United States Patent [19]

Lambert

[11] **3,846,944**

[45] **Nov. 12, 1974**

[54] **STRUCTURAL SELF-SUPPORTING SYSTEM**

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[73] Assignee: **Barton-King Systems Corporation,** Monrovia, Calif.

[22] Filed: **Nov. 6, 1972**

[21] Appl. No.: **304,188**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 100,321, Dec. 21, 1970, abandoned.

[52] **U.S. Cl.** ..... **52/758 R,** 211/148, 248/243

[51] **Int. Cl.** **A47f 5/10**

[58] **Field of Search** ..... 52/758 R; 46/27, 28, 29, 46/30, 31; 211/148, 176, 177, 182, 183, 184; 248/224, 243

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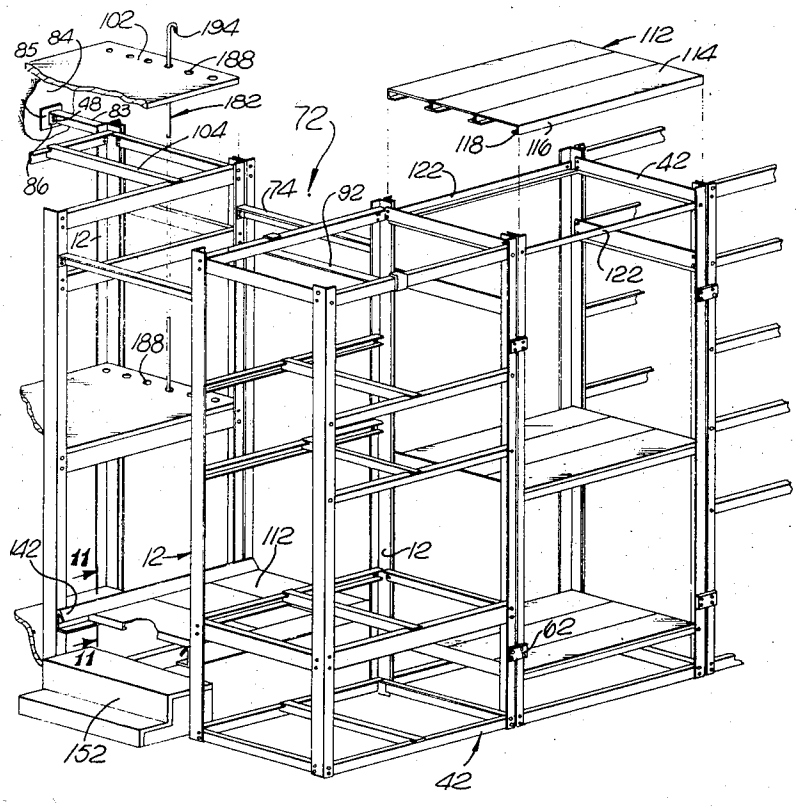
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Attorney, Agent, or Firm—Wills, Green & Mueth

[57] **ABSTRACT**

A structural self-supporting system having a plurality of axially extending upright members arranged to form a generally box-like structure. Each of the upright members has an L-shaped cross-sectional configuration defining a first section and a second section. Each of the sections has a row of axially extending openings. Each of the openings comprises an enlarged central portion with a reduced portion integral therewith. Support members are utilized to interconnect the uprights and complete the box-like structure. The support members have a surface formed in a plane parallel to one of the upright sections and have rivets extending in a plane perpendicular to the support member surface. Insertion of the rivets of one of the support members in a plurality of openings of a pair of upright members forms a rigid interconnection between the upright members. In addition, the system is modular, in that additional structures can be added to form an integral self-supporting system.

11 Claims, 14 Drawing Figures



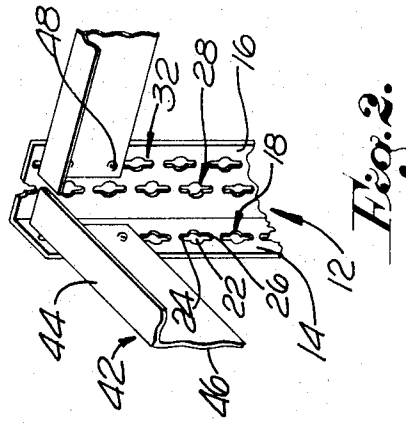


Fig. 2.

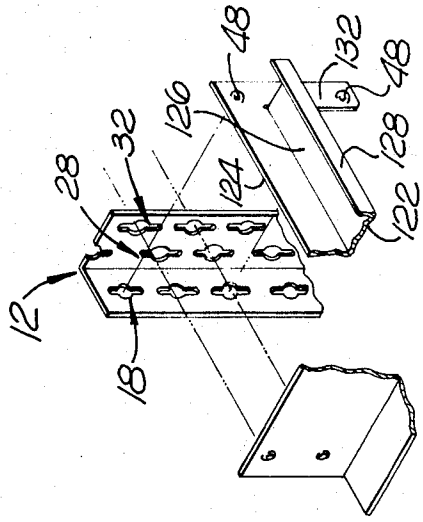


Fig. 10.

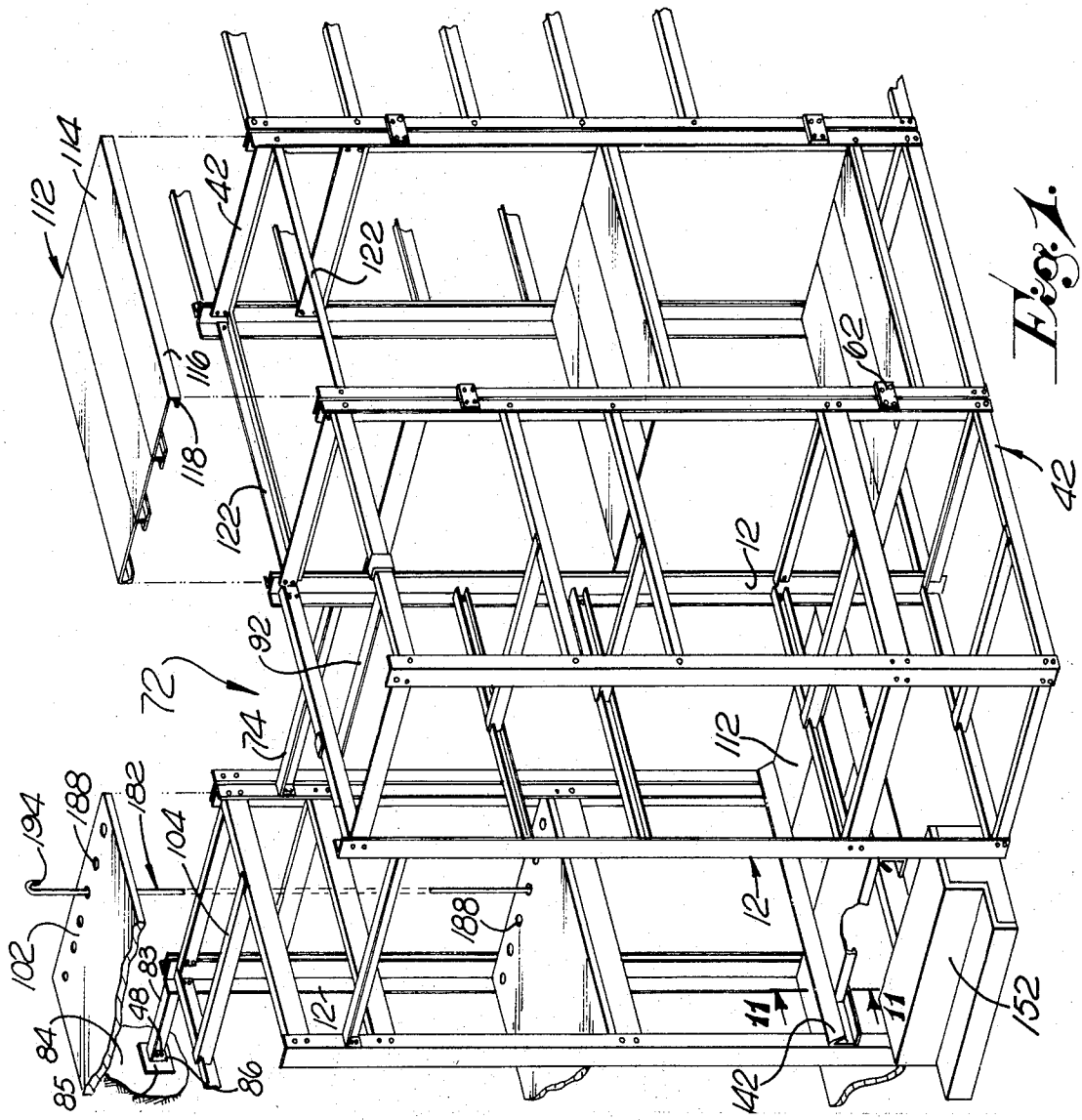


Fig. 1.

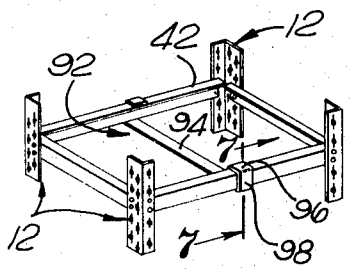


Fig. 6.

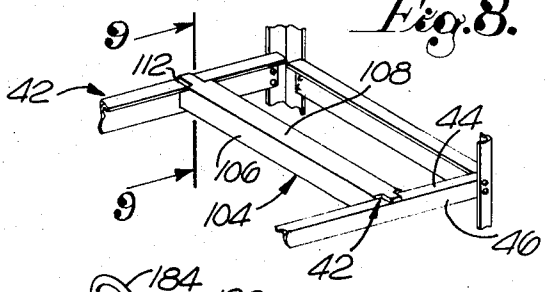


Fig. 8.

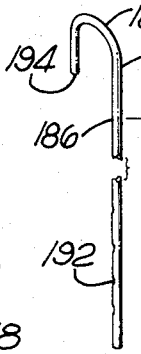


Fig. 14.

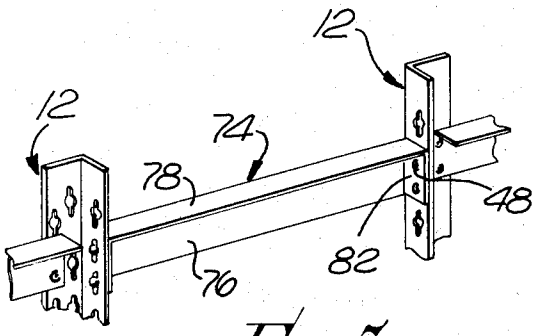


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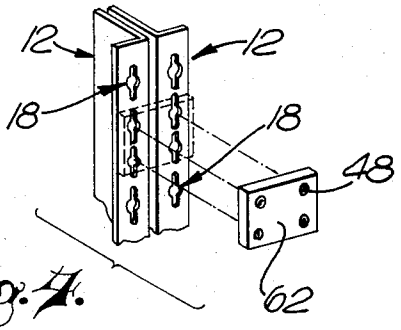


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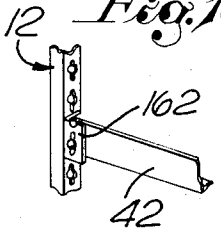


Fig. 13.

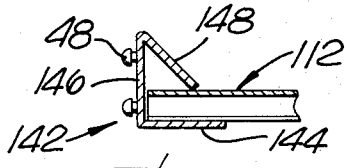


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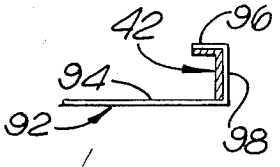


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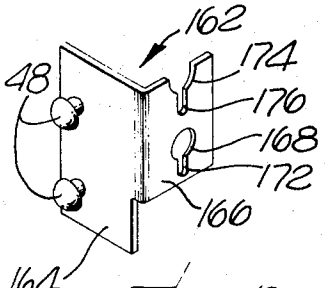


Fig. 12.

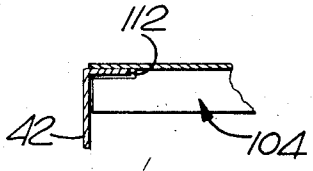


Fig. 9.

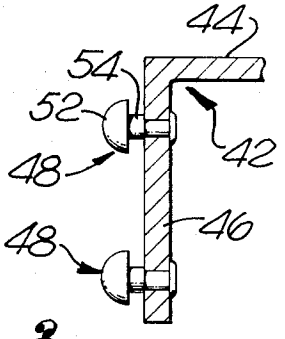


Fig. 3.

STRUCTURAL SELF-SUPPORTING SYSTEM

CROSS REFERENCE TO RELATED APPLICATION

The present invention is a continuation in part of U.S. Pat. application Ser. No. 100,321, filed Dec. 21, 1970, now abandoned.

BACKGROUND OF THE INVENTION

Conventional structural metal beam members, particularly those which are utilized for forming shelves used as storage and support structures, contain openings which are normally axially aligned, enabling the use of a nut and bolt to secure the structural elements together. To prevent torsional movement between the interconnected elements, it is particularly desirable that a plurality of nuts and bolts be used to interconnect adjacent structural elements. Conventional structural elements have also used, in place of nut and bolt arrangements, a riveted member which is fastened to one of the structural elements and is inserted in an opening in a second structural element to which the first structural element is to be connected. However, such structural elements, in addition, normally required some sort of bracing or other type of support to secure the elements together. Where bracing is not utilized, but the structural elements are contoured so as to interlock once fastened together, the manufacture of such structural elements is found to be extremely expensive.

In order to overcome the attendant disadvantages of prior art structural self-support systems, the present invention enables structural elements of the system to be secured together without any auxilliary or additional parts. In addition, each of the structural elements is relatively simple in form and requires no complex shapes. The structural self-supporting system is modular, enabling a plurality of self-supporting systems to be joined together. The strength of the system also enables heavy equipment to be stored thereon, walkways to be provided thereon, and assembly and disassembly provided with a minimum of effort. In addition, bracing or other external type structural devices are not needed and the entire system is self-supporting when assembled. For unusually heavy loads, system supporting devices may be provided. In addition, shelving can be made adjustable so that items of different sizes can be readily stored in the shelving.

SUMMARY OF THE INVENTION

A structural self-supporting system comprising a plurality of axially extending members arranged to form a generally box-like structure. Each of the upright members has an L-shaped cross-sectional configuration defining a first section and a second section formed in a plane perpendicular to the first section. Each of the sections also has a row of axially extending openings. Each of the openings comprises an enlarged central portion with a reduced portion integral therewith. Support members are utilized to interconnect the uprights and complete the box-like structure. The support members have a surface formed in a plane parallel to one of the upright sections and have rivets extending in a plane perpendicular to the support member surface. Insertion of the rivets of one of the supports in a plurality of openings in a pair of upright members forms a rigid interconnection between the pair of upright members.

The advantages of this invention, both as to its construction and mode of operation will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the figures.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a structural self-support system made in accordance with the principles of the invention;

FIG. **2** is an enlarged perspective view, partially broken away, illustrating the interconnection of typical structural members in the system of FIG. **1**;

FIG. **3** is a further enlarged, vertical sectional view adjacent one end of a transverse structural member shown in FIG. **2**;

FIG. **4** is a perspective view in exploded form of a tie plate and portions of two structural members which are connected thereby;

FIG. **5** is a perspective view of a portion of the system, showing a spacer structural element used to interconnect two vertical structural members;

FIG. **6** is a perspective view of a portion of the system, showing a tie strap as used to prevent the twisting of shelf-supporting structural members;

FIG. **7** is an enlarged, fragmentary, cross-sectional view of the end of the tie strap taken along the line **7—7** of FIG. **6**;

FIG. **8** is a perspective view of a portion of the system, showing a shelf-supporting member;

FIG. **9** is an enlarged, fragmentary sectional view of one end of the shelf-supporting member taken along the line **9—9** of FIG. **8**;

FIG. **10** is an exploded perspective view of a portion of the system, showing an alternative self support assembly;

FIG. **11** is a fragmentary, vertical, sectional view of a support member used in the system to support decking or flooring between shelve sections, taken along the line **11—11** of FIG. **1**;

FIG. **12** is a perspective view of a cleat used to add structural members to the system;

FIG. **13** is a fragmentary, perspective view of the cleat of FIG. **12**, shown interconnecting two support members; and

FIG. **14** is a perspective view of a divider rod used to provide partitions of the system.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. **1**, there is shown a structural self-supporting system made in accordance with the principles of the invention. While the embodiment of FIG. **1** illustrates a typical system which can be assembled utilizing the components of the invention, it should be understood, of course, that similar systems or arrangements could be utilized as well.

In FIG. **1**, the system comprises a plurality of uprights **12** with four uprights defining a generally box-like cross-sectional area. The uprights **12** are of L-shaped cross-sectional configuration and comprise a reduced width section **14** and an enlarged width section **16** shown in greater detail in FIG. **2**. The sections **14** and

16 are integrally formed of steel arranged to define the L-shaped cross-section. Centrally formed along the axis of the section 14 is a plurality of openings 18, each containing an enlarged central portion 22 of generally circular configuration and reduced width portions 24 and 26 extending in opposite directions from the central portion 22 along the longitudinal axis of the section 14.

The enlarged width section 16 contains a pair of rows of openings 28 and 32 offset from each other and also arranged along the longitudinal axis of the sections 16. The openings 28 and 32 are generally identical to the openings 18 with the openings 28 of one of the rows being staggered with respect to the openings 32.

To interconnect the uprights 12 in each corner and thus complete the box-like configuration, supports 42 are utilized (FIG. 2). The supports 42 are generally L-shaped in cross-section and contain a reduced width section 44 and an enlarged width section 46 integral therewith. Each of the supports 42 is utilized to interconnect two of the uprights 12 near the ends as well as at periodically spaced points, as illustrated in FIG. 1. At each end of the supports 42, a pair of rivets 48 is fastened in spaced-apart relationship in the enlarged section 46, in a plane perpendicular to the longitudinal axis of the enlarged section 46. As shown in FIG. 3, the rivets contain an enlarged head portion 52 which is spaced from the surface of the section 46 by means of a reduced width interconnecting portion 54 which terminates at the surface of the section 46. The head portion 52 is of a diameter that it can be inserted through the central portion 22 of each of the openings 18, 28 and 32 with the portion 54 being such that it forms a tight fit with the reduced width portions 24 and 26 in each of the openings. Therefore, the supports 42 can be connected to the uprights 12 by inserting the rivets 48 into a pair of openings 18, 28 or 32. It should be noted that the center-to-center distance of each pair of rivets 48 is equal to the center-to-center distance of adjacent openings 18, 28 or 32.

The rows of openings 28 and 32 in section 16 are staggered so that the center of one of the openings 28 is positioned midway between the centers of two adjacent openings 32. The centers of the openings 18 in section 16 are positioned in the same horizontal plane as the centers of the openings 32. Thus, when the rivets 48 of a pair of supports 42 are positioned in a pair of horizontally aligned openings 18 and 32, the supports will be in the same plane and can be used to support a level shelf. In addition, it should be understood that a second row of openings could be provided in the section 14 whose openings are aligned with the row of openings 28, thus giving additional flexibility in adjusting height of shelves. However, with sufficient openings formed in the rows 14 and 32, it has been found that an additional row of openings in the section 14 is unnecessary. The openings 28 which are offset from the openings 18 and 32 can be utilized with a structural member which is level with the member secured in openings 18 and 32 when the structural member is inserted with its rivets in the openings 28.

To interconnect adjacent uprights 12 such as shown in FIG. 1, and form a plurality of box-like structures adjacent each other, tie plates 62 are utilized. As shown in greater detail in FIG. 4, each tie plate 62 contains four rivets 48 of similar construction as the rivets in the supports 42. The four rivets are formed so that the vertically arranged rivets are spaced a distance equal to adjacent openings 18 in section 14, whereas the horizontally spaced rivets are spaced a distance equal to the distance between the openings 18 in adjacent sections 14 of the adjacent uprights 12. Thus, the tie plate can be inserted with the rivets in the openings 18 and then moved downwardly as previously described so as to interlock adjacent uprights.

When it is desired to form an aisle such as the aisle 72 shown in FIG. 1, so as to enable a person to walk between adjacent structures, yet enable the structures to be secured to each other, aisle tie bars 74 are utilized. As shown in FIG. 5, the aisle tie bars are of generally L-shaped cross-sectional configuration and comprise an enlarged width section 76 integrally formed with a reduced width section 78 in a manner similar to the supports 42. In addition, at each end of the aisle tie bar 74, end plates 82 are formed in a plane perpendicular to the longitudinal axis of the tie bar. The end plates 82 have a cross-sectional area approximately equal to the width of the L-shaped sections 76 and 78, so as to form a structurally integral member therewith. In addition, a pair of rivets 48 are positioned in the end plates in a manner as previously described, so as to enable the aisle tie bar 74 to be secured to openings 18 in the uprights 12.

Wall bar supports 83, having construction similar to that of the tie bar 74, but are normally not as long, and are illustrated in FIG. 1 for positioning an upright 12 with respect to a wall 84. One end of the wall support 83 is secured to a plate 85 mounted on the wall with openings therein for insertion of rivets 48 formed on an end plate 86 of the support 83. The rivets on the other end plate of the support 83 are positioned in the openings formed in an adjacent upright 12. Alternatively, the end plate 86 could be secured to the wall by use of expansion bolts or similar devices which can be positioned in openings formed in the end plates.

As illustrated in FIG. 1, the wall support 83 is of shorter length than the tie bar 74, yet the construction thereof is similar. It should be understood, of course, that the length of the wall support 83 could vary depending upon the distance between the support structure and the wall to which it is to be secured.

Referring now to FIGS. 6 and 7, there is illustrated a tie strap 92 which is used to increase the weight capacity of the supports 42 and prevent the supports from rotating. The tie strap 92 is snapped onto opposite side supports 42. The tie strap comprises a central member 94 which extends between the enlarged width sections 46 of each of the supports 42. The ends of the tie straps 92 are integrally formed with an L-shaped section at each end. The L-shaped sections are defined by an end portion 96 and an intermediate portion 98, which connects the ends of the tie strap 92 to the end portion 96. The end portion 96 and the intermediate portion 98 are positioned adjacent the outer surfaces of the reduced width section 44 and enlarged width section 46, respectively. More than one tie strap 92 can be used between opposite side supports when the weight capacity to be held by the supports is significant.

Additionally, where the supports 42 are utilized as a shelf support, as with a plywood shelf 102, illustrated in FIG. 1, a support channel 104 can be utilized. The support channel 104 is shown in greater detail in FIGS. 8 and 9 and comprises a generally U-shaped cross-sectional member having a pair of side walls 106 and

a top wall **108.** The support channel extends between opposite side supports **42** in a manner similar to that of the tie straps **92.** However, at the ends of the support channel the junction of the side walls **106** and the top wall **108** contain slots **110,** enabling the support channel to be fitted so that the top wall **108** is positioned above the reduced width section **44** of the support **42,** whereas the ends of the side walls **106** abut the inner surface of the enlarged width section **46** of the supports **42.** Then, when a plywood member, such as the plywood member **102,** is positioned on the top surface of the reduced width sections **44** of the supports **42,** the support channels are utilized in combination with the supports to reinforce the plywood member and any load which may be stored thereon.

In place of the plywood member **102,** steel shelving **112,** which is typically galvinized metal, can be utilized with the system. The steel shelving **112** can be used to store materials as conventional shelving as illustrated at the top right-hand corner of FIG. **1,** or can be used as a raised gangway as illustrated in the bottom left-hand corner of FIG. **1.** The steel shelving **112** is formed of a top surface **114** having L-shaped legs formed of side walls **116** and bottom walls **118.** The side wall **116** is integral with the top surface **114** along its edge and the bottom wall **118** is integral with the side wall **116** and extends inwardly toward the opposite bottom wall.

To mount the shelving **112** on the system, a modified support **122** is utilized. The modified support **122** is illustrated in greater detail in FIG. **10** and comprises a modified U-shaped channel member formed of a first side wall **124,** a bottom wall **126** which connects the side wall **124** to a second side wall **128.** The side wall **124** is higher than the side wall **128,** and extends a short distance beyond the bottom wall **126** and the side wall **128** at each end of the channel. The extended ends of the wall **124** contains standard system rivets **48,** one of which is mounted at the end of the wall **124** and the other one of which is mounted on a downwardly extending leg **132.** When mounted between adjacent uprights **12,** the modified support **122** is utilized to position the bottom wall **118** in the channel formed by the walls **124, 126** and **128,** with the side wall **116** abutting the inner surface of the side wall **124.**

As illustrated in FIG. **1** in the upper right-hand corner, three sheet shelve sections **112** are adjacent each other with the sides of the outer sections positioned in the channels formed by the modified support **122.** Conventional supports **42** which are formed perpendicular to the modified supports **122** and utilized to support the ends of the steel shelving **112.**

When used as a raised gangway or decking as illustrated in the bottom left-hand corner of FIG. **1** and in FIG. **11,** the steel shelving **112** is positioned in angled support members **142** which are formed of a bottom wall **144,** one end of which is integral with a side wall **146.** The other end of the side wall **146** is integrally connected to an angled top wall **148** which extends from the upper end of the side wall **146** towards the bottom wall **144.** A pair of conventional system rivets **48** is positioned on the side wall **146** adjacent each end enabling the angled support member **142** to be easily mounted on the outer surface of the uprights as is apparent. An opening is formed between the free end of the top wall **148** and the bottom wall **144.** The galvinized steel shelves **112** are positioned with their ends inserted into the opening formed between the free end of the top wall **148** and the bottom wall **144** on opposite shelving sections. In addition, conventional steps **152** can be utilized to enable a person to reach the raised gangway.

Referring now to FIGS. **12** and **13,** there is shown a cleat **162** which can be positioned on an upright **12** so as to enable a support **42** or similar type system structure to be secured thereto, as differentiated from tying together similar structures with the plates **62,** previously described. The cleat contains a first side plate **164** having a pair of system rivets **48** secured thereto in vertical position. Positioned at a **90** degree angle with respect to the plate **164** is a second plate **166** having an enlarged portion opening **168** and a reduced portion opening **172** integral therewith and extending directly below. A second enlarged opening **174,** a portion of which opens into the top surface of the cleat **162,** and a reduced portion opening **176** opening into the bottom surface of the enlarged opening **174** is illustrated. System rivets **48,** positioned at the ends of the supports **42,** such as that shown in FIG. **3,** can be positioned in the plate **155** enabling the support **42** to be secured thereto, as is illustrated in FIG. **12.** In addition, the plate **166** can be positioned so that it extends in an opposite direction as shown, so that a support can be positioned thereon in a reverse direction.

Should it be desirable to provide partitions on the plywood shelves **102,** adjustable divider rods **182,** illustrated on the top left-hand corner of FIG. **1** and in FIG. **14** can be utilized. The rods are formed with a U-shaped top portion **184,** one end of which forms an extension **186** in a plane parallel to the uprights **12** and through openings **188** in each of the plywood shelves. The extension **186** contains notches **192** enabling the length of the extension **186** to be shortened rather easily. The free end **194** of the top end is spaced from the extension **186** so that it can fit into an adjacent opening **188.** Thus, by utilizing a plurality of rods **182,** spaced along the plywood shelves **102,** a relatively simple and inexpensive divider system can be formed.

The present system illustrates the flexibility of making various types of shelving arrangements. For example, the openings **18, 28** and **32** have reduced width portions extending upwardly and downwardly therefrom, enabling the uprights to be used in a reversed position when desired. Additionally, the supports **42** have been illustrated in a first position when used with the shelving **112** in the upper right-hand corner in FIG. **1,** and rotated to a second position when used with the tie straps **92** and support channels **104.** Such examples are merely illustrative of the unique flexibility of the system. Other arrangements are possible, with the shelving used to support numerous commodities, such as books, canned goods, tires and the like. Additionally, the system is modular in nature, that is, the system can be initially started with a single box-like structure and additional sections added thereto, when needed.

I claim:

1. A structural self-supporting system, comprising:

a plurality of axially-extending upright members arranged to form a generally box-like structure, each of said upright members having an L-shaped cross-sectional configuration defining a first section, and a second section formed in a plane generally perpendicular to said first section;

a row of spaced openings in each section extending axially thereof, each of said openings comprising

an enlarged central portion and a reduced portion contiguous therewith;

means for interconnecting said uprights and completing said box-like structure, including elongated support members each having a surface parallel to one of said upright sections and an axis generally perpendicular to the axis of said openings;

at least one headed projection extending from said surface adjacent each end of a support member, insertion of said headed projections on one of said support members into openings of spaced-apart upright members providing a rigid interconnection between the support member and said upright members;

said interconnecting means including a plurality of generally horizontally-positioned, parallel pairs of said support members completing said box-like structure; and

strengthening means interconnecting a parallel pair of support members for preventing said support members from rotating, including a tie strap whose central portion extends between said parallel support members with an L-shaped section at each end positioned around one of said parallel support members in rotation preventing engagement therewith.

2. A structural self-supporting system, comprising:

a plurality of axially-extending upright members arranged to form a generally box-like structure, each of said upright members having an L-shaped cross-sectional configuration defining a first section, and a second section formed in a plane generally perpendicular to said first section;

a row of spaced openings in each section extending axially thereof, each of said openings comprising an enlarged central portion and a reduced portion contiguous therewith;

means for interconnecting said uprights and completing said box-like structure, including elongated support members each having a surface parallel to one of said upright sections and an axis generally perpendicular to the axis of said openings;

at least one headed projection extending from said surface adjacent each end of a support member, insertion of said headed projections on one of said support members into openings of spaced-apart upright members providing a rigid interconnection between the support member and said upright members;

said interconnecting means including a plurality of generally horizontally-positioned, parallel pairs of said support members completing said box-like structure; and

strengthening means interconnecting a parallel pair of support members for increasing the weight capacity of said supports and comprising a channel member of U-shaped cross-sectional configuration with a bottom wall and spaced side walls, said channel member being slotted at its ends along the junction of the bottom wall with the side walls, enabling the ends of said channel member to receive said support members in holding engagement.

3. A structural self-supporting system, comprising:

a plurality of axially-extending upright members arranged to form a first generally box-like structure, each of said upright members having an L-shaped cross-sectional configuration defining a first section, and a second section formed in a plane generally perpendicular to said first section;

a row of spaced openings in each section extending axially thereof, each of said openings comprising an enlarged central portion and a reduced portion contiguous therewith;

means for interconnecting said uprights and completing said first box-like structure, including elongated support members each having a surface parallel to one of said upright sections and an axis generally perpendicular to the axis of said openings;

at least one headed projection extending from said surface adjacent each end of a support member, insertion of said headed projections on one of said support members into openings of spaced-apart upright members providing a rigid interconnection between the support member and said upright members; and

a second like, box-like structure joined to said first box-like structure with the adjacent uprights of each box-like structure being joined together in abutting relationships by means of a tie plate, said tie plate having a plurality of pairs of headed projections formed therein, one pair of headed projections being positioned in each of said adjacent upright members.

4. A structural self-supporting system, comprising:

a plurality of axially-extending upright members arranged to form a generally box-like structure, each of said upright members having an L-shaped cross-sectional configuration defining a first section, and a second section formed in a plane generally perpendicular to said first section;

a row of spaced openings in each section extending axially thereof, each of said openings comprising an enlarged central portion and a reduced portion contiguous therewith;

means for interconnecting said uprights and completing said box-like structure, including elongated support members each having a surface parallel to one of said upright sections and an axis generally perpendicular to the axis of said openings;

at least one headed projection extending from said surface adjacent each end of a support member, insertion of said headed projections on one of said support members into openings of spaced-apart upright members providing a rigid interconnection between the support member and said upright members; and

an adjacent member to which the box-like structure is joined by means of a connector member of L-shaped cross-sectional configuration, the ends of said connector member having inturned end plate members formed in a plane generally perpendicular to said L-shaped cross-sectional configuration, said plate members having headed projections within the cross-sectional configuration securing one end of said support device to one of said uprights and the other end thereof to said adjacent member.

5. A structural self-supporting system, comprising:

a plurality of axially-extending upright members arranged to form a generally box-like structure, each of said upright members having an L-shaped cross-sectional configuration defining a first section, and a second section formed in a plane generally perpendicular to said first section;

a row of spaced openings in each section extending axially thereof, each of said openings comprising an enlarged central portion and a reduced portion contiguous therewith;

means for interconnecting said uprights and completing said box-like structure, including elongated support members each having a surface parallel to one of said upright sections and an axis generally perpendicular to the axis of said openings;

at least one headed projection extending from said surface adjacent each end of a support member, insertion of said headed projections on one of said support members into openings of spaced-apart upright members providing a rigid interconnection between the support member and said upright members; and

a set of angled support members, each having an opening for positioning one edge of a shelf therein, said angled support member containing a side wall having headed projections thereon securing said angled support member to two of said uprights, a bottom wall integral with the bottom edge of said side wall and extending generally perpendicular therefrom, and an angled wall extending from the top edge of said side wall toward said bottom wall and being spaced therefrom to define said opening.

6. A structural self-supporting system, comprising:

a plurality of axially-extending upright members arranged to form a generally box-like structure, each of said upright members having an L-shaped cross-sectional configuration defining a first section, and a second section formed in a plane generally perpendicular to said first section;

a row of spaced openings in each section extending axially thereof, each of said openings comprising an enlarged central portion and a reduced portion contiguous therewith;

means for interconnecting said uprights and completing said box-like structure, including elongated support members each having a surface parallel to one of said upright sections and an axis generally perpendicular to the axis of said openings; and

at least one headed projection extending from said surface adjacent each end of a support member, insertion of said headed projections on one of said support members into openings of spaced-apart upright members providing a rigid interconnection between the support member and said upright members;

one set of said support members being of generally U-shaped cross-sectional configuration whereby shelving members having side edges of L-shaped configuration can be positioned on said support members, the L-shaped edges of said shelving members nesting in said U-shaped portion of said support members.

7. A structural self-supporting system, comprising:

a plurality of axially-extending upright members arranged to form a generally box-like structure, each of said upright members having an L-shaped cross-sectional configuration defining a first section, and a second section formed in a plane generally perpendicular to said first section;

a row of spaced openings in each section extending axially thereof, each of said openings comprising an enlarged central portion and a reduced portion contiguous therewith;

means for interconnecting said uprights and completing said box-like structure, including elongated support members each having a surface parallel to one of said upright sections and an axis generally perpendicular to the axis of said openings;

at least one headed projection extending from said surface adjacent each end of a support member, insertion of said headed projections on one of said support members into openings of spaced-apart upright members providing a rigid interconnection between the support member and said upright members; and

at least one cleat member of L-shaped cross-sectional configuration having intersecting side walls and which is secured to one section of an upright member by headed projections positioned on one wall of said cleat, the other wall of said cleat having openings for insertion of headed projections of another support member therein.

8. A structural self-supporting system in accordance with claim **7** wherein said other support member secured to said cleat is positioned in the same plane as a support member secured directly to said upright member.

9. A structural self-supporting system, comprising:

a plurality of axially-extending upright members arranged to form a generally box-like structure, each of said upright members having an L-shaped cross-sectional configuration defining a first section, and a second section formed in a plane generally perpendicular to said first section;

a row of spaced openings in each section extending axially thereof, each of said openings comprising an enlarged central portion and a reduced portion contiguous therewith;

means for interconnecting said uprights and completing said box-like structure, including elongated support members each having a surface parallel to one of said upright sections and an axis generally perpendicular to the axis of said openings;

at least one headed projection extending from said surface adjacent each end of a support member, insertion of said headed projections on one of said support members into openings of spaced-apart upright members providing a rigid interconnection between the support member and said upright members; and

a wall bar fixedly spacing the box-like structure from a support surface, said wall bar having a generally L-shaped cross-sectional configuration with inturned end plates at each end thereof substantially perpendicular to the axis of said bar, one of said end plates having a pair of headed projections positioned in the openings formed in one of said uprights, and the other end plate being secured to said support surface.

10. A structural self-supporting system, comprising:

a plurality of axially-extending upright members arranged to form a first generally box-like structure, each of said upright members having an L-shaped cross-sectional configuration defining a first section, and a second section formed in a plane generally perpendicular to said first section;

a row of spaced openings in each section extending axially thereof, each of said openings comprising an enlarged central portion and a reduced portion contiguous therewith;

means for interconnecting said uprights and completing said box-like structure, including elongated support members each having a surface parallel to one of said upright sections and an axis generally perpendicular to the axis of said openings;

at least one headed projection extending from said surface adjacent each end of a support member, insertion of said headed projections on one of said support members into openings of spaced-apart upright members providing a rigid interconnection between the support member and said upright members;

a second like, box-like structure adjacent said first box-like structure; and

a section of raised decking positioned between said box-like structures, said decking being positioned between a pair of support members, each of said support members being defined by a side wall having headed projections secured to an upright member, a bottom wall extending in a plane generally perpendicular to said side wall, and a top-angled wall extending from the side wall, said top and bottom walls being integral with said side wall and extending towards each other with a spacing between said top and bottom walls defining an opening into which said decking is inserted.

11. A structural self-supporting system, comprising:

a plurality of axially-extending upright members arranged to form a generally box-like structure, each of said upright members having an L-shaped cross-sectional configuration defining a first section and a second section formed in a plane generally perpendicular to said first section;

a row of spaced openings in each section extending axially thereof, each of said openings comprising an enlarged central portion and a reduced portion contiguous therewith;

means for interconnecting said uprights and completing said box-like structure, including elongated support members each having a surface parallel to one of said upright sections and an axis generally perpendicular to the axis of said openings;

at least one headed projection extending from said surface adjacent each end of a support member, insertion of said headed projections on one of said support members into openings of spaced-apart upright members providing a rigid interconnection between the support member and said upright members; and

a plurality of vertically spaced shelves positioned on said support members in planes generally perpendicular to said upright members, said shelves having openings extending therethrough, and dividers positioned in said openings to form a shelf divider system, said dividers being formed of rods extending through said openings in a plane generally parallel to said uprights, and one end of said rods having a curved portion for securing said rods to one of said shelves.

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