

Dec. 7, 1954

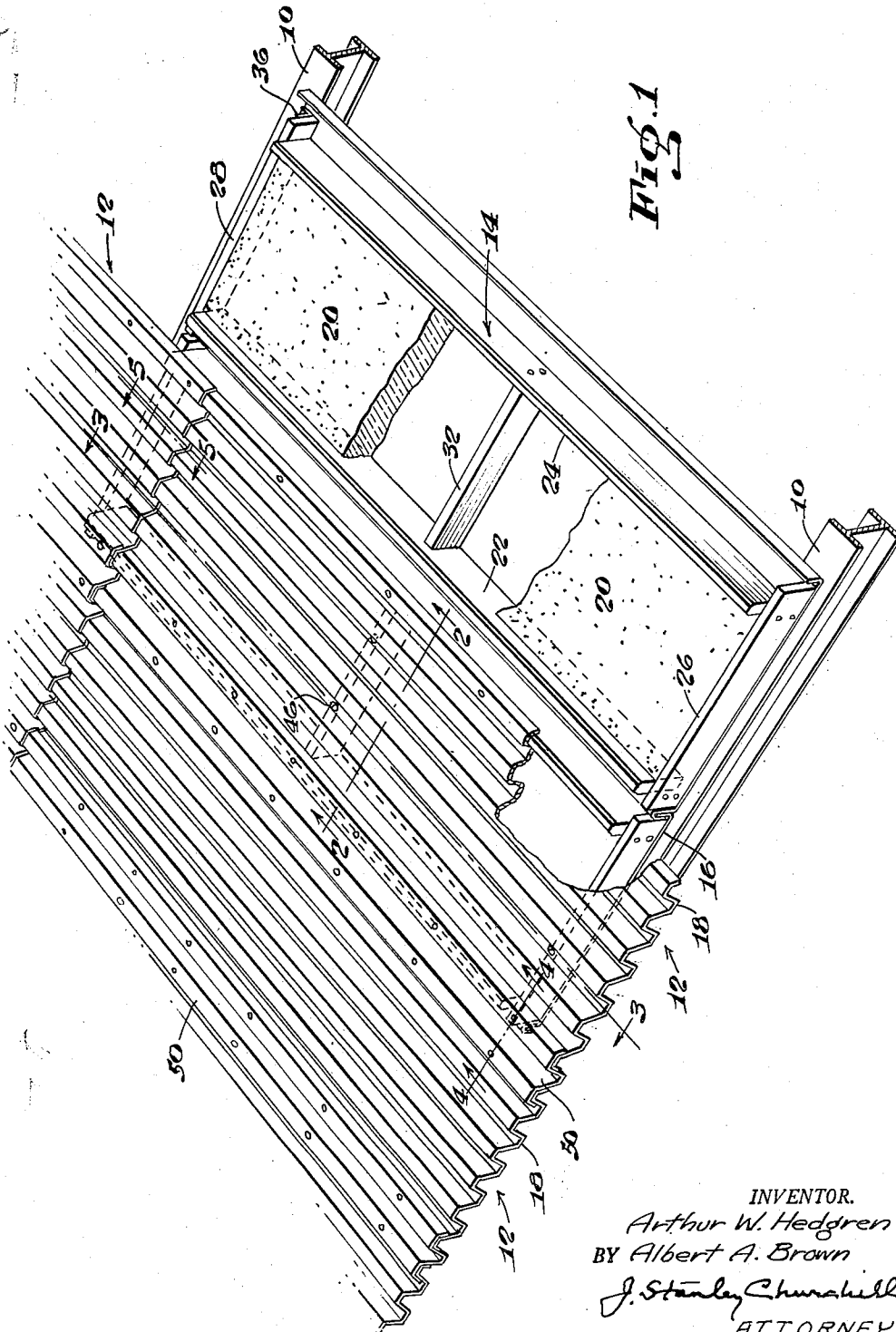
A. W. HEDGREN ET AL

2,696,281

BUILDING STRUCTURE AND INSULATED METAL PANEL

Filed April 16, 1952

2 Sheets-Sheet 1



Dec. 7, 1954

A. W. HEDGREN ET AL

2,696,281

BUILDING STRUCTURE AND INSULATED METAL PANEL

Filed April 16, 1952

2 Sheets-Sheet 2

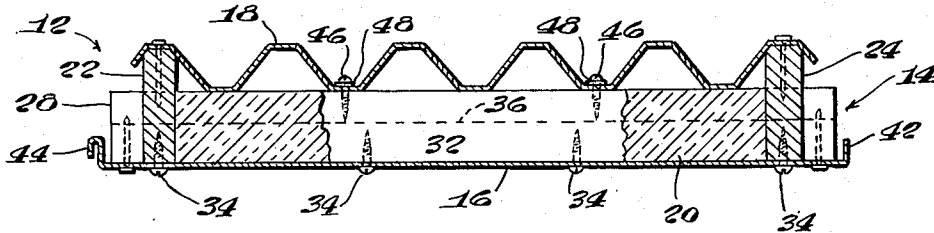


Fig. 2

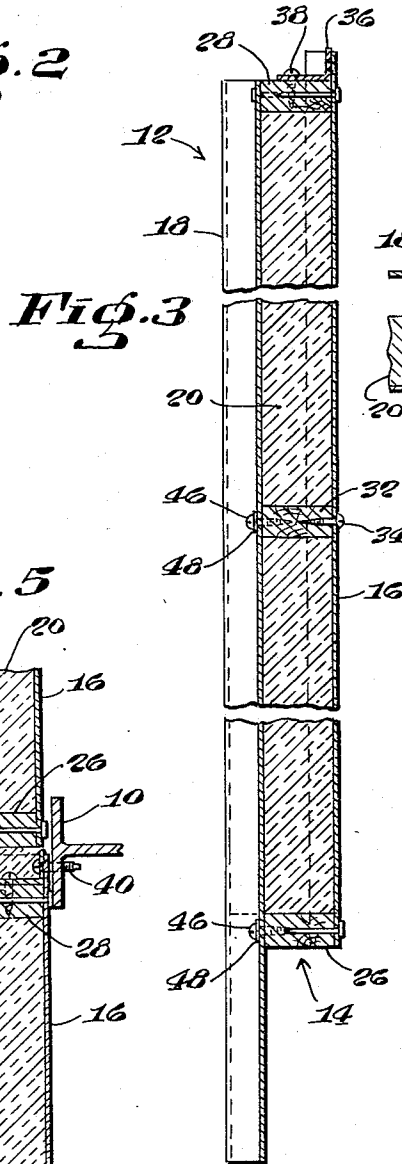


Fig. 3

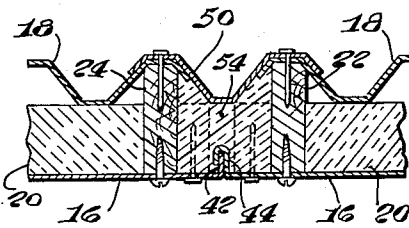


Fig. 4

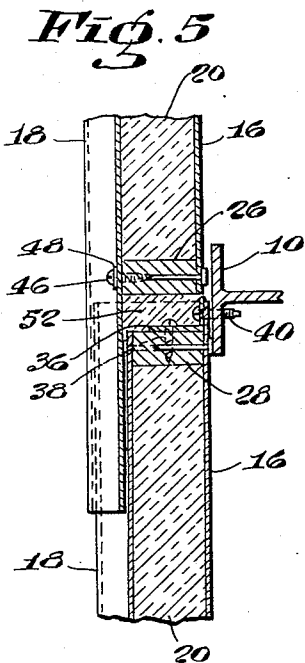


Fig. 5

INVENTOR.
Arthur W. Hedgren
BY Albert A. Brown
J. Stanley Churchill.
ATTORNEY

1

2,696,281

BUILDING STRUCTURE AND INSULATED METAL PANEL

Arthur W. Hedgren and Albert A. Brown, Pittsburgh, Pa.,
assignors to H. H. Robertson Company, Pittsburgh, Pa.,
a corporation of Pennsylvania

Application April 16, 1952, Serial No. 282,558

3 Claims. (Cl. 189—86)

This invention relates to a building structure and more particularly to an insulated metal panel structure.

The object of the invention is to provide a novel insulated panel unit which may be manufactured and assembled in the shop and then shipped to the field to be erected upon the building with the expenditure of a minimum of time, effort and expense.

Another object of the invention is to provide a novel insulated panel unit embodying two spaced metal sheets operatively supported upon an insulated framework and with preformed insulation disposed between the metal sheets and within the framework providing a panel unit which may be readily assembled in the field, and provision is made for enabling the spaces between adjacent panel units to be filled with loose insulation in the field as the panels are being erected to thereby form a most efficient, completely insulated panel structure.

With these general objects in view and such others as may hereinafter appear, the invention consists in the insulated panel structures and in the various arrangements and combinations of parts hereinafter described and more particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 is a perspective view illustrating a portion of a panel structure embodying the present invention; Fig. 2 is a transverse section of an individual panel as viewed from the line 2—2 of Fig. 1; Fig. 3 is a longitudinal section of an individual panel as viewed from the line 3—3 of Fig. 1; Fig. 4 is a cross-sectional detail taken on the line 4—4 of Fig. 1 showing the structure connecting the side edges of adjacent insulated panels; and Fig. 5 is a cross-sectional detail taken on the line 5—5 of Fig. 1 showing the overlapping structure of the ends of adjacent panels and the manner of attachment to the structural members of the building.

In general the present invention seeks to provide an insulated panel unit which may be fabricated in the shop and shipped as a unit to the field to be erected with similar panel units with the expenditure of minimum effort and expense in the field. The panel unit comprises an insulated framework, a pair of metal sheets secured to opposite sides of the framework in spaced relation and preformed slabs of insulated material received between members of the framework and between the metal sheets. One metal sheet preferably comprises a flat sheet provided with male and female lip portions along the side edges thereof, and such side edges are arranged to project a short distance beyond the side edges of the supporting framework. The second metal sheet preferably comprises a corrugated metal sheet which is arranged to terminate beyond the side members of the supporting framework but short of the side edges of the first metal sheet. When such sheets are erected upon the structural members of the building with the male and female lips interlocking, the spaces between adjacent members of the assembled and erected units may be filled with loose insulation, and the open spaces between the corrugated sheets of adjacent sections may be closed by a corrugated flashing or cover member secured to the adjacent side members of the supporting frames of the two panel units. In this manner minimum operations and labor are required in the field for forming the completely insulated panel structure. Provision is made for forming overlapping joints between the lower and upper edges of the vertically adjacent panel units, as will be described.

2

Referring now to the drawings, the invention has been illustrated herein as embodied in a building structure wherein 10 represents two structural members of the building frame upon which the present improved insulated panels, indicated generally at 12, are erected. As herein shown, each panel 12 includes an elongated rectangular frame member 14 of nailable and preferably non-heat conducting material, such as wood. A flat metal sheet 16 is attached to the underside thereof, and a corrugated metal weatherproofing sheet 18 is attached to the top thereof, the frame member 14 defining spaces or recesses in which preformed insulating sections 20 are received between and preferably filling the space between the upper and lower metal sheets.

As herein illustrated, the rectangular frame 14 may comprise two spaced longitudinal members 22, 24 tied together at their ends by horizontal members 26, 28 which may and preferably will extend laterally a short distance beyond the ends of the members 22, 24, and an intermediate tie piece 32 extended between the members 22, 24, the frame members being preferably nailed or otherwise secured together, as indicated. The flat metal sheet 16 may comprise a galvanized steel sheet which may be provided with punched openings to permit the sheet to be nailed to the horizontal end members 26, 28 of the frame and to permit the sheet to be nailed to the longitudinal members 22, 24. As illustrated, the sheet 16 may be secured to the intermediate member 32 by round-head wood screws 34, as shown. One edge of the flat metal sheet 16 may be substantially flush with the outer surface of the horizontal frame member 26, and the metal sheet 14 may extend a short distance beyond the horizontal frame member 28 to form a support for a horizontal angle bar 36 secured to the frame member 28 by round-head wood screws 38. The angle bar 36 comprises the attaching member for securing the assembled panel unit to the structural member 10 by means of metal drive screws 40 driven through the angle bar 36, metal sheet 16, and into the flange of the purlin 10, as shown in Fig. 5. The marginal side edges of the flat metal sheet 16 extend a short distance beyond the sides of the wooden frame and are provided with upwardly extended male and female lip portions 42, 44 respectively, as illustrated, for interlocking engagement with adjacent panel units 12.

With a panel unit assembled as thus far described, the preformed insulating sections 20 may be placed in the rectangular recesses defined by the wooden frame 14 and the flat bottom sheet 16, and the corrugated weatherproofing sheet 18 may then be secured to the tops of the longitudinal frame members 22, 24 by nailing, as indicated in Fig. 2. As therein shown, the longitudinal frame members 22, 24 extend upwardly beyond the tops of the horizontal frame members 26, 28, 32 a distance corresponding to the height of the corrugations of the weatherproofing sheet 18, and the tops of the members 22, 24 are beveled along their upper edges to fit into a corrugated portion placed thereover. The corrugated sheet 18 is further secured to the frame member by wood screws 46 provided with rubber or like washers 48 and extended through selected of the low corrugations and into the tops of the horizontal members 26, 28 and 32, as illustrated.

It will be observed that the insulated panel structures thus far described may be completely fabricated and assembled in the shop and shipped to the field in a condition ready to be erected and the panel structure completed with the expenditure of minimum time and effort.

In order to form overlapping joints at the ends of the erected panel units, the upper end of the corrugated sheet 18 is preferably substantially flush with the upper end of the rectangular frame 14, and the lower end of the corrugated sheet is preferably extended a substantial distance beyond the lower end of the frame 14, the extended portion being arranged to overlap the upper end of the next lower panel unit. The width of the corrugated weatherproofing sheet 18 is preferably made less than the width of the frame 14, and in the erection of the roofing or siding structure, when the bottom sheets 16 of adjacent panels are engaged in interlocking side by side relation, the space between the side edges of adja-

cent panels may be covered by a corrugated flashing member 50 arranged to rest in overlapping relation on the adjacent side edges of the corrugated sheets 18 on top of adjacent longitudinal frame members 22, 24 to bridge across the space, as illustrated. The corrugated flashing member 50 may and preferably will be of the same material and cross section as the corrugated sheets 18 and form in effect a continuation of the same. In practice, the flashing member may be equal in length to the corrugated sheets and may be secured to the adjacent edges of the corrugated sheets by nailing the same to the adjacent longitudinal frame members 22, 24, and in practice, a bituminous seal may be mopped onto the sheets underlying the overlapping portions of the flashing. In the erection of the panels 12, the horizontal spaces between the ends of adjacent frame members of the panels may be packed with insulation, as shown at 52, and likewise, the longitudinal spaces between the frame members 22, 24 of adjacent panels may also be provided with a packing of insulation 54 prior to affixing the flashing members 50, thus providing a completely insulated building structure.

In practice, the present insulated roofing or siding panels may be entirely prefabricated in the shop of a length such as to extend between the structural members 10 or other load-supporting members, the ends of the panels resting on and extended over substantially one-half the width of the purlins, each panel being secured at one end only to a purlin 10 by the metal fasteners 40 extended through the attaching bars 36, as described. During the erection of the panels in end to end relation, the upper end of a panel is provided with a packing of insulation 52 preferably in the form of a relatively thick ribbon prior to placing the next succeeding panel with the extended portion of the corrugated sheet 18 resting in overlapping relation on the upper face of the first panel, the insulating ribbon 52 being compressed between the ends of the panels during erection. The overlapping portion of the corrugated sheet may also be hot mopped in place and nailed to the adjacent panel, as indicated. During the erection of the panels in side by side relation, the marginal edges of the bottom sheets 16 are engaged in interlocking relation, the space between adjacent frame members being provided with a packing of loose insulation whereupon the flashing member 50 may be affixed to adjacent corrugated sheets to cover the spaces and to complete the insulated structure, as described.

It will be observed that the above-described construction may be quickly and easily erected and provides complete insulation against the transmission of heat or cold by conduction so that formation of condensation upon the undersurfaces of the panels is reduced to a minimum, the air spaces between the insulating sheets and the corrugations of the weatherproofing sheets providing ventilation. The described construction may be used for all panel purposes and to provide a dry, lightweight insulated roofing or siding structure which may be speedily erected from the exterior of the building, thus contributing to the economy with which the structure may be erected. It will also be observed that the interlocked undersides of adjacent panels provides a substantially continuous flat interior surface of neat appearance.

It will also be observed that the present construction of insulated building panel is such as to eliminate through bolts between the upper and lower metal sheets, thus reducing to a minimum through conductivity of heat or cold.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood

that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. An insulated panel unit comprising a flat metal inner facing sheet, a longitudinally corrugated outer metal facing sheet, a rectangular non-metallic insulating frame to which both metal facing sheets are secured to form a unit therewith and are maintained in spaced relation, said frame member comprising two spaced longitudinal members and two transversely extended end members, the longitudinal members of the frame being of a height and size to fit within the corresponding corrugations of the outer metal facing sheet and engaging the inner surfaces of the crests of the corrugations to support the same, the height of the end members of the frame being related to the depth of the corrugations in the corrugated sheet to engage and support the bottoms of the corrugations of said outer facing sheet, said frame lying wholly within the outer and inner sheets and the corrugated sheet extending at one end substantially beyond the frame and beyond the inner metal facing sheet to provide an overlap when adjacent panels are erected, the space between the outer and inner facing sheets and the frame being filled with insulation.
2. An insulated panel unit as defined in claim 1 wherein the sides of the inner metal facing sheet project laterally beyond the frame and beyond the outer metal facing sheet and are provided with lips for cooperation with lips of adjacent panels.
3. In a building structure, a plurality of structural members disposed in parallel and spaced relation and a plurality of insulated panels extended across and secured to said structural members, each panel unit comprising a flat metal inner facing sheet, a longitudinally corrugated outer metal facing sheet, a rectangular non-metallic insulating frame to which both metal facing sheets are secured to form a unit therewith and are maintained in spaced relation, said frame member comprising two spaced longitudinal members and two transversely extended end members, the longitudinal members of the frame being of a height and size to fit within the corresponding corrugations of the outer metal facing sheet and engaging the inner surfaces of the crests of the corrugations to support the same, the height of the end members of the frame being related to the depth of the corrugations in the corrugated sheet to engage and support the bottoms of the corrugations of said outer facing sheet, said frame lying wholly within the outer and inner sheets and the corrugated sheet extending at one end substantially beyond the frame and beyond the inner metal facing sheet and overlapping upon the corrugated outer sheet of an adjacent panel, the space between the outer and inner facing sheets and the frame being filled with insulation, a corrugated flashing overlapping upon the marginal corrugations of adjacent panel units, and a body of loose insulation filling the space between the flashing and the adjacent portions of adjacent panel units.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
320,757	Chesebro	June 23, 1885
1,659,539	Judson	Feb. 14, 1928
2,192,720	Tapman	Mar. 5, 1940

FOREIGN PATENTS

Number	Country	Date
738,113	France	Oct. 11, 1932