

Dec. 2, 1958

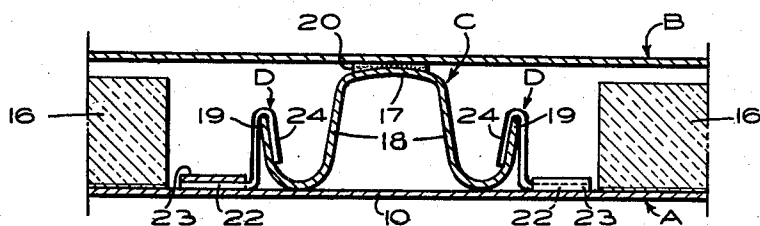
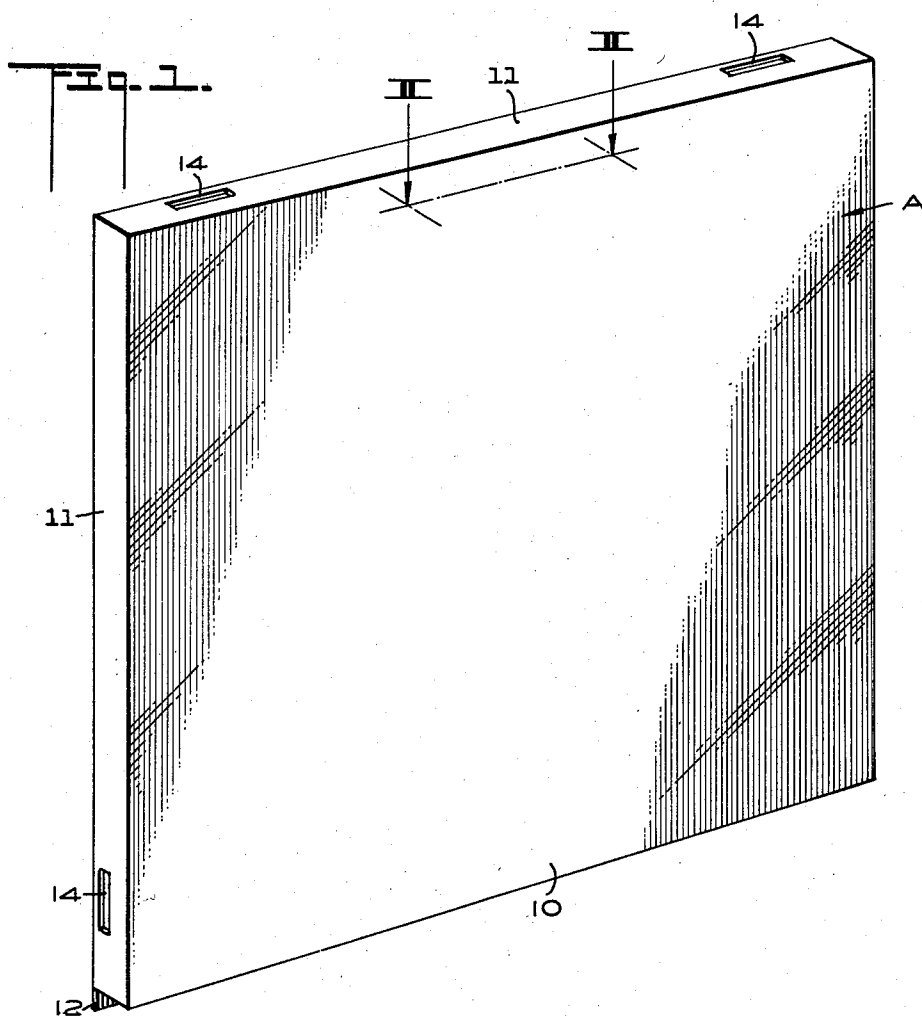
F. E. ALLEN

2,862,584

EXPANSIBLE WALL STRUCTURE

Filed Oct. 4, 1954

2 Sheets-Sheet 1



INVENTOR.

FRANCIS E. ALLEN

BY

BY Munn & Liddy

ATTORNEYS

Dec. 2, 1958

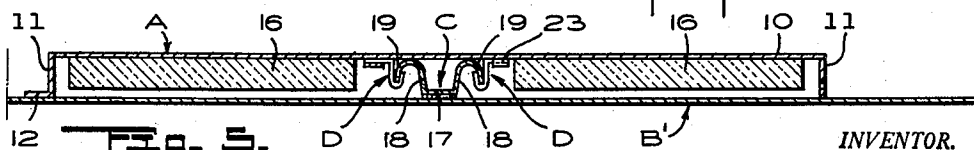
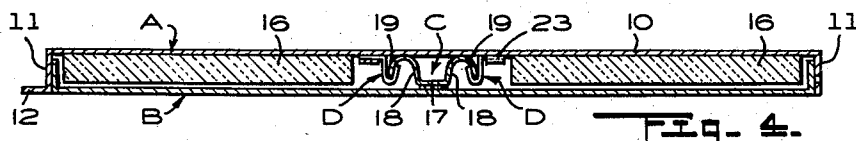
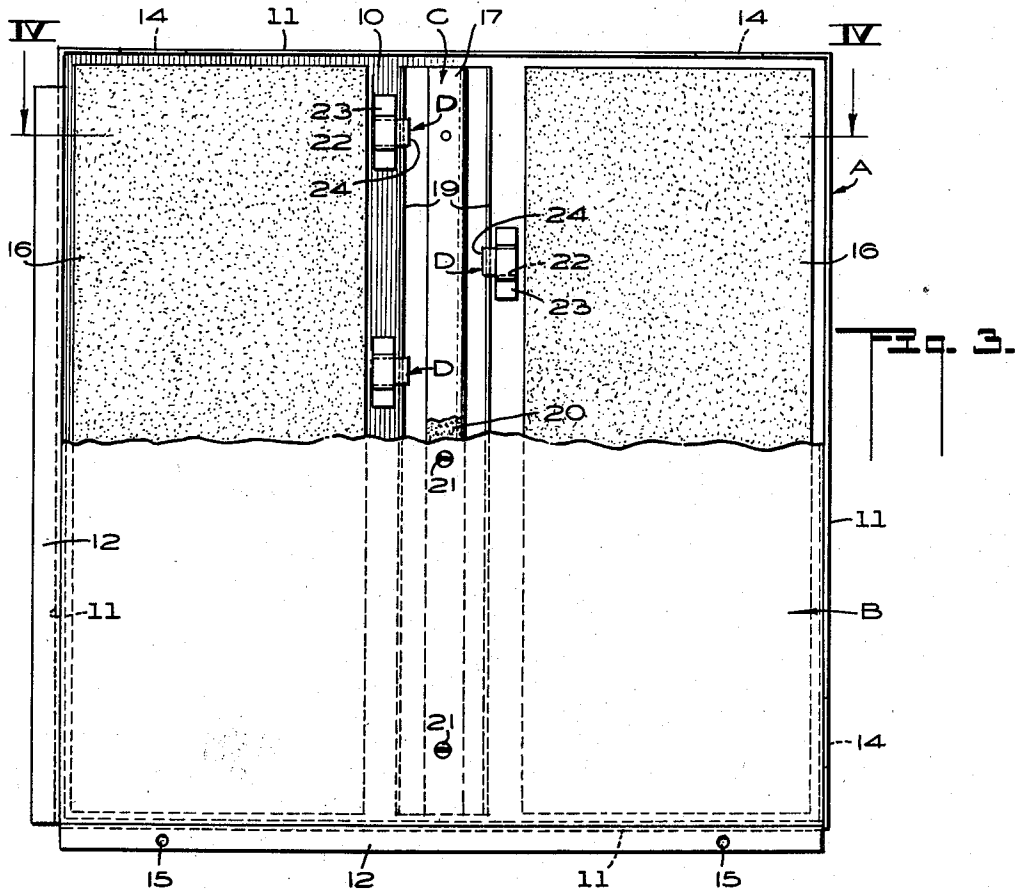
F. E. ALLEN

2,862,584

EXPANSIBLE WALL STRUCTURE

Filed Oct. 4, 1954

2 Sheets-Sheet 2



INVENTOR.

FRANCIS E. ALLEN

BY

BY
Munn & Liddy

ATTORNEYS

1

2,862,584

EXPANSIBLE WALL STRUCTURE

Francis E. Allen, San Leandro, Calif.

Application October 4, 1954, Serial No. 459,987

3 Claims. (Cl. 189—34)

The present invention relates to improvements in an expansible wall structure. It consists of the combinations, constructions, and arrangement of parts, as hereinafter described and claimed.

In my United States Patents Nos. 2,317,015 and 2,649,172, granted on April 20, 1943, and August 18, 1953, respectively, there are disclosed various types of architectural panels, which are adapted to provide facings on walls of buildings. Generally speaking, these panels are metallic; and when placed on the outer portion of the building are subject to considerable expansion and contraction, due to change in prevailing temperatures.

An object of the present invention is to provide an expansible wall structure, which is made up of inner and outer panels having a reinforcing and supporting structural member interposed therebetween. It will be appreciated, of course, that the outer panel, when exposed to the elements of the weather, will be subjected to far more expansion and contraction than the inner panel, the latter being more or less protected and insulated. Accordingly, the structural member hereinbefore mentioned is fixedly secured to the inner panel, but the outer panel is supported on the structural member in such a manner that the outer panel may expand and contract, both vertically and horizontally. The attachment of the structural member to the outer panel to permit vertical and horizontal movement of the latter with respect to the former when there are changes in temperature, is one of the principal objects of the invention.

Although mention has been made of applying the improved wall structure to an exterior of a building, the same arrangement may be used on interior walls, curtain walls and the like.

Other objects and advantages will appear as the specification continues. The novel features will be set forth in the claims hereunto appended.

Drawings

For a better understanding of the invention, reference should be had to the accompanying drawings, forming part of this application, in which:

Figure 1 is a perspective view of my expansible wall structure unit, disclosing the outer panel;

Figure 2 is an enlarged transverse sectional view taken along the plane II—II of Figure 1;

Figure 3 is an elevational view, looking at the inner panel, a portion of the latter being broken away to disclose the interior arrangement;

Figure 4 is a horizontal sectional view taken along the line IV—IV of Figure 3; and

Figure 5 is a view similar to Figure 4, but disclosing a modified form, in which the inner panel is made sufficiently large to have a plurality of outer panels fastened thereto.

While I have shown only the preferred forms of my invention, it should be understood that various changes,

2

or modifications, may be made within the scope of the annexed claims without departing from the spirit thereof.

Detailed description

Referring to the first embodiment of the invention, as shown in Figures 1 to 4, inclusive, the expansible wall structure includes outer and inner panels A and B, respectively. As disclosed, these panels are arranged in spaced apart relation, and a reinforcing and supporting structural member C is interposed therebetween.

For the purpose of illustration, the outer panel A has been shown as being fashioned with a front plate 10 of rectangular outline, which is provided with rearwardly-extending marginal flanges 11. Two of these flanges are provided with laterally-projecting feet 12, which are arranged parallel with the front plate 10. Slots 14 and openings 15 are formed in the flanges 11 and one of the feet 12, respectively, whereby a plurality of these wall units may be interconnected and secured to a supporting surface, in the manner shown in detail in my Patents Nos. 2,317,015 and 2,649,172.

Obviously, the outer panel A may be made of any suitable size and material. It may be fashioned from metal having an enameled surface, thus presenting a durable and attractive facing. It will be appreciated, that when this panel is exposed to the elements of the weather, there will be considerable expansion and contraction, due to changes in temperature. On the other hand the inner panel B is protected, and is subjected to far less expansion and contraction. It will be noted that heat-insulation pads 16 are interposed between the panels.

Turning now to the details of the structural member C, it defines a channel-shaped cross-section, providing a web 17 and a pair of lateral flanges 18 (see Figure 2). Each of these flanges is turned back upon itself to form a longitudinal runner 19. The inner panel B may be fixedly secured to the web 17 by any suitable fastening means, such as high strength adhesive 20 and/or screws 21 (see Figure 3).

In order to anchor the outer panel A to the structural member C, and at the same time afford expansion and contraction of this panel, both vertically and horizontally, there have been provided a plurality of clips D. These clips have feet 22, which are slidably disposed in stirrups 23 that are anchored to the outer panel by any suitable means, such as welding. The stirrups are arranged on opposite lateral sides of the structural member C, and the clips are movable transversely relative to the latter. Moreover, the clips have hooks 24 thereon slidably engaging over the runners, and allowing the outer panel A to expand or retract relative to the member C.

The modified form shown in Figure 5 is identical with the first embodiment, excepting for the fact that the inner panel B' is provided from a sheet that is large enough to have a series of outer panels A mounted thereon. In this event, the reinforcing and supporting members C are fixedly secured to the panel B'. Like reference characters have been applied to corresponding parts in the two forms.

It will be quite apparent that the sizes and thickness of the panels and interposed structural members may be increased so as to form the actual exterior, interior or curtain wall of a building.

Furthermore, when the thickness of the panel is increased, the size of the reinforcing and supporting member C is also increased so that this member can become a major frame member for the building and constitute a structural member that can support its part of a load such as a floor or roof structure. This will not interfere with the member C as acting as an interconnector between the outer and inner panels while permitting

3

relative vertical and horizontal movement of the outer panel with respect to the inner panel.

The structural member C also permits the outer panel to be one material and the inner panel to be a different material. When the materials of the two panels are different, the expansion and contraction of each due to temperature changes, will also differ. Yet the construction allows an independent vertical and horizontal movement of the outer panel with respect to the inner one.

The structural member C when applied to the outer panel A in a position to have the web 17 spaced from the front plate 10 by the lateral flanges 18, will give a box beam structural support to the front plate. Also the thickness of the material used for the structural member C, may be reduced where the web 17 is spaced from and parallels the front plate 10, than where the web contacts the plate.

Heretofore it has been the practice of using a channel for the member C and placing the web of the channel in direct contact with the front plate 10. The sides of the channel would then extend away from the front plate 10 and clips were used to secure the edges of the channel sides to the front plate 10. Unless a fairly heavy gauge of material were used, the channel sides would have a tendency to buckle when any strain was placed on the front plate due to temperature changes, to move it away from the channel.

In order to strengthen the channel sides, their edges were bent inwardly toward each other and downwardly toward the web a slight distance to give a reinforcing rib effect to each channel side. This improved the rigidity of the sides somewhat, but it was not until the channel was turned so that the sides faced the front plate 10 and the web was spaced from the plate, that real strength was imparted to the structural member and to the plate. The problem then remained of connecting the channel to the front plate with freedom of vertical and horizontal movement between the plate and the channel in the plane of the plate as the latter was subjected to changes in temperature.

The problem was solved by bending the channel sides for providing longitudinal runners 19 therefor and having the edges of the runners facing away from the front plate 10. The clips D then were made to slidably engage with the edges of the runners and to be adjustably attached to the inner surface of the front plate 10 by stirrups 23. It was found that the runners 19 provided the necessary stiffening rib effect to the channel sides 18. A box beam support for the front plate 10 was thus realized and the gauge of the metal used for the structural member C, was materially reduced with still sufficient strength provided.

One of the novel features of the invention lies in the formation of the structural member C and the manner in which it is connected to the front plate 10. It is possible to use the structural member C for reinforcing the front plate 10 even though the inner panel B is not used. The clips D adjustably connect the structural member C to the front panel 10 and permit horizontal and vertical movement between the two in the plane of the front plate 10.

The front plate is held against buckling due to changes in temperature. The stirrups 23 are arranged close enough to each other to act as a plurality of spaced apart attaching means between the front plate and the structural member C. Any wind load against the face of the front panel 10 will be borne by the structural member C and its box-like shape, and the curved longitudinally extending runners 19 will make the member C amply strong enough to withstand this wind load pressure. Therefore, the structural member C will maintain the front plate 10 in a flat plane and it will sustain the wind load against the plate.

When the structural member C has an inner panel B secured thereto by a high strength adhesive or by fasten-

4

ing means, such as screws 21, the member C will withstand the loading of the wall structure from either the inside or the outside. The outer panel A will expand from heat and will tend to buckle outwardly. This outward movement of the panel A will act on the structural member C through the stirrups 23 and clips D with a force that is the same as if a load were applied to the inner panel B.

The hooks 24 on the clips D will contact with the edges of the longitudinal runners and will permit shifting of the hooks along the edges. This shifting is parallel with the length of the structural member C. The feet 22 of the clips D that are received in the stirrups 23 permit shifting between the front plate 10 and the member C in a direction at right angles to the length of the member. The curve on the longitudinal runners 19 shown in Figure 2 permits ease of lateral shifting between the front plate 10 and the structural member C because there is a minimum of contact between the two. The curved portions of the longitudinal runners 19 have only a line contact with the inner surface of the front plate 10. There is less tendency to convey heat from the panel A to the inner panel B because of this line contact between the runners 19 and the outer panel A. Added insulating qualities are thus added.

The outer panel A can be in the form of pans as illustrated in Figure 1 or it can be sheet material of any desired size. The clips D permit unlimited expansion and contraction of commonly used materials. The outer panel A with the inner panel B and the structural member C, makes an incombustible wall that will not burn and it will stop a fire for a short time.

Figure 5 illustrates the inner panel B' as being larger in area than the outer panel A. This is a possible construction.

I claim:

1. In an expansible wall structure: outer and inner metallic panels arranged in spaced-apart relation; the outer panel being adapted to be mounted on the exterior of a building, or the like, where it will be exposed to elements of the weather, and thereby subjected to considerable expansion and contraction, due to changes in temperature; the inner panel being adapted to be arranged inwardly of the outer panel for protection by the latter, and thus subjected to less expansion and contraction on account of changes in temperature; a reinforcing and supporting structural member interposed between the panels, and contacting with both panels to give support thereto; said structural member including a portion channel-shaped in cross-section, defining a web bearing against the inner panel, and further defining a pair of lateral flanges engaging with the outer panel; the channel-shaped portion and outer panel coacting to define a vertical space adapted to confine a column of insulating air; each flange having a turned-back portion projecting toward the inner panel to define a runner; the runners being disposed on opposite sides of the structural member and extending longitudinally thereof between the panels; means fixedly securing the inner panel to the web of said member; a plurality of stirrups anchored to the outer panel on opposite lateral sides of said member; and a plurality of individual clips interconnecting the outer panel with the structural member; the clips being spaced one from the other to reduce transfer of heat from the outer panel to said structural member; each clip having a foot slidably disposed in a stirrup, and further being provided with a hook slidably engaging over a runner; each foot being disposed at right angles to its respective runner; the hooks being freely slidable along the runners, when the outer panel expands and contracts longitudinally of said member; and the stirrups being movable on the feet of the clips, when the outer panel expands and contracts transversely with respect to the structural member.

2. The expansible wall structure as defined in claim 1; and in which each lateral flange of the structural member

5

is joined to its respective runner by a curved portion, which makes a line contact only with the inner surface of the outer panel, thereby reducing the tendency of said member to convey heat from the outer panel to the inner panel.

3. In an expansible wall structure: a metallic panel consisting of a thin sheet of material; at least one vertical reinforcing structural member contacting with a surface of the panel and extending substantially from one end of the panel to the other end; said member having a portion channel-shaped in cross-section with the web of the channel being spaced from the panel surface; said structural member having a pair of lateral flanges that are arcuate in cross-section so that each flange will only have a line contact with the panel surface, the outer edges of the flanges constituting runners that project away from the panel surface and are parallel thereto; a plurality of clips having hook-shaped ends for slidably receiving the runners, and having feet extending parallel with the panel surface and at right angles to the length of the reinforcing structural member; and a plurality of stirrups for the clips and being secured to the said panel surface and slidably receiving the feet of the clips; the stirrups being arranged along opposite sides of the rein-

6

forcing structural member, and close enough to the member to prevent the feet of the clips from working free of the stirrups; the hook portions of the clips permitting expansion and contraction of the panel in a direction paralleling the length of the member, and the feet of the clips being slidable in the stirrups in a direction at right angles to the length of the member for permitting expansion and contraction of the panel in a direction transverse to the length of the member; a sufficient number of clips and stirrups being used for holding the said panel surface in contact with the entire length of the reinforcing member for holding the panel surface flat at all times.

References Cited in the file of this patent

UNITED STATES PATENTS

1,883,834	Turner	Oct. 18, 1932
1,891,189	Balduf	Dec. 13, 1932
2,324,654	Tinnerman et al.	July 20, 1943
2,324,710	Livar	July 20, 1943
2,656,902	Gotshall	Oct. 27, 1953
2,703,559	Godshalk	Mar. 8, 1955
2,718,287	Hobart	Sept. 20, 1955