May 15, 1951 F. J. BREMER 2,552,515

FIRE-RESISTANT DOORFRAME

Filed Nov. 16, 1948 2 Sheets-Sheet 1

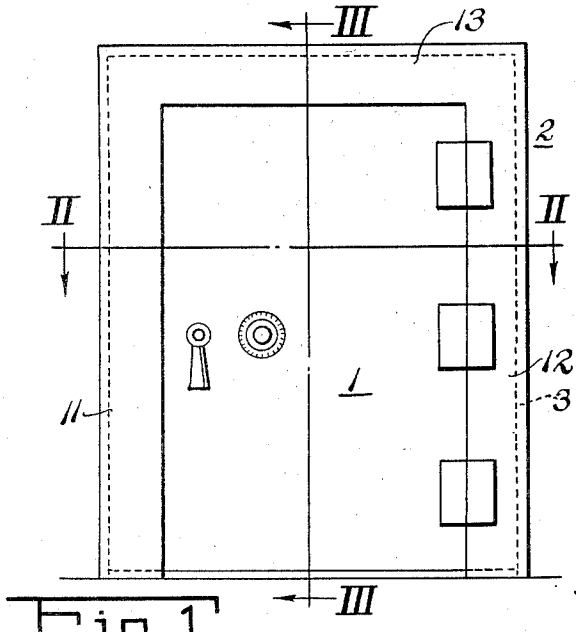


Fig. 1.

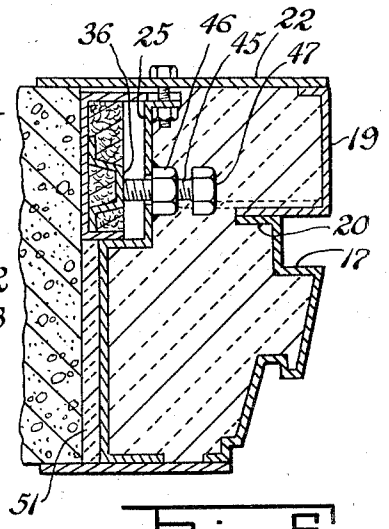


Fig. 6.

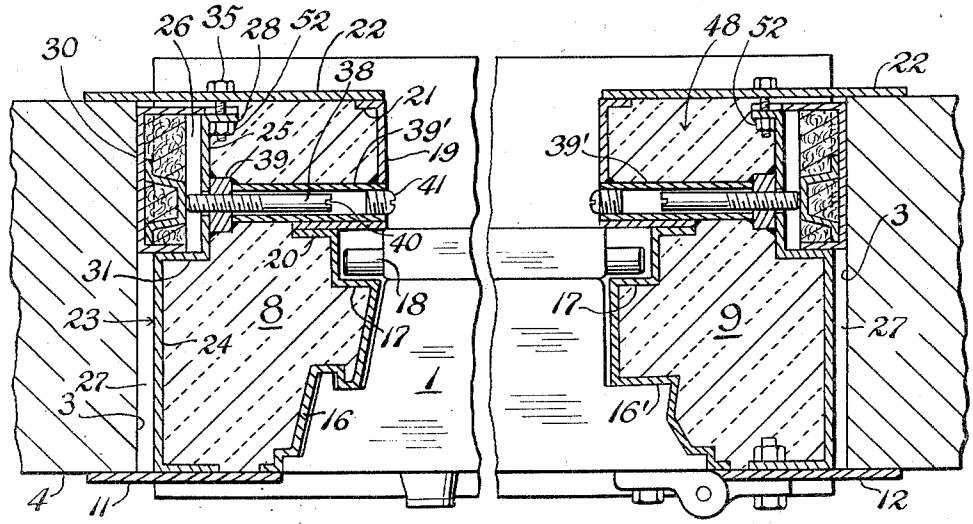


Fig. 2.

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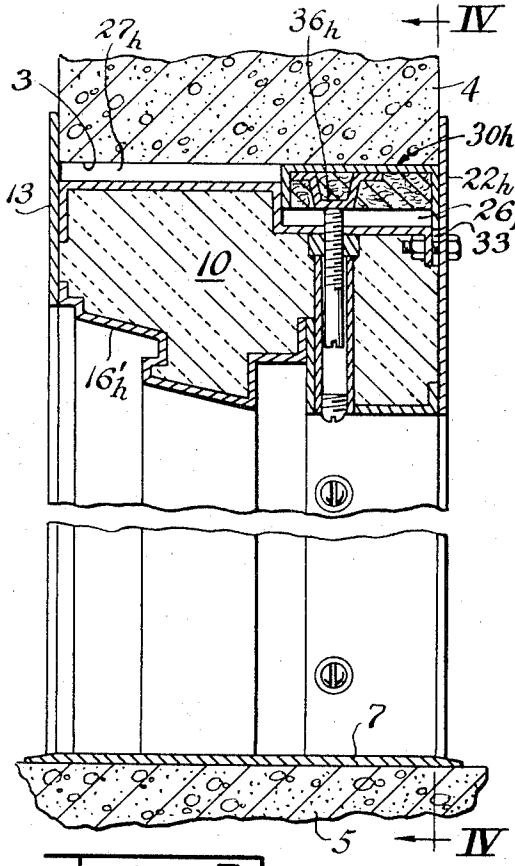


Fig. 3.

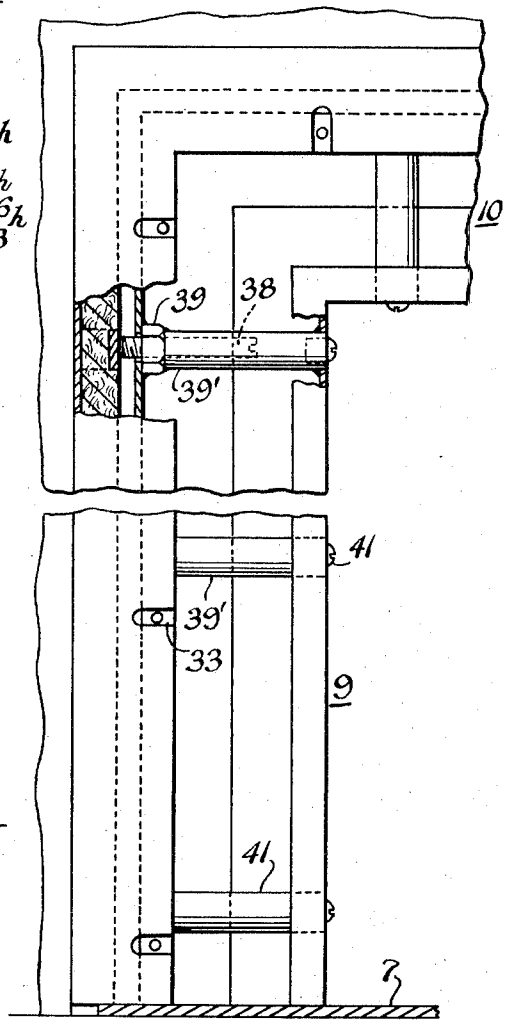


Fig. 4

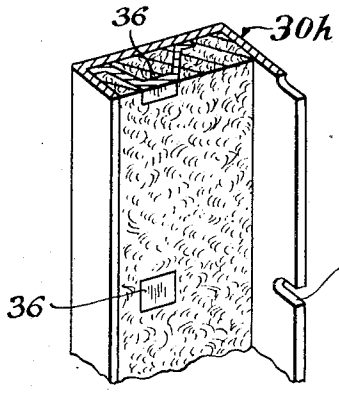


Fig. 5.

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FIRE-RESISTANT DOORFRAME

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Application November 16, 1948, Serial No. 60,306

11 Claims. (Cl. 109—77)

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This invention relates to vault doors and more particularly to fire resistant vault door frames and to improvements in features of construction thereof that make it possible to install and set the frames with the doors hung thereon, without the use of grouting and at the same time improving the heat insulating properties of the frames.

This application is a continuation-in-part of my application Serial No. 629,755, filed November 20, 1945, now abandoned.

An object of this invention is the provision of a fire resistant vault door provided with a frame having means associated with the stiles and header of the frame whereby the frame and its door may be set in a door opening in a vault wall in a plumb condition without grouting-in the frame, the said means being accessible from within the vault for such adjustments as may be necessary from time to time to realign the door to plumb in the event the frame and its door should be thrown out of plumb for one reason or another.

Another object of this invention is to provide a fire resistant door frame that shall be so constructed that a plurality of dead air spaces are provided between the walls at the sides and top of the opening in the vault wall and the stiles and header of the door frame, the construction of the frame being such that insulation may be confined in such spaces to supplement the heat insulating properties of such dead air spaces.

These and other objects of the invention will be apparent to those skilled in this particular art from the following description taken in conjunction with the accompanying drawings, in which:

Figure 1 is a view in front elevation of a fire resistant door hung in a door frame embodying the invention, the door and frame being mounted in place in an opening in a vault wall;

Fig. 2 is a view in section taken on line II—II on Fig. 1 showing the construction of the door frame stiles and means provided for securing the stiles to the vault walls;

Fig. 3 is a view in section taken on line III—III of Fig. 1 showing the details of construction of the header of the door frame and means provided for securing such header to the vault wall at the top of the opening therein;

Fig. 4 is a partial view partly in section as seen from the vault side of the door locking in the direction of the arrows IV—IV on Fig. 3, showing the open or hollow construction of the header and door stiles and the insulated space between

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the door frame at the sides and top of the opening in the vault wall;

Fig. 5 is a view in perspective, partly in section, of a section of member employed in conjunction with the door stiles and header for securing the door frame in place and also for providing a heat insulating dead air space between the vault walls at the sides and top of the vault wall opening and the rear portions of the stiles and header of the door frame; and

Fig. 6 is a view in section of one of the door frame stiles showing a modified means for securing the door frame in the opening in the vault wall.

Throughout the drawings and the specification like reference characters indicate like parts.

In Fig. 1 of the drawings is illustrated a fire resistant vault door 1 hung in a frame 2 disposed within a rectangular opening 3 in a vault wall 4. The door frame rests on the floor 5 in the vault door opening.

As may be seen in Figs. 2, 3, 4 and 6, the door frame is spaced from the vault wall at the sides and top of the opening 3 and the space between the door frame and the vault walls is closed, both at the front and vault sides of the vault wall so that this space is a dead air space and forms efficient insulation against the transfer of heat from the front of the vault wall through to the vault side of the door.

The door frame in which door 1 is hung comprises a sill 7 made of heavy steel plate, stiles 8 and 9 and a header 10. As will be described more in detail, the stiles 8 and 9 and the header 10 are made from structural members of steel or suitable steel alloy shaped and formed so that the various members of the stiles and header may be rigidly secured together and to the sill by welding or other suitable means. At the front of the stiles and header is a border comprising upright plates 11 and 12 and a horizontal plate 13. The border plates 11 and 12 as shown, extend from the jamb of the door frame stiles laterally a sufficient distance to span, conceal and close the spaces between the stiles and the vault wall at the sides of the door frame. Border plate 13 extends from the jamb at the top of the door upwardly and across the space between the header and wall at the top of the opening in the vault wall so as to close and conceal this space. The border plates 11, 12 and 13 form a part of the stiles 8 and 9, and header 10, respectively.

Stile 8 comprises a jamb 16 which extends inwardly from border plate 11 to a point where the inner face of the vault door 1 is located. Jam

16 as shown, has an irregular surface composed of shoulders and angularly disposed faces so as to conform to the shape of the adjacent edge of the door 1. The inner edge of the jamb 16 is of substantial Z-shape so as to provide an abutment or bearing 17 for the lock bolt 18 of the door. To the inner edge of the jamb 16 an upright structural member 19 of substantially L-shape is secured by welding or other suitable means. The long leg of the L abuts a flange 20 at the inner edge of jamb 16 and is welded thereto and at the extreme inner edge of member 19 is a flange 21 which serves to strengthen and stiffen member 19 and also to provide an abutment for a closure plate 22 at the vault side of the stile. The stile also includes a structural member 23 disposed adjacent the wall at the side of the vault wall opening. This member is so formed that its transverse section has a front or forward portion 24 of substantially channel shape and a rear offset portion 25 of substantially L-shape. The rear portion 25 is offset in a direction away from the adjacent vault wall so as to provide a space 26 which is substantially wider than the space 27 at the forward portion of the stile. The rear vertical edge of the offset portion 25 terminates in a flange 28 to which the closure plate 22 may be secured.

Within the space 26 formed by the offset portion 25 of the structural member 23 is disposed an upright or structural member 30 of substantially channel shape. One flange of the channel 30 abuts web 31 which joins the offset portion 25 with the channel 24. The rear flange of member 30 is longer than the opposite flange so that it may abut flange 28 of the offset portion 25. Channel 30 constitutes a part of the means provided for securing the door frame in the opening in the vault wall in a plumb position. It also serves to completely close the space 26 into a self-contained air space which is separated from the space 27 at the forward portion of the door frame. Channel 30 is not fixed to the door frame stile as it is required to be movable so that it can be moved towards or away from the offset portion 25 as may be required, first in the placing of the door within the opening in the vault wall and second in securing the door frame and its door to the vault wall in plumb position.

As shown in Figures 4 and 5 member 30 is provided with elongated slots 33 in the rear flange thereof which overlies and abuts flange 23 of portion 25. These slots are spaced along the flange so that it may be adjusted laterally towards or away from the adjacent vault wall at the side of the door stile when securing bolts 35 have been placed through the cover plate 22.

At spaced points in the height of the member 30 stools or bearing pedestals 36 are welded or otherwise secured to the web of the channel 30 against which screw jacks 38 may be turned with more or less force as may be required to properly align the door for plumb position and to secure it in the opening in the vault wall. As shown each jack 38 is in the form of a screw which is threaded through a nut 39 welded to offset portion 25 of member 23 and extends through an opening in portion 25. Jack 38 may be inclosed within a tubular housing 39' one end of which is welded to the nut 39 and the other end of which extends through the web of the structural member 19 and is welded thereto. Jacks 38 are provided at their outer ends with slots 40 for accommodating a screw driver or the like. If desired, the outer ends of the tubular

housings 39' may be closed by means of screw plugs 41. Thus screw jacks 38 are accessible from inside the vault without removing the back closure plate 22.

As shown by Figs. 3 and 4, the stiles are provided with a plurality of jacks 38 disposed at spaced points vertically of the door stile. These jacks are preferably uniformly spaced so that the adjustment of the door frame to plumb position may be readily facilitated.

When channel members 30 are mounted in place as shown, they form inclosed dead air spaces in the rear portions of the door stiles. These air spaces are in themselves efficient heat insulating barriers to the transfer of heat from the front of the vault door through to the interior of the vault. However, the heat insulating properties of these spaces may be supplemented by placing insulation in the channels to the depth of the short flanges thereof or to the depth of the stools 36. This insulation may be of a monolithic type having the property of expanding or increasing in volume when heated to high temperatures. The depth of the layer of insulation in the respective channels is such that when the temperature is raised sufficiently it will expand and substantially fill the spaces 26.

Door stile 9 is similar in substantially all respects to door stile 8, the only difference being in the configuration of its jamb member 16'. The configuration of jamb member 16' is such as to conform to the shape of the adjacent side of the vault door 1. The inner edge of the jamb member 16' terminates in a Z-shaped section having a flange or abutment 17 against which the lock bolt 18 may bear when the door is closed and locked. Since the stile 9 as shown is in all other respects the same as stile 8, similar and corresponding parts are designated by the same reference characters.

The front upright border plates 11 and 12 are welded to the forward flanges of the jamb members 16 and 16' and the channel portions 24 so as to form a unitary part of the door stiles.

The header 10 is fabricated from structural elements having substantially the same shape as the structural elements embodying the door stiles 8 and 9. It has a jamb member $16'_h$ the configuration of which is like that of jamb 16 and conforms to the configuration of the adjacent top side of the vault door 1. In other respects the structural members comprising header 10 are the same in section as those making up the stiles 8 and 9, therefore, similar and corresponding parts will be designated by the same reference characters with the subscript *h* applied so as to indicate that these members are part of the header.

In Figs. 3 and 4 are shown, respectively, a section of the header and a view of door stile 9 and a portion of header 10 as seen from the interior of the vault, parts being broken away and sectioned to indicate how the channel members 30 and 30_h are forced against the vault walls at the sides and top of the door frame. In Fig. 4 the hollow spaces within door stile 9 and the header are seen as the cover plates 22 and 22_h have been removed.

Fig. 4 also illustrates how the structural members composing the header and door stiles are so fitted together that the hollow space of the stiles and of the header within which heat insulation is confined are continuous and connected and also that the space between the door frame and the walls at the sides and top of the opening

in the vault wall 4 is a continuous communicating space.

In Fig. 6 is a view in section illustrating a modified form of jack for securing the stiles and header door frame in place. This type of jack may be employed in place of the concealed type of jacks illustrated in Figs. 2, 3 and 4. The type of jack illustrated in Fig. 6 comprises a screw 45 having screw thread engagement with a nut 46 which is secured as by welding to the offset portion 25 of the structural member 23. The jack extends through an opening in the offset portion 25 and its inner end is disposed to bear on a stool or bearing 36. The end of the screw extending into the hollow of the door stile or header is provided with a head 47 shaped to accommodate a wrench whereby the screw may be turned in one direction or the other as the adjustments require. The screw 45 is accessible for adjustment when the closure plates at the vault side of the door frame are removed.

As shown in the drawings, the door stiles 8 and 9 and header 10 are hollow. Within this space may be confined safe insulation 48. The insulation 48 may be placed at the time the door is being fabricated, or at the site after the door has been installed. Preferably it is installed at the time of fabrication of the door. The insulation may be of any known type such as monolithic insulation containing a high percentage of such materials as cement, vermiculite, diatomaceous earth, and similar substances. Such insulation ordinarily contains a substantial amount of moisture which at high temperatures is converted to steam and aids and supplements the insulating properties of the insulation.

The insulation in the channel members 30 and 30_h may also be of a monolithic type similar to that employed in the door stiles and header.

The spaces 27 and 27_h between the door stiles and header and the adjacent vault walls at the sides and top, respectively, of the opening in the vault wall may be utilized as a void space or it may be filled with insulation such as mineral wool or similar substance capable of withstanding high temperatures. Such insulation is indicated in Fig. 6 at 51.

When a vault door provided with a door frame such as herein illustrated, is to be installed, the back plates 22 and 22_h are removed, the jacks are retracted and preferably the channel members 30 and 30_h are removed from the frame. The door frame and door are then inserted into the opening in the vault wall until the front plates 11, 12 and 13 abut the surfaces of the wall surrounding the opening in the vault wall. The door frame and the door are then shifted so that it will be centrally disposed within the door opening. The channel members 30 and 30_h associated with the door stiles 8 and 9 and header 10 may then be inserted into the spaces 26 and 26_h. The jacks are then advanced towards the bearing members 36 and 36_h thereof until the channel members abut the walls at the sides and top of the opening in the vault wall. The door and frame are then checked for plumb with the vault door 1 closed, adjustments being made in the screw jacks until the door is plumb. The door is then opened wide and it is again checked for plumb and if further adjustments in the jacks are required these are made until the door and door frame hang in a plumb position when the door is wide open. After testing the frame and door for plumb in both open and closed positions, the proper adjustments in the jacks having been made until the desired plumbness has been attained, the jacks are uniformly tightened to assure that the door frame will be secured in the vault door opening. The cover plates 22 and 22_h may now be placed and secured by means of bolts 35. These bolts extend through the elongated slots 33 in the channel members 30 and 30_h into nuts 52 welded to the flanges at the innermost edges of the offset portions 25 and 25_h of the door stiles and the header, respectively.

Since a door such as herein illustrated, does not require any grouting in the space between the door frame and the walls at the sides and the top of the opening in the vault walls, the door may be installed after the vault walls have been finished and decorated as the installation of the door will not mar or spoil this finish.

After a door has been installed and for one reason or another the door should settle out of plumb, it may be readjusted to a plumb position by adjusting the jacks 38. As these are readily accessible, the readjustment and realignment of the door frame and its door may be effected quickly and with a small expenditure of time and labor. If the door frame were grouted-in as was the practice with prior art doors, such readjustment could not be effected without tearing out the hardened grout, and this would involve a large expenditure of time and labor.

Having thus described the invention, it will be apparent to those skilled in this particular art that various modifications and changes may be made in the embodiments of the invention illustrated without departing from either the spirit or the scope thereof. Therefore, what I claim as new and desire to secure by Letters Patent, is:

1. A fire-resistant vault door frame having a fire-resistant door hung therein, said frame having stiles and a header fabricated from steel shapes, and a steel sill all secured together as a rigid structure, the stiles and header being hollow within which insulation may be confined, the front portions of the outer walls of said stiles and the front portion of the top wall of said header being relatively close to but spaced from the adjacent walls of the opening in the vault wall, and the rear portions of said outer stile walls and the rear portion of the top wall of said header being offset into the hollows thereof to provide greater spacing from the adjacent walls of the opening in the vault wall than the front portions, and a channel for each of said offset portions having their flanges extending into said offset portions and the webs thereof presented to the walls of the opening in the vault wall, said channels extending substantially throughout the height and width of said stiles and header respectively, and means supported by each of said stiles and said header for actuating its associated inverted channel and adjustably forcing the respective webs thereof into engagement with the walls of the opening in the vault wall to adjust the door frame to and secure it in a plumb position.

2. A door frame according to claim 1 characterized by the fact that the flanges of the respective channels on the vault side of the stiles and header respectively, are deeper than the other and close the hollow space in said stiles and header at the vault side thereof, whereby said channels with said offset portions of the stiles and header form an enclosed air space at the vault side of the door, and additionally close the forward space between the stiles and header and

the walls of the opening in the vault wall to provide a second dead air space therebetween.

3. A door frame according to claim 1 characterized by the fact that the flanges of the respective channels on the vault side of the stiles and header respectively, are deeper than the other and close the hollow space in said stiles and header at the vault side thereof, whereby said channels with said offset portions of the stiles and header form an enclosed air space at the vault side of the door, and additionally close the forward space between the stiles and header and the walls of the opening in the vault wall to provide a second dead air space therebetween, and insulating material in said channels having a property upon being heated of expanding and substantially filling the space within said channels and the offset portions of said stiles and header.

4. A door frame according to claim 1 characterized by the fact that the flanges of the respective channels on the vault side of the stiles and header respectively, are deeper than the other and close the hollow space in said stiles and header at the vault side thereof, whereby said channels with said offset portions of the stiles and header form an enclosed air space at the vault side of the door, and in addition close the forward space between the stiles and header and the walls of the opening in the vault wall to provide a second dead air space therebetween, and insulating material in said channels.

5. A door frame according to claim 1 characterized by the fact that the means for adjustably actuating the webs of the respective channels against the walls at the sides and top of the opening in the vault wall comprises a plurality of spaced screws having screw thread support with the walls of the offset portions of the respective stiles and header disposed to be individually turned towards or from the webs of the channels thereby to force said channels against the adjacent walls of the vault wall opening to adjust the door frame to and secure it in plumb position.

6. A door frame according to claim 1 characterized by the fact that the space between the front portions of said stiles and header and the walls of the opening in the vault wall are filled with a heat resisting insulating material.

7. A door frame according to claim 1 characterized by the fact that the space between the front portions of said stiles and header and the walls of the opening in the vault wall are filled with a heat resisting insulating material, and insulating material within the channels associated with the offset portions of said stiles and header.

8. A fire-resistant door frame for a fire-resistant door adapted for mounting in an opening in a wall, said frame comprising a steel sill and hollow stiles and header formed of steel members, the members of the stiles being secured to said sill and to the members of the header, said stiles having portions extending the full height thereof offset inwardly of the door frame, channel members having their flanges disposed into said offset portions and being movable laterally of the stiles, and means supported by said offset portions for adjustably actuating said channels into engagement with the walls at the sides of an opening in a wall in which said door frame is mounted to adjust said door to a predetermined position and secure the same therein, said channels blocking the space between the door stiles and the adjacent walls at the sides of the opening in which it is mounted.

9. A fire-resistance door frame according to claim 8 characterized by the fact that means are provided on the frame header for adjustably securing the header to the wall at the top of the opening in which said door frame is mounted.

10. A fire-resistant door frame according to claim 8 characterized by the fact that a layer of insulation is disposed in the channel members of the frame.

11. A fire-resistant vault door frame having a fire-resistant door hung therein, said frame having stiles and a header fabricated from steel shapes, and a steel sill all secured together as a rigid structure, the stiles and header being hollow, a moisture containing safe insulation within and substantially filling the hollow space of said stiles and header, the front portions of the outer walls of said stiles and the front portion of the top wall of said header being relatively close to but spaced from the adjacent walls of the opening in the vault wall, and the rear portions of said outer stile walls and the rear portion of the top wall of said header being offset into the hollows thereof to provide greater spacing from the adjacent walls of the opening in the vault wall than the front portions, and a channel for each of said offset portions having their flanges extending into said offset portions and the webs thereof presented to the walls of the opening in the vault wall, said channels extending substantially throughout the height and width of said stiles and header, respectively, and means supported by each of said stiles and said header for adjustably forcing the webs of each of said channels into engagement with the walls of the opening in the vault wall to adjust the door frame to and secure it in a plumb position.

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