure of said ventilating opening.

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2. The improved fire door of claim 1 wherein said fusible material is in the form of a wire having its ends respectively attached to said first and second slide members.

3. The improved fire door of claim 1 and further comprising a bracket positioned in said ventilation opening, said bracket having spaced support means, and wherein said fusible material is in the form of a wire having its ends respectively attached to said spaced support means.

4. The improved fire door of claim 1 wherein said first plate has a second member extending downwardly therefrom so as to be positioned in said ventilating opening when said first plate is in its upper position, said second member being adapted to receive said fusible material to hold said first plate in its upper position in the absence of heat and fire.

5. The improved fire door of claim 4 wherein said fusible material is in the form of a wire having its ends respectively attached to said first and second slide members.

6. The improved fire door of claim 4 and further comprising a bracket positioned in said ventilation opening,

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said bracket having spaced support means, and wherein said fusible material is in the form of a wire having its ends respectively attached to said spaced support means.

7. The improved fire door of claim 1 and further comprising means attached to said fire door for limiting the downward movement of said first plate.

8. The improved fire door of claim 7 and further comprising sealing means positioned around the respective edges of said first and second plates.

References Cited

UNITED STATES PATENTS

3,230,859	1/1966	O'Hea	98—86 X
3,323,439	6/1967	Weaver	98—86

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52—1, 302; 98—86