

[54] **INTERLOCKING PANEL ASSEMBLY**
 [75] Inventor: **Darrel W. Craik**, San Marcos, Calif.
 [73] Assignee: **Teledyne, Inc.**, Los Angeles, Calif.
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 [51] Int. Cl.**E04d 3/362**
 [58] Field of Search.....**52/586, 588, 529, 52/539, 478**

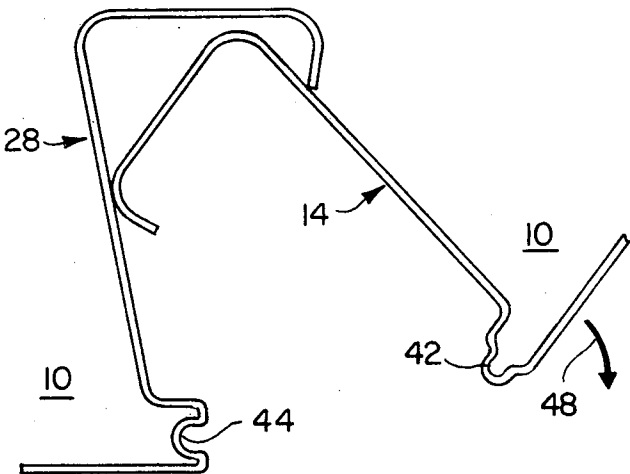
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Primary Examiner—Alfred C. Perham
Attorney—Ronald W. Reagin, Ralph M. Braunstein,
 Stephen L. King and Kenneth W. Mateer

[57] **ABSTRACT**
 An interlocking panel assembly is disclosed in which each panel in the assembly includes a male flange section and a female flange section. The flange sections are configured such that, when assembled, an interlocked flange is provided which has a trapezoidal cross-section.

10 Claims, 4 Drawing Figures



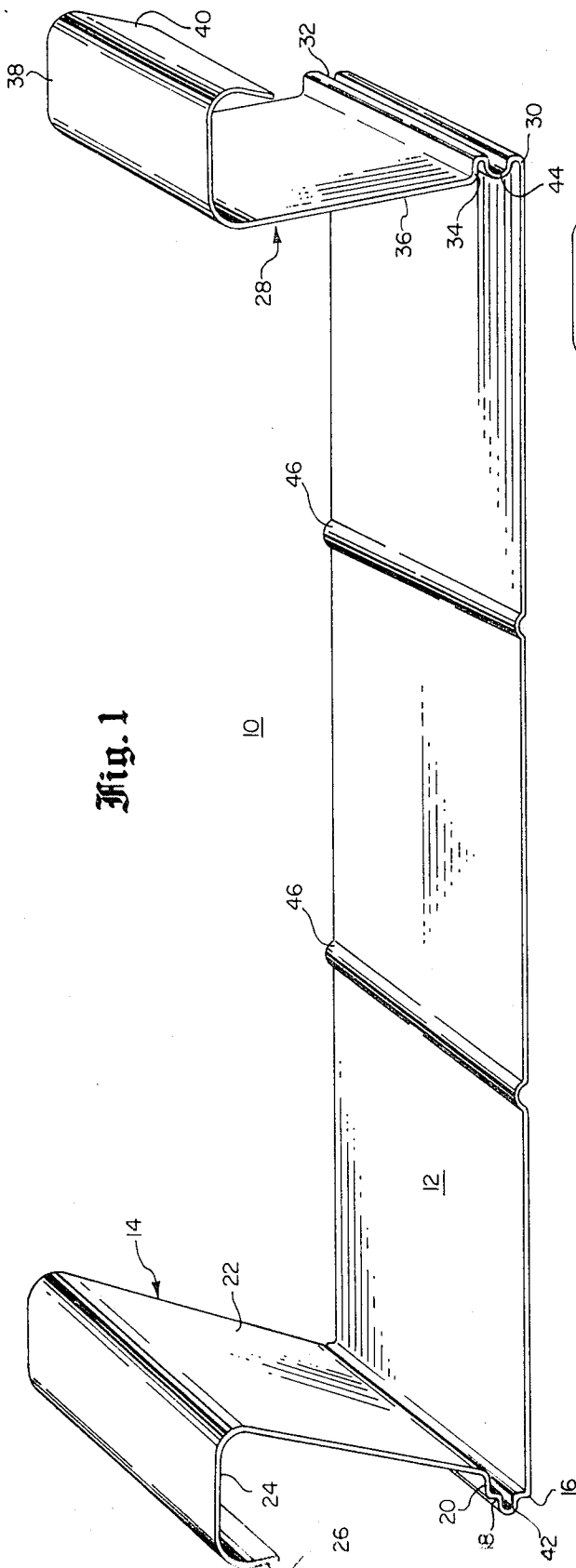


Fig. 1

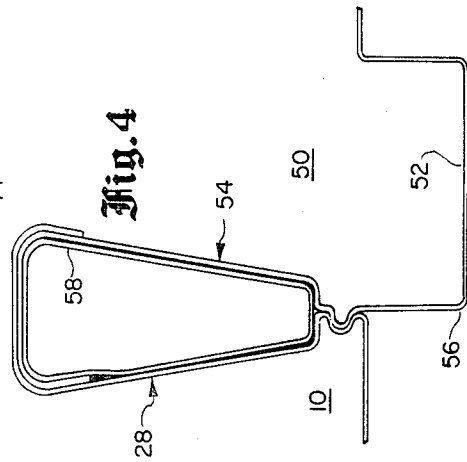


Fig. 4

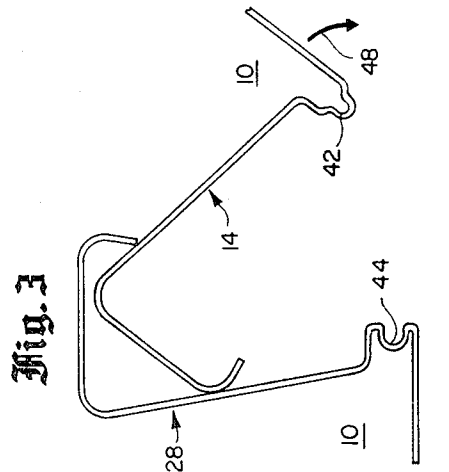


Fig. 3

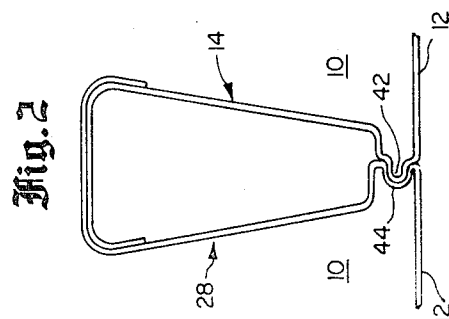


Fig. 2

DARREL W. CRAIK
INVENTOR.

BY *Donald W. Craig*
ATTORNEY

INTERLOCKING PANEL ASSEMBLY

The present invention relates to interlocking panel assemblies, and more particularly to an improved interlocking panel assembly in which the interlocking operation is easily effected, the resulting panel assembly shows greater strength and rigidity and the individual panel members in the assembly are easily and relatively inexpensively manufactured.

It is well known that there is a pressing need to provide improved components and techniques in the building industry to enable the industry to provide structures which can be quickly and economically assembled but which are still of adequate strength. Because of the rapidly growing need for such structures and because of economic pressures, prior building techniques under which individual structures are laboriously constructed by hand by skilled workmen are not acceptable for many building applications.

For many such applications, it is desirable to provide interlocking panel assemblies, such as panel assemblies made from sheet metal or the like, in which the panels are assembled into larger structures. Such panels, for example, may be assembled into walls, roofs, awnings, or the like. The prior art has proposed many such interlocking panel assemblies, but all of them have suffered from some defects such as being too expensive, being not strong enough, or being too complex and requiring too much labor to assemble the panels.

It is accordingly an object of the present invention to provide an improved interlocking panel assembly.

It is another object of the present invention to provide an improved interlocking panel assembly in which the interlocking operation is easily effected.

It is still another object of the present invention to provide an improved interlocking panel assembly in which the resulting assembly shows greater strength and rigidity.

It is yet another object of the present invention to provide panel members for use in an interlocking panel assembly which are easily and inexpensively manufactured.

Briefly stated, and in accordance with the presently preferred embodiment of the invention, an interlocking panel assembly is provided in which each panel includes a base section, a first male flange section along one edge of the base section and a second female flange section along the opposed edge of the base section. The male flange section comprises a first surface connected to and extending upwardly from the first edge of the base section at an angle substantially normal to the base section, a second surface connected to the first surface and extending back away from the first edge, a third substantially planar surface connected to the second surface whose plane forms acute angle with the base section, a fourth substantially planar surface which is substantially parallel to the base section and which is connected to the third surface and extends back towards and beyond the plane of the first surface, and a fifth surface connected to and extending downwardly from the fourth surface whose plane forms an obtuse angle with the plane of the base section, with the fifth surface being shorter than the third surface. The female flange section similarly comprises a sixth surface connected to and extending upwardly from the second edge of the base section and which is substantially normal to the base section, a seventh surface

connected to the sixth surface and extending back away from the second edge, an eighth substantially planar surface connected to the seventh surface whose plane forms an acute angle with the base section, a ninth substantially planar surface connected to the eighth surface and which is substantially parallel to the base surface and extends back towards and beyond the plane of the sixth surface and a tenth substantially planar surface connected to and extending downwardly from the ninth surface and whose plane forms an obtuse angle with the base section, with the tenth surface being shorter than the eighth surface. An interlocking panel assembly is provided by snapping the male flange of one panel into the female flange of another panel such that the above described surfaces interlock to form an interlocking flange having a cross section which is substantially a trapezoid. If desired, an interlocking tongue and groove arrangement may also be provided in the above first and sixth surfaces to provide additional rigidity to the assembly.

For a complete understanding of the invention, and an appreciation of other objects and advantages thereof, refer to the attached drawings, in which:

FIG. 1 shows a perspective view of a panel member in accordance with the present invention;

FIG. 2 shows a cross-sectional view of an interlocking panel assembly of two panels such as are shown in FIG. 1;

FIG. 3 shows a cross-sectional view similar to FIG. 2 and shows the panel members in the process of being assembled and interlocked; and

FIG. 4 shows a cross-sectional view similar to FIG. 2 and illustrates a second embodiment of the invention.

FIG. 1 shows a perspective view of a panel member 10 which may be assembled with other similar panel members to form the interlocking panel assembly of the present invention. The panel 10 includes a base section 12 and a first male flange section 14 connected to the base section 12 along a first connecting edge 16 of the base section 12. The male flange section 14 is formed from the surfaces 18, 20, 22, 24 and 26 which are configured as shown in FIG. 1. As shown therein, the first surface 18 is connected to the base section 12 along the first connecting edge 16 and extends upwardly from the base section 12 at an angle normal to this section. The second surface 20 is a short substantially planar surface connected to the first surface 18 and extends back away from the first connecting edge 16 parallel to the base section 12. The third surface 22 is a substantially planar surface connected to the second surface 20 whose plane forms an acute angle with the base section 12. The fourth surface 24 is also substantially planar and is connected to the third surface 22 so as to be parallel to the base section 12. The fourth surface 24 is of sufficient length that it extends back towards and beyond the plane of the first surface 18. The fifth surface 26 is connected to and extends downwardly from the fourth surface 24. The plane of the fifth surface 26 forms an obtuse angle with the base section 12 which is supplementary with the acute angle formed by the third surface 22 and the base section 12. As shown in FIG. 1, the fifth surface 26 is substantially shorter than the third surface 22.

The panel member 10 also includes a second female flange section 28 which is connected to the base section 12 along a second connecting edge 30 on the opposite side of base section 12 from first connecting

edge 16. The second female flange section 28 is formed from the five surfaces 32, 34, 36, 38 and 40, with the sixth surface 32 corresponding to the first surface 18 in first male flange section 14, the seventh surface 34 corresponding to the second surface 20, the eighth surface 36 corresponding to the third surface 22, the ninth surface 38 corresponding to the fourth surface 24 and the tenth surface 40 corresponding to the fifth surface 26. The surfaces in the male flange section 14 and female flange section 28 are dimensioned such that the dimensions of first surface 18 and sixth surface 32 are substantially equal, the dimensions of second surface 20 and seventh surface 34 are substantially equal and the dimensions of the exterior surfaces of third surface 22, fourth surface 24 and fifth surface 26 are substantially equal to the dimensions of the interior of eighth surface 36, ninth surface 38 and tenth surface 30, respectively.

If desired, a tongue and groove arrangement may also be provided in first surface 18 and sixth surface 32 to provide additional rigidity in the resultant interlocking panel assembly. As shown in FIG. 1, a tongue 42 is provided along the first surface 18 and a corresponding groove 44 is provided in the sixth surface 32. Also, if desired, beads 46 may be provided along base section 12 to provide additional rigidity to base section 12.

FIG. 2 shows a cross sectional view of an interlocking panel assembly formed from two adjacent panels 10 each of which is similar to the panel shown in FIG. 1. As is shown in FIG. 2, the male flange section 14 of one panel is interlocked within the female flange section 28 of the other panel to form an interlocking panel assembly whose interlocked flanges have a substantially trapezoidally shaped cross-sectional area. FIG. 2 also shows the tongue 42 in one panel interlocked with the groove 44 in the other. It has been found that this resultant interlocked assembly having the trapezoidal cross-section and the tongue-and-groove arrangement as shown is easily manufactured, easily assembled and is substantially stronger than interlocking panel assemblies known of the prior art.

FIG. 3 shows a cross-sectional view similar to that of FIG. 2 and illustrates the ease with which two adjacent panels can be snapped together to form the interlocking assembly. As is shown in FIG. 3, the male flange 14 of one panel 10 is placed within the female flange 28 of another panel 10 and the assembly is then slightly rotated clockwise, as shown by the arrow 48, causing the male flange 14 to snap all the way up into the female flange 28 and causing the tongue 42 to mate with the groove 44 to form a rigid interlocking assembly such as is shown in FIG. 2.

FIG. 4 shows a cross-sectional view similar to that of FIG. 2 but illustrates a second embodiment of the present invention. As is shown in FIG. 4, one panel member 10 includes a female flange section 28 such as was shown in the above drawings, but the other panel member 50 includes a channel section 52 positioned along one edge thereof. The male flange section 54 of panel member 50 is connected to the channel section 52 along a connecting edge 56. The resultant assembly shown in FIG. 4 is thus given additional rigidity by the channel 52. In addition, if desired, a spline 58 may be positioned within the interlocked male and female flange sections 54 and 28. As is shown in FIG. 4, spline 58 has a trapezoidal cross-section and the exterior surface of spline 58 substantially conforms to the interior

surface of the interlocked male and female flanges 54 and 28 respectively.

It has been found that all of the panel members shown in the figures can quickly and economically be manufactured by cold roll forming, with entire panel members being formed from a roll of suitable material, such as aluminum.

While the invention is thus shown and several embodiments described in detail, it is not intended that the invention be limited to these shown embodiments. Instead, many modifications will occur to those skilled in the art which lie within the spirit and scope of the invention. It is thus intended that the invention be limited in scope only by the appended claims.

What is claimed is:

1. An interlocking panel assembly comprising, in combination:

- a first panel member including a first base section and a first male flange section, said first flange section comprising:
 - a first surface connected to and extending upwardly from a first connecting edge of said first base section and being substantially normal to said first base section;
 - a second surface connected to said first surface and extending back away from said first connecting edge;
 - a third substantially planar surface connected to said second surface whose plane forms an acute angle with said first base section;
 - a fourth substantially planar surface substantially parallel to said first base section connected to said third surface and extending back towards and beyond the plane of said first surface, and
 - a fifth surface connected to and extending downwardly from said fourth surface whose plane forms an obtuse angle with said first base section, said fifth surface being shorter than said third surface;
- a second panel member including a second base section which is substantially co-planar with said first base section and a second female flange section, said second flange section comprising:
 - a sixth surface connected to and extending upwardly from a second connecting edge of said second base section and being substantially normal to said second base section;
 - a seventh surface connected to said sixth surface and extending back away from said second connecting edge;
 - an eighth substantially planar surface connected to said seventh surface whose plane forms an acute angle with said second base section;
 - a ninth substantially planar surface substantially parallel to said second base surface connected to said eighth surface and extending back towards and beyond the plane of said sixth surface, and
 - a tenth substantially planar surface connected to and extending downwardly from said ninth surface whose plane forms an obtuse angle with said second base section, said tenth surface being shorter than said eighth surface;
- said first and second flange sections being interlocked such that said first and sixth surfaces are adjacent to and co-extensive with each other and said second, third, fourth, fifth, seventh, eighth, ninth and tenth surfaces form an interlocking assembly having a substantially trapezoidal cross-section.

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2. The interlocking panel assembly of claim 1 in which one of said first and sixth surfaces has a groove formed therein and the other of said first and sixth surfaces has a complementary tongue formed therein.

3. The interlocking panel assembly of claim 2 in which said first and sixth surfaces are of substantially equal length, said second and seventh surfaces are substantially co-planar and of equal length, said third and eighth surfaces are of substantially equal length and said fourth and ninth surfaces are of substantially equal length, whereby said interlocking flanges form a trapezoid which is symmetrical about the plane of said first and sixth surfaces.

4. The interlocking panel assembly of claim 3 in which said groove is formed in said sixth surface and said tongue is formed in said first surface.

5. The interlocking panel assembly of claim 4 which further comprises a spline positioned within said trapezoid.

6. The interlocking panel assembly of claim 5 in which the exterior surface of said spline substantially confirms to said trapezoid.

7. A panel member comprising a base section having a first edge and a second edge, a first flange section and a second flange section;

said first flange section comprising:

a first surface connected to and extending upwardly from said first edge of said base section and being substantially normal to said base section;

a second surface connected to said first surface and extending back away from said first connecting edge;

a third substantially planar surface connected to said second surface whose plane forms a first acute angle with said base section;

A fourth substantially planar surface substantially parallel to said base section connected to said third

surface and extending back towards and beyond the plane of said first surface, and

a fifth surface connected to and extending downwardly from said fourth surface whose plane forms a first obtuse angle with said base section, said fifth surface being shorter than said third surface;

said second flange section comprising:

a sixth surface connected to and extending upwardly from said second edge of said base section and being substantially normal to said base section;

a seventh surface connected to said sixth surface and extending back away from said second connecting edge;

an eighth substantially planar surface connected to said seventh surface whose plane forms a second acute angle with said base section;

a ninth substantially planar surface substantially parallel to said second base surface connected to said eighth surface and extending back towards and beyond the plane of said sixth surface; and

a tenth substantially planar surface connected to and extending downwardly from said ninth surface whose plane forms a second obtuse angle with said base section, said tenth surface being shorter than said eighth surface.

8. The panel member of claim 7 in which one of said first and sixth surfaces has a groove formed therein and the other of said first and sixth surfaces has a complementary tongue formed therein.

9. The panel member of claim 8 in which said groove is formed in said sixth surface and said tongue is formed in said first surface.

10. The panel member of claim 9 which further includes a channel section formed in said base section along said first edge of said base section, with the outer side of said channel section forming said first surface.

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