Feb. 9, 1971 C. K. KEENER 3,561,183

WALL CONSTRUCTION

Filed Feb. 20, 1969 3 Sheets-Sheet 1

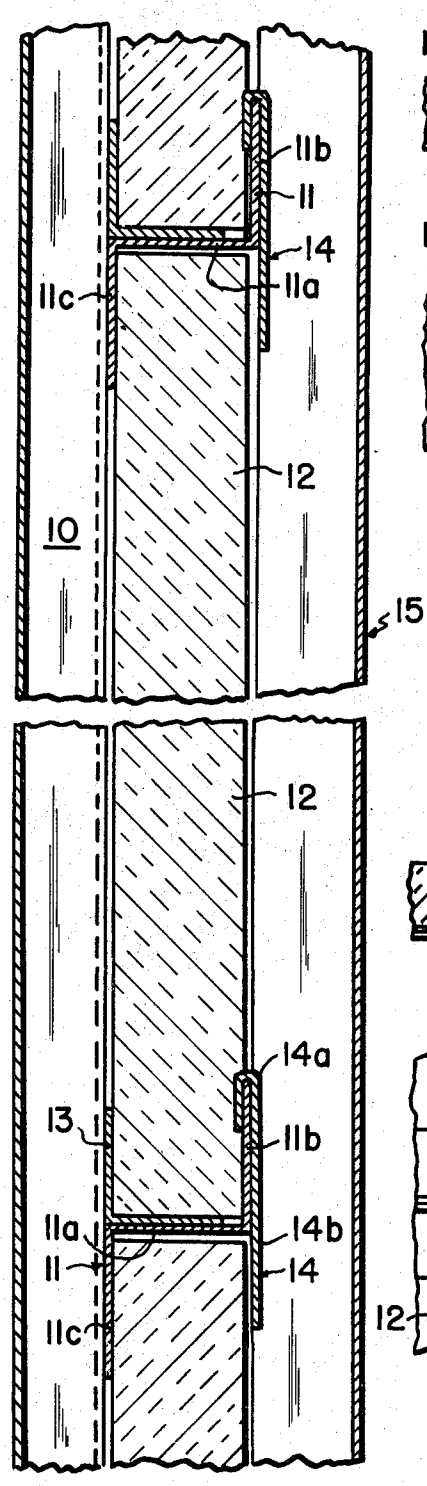


Fig. 8

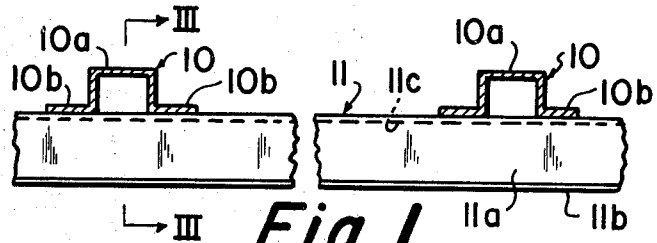


Fig. 1

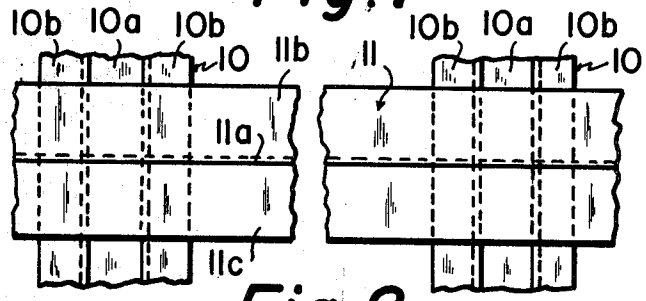


Fig. 2

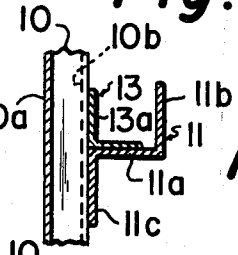


Fig. 3

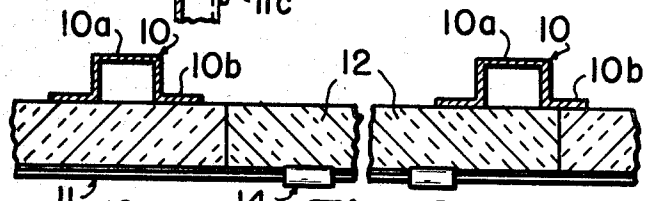


Fig. 4

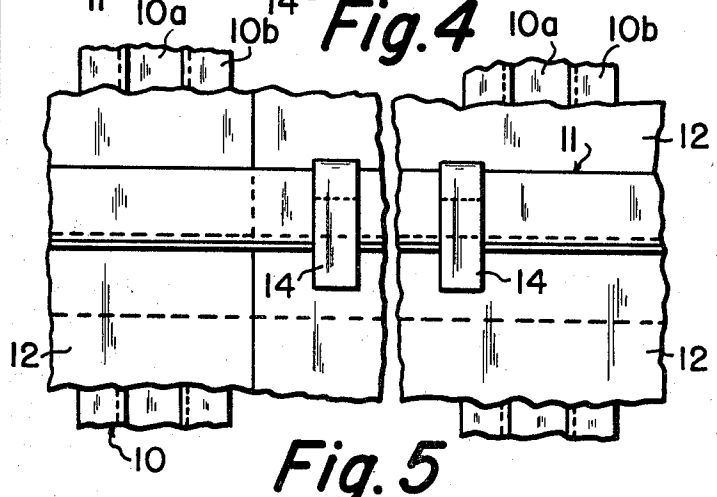


Fig. 5

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WALL CONSTRUCTION

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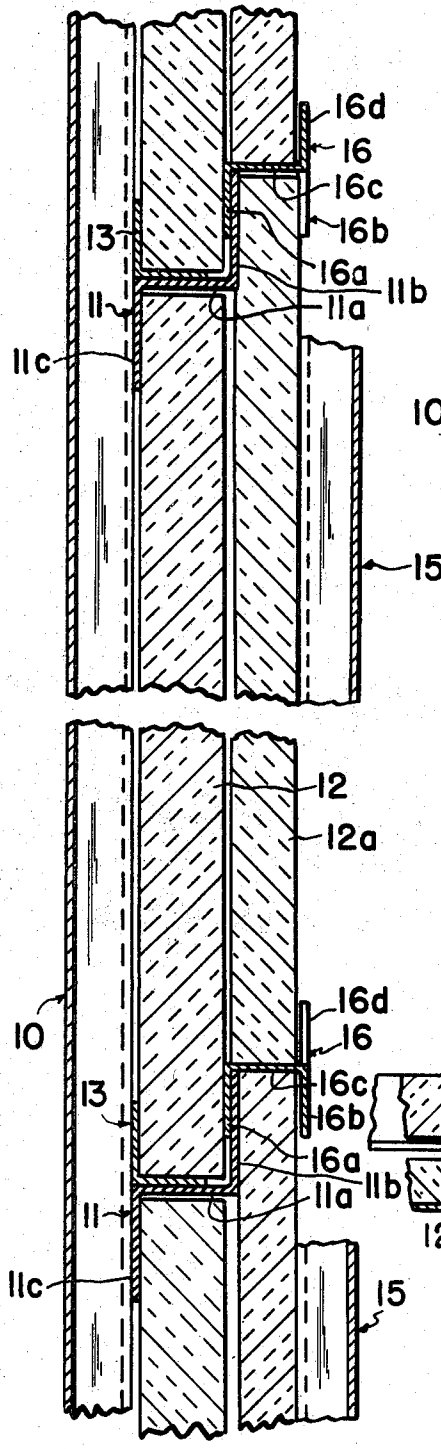


Fig. 11

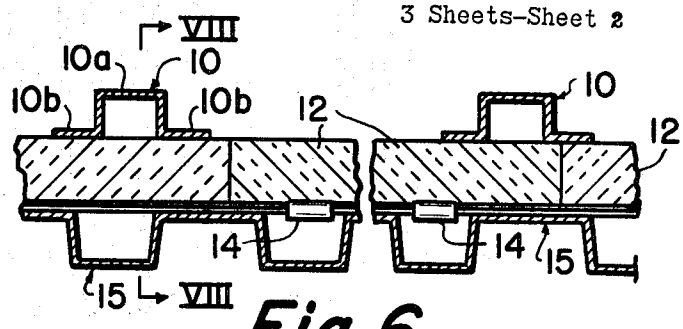


Fig. 6

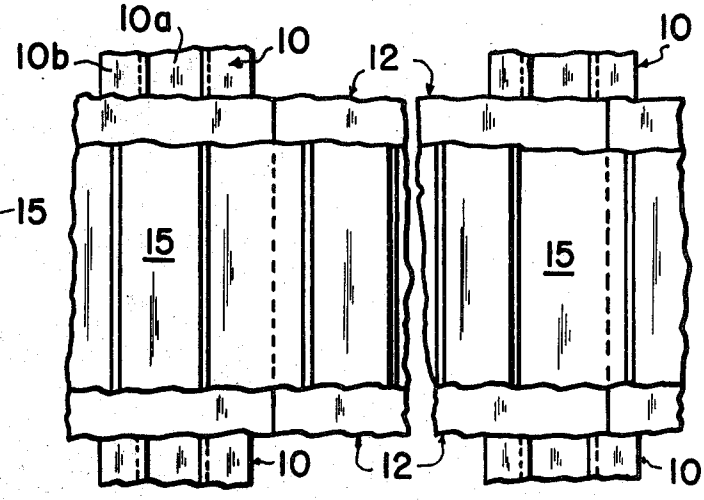


Fig. 7

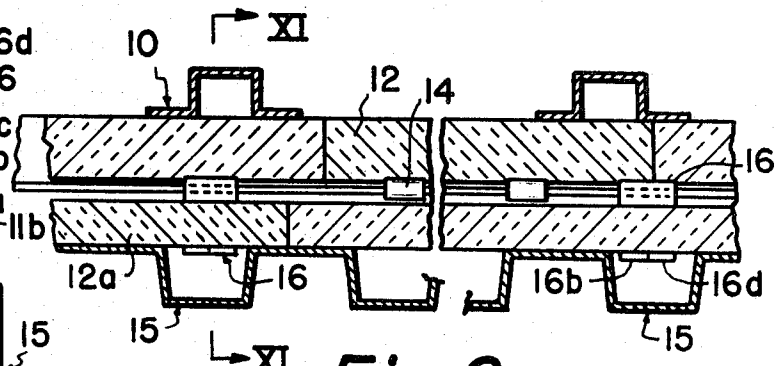


Fig. 9

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WALL CONSTRUCTION

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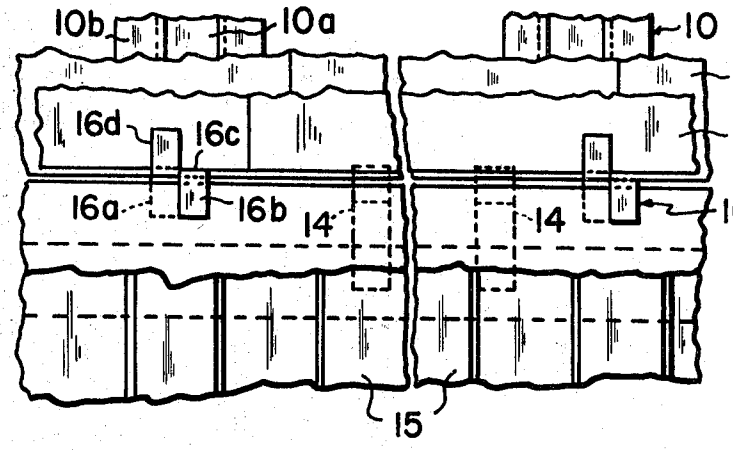


Fig. 10

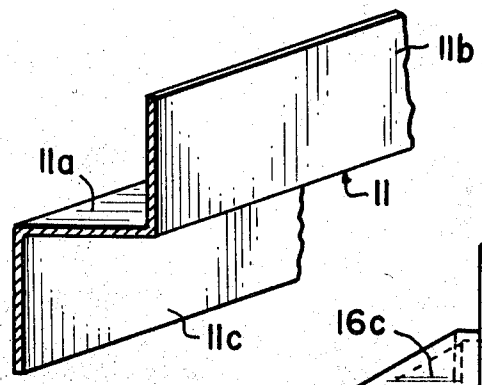


Fig. 12

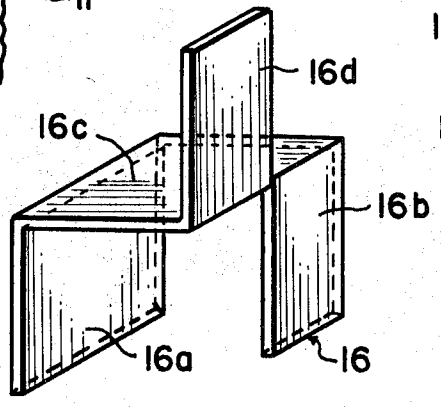


Fig. 14

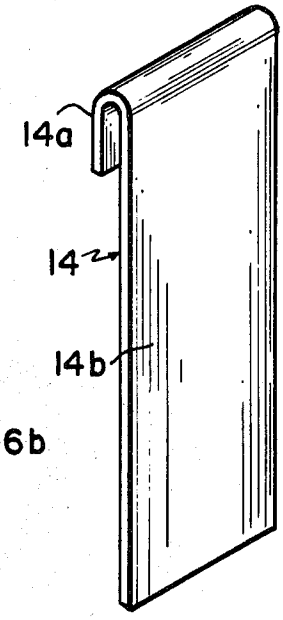


Fig. 13

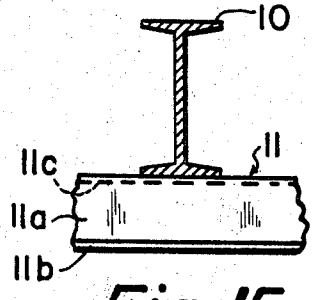


Fig. 15

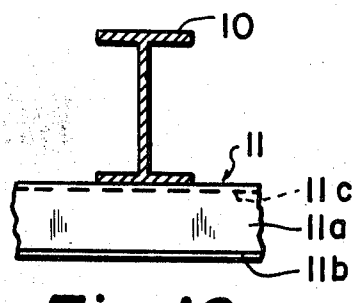


Fig. 16

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3,561,183

WALL CONSTRUCTION

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Int. Cl. E04b 2/02, 2/72
U.S. Cl. 52—488 6 Claims

ABSTRACT OF THE DISCLOSURE

A wall construction and method of erection thereof which utilizes spaced parallel Z-bars affixed transversely of parallel buckstays and includes positioning insulation panels in single or double layers between the Z-bars where they are retained by special clip means attached to one of the Z-bars and insulation panels. Facing may be applied across the wall construction for additional rigidity weather protection or architectural purposes.

This invention relates to a wall construction and particularly to a wall made from a plurality of panels mounted on a Z-bar frame. The method of erecting the wall is also a part of the invention.

Although Z-bars or angles have been used as frame components for building walls and ducts, it has not been appreciated heretofore that they can form an integral part of such a construction, especially where it is desired to build a high temperature heat transfer barrier. In the past, such barriers or insulation walls for high temperature furnaces, boilers, ducts, etc. have been constructed by physically attaching, as by welding, studs, welding pins or bolts, insulating materials to metal frame members. Not only is this prior method cumbersome in that it requires individual location and securing of studs or welding pins, thus increasing the expense, but also the finished construction is marked by such fasteners which protrude from the frame and interfere with finishing off the face of the insulation panel for decorative and architectural purposes and weather protection.

Among the prior methods of building insulation walls, the most frequently employed comprised installing insulation against plates or road mesh impaled over studs or pins which were welded to these permanent metal framings. A disadvantage common to all of the various methods presently used is that there is considerable heat transfer through the fastening means which the construction is supposed to prevent. This problem is particularly acute in high temperature conditions such as the boiler ducts, where temperatures approach 1000° F. My insulation wall construction meets these service requirements and additionally, the installation of it is less difficult, requires less time and fewer materials to erect and is, therefore, less expensive than present wall constructions. Moreover, my wall includes a feature which makes it especially attractive to contractors: large sections of it can be erected in substantially assembly-line fashion and any section of it can be eliminated to accommodate electrical, plumbing or other service junction boxes, beams, or other permanent fixtures; or it may be placed across such service connections and single sections removed at will for maintenance and repair of the otherwise covered boxes without having to take down an entire wall.

Hereinafter, I have disclosed preferred embodiments of my wall construction: one which includes a single thickness of insulation, that is, the depth of the insulation is substantially that of a single commercial pre-molded insulation panel suitable for temperatures up to about 400° F.; and another which comprises a double thickness of insulation and including at least two panels disposed face-to-face but not necessarily of the same thickness.

The former embodiment is referred to in this specification as a single or one layer wall; the plural insulation panel arrangement is called a two layer wall. The two layer wall is particularly suitable for use where temperatures to be encountered approach 1000° F. It should be understood that the temperatures given are examples only, since the heat transfer or barrier capacity depends on a number of factors including the type of insulation material used, its surface finish, density, the heat source to which it is exposed, and the like.

Briefly, my invention is a wall construction comprising at least two spaced parallel buckstay members across which are secured at least one pair of Z-bars. The Z-bars are also spaced from one another. An insulation panel is mounted between the Z-bars and against the buckstays. The bottom edge of the panel rests on the central portion of the lower Z-bar and behind the upstanding portion of it. The top edge of the panel fits under the central portion of the upper Z-bar. A clip means attached to the upper Z-bar depends across the face of the panel and retains it in position between the Z-bars.

In another embodiment of the invention, a second insulation panel is mounted adjacent a panel thus positioned between two Z-bars and against buckstays. Clip means, such as h-clips, are secured to the Z-bars and a second panel is mounted on the h-clips.

A complete understanding of the present invention will be obtained from the following description together with the accompanying drawings in which:

FIG. 1 is a plan view of a Z-bar secured to a stiffener or buckstay;

FIG. 2 is a front elevation view of FIG. 1;

FIG. 3 is a sectional view on line III—III of FIG. 1 and showing an angle piece which may be placed on a Z-bar;

FIG. 4 is a sectional view similar to FIG. 1 and including an insulation panel and clip means;

FIG. 5 is a front elevation of FIG. 4;

FIG. 6 is a sectional view similar to FIG. 4 and including a cover;

FIG. 7 is a front elevation of FIG. 6;

FIG. 8 is a section on line VIII—VIII of FIG. 6;

FIG. 9 is a sectional view similar to FIG. 6 and including a second insulation layer secured with clip means and a cover;

FIG. 10 is a front elevation of FIG. 9;

FIG. 11 is a section on line XI—XI of FIG. 9;

FIG. 12 is an isometric view of a Z-bar;

FIG. 13 is an isometric view of one type of clip means used in a single layer wall;

FIG. 14 is an isometric view of another type of clip means used in a two layer wall;

FIG. 15 shows a Z-bar secured to a buckstay shown as I-beam; and

FIG. 16 shows a Z-bar secured to a buckstay shown as H-beam.

Referring to FIGS. 1–3, my wall construction comprises a pair of spaced buckstays **10**. Each buckstay **10** includes a U-shaped channel **10***a*, the legs of which terminate in outwardly extending flanges **10***b*. A longitudinally extending Z-bar **11** (see FIG. 12) extends across the buckstays and is secured to the flanges of buckstays, as by welding. Each Z-bar has a central portion **11***a* from which extend oppositely directly leg portions **11***b* and **11***c*. The leg portions **11***b* and **11***c* are joined to the central portion at substantially right angles and are substantially parallel to each other. The depending leg portion **11***c* is secured to the Z-bar flanges. The length of the central portion of the Z-bar thus defines a space between the leg portion **11***b* and the flange **10***b*. This space is substantially the width of a thickness of a panel **12** of insulation material (FIG. 4) adapted to be vertically disposed therein. As shown in

FIG. 3, an angle strip **13** may be extended positioned on the central portion **11***a* of the Z-bar with one leg **13***a* of the strip abutting the flange **10***b* of the channel. The strip **13** permits the use of any length of insulation panel **12** as where, for example, buckstays are spaced farther apart than the width of a preformed insulation panel. The strip prevents the panel from slipping or falling through the back of the frame formed by the Z-bars and buckstays. Of course, angle strip **13** may also be used to reinforce an insulation panel even where adjacent buckstays are sufficiently close to directly back-up and support a single insulation panel.

A series of such panels **12** are placed end-to-end along a Z-bar **11** against a pair of buckstays **10**. Clip means, such as clips **14** (see FIG. 13), shown in front of the panels **12**, removeably secure the insulation in position.

Each clip **14** comprises a single metal piece, preferably of ductile metal such as aluminum, bent upon itself at one end to form a hook portion **14***a* and an extending flat portion **14***b*. After an insulation panel has been positioned on a lower Z-bar against the buckstays and below the upper Z-bar, a clip **14** is hooked over a leg **11***b* of the upper Z-bar. The flat portion **14***b* is of sufficient length that it extends across a part of the face of the panel, with the flat portion **14***b* abutting a part of the panel along its upper edge to hold the panel in position.

In FIGS. 4–8, is shown a single layer wall construction, according to my invention. A pair of elongated Z-bars **11** are positioned horizontally across two spaced buckstays **10** in the manner earlier described. The Z-bars are secured parallel to one another and spaced from one another a distance sufficient to accommodate a prefabricated insulation panel **12** therebetween. This distance is slightly greater than the size of a panel **12** such that when the bottom edge of a single layer panel is placed on the central portion **11***a* of a lower Z-bar or on strip **13** behind an upstanding leg portion **11***b*, the panel substantially fills the space between the upper and lower Z-bars. The panel is maintained in place between the Z-bars by clips **14** placed along the upper Z-bar, as shown. When the clip is in place over a Z-bar, the flat portion **14***b* holds the panel in substantial alignment between the Z-bars. A series of such clips placed along a single insulation panel **12** prevent the panel from falling out from between the Z-bars. If desired, a cover or facing member **15**, as shown in FIGS. 6 and 7, may be secured across the front of the panel to cover the insulation panel to give the wall a completely finished and/or decorative appearance.

From the foregoing, it is apparent that my wall can be quickly, efficiently and inexpensively constructed. Once a pair of Z-bars **11** are positioned properly, a plurality of insulation panels **12** may be placed end-to-end between them along any length Z-bar. Spaces may be left between panels for service junction boxes and the like as needed. The clips **14** may be left on the Z-bars even if facing is used or may be salvaged for reuse as the facing is put up, since the facing will maintain the insulation in proper position.

FIGS. 9–11 show my two layer wall construction which comprises a second insulation panel **12***a* being positioned face-to-face with a panel **12** of the wall construction described with reference to FIGS. 1–8. The two layer wall is constructed by first erecting a single layer wall including a pair of parallel horizontal Z-bars **11** attached as by spot welding them to a pair of vertically disposed, spaced parallel buckstays **10**. An insulation panel **12** is placed between the Z-bars. The panels may be retained therebetween, and against the buckstays and a strip **13** by clips **14**; however, the clips **14** need not be used since the panel **12***a* will perform their function.

Referring particularly to FIG. 11, a pair of h-clips **16** (see FIG. 14) are then placed as shown. Each h-clip includes a pair of downwardly extending legs **16***a*, **16***b*, a central flat portion **16***c* and an upwardly extending leg portion **16***d*. The h-clips are so dimensioned that when they

are positioned on Z-bars **11**, upwardly extending leg **16***d* and positioned downwardly extending leg **16***b* are positioned from the face of a panel **12** a distance sufficient to provide a space approximating the width of a second insulation panel **12***a*. The h-clips are positioned with a leg **16***a* of the h-clip extending over and behind the upstanding leg **11***a* of the Z-bar and against the face of insulation panel **12**. After at least a pair of h-clips **16** are so placed, one on each of two spaced Z-bars, the second insulation panel **12***a* is positioned between them in the manner particularly shown in FIG. 11. A series of such h-clips **16** placed across each of two adjacent spaced Z-bars secure a panel **12***a* therebetween and form a good thermal insulation barrier. Facing, such as cover **15**, may also be secured across the second insulation layer **12***a* to architecturally finish the wall construction.

A two layer construction is particularly useful where high temperatures are encountered, such as those reaching approximately 1000° F. The insulation panels used are generally rectangular and their thickness dimension small relative to their width and length; they may be prefabricated to dimension and appropriately selected for optimum heat transfer characteristics.

Any preformed insulation material which will meet the temperature requirements is useful in my wall construction. It should be noted, however, that nearly all commercial panel insulations are susceptible to breaking off or crumbling along an edge. Such panel edges usually cannot be mitered without damage; even if mitered, the edges of such a panel are liable to breakage in installation and use. Hence, my use of Z-bars and angle strips having nearly right angle corners to fir insulation panels having substantially complementary edges is of particular significance.

In describing my invention, I have demonstrated my wall construction as a planar wall. Those in the art will recognize the principles of the invention sufficiently to apply it to corner joints formed by intersecting walls, to sloping walls, and to walls of modified curvature or undulation.

Also, those in the art will appreciate that the term buckstay not only includes a channel member such as shown in FIG. 1, but also members such as an I-beam (FIG. 15), an H-beam (FIG. 16), angles or channels. The Z-bar may be secured to the buckstays in any suitable manner such as by bolts, rivets, welds or the like.

I claim:

1. A wall construction comprising:
   (a) at least a pair of spaced substantially parallel buckstay members;
   (b) at least a pair of Z-bars transversely positioned across said members and spaced from one another a distance sufficient to support an insulation panel therebetween;
   (c) at least one insulation panel positioned between the Z-bars and against the buckstay members;
   (d) said insulation panel being supported along an edge by one of said Z-bars such that an opposite edge is beneath the next adjacent Z-bar; and
   (e) clip means comprising at least one clip having a hook portion and a substantially flat elongated portion, the elongated portion of such clip being of a length such that when the clip is hooked over said adjacent Z-bar the elongated portion extends along a face of the panel to retain said panel in position to form the wall construction.

2. A wall construction comprising:
   (a) at least a pair of spaced substantially parallel buckstay members;
   (b) at least a pair of Z-bars transversely positioned across said members and spaced from one another a distance sufficient to support an insulation panel therebetween;
   (c) at least one insulation panel positioned between the Z-bars and against the buckstay members;

(d) said insulation panel being supported along an edge by one of said Z-bars such that an opposite edge is beneath the next adjacent Z-bar;

(e) clip means secured to said next adjacent Z-bar and extending therefrom to contact a portion of said panel to retain said panel in position; and

(f) an angle strip positioned between a lower edge of an insulation panel and a Z-bar, one leg of said angle extending upwardly behind said panel to prevent the panel from passing between adjacent buckstay members, the length of the strip being at least as great as the distance between such buckstay members.

3. A wall construction comprising:

(a) at least a pair of spaced substantially parallel buckstay members;

(b) at least a pair of Z-bars transversely positioned across said members and spaced from one another a distance sufficient to support an insulation panel therebetween;

(c) at least one insulation panel positioned between the Z-bars and against the buckstay members;

(d) said insulation panel being supported along an edge by one of said Z-bars such that an opposite edge is beneath the next adjacent Z-bar;

(e) clip means secured to each of said Z-bars and extending outwardly therefrom to support therebetween a second insulation panel; and

(f) a second insulation panel disposed between a pair of clips forming said clip means and being supported by one of said clips and retained in position opposite the first insulation panel.

4. A wall construction as set forth in claim 3 wherein the clip means comprises at least a pair of h-clips, one of said clips being secured to a Z-bar and the other clip being secured to the next adjacent Z-bar and being opposed to the first clip, the second insulation panel being supported between said h-clips and against said insulation panel.

5. A wall construction as set forth in claim 3 in which the first and second insulation panels are of substantially the same thickness.

6. A wall construction as set forth in claim 3 in which one of the first and second insulation panels is of greater thickness than the other panel.

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U.S. Cl. X.R.

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