Jan. 21, 1964 G. D. WEED ETAL 3,118,252

METALLIC ROOF CONSTRUCTION

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Fig. 1

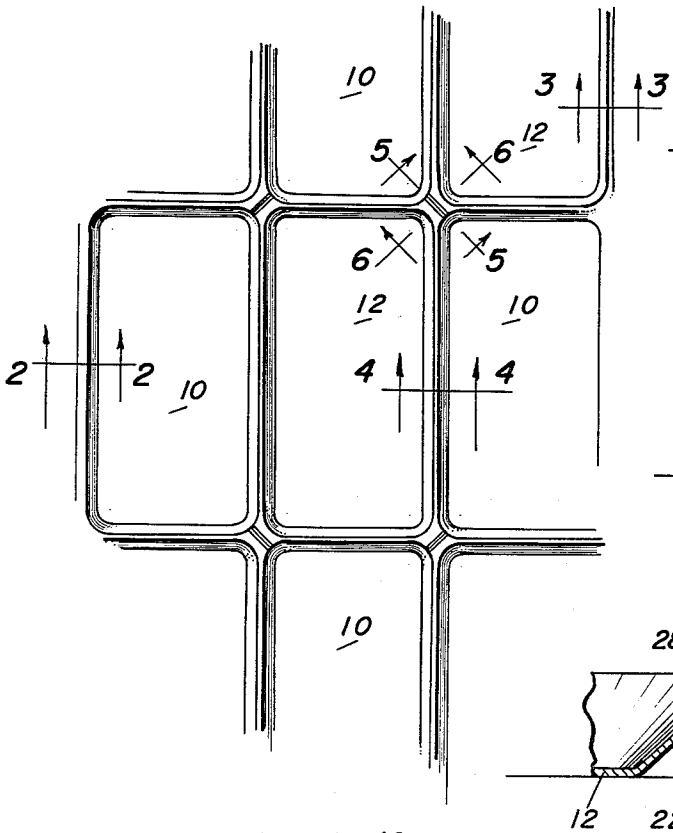


Fig. 2

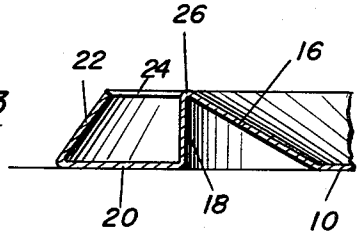


Fig. 3

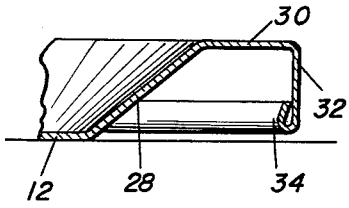


Fig. 4

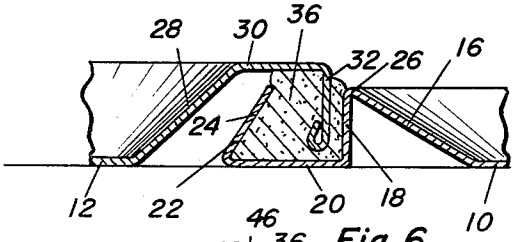


Fig. 5

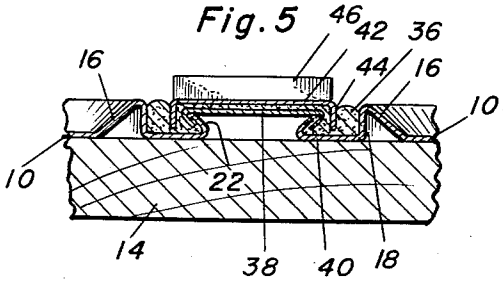


Fig. 6

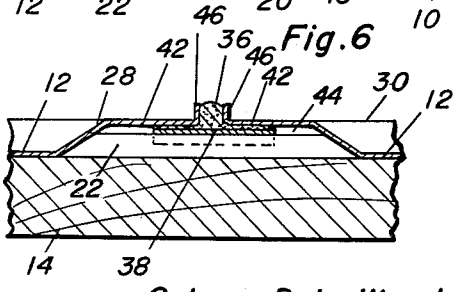
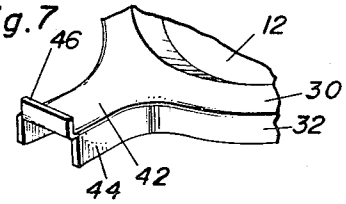


Fig. 7



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Fig. 10

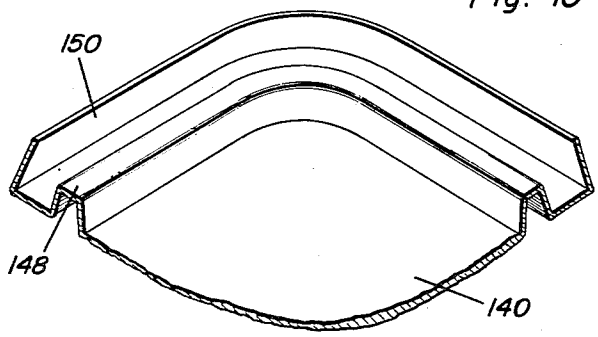


Fig. 11

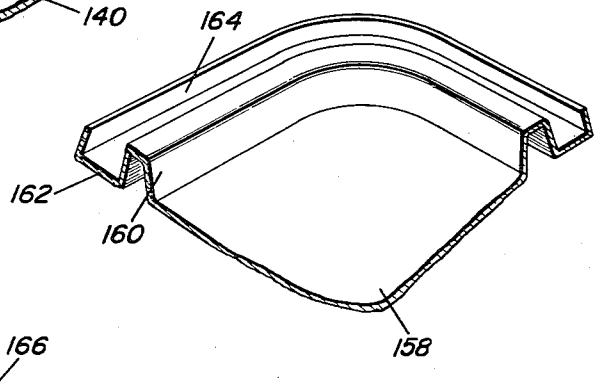


Fig. 8

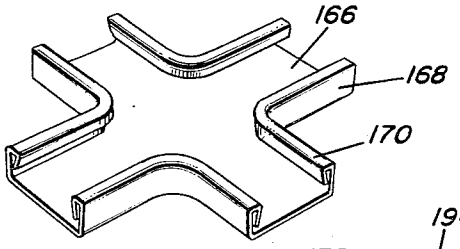
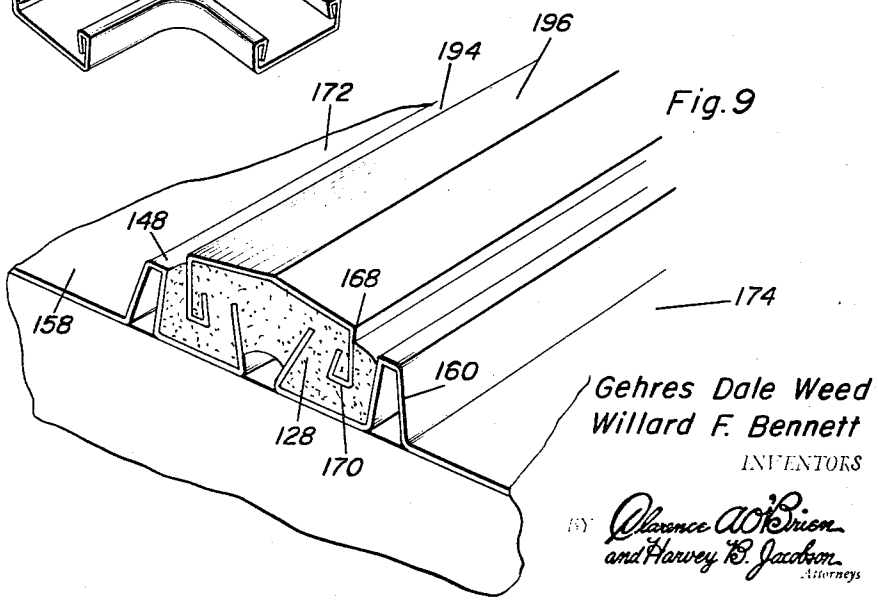


Fig. 9



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Fig. 12

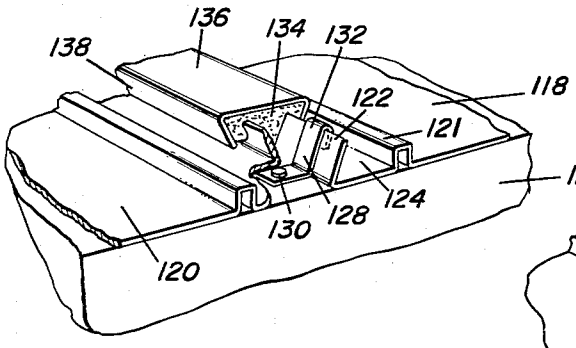


Fig. 13

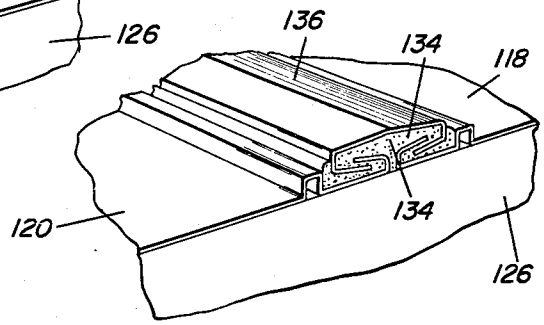


Fig. 14

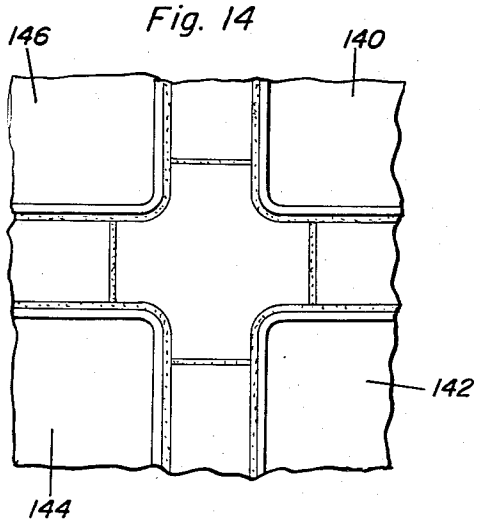
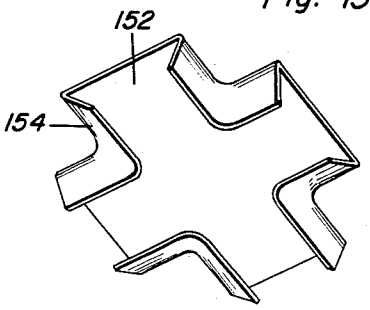


Fig. 15



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United States Patent Office 3,118,252 Patented Jan. 21, 1964

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METALLIC ROOF CONSTRUCTION

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Filed Aug. 19, 1959, Ser. No. 834,729
6 Claims. (Cl. 50—209)

The present invention generally relates to novel structural details of sheet metal roofing and more particularly to a joint for securing the edges of panels or units of sheet metal roofing together while sealing the same.

In the application of sheet metal roofing to buildings or the like, there has been an outstanding problem of connecting the panels of sheet metal in such a manner that the joint will be retained in a waterproof condition for an extended length of time. Various methods have been employed in joining the edges of the sheet metal panel including the overlapping and interlocking of the panels as well as the actual connection of the panels such as by soldering or the like. While soldering provides a waterproof condition, it also provides a rigid relationship between the panels which will not allow for expansion and contraction which occurs in roof panels due to change in temperatures. When this occurs, the joint between the panels, even though soldered, will quite often be ruptured thus eliminating the waterproof condition thereof. Therefore, it is the primary object of this invention to provide a simple and inexpensive method of joining sheet metal together for use as a roofing material by providing a joint between said sheets of metal which includes a plastic material that will insure expansion and contraction without the rigidity of a soldered joint and also maintain the watertight relationship between the panels.

Another object of the present invention is to provide a method of joining metal roofing panels in which the adjacent edges are generally bent to define a channel-shaped area or trough-shaped area for receiving a mastic with the edges of some portion of the edges of each panel being embedded in plastic material disposed in the trough or channel-shaped area for effectively sealing the panels together.

Another important object of the present invention is to provide a method of joining sheet metal roofing panels in which several variations of the basic concept are provided with all of these concepts providing an expansion joint due to the particular bend formed in the edges of the panels and also due to the mastic or plastic material disposed in the trough shaped area and also due to the disposal of edge portions of the channel in the mastic for sealing relation.

A further important feature of the present invention is to provide a method of joining sheet metal roofing panels which incorporates a structure which may be easily formed on the job by suitable simple tools with the structure being extremely simple, easy to make and use, efficient in use, well adapted for which the same is intended and generally inexpensive to manufacture.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and opertation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a plan view of a portion of a roof with a plurality of panels joined peripherally;

FIGURE 2 is a detailed sectional view, on an enlarged scale, taken upon a plane passing along section line 2—2 of FIGURE 1 illustrating the structure of one edge of each panel;

FIGURE 3 is a detailed sectional view, on an enlarged scale, taken substantially upon a plane passing along section line 3—3 of FIGURE 1 illustrating the structure of another edge of the panel;

FIGURE 4 is a detailed sectional view taken substantially upon a plane passing along section line 4—4 in FIGURE 1 showing the joint between parallel edges of the panels;

FIGURE 5 is a detailed sectional view taken upon a plane along section line 5—5 of FIGURE 1 illustrating the structure of the corner joint;

FIGURE 6 is a sectional view taken substantially upon a plane passing along section line 6—6 of FIGURE 1 showing further details of the corner joint structure;

FIGURE 7 is a fragmentary perspective view of one corner of a panel illustrating the structure thereof;

FIGURE 8 is a perspective view of a modified form of corner joining device;

FIGURE 9 is a partial perspective view of yet another form of the invention;

FIGURE 10 is a partial perspective view of the corner one of the panels;

FIGURE 11 is a view similar to FIGURE 10 but illustrating the structure when the joint is completely formed;

FIGURE 12 is a partial perspective view of another form of the present invention with the joint partially completed;

FIGURE 13 is a perspective view of the completed joint;

FIGURE 14 is a plan view of a corner joint employing the concepts of FIGURE 12; and

FIGURE 15 is a perspective view of the corner joint.

Referring now specifically to FIGURES 1–7, one form of the present invention is illustrated for joining rectangular sheet metal roofing panels 10 and 12 together and mounting the same on sheeting 14 or the like.

Each of the panels 10 is provided with a peripheral upwardly inclined and outwardly extending edge portion 16 terminating in a downwardly extending vertical wall portion 18 with the vertical wall portion 18 extending peripherally around the panel 10 and having an outwardly extending horizontal flange 20 at the bottom edge thereof. The outwardly extending horizontal flange 20 terminates in an upwardly inclined flange 22 which converges towards the vertical wall 18 and which has an upper edge 24 terminating below the upper edge of the vertical wall portion 18 which is in the form of a bend 26 connecting the vertical wall portion 18 to the inclined portion 16.

Each panel 12 is provided with a peripheral upwardly inclined flange or portion 28 which terminates at its upper end with a horizontally extending peripheral flange 30. The flange 30 terminates in the depending vertical wall portion 32 having the lower edge terminating in a reversely bent portion 34. The lower edge of the vertical wall portion 32 is disposed above the plane of the panel 12 and is adapted to be disposed within the trough or U-shaped channel formed by the vertical wall portion 18, flange 20 and flange 22 as illustrated in FIGURE 4.

Before application of panels 12, the gutter or trough around the margin of panels 10 are filled with mastic 36 and the panels 12 are then placed in their proper location in relation to panels 10 and the marginal depending legs 32 are pressed into the mastic in the gutter of the panels 10 thus forming a seal about the periphery of the panels with portion 34 forming a key in the mastic.

At the corner between the panels, it will be seen in FIGURE 5 that a spacer 38 of inverted U-shaped construction is disposed between the panels 10 with the spacer 38 having downwardly extending and converging legs 40 received within the upwardly opening troughs or gutters formed on the panels 10. The spacer 38 not only serves to retain the panels 10 in exact spaced relation

but also serves as a baffle against leakage through the crack between diagonally disposed panels 12.

As shown in FIGURE 7, each corner of the panels 12 has a radial extension 42 with depending legs 44 forming continuations of the legs 32 with the extension 42 forming a continuation of the flange 30. The legs 44 are curved to conform to the curvature of the gutters or troughs formed in the panel 10 and are received therein as illustrated in FIGURE 5. Also, the outer edge of the extension 42 is provided with an upturned tab 46 which is spaced from a corresponding tab 46 on a diagonally opposed panel 12 whereby mastic 36 is also disposed between the abutment 46 and between the extension 42 and the spacer 38 and between the free edges of the legs 44 and the vertical wall portions 18 and the flanges 22 and inturned legs 40 whereby the mastic cooperates with all of the various flanges for retaining the panels in sealed relation.

Referring now particularly to FIGURES 8–15, the roof panels 118 and 120 are placed on the roof in consecutive order with the roof panels 118 and 120 each having a longitudinally extending and upstanding U-shaped inverted member or rib 121 thereon in spaced relation to an upturned and slightly outwardly inclined flange 122 which defines a channel shaped area 124 therebetween. The panel 118 is secured to the underlying roof structure 126 by a plurality of clips 128 having a fastener 130 securing it to the roof structure 126 and having a hook shaped end 132 for engagement over the upper edge of the upturned flange 122. Thus, when the flanges 122 are disposed in adjacent relation to each other, they define a generally V-shaped trough for receiving mastic 134 which is also received in a generally inverted U-shaped cap 136 that has the depending side walls 138 converging inwardly with the side walls 138 being spaced from the flanges 122 with mastic 134 therebetween.

The cap 136 is filled with mastic and is pressed over the two upstanding flanges 122 with the final condition of the components of the joint being illustrated in FIGURE 13.

FIGURE 14 is a plan view of the joint structure of the present invention for joining the corners of adjacent panels 140, 142, 144 and 146 each of which includes the inverted U-shaped rib 148 and the upturned free edge, flange 150, see FIG. 10, which is the same as the structure mentioned in connection with panels 118 and 120.

FIGURE 15 illustrates the cap which includes a generally cruciform panel 152 having depending flanges 154 converging towards each other similar to the flanges 138 but with the flanges being disposed on all of the side edges of the member 152.

FIGURE 11 illustrates a panel 158 having an upstanding inverted U-shaped rib 160 around the periphery thereof which rib includes an outwardly extending flange 162 terminating in an upwardly and inwardly inclined flange 164 which is adapted to receive the cruciform type of cap shown in FIGURE 8 including sheet member 166 which has depending flanges 168 on each side edge of each arm of the cruciform body 166. The flanges 168 are reversely bent as indicated by the numeral 170.

FIGURE 9 illustrates the form of the invention described in FIGURE 8 and also includes the use of panels 172 and 174 and the panels 172 and 174 have raised portions 194 and the mastic will effectively seal the joints between the closure member 196 similar to the member 166 with the mastic 128 being disposed completely within the cap 196 and also exteriorly of and interiorly of the internal flanges or ribs respectively. After the mastic is hardened, the wedge shape of flange 168 and the wedge shape of the channel formed by flanges 162 and 164 renders the components completely interlocked.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A roof assembly comprising a plurality of rectangular panels arranged in side by side and end to end relation to form a continuous roof, the panels being of two different groups and each group alternating both horizontally and vertically in said side by side and end to end arrangement so that like panels are arranged in diagonal opposed relationship, a first group of said panels having an upwardly facing gutter defined peripherally thereon, the second group of said panels each having a downwardly extending leg for reception in the gutter, and mastic received in the gutter for embedment of the downwardly extending leg thereby sealing the panels peripherally, the corners of the first group of panels being curved and interconnected and spaced by inverted U-shaped spacers received in and engaging with the gutters on the first group of panels for retaining the first group of panels in properly orientated position, and means on the corners of the second group of panels for engaging each other and retaining the second group of panels in spaced relation.

2. The structure as defined in claim 1 wherein said last named means includes a radial extension at each corner of the second group of panels with the radial extension having depending legs curved to conform to the curvature of the corner portions of the gutters on the first group of panels, and an upstanding abutment on the free end of the radial extension for disposition in spaced relation to a similar abutment on a diagonally opposed identical panel for receiving mastic therebetween thereby sealing the corner structure.

3. The structure as defined in claim 2 wherein said extension is disposed in overlying relation to the spacer whereby the spacer will form a bottom for that area of the extension to either side of the upstanding abutments thereby preventing leakage of the mastic.

4. The structure as defined in claim 3 wherein said gutter is formed by an upwardly inclined peripheral wall, a depending vertical wall portion at the outer edge of the inclined wall, a horizontal flange connected with the bottom edge of the vertical wall portion, and an upwardly and inwardly inclined flange forming a generally U-shaped gutter for receiving mastic and for receiving the depending leg on the second group of panels.

5. The structure as defined in claim 4 wherein said depending leg on the other group of panels is defined by an upwardly and outwardly inclined peripheral wall portion, an outwardly extending horizontal flange connected with the wall portion, and a depending peripheral leg on the outer edge of the horizontal flange for embedment in the mastic for sealing the joint between adjacent panels.

6. A joint for connecting the corners of diagonally arranged roof panels, each roof panel having a peripheral upwardly opening trough formed thereon with the bottom of the trough being coplanar with the major portion of the panel, an inverted U-shaped member bridging the space between the troughs and having depending flanges received in the troughs, and mastic filling said troughs and surrounding said U-shaped member for sealing the U-shaped member, and further comprising means for connecting diagonally arranged panels disposed in side-by-side relation to the first mentioned pair of panels and including a diagonally extending projection overlying the inverted U-shaped member, each projection terminating in an upwardly extending flange, said flanges being normally spaced from each other and forming a mastic receiving area whereby the inverted U-shaped member forms

a bottom for the area between the flanges for retaining the mastic therein.

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