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3,413,765

EXPANDABLE WALL PANEL AND METHOD FOR MAKING SAME

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2 Sheets-Sheet 1

Fig. 1.

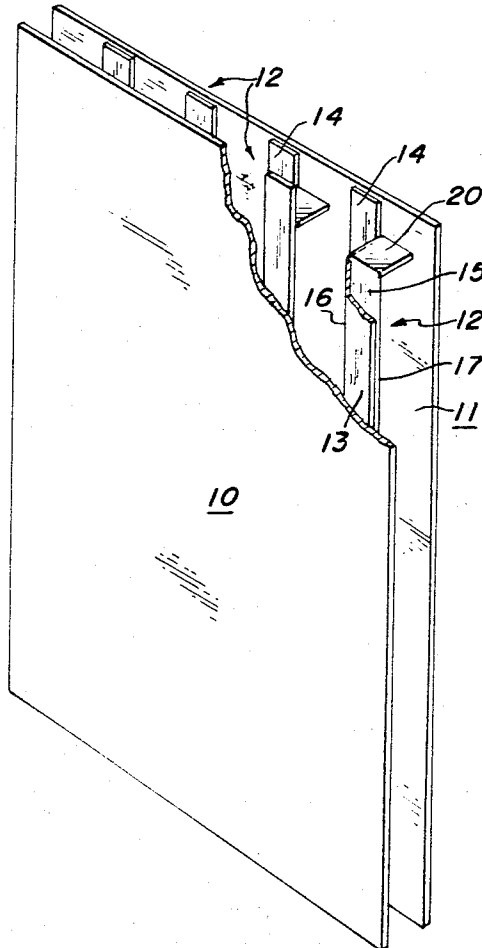
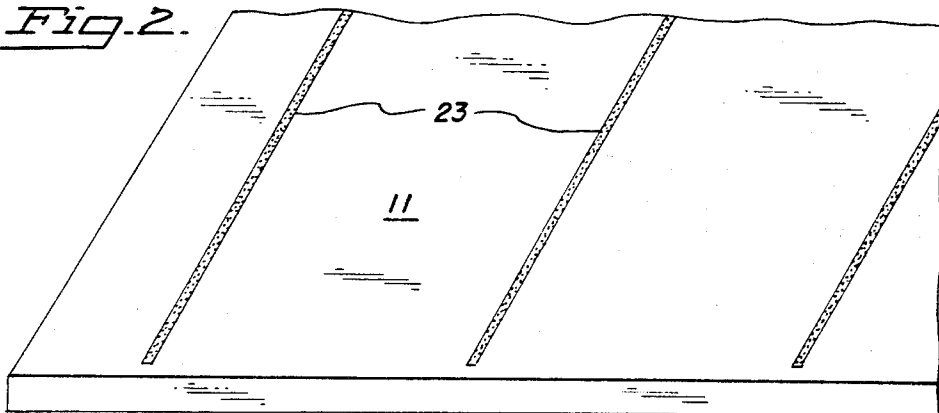


Fig. 2.



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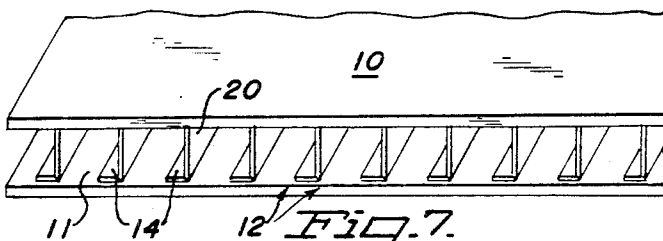
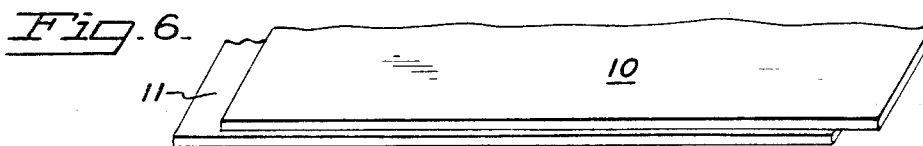
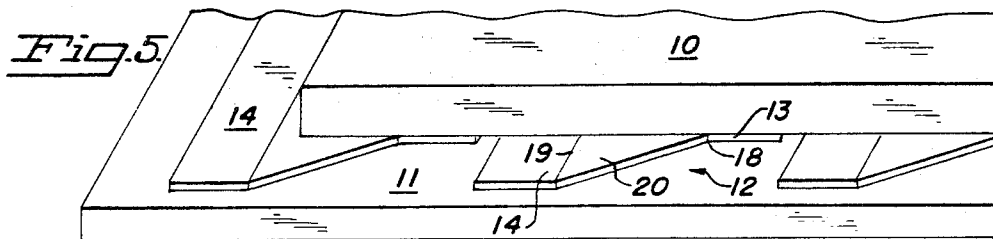
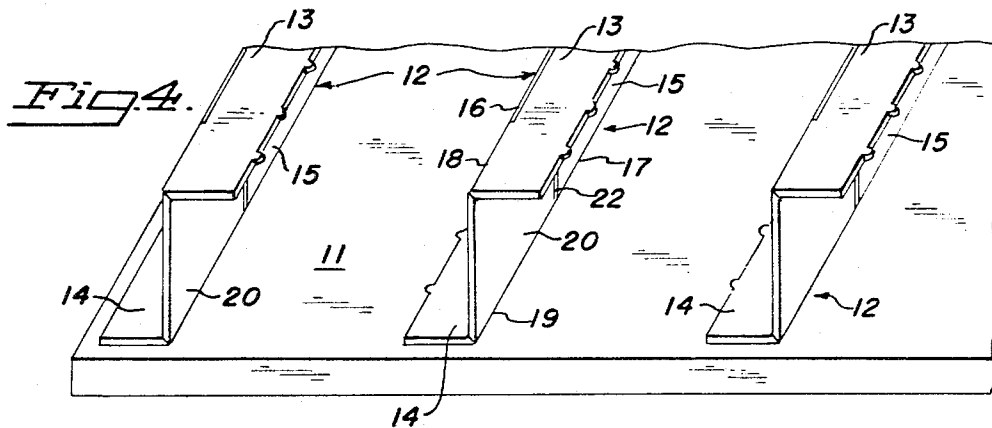
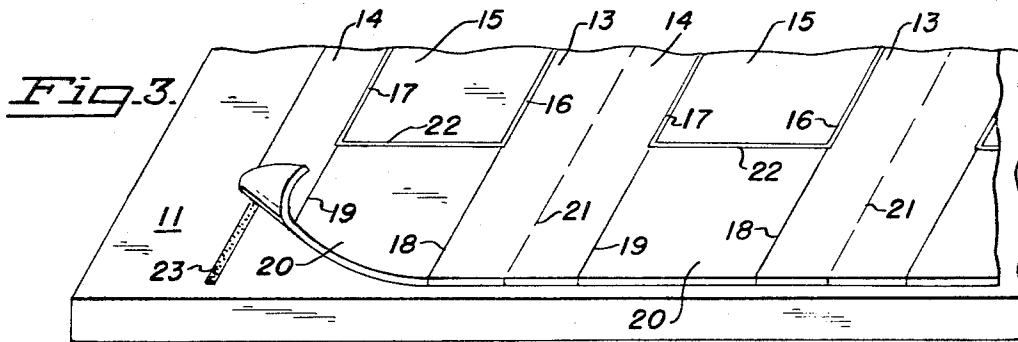
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EXPANDABLE WALL PANEL AND METHOD FOR MAKING SAME

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EXPANDABLE WALL PANEL AND METHOD FOR MAKING SAME

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ABSTRACT OF THE DISCLOSURE

An expandable wall panel is formed by securing a sheet of material between two superimposed panels. The sheet is suitably constructed and arranged so that when the two panels are moved apart at least one spacing web or rib is positioned substantially perpendicularly therebetween.

Background of the invention

Conventional wall structures oftentimes comprise a plurality of abutting panel members, nailed or otherwise secured to opposite sides of a wooden framework. In order to expedite wall installation and to reduce the overall cost thereof, attempts have been made to fabricate wall sections or panels to substantial completion prior to when they are shipped to a particular job. In general, a number of such "ready-made" wall sections have not been accepted by the building industry since they are quite expensive, difficult to fabricate and assemble and/or do not afford the desired structural integrity when they are integrated together to form a completed wall structure.

Summary of the invention

The expandable wall panel of this invention comprises first and second substantially parallel panels having at least one web or rib arrangement secured therebetween. The rib arrangement preferably comprises a first flange or flap, secured to the first panel, a second flange or flap secured to the second panel and an intermediate web or rib hingedly connected to the first and second flaps. A tab may be formed in the rib arrangement and arranged to be moved out of the plane thereof and positioned perpendicularly relative to the panels to space them apart positively. When the wall panel is collapsed, a free edge of the first flap of one of the rib arrangements is preferably arranged to coincide with an adjacent and parallel free edge of the second flap of the other rib arrangement. In certain applications, such adjacent free edges may be spaced apart at a predetermined distance from each other.

The method of this invention essentially comprises the securing of a flat strip or sheet of material between opposed panels, the sheet having at least one rib arrangement formed thereon. Upon expansion of the panels, a rib member is moved substantially perpendicularly therebetween. In the preferred embodiment, at least two interconnected and severable rib arrangements are formed on the sheet.

Brief description of the drawings

FIG. 1 is an isometric view illustrating the preferred expandable wall panel embodiment of this invention, adapted to be integrated into a completed wall construction;

FIGS. 2-7 illustrate a series of steps preferably employed to fabricate the expandable wall panel embodiment illustrated in FIG. 1.

Description of the preferred embodiment

Referring to FIG. 1, the preferred expandable wall panel embodiment comprises flat first and second substan-

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tially parallel panels 10 and 11. A plurality of rib or web arrangements 12 are arranged therebetween to attach the panels together. Each rib arrangement comprises a first flange or flap 13 secured to the first panel, a second flange or flap 14 secured to the second panel and a rib or web 15 hingedly connected to the first and second flaps at parallel scorelines 16 and 17, respectively. Panels 10 and 11 may comprise a suitable wallboard material, such as gypsum, plywood, metal, particle board, asphalt impregnated paperboard or a suitable combination of two or more of such materials. The strip or sheet forming a rib arrangement can comprise a stiff paperboard, plastic or like material which will exhibit the desired physical properties.

Cut means, preferably comprising first and second cuts 18 and 19 (FIG. 3), are formed in the rib arrangement, preferably coextensively with respect to scorelines 16 and 17, to define a tab 20 therein. The tab is preferably arranged to terminate at a free edge of the sheet and is further arranged to be moved out of the plane of rib 15 to be positioned substantially perpendicularly relative to the panels. Thus, the tab will function to positively space and position the panels at a predetermined distance from each other when the wall panel is expanded as shown in FIG. 1. It should be understood that more than one tab may be formed in rib 15 for certain applications. For example, a tab may be formed at each end of each rib arrangement. Also, one or more tabs could be formed intermediate the ends of a particular rib arrangement. In addition, the tab could be bent at an angle relative to rib 15 different than the right angle relationship illustrated in FIG. 1.

Although the above described rib arrangement is preferably disposed vertically between the panels upon installation, it should be understood that such rib arrangement could be disposed horizontally or at any other desired disposition therebetween. In particular, the disposition of the rib arrangement relative to the long or major axes of the panels can be varied to meet various shipping, erection, structural stability and/or manufacturing requirements.

As will be hereinafter more fully understood, the preferred method for fabricating the FIG. 1 expandable wall panel assures that the panel may be fully collapsed (FIG. 6) for storage and shipping purposes. In this connection, it should be noted that two adjacent rib arrangements are preferably constructed and arranged so that when panels 10 and 11 are collapsed into superimposed relationship a free edge of first flap 13 of one of the rib arrangements will substantially coincide with the free and adjacent edge of the second flap 14 of the other rib arrangement. Thus, no "bunching" of the rib arrangements will occur between the panels, i.e., the rib arrangements will substantially lie in the same plane when the panel is collapsed. The first flap 13 is preferably arranged to extend from rib 15 in a direction opposite to the direction in which second flap 14 extends from such rib. It should be further understood that in certain building applications the above-mentioned adjacent free edges of flaps 13 and 14 may be spaced apart at a predetermined distance.

The following method is preferably employed to fabricate the above-described expandable wall panel. The first step in such method comprises forming the above described cuts and scores in a sheet of material to define a plurality of rib arrangements 12. As above described, each rib arrangement comprises first flap 13, rib 15 and second flap 14 connected together in series. Each sheet has a breakable tear line means 21 releasably connecting the first flap of one arrangement to the second flap of an adjacent rib arrangement. In addition, a scoreline 22 may be formed on rib 15 to define tab 20 along with cut lines

18 and 19 and to facilitate bending of such tab upon panel installation. The multi-ribbed sheet may be formed from a suitably arranged roll stock, for example. Alternatively, each rib arrangement may be precut and fed individually between the panels, i.e., breakable scoreline 21 would be eliminated in such an application.

The next preferred step is one of applying parallel strips of adhesive 23 (FIG. 2) to inner surface portions of panel 10. In the embodiment illustrated, the spacing of the adhesive strips is determined primarily by the distance between adjacent second rib members 14 (FIG. 3). It should be understood that such spacing is not a fixed dimension, i.e., such dimension will change in accordance with changes in the width of rib member 15, the size of the glue flaps (the widths of rib members 13 and 14) and the number of rib members utilized for a given panel width. The adhesive may be applied to panel 10 by extrusion, transfer rolls, or a suitable spray means. It should be understood that heat sealing or hot melt adhesive techniques could be utilized alternatively. The partially completed panel may be then introduced into a suitably arranged conveyor system in order to complete the fabrication thereof. A continuously driven conveyor or a stop-and-go arrangement cycled to achieve the required fabrication steps may be utilized.

Referring again to FIG. 3, the next preferred step comprises superimposing the sheet on panel 11 and positioning each one of the second flaps over a respective one of the adhesive strips. The free edge of the sheet may be set back a slight distance from the adjacent and parallel free edge of panel 11, as illustrated, or arranged to coincide therewith. Such set-back facilitates reception of floor and/or ceiling runners therein upon wall installation. Pressure rollers or like means may be then provided for compressing and securing the second flaps and panel 11 together.

The next steps preferably comprise severing tear lines 21, breaking scoreline 17 and bending ribs 15 so that they are maintained substantially perpendicularly relative to panel 11 and second flaps 14 (FIG. 4). Suitably arranged ploughs or the like may be employed to carry forth the latter steps and to also break scorelines 16 and/or 22 if so desired. The next step preferably comprises returning the rib arrangements to a flattened position by means of suitably arranged rollers or the like. Thereafter, means may be provided for applying adhesive strips to inner surface portions of panel 10 and spacing the strips thereon substantially as shown in FIG. 2. Panel 10 is then superimposed over panel 11 and each adhesive strip is secured to a respective first flap 13.

It should be noted in FIG. 5 that the leftwardly positioned free edge of panel 10 is preferably offset a predetermined distance from an adjacent free edge of panel 11. Thus when the panel construction is expanded to its FIG. 7 condition such parallel edges will substantially lie in a vertical plane arranged parallel relative to ribs 15. Otherwise stated, such free edge of panel 10 is arranged at a distance from scoreline 16 which substantially equals the distance which lies between the free edge of panel 11 and scoreline 17. In certain applications, such as that illustrated in FIG. 5, it may prove preferable to extend panel 11 at a slightly greater distance to facilitate formation of overlapping joints between adjacent wall panels.

The above described method may be varied somewhat to meet certain structural requirements. As above suggested, such alternative comprises precutting and superimposing each rib arrangement between panels 10 and 11 individually. The adjacent free edges of flaps 13 and 14 may be spaced apart a predetermined distance from each other or may be arranged to substantially about each other. Also, additional strips of adhesive 23 may be applied to the respective panels in certain applications.

FIG. 6 illustrates a completed expandable wall panel in its collapsed condition. The finished wall panels may be stacked for final drying of the adhesive and/or may be

run through suitably arranged pressure rollers to ensure positive securance of the flaps to their respective panels. The finished panels are then stored and shipped to a particular job site and thereafter expanded to their FIG. 1 condition for final wall installation purposes. Tabs 20 may be knocked down into position to assure positive panel separation.

Referring again to FIG. 3, it should be noted that an alternative method for applying panel 10 to the integrated panel construction may be employed. Either before or after tear lines 21 have been severed, panel 10 may be secured thereto. Thereafter, vacuum plates or the like may be applied to outside surface portions of panels 10 and 11 and moved away from each other to place them in spaced relationship. Such an alternative method step may be further used to move ribs 15 180° about their respective hinge or scorelines 17 to "loosen" the structure for later installation. In addition, such an alternative fabrication step will double check the quality of the glue joints and also break loose any glue that may have been lodged inadvertently between respective panel portions and portions of the rib arrangements.

In actual building applications, the above described inventions have been found to substantially reduce the total cost of installing completed walls over conventional structures and methods. Wall panels constructed and arranged as above described have been found capable of withstanding a load of up to 1,500 pounds.

As suggested above, the wall panels of this invention can be collapsed for shipping and storage purposes and expanded on a job site for wall construction purposes. It has been found that such wall panels can be installed substantially faster than conventional ones. In addition, the wall panels of this invention eliminate the need for studding generally required for conventional double-wall constructions. Also the number of fastening means required is reduced to approximately one-third of those normally required.

What is claimed is:

1. A collapsed building wall panel adapted to be expanded to form a substantially hollow wall structure and further adapted to be coupled together with a series of like structures to form an integrated building wall construction comprising flat first and second panels solely connected together by a flattened sheet of material normally arranged in parallel relationship between said panels so that the marginal edges of each of said panels is unconnected from the other of said panels and the thickness of said collapsed building wall panel constitutes the composite thicknesses of said first and second panels and said sheet, said sheet constructed and arranged to define at least two rib arrangements thereon connected together by a tear line extending substantially the full length of said sheet, said rib arrangements each comprising a rib free from direct securance to said first and second panels and first and second flaps connected thereto by first and second substantially parallel scorelines, respectively, said first and second flaps secured to said first and second panels, respectively, said tear line releasably connecting a first flap of one of said rib arrangements to a second flap of the other rib arrangement whereby said tear line is severed upon expansion of said collapsed building wall panel to separate said rib arrangements from each other to form a hollow wall structure.

2. The invention of claim 1 wherein said first flap is arranged to extend from said rib in a direction opposite the direction in which said second flap extends from said rib.

3. The invention of claim 1 further comprising cut means formed in at least one of said ribs defining a tab therein, said tab adapted to be arranged substantially perpendicularly between said first flap and said second panel when said collapsed building wall panel is expanded.

4. The invention of claim 3 wherein said cut means comprises first and second cuts arranged coextensively

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with respect to said first and second parallel scorelines, respectively.

5. The invention of claim 4 wherein said first and second cuts are further arranged to terminate at a free edge of said sheet.

6. The invention of claim 1 wherein said tear line means is released to separate said first flap of one of said rib arrangements from said second flap of the other rib arrangement and said first and second panels are arranged in spaced apart relationship with each to each other with said ribs arranged substantially perpendicularly therebetween.

7. The invention of claim 1 wherein free parallel edges of the marginal edges of said first and second panels are arranged in substantial parallel relationship with respect to said parallel scorelines and in a plane arranged substantially parallel to said ribs.

8. The invention of claim 1 wherein said wall panels have major axes longer than minor axes arranged perpendicular thereto and said rib arrangements are disposed in parallel relationship with respect to said major axes.

9. The invention of claim 1 wherein said wall panels have major axes longer than minor axes arranged perpendicular thereto and said rib arrangements are disposed in parallel relationship with respect to said minor axes.

10. A method for fabricating an expandable building wall panel adapted to be coupled together with a series of like panels to form an integrated building wall construction comprising the steps of

forming parallel cuts and scores on a sheet of material to define at least two adjacent rib arrangements, each rib arrangement comprising a first flap, a rib and a second flap connected together in series, the first flap of one arrangement connected directly to the second flap of the second arrangement at a breakable tear line;

securing one side of each of said first flaps to a first panel having free marginal edges, and

securing the other side of each of said second flaps to

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a second panel having free marginal edges while leaving said rib free from securance to said first and second panels to connect said first and second panels together solely by securance thereof to said first and second flaps, respectively, whereby a substantially hollow wall panel may be formed when said first and second panels are moved away from each other to break said tear line and to position said rib substantially perpendicularly therebetween.

11. The invention of claim 10 wherein said one side of the second flaps are secured to said first panel by applying parallel strips of adhesive to said first panel, positioning each one of said second flaps over a respective one of said adhesive strips, and compressing said second flaps and first panel together.

12. The invention of claim 10 further comprising the step of positioning said second panel on said sheet so that when said first and second panels are moved away from each other to position said rib substantially perpendicularly therebetween, free edges of said first and second panels, arranged adjacent and parallel to said rib, are positioned to substantially lie in the same plane disposed perpendicularly relative to said panels.

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