United States Patent [19]

Barbera

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[54] **BUILDING WALL CONSTRUCTION**

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[52] **U.S. Cl.** **52/426,** 52/381, 52/562, 52/713

[51] **Int. Cl.** **E04b 2/28,** E04b 2/30, E04b 2/40

[58] **Field of Search** 52/381, 382, 425, 426, 52/562–564, 713

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Primary Examiner—Henry C. Sutherland

[57] **ABSTRACT**

A building wall construction that includes a plurality of pairs of opposed panel elements mounted on opposed surfaces of a supporting structure. Connecting members are pivotally mounted on opposed panel elements that interengage upon pivoted movement toward each other, and wherein the interengaged connecting members are in gripping relation to surface portions of the supporting structure.

8 Claims, 6 Drawing Figures

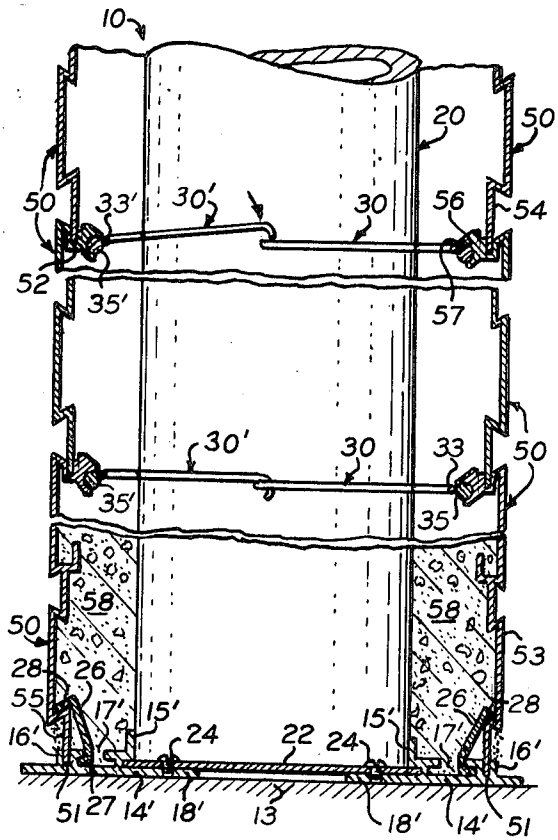


FIG. 1.

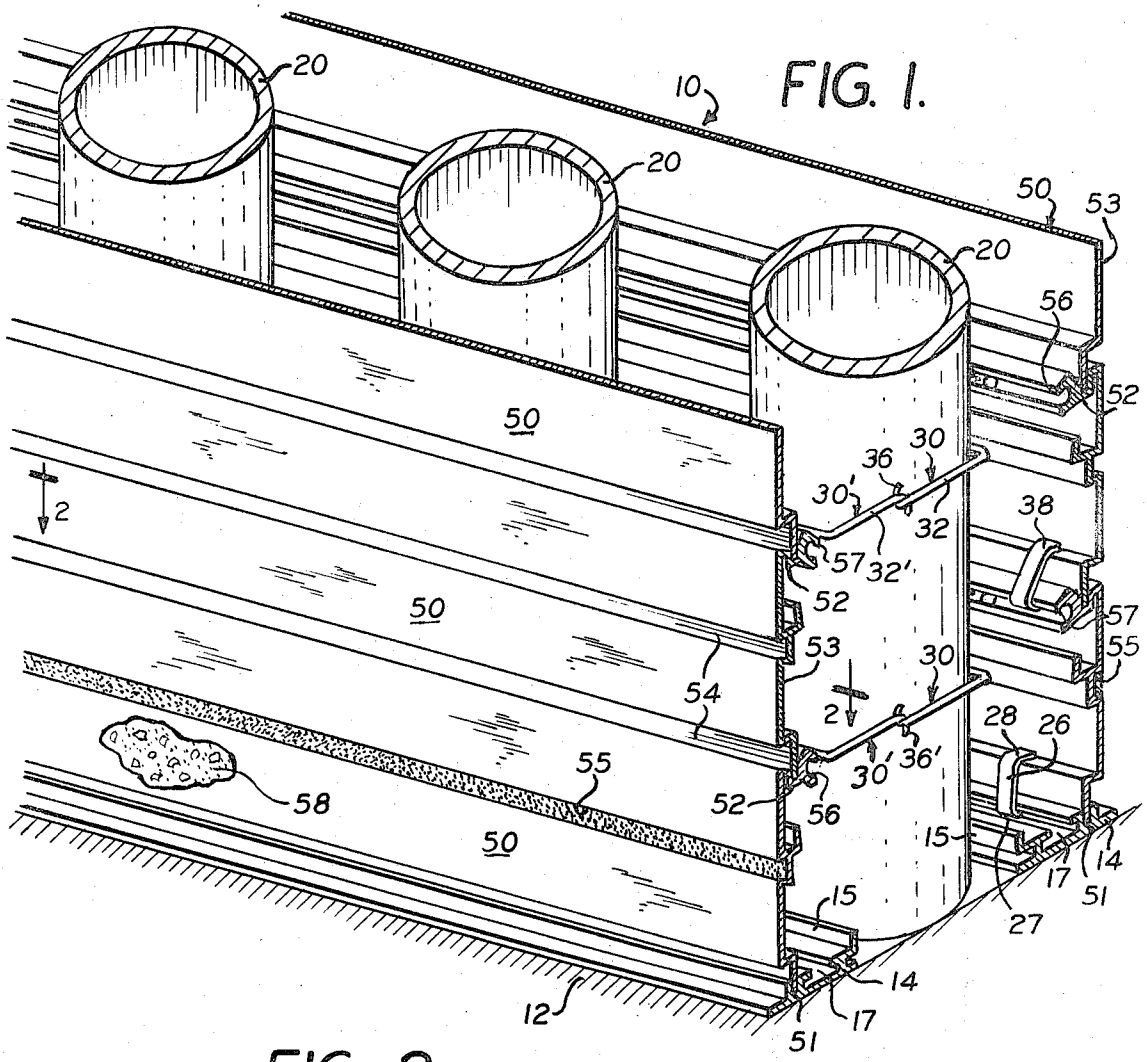

10
20
50
53
56
52
30
36
30'
32
38
57
32'
55
54
58
12
51
17
14
15
27
28
26

FIG. 2.

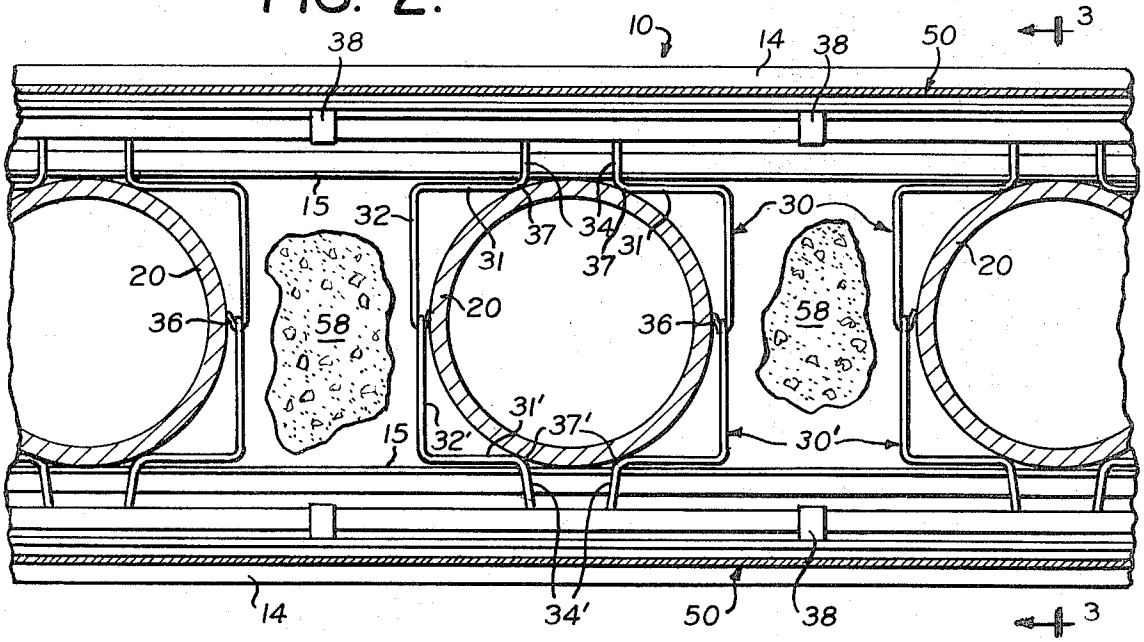

10
38
14
50
3
15
32
37
34
31
30
20
36
58
30'
32'
37'
34'

FIG. 3.

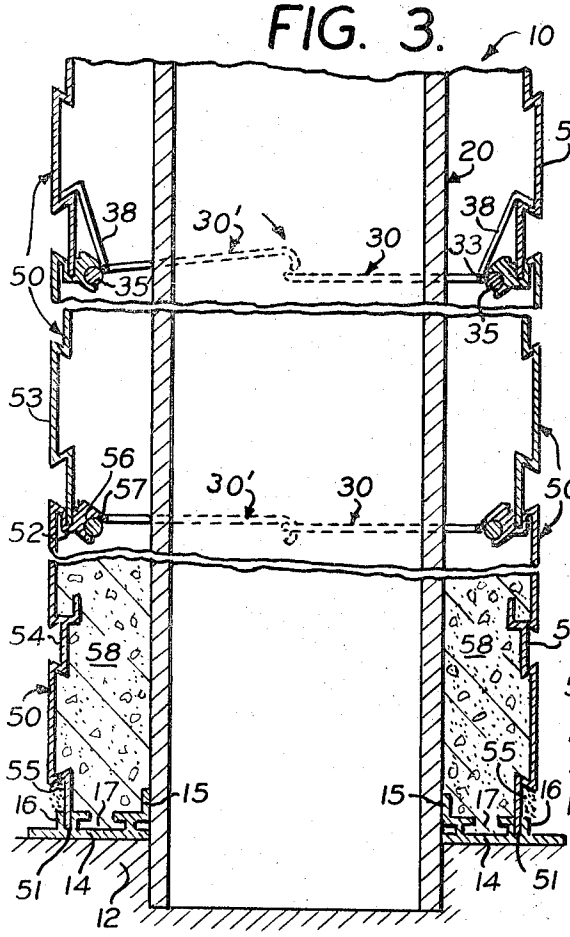


FIG. 6.

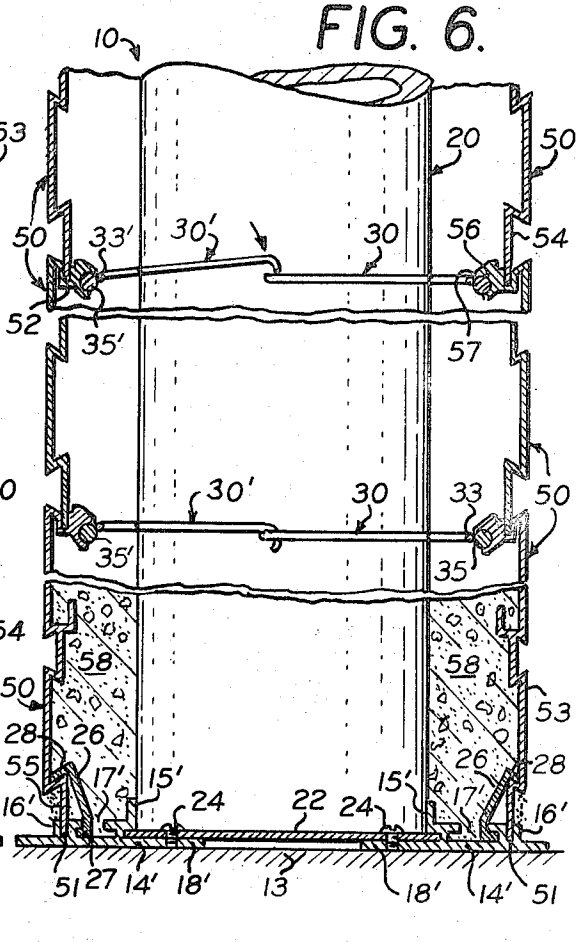


FIG. 4.

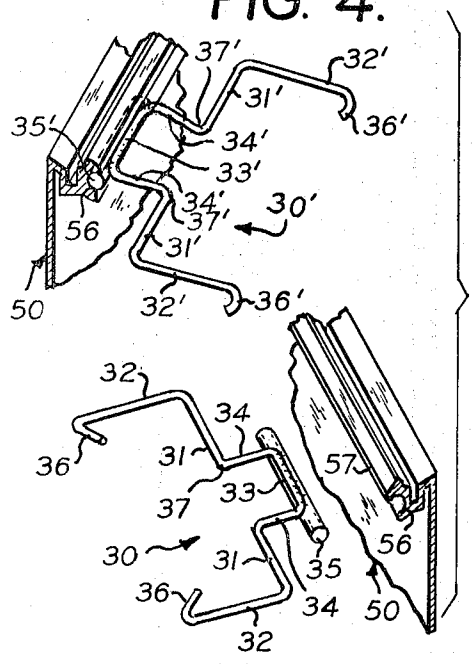
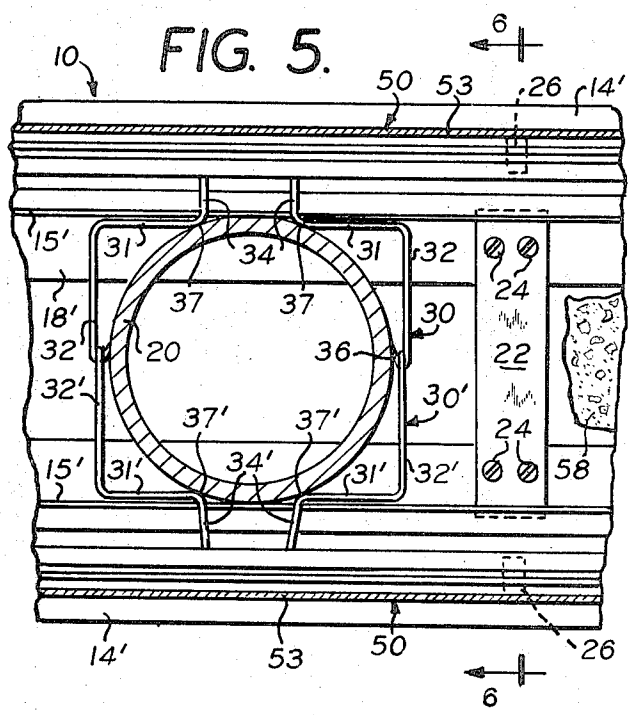


FIG. 5.



BUILDING WALL CONSTRUCTION

This invention relates, generally, to a building wall construction, and more particularly, to a plurality of panel elements assembled to form a wall construction.

DESCRIPTION OF THE PRIOR ART

Heretofore, building wall panels have been proposed which included a plurality of panel elements mounted on a supporting structure which, in turn, were mounted or affixed to a base or wall surface. It has further been proposed to assemble building wall blocks which included spaced panels interconnected by some type of spacing structure. The assembly of such conventional wall panels and blocks has not proven satisfactory in view of the multiple manual assembly operations involved; such as screwing, clamping and the like, which require a fair degree of skill. Additional problems have arisen with respect to conventional building wall structures in the manner by which they are made and interconnected. For example, with respect to a wall structure constructed of spaced panel elements, it is customary to have the spacing structure inserted directly into the respective panels. This has not provided a practical and operative interconnecting arrangement and has resulted in making the conventional building panels and blocks heavy, complicated and expensive to manufacture.

The above and other disadvantages known in the aforesaid conventional building wall structures prompted the applicant to invent and develop improved structures such as those referred to in his U.S. Letters Patents No. 3,405,495; No. 3,611,664 and copending application for U.S. Letters Patent, Ser. No. 168,202, now U.S. Pat. No. 3,772,842.

The aforesaid U.S. Pat. No. 3,405,495 is directed generally to a construction that includes a plurality of pairs of spaced panel members arranged in vertically staggered and longitudinally end abutting relation. Each panel member is provided with a connector member extending along and secured to a longitudinal edge thereof. The connector members cooperate in association with spacing members to support pairs of panel members in spaced apart relation.

The aforesaid U.S. Pat. No. 3,611,664 is directed generally to a spaced wall construction formed of a plurality of panel elements mounted on a supporting structure. Each panel cooperates with an elongated mounting member having a cross section defining first, second and third groove portions. Two of said grooves are substantially aligned and oppositely extending with respect to each other for receiving the tongue-like portions of the panel elements located immediately above and below said elongated mounting member. The third groove portion is laterally related to one of the other groove portions and cooperates with a clamping structure provided on a support member, which in turn, affixes said panels to a plurality of such spaced support members.

The aforesaid Patent Application Serial No. 168,202, which is now Patent No. 3,772,842, is similarly directed generally to a spaced wall construction formed of a plurality of panel elements mounted on opposed surfaces of slotted support members. The support members are arranged in longitudinally spaced relation and include a plurality of pairs of opposed slotted openings in vertically spaced relation along opposed surface wall portions thereof. The spaced openings of the support members, at any given level, are in substantially longitudinally aligned relation to each other. A plurality of pairs of elongated mounting members are arranged in opposed and vertically spaced relation and extend transversely of the support members, whereby the opposed inner edge portions of each pair of said opposed mounting members are respectively received within the corresponding pairs of opposed slotted openings in the support members. The mounting members, in turn, cooperate the panel elements to form the building wall structure.

Other building structures which utilize a plurality of longitudinally spaced support members, to which are mounted spaced panel or facing elements, are noted in U.S. Pat. No. 3,238,684. More specifically, this patent is directed to a reinforced concrete structure which includes a plurality of such supporting or reinforcement members, and panel or facing members erected on both sides of the reinforcement and secured thereto by suitable anchoring members.

While the inventions of each of the above patents have contributed to the state of the art, they, nonetheless, did not fully satisfy applicant's desire to provide a building structure capable of assembly without requiring the services of highly skilled personnel. The present invention, thus, generally provides for improved means for mounting a plurality of pairs of opposed panel elements on a supporting structure, in spaced apart relation, as will be explained in further detail subsequently herein.

SUMMARY OF THE INVENTION

The building wall construction of the present invention includes plurality of pairs of panel elements mounted on opposed surfaces of a supporting structure, in spaced apart relation, to form a spaced wall construction. More specifically, the supporting structure includes a plurality of support members arranged in longitudinally spaced relation. The mounting structure for mounting the panel elements to the support members include a plurality of pairs of connecting members pivotally mounted and slideably disposed on inner surface portions of associated panel elements. The arrangement is such that each pair of the pairs of connecting members have portions for interengagement upon pivoted movement toward each other, and wherein the interengaged connecting members are in gripping relation to surface portions of associated support members to locate and mount the panel elements in spaced apart relation.

Accordingly, an object of the present invention is to construct a building wall structure that will provide a sturdy and competitive article of manufacture.

Another object and feature of the invention is to provide a building wall construction wherein a pair of novel panel elements are kept accurately spaced and firmly supported.

A further object and feature of the invention is to provide a building wall construction wherein the individual components are economical to manufacture and easy to assemble, without requiring the services of highly skilled personnel.

The above brief description, as well as further objects, features and advantages of the present invention,

will be more fully appreciated by reference to the following detailed description thereof, when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary perspective view, partly in section, illustrating a plurality of panel elements and their associated mounting means and supporting means forming a portion of a building wall construction in accordance with the present invention;

FIG. 2 is a sectional view taken through a line 2—2 of FIG. 1;

FIG. 3 is a sectional view taken through line 3—3 of FIG. 2;

FIG. 4 is a perspective view illustrating a pair of the mounting means of the novel building wall construction;

FIG. 5 is a view similar to that of FIG. 2 and illustrating another embodiment of the invention; and

FIG. 6 is a sectional view taken through line 6—6 of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, and more particularly to FIGS. 1, 3 and 6, numeral 10 represents a novel building wall assembly constructed in accordance with the present invention. Assembly 10 includes a plurality of support members 20 arranged in longitudinally spaced relation and a plurality of pairs of connecting members 30, 30' pivotally mounted and slideably disposed on inner surface portions of associated panel elements 50 for mounting said panel elements to support members 20 in spaced apart relation.

More specifically, support members 20 are preferably tubular and made of stiff paper or cardboard having 6 inch diameters and are spaced at 8 inch centers; however these dimensions are purely illustrative and are not to be deemed as limitations. Furthermore, the tubular support members may be constructed of other materials; such as metal, plastic or the like. In addition, the reference to the term tubular is not confined to members having a cylindrical shape, but is deemed to mean any structure, whether it be hollow, solid or cellular, and whether it be oval, square or polygonal in section.

The support member may be fixedly retained in a cement foundation 12 and arranged in upstanding relation thereto as illustrated in FIGS. 1 and 3. Alternatively, support members 20 may be secured or affixed to a support surface 13 as illustrated in the embodiment of FIG. 6. Referring to FIGS. 1, 2 and 3, there is disposed on opposite sides of support member 20 a pair of longitudinally extending base members 14 each including an upstanding flange portion 15 extending longitudinally and adapted to bear against an outer surface portion of the associated support members. Base members 14 further include a longitudinally extending groove portion 16 that opens upwardly to receive a longitudinal edge 51 of a panel element 50. Extending between flange portion 15 and groove portion 16 is a channel portion 17 which may be of use in association with a clip member to initially support the lowermost panel element 50 to base members 14. The use of such a clip is noted more fully in connection with the embodiments of FIGS. 5 and 6; however, it also appears in FIG. 1 for illustrative purposes.

Referring now to FIGS. 5 and 6, the embodiment therein similarly includes a pair of base members 14' comparable in construction to base member 14. Accordingly, base members 14' each include the similar upstanding flange portion 15'; the upwardly opening groove portion 16' and the channel portion 17' located therebetween. Base members 14' further include extended base portions 18' extending longitudinally and interconnected to one another by a plurality of spaced bracing members 22 disposed in overlying relation to said extended base portions 18' and affixed thereto by screw means 24. In this embodiment, support members 20 rest on the top surface of extended base portions 18' and between the respective flange portions 15', in an upstanding relation thereto. Suitable means, not shown, may be employed to maintain the spaced base members 14 and/or 14' in a secured, fixed position.

In order to initially support the lowermost panels 50 in an upright position after the respective longitudinally extending edges 51 thereof are received in groove portions 16', it may be of assistance to use a spring clip member 26 in association with each said lowermost panel 50, wherein one end 27 of said clip 26 is received within channel portion 17' and the other end 28 engages with a lower inner portion of the associated panel. It is to be noted, however, that the use of such clips is optional. In this connection, after the lowermost panels 50 have been connected to support members 20 by means of connecting members 30, 30' in the manner hereinafter described, the clip members 26 may be removed from the structure prior to the continued assembly thereof.

Referring now to the panel elements 50 themselves, each such panel is preferably rectangular in shape and is finished, embossed, raised or provided with other finished designs. The panels may be formed of aluminum, steel, plastic or other materials having dimensions of 4 feet in length and 2 feet in width. However, these dimensions and construction materials are purely illustrative and are not to be interpreted as being limitations on the present invention.

The opposite longitudinally extending edge portions of each panel 50 serve to secure and interconnect adjacent like panel elements together. In this connection, one edge portion 51 functions as a tongue-like element while the other edge portion 52 defines a complementary groove into which is received the tongue-like edge portion of the next adjacent panel element. The opposed side edge portions are disposed to abut against the corresponding side edge portions of adjacent panel elements. Alternatively, the opposed side edge portions may be joined together by suitable ribbing or other connector members (not shown). Located between the opposite panel edges 51, 52 is one or more dovetail portions 53 which not only attributes an attractive design to the panels but also serves to provide clip engaging edges as required. For example, referring once again to FIG. 6, clip end 28 is shown as engaging a lower edge of dovetail portion 53 to initially maintain the lowermost panels of the structure in an upright position prior to the interengagement of connecting members 30, 30'. If desired, the recesses 54 between dovetail portions 53 may be filled with an exposed mortar simulating coating or composition 55 having an outer surface which is substantially co-level with the outer surface of the panel to thus provide an overall appearance closely simulating an actual brick assembly.

The top edge portion **52** of each panel further defines a second grooved portion **56** located on an inner surface and extending longitudinally thereof. Grooved portion **56** is adapted to receive a portion of the associated connecting members **30, 30'** so as to permit said connecting members to be pivotally mounted with respect thereto.

Referring now, more specifically, to the manner of engaging panel elements **50** with the support members **20,** attention is directed to the connecting members **30, 30'** illustrated in the drawings. Connecting member **30** is defined as a U-shaped wire member having a base portion **31** and opposed arm portions **32** resiliently biased toward each other. Base portion **31** includes a second off-set U-shaped wire portion similarly having a base portion **33** and opposed arm portion **34** resiliently biased toward each other. Associated with base portion **33,** is an elongated pin **35** having a shape complementary to that of grooved portion **56.** Pin **35** may be a separate component soldered or otherwise secured to base portion **33,** or alternatively, may be formed integral therewith. The arrangement is such that connecting member **30** may be pivotally mounted on an inner surface portion of panel **50** by slideably disposing pin **35** within grooved portion **56** for adjustably aligning the opposed arm portions **32** along said panel and with respect to a selected support member **20.** The terminal ends of opposed arm portions **32,** include hook portions **36** disposed inwardly toward each other to grip surface portions of the support member upon pivoted movement of said connecting member as hereinafter described.

Connecting member **30'** is essentially similar in construction to connecting member **30** and thus, includes main base portion **31'** and opposed arm portion **32'**; and the secondary base portion **33'** and opposed arm portions **34'**. Base portion **33'** includes pin **35'** which is slideably disposed within grooved portion **56** of the associated panel **50** and thus serves to pivotally mount connecting member **30'** on an inner surface portion of said panel.

Connecting member **30'** distinguishes from its comparable connecting member **30** in that opposed arms **34'** are intended to be resiliently biased toward each other for gripping additional surface portions of the associated support member **20** at such time as said connecting members interengage. Furthermore, the terminal ends of opposed arm portions **32'** include hook portions **36'** disposed in such manner as to interengage with hook portions **36** when the respective connecting members **30, 30'** are pivoted toward each other.

In the assembly of the novel building wall construction herein, the support members **20** are fixedly retained in position in the manner heretofore described. A pair of connecting members **30, 30'** are pivotally mounted on inner surface portions of respectively associated panel elements **50** by slideably disposing pins **35, 35'** within grooved portions **56,** respectively. Connecting members **30, 30'** are suitably disposed relative to the associated panels **50** to align the respective arm portions **32, 32'** with a selected support member **20.** The lower edge portions **51** of said panels are received within groove portions **16** of base member **14** and clips **26** may be employed to temporarily hold said panels in upright position. If clips **26** are not used, then the operator would merely assembly one of the panels to support member **20** at any one time.

That panel incorporating connecting member **30** is first assembled to the support members **20** by pivotally mounting arm portions **32** toward the support member to dispose the terminal ends of said arm portions **32** in gripping relation to surface portions of said support member. In this connection, the resiliently biased arm portions **32** allow the inwardly disposed hook end portions **36** thereof to grip surface portions of support member **20,** upon pivoted movement of said connecting member, to maintain the associated panel **50** in an upright position. Thereafter, the panel incorporating connecting member **30'** is assembled to support member **20** by pivotally moving arm portions **32'** toward the support member whereby the hook end portions **36'** interengage with the hook end portions **36** to similarly maintain its associated panel element **50** in an upright position and in spaced relation to the panel associated with connecting member **30.**

In view of the resiliently biased feature of arm portions **34',** the juncture portions **37'** of said arms **34'** and main base portions **31'** also grip surface portions of support member **20** upon the pivoted interengaging movement of said connecting members **30, 30'.** This also serves to displace interengaged arm portions **32** and **32'** away from each other and thereby tighten the interengagement of said hook end portions **36** and **36'.**

The next adjacent pair of opposed and vertically aligned panel elements **50** are then secured to support member **20** by inserting the respective lower edge portions **51** within the groove edge portion **52** of the next adjacent lower panel element **50,** and this sequence is repeated until the spaced wall structure is completed. If desired, additional clip members **38,** similar to clip member **26,** may be employed to hold adjacent vertically aligned panel elements **50** together prior to moving connecting members **30, 30'** in intergaging relation. For example, referring to FIGS. **1** and **3,** clip member **38** spans the juncture of adjacent vertically aligned panels **50** and is illustrated as having one clip end received within the grooved portion **56** of one panel and the other clip end engaging the lower edge of dovetail portion **53** of the next adjacent panel.

As will be appreciated, the invention provides for a plurality of support members **20** in longitudinally spaced relation and a plurality of pairs of said connecting members **30, 30'** pivoted mounted and slideably disposed on inner surface portions of associated panel elements **50;** whereby the arm portions **32, 32'** are disposed for interengagement upon pivoted movement toward each other in gripping relation to surface portions of associated support members.

In order to insure that the panel elements **50** are in vertically aligned relation to each other, means are provided to limit the angular extent to which connecting members **30, 30'** may be pivoted relative to the associated panel. In this connection, the configuration of grooved portions **56** is such that when panels **50** are not in use, the associated connecting member may be pivotally moved toward the panel to lie in substantially spaced, parallel relation to the inner surface thereof to facilitate packaging and storage. However, when the connecting members are pivotally moved away from the associated panel, the respective base portions **33, 33'** abut against an edge **57** of associated grooved portion **56** to restrict further movement of said connecting members away from the panel. The configuration is such that when base portions **33, 33'** abut said edge **57,**

the arm portions **32, 32'** will be substantially normal to the plane of support members **20.** Since it is within the perview of the present invention for the connecting members **30, 30'** to have the same transverse dimension, the panels will be maintained in true vertically aligned relation to each other when the associated connecting members are pivotally mounted to their respective maximum limits.

It will be further appreciated that the wire connecting member **30, 30'** are somewhat resilient so as to permit the respective terminal hook end portions **36'** to be slightly displaced above the horizontal for interengagement with hook end portions **36.**

If desired, upon completion of the spaced building wall construction of a selected height, concrete **58** may be poured into the spaces between the panel elements **50** of the enclosed structure, and the support members **20,** to provide additional strength and rigidity to the assembled structure. It is understood that various insulating and/or structural reinforcements may be used in lieu of concrete **58,** such as mineral wool, insulating foams and granular insulators or the like. Furthermore, the supporting structure may be constituted of longitudinally successive support members **20** suitably coupled together in end to end relation to provide a desired length thereof.

While the invention has been described with reference to a spaced wall construction, it is to be noted that the term "wall" is merely illustrative and that the use of said term is not to be deemed a limitation on the invention. For example, it is within the scope of the invention to practice the concepts thereof in building a spaced floor construction, wherein the panels **50** on one side of the support members **20** would define the floor surface of a room at one level and panels **50** on the other side thereof would define the ceiling surface of a room at the next lower level. In other words, the structure hereinabove defined may be readily used in horizontal as well as vertical disposition thereby providing exterior and interior walls, floor panels, ceilings or combinations thereof, including those requiring angular corner structures.

It will now be appreciated from the above description, that the present invention provides for an improved building wall construction that eliminates the difficulties and other shortcomings heretofore referred to in the description of the prior art. The wall can be constructed and assembled rather quickly with a minimum of effort, and such assembly does not require the services of highly skilled personnel. Labor and material costs are thus sharply reduced as comapred to conventional construction designs and techniques.

While specific embodiments of the invention have been shown and described in detail, it will be readily understood and appreciated that various changes or modifications thereof may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. In a building wall construction a plurality of pairs of opposed parallel panel elements, means supporting said pairs of panel elements in spaced apart relation and means mounting said pairs of panel elements to said supporting means,

a. said supporting means including a plurality of vertically disposed, generally parallel elongated support members located between and engaging the opposed panel elements and maintaining said panel elements in said spaced apart relation,

b. said mounting means including a a plurality of pairs of connecting members in envoloping relation to said support members;

c. means for pivotally mounting each one of said pair of connecting members on an inner surface portion of the associated panel element,

d. each connecting member of said pair having portions remote from the pivotally mounting means interengaged with corresponding remote portions of the other connecting member of said pair upon pivoted movement of said connecting members toward each other;

e. The interengaging connecting members being in gripping relation to the surface portions of opposite sides of the support member.

2. The building wall construction as recited in claim **1,** wherein each of said connecting members is substantially U-shaped having base and arm portions; means for pivotally mounting said base portion on the inner surface portion of the associated panel element for movement of the arm portions toward the support member to dispose the remote terminal portions of said arm portions in gripping relation to surface portions of the support member.

3. The building wall construction as recited in claim **2,** wherein the terminal ends of said connecting members include hook portions; the arms of one of the pair of connecting members being resiliently biased toward each other to allow the hook end portions thereof to grip surface portions of the support member upon pivoted movement of said connecting member; the hook end portions of the other one of the pair of connecting members being operative to interengage the hook end portions of said one of the pair of connecting members upon pivoted movement of said other connecting member.

4. The building wall construction as recited in claim **3,** wherein the base portion of each of the connecting members comprises a U-shaped off-set portion, the off-set U-shaped portion of the other one of said pair of connecting members including a pair of opposed arm portions resiliently biased toward each other whereby the juncture portions of the arms of said off-set U-shaped portions and the first mentioned base portion of the associated connecting member grip surface portions of the support member upon pivoted interengaging movement of said connecting members.

5. The building wall construction as recited in claim **2,** wherein said panel elements include an elongated portion on the inner surface portion thereof, means on the base portion of said U-shaped connecting members pivotally and slideably disposed in the grooved portion of the associated panel element for adjustably aligning the arm portions of said connecting members with the support member.

6. The building wall construction as recited in claim **5** wherein the elongated grooved portion extends along the top edge of the panel elements.

7. The building wall construction as recited in claim **5,** wherein a portion of each of the interengaged connecting members abuts an edge of the associated grooved portion for limiting the pivotal movement of said connecting members.

8. The building wall construction as recited in claim **1,** further including structural filler means extending between the pairs of opposed panel elements and the support members.

* * * * *