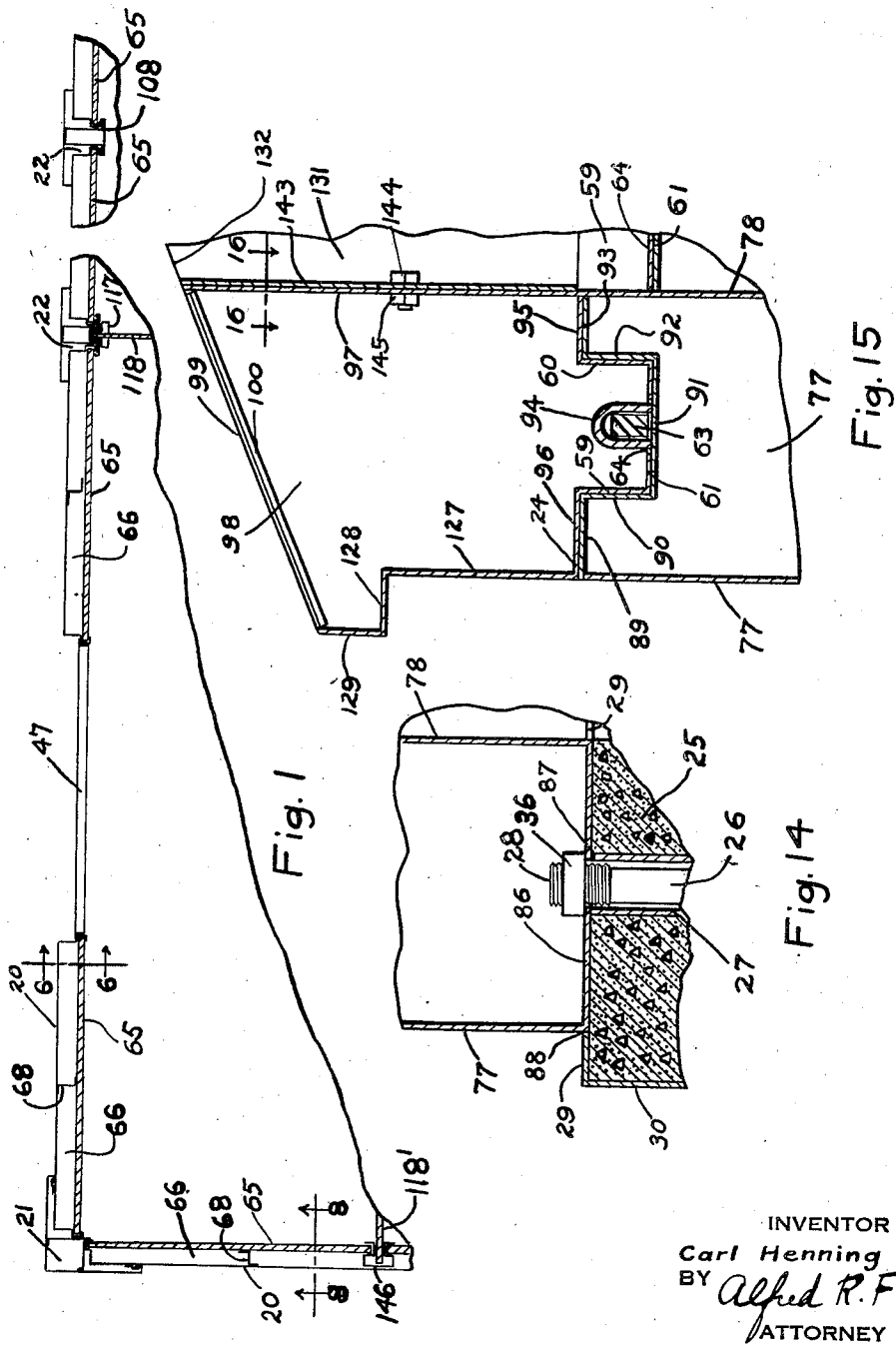
Feb. 4, 1941. C. HENNING 2,230,246

WALL CONSTRUCTION FOR METAL HOUSES

Filed Oct. 27, 1938 5 Sheets-Sheet 1




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WALL CONSTRUCTION FOR METAL HOUSES

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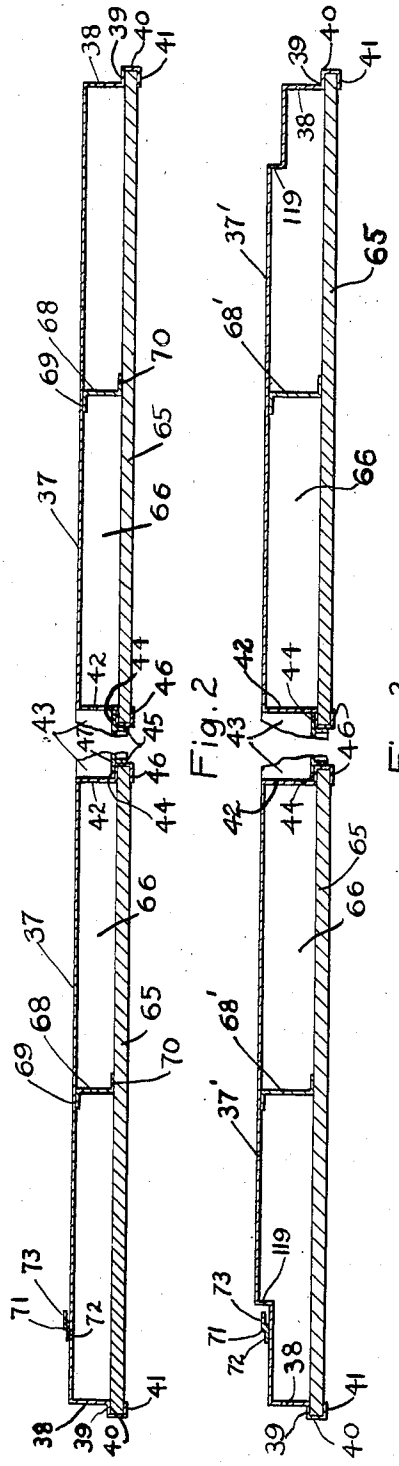



Fig. 2




Fig. 3

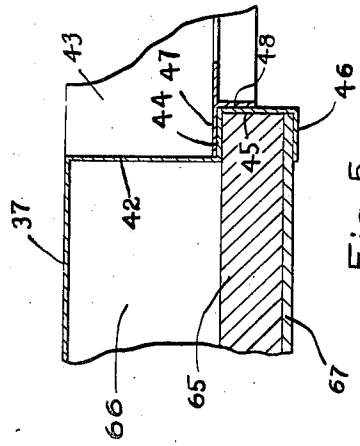



Fig. 5

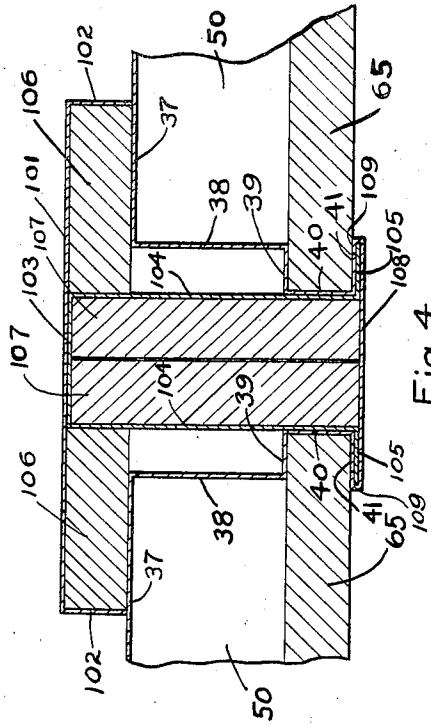



Fig. 4

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WALL CONSTRUCTION FOR METAL HOUSES

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Fig. 7

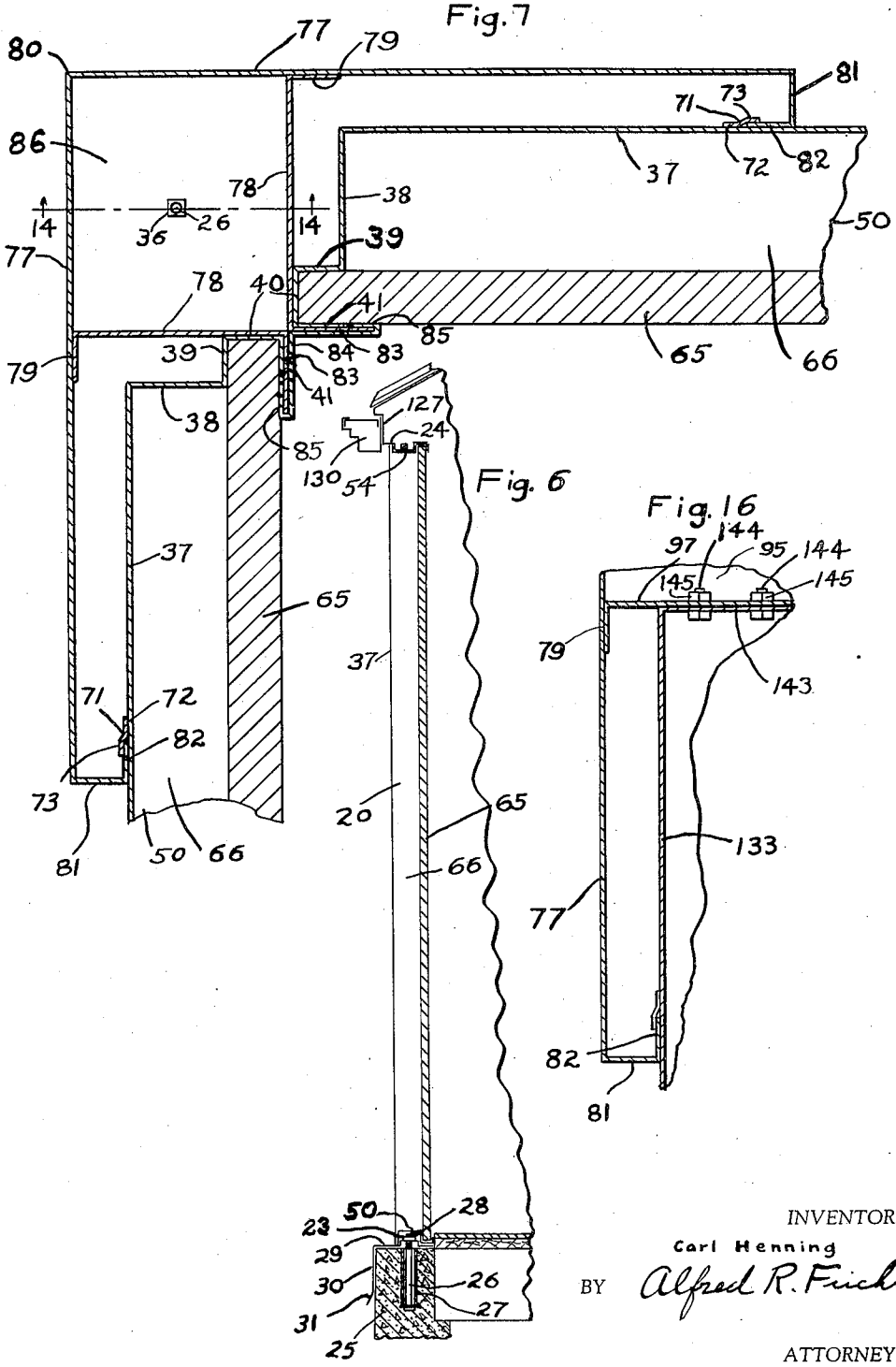



Fig. 6

Fig. 16




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WALL CONSTRUCTION FOR METAL HOUSES

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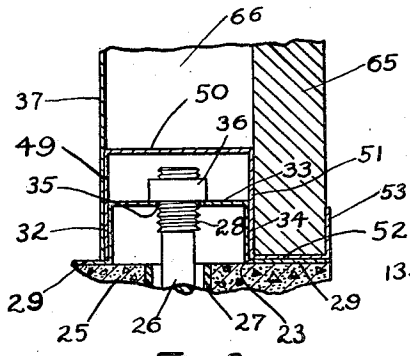



Fig. 8

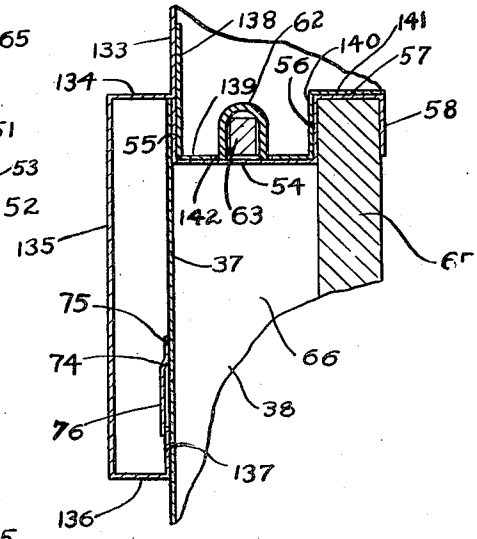



Fig. 9

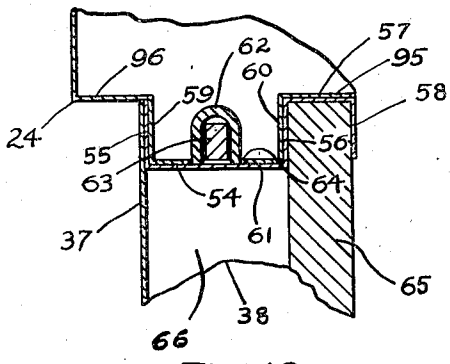



Fig. 10

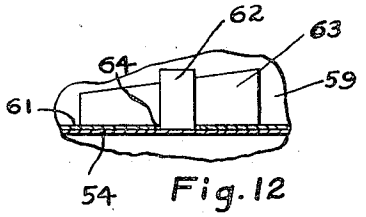



Fig. 12

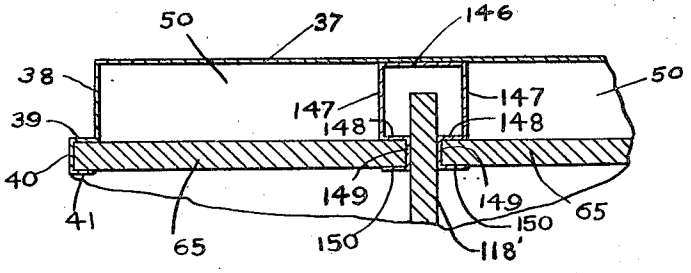



Fig. 11

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WALL CONSTRUCTION FOR METAL HOUSES

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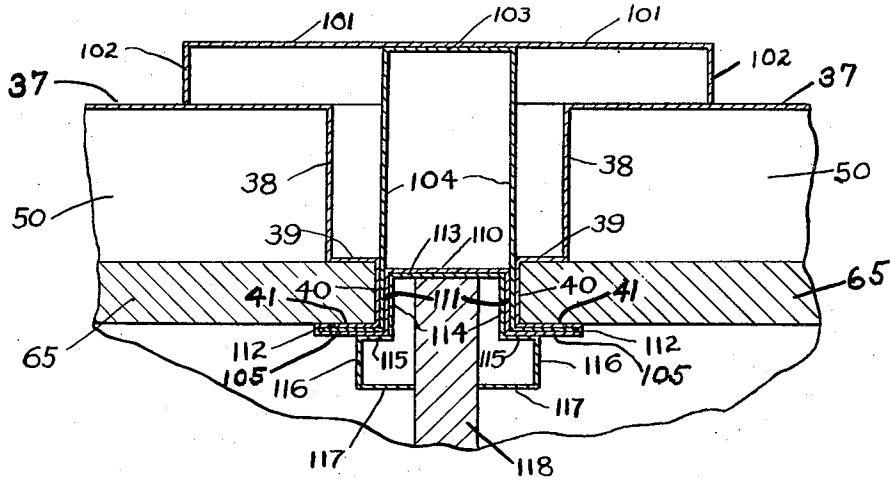



Fig. 13

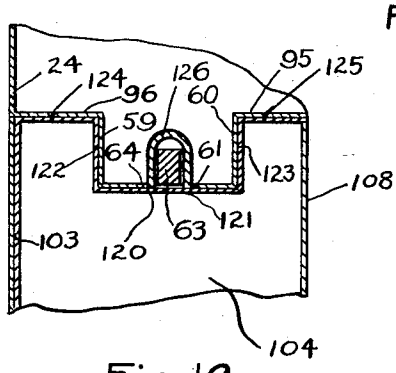



Fig. 19

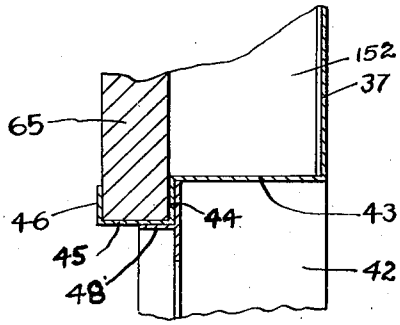



Fig. 18

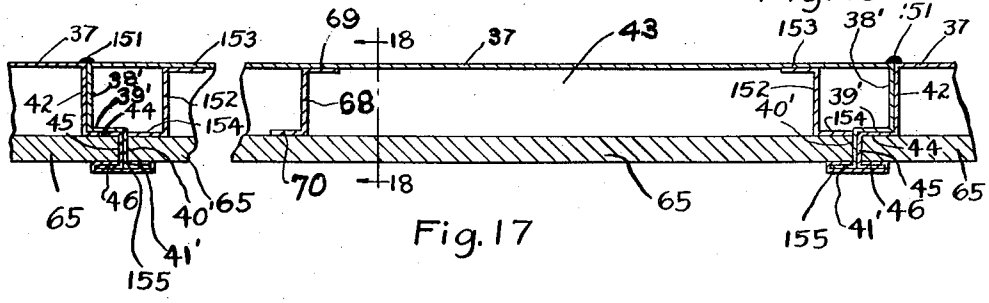



Fig. 17

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Patented Feb. 4, 1941 2,230,246

# UNITED STATES PATENT OFFICE

2,230,246

## WALL CONSTRUCTION FOR METAL HOUSES

Carl Henning, Kansas City, Mo., assignor to Andrew A. Kramer, Kansas City, Mo.

Application October 27, 1938, Serial No. 237,249

15 Claims. (Cl. 189—1)

My invention relates to metallic building structures, and more particularly to wall construction for metal houses.

It is a purpose of my invention to provide a wall for metal buildings, comprising wall panels and columns alternating with said wall panels, said wall panels and columns being made of sheet metal and having interengaging means thereon to interlock the panel members with the columns, so as to hold the same in properly aligned position relative to each other and to prevent separation thereof lengthwise of the wall.

It is a further purpose of my invention to provide a wall construction for metal buildings comprising panel members and columns that have interengaging means, as above set forth, and to provide supporting means for said panels and columns and interengaging means on said supporting means and said panels for holding said panels from horizontal movement transversely of the wall on said supporting means.

It is a further purpose of my invention to provide, in a metallic building wall structure of the above mentioned character, eaves-forming members, which constitute locking means for the elements making up the wall, so as to hold said columns and panels and said panels and supporting members in interlocking relationship, said eaves-forming members and said panels and columns being provided with means thereon, with which means on said eaves-forming members engage to interlock said eaves-forming members and said columns and panels, and said eaves-forming members and said columns and panels being provided with means for clamping the eaves forming members to said columns and panels to hold the elements of the wall in firmly interlocked relationship.

It is a further purpose of my invention to provide means for supporting partitions on said walls, said partitions being either supported by the wall panel elements, or by the columns, as may be found desirable, and my invention includes a new and improved column structure providing a partition mounting and a new and improved panel structure providing a partition mounting.

It is a further purpose of my invention to provide eaves-forming members that act as means for connecting the wall forming elements and the roof of the building, said eaves-forming members supporting the roof and also carrying gutter members.

It is still a further purpose of my invention to provide new and improved means for mounting a gable member on a wall member, so that said gable member is interlocked with the wall panels and clamped thereto, and further to provide means for providing an interlocking connection between intermediate columns and the gable members, and means for clamping said gable members to said intermediate columns.

It is still a further purpose of my invention to provide new and improved means in a sheet metal building for connecting gable members and hollow sheet metal corner columns.

It is a particularly important purpose of my invention to provide wall panels comprising an outer metallic wall and an inner wall of heat insulating material, and means for spacing said heat insulating material and said sheet metal wall from each other in a manner to provide a dead air space, or dead air spaces, in each of said wall panel members.

It is a further purpose of my invention to provide means for mounting window sash and similar members in a wall panel of the above mentioned character, and to provide means for heat insulating a hollow metal column constituting part of a sheet metal wall structure.

It is a further purpose of my invention to provide new and improved means for mounting insulating board or similar sheet material in a sheet metal wall panel, so as to provide a dead air chamber in the metal wall panel and give a highly finished appearance to said wall panels on the inner face of the wall, said sheet material comprising a finishing ply in addition to the insulating board, if desired.

It is another purpose of my invention to provide a bottom or base plate for the wall, which is mounted on a suitable foundation, and which is provided with means for securing the same to the foundation and with means for interlocking the same with the wall panels above referred to.

Other objects and advantages of my invention will appear as the description of the drawings proceeds. I desire to have it understood, however, that I do not intend to limit myself to the particular details shown or described, except as defined in the claims.

In the drawings:

Fig. 1 is a fragmentary diagrammatic view partly broken away and partly in horizontal section, showing a portion of my improved wall construction for sheet metal buildings and the partition mountings provided thereon.

Fig. 2 is a horizontal section through one of the wall panel elements of my improved wall

structure, taken substantially midway between the upper and lower margins thereof.

Fig. 3 is a view similar to Fig. 2, of a slightly modified form of wall panel.

Fig. 4 is a fragmentary horizontal sectional view on an enlarged scale, through a portion of my improved wall structure, showing one of the intermediate columns in horizontal section and fragments of the adjacent wall panel elements in horizontal section.

Fig. 5 is a fragmentary view in horizontal section of the wall panel at a window opening therein, a fragment of the sash mounted on said wall panel in said opening being shown.

Fig. 6 is a somewhat diagrammatic vertical sectional view through my improved wall structure, taken substantially on the line 6—6 of Fig. 1, showing a portion of the foundation and a portion of the roof.

Fig. 7 is a horizontal section through a corner of my improved wall construction, showing a corner column in horizontal section and fragmentary portions of adjacent wall panel elements in horizontal section.

Fig. 8 is a fragmentary vertical sectional view of the lower portion of a wall panel member and the bottom or base plate mounting therefor, taken substantially on the line 8—8 of Fig. 1.

Fig. 9 is a fragmentary vertical sectional view through the lower portion of a gable member and the upper portion of a wall panel element, showing the mounting of the gable member on the wall panel element.

Fig. 10 is a view similar to Fig. 9, showing a fragmentary portion of the eaves-forming member and the upper portion of a wall panel element and the connection between said eaves-forming member and wall panel member.

Fig. 11 is a fragmentary horizontal sectional view through a wall panel member, showing a partition mounting element mounted therein.

Fig. 12 is a fragmentary longitudinal vertical sectional view, taken substantially at right angles to Fig. 10, showing the wedging means for clamping the eaves-forming member to the wall panel member.

Fig. 13 is a fragmentary horizontal sectional view through an intermediate column, showing a partition mounting means associated therewith.

Fig. 14 is a fragmentary sectional view through the lower portion of a corner column and a portion of the foundation, taken on the line 14—14 of Fig. 7, and showing means for securing the corner column to the foundation and base plate, or bottom supporting member.

Fig. 15 is a vertical sectional view through the upper portion of a corner column, taken substantially on a plane substantially perpendicular to that of Fig. 14, showing the connection of the eaves-forming and gable forming members therewith.

Fig. 16 is a fragmentary horizontal sectional view through the corner column above the top of the wall panel, taken substantially on a plane corresponding to line 16—16 of Fig. 15.

Fig. 17 is a horizontal sectional view, partly broken away, of a wall panel member, either above or below the window opening in said panel.

Fig. 18 is a fragmentary vertical sectional view, taken substantially on the line 18—18 of Fig. 17, through the wall panel member at a window opening, showing a fragment of a sash mounted therein, and

Fig. 19 is a fragmentary vertical sectional view through the upper end portion of an intermediate column and the eaves-forming member.

Referring in detail to the drawings, my improved wall construction comprises a plurality of wall panels 20, corner columns 21, intermediate columns 22, a bottom supporting member, or bottom plate, 23, and a combined top plate, or top connecting member, and eaves-forming member 24, the bottom plate and top plate being shown in relationship to the panel 20 in Fig. 6 and the relationship of the columns 21 and 22 and the panel members 20 being shown in Fig. 1.

Referring to Fig. 6 it will be noted that the bottom plate 23 is mounted on a foundation 25, which is shown as being of concrete, but may be of any desired material, a bolt-like member 26 surrounded by a sleeve 27 being embedded in the concrete, said bolt-like member having a threaded end portion 28 projecting upwardly above the foundation member 25.

Referring to Figs. 6 and 8 it will be noted that the bottom plate 23 has a horizontally extending portion 29 overlying the top of the foundation 25 and has a skirt 30 thereon that overlies the outer face of the foundation and has a slightly outwardly deflected obliquely extending lower end portion 31, said skirt finishing off the building at the foundation, and in the case of a foundation that does not project any material distance above the ground level, hiding the foundation itself on the outside of the building. The bottom plate member 23 further has an upwardly extending wall portion 32 extending upwardly from the horizontal portion 29, a transversely extending portion 33 and a vertically extending wall portion 34, the portions 32, 33 and 34 forming a hollow rib or tongue projecting longitudinally above the main body portion of the member 23, that is, above the portion 29, which lies on the top surface of the foundation 25. The top wall 33 of said rib or tongue is provided with an opening 35, through which the bolt-like member 26 extends, a nut 36 engaging the threaded portion 28 of the bolt-like member 26, serving to clamp the base plate 23 to the foundation to anchor it in position. There is, of course, a plurality of the bolt-like members utilized for securing each of the base plates, or bottom supporting members for the wall, in position.

The wall panels are shown more in detail in Figs. 2 and 3, the form of the invention shown in Fig. 2 being that illustrated also diagrammatically in Fig. 1. The wall panels are hollow members, the major portion of each of which is made of sheet metal, and the sheet metal portion of the panel member shown in Fig. 2 comprises an outer wall 37, which is provided with marginal flanges 38 along the vertical end edges thereof, forming end walls of the panel, said flanges 38 being outwardly offset at 39 and having portions 40 extending parallel to the portions 38 from the outer ends of the offsets 39 and terminating in inwardly directed flanges 41, thus forming grooves, or guideways, running vertically of the panel members on the inner faces of the ends of the panels at points spaced from the outer wall 37.

The outer wall 37 of the wall panel is, preferably, made of a plurality of sections. Ordinarily some openings exist in the walls of the building, such as for windows. Preferably the outer wall 37 is made up of a section lying on each side of the window opening and sections above and below the window opening interposed between said first

mentioned sections, all said sections being integrally united by welding at their adjacent portions. A window opening is shown in Figs. 2, 5 and 18. Flanges 42, similar to the flanges 38, project inwardly from the vertical edges of the sections of the outer wall 37, that are on opposite sides of the window opening, the flanges 42 extending from top to bottom of the wall panel and being provided with right angular offsets 44, the portions 45 extending substantially perpendicularly to the portions 44 and inwardly directed flanges 46 extending at right angles to the portions 45, the portions 44, 45 and 46 thus forming grooves, or guideways, running vertically of the panel members adjacent the window opening, and in alignment with the grooves in the flanges 38. The flanges 38' and 42 are welded together occasionally along the seam, as indicated at 151, to prevent any spreading at said seam.

The sections of the outer wall 37 above and below the window opening have inwardly extending vertical flanges 38', similar to the flanges 38, but shaped at their inner ends to nest with the flanges 42, as shown in Fig. 17. This nesting is accomplished by providing an offset 39' therein extending perpendicularly to the flange 38, a narrow wall portion or flange 40' perpendicular to the offset 39', and a flange 41' extending perpendicularly to the portion 40'. The upper edge of the section of the outer wall 37 of said panel below the window opening and the lower edge of the section of the outer wall 37 of said panel above the window opening have flanges 43 provided thereon, in all respects similar to the flanges 42, as will be evident from Fig. 18, the flanges 43 extending between and being welded to the flanges 38'.

Any suitable window sash member 47, having a metallic frame, may be mounted in the opening, said window sash member being shown as being T-shaped in cross section in the drawings, although, obviously any cross sectional shape of frame member can be utilized, as long as the same has flanges 48 that will lie adjacent the portions 45 of the flanges 42 and 43, so that the portions 48 can be welded to the portions 45 to hold the sash in place.

The bottom wall of each panel is made up of the vertically extending portion 49, which extends upwardly from the bottom edge of the wall 37 on the inner face of said wall and is welded thereto, so as to be substantially integral therewith. The transversely extending portion 50 extends from the vertically extending portion 49, the transversely extending portion 50 thus being upwardly offset from the bottom edge of the outer wall 37. A vertically extending wall 51 extends downwardly from the upwardly offset transverse wall portion 50 to a point in transverse alignment with the bottom edge of the outer wall 37 and from the bottom of said vertically extending wall portion 51 a horizontal flange 52 extends toward the inner face of the panel, and said horizontally extending flange 52 terminates in a vertically extending flange 53, which extends upwardly from the flange 52 and substantially parallel to the outer wall 37, the flanges 52, 53, and the vertical wall portion 51 providing a groove, or guideway, on the inner face of the bottom wall of the panel running longitudinally thereof and spaced the same distance from the vertical outer wall 37 as the channel formed by the portions 39, 40 and 41 of the flanges 38 and the groove formed by the portions 44, 45 and 46 of the flanges 42 and 43.

The portions 49, 50 and 51 also form an upwardly extending box-like portion, providing a channel, or groove, adapted to receive the upwardly projecting rib, or tongue, formation on the base member, or bottom plate, 23, the wall portions 32 and 34 of the bottom plate being snugly received between the vertically extending wall portions 49 and 51. Thus the bottom plate and the wall panel are interlocked by means of the interfitting tongue and groove formations on said bottom plate and wall panel, respectively.

The upper end portion of the wall panel member is provided with a transverse wall portion 54, which is depressed below the top edge of the outer wall 37 of said panel, as will be evident from Figs. 6, 9 and 10. Said transverse wall portion has a flange 55 projecting upwardly therefrom and terminating at the top edge of the outer wall 37 and lying in face to face engagement with the inner face of said wall portion 37, said flange being welded to the outer wall 37. The transverse wall 54 also has a vertical wall 56 extending upwardly therefrom in spaced relation to the flange 55 and of the same height as said flange. Said wall portion 56 is also aligned with the vertical wall portion 51 on the bottom wall of the wall panel and with the vertical offsets 39 and 44 on the flanges 38 and 42.

A horizontally extending flange 57 extends laterally from the vertical wall portion 56 away from the outer wall 37, and is provided with a depending flange 58, which is in alignment with the flange 53 and the flanges 41 and 46, thus providing a groove in alignment with the grooves provided in the marginal flanges forming the end walls of the wall panel and the bottom wall, previously described, said groove being open inwardly. Also the portions 54, 55 and 56 of the top wall forming member of the panel form an outwardly open channel, or groove, larger than the downwardly or inwardly opening groove previously described, which channel or groove is adapted to receive a depending hollow rib formation on the top connecting, or eaves-forming, member 24, said hollow rib portion being formed by the depending vertical walls 59 and 60 of the eaves-forming member 24, which are parallel to each other and spaced so as to fit snugly between the wall portions 55 and 56, and which are connected by the transversely extending wall portion 61, which lies on the top face of the wall portion 54 when the parts are in assembled relation, as shown in Fig. 10. Said channel, or groove, thus formed in the top of the wall panel sections is also adapted to be engaged by a gable forming member in a similar manner, which will be described below. The transverse wall portion 54 is provided with a wedge-retaining member, or keeper, 62, which is of a U-shaped character and is welded to the transverse wall 54, said retaining member 62 receiving a wedge 63, which is shown in iFgs. 10 and 12, the U-shaped member 62 extending through an opening 64 in the transverse wall portion 61, and said wedge 63 engaging the inner side of the U-shaped member 62 and the top face of the transverse wall portion 61 to firmly clamp the connecting member or eaves-forming member 24 to the top wall of the hollow wall panel member.

The sections of the outer wall 37 that lie above and below the window opening are provided with Z-bars 152 having flanges 153 welded to the inner face of the outer wall 37 of each section, and flanges 154 aligning with the offsets 44 and forming grooves aligning with the grooves formed by

the portions 44, 45 and 46 of the flanges 42 and 43.

Said wall panel member has the inner wall thereof formed by board-like members, such as sheets of thick insulating board 65, certain of which are received in the inwardly opening grooves formed in the top and bottom walls and end wall forming flanges 38 of the wall panel member, and the grooves provided in the flanges 42, and others of which are received in the grooves formed in the flanges 43, the grooves in either the top or bottom walls of the panel and the grooves formed by the flanges 41' on the flanges 38' and the flanges 154 of the Z-bars 152. The insulating board sheets are slid into position between the flanges 42, above and below the window frame opening, after which the top wall forming member on each panel is inserted in position and welded in place, so as to firmly lock and confine the insulating board ply 65 in position between the flanges 38', 43 and said top wall. Then the sheets of insulating board 65 are slid into position between the flanges 38 and 42 and the top wall of the panel, and finally the bottom wall of the panel is welded in position, confining the insulating board in position below and on both sides of the window opening. Said insulating board ply fits snugly within the grooves provided for the same, forming a dead air chamber 66 between itself and the outer wall 37. A trim strip 155 having hook flanges engaging the flanges 46 and 41' slidably engages and overlies these flanges.

Instead of using merely a ply of insulating board, as shown in Figs. 1 to 4, inclusive, and Figs. 6 to 11, inclusive, the grooves provided for the insertion of the sheet material forming the inner wall of the hollow wall-panel member can be made of such width that not only the insulating ply 65 of suitable insulating board may be provided, but a ply 67 of sheet material for finishing the interior face of the wall may also be inserted in the grooves, between one face of the insulating board member 65 and the flanges forming the walls of the grooves that are nearest the inner face of the wall forming panel, as shown in Fig. 5. Said finishing ply 67 may be of any desired thickness and of any desired material, such as artificial wood board, ply wood, or other wall finishing plies, that are of a stiff or rigid character.

In order to prevent any vibration or flexing of the board-like member 65 forming the inner wall of the wall panel, any large span of such material 65 is, preferably, stiffened by means of a stiffening bar 68, which is, preferably, Z-shaped in cross section and has one flange 69 thereof welded to the inner face of the outer wall forming 37, and has the other flange 70 thereof engaging flatly with the face of the insulating board member 65 that is on the side thereof toward the dead air chamber 66. Preferably, such stiffening member 68 extends in a vertical direction, as shown in Fig. 2.

Each wall panel is further provided with a clip member 71, which extends vertically in spaced relation to the flange 38 and is secured to the outer side of the outer wall 37, said clip being in the form of a strip of sheet metal running substantially the full height of the wall 37 and having an off-set therein to provide a portion 72 thereof that engages said wall 37 and is welded thereto, and a portion 73 thereof that is spaced sufficiently from the outer face of the wall 37 to receive the edge of a sheet metal member, to be described below. Only one of the members 71 is provided on each panel section under ordinary circumstances, but on some of the sections said clips are provided adjacent one marginal flange 38 thereof and on others adjacent the other marginal flange 38 thereof, as will be evident from Fig. 7, for a purpose which will be described below. Certain of said wall panel members are also provided with horizontally extending clips 74 spaced a short distance below the top edge of the outer walls 37 of said wall panels, said clips being made of strips of sheet metal that are provided with an offset therein, so as to provide a portion 75 on each thereof that is welded to the outer face of the outer wall 37 of said panel member and a portion 76 that is spaced sufficiently from said outer wall 37 to receive a sheet metal member, as will be described below.

One of the corner columns 21 is shown more in detail in Fig. 7. Said corner column comprises an outer wall made up of two wall portions 77, which extend at right angles to each other and the two inner wall portions 78, which extend perpendicularly to the wall portions 77 and have flanges 79 thereon that are in engagement with the inner faces of the wall portions 77 and welded thereto. Thus is formed a box-like hollow metal column that is substantially rectangular in cross section. The wall portions 77 are made of one integral piece bent at right angles at 80. Said wall portions 77 extend a considerable distance beyond the junction of the wall portions 78 therewith, thus forming wide lateral flanges on the corner column, and each of the wall portions 77 is provided with an inwardly directed flange 81 extending perpendicularly to the main body of the wall portion 77, and a flange 82 extending perpendicularly to the flange 81 and extending inwardly, or toward the wall portions 78, to thus form an inwardly projecting flange angular in cross section on each of the lateral flanges, formed by the wall portions 77 projecting in opposite directions laterally from the box-like main body portion of the corner column. The flanges 82 are received between the offset ends 73 of the clips 71 and the body portions of the outer walls 37 of the wall panels, and the portions 40 of the flanges 38 on said wall panels engage on their outer faces flatly against the walls 78 of said corner column. Thus the corner column and the wall panels are firmly secured to each other so that there can be no relative movement thereof lengthwise of the wall panel members.

The wall portions 78 have flanges 83 extending perpendicularly therefrom at the opposite edges thereof to those having the flanges 79. Thus the members 78 are substantially channel-shaped in cross section and the flanges 83 on the adjacent members 78 extend at right angles to each other. A securing member 84, in the shape of a clip angular in cross section, and having the hook-like portions 85 thereon formed by bending back portions of the member 84 on itself, engages the flanges 83 on the wall portions 78 of the corner column to firmly secure the same together. The member 84 serves not only as a connecting member, but as a finishing or trim, strip, being of a length equal to the height of the wall panel, and thus providing a corner finish to the junction of the wall panels with the corner column, as well as securing the walls 78 of the corner column together. The engagement of the clip-like member 84 with the flanges 83 is accomplished by a

longitudinal sliding movement of the member 84 relative to the corner column, that is, in a vertical direction.

It will be noted that all of the securing elements for fastening the corner column and the wall panel members together are hidden by the construction described, and that the corner columns have the outer walls 77 thereof offset outwardly a distance dependent upon the width of the flange 81, so as to project the same outwardly beyond the outer walls 37 of the wall panel members. By providing the extending portions on the walls 77 beyond the wall 78, a massive appearance is given to the corner columns. Also any offsets and other parts of objectionable appearance of the wall panels are hidden thereby and a joint of good appearance is provided on the exterior of the wall between the corner column and the wall panel member.

The corner column is provided with a bottom wall 86, which lies between the walls 77 and 78 and is welded thereto and has an opening 87 therein, through which one of the bolt-like members 26 extends, which is mounted in the foundation 25 in the manner previously described, the nut 36 engaging the wall 86 to clamp the corner column to the foundation, an opening 88 being cut in the top wall 29 of the member 23 to eliminate the upwardly projecting rib portion thereon, so that the bottom wall 86 of the column can rest on the foundation and be clamped thereto, this structure being shown in Fig. 14.

The upper end of a corner column is shown in Fig. 15, the section being taken in a plane perpendicular to Fig. 14, or transversely of the eaves of the building. A transversely extending wall is provided closing the upper end of the hollow corner column 21, forming a dead air chamber within said corner column, said wall being provided with a portion 89 extending inwardly from the top of the one outer wall 77, and has a vertically extending portion 90 depending from the horizontally extending portion 89 and a transverse portion 91 depressed below the top edge of the said wall 77, from which a vertically extending portion 92 extends upwardly, to thus provide a channel-shaped portion providing a deep, wide groove in the top wall of said corner column, a horizontal wall portion 93 extending from the top of the wall portion 92 in alignment with the wall portion 89. The downwardly projecting hollow rib, made up of the portions 59, 60 and 61 of the eaves-forming member 24, is seated in the channel, or groove, thus formed in the top wall of the hollow corner column. The edges of the portions 89 and 93 are welded respectively to the wall portions 77 and 78.

A U-shaped retaining member 94, similar to the member 62, is secured by welding to the transverse wall portion 91 and extends through one of the openings 64 in the transverse wall portion 61 of the eaves-forming member, and said eaves-forming member is clamped to the top end wall of the column, by means of a wedging member 63, in the same manner as previously described for securement of the eaves-forming member to the wall panel. Said eaves-forming member also has a flange 95 engaging flatly with the horizontal wall portion 93 on the hollow corner column, and a horizontal wall portion 96 engaging flatly with the wall portion 89. Said flange 95 also engages flatly with the wall portion 57 on the wall panel member and the wall portion 96 engages with the top edge of the outer wall 37 of the wall panel. It will thus be seen that the eaves-forming member forms a locking member, or connecting member, for rigidly clamping the corner columns and wall panels to each other to prevent any relative movement of these members. One of the walls 78 of each corner column has an upward extension 97, the purpose of which will be described below, and one of the walls 77 has an upward extension 98, which is provided with an obliquely extending top edge portion 99 having an angle member 100 welded thereto, so as to provide means for supporting the roof on the corner column.

The intermediate hollow columns 22 are made up of an outer member having a vertical wall portion 101, the opposite ends of which are turned inwardly to form flanges 102, which engage the outer walls 37 of the wall panel members, said flanges 102 extending at right angles to the wall portion 101. The intermediate hollow columns further include an inner member having an outer vertical wall portion 103, which lies adjacent the vertical wall portion 101 in face to face engagement therewith and is welded thereto. A pair of parallel vertical walls 104 extend perpendicularly to the wall portion 103 inwardly toward the inner face of the wall, and terminate in opposite outwardly directed flanges 105, which extend perpendicularly to the wall portions 104 and are so spaced from the wall portion 101 that with the outer face of the wall 37 in engagement with the edge of the flange 102, the flange 41 on the wall panel member will engage face to face with the flange 105 to thus confine the wall panel member between the flange 102 and the flange 105.

Pieces of insulating board 106 are, preferably, inserted in the spaces between the walls 37 and the walls 101, and pieces of insulating board 107 are, preferably, confined within the hollow column between the walls 104, so as to provide a heat insulating filling for said hollow metallic column. Where no partition is to be supported by the intermediate hollow column described, an inner wall forming member 108 is provided, which also acts as a finishing or trim strip and which has hook-like flanges 109 thereon, formed by bending back a portion of the strip 108 on itself, which are slidably engaged with the flanges 105 to complete the column and to secure the walls 104 to each other. Thus the intermediate columns comprise a box-like main body portion, from which the wall 101 extends in opposite directions, so as to provide a flange on said column, which is itself provided with a flange 102, so as to form an offset in the outer wall of the building and give a massive appearance to the intermediate column, said flange portions thus formed on the columns also hiding any parts of undesirable appearance on the wall panel member that would be otherwise visible.

If a partition member is to be mounted on an intermediate column, the construction shown in Fig. 13 is utilized, the wall panels being made in the same manner as previously described and bearing the same reference numerals, and the major portion of the intermediate column being made in the same manner as previously described. However, instead of providing the closure and finishing strip 108 in engagement with the flange 105 on the walls 104, a partition supporting member is mounted on said flanges 105 engaging the same slidably. Said partition supporting member comprises an inner channel-shaped member having a transverse wall portion 110 and a pair of legs 111 that extend perpendicularly toward the flanges 105 from the transverse wall portion

110 and terminate in hook-like flanges 112 extending perpendicularly to the legs 111 and slidably engaging with the flanges 105. Welded to the channel member, having said hook flanges 112, at the transverse wall portion 110, is a transverse wall portion 113 of the partition holding member, which has a pair of wall portions, or legs, 114 extending perpendicularly to the transverse wall portion 113, said partition holding member also having wall portions 115 outwardly offset in opposite directions extending from the wall portions 114, and wall portions 116 extending perpendicularly to the wall portions 115 and terminating in flanges 117 directed toward each other and extending parallel to the offsets 115, the ends of the flanges 117 being spaced from each other to provide a slot within which the partition member 118 of insulating board or similar material is mounted, said partition member 118 being slidable into position within the holder thus provided, with the end edge thereof in engagement with the transverse wall 113.

The hollow intermediate and corner columns described above, when used with the wall panel members, such as shown in Fig. 2, form a wall which has offsets therein at the corners and intermediate columns, so as to provide an alternating paneled and columnar effect, with the outer faces of the columns projecting outwardly beyond the outer face of the wall. When it is desired to obtain a flat appearance to the wall, without any offsets at the columns, a wall panel member, such as that shown in Fig. 3, is provided, which is made in the same manner as the wall panel member previously described, except that an offset is provided at 119 in the outer wall 37' of said panel, so as to locate said wall 37' in alignment with the outer walls 77 and 101 of the corner and intermediate columns. The other parts of the wall panel member shown in Fig. 3 are made in the same manner as previously described and have the same reference numerals applied thereto. Of course, the bracing member 68' is of somewhat greater width than the member 68, to allow for the difference in spacing between the insulating board member 65 and the outer wall 37'.

The intermediate columns are provided with top walls between the vertical walls 104 and the walls 103 and 113 or 108, as the case may be, the upper portion of an intermediate column being shown in vertical section in Fig. 19, and such a transverse wall being shown in said figure as extending between the wall 103 and the wall 108. In order to accommodate the top wall, the wall portions 104 are provided with cut out portions 120 to receive the depressed central transverse portion 121 of said top wall, from which the vertically extending wall portions 122 and 123 extend, a lateral flange 124 extending from the wall 122 and a lateral flange 125 extending from the wall 123, thus providing a channel, or groove, in the top wall of the intermediate column running lengthwise of the wall and receiving the wall portions 59, 60 and 61 of the eaves-forming member 24, the flange 95 of said eaves-forming member resting on the flange 125 and the transverse wall portion 96 of said eaves-forming member resting on the flange 124, the engaging portions being held clamped in tight engagement by means of the wedging member 63 engaging a U-shaped member 126 mounted on the transverse wall portion 121 and extending through an opening 64 in the transverse wall portion 61 of the eaves-forming member, the member 126 and the wedge 63 cooperating in the same manner as the U-shaped member 62 and the wedge 63. Thus the intermediate columns are firmly interlocked with the wall panel members by means of the connecting member that also serves as an eaves-forming member.

Said eaves-forming member is provided with a vertically extending wall portion 127 extending upwardly from the transverse wall portion 96 and is outwardly offset at 128 terminating in a short upward extension 129, upon which the roof sheets are adapted to rest at the upper edge portion thereof. As will be evident from Fig. 6, a gutter member 130 can be secured, by welding or otherwise, to the vertical wall portion 127 of the eaves-forming member 24.

Gable members are also provided extending upwardly from the wall panels to the roof and portions of one of said gable forming members is shown in Figs. 9, 15 and 16, said gable forming members being indicated generally in Fig. 15 by the numeral 131 and having an inclined top edge 132, as will be evident from Fig. 15. The vertical wall portion 133 of said gable forming member is provided with a lateral horizontal offset 134 extending perpendicularly to the vertical wall portion 133 on the outer face thereof and spaced a short distance from the bottom edge of said gable member. A vertical wall portion 135 extends downwardly from the outwardly offset portion 134 and an inwardly directed narrow wall portion 136 extends perpendicularly from the lower edge of the vertical wall portion 135 and terminates in an upwardly directed vertical flange 137 extending perpendicularly to the inwardly directed flange 136.

Welded to the vertical wall 133 a short distance above the outward offset 134 is an upwardly extending flange portion 138 on a channel-shaped member having a transverse wall portion 139 and an upwardly extending vertical wall portion 140 terminating in a laterally directed horizontal flange 141, said channel-shaped member thus forming an integral part of the gable member and being shaped in the same way as the channel-shaped member provided on the eaves-forming member and cooperating with the groove formed in the top of the wall panel member in a similar manner, the flange 138 lying adjacent the vertical wall portion 55 on the wall panel member, the transverse wall 139 engaging the transverse wall 54 of said wall panel member, the vertically extending wall portion 140 engaging the wall portion 56 on the wall panel member, and the flange 141 engaging the upper transverse wall portion or flange 57 on the wall panel member, the parts being clamped in face to face engagement by means of the wedging member 63, which has been previously described, cooperating with a U-shaped member 62, previously described, which extends through an opening 142 in the transverse wall 139.

The upwardly directed flange 137 engages in back of the outwardly offset portion 76 of the clip 74 when the parts are in assembled relation, as shown in Fig. 9. In assembling the parts, the flange 137 is inserted back of the clip 76 before the channel formation thereon is inserted in the corresponding channel in the wall panel member. In order to insert the downwardly projecting formation that is channel-shaped in cross section, provided on the gable member, into the groove, or channel, formed in the top of the wall panel, the entire gable member

is moved upwardly, a space being provided back of the portion 76 of the clip 74 to permit this, and after the wall portion 139 has been raised to a point above the top of the wall 37 the gable member is moved laterally and downwardly to seat the downwardly projecting tongue or rib formation on the gable member in the corresponding groove or channel in the wall panel member. The vertical wall 133 of the gable member extends back of the hollow corner column member, as will be evident from Fig. 16, the wall 133 engaging with the flanges 82 on said corner column member, and having a right angularly directed flange 143 thereon, which engages with the upwardly extending portion 97 of the wall 78, being secured thereto by suitable securing elements, such as the bolts 144 and nuts 145.

The partitions sometimes cannot be located at the points at which the intermediate columns 22 are provided in the wall. When this is not possible, the partitions can be mounted directly on the wall panel member. A wall panel member made so as to mount a partition is shown in Fig. 11. A hollow box-like member of a tubular character, rectangular in cross section, is mounted between the outer wall 37 of the wall panel member and the insulating board inner wall 65, said hollow tubular member having a plane outer vertical wall 146, parallel vertical walls 147 extending perpendicularly thereto toward the inner face of the wall panel, and inwardly directed flanges or narrow wall portions 148 that extend toward each other and which are provided with outwardly directed flanges 149, providing a groove, or slot, snugly receiving a partition member 118', which may be made of insulating board or similar material, and terminating in outwardly bent flanges 150 that extend perpendicularly to the flanges 149 and are directed away from each other so as to form a pair of grooves receiving the insulating board 65 therein, said grooves operating in the same manner as those previously described for receiving the insulating board members 65 and aligning with the other grooves of the wall panel member for this purpose.

What I claim is:

1. In a metallic building structure, a wall comprising alternating wall panels and columns, supporting means for said panels and columns, and a long narrow eaves-forming member extending longitudinally of said wall and laterally beyond the same only on the outer side thereof, said wall panels and columns and said wall panels and supporting means having interengaging means thereon to interlock said panel members with said columns and supporting means, said columns and panels having longitudinally extending aligning formations thereon, a complementary formation on said eaves-forming member interfitting with said aligning formations and interengaging means on said eaves-forming member and said columns and panels, holding said formations in engagement to interlock said columns, panels and eaves-forming member.

2. In a metallic building structure, a wall comprising alternating wall panels and columns, supporting means for said panels and columns, and an eaves-forming member, said wall panels and columns and said wall panels and supporting means having interengaging means thereon to interlock said panel members with said columns and supporting means, and said columns and panels having means thereon interengaging with means on said eaves-forming member to interlock said columns, panels and eaves-forming member, certain of said wall panels having a vertically extending channeled member secured thereon in spaced relation to both ends thereof for slidably receiving and supporting a partition.

3. In a metallic building structure, a wall comprising alternating wall panels and columns, supporting means for said panels and columns, a gable member, said wall panels and columns and said wall panels and supporting means having interengaging means thereon to interlock said panel members with said columns and supporting means, and said panels having longitudinally extending formations thereon, a longitudinal formation on said gable member to interlock said panels and gable member, means for securing said gable member to said columns, and means for clamping said gable member to said panels in interlocking relation therewith.

4. In a metallic building structure, a wall comprising alternating wall panels and columns, supporting means for said panels and columns, and interfitting means on said columns and panels for securing said columns and panels together, each of said panels comprising an outer metallic wall having marginal flanges provided with grooves spaced from said outer metallic wall, and an inner wall of heat insulating material mounted on said flanges in said grooves in spaced relation to said outer metallic wall.

5. In a metallic building structure, a wall panel comprising an outer metallic wall and an inner wall of heat insulating material, said metallic wall having marginal flanges provided with a plurality of portions extending perpendicularly to each other to form a groove spaced from said outer metallic wall and receiving said heat insulating material.

6. In a metallic building structure, a wall comprising wall panels each of said panels comprising an outer metallic wall having marginal flanges providing grooves spaced from said outer wall, an inner wall of heat insulating material, having margins thereof mounted in said grooves and being spaced from said outer wall to provide a dead air chamber within said panel, said wall panel having an opening therein and means for mounting a frame in said opening, said means having grooves therein aligning with said grooves in said flanges.

7. A sheet metal wall panel having a top wall having a longitudinally extending groove therein, sheet metal columns having top walls having grooves aligning with the grooves in the top walls of said panels, a longitudinally extending connecting member having a longitudinal projection entering said groove, and means for clamping said projection in said groove comprising retaining means on said wall panels and columns projecting through openings in said connecting member and wedging means engaging said retaining means.

8. In a metallic building structure, a wall comprising sheet metal panel members having longitudinal bottom walls having longitudinal grooves therein and means for mounting said wall panel members on a foundation comprising a bottom plate having an upstanding hollow box-like rib snugly received within the groove in said wall panel member and providing a transverse wall on said plate lying within said groove and a fastening element projecting from said

foundation and secured to said transverse wall, said bottom plate having an extension on each side of said rib, one of which is provided with a flange depending perpendicularly therefrom and embracing the outer face of said foundation.

9. A wall panel member comprising a sheet metal body portion having an outer sheet metal wall, marginal flanges projecting inwardly from said outer wall, said flanges having grooves formed adjacent the inner margins thereof, and inner wall forming means having margins thereof seated in said grooves, certain of said marginal flanges having portions extending perpendicularly to said outer wall and offset inwardly from the marginal edges of said outer wall having said flange to provide longitudinal channels in certain edges of said panels between said outer wall and said grooves open oppositely to said grooves, said flanges, outer wall and inner wall defining a dead air space in said wall panel.

10. A wall panel member comprising a sheet metal body portion having an outer sheet metal wall, marginal flanges projecting inwardly from said outer wall, said flanges having grooves formed adjacent the inner margins thereof, and inner wall forming means having margins thereof seated in said grooves, the groove forming portions of said marginal flanges at the opposite ends of said panel member projecting endwise beyond the ends of said outer wall.

11. A wall panel member comprising a sheet metal body portion having an outer sheet metal wall, marginal flanges projecting inwardly from said outer wall, said flanges having grooves formed adjacent the inner margins thereof, and inner wall forming means having margins thereof seated in said grooves, the marginal flange at the top of said panel member comprising a portion depressed below the top edge of said panel member between said outer wall and the groove forming portion thereof adjacent the inner margin of said flange to provide an upwardly opening channel in the top of said panel member between said groove and said outer wall.

12. A wall panel member comprising a sheet metal body portion having an outer sheet metal wall, marginal flanges projecting inwardly from said outer wall, said flanges having grooves formed adjacent the inner margins thereof, and inner wall forming means having margins thereof seated in said grooves, the marginal flange at the bottom of said panel member comprising a portion offset upwardly from the bottom edge of said panel member between said outer wall and the groove forming portion thereof adjacent the inner margin of said flange to provide a downwardly opening channel in the bottom of said panel member between said groove and said outer wall.

13. A wall panel member comprising a sheet metal body portion having an outer sheet metal wall, marginal flanges projecting inwardly from said outer wall, said flanges having grooves formed adjacent the inner margins thereof, and inner wall forming means having margins thereof seated in said grooves, and bracing members having flanges secured to said outer wall and flanges engaging said inner wall forming means at points spaced from said marginal flanges.

14. In a metallic building structure, a wall panel comprising an outer metallic wall and an inner wall member, said outer wall having marginal flanges provided with means for mounting said inner wall member thereon in spaced relation to said outer wall, and partition mounting means spaced from said flanges comprising a box-like body portion mounted between said inner wall member and outer wall and having means thereon for mounting said inner wall member and providing a partition receiving channel between said means.

15. In a metallic building structure, a wall comprising alternating wall panels and columns and supporting means for said panels and columns, said columns comprising closed rectangular box-like body portions each having a pair of opposed flat parallel walls and a pair of flat parallel walls extending between and connecting said first pair of parallel walls to form said box-like body portion, laterally extending wings on said body portions having flat faces aligning with the flat outer faces of said body portions and terminating in inwardly directed flanges, said wall panels having flat outer faces over the major portions thereof aligning with the flat outer faces of said body portions and wings, and having offsets in the outer faces thereof of the depth of said flanges and engaged thereby to align the flat major portions of said panels with the flat outer faces of said columns, said wall panels having marginal flanges thereon extending inwardly from said offsets and engaging said box-like body portions, said wall panels and columns and said wall panels and supporting means having interfitting means thereon to interlock said panel members with said columns and supporting means.

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