

Jan. 12, 1937

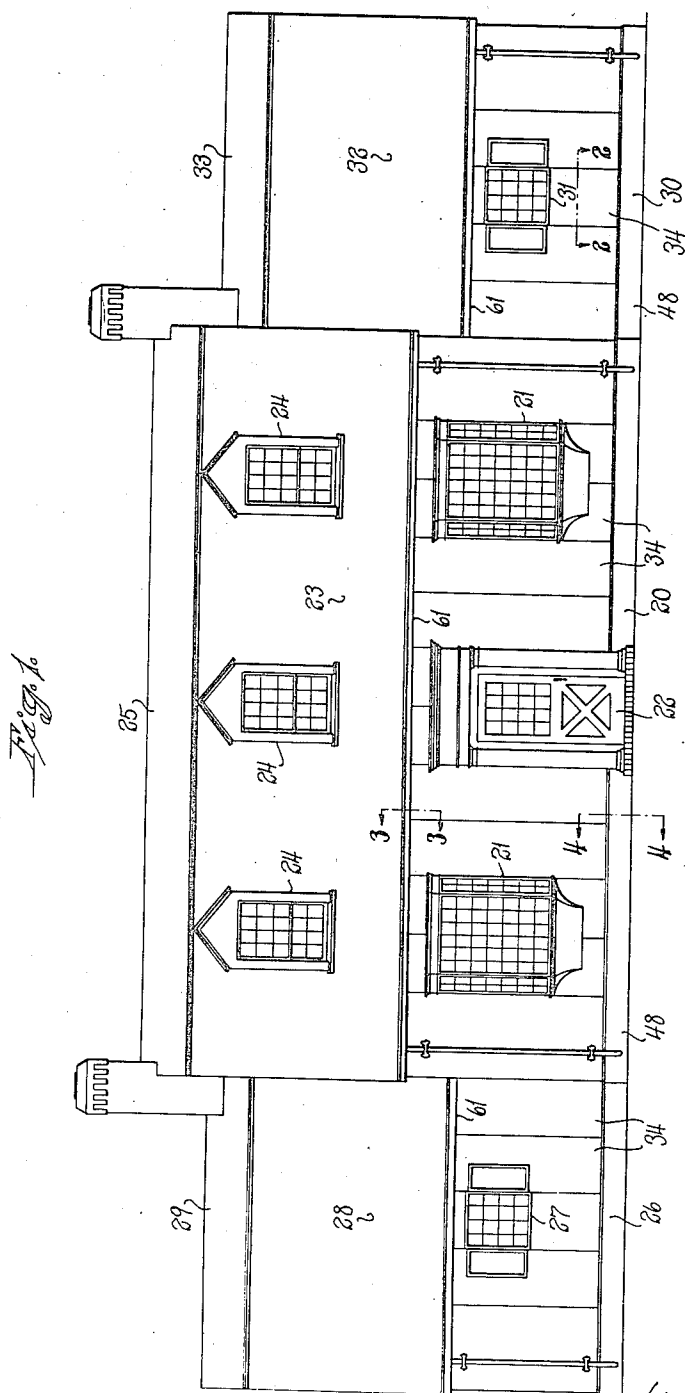
J. J. WHELAN

2,067,252

SHEET MATERIAL BUILDING CONSTRUCTION

Filed July 31, 1935

4 Sheets-Sheet 1



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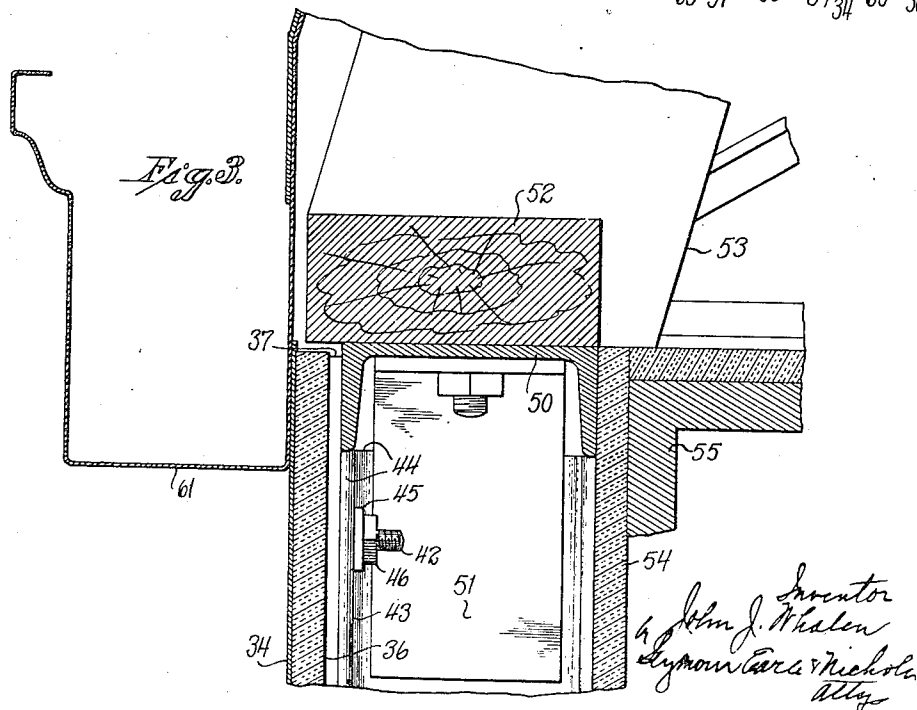
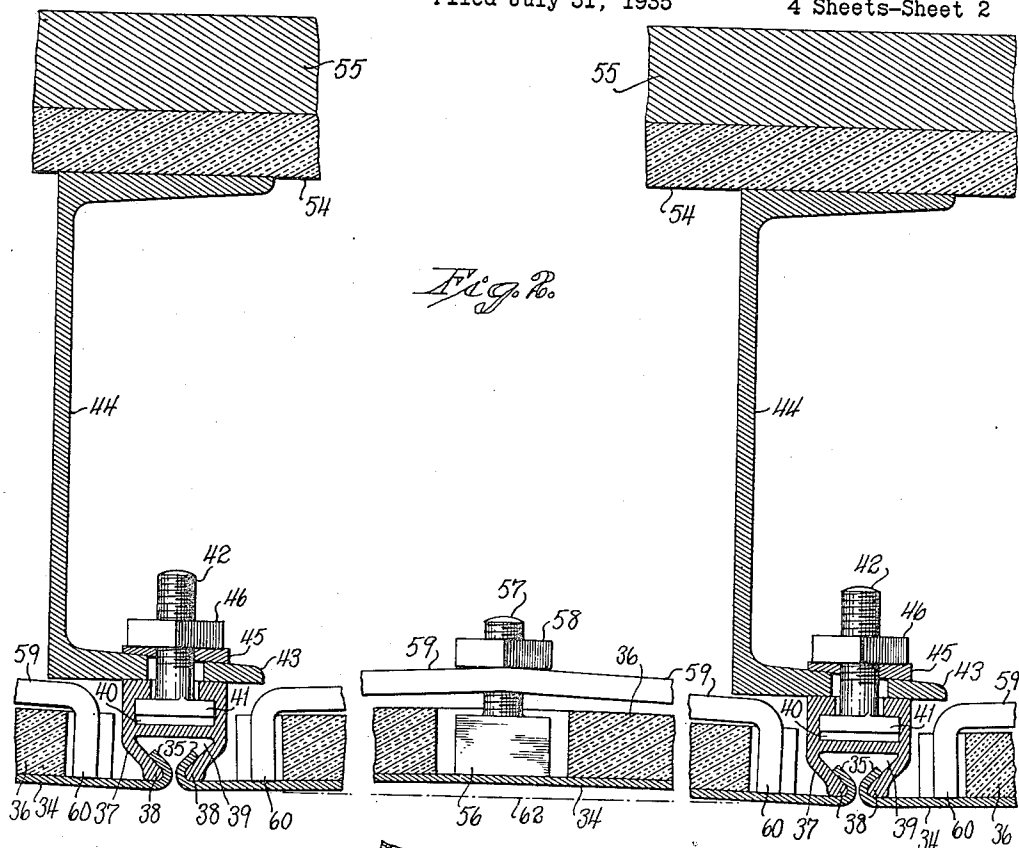
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SHEET MATERIAL BUILDING CONSTRUCTION

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4 Sheets-Sheet 2



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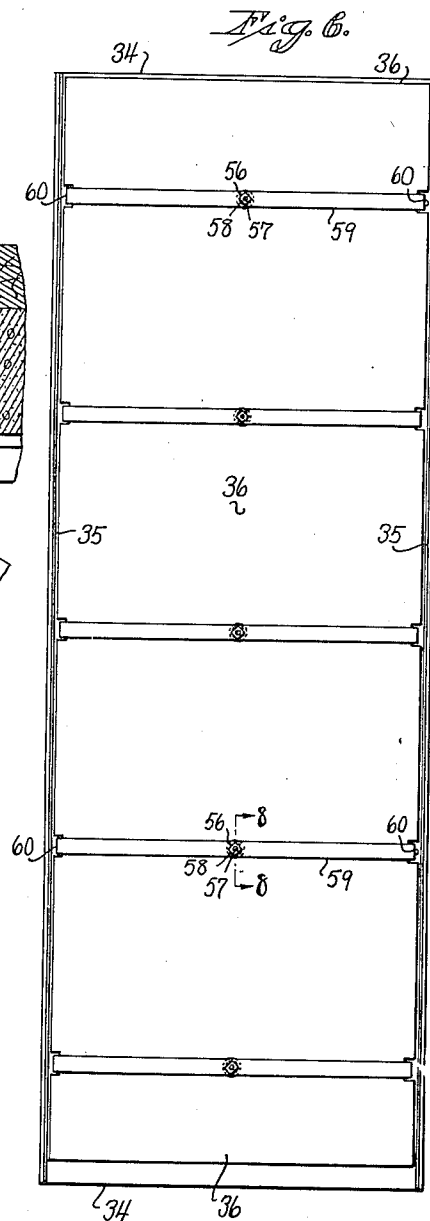
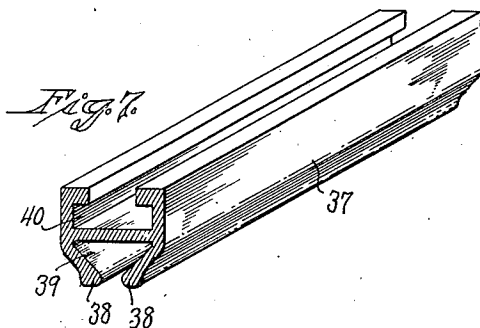
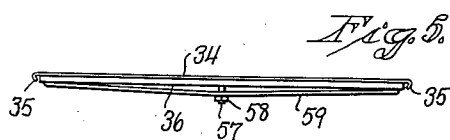
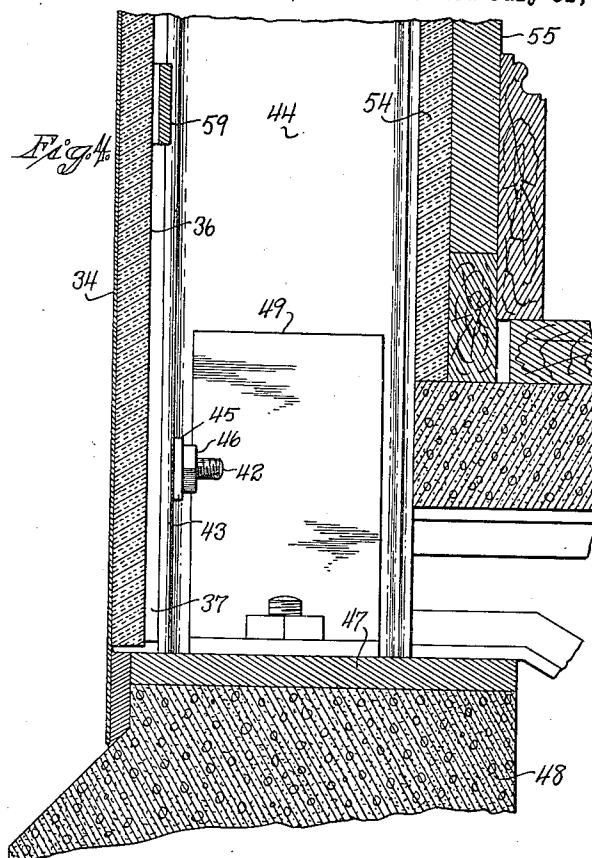
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SHEET MATERIAL BUILDING CONSTRUCTION

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4 Sheets-Sheet 3



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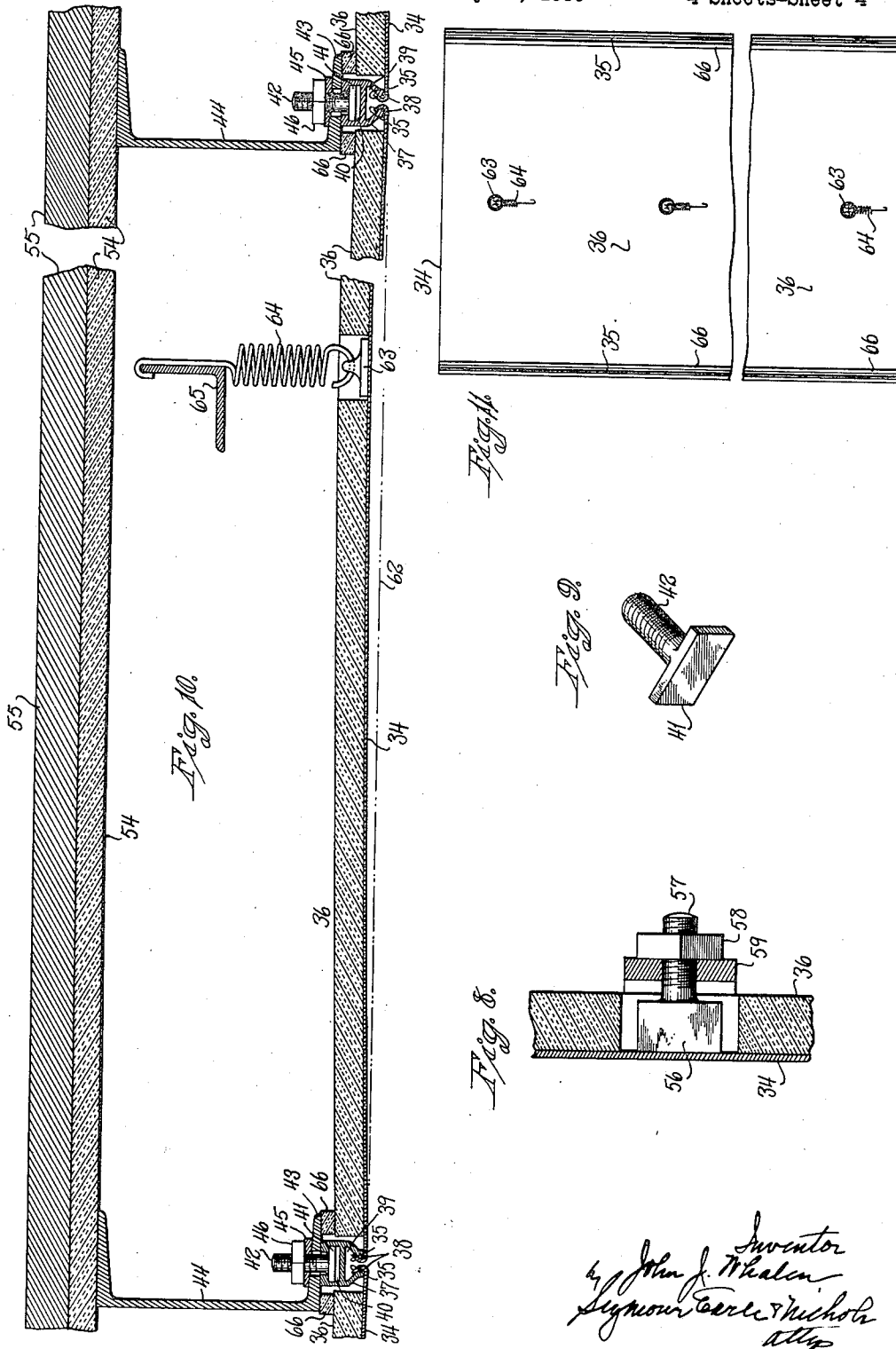
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SHEET MATERIAL BUILDING CONSTRUCTION

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4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE

2,067,252

SHEET MATERIAL BUILDING
CONSTRUCTIONJohn J. Whelan, Washington, D. C., assignor to
Copper Houses Incorporated, New York, a corporation

Application July 31, 1935, Serial No. 33,951

20 Claims. (Cl. 189—34)

This invention relates to improvement in buildings having wall areas of sheet material, preferably of copper, brass, or other non-ferrous metal, though other sheet material may be employed if desired, such, for instance, as stainless steel, etc.

One of the objects of the present invention is to provide a superior building construction in which wall areas of sheet material are employed.

10 A further object is to provide a sheet material building construction having superior provision for expansion and contraction.

15 Another object is to provide a construction of the class described, whereby contraction and expansion will affect the wall areas of the building in a uniform manner.

20 A still further object is to provide a sheet material building construction which will preserve an attractive appearance despite the expansion and contraction of its wall panels.

25 Still another object is to provide a building construction having panels of sheet material secured in place in such manner as to be substantially proof against looseness, without, however, being marred upon their exposed surfaces.

30 With the above and other objects in view, as will appear to those skilled in the art from the following, considered in conjunction with the accompanying drawings and appended claims, the present invention includes all features disclosed therein which are novel over the prior art.

In the accompanying drawings:

35 Fig. 1 is a view in front elevation of a house having wall panels of sheet material in accordance with the present invention;

Fig. 2 is a broken, horizontal, sectional view taken on the line 2—2 of Fig. 1;

40 Fig. 3 is a broken, vertical, sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a similar view taken on the line 4—4 of Fig. 1;

45 Fig. 5 is a top edge view of one of the panels detached;

Fig. 6 is an inside face view thereof;

Fig. 7 is a broken perspective view of one of the coupling-bars;

50 Fig. 8 is a broken sectional view taken on the line 8—8 of Fig. 6;

Fig. 9 is a perspective view of one of the coupling-bolts;

55 Fig. 10 is a horizontal sectional view of the character of Fig. 2 but illustrating another mode of tensioning the panels; and

Fig. 11 is an inside face view of one of the panels of the structure shown in Fig. 10.

Buildings embodying the present invention may assume innumerable forms but the residence chosen for illustration in Fig. 1 of the accompanying drawings includes a central main building generally designated by the numeral 20, having in the vertical front wall of its first story complementary bay windows 21—21 respectively located on the opposite sides of a main entry 22. 10 The roof form is of the so-called "gambrel" type and includes a very steeply-inclined front roof-section 23 having dormer windows 24—24—24 extending outwardly therefrom and joining a nearly-horizontal type roof-section 25 in the 15 usual manner of roof structures of the type referred to.

The surface of the roof-sections 23 and 25 of the main structure 20 may be made of any approved material, such, for instance, as fireproof 20 shingles or metallic roofing.

To the left of the main structure 20 is a wing 26 having, in the vertical front wall of its first floor, a window 27 and also having gambrel-roof-sections 28 and 29 respectively corresponding in 25 substance to the roof-sections 23 and 25 before referred to.

To the right of the main structure 20 is a wing generally designated by the numeral 30 complementing the wing 26 before referred to and having the vertical wall of its first story provided with a window 31 and also having a gambrel-roof structure including sections 32 and 33, the 30 former of which corresponds to the roof-sections 23 and 28, and the latter of which corresponds to the roof-sections 25 and 29 before referred to. 35

The vertical walls of the first stories of the main building 20 and wings 26 and 30 are composed of a series of vertically-extending panels 34 formed of sheet material, such, for instance, 40 as copper, and having their adjacent side edges arranged in close proximity to provide a substantially-continuous surface. Each panel 34 is formed on each of its respective opposite edges with a reversely-bent coupling-flange 35 and 45 preferably has cemented, or otherwise secured to it, a substantially-coextensive backing-slab 36 of sound-deadening and heat-insulating material. The said backing-slabs 36 may be composed of fiber board, for instance, or of other suitable 50 material, and it has been found that they may be conveniently cemented in place to the rear face of the panels 34 by means of water glass, heavy asphalt, or the like.

Located to the rear of the junction-point of 55

any given two of the panels 34 is a vertical coupling-bar generally designated by the numeral 37 and having inturned coupling-flanges 38—38 producing a vertically-extending drainage-channel 39 of V-shaped form. The said flanges have their inner faces respectively reversely sloped to correspond to the reversely-bent coupling-flanges 35—35 which are entered into the drainage-channel 39, as indicated particularly well in Fig. 2 of the accompanying drawings.

The vertically-extending coupling-bars 37 may be formed of extruded brass and each is provided in its rear portion with a vertically-extending T-shaped bolt-receiving groove 40 adapted to receive the beveled heads 41 of a series of coupling-bolts 42, each of which passes through the front flange 43 of the adjacent one of a vertical channel-iron studding 44. The said studding are horizontally spaced from each other a distance corresponding to the width of the panels 34 and serve as studding for the building. Each coupling-bolt 42 also passes through a wedge-shaped washer 45 and has applied to its threaded inner end a nut 46, the tightening of which serves to draw the coupling-bar 37 into firm engagement with the outer face of the outer flange 43 of the adjacent one of the said studding 44.

The heads 41 of the coupling-bolts 42 are of elongated form, as particularly well shown in Fig. 9, and are of a width such as to permit their introduction into the bolt-receiving groove 40 of each coupling-bar through the contracted inner throat portion thereof.

By reference to Fig. 4 in particular, it will be seen that the channel-iron studding 44 rest at their lower end upon a metallic sill-plate 47 which in turn rests upon a concrete or other suitable foundation wall 48. The lower end of each studding 44 is suitably secured to the said sill-plate 47 by means of angle-brackets 49.

By reference to Fig. 3, it will be seen that the upper ends of the various channel-iron studding 44 are capped by an inverted channel-iron plate 50 secured in place by angle-brackets 51. Superimposed upon the channel-iron plate 50 may be a plate 52 of wood upon which the rafters 53 of the gambrel roof may rest.

To the inner face of the channel-iron studding 44 may be secured plaster board 54, or other suitable material, to receive a plaster inner wall 55. If desired, the inner walls of the building, instead of being plastered as shown, may obviously be formed of panels such as 34, and the space between the inner and outer walls may be filled with so-called "mineral wool" or other heat-insulating and sound-deadening material.

Each panel 34 has secured to its rear face by solder, brazing, or in any other suitable manner, a central vertical series of studs 56, each of which has a rearwardly-extending threaded stem 57 receiving a clamping-nut 58. The stem 57 of each of the studs 56 passes through a rearwardly-bowed horizontal tensioning-bar 59 formed of resilient material, such as steel, and having at each of its respective opposite ends a forwardly-extending thrust-finger 60 bearing against the inner face of the panel 34 and for the clearance of which the backing-slab 36 is suitably notched, as shown.

The backing-slab 36, the various studs 56 and the series of spaced tensioning-bars 59 may be all applied to the individual panels 34 before the assembly of the latter in the building, as illustrated in Figs. 5 and 6, with the various nuts 58 left loose so as not to unduly flex the panel. Each

panel may be installed by registering the lower ends of each of its opposite retaining-flanges 35—35 respectively with the open upper end of the drainage-channels 39 of two of the spaced-apart coupling-bars 37 and sliding the panel, together with the parts mounted thereon, downwardly until it reaches the desired position, which preferably, and as shown in Fig. 4, is such that its lower portion overlaps the sill-plate 47 and portions of the foundation wall 48. The described installing of the panel is effected prior to the installation of the plate 52 and a gutter 61, which normally downwardly overlaps the upper edge of the said panel, as shown in Fig. 3.

The nuts 58 on each of the studs 56 may now be tightened so as to draw inwardly upon the vertical center of each panel at a plurality of vertically-spaced intervals, as will be obvious by reference to Fig. 6. By the tightening of the nuts 58 as just described, tension is also applied to the resilient tensioning-bars 59.

Presuming that the building is being erected during warm weather, the panels will, under such conditions, be bowed inwardly, as illustrated in Fig. 2, by the tensioning-bars 59 and associated parts, thus insuring the firm engagement of the coupling-flanges 35—35 of each panel with the coupling-flanges 38 of adjacent coupling-bars 37.

As the building becomes cooler, the panels 34 will contract and tend to straighten out toward the straight-line position indicated by the broken line 62 in Fig. 2 against the resistance afforded by the tensioning-bars 59, to thus, at all times, regardless of changes in temperature, maintain the flanges 35 in firm engagement with the flanges 38.

Instead of employing tensioning-bars 59, as in the structure of Figs. 1 to 8 inclusive, for tensioning the various panels 34, the said panel may be provided upon the lateral center of its rear face with a series of vertically-spaced-apart eye-plates 63, as illustrated in Figs. 10 and 11. Hooked into each of the said eye-plates 63 is the outer end of a helical tensioning-spring 64, the opposite inner end of which is hooked over a vertical angle-shaped anchoring-bar 65 (Fig. 10) mounted between the panel 34 and the inner wall-structure 54 and 55 of the building. Cemented or otherwise suitably secured to each of the respective opposite edges of the backing-slab 36 is a cushioning-strip 66 of Celotex, or like material, which bears against the front face of the adjacent studding 44.

Preferably and as shown, the tensioning-means serves to bow the panels inwardly when the same are in their expanded condition owing to relatively-high temperatures. This effect is preferred, since it produces the best appearance architecturally, but, if desired, the tension may be reversed and serve to exert a constant force tending to bow the panels outwardly.

By means of the construction above described, the various panels are not only firmly held in engagement with the coupling-bars 37, or such other means as may be employed for securing them in place, but the said panels are caused to distort, if at all, substantially uniformly and in a manner presenting an unobjectionable architectural appearance.

Furthermore, by means of suitable tensioning devices, the wall panels are largely deprived of all objectionable diaphragm properties, and the structure has imparted to it a feeling of desirable solidity. When expansion and contraction take place, as will happen when temperature changes take place, the panels will be effectively prevented from presenting a wrinkled appearance.

ance, inasmuch as the bowing (if any) of the panel is caused to take place in one direction and in a substantially-uniform manner.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. A house or like structure, including at least one panel of sheet-material; supporting-means for the said panel constructed and arranged to support said panel at spaced-apart points; and yielding tensioning-means associated with the said panel and exerting a yielding effort to bow the same intermediate the points at which it is supported by the said supporting-means, the said tensioning-means being constructed and arranged to yield to the force exerted by the said panel when the same contracts.

2. A house or like structure, including at least one panel of sheet-material; supporting-means for the said panel constructed and arranged to support said panel at spaced-apart points; and yielding tensioning-means associated with the said panel and exerting a yielding effort to inwardly draw the same intermediate the points at which it is supported by the said supporting-means, the said tensioning-means being constructed and arranged to yield to the force exerted by the said panel when the same contracts.

3. A house or like structure, including at least one panel of sheet-material; supporting-means supporting the respective opposite edges of the said panel; and yielding tensioning-means associated with the said panel and exerting a yielding effort to bow the same intermediate its respective opposite edges, the said tensioning-means being constructed and arranged to yield to the force exerted by the said panel when the same contracts.

4. A house or like structure, including at least one panel of sheet-material; supporting-means supporting the respective opposite edges of the said panel; and yielding tensioning-means associated with the said panel and exerting a yielding effort to inwardly draw the same intermediate its respective opposite edges, the said tensioning-means being constructed and arranged to yield to the force exerted by the said panel when the same contracts.

5. A house or like structure, including at least one panel of sheet-material; supporting-means for the said panel constructed and arranged to support said panel at spaced-apart points; and yielding tensioning-means associated with the said panel and including a series of spaced-apart yielding-members each exerting a yielding effort to bow the said panel intermediate the points at which it is supported by the said supporting-means, the said tensioning-means being constructed and arranged to yield to the force exerted by the said panel when the same contracts.

6. A house or like structure, including at least one panel of sheet-material; supporting-means for the said panel constructed and arranged to support said panel at spaced-apart points; and yielding tensioning-means associated with the said panel and including a series of spaced-apart yielding-members each exerting a yielding effort to inwardly draw the said panel intermediate the

points at which it is supported by the said supporting-means, the said tensioning-means being constructed and arranged to yield to the force exerted by the said panel when the same contracts.

7. A house or like structure, including at least one panel of sheet-material; supporting-means supporting the respective opposite edges of the said panel; and yielding tensioning-means associated with the said panel and exerting a yielding effort to bow the same intermediate its respective opposite edges, the said tensioning-means being constructed and arranged to yield to the force exerted by the said panel when the same contracts.

8. A house or like structure, including at least one panel of sheet-material; supporting-means supporting the respective opposite edges of the said panel; and yielding tensioning-means associated with the said panel and exerting a yielding effort to inwardly draw the same intermediate its respective opposite edges, the said tensioning-means being constructed and arranged to yield to the force exerted by the said panel when the same contracts.

9. A house or like structure, including at least one panel of sheet-material having a backing-slab secured thereto; supporting-means for the said panel constructed and arranged to support said panel at spaced-apart points; and yielding tensioning-means associated with the said panel and exerting a yielding effort to bow the same and its said backing-slab intermediate the points at which it is supported by the said supporting-means, the said tensioning-means being constructed and arranged to yield to the force exerted by the said panel when the same contracts.

10. A house or like structure, including at least one panel of sheet-material having a backing-slab secured thereto; supporting-means for the said panel constructed and arranged to support said panel at spaced-apart points; and yielding tensioning-means associated with the said panel and exerting a yielding effort to inwardly draw the same and its said backing-slab intermediate the points at which it is supported by the said supporting-means, the said tensioning-means being constructed and arranged to yield to the force exerted by the said panel when the same contracts.

11. A house or like structure, including at least one panel of sheet-material having a backing-slab secured thereto; supporting-means for the respective opposite edges of the said panel; and yielding tensioning-means associated with the said panel and exerting a yielding effort to bow the same and its said backing-slab intermediate its respective opposite edges, the said tensioning-means being constructed and arranged to yield to the force exerted by the said panel when the same contracts.

12. A house or like structure, including at least one panel of sheet-material having a backing-slab secured thereto; supporting-means for the respective opposite edges of the said panel; and yielding tensioning-means associated with the said panel and exerting a yielding effort to inwardly draw the same and its said backing-slab intermediate its respective opposite edges, the said tensioning-means being constructed and arranged to yield to the force exerted by the said panel when the same contracts.

13. A house or like structure, including at least one panel of sheet-material having a backing-slab secured thereto; supporting-means for the

said panel constructed and arranged to support said panel at spaced-apart points; and yielding tensioning-means associated with the said panel and including a spaced-apart series of yielding-members each exerting a yielding effort to bow the said panel intermediate the points at which it is supported by the said supporting-means, the said tensioning-means being constructed and arranged to yield to the force exerted by the said panel when the same contracts.

14. A house or like structure, including at least one panel of sheet-material having a backing-slab secured thereto; supporting-means supporting the respective opposite edges of the said panel; and yielding tensioning-means associated with the said panel and including a spaced-apart series of yielding-members each exerting a yielding effort to bow the said panel intermediate its respective opposite edges, the said tensioning-means being constructed and arranged to yield to the force exerted by the said panel when the same contracts.

15. A house or like structure, including at least one panel of sheet-material; supporting-means for the respective opposite edges of the said panel, including two spaced-apart coupling-bars each having a coupling-flange engaging with one edge of the said panel; and yielding tensioning-means associated with the said panel and exerting a yielding effort to bow the same intermediate the said coupling-bars.

16. A house or like structure, including at least one panel of sheet-material; supporting-means for the respective opposite edges of the said panel, including two spaced-apart coupling-bars each having a coupling-flange engaging with one edge of the said panel; and yielding tensioning-means associated with the said panel and exerting a yielding effort to inwardly draw the same intermediate the said coupling-bars.

17. A house or like structure, including at least one panel of sheet-material having substantially-parallel coupling-flanges along each of its respective opposite edges; supporting-means for the respective opposite edges of the said panel, including two spaced-apart coupling-bars each having a

coupling-flange engaging with the flange upon the adjacent edge of the said panel; and yielding tensioning-means associated with the said panel and exerting a yielding effort to bow the same intermediate the two said spaced-apart coupling-bars.

18. A house or like structure, including at least one panel of sheet-material having substantially-parallel coupling-flanges along each of its respective opposite edges; supporting-means for the respective opposite edges of the said panel, including two spaced-apart coupling-bars each having a coupling-flange engaging with the flange upon the adjacent edge of the said panel; and yielding tensioning-means associated with the said panel and exerting a yielding effort to inwardly draw the same intermediate the two said spaced-apart coupling-bars.

19. A house or like structure, including at least one panel of sheet-material having substantially-parallel coupling-flanges along each of its respective opposite edges; supporting-means for the respective opposite edges of the said panel, including two spaced-apart coupling-bars, each having a coupling-flange engaging with the flange upon the adjacent edge of the said panel; and yielding tensioning-means associated with the said panel and including a spaced-apart series of yielding-members each exerting an effort to bow the said panel intermediate the two said spaced-apart coupling-bars.

20. A house or like structure, including at least one panel of sheet-material having a backing-slab secured thereto and having substantially-parallel coupling-flanges along each of its respective opposite edges; supporting-means for the respective opposite edges of the said panel, including two spaced-apart coupling-bars, each having a coupling-flange engaging with the flange upon the adjacent edge of the said panel; and yielding tensioning-means associated with the said panel and including a spaced-apart series of yielding-members each exerting an effort to bow the said panel and its said slab intermediate the two said spaced-apart coupling-bars.

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