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(54) Sandwich panel.

(57) A sandwich panel in which a connection profile 21 is provided on at least one edge and co-operates with a tongue 15 on the edge of an adjacent panel. The sandwich panel itself is filled with an insulating material, wuch as foam, and has on opposite faces metal sheets 12, 13, 18, 19. A connection profile 21 includes a web 22, first and second edge flanges 23 and 24, nd third and fourth flanges 23 and 24 therebetween. The fourth flange extends into a recess 33 in the tongue and is spaced from the first flange sufficiently to accommodate a part of th tongue as well as the clamping portion 30 of a clamp 31 which holds th panels against a support member 35.

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SANDWICH PANEL

The present invention relates to sandwich panels.

Sandwich panels have been used for a considerable time now in the building trade and incorporate a front and rear sheet, usually formed of metal, and sandwiched between these sheets is an insulating core which can be formed of a variety of materials such as cellular or foam plastic, reconstituted wood, fibrous materials or the like or a mixture of all of these.

Many different proposals have been made for joining the edges of such panels and one such proposal is in GB-A-1072595. Here one abutting panel edge is provided with a profiled strip, which includes two edge flanges around which are bent the ends of the front and rear sheets respectively, and a protruding tongue portion. The interior of the tongue portion and the space between the front and rear sheets is filled with the insulation. The other co-operating member has both a front and rear sheet bent first inwardly and then longitudinally parallel to the main surfaces of the sheet material to provide free edges, the tongue of the first panel being inserted between these free edges to provide a joint. A clamp is provided by which the assembly can be secured to a supporting structure, the clamp engaging one of the flanges of the profiled edge member.

While such a construction is generally satisfactory, it does have a number of problems. Firstly, particularly if the sandwich panel arrangement is used for cladding the exterior of a building, and to a lesser extent on internal partioning, the result of wind on the outside of the structure can produce a suction effect. This puts the sheet metal which projects beyond the second panel edge and engages the exterior surfaces of the tongue under considerable loading, the sheet material not really having sufficient strength to support any substantial loading. Secondly there is a significant reduction in the insulating effect in the vicinity of the junction between two panels.

It is now proposed, according to the present invention, to provide a sandwich panel comprising an insulating material core sandwiched between first and second spaced sheets, at least one edge of the panel being closed by a connection profile in the form of an elongate channel member of constant cross section, said cross section including a web portion, having first and second flanges extending parallel to one another from opposite edges to define, with the web, a channel shape, said first and second sheets being bent around the free edges of said first and second flanges respectively, with the opposite face of the web abutting the insulating core, a third flange extending from said web parallel to and between said first and second flanges and spaced from said first flange by a distance sufficiently to accommodate in said space the clamping part of a support clamp and a tongue of an adjacent panel, the third flange being positioned to engage an outer face of said tongue, a fourth flange extending from said web parallel to and between said first and third flanges, said fourth flange being positioned and shaped to co-operate with and extend into a recess formed in the end of said tongue, so that a part of said tongue and the clamping portion of said support clamp are between the fourth flange and the first flange when the clamping portion of said clamp is engaged with the inner surface of said first flange to hole said panel.

With such a construction the provision of the third and fourth flanges greatly rigidifies the connection profile and enables the fourth flange to extend into a recess formed in the end of the tongue of the co-operating panel. This also allows the insulating core material to enter to immediately adjacent the end of the tongue. These provisions both increase the rigidity of the structure and improve the insulating effect. Furthermore, it enables one to use a sandwich panel construction which is very similar to that already available and is shown in GB-A-1072595 with very little modification. Thus the construction of the present invention allows one to use identical first and second sheets, one on each face of the panel, and it enables one to maintain the same thickness of panels and the same clamps while overcoming the problems previously mentioned.

Preferably the first, third and fourth flanges have a sufficient length to allow for adjustable telescoping interlocking with the tongue of an adjacent panel and/or to allow compressible sealing to be accommodated between the third and fourth flanges this again helping to rigidify the junction and improve the insulation effect.

In a most convenient construction, the fourth flange is positioned substantially centrally between the first and second flanges. It can therefore engage substantially centrally in the tongue of the adjacent panel so that this tongue is equally strong in either direction should a laterial load be put on the panels, for example, by the wind or some other external force.

Desirably the fourth flange is tapered towards its free end to facilitate insertion into the recess during construction of a panelling wall with the sandwich panels of the invention.

In order to ensure that the connection profile is firmly secured to the insulating core, to distribute the load and to rigidify the structure, at least one achoring portion is preferably provided to project from the face of the web portion opposite to face from which the flanges project, to be engaged by the insulating material, which is preferably a cellular material.

In order to make up a seried of panels, preferably the edge of the panel opposite to the one edge, which carried the connecting profile, may include a thinned down tongue configuration with a sheet extending along each of the opposite faces of the tongue configuration, the front edge of the tongue having an axially extending recess formed therein, to accommodate the fourth flange of an adjacent similar panel. It is also contemplated that any given panel could have two connection profiles on opposite edges to co-operate with a tongue on an adjacent panel which may itself be prov.ded with two tongues if this is appropriate. Normally the connection profiles will be provided on at least one side edge but it is also contemplated that they could be provided on the top and/or bottom edge when one is building a structure which has several panels one above the other.

The anchoring portion preferably comprises two L-section ribs extending parallel to one another and to the flanges and having a first arm extending away from the face of the web portion opposite to the face from which the flanges project, and a second arm angled to said first arm, said second arms extending towards one another. This enables a strip of rigid material to be inseeted between the arms of the anchoring portions to join two adjacent connection profiles end to end and also improve the anchoring of the correction profile to the insulating core.

Further to improve the seal between adjacent panels, the third flange may include a resilient sealing lip extending from adjacent the free end of the third flange, on the side thereof nearer said fourth flange, the free end of the sealing lip being spaced from the web. The third flange may be provided, on its side facing the fourth flange, with a recess in which said sealing lip can be accommodated and the face of the sealing lip facing the fourth flange may be ribbed.

Preferably the connection profile is extruded from a relatively hard plastics material and said sealing lip is simultaneously extruded from a relatively soft plastics material.

In order that the present invention may be more readily understood, the following description is given, merely by way of example, reference being made to the accompanying drawing, in which:-

Figure 1 is a cross section which shows a junction between two sandwich panesl according to one embodiment fo the invention;

Figure 2 is a section on the line A-A of Figure 1;

Figure 3 is an end view of the connection profile of the panel of Figure 1; and

Figure 4 is a view similar to Figure 3 of a modified connection profile.

Referring first to Figure 1 there is illustrated a first sandwich panel 10 and an adjacent second sandwich panel 11. The first panel 10 includes rear and front sheets 12, 13 of metal, eg aluminium, and which are preferably parallel. Between these is sandwiched an insulating material 14, which may for example be cellular foam polystyrene material, which can adhere firmly to the sheets 12,13. The insulating material is thinned down, on the right, to provide a tongue 15, and the sheets 12, 13 continue to cover this tongue at 16 and 17 respectively. The tongue is substantially centrally of the thickness of the panel 10.

The second panel 11 has rear and front sheets 18 and 19 respectively sandwiching therebetween further similar insulating material 20. The edge of the panel 11 is provided with a connection profile indicated by the general reference numeral 21, this being of a generally channel cross section having a web 22 and first and second flanges 23 and 24 extending generally parallel to one another and to the left, in Figure 1, of the web 22. The profile connection 21 is secured to the insulation by anchoring portions 25 and 26 which extend in the opposite direction from the web from the flanges 23 and 24. Free edge portions 27 and 28 of the front and rear sheets 19 and 18 are bent around the free edges of the first and second flanges 23 and 24. A third flange 29 extends from the web portion 22 parallel and between the first and second flanges 23 and 24. The flange is spaced from the first flange by a distance sufficiently to accommodate in the space the whole of the tongue portion 15 and the clamping part 30 of a support clamp 31 to be described further later. The third flange is then positioned to engage the outer face of the sheet 16 defining the outer face of the tongue 15.

A fourth flange 32 extends from the web 22 parallel to, and between, the first flange 23 and the third flange 29, the fourth flange 32 being positioned and shaped to co-operate with, and extend into a recess 33 formed in the end of the tongue 15, so that part of the tongue and the clamping portion of the support clamp are between the fourth flange 32 and the first flange 23 when the clamping portion 30 fo the clamp 31 is engaged with the inner surface of the first flange to hold the panel. The panel is in fact held by the clamp 31, which

includes a bolt 33 and a nut 34, to a support member 35 and is engaged and disengaged by turning the clamp 31 about the axid of the bot 33 so that the clamping portion 30 can engage and disengage the flange 23.

A compressible sealing element 36 is inserted between the third and fourth flanges 29 and 32.

If reference is made to Figure 3 it will be seen that the first flange 23, the second flange 24, the third flange 29 and the fourth flange 32 of the connection profile 21 are all substantially of the same length. The first and second profiles 23 and 24 are provided, on their inner face, with grooves 36 and 37 respectively, to receive the free ends of the inturned portions 27, 28. The inner surface of third flange 29 is serrated at 38 to improve engagement with the sheet 16 of the tongue 15 and the fourth flange 32 is tapered to facilitate insertion into the recess 33.

The dimensioning of the first, third and fourth flanges, particularly their length, is adequate to allow adjustable telescoping and interlocking with the tongue 15 of the adjacent panel and also allows the compressible sealing element 36 to be inserted and accommodated between the third and fourth flanges.

Figure 4 illustrates a similar embodiment to that Figure 3 and like parts have been indicated by like reference numerals with the addition of 100. It will be noted that the two major changes involve the addition to the third flange 129 of a sealing lip and a modification of the anchoring portions 125 an d126.

With regard to the third flange 129, this has attached to it a flexible sealing lip 140 which is formed of a relatively soft material such as a PVC having a Shore hardness of 75. Preferably this is extruded at the same time as the remainder is extruded for example from a rigid, high impact resistant PVC.

It will be seen that the outer face of the sealing lip 140, facing the fourth flange 132, is provided with ribs 141 and that the face of the third flange 129 facing the fourth flange 132 is provided with a recess 142 of a sufficient size to accommodate the sealing lip, at least partially.

It will be understood that this sealing lip provides a better seal against the tongue 15.

With regard to the anchoring portions 125, 126, these are both L-shaped having arms 125a, 126a, extending towards one another. The purpose of this is two-fold. Firstly it provides a better anchoring with the insulating material and secondly it enables one to insert a rigid element 150 adjacent the ends of two profiles so that the profiles can be held together in end to end relationship. Thus one can provide a stock of standard length profiles and these can be made up into longer profiles by use of this expedient.

Claims

1. A sandwich panel comprising an insulating material core sandwiched between first and second spaced sheets, at least one edge of the panel being closed by a connection profile in the form of an elongate channel member of constant cross section, said cross section including a web portion, having first and second flanges extending parallel to one another from opposite edges to define, with the web, a channel shape, said first and second sheets being bent around the free edges of said first and second flanges respectively, with the opposite face of the web abutting the insulating core, a third flange extending from said web parallel to and between said first and second flanges and spaced from said first flange by a distance sufficiently to accommodate in said space the clamping part of a support clamp and a tongue of an adjacent panel, the third flange being positioned to engage an outer face of said tongue, a fouth flange extending from said web parallel to and between said first and third flanges, said fourth flange being positioned and shaped to co-operate with and extend into a recess formed in the end of said tongue, so that a part of said tongue and the clamping portion of said support clamp are between the fourth flange and the first flange when the clamping portion of said clamp is engaged with the inner surface of said first flange to hold said panel.

2. A sandwich panel according to claim 1, wherein the first, third and fourth flanges have a sufficient length to allow adjustable telescoping interlocking with the tongue of an adjacent panel and/or to allow a compressible sealing element to be accommodated between the third and fourth flanges.

3. A sandwich panel according to claim 1 or 2, wherein said fourth flange is positioned substantially centrally between first and second flanges.

4. A sandwich panel according to claim 1, 2 or 3, wherein said fourth flange is tapered towards its free edge to facilitate insertion in said recess.

5. A sandwich panel according to any preceding claim, wherein at least one achoring portion projects from the face of said web portion opposite to said face from which the flange projects, to be engaged by said insulating core.

6. A sandwich panel according to claim 5, wherein said at least one anchoring portion comprises two L-section ribs extending parallel to one

another and to the flanges and having a first arm extending away from the face of the web portion opposite to the face from which the flanges project, and a second arm angled to said first arm, said second arms extending towards one another.

7. A sandwich panel according to any preceding claim, wherein the edge of said panel opposite said one edge includes a thinned down tongue configuration with the sheets extending along each of the opposite faces of the tongue configuration, the front edge of said tongue having a generally axially extending recess formed therein, to accommodate the fourth flange of an adjacent similar panel.

8. A sandwich panel according to any preceding claims, wherein the third flange further comprises a resilient sealing lip extending from adjacent the free end of the third flange, on the side thereof nearer said fourth flange, the free end of the sealing lip being spaced from the web.

9. A sandwich panel according to claim 8, wherein the third flange is provided, on its side facing the fourth flange, with a recess in which said sealing lip can be accommodated.

10. A sandwich panel according to claims 8 or 9, wherein the face of the sealing lip facing said fourth flange is ribbed.

11. A sandwich panel according to claims 8, 9 or 10, wherein said connection profile is extruded from a relatively hard plastics material and said sealing lip is simultaneously extruded from a relatively soft plastics material.

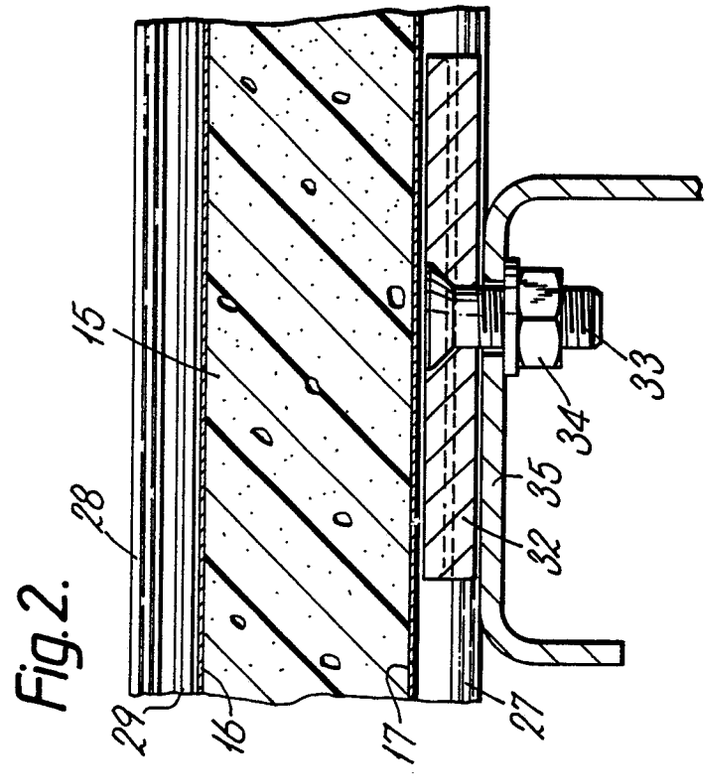

Fig.2.

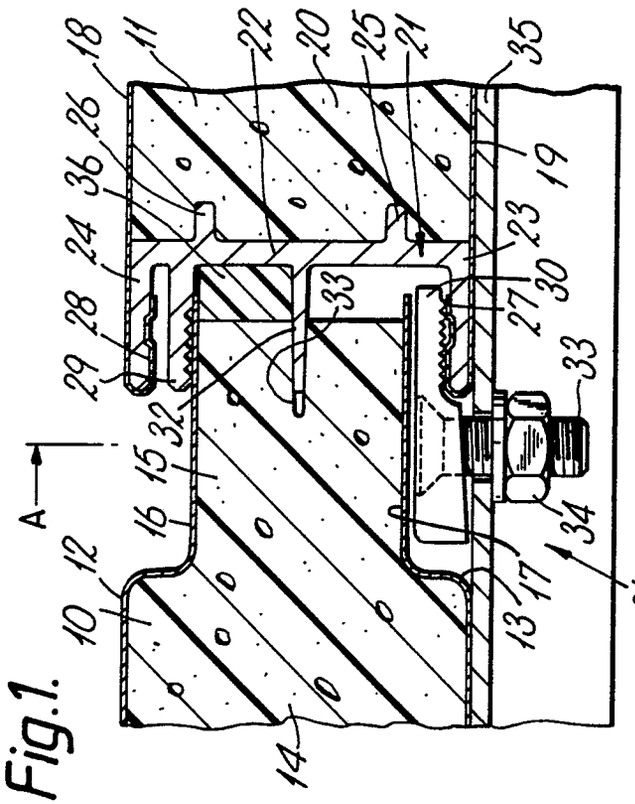

Fig.1.

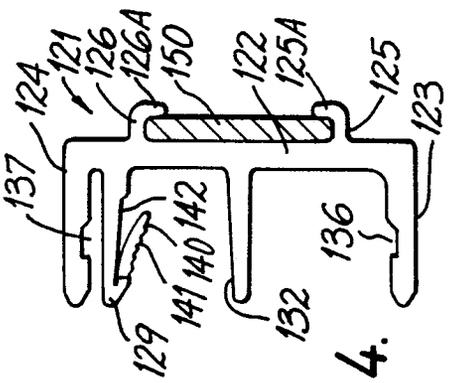

Fig.4.

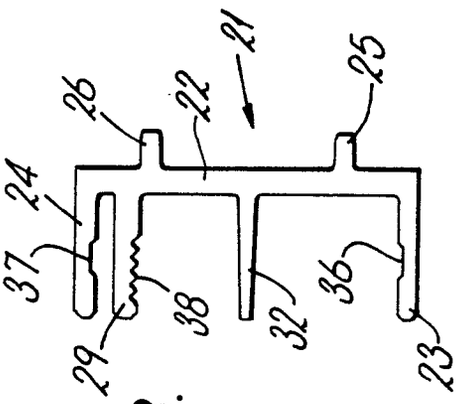

Fig.3.