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G. C. RUSSELL

3,239,986

SPLINE TYPE JOINT BETWEEN COMPOSITE PANELS

Filed April 8, 1963

2 Sheets-Sheet 1

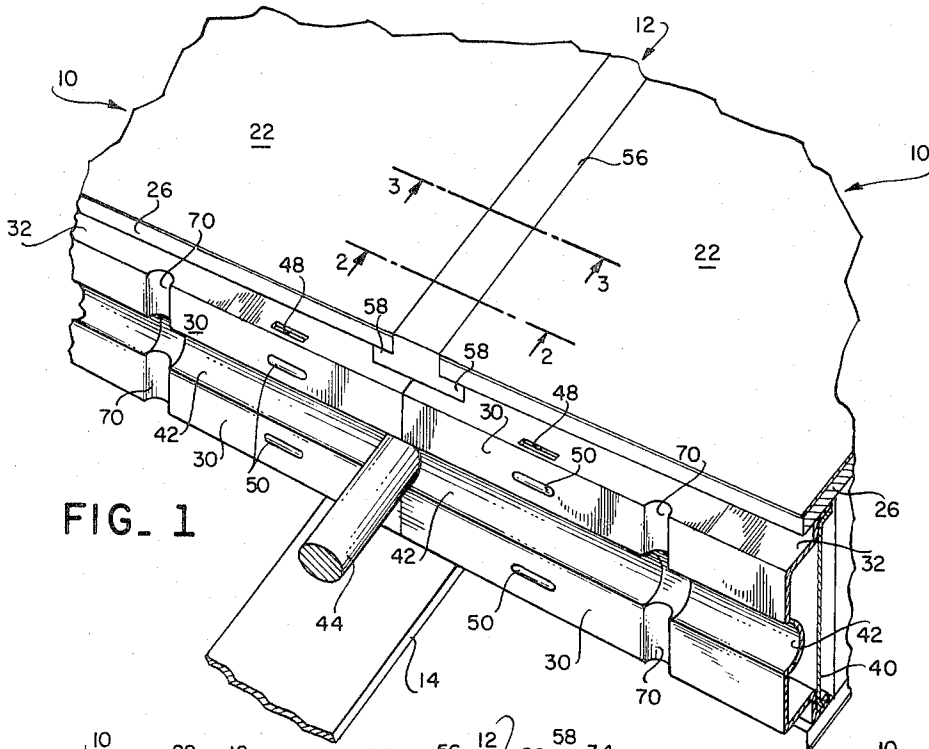


FIG. 1

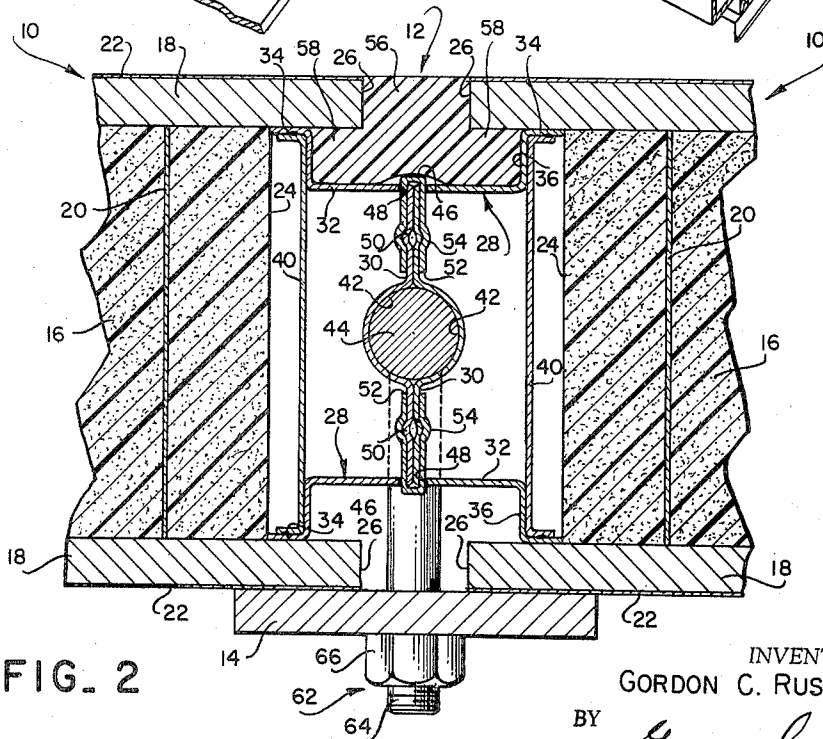


FIG. 2

INVENTOR.  
GORDON C. RUSSELL

BY

*George C. Sullivan*  
Agent

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G. C. RUSSELL

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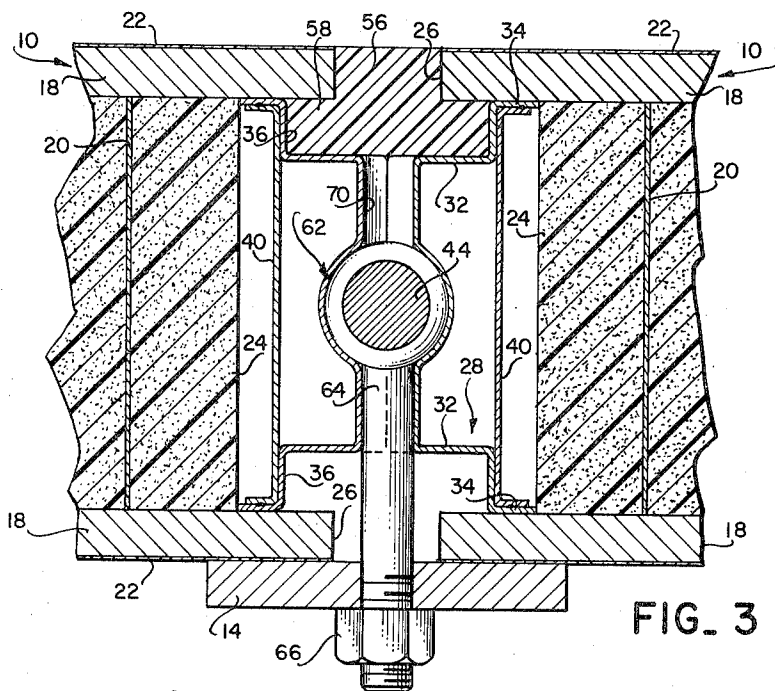


FIG. 3

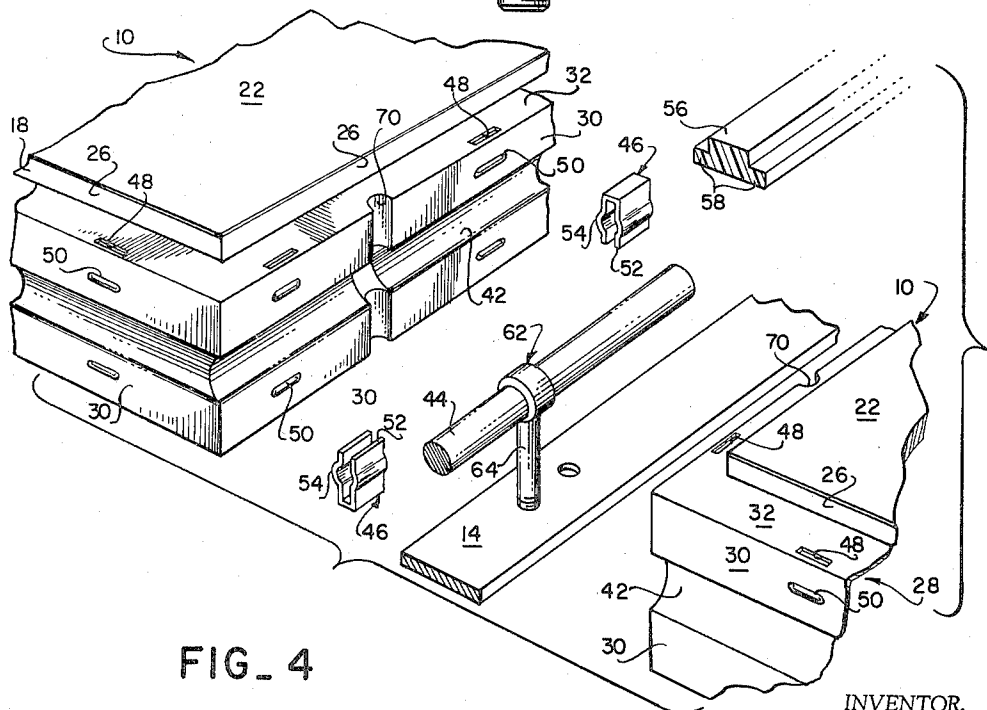


FIG. 4

INVENTOR.  
GORDON C. RUSSELL

BY

*George Sullivan*  
Agent

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## 3,239,986 SPLINE TYPE JOINT BETWEEN COMPOSITE PANELS

Gordon C. Russell, Studio City, Calif., assignor to  
Lockheed Aircraft Corporation, Burbank, Calif.  
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7 Claims. (Cl. 52—584)

This invention pertains to new and improved building panels and to joints connecting such panels.

The need for new and improved buildings capable of being erected at a lower cost than conventionally constructed structures has resulted in the development of specialized building panels. At the present time, building panels are known which consist of a physically "soft" core of cellular plastic material laminated between rigid sides. Such panels are relatively light in weight and are capable of being used as structural members as well as panels serving to enclose a surface. In using panels of this type, several significant problems have been encountered.

One of these problems concerns the protection of the cores in such panels at the edges of these panels. Another of these problems concerns the mounting of these panels in an edge to edge relationship so as to create a substantially weatherproof joint. A further problem which has been encountered is the problem of connecting these panels to various structural members in such a manner that the panels are not damaged by the type of connection used. All of these problems are considered to be significant in providing building panels and joints for use with such panels of such a character as to advance the field of prefabricated buildings such as homes, apartments, factories or the like.

An object of the present invention is to provide new and improved building panels which overcome problems as are briefly indicated in the preceding discussion. Another object of the present invention is to provide new and improved joints for use in connection with these panels, and for attaching them to structural members. Other objects of this invention are to provide building panels as indicated which are comparatively inexpensive to construct, which are capable of being easily assembled in a building, and which are capable of providing satisfactory service. Still other related objects of the invention are to provide joints which are also relatively simple to construct, which are inexpensive in character, which enable building panels as herein indicated to be connected to a structural member without difficulty, and which are capable of satisfactorily holding such panels with respect to a structural member.

Various other objects of this invention as well as many specific advantages of it will be apparent from a detailed consideration of the remainder of this specification, the appended claims, and the accompanying drawing in which:

FIGURE 1 is a partial perspective view showing parts of two building panels of this invention and a part of a joint connecting these two building panels;

FIGURE 2 is a partial cross-sectional view taken at line 2—2 of FIGURE 1;

FIGURE 3 is a partial cross-sectional view taken at line 3—3 of FIGURE 1; and

FIGURE 4 is an exploded view showing the parts illustrated in FIGURE 1.

The accompanying drawing is primarily intended to clearly illustrate for explanatory purposes the nature of presently preferred building panels and a joint of this invention. From a careful consideration of this drawing and of the remainder of this specification it will be realized that various changes of a routine engineering nature may be made in the building panel and joint illus-

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trated without departing from the features of this invention defined by the appended claims.

As an aid to understanding this invention it can be stated in essentially summary form that it concerns building panels of the type indicated in the initial portions of this specification, each of which includes a core laminated between rigid sides, and each of which also includes a rigid channel extending between the sides and extending completely around the perimeter of the panel. This channel serves to protect the core of the panel, and to add structural rigidity to the panel so as to enable it to be used satisfactorily as a structural member.

Preferably this channel includes a base having various grooves and depressions formed in it as hereinafter indicated and includes slots enabling clips to be used in connecting the bases of channels on adjacent panels so as to latch such adjacent panels to one another. In a joint in the present invention such clips are utilized and at the same time an interconnecting member is located within the grooves on adjacent channels so as to provide structural rigidity.

The actual nature of this invention is best more fully explained by referring directly to the accompanying drawing. Here there are shown two identically formed rectangular panels 10 of this invention which are interconnected by means of a joint 12 to a structural member 14 such as a roof truss, a metal beam or the like. Each of the panels 10 is constructed the same along all of its sides and consists of a flat core 16 laminated between flat, rigid sides or side walls 18 through the use of a conventional adhesive (not shown). The cores 16 may consist of rigid cellular or foamed polyurethane material, cellular polystyrene or other related material. If desired, the core 16 may include internal reinforcing ribs 20. The sides 18 may be wood, metal or rigid plastic members; if desired, they may be coated with an adherent protective coating 22. In each of the panels 10 the core 16 is preferably of smaller dimension than the sides 18 so as to have an end 24 located internally of the edges 26 of the sides 18.

In accordance with this invention a rigid channel 28 of essentially a U-shape is employed so as to extend along all of the edges 26 of the sides 18. Preferably each of the channels 28 is formed of a metal capable of adding structural strength to a panel 10. Each of these channels 28 includes a base 30 and attached parallel sides 32. Preferably these sides 32 are provided with offset terminal end flanges 34 which extend parallel to one another and which are spaced so as to fit between the interiors of the sides 18. The end flanges 34 are preferably attached to the interiors of the sides 18 through the use of a conventional adhesive (not shown) although, if desired, other equivalent fastening means can be used to secure them in position. When the channel 28 is used in this manner the flanges 34 fit closely against the ends 24 of the core 16. Further, as the panel 28 is preferably used, the offset portions 36 of the sides 32 connecting the end flanges 34 are spaced a comparatively small distance from the edges 26 toward the core 16.

Although it is not considered necessary, it is possible to locate between the terminal end flanges 34 against the offset portions 36 a rigid reinforcing member 40 which serves to prevent any danger of the sides 32 being collapsed toward one another and which serves to protect the core 16 against any possibility of moisture seeping through the channel 28 into contact with the core 16. The member 40 may consist of a metal web extending between the end flanges 34 as shown and secured to these metal end flanges by welding or similar techniques. If desired, the member 40 may be a wood or rigid plastic strip extending between these end flanges and secured in place by friction. If in any particular panel 10 added

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structural strength such as would be provided by the member 40 is not needed, this member may consist of a moisture impervious sheet or diaphragm secured so as to extend between the flanges 34.

A centrally located semi-cylindrical groove 42 is employed in the base 30 of a channel 28 used with a panel 10 of this invention. This groove 42 is capable of fitting against a portion of a cylindrical rod 44 used in creating a joint such as a joint 12. If desired, a cylinder can be used in place of the rod 44. From an examination of FIGURES 2 and 3 of the drawing it will be apparent that the rod 44 fits closely within the interiors of the grooves 42 in the bases 30 of two of the channels 22 which are disposed so that their edges are adjacent to one another in the joint 12. The rod 44 does not physically connect the two panels 10 located in this manner, but serves to prevent the edges of them from shifting at an angle to one another. The panels 10 in this joint 12 are physically held to one another by clips 46 of the type set forth in the co-pending application for U.S. Letters Patent entitled "Panel Retention Type Joints," filed October 25, 1962, Serial No. 232,968. The entire disclosure of this co-pending application is incorporated herein by reference.

The channels 28 used in the panels 10 are each formed so as to include a plurality of equally spaced slots 48 located along their length which are adapted to receive these clips 46. These slots 48 are each located adjacent to the base 30 of the channel 28 with which they are located, and each such base 30 is provided with an internally extending projection 50 located adjacent to and corresponding to one of the slots 48. These slots 48 and projections 50 are designed so as to receive and latch in place the sides 52 of the clips 46. Preferably, each of these sides 52 includes a groove 54 capable of fitting over and engaging a projection 50.

When the panels 10 are assembled so as to be held together by the clips 46 with a rod 44 held in position between these two panels the joint 12 is created from a physical standpoint. However, the joint created in this manner does not possess adequate resistance against ambient conditions such as rain to enable it to be used for many purposes. This joint 12 is completed in a practical sense by the insertion between the edges 26 of sides 18 on adjacent panels 10 of a small sealing strip 56 formed of an elastomeric material such as polychloroprene. This sealing strip 56 has a cross-sectional configuration roughly corresponding to a T-shape and is preferably slightly larger than the space within which it fits. The ends 58 of it fit between the edges 26 of the sides 18 in the panels 10 of the joint 12 against the offset portions 36 so as to form a weather tight connection. With this particular shape of the strip 56 there is substantially no danger of the strip being dislodged from its position within the joint 12. If desired, the strip 56 may be secured in place through the use of a conventional adhesive (not shown).

When it is desired to use the joint 12 in connecting two panels 10 to the rigid structural member 14 such as a roof truss a ring bolt 62 is employed in the manner indicated in FIGURES 2 through 4 of the drawing. The shank 64 of this ring bolt 62 is directly connected to the member 14 using a conventional nut 66. The ring on the ring bolt is passed around the rod 44 so as to directly connect this rod to the member 14. In order to prevent the physical dimensions of the ring bolt 62 from tending to space the panels 10 in the joint 12 away from one another, preferably the bases 30 of the channels 28 are provided with depressed areas 70 extending completely across the widths of these bases including across the grooves 42 in them. Each of these depressed areas 70 corresponds in dimension to the shape of one-half of the ring bolt 62 and is formed so as to extend completely across a base 30 in order to allow a bolt such as the bolt 62 to project from either side of the panel 10 with which it is used.

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Preferably a plurality of equally spaced depressed areas 70 are formed in each channel 28 along its length.

From a careful consideration of the foregoing it will be seen that panels such as the panels 10 herein described may be easily and conveniently used in a variety of different ways in different types of buildings. It will also be seen that joints such as the joints 12 herein described may be easily created so as to connect such panels. When a bolt such as the bolt 62 is used in connecting a structural member with a joint such as the joint 12, it provides a simple effective method for connecting the associated panels to a structural member.

Because of the nature of this invention it is to be considered as being limited solely by the appended claims forming a part of this disclosure.

I claim:

1. A building panel joint which comprises:

- (a) two building panels, each of said panels having sides and a rigid channel at its ends, each of said channels having a base spaced from said panel end recessed from said sides and having a centrally located groove formed therein extending the length of said base, a plurality of depressed regions being provided in each said groove to receive eye bolts, said base of each said channel upon one said panel abutting a said base on another panel in an end to end relationship so that said grooves in said bases are opposite to one another in matched relationships;
- (b) a rigid member located within said matched grooves between said ends of said building panels, said rigid member fitting closely within said grooves; and
- (c) a plurality of clip means disposed across said abutted bases in contact therewith and connecting said channels so as to prevent said channels from being moved away from one another.

2. A building panel joint as defined in claim 1 wherein said channels include a plurality of slot means formed therein and wherein each of said clip means fits with a slot means on each of said channels.

3. A building panel joint as defined in claim 1 wherein said panels are located so that the depressed areas on one of said channels are opposite to the depressed areas on the other of said channels, and including eye bolt means for use in attaching said panels to a structural member located in said opposed depressed areas and extending from said channels, said eye bolt means extending around said rigid member.

4. A building panel joint which comprises:

- (a) two building panels, each of said panels having a rigid channel at its ends, each of said channels having a base with a groove located therein, said groove extending the length of said bases, each of said bases including a plurality of equally spaced depressions shaped so as to fit around part of an eye bolt, said channel being located next to one another in an end to end relationship so that said grooves and said bases are opposite to one another;
- (b) a rigid member located between said ends of said building panels, said rigid member fitting closely within said groove;
- (c) a plurality of clips fitted across and in contact with opposite sides of said opposed bases and connecting said channels so as to prevent their being moved away from one another; and
- (d) eye bolt means located in at least some of said depressions so as to extend away from said panels, said rigid member projecting through said eye bolt means so as to be held thereby.

5. A building panel joint as defined in claim 4 wherein said depressions extend completely across the bases of said channels and wherein said eye bolt means are capable of being located so as to extend from either side of said panels.

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6. A building panel which comprises:

- (a) a flat rectilinear core having ends, said core being of a porous cellular character;
- (b) rigid side walls attached to the sides of said core, said side walls extending beyond the ends of said core; 5
- (c) a rigid channel extending along each of the ends of said core, each of said channels having a base and parallel sides, each of said sides having an offset portion and offset terminal end flanges, said end flanges being secured to the surfaces of said rigid sides adjacent to the ends of said core, said channels extending from the ends of said core between said rigid sides, said sides of said channels being spaced from said rigid sides by said offset portions, each of said channels including a centrally located groove extending along the length of its base and a plurality of equally spaced depressions shaped so as to fit around a part of an eyebolt, each of said channels having a plurality of slots formed in its parallel sides adjacent to said base, said slots being equally spaced from one another. 10 15 20

7. A building panel which comprises:

- (a) a flat rectilinear core having ends;
- (b) rigid side walls attached to the sides of said core, said side walls extending beyond all of the ends of said core; 25
- (c) a rigid channel extending along each of the ends of said core, each of said channels having a base and parallel sides, said sides of said channels being secured to the adjacent, opposed inner surfaces of said side walls and extending beyond said side walls, 30

- a portion of said side of each of said channels being recessed from said side wall to which it is secured, said bases of said channels being spaced by said sides of said channels from said core;
- (d) said base of each of said channels being provided with a groove, said grooves being centrally located with respect to said bases of said channels and extending longitudinally over the length of said channels; and
- (e) each of said channels including a plurality of depressed areas extending completely across said base and said groove at right angles thereto, said depressed areas being shaped so as to fit around a part of a ring bolt.

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FRANK L. ABBOTT, *Primary Examiner.*

JACOB L. NACKENOFF, *Examiner.*