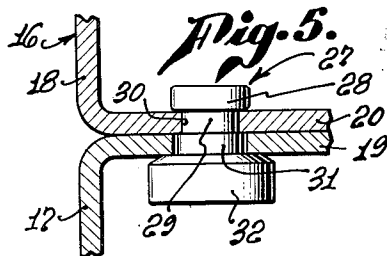
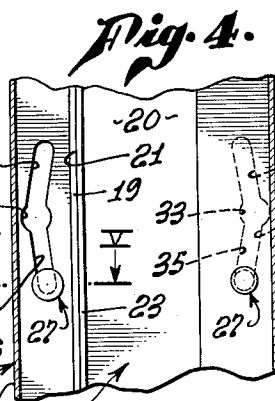
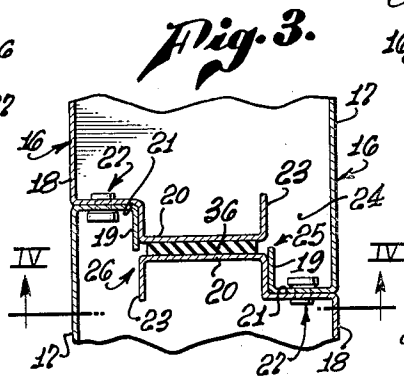
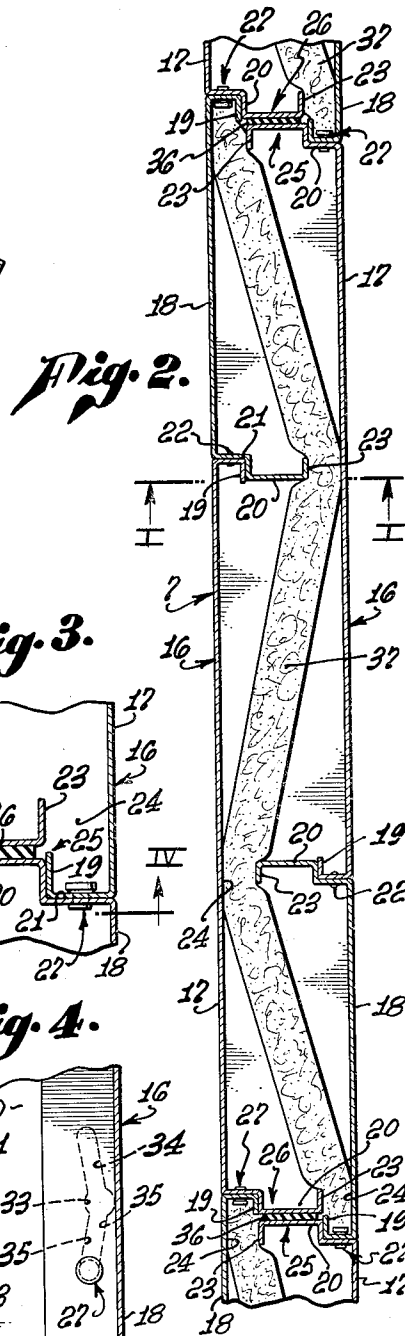
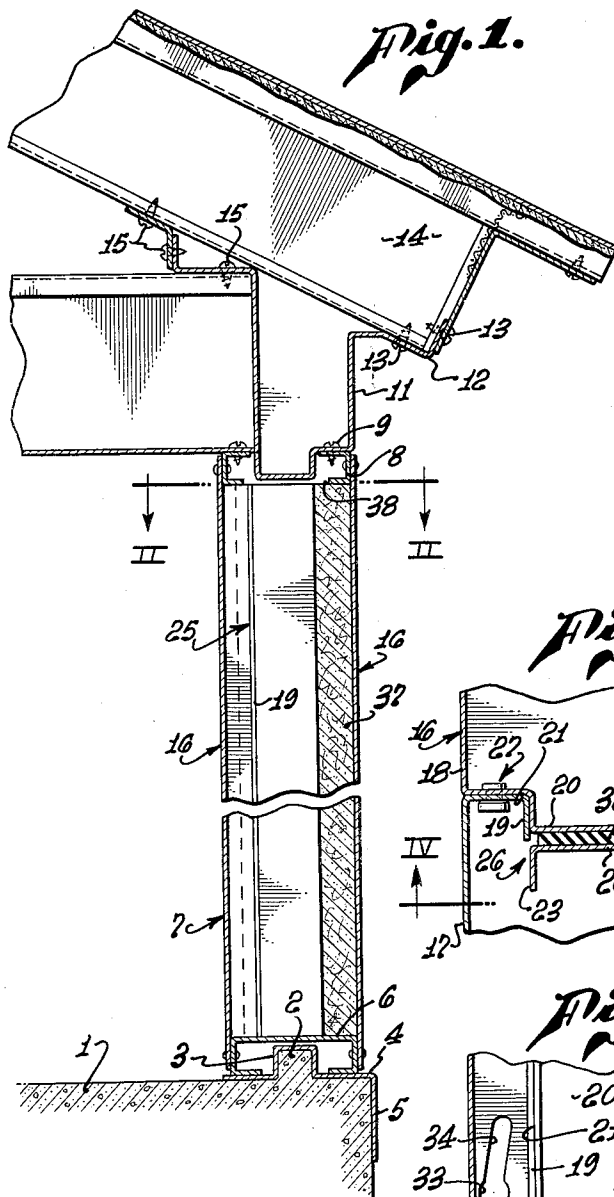


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A. J. GRAFMAN
METAL PANEL CONSTRUCTION

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INVENTOR.
ABRAHAM J. GRAFMAN,
BY *Q. H. K. K. K.*
ATTORNEY.

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METAL PANEL CONSTRUCTION

Abraham J. Grafman, Pasadena, Calif., assignor to
Richard Rand, Beverly Hills, Calif.

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This invention relates to a wall construction of metal prefabricated type.

The primary object of this invention is to provide an improved wall construction utilizing hollow panel units which may be readily varied in width for employment in walls, partitions and roof structures of a building of prefabricated construction.

An object of this invention is to design and provide a preassembled panel unit of double walled construction which is readily adapted for interlocking connection to similar adjacent panel units.

Another object of this convention is to design and provide a preassembled hollow panel unit wherein insulation is secured within the panel in such a manner that metal-to-metal contact between outer and inner walls of the panel unit is virtually eliminated throughout the panel.

Still another object of this invention is to provide a preassembled hollow panel unit wherein the insulation material is mounted and held in position in such a manner that wall vibrations are virtually eliminated.

A further object of this invention is to provide preassembled double-walled panel units which may be quickly assembled or disassembled by a novel, tight interlocking means provided on said units and without the use of special tools, screws, or nut and bolt assemblies.

This invention contemplates the design of an improved preassembled double-walled panel unit wherein each unit may be prefabricated in the shop to desired width by selection of preformed panel sections of sheet metal of varying width, each of the sections having inwardly directed edge portions of virtually the same complementary cross-sectional configuration. The edge portions of the panel sections are so arranged that they may be secured together in the shop by spot welding or metal stitching along portions of the sections which are convenient and readily accessible to the worker.

The preassembled double-walled panel unit contemplated by this invention utilizes panel sections on opposite walls which may be offset in the direction of their width so that the inwardly directed edge portions of sections of one wall are disposed intermediate edge portions of sections of the opposed wall, thereby providing a rigid and strong panel unit.

This invention contemplates a novel preassembled panel unit which is capable of being employed in vertical walls of a building and also in floor, ceiling, and roof structures for the purpose of providing a prefabricated building in which there is a minimum of different structural elements, thereby affording an economical, efficient and inexpensive building structure.

Other objects and advantages of this invention will be readily apparent from the following description of the drawings.

In the drawings:

Fig. 1 is a fragmentary sectional view of a prefabricated structure embodying this invention, the section being taken in a vertical plane through the structure as indicated by line I—I of Fig. 2.

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Fig. 2 is a fragmentary sectional view taken in a horizontal plane indicated by line II—II of Fig. 1.

Fig. 3 is a fragmentary sectional view taken in a horizontal plane substantially the same as that indicated by line II—II of Fig. 1.

Fig. 4 is a fragmentary edge view taken in a vertical plane indicated by line IV—IV of Fig. 3.

Fig. 5 is an enlarged fragmentary view of the interlocking means connecting panel units taken in a transverse plane as indicated by line V—V of Fig. 4.

Referring particularly to Fig. 1, a fragmentary section of a metal prefabricated building structure is illustrated for the purpose of showing by way of example a use of my novel panel units or assemblies in connection with a building structure. A foundation, generally indicated at 1, may include a longitudinally extending rib 2 of generally square cross-section spaced a slight distance from the outer edge of the foundation. The rib 2 may be composed of and formed of the same material as that employed in the foundation, such as concrete. The rib 2 may be enclosed within a correspondingly shaped portion 3 of a sill 4 which extends longitudinally along the top of the foundation wall for providing a suitable base and interlocking connection with panel units 7 as described hereafter. The sill 4 may be provided with a downwardly turned vertical flanged portion 5 overlying upper vertical marginal surfaces of the foundation.

Supported and interlocked in position on the sill 4 by bottom generally C-shaped channel members 6 may be a plurality of double-walled panel units described in greater detail hereinafter. The top of each panel unit is provided with a generally C-shaped channel member 8 affording a connection by means of suitable sheet metal screws 9 to a preformed joist 10 and a preformed horizontal longitudinally extending stringer 11. The stringer 11 may be provided with an outer marginal preformed edge portion generally indicated at 12 providing a suitable connection by means of sheet metal screws 13 to the outer edge of an inclined roof rafter panel generally indicated at 14. The inner longitudinally extending marginal portions of the stringer 11 may be preformed so as to provide suitable connection by means of sheet metal screws 15 to the horizontal joist 10 and to the lower marginal edge portions of the inclined rafter 14. Obviously, various forms of joists and stringers may be used in connection with the panel unit 7 to afford a roof, ceiling, and wall juncture.

Each of the panel units 7 is made from a plurality of similarly formed sheet metal (or other suitable material), panels, whereby said panels and panel units can be manufactured with a minimum expenditure for equipment and maximum standardization and flexibility. It will be noted that each panel is provided with one longitudinal edge having a narrow flange at right angles to the plane of the panel (and of a width of not more than 1/3 of the thickness of a finished panel unit) and an inwardly extending lip, while the other longitudinal edge has a flange of greater width and an inwardly turned lip, this wider flange being provided with a re-entrant recess. The re-entrant recess is adapted to receive the narrow flange of an adjoining panel lying in the same plane, and a permanent connection is made between such panels of a single unit by means of rivets, spot welding etc. Top and bottom edges of panels forming opposite sides of a panel unit are connected as by members 6 and 8 only, the walls of each panel unit being unconnected in any other manner, thereby preventing heat flow from one wall of a panel unit to another wall thereof. The edges of each panel unit are stepped by reason of the fact that the narrow flanged edge of one panel is positioned adjacent the wider flanged edge of the panel forming the other side of a panel unit.

Adjacent panel units fit each other, the narrow flanged edge of one panel unit fitting into the recess of the wider flanged portion of the adjacent panel unit as best shown in Fig. 3. Means are provided for making a connection between such panel units as will be described in detail hereafter, such connection including a fixed key means on one panel unit edge and a cooperating slot in the opposing edge of the adjacent unit, whereby vertical movement of one panel unit with respect to the other causes the two panel units to become interlocked and aligned with their wall surfaces in common planes.

Each unit or assembly 7 comprises spaced side walls 16 each made of a plurality of preformed panels 17 and 18 of any suitable sheet metal material. Panel 17 is shown as having a greater width than panel 18. Other panels may be formed of varying width as desired for the particular type of wall construction contemplated. Preferably the wider panels such as 17 are increased in width in multiples of the narrowest panel such as 18.

Each panel 17 and 18 is provided with substantially the same cross-sectional configuration; for example, it will be noted that each panel is provided along one longitudinal edge with an inwardly directed narrow edge portion or flange 19 of generally L-shaped configuration having one leg disposed virtually perpendicularly to the plane of the panel and the other leg or lip overlying the adjacent margins of the panel. Edge portion 19 extends only a relatively short distance inwardly of the panel unit.

Along the other longitudinal edge of each panel is provided an inwardly directed wide edge portion or flange 20, said edge portion being rabbeted to form a re-entrant recess as at 21 for accommodating an inwardly directed adjacent edge portion 19 in closely abutting and interlocking relationship. The interlocking relationship of the complementary edge portions of adjacent panels holds the adjacent panels in aligned relationship for presenting a flat outer wall surface.

Adjacent panels of each side wall may be secured together in any suitable manner as by spotwelding along abutting edge portions of the panels or by metal stitching as indicated at 22.

Each edge portion 20 extends inwardly beyond its rabbeted configuration for presenting a lip 23 disposed parallel to the spaced side walls in proximity to the opposed side wall and spaced therefrom as indicated at 24 a distance slightly greater than the distance edge portion 19 projects inwardly of the hollow wall.

Composite end walls, generally indicated at 25 and 26 of stepped configuration are provided at ends of panel unit 7 by cooperative relationship of the inwardly directed opposed edge portions 19 and 20 of end panels of opposed walls. The stepped end wall arrangement may be provided by the selection of a panel of narrow width, such as 18, in relationship to an opposed end panel of relatively great width such as 17.

Panels 17 and 18 forming spaced side walls 16 are thus disposed in opposite walls so that between end walls 25 and 26 interlocking edge portions of panels on one wall are positioned intermediate interlocking edge portions of panels on the other wall. Since edge portions 20 of panels of the spaced walls are arranged in alternating relationship from wall to wall, the spaces 24 between flanges 23 and the opposed panels are likewise in alternate relationship for affording a continuous opening or passage of generally zigzag nature extending between end walls 25 and 26 of a panel unit.

Insulation means and vibration dampening means may be provided in each panel unit 7 by positioning a sheet of suitable insulating material 37 between the spaced walls 16 in the continuous passage thus formed. The insulation material may have characteristics of being fire-resistant, sound-deadening or heat transfer resistant. Preferably, the sheet of insulating material should be rigid in a vertical direction so as to prevent settling of the material toward the bottom of the panel unit and

should be generally flexible in a horizontal direction so that the sheet may be bendably adjusted to conform with the continuous passage of zigzag nature.

Preferably the relationship between the thickness of the sheet of insulation material and the space 24 is such that space 24 is slightly less than the thickness of the sheet of insulating material 37 so that when walls 16 are secured in assembled relationship the portions of the insulation material in the spaces 24 will be under slight compression and thus firmly held in position between the spaced walls 16.

The spaced walls 16 of each panel unit are secured together in any suitable manner along their top and bottom marginal edges by means of the generally C-shaped channel members 8 and 6 respectively. Members 6 and 8 may be secured to the marginal edges of the walls 16 in any suitable manner as by means of metal stitching or by spotwelding. It may be noted that the edge portions 19 and 20 terminate a short distance from the top and bottom edges of walls 16 so as to accommodate the web of channel members 6 and 8 within the walls 16 with the inwardly turned portions forming the C shape being virtually flush with said top and bottom wall edges. The edges of the inwardly turned portions of each channel member 6 and 8 are spaced apart for embracing panel unit or wall positioning means such as rib 2 on the foundation and similarly shaped means on stringer 11 for positioning the top of the panel. Normally some clearance is maintained between the inwardly turned edge portions and rib 2 for permitting accurate alignment of the panel units even though the rib 2 may be slightly irregular. In some instances it may be preferable to grasp the wall positioning means with the inwardly turned portions of the C-shaped channel members.

It will be readily apparent that by this construction of a re-assembled panel unit, metal to metal contact between the spaced walls is virtually eliminated throughout the width and height of the panel unit and heat flow between the walls of the panel unit is substantially prevented. The only metal to metal contact between the spaced walls is provided by the connecting top and bottom channel members 6 and 8 which are preferably perforated with openings 38 throughout their length.

Self-aligning interlocking means are provided on end walls 25 and 26 for securing and connecting adjacent panel units 7. The edge portion 20 of each end wall may be provided with a stationary, fixed button or key generally indicated at 27. Each key has a head 28 and a shank 29 extending through an aperture 30 in the wall of recess 21 perpendicular to the panel. The shank 29 is provided with an upset shoulder 31 and an enlarged locking end 32 having a diameter greater than shoulder 31.

The edge portion 19 accommodated within the recess 21 of edge portion 20 may be provided with a slightly outwardly offset key-receiving port 33 of such diameter as to permit the enlarged locking end 32 of the key to pass therethrough.

On opposite sides of port 33 are provided upwardly and downwardly angularly directed slots 34 and 35, said slots being inclined inwardly of the panel unit. The keys 27 and the ports 33, together with their associated slots 34 and 35, are substantially aligned vertically of the panel units so that the interlocking narrow edge portions 19 and rabbeted edge 21 of the end walls of the panel units may be brought into substantially abutting relationship by insertion of the locking ends 32 through the key ports 33. The slots 34 and 35 are adapted to closely accommodate the stepped shoulder 31 on the keys. When the panel units are assembled an adjacent panel unit is moved vertically downward so that keys 27 will be positioned in the end of the associated slot 34 or 35 and the panel units held in proper vertical aligned position. The inclination of slots 34 and

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35 brings the wall of adjacent panel units into virtually the same common plane, while at the same time provides a tight secure interlocking arrangement. Slots 34 and 35 are provided on opposite sides of port 33 in order to permit reversibility of a panel unit with respect to the adjacent panel unit and thus facilitate rapid and efficient assembly of said units.

The interlocking connection between adjacent end walls of adjacent panel units may be provided with a sealing or gasketing means for eliminating metal to metal contact between the spaced side walls at ends thereof. The sealing means may comprise a vertically extending pad 36 of any suitable slightly compressible resilient yieldable material such as a fabric-reinforced phenolic resin. Preferably the pad 36 is bonded along one surface to the associated edge portion 20 and when the units are in assembled relationship, the other surface of said pad closely contacts the edge portion 20 of the adjacent end wall.

It should also be noted that resilient pad 36 also acts to spread apart the edge portions 20 adjacent the axis of the end walls. This spreading apart action tends to hold the interlocking key connection between adjacent panel units in tight relationship. It is also contemplated that means other than a pad may be used for this purpose, such as outwardly extending cooperatively engaging projections suitably formed as by crimping the metal edge portions 19 and 20.

It will thus be readily apparent to those skilled in the art that a preassembled prefabricated metal hollow panel unit has been provided which may be readily interlocked and joined to adjacent units for providing a wall construction of desired length and height. Each panel unit is suitably insulated by the provision of insulation material extending continuously between its end walls and held in proper position within the panel unit by cooperation of the edge portions of the various panels forming opposed side walls. The manner in which the insulation is held within the panel units also dampens any wall vibrations which may occur in the spaced walls of the panel unit. Vibration between adjacent panel units is dampened by the resilient pads 36, and the interlocking arrangement between units, together with the stepped complementary configuration of adjacent end walls, affords an effective weather-proof joint.

Obviously the width of various panel units may be readily selected and varied by employing a suitable number of panels of desired width. Since the panels have edge portions which are of complementary configuration and are preferably preformed in width in multiples of the narrowest panel width, it will be readily apparent that a selected number of panels may be used to provide a panel unit of desired width which will cooperate and interlock in desired manner with adjacent panel units.

The improved insulated hollow panel units provided by this invention may be readily assembled in the manner illustrated on a foundation wall or, if desired, different forms of channel members 6 and 8 may be employed for cooperative interlocking engagement with a foundation wall or stringer. It will be readily apparent that the panel units installed in the manner illustrated do not require the use of any special tools, screws or bolt and nut assemblies and they may readily be disassembled for transportation and erection at another building site if desired.

The hollow panel unit construction illustrated above may be readily varied or modified to provide a roof panel suitable for virtually flat roof construction. It is contemplated that in such flat roof construction one of the walls of the panel may be employed as a ceiling, while the other wall may be slightly inclined thereto in order to permit some water drainage. The upper wall in such construction may be spaced from the inwardly directed edge portions of the lower ceiling wall by the

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use of suitable perforated spacers extending between flange 23 and the other wall.

All other changes and modifications coming within the scope of the appended claims are embraced thereby.

I claim:

1. A prefabricated wall construction comprising: a plurality of hollow panel units including spaced walls formed of interconnected panels of varying widths and having respective edge portions of virtually the same cross-sectional configuration; edge portions at ends of each panel unit cooperating to afford stepped end walls extending between said spaced walls and complementary to end walls of an adjacent unit; interconnected edge portions of the panels in each wall being disposed intermediate the edges of opposed panels in the opposite wall and adapted to afford a continuous space throughout said unit; insulation means extending between the end walls through said space within each hollow panel unit; top and bottom walls for said unit; interlocking means on end walls of said units for securing said units together; and resilient means on adjacent end walls for urging central portions of opposed end walls apart.

2. A hollow panel unit for use in prefabricated building construction comprising: spaced side walls, top and bottom walls interconnecting said side walls, and end walls of stepped configuration; each side wall including a plurality of interconnected metal panels lying in the same plane, each panel being of corresponding cross-sectional configuration and including a narrow inwardly directed edge means along one edge and a wide inwardly directed stepped edge means along the other edge, the narrow and wide stepped edge means of adjacent panels lying in the same plane having complementary portions in cooperative engagement for aligning said adjacent panels, and the narrow and wide edge means of opposite side walls at ends of the unit extending between and cooperating to form the end walls of stepped configuration, the wide edge means extending toward and terminating in spaced relation from the inner face of the panel in the opposite side wall, the panels in said side walls at each end of the unit being of different width to alternately space the cooperative engagement of the edge means of adjacent panels of one side wall with respect to the cooperative engagement of edge means of adjacent panels of the other side wall for providing a continuous passageway extending between end walls of the unit; and insulation means extending through said continuous passageway between end walls and positioned under compression by the wide edge means of the panels of one side wall and the inner face of the panels of the opposed side wall and terminating at diagonally opposite end edges of the panel unit.

3. A prefabricated wall construction comprising: a plurality of hollow panel units each including spaced parallel side walls formed by interconnected panels of varying width and having respective side edge portions of virtually the same cross-sectional configuration and extending toward the opposite side wall, one side edge portion extending not greater than one-third the distance between said side walls; the side edge portions at ends of each unit cooperating to provide stepped end walls each presenting a longitudinally extending recess along one edge margin, a central flat transverse section, and a longitudinally extending tongue section along the other end edge margin; interconnected side edge portions of the panels in each side wall being disposed intermediate the edges of opposed panels in the opposite wall and adapted to afford a continuous space throughout said unit; insulation means extending from the tongue section of one end wall, through said continuous space, to the tongue section of the opposite end wall whereby the ends of the insulation are arranged in overlapping relationship when adjacent panel units are assembled in a wall; the tongue section of one end wall being received within the edge recess of the adjacent end

wall; resilient means compressed between the central flat sections of the stepped end walls of adjacent panels, and interlocking means on the end walls of said units for securing adjacent panel units together.

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