

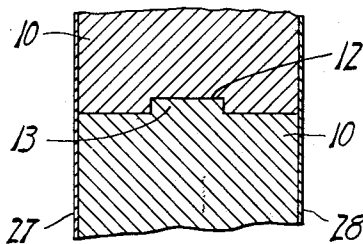
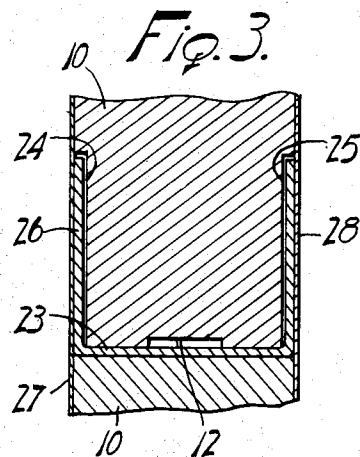
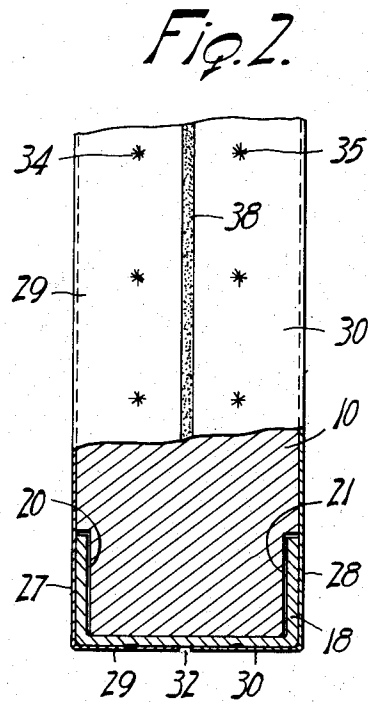
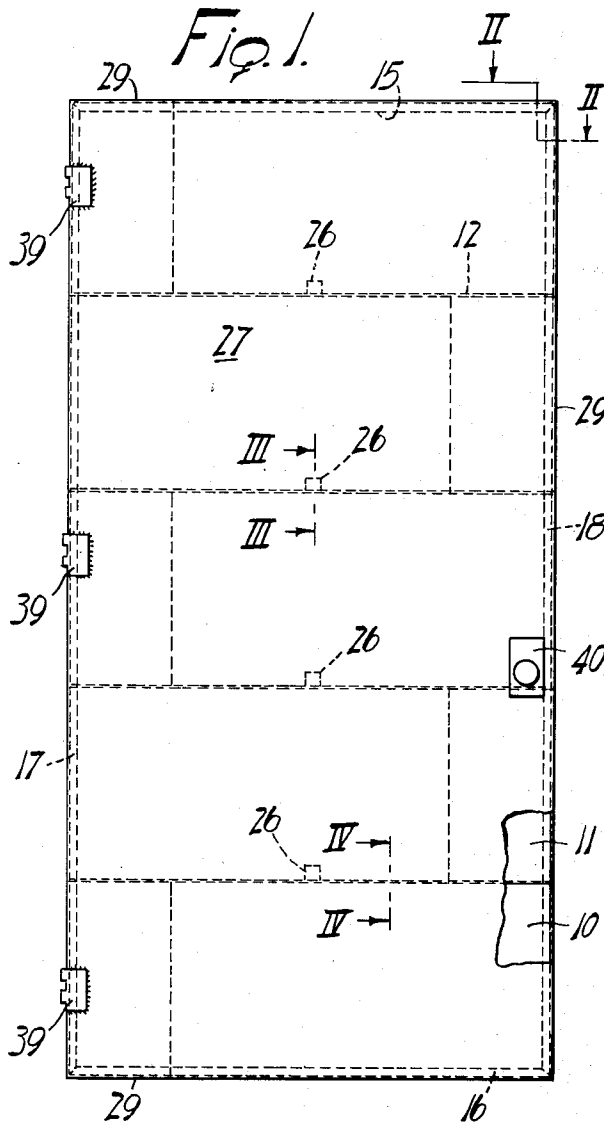
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FIRE DOOR

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2,717,062

FIRE DOOR

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This invention relates to fire doors and particularly to a novel fire door construction of the so-called flush type.

Fire doors most commonly in use at the present time fall into two general classes. One class comprises wood core doors wherein the wood itself comprises a structurally complete door and there is merely a sheet metal facing applied to the door surface. A second class comprises hollow core doors wherein a built-up double wall sheet metal door is provided with enclosed dead air spaces for insulating purposes.

The fire door of the present invention falls in neither of these two well defined classes but comprises, rather, a door in which the non-metallic insulating materials or portions cooperate structurally with the metallic components to provide the ultimate strength and structural rigidity of the fire door.

One form of the fire door of the present invention is illustrated in the accompanying drawing and described in detail in the following specification. However, it is to be understood that this is done merely by way of example and that the principles of the present invention may be varied in their application, the scope of the invention disclosed herein being limited only as defined in the appended claims.

In the drawing:

Fig. 1 is a general elevational view of one form of the fire door of the present invention;

Fig. 2 is an enlarged fragmentary cross-sectional view on the line II—II of Fig. 1;

Fig. 3 is an enlarged fragmentary cross-sectional view on the line III—III of Fig. 1; and

Fig. 4 is an enlarged fragmentary cross-sectional view on the line IV—IV of Fig. 1.

In the several figures of the drawing like characters of reference denote like parts. The core of the door of the present invention is made up of a series of rectangular panels or slabs of uniform thickness placed edge to edge to make up the general rectangular expanse of the door. These panels or slabs are of a structurally rigid and self-sustaining mineral insulating material. The material is chiefly hydrous calcium silicate and is available commercially as "Kaylo," having a density of about twenty pounds per cubic foot. The slabs may be sawed and nailed and worked generally with woodworking tools.

Speaking generally, the slabs which make up the core of the door of the present invention are arranged in horizontal rows with the vertical lines of abutment of adjacent slabs in a given horizontal row staggered with respect to the vertical lines of abutment of the horizontal rows above and below. Referring to Fig. 1, each horizontal row comprises merely what may be called a full slab 10 and a partial or fractional slab 11.

The bottom edges of the several slabs are grooved as shown in detail at 12 in Fig. 4, and their top edges are provided with tongues 13. The group of panels or slabs 10 and 11 thus interlocked are provided with a rigid rectangular outer framework comprising upper and lower framing channels 15 and 16, respectively, and side chan-

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nels 17 and 18. The channels 15, 16, 17, and 18 are mitered and welded where they meet at the four corners of the door.

As shown in Fig. 2, the edges of slabs 10 and 11 which lie at the outer edges of the door generally are recessed at their front and rear faces as at 20 and 21 to receive the flanges of the channels 15 through 18 and the outer surfaces of those flanges may thus be coplanar with the front and rear faces of the panels or slabs 10 and 11.

Before the slabs 10 and 11 are assembled with respect to each other certain of them are grooved and recessed to receive channel clips which cooperate in supporting facing sheets for the door, as will presently appear. Referring to Fig. 3, the lower edge of a slab 10 is grooved as at 23 and the adjacent front and rear faces are recessed as at 24 and 25 to receive U-shaped metallic clips 26.

These clips 26 are placed in position as the panels or slabs are being arranged with respect to each other and, after the panel assembly is rigid and entirely self-sustaining and unitary by cooperation of the framing channels 15 through 18, facing sheets are applied in a manner which will now be described. The front facing sheet is designated 27 and the rear facing sheet 28, and they are provided with flanges 29 and 30, respectively, at each of their four edges.

The flanges 29 and 30 are proportioned so that, when the facing sheets 27 and 28 are applied to front and rear faces of the slab and channel assembly, the flanges 29 and 30 do not meet but leave a definite gap extending centrally about the four edges of the door as indicated at 32 in Fig. 2.

With the facing sheets 27 and 28 thus positioned, a pair of opposed resistance welding electrodes are applied, one to the front facing sheet 27 and one to the rear facing sheet 28, at the flanges of one of the U-shaped clips 26. The facing sheets are thus securely spot welded, front and rear, to the flanges of each of the several clips 26.

Referring to Fig. 2, a pair of opposed resistance welding electrodes are applied as at 34 and 35 to effect what is known as series spot welding. Because of the gap 32 between the flanges 29 and 30 and the relative thickness of the webs of the channels 15 through 18 this produces spot weld connections between the flanges 29 and 30 and the webs of the framing channels. This operation is repeated about the four edges of the door to provide a continuous series of spot welds which, together with the spot welded joints between the facing sheets and the clips 26, fix the facing sheets securely to the underlying door assembly.

The gap 32 is subsequently filled with a suitable plastic filler as at 38 in Fig. 2, the gap 32 being shown at the bottom of Fig. 2 merely by way of illustration. There is thus provided an entirely flush door construction in which the facing sheets may be relatively thin since whatever they add to the structural rigidity of the ultimate door is more or less incidental, the cross assembly comprising the slabs 10 and 11 and the framing channels 15 through 18 comprising a structurally rigid unit before the facing sheets 27 and 28 are applied.

The manner in which provision is made for the reception and application of hinges 39 and a latch or lock assembly 40 is immaterial to the present invention, albeit such provision is made in the course of fabricating the door.

What is claimed is:

1. In a fire door, a group of generally rectangular relatively rigid slabs of insulating material disposed edge to edge to form a vertical series of horizontally extending rows of slabs to form a door body, complementary tongue and groove formations in the upper and lower abutting edges of adjacent slabs, framing channels at the

four edges of the door body with their flanges directed inwardly, marginal recesses in said slabs extending about the front and rear faces of the door body to receive said flanges to form a flush door core construction, said framing channels being welded to each other at their ends at the corners of the door body, and front and rear facing sheets at the front and rear surfaces of the door and having marginal flanges lying against the webs of the framing channels, the facing edges of the flanges of said facing sheets being spaced to form a medial groove extending about the door edges and the front and rear facing sheet flanges being jointly series spot welded to said framing channel webs, and a filler material in said medial groove.

2. In a fire door, a group of generally rectangular relatively rigid slabs of insulating material disposed edge to edge to form a series of rows of slabs to form a door body, complementary tongue and groove formations in the abutting edges of adjacent rows of slabs, framing channels at the four edges of the door body with their flanges directed inwardly, marginal recesses in said slabs extending about the front and rear faces of the door body to receive said flanges to form a flush door core construction, said framing channels being welded to each other at their ends at the corners of the door body, and front and rear facing sheets at the front and rear surfaces of the door having marginal flanges lying against the webs of the framing channels, the facing edges of the flanges of said facing sheets being spaced to form a medial groove extending about the door edges and the front and rear facing sheet flanges being jointly series spot welded to said framing channel webs, and a filler material in said medial groove.

3. In a fire door, a group of generally rectangular relatively rigid slabs of insulating material disposed edge to edge to form a series of rows of slabs to form a door body, complementary tongue and groove formations in the abutting edges of adjacent rows of slabs, framing channels at the four edges of the door body with their flanges directed inwardly to embrace the marginal portions of said door body, said framing channels being welded to each other at their ends at the corners of the door body, and front and rear facing sheets at the front and rear surfaces of the door and having flanges lying against the webs of the framing channels, the facing edges of the flanges of said facing sheets being spaced to form a medial groove extending about the door edges and the front and rear facing sheet flanges being jointly series spot welded to said framing channel webs, and a filler material in said medial groove.

4. In a fire door, a group of generally rectangular relatively rigid slabs of insulating material disposed edge to edge to form a vertical series of horizontally extending rows of slabs to form a door body, complementary tongue and groove formations in the upper and lower abutting edges of adjacent slabs, framing channels at the four edges of the door body with their flanges directed inwardly, marginal recesses in said slabs extending about the front and rear faces of the door body to receive said flanges to form a flush door core construction, said framing channels being welded to each other at their ends at the corners of the door body, front and rear facing sheets at the front and rear surfaces of the door and having flanges lying against the webs of the framing channels for securement thereto, and metal clips disposed between abutting slabs, each having a web portion disposed between abutting slabs and flange portions in abutment with the inner faces of the front and rear facing sheets and being spot-welded thereto.

5. In a fire door, a group of generally rectangular relatively rigid slabs of insulating material disposed edge to edge to form a vertical series of horizontally extending rows of slabs to form a door body, complementary tongue and groove formations in the upper and lower abutting edges of adjacent slabs, framing channels at the four edges of the door body with their flanges directed

wardly to embrace the marginal portions of said door body, said framing channels being welded to each other at their ends at the corners of the door body, and front and rear facing sheets at the front and rear surfaces of the door and having flanges lying against the webs of the framing channels for securement thereto, metal clips disposed between adjacent slabs inwardly of the edges of the door body to provide resistance welding conductors therethrough after assembly, each clip having portions in engagement with the inner faces of the front and rear facing sheets and spot-welded thereto.

6. In a fire door, a group of generally rectangular relatively rigid slabs of insulating material disposed edge to edge to form a door body, framing channels at the four edges of the door body with their flanges directed inwardly to embrace the marginal portions of said door body, said framing channels being welded to each other at their ends at the corners of the door body, and front and rear facing sheets at the front and rear surfaces of the door and having flanges lying against the webs of the framing channels for securement thereto, metal clips disposed between adjacent slabs inwardly of the edges of the door body to provide resistance welding conductors therethrough after assembly, each clip having a web portion disposed between abutting slabs and flange portions in engagement with the inner faces of the front and rear facing sheets and spot-welded thereto.

7. In a fire door, a group of generally rectangular relatively rigid slabs of insulating material disposed edge to edge to form a door body, framing channels at the four edges of the door body with their flanges directed inwardly, marginal recesses in said slabs extending about the front and rear faces of the door body to receive said flanges to form a flush door core construction, said framing channels being welded to each other at their ends at the corners of the door body, and front and rear facing sheets at the front and rear surfaces of the door and having marginal flanges lying against the webs of the framing channels, the facing edges of the flanges of said facing sheets being spaced to form a medial groove extending about the door edges and the front and rear facing sheet flanges being jointly series spot welded to said framing channel webs, and a filler material in said medial groove.

8. In a fire door, a group of generally rectangular relatively rigid slabs of insulating material disposed edge to edge to form a door body, framing channels at the four edges of the door body with their flanges directed inwardly, marginal recesses in said slabs extending about the front and rear faces of the door body to receive said flanges to form a flush door core construction, said framing channels being welded to each other at their ends at the corners of the door body, and front and rear facing sheets at the front and rear surfaces of the door and having marginal flanges lying against the webs of the framing channels for securement thereto, metal clips disposed between adjacent slabs inwardly of the edges of the door body to provide resistance welding conductors therethrough after assembly, each clip having portions in engagement with the inner faces of the front and rear facing sheets and spot-welded thereto.

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