Dec. 6, 1966 W. D. VAN ETTEN 3,289,370

SELF-SUPPORTING PREFABRICATED PANELS AND SEALING MEMBERS THEREFOR

Filed Dec. 21, 1964 2 Sheets-Sheet 1

Fig. 1

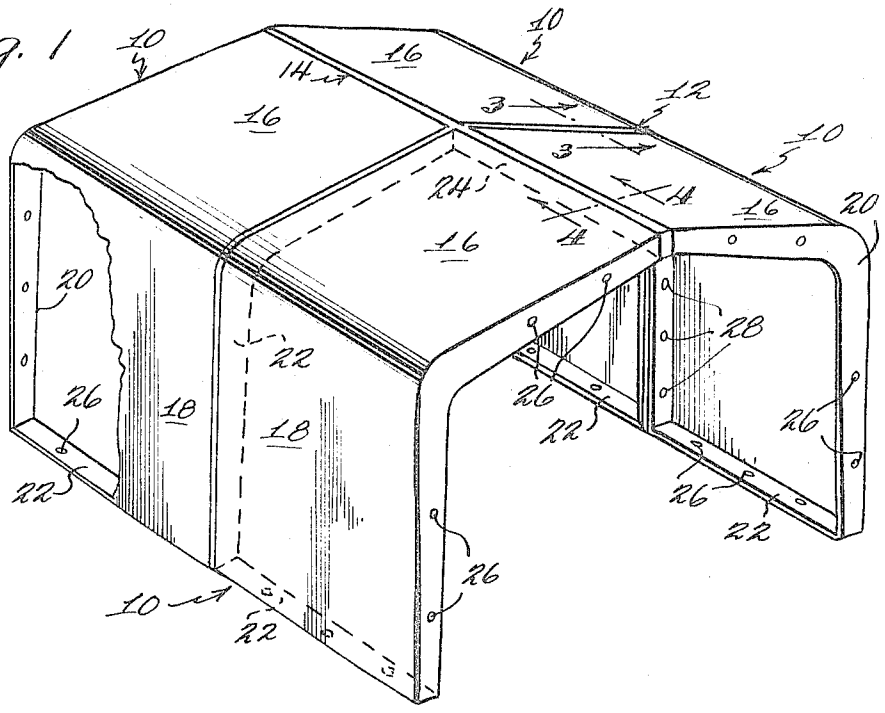
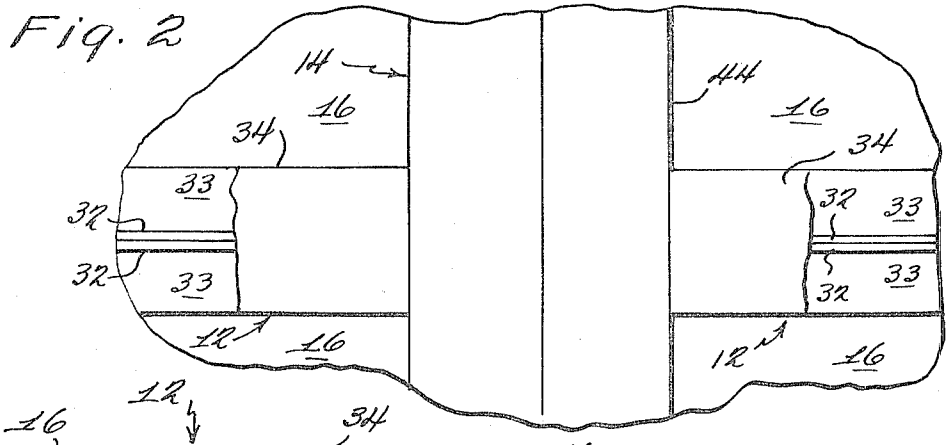


Fig. 2



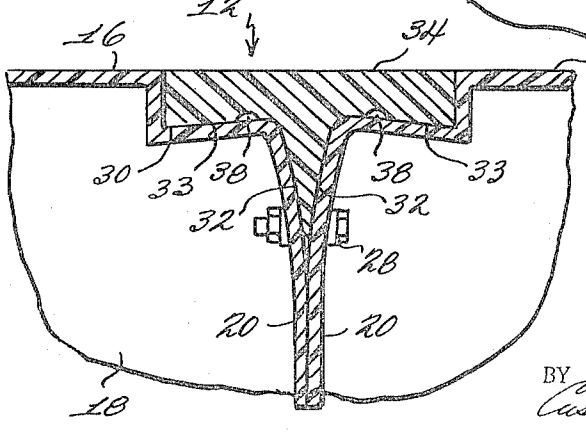


Fig. 3

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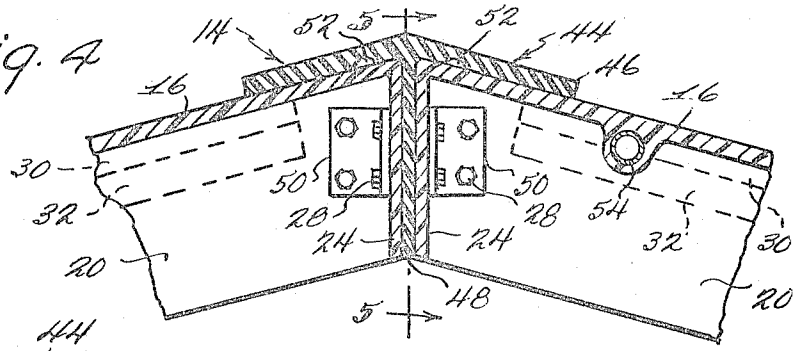
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Fig. 4



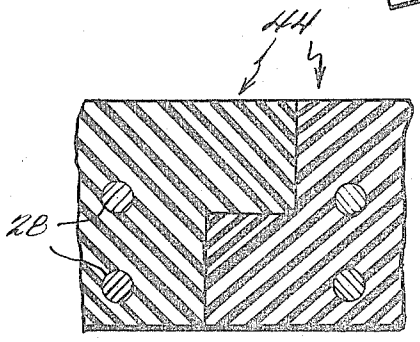


Fig. 5

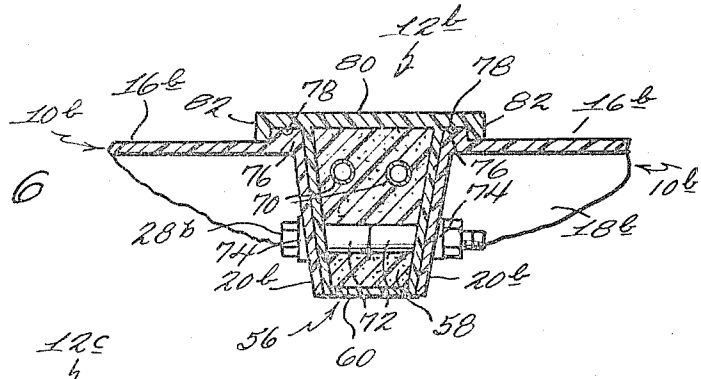


Fig. 6

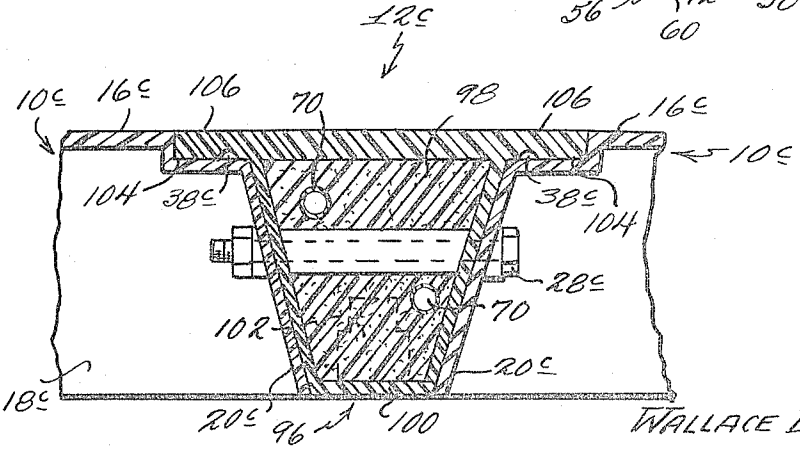


Fig. 7

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3,289,370

SELF-SUPPORTING PREFABRICATED PANELS AND SEALING MEMBERS THEREFOR

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4 Claims. (Cl. 52—309)

This invention relates to weatherproof joints between prefabricated building units and in particular to such joints in combination with building panels which consist of a side wall and half-roof portion constructed integrally with a supporting arch.

In my patent application Serial No. 145,804, filed October 18, 1961, there is described a building unit constructed of fiber-reinforced plastic which is adapted to be joined edge-to-edge with similar units to form small buildings. Each of these units is a panel of generally L shape in profile and includes a side wall section and a half-roof section formed integrally with an arch extending along each of the side edges of the wall and half-roof sections. The free edge of the half-roof section is provided with an integral depending flange. The panels may be assembled by first securing together the just-mentioned roof flanges of two panels, as with bolts, to form a whole roof section and two spaced side walls. Then another pair of similarly joined panels may be joined to the first pair by securing together the sides of the arches of the pair. This arrangement results in a seam along the ridge of the assembled structure and a plurality of spaced seams which extend up one side wall, across the roof and down the other side wall. The present invention has for its object the formation of weatherproof seals at these seams and, more broadly, the provision of weatherproof or watertight seams between building panels generally.

The invention will be further understood from the following detailed description taken with the drawings in which:

FIGURE 1 is a schematic perspective view of a simple building constructed of four prefabricated panels;

FIGURE 2 is a fragmentary top plan view, on an enlarged scale, of the portion of the building of FIGURE 1 where the four panels meet;

FIGURE 3 is a sectional view, on an enlarged scale, taken on the line 3—3 of FIGURE 1, and showing the sealing arrangement between adjacent arches of two panels;

FIGURE 4 is a sectional view, on an enlarged scale, taken on the line 4—4 of FIGURE 1, and showing the sealing arrangement between the depending roof flanges of two panels;

FIGURE 5 is a sectional view taken on the line 5—5 of FIGURE 4; and

FIGURES 6 and 7 are sectional views, corresponding to FIGURE 3, showing second and third forms of sealing arrangements between adjacent arches.

Referring to FIGURE 1 there is shown, schematically, a simple small building assembled from four prefabricated panels **10** which are joined together along weatherproof seams **12**, **14** constructed in accordance with the principles of the present invention. As shown, only four panels **10** have been employed, but it will be appreciated that additional pairs of panels may be added onto the front or rear of the illustrated building. It will be appreciated also that windows and doors may be provided in the sides where desired and that vertical end panels (not shown) and a suitable horizontal base (not shown), such as a concrete slab, may also be provided, all as described in the aforesaid application Serial No. 145,804.

Each panel **10** is an integral unit including a sloping half-roof section **16** merging at its lower end with a vertical side wall section **18**. Along each side edge of the panel is an integrally formed, inwardly extending arch **20**

which is of gradually increasing width from each end toward the middle. A base flange **22** extends in a horizontal plane along the lower end of the side wall section **18** and is integrally formed with the side wall section **18** and with the lower end of each arch **20**. The free end of the half-roof section **16** is integral with a depending roof flange **24** which is also integral at its ends with the upper ends of the arches **20**. The flange **24** and the arches **20** are provided with preformed apertures **26** therethrough for receiving bolts **28** employed in securing adjacent panels **10** to each other or in securing the base flange **22** to a concrete slab or the like.

Preferably, the panels **10** are molded in laminate form of fiber-reinforced polyester plastic material, acrylic resin or other resin. The fiber may be synthetic or natural fiber but preferably is glass fiber in fabric, mat or chopped form. Additional strengthening members, such as steel plates or rods, may be incorporated in the laminate, or plastic strengthening ribs may be molded integrally with either the side wall or half-roof portions. Any appropriate molding technique may be employed such as hand lay-up, spray-up or preform for matched die molding.

Referring to FIGURES 2, 3 and 4 there is shown on an enlarged scale one manner in which the seams **12**, **14** between adjacent panels may be weatherproofed. Referring first to the seam construction **12** between the side wall and half-roof sections **18** of two abutting panels **10** (that is, between adjacent arches of two abutting panels) as shown in FIGURE 3, it will be seen that the junction between each arch **20** and the remainder of its panel is provided with a groove **30**. When the arches **20** are drawn together by tightening the bolts **28**, a channel of substantial width and depth is formed along the abutting surfaces of the two panels **10**. The channel thus formed has lateral boundaries defined by the grooves **30**. The bottom of the channel is defined by a deep central portion **32** which tapers inwardly and which terminates where the flat portions of the arches **20** engage each other. The surface **33** of each arch **20** in the area between the groove **30** and the tapered portion **32** is flat and is inclined upwardly from the groove **30** toward the exterior of the panel.

A sealing strip **34** formed in a shape complementary to the channel between the panels **10** is retained therein by being clamped between the arches **20** along the central portion **32**. The outer exposed surface of the strip **34** is flat and is flush with the exterior surfaces of the panels **10**.

In order to improve the resistance of the seam **12** to the passage of water, the sealing strip **34** is provided with a pair of longitudinal grooves **38** which cooperate with the surfaces **33** of the channel to form a pair of continuous enclosed passages extending the entire length of the strip **34**. These passages, particularly in combination with the sloping surfaces **33**, are important in maintaining a waterproof seam. Water which seeps between the strip **34** and the panels **10** at the exposed surfaces will tend to find its way to the interior of the building by capillary action which will exist in the thin film of water. This action is hindered first by the abrupt change in direction at the grooves **30** and by the sloping of the surfaces **33**. More important, however, is the presence of the enclosed passages which are of sufficient height and width to disrupt the capillary action. Water finding its way to the passages will drain away by virtue of the slope of the half-roof sections **16** and the vertical position of the side wall sections **18** of the panels **10**.

In FIGURE 4 there is shown one manner of providing a weatherproof seam **14** along the ridge of the building between two abutting roof flanges **24**. In this embodiment the seam **14** consists of a generally T-shaped

sealing strip **44** having a cap portion **46** and a vertical body **48**. The body **48** is clamped between the opposed surfaces of the adjacent roof flanges **24** and the cap portion overlies part of the adjacent half-roof sections **16**. The four panels **10** are held in abutting relationship by four angle brackets **50**, two of which are shown in FIGURE 4. One bracket **50** is disposed at the corner of each panel in engagement with the respective roof flange **24** and with the respective arch **20**, and bolts **28** are passed through the opposed legs of the different brackets, as shown.

The undersurface of the cap portion **46** of the ridge strip **44** is provided with two longitudinal grooves, one disposed on each side of the body **48**. In the assembled seam **14**, the grooves **52** define with the upper surface of the half-roof sections **16** a pair of passages which, like the passages formed by the grooves **38** in FIGURE 3, break the capillary action of any water attempting to seep between adjacent roof flanges **24**.

FIGURE 4 also shows a conduit **54** which has been incorporated into one of the half-roof sections **16** during fabrication of the latter. The conduit **54** projects through the arches **20** of the respective panel and is connected to a corresponding conduit in the next panel so as to form a continuous passage for receiving electric cables or the like.

Preferably ridge strip **44** and each of the roof and side strips **34** are formed in a single length so that no splicing is necessary. If it becomes necessary to splice two lengths, a portion of each end may be cut away so that the ends may be overlapped, as shown in FIGURE 5, and secured together with a waterproof adhesive. If desired, the ends may be mitered in a conventional manner.

The strips **34** and **44** may be constructed of resilient rubber-like material, as illustrated, or of more rigid material, such as the same material of which the panels are formed. During assembly of a building the strips will be placed in position before final drawing together of the panels **10**. In most instances the ridge strip **44** may be slid into the channel just before insertion of the bolts which will pass through the roof flanges **24**.

In FIGURE 6 there is shown a second form of side and half-roof seam **12***b* which also provides additional structural strength. As shown, there is provided a separate rigid arch member **56** of substantial thickness which is coextensive with and clamped tightly between the adjacent arches **20***b* of two panels **10***b*. The arches **20***b* are inclined outwardly from the center of their respective panels **10***b* for closer nesting of the panels during storage and transit and for added strength in long span buildings.

The separate arch members **56** are each constructed of a lightweight, high-strength core **58** which is of the same width as the panel arches **20***b*. Surrounding the core **58** on all sides is a molded-on shell **60** of fiber-reinforced plastic formed, for example, of the same material as the panels **10***b*. The core **58**, which in transverse cross section has the shape of a trapezoid in order to conform to the inclined panel arches **20***b*, is formed of foamed plastic, honeycomb of plastic or metal sheet construction, or other lightweight filler. Electrical conduits **70** or other piping may be incorporated in the core **58** as it is manufactured, or the core **58** may be provided with molded or drilled holes to receive wiring directly. The shell **60** defines a batten member **80** which cooperates with adjacent portions of the panels to form a weatherproof joint.

Integral with each arch **20***b* is a longitudinally extending, outwardly projecting rib **76** which forms a support and seal for the batten member **66**. The outer surface of each rib **76** is provided with a longitudinal groove **78** which forms with the undersurface of the batten member **80** a passage for breaking capillary action and for draining away water. The edges of the

batten member **80** terminate in flanges **82** which snap over and tightly engage the lateral surfaces of the ribs **76** to aid in forming a weatherproof joint.

Panels having the arch construction shown in FIGURE 6 may be assembled with bolts **28***b* which pass through the panel arches **20***b* and through the separate arch member **56**. As shown, spacer sleeves **72** surrounding the shanks of the bolts are provided inside the arch member **56**, and wedge-shaped washers **74** are provided at the bolt head and at the nut to mate with the inclined arches **20***b*.

In FIGURE 7 there is shown a third form of a side and half-roof seam **12***c*. As in the construction shown in FIGURE 6, there is provided a separate arch member **96** which is coextensive with and clamped tightly between adjacent arches **20***c* of two panels **10***c*. As before, each arch member **96** consists of a central trapezoidal core **98** of lightweight construction, such as foamed plastic, and an outer shell **100** of fiber-reinforced plastic. Electrical conduits **70** or other piping may be incorporated in the core **98** as well as electrical outlet boxes, one of which is illustrated at **102**. As in the previously described embodiments the panels are joined together with bolts, one of which is illustrated at **28***c*.

The junction of each panel arch **20***c* with its respective half-roof section **16***c* has a longitudinal generally L-shaped groove **104** which is undercut below the exterior surface of the half-roof portion **16***c*. In the assembled form these grooves **104** receive laterally extending flanges **106** formed integrally with the shell **100** of the beam **96**. The undersurface of each flange **106** is provided with a longitudinal groove **38***c* for forming a capillary break.

It will thus be seen that the present invention provides a seam construction between prefabricated building panels which is weatherproof and easily incorporated during assembly of the panels. Modifications will occur to those skilled in the art without departing from the scope of the invention, and it is therefore not intended that the above-described details be limiting except as they appear in the appended claims.

What is claimed is:

1. A building structure formed of separate self-supporting prefabricated panels, each of said panels including a wall section and a flange depending from at least one edge of the wall section in a direction generally normal to the wall section, each panel having a shoulder portion extending along the juncture between each flange and its wall section; adjacent panels being disposed with their flanges facing each other in opposed relationship; an elongated sealing member interposed between the opposed flanges, each sealing member having a batten portion cooperating with the shoulder portions of the panels and an integral leg depending therefrom and extending between the panel flanges; fastening means passing through opposed flanges and the leg of the sealing member thereby holding the panels in sealing relationship; said sealing member forming with the flanges of adjacent panels an unobstructed enclosed passage defined in part by the respective panel flange and in part by the sealing member, said passage extending substantially the entire length of said sealing member and parallel to said flanges, either one of said shoulders or said batten having a groove for breaking the capillary action acting within any film of water which has penetrated between said sealing member and the flanges.

2. A building structure according to claim **1** in which the shoulder portion of the panel is a depressed shoulder in which the back portion of the sealing member fits to form a substantially flush surface with the wall section of the panel.

3. A building structure according to claim **1** in which the shoulder portion is in the form of a raised rib extending above the surface of the wall section of the panel and the back portion of the sealing element being in

the form of a shallow trough, the edges thereof depending from the batten and contacting the flat surface of the panel beyond the portion defining the groove for breaking capillary action.

4. A building structure according to claim 1 in which the leg of the sealing member is a trapezoidal cross section with the broader of the parallel sides of the trapezoid forming a part of the batten, the leg having a lightweight core of foam synthetic plastic and a shell of water impervious material of greater density than the core.

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