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Description

This invention relates to a building wall assembly, and in particular, to an insulated wall assembly. More specifically, the invention provides novel panels and posts for use in an insulated wall assembly, and wall assemblies incorporating panels and posts.

Insulated wall assemblies are not new. Examples of such assemblies are found in Canadian Patents Nos. 1,116,371, issued to Truefoam Canada Limited on January 19, 1982 and 1,124,482, issued to Cano Thermo Systems Inc. on June 1, 1982.

While the patented assemblies provide well insulated structures, there is room for improvement in terms of the structure of the individual elements used in the assemblies, and the assembling of such elements to form building walls.

The object of this invention is to provide an assembly for building insulated load-bearing building walls with selectively interchangeable lightweight components. The components are designed to eliminate thermal bridging between the interior and the exterior surfaces of the walls thereby, to produce an energy-efficient structure for use in both hot and cold environments.

Accordingly the present invention provides a wall assembly comprising a plurality of panels of rectangular rigid foam plastic, each panel having central longitudinally extending grooves defined in each of its opposed side edges, and being connected to an adjacent similar panel by a vertical spline fitted within grooves of adjacent panels characterised by provision of cripples or end posts connected to the edges of those of said panels where connection to corner posts or to define door or window frames is required, each cripple or end post comprising an elongated block of rigid foam material having longitudinal timber strips attached on either side and having at least one central longitudinal groove on a side edge for splined connection to a panel or end post in a manner which provides a virtually uninterrupted thermal barrier along the wall assembly and eliminates thermal bridging.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in greater detail with reference to the accompanying drawings, which illustrate preferred embodiments of the invention, and wherein:

Figure 1 is a schematic perspective view from above, of a section of one embodiment of wall assembly in accordance with the present invention;

Figure 2 is a perspective view of a panel for use in the wall assembly of Fig. 1;

Figure 3 is a perspective view of a corner post for use in the assembly of Fig. 1;

Figure 4 is a perspective view of a column for use in the assembly of Fig. 1;

Figure 5 is a perspective view from one end of a cripple for use in the wall assembly of Fig. 1;

Figure 6 is an exploded, perspective view of one end of a door or window frame during construction, depicting in phantom a section of the cripple removed to accept an end of the door or window lintel.

Figure 7 is a schematic perspective view from above of a section of a second embodiment of the wall assembly in accordance with the present invention;

Figure 8 is a perspective view of a panel for use in the wall assembly of Fig. 7;

Figure 9 to 11 are perspective views of cripples for use in the wall assembly of Fig. 7; and

Figure 12 is a perspective view from above of sections of two walls constructed with the elements of Figs. 4, 5, 6 and 8.

DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

Proceeding to describe the assembled wall system, reference is made to Fig. 1 which depicts one form of wall assembly in accordance with the invention. A bottom plate 1 defined by lengths of 5.08cm x 15.24cm (2"x6") spruce, and a top plate 2 defined by two layers of 5.08cm x 15.24cm (2"x6") spruce, are familiar structural components. A plurality of panels 3 extend between the bottom plate 1 and the top plate 2 to form walls. Corners 4 are formed in the walls using corner posts 5, columns 6 defining end posts and a cripple 7. Infill panels 3 are connected to each other, to the corner posts 5, to the column 6 and to the cripple 7 by splines 8. The splines 8 may be formed of wood or a rigid foam plastic, e. g. expanded polystyrene. A window 9 is formed in one wall using a lintel 10, a sill 11, cripples 7 and infill panels 3 and 13. Additional panels 14 are also provided where necessary between the end posts 4 and the cripples 7. The panels 13 and 14 include rectangular grooves (not shown) where necessary for receiving splines 8. A door 16 is formed in much the same manner as the window 9 using a lintel 10 and cripples 7. Each of the lintels 10 includes a rigid foam plastic insert 20 sandwiched between a pair of boards 21.

Having thus described in general terms the assembled wall system, the detail of the several components will now be described. Referring to Fig. 2, an infill panel 3 is defined by an elongated

body 25 formed of rigid foam plastic. It has been found that expanded polystyrene, well known in present-day building construction, is quite suitable for the purpose. Rectangular grooves 26 extend along the entire length of each edge 27 of the body 25 for receiving splines 8. A wooden insert 28 extends along the longitudinal centre line of one side of the body 25 so that wall finishing material such as panels, drywall, cladding or the like, may be attached to the panel 3. The insert 28 is tightly fitted into a rectangular groove 29 formed in the panel 3, so that the outer surface 30 thereof depicted in Figs. 1 and 2, is flush with the adjacent surface 32 of the panel 25. A second strip of wood (not shown) provided in the opposing surface 33 of the panel 25 for connecting cladding or other finish material thereto. A nailing guideline, which may be a line or a shallow notch 35, disposed vertically on the outer surface 33 of the body 15, is provided as a reference for nailing through to the wood insert 28.

This design is also suitable for structures which are to be clad on the outside with cement or stucco finishes, which have been found to bond well to the expanded polystyrene surface. the groove 35 acts as a reinforcing rib for the cement or stucco, and the exterior surface has a minimum amount of exposed wood which would require a mesh or web covering before the application of a cement or stucco finish.

As best shown in Fig. 3 each corner post 5 includes an elongated rectangular block 37 of rigid foam plastic with a rectangular, longitudinally extending groove 38 in one side thereof for receiving a spline 8. Wooden inserts 39 are glued into each of the two corners opposite the groove 38. The outer surfaces of the inserts 39 are flush with the adjacent surfaces of the block 37. The groove 38 and the inserts 39 extend the entire length of the block 37.

Referring to Fig. 4, each column 6 is defined by an elongated, rectangular block 40 of rigid foam plastic. A rectangular, longitudinally extending groove 41 is provided in each of two opposed sides of the block 40 for receiving splines 8, Fig. 1. A strip 42 of wood is glued to each of the other two sides of the block 40. The strips 42 may be additionally connected to each other by screws or nails (not shown), for further strength.

The cripples 7 are similar in structure to the columns 6, except that a groove is provided in one side only for receiving a spline 8. As shown in Fig 5, the cripple 7 is defined by a pair of wooden strips 44 glued to the sides of an elongated rectangular block 45 of rigid foam plastic. A longitudinally extending saw-cut 46 is optionally provided in one end of each strip 44, the function of which will be hereinafter described. A rectangular, longitudinally

extending groove 48 in one side of the block 45 receives a spline 8, for interconnection of other wall components. It will however be appreciated that the groove 48 can be provided also in the other side of block 45, again for receiving spline 8.

When assembling the wall structure of Fig. 1 or similar structures, it will be appreciated that the foot plate 1 is nailed in position. The wooden elements of the panels 3, posts 4, columns 6, cripples 7, window 9 and door 16 are nailed to the foot plate 1 and top plate 2. With rigid foam plastic splines 8, the wall assembly provides maximum insulation, since there is a virtually uninterrupted thermal barrier along the entire extent of the wall assembly.

The slotted cripples 7 are used when forming doors or windows, in which case the slotted end of the cripple is cut horizontally to the slots 46 to form a ledge for receiving the lintel 10 (Fig. 6). Conveniently, the top of the lintel 10 is aligned with the top of the cripple 7, so that an accurate cut can be made.

Referring now to the alternative embodiment depicted in Fig. 7, a wall assembly is provided which differs from that depicted in Fig. 1, in the structure of the panels 50, which have eliminated the wood members 28 of Figs. 1 and 2. In Fig. 7, whenever possible, the same reference numerals have been used as in Figs. 1 and 6 to identify the same or similar elements.

The wall assembly of Fig. 7 includes the bottom plate 1, the top plate 2, and a plurality of panels 50 disposed between such plates to form walls. The corners 4 are formed in the walls using two cripples 7 of the type shown in Fig. 5, a column 6 of the type shown in Fig. 4, and splines 8. The corners are constructed as shown in the detail of Fig. 12. In the structure of Fig. 12, the columns 6 and cripples 7 are used in combination to achieve a strong structural corner with a nailing surface on both inside surfaces to attach interior cladding. It also provides an exterior nailing surface to attach exterior siding. The window 9 is formed using a lintel 10, a sill 11, and cripples 51 of the type shown in Fig. 9. For such purpose, slots (not shown) similar to the slots 46 (Fig. 6) are provided in the cripples 51 forming the sides of the window to facilitate cutting of shoulders or ledges 52 for receiving the lintel 10. A cripple 54 of the type shown in Fig. 10 is provided beneath the centre of the sill 11 between two panels 50. Additional panels 50 are provided where necessary between the end posts 4, columns 6 and cripples 7. The panels 50 have a variety of widths depending on the distance required between centre, i. e. between the centre of the wooden portions of the end posts, columns and cripples. The door 16 is formed in the same manner as the window 9 using a lintel 10 and

a pair of cripples 51 of the type shown in Fig. 9. In this embodiment of the invention, panels 50 are never connected directly to each other. For structural strength, there is always a column or cripple between adjacent panels. In general, except when constructing basement or interior non-supporting walls, it is preferable to include a wood-containing cripple or columns between adjacent panels 50.

Now, having particular reference to the components of this assembly depicted in Fig. 7, first referring to Fig. 8, each panel 50 is defined by an elongated, rectangular body 56 formed of rigid foam plastic. Rectangular grooves 57 extend along the entire length of each end 58 of the body 56 for receiving splines 8.

With a view to simplifying the structure even more, the splines 8 can be incorporated in the body of the components, to define a single unit for connecting the grooved panel to columns or cripples. Figs. 9 and 10 depict, respectively, a cripple and a column having outstanding tongues extending longitudinally along each edge thereof formed integrally with the rigid foam body 62, to register with the groove 57 of the panel 50 of Fig. 8 or the column and cripple depicted in Figs. 4 and 5.

Further incorporating the outstanding integral tongue of this embodiment, another form of cripple is shown in Fig. 11 defined by an elongated, rectangular, rigid foam plastic body 67, and a structural wooden member 68 extending along each side thereof. In each case, the body 67 extends outwardly beyond the side edges of the wood to define tongues integral with the body.

In the cripple 66 of Fig. 11, longitudinally extending saw-cuts 72 are provided in the centre of one end of each strip 68, as in the former embodiments of the invention. The slots 72 thus formed act as a guide for cutting the cripple when a lintel or the like is to be supported thereby; and to obviate the difficulty in making a longitudinal saw-cut in the cripple after it is installed in the wall assembly. Means are optionally provided in each component of the wall system to accommodate horizontally-extending electrical wiring or conduits, by forming a horizontally extending channel depicted at 73 in Fig. 7, in the rigid foam body of each component.

Having thus described the separate components in their differing embodiments, a typical assembly and construction procedure will now be outlined. Conveniently, the wall section is assembled and nailed together in horizontal disposition on a flat regular surface (normally a sub-floor), and subsequently raised into erect position. Using the panel 60 of Fig. 8, the column 6 of Fig. 4 and the cripple 7 of Fig. 5, the first step is positioning the bottom plates 1 on edge, since the components are attached to the plates 1 by nailing through the

plates into the wooden structural members of the various elements. The panels 60, columns 6, cripples 7 and splines 8 are placed in position and nailed to the bottom plate, with the electrical wiring slots 60, 64 and 70 properly aligned. A single top plate 2 is then nailed to the assembled elements. The finished wall assembly is raised, braced and toe-nailed into a sub-floor. A second top plate 2 is nailed on top of the wall assembly. At corners 4, the uppermost top plate 2 of one section will overlap the lowermost top plate of the adjacent wall section. In straight walls including more than one section, the top plate of one section must overlap the top plate of the next wall section. Any normal roof structure can be mounted directly on the top plate 2. Building paper and siding can be connected directly to the wall assembly.

It will be appreciated that each cripple 7 and spline 8 combination of Fig. 12 can be replaced with the cripple 51 of Fig. 9, and that each column 6 and pair of splines 8 of Fig. 12, can be replaced with the column assembly 54 of Fig. 10. Thus, the simplest form of wall assembly, in accordance with the present invention, has relatively few components including the panels 60, columns defined by cripples 54 and cripples 51 for use in forming door or window frames. When using the cripples 51 and 54, a corner 4 is formed using a plain rectangular corner column (not shown) defined by a central, elongated, rectangular block of rigid foam plastic and a pair of strips of wood co-extensive with opposite sides of the block. Thus, the column is similar in structure and orientation to the cripple depicted in Fig. 5, except for the groove 48. The column 6 and the second cripple 7 at the corner 4 are both replaced by cripples 51.

It will also be appreciated, that with reference to the assembly as shown for example in Figs. 7 and 12, the arrangement of cripples and corner posts identified in this embodiment, could be replaced by the cripples and corner posts of Figs. 9 and 10.

Claims

1. A wall assembly comprising a plurality of panels (3) of rectangular rigid foam plastic, each panel having central longitudinally extending grooves (26) defined in each of its opposed side edges (27), and being connected to an adjacent similar panel by a vertical spline (8) fitted within grooves of adjacent panels

characterised by provision of cripples or end posts connected to the edges of those of said panels where connection to corner posts or to define door or window frames is required,

each cripple (7) or end post (6) comprising an elongated block of rigid foam material having longitudinal timber strips (42 or 44) attached on either side and having at least one central longitudinal groove on a side edge for splined connection to a panel or end post in a manner which provides a virtually uninterrupted thermal barrier along the wall assembly and eliminates thermal bridging.

2. A wall assembly according to claim 1 in which each cripple (7) for provision of a door or window frame has a vertical slot (46) at its upper end to permit horizontal cutting to form a lintel receiving ledge.
3. A wall assembly according to claim 1 or claim 2 in which each corner is formed from an arrangement comprising a corner post (5) in the form of an elongated rectangular block (37) of rigid foam plastic having a central longitudinally extending groove in one edge thereof for receiving a spline (8) and having timber inserts (39) attached into each of the two corners opposite its groove (38), and at least one cripple (7) attached thereto.
4. A wall assembly according to claim 3 in which the corner post (5) has a cripple (7) attached on one edge and an end post or column (6) attached at right angles thereto by a spline connection.
5. A wall assembly according to claim 1 in which each corner is formed from an arrangement comprising two cripples (7) attached together and end post or column (6) attached at right angles thereto by a spline connection.

Revendications

1. Assemblage formant paroi, comportant plusieurs panneaux rectangulaires (3) en mousse de matière plastique rigide, chaque panneau présentant dans chacun de ses bords latéraux opposés (27) des rainures centrales (26) s'étendant longitudinalement, et étant relié à un panneau semblable adjacent par une clavette verticale (8) insérée dans les rainures des panneaux adjacents,
caractérisé en ce qu'il est prévu des éléments d'appui ou montants d'extrémité reliés aux bords de ceux de ces panneaux où il faut une liaison avec un montant d'angle ou définir un encadrement de porte ou de fenêtre, chaque élément d'appui ou montant d'extrémité (6) comportant un bloc allongé de matériau en

mousse rigide de chaque côté duquel est fixé un chevron longitudinal (42 ou 44) et qui présente au moins une rainure longitudinale centrale ménagée sur l'un de ses bords latéraux pour sa liaison clavetée à un panneau où à un montant d'extrémité d'une manière qui constitue une barrière thermique pratiquement ininterrompue le long de l'assemblage formant paroi et élimine les ponts thermiques.

2. Assemblage formant paroi conforme à la revendication 1, dans lequel chaque élément d'appui (7) permettant de prévoir un encadrement de porte ou de fenêtre présente à son extrémité supérieure une fente verticale afin de permettre une découpe horizontale pour former un épaulement d'appui pour un linteau.
3. Assemblage formant paroi conforme à l'une des revendications 1 ou 2, dans lequel chaque angle est constitué par un ensemble comportant un montant d'angle (5) sous forme d'un bloc rectangulaire allongé (37) en mousse de matière plastique rigide présentant dans un de ses bords une rainure centrale s'étendant longitudinalement destinée à recevoir une clavette (8) et ayant un chevron fixé sous forme d'insert (39) à chacun de ses deux angles opposés à sa rainure (37), et au moins un élément d'appui (7) fixé au montant d'angle.
4. Assemblage formant paroi conforme à la revendication 3, dans lequel le montant d'angle (5) comporte un élément d'appui (7) fixé sur l'un de ses bords et un montant, ou colonne, d'extrémité (6) fixé(e) à angle droit par rapport à l'élément d'appui au moyen d'une liaison par clavette.
5. Assemblage formant paroi conforme à la revendication 1, dans lequel chaque angle est constitué par un ensemble comportant deux éléments d'appui (7) fixés l'un à l'autre, et par un montant, ou colonne d'extrémité (6) fixé(e) à angle droit par rapport à ceux-ci au moyen d'une liaison par clavette.

Ansprüche

1. Eine Wand-Baugruppe mit einer Vielzahl von Platten (3) aus einem rechteckigen Starrschaumkunststoff, wobei jede Platte in jeder ihrer gegenüberliegenden Seitenkanten (27) zentral angeordnete Längsnuten (26) aufweist und mit einer benachbarten ähnlichen Platte mittels einer vertikalen Feder (8) verbunden ist, die in die Nuten benachbarter Platten einge-

- paßt ist, gekennzeichnet durch das Vorsehen von Stützbalken oder Endpfosten die mit den Kanten derjenigen der genannten Platten verbunden sind, wo eine Verbindung mit Eckpfosten oder die Ausbildung von Tür- oder Fensterrahmen erforderlich ist, wobei jeder Stützbalken (7) oder Endpfosten (6) einen langgestreckten Block aus einem Starrschaummaterial aufweist, der auf seinen beiden Seiten Holz-Längsleisten (42 oder 44) aufweist und wenigstens eine zentrale Längsnut in einer Seitenkante aufweist für eine Federverbindung mit einer Platte oder einem Endpfosten auf eine solche Weise, die eine praktisch ununterbrochene thermische Sperre über die Länge der Wand-Baugruppe schafft und eine thermische Brückenbildung ausschließt.
- 5
- 10
- 15
2. Eine Wand-Baugruppe nach Anspruch 1, bei der jeder Stützbalken (7) zur Ausbildung eines Tür- oder Fensterrahmens einen senkrechten Schlitz (46) an seinem oberen Ende aufweist, um ein horizontales Schneiden unter Ausbildung eines Absatzes für die Aufnahme eines Tür- oder Fenstersturzes zu ermöglichen.
- 20
- 25
3. Eine Wand-Baugruppe nach Anspruch 1 oder Anspruch 2, bei der jede Ecke aus einer Anordnung gebildet wird, die einen Eckpfosten (5) in Form eines langgestreckten rechteckigen Blocks (37) aus einem Starrschaumkunststoff mit einer zentralen Längsnut in einer seiner Kanten zur Aufnahme einer Feder (8) und mit Holzeinsätzen (39), die in jede der beiden Ecken gegenüber seiner Nut (38) angefügt sind, sowie wenigstens einen daran angefügten Stützbalken (7) aufweist.
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- 35
4. Eine Wand-Baugruppe nach Anspruch 3, bei der der Eckpfosten (5) einen Stützbalken (7), der an eine Kante angefügt ist, und einen Endpfosten oder eine Säule (6) aufweist, die dazu unter einem rechten Winkel mit Hilfe einer Federverbindung angefügt sind.
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- 45
5. Eine Wand-Baugruppe nach Anspruch 1, bei der jede Ecke aus einer Anordnung gebildet wird, die zwei zusammengefügte Stützbalken (7) und einen Endpfosten oder eine Säule (6) aufweist, die dazu unter einem rechten Winkel mit Hilfe einer Federverbindung angefügt sind.
- 50
- 55

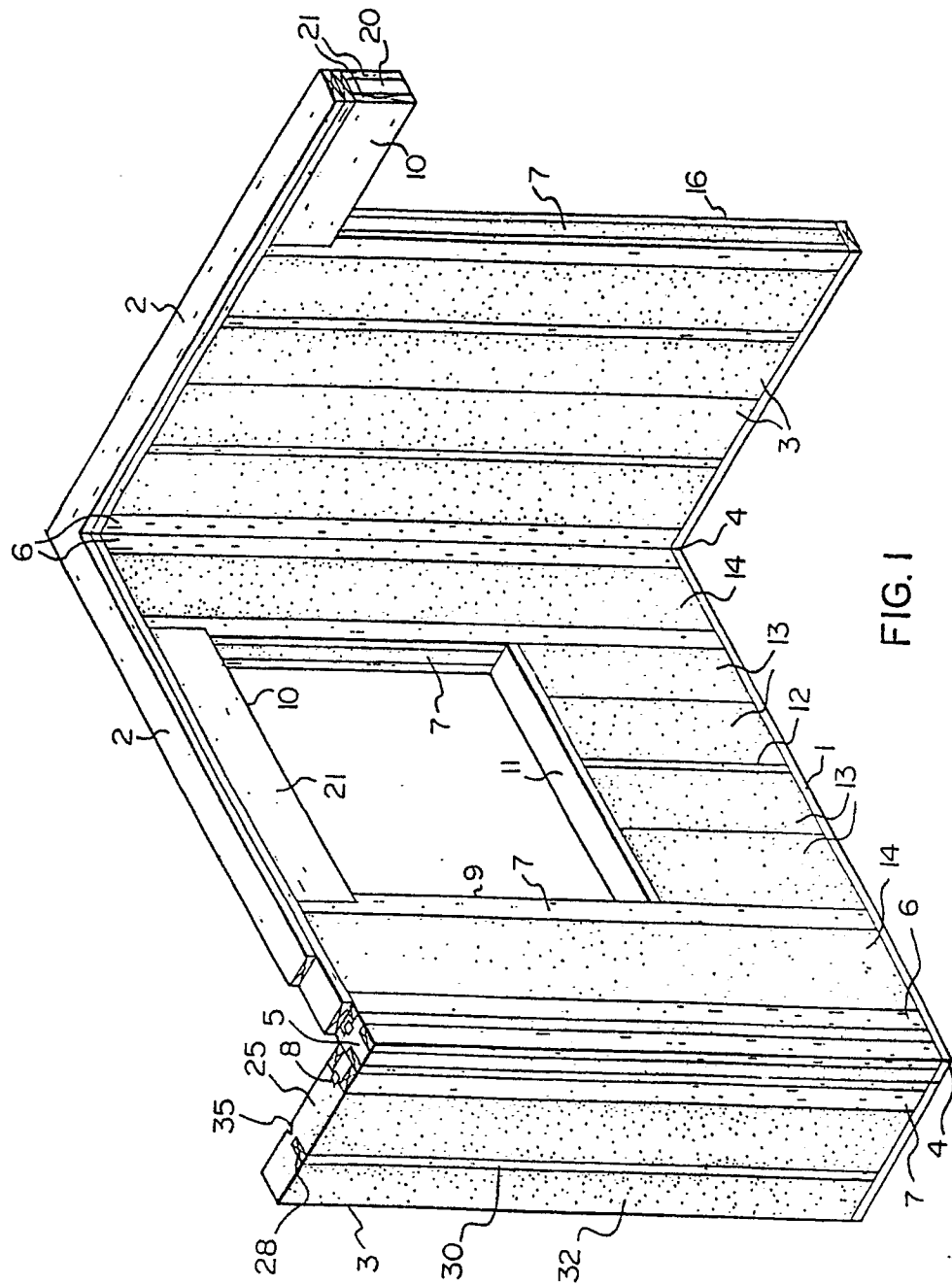


FIG. 1

