REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978

FORM P.8
(to be lodged in duplicate)

A&A Ref: **152792**

PUBLICATION PARTICULARS AND ABSTRACT
(Section 32(3)(a) - Regulations 22(1)(g) and 31)

21	01	PATENT APPLICATION NO	22	LODGING DATE	43	ACCEPTANCE DATE
		2005/05004		20 June 2005		27-01-06

51	INTERNATIONAL CLASSIFICATION	NOT FOR PUBLICATION
	E04B E04C	CLASSIFIED BY **Adams & Adams**

71	FULL NAME(S) OF APPLICANT(S)

MiTek Holdings, Inc.

72	FULL NAME(S) OF INVENTOR(S)

TADICH, John

EARLIEST PRIORITY CLAIMED	COUNTRY		NUMBER		DATE	
	33	**AU**	31	**2004903358**	32	**21 June 2004**

NOTE: The country must be indicated by its International Abbreviation - see schedule 4 of the Regulations

54	TITLE OF INVENTION

Structural wall framework

57	ABSTRACT (NOT MORE THAN 150 WORDS)

NUMBER OF SHEETS	17

The sheet(s) containing the abstract is/are attached.

~~If no classification is furnished, Form P.9 should accompany this form.~~
The figure of the drawing to which the abstract refers is attached.

ABSTRACT

A building framework is disclosed which comprises studs 12 and 14. The studs 12 and 14 are coupled together by separate bracing elements 16 and 17. The studs 12 and 14 and bracing elements 16 and 17 form a bracing unit 10. The bracing unit 10 is provided between a top plate 51 and bottom plate 52. The bracing elements 16 and 17 extend substantially all of the way from the top plate 51 to the bottom plate 52. The bracing unit may have more studs, such as bracing unit 20 comprising three studs 22, 24, and 26.

MiTek Holdings, Inc.
Figure for Publication

~~1/5~~

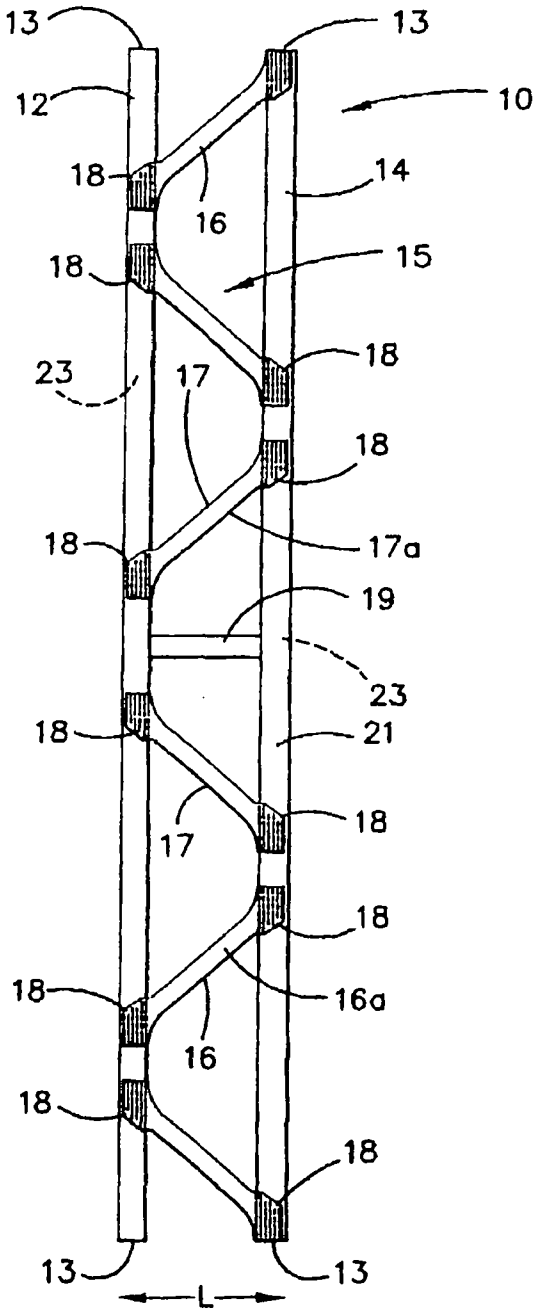

FIGURE 1

STRUCTURAL WALL FRAMEWORK

Field of the Invention

This invention relates to a structural wall framework, to a method of forming the framework and to a bracing unit for use in the framework.

Background of the Invention

Prefabricated wall frameworks for buildings such as houses are made by advancing a top plate and bottom plate past a fastening station. Studs are located between the plates and are fixed in place by a nailing or pressing machine or the like.

As is well known, studs are arranged at predetermined spacings such as about 450 to 600 mm in order support loads which the framework will be subjected to when installed in a building. The studs are also required at these spacings to support plasterboard which will form the internal wall surface of the building.

In order to ensure that the framework has the required structural integrity, the framework is braced by bracing. The bracing can take a number of forms, including angle brace, plywood brace and wooden brace. Generally the angle brace and wood brace needs to be cut into the framework, thereby reducing its strength, as the framework is being prefabricated, and this greatly increases the time taken to form the framework and also the complexity of the manufacturing process. Plywood braces are usually only suitable for external walls or where brick veneer cladding is used.

Modern building designs and, in particular, domestic dwellings generally include large window spaces. The incorporation of large window spaces in the framework limits the amount of bracing which can be used, and therefore the raking strength of the framework. The raking strength of the framework is the ability of the framework to restrain horizontal shear forces which apply a load which tends to flatten the framework generally in the plane of the framework. The effectiveness of the common forms of wall bracing diminishes significantly as the length of the braced section of the wall frame diminishes.

Summary of the Invention

Among the objects of a first aspect of the invention is to provide a structural wall framework which can provide for large window spacings, yet still have sufficient raking strength to support required loads.

This aspect of the invention may be said to reside in a structural wall framework comprising a top plate, a bottom plate, and a plurality of studs extending between the top plate and the bottom plate. The studs have a first face and a second opposite face which are parallel to the plane of the wall framework. Side faces join the first and second faces. At least one bracing unit is connected to the top plate and bottom plate, and comprised of at least two of said studs and separate bracing elements interconnecting the studs. Each of the separate elements are connected to the first or second faces of the at least two studs. The bracing elements extend substantially all of the way from the top plate to the bottom plate.

By providing the plurality of bracing elements which are connected to the studs and extend between the top plate and bottom plate, the framework is provided with the required raking strength in a smaller space than with conventional angle brace and wooden brace. This allows large window spaces to be formed in the framework whilst at the same time providing the required raking strength.

The use of a prefabricated bracing unit reduces the complexity of manufacture of the framework because studs together with suitable bracing can be concurrently provided in the framework. Thus, it is not necessary to perform a separate step of cutting in angle brace or wood brace into the framework. Thus, both the time taken to produce the framework and the complexity of the manufacturing process can be reduced.

A further aspect of the invention may be said to reside in a bracing unit for a structural wall framework. The bracing unit comprises at least two spaced apart studs, each having a first face and a second face which are parallel. Side faces join the first and second faces. The studs have first and second ends. A plurality of separate bracing elements are connected to the first face or second face of the studs and extend substantially all the way from the first end to the second end of the studs.

A further aspect of the invention relates to a method of forming a structural wall framework. This aspect of the invention comprises providing a top plate and a bottom plate, and locating at least one prefabricated bracing unit between the top plate and the bottom plate. The bracing unit comprises at least two studs each having ends, the studs having a first face and a second face which are parallel to a plane of the wall framework and side faces joining the first and second faces, and a plurality of separate bracing elements extending substantially all of the way from one end of the bracing unit to the other end of the bracing unit. The bracing unit is connected to the top plate and bottom plate.

Thus, according to this aspect of the invention, both bracing and studs are

incorporated into the framework in a single operation, thereby decreasing the amount of work which is required to form the framework, and also simplifying the manufacturing process.

Other objects and features of the present invention will be in part apparent and in part pointed out hereinafter.

Brief Description of the Drawings

Preferred embodiments of the invention will be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a view of a bracing unit according to one embodiment of the invention;

Figure 2 is a view of a bracing unit according to a second embodiment of the invention;

Figure 3 is a view of a bracing element according to the preferred embodiment of the invention;

Figure 4 is a view of a structural wall framework according to one embodiment of the invention;

Figure 5 is a detailed view showing connection of a bracing unit to a bottom plate of the framework; and

Figure 6 is a view along the line V-V of Figure 5.

Corresponding reference characters indicate corresponding parts throughout the views of the drawings.

Detailed Description of the Preferred Embodiments

Figure 1 shows a bracing unit 10 according to one 30 embodiment of the invention. The bracing unit 10 comprises spaced apart studs 12 and 14 which have free ends 13 and which are connected together by a bracing system 15 which comprises discrete bracing elements 16 and 17.

In the preferred embodiment of the invention, the elements 16 comprise metal braces sold under the name POSI-STRUT manufactured by MiTek. The bracing element 17 comprises one half of a bracing element 16. As is shown in Figure 3 the bracing element 16 has a weakening 32 formed by partially cutting or scoring the element 16 so the element 16 can be easily broken in half to form the two elements 17. The bracing elements 16 and 17 are provided with punched teeth 31 (see Figure 3) at end plate regions 18 which penetrate into the studs 12 and 14 to thereby fix the bracing elements 16 and 17 to the studs 12 and 14 to form the bracing unit 10.

The bracing elements which are connected to the studs may comprise only

bracing elements 16, only bracing elements 17, or as is shown in the drawings, a combination of the elements 16 and 17. By using elements 16 and 17 it is more easy to provide an integral number of bracing elements which extend all of the way from one end of the studs to the other end of the studs with suitable small spacings between the elements to provide as many bracing elements as is possible from the bracing elements 16 and 17 to thereby increase the raking strength of the framework including the bracing unit.

In other embodiments, bracing elements of a different type to those formed by or of the POSI-STRUT braces referred to above could be used. These include thin strips of metal, wooden elements such as rectangular cross-section boards. Furthermore, the shape of the elements may be different to those referred to above. Still further, the elements need not extend between the studs at acute angles (about 45 degrees as in the preferred embodiment), but could extend at other angles including perpendicular (i.e., horizontally) to the studs.

The vertical height of the units 10 depend on the size of the wall frame which is being made, and the height of the units 10 may be anywhere between, for example, 2100 mm to 2700 mm. The studs 12 and 14 may be spaced apart by a distance between 300 and 400 mm for example. The bracing elements 16 and 17 extend substantially the full length of the studs 12 and 14 between free ends 13 of the studs so that when the unit 10 is arranged vertically, the bracing elements 16 and 17 extend all the way from an upper end of the bracing unit 10 to a lower end of the bracing unit 10. The elements 16 and 17 are spaced apart, as is required to enable a number of the bracing units 16 or 17 to be so located.

The formation of the bracing system 15 from the discrete bracing elements 16 or 17 accommodates a greater variation in height of the frame unit by simply increasing the size of the gaps between elements 16, 17 as is needed to ensure that an integral number of the units are provided to extend between the top end and lower end of the bracing unit 10.

A nogging 19 may be provided between the studs 12 and 14 as is shown.

Figure 2 shows a second embodiment in which a bracing unit 20 is comprised of three studs 22, 24 and 26. As in the previous embodiment, a bracing system 25 is provided which extends from the upper end of the bracing unit 20 to the bottom end of the bracing unit 20. The bracing system 25 comprises two sets 25' and 25" of discrete bracing elements 16 and 17 which are the same as those described with reference to Figure 1. Once again, the bracing elements 16 and 17 are spaced apart to extend all of the way between the free ends 13 of the studs 22, 24 and 26.

As in the earlier embodiment, noggings 19 may be provided between adjacent studs 22, 24 and 26.

In other embodiments, the bracing unit may include four or more studs with appropriate numbers of bracing sets interconnecting the adjacent studs.

It should also be understood in other embodiments the bracing elements may have a different configuration to those shown in the drawings. Whilst in the embodiment of Figure 2 the two sets of bracing elements are horizontally aligned, the horizontal configuration is optional and the two sets of bracing elements could be staggered with respect to one another.

The embodiment of Figure 2 provides a stronger wall frame than the embodiment of Figure 1. Although the effective length L of the bracing unit of Figure 2 is double the length L of the bracing unit of Figure 1 the configuration of Figure 2 gives more than double the strength. Thus, the embodiment of Figure 2 provides more than double the raking strength compared to the embodiment of Figure 1 while still using relatively small components which are also used in the embodiment of Figure 1.

The embodiments of Figures 1 and 2 greatly increase the horizontal raking load a wall frame using the bracing units can take, compared to an equivalent width of a braced framework according to conventional bracing techniques. Typically, conventional systems for bracing adjacent studs have a single brace extending between a top of one stud to a bottom of the adjacent stud. When studs must be spaced relatively closer together, the brace tends to become more nearly vertical. That leaves the brace practically ineffective in resisting the horizontal loads. This is not the case in the present invention which features multiple unit braces which remain more nearly horizontal.

Typically the load which the bracing unit of Figure 2 can take is in the order of 2.7 kN and the length L of the bracing unit is in the order of 750 mm. This compares to a conventional braced wall frame using angle iron or timber bracing which would require bracing of a length of in order of 1800 mm in order to provide the same capacity. Thus, in this embodiment of the invention, the load capacity is provided by a greatly reduced length L compared to conventional systems, thereby increasing the amount of space which is available for a window without sacrificing raking strength.

Figure 4 is a view of a framework 50 according to one embodiment of the invention. The framework 50 has a top plate 51 and a bottom plate 52. For illustrative purposes, the bracing unit 10 described with reference to Figure 1 is located at one end of the framework 50 and the bracing unit 20 described with reference to Figure 2 is located at the other end. However, it should be understood that the wall framework may include only bracing units according to the embodiment of Figure 1, or only bracing units according to the embodiment

of Figure 2, or some other combination of those two types of bracing units. A window space 30 is defined between the bracing units 10 and 20 and the top plate 51 and bottom plate 52. The framework 50 is formed by locating the bracing unit 10 between the plates 52. and 52 so the free ends 13 of the studs abut respective plates 51 and 52 and securing the framework 10 to the plates 51 and 52 by fasteners, as will be described with reference to Figures 5 and 6. Similarly, the bracing unit 20 is located at the other end of the plates 51 and 52 and secured in place.

The bottom plate 52 may be provided with tie down connectors 60 to facilitate connection of the framework to a floor frame or concrete slab of a building.

In the preferred embodiment of the invention, the bracing elements formed from the POSI-STRUT braces are thin and are connected on a first face 21 of the studs 12 so that the opposite second face 23 of the studs are left completely free, thereby providing a surface for location of plasterboard which is not interfered with by bracing or the like. The first face 21 and second face 23 of the studs are joined by side faces 27. The first face 21 of the studs is the side of the studs which is intent to be outermost when the framework is installed in a building. Thus, the bracing on first face 21 of the studs is substantially flush with the studs and is easily accommodated within the brick cavity of an exterior building wall.

The framework of the present invention therefore particularly lends itself to exterior walls of a building in which window spaces are required. However, the framework could be used as an internal wall of a building if required.

The framework shown in Figure 4 may also include individual studs 29 which are connected to the top plates 51 and 52 in the usual manner. Typically, a number of such conventional studs 29 are connected in the normal manufacturing technique by advancing the top plate 51 and bottom plate 52 past a securing station and locating the stud or studs 29 in place, and then securing them to the top plate 51 and bottom plate 52.

After the standalone studs 29 have been connected in place, the bracing units 10 and 20 can be lifted into position and then secured to the top plate 51 and bottom plate 52.

Figures 5 and 6 show one method of connecting the studs of 35 the bracing units 10 and 20 to the top plate 51 and bottom plate 52. The stand alone studs 29 can be connected in the same manner.

As is shown in Figures 5 and 6, the studs 12 and 14 are connected to bottom plate 52 by a generally U-shaped strap 90 which has an arm 91 and opposite arm 92 and a base 93. The arms 91 and 92 may be provided with

punched teeth for penetrating the stud 12 and bottom plate 52, or may be provided with holes so that the arms 91 and 92 can be nailed to the stud 12 such as by nails 33.

The other ends of the studs 12 and 14 are connected to the top plate 51 (not shown in Figures 5 and 6) in the same manner.

Thus, the studs 12 and 14 are connected to the plates 51 and 52 in the same manner as individual studs would have been connected in the conventional manufacturing method. However, in this embodiment of the invention, bracing is concurrently incorporated into the framework when the studs 12 and 14 are secured to the plates 51 and 52. Thus, in the preferred embodiment of the invention the bracing elements 16 and 17 are connected to the studs 12 and 14, and 22, 24 and 26 before the bracing units 10 and 20 are attached to the top plate 51 and bottom plate 52. Therefore the bracing is provided at the same time as those studs. However, in other embodiments the bracing elements 16 and 17 could be attached on site after the studs 12 and 14, and 22, 24 and 26 are connected to the top plates 51 and 52.

In the preferred embodiment shown in Figures 1 and 2 the ends of the studs 12 and 14, 22, 24 and 26 connect directly to the top plate 51 and bottom plate 52. However, in other embodiments cross members (not shown) may be provided at the ends 13 of the studs and the cross members may connect to the top plate 51 and bottom plate 52.

In the claims which follow and in the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, the word "comprise", or variations such as "comprises" or "comprising", is used in an inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments of the invention.

Since modifications within the spirit and scope of the invention may readily be effected by persons skilled within the art, it is to be understood that this invention is not limited to the particular embodiment described by way of example hereinabove.

CLAIMS:

1. A bracing unit for a structural wall framework, the bracing unit comprising:

at least two spaced apart studs, each having a first face and a second face which are parallel, side faces joining the first and second faces, and a first end and a second end, each stud being sized and shaped to fit between top and bottom plates of the structural wall framework; and

a plurality of separate bracing elements connected to the first faces or second faces of the studs and extending substantially all the way from the first ends to the second ends of the studs, each bracing element having integrally formed teeth at opposite end plate regions for connecting the bracing element to the respective studs, .

2. The bracing unit of claim 1 wherein the unit comprises two studs and the said bracing elements.

3. The bracing unit of claim 1 wherein the bracing unit comprises three studs comprised of a first outer stud, an intermediate stud, and a second outer stud, and a first set of said separate bracing elements connected to the first stud and the intermediate stud, and a second set of said separate bracing elements connected to the intermediate stud and the second stud.

4. The bracing unit of claim 1 wherein the bracing unit includes at least one flogging located between adjacent said studs of the bracing unit.

5. The bracing unit of claim 1 wherein the bracing elements have punched teeth for connecting the bracing elements to the respective studs.

6. The bracing unit of claim 1 wherein the separate bracing elements are all connected only to the first faces of the studs.

7. The bracing unit of claim 1 wherein the separate bracing

elements are spaced apart from one another so that a predetermined number of the bracing elements extend between the first end and second opposite end of the studs.

8. A method of forming a structural wall framework, comprising:

providing a top plate and a bottom plate;

locating at least one prefabricated bracing unit between the top plate and the bottom plate, the bracing unit comprising at least two studs each having ends, each stud having a first face and a second face which are parallel to a plane of the wall framework, and side faces joining the first and second faces, and a plurality of separate bracing elements extending substantially all of the way from one end of the bracing unit to the other end of the bracing unit, each bracing element having integrally formed teeth at opposite end plate regions for connecting the bracing element to the respective studs; and

connecting the bracing unit to the top plate and bottom plate.

9. The method of claim 8 wherein the prefabricated bracing unit comprises two said studs and the said bracing elements.

10. The method of claim 8 wherein the prefabricated bracing unit comprises three studs and two sets of separate bracing elements, a first of the two sets of bracing elements extending between a first outer stud of the three studs and an intermediate stud of the three studs, and the second set of bracing elements extending between the said intermediate stud and a second outer stud of the three studs.

11. The method of claim 8 wherein the bracing elements have a plurality of punched teeth for connecting the bracing elements to the studs.

12. The method of claim 8 wherein the prefabricated bracing unit also includes at least one nogging extending between adjacent studs.

13. A method of reinforcing an existing structural wall framework having a top plate, a bottom plate and at least two spaced apart studs connected to the top and bottom plate, each stud having a first face and a second face which are parallel, side faces joining the first and second faces, and a first end and a second end, the method comprising:

connecting a plurality of separate bracing elements to the first faces or second faces of the studs so that the bracing elements extend substantially all the way from the first end to the second end of the studs, each bracing element having integrally formed teeth at opposite end plate regions for connecting the bracing element to the respective studs.

14. A bracing unit of any one of claims 1 to 7, substantially as herein described with reference to and as illustrated in any of the drawings.

15. A method of any of claims 8 to 12, substantially as herein described with reference to and as illustrated in any of the drawings.

Dated this 20th day of June 2005

C G KAHN
Adams & Adams
Applicants Patent Attorneys

Clean copies as filed.
Dated this 5TH day of April 2006

C.P. Forbes

Adams & Adams
Applicants Patent Attorney

1/5

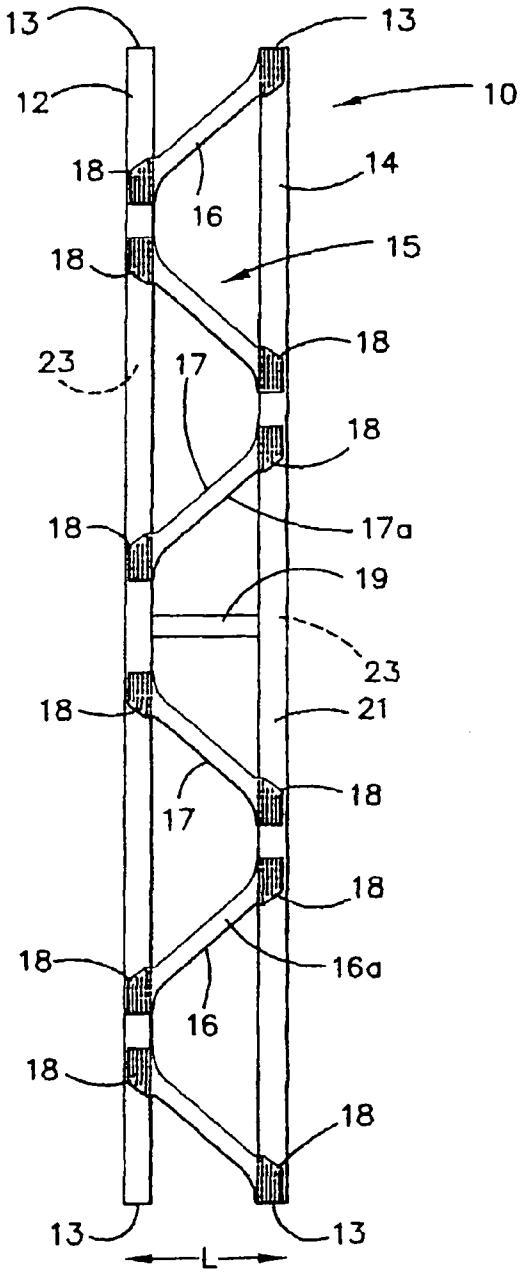

FIGURE 1

Adams & Adams
Applicants Patent Attorneys

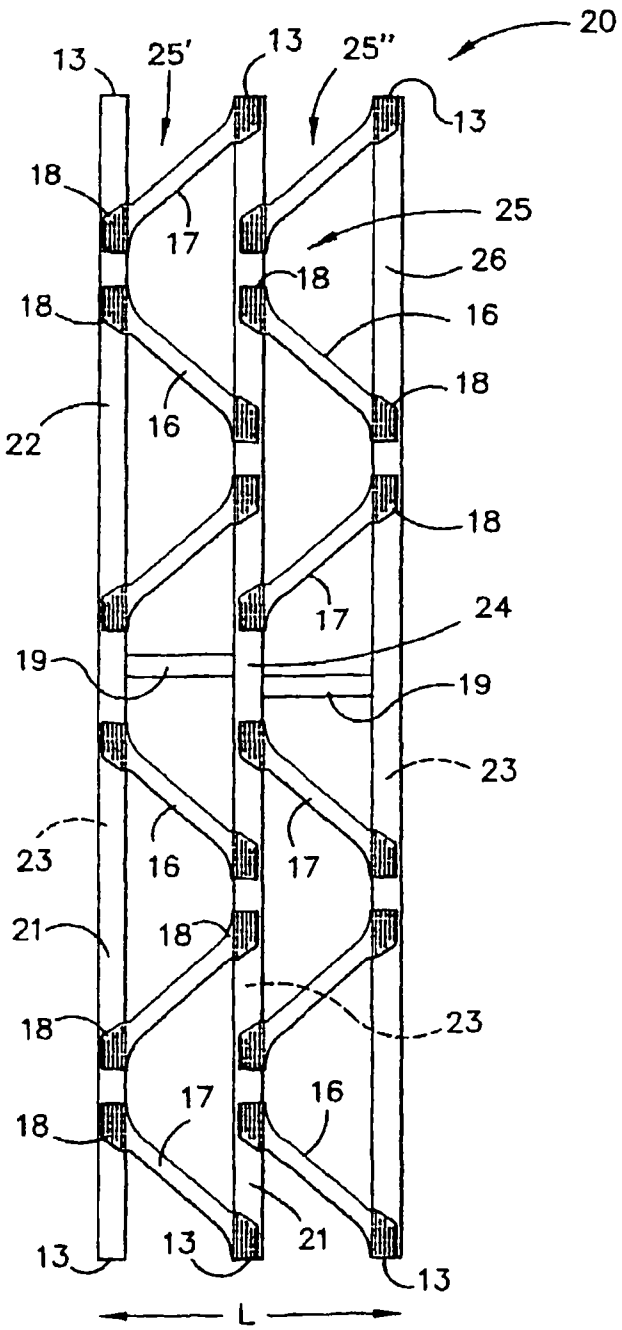

FIGURE 2

Adams & Adams
Applicants Patent Attorneys

3/5

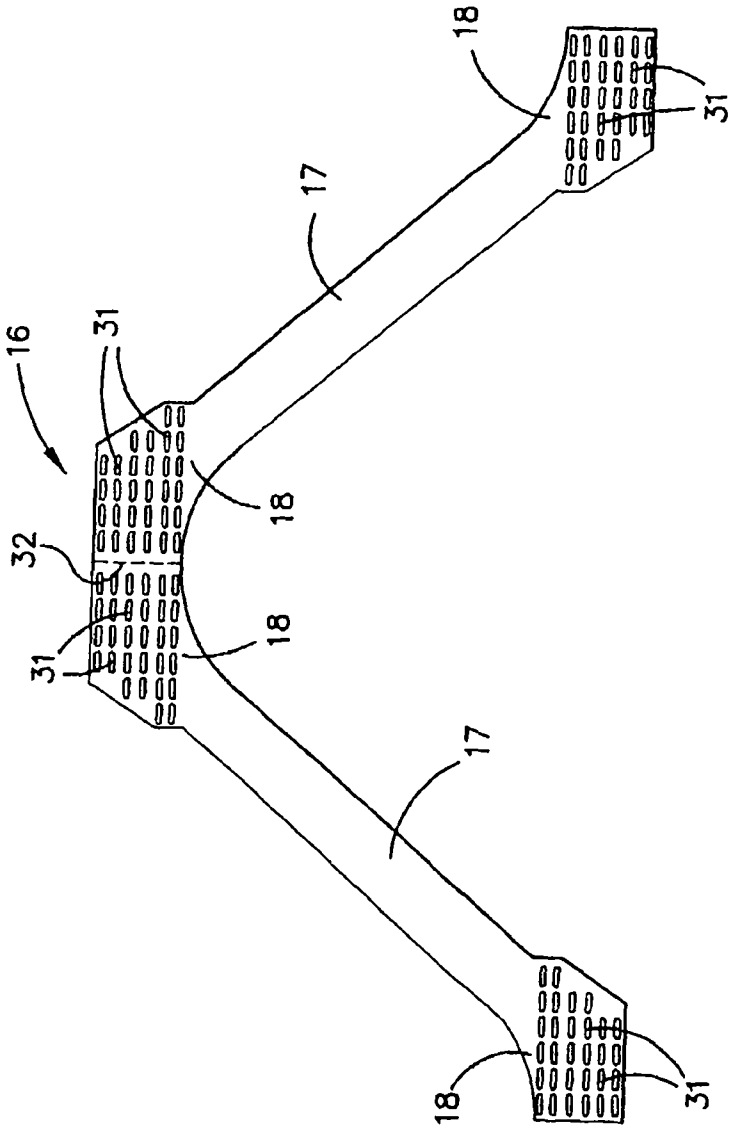

FIGURE 3

Adams & Adams
Applicants Patent Attorneys

4/5

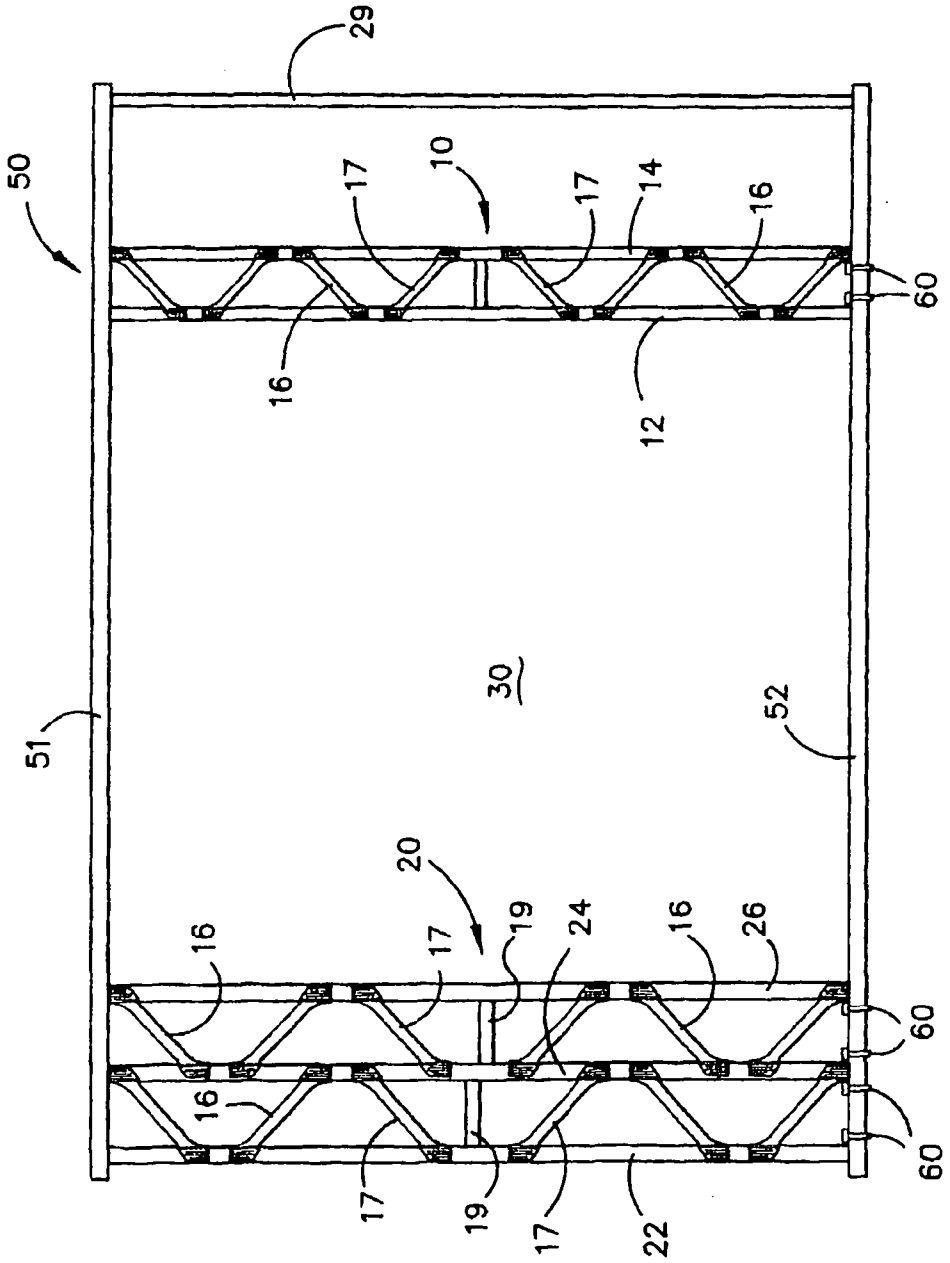

FIGURE 4

Adams & Adams
Applicants Patent Attorneys

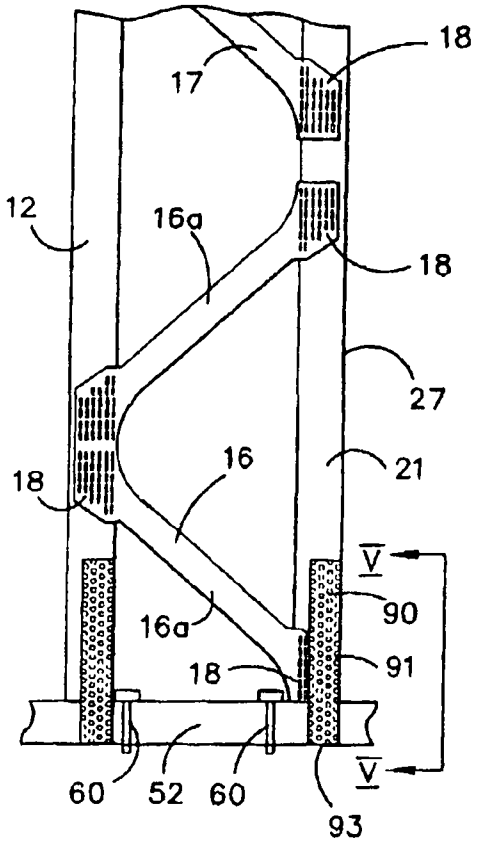

FIGURE 5

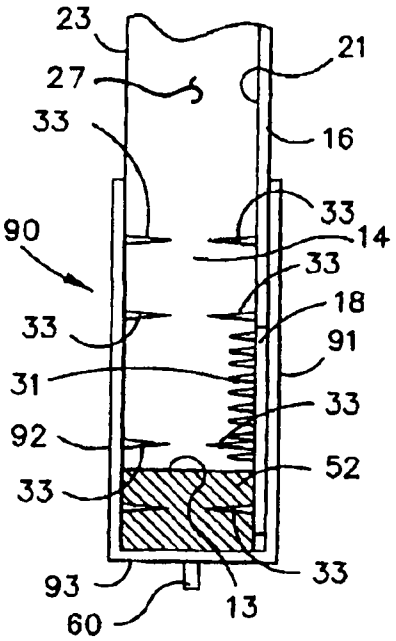

FIGURE 6

Adams & Adams
Applicants Patent Attorneys