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(54) **Fire resisting enclosure and method of constructing same**

(57) A fire-resisting enclosure/cabinet comprising an open-box like structure forming a body (11) to which is hinged a door (12). Both the body and the door are made up of an outer sheet steel skin (13) which has its one 'open' face closed by a liner (16;22). For the body, the liner (16) defines the inside of the body of the cabinet, whilst for the door the liner (22) defines the rear surface of the door of the cabinet. For both the body and the door

thermally insulating material (30; 36; 42) is disposed in the space between the outer skin and the liner, with phase-change material (32) between the liner and the thermally insulating material and with fire-resistant concrete between the outer skin and the thermally insulating material. Engaging surfaces of the door and body respectively are formed by the material of the liner, i.e. polymeric material, thereby forming a near-hermetic seal therebetween in the event of fire.

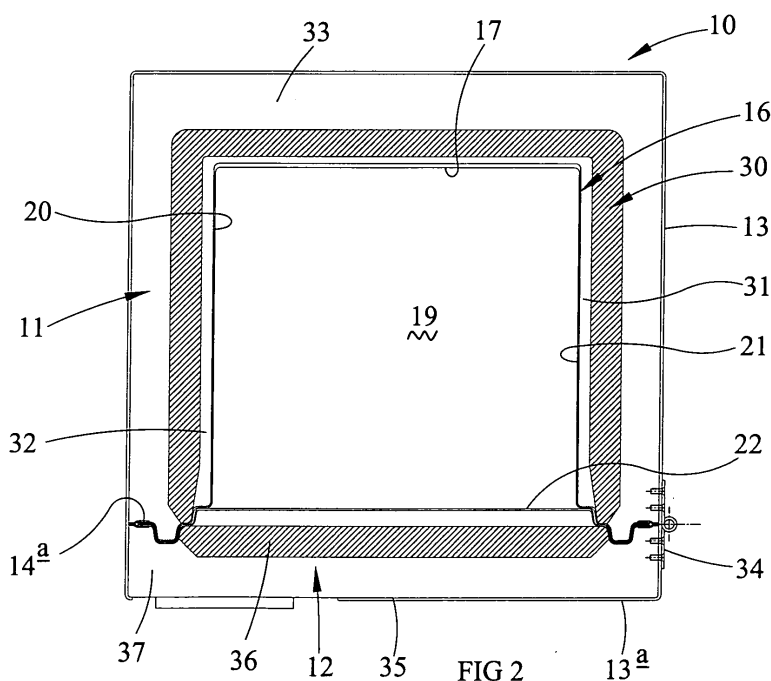


FIG 2

Description

[0001] This invention relates to fire resisting enclosures for the protection of temperature-sensitive articles and has particular application to fire resisting cabinets and files intended for the storage of electronic data-processing media such as magnetic discs, tapes, CDs and DVDs, etc. The invention also relates to a method of constructing same.

[0002] Although the performance of fire resisting cabinets has improved over the years, there is a continuing need to meet International Standards, for example UL 72 (USA), EN 1047-1 and EN 1047-2 (Europe), NT 017 FIRE (Scandinavia) and JIS S1037 (Japan). Alongside the improved performance aspect, it is of course also desirable that product weight, wall thickness and manufacturing costs are reduced if at all possible.

[0003] An object of the invention is to provide an improved fire resisting enclosure.

[0004] According to a first aspect of the invention there is provided a component of a fire-resisting enclosure comprising a metallic element defining an open box-like structure constituting an outer skin of the component, and polymeric material secured to said element to extend across at least part of its open side so as to be disposed where said component is to engage with a further component of the enclosure, in use.

[0005] Preferably where the component is a body of the enclosure the polymeric material is thermoplastics which is provided at its four front outwardly facing surfaces with which, in use, a door of the enclosure engages when the enclosure is closed.

[0006] Where the component is a door of the enclosure, the thermoplastics material is provided at the four inwardly facing surfaces which, in use, engage the body of the enclosure when the enclosure is closed.

[0007] More preferably with the completed enclosure the thermoplastics material of the body engages the thermoplastics material of the door when the door of the enclosure is closed against the body of the enclosure. Desirably the door is hinged to the body or is slidably fitted thereto to allow opening of the enclosure.

[0008] In one embodiment of the body of the enclosure the thermoplastics material is in the form of a one-piece liner shaped to define a peripheral front surface and the inside of the body component. In another embodiment of the body of the enclosure the thermoplastics material defines a peripheral front surface of the body and is secured to a metallic liner defining the inside of the body component.

[0009] In one embodiment of the door of the enclosure the thermoplastics material is in the form of a one-piece liner shaped to define the whole or substantially the whole of the inner surface of the door by closing said open side of the box-like structure. Preferably the two (one-piece) liners for the body and the door are of the same material.

[0010] The one-piece liner may be injection moulded, rotationally moulded or vacuum formed. Alternatively it

could be formed by RIM moulding.

[0011] Conveniently in a preferred embodiment where maximum fire resistance is required, there is provided inwards of the liner forming the inside or inner surface of the component thermally insulative material, with there being phase-change material (as hereinbelow defined) in a space between the liner and the insulative material and water-bearing material between the metallic element defining the outer skin and the insulative material. In a further embodiment, however, the thermally insulative material extends from the phase-change material to the outer skin. This could be phenolic foam.

[0012] As defined herein, 'phase-change material' is material having a high latent heat of fusion and a melting point just below the specified acceptable internal enclosure temperature, which is capable of absorbing any heat which penetrates through outer layers of the enclosure over a significant period of time, in melting from the solid state to the liquid state. The material can thus act to hold the internal temperature of the enclosure below the critical level throughout the period during which it is undergoing its change of phase. Known materials for this purpose include paraffin wax and hydrated forms of sodium acetate, meta silicate and thiosulphate. The material in the space can be in the form of pre-formed slabs, or it can be poured into the space and allowed to set. Preferably it fills the space. Close control of the shape of the space or cavity between the liner and the thermally insulative material allows the thickness of the phase-change material to be varied according to where it is required. The material could be provided in bags.

[0013] Advantageously the thermally insulative material is polyurethane foam. It can be in the form of a pre-formed jacket placed over or in the liner and optionally bonded to it, including bonding to the thermoplastics material where the liner is not of one-piece form. Alternative materials include polystyrene, phenolic or polyethylene foams.

[0014] The water-bearing material is typically a light-weight fire-resisting concrete, e.g. a cement based material, gypsum or plaster, which acts to delay heat penetration to the interior of the enclosure as the moisture within the material absorbs its latent heat in turning to steam.

[0015] Preferably the enclosure door is of the same form, having an internal central layer of thermally insulative material with phase-change material filling the space between it and the liner and with water-bearing material filling the space between the thermally insulative layer and the metallic outer skin.

[0016] In the embodiments where the enclosure is required to less stringent requirements regarding fire resistance firstly the phase-change material could be omitted, with no space between the liner and the thermally insulative material, and secondly the thermally insulative material could further be omitted, so that between the inner and outer skins, only the water-bearing material would be provided. The inner skin for the body and the

inner skin for the door would of course still provide the thermoplastics material of the invention.

[0017] Due to the materials and the design of the 'closure', a very close fit can be provided between the door and the body. Accordingly rubber and intumescent seals used in enclosures, i.e. cabinets, of conventional design may no longer be needed. This is advantageous in that such seals are relatively expensive, may be prone to leaking and take time correctly to assemble during manufacture.

[0018] It has also advantageously been found that in a fire, the heat melts the thermoplastics materials a limited distance into the 'closure', whereupon the close fit of the body and door causes the two thermoplastics layers to become welded together, forming a near-hermetic seal therebetween. The corners of the thermally insulative jacket are rounded to prevent stress cracking of the water bearing material, and the liner corners are similarly curved where they are contacted by the water bearing material where the jacket is omitted.

[0019] According to a second aspect of the invention there is provided a component of a fire-resisting enclosure comprising a liner defining the inside or an inner surface of the component, thermally insulative material spaced from the liner and phase-change material (as herein defined) in the space between the liner and the thermally insulative material.

[0020] As defined herein, 'phase-change material' is material having a high latent heat of fusion and a melting point just below the specified acceptable internal enclosure temperature, which is capable of absorbing any heat which penetrates through outer layers of the enclosure over a significant period of time, in melting from the solid state to the liquid state. The material can thus act to hold the internal temperature of the enclosure below the critical level throughout the period during which it is undergoing its change of phase. Known materials for this purpose include paraffin wax and hydrated forms of sodium acetate, meta silicate and thiosulphate. The material in the space can be in the form of pre-formed slabs, or it can be poured into the space and allowed to set. Preferably it fills the space. Close control of the shape of the space or cavity between the liner and the thermally insulative material allows the thickness of the phase-change material to be varied according to where it is required. The material could be provided in bags.

[0021] The liner can be of metallic material, but is preferably a one-piece thermoplastics material moulding or a one-piece thermoplastics material vacuum formed element. Where the component is a body of the enclosure it is of five sided open box-like form, whereas where the component is a door of the enclosure it forms the inner side of the door to close the box-like outer metallic skin defining the door. In both cases, the liner preferably defines a 'sealing' surface around the periphery of the component, so that with the door closed onto the body of the enclosure the peripheral 'seals' engage one another as a close fit.

[0022] The thermally insulative material is preferably polyurethane foam. It can be in the form of a pre-formed jacket placed over (for the body), or in (for the door), the liner, and is optionally bonded to it.

[0023] The phase-change material can be in the form of pre-formed slabs, or it can be poured into the space and allowed to set. Preferably it fills the space. The material could be contained in one or more bags. Close control of the shape of the space or cavity between the liner and the thermally insulative material allows the thickness of the phase change material to be varied according to where it is required.

[0024] According to a third aspect of the invention there is provided a fire-resisting enclosure/cabinet comprising a body component and a door component each as said first aspect of the invention.

[0025] According to a fourth aspect of the invention there is provided a fire-resisting enclosure/cabinet comprising a body component and a door component each as said second aspect of the invention.

[0026] According to a fifth aspect of the invention there is provided a method of constructing a component according to said first aspect of the invention.

[0027] According to a sixth aspect of the invention there is provided a method of constructing a component according to said second aspect of the invention.

[0028] According to a seventh aspect of the invention there is provided a method of constructing a fire-resistant enclosure/cabinet according to said third aspect of the invention.

[0029] According to an eighth aspect of the invention there is provided a method of constructing a fire-resistant enclosure/cabinet according to said fourth aspect of the invention.

[0030] The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a front view of a fire-resisting cabinet, with its door removed, constructed in accordance with the present invention,

Figures 2 and 3 are respective top and side cross-section views of the cabinet of Figure 1, with the door being shown,

Figure 4 is an enlarged fragmentary view of the engagement of the door with the body of the cabinet shown in Figures 2 and 3, and

Figure 5 is an internal top view of a fire-resisting cabinet of another embodiment of the invention.

[0031] Although the invention will be described hereinafter in relation to a fire resisting cabinet as shown in the Figures, namely a cabinet 10 made up of a body 11 and a door 12 hinged to the body, it will be understood that the invention can relate to fire resistant enclosures in general. The embodiment of Figures 1 to 4 applies to diskette protection units conforming to International Standards UL 72 and EN 1047-1 where the fire resisting

cabinet has an opening door. The invention similarly applies to fire resisting enclosures in the form of filing cabinets in which the door is replaced by the front of a moving drawer. Moreover as will hereinafter be described the invention also applies to fire-resisting enclosures constructed to less stringent International Standards, and to other levels in the above International Standards, for example to enclosures intended for paper protection rather than for the storage of electronic data-processing media and the like.

[0032] With regard to Figures 1 to 4, the body 11 shown therein is in the form of a regular five-sided box, the outer skin 13 of which is formed by sheet steel. As can be seen in detail from Figure 4, at the open front of the open box-like structure forming the body, the respective four side edges of the outer skin 13 are turned substantially through 90° to define four peripheral planar front surfaces 14. In particular it will be noted from Figure 4 that this planar surface 14 is in each case slightly recessed rearwardly from the corner junction at which each of the four side surfaces is turned through 90°, this corner end portion being indicated at 15 in Figure 4. Each surface 14 extends only a short distance at the open front of the body 11, being normal to its respective adjacent side surface.

[0033] The inside of the body 11 of the cabinet 10 is defined by a liner 16, which is of thermoplastics material, and, in the embodiment shown in Figures 1 to 4, is a one-piece construction. The liner can be injection moulded, rotationally moulded, vacuum formed or otherwise shaped to define the interior form of the body 11, the interior being square in the embodiment shown.

[0034] Accordingly the liner 16 is formed with a square rear wall 17, respective square upper and lower inner walls 18, 19 and left and right side walls 20, 21 as viewed in Figure 1, the walls 18 to 21 also being square.

[0035] At its free edge, each of the walls 18 to 21 is configured, as will be described herein below, to form a 'closure' namely a 'sealing' peripheral part of the wall which, as will be described, engages with a complementarily configured peripheral edge portion of a liner 22 of the door 12 of the cabinet 10 so that when the door is closed onto the body 11, a very close fit is obtained with the result that rubber and intumescent seals used in conventional cabinets are no longer required.

[0036] In the embodiment shown in Figures 1 to 4, each of the walls 18 to 21 is, at its free edge configured as shown in detail in Figure 4. Towards its free edge, each of the walls is firstly turned outwardly through 90° to form a short outwardly directed wall portion 23, which at its end, is turned through just less than 90° to form a wall portion 24 which is directed to the front of the body 11 and slightly outwardly. This configuration is then repeated for wall portions 25 and 26 which are parallel to the wall portions 23 and 24 respectively with the wall portion 25 being somewhat shorter than the wall portion 23. A wall portion 27 extends outwardly from the wall portion 26 so as to lie normal to the plane of the main part of the

wall 20. Finally from the outer end of the wall portion 27 a wall portion 28 extends rearwardly and slightly outwardly, this terminating in a final wall portion 29 which is parallel to the wall portion 27 and extends outwardly to the free edge of this configured part of the wall 20. As can be seen from Figures 2 and 3, the configuration is the same at the end of each of the wall portions 18 to 21, i.e. at the top, bottom and opposite sides of the open front of the body 11. It can be seen from Figure 4 that the inner surface of the wall portion 29 engages the outwardly facing front surface 14 of the outer skin 13 of the body 11, and the two surfaces can be secured together by adhesive bonding, mechanical means or other suitable means.

[0037] Accordingly with the liner 16 secured in this way to the outer skin 13 at the respective free peripheral edges of its four sides, the body is as shown in Figure 1 defining a five sided open box structure having its inner surface defined by the liner 16 and its outer surface defined by the metallic outer skin 13.

[0038] Within the space between the liner 16 and the outer skin 13 is provided a pre-formed insulating jacket 30 which is of thermally insulative material, for example polyurethane foam. As shown in Figures 2 and 3, the jacket, like the liner, is of open five-sided box form, and is arranged to be placed over the liner 16 and optionally bonded to it, for example bonded to the wall portion 25 as shown in Figure 4, this bonding occurring around all four outer side surfaces of the jacket 30. Although, as shown in Figure 4, the wall portion 24 engages part of the inner surface of the jacket 30, for the majority of the inner surface of the jacket 30, it is spaced from the liner 16 so as to provide a gap or cavity 31 all the way around. As an alternative to polyurethane foam, the jacket could be of, for example, polystyrene, phenolic or polyethylene foam. Normally this jacket would constitute a layer of high-grade insulation.

[0039] Into the cavity 31 is poured a phase-change material in its liquid state, this then being allowed to set to form a phase-change layer 32. As specified above, this is a material having a high latent heat of fusion and a melting point just below the specified acceptable internal cabinet temperature, which is capable of absorbing any heat which penetrates outer layers of the cabinet over a significant period of time, in melting from a solid state to the liquid state. The material can thus act to hold the internal temperature of the cabinet below the critical level throughout the period during which it is undergoing its change of phase. As stated, known materials for this purpose include paraffin wax and hydrated forms of sodium acetate, meta silicate and thiosulphate. Instead of being poured, the material in the cavity 31 can be in the form of pre-formed slabs, but in either case the material fills the space, although this is not essential. Close control of the shape of the cavity between the liner and the thermally insulated material allows the thickness of the phase-change material to be varied according to where it is required, and this is a direct advantage of the provi-

sion of the moulded or vacuum formed liner 16. In a further alternative embodiment, the phase-change material could be provided in bags.

[0040] Finally in respect of the manufacture of the body, a cavity provided between the metallic (steel) outer skin 13 and the foam jacket 30 is filled with a water-bearing material 33, for example a lightweight fire-resistant concrete.

[0041] Typically this is a cement based material, gypsum or plaster which acts to delay heat penetration to the interior of the enclosure as the moisture within the material absorbs its latent heat in turning to steam. It will be noted from Figures 2 and 3 that the four corners of the jacket 30 within the concrete are rounded, and it has been found that this is advantageous in that it prevents stress cracking of the concrete.

[0042] Typically in a method of manufacturing the body 11 described in relation to Figures 1 to 4, the liner 16 would firstly be provided and the foam jacket 30 would then be placed over the liner and, as stated, optionally bonded to it. Into the cavity 31 would then be poured the phase-change material in its liquid state, this then being allowed to set. The steel outer skin 13 would then be secured to the liner part 29 by adhesive bonding or mechanical means and finally the cavity between the steel outer skin 13 and the foam jacket 30 would be filled with the fire-resistant concrete. Thereafter the door 12, to be described, would be attached to the body with hinges 34 and secured with a latch (not shown).

[0043] The door 12 shown fully in Figures 2 and 3 and partly in Figure 4 is of somewhat similar construction to the body 11. It has an outer skin 13a of metallic material, such as steel, in the same way as the outer skin 13 and defines a generally five-sided open box-like structure. It is however very much narrower than the body 11 as can be seen from Figures 2 and 3. Like the outer skin 13, its four side walls are turned through substantially 90° at their free edges in the same manner as at 14 and 15 for the body 11 to provide rear surfaces 14a which are directly opposite, but spaced from the surfaces 14 when the door is closed onto the body 11 as shown in Figures 2 to 4, the surfaces 14a thus being parallel to the front surface 35 of the door.

[0044] The rear surface of the door, which effectively closes the open box-like structure formed by the outer skin 13a is defined by said liner 22 which, in the embodiment shown in Figures 1 to 4, is, like the liner 16, a one-piece construction of thermoplastics material. However this liner 22, like the liner 16, could be formed with the thermoplastics material portions at the 'closure' parts of the door and body only, with the remainder, i.e. the part of the liner inside the enclosure being of steel or other metal.

[0045] However as shown in Figures 2 to 4, the liner 22 is in one piece with its main square central portion defining the flat inner surface of the door. Around its four peripheral sides, the free edge of the liner 22 is configured, as best shown in Figure 4, exactly to match the

configuration of the wall portions 23 to 29 for the liner 16, and for convenience and consistency the equivalent wall portions of the liner 22 have been given the same numerals but with the suffix 'a'. Similarly to the arrangement with the surfaces 14 and 29, it can be seen that the outwardly facing surface 14a of the outer skin 13a is engaged by the wall portion 29a of the liner 22 and can be adhesively bonded to it or attached to it by mechanical or other means.

[0046] In the same way as with the body 11, the door has an inner layer of thermally insulating material, for example a layer of polyurethane foam, glass or other mineral fibres 36, this being formed as a flat straight slab which is optionally bonded to the liner 22 at one or both of the wall surfaces 25a, 26a. Between the liner and the thermally insulating material is phase-change material. Finally with regard to the door, water-bearing material 37, for example a lightweight fire-resisting concrete or other material equivalent to the material 33, is provided to fill the cavity between the thermally insulative layer 36 and the outer skin 13a. The door is then connected to the body by way of the hinges 34 shown in Figures 1 and 2.

[0047] Figure 4 shows in detail the arrangement when the door is closed onto the body. It can be seen that whilst there is a slight gap between the liners 16 and 16a for part of the 'closure', i.e. where the door and the body seal, it will be noted that the wall portions 25 and 25a of the body and the door respectively are in tight engagement and due to the materials and the design of the closure, a very close fit can be obtained between the door and the body. As stated this means that the rubber and intumescent seals used in cabinets of conventional design are no longer required. Since such seals are susceptible to leakage, are expensive, and are time consuming in the assembly of the cabinet, the replacement by the liners is clearly advantageous. Although preferably the two liners would be of the same material, they need not be so. Moreover as mentioned above, the thermoplastics material need form the liner only at the 'closure' parts of the body and door respectively.

[0048] In particular it has been found that in a fire, the heat melts the thermoplastics material a limited distance into the 'closure', whereupon the close fit of the door and body parts causes them to become welded together forming a near-hermetic seal between the two. This is in contrast to known bonds between plastics material and steel where the plastics material burns away.

[0049] It will be understood that instead of a hinged door for the body of the cabinet, this could be replaced by a sliding drawer which can be of the same construction as the door, or indeed the body, having the liner, phase-change material, thermally insulated material, water-bearing material and an outer metallic skin.

[0050] The liner in the body could be provided with interior indentations or the like for interior shelves to be provided in the body of the cabinet. These shelf and runner supports incorporated in the plastic lining would save

internal space for media storage.

[0051] With the invention, not only is the internal appearance of the cabinet significantly improved, but close control of the cavity shape between the liner and the insulating jacket means that the thickness of the phase-change material can be varied according to where it is required.

[0052] Where the fire-resisting properties required for a cabinet are less stringent, various changes can be made to the embodiment of the cabinet shown in Figures 1 to 4. For example Figure 5 shows a cabinet 38 having a body 39 and door 40, each of which is similar to that shown in Figures 1 to 4 but without the provision of phase-change material. Accordingly there is no gap, space or cavity between the liner 41 and the foam jacket 42. As with the embodiment of Figures 1 to 4, water-bearing material 43 fills the space between the jacket 42 and the outer skin 44 of the body. The door 40 can be of similar construction to the body 39, and whilst the thermo-plastics material 'closure' arrangement is of the same form as in the first embodiment, it will be noted from Figure 5 that the respective free edges of the four sides of the liner for the body and the liner for the door are of somewhat simpler configuration in that, in effect, the surfaces 27 and 27a are bonded directly to the respective surfaces 14 and 14a. In other words the surfaces 28, 29 of the body liner and the surfaces 28a, 29a of the door liner are omitted. As with the first embodiment, it will be noted that the corners of the jacket are rounded to prevent stress cracking of the concrete.

[0053] In an embodiment, not illustrated, a cabinet intended for paper protection only could have the thermally insulated material omitted so that between the liner of the body and the outer skin there is merely water-bearing material, such as lightweight fire-resistant concrete. The door could be of similar construction, but here again at the 'closure' (sealing) points between the door and the body the thermoplastics material, preferably provided by respective one-piece liners, would still be provided to provide the close fit referred to above and the advantages which this brings, particularly the welding together in the heat of a fire to form a near-hermetic seal. In this final embodiment, the corners of the liner would be curved in the same way as the corners of the thermally insulative material described above in order to prevent stress cracking of the concrete.

[0054] In one further embodiment, there could be a polymeric material boundary between the phase-change material and the thermally insulative material. With this construction it would be possible for the thermally insulative material to be provided in the form of flat panels.

[0055] In a still further embodiment, aimed at the requirements of EN 1047-2, the 'box-like' structure could be formed by five pre-formed panels secured together to form the body, with a further pre-formed panel forming the door. The polymeric material feature of the first aspect of the invention would in this case be provided at each of the meeting edges of the respective elements. The

outer skin of the body is thus of composite form, i.e. formed by the respective outer parts of the five panels. Each panel and/or the composite body could satisfy the second aspect of the invention.

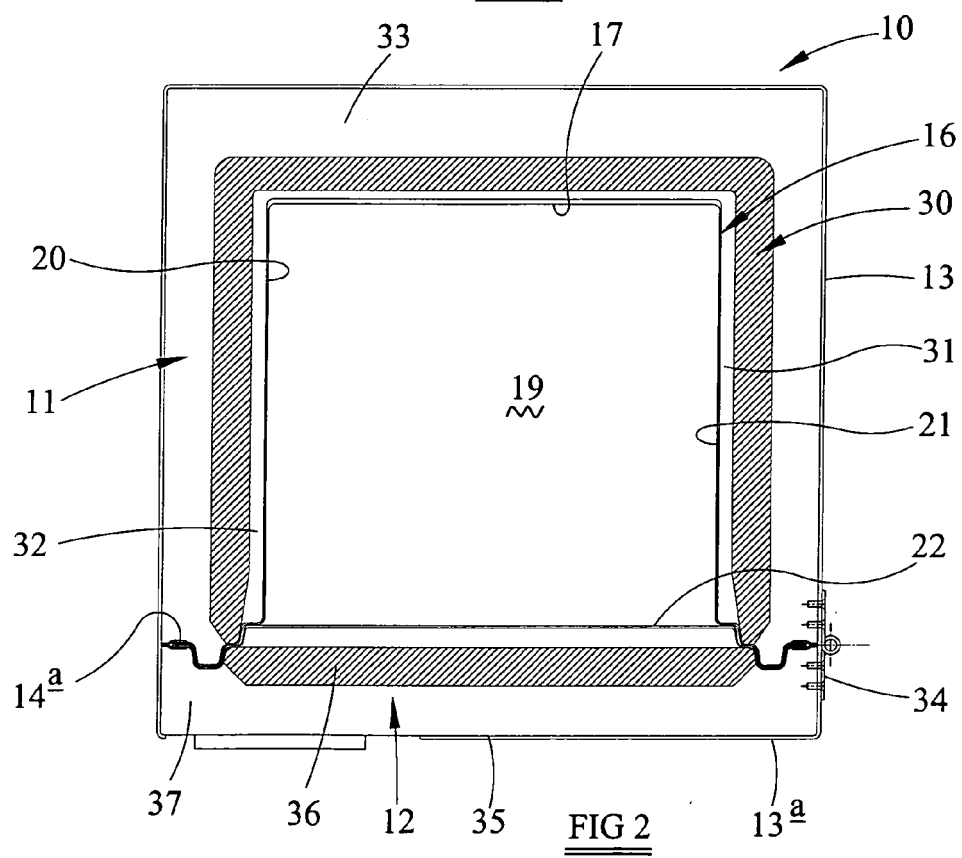
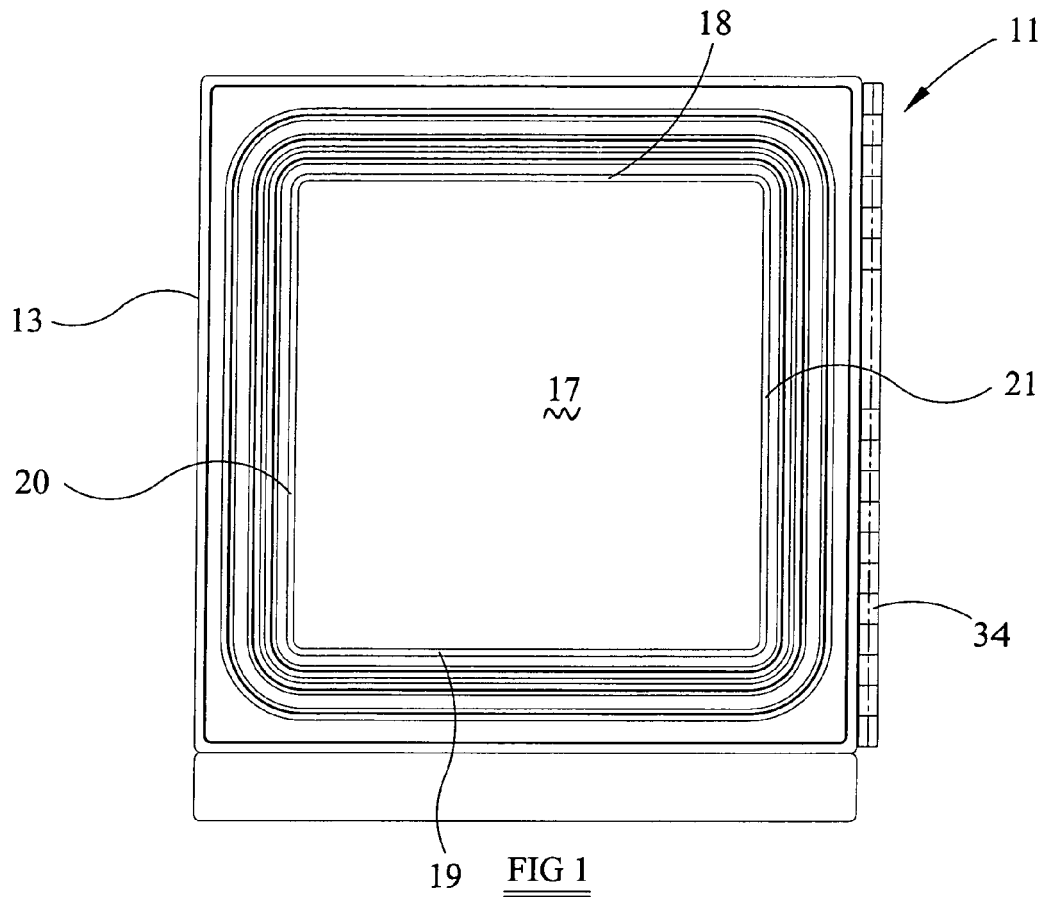
[0056] It is considered that the first aspect of the invention relates to the 'closure' construction with the polymeric materials described, whilst the second embodiment relates to the provision of phase-change material in the cavity between the liner and the thermally insulative material. It is also believed inventive to employ these aspects separately not only in a component of a fire resisting enclosure, but also to provide a fire-resisting enclosure as a complete article, i.e. with a body and a door, whether this is hinged or sliding. Methods of making the various components as well as complete enclosures are also considered inventive.

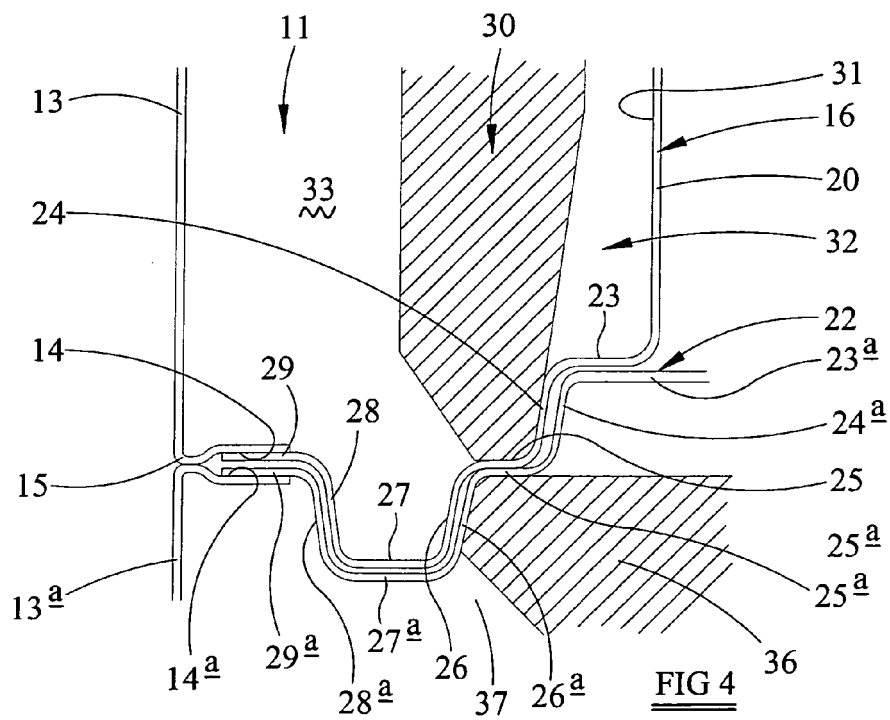
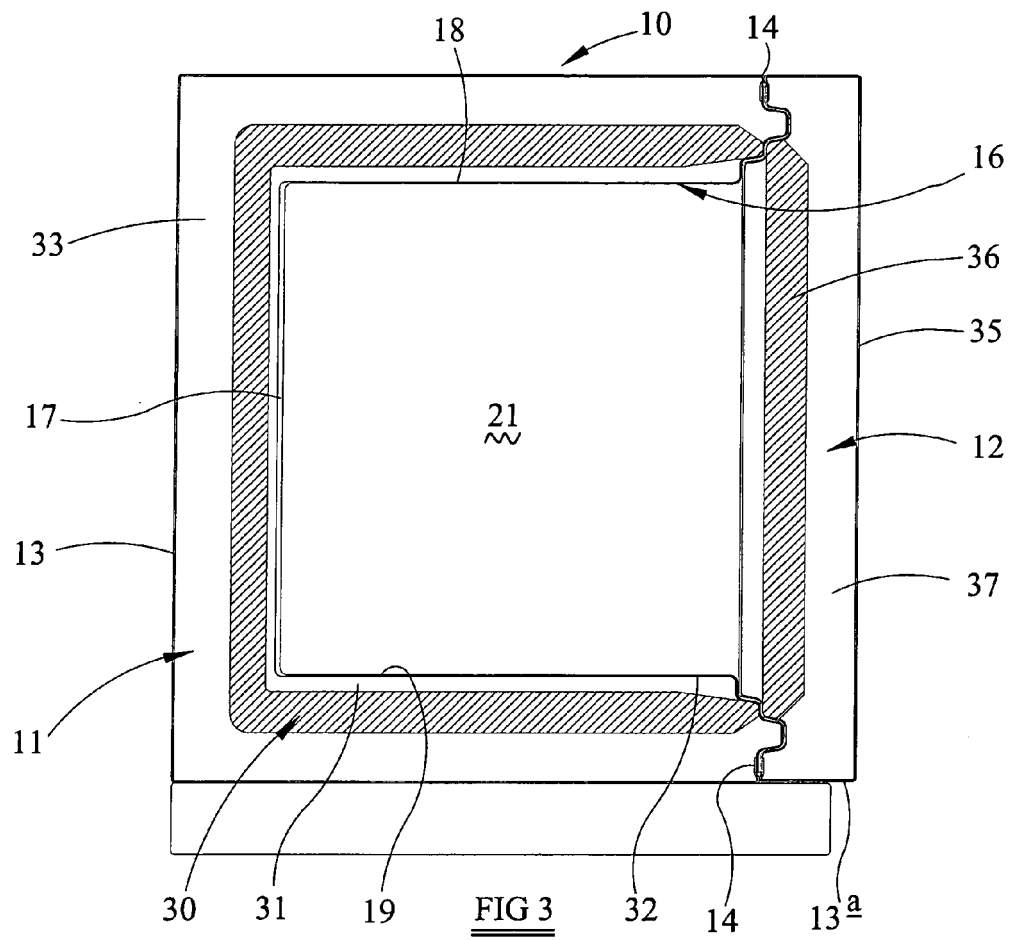
Claims

1. A component of a fire-resisting enclosure comprising a metallic element defining an open box-like structure constituting an outer skin of the component, and polymeric material secured to said element to extend across at least part of its open side so as to be disposed where said component is to engage with a further component of the enclosure, in use.
2. A component as claimed in Claim 1, wherein the component is a body of the enclosure which is provided with said polymeric material at its four front outwardly extending surfaces with which, in use, a door of the enclosure, constituting said further component, engages, when the enclosure is closed.
3. A component as claimed in Claim 1 or Claim 2, wherein the polymeric material is in the form of a one-piece liner shaped to define a peripheral front surface and the inside of the body component.
4. A component as claimed in Claim 3, wherein the one piece liner is moulded.
5. A component as claimed in Claim 2, wherein the one piece liner is vacuum formed.
6. A component as claimed in any one of Claims 3 to 5, wherein inwards of the liner is thermally insulative material.
7. A component as claimed in Claim 6, wherein there is phase-change material in a space between the liner and the thermally insulative material.
8. A component as claimed in Claim 6 or Claim 7, wherein there is water-bearing material between the metallic element defining the outer skin and the thermally insulative material.

9. A component as claimed in Claim 7, wherein the thermally insulative material extends from the phase-change material to the outer skin.
10. A component as claimed in any one of Claims 7 to 9, wherein the phase-change material is in the form of pre-formed slabs. 5
11. A component as claimed in any one of Claims 7 to 9, wherein the phase-change material is poured into said space and allowed to set. 10
12. A component as claimed in any one of Claims 7 to 11, wherein the phase-change material fills said space. 15
13. A component as claimed in any one of Claims 6 to 12, wherein the thermally insulative material is in the form of a pre-formed jacket placed over the liner. 20
14. A component as claimed in Claim 13, wherein the thermally insulative material is bonded to the liner.
15. A component as claimed in any one of Claims 6 to 14, wherein the thermally insulative material is polyurethane foam. 25
16. A component as claimed in Claim 6, wherein there is no space between the liner and the thermally insulative material. 30
17. A component as claimed in any one of Claims 1 to 5, wherein water-bearing material fills the space between the liner and the outer skin of the component. 35
18. A component as claimed in Claim 13 when dependent on Claim 8, wherein the water-bearing material fills the space between the outer skin of the component and said jacket, and the corners of said jacket in contact with said water-bearing material are rounded. 40
19. A component as claimed in Claim 17, wherein the corners of the liner in contact with said water-bearing material are curved. 45
20. A component as claimed in Claim 8 or Claim 17, where the water-bearing material is fire resisting concrete. 50
21. A component as claimed in Claim 1, wherein the component is said door of the enclosure, which door is provided with said polymeric material at its four inwardly extending surfaces which, in use, engage a body of the enclosure, constituting said further component. 55
22. A component as claimed in Claim 21, wherein the polymeric material is in the form of a one-piece liner shaped to define the whole or substantially the whole of the inner surface of the door by closing said open side of the open box-like structure.
23. A component as claimed in Claim 22, wherein the door comprises a layer of thermally insulative material, with phase-change material filling the space between it and the liner, and with water-bearing material filling the space between it and the metallic outer skin.
24. A component as claimed in any one of Claims 3 to 16, wherein the liner is formed with indentations for shelves in the body of the enclosure.
25. A component as claimed in Claim 1, wherein the component is a body of the enclosure, the polymeric material defining a peripheral front surface of the body and being secured to a metallic liner defining the inside of the body component.
26. A component as claimed in Claim 1, wherein the component is a door of the enclosure, the polymeric material defining a peripheral rear surface of the door and being secured to a metallic liner defining the remainder of the rear surface of the door.
27. A fire resisting enclosure comprising a body component of the enclosure as claimed in Claim 1, and a door component as claimed in Claim 1, the door component being hinged or slidably fitted to the body component to allow opening and closing of the enclosure.
28. A component of a fire-resisting enclosure comprising a liner defining the inside or inner surface of the component, thermally insulative material spaced from the liner, and phase-change material (as herein defined) in the space between the liner and the thermally insulative material.
29. A component as claimed in Claim 28, wherein the phase-change material is in the form of a pre-formed slabs.
30. A component as claimed in Claim 28, wherein the phase-change material is poured into said space and allowed to set.
31. A component as claimed in Claim 28, wherein the phase-change material is contained in one or more bags.
32. A component as claimed in any one of Claims 28 to 31, wherein the phase-change material fills said space.

33. A component as claimed in any one of Claims 28 to 32, wherein the liner is of polymeric material.
34. A component a claimed in any one of Claims 28 to 32, wherein the liner is metallic. 5
35. A component as claimed in any one of Claims 28 to 31, or Claim 33, wherein the thickness of the phase-change material varies within said space.
36. A fire resisting enclosure comprising a body component of the enclosure as claimed in any one of Claims 28 to 35, and a door component of the enclosure as claimed in any one of Claims 28 to 35, the door component being hinged or slidably fitted to the body component to allow opening and closing of the enclosure. 10
37. A method of constructing a component of a fire-resisting enclosure, comprising providing an open box-like structure defined by a metallic element constituting an outer skin of the component, and securing it to polymeric material so that said polymeric material extends across at least part of the open side of the metallic element so as to be disposed where said component is to engage with a further component of the enclosure, in use. 15 20 25
38. A method as claimed in Claim 37, wherein the polymeric material is in the form of a liner and a foam jacket forming thermal insulation is placed over the liner. 30
39. A method as claimed in Claim 38, wherein phase-change material is disposed into a cavity defined between the liner and the thermal insulation. 35
40. A method as claimed in Claim 39, wherein the phase-change material is poured into said cavity, and then allowed to set. 40
41. A method as claimed in Claim 39 or Claim 40, wherein the metallic element is secured to the polymeric material after the phase-change material is disposed into said cavity, and set if necessary. 45
42. A method as claimed in Claim 41, wherein water-bearing material is disposed in a cavity between said liner and the metallic element. 50
43. A method as claimed in Claim 42, wherein the water-bearing material is fire-resistant concrete.
44. A method of constructing a component of a fire resisting enclosure comprising providing a liner defining the inside or inner surface of the component, providing thermally insulative material spaced from the liner and disposing phase-change material in the space between the liner and the thermally insulative material.
45. A method as claimed in Claim 44, wherein the liner is of polymeric material.
46. A method as claimed in Claim 44, wherein the liner is metallic.
47. A method of constructing a fire-resisting enclosure comprising constructing a body component of the enclosure as claimed in any one of Claims 1 to 24, and a door component of the enclosure as claimed in any one of Claims 1 to 24, and fitting the door component to the body component by hinge means or as a sliding fit, to allow opening and closing of the enclosure. 10 15
48. A method of constructing a fire-resisting enclosure comprising constructing a body component of the enclosure as claimed in any one of Claims 28 to 35, and a door component of the enclosure as claimed in any one of Claims 28 to 35, and fitting the door component to the body component by hinge means or as a sliding fit, to allow opening and closing of the enclosure. 20 25
49. A component of a fire-resisting enclosure comprising an open box-like structure formed by five pre-formed panels secured together to form a body component, polymeric material being provided at at least part of the open side of the structure where it is to engage, in use, with a further component of the enclosure. 30 35





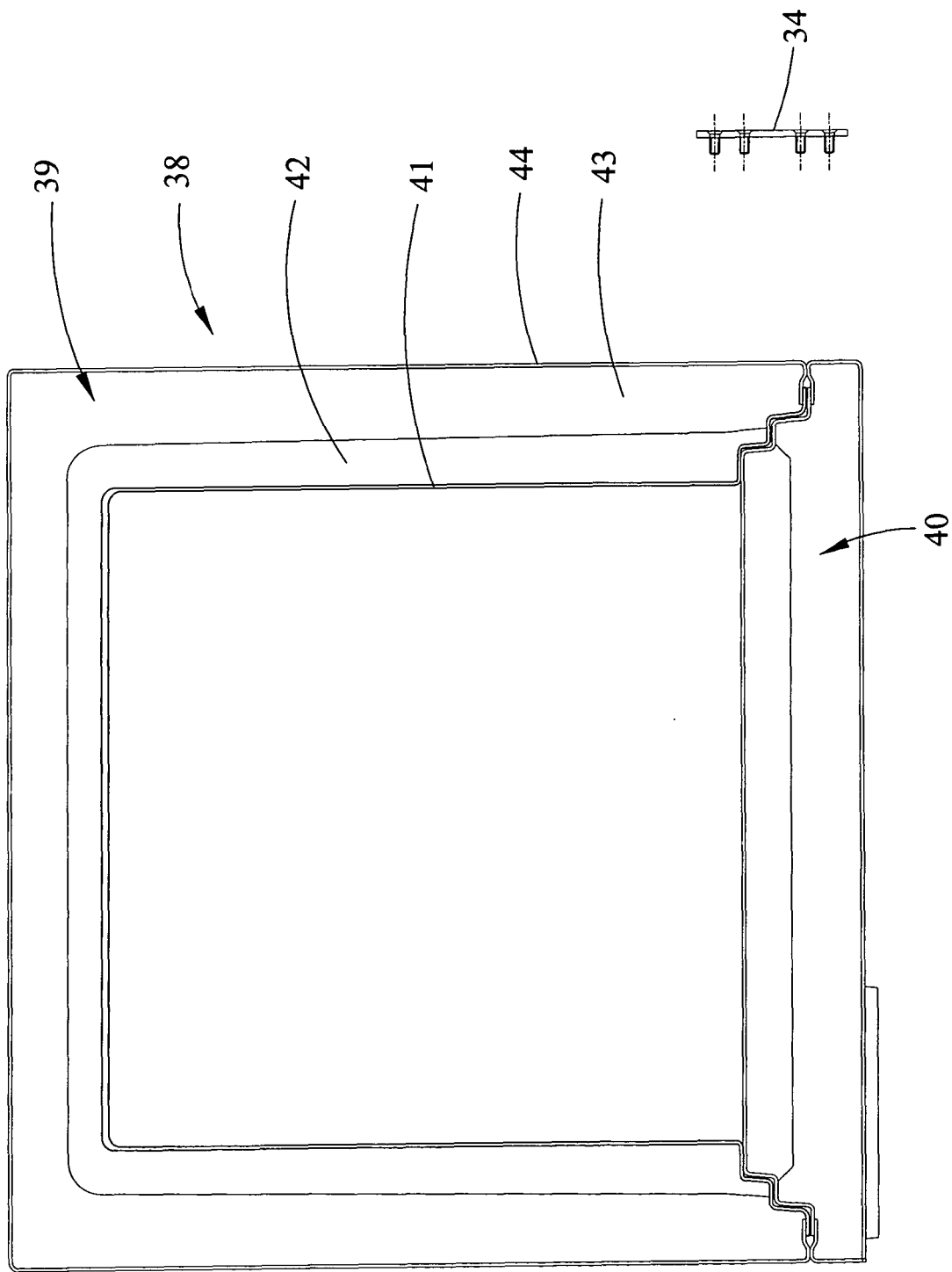


FIG 5