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(54) **An armoured panel for a secure enclosure**

(57) An armoured panel (10) for a secure enclosure, such as automated teller machine (ATM) enclosure, safe

or the like, the panel (10) being a composite material comprising a metallic reinforcing material (20) enclosed within high-strength cement material (22).

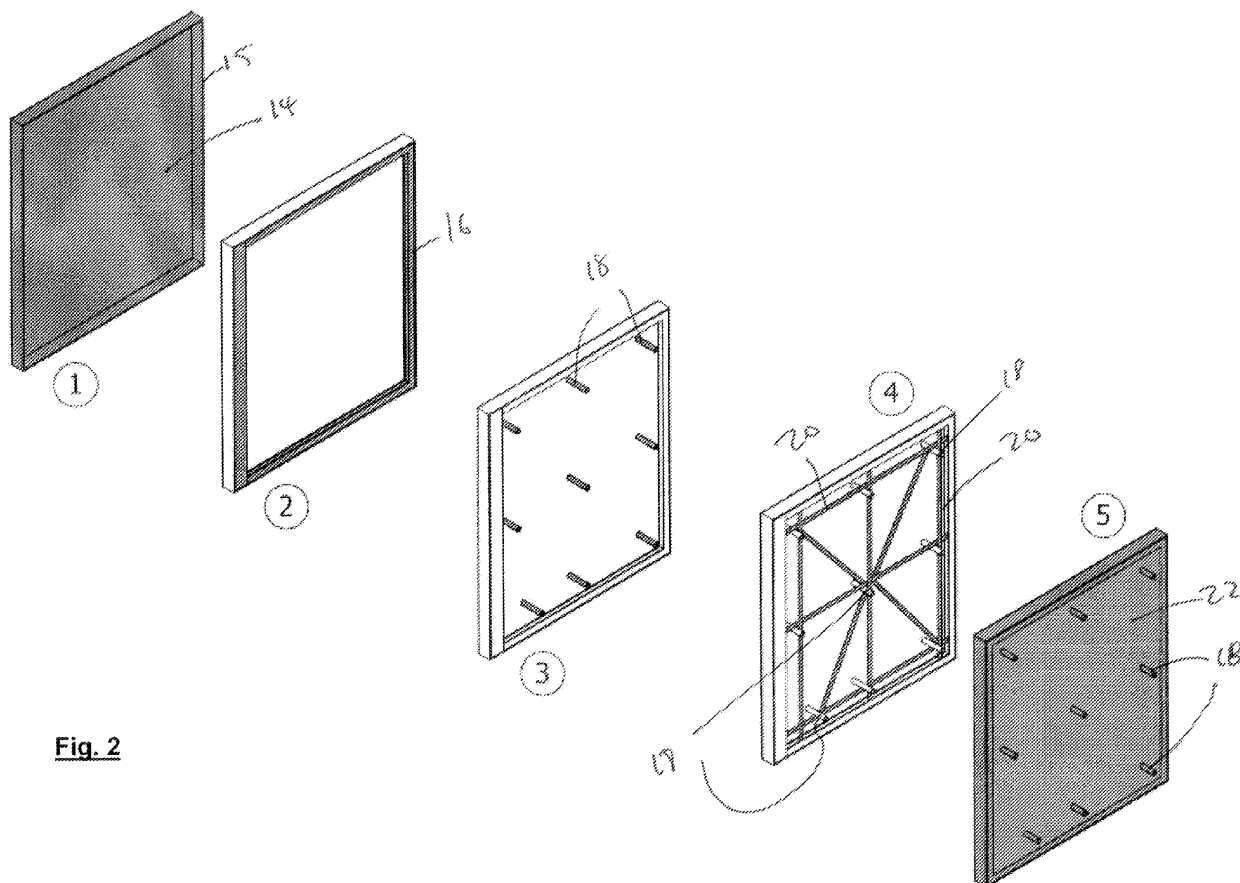


Fig. 2

Description

[0001] The present invention relates to an armoured panel for a secure enclosure. Particularly, but not exclusively, the present invention relates to panels that may be attached to a teller machine (ATM) enclosures, safes and the like.

[0002] ATMs are increasingly being installed in buildings such as filling stations, convenience stores, fast food outlets, supermarkets, and other locations that are intrinsically less secure than their traditional installation locations in banks and other financial institutions. As a consequence there is an increased risk of ATMs being attacked using a number of different methods, including use of oxy-acetylene torches, hammers and abrasive cutting implements to access the interior and steal the money contained therein.

[0003] It is therefore desirable to improve the security of the existing installed base of enclosures by retrofitting them with improved armour, and to fit armour to new installations, since this reduces the theft risk, and lowers insurance premiums.

[0004] Previous attempts at improving the security of ATMs have suffered from a number of drawbacks, including complex and therefore costly manufacturing processes, the lack of a possibility to retrofit existing ATMs and/or the inability of the armour to sufficiently improve the level of security - e.g. to a CEN2 or CEN3 level.

[0005] The present invention seeks to overcome or at least mitigate the problems of the prior art.

[0006] One aspect of the invention provides an armoured panel for a secure enclosure, such as an automated teller machine (ATM) enclosure, safe or the like, the panel being a composite material comprising a metallic reinforcing material enclosed within high-strength cement material.

[0007] The metallic reinforcing material advantageously comprises metallic fibre material, preferably steel fibre. In addition or alternatively the metallic reinforcing material may comprise at least one metallic bar, preferably steel bar. The reinforcement provides additional protection against impact and abrasive implement attacks.

[0008] The or each bar is preferably arranged substantially parallel to a face of the panel.

[0009] The high strength cement material preferably has a compressive strength of at least 100N/mm² when cured, more preferably a compressive strength of at least 200N/mm² when cured.

[0010] The armoured panel advantageously further comprises an outer casing, preferably comprising a metallic facing sheet, more preferably a steel sheet, which acts as a mould for the cement material, and as a facing material for the panel.

[0011] In addition the outer casing may comprise a peripheral frame, which imparts rigidity to the panel.

[0012] The panel may further comprise a fixing arrangement to secure the panel to an enclosure to be armoured. The fixing arrangement preferably comprises at

least one stud embedded in the cement material and projecting therefrom, and even more preferably is secured to the metal bars.

[0013] A second aspect of the present invention provides a secure enclosure, such as an automated teller machine (ATM) enclosure, safe or the like, comprising a panel according to the first aspect of the present invention.

[0014] A third aspect of the present invention provides a method of forming an armoured panel for a secure enclosure, such as an automated teller machine (ATM) enclosure, safe or the like, the method comprising the steps of:

- a) providing an outer casing of appropriate dimensions;
- b) securing reinforcing material within a space defined by the outer casing; and
- c) substantially filling the remaining space with a high strength cement material.

[0015] Embodiments of the present invention will now be described with reference to the accompanying drawings in which:

FIGURE 1 is a horizontal cross-sectional view of an ATM enclosure incorporating panels according to the present invention;

FIGURE 2 is a step by step build diagram of one of the panels of Figure 1;

FIGURE 3 is a step by step build diagram of another panel of Figure 1;

FIGURE 4 is a continuation of the step by step diagram of Figure 3;

FIGURES 5 and 6 are side and cross-sectional views respectively of the panel of Figure 2 in a semi-assembled state;

FIGURES 7 and 8 are side and cross-sectional views respectively of the panel of Figures 3 and 4 in a semi-assembled state;

FIGURE 9 is a fully assembled side view of the panel of Figure 2;

FIGURE 10 is a fully assembled side view of the panel of Figures 3 and 4; and

FIGURE 11 illustrates a step by step build diagram of a further panel according to the present invention incorporating an alternative reinforcing layout.

[0016] With reference to Figure 1, a typical ATM enclosure 2 is shown with a first panel of the present invention attached to a fixed enclosure wall 11 and a second

panel 12 attached to a door 13. Although not shown in Figure 1, additional panels may be secured to other exposed walls as appropriate. In this embodiment, the ATM being protected in an NCR 5684 model. In other embodiments, the armour may be adapted for different models.

[0017] Figure 2 shows the manufacturing steps for the panel 10 with each step being illustrated by the circled numbers. An outer casing in the form of a tray 14 is formed from relatively thin sheet metal, such as 4mm mild steel of the appropriate dimensions for the finished panel, including a panel thickness that is determined by the depth of a peripheral lip 15 of the tray.

[0018] A frame 16 formed from rolled steel angle section is fabricated with appropriate dimensions to be a close fit within the tray 14, to extend around its entire periphery and be welded to it, as shown at step 2.

[0019] An array of M16 studs 18 (9 studs in this embodiment) are then positioned at appropriate locations within the tray 14, proximate the edges and centrally. Each stud 18 is tack welded or otherwise secured to the tray to hold them in place at step 3.

[0020] Then, at step 4, reinforcing bars 20 (typically 10mm diameter) are welded around to the studs 18 to extend substantially parallel to each edge, but inset from the edge, and radially from the central stud out to each of the eight further studs located near the edge, as can be seen more clearly in Figures 5 and 6. In additions the bars 20 extend within the frame 16 and are welded to the angle section, thereby producing a rigid basic structure for the panel 10.

[0021] In the final construction step 5 of Figure 2, a high strength cement based compound 22 is introduced into the space defined by the tray, and allowed to cure, producing a finished panel as shown in Figure 9. The tray 14 and frame 16 advantageously provides the mould for the cement based compound 22.

[0022] Various high strength cement compounds are known that can achieve a compressive strength in excess of 100 N/mm² (tested by an appropriate method, such as that set out in EN 12390-3) when cured. The present applicant has found that Flexbinder produced by Densit a/s of Aalborg, Denmark, combined with refractory grade bauxite with a 5-8mm grain size distribution, steel fibres (in this embodiment 0.4mm x 12mm fibres) and water produces a particularly effective cement material having a strength in compression in excess of 200 N/mm² in compression, as well as good tensile properties, even without the presence of the reinforcing bars 20. The cement material also bonds well to the reinforcing bars 20, adding to the overall strength of the panel. The cement compound 22 is workable after mixing for around 45 minutes before curing, making panel manufacture easier.

[0023] A particularly preferred mix is set out in the table below:

Mix design		
	Kg/m ³	Mix pr. bag
Flexbinder	1738	25 kg
Bauxite 4-6 JZS	658	9.47 kg
Steel fibre	234	3.37 kg
Water	189	2.72 kg

[0024] This compound, when used to fill the void in the panel 10, has been found to produce a panel that is highly resistant to oxy-acetylene, hammer, and abrasive tool attacks.

[0025] Once manufacture of the panel 10 is complete, suitably positioned holes are drilled in the corresponding wall of the enclosure 2 to align with the studs, and the panel 10 is offered up. Nuts (not shown) are then secured on to the studs from the interior of the enclosure 2.

[0026] A panel 12 according to second embodiment of the present invention is shown in Figures 3, 4, 8 and 10. The same general principles of construction apply as they do to the panel of the first embodiment, and like parts are indicated by like numerals, but with the addition of the prefix "1". Only those components that differ from the panel 10 of the first embodiment are discussed in more detail.

[0027] This panel 12 is designed to fit over and protect a door 13. As a consequence, the tray 114 comprises a pair of recesses to accommodate the door hinges 126 (Fig 4), a lock aperture 128 and a handle aperture 130. The apertures 128 and 130 are additionally provided with lips 132 and 134 respectively. In this embodiment, the upper portion of the lip 132 of the lock aperture is angled at approximately 45° to the tray in order that a Cencon type lock may be fitted therein and adequately accessed. In other embodiment where different locks are used, the lip arrangement may be altered.

[0028] As can be seen from step 2 of Figure 3, the frame 116 is interrupted where it meets the hinge recesses 124.

[0029] In steps 3 and 4 and Figures 7 and 8, it is apparent that the studs 118 and reinforcing bars 120 have been relocated so as to fit around the apertures 128 and 130, whilst maintaining sufficient strength for the panel.

[0030] In step 5 a similar cement compound 122 mix is used to the compound of the first embodiment, before the panel 12 is offered up to the door and secured at step 6.

[0031] Figure 11 illustrates a panel according to a third embodiment of the present invention. Like components are labelled by like numerals, but with the addition of the prefix "2".

[0032] The tray 214 of this embodiment is similar to the previous embodiments, but the frame 216 includes additional reinforcing cross-members 236. Numerous relatively short reinforcing bars 220 are welded in a quasi-random positions and angles within the tray in place of

the bars 20 and 120 of the first and second embodiments, and a wire mesh is then welded to the open face of the tray before it is filled with the cement compound. Whilst a strong, attack resistant panel is produced, the welding of the reinforcing bar is a time consuming step.

[0033] Numerous changes may be made within the scope of the present invention. The shape and dimensions of panels may be altered for different models of enclosure. Cross-members and mesh similar to those of the third embodiment may be used in the panels of the first and second embodiments. Different arrangements of reinforcing bars may be used. Alternative fixings may be employed. For example the studs could be welded to the interior of the enclosure. Alternative materials could be used for the cement compound and metal reinforcement. Rather than the panels being add-ons to existing enclosures, the panels may be constructed as permanent walls and doors of such enclosures.

Claims

1. An armoured panel for a secure enclosure, such as automated teller machine (ATM) enclosure, safe or the like, the panel being a composite material comprising a metallic reinforcing material enclosed within high-strength cement material. 25
2. An armoured panel according to claim 1 wherein the metallic reinforcing material comprises metallic fibre material, preferably steel fibre. 30
3. An armoured panel material according to claim 1 or claim 2 wherein the metallic reinforcing material comprises at least one metallic bar, preferably steel bar. 35
4. An armoured panel according to claim 3 wherein the or each bar is arranged substantially parallel to a face of the panel. 40
5. An armoured panel according to claim any preceding claim wherein the high strength cement material has a compressive strength of at least 100N/mm² when cured. 45
6. An armoured panel according to claim 5 wherein high strength cement material has a compressive strength of at least 200N/mm² when cured. 50
7. An armoured panel according to any preceding claim further comprising an outer casing. 55
8. An armoured panel according to claim 7 wherein the outer casing comprises a metallic facing sheet, preferably a steel sheet.
9. An armoured panel according to claim 7 or claim 8

wherein the outer casing comprises a peripheral frame.

10. An armoured panel according to any preceding claim further comprising a fixing arrangement to secure the panel to an enclosure to be armoured. 5
11. An armoured panel according to claim 10, wherein the fixing arrangement comprises at least one stud embedded in the cement material and projecting therefrom. 10
12. An armoured panel according to claim 10 or claim 11, when dependent upon claim 3, wherein the fixing arrangement is secured to the metal bars. 15
13. A secure enclosure, such as automated teller machine (ATM) enclosure, safe or the like, comprising a panel according to any preceding claim. 20
14. A method of forming an armoured panel for a secure enclosure, such as automated teller machine (ATM) enclosure, safe or the like, the method comprising the steps of: 25
 - a) providing an outer casing of appropriate dimensions;
 - b) securing reinforcing material within a space defined by the outer casing; and
 - c) substantially filling the remaining space with a high strength cement material.

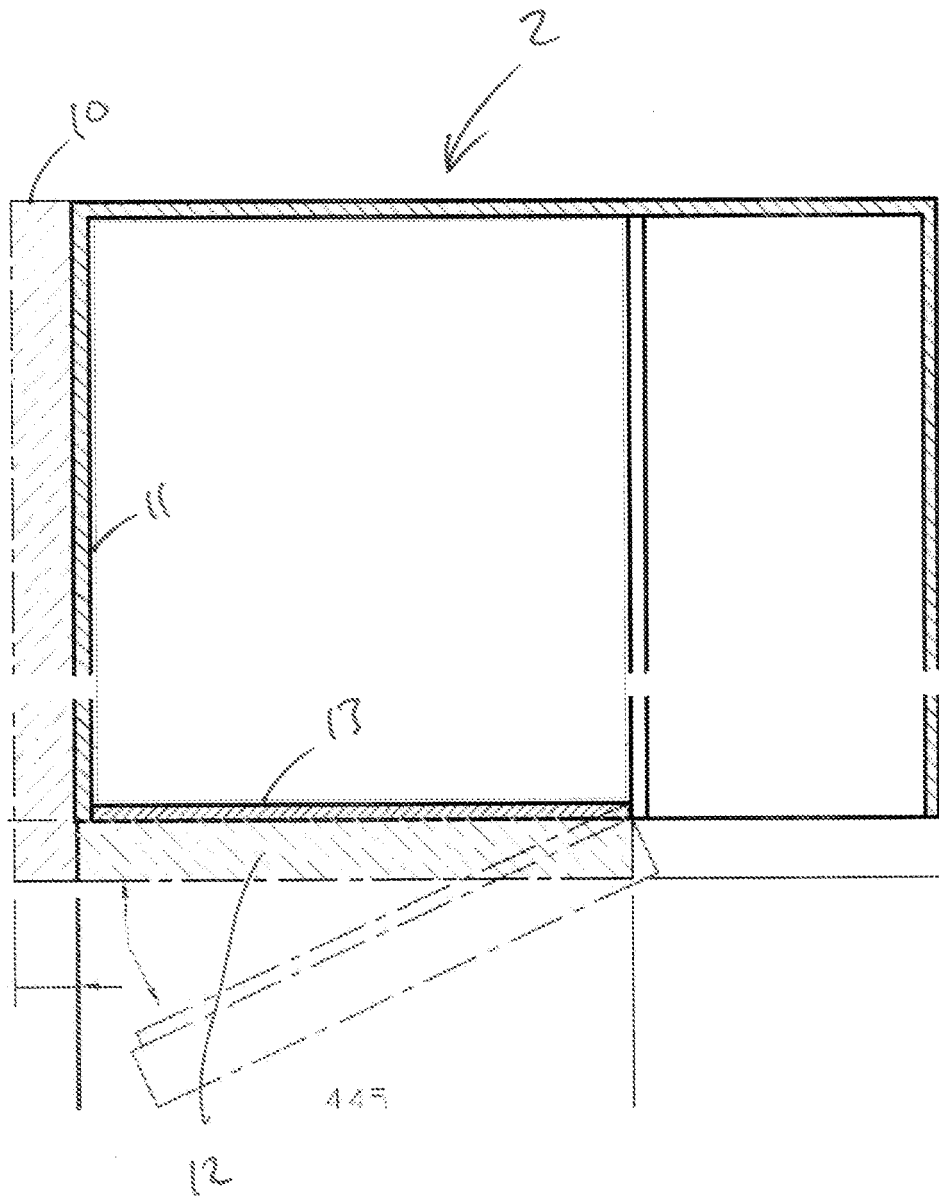


Fig. 1

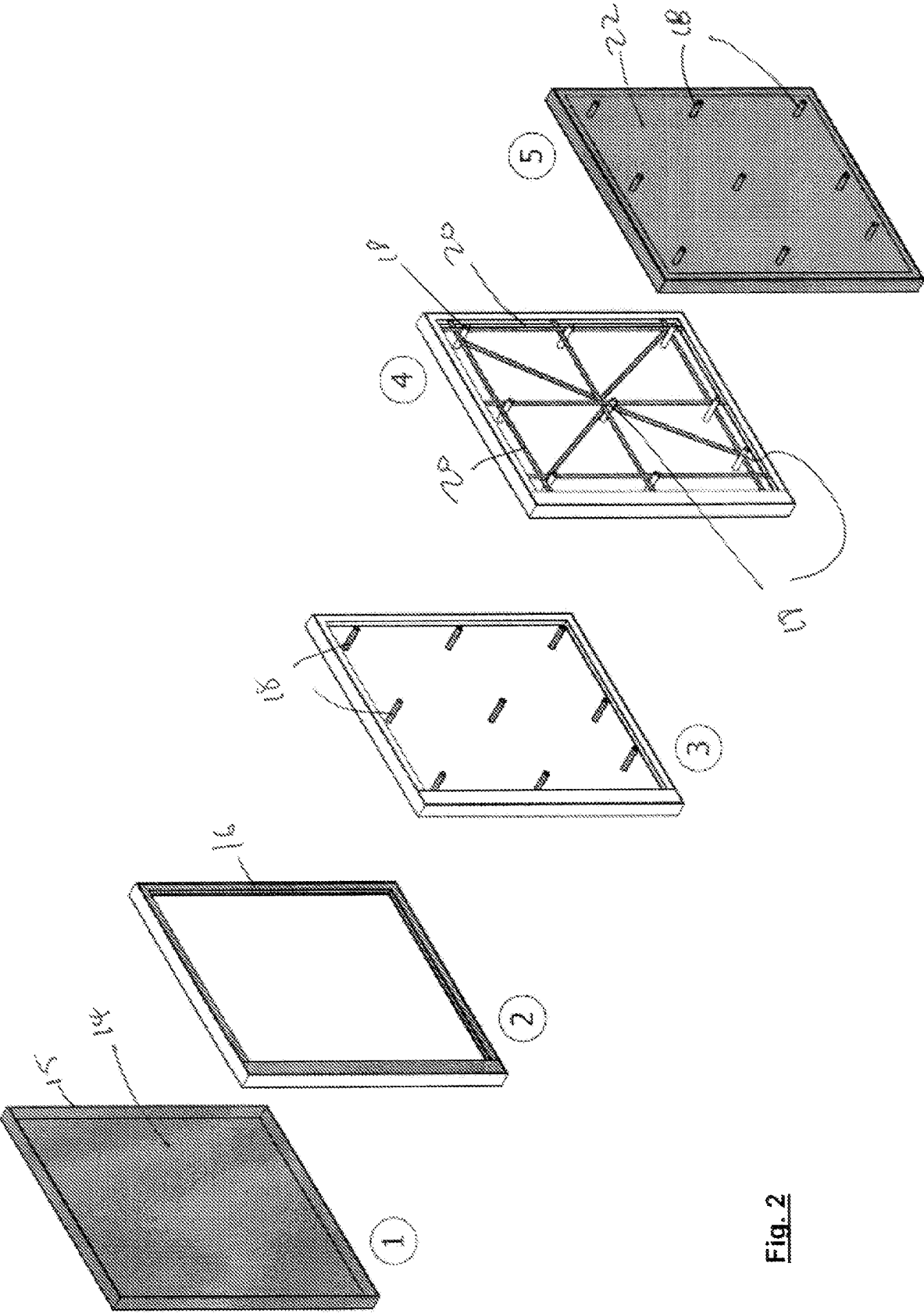


Fig. 2

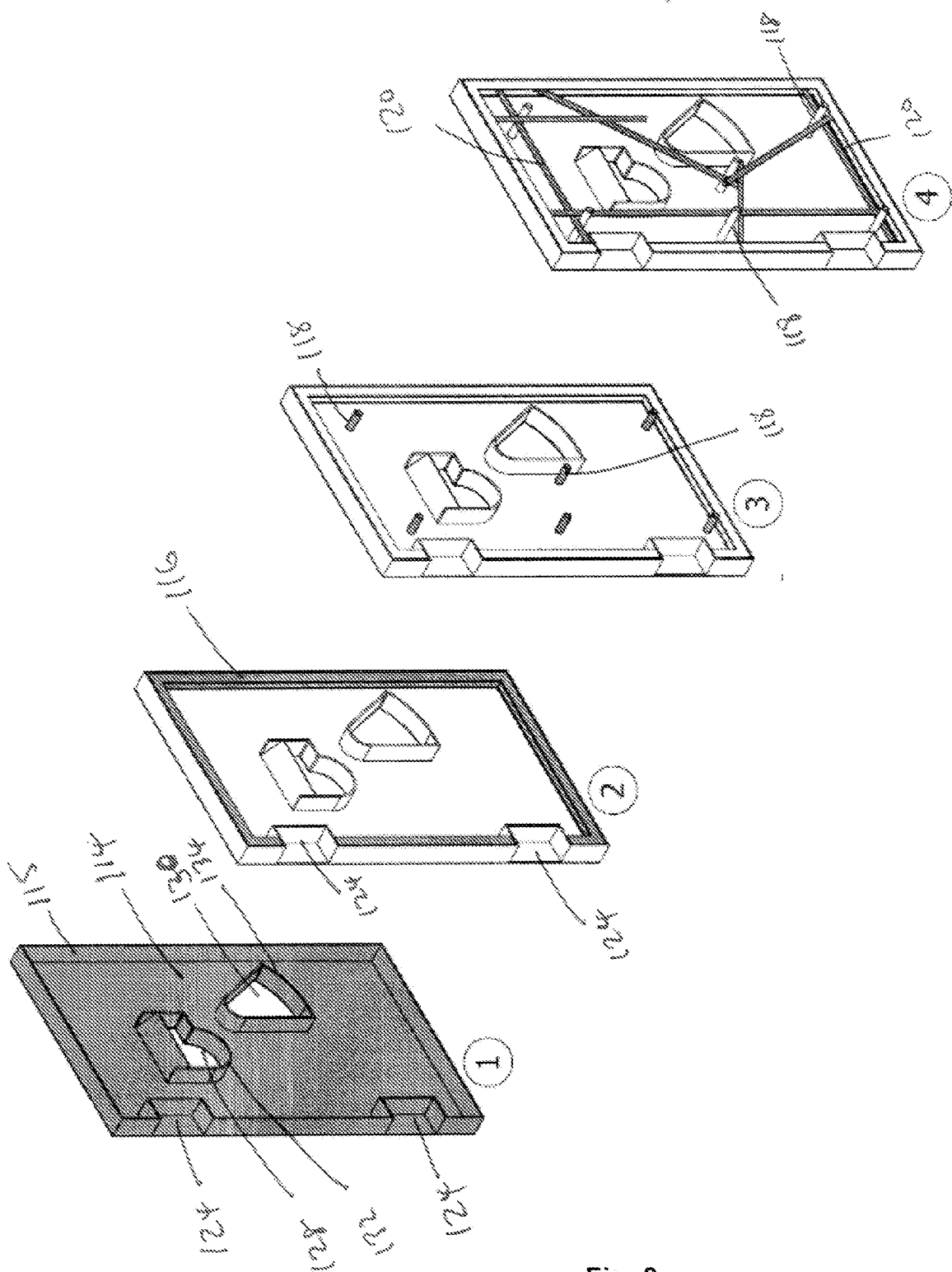


Fig. 3

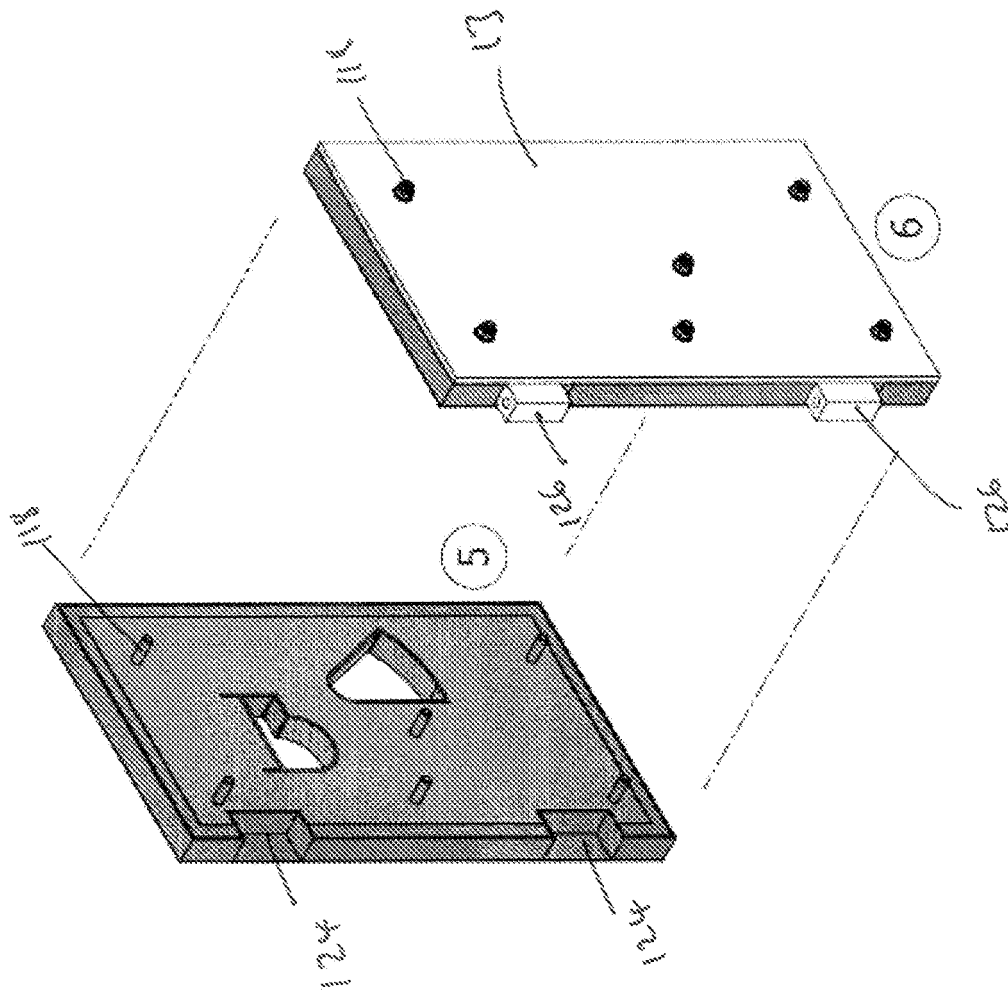


Fig. 4

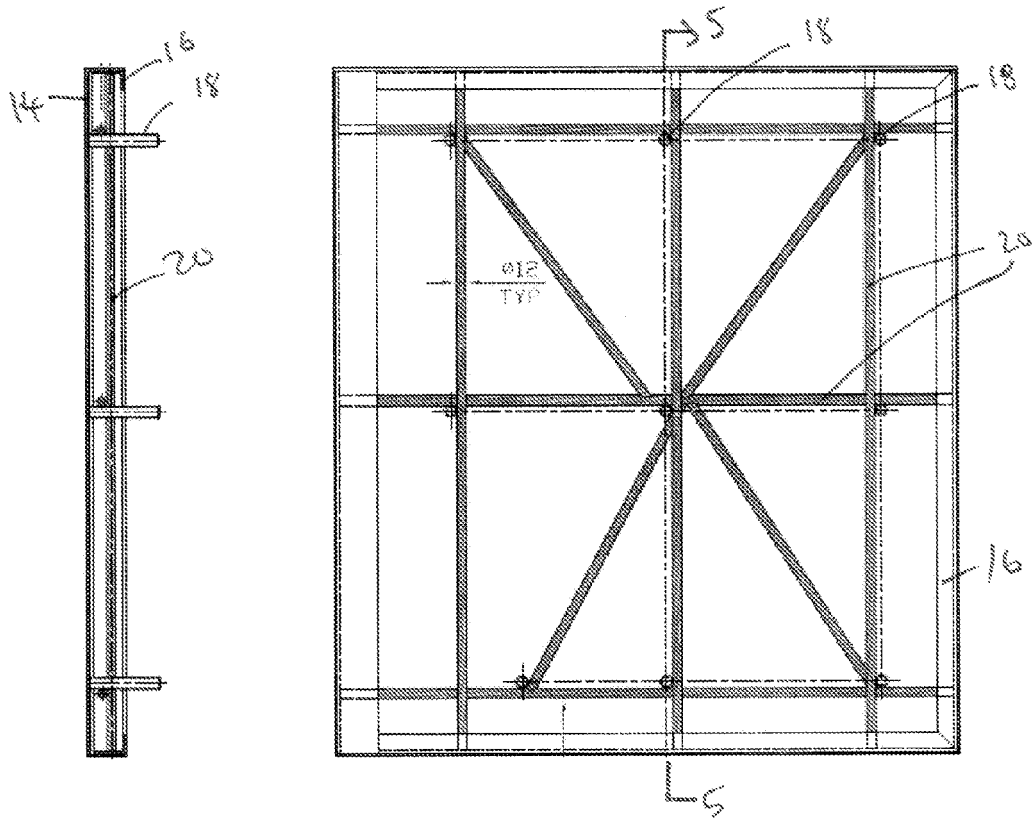


Fig. 5

Fig. 6

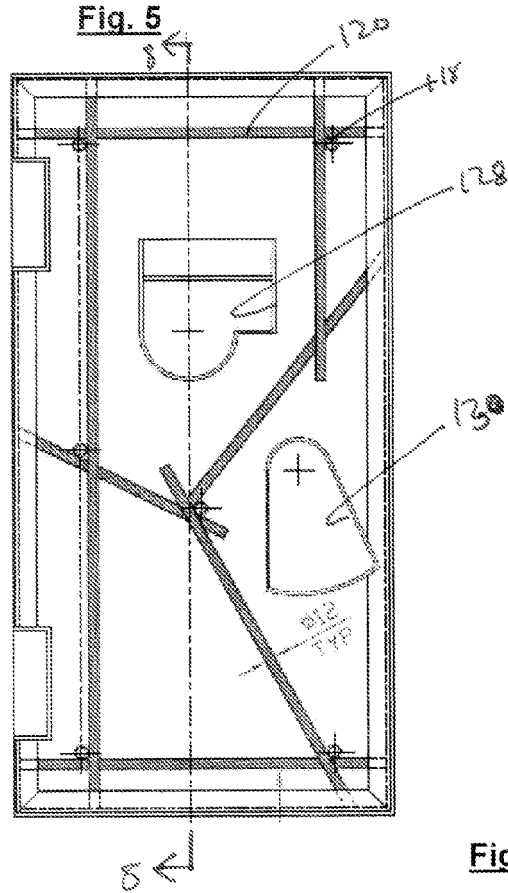


Fig. 7

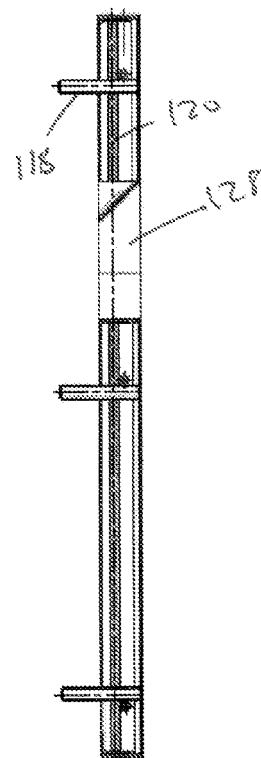


Fig. 8

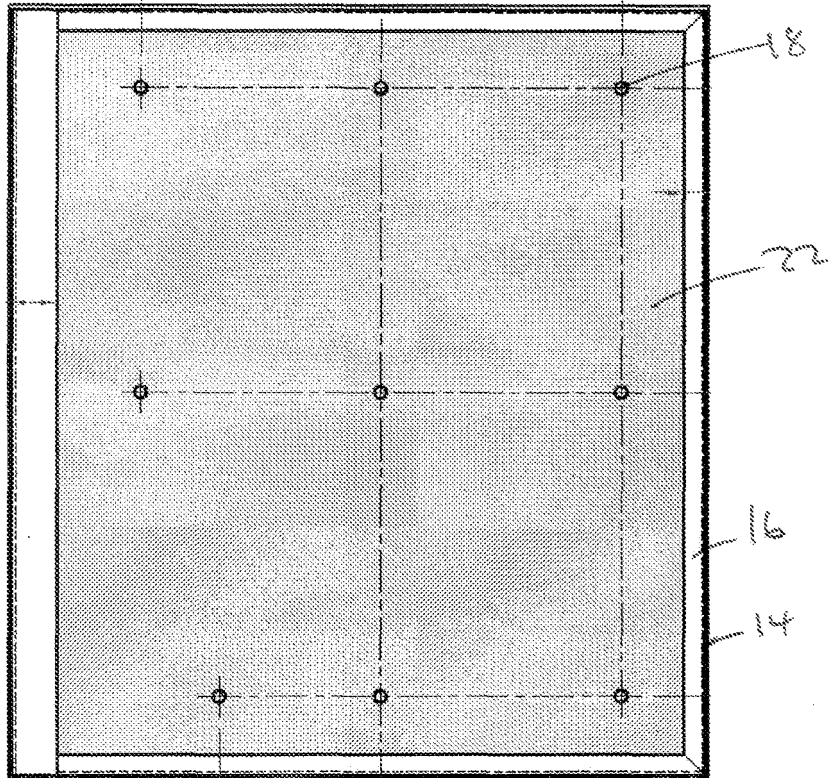


Fig. 9

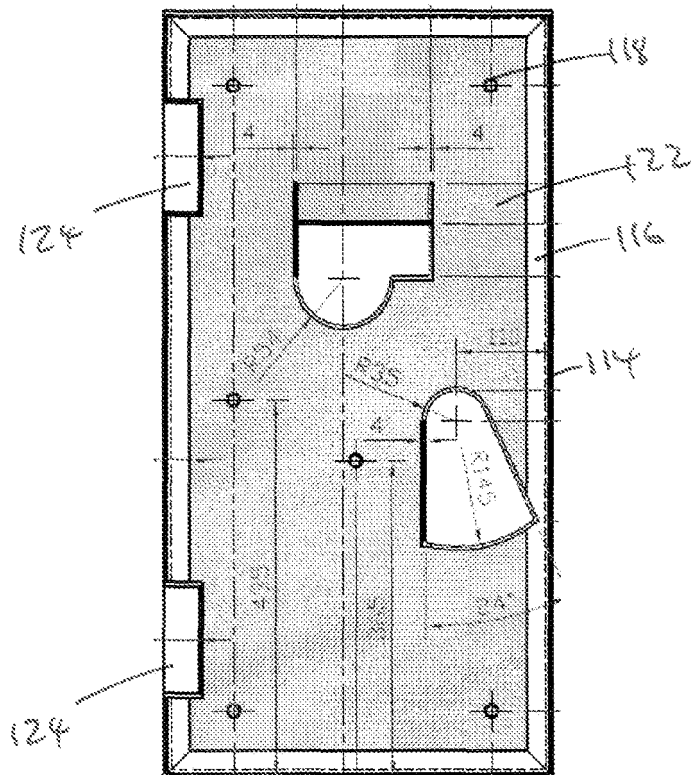


Fig. 10

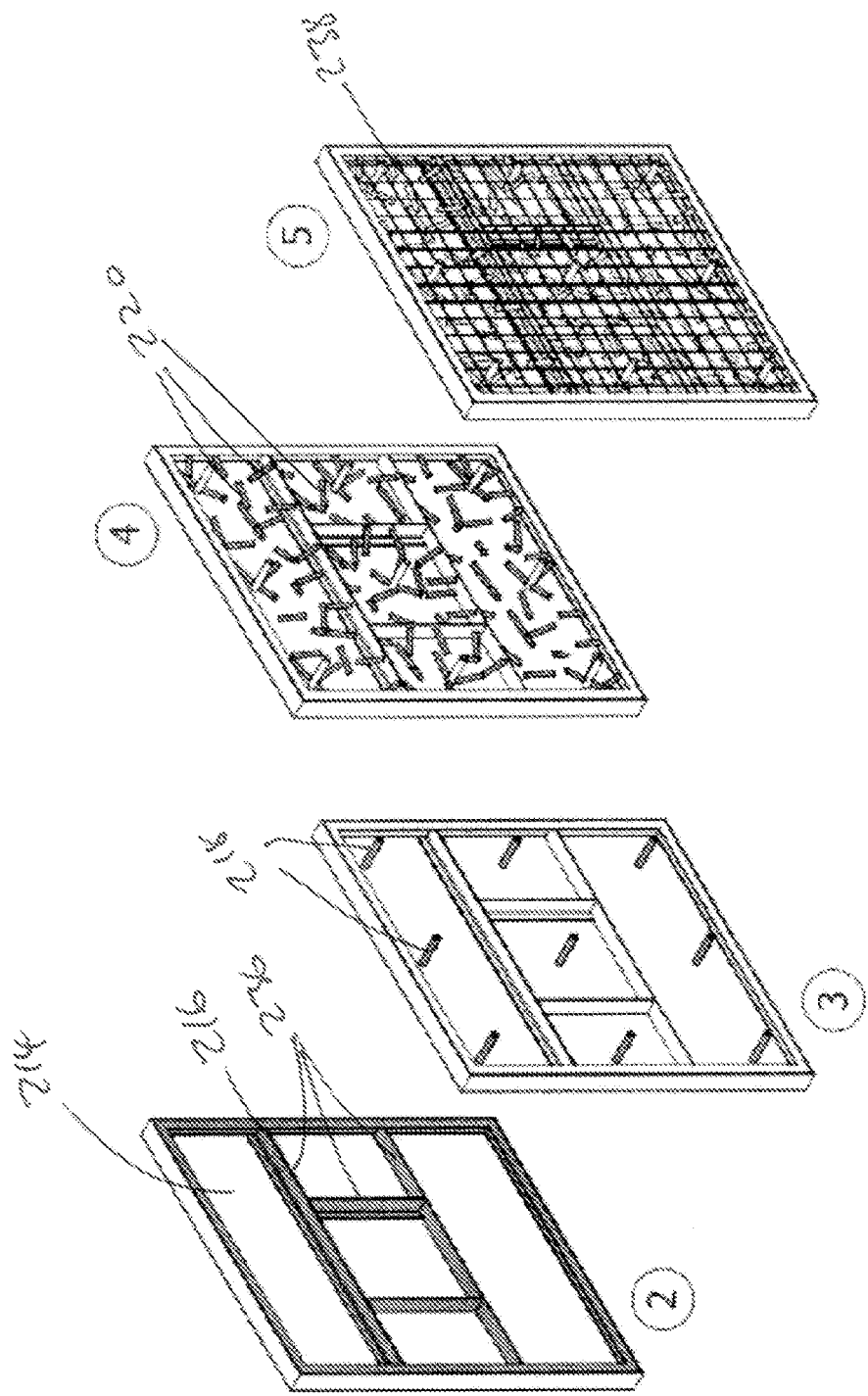


Fig. 11