

June 23, 1936.

V. C. PORTER

2,045,367

FIREPROOF DOOR

Filed July 30, 1932

5 Sheets-Sheet 1

Fig. 3.

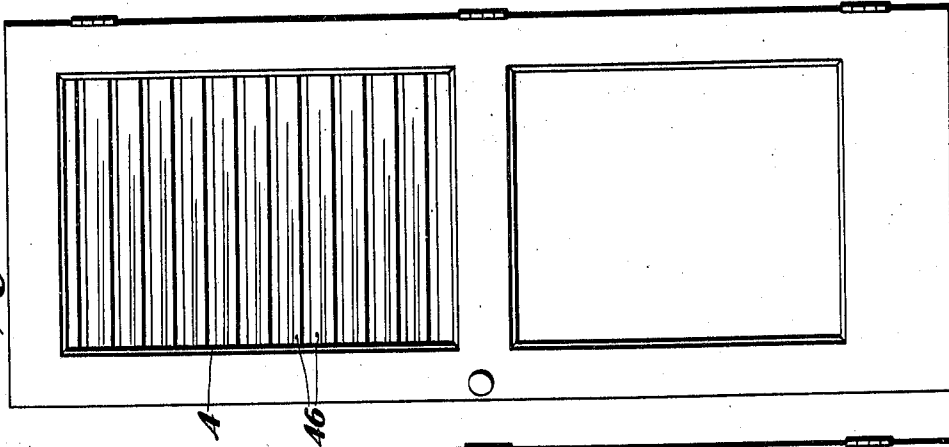


Fig. 2.

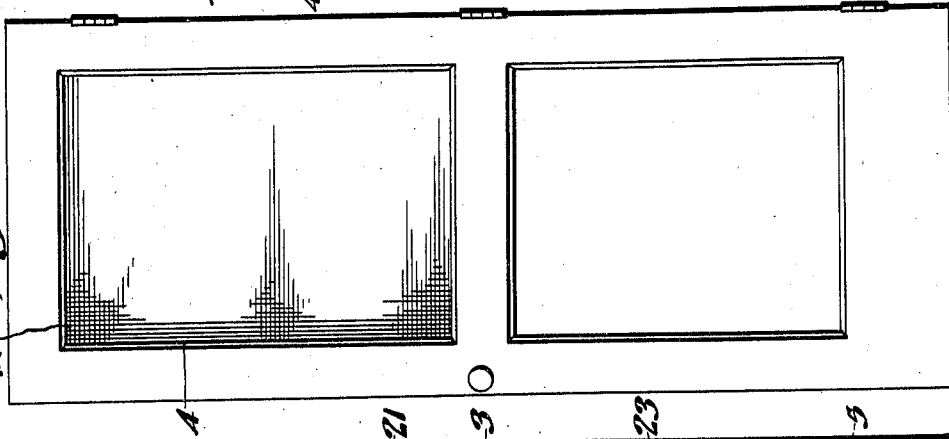
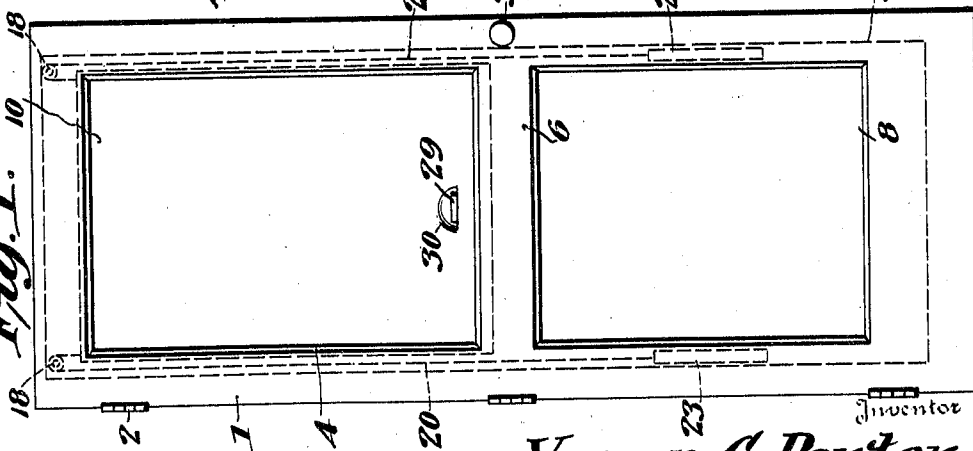


Fig. 1.



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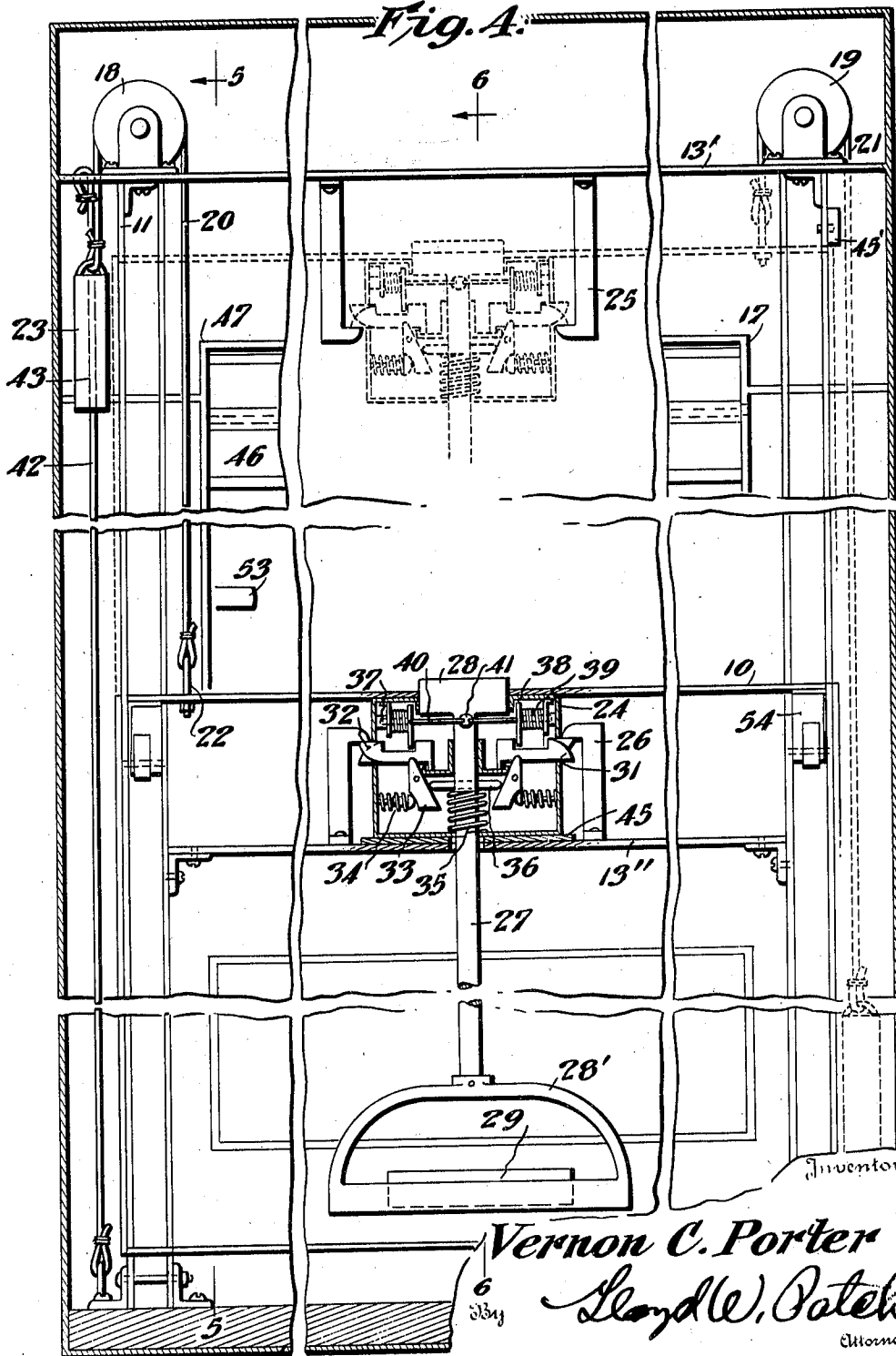
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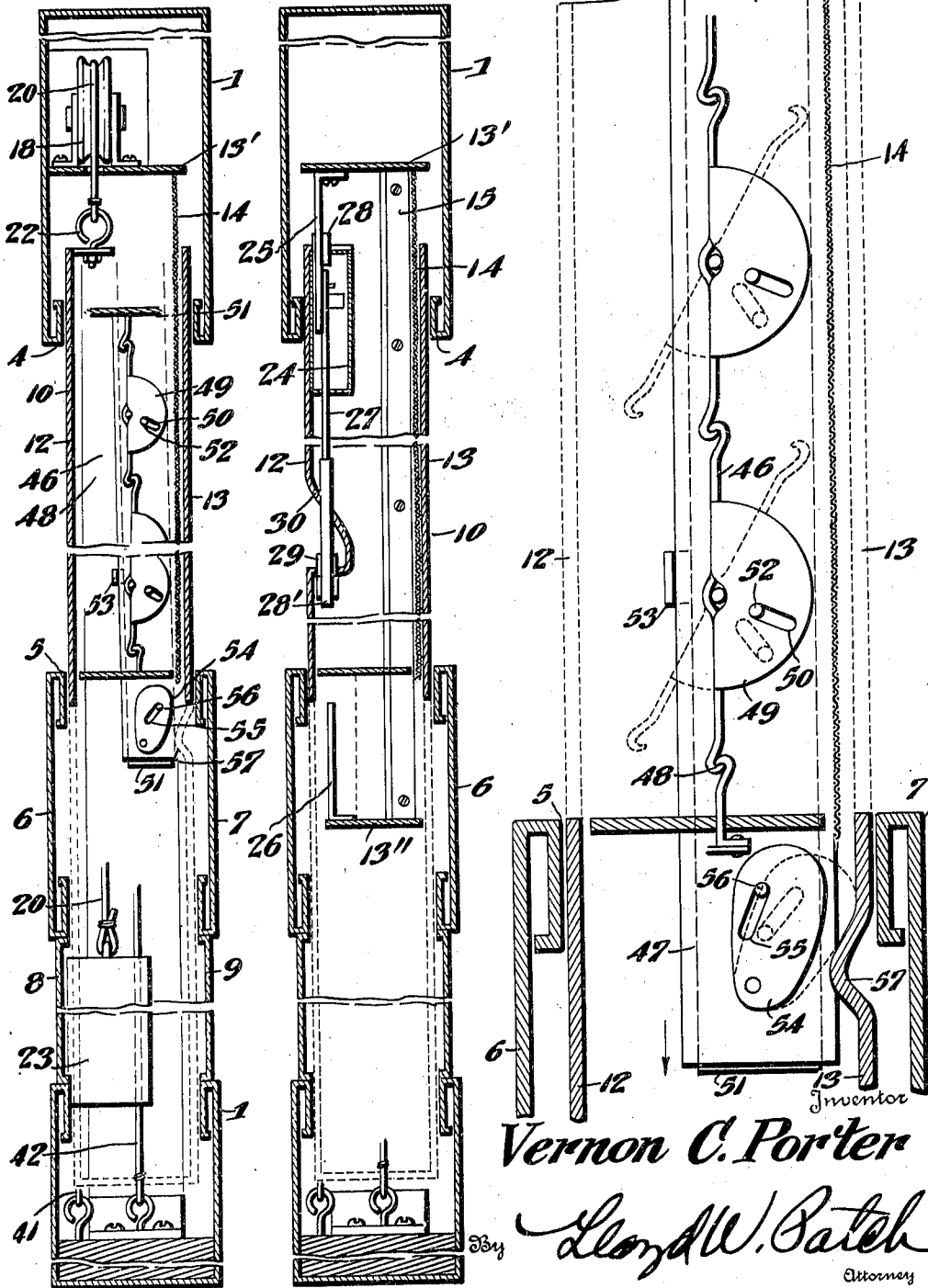
Filed July 30, 1932

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Fig. 5.

Fig. 6.

Fig. 7.



June 23, 1936.

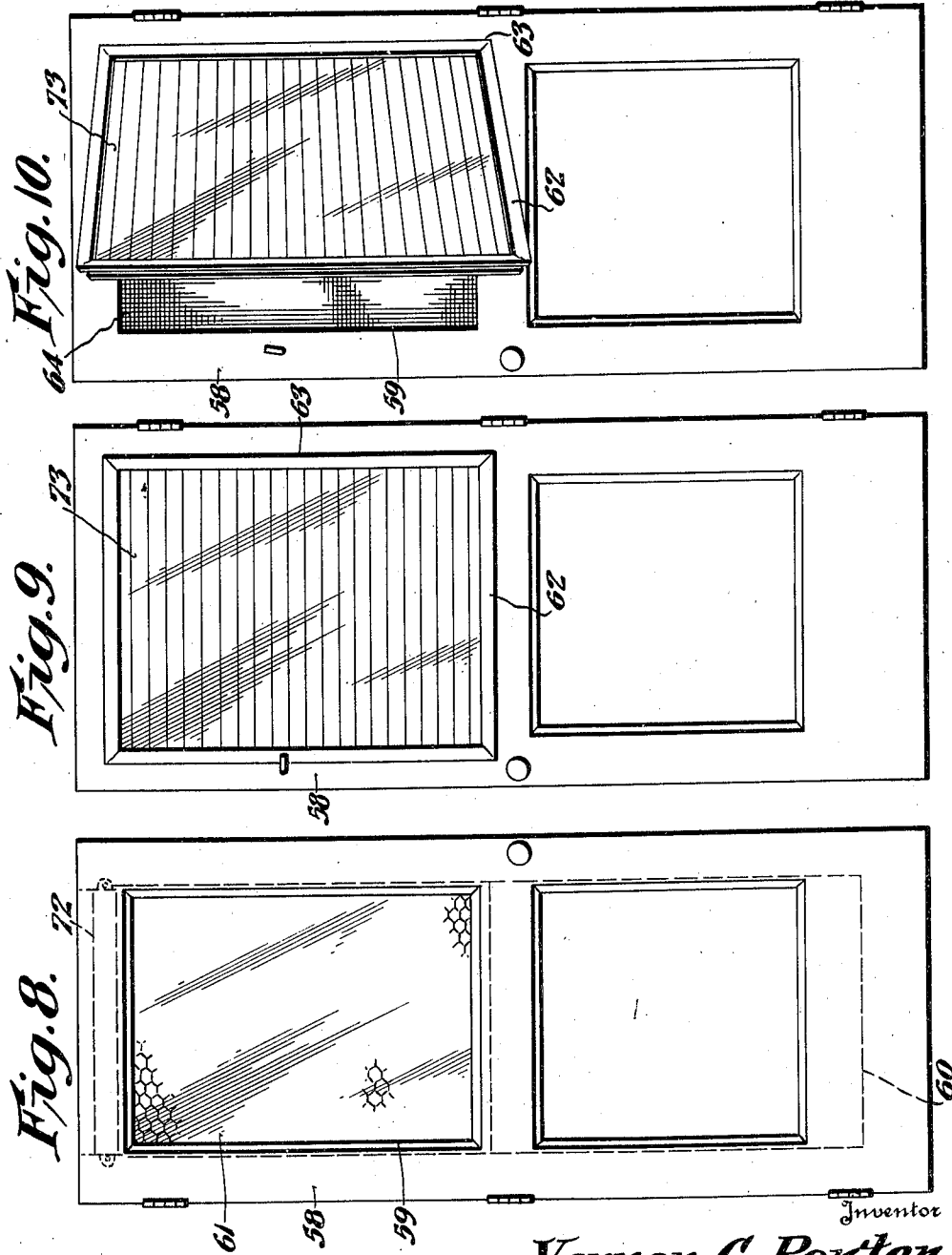
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FIREPROOF DOOR

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5 Sheets-Sheet 4



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2,045,357

FIREPROOF DOOR

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5 Sheets-Sheet 5

Fig. 11.

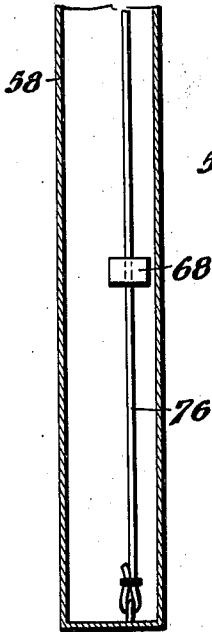
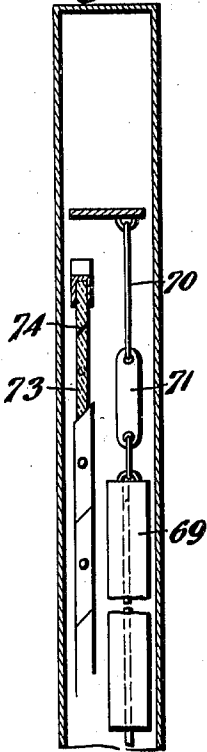


Fig. 12.

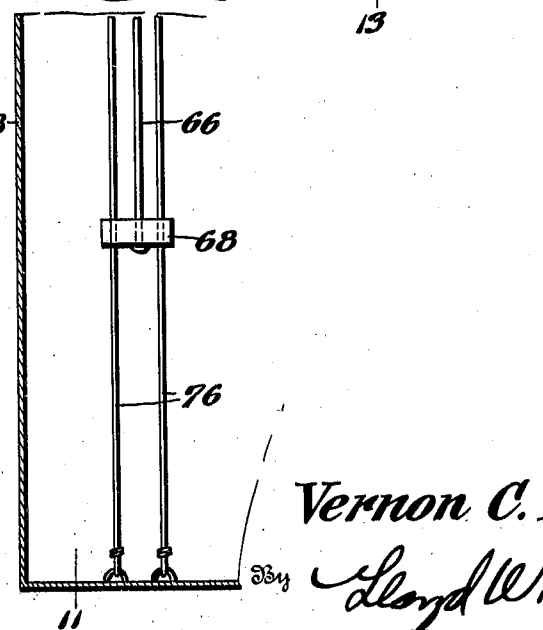
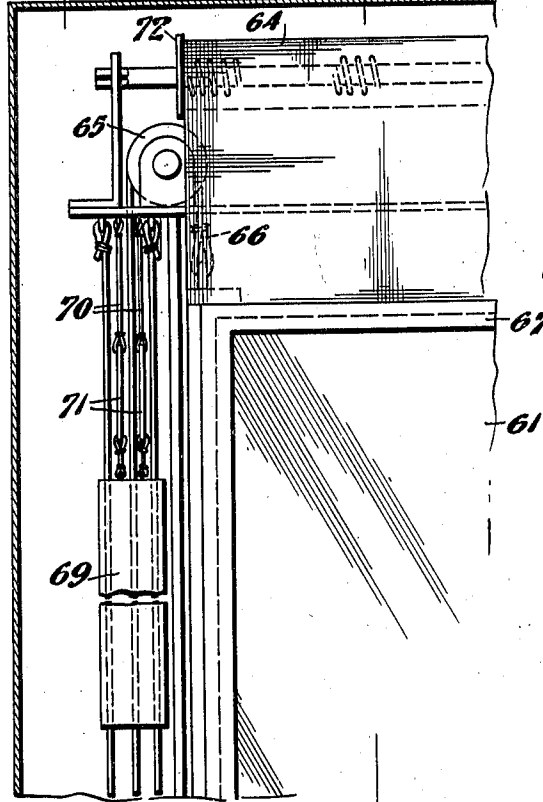
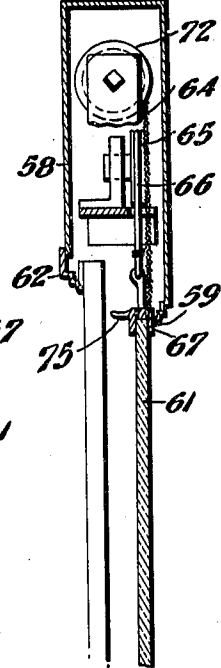


Fig. 13.



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UNITED STATES PATENT OFFICE

2,045,367

FIREPROOF DOOR

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Application July 30, 1932, Serial No. 626,931

6 Claims. (Cl. 20—36)

My invention relates to improvements in fire proof doors and particularly to doors intended and adapted for general fire proof construction in hotels, office buildings, and other buildings where interior ventilation is desired.

Heretofore, ventilation has usually been obtained by drop transoms, by the use of fixed open louvres in the door, or by checking the door more or less open; however, open transoms and open doors invite unauthorized entry, and all of the above adaptations and manners of construction increase the fire hazard due to the fact that direct and unobstructed passages or openings are provided; and, it is the primary object of this invention to provide a structure than can be built into or embodied in a door and the like, and which will give light and air and at the same time presents a positive fire proof or fire resistant closure when the temperature at or around the door is raised.

Another object is to so construct and mount the parts that they can be readily built into or embodied with a door or the like of standard size and thickness, and of substantially usual external appearance and construction.

Still another object is to provide thermally influenced control means so that the operation or actuation of the parts will be automatic to interpose the closure in the opening when the temperature adjacent to the door is raised above a predetermined degree.

Yet another object is to provide a structure including and embodying movable louvres capable of being opened to give shielded ventilation and air passage, and means to positively and automatically close the louvres as the temperature is raised above the predetermined or danger point.

A still further object is to so construct and associate the parts that as the closure is moved from the opening a screen is interposed, and as the closure is moved into or across the opening the screen is removed.

A further object is to provide a structure of this character that is simple and inexpensive to manufacture, that can be installed and used in any desired mounting or fitting, and that will present the appearance of and will serve in the same manner as the usual door, at the same time affording fire proof protection and other advantages inherent in my invention.

With the above and other objects in view, which will be apparent to those skilled in the art, my invention includes certain novel features of construction and combinations of parts which will

be hereinafter set forth in connection with the drawings and then pointed out in the claims.

In the drawings:

Figure 1 is a view in elevation of a door constructed in accordance with my invention and with the opening therethrough closed, showing the inside of the door.

Fig. 2 is a similar view illustrating the outside of the door.

Fig. 3 is a view in elevation of the inside of the door with the ventilating louvres open.

Fig. 4 is a broken view in longitudinal vertical section through a door having the invention embodied therewith.

Fig. 5 is a transverse vertical view substantially on line 5—5 of Fig. 4.

Fig. 6 is another transverse vertical sectional view taken on line 6—6 of Fig. 4.

Fig. 7 is an enlarged fragmentary sectional view to better show the louvre structure and operating parts therefor.

Fig. 8 is a view in elevation showing the outside of a door of modified construction.

Fig. 9 is a similar view illustrating the inside of the door.

Fig. 10 is a view in elevation showing the inside of the door with the louvre frame opened.

Fig. 11 is a broken transverse vertical sectional view through the modified form of door substantially on line 11—11 of Fig. 12.

Fig. 12 is a broken and fragmentary longitudinal vertical section through the modified construction.

Fig. 13 is a view similar to Fig. 11, taken on line 13—13 of Fig. 12.

In the main embodiment I have illustrated the door structure as made up of a shell of steel, or other fireproof or fire-resisting material, and this shell can be reinforced with steel or other suitable bracing, or the top and bottom and side stiles, and other normally solid portions of the door can be built up with a filler of fireproof wood, composition, or other suitable material.

The door, generally indicated at 1, has the usual hinges 2 on which the door is swingably mounted, and a suitable lock set and knob 3, or other suitable latch and lock mechanism for the door can be provided as desired.

The door 1 is, in the present adaptation, shown as having an opening 4 through its upper portion corresponding to the usual panel space or glass opening of an ordinary door, and a recess 5 is provided in the lower part of the door, by separating the inner and outer walls 6 and 7 of the door stiles, and correspondingly separating inner 55

and outer sides 8 and 9 of the panel closing material. The door stiles, and the panel members 8 and 9 can be stamped, molded, or otherwise formed to have the usual and ordinary shapes of such portions of a door, or can be made up to any desired form, shape, and design, the essential feature being that an opening be provided through the door, as at 4, adjacent one end, and that a recess be provided, as at 5, within the door at the other end, the recess to be at least equal in its longitudinal dimension to the corresponding dimension of the opening.

A sliding double faced plain panel or closure member, generally indicated at 10, is slidably mounted in suitable guideways 11, to be movable to one extreme position where it is within the recess 5, and to another extreme position where the panel structure closes the opening 4 through the door. This sliding panel or closure member 10 is preferably made with its side walls 12 and 13 separated to provide a space therebetween, and open on top and bottom sides to permit passage over a screen and louvres.

The door structure has transverse supporting members 13 secured or mounted therein, and a screen 14 is held in place and stretched across the opening 4 of the door by means of bars 15 holding the edges of the screen strip secure to said transverse members 13. The screen strip 14 is mounted to be between the two sides 12 and 13 of the sliding panel or closure member 10, and will be covered, as shown in Fig. 1, by the sides of the panel member 10, when same moves to close the opening 4. When the sliding panel or closure member 10 is shoved down or lowered into the recess 5, the screen strip 14 will be presented over the opening 4, as illustrated in Fig. 2.

Under some circumstances it will be found desirable to provide louvres in and across the opening 4 to prevent and cut off a direct view through this screened opening in the door, and also provide for or prevent a direct draft or passage of air through the opening, and where louvres are used these will be swingably mounted in the frame 17 to be between the side members 12 and 13 of the slidable panel or closure member 10. Thus, the louvres will be mounted to be normally out of sight when the sliding panel member 10 closes the opening 4, and will be visible, accessible, and operable manually when the panel is opened or slid down, as shown in Fig. 3 of the drawings.

The sliding panel or closure member 10 is intended to be mounted so that it can be readily manually moved to the opened and the closed positions, and at the same time, my invention contemplates construction of the parts for and provision of means to automatically accomplish upward movement of the sliding panel or closure member to a position in which the opening 4 is closed and sealed, when the temperature at the door is raised above a predetermined point or degree.

Wheels or pulleys 18 and 19 are mounted in suitable stanchion bearings carried by the upper cross bar or transverse member 13', to be within the head stile of the door and at the upper ends of the side stiles. Cables 20 and 21 are led over these wheels or pulleys 18 and 19 with one end of each cable attached, by means of eye member 22, or other suitable fastening, to the sliding panel or closure member 10, weights 23 being carried at the other end of each of the cables 20 and 21. The weights 23 are sufficiently heavy to normally exert force to overcome the weight

of the panel 10, and its associated parts, and slide the same to a raised position to close the door opening 4.

To prevent unauthorized opening of the panel when closed, and to hold the panel in opened position, it is desirable that latch or lock means be provided, operable from the inner side of the door, to hold the panel in each of its extreme positions and movements. With this in mind, a latch box or case 24 is provided in the upper part of the panel structure attached to the inner wall 12, being thus mounted in position to not interfere with the screen and louvre structures, or free movement of the panel in either direction. Latch hooks 25 are provided depending from the transverse member 13' to be on opposite sides of the latch box or case 24, and similar latch hooks 26 are mounted upon a lower transverse bar 12'' in upstanding relation, with their hook portions thus disposed in reverse to the hook portions of the members 25.

A latch rod 27 is slidably mounted in suitable bearings to extend substantially vertically and centrally through the latch box or case 24, with its upper end terminating in a latch operating bar 28. At the lower end of the latch operating rod 27, a substantially D-shaped hanger 28 is provided, and a latch operating bar 29 is carried by this substantially D-shaped hanger 28. The panel or side member 12 is provided with a depression 30 adjacent the lower part as exposed when the panel is closed, and this depression has an opening through the bottom or lower side thereof through which the latch operating bar 29 extends to be accessible for manual depression and operation.

Upper and lower latch members 31 and 32 are provided in horizontal mounting on opposite sides of the latch rod 27 extending through openings in the sides of the latch box or case 24 to be in substantially vertical alignment with the latch hooks 25 and 26; which are respectively slightly offset from vertical alignment to thus have true vertical alignment with the relative latch members, and to prevent interference with unrelated parts.

Latch shifting fingers 33 are pivoted within the latch box or case 24 and have portions at one end engaging in notches in the latch members 31 and 32, and these latch operating fingers 33 have their ends beyond the pivotal mounting formed as cam faces sloping inwardly toward the latch operating rod 27. Springs 34 bear against the latch fingers 33 to normally resiliently force the latch members 31 and 32 to the extended or latching position. A spring 35 fits upon latch operating rod 27 normally resiliently to hold this rod in an upwardly extended position with the latch operating bars 28 and 29 exposed, and a cross bar 36 is carried by the latch operating rod 27 with its ends extending in position to engage with the cam portions of the latch fingers 33 when this rod 27 is moved downwardly against the pressure of spring 35. As manual pressure is brought to bear upon latch operating bar 28 or 29, the rod 27 will be moved downwardly and the ends of the cross bar 36 engaging with the cam faces of the fingers 33 will swing these fingers back against the pressure of springs 34 to draw the latch members 31 and 32 into the latch box or case 24 to thus clear the latch hooks 25 and 26, as the panel may be raised or lowered.

With the parts constructed, arranged and mounted in the manner set forth, the panel 10

can be manually moved to the opened position, and can be latched in this position. When the latch means is manually released by pressure exerted on latch operating bar 28 exposed at the upper edge of sliding member 10, the weights 23 will pull upon cables 20 and 21 to automatically raise the sliding member to close the opening 4 through the upper part of the door. As the sliding member reaches its extreme upper position, as indicated by the dotted lines in Fig. 4, the latch members 31 will engage with latch hooks 25 to hold the panel against unauthorized lowering or opening movement. When the sliding panel is in the closed position, the depression at 30 is exposed above the middle cross stile of the door and consequently the latch operating bar 29 is exposed for manual movement to release the latch from the position indicated by the dotted lines in Fig. 4.

While manual operation is readily and effectively accomplished with this structure, it is an object of my invention to provide means by which the latch structure will be released, when the sliding panel or closure is in the opened position, should the temperature around the door rise above a predetermined point or degree, and with this in mind it is desirable that the weights 23 be made sufficiently heavy to instantly inaugurate and quickly accomplish closing of the sliding panel member when the latch members 32 are released from the full line position illustrated in Fig. 4. To accomplish this automatic release it is necessary that thermally influenced means be provided, and with this in mind slides 37 are provided in the upper part of the latch box or case 24 and have fingers 38 projecting to positions adjacent to the inner ends of the latch members 32. Springs 39 are provided to normally move the slide members to cause the latch members 32 to be withdrawn from latching positions against the latching pressure of springs 34. During manual operation of the closure, and under normal conditions of use of the door, it is necessary that the slide members 37 and the latch moving fingers 38 be rendered inoperative and that the operating impulse of springs 39 be controlled, and with this in mind I provide spring links 40 on opposite sides of fusible ball 41, which fusible ball 41 with spring links 40 bridge between to separate and hold the slide members in the position illustrated in Fig. 4. As long as the spring links 40 remain in straight line position, the slide members 37 and the latch operating fingers 38 are inoperative, but if the temperature around the door be raised sufficiently to fuse or soften the ball 41 so that it will give under the strain of springs 39, the bridge structure made up of parts 40 and 41 will collapse and these springs will move the operating fingers 38 to engage with the latch members 32 and will draw the same from engagement with the hooks 26, thus fully and entirely releasing the slidable member to permit the same to be moved to the closed position, under the force exerted by weights 23.

The weights 23 are intended to move vertically in passages provided in the side stiles of the door, and to hold these weights against lateral swinging and clattering within the door, I provide guide cables 41 and 42 secured at their ends adjacent the top and bottom of the door and received through openings 43 in the weights, this arrangement permitting free up and down sliding movement of the weights and holding the same in a predetermined path of movement and

out of contact with the side members of the door.

To guard against undue noise and shock in lowering and raising the slidable member it is desirable that bumpers 44 and 45, of rubber or other suitable material, be provided against which portions of the sliding member or panel will abut when the panel is moved to each of its extreme positions.

As stated, the side members 12 and 13 of the slidable member or panel 10 are spaced apart, and swinging louvres 46 are mounted in a suitable supporting frame 47 attached to frame 13' within the space thus provided. These louvres have their edges 48 formed as hooks, or otherwise shaped, to insure that the adjacent edges will come together and form a tight closure between adjacent louvres. Each louvre 46 has a half disc 49 connected therewith and the half discs have elongated radial slots 50 formed there-through. A slidable bar 51 has pins 52 thereon extending through the slots 50, and as the bar 51 is slid, through the medium of handle 53, which is attached to 51, these pins 52 working in the slots 50 will swing the louvres to opened position when the bar is lowered and to closed position when the bar 51 is raised.

While the louvres might be manually opened and closed, it is desirable that means be provided to prevent excessive opening of the louvres and to insure closing of the same automatically when the panel or slidable member 10 is closed. An eccentric wheel 54 is mounted for swinging movement on 47 in the upper part of recess 5 adjacent to the lower end of sliding bar 51, and this eccentric wheel has an elongated slot 55 therein to receive a pin 56 on the slide bar 51. The panel or sliding member 10 has an inwardly bent or formed cam portion 57 against which the eccentric wheel 54 rests when the sliding bar 51 is slid down to open the louvres 46, this eccentric wheel thus limiting downward movement of the sliding bar to prevent excess opening of the louvres. When the sliding member or panel 10 is moved upwardly from the recess, to close the opening 4 through the door, this cam portion 57 sliding against the eccentric wheel 54 will swing the wheel to cause pin 56 to ride up in slot 55, and consequently the sliding bar 51 will be moved upwardly a distance sufficient to swing each of the louvres 46 to a closed position.

The modified construction as illustrated in Fig. 8 et seq. includes a door structure of substantially the same form as set forth above, with a slidable solid glass outside panel to resist fire, and swingable inside glass ventilating louvres, with a protective screen associated with the sliding panel, and the parts are so arranged that as the fire-resisting panel is slid down to uncover the opening the screen is drawn over the opening, the inside louvres being bodily movable to permit free access to the inner side of the sliding glass panel 4, for cleaning, repairing, replacement, or other purposes.

With this construction, the door generally indicated at 58, is built up in substantially the manner described above and is provided with an opening 59 through its upper portion and a recess 60 in its lower portion. As shown in Fig. 8, the sliding panel 61 is preferably of wire glass, or other suitable fire-resisting material, and the inside louvre structure is carried by a frame 62, hingedly mounted at 63 upon the main door structure. A screen 64 is provided to be moved across the opening 59 as the panel 61 is slid from the opening.

Pulleys or wheels 65 have cables 66 running thereover and attached to the sliding panel 61 at its upper edge, this sliding panel being preferably carried in and framed by the binding strip 67, of metal or other suitable material.

A bar 68, not sufficiently heavy to move the sliding panel 61, is secured on the loose end of cable 66, and the panel 61 will be normally moved and slid manually. Weights 69 are suspended within the side stiles of the door by cables 70, which have fusible links 71 incorporated therein, and these weights are normally held in inactive position under the top of the door, the weights being provided with openings through which the cables 66 are freely slidable. With this arrangement, the fusible links 71 normally hold the weights 69 in fixed positions, and the cable 66 slides freely through the opening of each weight, so that free manual shifting and movement of the sliding panel 61 is permitted. However, if the temperature around the door is raised sufficiently to melt or soften the fusible links 71 to permit weight 69 to drop, this weight will engage and rest upon the bar 68, and will thus increase the pull on cable 66 sufficiently to overbalance the weight of the sliding panel 61 and quickly slide the panel to the closed position.

The screen 64 is mounted on a spring operated roller 72 carried by brackets in the upper stile of the door, and as panel 61 is slid down the screen strip 64 will be drawn across the opening 59, the spring roller 72 serving to automatically take up the screen as the panel 61 slides upwardly to close the opening 59.

In the present instance, the louvres 73, carried by the swinging frame 62 are illustrated as made of glass or other transparent material with their side mounting edges beveled to overlap and give a tight joint. These louvres can be hinged and mounted substantially as set forth in connection with louvres 46, and the same slide bar and eccentric wheel arrangement can be employed, a finger 75 being provided on slidable panel 61 to engage with the eccentric wheel and swing the same to close the louvres as the sliding panel 61 is moved into the opening 59.

Cables 76 will be preferably provided to guide and hold the cross bar 68 and the weight 69 in the proper path of movement.

The opening might be made of other than rectangular form, and might be placed lower down in the door, but the construction and operation, in each instance, will be substantially the same as set forth.

This structure might be embodied in a fire proof window, such as used in factory buildings, warehouses, and other buildings, where solid steel shutters or other fire proof closures are required, and light and ventilation can thus be secured while the door or shutter is closed. Further, the structure might be embodied as a ventilator only, in grain elevators, steamships, and in other connections, with the parts arranged to automatically close in case of fire.

While I have herein shown and described only certain specific embodiments and have set forth only certain possible modifications, it will be appreciated that changes and variations can be made in the form, construction, arrangement, and mounting of the parts, in the positioning and adaptations to other shapes and sizes of closures, and in general in the manner of constructing and using the parts for particular adaptations or installations, without departing from the spirit and scope of my invention.

I claim:

1. A door swingably mounted for movement to opened and closed positions having an opening through its middle portion and provided with hollow side stiles, a closure member slidably carried by the door to be moved to positions to close the opening and to clear the opening, swingable louvres carried by the door over the opening and adjustable to opened and closed positions, wheels mounted within the hollow side stiles of the door, cable members attached to said sliding member led over said wheels, weights attached to said cables to exert force to normally move said sliding member to a position to close the opening, and means to swing and open and close said louvres when the sliding member is moved to the opened and the closed positions.

2. A door swingably mounted for movement to opened and closed positions having an opening through its middle portion and provided with hollow side stiles, a closure member slidably carried by the door to be moved to positions to close the opening and to clear the opening, swingable louvres carried by the door over the opening and adjustable to opened and closed positions, wheels mounted within the hollow side stiles of the door, cable members attached to said sliding member led over said wheels, weights attached to said cables to exert force to normally move said sliding member to a position to close the opening, means to swing and open and close said louvres when the sliding member is moved to the opened and the closed positions, and thermally influenced and released means to engage with the sliding member to hold the same in a position to clear the opening of the door.

3. A door swingably mounted for movement to opened and closed positions having an opening through its middle portion and provided with hollow side stiles, a closure member slidably carried by the door to be moved to positions to close the opening and to clear the opening, swingable louvres carried by the door over the opening and adjustable to opened and closed positions, wheels mounted within the hollow side stiles of the door, cable members attached to said sliding member led over said wheels, weights attached to said cables to exert force to normally move said sliding member to a position to close the opening, means to swing and open and close said louvres when the sliding member is moved to the opened and the closed positions, and a screen associated with the sliding member to be moved over and from the opening of the door.

4. A fire proof door comprising a metallic shell having hollow side stiles and provided with an opening through the middle, a panel, guideways mounting said panel for sliding movement to close upwardly over the opening and to open downwardly to clear the opening, wheels mounted in the upper part of the hollow side stiles, cables attached to said panel and extended over said wheels, weights attached to the cables and travelling within the hollow side stiles of the door to thus exert force to normally move the panel upwardly to a closed position, and thermally influenced and releasable latch means carried by the door to engage the panel and hold said panel in the open position.

5. A fire proof door comprising a metallic shell having hollow side stiles and provided with an opening through the middle, a panel, guideways mounting said panel for sliding movement to close upwardly over the opening and to open downwardly to clear the opening, wheels mounted

in the upper part of the hollow side stiles, cables
attached to said panel and extended over said
wheels, weights attached to the cables and travel-
ing within the hollow side stiles of the door to
5 thus exert force to normally move the panel up-
wardly to a closed position, thermally influenced
and releasable latch means carried by the door
to engage the panel and hold said panel in the
open position, and guide means within the hollow
10 side stiles of the door to guide said weights and
keep the same from contact with the structural
parts of the door and hollow stiles.

6. A fireproof door provided with an opening
therethrough and having swingable louvres car-
ried adjacent to said opening and movable to
opened and closed positions, a sliding member
carried by the door and movable to positions to 5
close over said opening and to clear the opening,
and means actuated by movement of said slid-
ing member to open the louvres when said slid-
ing member is moved to clear the opening and to
10 close said louvres when the sliding member is
moved to close the opening.

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