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(54) Fire resistant panel systems

(57) A fire resistant panel structure comprises an opposed pair of panels (1,2) each comprising two steel sheets (3,4) separated by a filling (5) formed of cementitious material and having a thickness of a first order and sandwiched between the panels is a central insulating board (6) having a thickness of a second order of size. The second order of size is greater than the first order of size.

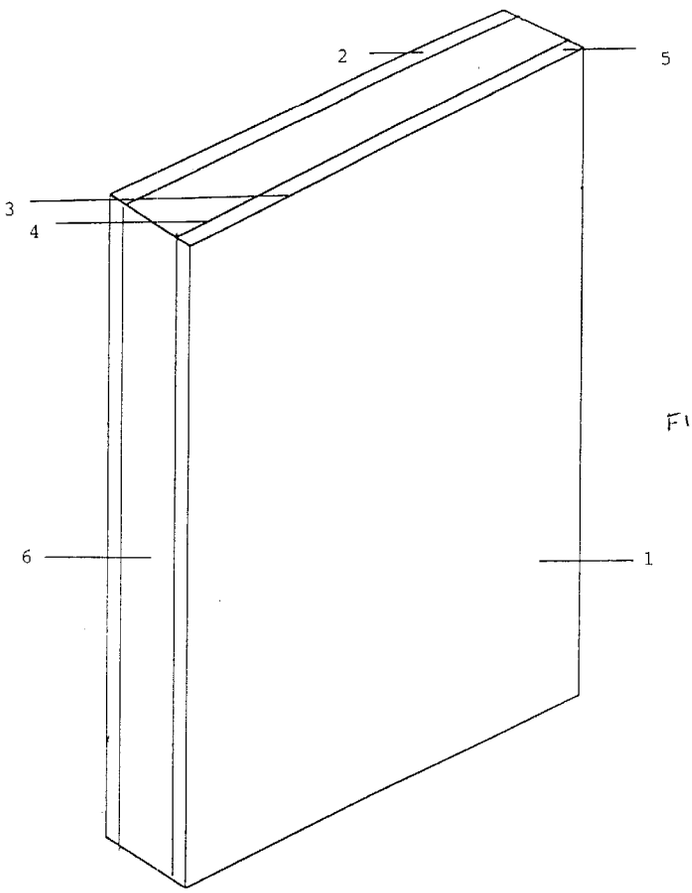

FIG 1

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Description

This invention relates to fire resistant panels.

As safety requirements in industry increase, ever more sophisticated panel structures meeting ever increasing specifications for use in resisting the advance of fires for specified periods of time have been proposed. Panel structures are thus being proposed which are increasingly expensive. Frequently, use is made of steel sheeting and of sandwich structures containing cementitious material for this purpose. Technology developed in the construction industry is occasionally extended to meet the requirements of high specification fire resistance.

It is an object of the present invention to provide a relatively low cost high specification fire resistant panel system which is fire resistant from both sides.

According to the present invention, there is provided a panel structure comprising an opposed pair of panels each comprising two metal sheets separated by a filling formed of cementitious material, the panels each having first thicknesses which may be the same or different and, sandwiched between the panels, is a central insulating board having a second thickness greater than either first thickness. In the preferred practice, the two opposed panels will be identical in dimensions and structure.

In one panel embodying the invention, the opposed pair of panels and insulating board are held together by fire-resistant adhesive applied to all mating surfaces.

A panel structure embodying the invention provides fire resistance by means of the opposed pair of panels and fire and thermal insulation by means of the insulating board. The fire resistant panels will protect the insulating board from direct contact with the fire which would otherwise cause surface erosion of the insulating board and reduce its insulating properties.

The fire resistant panels may typically be of a cement and steel sheet composite such as that known by the trade mark "Durasteel". Such a composite will offer additional useful properties, such as resistance to impact, moisture, ballistic and criminal attack. The steel element of the composite will form a Faraday Cage which causes attenuation of electromagnetic waves. Such composite boards are readily available and of relatively low-cost. However other fire resistant panels may also be used if further specific properties are required.

The insulating board is preferably a thermally insulating board formed of calcium silicate of low density (260 kg/m^2) which will enable it to perform its insulating function at high temperatures. Other materials can be used which provide similar properties. Calcium silicate board thicknesses tend to be greater than those of many fire resistant boards and this is a desirable property where insulating behaviour is required. Typically, fire resistant boards as aforesaid can be manufactured with a thickness of as little as 6 mm overall to be used with calcium silicate insulating board having a thickness of the order of 50 mm.

When built into an insulating fire barrier system, panels embodying the invention can be held together by means of cover strips made from the fire resistant panel material comprised thereby. The cover strips are preferably held in place by screws connecting through to the fire resistant panel of the panel structure. Such structures are self supporting and it is merely necessary for steel angles to be fixed to surrounding masonry and panels to hold to the system in place. The panels may be cut to size to suit the shape of the barrier to be formed and holes cut to accommodate services that need to pass through the barrier. Joints between the panels and masonry may be sealed with fire resistant compositions to prevent passage of fire. Similarly, the services passing through the panel may be sealed with suitable fire stopping material.

For a better understanding of the invention and to show how the same can be carried into effect, reference will now be made by way of example only, to the accompanying drawings, wherein:-

Figure 1 is a perspective view of a panel structure embodying this invention; and
Figure 2 is a section through a joint between a pair of panels embodying the invention.

Referring to the drawings, Figure 1 shows a pair of fire resistant panels 1 and 2 each made up of a pair of thin steel sheets 3 and 4 between which is sandwiched a body 5 of cementitious material. An insulating panel 6 formed of calcium silicate is adhesively bonded to each such panel by means of a fire resistant adhesive.

Referring to Figure 2, a pair of panels 1 abut at a joint 7 over which are laid a pair of cover strips 8 secured to each of the panels 1 by screws at positions 9, 10, 11 and 12.

Claims

1. A panel structure comprising an opposed pair of panels each comprising two metal sheets separated by a filling formed of cementitious material, the panels each having first thicknesses which may be the same or different and, sandwiched between the panels, is a central insulating board having a second thickness greater then either first thickness.

2. A panel structure as claimed in claim 1 wherein the two opposed panels are identical in dimensions and structure.

3. A panel structure according to claim 1 or 2, wherein the opposed pair of panels and insulating board are held together by fire resistant adhesive applied to all mating surfaces.

4. A panel structure as claimed in any preceding claim, wherein the insulating board is formed of low density calcium silicate.

5. A panel structure as claimed in claim 4 wherein the opposed panels have a thickness of about 6mm and are separated by calcium insulating board having a thickness of about 50mm.

6. A panel structure as claimed in any preceding claim wherein each panel is a cement and steel sheet composite.

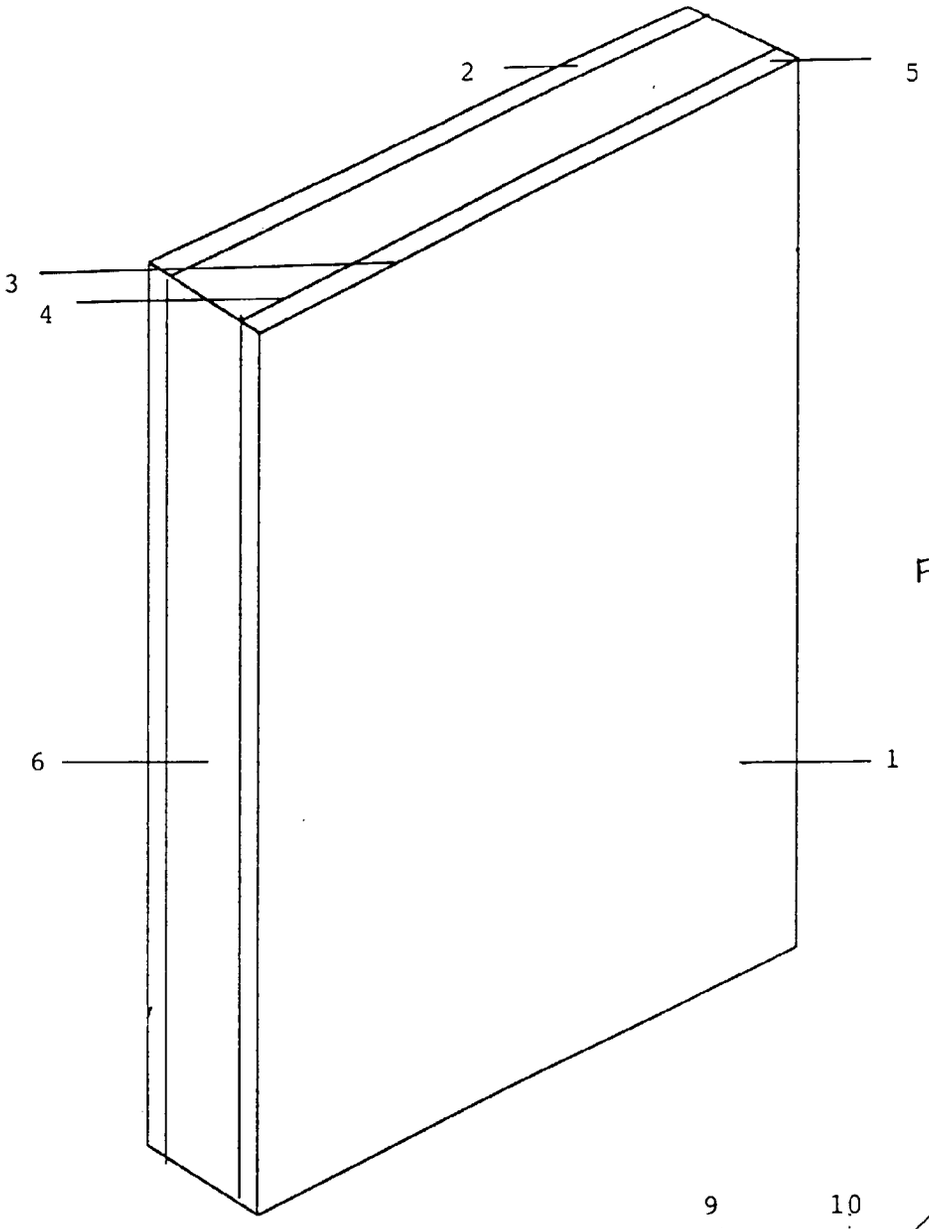

FIG 1

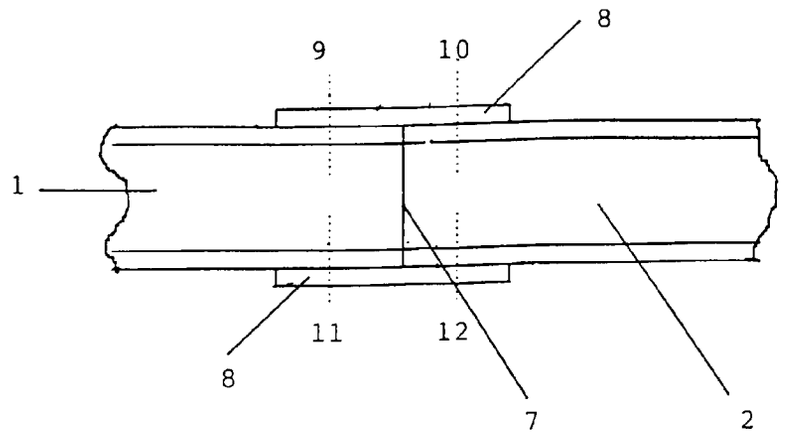

FIG 2

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EUROPEAN SEARCH REPORT

Application Number
EP 96 30 6492

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	WO-A-93 20300 (GNJATOVIC LJUBOMIR) 14 October 1993 * page 2, paragraph 4 - page 3, paragraph 2; claims 1-3,7-10; figure 5 *	1-6	E04B1/94 E04C2/292
Y	WO-A-93 21406 (WILSON JOE ;BALLA GODDARD MICHAEL STEVEN A (GB); DENNY ANDREW FRAN) 28 October 1993 * page 7, line 24 - line 31; claims 1-5; figure 6 *	1-6	
A	US-A-2 757 116 (MC MILLAN CLEMENTS) 31 July 1956 * column 2, line 3 - line 63; figure 1; tables 1,2 *	1-6	
A	DE-A-33 13 526 (THIERAUF GEORG PROF DR ING) 15 September 1983 * page 4, line 1 - line 27; claim 1; figure 3 *	1-6	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) E04B E04C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	11 December 1996	Bousquet, K

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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