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Glassman

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[54] **STORAGE ASSEMBLY**

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[21] Appl. No.: **136,485**

[52] **U.S. Cl.** **211/177,** 312/107, 108/60

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

[58] **Field of Search** 211/177, 178, 74, 184, 211/14, 85, 72; 248/165, 174; 312/107, 108; 108/60, 153

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Attorney, Agent, or Firm—Spensley, Horn & Lubitz

[57] **ABSTRACT**

A knock-down storage assembly providing compartmentalized space for the storage and display of a large variety of items, especially books, phonograph records, magazines, newspapers and objects of art. The storage assembly is formed by a pair of collapsible three-sided notched structural elements which interfit with one another. When assembled, the storage assembly can stand in any one of six positions. In addition, two or more storage assemblies may be stacked to form larger storage systems in any of a variety of geometric configurations.

8 Claims, 11 Drawing Figures

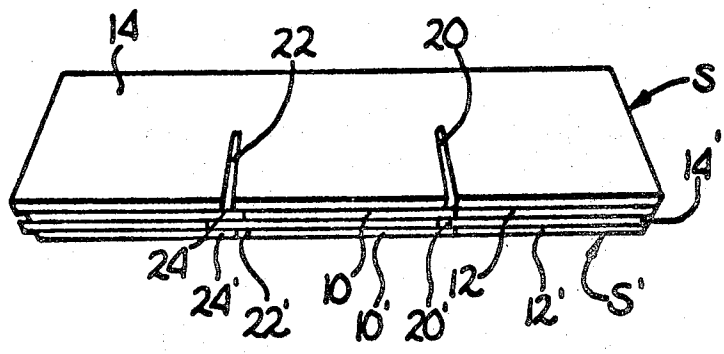
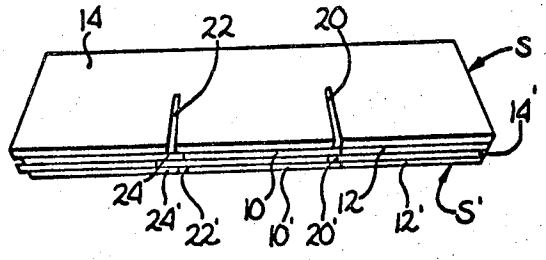


Fig. 1



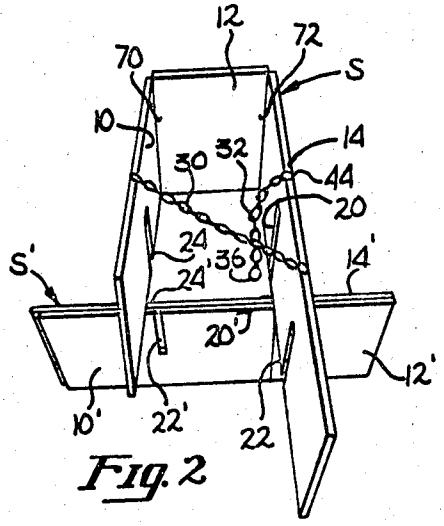


Fig. 2

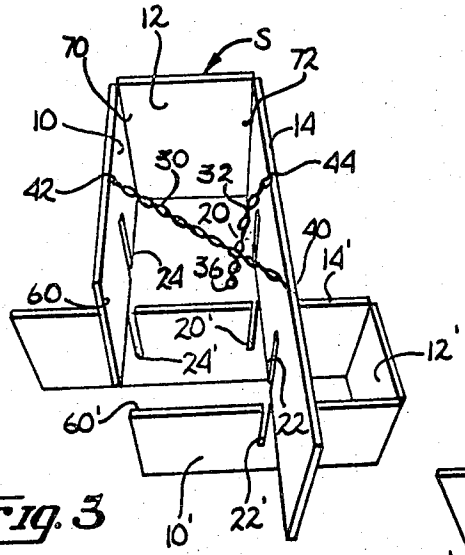


Fig. 3

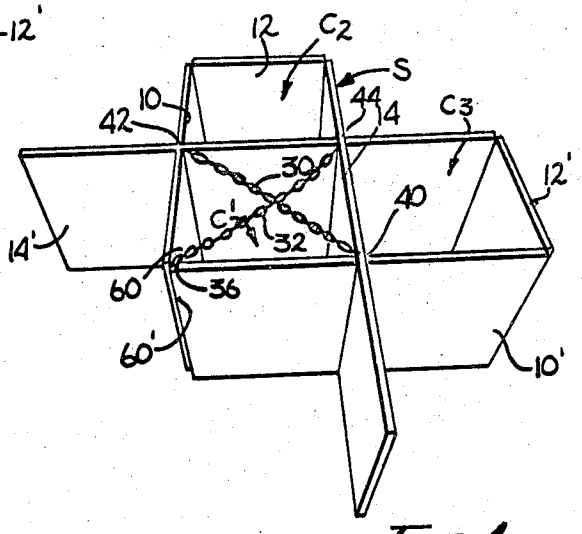


Fig. 4

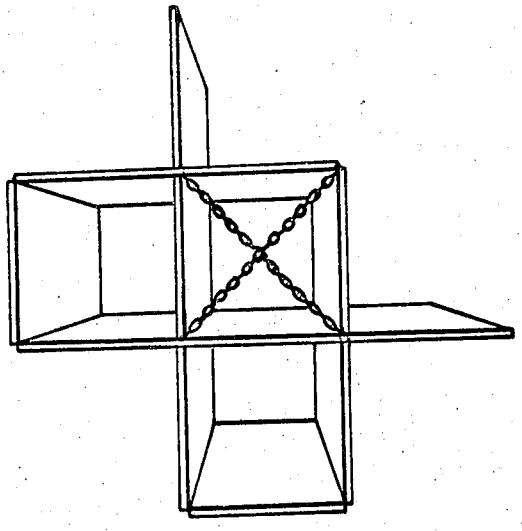


Fig. 5

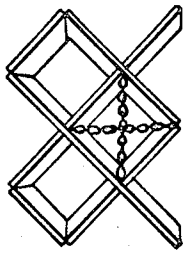


Fig. 6

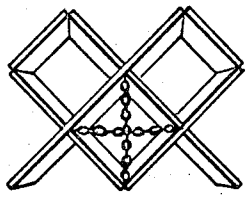
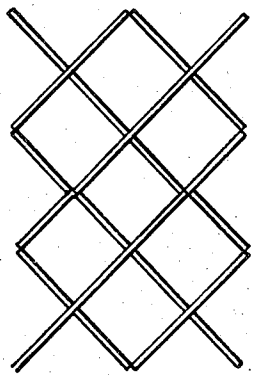


Fig. 7

Fig. 8



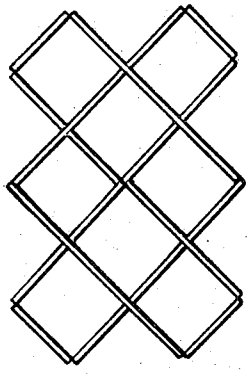


Fig. 9

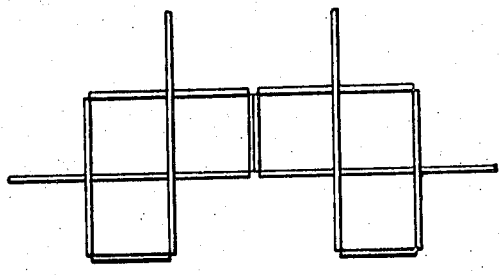


Fig. 10

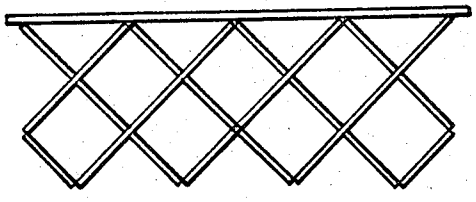


Fig. 11

STORAGE ASSEMBLY

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to storage structures and more particularly to a novel knock-down storage assembly which provides compartmentalized space for storage and display, and which may be the building block for configuring a great variety of larger storage systems.

2. Prior Art

A number of different storage structures are disclosed by the prior art. These structures, however, have shortcomings and limitations which reduce their overall usefulness. For example, many of these known structures have a single, fixed configuration; i.e., they provide the user no capability or means for changing the manner in which they divide the storage space provided. A user of such storage structures is limited to a static and unvarying storage configuration.

Some storage structures disclosed by the prior art, however, do enable the user to arrange a set of storage assemblies or building blocks in any of a number of possible configurations. While these storage structures offer greater variety than those of the fixed configuration type, they still have significant shortcomings. In the first place, such build-up storage structures are generally expensive. Secondly, the number of possible configurations which can be arranged are relatively small. Lastly, and perhaps most importantly, these storage structures typically require wall mounting or other external support; thus, once assembled and installed, they are difficult and inconvenient to either rearrange or move.

Some storage structures known in the prior art have the disadvantage of being heavy and/or bulky and therefore difficult to move, while others are not collapsible and, therefore, occupy a great deal of space when not in use.

The present invention, however, overcomes these shortcomings and limitations of the prior art by disclosing a relatively inexpensive, lightweight knock-down storage assembly which provides a greater variety of possible storage configurations than has heretofore been disclosed. The invented storage assembly, for example, can be used singly or it can be stacked with others to form larger storage systems. When used singly, the invented storage assembly can stand on the floor in any one of six different and aesthetically pleasing positions without any external support required under reasonably distributed loads. In addition, its light weight, compactness, and freedom from support constraints allow it to be easily and quickly moved, thereby enabling the user to change from one standing position to another as he desires. While the storage assembly does not require external support, wall mountings or other external support may be used as required to implement additional novel arrangements.

The invented storage assembly may also be used as a building block for assembling larger storage and display systems. In this mode of use, storage assemblies are stacked one on top of another and/or one adjacent to another. By so stacking the storage assemblies, larger storage and display systems can be assembled in any of an indefinite number of possible geometric configurations. No external support is required for such stacks under reasonably distributed loads, although wall mounting or other support is not precluded. In addition, the light weight, compactness, and freedom from support constraints of the storage assemblies allow the user to easily and quickly change the geometric configuration of the storage system assembled therefrom.

The corners of the invented storage assembly are readily adaptable to being interconnected to the corners of a second storage assembly. Thus, when two or more units of the present invention are stacked to form a larger storage and display system, additional storage space is created in the space between each pair of storage assemblies used. There is no redundancy of structural material in the stacked configuration as is typically the case in the prior art.

The present invention overcomes a shortcoming of many storage structures known in the prior art, to wit: the difficulty of storing the structure when not in use. As will be disclosed more fully hereinbelow, the invented storage assembly, in its knocked-down stage, consists of a pair of three-sided structural elements whose members can be folded to lie flat; thus, a large storage and display system assembled by stacking the present invention can be knocked down to a relatively small volume equal to the sum of the actual volumes of each of its members. When not in use, therefore, the storage system can be put away in a relatively small space.

The compactness of the present invention in its knocked-down state, together with its light weight, make transporting it (and storage systems built up from it) substantially easier and more economical. The invented storage assembly is easily and quickly assembled and disassembled without tools, further adding to the ease with which it can be put away or transported.

While certain knock-down or collapsible storage structures are disclosed by the prior art, and while some may have ease of assembly in common with the present invention, there has heretofore been no storage structure which combines in one structure all of the features and advantages found in the present invention.

BRIEF SUMMARY OF THE INVENTION

The present invention is a storage assembly which provides compartmentalized space for the storage and display of a variety of items, especially books, phonograph records, magazines, newspapers and objects of art. It is capable of maintaining books, records, etc. in their place without the use of bookends; i.e., the structural members of the assembly provide the support required. In addition, in certain standing positions of the storage assembly, the books, records, etc. are supported in an angular direction, so that their own weight provides the force for maintaining them in position without bookends or other external support means.

The storage stack may be used as the basic building block for larger storage and display systems having any one of an indefinite number of possible geometric configurations.

The storage assembly is comprised of a pair of notched foldable structural elements which interfit with one another to form the assembly. Each structural element is in turn comprised of three members, the first and second of which are joined at one of their ends by a pivotal coupler, typically a hinge, while the second and third members are joined at the opposite end of the second member by a second pivotal coupler. The members comprising the structural elements may be made

from any strong and inflexible material such as wood, aluminum, plastic or sturdy cardboard.

Notches are located at corresponding positions on the members of each of the two structural elements. In order to assemble the invented storage assembly, the structural elements are first unfolded and their corresponding notches aligned for engagement. The two structural elements are then interfit by pressing one into the other along corresponding pairs of notches. The fit is best characterized as a "press fit," sufficiently tight to provide a rigid structure, while at the same time, not so tight so as to make assembly or disassembly difficult. To provide geometric stability, tensile members, typically chains, are disposed diagonally across one face of the central storage compartment (formed by the storage assembly). Under load each chain is pulled taut, and while under stress, it provides additional structural support.

After being assembled, the storage assembly can be placed in any one of six standing positions without any external support being required under reasonably distributed loads. In addition, as noted above, two or more storage assemblies can be stacked to form larger storage and display systems in a large variety of geometric configurations.

Thus, it is a principal object of the present invention to provide a knock-down storage assembly which is easily assembled and disassembled.

It is another principal object of the present invention to provide a storage assembly which can be stacked to form larger storage systems in a large variety of geometric configurations.

It is still another principal object of the present invention to provide a storage assembly which can stand in a number of different, aesthetically pleasing positions without external support.

A further object of the present invention is to provide a storage assembly which can be readily and conveniently moved, stored or transported.

A still further object of the present invention is to provide a relatively inexpensive, functional and aesthetically pleasing storage assembly which provides great flexibility in the ways it can be used.

The novel features which are characteristic of the present invention, as well as other objects and advantages thereof, will be better understood from the following description, reference being had to the accompanying drawings in which a presently preferred embodiment of the invention is illustrated by example.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a pair of structural elements in their knocked-down and folded state.

FIG. **2** is a perspective view of a one structural element in its knocked-down and folded state and a second structural element in its fully unfolded state.

FIG. **3** is a perspective view of a pair of fully unfolded structural elements aligned for engagement.

FIG. **4** is the view of FIG. **3** after the two structural elements have been engaged to form storage assembly.

FIG. **5** is a perspective view of a storage assembly in a first of its six standing positions.

FIG. **6** is a perspective view of a storage assembly in a second of its six standing positions.

FIG. **7** is a perspective view of a storage assembly in a third of its six standing positions.

FIG. **8** is a cross-sectional view of a first storage system formed by stacking two storage assemblies.

FIG. **9** is a cross-sectional view of a second storage system formed by stacking two storage assemblies.

FIG. **10** is a cross-sectional view of a third storage system formed by combining two storage assemblies.

FIG. **11** is a cross-sectional view of a fourth storage system formed by combining two storage assemblies.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIGS. **1** through **4**, the present invention will be described in detail by describing a preferred embodiment thereof. The present invention is a storage assembly comprising two substantially identical structural elements S and S'. Each of the structural elements S and S' consists of three members **10, 12** and **14** and **10', 12'** and **14'**, respectively. The height and thickness of members **10, 10', 12, 12', 14** and **14'** are approximately equal. With respect to length, members **12** and **12'** and approximately one-third the length of members **14** and **14'** respectively, while members **10** and **10'** are approximately two-thirds the length of members **14** and **14'** respectively, as shown in FIGS. **3** and **4.**

The members **10, 10', 12, 12', 14** and **14'** may be constructed from any strong and inflexible material such as wood, aluminum, plastic or sturdy cardboard having a suitable thickness.

With specific reference to FIGS. **3** and **4,** members **10** and **12** of structural element S are joined by a conventional pivotal coupler, preferably a hinge, at a first end **70** of member **12.** (The hinge is not shown explicitly in the FIGURES.) Members **12** and **14** of structural element S are similarly joined by a hinge at a second end **72** of member **12.** Members **10', 12'** and **14'** of structural element S' are joined by pivotal couplers in a manner identical to that just described for members **10, 12** and **14.**

In this preferred embodiment, two notches **20** and **22** are provided in member **14** while a notch **24** is provided in member **10** of structural element S. In structural element S' notches **20'** and **24'** are provided in member **14'** while a notch **22'** is provided in member **10'.** The notches **20** and **22** are located at approximately the one-third and two-thirds points respectively along the length of member **14,** while notch **10** is located at approximately the one-half point along the length of member **10.** Similarly, notches **20'** and **24'** are located at approximately the one-third and two-thirds points respectively along the length of member **14'** while notch **22'** is located at approximately the one-half point along the length of member **10'.** By providing the notches at the locations described hereinabove, square storage compartments C_1, C_2 and C_3 are formed when the structural elements S and S' are engaged as shown in FIG. **4.** The length of each side of the square compartments C_1, C_2 and C_3 is the length of members **12** and **12',** or one-half the length of members **10** and **10',** or one-third the length of members **14** and **14'.**

The notches **20, 20', 22, 22', 24** and **24'** are relatively narrow slots extending in a direction normal to the edges of the members in which they are provided. In this preferred embodiment each of the notches extends to the one-half point along the height dimension of its respective member. However, other lengths are possible provided that the sum of the lengths of interfitting notches equals the height of the members; e.g.,

notch 20 could extend to the one-third point and notch 20' to the two-thirds point along the height dimension of members 10 and 10' respectively. The width of the notches 20, 20', 22, 22', 24 and 24' are substantially equal to the thickness of the members 10, 10', 14 and 14' so as to provide a press fit when structural elements S and S' are engaged as described hereinbelow. The press fit required is one which is sufficiently tight to provide a rigid structure, while at the same time not so tight so as to make assembly or disassembly difficult.

The present invention contemplates that other notches may be provided in its members in addition to those notches disclosed hereinabove. Such other notches could be provided for such possible purposes as interfitting one storage assembly with another or for joining an assembly to a wall or other fittings.

In order to better understand the present invention, the manner in which it is assembled will now be described. In FIG. 1 structural elements S and S' are shown in their folded state, one on top of the other. This would be the state of the elements S and S' when not in use or during transport. In FIG. 2 structural element S is shown unfolded forming a three-sided structure, the planes of its members 10 and 14 being parallel and perpendicular to the plane of member 12. FIG. 3 depicts both structural elements S and S' in their respective unfolded states. Structural element S' is unfolded in the identical manner as described above with respect to element S. In FIG. 3 the structural elements S and S' are placed in position for engagement by aligning the opening of notch 20 with that of notch 20'; the opening of notch 22 with that of notch 22'; and the opening of notch 24 with that of notch 24'. After the alignment of their respective notches, structural elements S and S' are interfit by pressing one into the other to form the storage assembly shown in FIG. 4.

In order to provide geometric stability, tensile members 30 and 32, preferably chains, are diagonally disposed across the center storage compartment C_1 of the storage assembly of FIG. 4. The chain 30 is permanently secured to member 14 and member 10 by conventional anchor fittings 40 and 42 respectively. Chain 32 is permanently secured at one of its two ends to member 14 by conventional anchor fitting 44. The second end 36 of chain 32 is not connected until after structural elements S and S' are assembled as shown in FIG. 4. After assembly, the second end 36 of chain 32 is connected to one corner of the junction formed by ends 60 and 60' of members 10 and 10' respectively by conventional means such as, for example, the following: each of a pair of interlacing hinge-like elements (not shown) is secured to one corner of members 10 and 10' at ends 60 and 60' respectively. The engagement of a drop pin through the center of the hinge-like elements, after the latter are interlaced and aligned, holds members 10 and 10' together. End 36 of chain 32 is secured to the drop pin and is thereby connected to the junction formed by members 10 and 10' at the corner where the hinge-like elements are affixed.

When structural element S is in its collapsed state, chains 30 and 32 hang loosely. When assembled and under load, chains 30 and 32 are of such a length so as to be pulled taut, and while under stress, they provide additional structural support.

Fully assembled the present invention provides compartmentalized space and several surfaces for the storage and display of a large variety of items. Preferred dimensions of the square storage compartments C_1, C_2 and C_3 shown in FIG. 4 are approximately 13½ inches by 13½ inches and the preferred depth of the storage assembly is on the order of 12 inches. The length of those portions of members 14 and 14' extending beyond the square compartments shown in FIG. 4 would also be approximately 13½ inches. These preferred dimensions enable the storage of large magazines, such as "Life" magazine. (Life is the largest standard magazine, being 13¼ inches in height.) It is within the contemplation of this invention that storage compartments C_1, C_2 and C 3 be subdivided by techniques known in the art into smaller spaces for specific uses, such as, for example, book storage.

The present invention can be placed in any one of the six standing positions. Three of these are shown in FIGS. 5 through 7. Two of the remaining three standing positions are the mirror images of the positions shown in FIGS. 5 and 6. The sixth standing position is an upside down reversal of that shown in FIG. 7. In any of these positions the storage assembly requires no external support under reasonably balanced loads. It is contemplated that the storage assembly will stand freely against a wall, although wall mounting or locations away from a wall are not precluded.

The invented storage assembly may also be used as a building block for assembling larger storage and display systems. In this mode of use, two or more storage assemblies are stacked one on top of the other and/or one adjacent to the other. By so stacking the invented storage assemblies, an indefinite number of geometric configurations can be achieved, limited only by the number of storage assemblies used. The invented storage assembly is adapted to the kind of stacking described above, and external support of the stacked structure, while optional, is not required. In addition, the corners of the invented storage assembly are readily adaptable to being interconnected to the corners of a second storage assembly with or without fastening means. Thus, when two or more units of the present invention are combined to form a larger storage and display system, additional storage compartments are formed in the space between each pair of storage assemblies used, without any redundancy of structural material in the stacked configuration.

FIGS. 8 through 11 provide illustrations of four geometric configurations made possible by the present invention. The configurations depicted in FIGS. 8 through 11 utilize only two storage assemblies. It can thus be seen that countless other configurations are possible as the number of storage assemblies combined (stacked) is increased.

In an additional use of the present invention, it is contemplated that a door or a board of plywood, plastic or other suitable material can be laid across the tops of two separate storage assemblies to form a table or desk-like structure. Likewise, by placing a board of plywood, for example, across the tops of a pair of storage assemblies standing in the position depicted in FIG. 6, a drafting height table or a bar/counter can be created. In a still further use of the present invention a sheet of plywood, plastic, glass or other suitable material can be laid across the tops of a pair of combined storage assemblies to provide a horizontal surface as shown in FIG. 11.

Although this invention has been disclosed and described with reference to a particular embodiment, the

principles involved are susceptible of other applications which will be apparent to persons skilled in the art. This invention, therefore, is not intended to be limited to the particular embodiment herein disclosed.

I claim:

1. A storage assembly comprising first and second substantially identical structural elements, each of said structural elements comprising first, second and third substantially flat, rectangular members having approximately the same thickness dimension, said thickness dimension of each of said members being substantially less than both its length and height dimensions, said first member having a length approximately three times that of said second member, and said third member having a length approximately two times that of said second member, said first and third members being fixedly secured to opposite ends of said second member by first and second pivotal coupling means for enabling said first and second members to rotate with respect to each other around an axis of said first pivotal coupling means at least from a position whereby the surfaces of said first and second members are in substantial contact to a position whereby such first and second members are substantially at right angles, and for enabling said second and third members to rotate with respect to each other around an axis of said second pivotal coupling means at least from a position whereby said second and third members are substantially coplanar to a position whereby said second and third members are substantially at right angles to each other with said third member substantially parallel to and disposed over said first member when said first member is at right angles to said second member, said first and third members having at least first, second and third notches, substantially in parallel, extending from corresponding first edges of said first and third members in a direction normal to said edges, said first and second notches being located in said first member at approximately the one-third and two-thirds points respectively along the length dimension of said first member in a direction away from said first pivotal coupler, said third notch being located in said third member at approximately the one-half point along the length dimension of said third member, said first structural element being adapted to interfit with said second structural element by the engagement of said first member of said first structural element into said first and third members of said second structural element along said first and second notches of said first structural element and said first and third notches of said second structural element respectively, and by the engagement of said third member of said first structural element into said first member of said second structural element along said third notch of said first structural element and said second notch of said second structural element, to form said storage assembly.

2. The storage assembly of claim 1 wherein each of said notches extends to approximately the one-half point in the height dimension of said first and third members of each of said first and second structural elements.

3. The storage assembly of claim 1 having, in addition, at least a first tensile member having first and second ends, said first end being fixedly secured to said first member of said first structural element at a point along a second edge of said first member approximately opposite from the openings of said second notch in said first member, and said second end being fixedly secured to said third member of said first structural element at a point along a corresponding second edge of said third member approximately opposite from the opening of said third notch in said third member, said first tensile member being of such a length so as to be rendered substantially taut when said storage assembly is placed under load.

4. The storage assembly of claim 3 wherein said first tensile member is a chain.

5. The storage assembly of claim 1 having, in addition, a coupling means for fixedly joining the unsecured end of said third member of said first structural element to the unsecured end of said first member of said second structural element, after said first and second structural elements are fully engaged.

6. The storage assembly of claim 5 having, in addition, a second tensile member having first and second ends, said first end being fixedly secured to said first member of said first structural element at a point along a second edge of said first member approximately opposite from the opening of said first notch in said first member, and said second end being fixedly secured to said coupling means for fixedly securing said unsecured ends of said third and first members respectively, said second tensile member being of such a length so as to be rendered substantially taut when said storage assembly is placed under load.

7. The storage assembly of claim 6 wherein said second tensile member is a chain.

8. The storage assembly of claim 1 wherein the width of the opening of each of said notches is approximately equal to the thickness of said first, second and third members.

* * * * *