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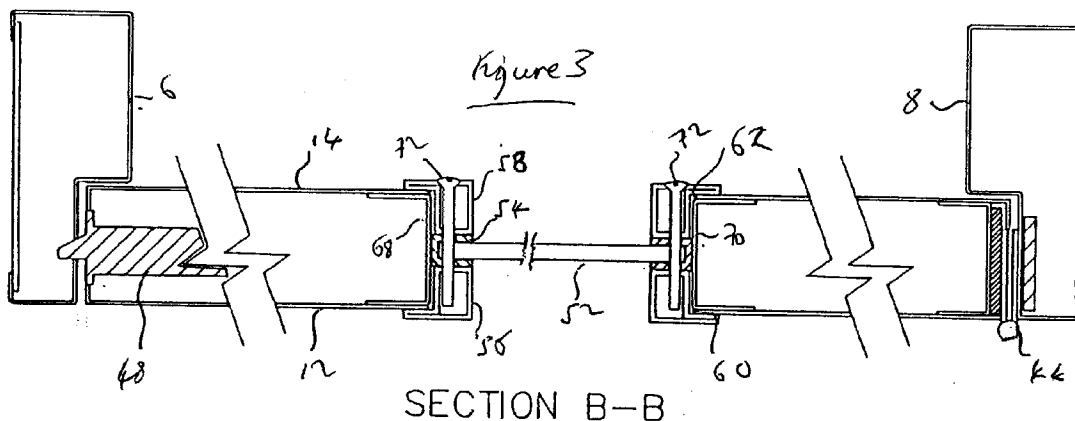
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54 **Fire door leaf.**

57 A fire door leaf comprising a pair of spaced metal sheets having respective outer edges which are bent back towards the respective other metal sheet to define channel portions along the edge of the door leaf, opposed channel portions being spaced apart to form at least one recess surrounding the door leaf, intumescent sealing material located in the at least one recess, and a vitreous enamel coating on the exposed surface of at least one of the metal sheets.



The present invention relates to a fire door leaf.

A variety of fire door leafs are known. In certain public areas it is necessary to have a fire door leaf which not only offers good fire resistance but also is resistant to vandalism and/or graffiti. A known fire door leaf for such a use incorporates a metal sheet which has been attached to a wooden door leaf. However, such an arrangement suffers from both manufacturing and operational disadvantages.

The present invention aims to provide an improved fire door leaf.

Accordingly, the present invention provides a fire door leaf comprising a pair of spaced metal sheets having respective outer edges which are bent back towards the respective other metal sheet to define channel portions along the edge of the door leaf, opposed channel portions being spaced apart to form at least one recess surrounding the door leaf, intumescent sealing material located in the at least one recess, and a vitreous enamel coating on the exposed surface of at least one of the metal sheets.

Embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings, in which:-

Figure 1 is an elevational view, partly in phantom, of a fire door leaf in accordance with the present invention in a door frame;

Figure 2 is a section along line A-A of the fire door leaf and frame of Figure 1;

Figure 3 is a section along line B-B of the fire door leaf and frame of Figure 1;

Figure 4 is a section along line C-C of the fire door leaf and frame of Figure 1;

Figure 5 is a first arrangement of a intumescent seal in the fire door leaf of Figure 1; and

Figure 6 is a second arrangement of an intumescent seal in the fire door leaf of Figure 1.

Referring to the drawings, a fire door leaf 2 is mounted in a door frame 4 comprising opposed side frame members 6,8 and top frame member 10. The fire door leaf 2 comprises a pair of parallel spaced metal sheets 12,14. The sheets 12,14 have respective outer edges 16,18 which are bent back towards the respective other metal sheet 14,12 to define channel portions 20,22 along the edge 24 of the door leaf 2. Opposed channel portions 20,22 are spaced apart to form a recess 26 surrounding the door leaf 2. A U-shaped metal frame member 28 is disposed between the metal sheets 12,14 with the two arms 30,32 of the U being disposed against the respective inner surfaces of the metal sheets 12,14 and the outer surface of the central portion 34 of the U defining the inner surface of the recess 26. Intumescent sealing material 36 is located in the recess 26. The inner edges of the channel portions 20,22 are welded to the central portion 34 of the frame member 28.

Figure 5 shows a first arrangement of the intumescent sealing material 36 which comprises a

multi-laminar structure located in the recess 26. Figure 6 shows an alternative arrangement of the intumescent material 36 which comprises a multi-laminar structure having a smoke seal 37 extending out of the recess 26.

Each metal sheet 12,14 comprises 1.6 mm steel plate of vitreous enamel quality (i.e. CR4 grade or better) which preferably complies with BS1449. The exposed surface of the or each of the metal sheets 12,14 is coated with a vitreous enamel coating 38,40. The coating 38,40 has been fired onto the respective metal sheet 12,14 in an enamelling process at a temperature of around 800°C. The enamel coating 38,40 is fired onto the respective sheet 12,14 after bending of the respective sheet 12,14. A suitable enamel is manufactured by Escor Products Limited of Wellingborough, United Kingdom.

The door leaf 2 incorporates between the metal sheets 12,14 a series of strengthening members 42 which are bonded to the inner surfaces of the metal sheets 12,14. The strengthening members 42 are composed of a heat resistant material such as Viculad. The strengthening members 42 add structural rigidity and strength to the door leaf 2. In particular, the strengthening members 42 strengthen the door against vandalism, e.g. against being kicked in. The strengthening members are spaced apart so as to permit a degree of heat conduction between the metal sheets 12,14 when there is a fire on one side of the door leaf 2.

Hinges 44 are located on one side of the door leaf 2 for hingedly mounting the door leaf 2 to the door frame 4, which is also composed of metal sections, 6,8,10. On the opposite side of the door leaf 2 is a handle 46 with a latch 48 which lockably engages the door frame 4.

In the illustrated embodiment a window 50 is disposed in the door leaf 2. The window 50 comprises a fire resistant glass sheet 52 which is mounted via a gasket 54 by mitred frame members 56,58 in cut out orifices 60,62 in the metal sheets 12,14. In the region of the orifices 60,62 the metal sheets 12,14 are supported by upper and lower horizontal U-shaped channel members 64,66 and by opposed vertical U-shaped channel members 68,70. Each channel member 64,66,68,70 is disposed snugly between the two metal sheets 12,14. The window assembly is held together by screws 72 which connect together the frame members 56,58.

The fire door leaf of the present invention comprises vitreous enamel coated metal sheets which have been bent over at their edges whereby, apart from any window area, the entire surface of the fire door leaf which would be exposed in a fire comprises the vitreous enamel coated surface. This enables the door leaf to have good fire resistance and typically the door leaf can withstand a fire for at least one hour. The construction of the present invention very conve-

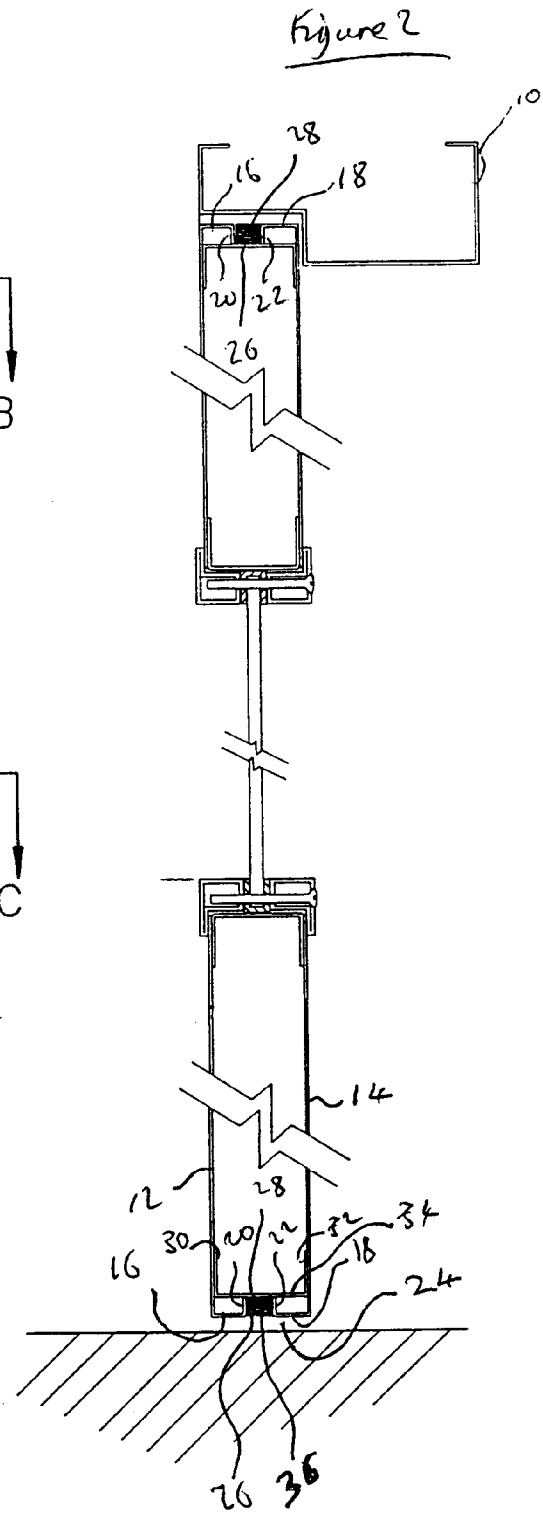
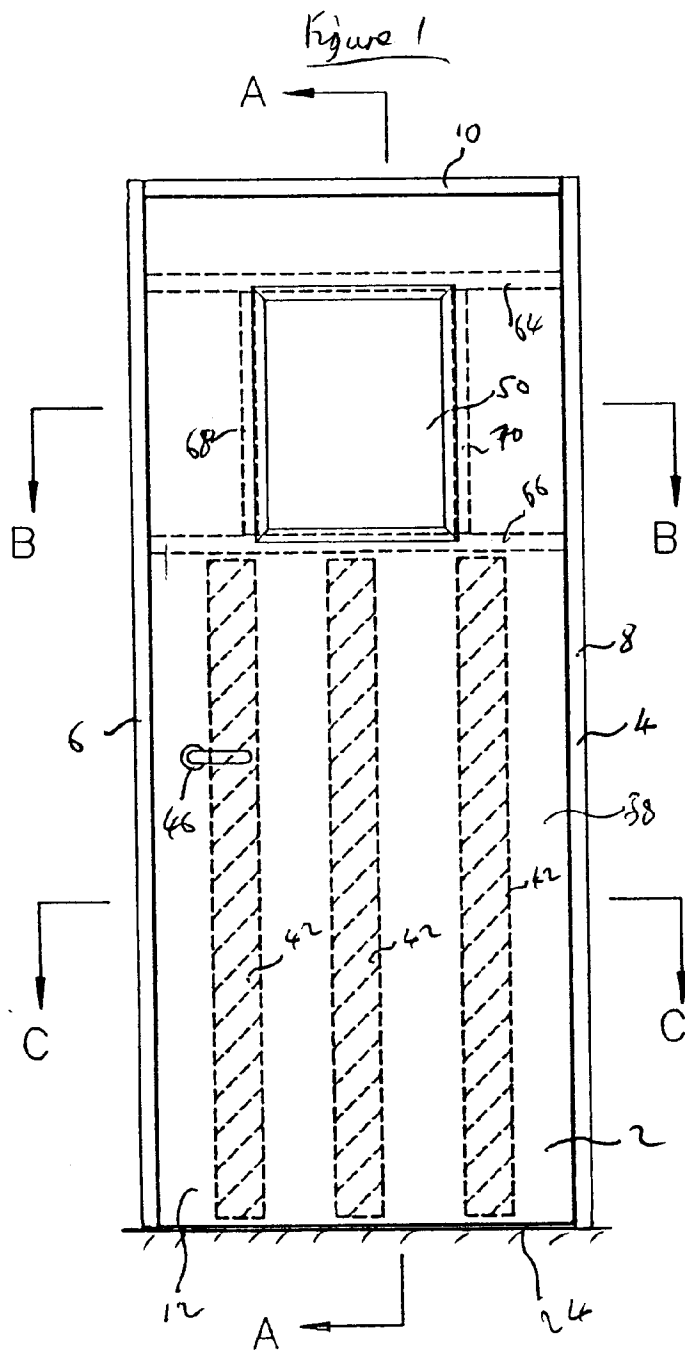
niently enables the manufacture of a vitreous enamel coated door without the requirement for a separate enamelled metal sheet to be attached to an existing door e.g. of wood. The fire door leaf of the present invention also provides the advantage that the door can be held shut by a latch which is disposed along one side of the door leaf. When the door is subjected to fire, the door leaf does not tend to bow out, thereby releasing the latch, since heat can be conducted in a controlled manner between the metal sheets 12,14 thereby substantially to prevent bowing of the door. In addition, the vitreous enamel surface improves the fire resistance and also offers resistance to vandalism and graffiti. In a fire, the intumescent material expands thereby to seal the gaps between the door leaf and the door frame, thereby providing a barrier to heat and smoke.

Claims

1. A fire door leaf comprising a pair of spaced metal sheets having respective outer edges which are bent back towards the respective other metal sheet to define channel portions along the edge of the door leaf, opposed channel portions being spaced apart to form at least one recess surrounding the door leaf, intumescent sealing material located in the at least one recess, and a vitreous enamel coating on the exposed surface of at least one of the metal sheets.
2. A fire door leaf according to claim 1 further comprising a U-shaped frame member which is disposed between the metal sheets with two arms of the U-shaped member being disposed against the respective inner surfaces of the metal sheets and the outer surface of a central portion of the U-shaped member comprising an inner face of the at least one recess.
3. A fire door leaf according to claim 2 wherein the U-shaped frame member is of metal and the said outer edges are welded to the central portion of the frame member.
4. A fire door leaf according to any one of claims 1 to 3 further comprising a plurality of strengthening members which are disposed between the metal sheets, each strengthening member being composed of a heat resistant material.
5. A fire door leaf according to claim 4 wherein the strengthening members are elongate and extend along the length of the door in laterally spaced relation.
6. A fire door leaf according to any foregoing claim

wherein the vitreous enamel coating has been applied to and fired onto the exposed surface of the said at least one of the metal sheets after the said sheet has been bent to form the channel portions.

7. A fire door leaf according to claim 6 wherein the at least one sheet comprises steel plate of vitreous enamel quality as hereinbefore defined.
8. A fire door leaf according to any foregoing claim further comprising a latch along one longitudinal edge thereof for locking the door leaf in a frame.
9. A fire door leaf according to any foregoing claim further comprising a window, the window comprising a fire resistant glass sheet which is mounted by window frame members in cut-out orifices in the metal sheets.
10. A fire door leaf according to claim 9 wherein in the region of the orifices the metal sheets are supported by upper and lower lateral U-shaped channel members and by opposed longitudinal U-shaped channel members, the two arms of each U-shaped member being disposed against the respective inner surfaces of the metal sheets and an outer surface of a central portion of each U-shaped member comprising a mounting surface for a gasket for the glass sheet.



SECTION A-A

