April 17, 1928. **1,666,486**

G. C. BRAINARD ET AL

FIREPROOF SAFE CONSTRUCTION

Filed Jan. 21, 1924 5 Sheets-Sheet 1

Fig. 2.

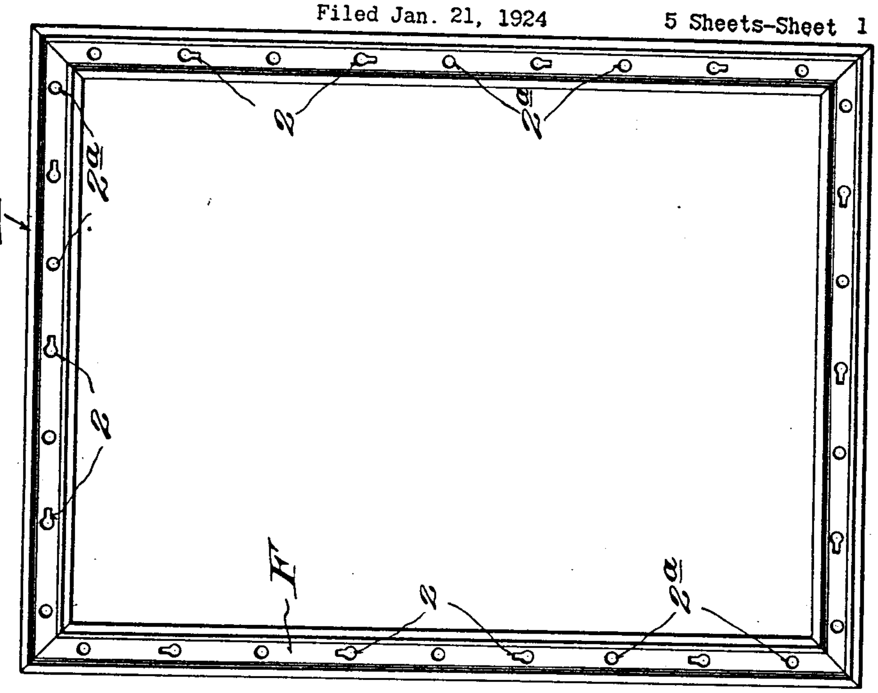
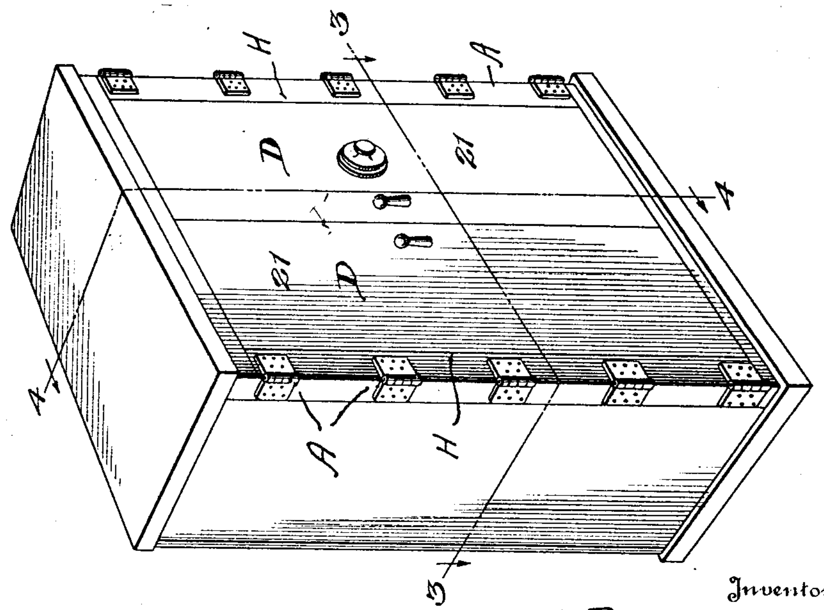


Fig. 1.



Inventors
GEO. C. BRAINARD
JASON A. FITCH
ERIC E. WOLTERS

WITNESSES:-
Chas. L. Griesbauer
Emory L. Groff

By D. P. Wolhaupter
Attorney

April 17, 1928.

1,666,486

G. C. BRAINARD ET AL

FIREPROOF SAFE CONSTRUCTION

Filed Jan. 21, 1924

5 Sheets-Sheet 2

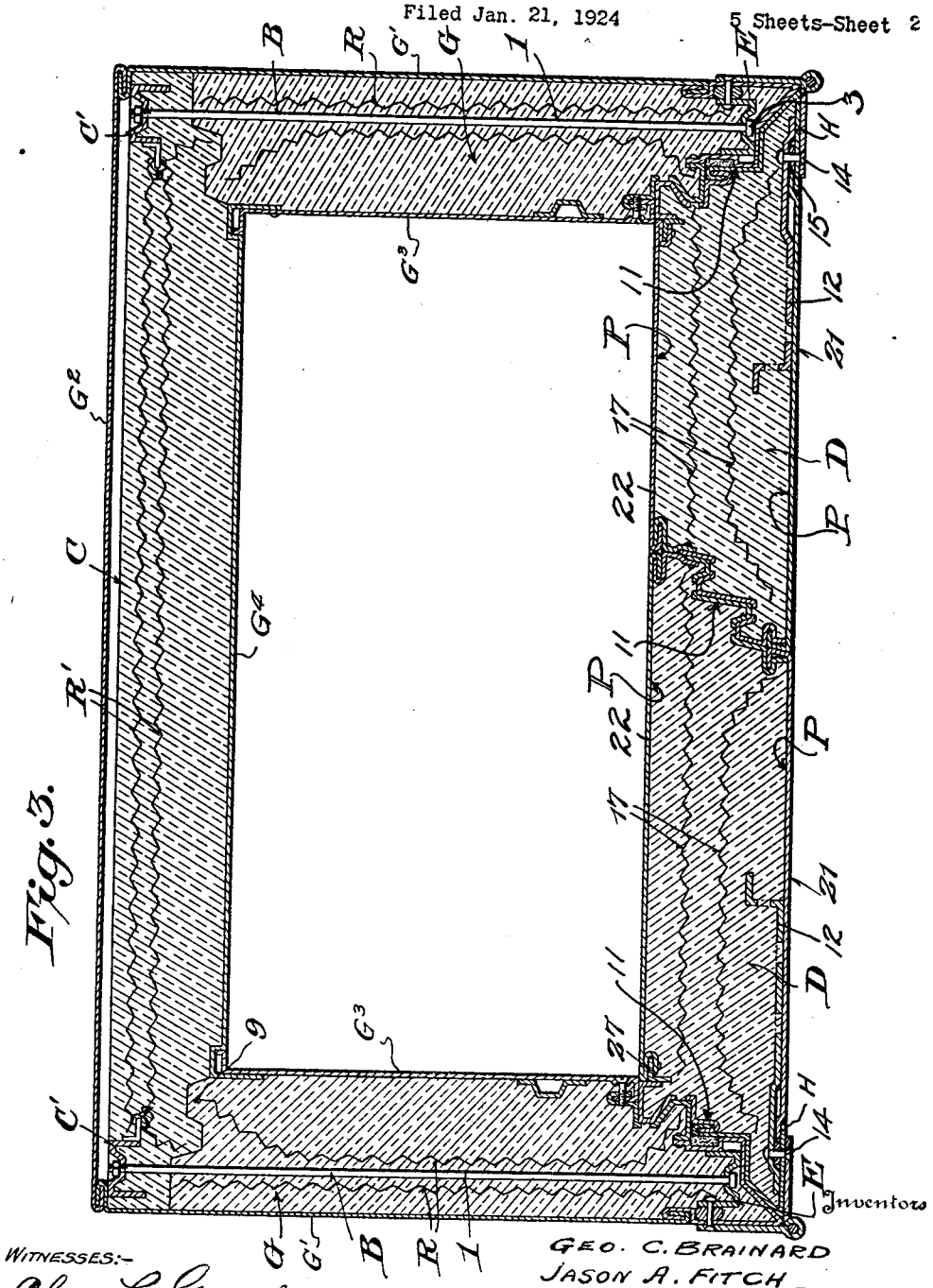


Fig. 5.

Inventors

WITNESSES:-

Chas. L. Griffbauer

Emory R. Groff

GEO. C. BRAINARD
JASON A. FITCH
ERIC E. WOLTERS

By D. T. Wolcan Jr.

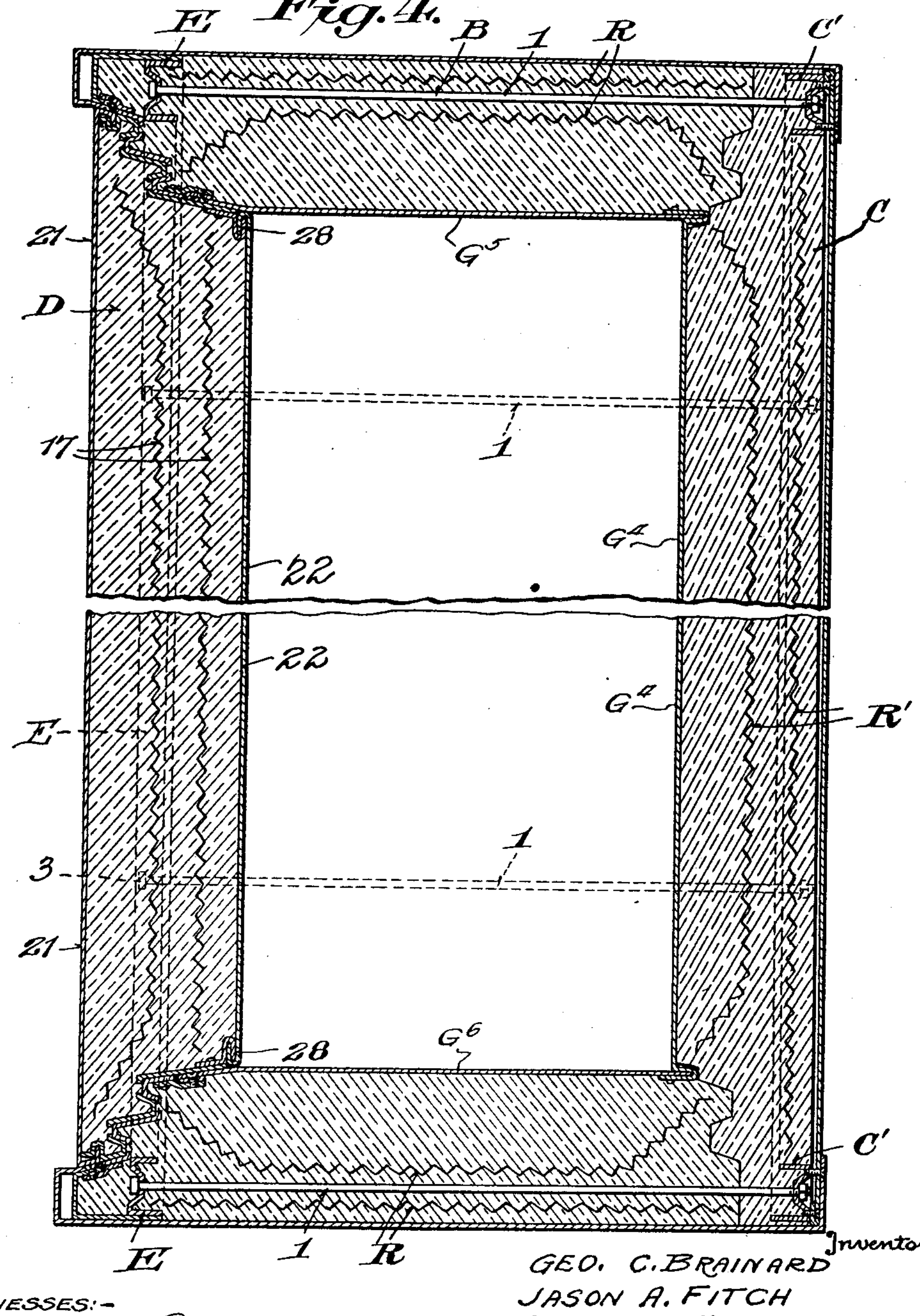
Attorney

April 17, 1928. G. C. BRAINARD ET AL 1,666,486

FIREPROOF SAFE CONSTRUCTION

Filed Jan. 21, 1924 5 Sheets-Sheet 3

Fig. 4.



Inventors
GEO. C. BRAINARD
JASON A. FITCH
ERIC E. WOLTERS

Witnesses:-
Chas. L. Griesbauer
Emory L. Groff

By D. P. Wolhaupter

Attorney

April 17, 1928. 1,666,486

G. C. BRAINARD ET AL

FIREPROOF SAFE CONSTRUCTION

Filed Jan. 21, 1924 5 Sheets-Sheet 4

Fig.5.

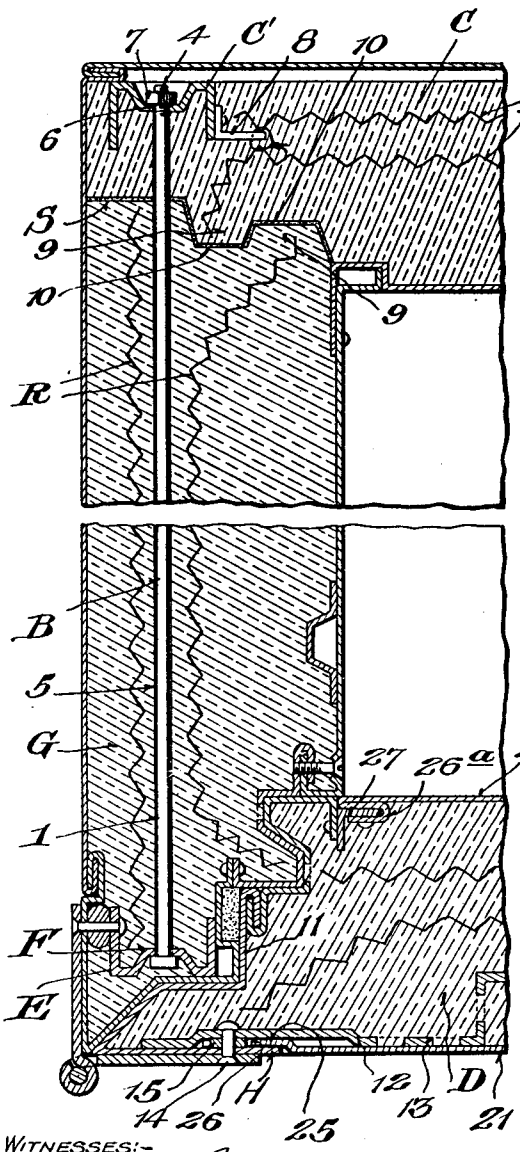
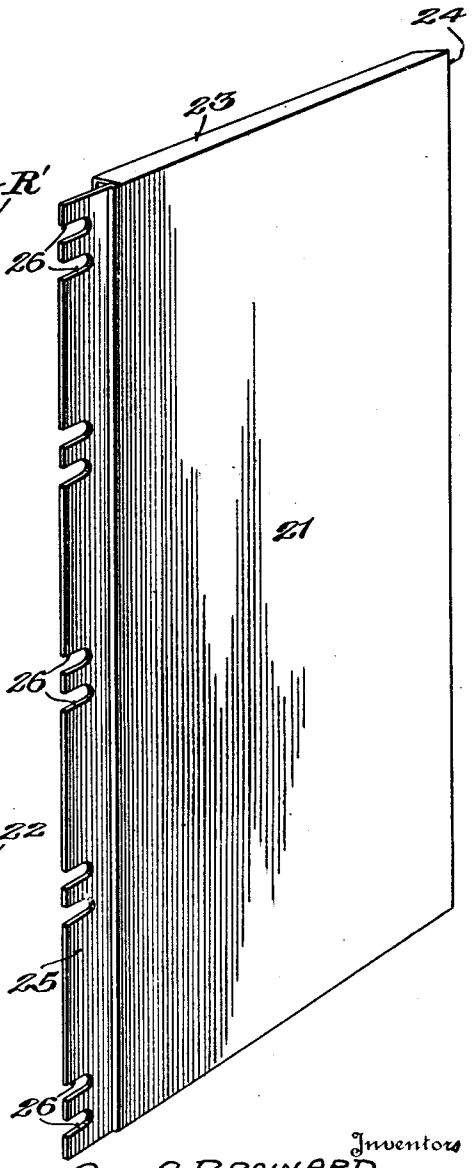


Fig.6.



WITNESSES:-
Chas. L. Griffstaver
Emory L. Groff

Inventors
GEO. C. BRAINARD
JASON A. FITCH
ERIC E. WOLTERS
By D. T. Wolcheffer
Attorney

April 17, 1928. 1,666,486

G. C. BRAINARD ET AL

FIREPROOF SAFE CONSTRUCTION

Filed Jan. 21, 1924 5 Sheets-Sheet 5

Fig. 7.

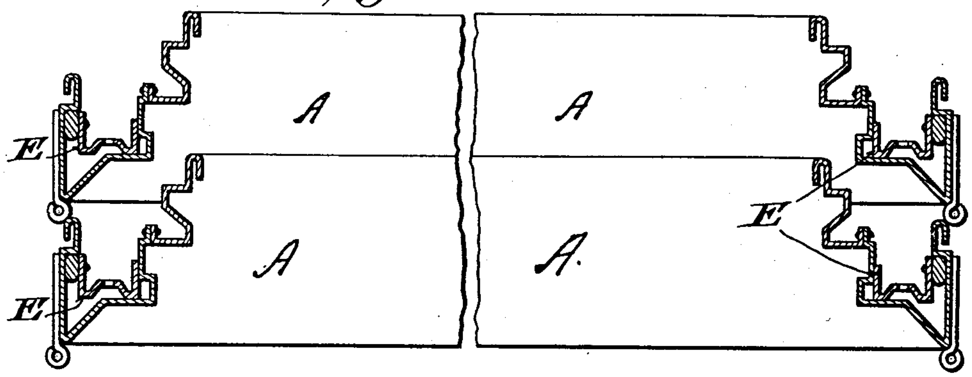


Fig. 8.

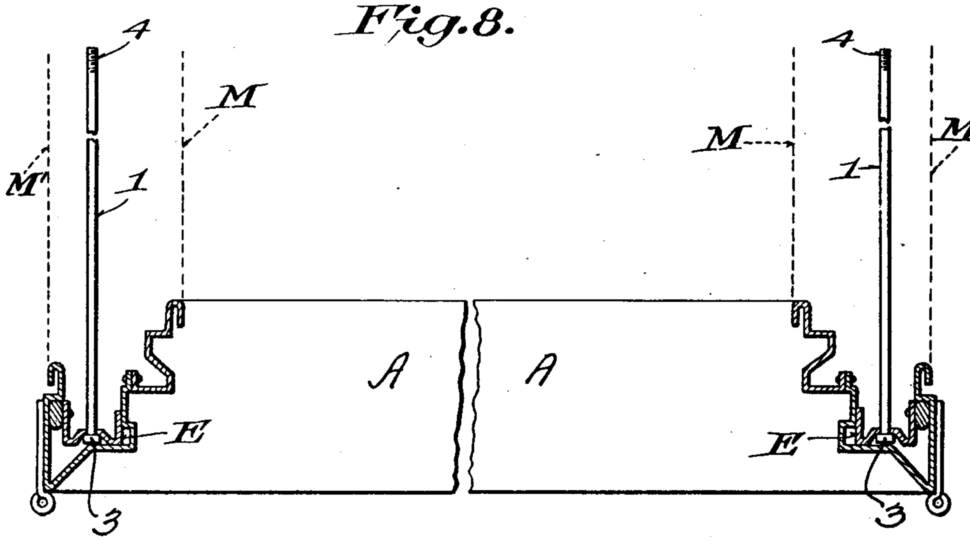
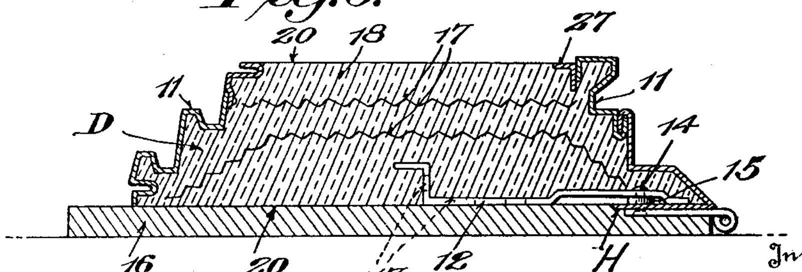


Fig. 9.



Inventors
GEO. C. BRAINARD
JASON A. FITCH
ERIC E. WOLTERS

Witnesses:-
Chas. L. Griesbauer
Emory L. Groff

By D. P. Wolhaupter
Attorney

Patented Apr. 17, 1928. 1,666,486

UNITED STATES PATENT OFFICE.

GEORGE C. BRAINARD, JASON A. FITCH, AND ERIC E. WOLTERS, OF YOUNGSTOWN, OHIO, ASSIGNORS TO THE GENERAL FIREPROOFING COMPANY, OF YOUNGSTOWN, OHIO, A CORPORATION OF OHIO.

FIREPROOF SAFE CONSTRUCTION.

Application filed January 21, 1924. Serial No. 687,630.

This invention relates to improvements in fire-proof safe construction, having chiefly in view effecting economies in time and cost of manufacture, as well as providing an improved structure having inherent strength and fire-resisting capacity, and generally responding to Fire Underwriters requirements.

To that end, the invention contemplates a reduction in the number of parts and operations employed in fabricating a safe structure, thereby permitting of a maximum production in a minimum amount of time, and also requiring the stocking of only a minimum number of parts; thus conserving space and obviating the handling of bulky and unwieldy partly assembled safe structures.

Another important object of the invention is to so construct the door part of the safe as to permit the contemporaneous drying thereof with the safe body, and in a manner that will assure the eliminating of all free water and moisture before the facing or finishing plates are fitted thereto thus eliminating the possible development of rust, as in some safe constructions heretofore made. Therefore, it is proposed by the present invention to construct the doors of the safe in such a manner that the drying period therefor is equivalent to the drying period for the body and back thereby making it possible to time the drying operations of the body and its back, and the doors, so that the same may be carried out contemporaneously thereby permitting each safe to be put through the drying oven as a complete unit.

A further object of the invention is to provide a simple and practical means for making the door frame and the back panel in such a way that these members are held together under tension by suitable ties, such as rods, which together constitute a cage for reinforcing the insulation shell. With this construction it is possible to tighten the back to the body or shell uniformly at all points, and at the same time permit the tension members to be embedded within the insulation shell in such a way as to afford maximum protection from heat. Also by reason of the manner in which the tension members are connected with the door frame and structural element of the back panel, there will be no tendency for the tension members or rods to push or pry the back panel away from its seat on the insulation shell in event that sufficient heat should be conducted thereto to thereby cause their elongation. That feature is, in part, provided for during the molding and baking operations in the course of manufacture as will hereinafter more fully appear.

A further important object of the invention is to assemble and locate the built-up reinforcing cage of the body in such a way, that expanded metal or like reinforcement may be anchored or attached thereto so as to definitely locate such reinforcement and produce known reinforcing results in the insulation body.

A still further object of the invention is to provide an improved door construction which utilizes a rectangular frame open at both sides so as to receive the insulation material, and thereby leave relatively large areas at both sides of the door exposed for drying purposes. In that connection the invention contemplates the use of removable front and back plates for the door which may be put in position after the insulation has been molded and coated with a surface of water-proof paint, the latter being employed to prevent absorption of atmospheric moisture by the insulation, thereby eliminating the possibility of rust at the inside of the metallic portions of the door.

With the above and other objects in view which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

A preferred and practical embodiment of the invention is shown in the accompanying drawings, in which:—

Figure 1 is a perspective view of a safe constructed in accordance with the present invention.

Fig. 2 is a detail view of the primary structural element of the door frame.

Fig. 3 is a horizontal sectional view taken on the line 3—3 of Figure 1.

Fig. 4 is a vertical sectional view taken on the line 4—4 of Figure 1.

Fig. 5 is an enlarged detail horizontal sectional view showing more clearly the manner of placing the tension rods and their con-

nection with the door frame and back panel.

Figure 6 is a perspective view of the facing sheet for the door.

Fig. 7 is a more or less diagrammatic view illustrating the manner in which the door frames may be stacked during fabrication.

Fig. 8 is a detail view illustrating the manner in which the tension rods constituting the skeleton cage for the body may be fitted to the door frame.

Fig. 9 is a detail view illustrating the manner of assembling a safe door.

Similar reference characters designate corresponding parts throughout the several figures of the drawings.

With a view to simplifying and expediting the manufacture of safes of the type previously referred to, and yet combining all of the structural features and advantages of a safe of that type with the additional advantages obtained from the present invention, it is desirable to make the reinforcing cage of the body in such a way that it is not necessary for the same to be carried by the door frame during the preliminary stages of manufacture.

That is to say, the door frame A must be subjected to certain finishing operations prior to the pouring of the insulation material to form the insulation shell, and therefore in order to avoid the necessity of handling a bulky construction consisting of the door frame A and the skeleton cage B, which not only occupies considerable floor space as well as space within the ovens, it is proposed to make the skeleton cage B in such a way that it may be built up from a plurality of tension members, ties, or rods 1, or their equivalent, which may be readily interlocked with the door frame A after the door frames have been finished and set up as the bottom of the mold for the body. When the door frame A and skeleton cage B consisting of the interlocked tension rods 1 and other reinforcements have been assembled within the mold, and other reinforcement located as shown the insulation shell may be poured to form the safe body, and the pre-formed back section C may then be placed upon the body and secured thereto by the tension rods in such a way as to evenly and uniformly clamp the back panel in place.

As will later appear the doors D of the safe, are made in a novel manner to facilitate handling and drying so that they may be made contemporaneously with the body of the safe instead of requiring a longer period of drying as heretofore, thus obviating the necessity of holding-up the completion of a number of safe bodies due to the delay in completing the doors.

The door frame A is constructed to include a primary structural element E which is provided with a countersunk channel F whose bottom wall is formed with the key hole slots 2 or their equivalents, for receiving the heads 3 of the tension rods. Also, as shown in Figure 2 the bottom of the channel F may be provided with the openings 2^a for permitting the cementitious insulation material to flow into the door frame when the same is used as the bottom of the mold.

By reason of the fact that the tension rods 1 are detachably interlocked with the structural element E it is possible to make the door frames A in any desired quantity, and stack them as indicated in Figure 7. In that way they occupy little space on the floor while waiting their turn for embodiment in a finished safe, while on the other hand they may be easily manipulated and later placed on the trucks for passage through the baking ovens which dry or bake the paint.

It will therefore be apparent that by reason of the fact that the door frames do not have to initially carry the cage B which is formed by the tension rods 1, considerable labor is saved in handling while at the same time the number of parts constituting the cage is greatly reduced. Also this arrangement does away with a multiplicity of welded joints usually occurring in a safe construction of this kind.

After the door frames A have been made in accordance with the predetermined specifications, they are laid in the position shown in Figure 8 and the mold members M and M' are assembled as shown therein. The tension rods 1 may be interlocked with the structural member E by fitting the heads 3 of the tension rods in the key-hole slots 2 with the threaded ends 4 of the rods projecting above the plane of the seat which is to be formed in the insulation body to receive the back panel C. When the rods are thus assembled a reticulated reinforcing fabric such as expanded metal R or other wire mesh may be interwoven with or attached to the rods and thus be definitely located. The cementitious insulation body or shell G may then be poured to form the body, and this construction, after setting, is placed in an oven and subjected to a drying heat for the required period.

The effect of such baking is to heat up the cementitious material G as well as the tension rods 1, and by reason of the expansion of the rods 1 their diameter will be increased while in the oven. That is to say, the insulation is poured about the rods and is in close contact with the rods. The insulation is set and dried in that position, but owing to small differences of expansion and contraction due to varying temperatures there may be a little looseness. There also may be expansion of the rods in excess of the expansion of the insulation, producing a binding effect, or there may be an expansion in

heating in excess of rod expansion causing a small amount of loosening. Therefore, when the completed body is removed from the oven and allowed to cool the rods 1 will contract thereby leaving a well defined channel or space 5 entirely about the rods in such a way that there is no adhesion between the rod and the insulation body or shell G. That feature insures freedom of expansion or elongation of the rod in event that the same is subjected to heat by conduction during a fire and permits the movement of the rod to go on freely and unhindered without damage.

In connection with the formation of the skeleton cage B by the tension rods 1 another distinctive feature of the invention exists, namely that of providing an anchoring means for expanded metal or other suitable mesh reinforcement R. As shown in Figure 5 such reinforcement may be placed around and about both the inside and outside of the rods 1 where it may be held by suitable clips or other ties. The positioning of such reinforcement not only strengthens the insulation shell, but permits of locating the inner sheet of such reinforcement in such a way as to include one of the ribs which constitute a portion of the seat for the back panel.

The back panel C includes in its organization a structural element C′ of the same general type as the element E, except that instead of key-slots, the said member C′ is provided with openings 6 for receiving the threaded ends 4 of the tension rods so that the said rods may receive the clamping nuts 7 within the countersunk or depressed channel portion of the said member C′. Also the insulation of the back provides definite clearance in insulation for the tension rods.

As will be observed from Figures 3, 4 and 5 the structural element C′ of the back panel may be equipped with suitable clips 8 or their equivalent for permitting the expanded metal R′ for the back panel to be conveniently anchored in place. In connection with said reinforcement it may be observed that the same may be used in two layers having the mesh thereof running criss-cross while one of the pieces of expanded metal may be turned into one of the dovetail ribs on the back panel.

During the pouring of the shell G and the making of the back panel C, the same will be formed with the complemental tongue and groove members 9 and 10 which form a seat S for the back panel. This seat is adapted to receive a suitable plastic adhesive or fire-proof cement so that when the back panel C is laid on the seat, and clamped to the shell by the tension rods and nuts, the adhesive material is uniformly forced throughout the joint, thereby firmly uniting the back and the shell and sealing the joint in a fire-proof manner. It is apparent that the provision of the tension bolts and nuts makes it possible to uniformly distribute the clamping pressure between the back and the shell over the entire area of the back and the body, thereby insuring maximum rigidity and effecting the locking of the back to the primary structural element E of the door frame A in a simple, practical and expeditious manner. Also, by reason of the fact that tension rods and other reinforcement 1 are encased and adequately housed and protected by the insulation, they are protected to a maximum extent from the absorption of heat by conduction. However, if under the intensity of a fire the rods 1 should elongate it will be apparent from Figure 5 that such elongation may readily take place due to the fact that the rods are free from the insulation and expansion longitudinally will simply lift the nut 7 from its position on the bottom of the channel and structural member C′ without in any way imposing a prying off or pushing strain on the back panel.

The insulation body B is, as previously indicated, surrounded by the metallic shell G which includes the side plates G′ interlocking at their forward edges with a part of the door frame and engaged at their rear edges by the plate G^2 of the back section. The inside of the shell is formed by the inner side wall plates G^3, the back wall plate G^4, and the top and bottom plates G^5 and G^6, all of which are interlocked in such a way as to provide tight joints at the corners and seams.

Referring to Figure 9 which illustrates one of the doors D it will be observed that it is proposed to construct the same in accordance with the present invention in such a way that only the side frames 11 are made prior to the operation of pouring the insulation material within the same as a part of the mold. As shown in Figures 3 and 9 the doors are provided with the stiffening members 12 which may be perforated as indicated at 13 and are attached to the hinge portion H of the side frames 11 as indicated at 14, a spacing washer 15 being employed to separate the attaching edge of the stiffening member from the inner face of the hinge molding.

As will be observed from Figure 9 the door frame 11 is left open at both sides prior to pouring the insulation material, and that feature permits of adequately painting all of the inner surfaces of the door molding. When the door frame is ready to receive a plastic composition the same is laid on a mold or its equivalent 16 and suitable mesh-reinforcement 17 placed therein, and the insulating material 18 poured. After the poured insulation has received its initial set and is ready for the oven, it will be apparent that a relatively extended drying area for the door is provided. In other words the ex-

posed drying area or surface of the cementitious material 18 is greatly enlarged in proportion to the volume of such material, thereby making it possible to complete the drying of a door of this type in from eight to eighteen days, whereas a door having only one side exposed for drying heretofore required from eighteen to twenty-four days for drying.

After the door has been oven-dried the surfaces 20 thereof may be provided with a coating of water-proof paint P, such paint forming a moisture proof envelope which prevents absorption of water from atmospheric air.

When the door has thus been dried and painted it is ready to receive the front or facing sheet 21 shown in Figure 6 and the back sheet 22. The said front sheet has its side edges 23 and front edge 24 provided with suitable anchoring flanges whereby it may be slid toward the hinge edge H of the door while the back edge of said facing sheet 21 is provided with an offset portion 25 and slots 26 whereby said offset portion may fit beneath the hinge molding of the door, and also straddle the washers 15. The back sheet 22 may be provided with the flange 26^a for engaging with the anchor member 27 as shown in Figure 5 while the top and bottom edges thereof may respectively be provided with the locking flanges 28 as shown in Figure 4.

From the foregoing it will be apparent that one of the novel and distinctive features of the present invention is the manner in which the tension rods 1 constituting the cage B are attached to the primary structural element E of the door frame after the latter has been finished and set up as a part of the mold. That feature eliminates the necessity of carrying a large unwieldy body frame through the shop with the consequent elimination of much labor and care in handling, while at the same time permitting the expanded metal lath reinforcement to be definitely attached to the tension rods by looping and twisting a piece of wire about the lath and wire to hold the lath in place if desired to produce predetermined results so far as strengthening the insulating shell is concerned.

Another outstanding feature of the improvement resides in the manner of fabricating the door so as to make the time schedule of its completion substantially equal to that of the body, while at the same time the use of removable or separate back panels permits finishing after the insulation is dried instead of before and insures uniform painting as to color while at the same time eliminating considerable re-handling and finishing.

We claim:—

1. A fire-proof safe construction including an insulating monolithic body open at the front and rear, a door frame fitting the body at its front side, a separate back panel of insulating material and including a fastening anchoring element embedded therein, said back panel being fitted to the rear side of the body, and rods engaging the door frame and fastening anchoring element of the back panel to draw the same together.

2. A fire-proof safe construction including a hollow monolithic body of insulating material and a back panel also of insulating material fitted to one side of the body, anchoring elements of channel cross-section associated respectively with the doorway of the hollow monolithic body and also with the back panel and having the bottoms thereof countersunk, and clamping rods for carrying means for engaging the countersunk bottoms of the fastening anchoring elements to hold the back panel and body together.

3. A fire-proof safe construction including a hollow monolithic body of insulating material and a back panel also of insulating material fitted to one side of the body, fastening anchoring elements associated with the doorway of the hollow monolithic body, and also with the back panel, said elements having countersunk portions, and fastening members extending through the walls of the hollow monolithic body and having abutments at their ends bearing in the countersunk portions of the fastening anchoring elements whereby expansion of said fastening members will not force the back panel from contact with the body.

4. A fire-proof safe construction including a hollow monolithic body having a back panel receiving seat at one end, a fastening anchoring element at its front end, an insulating back panel adapted to fit into said seat, an adhesive cement for uniting the back panel with the body at the said seat, a fastening anchoring element carried by the back panel, tie means extending through the side walls of the hollow monolithic body and engaging with the fastening anchoring element of the back panel and the fastening anchoring element of the body to unite the panel and the body under tension.

5. A fire-proof safe construction including a hollow monolithic body having a back panel receiving seat, an insulating back panel adapted to fit in said seat, an adhesive cement for securing and sealing the joint between the back panel and the body at said seat, a fastening member projecting from said seat and piercing the back panel whereby the back panel and body may be locked together in addition to the holding back of said cement.

6. A fire-proof safe construction including a hollow monolithic body of insulating material and a back panel also of insulating material fitted to one side of the body, fas-

tening anchoring elements associated with the doorway of the hollow monolithic body and also with the back panel, the said fastening element associated with the doorway having a plurality of key-hole slots therein, headed fastening rods fitting in said key-hole slots and also passing through said hollow monolithic body and the fastening anchoring element carried by the back panel, and means on the end of said rod projecting through the fastening anchoring element of the back panel for engaging with said element to clamp the panel and body together under tension.

7. In a safe door, an interior insulation slab, a door frame surrounding said slab, and front and back sheets for the slabs having means for providing an expansion joint with the door frame.

8. A safe door including an interior body of insulation material, metallic moldings constituting the sides of the door frame, a back sheet interlocked with the moldings, and a front sheet interlocked with the front portions of the moldings and having an expansion joint connection with the edge of one of said moldings.

9. In a safe door, an insulation cast within an outer frame, said frame having rigid attachment to front and rear sheets perpendicularly to the plane of the sheets, and slipping attachment to the sheets in the plane of the sheets.

In testimony whereof we hereunto affix our signatures.

GEORGE C. BRAINARD.
JASON A. FITCH.
ERIC E. WOLTERS.