

[54] WALL PANEL STRUCTURE

[76] Inventor: Earl Bangle Teeter, Jr., 1216 Crescent Ave., Gastonia, N.C. 28052

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[56] References Cited  
UNITED STATES PATENTS

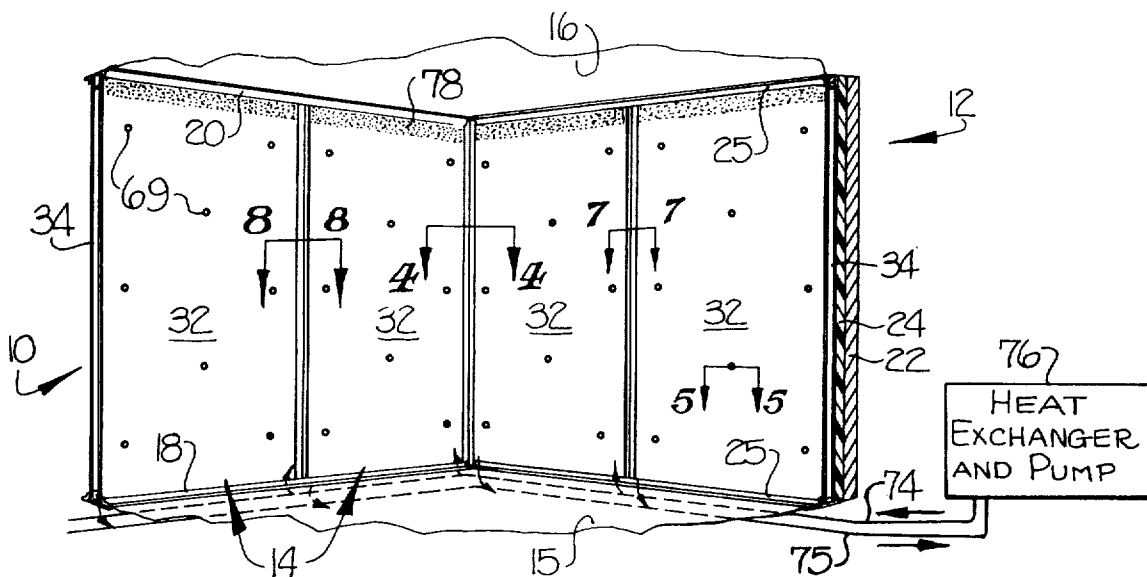
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Primary Examiner—Charles Sukalo  
Attorney, Agent, or Firm—Parrott, Bell, Seltzer, Park & Gibson

[57] ABSTRACT

A decorative wall panel suitable for use in connection with an interior or exterior wall in a home or other building, the panel comprising two closely spaced, parallel panel members defining an enclosed chamber therebetween, at least one of said panel members comprising a light transmitting plastic. Means are provided for passing a colored fluid across the enclosed chamber such that the fluid is visible through the plastic panel members to provide a decorative effect. Also, the fluid may be circulated through a heat exchanger such that the fluid may be used to control the temperature of the interior of the building.

13 Claims, 9 Drawing Figures



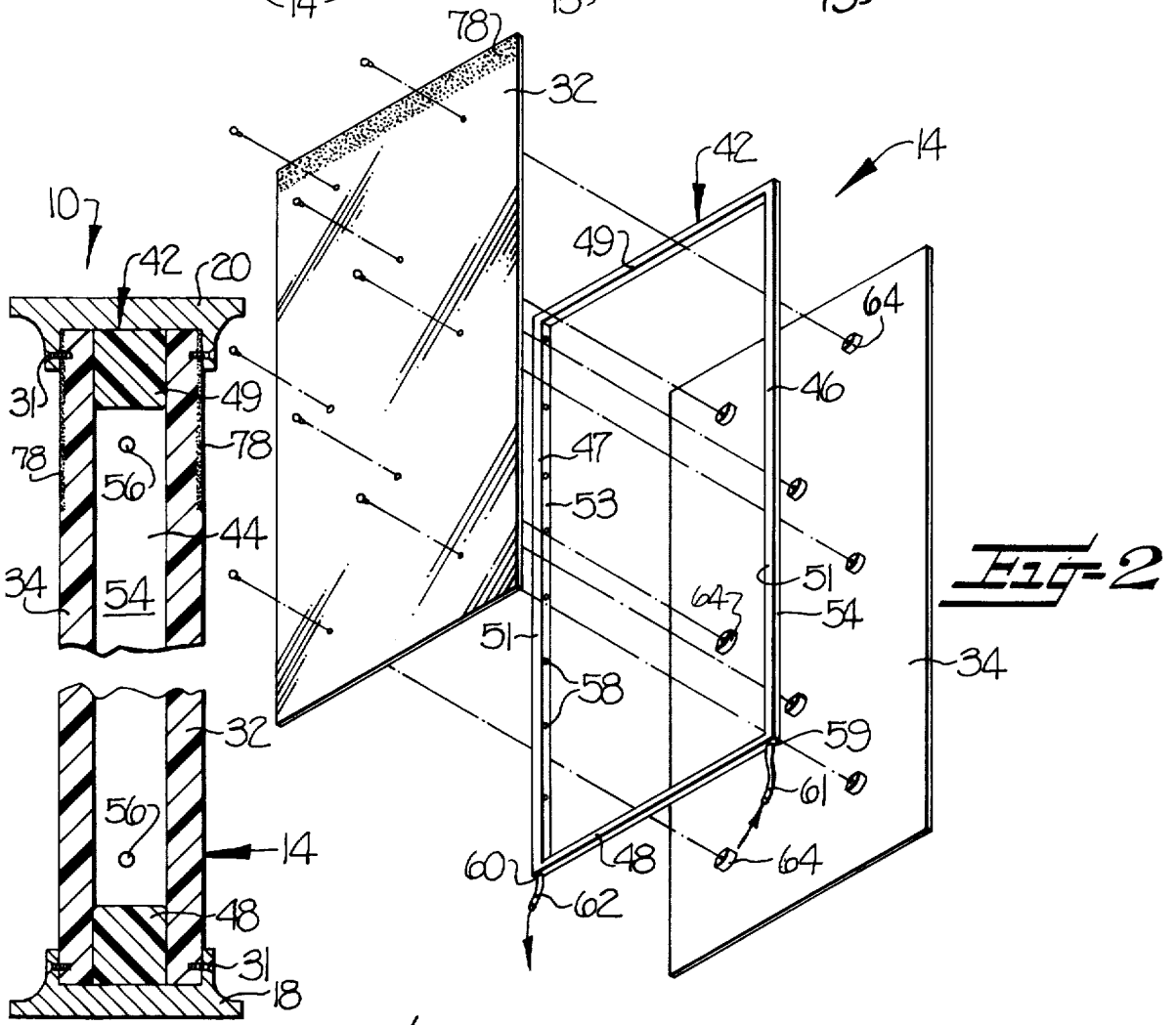
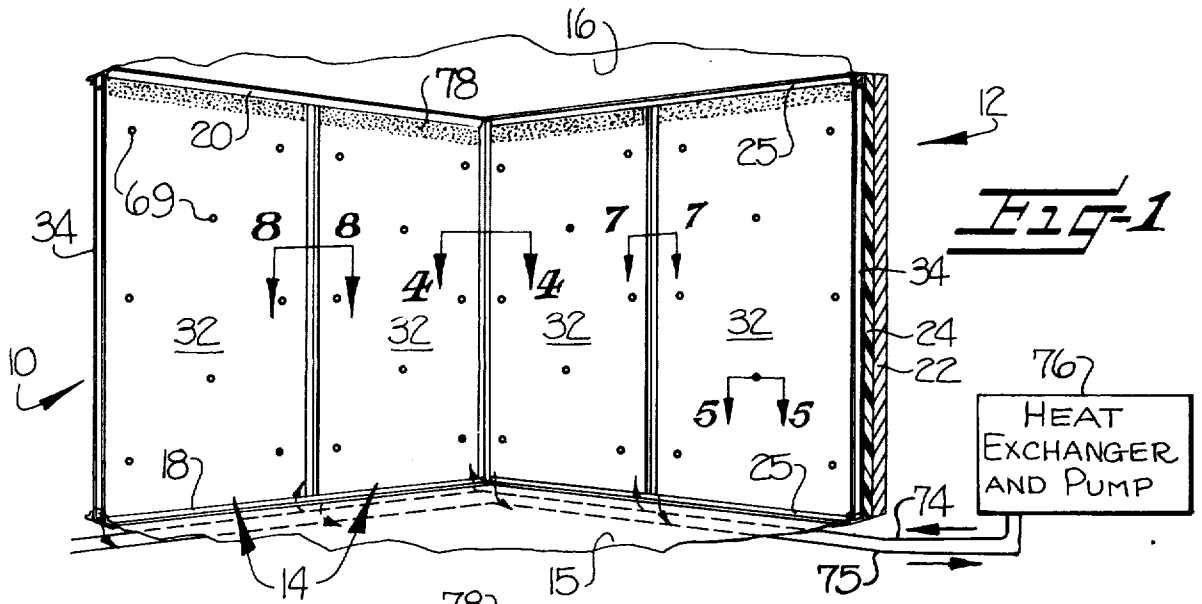


Fig. 3



## WALL PANEL STRUCTURE

The present invention relates to a wall panel structure which is designed to be decorative as well as utilitarian. More particularly, the invention relates to a novel wall panel which includes an enclosed chamber, and a fluid circulation system for directing fluid across the enclosed chamber for decorative and/or temperature control purposes.

It is among the objects of the present invention to provide a decorative wall panel which is adapted for use in connection with either an interior or exterior wall.

It is another object of the present invention to provide a wall panel which provides a decorative and visually appealing appearance by reason of a fluid slowly passing behind a clear plastic panel member of the wall panel so as to be visible to an observer.

It is still another object of the present invention to provide an insulating and temperature controlling wall panel which is adapted to either heat or cool a room by means of a fluid passing through the panel.

It is a further object of the present invention to provide a wall panel which may be prefabricated, and easily assembled and disassembled at the building sight to thereby provide a low cost building construction.

These and other objects and advantages of the present invention are achieved in the embodiment illustrated herein by the provision of a wall panel which comprises first and second rectangular panel members disposed in spaced apart, parallel relationship and with at least one of the panel members comprising a light transmitting plastic. The panel members are sealed about the peripheral edge to define an enclosed chamber therebetween, and means are provided for introducing a fluid into the enclosed chamber along one side of the peripheral edge and for withdrawing the fluid along the opposite side of the peripheral edge such that the fluid is caused to flow across the enclosed chamber and is visible through the plastic panel member. A plurality of vanes may be positioned within the enclosed chamber for controlling the flow pattern to thereby provide visually interesting effects. In addition, the fluid circulating through the enclosed chamber may be passed through a heat exchanger such that the temperature of the circulating fluid and thus the temperature of the interior of the building may be controlled.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which:

FIG. 1 is a sectioned perspective view of an interior and an exterior wall which incorporate wall panels embodying the present invention;

FIG. 2 is an exploded perspective view of one of the wall panels as shown in FIG. 1;

FIG. 3 is a sectioned elevation view illustrating the trackways which permit the wall panels to be slideably assembled to form an interior wall;

FIG. 4 is a sectioned plan view taken substantially along the line 4—4 of FIG. 1;

FIG. 5 is a sectioned plan view showing one of the vanes positioned between the panel members of the wall panel of the present invention;

FIG. 6 is an exploded perspective view of the vane shown in FIG. 5;

FIG. 7 is a sectioned plan view taken substantially along the line 7—7 of FIG. 1;

FIG. 8 is a sectioned plan view taken substantially along the line 8—8 of FIG. 1; and

FIG. 9 is a front elevation view of a wall panel embodying the present invention and illustrating the interesting visual effect which may be produced by varying the orientation of the vanes therewithin.

Referring more specifically to the drawings, FIG. 1 shows an interior wall 10 and exterior wall 12, each of which incorporates the novel wall panel of the present invention and which is generally indicated at 14. More particularly, the interior wall 10 comprises a plurality of wall panels 14 disposed in a side by side arrangement and supportingly positioned between the floor 15 and overlying ceiling 16 by a pair of opposed trackways 18 and 20, the trackway 18 being fixedly secured to the supporting floor 15 by suitable fastening means (not shown), and the trackway 20 being similarly secured to the overlying ceiling 16.

As best seen in FIG. 4, the exterior wall 12 includes a weatherproof exterior brick support wall 22 positioned in spaced apart parallel relationship with the adjacent wall panels 14, and an insulating material 24 such as a foamed plastic material, fiberglass, or the like substantially fills the area between the support wall 22 and wall panels 14. The exterior wall 12 may thus be constructed by initially fabricating the brick support wall 22, and then fixedly securing the wall panels 14 in the illustrated spaced apart relationship with the brick support wall. Such securement may be conveniently effected by means of the bolt 26 and spacing sleeve 27, the bolt 26 being connected to the support wall 22 by a conventional expansion head 28. The insulating material 24 may then be positioned between the wall 22 and wall panels 14 in a manner well known to those skilled in the art. In addition, a molding strip 25 may be mounted along the upper and lower edges of the panel members to provide a finished appearance.

Also as seen in FIG. 4, a vertically directed corner member 30 is positioned at the intersection of the interior and exterior walls. As will thus be apparent, the interior wall 10 may be assembled by initially positioning the two trackways 18 and 20 along the floor and ceiling respectively, inserting the corner member 30, and then sliding the wall panels 14 into position. The wall panels may then be secured to the trackways by suitable fastening members 31 in the illustrated side by side arrangement. It will also be apparent that the interior wall 10 may easily be disassembled for relocation or other purposes by disconnecting the fastening members 31 and then sliding the wall panels from the trackways. In addition, it will be noted that the trackways 18 and 20 present an outer appearance generally similar to that of the molding strips 25 of the exterior wall.

Each of the wall panels 14 in both the interior and exterior walls comprises first and second rectangular panel members 32 and 34 respectively which are disposed in spaced apart, parallel relationship to define a four-sided peripheral edge. More particularly, the edge includes first and second vertically directed sides 36 and 37 respectively, and third and fourth horizontally directed sides 38 and 39 respectively, note FIG. 9.

The edge of each wall panel 14 is further defined by a rectangular connecting member 42 which is interposed between the two panel members 32 and 34 and extends about the periphery of each panel member to define an enclosed chamber 44 therebetween. The connecting member 42 may be fabricated from plastic, and

as seen in FIG. 2, it includes a first tubular member 46 extending vertically along the first side 36, and a second tubular member 47 extending vertically along the second side 37. A lower horizontal leg 48 extends along the third side 38, and an upper horizontal leg 49 extends along the fourth side 39. The legs 48 and 49 may be solid, or they may include a suitable bulkhead (not shown) to prevent communication between the hollow first and second tubular members 46 and 47.

The tubular members 46 and 47, as well as the legs 48 and 49, are rectangular in cross section as best seen in FIG. 4 and define first and second flat surfaces 51 and 52, respectively, which are adapted to contact the adjacent panel members. A third flat surface 53 faces the enclosed chamber, and a fourth flat surface 54 faces opposite the third surface. The surfaces 51 and 52 are sealably adhered to the adjacent panel members, such sealed interconnection being effected by a conventional plastic solvent cement or other suitable adhesive.

As seen in FIG. 2 the first and second tubular members 46 and 47 each include a series of spaced apertures 56 and 58, respectively, which extend along the full length of the inwardly facing surfaces 53 to thereby communicate with the enclosed chamber 44. In addition, the lower end of each tubular member 46 and 47 includes a fluid port 59 and 60 communicating with the interior of the associated tubular member, and an external flexible tube 61 and 62 connected, respectively, to the ports 59 and 60. There is a like number of apertures in each of the series, and each aperture is horizontally aligned with a corresponding aperture of the other series whereby a fluid is adapted to flow across the enclosed chamber in the form of a plurality of adjacent horizontal streams.

A plurality of rotatable vanes 64 are disposed in the enclosed chamber 44, the vanes serving to fixedly support the two panel members 32 and 34 in a predetermined spaced relationship. In addition, the vanes may be rotated into various orientations during assembly of the wall panels such that the flow pattern of the fluid may be varied as hereinafter further explained. As seen in FIG. 5, the vanes 64 are secured within the enclosed chamber by means of a threaded connector which comprises a bolt 66 and sleeve 67, the bolt and sleeve each having a head 69 positioned externally of the panel members and a sealing washer 70. Thus by gripping both heads, the orientation of the vanes 64 may be changed after the assembly of the wall panel.

The panel members 32 and 34 may be fabricated from any suitable sheet material such as plastic, fiberglass, or glass. Preferably, however, at least one of the panel members is fabricated from a light transmitting material, which may be either transparent or translucent, such that the interior of the enclosed chamber 44 is visible to an observer within the room. Thus as illustrated, the panel members 32 associated with the exterior wall 12 are fabricated from a light transmitting plastic material, while the associated panel member 34 is fabricated from fiberglass. In the case of the wall panels associated with the interior wall 10, both panel members 32 and 34 are illustrated as being formed from a light transmitting plastic material.

Viewing FIGS. 4 and 7, it will be observed that the fiberglass panel members 34 associated with the exterior wall 14 include a vertical side edge portion 34' which extends beyond the periphery of the associated

outer panel member 32. This peripheral portion 34' serves to provide means for supporting the bolt 26 for connecting the wall panel to the support wall 22 in the manner described above. Also, as seen in FIGS. 7 and 8, a flexible plastic face plate 71 or the like may be positioned to extend between the two adjacent outer panel members 32 and thereby improve the appearance of the interconnection. More particularly, the face plate is adapted to snap into the receiving channels 72 forming each of the panel members 32. Thus the face plate may be easily attached during the assembly of the wall panels, and may be subsequently removed such that a corner member 30 may be substituted and an interior wall may be joined at that point. Also, a conventional light source may be suitably mounted between the panel members as shown schematically at 73 for the purposes hereinafter described.

The wall panels of the present invention further include a fluid circulation system for circulating a fluid through the enclosed chamber 44 of each wall panel to provide a decorative effect and/or a temperature controlling function. In particular, the fluid circulation system includes a fluid entry line 74 communicating with the tube 61 of each wall panel such that a fluid may be introduced into the first tubular member 46. A fluid withdrawal line 75 similarly communicates with the tube 62 of the second tubular member 47. The lines 74 and 75 are operatively connected to a heat exchanger and pump generally indicated at 76. Thus in operation, a fluid is introduced into each enclosed chamber at a plurality of spaced locations represented by the apertures 56 in the third flat face 53 of the first tubular member 46, and withdrawn from the enclosed chamber at a plurality of spaced locations represented by the apertures 58 in the second tubular member 47. The pump serves to maintain a continuous flow across each enclosed chamber, and this moving fluid is visible through the plastic panel member 32. If desired, the fluid may be colored with a suitable nonmiscible substance such that the color of the fluid is visible through the plastic panel member to further highlight the decorative effects.

The heat exchanger may comprise either a conventional heating or cooling means. In the case of cooling means, the heat exchanger may take the form of a plurality of coils positioned deep within the ground such that the ground temperature serves to dissipate the heat of the fluid passing therethrough. Also in the case of cooling means, it will be understood that a suitable air dehumidifier may be employed with the present invention to remove the moisture from within the room and thereby prevent condensation on the cool panel members.

As indicated schematically in FIGS. 7 and 8, the light source 73 may extend along the length of the vertical side edges of alternate wall panels to provide illumination for the fluid passing through the chamber 44. In addition, a portion of the surface of the outer panel member may be frosted as indicated at 78, and the light entering through the peripheral edge of the panel members will be diffused through the frosted area 78 to produce a visually attractive lighting effect.

In the drawings and specification, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation.

That which is claimed is:

1. A decorative wall panel suitable for use in connection with an interior or exterior wall in a home or the like, said wall panel comprising

first and second rectangular panel members disposed in spaced apart, parallel relationship and defining a four sided peripheral edge with first and second sides extending parallel to each other in a vertical direction and third and fourth sides extending parallel to each other in a horizontal direction, at least one of said first and second panel members comprising a light transmitting material,

means for sealably interconnecting said first and second panel members about said peripheral edge to define an enclosed open chamber therebetween,

means for introducing a fluid into said enclosed chamber at a plurality of locations extending along substantially the full length of said first side of said peripheral edge,

means for withdrawing the fluid from said enclosed chamber at a plurality of locations extending along substantially the full length of said second side of said peripheral edge,

and

means for circulating a fluid through said introducing means and said withdrawing means and across said enclosed chamber, whereby the fluid may be caused to flow across said enclosed chamber and with the flowing fluid being visible through said light transmitting panel member.

2. The decorative wall panel as defined in claim 1 wherein said means for sealably interconnecting said first and second panel members comprises a first tubular member extending along said first side of said peripheral edge and a second tubular member extending along said second side of said peripheral edge.

3. The decorative wall panel as defined in claim 2 wherein said first and second tubular members are rectangular in cross-section to provide a flat face on each side thereof, said flat faces of each tubular member adheringly contacting the associated panel members.

4. The decorative wall panel as defined in claim 2 wherein said means for introducing a fluid into said enclosed chamber comprises a first series of spaced apertures in said first tubular member and communicating with said enclosed chamber, and said means for withdrawing the fluid from said enclosed chamber comprises a second series of spaced apertures in said second tubular member and communicating with said enclosed chamber.

5. The decorative wall panel as defined in claim 4 wherein each aperture of said first series is horizontally aligned with a corresponding aperture of said second series whereby the fluid is adapted to flow across said enclosed chamber in the form of a plurality of adjacent horizontal streams.

6. The decorative wall panel as defined in claim 5 further including joining means extending transversely through said enclosed chamber for fixedly supporting said panel members in a predetermined spaced relationship.

7. The decorative wall panel as defined in claim 6 wherein said joining means includes a plurality of rotatable vanes disposed in said enclosed chamber for controlling the flow pattern of the fluid flowing thereacross.

8. The decorative wall panel as defined in claim 1 wherein said fluid is colored such that the color of the fluid is visible through said light transmitting panel member.

9. A wall structure suitable for use in a home or the like and having provision for controlling the temperature in the interior of the home, said wall structure comprising

first and second rectangular panel members disposed in spaced apart, parallel relationship and defining a four sided peripheral edge with first and second sides extending parallel to each other in a vertical direction and third and fourth sides extending parallel to each other in a horizontal direction, at least one of said first and second panels comprising a light transmitting material,

means for sealably interconnecting said first and second panel members about said peripheral edge to define an enclosed open chamber therebetween

means for introducing a fluid into said enclosed chamber at a plurality of locations extending along substantially the full length of said first side of said peripheral edge,

means for withdrawing the fluid from said enclosed chamber at a plurality of locations extending along substantially the full length of said second side of said peripheral edge, and

means for circulating a colored fluid through said introducing means and said withdrawing means and across said enclosed chamber, said circulating means including heat exchange means for controlling the temperature of the circulating fluid whereby the flowing fluid is visible through said light transmitting panel and the temperature of the wall panels and thus the temperature of the interior of the home may be controlled.

10. The wall structure as defined in claim 9 further including means positioned along said third and fourth sides for mounting said panel members between a supporting floor and overlying ceiling such that said panel members are adapted to form an interior wall.

11. The wall structure as defined in claim 9 further including a weatherproof exterior support wall positioned in spaced apart parallel relationship to said panel members, and an insulating material substantially filling the area between said support wall and adjacent panel members whereby said wall structure is adapted to form an exterior wall of a home or the like.

12. The wall structure as defined in claim 9 wherein said means for sealably interconnecting said first and second panel members comprises a first tubular member extending along said first side and a second tubular member extending along said second side, and said means for introducing a fluid into said enclosed chamber comprising a first series of spaced apertures in said first tubular member and communicating with said enclosed chamber, and said means for withdrawing the fluid from said enclosed chamber comprises a second series of spaced apertures in said second tubular member and communicating with said enclosed chamber.

13. The decorative wall structure as defined in claim 9 wherein a portion of said light transmitting material of said one of said wall panels is frosted, and wherein said wall structure further comprises means for directing a beam of light onto each of said frosted portions to cause the light to be emitted therefrom.

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