May 17, 1932. H. BOETTCHER 1,858,701

BUILDING CONSTRUCTION

Filed July 25, 1929 4 Sheets-Sheet 1

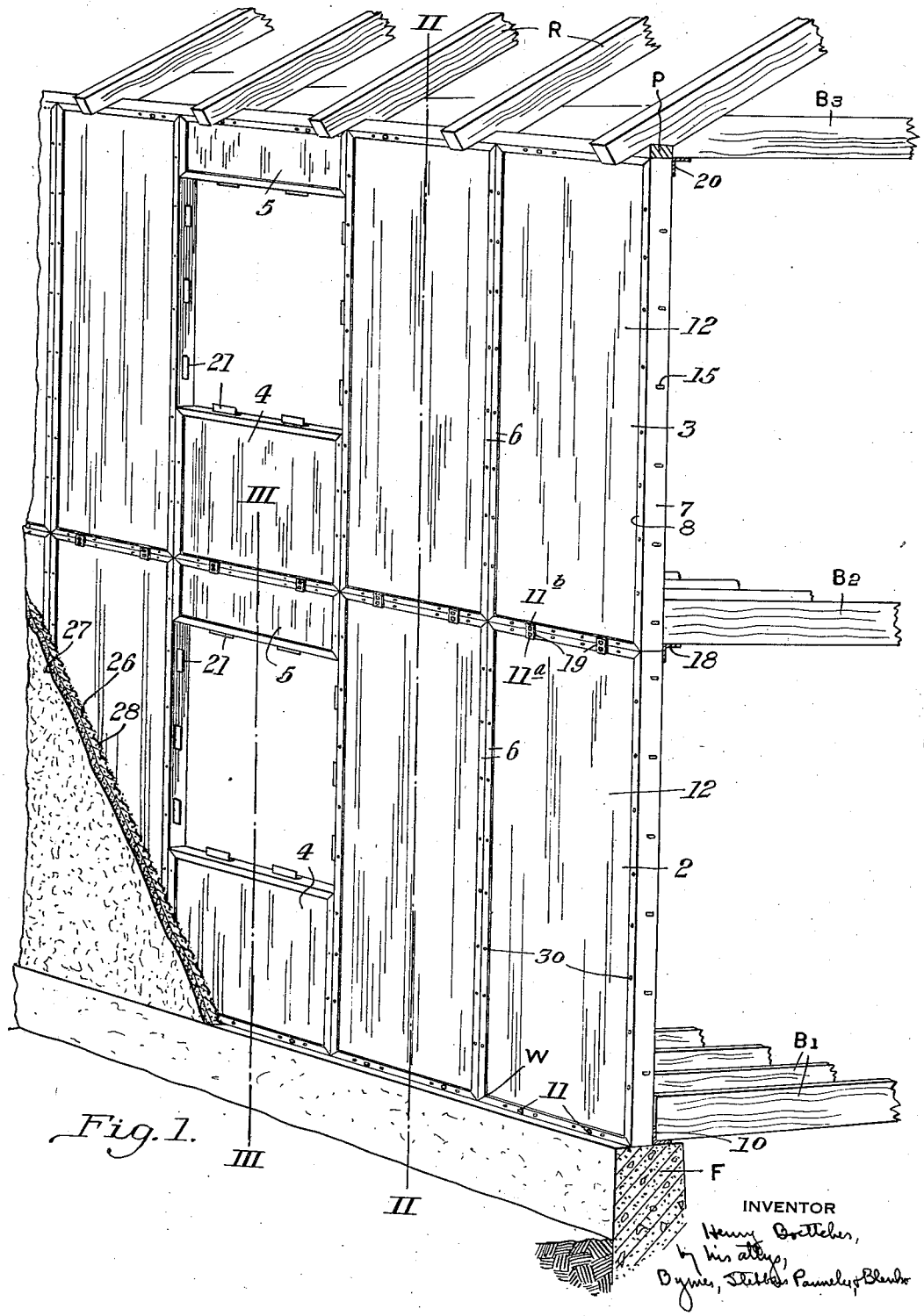


Fig. 1.

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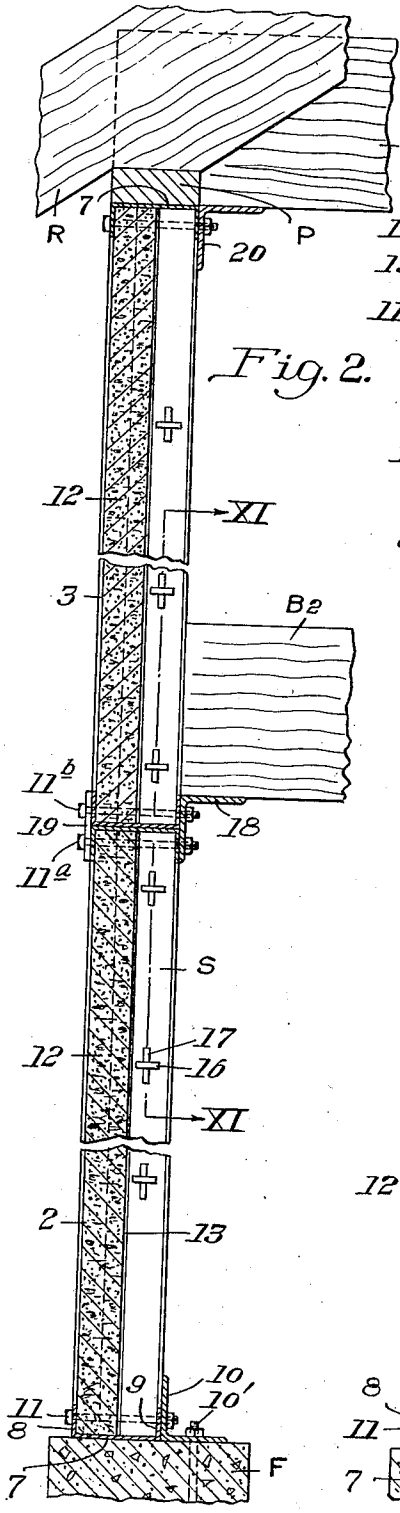


Fig. 2.

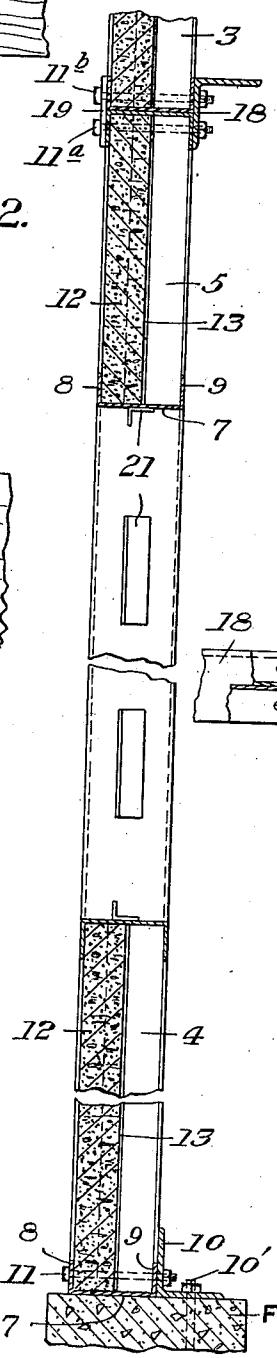


Fig. 3.

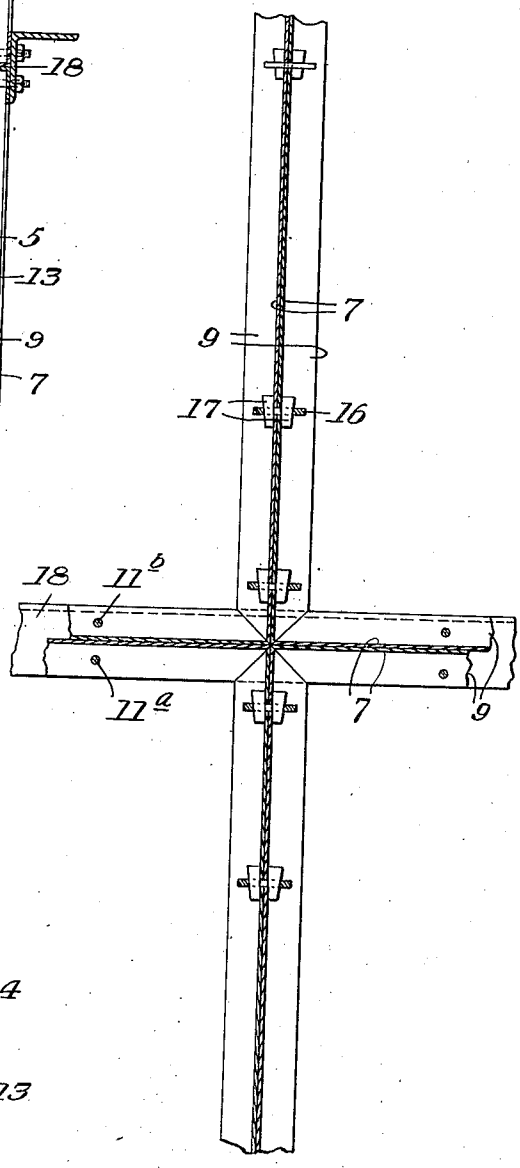


Fig. 11.

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Fig. 4.

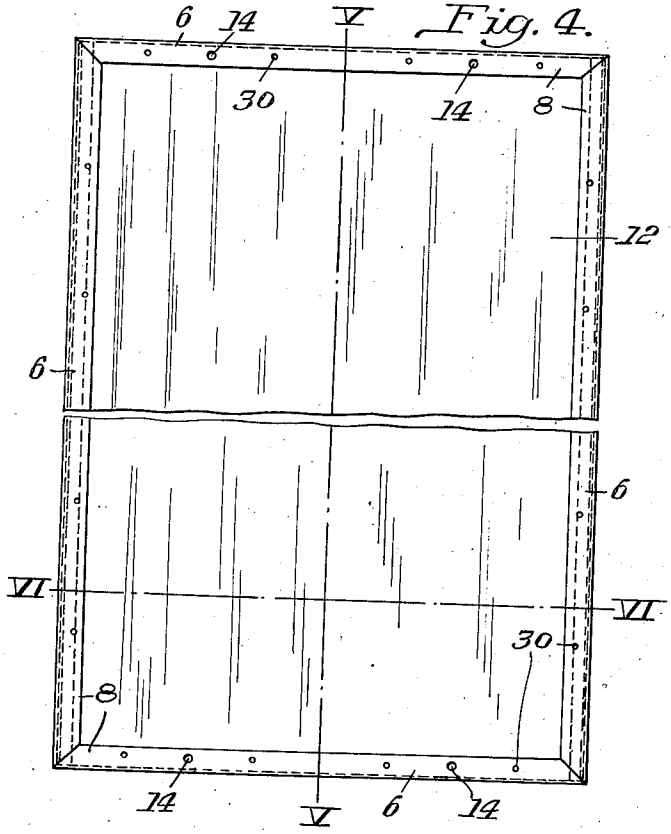


Fig. 5.

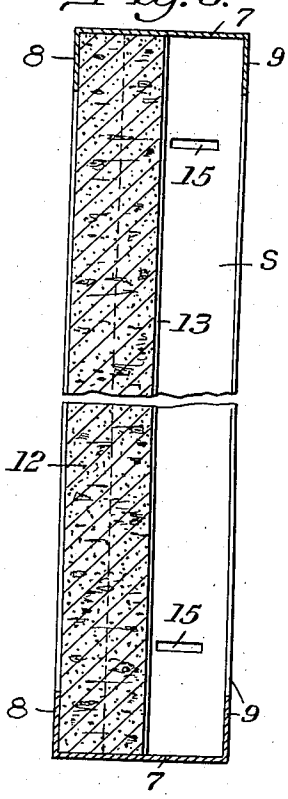


Fig. 6.

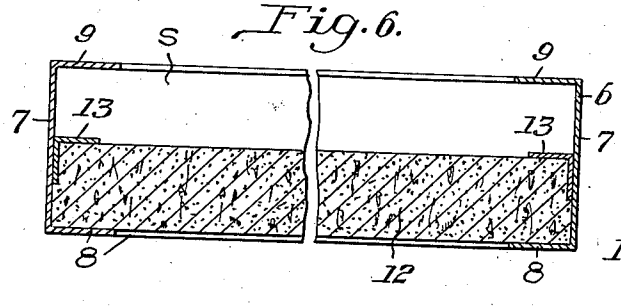


Fig. 7.

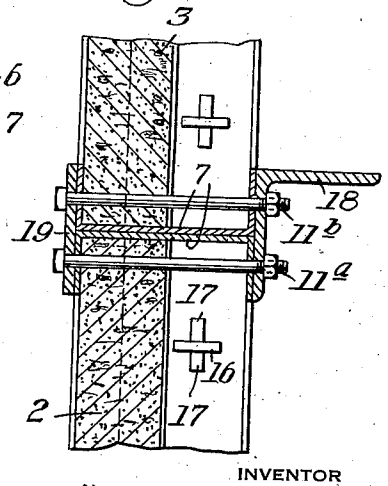
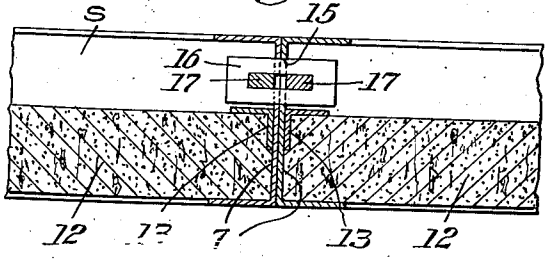


Fig. 8.



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Fig. 9.

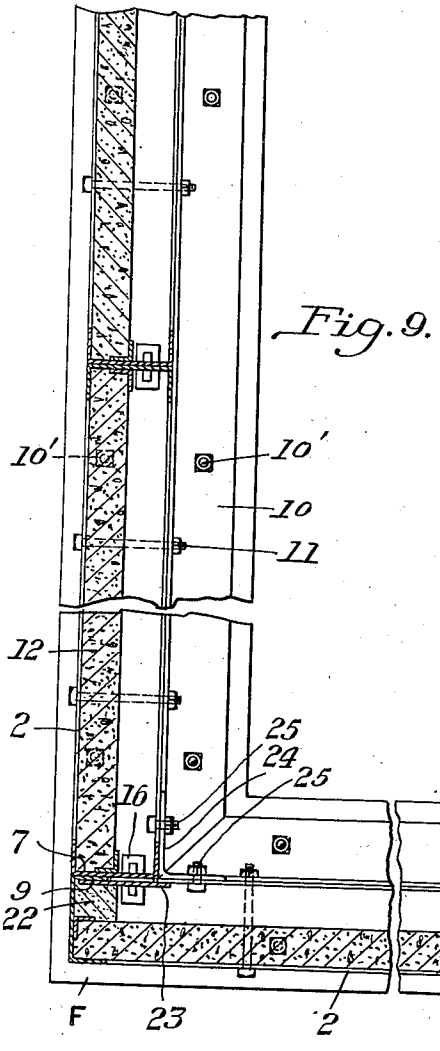
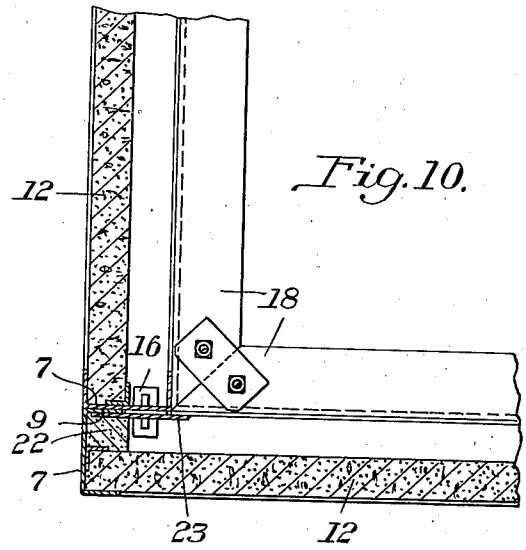


Fig. 10.



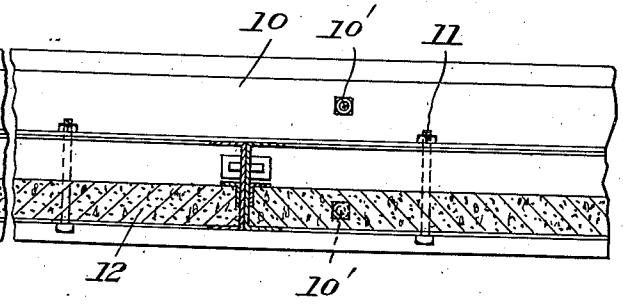
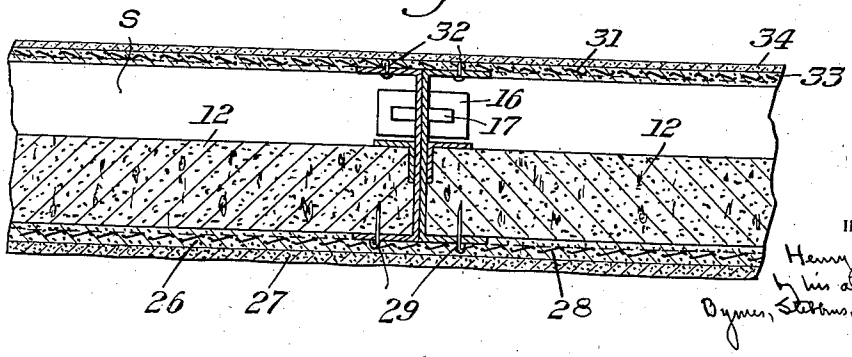


Fig. 12.



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Patented May 17, 1932 1,858,701

UNITED STATES PATENT OFFICE

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BUILDING CONSTRUCTION

Application filed July 25, 1929. Serial No. 380,804.

This invention relates to building construction and particularly to a building unit and a structure formed therefrom whereby a highly improved building may be made at relatively low cost.

The value of cork as an insulating material is well known. A wall of cork alone would be ideal from the standpoint of thermal and sound insulation. However, provision must be made for supporting the weight of the building and for protecting the cork from injury. It has heretofore been customary to secure the cork to the inside or outside of studding in the case of wood framed structure, on the inside or outside of a steel frame after the entire steel is erected, or to the inside of a tile or brick wall where it was desired to insulate the building walls. I provide a building made of units comprising metal frames which form the supporting skeleton of the building, these frames containing panels of a suitable insulating material such as cork board. The panels are inserted before erection. The units may be made up in standard sizes at a factory at relatively low cost, shipped in a relatively small space, and readily assembled by semi-skilled labor into the desired structure, and are easy to handle on account of their light weight.

The frames are preferably made of steel channels welded together at the corners so that each frame is in itself a very rigid structure. The channels are preferably deeper than the insulating panels are thick, the panels being placed adjacent the flanges of the channels at one side of the unit and being held in place by clips or the like within the frame. The units are preferably assembled in such manner that the panel side is outermost. This gives recesses in each unit when the assembled structure is viewed from the inside and these recesses provide convenient places for pipes, wiring, etc.

The problem of uniting the several units is also materially simplified by reason of the fact that the insulating panels are of less depth than the units. Such construction leaves parts of the channel webs exposed and provision is made for uniting such web portions.

At the corner of a building the units forming one wall are placed against the edges of the adjacent units in the other wall, and by reason of the fact that the insulating panels are outermost the insulation does not extend continuously around the corner as is desired. I therefore provide a filler strip which may be placed in the corner unit so as to carry the insulation all the way round the corner. Special provision is also made for connecting the units of one wall to the units of the other wall.

The character of cork board is such that plaster, stucco, or the like readily adheres to it. The units are therefor particularly desirable in the construction of stucco houses. While the cementitious coating will adhere to the cork, I preferably place metallic lath or the like over the several units and plaster onto it. The plaster is therefore held in place by the cork and by the lath. The outermost flanges of the channels making up the units are perforated so that nails may be driven through them into the cork. This materially simplifies the securing of the lath to the assembled structure. Similar perforations are provided on the inner flanges so that metal lath may be fastened on the inside by wires to receive the inside plaster.

The units are preferably made of a height corresponding to one story of the structure. They are connected by a bearing strip preferably in the form of an angle which carries the floor beams at the junction of units between stories. The bearing strip is preferably so placed that it bears against the inner flanges of the upper and lower units and provision is made for securing both sets of units to this strip.

If desired assembled panels may be dipped in asphalt or other protective medium. This will be effective for sealing any air openings and for preventing rusting of the frames.

In the accompanying drawings, illustrating the present preferred embodiment of my invention as applied to a residence structure,

Figure 1 is a perspective view illustrating the use of my units and some of the other framing of the building;

Figure 2 is a vertical section, partly broken

away, taken on the line II—II of Figure 1;

Figure 3 is a similar view taken on the line III—III of Figure 1;

Figure 4 is a front elevation partly broken away of one of the units;

Figure 5 is a vertical section taken on the line V—V of Figure 4;

Figure 6 is a transverse section on the line VI—VI of Figure 4;

Figure 7 is a detail section to enlarged scale showing the manner of joining the units between stories;

Figure 8 is a detail horizontal section showing the manner of connecting adjacent panels;

Figure 9 is a horizontal section of the corner of the structure showing the connection at the corner between stories;

Figure 10 is a similar view showing the corner connection at the bottom of the first story of units;

Figure 11 is a horizontal section taken on the line XI—XI of Figure 2; and

Figure 12 is a view corresponding to Figure 8, but showing the units after the plaster and stucco have been applied.

Referring first to Figures 1 to 3 inclusive, there is shown a structure built on a foundation F and consisting of full sized units 2 and 3 and smaller units 4 and 5. The units 2 and 3 are each the height of a full story and are used to form all of the solid wall portions of the building. The units 4 and 5 are of less height and are employed where it is desired to provide a window or door opening.

Each unit consists of metal channels 6, having webs 7 and flanges 8 and 9, the several channels being welded together at the corners as indicated at W in Figure 1. A bearing strip 10 in the form of a structural angle is secured to the foundation F by bolts 11. The units are fastened to this angle by bolts 12 extending through the flanges 8 and 9.

The construction of the individual panels is best shown in Figures 4 to 6 inclusive. Each of the frames is, as above stated, made of channel shaped members which are preferably stamped out of a sheet metal. Panels 12 of cork are placed within the units and lie against the flanges 8. They are held in place by angle strips 13 which are secured to the webs 7 as by welding, or the channels may be drawn or rolled with this strip in place. As best shown in Figure 6, the panels 12 are of less depth than the channels 6, so that there is provided an open space S for the reception of pipes, wires, conduits, and the like. Each unit is provided in its top and bottom portions with openings 14 for the reception of bolts 11. The webs of the wide members are punched, as indicated at 15, so that adjacent units may be tied together. The manner of joining the units is best shown in Figures 7 and 8. Links 16 are inserted through the punched slots 15, and wedges 17 are driven in to hold the panels together.

Again referring to Figure 1, the first story of the house is shown as made up principally of units 2. The units 3 are similar in all respects to the units 2, but are placed on top of them so as to form the second story. They are fastened together through a bearing strip 18 in the form of a structural angle, there being bolts 11*a* extending through the openings 14 in the tops of the units 2 and 5, and bolts 11*b* extending through the corresponding openings in the bottoms of the units 3 and 4. The bolts 11*a* and 11*b* are connected at their outer ends by a punched bearing strip 19. The angle 10 supports the floor beams B_1 for the first floor and the angle 18 supports the floor beams B_2 for the second floor. A structural angle 20 connects the panels 3 and 5 at the tops thereof and supports the beams B_3 for the top floor. The rafters R are carried on a wood plate P which lies over the tops of the units 3 and 5.

The units which surround the window openings are provided with clips 21 to permit of attaching metal window sash. If double hung windows are used these clips are omitted.

Figures 9 and 10 show the construction employed at the corners. The flanges 9 of the corner units in one wall abut the webs 7 of the corner units in the adjacent wall. The cork panels 12 of the two units are thus remote from one another and the space is filled by a cork strip 22. Such strip is put in place either before or after the units have been erected. In order to tie the units together at the corners, clips 23 are employed. These clips are punched with openings corresponding to the openings 15 so as to accommodate the links 16. A link is slipped through the web 7, shown in Figure 10, and through the corresponding opening in the clip 23 and is held in place by wedges as above described. The clip 23 extends behind the flange 9, so that when the wedges are driven home the units are secured together.

Figure 9 shows a vertically extending angle clip 24 which is employed at the junction between stories, it being fastened to the flanges of the corner units by bolts 25.

Figure 12 is a section through a completed wall. The outer facing consists of two coats 26 and 27 of cementitious material such as stucco. These coats extend over the cork panels 12 as well as over the metal flanges 8. A layer of expanded metal lath 28 is embedded in the first coat 26. The metal lath is secured to the structure by nails 29, which are driven through small openings 30 punched in the flanges 8, the heads of the nails being bent over to hold the lath. The metal lath can also be wired on. The clips 13 provide adequate backing for the cork so that there is no tendency to rupture the same

during nailing. In fact the cork may be under some slight degree of compression at this point. The coating tends to adhere strongly to the cork so that a unitary structure without cracks is assured.

The interior is finished in a similar manner. Expanded metal lath 31 is held in place by small clips or wires 32 extending through openings 30 in the flanges 9, and the plaster coats 33 and 34 are applied thereto.

If brick or stone facing instead of stucco is used, the metal lath is omitted and the brick or stone veneer is set against the outer cork wall with cement mortar and held in place by wall ties fastened to the channels and extending in the joints of the brick or stone facing.

By the use of my invention a building may be rapidly framed from pre-formed panels. These panels being of large size, they are relatively few in number so that a very large percentage of the total wall surface is cork. Sufficient metal is provided to sustain the structure, but the units are of such character that the metal is very economically employed. When two units are placed side by side and secured together, the adjacent channels act together and may be considered as a column of H or I section. There is no load on the cork, and the cork is thoroughly protected by reason of the wire mesh and stucco coating extending thereover. The structure is highly desirable in that the cork gives high thermal and sound insulation. The air space S is also of value in this respect. Since cork is slow burning, the structure is also desirable in that the fire risk is very low.

I have illustrated and described a present preferred embodiment of my invention. It will be understood, however, that it is not limited to the forms shown, but may be otherwise embodied within the scope of the following claims.

I claim:

1. In a building structure, metal frames arranged at an angle to one another, the frames being made of members which are channel-like in cross section, the web of a channel on one frame engaging the flange of a channel on another frame, insulating panels in the frames, the panels being a portion only of the depth of the frames, and a filler strip at the junction of the frames.

2. In a building structure, a plurality of frames arranged side by side and forming a wall skeleton, insulating panels in the frames, a bearing strip secured to the frames adjacent their upper ends but projecting thereabove, and another set of frames on top of the first mentioned frames and secured to the bearing strip.

3. In a building structure, a plurality of self-sustaining units made of rigid self-supporting open metal frames arranged side by side and forming a wall skeleton, cork panels in the frames, which panels close off the openings therethrough and a substantially continuously extending cementitious coating over the cork panels and the frames.

4. In a building structure, a plurality of self-sustaining units made of rigid self-supporting open frames arranged side by side and forming a wall skeleton, cork panels in the frames, which panels close off the openings therethrough lathing extending over the cork and the frames, and a cementitious coating on the lathing.

5. In a building structure, a plurality of self-sustaining units made of rigid self-supporting open frames arranged side by side and forming a wall skeleton, insulating panels in the frames, which panels close off the openings therethrough lathing extending over the panels and the frames, and a cementitious coating on the lathing.

6. In a building structure, a plurality of self-sustaining units made of rigid self-supporting open frames arranged side by side and forming a well skeleton, insulating panels in the frames, which panels close off the openings therethrough and an outer facing for the building extending over the frames and the panels.

7. In a building structure, a plurality of self-sustaining units made of rigid self-supporting open frames arranged side by side and forming a wall skeleton, insulating panels in the frames, which panels close off the openings therethrough an inner plaster coating extending over the frames, and an outer building face extending substantially continuously over the frames and the panels.

8. In a building structure, a plurality of metal frames adapted to be placed side by side and secured together to form the supporting skeleton of the building, the frames having inwardly turned flanges adjacent one of their faces, and panels of insulating material within the frames, the panels being of less depth than the frames and abutting the flanges.

9. In a building structure, metal frames arranged at an angle to one another, the frames having insulating panels therein filling a portion only of the depth of the frames, the frames being so positioned relative to one another that the face of one frame lies against an edge of a second frame, an edge portion of the first frame being thus exposed, and a filler strip of insulating material at the junction of the frames providing, with the insulating panel in the first frame, insulation for the full depth of the second frame at the junction.

In testimony whereof I have hereunto set my hand.

HENRY BOETTCHER.