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Improvements in and relating to building panels

This invention concerns building panels and specifically prefabricated panels typically used in the construction of factories and warehouses.

Building panels for use in the above field are known and typically comprise two skins of metal sheet, typically zinc plated sheet steel which are bonded to opposite surfaces of a layer of thermal insulating material or the like to form a composite sandwich.

Systems have been proposed in which the sheets are additionally joined by means of discrete spacer elements which not only serve to separate the two sheets of material by the appropriate distance but also to assist in holding the two sheets together on opposite sides of the sandwich and tend to reinforce the bond between the inner material and the two outer skins of metal sheet.

Structurally, the simple bonded sandwich without spacers is less strong than the form of construction in which the two outer skins are additionally joined by spacer members but it is less easy to customise cladding panels which incorporate spacers since the spacing between the two sheet steel skins is one of the parameters which has to be varied to adjust the span strength i.e. structural spanning capacity of a panel. To this end a large number of different sizes of spacer would be required to provide a range of panel thicknesses and in practice this is not normally possible from a cost and storage point of view. Consequently, hitherto cladding panels have tended to be constructed to one or two standard thicknesses and more often than not the cladding used is of far greater strength and weight than is necessary for the particular spans in the building concerned.

In known arrangements, such as illustrated in British Specification No. GB—A—469098 and US Patent No. US—A—3344571, metal sheets or skins are linked by metal stiffeners. The stiffeners will function as thermal bridges between the sheets or skins, thus permitting the transmission of heat.

It is thus an object of the invention to provide a building panel in which such heat transmissions is eliminated or substantially reduced.

It is also an object of the present invention to provide an improved means for fixing together the two skins of a composite cladding panel, so as to readily allow different spacings between the two panels without interfering with the panel surfaces.

It is a further object of the invention to provide a panel whose structural integrity is independent of any chemical bond.

According to the present invention there is provided a building panel for cladding which comprises elongate inner and outer metal sheet members having complementary and aligned channels which are formed out of the planes of the respective sheets by deformation, casting or extrusion, said channels extending parallel to the direction of the width of the sheets, and joining means for joining said sheet members together in spaced relationship, characterised in that said joining means is of elongate form being bent to include parts extending between the sheet members and parts extending along the line of aligned channels and secured within the channels by crimping, sleeves of thermally insulating material being located between the relevant parts of the joining means and the associated channels in the sheet members so as to form a thermal break between the sheet members.

In one preferred form the elongate means comprises a length of wire or strip material bent in a zig zag manner so as to extend diagonally between the two panels forming the inner and outer sheet members, the wire or strip material being secured within the channels at the junctions between the diagonals.

In order further to reduce any transmission of heat from one sheet member to the other, the joining means are preferably formed at least in part of a low thermal conductivity material such as suitable plastics materials.

Where the elongate joining means is a deformed length of wire or metal strip, thermal resistance can be increased by increasing the length of the conductive path between the two sheet members by bending the wire at a shallower angle between the bridging sections received in the channels so that a longer length of wire extends between the two sheet members.

It will be seen that by using a simple elongate bridging means such as the type described, a panel can be constructed readily from stock material with the desired degree of spacing between the inner and outer sheet members being obtained by e.g. appropriately forming the wire or strip material so as to provide the required spacing between the two sheet members.

The joining means may be constructed in two parts, one for securing in the channel in one sheet member and the other for securing in a channel in the other sheet member, and a joint of thermal insulating material may be formed at the junction between the two parts forming the elongate joining means. This arrangement is particularly suitable when the elongate joining means is formed from bent wire, and in this arrangement two zig zags of wire are used to form a single elongate joining means, the apices of the triangular sections formed by the zig zag bending of the wire being either joined by means of thermal insulating joints to the apices of the adjoining zig zag wire or being received in one or other of the channels in the two sheet members.

The sheet members are themselves pre-

ferably preformed with the channels at regular spacings. By inserting an appropriate joining member into every pair of aligned channels, so maximum rigidity and structural strength can be built into the panel. Where a standard sheet is used, but less rigidity and or structural strength is required, joining members may be omitted from selected pairs of aligned channels. Thus for example every other pair of channels may be left empty.

The invention will now be described by way of example with reference to the accompanying drawings.

Figure 1 is a perspective view, partly cutaway, illustrating one embodiment of the invention with those parts of the construction not normally visible shown in hidden detail;

Figure 2 is a scrap perspective section illustrating a thermal break incorporated between an elongate joining member and a sheet member forming one surface of the panel the type shown in Fig. 1; and

Figures 3 and 4 are respective cross-sectional and scrap perspective views illustrating a two part elongate joining member.

Referring firstly to Fig. 1, a composite panel is formed from two metal sheets 10 and 12 each formed with parallel ridges of which one is generally designated 14 in sheet 10 and one is designated 16 in sheet 12. The sheets 10 and 12 are arranged so that the ridges are on the external surfaces of the composite panel and the two sheets 10 and 12 are joined and simultaneously separated by means of zig zag wire joining members. One such member which cooperates with the ridges 14 and 16 is indicated by reference numeral 18.

The ridges 14 and 16 are formed by deforming the sheet metal 10 and 12 and initially define parallel sided channels into which the wire 18 can be slid. The wire is bent in a zig zag profile so as to have diagonal sections such as 20 and 22 which extend between a bridging section 24 for entering the channel formed by the ridge 16 and two bridging sections 26 and 28 which enter the channel formed by the ridge 14. The numer of bends in the wire and the length of the wire is selected according to the size of the panels and the spacing required between them.

After inserting the bridging sections 26 and 28 into the channel formed by the ridge 14, the walls of the latter are crimped as shown in Fig. 1 so as to trap the bridging sections of the wire zig zag in the ridge 14.

The bridging section 24 is similarly trapped by crimping the walls of the ridge 16.

The result is a very strong panel which can be constructed from standard material and can also, during manufacture, be constructed with any desired spacing between the two inner and outer sheet members formed by the panels 10 and 12.

In cases where the external surfaces of the panels 10 and 12 are to be flat or substantially flat, the ridges such as 14 and 16 can be hidden by bending the sheet material at the bottom of each of the ridges through 90° so as to produce re-entrancy on either side of the ridge 14 and thereafter bending the sheet material parallel with the apex of the ridge 14 so as to extend away from the ridge. By doing this on each side of each ridge, so considerably more material is required to produce a given length of panel but the ridges are totally contained within the thickness of the panel so formed.

Fig. 2 illustrates a thermal break incorporated in the embodiment of Fig. 1. A sleeve of thermal insulating material 72 is fitted around each of the bridges such as 24, 26, 28 before these are inserted into the channel formed by the ridges 14 and 16. The walls of the ridges are then crimped around the sleeve of insulating material which forms the required thermal bridge between the conductive wire 18 and the thermally conductive sheet material normally metal forming the plate 10.

Figs. 3 and 4 illustrate a further thermal break. In the illustrated arrangement the elongate joining means is formed from two zig zag profiles each of half amplitude relative to the zig zag of the wire joining member of Fig. 1, the frequency of the bends being twice that of the frequency of the bends in the wire joining member of Fig. 1. The bridges at the external edges of the zig zag profile are, as in Fig. 1, received in the ridges formed in the two panels 10 and 12 and the other set of bridging sections (74 and 76 as shown in Fig. 8) are joined together through a joint of thermal insulating material designated by reference 78. This may be a quick setting resin material having low thermal conductivity or may be a sleeve having two parallel apertures through which the wire is threaded before it is bent.

The invention thus allows a building panel for cladding to be constructed which, since it does not rely on a chemical bond for its strength is not susceptible to fire damage or weakening as a result of ageing or creep.

Claims

1. A building panel for cladding which comprises elongate inner and outer metal sheet members (10, 12) having complementary and aligned channels (14, 16) which are formed out of the planes of the respective sheets by deformation, casting or extrusion, said channels extending parallel to the direction of the width of the sheets, and joining means (18) for joining said sheet members together in spaced relationship, characterised in that said joining means is of elongate form being bent to include parts (20, 22) extending between the sheet members and parts (24, 26, 28) extending along the line of aligned channels and secured within the channels by crimping, sleeves (72) of thermally insulating material being located between the relevant parts (24, 26, 28) of the

joining means and the associated channels in the sheet members so as to form a thermal break between the sheet members.

2. A building panel as claimed in claim 1, characterised in that the joining means comprises a length of wire or strip material (18) bent in a zig zag manner so as to extend diagonally between the inner and outer sheet members (10, 12) with the wire or strip material secured within the channels at the junctions between the diagonals.

3. A building panel as claimed in claim 1, characterised in that the joining means are formed at least in part of a low thermal conductivity material.

4. A building panel as claimed in any one of the preceding claims, characterised in that the joining means joining the two sheet members together is formed in two parts (74, 76), one for securing in the channel in one sheet member (10) and the other for securing in the channel in the other sheet member (12) and a joint (78) of thermally insulating material is provided at the junction between the two parts forming the elongate joining means.

5. A building panel as claimed in claim 4, characterised in that the two parts of the joining means are lengths of wire (74, 76) bent to form zig zags and the apices of the triangular sections formed by the zig zag bending of the wire are either joined by means of thermal insulating joints (78) to the apices of the adjoining zig zag wire or are received in one or other of the two channels in the two sheet members (10, 12).

Revendications

1. Panneau de construction pour l'habillage, qui comprend des plaques métalliques allongées interne et externe (10, 12) comportant des canaux complémentaires et alignés (14, 16) qui sont ménagés à l'extérieur des plans des plaques respectives par déformation, moulage ou extrusion, lesdits canaux s'étendant parallèlement à la direction de la largeur des plaques, et un moyen de jonction (18) pour relier l'une à l'autre lesdites plaques en relation d'espacement, caractérisé par le fait que ledit moyen de jonction est de forme allongée, en étant cintré pour présenter des parties (20, 22) s'étendant entre les plaques et des parties (24, 26, 28) s'étendant le long de la rangée de canaux alignés et fixées à l'intérieur des canaux par sertissage, des douilles (72) en matière thermiquement isolante étant situées entre les parties respectives (24, 26, 28) du moyen de jonction et les canaux associés dans les plaques, de manière à former une disruption thermique entre les plaques.

2. Panneau de construction selon la revendication 1, caractérisé par le fait que le moyen de jonction consiste en une longueur de matière (18) du type câble ou ruban cintrée en zigzag de façon à s'étendre en diagonale entre les plaques interne et externe (10, 12), la matière du type câble ou ruban étant assujettie à l'intérieur des canaux aux jonctions entre les diagonales.

3. Panneau de construction selon la revendication 1, caractérisé par le fait que les moyens de jonction consistent, au moins en partie, en une matière à faible conductivité thermique.

4. Panneau de construction selon l'une quelconque des revendications précédentes caractérisé par le fait que le moyen de jonction solidarisant l'une à l'autre les deux plaques est réalisé en deux parties (74, 76), l'une étant assujettie dans le canal de l'une (10) des plaques et l'autre étant assujettie dans le canal de l'autre plaque (12) et un joint (78) en une matière thermiquement isolante est prévu à la jonction entre les deux parties constituant le moyen de jonction allongé.

5. Panneau de construction selon la revendication 4, caractérisé par le fait que les deux parties du moyen de jonction sont des longueurs de câble (74, 76) cintrées pour former des zigzags et les sommets des sections triangulaires formées par le cintrage du câble en zigzag sont reliés au moyen de joints (78) thermiquement isolants aux sommets du câble adjacent en zigzag, ou bien sont reçus dans l'un ou l'autre des canaux dans les deux plaques (10, 12).

Patentansprüche

1. Zum Verkleiden bestimmte Bauplatte aus langgestreckten Innen- und Außenblechen (10, 12) mit zueinander komplementären und ausgerichteten Kanälen (14, 16), die durch Verformen, Guß oder Extrusion aus den Ebenen der betreffenden Bleche heraus ausgebildet sind und die parallel zu der Richtung der Breite der Bleche verlaufen, und aus einem Verbindungsmittel (18) zum Verbinden der Bleche unter gegenseitigem Abstand, dadurch gekennzeichnet, daß das Verbindungsmittel eine langgestreckte Form aufweist und diese so gebogen ist, daß sie Teile (20, 22) enthält, die zwischen den Blechen verlaufen, und Teile (24, 26, 28), die entlang der Linie der ausgerichteten Kanäle verlaufen und in den Kanälen durch Umbiegen befestigt sind, und Hülsen (72) aus einem wärmeisolierenden Material zwischen den relevanten Teilen (24, 26, 28) des Verbindungsmittels und den zugehörigen Kanälen in den Blechen angeordnet sind, so daß zwischen den Blechen eine thermische Unterbrechung entsteht.

2. Bauplatte nach Anspruch 1, dadurch gekennzeichnet, daß das Verbindungsmittel ein Draht- oder Streifenmaterialstück (18) ist, das zickzackförmig gebogen ist, so daß es diagonal zwischen dem Innen- und dem Außenblech (10, 12) verläuft, wobei das Draht- oder Streifenmaterial an den Verbindungsstellen zwischen den Diagonalen in den Kanälen befestigt ist.

3. Bauplatte nach Anspruch 1, dadurch gekennzeichnet, daß das Verbindungsmittel

mindestens zum Teil aus einem Material mit niedriger Wärmeleitfähigkeit hergestellt ist.

4. Bauplatte nach irgendeinem der vorhergehenden Patentansprüche, dadurch gekennzeichnet, daß das die beiden Bleche verbindende Verbindungsmittel aus zwei Teilen (74, 76) hergestellt ist, von denen das eine zum Befestigen im Kanal im einen (10) der Bleche und das andere zum Befestigen in dem Kanal in dem anderen (12) der Bleche dient und eine aus einem wärmeisolierenden Material bestehende Verbindung (78) an der das langgestreckte Verbindungsmittel bildenden Verbindung zwischen den beiden Teilen vorgesehen ist.

5. Bauplatte nach Anspruch 4, dadurch gekennzeichnet, daß die beiden Teile des Verbindungsmittels in Zickzackform gebogene Drahstücke (74, 76) sind und die Scheitelpunkte der durch das Zickzackbiegen des Drahtes gebildeten dreieckförmigen Abschnitte entweder mit den wärmeisolierenden Verbindungen (78) an die Scheitelpunkte des angrenzenden Zickzackdrahtes angeschlossen oder in dem einen oder anderen der beiden Kanäle in den beiden Blechen (10, 12) aufgenommen sind.

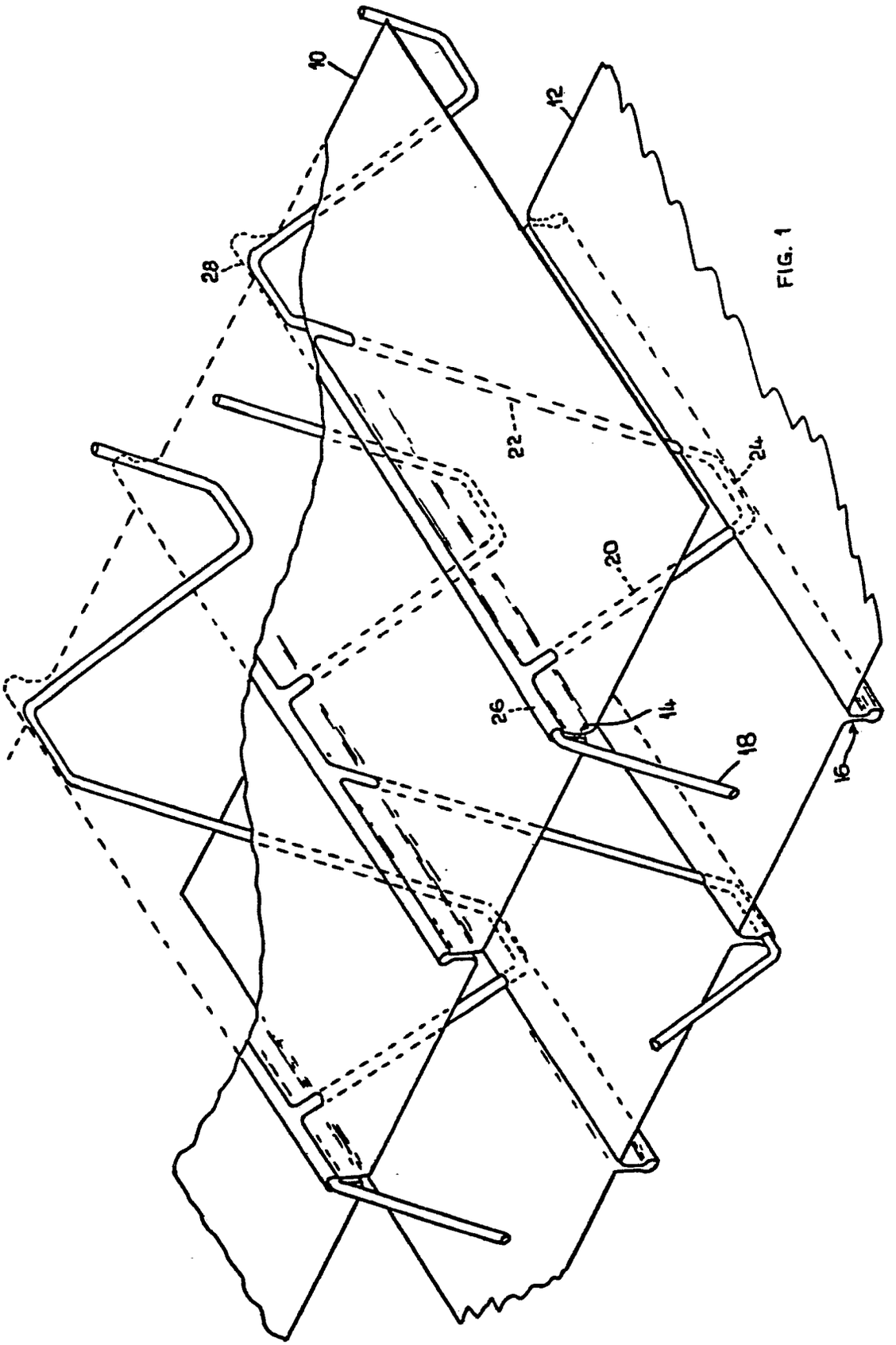

FIG. 1

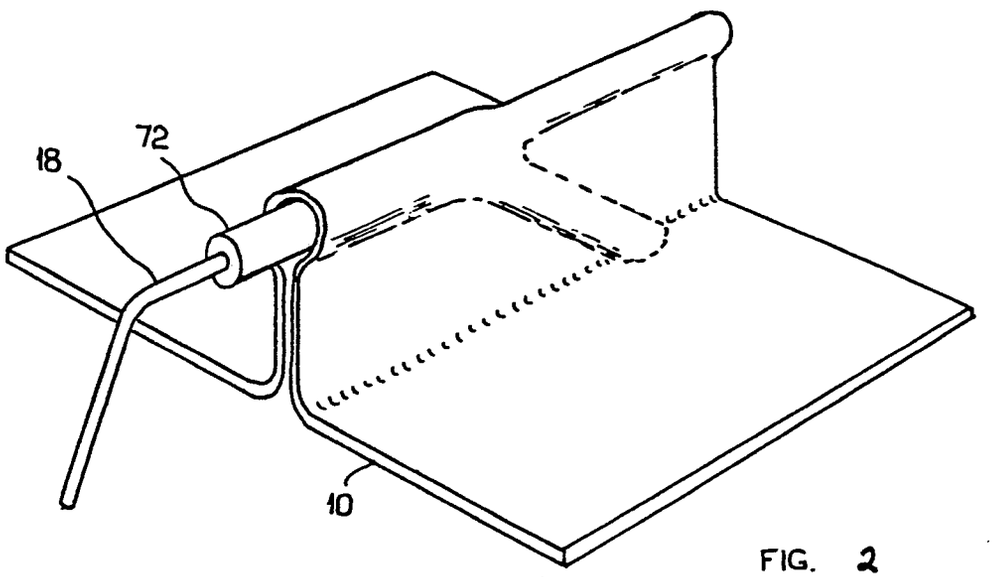

FIG. 2

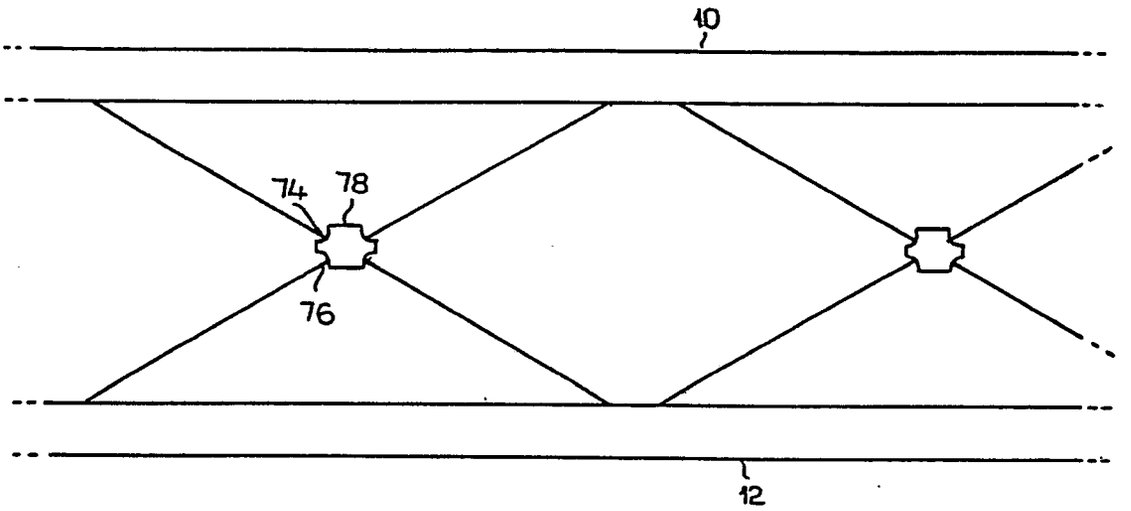

FIG. 3

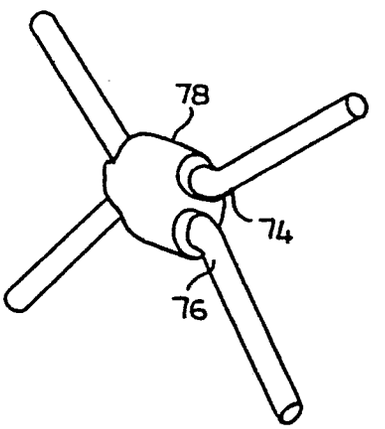

FIG. 4