United States Patent [19]

Gerhardt

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[54] OVEN WALL AND PANEL THEREFOR

[76] Inventor: **Jacob M. Gerhardt,** 114 Ingleside Avenue, Marietta, Ohio

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[52] **U.S. Cl.** **52/98,** 52/573, 52/582, 52/593

[51] **Int. Cl.** **E04b 1/00,** E04b 1/68, E04c 1/10

[58] **Field of Search** 52/593, 595, 619, 52/620, 621, 588, 98, 99, 582, 573, 98, 593

[56] **References Cited**

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1,831,281	11/1931	Young	52/578
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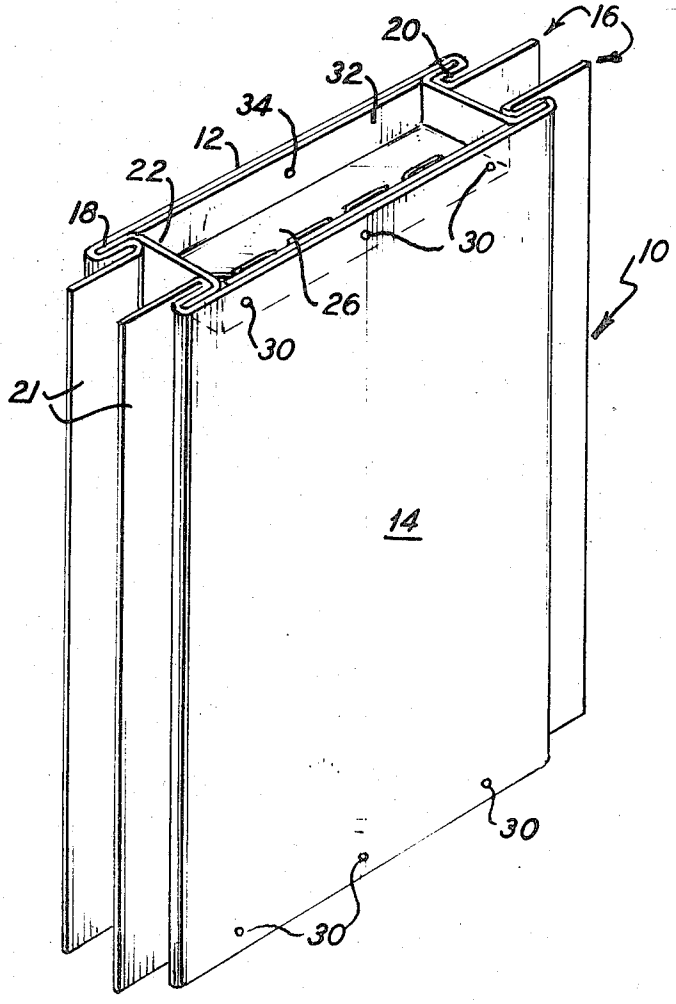
Primary Examiner—Henry C. Sutherland
Attorney—D. Paul Weaver et al.

[57] **ABSTRACT**

An oven or furnace assembly formed of a plurality of contiguous panels assembled to each other. Each panel is formed of spaced inner and outer walls having resilient tangs at the wall ends. The tangs of the contiguous panels overlap each other and apply resilient pressure against each other to retain the panels in assembled relation while allowing the walls to breathe. The tangs are formed at the ends of wall extensions of the inner and outer walls that have loops that receive legs of flanges that extend between the walls. Channels, extending between the walls, are secured to the walls by spot welds, each channel being secured to its associated inner wall by a single spot weld located centrally of the wall and being secured to its associated outer wall by a plurality of spot welds to provide a stronger securement of the channels to the outer walls than to the inner walls. A batt of compressible insulation is located in the interior of each panel. The panels are assembled by first assembling the flanges to a first of the walls, then inserting the batt of insulation between the flanges, then hooking the loops of the second of the walls onto flange legs, then inserting the channels in place, and then spot welding the channels to the walls.

10 Claims, 8 Drawing Figures



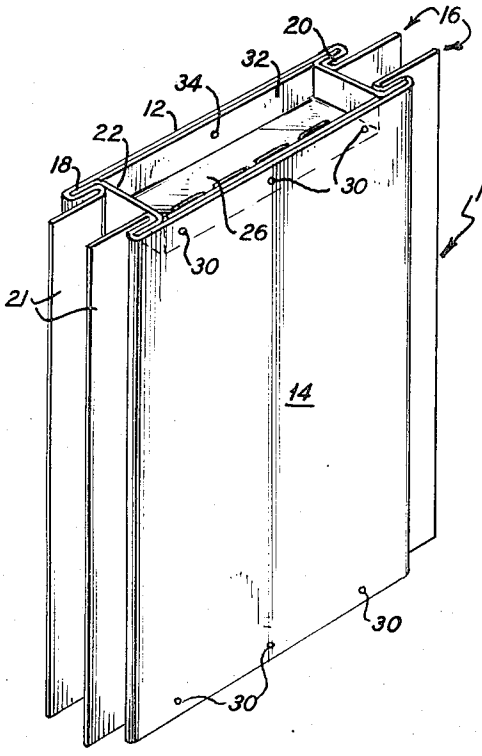


FIG. 1

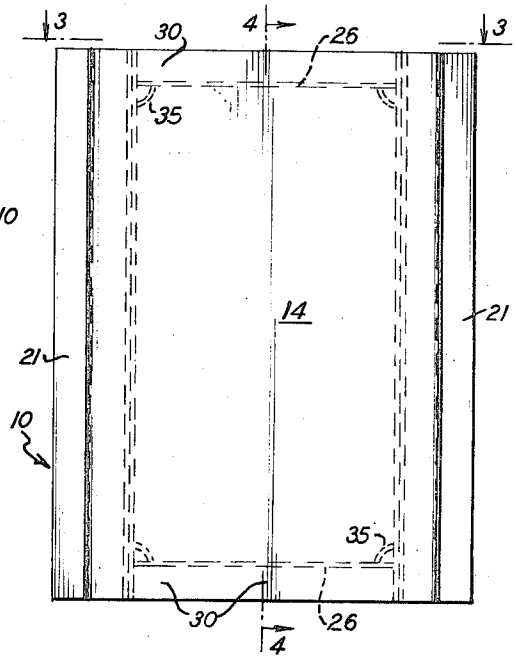


FIG. 2

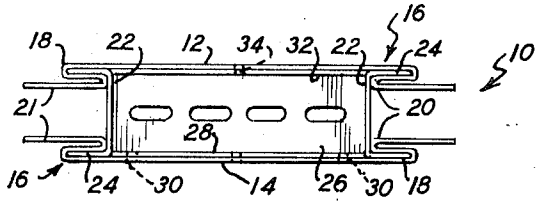


FIG. 3

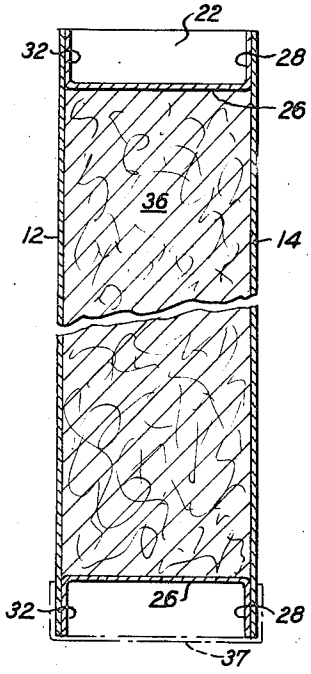


FIG. 4

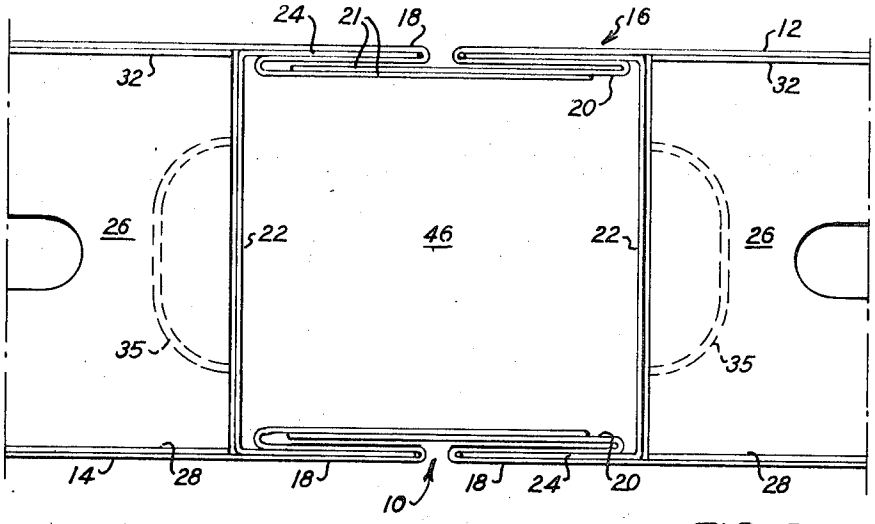


FIG. 5

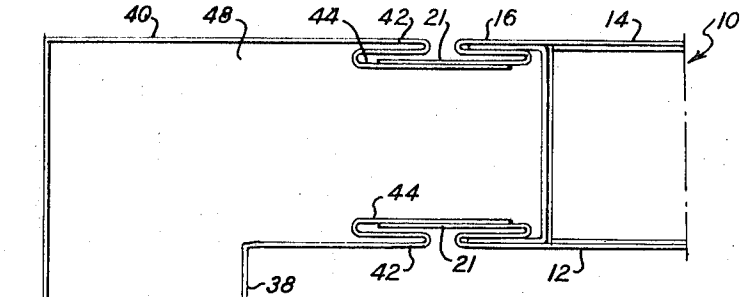
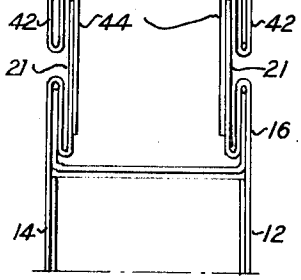


FIG. 6



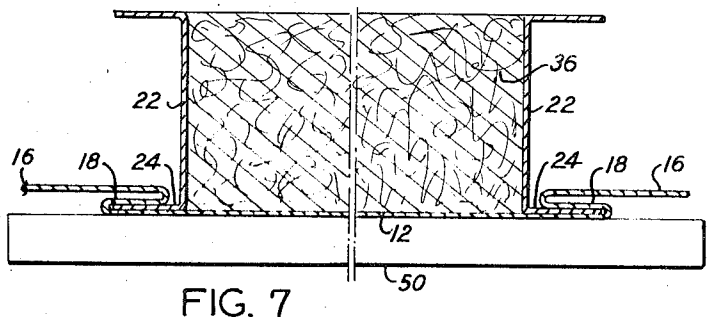


FIG. 7

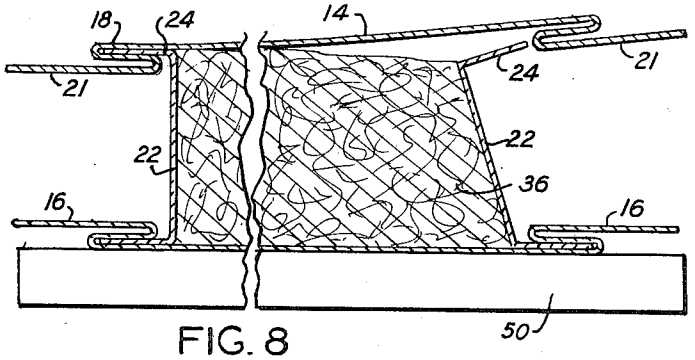


FIG. 8

OVEN WALL AND PANEL THEREFOR

BACKGROUND OF THE INVENTION

U.S. Pat. Nos. 1,831,281 and 1,843,430 are illustrative of insulated panels used in the construction of a heating mechanism such as an oven or a furnace. These panels have spaced inner and outer walls with insulation therebetween. The inner wall, and to a more limited extent, the outer wall are subject to expansion and contraction, know as breathing, due to the heat of the heating mechanism. This breathing should take place in such a manner as to not rupture, crack or buckle the panel and to not deleteriously affect the assemblage of the panels.

SUMMARY OF THE INVENTION

A first aspect of this invention is concerned with the construction of a heating mechanism assembly that provides for a ready assemblage of the panels and enables the breathing of at least the inner wall to take place without distorting or buckling the wall while maintaining a tight assemblage of the panels. The assembly is formed of contiguous panels having the spaced outer and inner walls. The body portions of the inner and outer walls on the contiguous panels are coplanar and identical resilient extensions extend from the body portions that form tangs. The tangs of the contiguous walls overlap each other and lie in planes that are parallel to the planes of the walls. The walls are thus retained in assembled relation by the resilient pressure of the tangs against each other and may breathe due to the tangs sliding with respect to each other in their planes.

A second aspect of this invention is concerned with the construction of an individual panel that permits the breathing to take place and enables the walls to be assembled to each other by means of flanges that extend between the walls and hold insulation in place between the walls. The resilient extensions are formed of outer loops and inner loops, the tangs being located as continuations of the inner loops. The flanges have legs that are inserted into the outer loops to thereby assemble the inner and outer walls.

The inner and outer walls have channels extending therebetween and secured thereto that also hold the walls in assembled relation and hold the insulation in place. A third aspect of this invention relates to the securement of the channels to the walls in order to enable the inner wall to breathe. This is accomplished by providing a relatively strong securement of the channels to the outer walls and a weaker securement, that could be no securement at all, of the channels to the inner walls. The relatively strong securement holds the channels in place between the walls and the relatively weak securement enables the inner walls to breathe. The relatively weak securement is primarily for the purpose of holding the channels to the inner walls during shipment of the panels to a location where the panels are assembled to each other to erect the heating mechanism, but may rupture when the heating mechanism is erected to further facilitate breathing of the inner walls.

A fourth aspect of the invention is concerned with a method of assembling the panels. This is accomplished by supporting a first one of the walls, then assembling flanges to the first wall, then hooking a loop on one end of the other wall onto a flange leg, then moving the other flange inwardly so that its flange leg clears a loop on the other end of the other wall, and then releasing

the other flange so that its flange leg can enter the loop on the other end of the other wall.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an isometric view of a panel;

FIG. 2 is an elevation of a panel;

FIG. 3 is a plan view taken on the line 3—3 of FIG. 2;

FIG. 4 is a section taken on the line 4—4 of FIG. 2;

FIG. 5 is a plan view of an assembly of a pair of contiguous panels;

FIG. 6 is a plan view of a pair of panels that are assembled to each other by connector strips located between the panels;

FIG. 7 is a section of a panel showing it at an early stage in its assemblage; and

FIG. 8 is a section of the panel showing it at a later stage in its assemblage.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1–4, each panel 10 comprises an inner wall 12 and an outer wall 14, the walls 12, 14 being spaced from each other and being made of resilient material such as steel. The side ends of the walls 12, 14 are formed into resilient extensions 16 that extend laterally from planar body portions of the walls. Each extension 16 is formed of an outer loop 18 that extends outwardly of its associated wall and then bends inwardly of the panel and towards its associated wall end and an inner loop 20 that is a continuation of the outer loop and bends further inwardly of the panel and then extends away from its associated wall end to form a resilient tang 21. Substantially U-shaped side flanges or channel members 22 are located between the corresponding side ends of the walls 12, 14 by means of legs 24 that are positioned within the outer loops 18.

Inwardly of the side flanges or channel members 22, the tops and bottoms of the walls 12, 14 are bridged by U-shaped channels 26. Each channel 26 has an outer leg 28 that is secured to its associated outer wall 14 by a plurality of spot welds 30 (therein illustrated as three spot welds) and an inner leg 32 that is secured to its associated inner wall 12 by a single spot weld 34 located centrally of the inner leg 32 and the inner wall 12. Protuberances in the form of embossments 35 (FIGS. 2 and 5) extend inwardly of the side flanges or channel members 22 so as to be contiguous to and inward of an end of a channel 26.

Heat insulative batting 36 is located in the cavity formed by the inner wall 12, the outer wall 14, the side flanges 22, and the channels 26.

After being manufactured, in the manner described below, the panels are transported to a site where a heating mechanism, such as an oven or a furnace, is to be erected and are assembled to each other to form the heating mechanism.

In assembling the heating mechanism, the bottoms of the panels 10 are placed in tracks 37 (FIG. 4) so that they stand upwardly thereof and adjacent side ends of the panels are secured to each other by forcing their resilient tangs 21 against each other as indicated in FIG. 5 so that the tangs overlap and retain the panels in place by virtue of the resilient forces they apply against each other, with the tangs lying in planes parallel to the planes of the body portions of the walls 12, 14.

Where adjacent panels **10** are erected so that they are not coplanar, they are connected by connecting strips, FIG. **6** illustrating one such arrangement. This figure shows a corner of a heating mechanism where adjacent panels **10** lie in planes that are at right angles to each other. The inside panel walls **12** are connected by a connector strip **38** and the outside panel walls **14** are connected by a connector strip **40.** The ends of the strips **38** and **40** are formed into extensions **42** constructed similarly to the extensions **16,** the extensions **42** having tangs **44** that coact with the tangs **21** to secure the strips **38** and **40** to the panels **10** in the manner described above.

After the panels have been assembled to each other, insulative batting is inserted into the cavities **46** (FIG. **5**) formed between contiguous panels **10** and into the cavities **48** (FIG. **6**) formed between the connector strips **38, 40** and their contiguous panels **10.** After this, the roof of the heating mechanism is mounted to the panels **10** in any desired manner and the conventional conveyor belts and motor shafts are caused to extend through the panels in any desired manner. Other accessories, such as a door for the heating mechanism, are formed in the heating mechanism in any desired fashion.

Among the heating mechanisms that can be fabricated in the above described manner are paint drying ovens and metal heat treating ovens. In such heating mechanisms, the inner walls **12** are raised to a considerably higher temperature than the outer walls **14** resulting in expansion and contraction of the inner walls **12** as they heat and cool. It is desirable that this expansion and contraction, which is also known as breathing, take place without the inner walls distorting or buckling as such distortion or buckling has the deleterious effect of misaligning the inner walls with members, such as conveyor belts or motor shafts, that extend through the walls and also may cause the inner walls to rupture or crack. Since the inner walls **12** are bridged to each other by the resilient tangs **21,** their expansion or contraction is accommodated by planar movement of the body portions of the inner walls with the tangs in adjacent walls sliding with respect to each other in their planes which are parallel to the planes of the inner wall body portions. It is particularly advantageous, in assembling the heating mechanism that the tangs **21** are integral with the walls **12, 14,** and that the tangs, together with the rest of the extensions **16,** are identically constructed to thereby simplify the task of assembling the panels **10** to each other. Due to the fact that the legs **24** of the side flanges or channel members **22** are positioned within the outer loops **18,** the side flanges or channel members **22** do not impede the aforementioned breathing of the inner walls **12.**

As mentioned above, the channels **26** are secured to the inner walls **12** by a single centrally located spot weld **34** so that the securement of the channels to the inner wall does not impede the planar breathing of the inner walls. The spot welds **34** are applied primarily to hold the panels **10** together during shipment and are unnecessary after the heating mechanism has been assembled since the spot welds **30** securing the outer walls **14** to the channels **26** are adequate to hold the channels in place in the assembled heating mechanism. Therefore, once the heating mechanism has been assembled, the relatively weak connections between the channels **26** and the inner walls **12,** formed by the single spot welds **34,** may rupture to enhance the planar breathing of the body portions of the inner walls without adversely affecting the construction of the assembled heating mechanism. The flanges **22** are retained in assembled relation in the panels by means of the positioning of the legs **24** in the outer loops **18** and by the embossments **35** that can bear against the channels **26** so as to limit their movements lengthwise of the outer loops.

In assembling a panel **10,** and referring to FIG. **7,** a wall which can be either the wall **12** or **14,** but in FIG. **7** is illustrated as being the wall **12,** is layed down on a support or table **50** so that the extensions **16** extend upwardly of the table. The flanges or channel members **22** are then assembled to the wall **12** by inserting a flange leg **24** into each of the outer loops **18** of the wall **12** so that the flanges are upright. This is followed by the insertion of a batt of insulation **36** onto the wall **12** between the flanges **22** to bring the parts to the position shown in FIG. **7.**

After this, and referring to FIG. **8,** the wall **14** is hooked onto one of the uppermost flange legs **24** (illustrated in FIG. **8** as the left flange leg) by looping its left outer loop **18** onto the left flange leg **24.** An appropriate tool then bends the right flange **22** inwardly about its connection with its lower flange leg **24** so that its upper flange leg **24** moves inwardly a sufficient distance to clear the right outer loop **18** of the wall **14,** the batt **36** compressing during this inward movement of the flange or channel member **22.** The wall **14** and the right outer loop **18** are then lowered to bring the right outer loop **18** into alignment with the upper flange leg **24** of the right flange or channel member **22,** and the right flange or channel member **22** is released from the tool to spring back into an upright position with its upper flange leg **24** located in the right outer loop **18** of the wall **14.**

The assemblage of the walls **12** and **14,** the flanges or channel members **22** and the batting **36** are now removed from the table **50** and the channels **26** are inserted in place between the walls **12, 14** and the flanges or channel members **22** and are spot welded to the walls **12, 14** to form the spot weld connections **30** and **34.**

I claim:

1. In a heating mechanism assembly formed of at least a pair of contiguous panels, each panel being formed of an outer wall and a substantially planar inner wall spaced from its associated outer wall, the inner and outer walls being respectively assembled to each other in a substantially coplanar relationship; the improvement wherein the means for assembling the adjacent coplanar inner walls to each other and the adjacent coplanar outer walls to each other comprises:

substantially identical resilient extensions formed on adajcent ends of the inner walls, each of said extensions on said inner walls extending outwardly of its associated inner wall body portion and then being bent inwardly of the panel toward its associated inner wall body portion to form an outer loop, and then being bent outwardly of the panel away from its associated inner wall body portion to form an inner loop, and continuing beyond the outer loop to form a tang that lies in a plane substantially parallel to the plane of the body portions of the inner walls;

substantially identical resilient extensions formed on adjacent ends of the outer walls, each of said extensions on said outer walls extending outwardly of its associated outer wall body portion and then being bent inwardly of the panel toward its associated outer wall body portion to form an outer loop, and then being bent outwardly of the panel away from its associated outer wall body portion to form an inner loop, and continuing beyond the outer loop to form a tang that lies in a plane substantially parallel to the plane of the body portions of the outer walls, said tangs on said extensions of said inner and outer walls of one of said panels being resiliently and slidably received in the associated inner loops formed on the extensions of the inner and outer walls of a contiguous panel to hold said panels in assembled relation and permit movement therebetween;

a pair of spaced vertically extending channel members disposed between the associated ends of the inner and outer walls of each panel, each of said channel members having a pair of outwardly extending legs that are slidably received in the associated outer loops formed on said associated extensions of the inner and outer walls of each panel;

a pair of spaced horizontally extending channel members bridging the top and the bottom of the associated inner and outer walls of each panel; and

means securing said horizontally extending channel members to said inner and outer walls, said means providing a stronger securement of said horizontally extending channel members to its associated outer wall than to its associated inner wall, whereby said inner wall may expand and contract without distorting said panel.

2. The assembly of claim **1** wherein said securement means comprises spot welds.

3. The assembly of claim **5** wherein said securement comprises a spot weld designed to rupture when said panels are subjected to heat during usage.

4. The assembly of claim **1** further comprising: a protuberance extending inwardly of each of said vertically disposed channel members inwardly of and contiguously to each of its associated horizontally disposed channel members to thereby limit the movements of the horizontally disposed channel members.

5. The assembly of claim **1** wherein the securement of each of said horizontally disposed channel members to its associated inner wall is located centrally of the inner wall.

6. A panel, for use as part of a heating mechanism, comprising:

an inner wall having a substantially planar body and having top, bottom and side edges;

an outer wall having a substantially planar body, parallel to and spaced from said inner wall, and having top, bottom and side edges;

a pair of vertically disposed channel members extending between the associated side edges of said inner and outer walls, each of said channel members having a pair of outwardly extending legs;

a resilient extension on each side edge of the inner wall that extends outwardly of its associated inner wall and then bends inwardly of the panel towards its associated inner wall to form an outer loop and then extends outwardly of its associated inner wall to form an inner loop and then extends outwardly of its associated inner wall;

an inner tang integrally formed on each of said last named outwardly extending portions;

a resilient extension on each side edge of the outer wall that extends outwardly of its associated outer wall and then bends inwardly of the panel toward its associated outer wall to form an outer loop and then extends outwardly of its associated outer wall to form an inner loop and then extends outwardly of its associated outer wall;

an outer tang integrally formed on each of said last named outwardly extending portions;

said legs of said channel members being slidably disposed in said outer loops of said extensions of said inner and said outer walls;

a pair of horizontally disposed channel members bridging the top and bottom of the inner and outer walls; and

means securing said horizontally disposed channel members to said inner and outer walls, said means providing a stronger securement of said horizontally extending channel members to its associated outer wall than to its associated inner wall;

each of said inner and outer tangs being adapted to overlap a similar tang on a contiguous panel with the overlying tangs lying in planes substantially parallel to the plane of said panel, thus enabling the inner and outer walls of the contiguous panels to be retained in assembled relation by way of resilient pressure of the tangs against each other and enabling the inner walls to breathe by way of the inner tangs sliding with respect to each other in their planes.

7. The assembly of claim **6** wherein said securement means comprises spot welds.

8. The assembly of claim **10** wherein said securement comprises a spot weld designed to rupture when said panels are subjected to heat during usage.

9. The panel of claim **6** further comprising: a protuberance extending inwardly of each of said vertically disposed channel members inwardly of and contiguous to each of its associated horizontally disposed channel members to thereby limit the movement of the horizontally disposed channel members.

10. The panel of claim **6** wherein the securement of each of said horizontally disposed channel members to its associated inner wall is located centrally of the inner wall.

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