Dec. 19, 1939. S. S. CALAFATI 2,184,113

BUILDING CONSTRUCTION

Filed March 5, 1935 5 Sheets-Sheet 1

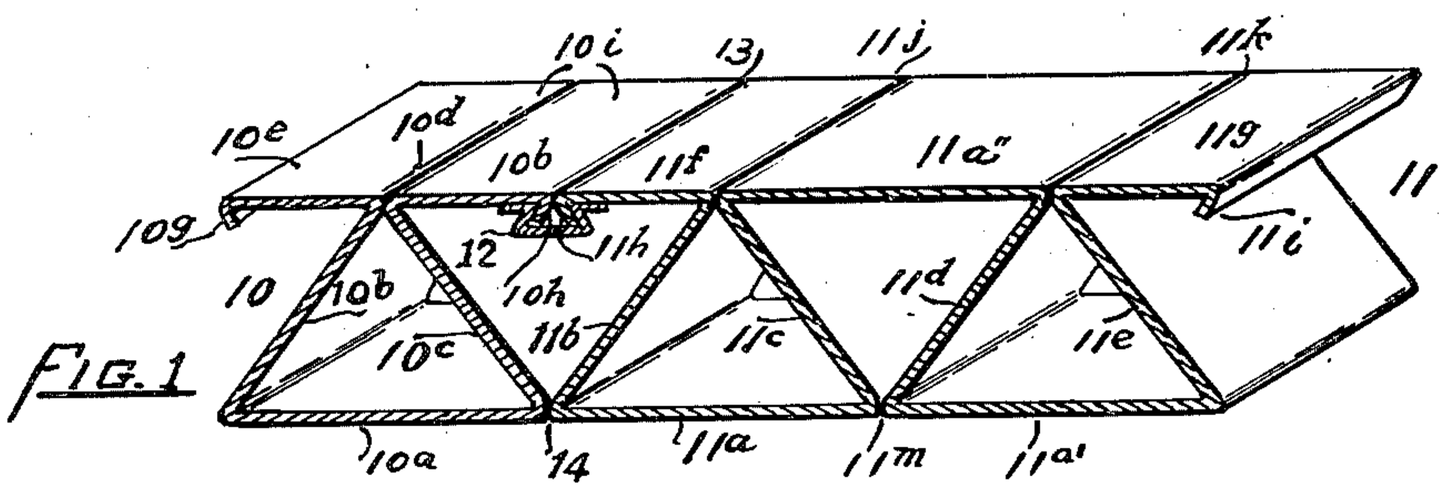

FIG. 1

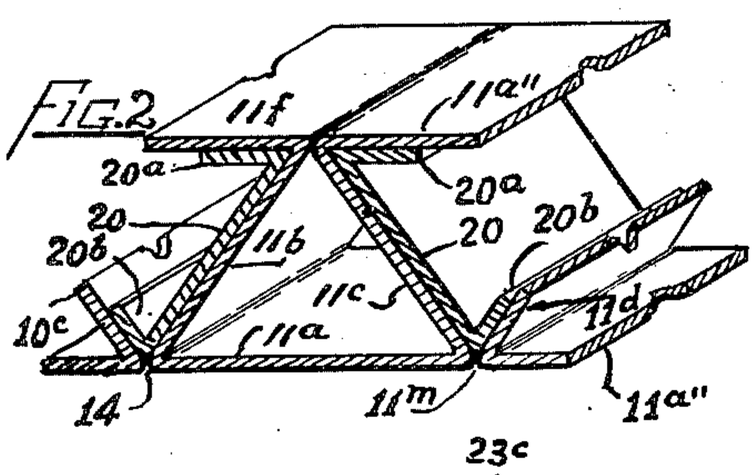

FIG. 2

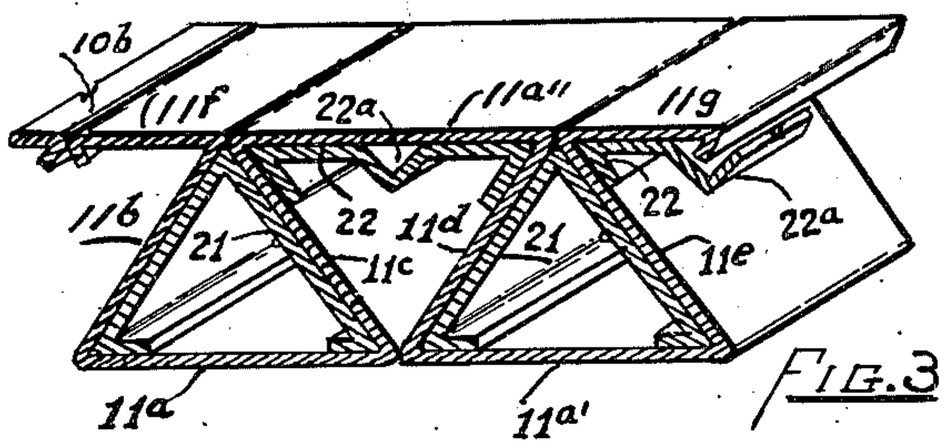

FIG. 3

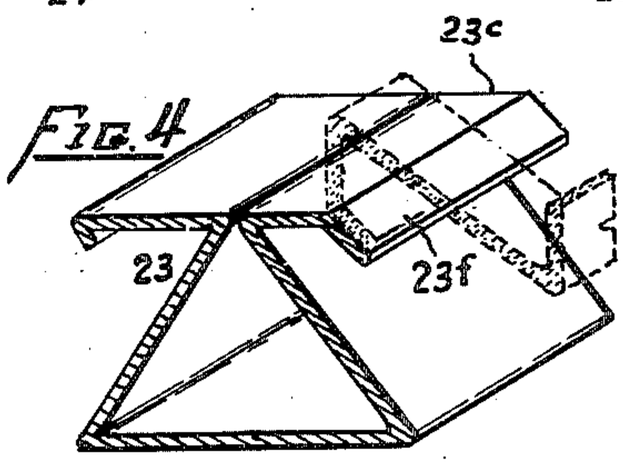

FIG. 4

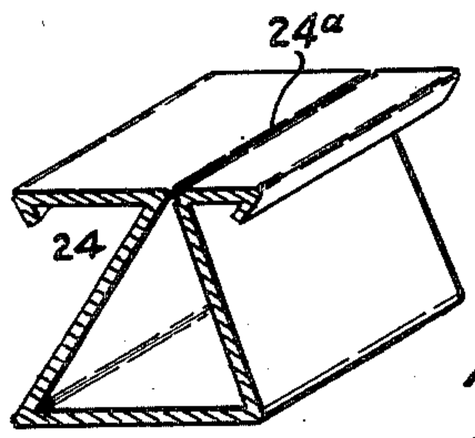

FIG. 5

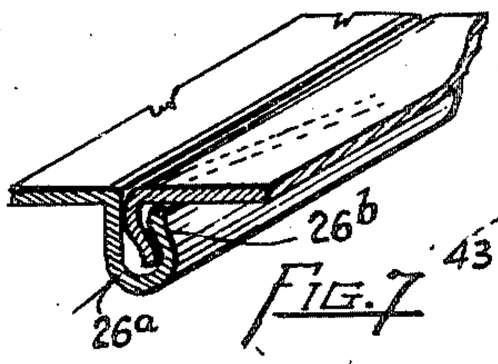

FIG. 7

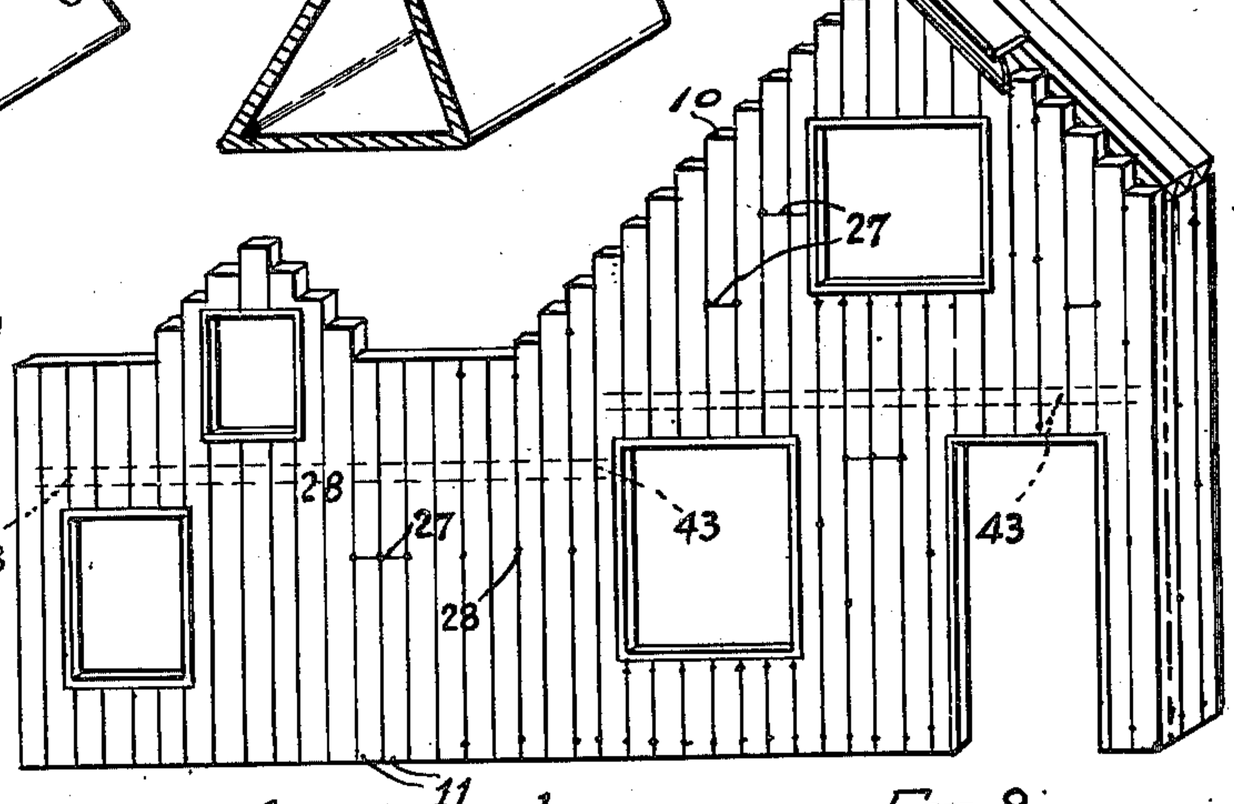

FIG. 8

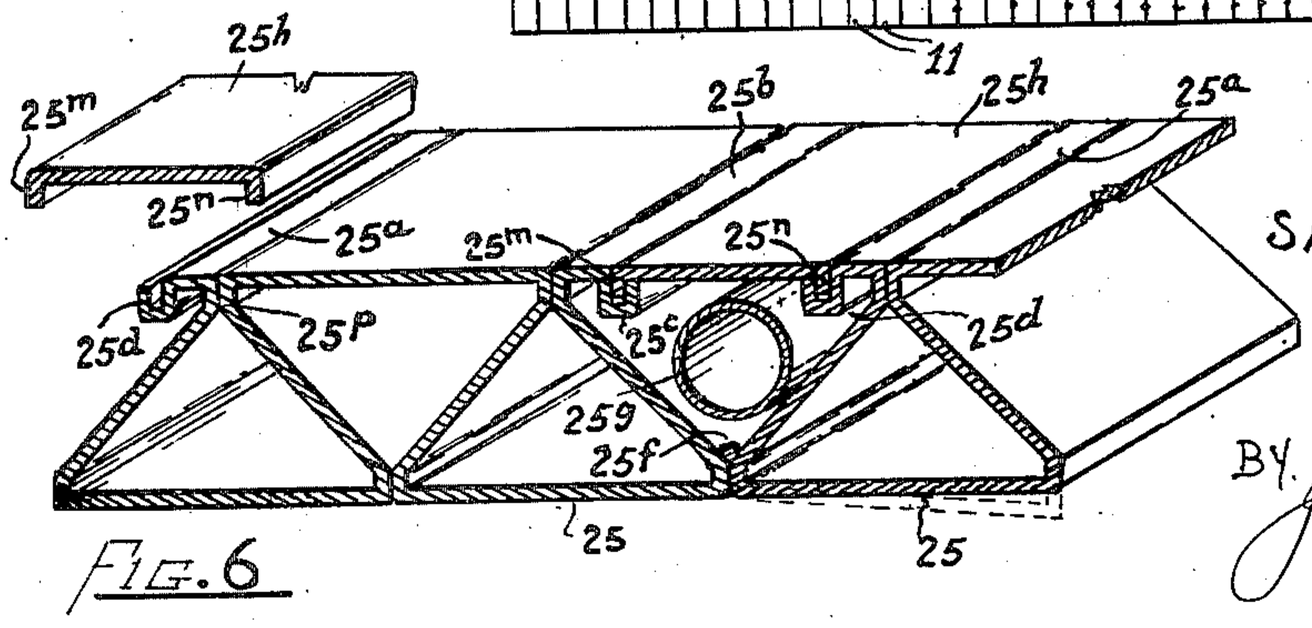

FIG. 6

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BUILDING CONSTRUCTION

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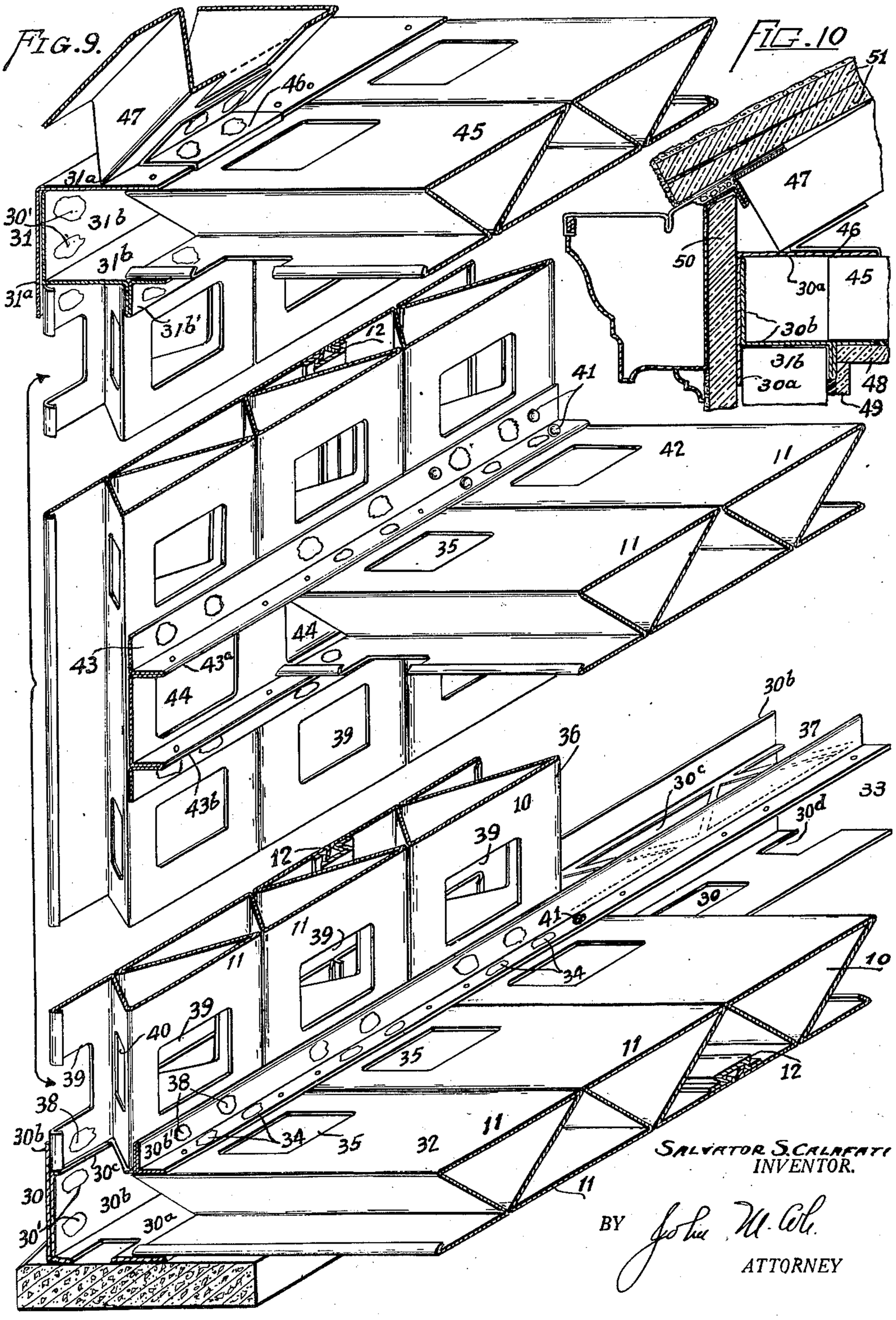
FIG. 9.

FIG. 10



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Dec. 19, 1939. S. S. CALAFATI 2,184,113

BUILDING CONSTRUCTION

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FIG. 11

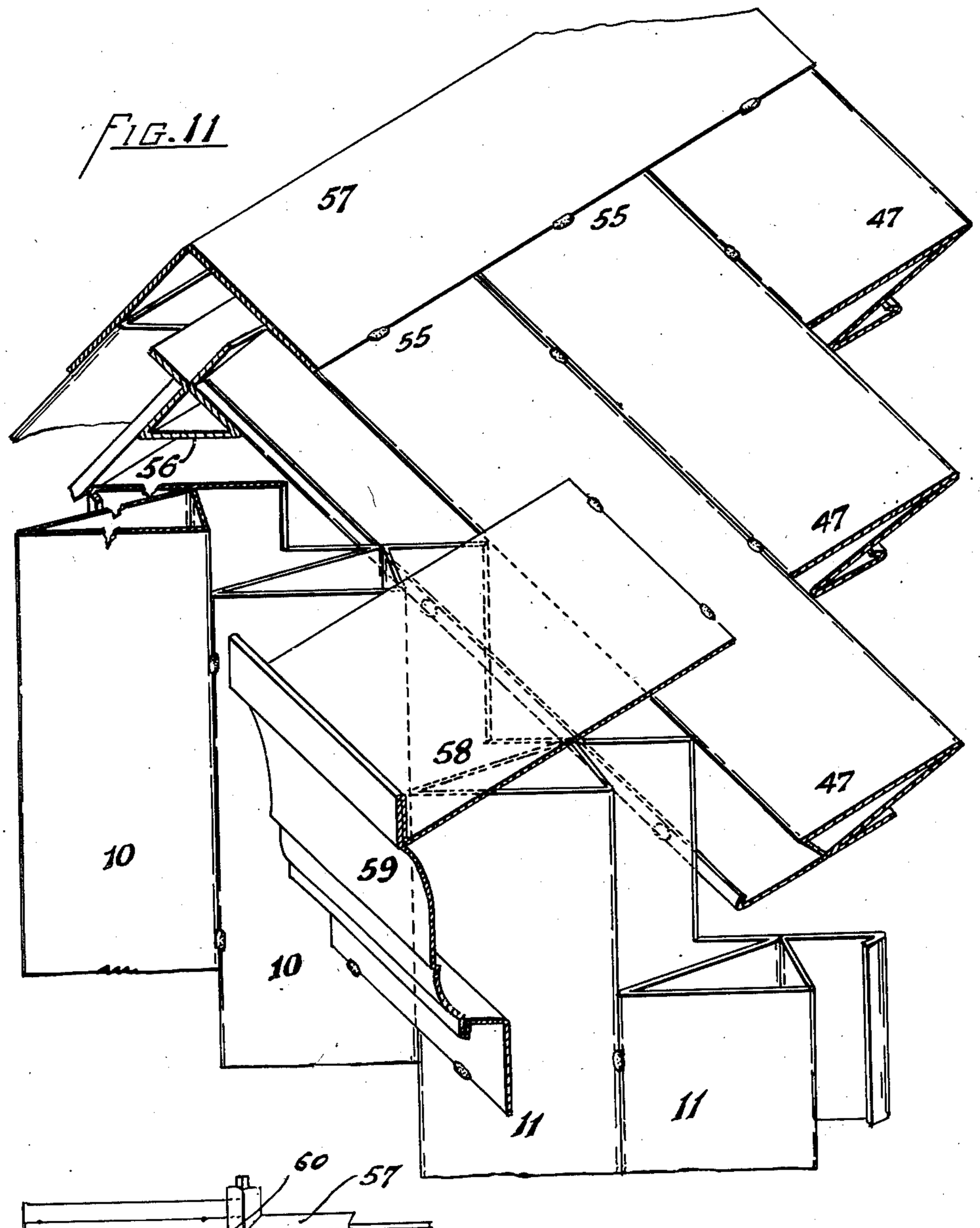

FIG. 12

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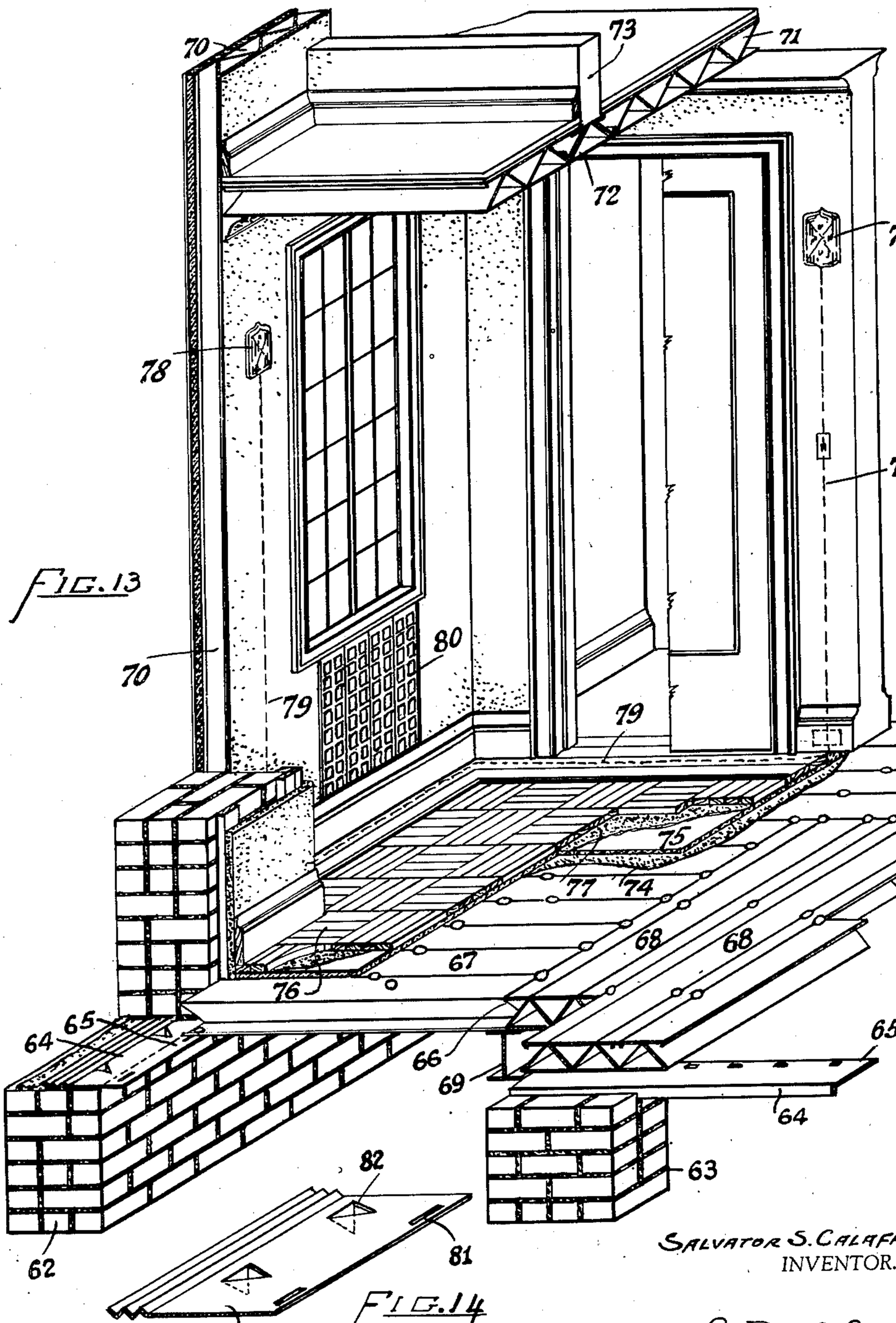

FIG. 13

FIG. 14

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BUILDING CONSTRUCTION

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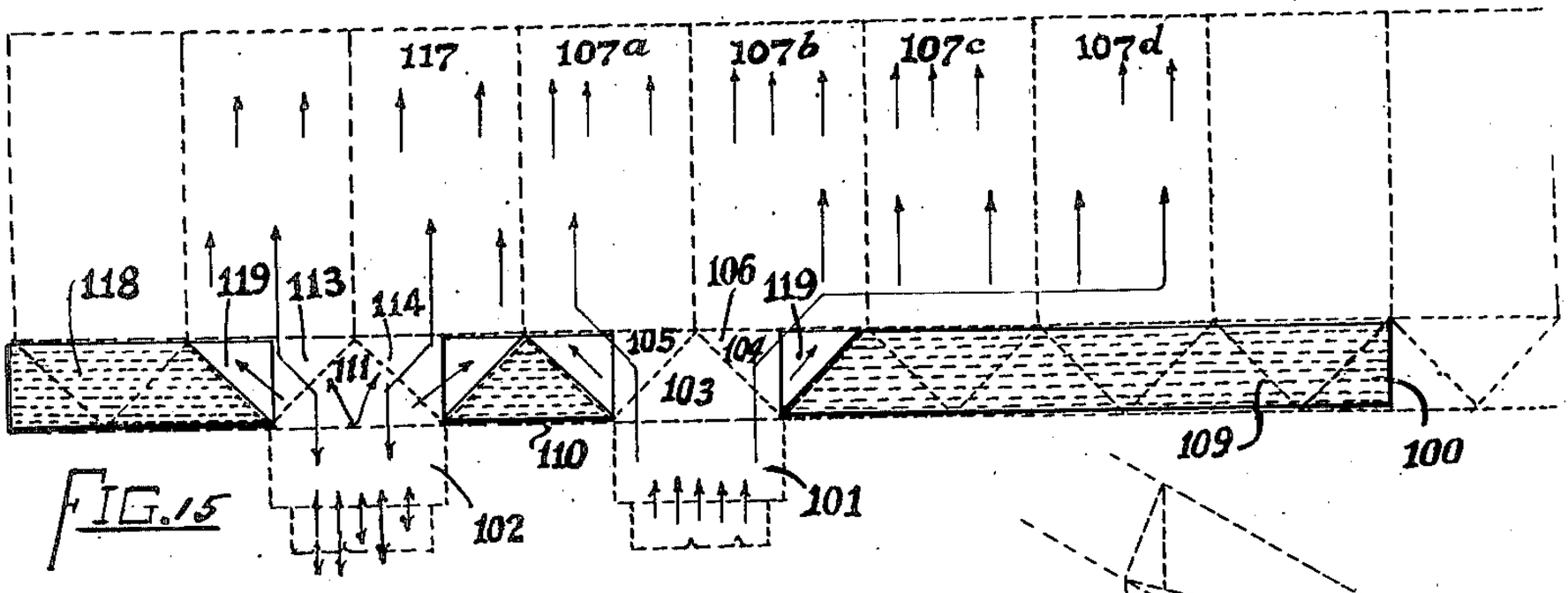

FIG. 15

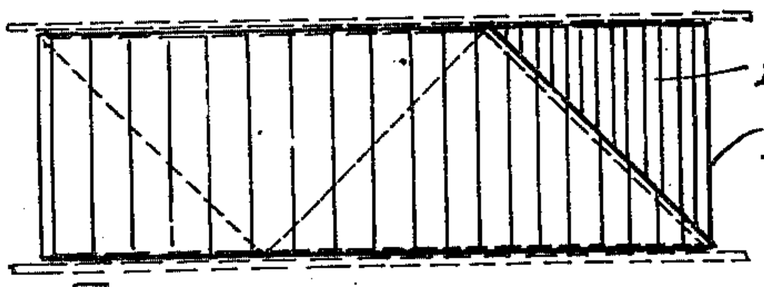

FIG. 16

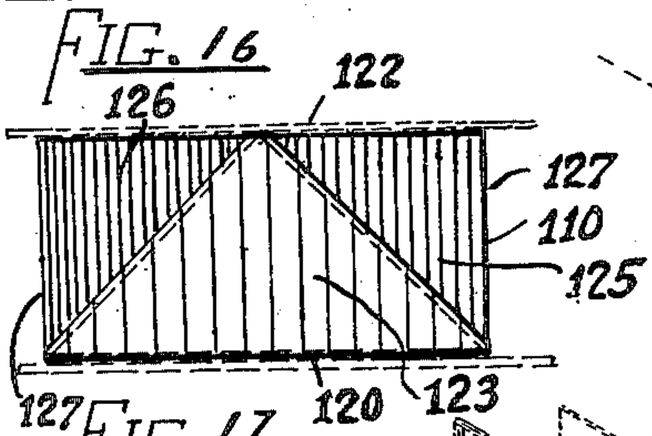

FIG. 17

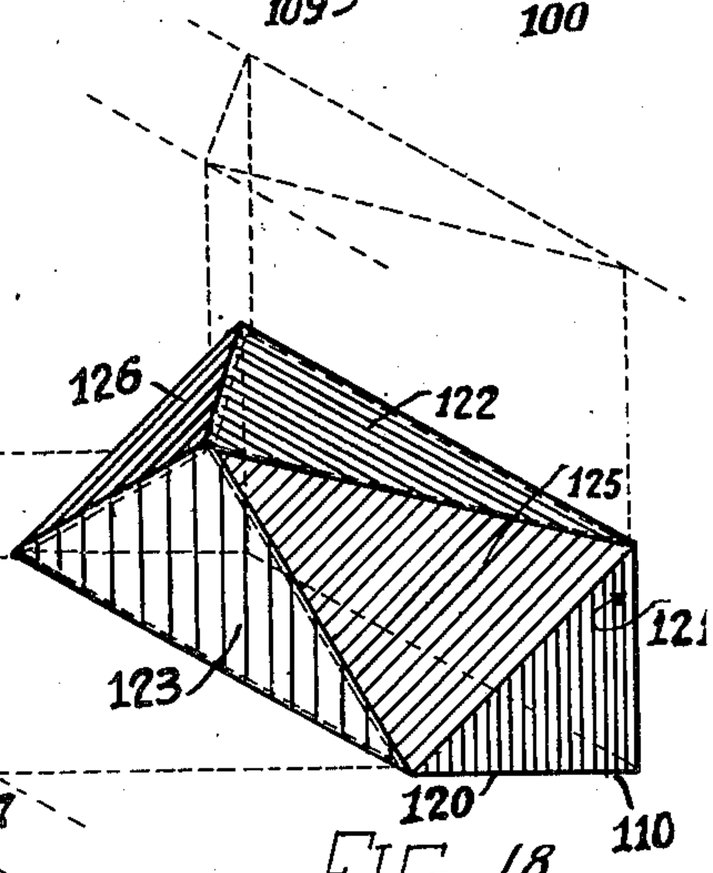

FIG. 18

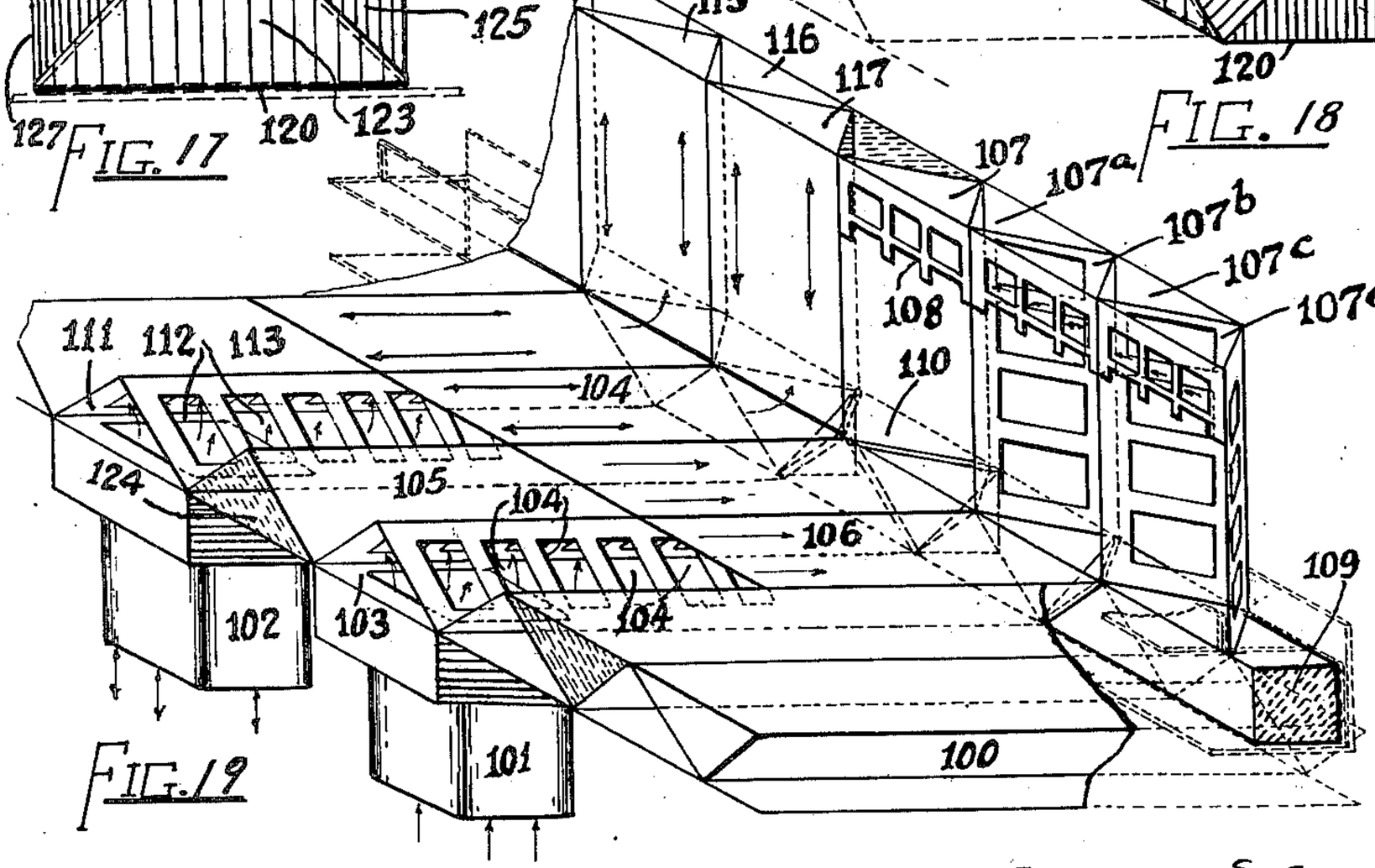

FIG. 19

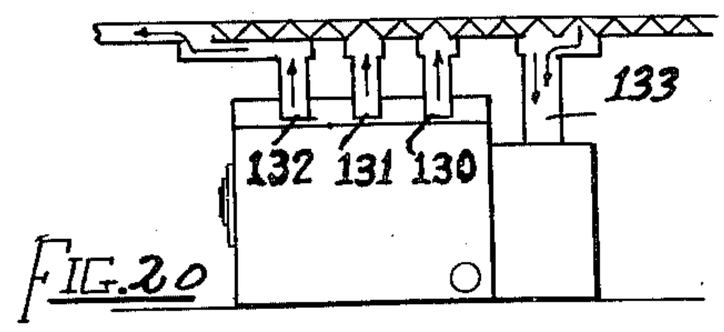

FIG. 20

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Patented Dec. 19, 1939 2,184,113

UNITED STATES PATENT OFFICE

2,184,113

BUILDING CONSTRUCTION

Salvator S. Calafati, New York, N. Y., assignor of four-fifths to Annunziata Calafati and one-fifth to John M. Cole, both of New York, N. Y.

Application March 5, 1935, Serial No. 9,436

16 Claims. (Cl. 189—1)

The present invention relates to building construction and is more particularly directed toward improvements in building construction whereby the floors, ceilings, walls, and roofs, or any of these, may employ preformed cellular metal units, preferably of standardized width.

According to the present invention, these cellular metal units are made up from sheet metal by bending or rolling a wide strip of sheet metal along longitudinally extending lines into a shape which has great strength and rigidity with the minimum amount of metal. A narrow strip may be formed into a single celled unit or a wider strip may be formed into a multiple celled unit.

The units are provided at their edges with interiorly disposed means to facilitate securing them together side by side whereby they may form panels to cover extended areas. The assembled units provide smooth surfaces at top and bottom for the reception of floor, wall and ceiling finishes, and roofing material.

To achieve these advantages, the invention contemplates that the sheet metal shall be formed to provide a comparatively narrow flat area of unit width (for example six inches) and two converging diagonal elements which meet opposite the center line of the flat area to form a cell of triangular cross section. At the apex of the triangle the material is bent laterally into a plane parallel with the plane of the first flat area and extended in a flange to the right or left. This flange may form a part of an adjacent cell of a multiple celled unit, or may be adapted for connection with a similar flange of an adjacent unit. For the former purpose the flange width equals to the unit width, while for the latter purpose the flange extends part way, depending upon the type of connection to be made with the adjacent unit. If it extends the unit width, it forms an area of unit width similar to that on the other face. The metal is then bent back to form a reversed cell of triangular cross section, the diagonal element meeting the adjacent edge of the first unit area. The metal is then bent in to the plane of first flat area to extend the exposed surface another unit width. It is again bent to form another diagonal element and triangular cell similar to the first cell. The formation of these cells may continue, or the edge of the flange formed into some convenient shape for joining to an adjacent shape or unit. The joints or seams formed where the diagonal elements of a unit meet may be welded to assure alignment and prevent separation.

The cells formed in this way utilize the metal in a very efficient manner so that great strength and little deflection may be had with minimum depth of section.

When a plurality of the preformed units, of single or multiple width, are placed side by side, the seams formed by the meeting of the diagonal elements and the narrow flanges of the adjacent units may be interlocked, welded together, secured together by slidable clips forced over inwardly bent flanges, or a filler may be utilized.

Owing to the inherent rigidity of the parts having alternating units with opposed angles, the provision of a continuous flat surface on both faces of the units and of areas made up on a plurality of the units, and the possibility of securing the units together as described, an exceedingly strong, rigid inflexible panel smooth on both sides may be provided for floor, wall, ceiling, or roof. Not only is it of less weight and thickness than conventional constructions designed for some of these purposes, but additional advantages are available; such as, ease of fireproofing, insulating, sound deadening, and application of wall finish, freedom of shrinkage, warping and the like, and saving in building height (without sacrifice of room height).

The availability of units, of the elementary shape above referred to, also makes it possible to slightly alter them where desired so that heating, ventilating, and/or air conditioning may be accomplished by using the cells as ducts to convey the air to and from the rooms, thereby making it unnecessary to build into the walls and floor, ventilating ducts, registers, and the like.

The accompanying drawings show for purposes of illustration, several forms of cellular metal building units, and the construction of floors, walls, ceilings, and roofs from the same, it being understood that the drawings are illustrative of the invention and that they do not limit the same.

In these drawings:

Fig. 1 is a sectional view showing a single cell unit and a multiple cell unit secured together, the thickness of the metal being exaggerated.

Fig. 2 is a sectional view showing one form of reinforcing which may be used with the cellular structure of Figure 1;

Fig. 3 is a sectional view showing another form of reinforcing which may be employed;

Figs. 4, 5 and 6 are sectional views through modified forms of cell construction;

Fig. 7 is a fragmentary section showing a

modified construction for joining two units together;

Fig. 8 is an elevational view of a building wall made up of a plurality of the units and showing gable, window, and door openings;

Fig. 9 is a perspective view with parts in section to show the assembly of floor, wall, ceiling and roof from panels employing the units of the preceding figures;

Fig. 10 is a sectional detail showing roof construction;

Fig. 11 is a perspective view, with parts in section illustrating the formation of the ridge of a roof, and a connection of the roof and gable wall;

Fig. 12 is a top plan view illustrating a hip;

Fig. 13 is a perspective view of a fragment of a building showing foundation, floors and walls;

Fig. 14 is a perspective view of an anchorage for use in a brick wall to support a floor;

Fig. 15 is a diagrammatic sectional view through a floor showing a wall in elevation and indicating the paths of air for heating and ventilating;

Fig. 16 is a front elevational view of one form of insert to be used in a cell to block off a plurality of cells of the wall and floor system;

Fig. 17 is a front elevational view of a form of insert intended to block or close off a single horizontal cell and single vertical cell of the type having the apices of the triangular cells together;

Fig. 18 is a perspective view of the member shown in Figure 17;

Fig. 19 is a perspective view of a floor and wall system illustrating the adaption of the same for heating and ventilating; and

Fig. 20 is an elevational view showing the connection between the floor system and a furnace and air conditioning plant.

In Fig. 1, a single celled unit is shown at **10**. It has a face **10***a* of unit width, two diagonal elements **10***b* and **10***c* (which meet along a seam **10***d*), and lateral extensions or flanges **10***e* and **10***f* terminating in inwardly extending flanges **10***g* and **10***h*. The seam **10***d* may be welded at the factory, if desired. The combined width of the extensions **10***e* and **10***f* equals the width of the face **10***a* and these extensions together form a face **10***i*.

In Fig. 1, the multiple celled unit is shown at **11**. It has two faces **11***a* and **11***a'* of unit width on the bottom and one such face **11***a''* on the top, four diagonals **11***b*, **11***c*, **11***d*, and **11***e*, and two lateral extensions **11***f* and **11***g*, similar to the extensions **10***e* and **10***f* of unit **10**, and provided with similar flanges **11***h*, and **11***i*. The seams **10***d*, **11***j*, **11***k*, and **11***m* may be welded at the factory, if desired and ground smooth.

The flanges **10***h* and **11***h* are secured together by a slidable clip **12** which fits these flanges and holds the extensions together.. The units **10** and **11** abut along seams indicated at **13** and **14** and these seams may be welded after installation.

The diagonal elements are preferably of the same width, and at an angle in the neighborhood of 45° to the plane of the flat face of the unit. This brings them together at approximately right angles to one another along the seams. The units are then symmetrical and may be used upside down or turned end for end. With the units at 45°, the depth of the unit is then one-half the width of the single celled unit. While with an angle of approximately 52°, the depth of the section is about two-thirds the unit width.

While units of varying load carrying capacity may be made by varying the gage of the metal used and/or the depth of the section, it is sometimes desirable to reinforce certain of the cells to carry extra loads, without changing the basic unit at all. Fig. 2 shows one way of doing this for lighter loads. Stiffeners **20** are inserted so as to lie adjacent a pair of converging diagonal elements. These stiffeners have flanges **20***a* to fit against the flat face of the units and flanges **20***b* to fit against the adjacent diagonal elements.

Fig. 3 shows a stronger form of reinforcing. Here angle irons **21** are inserted in alternate cells to supplement the diagonals and corrugated plates **22** are inserted into the intermediate cells to supplement the flat areas. The angle irons bridge the clips **12** as indicated in the drawings. The center corrugation **22***a* of plate **22** bridges the clips when these plates are inserted in cells formed by uniting two units.

The cross section of unit **23** of Figure 4 is the same as that of unit **10** except that one of the extensions **23***c*, corresponding with either extension **10***e* or **10***f*, is of one-half the effective width of the other extension and has a 45° flange **23***f* parallel with the adjacent diagonal element. This form of unit is particularly designed for use in the erection of outside or inside corners where one wall is at 90° to the other wall indicated by the second similar unit shown in dotted lines. It compensates for the wall thickness at the corner.

The unit **24** shown in Fig. 5 is modified on the right of the line **24***a* so that the entire unit is ¾ the width of the standard unit. The unit **24** is designed for welding against another flat wall, and compensates for wall thickness.

Fig. 6 shows two cellular units **25** of modified form secured together. The laterally extending flanges **25***a* and **25***b* are narrower than the flanges shown in Figures 1–3, and are provided with upwardly opening grooves **25***c*, **25***d*. When the two units **25** are brought together, they can be inside welded as indicated at **25***f*, the welding being done from above, instead of from below. This provides a smoother outer surface, and permits the insertion of a pipe, conduit or the like, **25***g*. A filler plate **25***h* has flanges **25***m*, **25***n* which fit into grooves **25***c*, **25***d* so as to complete the cell, and provide a smooth upper surface. This filler may be welded in place. As shown in Figure 6, the cells have short perpendicular walls **25***p* between the flat faces and diagonals to provide greater inter-cell bearing area.

Where curved structures, such as walls for grain bins, silos, coal pockets, tanks, roof or railway cars, and the like, are desired the units may be designed so that, when assembled, a cylindrical surface results. In the form shown in Figure 6, this may be obtained by using a wider or a narrower filler strip **25***h*. The wider strip will shift the right hand unit down toward the dotted line position.

In Fig. 7, the right hand edge of one of the units is shown as having groove **26***a*, while the left-hand edge of the adjacent unit has a curved flange **26***b* which is adapted to be received in the groove, either by swinging this part from the dotted to the full line position, or by a suitable press. This arrangement takes the place of the slidable clip **12**, or the filler **25***g* and the interlocking parts may be welded or not as desired.

Figure 8 illustrates the assembly of the side wall of a house. Single width units **10** and double width units **11** of random lengths are utilized to provide the window and door openings and gables. A floor slab would be assembled in the same way. The ends **27** and longitudinal joints

28 are united to form a monolithic slab which includes the door and window frames. Oxyacetylene welding, spot welding, arc welding or some form of interlocking of joints may be utilized.

Figure 9 shows a perspective view of a building employing the welded sheet metal unit shown in Fig. 1, although it will be understood that the units shown in Figs. 2, 3, 6, or 7 may be used. The sill 30 and plate 31 are each made of two sheet metal angles welded together, the angles 30*a* and 31*a* being plain angles with equal flanges and the angles 30*b* and 31*b* having a doubled fold 30*b'* and 31*b'*. The angles are spot welded together as indicated at 30'. The end of the floor 32, formed of units 10 and 11, is inserted in the laterally opening channel 33, formed by the sill angles 30*a* and 30*b*. It may be welded in place by flame or arc welding, or spot welded at 34, the tools being inserted through holes 35, or through the opening between the flanges 25*d* and 25*c*, of Figure 6. The lower end of the wall 36, also formed of units 10 and 11, is inserted in the upwardly opening channel 37, formed by the sill angles 30*a* and 30*b*. It may be welded to both sill angles, as indicated at 38. The holes 39 formed in the wall member as well as the holes 35 in the floor member will be closed by the wall and floor surfacing. The sill member 30*b* has triangular holes 30*c* punched in its upper wall to match the cells of the wall member 36 so that the wall member may be connected into the sill to form a conduit for heating and ventilating. The air connection may be direct to the floor unit, or if this is closed off, connection may be had through holes 30*d* in the bottom of the sill to a duct. Holes 40 may be punched in the diagonals near the holes 39 to facilitate the passage of wires, pipes, etc. These holes do not materially affect the strength of the structure, the loads being distributed throughout all the metal. Instead of welding, rivets 41 may be employed.

The second floor indicated at 42, may be like the first floor. It is received in a channel member 43 formed of sheet metal to have two doubled walls 43*a* and 43*b* spaced to form a channel. The member 43 is spot or arc welded, or otherwise secured to the wall at the desired elevation, and the floor member 42 welded or riveted in place. When the floor 42 is to provide ducts for heating or ventilating, or when wires or pipes are to pass through it, appropriate holes 44 are provided in the wall. These may be used to facilitate welding or riveting. These channels 43 may receive the side edges of the floor slab or may be used to receive the upper or lower ends of a wall slab.

The plate 31 is secured on the upper end of the wall as shown (in Figs. 9 and 10) and the next floor (or ceiling) 45 fastened in as indicated. Plate angle 31*b* may have holes such as 30*c* or not, as desired. Short angles 46 are welded to the top of the plate, and a roof slab 47 welded to these angles. The roof slab may also be made up of units of such as 10 and 11.

Figure 10 also shows the placing of ceiling and wall finish, 48, 49, outside wall covering 50, and roofing 51, on the flat surfaces provided by the cellular units. For these purposes one may use, as indicated elsewhere in the drawings, other finishes or a decorative covering.

In the arrangement shown in Figure 11, the wall is formed out of elements 10 of single unit width and different lengths, or cut off elements 11 of double width, having a short cell and a long cell so as to produce a stepped effect as shown in Figure 8 or 11. If the lengths of material for forming this stepped effect is not available, the slab may be trimmed to a suitable shape by a torch. The upper ends 55 of the roof members 47 are rested on and preferably welded to a transverse support, such as indicated at 56. The gaps between the upper ends of the roof units are closed by an angle 57. The space above the wall is closed off by a strip 58 welded in place. This strip is preferably L shaped to accommodate the roofing material, and supports a molding 59 adapted to extend down onto the wall members and be welded to the same. It will be apparent that the foregoing provides an exceedingly rigid structure.

In Figure 12 roof forming units 47 are shown as meeting along a hip 60. The joint is covered by a member indicated at 61, and a similarly shaped angle plate is employed underneath. When these parts are welded together a rigid hip construction is provided.

In Figure 13 a portion of a brick wall is illustrated at 62, and a column or other support at 63. Anchor plates such as shown at 64 are embedded in the wall or column to provide an inwardly projecting support or shelf 65 to support a floor.

The floor supporting system is indicated at 66. It comprises lengths of cell members 67 and 68 supported from the shelves 65. Where certain of the members extend at right angles to the adjacent members a support, such as an I beam 69, may be employed under the joint. The wall 70 may be constructed as indicated in Figure 9 and support an upper floor system as shown at 71. A portion of this floor system is reinforced as indicated at 72 to support a partition 73.

Any suitable form of floor finish may be employed. In the drawings, a layer of mastic is shown at 74, and of insulation at 75. Parquet flooring 76 may be placed on mastic 77. The wall and ceiling finishes may be whatever is desired. Lighting fixtures are indicated at 78, the wiring 79 being carried in the cell members forming the wall or floor. A register is shown at 80.

Figure 14 is an enlarged fragment of wall plate 64, with oblong holes along the edge and prongs to anchor same to wall. Holes 81 are for the purpose of fastening floor slab by means of screw nails or bolts, prongs 82 are punched from plate and will engage in joints of brick work.

Heating and ventilating

The adaptation of cellular wall and floor construction for heating and ventilating is illustrated in Figures 15 to 20 inclusive. A floor system is diagrammatically illustrated at 100. It is connected to two ducts 101 and 102 for supplying heated air from furnace or for use in withdrawing air from the room for air conditioning. The duct 101 is connected through the bottom of a downwardly facing triangular cell 103. The diagonal members forming this cell are provided with openings as indicated at 104 so that the air may spread out and pass toward the wall through the two adjacent cells 105 and 106. As shown in Figure 15 this air passes into a number of vertically extending cells 107, 107*a*, 107*b*, 107*c*, and 107*d*, and this air passes out through the register such as that shown at 108, the same being similar to register 80 shown in Figure 13. The air flowing to the right through the cells 103, 105 and 106, and up into the cells 107*a*, 107*b*, 107*c*, and 107*d*, is prevented from passing lengthwise of the sill forming member and into other floor and wall cells by batts, blocks, or stoppers 109 and 110 placed in the sill.

The duct 102 which may be used either for heating or withdrawing of air is connected to a cell 111 similar to the cell 103 and has holes 112 to permit the air to pass into or out of the two adjacent cells 113 and 114. These cells are connected to vertical cells 115, 116, and 117 so that the air passes up or down as desired. The batt 110 separates the air streams supplied by the ducts 101 and 102 and the batt 118 stops the sill to the left of the duct formed by the cells 111, 113 and 114.

The batts 109 and 118 are alike except that one is made right-hand and the other left-hand. They have a square cross section as indicated at the lower end of Figure 19 and are made of the proper size to fit in the space below the upper sill forming member 30 and inside the ends of the floor forming cells as will be apparent. One end of the batt is provided with a bevelled surface as indicated at 119 so as not to impede flow of air into the vertical cell.

The batt 110 shown in Figures 17 and 18 has a rectangular bottom face 120 and a rectangular rear face 121 adapted to rest against the bottom and inner walls of the sill forming member. It has a triangular upper face 122 adapted to close off the opening 30c in the upper sill forming plate. The batt has triangular front face 123 adapted to close off the opening in the cell 124 (this being the cell between the cells 105 and 114). The faces 125 and 126 are bevelled to allow the air to spread and reach the vertical cells 107a and 117 respectively.

The furnace and air conditioner shown in Figure 20 is arranged so that three outlet pipes 130, 131 and 132 lead into the floor, the pipe 132 being connected to a series of cells running at right angle to cells to which the pipes 130 and 131 are connected. A return connection is shown at 133 for the air conditioning.

Any of the cells which are not to be used for heating or ventilating may be closed up by blowing in suitable packing material or need not to be filled. The batts are inserted and secured in place in any suitable way before the wall or floor forming members are assembled with cell. It will of course, be understood that various other expedients may be employed to close off vertical and horizontal cells through which it is not desired to have the air passed whereby the air duct may comprise selected horizontal cells and selected vertical cells, communication being had through a portion of the cell. The cells in the vertical wall may be closed off from above so that the heating is passed out through the register, or these cells may be left open so that the air is conducted through either a ceiling register above to the second floor.

This form of heating has many advantages, particularly in that there is no outlay for piping or ducts other than those necessary in the basement. All the other ducts may be provided for in the floor and wall. A further advantage is that any number of floor units may be connected together by a suitable manifold so that large areas of the floor or the wall may be connected to the furnace or air conditioner. In this way it is possible to provide comparatively large areas to radiating surfaces and maintain the same at the desired temperature so that heat is radiated to the occupants without necessarily overheating the air in the room.

What is claimed is:

1. A structural member for building walls, floors and the like, comprising a single piece of longitudinally bent sheet metal of indefinite length and uniform cross section, said cross section comprising the base and sides of a triangle to provide a longitudinally extending cell of triangular cross section, the piece of metal having outwardly bent extensions at the apex of the triangle parallel with the base, whereby the structural member has two parallel opposed faces and interconnecting diagonal elements, the contiguous parts of the member being welded together along the apex of the triangle to prevent spreading and insure alignment.

2. A structural unit as claimed in claim 1, wherein at least one of the outwardly bent extensions is provided with a flange extending toward the opposite face.

3. A structural unit as claimed in claim 1, wherein at least one of the outwardly bent extensions is provided with a flange extending toward and disposed opposite the edge of the opposite face.

4. A structural member for building walls, floors and the like, comprising a single piece of longitudinally bent sheet metal of indefinite length and uniform cross section, said cross section comprising the base and sides of a triangle to provide a longitudinally extending cell of triangular cross-section, the piece of the metal having outwardly bent elements at the apex of the triangle parallel with the base of the triangle and of width equal to said base, inwardly bent elements at the extremities of the outwardly bent elements, said inwardly bent elements being parallel with the sides of said triangle and extending to the base of the first triangle to form two additional similar but inverted triangular cells, outwardly bent extensions at the apices of said additional triangular cells, whereby the structural member has two parallel opposed faces with interconnecting diagonal elements, the contiguous parts of the member being welded together along the apices of the triangles to prevent spreading and insure alignment.

5. A structural member as claimed in claim 4, wherein said outwardly bent extensions are provided with flanges extending toward the opposite face.

6. In a building floor, wall, or the like, a panel comprising a plurality of sheet metal strips folded along parallel longitudinally extending lines to form units having longitudinally extending cells of trianguar cross section, said triangular cells having bases in parallel planes to form plane surfaces for the opposite faces of the units, the seams formed by the adjacent bases being welded and adjacent units being secured together, the edges of the strips forming the units being in the same face of the panel and opposite the edge of the other face of the same unit.

7. In a building floor, wall, or the like, a panel comprising a plurality of sheet metal strips folded along parallel longitudinally extending lines to form units having longitudinally extending cells of triangular cross section, said triangular cells having bases in parallel planes to form plane surfaces for the opposite faces of the units, the seams formed by adjacent bases being welded and adjacent units being secured together, and interiorly disposed clips receiving the adjacent edges of the strips for holding the units together.

8. In a building floor, wall, or the like, a panel comprising a plurality of sheet metal strips folded along parallel longitudinally extending lines to form units having longitudinally extending cells of triangular cross section, said triangular cells

having bases in parallel planes to form plane surfaces for the opposite faces of the units, and equal sides in diagonal planes, the longitudinally extending seams of each unit being welded, the edges of the strips forming the units being in one face of the panel so that the other face is comprised entirely of the bases of the triangles, the seams formed by abutting bases of the triangles of adjacent units being welded, the edges of the strips forming adjacent units being spaced, and filler strips secured to said edges.

9. In a building, a floor panel comprising sheet metal folded to form reversed triangular cells with walls of single thickness, the bases of the cells forming parallel spaced faces having longitudinally extending seams, the seams being welded together, a sheet metal sill having a lateral opening into which the end of floor panel extends and into which the cells open, a wall panel similar to the floor panel and arranged with the cells vertical, the sill having an upper opening to receive the wall panel.

10. In a building, a floor panel comprising sheet metal folded to form reversed triangular cells with walls of single thickness, the bases of the cells forming parallel spaced faces having longitudinally extending seams, the seams being welded together, a wall panel similar to the floor panel and arranged with the cells vertical, and a channel shaped member welded to the inner side face of the wall panel and receiving the floor panel.

11. In a building, a floor panel comprising sheet metal folded to form reversed triangular cells with walls of single thickness, the bases of the cells forming parallel spaced faces having longitudinally extending seams, the seams being welded together, a wall panel similar to the floor panel and arranged with the cells vertical, and a channel shaped member welded to the inner side face of the wall panel and receiving the floor panel, the cells in the floor panel opening into the channel, the wall panel and channel being apertured to provide communication between the cells of the floor and wall panels.

12. In a building, a member adapted to form a sill or plate, comprising two sheet metal members of uniform cross section secured together, the first member being in the form of an angle having a vertical wall and a horizontal wall, the second being in the form of an angle having a vertical wall narrower than the vertical wall of the first member and a horizontal wall spaced from the horizontal wall of the first member to form a laterally open channel, the horizontal wall of the second member carrying a vertical flange opposite the projecting portion of the vertical wall of the first member to form a vertically open channel.

13. In a building, a member adapted to form a sill or plate, comprising two sheet metal members of uniform cross section secured together, the first member being in the form of an angle having a vertical wall and a horizontal wall, the second being in the form of an angle having a vertical wall narrower than the vertical wall of the first member and a horizontal wall spaced from the horizontal wall of the first member to form a laterally open channel, the horizontal wall of the second member carrying a vertical flange opposite the projecting portion of the vertical wall of the first member to form a vertically open channel, a horizontal floor or ceiling forming panel comprising sheet metal folded to form reversed triangular cells with walls of a single thickness, the bases of the cells forming parallel spaced faces having longitudinally extending seams, the seams being welded together, the end of said panel projecting into the laterally opening channel of the sill or plate forming member, and being secured thereto, and a wall forming panel similar to the floor or ceiling forming panel and having vertically extending cells, its end being received in the vertically opening channel.

14. A building as claimed in claim 13, wherein the horizontal wall of the sill or plate forming member is apertured to permit passage of air from the said member to the cells of the vertical panel.

15. A building as claimed in claim 13, wherein the horizontal wall of the sill or plate forming member is apertured to permit passage of air from the said member to the cells of the vertical panel, and having means in the sill or plate forming member to close off the same so that predetermined cells in the floor or ceiling forming panel may be placed in communication with predetermined vertical cells in the wall forming panel, other cells being cut off.

16. A building floor, wall, or the like, formed of sheet metal and having parallel faces and diagonal connecting elements, each diagonal connecting element being integral with and a continuation of the sheet metal forming the adjacent face portion, said connecting elements forming longitudinally extending cells of triangular cross section, the adjacent cells being reversed to form longitudinally extending seams at their apices, said seams being welded, certain of the bases of the triangular cells consisting of two pieces of sheet metal united along a longitudinal seam.

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