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(71) Applicant (for all designated States except US): **ELECTROLUX HOME PRODUCTS PTY LIMITED** [AU/AU]; 163 O'Riordan Street, Mascot, New South Wales 2020 (AU).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **SANDERS, Philip** [GB/AU]; C/- Electrolux Home Products Pty Limited, 9 Edward Street, Orange, New South Wales 2800 (AU). **CHITRE, Rohit** [IN/AU]; c/- Electrolux Home Products Pty Limited, 9 Edward Street, Orange, New South Wales 2800 (AU). **ANWAR, Mohammed** [MM/AU]; c/- Electrolux Home Products Pty Limited, 9 Edward Street, Orange, New South Wales 2800 (AU).

(74) Agents: **BORG, Keith, Joseph** et al.; Halfords IP, 1 Market Street, Sydney, New South Wales 2000 (AU).

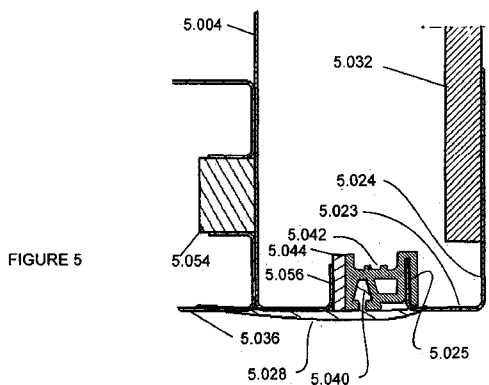
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(54) Title: AN INSULATED PANEL AND METHOD OF ASSEMBLY



(57) Abstract: An insulated panel including first and second walls (5.004, 5.024) spaced apart by a predetermined distance, each wall including an internal peripheral channel formed by first and second bends, the second bend forming an internal peripheral flange (5.025, 5.056), the panel including an intermediate joining member (5.042) adapted to connect to the internal peripheral flanges of the first and second walls. The connection to a first flange can be via a slot (5.046), and the connection to the second flange can be by adhesive (5.044).



An Insulated Panel and Method of Assembly

Field of the invention

[001] This invention relates to insulated panels and a method of assembling insulated panels.

[002] The invention is particularly suited for insulated panels for cold apparatus such as, for example, refrigerators, freezers, refrigerator and freezer combinations, wine coolers, wine cabinets, side by side, multi door and undercounter refrigerators etc.

Background of the invention

[003] The manufacture of cold appliance is commonly done close to the customers because of the bulky nature of the appliances, a large proportion of the volume being empty space. This increases the cost of transportation. The cabinet must be easily assembled to form a rigid structure with good thermal insulation characteristics, and to resist moisture migration, and must have an aesthetically attractive appearance. A further complication is that the cabinet must contain technical equipment for performing different functions. In particular, the cold appliance must have a refrigeration system and associated sensors and controls.

[004] Another problem associated with the manufacturing of cold appliances is that it involves high investment costs for the development of product lines and the like. Conventional manufacturing plants for cold appliances are usually inflexible, so that it is difficult to adapt the plant for manufacturing cold appliances with differing dimensions and variable component options in small series. Normally, new product designs require large production runs to be economically feasible. Thus the developers are discouraged from innovation, or variations in product design are very costly.

[005] It is desirable to provide a cold appliance which can be manufactured in segments amenable to transport and which can be assembled to form the cabinet at another location which does not need the complex and expansive manufacturing equipment of the primary manufacturing site. The segments should be easy to assemble and interconnect.

[006] The current method for making insulation panels uses continuous line assembly. However, this can be problematic where foamed-in brackets and reinforcements are required, as improper location of these elements can result in a high scrap rate. Further, it is difficult to incorporate vacuum insulation panels in a continuous line process. Plastic trim over open foam

edges needs adhesive to attach the trim. It is also difficult to incorporate roll forming of steel panels into a continuous line process.

[007] This invention seeks to ameliorate, at least in part, one or more of these problems.

Summary of the invention

[008] The present invention provides an insulated panel including first and second panel members spaced apart by a predetermined distance, each panel member including a periphery having a peripheral flange or edge, the panel including an intermediate joining member adapted to connect to the peripheral flanges or edges of the first and second panel members.

[009] The joining member can include an elongate profiled member extending at least part way along each side of the flanges of the first and second walls.

[010] The joining member can include at least one channel which will be inwardly directed so as to receive expandable foam.

[011] The joining member can also include at least one slot to engage at least one flange.

[012] The joining member can be attached to at least one of the flanges by adhesive.

[013] The adhesive can be in the form of a double sided foamed tape.

[014] A vacuum panel can be attached to the interior surface of at least one of the walls.

[015] The panel can include foamed-in brackets or reinforcing elements.

[016] The joining member can include a cavity accessible from the outside of the panel.

[017] The cavity can provide a conduit to receive elongated elements, said conduit running partially or totally along length of said panel.

[018] The joining member can have the cavity closed by means of a cap member.

[019] The peripheral flange or edge can be formed by a first bend, or a first and second bend.

[020] The cavity can serve as a conduit to conduct cables and or tubes from one location on said panel to another.

[021] The present invention also provides a method of forming an insulating panel as described above, including the step of roll-forming a bend and or extruding the join member.

- [022] The method can include the steps of engaging a joining member to a first panel wall, and attaching the joining member to the second panel wall.
- [023] The method can also include the step of filling the space between the panel walls with insulating foam.
- [024] The present invention further provides an elongate joining member adapted to join the edges of a pair of panel walls, the joining member including at least one slot or rebate adapted to engage an edge of at least one of the panel wall edges.
- [025] The joining member can be a profiled extrusion.
- [026] The joining member can include at least one slot adapted to engage an edge of at least one panel wall.
- [027] The joining member can include an attachment surface adapted to be attached to an edge of a wall panel by adhesive.
- [028] The joining member can include a trim attachment formation.
- [029] The trim attachment formation can be in the form of a snap fit section recess.
- [030] The joining member can include at least one inboard directed channel portion.
- [031] The joining member can include at least one outboard directed channel portion.
- [032] The outboard directed channel can be capped to form a covered conduit.
- [033] The present invention also provides an elongate joining member adapted to join the edges of a pair of panel walls, the joining member including at each end a corner formation to be received into a respective internal corner of said pair of panel walls, and having at least one slot or channel adapted to receive a sealing means or insulation foam.
- [034] The joining member can be a profiled extrusion.
- [035] The joining member can include at least two slots, each adapted to receive a sealing means.
- [036] The corner formation can include an attachment or rebate surface adapted to be attached to a panel wall by adhesive.
- [037] The joining member can include inboard directed projections or channels to allow greater contact for the foaming in of said joining member.
- [038] The sealing means can be in the form of a gasket or tape.

- [039] The sealing means can be adhered to said slot and projects proud of the outboard periphery of said slot.
- [040] The joining member can include a slot or channel which can act as a conduit to conduct cables and or tubes from one location to another.
- [041] The present invention further provides an insulated panel including first and second panels spaced apart by a predetermined distance, each panel including an angled periphery formed by a bend, the bend forming an internal corner, the panel including an intermediate joining member adapted to connect to the internal corners of the first and second walls.
- [042] The joining member can include an elongate profiled member extending at least part way along each side of the periphery of the first and second walls.
- [043] The joining member can include at least one slot or at least one inboard extending projection.
- [044] The joining member can be attached to one of the first and second walls by adhesive.
- [045] The adhesive can be in the form of a double sided foamed tape.
- [046] One or more vacuum panels can be attached to the interior surface of at least one of the walls.
- [047] The panel can include foamed-in brackets or reinforcing elements.
- [048] The present invention further provides a method of forming an insulating panel as described above, including the step of roll-forming one or two bends at or near to the periphery of the first and second walls.
- [049] The method can include the step of engaging a joining member to a first panel wall, and attaching the joining member to the second panel wall.
- [050] The method can include the step of filling the space between the panel or walls with insulating foam.
- [051] The present invention also provides a cabinet or appliance assembled from a panel as described above, or manufactured by the method described above, or which utilises a joining member as described above.

[052] The present invention further provides a joining member, an insulation panel, a cabinet or appliance assembled with these, and a method of manufacturing an insulation panel, being substantially as herein described with reference to the accompanying drawings.

Brief description of the drawings

[053] An embodiment or embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

[054] Figure 1 is an illustration of a first panel adapted for use in an embodiment of the invention

[055] Figure 2 is an illustration of a second panel adapted for use with the panel of Figure 1.

[056] Figure 3 is a partial section illustration of an assembly of a pair of panels.

[057] Figure 4 is an illustration of a top edge cap.

[058] Figure 5 shows detail of an edge of a panel assembly of Figure 3.

[059] Figure 6 illustrates a section of an alternative joining extrusion.

[060] Figure 7 illustrates a section of an alternative joining extrusion.

[061] Figure 8 shows a partially exploded view of a panel assembly including foamed-in brackets.

[062] Figure 9 shows a partial cross section of an alternative panel assembly, and panel join.

[063] Figure 10 shows a cross section through three panels joined to form a cabinet.

[064] Figure 11 illustrates a perspective view of a metal panel to be used in the panel assembly of Figure 9.

[065] Figure 12 illustrates an exploded perspective view of the upper left hand corner of the panel of Figure 11.

[066] Figure 13 illustrates an exploded perspective view of the upper right hand corner of the panel of Figure 11.

[067] Figure 14 illustrates a perspective view of a corner of an assembled panel made by the method of figures 9 to 13.

[068] Figure 15 illustrates a cross-section view of an alternative panel assembly mechanism and panel joining method and interaction with a door panel.

[069] Figure 16 illustrates a detailed cross sectional view of the end section and trim member to complete the front edge of eth panel of figure 15.

[070] The numbering convention used in the drawings is that the digits in front of the full stop indicate the drawing number, and the digits after the full stop are the element reference numbers. Where possible, the same element reference number is used in different drawings to indicate corresponding elements.

[071] It is understood that the drawings are intended to be illustrative rather than exact reproductions, and are not necessarily drawn to scale. The orientation of the drawings is chosen to illustrate the features of the objects shown, and does not necessarily represent the orientation of the objects in use.

Detailed description of the embodiment or embodiments

[072] Figure 1 illustrates an internal wall arrangement 1.002 including a major wall panel 1.004, the edges of which have been folded to form a shallow open box with a peripheral channel with attachment flanges 1.006, 1.008, 1.010, 1.012. The corners of the flanges can be mitred as shown, for example, at 1.014.

[073] A second wall arrangement 2.022 is illustrated in Figure 2 for assembly with the panel wall 1.002 of Figure 1. The wall arrangement 2.022 can be a mirror image of the rear wall arrangement 1.002 of Figure 1. Because the walls are symmetric, the wall arrangements 1.002, 2.022 can be identical, to reduce inventory. The panels are assembled with the peripheral channels facing each other. As discussed below, a joining member is used to connect the channel of the two panels. The walls can be roll formed and transported as a flat-pack.

[074] Figure 3 illustrates a section of a panel assembly including a panel 3.030 formed by the front wall 3.024 and rear wall 3.004 such as those of Figures 2 and 1 with additional panel assembly elements. The front panel 3.024 has a vacuum panel 3.032 attached to its inner surface, for example, by adhesive, or by other suitable means such as welding etc. A trim cap 3.038 is attached to the top edge of the panel assembly. Joining members connect the flanges of the channels as is described in more detail below.

[075] Figure 4 is a section view of a top cap member 4.038 which is adapted to connect with the snap fit slot of the joining member via a number of snap fit spigots 4.040. This can extend along the length of the panel. As would be understood by a person skilled in the art, the

snap fit elements can be interchanged in an alternative embodiment. The cap can include a pair of legs adapted to extend down the exterior face of the walls 3.004, 3.024.

[076] The rear wall panel 3.004 and the front panel wall 3.024 are connected by a joining member 5.024 better illustrated in the partial view of 3.034 shown enlarged in Figure 5. The front wall includes an internal peripheral channel formed by the inward bent segment 5.023 and the transverse bent segment or flange 5.025. The rear wall assembly includes a similar mirror image peripheral channel.

[077] The joining member 5.024 can be an elongate member, and can be formed by extrusion. It includes a first slot such as 6.046 in Figure 6 into which the upturned channel wall 5.025 is engaged, preferably in an interference fit. The open end of the slot 6.046 can be tapered to facilitate engagement of the channel wall 5.025 with the slot. The other side of the joining member is a substantially flat surface which is attached to the inner wall of the flange of the rear wall channel by adhesive. In this embodiment, double sided foam tape 5.044 is used.

[078] The foam tape 5.044 can assist insertion of a snap fit spigot of a trim attachment when the spigot is inserted into the snap fit section slot 6.050 as the foam tape will permit deflection of the side of the snap fit slot. The foam tape 5.044 also allows compression or expansion when the assembly is foam filled, with, for example, polyurethane foam.

[079] A second panel 5.036 is shown as a butt attachment to the panel 5.030. The panel 5.036 can be attached to the panel wall 5.004 by adhesive applied to the abutting surfaces of the two panels.

[080] An overcrowned mushroom headed trim piece 5.028 is attached to the edge of the panel assembly by the snap-fit spigots such as 5.040.

[081] The panel also 5.036 includes a gap similar to the gap between the wall panels 5.004, 5.024 extending along its butting edge in which foam tape 5.054 is inserted. The foam tape 5.054 can absorb tolerances in the assembly and foaming processes and provide a thermal break.

[082] The extrusion can be attached along all four sides of the channel. The corners of the extrusions can be mitred for neat appearance and effective sealing.

[083] The space between the front and back walls can be filled with insulating foam.

[084] The panel walls can be stainless steel, a plastics material or other suitable material.

[085] Figure 6 illustrates an alternative joining member having a second slot 6.048 for attachment to the channel wall 5.056 of the rear panel. However, with a complete peripheral channel arrangement with mitred corners, such an arrangement cannot be readily utilized because the joining member must be connected to the internal flanges.

[086] Figure 7 illustrates a modified version of the joining member of Figure 6 which includes a chamfered surface to facilitate engagement with the rear channel wall. The joining member is attached to the flanges of a first panel wall channel using the slots 7.046. The inclined surface 7.052 serves to deflect the flanges of the peripheral channels so they can snap into the slots 7.048 of the second panel wall when the assembled first panel wall and joining members are pressed against the flanges of the second panel wall. To allow for the additional rigidity of the flanges at the mitred corners, the inner slot 7.048 and inclined surface 7.052 can be terminated short of the corners.

[087] Figure 8 shows a partially exploded view of a panel assembly including foamed-in brackets 8.060, 8.062. The bracket 8.060 can be, for example, a hinge support bracket to which a hinge can be attached. The bracket 8.062 can be a support bracket by which the refrigeration apparatus can be attached to a wall or adjacent cabinets, etc. The brackets can be installed in the panel wall 8.024 by adhesive, double sided tape, masking tape or other suitable means before the second wall 8.004 is attached to the foam tape 8.044. The second wall panel 8.004 has a cut-out 8.020 adapted to accommodate the bracket 8.060 when the walls are assembled. The adhesive foam tape 8.044 and the joining member 8.042 can also have cut-outs adapted to accommodate the bracket 8.060. The bracket 8.062 does not require any cut-outs as it is seated on the wall 8.024 and is within the channel flange 8.056. The other flange 8.025 is not visible because of joining member 8.042.

[088] When the foam insulation is injected, it will hold the brackets in place and also serve as an adhesive to keep the panels and other elements of the panel assembly in place.

[089] Illustrated in Figures 9 to 13 is an alternative joining member 9.042, which is an extruded plastic or polymeric member, having three inboard channel or slot portions 9.0421, 9.0422 and 9.0423, and two outboard channel or slot portions 9.0424 and 9.0245. The outboard faces of the two sides of the channels 9.0421 and 9.0423 form an external ninety degree corner, which can be mated to an internal corner of the walls 9.004 and 9.024, with one or both of the outboard faces being used to adhere the joining member 9.042 to the walls 0.004 and 9.024. In the illustration of Figure 9, only the outboard face of the left side wall of channel 9.0421, and the

outboard face of the right side wall of channel 9.0423 are used to mount double sided tape 9.044 to adhere the walls 9.004 and 9.024 into an assembly.

[090] The external channels 9.0424 and 9.0425 each can receive a gasket or foam tape 9.054 such as an EPDM foam tape which is adhered into the channels or slots, and projects proud of the outboard extremity or periphery of the member 9.042, in an outboard direction. As seen at the right hand side of Figure 9, where the a second assembled panel 9.036B is joined to the wall 9.024 of assembled panel 9.036A, the tape 9.054 compresses and changes shape, to provide a seal. When this join is made the external surfaces of the bent segments 9.023 of the panel 9.036B are adhered by means of a polyurethane based adhesive.

[091] The joining member 9.042 is preferably used all around the edges of an assembled panel, with mitred joins between abutting joining members 9.042, so as to produce a mitred external corner as represented in Figure 14.

[092] The panel 9.036A and 9.036B are different to each other in that the panel 9.036A has a thermal break 9.09 in the wall 9.024, which as better seen in figures 11, 12 and 13, is a longitudinal slot cut through the wall 9.024. This slot assist in ensuring heat is not transferred into or out of the assembled panels because conduction through the metal of the wall 9.024. Before the interior of the panel 9.036A is filled with foam, the thermal break 9.09 is sealed by tape to prevent foam escaping, and this will result, once foamed-in in a foam exterior surface represented by broken line 9.091, against which the tape 9.054 in the panel 9.036B can also make contact with.

[093] With respect to assisting with the foaming-in of the joining member 9.042 into the assembled panel 9.036A or 9.036B, the member 9.042 includes inwardly directed projections 9.0426 and 9.0427 respectively extending from the inboard sides of the bases of channel 9.0424 and 9.0425. These projections provide greater surface area of contact for the expanding foam to adhere to as it sets.

[094] Illustrated in figure 10, is a representation of the joining of three panels 10.036A, 10.036B and 10.036C, joined together by means of the joining system described with respect to figure 9. Figure 10 is a plan view section of the three walls of a cabinet. It will be noted that the rear of the cabinet has foam tape 10.054 present and exposed, however if desired the tape 10.054 can be removed or the panels 10.036A and 10.036C assembled so that the external faces of the joining members do not include such foam tape.

[095] Illustrated in Figures 11 to 13 is the wall panel 11.024, 12.024 and 13.024. The whole wall panel 11.024 is shown in figure 11, and it can be seen that on the left hand side of the

panel 11.024 is the left hand side thermal break 11.09 which is slot or rectangular elongated opening down the whole length of the wall 11.024. The upper corner of panel is seen in figure 12, which further illustrates that the upper edge bent segment 12.023 extends past the corner 12.0233 in a downward direction to meet up with the side edge bent segment 12.023. A join line 12.0231 is provided which is first angled at 12.0234 to the vertical and then terminates at the rear edge with a horizontal segment 12.0235. By providing a join line which is first inclined to the vertical and then horizontal, this provides a relatively safe edge to work with, and by virtue of the foam on the inside surface of the bent segments 12.023 to adhere the joining member 9.042 thereto, a strong corner join is produced which provides a better finish.

[096] Illustrated in figure 15 is an alternative panel assembly mechanism and panel joining method which is also illustrated having the front edge interacting with a door panel. This assembly mechanism is similar to that of previous figures and like parts have been like numbered.

[097] In figure 15 the side panel 15.036A is joined to a rear panel 15.036, which will be described in more detail later. While front edge of the panel 15.036A has a join member 15.142, which can be described as having channel construction with side walls 15.1421 and 15.1422 extending generally perpendicularly from the central portion 15.1423. The side wall 15.1422 is longer in extension than the wall 15.1421 so that it can extend across the thermal break gap 15.09 in the region where they overlap. The join member 15.142 also includes shorter intermediate walls 15.1424 and 15.1425, which assist the join member 15.142 in being foamed into the panel and to keep the join member secured to the panel when the foam has set.

[098] It will be noted that the outboard face of the join member 15.142 includes rebated edge surfaces 15.1426 and 15.1427, which allows the bent segments 15.023 to sit therein. By this means the outer surfaces of segments 15.023 and the relatively protruding surface 15.1428 form a generally straight or planar end onto which can be attached a finishing member or break piece 15.144. The break piece 15.144 is attached to the extrusion or join member 15.142 by gluing or any appropriate joining means. A trim piece 15.146 is attached to the break piece 15.144. The trim piece 15.146 can be of a magnetisable material for producing sealing force with the seal 15.148 which has a magnet 15.1481 which is mounted a door extrusion 15.150.

[099] The break piece 15.144 includes a series of clips or an extruded or elongated clip structure such as 15.1441 adapted to receive a heat transfer fluid ducting, conduit or tubing, which is not illustrated. The clips hold the heat transfer fluid ducting, conduit or tubing in

proximity to the trim member 15.146 so heat from the ducting, conduit or tubing can heat the trim member 15.146 in the region where condensation may otherwise form.

[0100] From figure 15 and 16, it can be seen that the trim member 15.146 has a curled formation on its inboard edge 15.1461, and on its outboard edge 15.1462 it has a two bends to form a generally J-shaped edge. The break piece 15.144 includes an inboard hook 15.1442 and an outboard hook 15.1443, so that the trim 15.146 can be first engaged with hook 15.1443 by edge 15.1462 and then the trim rotated so that the edge 15.1461 can push past the hook 15.1442 and then be caught and held in place by the hook 15.1442.

[0101] At the rear end of side panel 15.036A, the rear edge of the panel 15.036A is formed from a join member 15.042, which is shaped to receive a complementarily shaped capping member 15.028. The members 15.042 and 15.028 together create a duct or conduit 15.0281, into which heat transfer fluid tubes, water tubes, electrical and signal cables or wires or harnesses can be located and run. If desired the formation 15.0282 which forms the other half of cylindrically shaped conduit 15.0281 can be absent, thus providing an even bigger conduit cavity, if required.

[0102] The cap 15.028 includes two inwardly directed projections 15.0283 having locking members 15.0284 to engage complementarily shaped recesses on the join member 15.042.

[0103] It will be noted from figure 15 that the cap 15.028 overlaps the external join line between the panels 15.036A and 15.036B, to thereby hide the join line. The join between the panels 15.036A and 15.036B is similar to that illustrated in figure 9, except that the panel 15.036B does not include a join member between the inboard and outboard panels, but still includes a thermal break 15.09, as does the panel 15.036A which includes a side located thermal break 15.09. The two panels can be joined together by gluing or otherwise adhering the metal surfaces which make contact with each other.

[0104] The join member 15.042 includes rebated edges, in a similar manner to the join member 15.142, so as to receive the bent edges of the panels 15.004 and 15.024.

[0105] The join member 15.042 is preferably used on the rear edge and upper edges of the side panels 15.036A, while it is preferred that the join member 15.142 is used on the lower and front edges of the side panels 15.036. However, which join member is to some extent dependent on the need to utilise the conduit 15.0281.

[0106] It will be readily understood that the extrusion from which cap member 15.028 is manufactured will be usable on both the left and right rear side panels to cover the join line between the panels 15.036A and 15.036B, as it simply requires an orientation adjustment. This observation applies to the trim member 15.146, the break piece 15.144 and join member 15.142, which each have an element of right or left handedness, but this is readily resolved by rotation before use for the other side.

[0107] In this specification, reference to a document, disclosure, or other publication or use is not an admission that the document, disclosure, publication or use forms part of the common general knowledge of the skilled worker in the field of this invention at the priority date of this specification, unless otherwise stated.

[0108] In this specification, terms indicating orientation or direction, such as “up”, “down”, “vertical”, “horizontal”, “left”, “right”, “upright”, “transverse” etc. are not intended to be absolute terms unless the context requires or indicates otherwise. These terms will normally refer to orientations shown in the drawings.

[0109] Where ever it is used, the word “comprising” is to be understood in its “open” sense, that is, in the sense of “including”, and thus not limited to its “closed” sense, that is the sense of “consisting only of”. A corresponding meaning is to be attributed to the corresponding words “comprise”, “comprised” and “comprises” where they appear.

[0110] It will be understood that the invention disclosed and defined herein extends to all alternative combinations of two or more of the individual features mentioned or evident from the text. All of these different combinations constitute various alternative aspects of the invention.

[0111] While particular embodiments of this invention have been described, it will be evident to those skilled in the art that the present invention may be embodied in other specific forms without departing from the essential characteristics thereof. The present embodiments and examples are therefore to be considered in all respects as illustrative and not restrictive, and all modifications which would be obvious to those skilled in the art are therefore intended to be embraced therein.

Claims

1. An insulated panel including first and second panel members spaced apart by a predetermined distance, each panel member including a periphery having a peripheral flange or edge, the panel including an intermediate joining member adapted to connect to the peripheral flanges or edges of the first and second panel members.
2. An insulated panel as claimed in claim 1, wherein the joining member includes an elongate profiled member extending at least part way along each side of the flanges of the first and second walls.
3. A panel as claimed in claim 1 or claim 2, wherein the joining member includes at least one channel which will be inwardly directed so as to receive expandable foam.
4. A panel as claimed in any one of claims 1 to 3, wherein the joining member also includes at least one slot to engage at least one flange.
5. A panel as claimed in any one of claims 1 to 4, wherein the joining member is attached to at least one of the flanges by adhesive.
6. A panel as claimed in claim 5, wherein the adhesive is in the form of a double sided foamed tape.
7. A panel as claimed in any one of claims 1 to 6, including a vacuum panel attached to the interior surface of at least one of the walls.
8. A panel as claimed in any one of claims 1 to 7, including foamed-in brackets or reinforcing elements.
9. A panel as claimed in any one of claims 1 to 8, wherein said joining member includes a cavity accessible from the outside of the panel.
10. A panel as claimed in claim 9, wherein said cavity provides a conduit to receive elongated elements, said conduit running partially or totally along length of said panel.
11. A panel as claimed in any one of claims 9 or 10, wherein said joining member has said cavity closed by means of a cap member.
12. A panel as claimed in any one of claims 1 to 11, wherein said peripheral flange or edge is formed by a first bend, or a first and second bend.
13. A panel as claimed in any one of claims 9 to 11, wherein said cavity can serve as a conduit to conduct cables and or tubes from one location on said panel to another.
14. A method of forming an insulating panel as claimed in any one of claims 1 to 13, including the step of roll-forming a bend and or extruding the join member.
15. A method as claimed in claim 14, including the steps of engaging a joining member to a first panel wall, and attaching the joining member to the second panel wall.

16. A method as claimed in claim 14 or 15, including the step of filling the space between the panel walls with insulating foam.
17. An elongate joining member adapted to join the edges of a pair of panel walls, the joining member including at least one slot or rebate adapted to engage an edge of at least one of the panel wall edges.
18. A joining member as claimed in claim 17, wherein the joining member is a profiled extrusion.
19. A joining member as claimed in claim 17 or claim 18, including at least one slot adapted to engage an edge of at least one panel wall.
20. A joining member as claimed in any one of claims 17 to 19, including an attachment surface adapted to be attached to an edge of a wall panel by adhesive.
21. A joining member as claimed in any one of claims 17 to 20, including a trim attachment formation.
22. A joining member as claimed in claim 21, wherein the trim attachment formation is in the form of a snap fit section recess.
23. A joining member as claimed in any one of claims 17 to 22, wherein said member includes at least one inboard directed channel portion.
24. A joining member as claimed in any one of claims 17 to 13, wherein said member includes at least one outboard directed channel portion.
25. A joining member as claimed in claim 24, wherein said outboard directed channel can be capped to form a covered conduit.
26. An elongate joining member adapted to join the edges of a pair of panel walls, the joining member including at each end a corner formation to be received into a respective internal corner of said pair of panel walls, and having at least one slot or channel adapted to receive a sealing means or insulation foam.
27. A joining member as claimed in claim 26, wherein the joining member is a profiled extrusion.
28. A joining member as claimed in claim 26 or claim 27, including at least two slots, each adapted to receive a sealing means.
29. A joining member as claimed in any one of claims 26 to 28, wherein said corner formation include an attachment or rebate surface adapted to be attached to a panel wall by adhesive.

30. A joining member as claimed in any one of claims 26 to 29, wherein said joining member includes inboard directed projections or channels to allow greater contact for the foaming in of said joining member.
31. A joining member as claimed in any one of claims 26 to 30, wherein said sealing means is in the form of a gasket or tape.
32. A joining member as claimed in claim 31, wherein said sealing means is adhered to said slot and projects proud of the outboard periphery of said slot.
33. A joining member as claimed in any one of claims 26 to 32, wherein said joining member includes a slot or channel which can act as a conduit to conduct cables and or tubes from one location to another.
34. An insulated panel including first and second panels spaced apart by a predetermined distance, each panel including an angled periphery formed by a bend, the bend forming an internal corner, the panel including an intermediate joining member adapted to connect to the internal corners of the first and second walls.
35. An insulated panel as claimed in claim 34, wherein the joining member includes an elongate profiled member extending at least part way along each side of the periphery of the first and second walls.
36. A panel as claimed in claim 34 or claim 35, wherein the joining member includes at least one slot or at least one inboard extending projection.
37. A panel as claimed in any one of claims 34 to 36, wherein the joining member is attached to one of the first and second walls by adhesive.
38. A panel as claimed in claim 37, wherein the adhesive is in the form of a double sided foamed tape.
39. A panel as claimed in any one of claims 34 to 38, including a vacuum panel attached to the interior surface of at least one of the walls.
40. A panel as claimed in any one of claims 34 to 39, wherein there is included foamed-in brackets or reinforcing elements.
41. A method of forming an insulating panel as claimed in any one of claims 31 to 37, including the step of roll-forming one or two bends at the periphery of the first and second walls.
42. A method as claimed in claim 41, including the steps of engaging a joining member to a first panel wall, and attaching the joining member to the second panel wall.
43. A method as claimed in any one of claims 41 or 42, including the step of filling the space between the panel or walls with insulating foam.

44. A cabinet or appliance assembled from a panel as claimed in any one of claims 1 to 13 or 34 to 40, or manufactured by the method of any one of claims 14 to 16 or 41 to 43, or which utilises a joining member as claimed in any one of claims 17 to 33.
45. A joining member substantially as herein described with reference to the accompanying drawings.
46. An insulation panel substantially as herein described with reference to the accompanying drawings.
47. A method of manufacturing an insulation panel substantially as herein described with reference to the accompanying drawings.

FIGURE 1

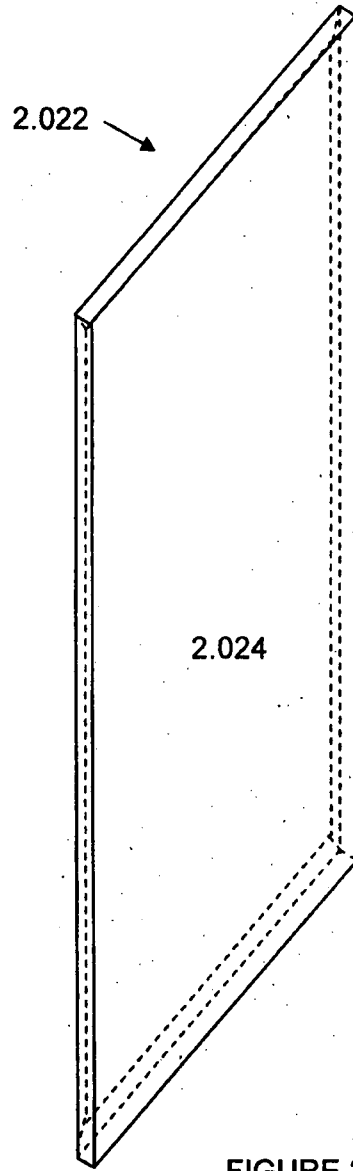
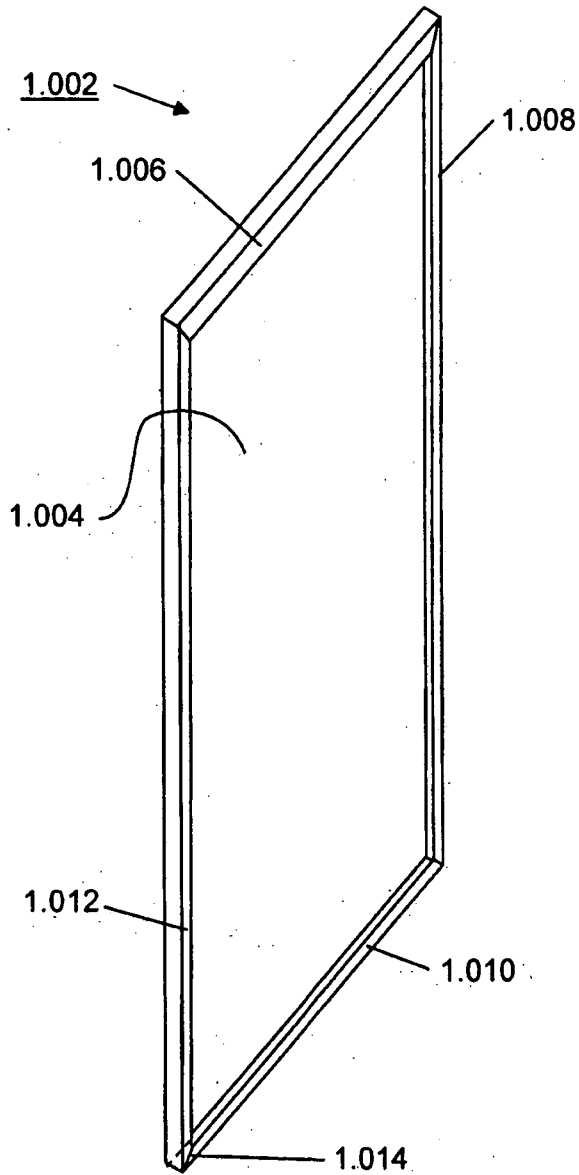


FIGURE 2

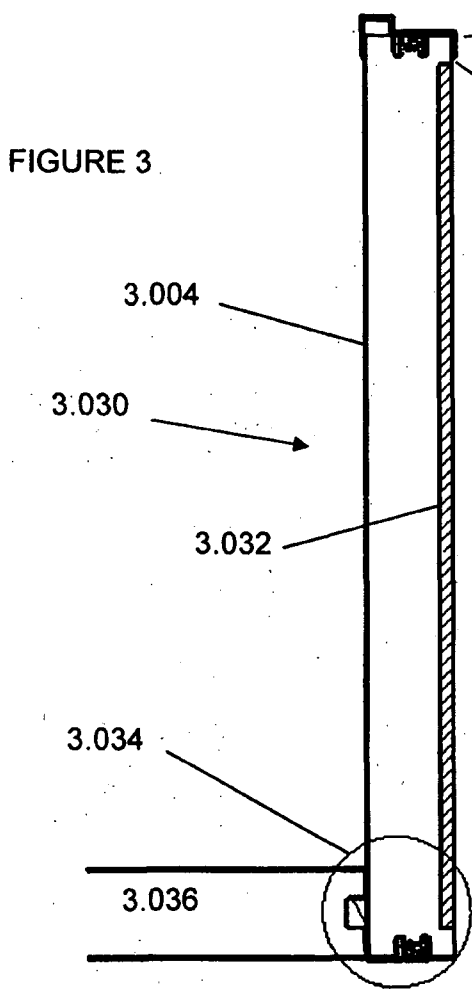


FIGURE 3

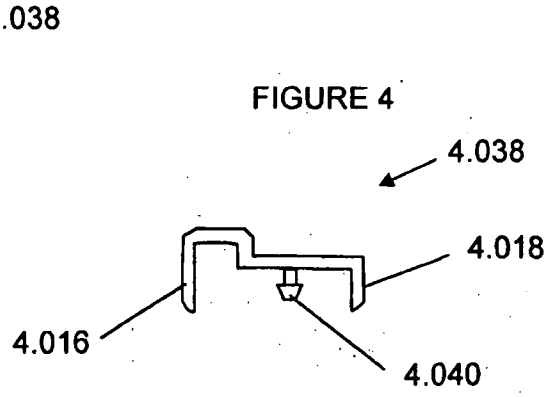


FIGURE 4

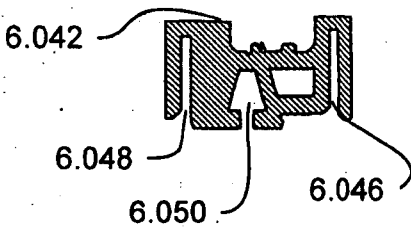


FIGURE 6

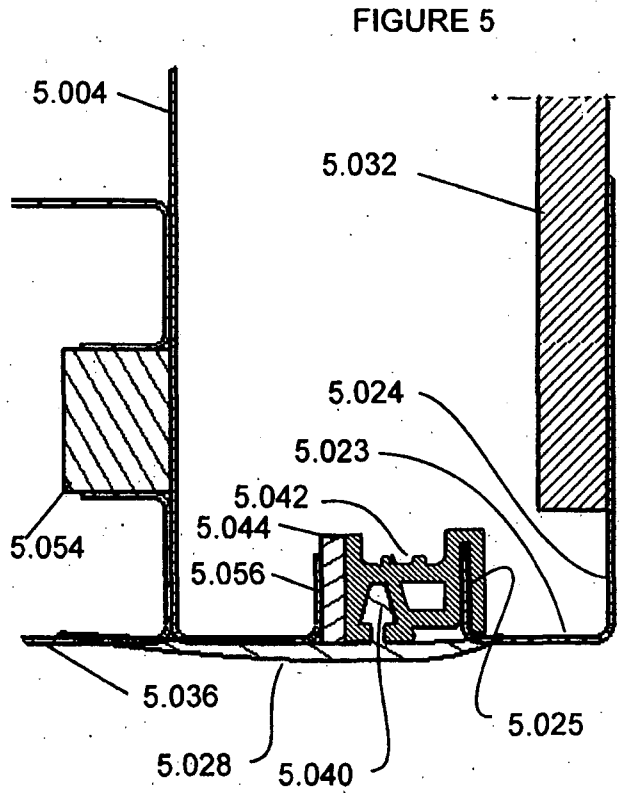


FIGURE 5

FIGURE 7

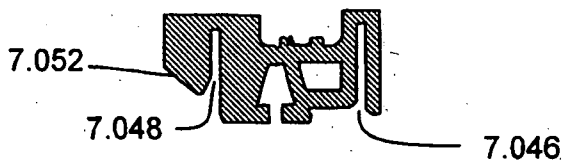
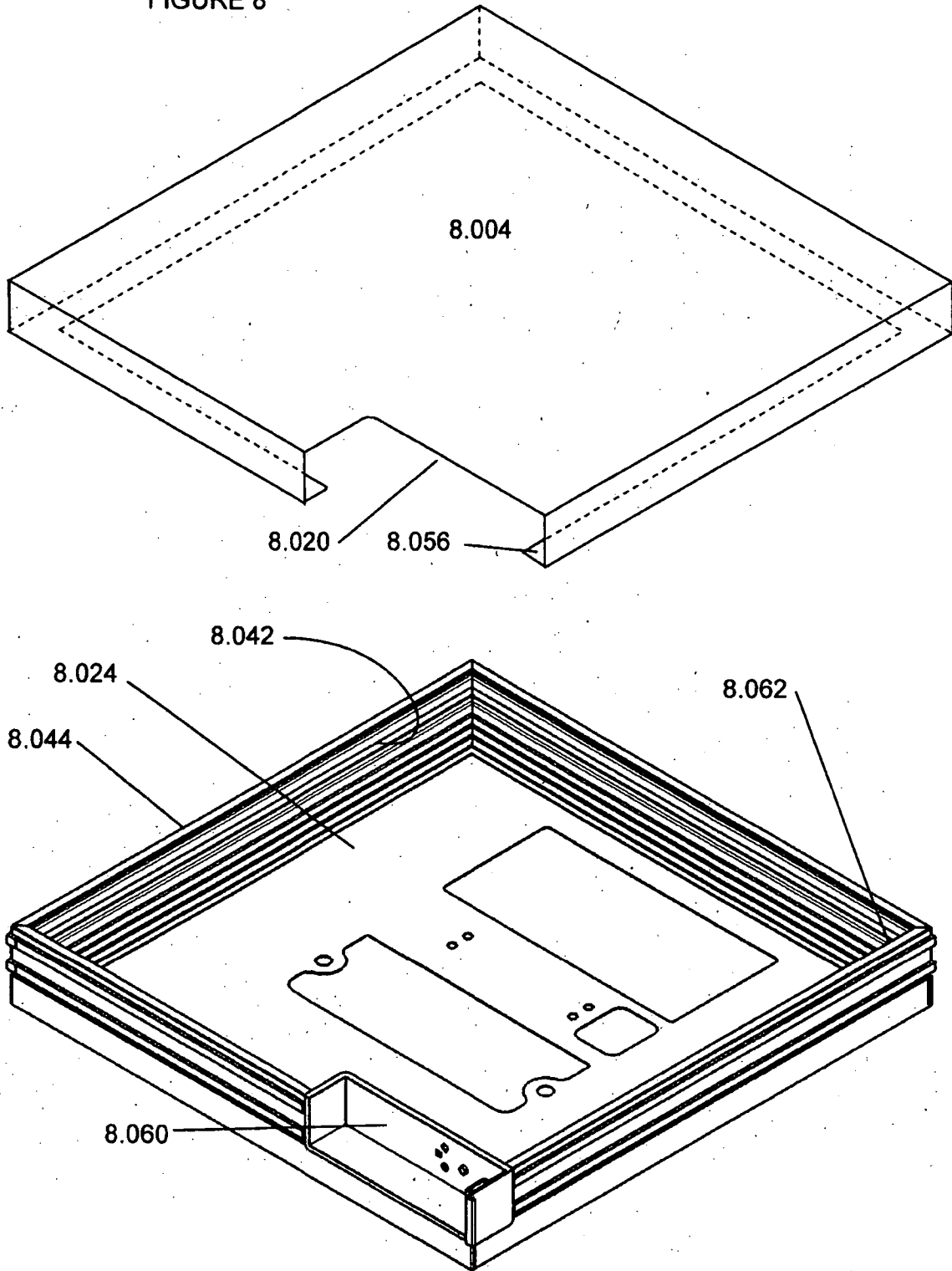


FIGURE 8



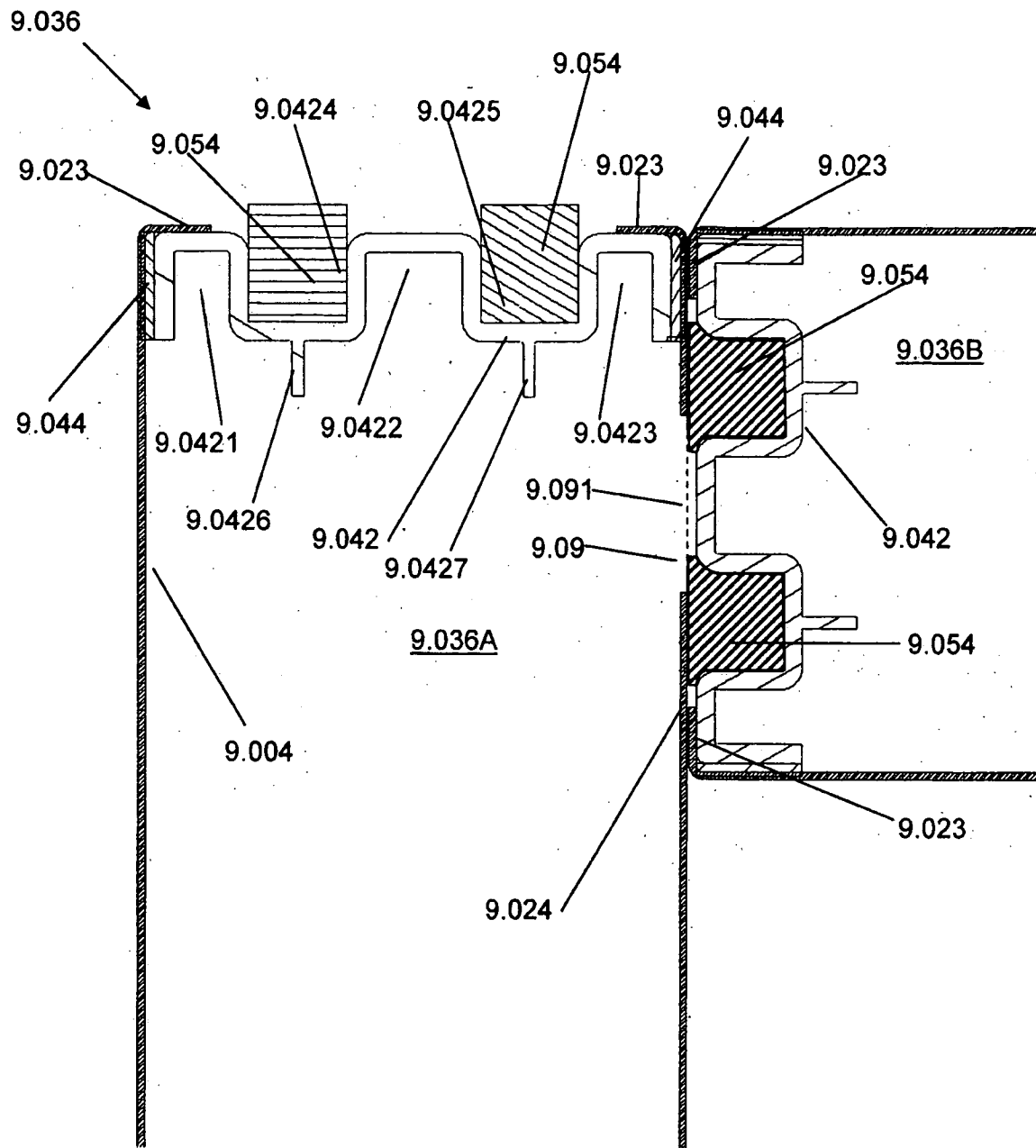


FIGURE 9

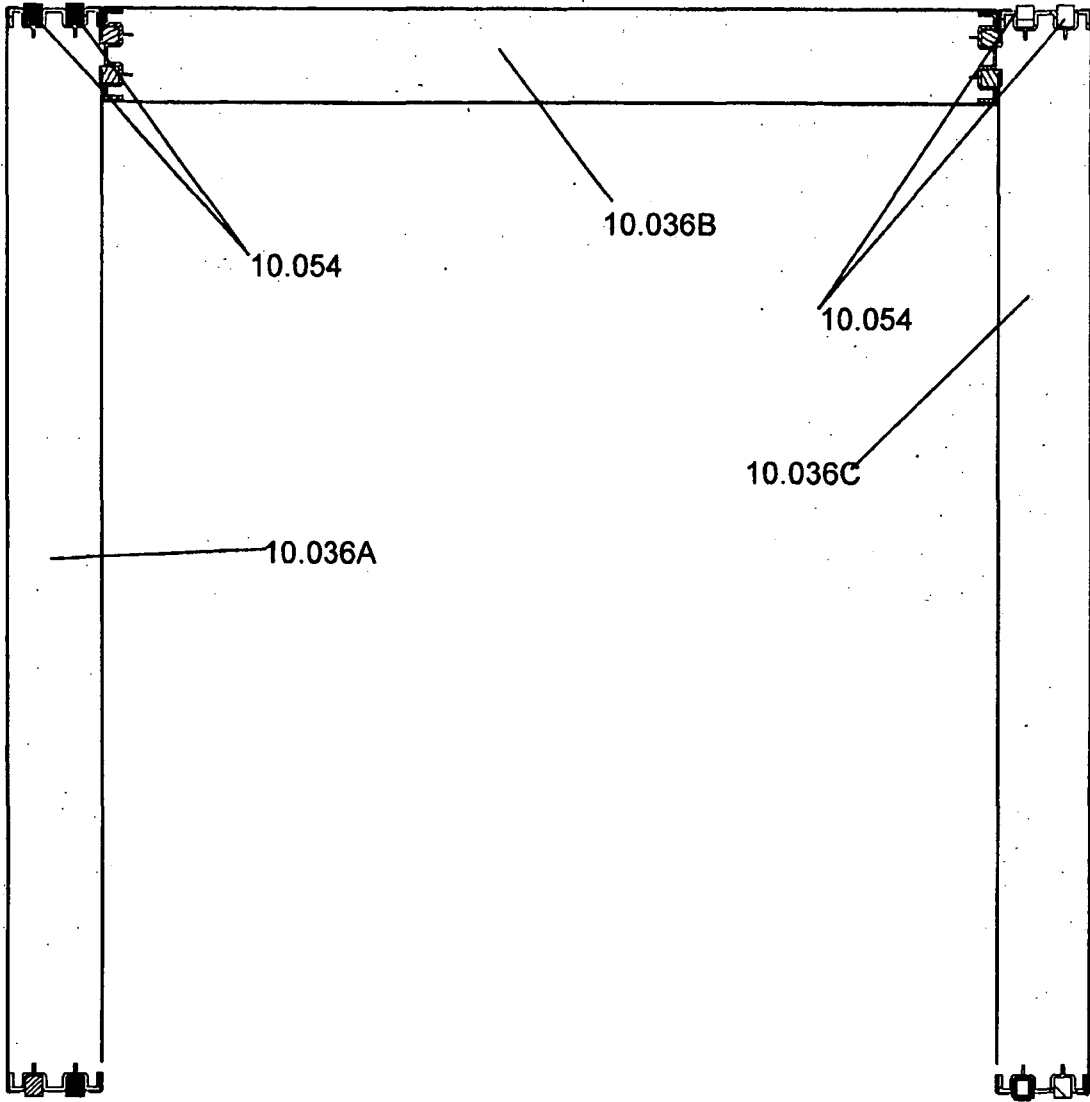


FIGURE 10

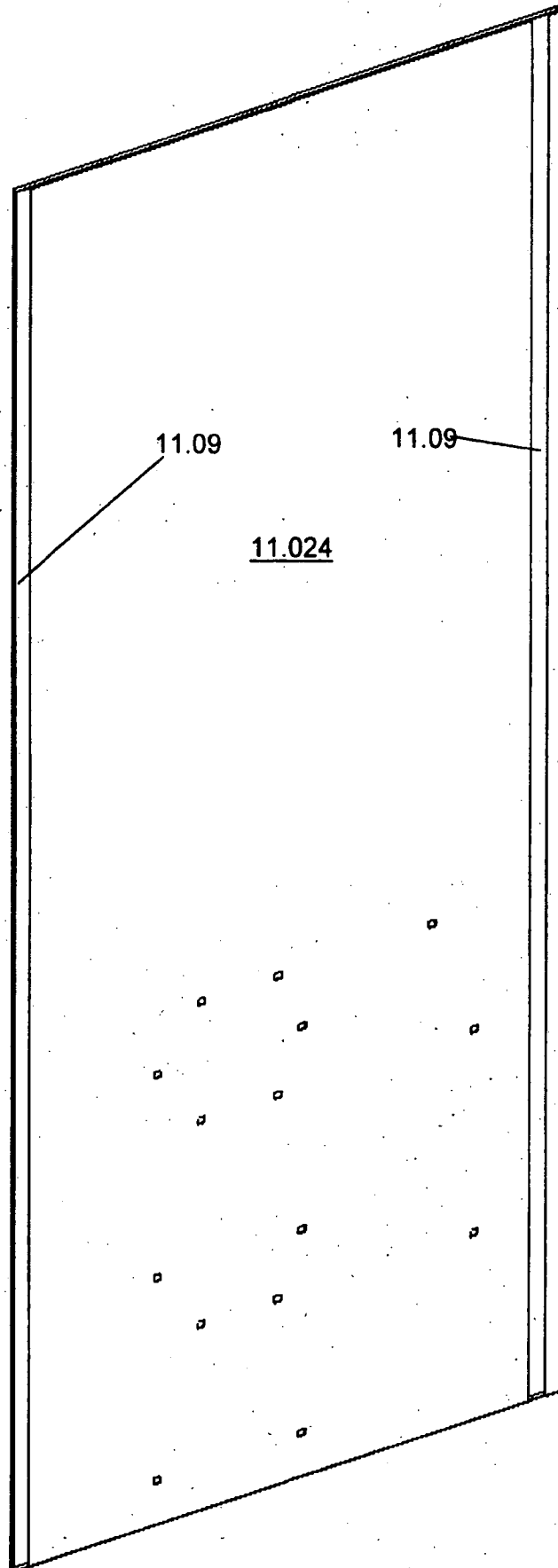


FIGURE 11

FIGURE 12

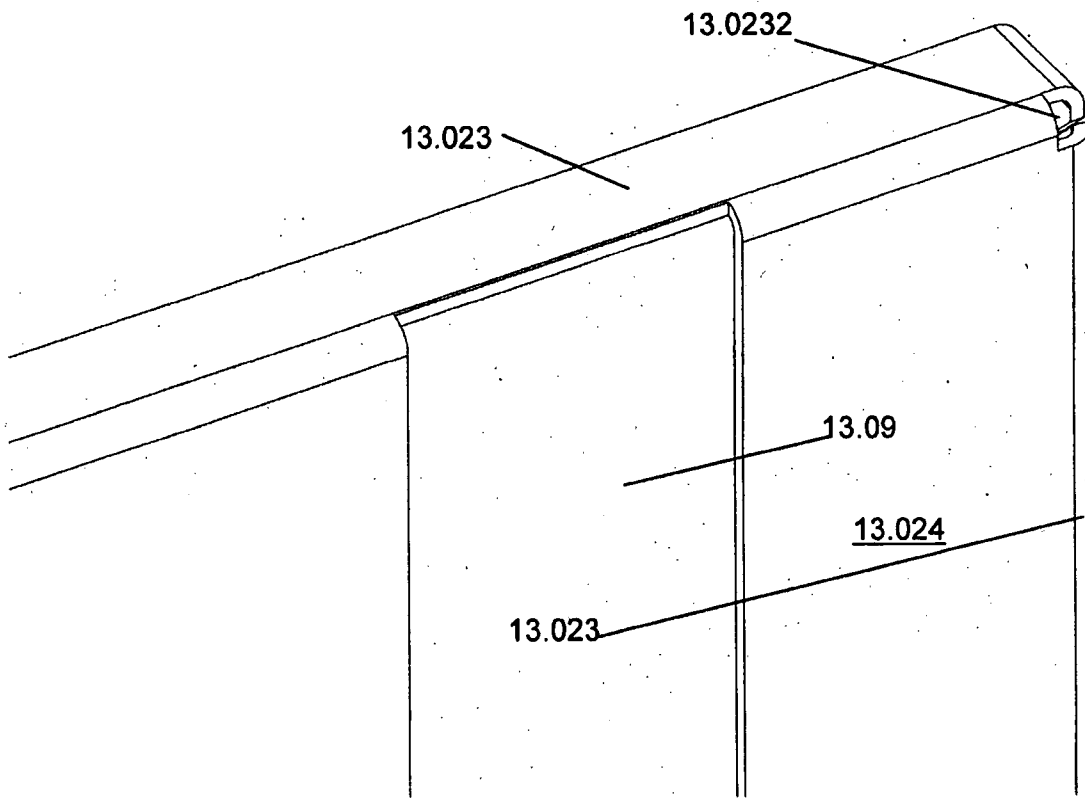
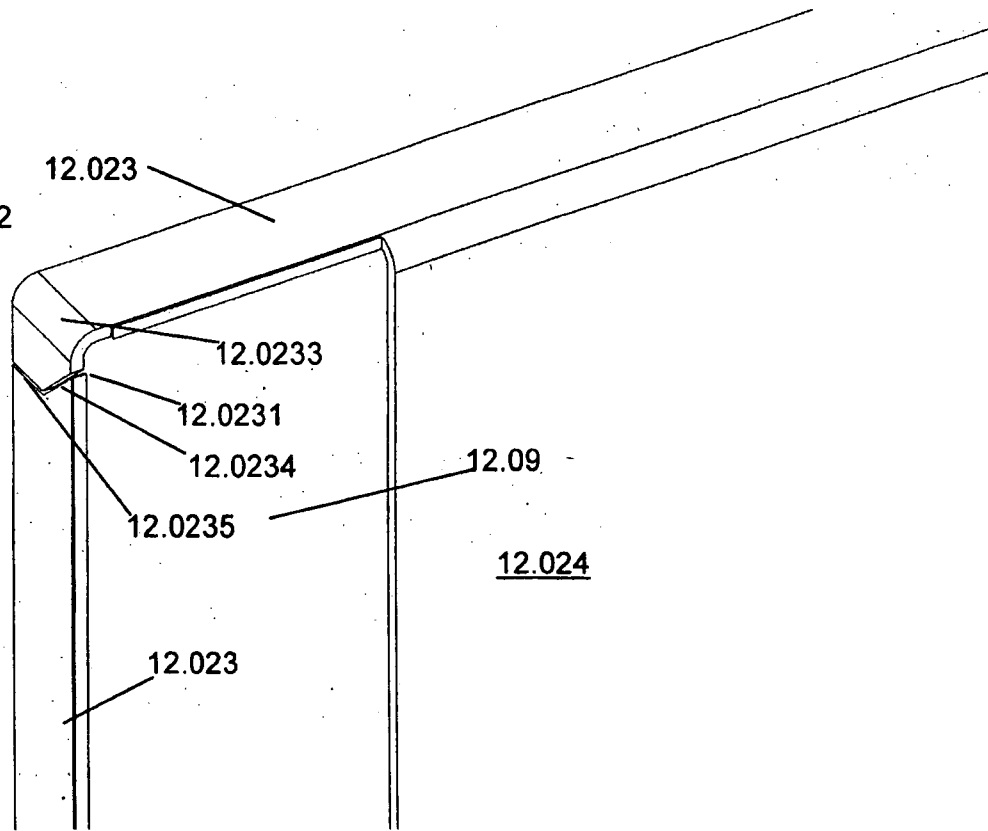


FIGURE 13

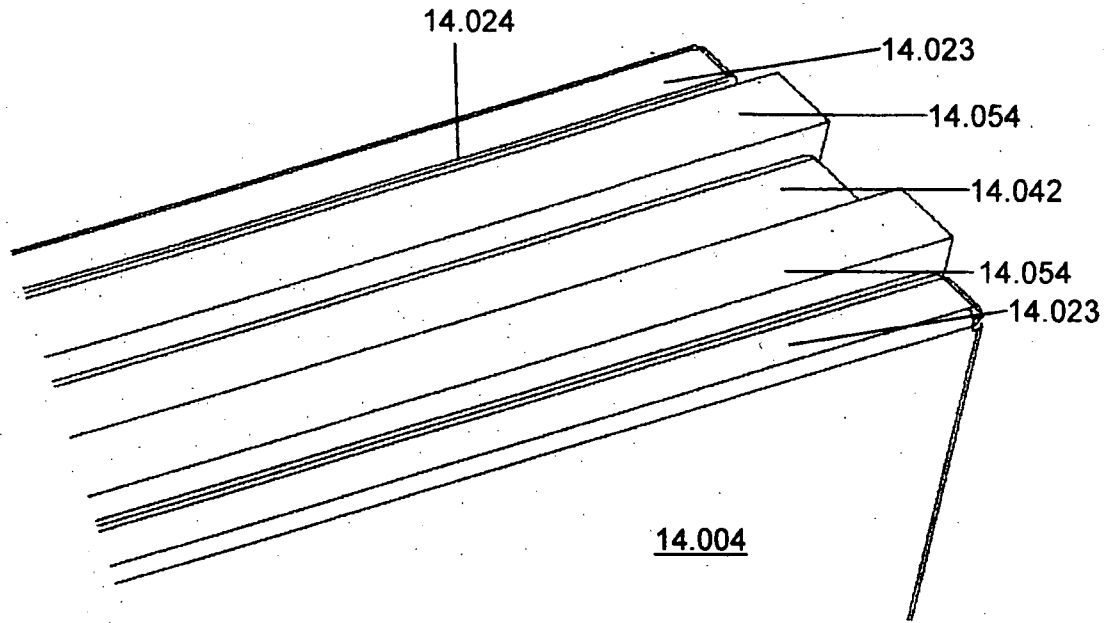
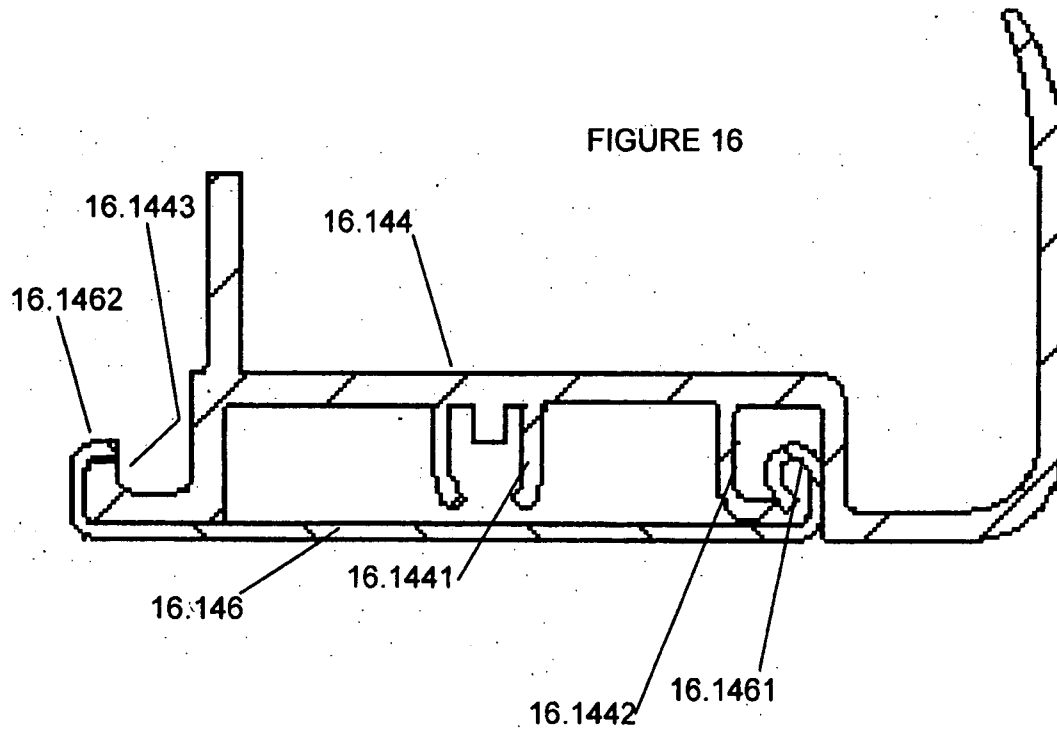
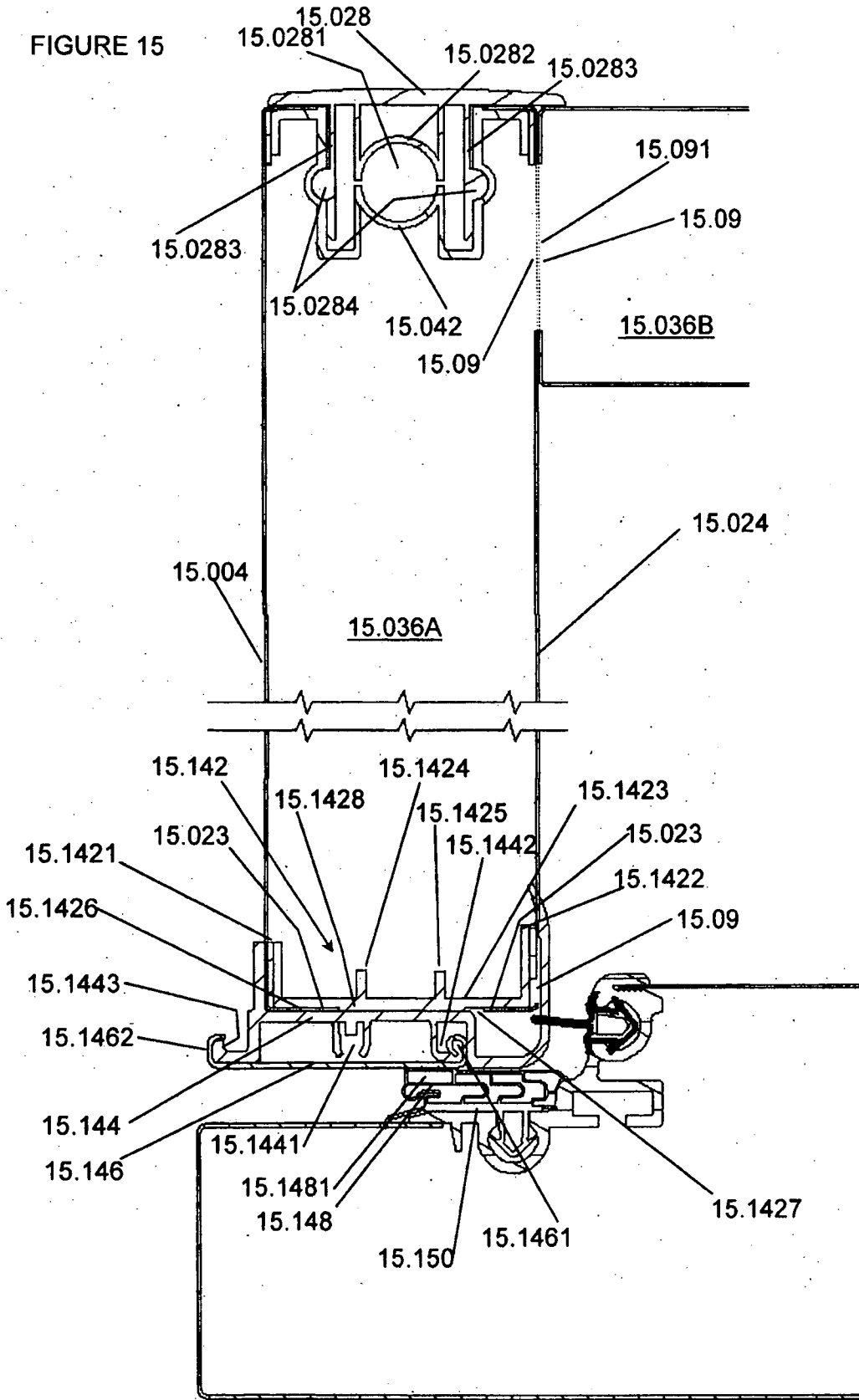


FIGURE 16





INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2010/001560

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

F25D 23/06 (2006.01)

E06B 7/16 (2006.01)

F25D 23/12 (2006.01)

B65D 81/38 (2006.01)

F16B 5/00 (2006.01)

E06B 3/96 (2006.01)

F16B 12/02 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 EPODOC, WPI; IPC marks E06B: 3/96, 7/16 E04B :1/38, 2/32, 2/46 2/78; F16B:12/02 ,5/00, 5/01; F25D: 23/02 , 23/06, 23/08, 23/10 and Key words: panel, wall, sheet, board, plate, clad+; pair, two, double , dual, second; join; connect, link, mitre, attach, member, piece, channel , clip; slot, groove, recess, rut, slit, gap, niche, opening, notch; flange, edge, corner, periphery, bend, angle, turn, crook, rim, border, extrusion, profile, insulate, padd+, lagg+, internal, inside, conceal and like terms
 Full text search using databases, ESPACENET, GOOGLE, PATENTLENS and USPTO with keywords; refrigerator, insulate, panel, connect or join, adhesive or tape and vacuum and like terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2245243 A (REHAU PLASTIKS [DE]) 23 April 1975 Abstract from WPI and machine translation of specification downloaded from Espacent, Figs. 1 - 6 of French document	1 - 3, 12, 15 - 19, 26, 27, 29, 30, 34 - 36, 40 - 44
Y	As above	7, 39
Y	As above	5, 6, 20, 29, 37, 38
X	GB 2260178 A (OSCAR ENGINEERING LTD.) 07 April 1993 Abstract, figures 1 - 3; page8, lines 23 - 27 and page 9, lines 17 - 29	1, 3, 15 - 19, 23, 24, 26, 27, 30, 34 - 36, 40-43
Y	As above	5, 6, 20, 29, 37, 38

 Further documents are listed in the continuation of Box C See patent family annex

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
08 February 2011Date of mailing of the international search report
17 FEB 2011Name and mailing address of the ISA/AU
AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaustalia.gov.au
Facsimile No. +61 2 6283 7999Authorized officer
KOSALA GUNATILLAKA
AUSTRALIAN PATENT OFFICE
(ISO 9001 Quality Certified Service)
Telephone No : +61 2 6222 3652

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2010/001560

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3520581 A (BORGHI) 14 July 1970 Figs. 4 and 18 and col. 10, lines 44 -58	1 - 4, 9, 10, 12, 13, 15-19, 22 -24, 26, 27, 30, 33-36, 40 -44
Y	As above	7, 39
Y	As above	5, 6, 20, 29, 37, 38
X	US 7140159 B2 (AVENDANO et al.) 28 November 2006 Abstract; Figs. 1 - 5 and paras. [006] - [0008] & [0023]	1 - 4, 15 - 19, 26 - 28, 30 - 32, 34 - 36, 40, 41
Y	As above	7, 39
Y	As above	5, 6, 20, 29, 37, 38
Y	US 6260377 B1 (TAMAOKI YUICHI et al.) 17 July 2001 Abstract and Figs. 1 - 3	7, 39
Y	US 4258519 A (HUGENS) 31 March 1981 Col. 1, lines 14 - 33 and Fig. 1	5, 6, 20, 29, 37, 38
A	EP 0425281 B1 (STARTVITAL LTD [GB]) 02 May 1991 Whole document	
	For Y indications: Claims 7 & 39: US 6260377 B1 can be combined with any one of FR 2245243 A, US 3520581 A & US 7140159 B2. Claims 5, 6, 20, 29, 37, 38: US 4258519 A can be combined with any one of FR 2245243 A, GB 2260178 A, US 3520581 A & US 7140159 B2	

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.: **45 - 47**
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
The claims do not comply with Rule 6.2(a) because they rely on references to the drawings.

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Gp. I: claims 1 – 16 and 34 – 44; Gp. II : claims 17 – 25; and Gp. III: claims 26 – 33

See Supplemental Box for details.

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

Supplemental Box

(To be used when the space in any of Boxes I to IV is not sufficient)

Continuation of Box No III:

This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

In assessing whether there is more than one invention claimed, I have given consideration to those features which can be considered to potentially distinguish the claimed combination of features from the prior art.

This International Searching Authority has found that there are different inventions as follows:

- Claims 1 – 16 and 34 – 44 are directed to an insulated panel including first and second panel members spaced apart by a predetermined distance, each panel member including a peripheral flange or edge or a bend forming an internal corner, the panel including an intermediate joining member adapted to connect the flange or edge or internal corner of at least one panel member. It is considered that this group of claims define a first invention.
- Claims 17 – 25 are directed to an elongated joining member adapted to join the edges of a pair of insulated panel walls, the joining member including at least one slot or rebate adapted to engage an edge of at least one of the panel walls. It is considered that this group of claims define a second invention.
- Claims 26 – 33 are directed to an elongated joining member adapted to join the edges of a pair of insulated panel walls, the joining member including at least one end or corner to be received into a respective corner of the pair of panel walls and having at least one slot or channel adapted to receive a sealing means or insulation foam. It is considered that this group of claims define a third invention.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art.

The only feature common to all of the claims is, 'a joining member adapted to join a pair of panels walls, the joining member including at least one slot or rebate adapted to engage at least one panel wall edge'. However this concept is not novel in the light of any one of D1 – D4.

D1: FR 2245243 A (REHAU PLASTIKS [DE]) 18 April 1975 (Abstract and figs. 2 and 3)

D2: GB 2260178 A (HANCOCK) 07 April 1993 (Abstract and figs. 1 -3)

D3: US 3520581 A (BORGHI) 14 July 1970 (Claims 1 – 9 and Figs. 1 – 7)

D4: US 7140159 B2 (AVENDANO et al.) 28 November 2006 (abstract and figs. 1 – 5)

This means that the common feature can not constitute a special technical feature within the meaning of PCT Rule 13.2, second sentence, since it makes no contribution over the prior art.

Because the common feature does not satisfy the requirement for being a special technical feature it follows that it cannot provide the necessary technical relationship between the identified inventions. Therefore the claims do not satisfy the requirement of unity of invention 'a posteriori'.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU2010/001560

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
FR	2245243	BE	820162	DE	2347520	NL	7411399
GB	2260178	EP	0522854				
US	3520581	DE	1601868	ES	351180	FR	1580170
		GB	1216693	NL	6803055		
US	7140159	CA	2421891	US	2004177591		
US	6260377	NONE					
US	4258519	NONE					
EP	0425281	IE	903909				

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX