United States Patent

Young

[15] **3,677,202**

[45] **July 18, 1972**

[54] STORAGE SYSTEM

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[22] Filed: **July 27, 1970**

[21] Appl. No.: **58,214**

[52] **U.S. Cl.** **108/109**, 108/111, 211/153

[51] **Int. Cl.** **A47b 57/16**

[58] **Field of Search** ..... 108/108, 109, 110, 111; 211/148 US, 153 US; 52/627

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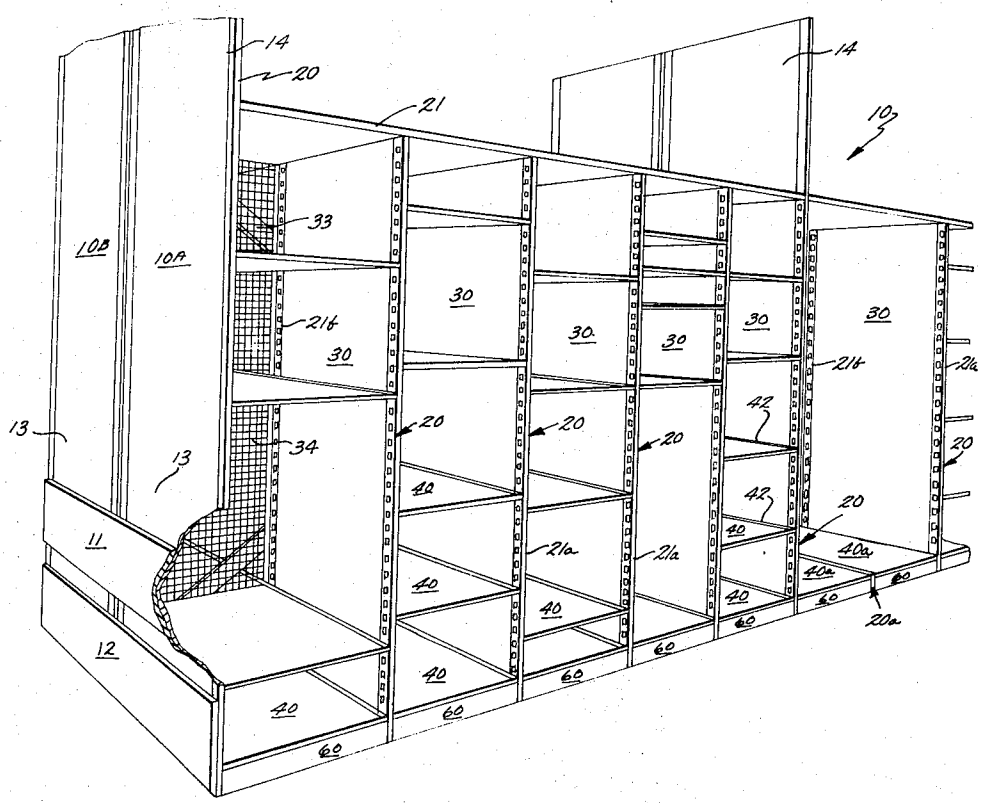
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[57] **ABSTRACT**

A storage system including a series of spaced, elongated, load-bearing members, each such member including two spaced uprights. Each of the uprights include opposed, spaced surfaces, each such surface having a series of vertically spaced, tongue-like members extending upwardly therealong. Article supporting means such as shelves, hanger rods and the like are adapted to be suspended between two of the load-bearing members, the supporting means including at least four spaced tongue-like member engaging means, the spacing between said engaging means, said uprights and said bearing members being such that each of the engaging means is engageable with one of the tongue-like members on a different surface.

15 Claims, 12 Drawing Figures



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3 Sheets-Sheet 1

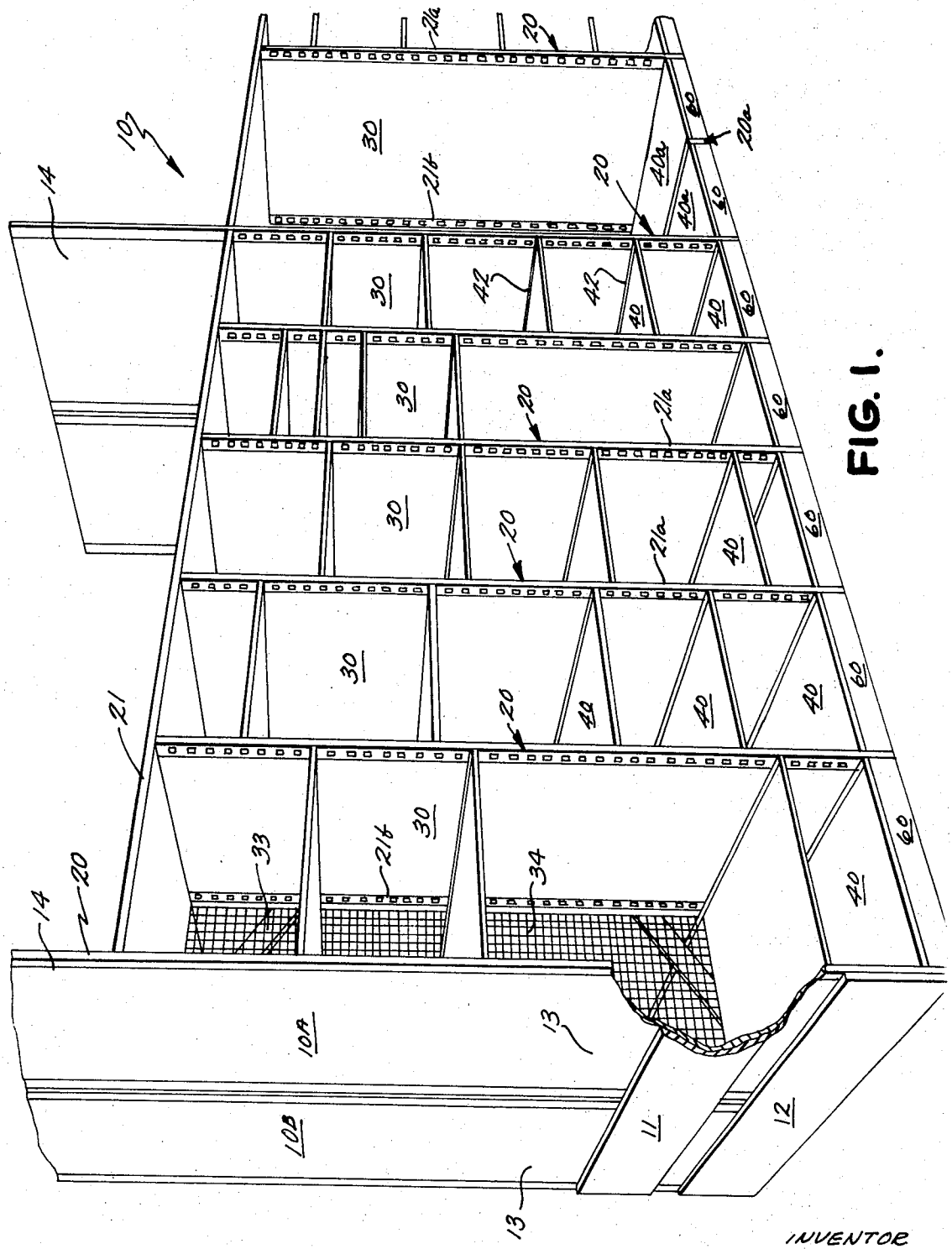


FIG. 1.

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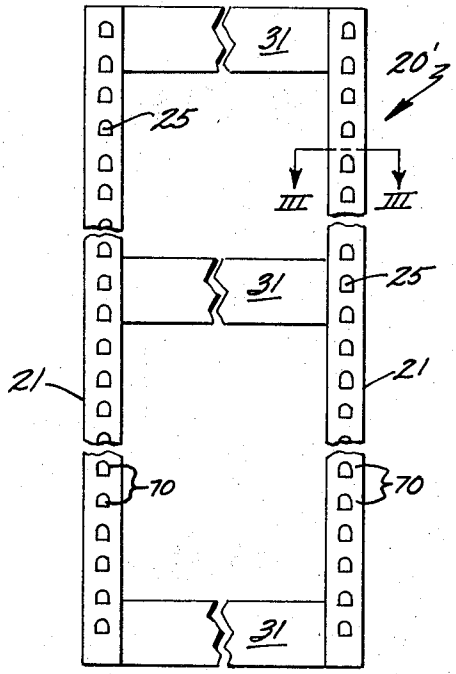


FIG. 2.

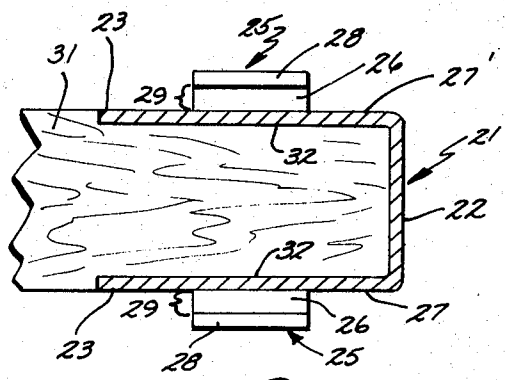


FIG. 3.

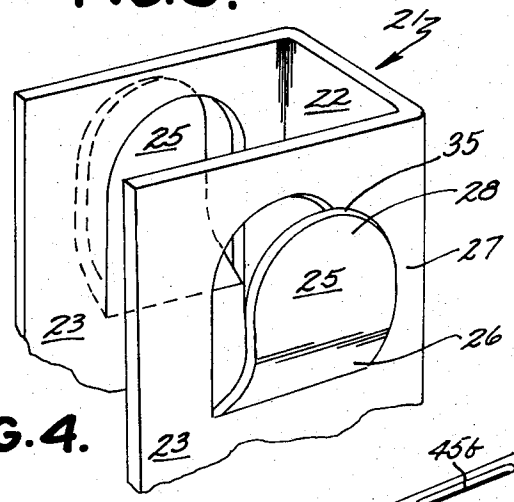


FIG. 4.

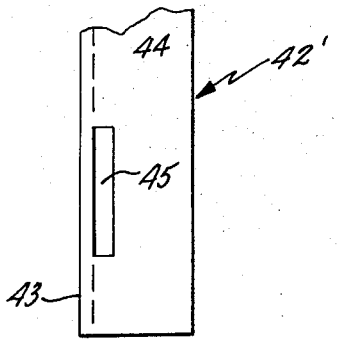


FIG. 6.

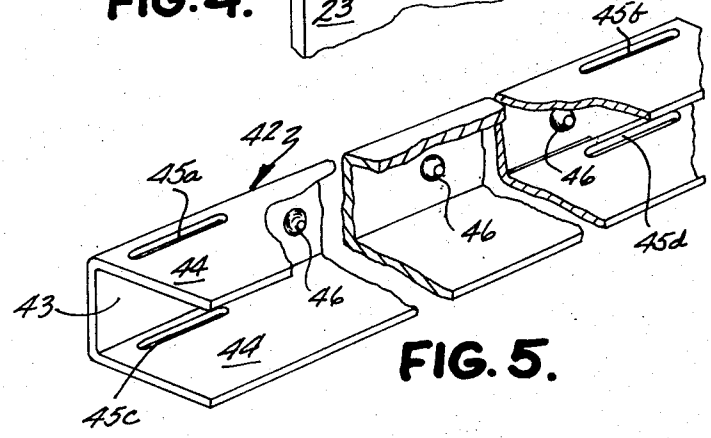


FIG. 5.

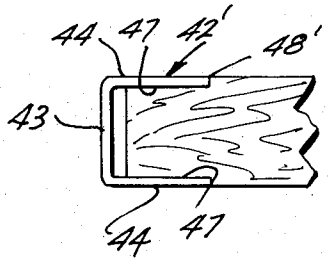


FIG. 8.

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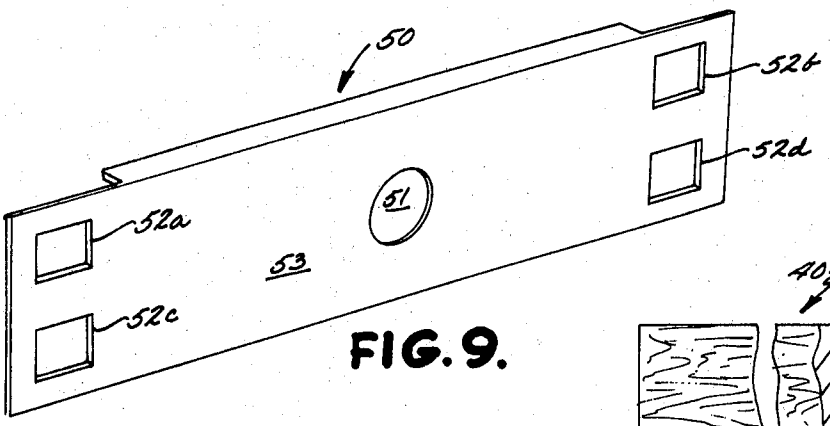


FIG. 9.

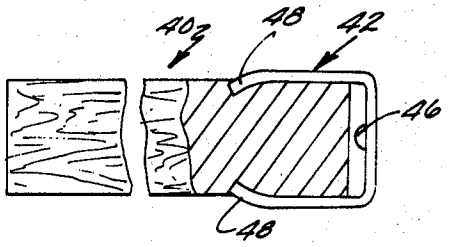


FIG. 7.

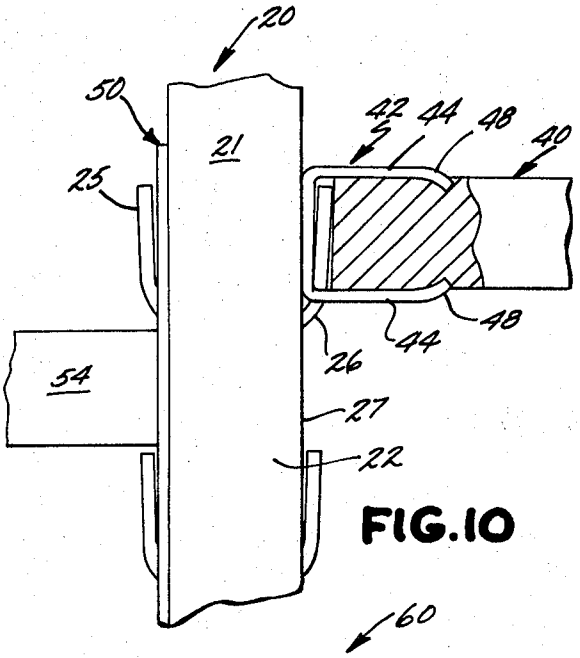


FIG. 10

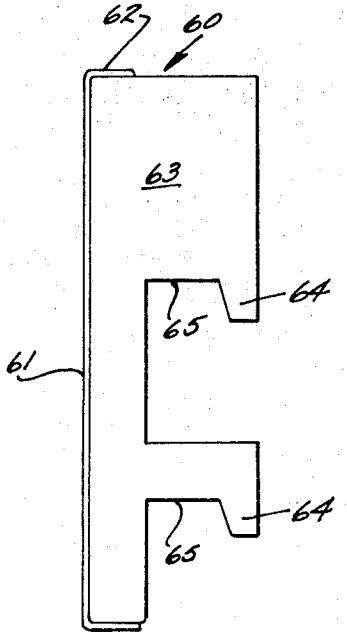


FIG. 12.

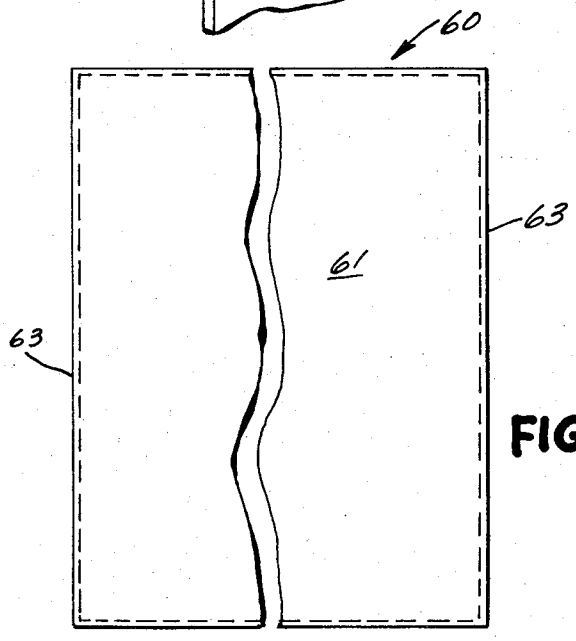


FIG. 11.

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STORAGE SYSTEM

BACKGROUND OF THE DISCLOSURE

This invention relates to storage system and, more particularly, to such systems including modular components capable of being assembled in a variety of different configurations.

It has been proposed heretofore in the art to fabricate shelving in such a manner that it can be assembled at the situs of use in varying configurations particularly adapted for the particular use in question. It has been proposed, additionally, to provide such systems which are capable of being disassembled at least partially at the situs of use and, thereafter, either moved to another location or reassembled in a differing configuration particularly adapted to a differing use. One example of such a system is shown in U.S. Pat. No. 2,577,138.

The instant invention concerns itself with systems of this type and the preferred embodiment thereof is particularly adapted for use in the stock room or back room type of environment. Such shelving and storage arrangements have been constructed heretofore primarily of wood and have lacked not only the versatility of the modular-type of system but, additionally, have been rather expensive to fabricate because of the amount of labor involved.

OBJECTS AND SUMMARY OF THE INVENTION

It is an object of this invention, thus, to provide a storage system of the general type described which, while affording the advantages of all-wooden shelving insofar as the same relate to structural rigidity, longevity and the like, provides additionally the convenience and versatility of the modular, knock-down type of systems.

It is an object of this invention, more particularly, to provide a system of the type described wherein the various article supporting surfaces, rods and the like may be quickly and easily assembled into any desired configuration and, if desirable at some later date, disassembled and re-assembled in a differing configuration more suitable to the various articles then being stored.

It is an object of this invention, additionally, to provide such a system which is extremely stable and rigid and, yet, which may be easily and quickly assembled or disassembled by non-skilled labor.

It is yet a further object of this invention to provide a system of the type described which may be fabricated and assembled relatively inexpensively and with minimal labor.

These as well as other objects of this invention are accomplished through the provision of an article storage system comprising a series of elongated, load-bearing members adapted to be positioned vertically in space, side-by-side relationship with respect to one another. Each of the members has at least two spaced uprights, each of the uprights having a pair of opposed, spaced surfaces. Each of the surfaces, in turn, have a series of vertically spaced engaging means therealong, each of the engaging means including an upwardly extending tongue-like member. The base portions of the tongue-like members are affixed to the surfaces from which they extend and the upper portions thereof are spaced from such surfaces. Article supporting means are provided which are adapted to be suspended between two of the load-bearing members, the supporting means including at least four spaced tongue-like member engaging means, the spacing between said engaging means, said uprights and said bearing members being such that each of said engaging means on said supporting means is engageable with a tongue-like member on a different of said surfaces.

DESCRIPTION OF THE DRAWINGS AND THE PREFERRED EMBODIMENT

The instant invention will be readily understood by those skilled in the art from a reading of the following specification and a study of the accompanying figures in which:

FIG. **1** is a perspective view of a storage system section constructed in accordance with the teachings of this invention;

FIG. **2** is a broken side-elevational view of one of the load-bearing members, such member being slightly modified from those illustrated in FIG. **1**;

FIG. **3** is a cross-sectional view taken along plane III—III of FIG. **2**;

FIG. **4** is a fragmentary perspective view of an upright;

FIG. **5** is a broken, fragmentary perspective view of one of the rigid shelf supports;

FIG. **6** is a fragmentary, plan view of the shelf support;

FIG. **7** is a front-elevational view, partially in cross section, of a shelf assembly having the end support illustrated in FIG. **5** affixed thereto;

FIG. **8** is a front-elevational view of a slightly modified form of shelf-end support structure;

FIG. **9** is a perspective view of a hanger rod support suitable for use in conjunction with the invention;

FIG. **10** is a fragmentary, front-elevational view, partially in cross section, of a load-bearing member having a shelf extending from one side thereof and a hanger rod from the other side thereof;

FIG. **11** is a front-elevational view of the front skirt; and

FIG. **12** is a side-elevational view of the front skirt.

Referring initially to FIG. **1**, there is illustrated a storage system **10** including two back-to-back sections **10A** and **10B**. Each section includes a series of spaced, elongated, load-bearing members **20** positioned in side-by-side relationship with respect to one another. Each of the load-bearing members **20**, as illustrated additionally in FIGS. **2** through **4**, comprises a pair of spaced metal uprights **21***a* and **21***b*. The uprights include a connecting section **22** having a pair of plate sections **23** extending perpendicularly therefrom in generally U-shaped fashion and are formed, preferably, integrally from suitable metallic stock.

The exterior, opposed surfaces **27** and **27'** of the plate sections **23** have formed directly therein through a suitable lancing or die-cutting process a series of vertically spaced, tongue-like members **25**. Each of the tongue-like members **25** includes a base section **26** extending away from its surface **27** at an acute angle and thereafter bending upwardly so as to lie generally parallel to but spaced from the surfaces **27** at upper section **28**. Upper section **28**, as will be noted clearly from FIG. **4**, preferably includes a rounded upper edge **35** in the manner illustrated to assist in the installation of a particular system as will become apparent hereinafter.

The resulting configuration provides a space **26** between the upper portion **28** of the tongue-like member and the plane of the surface **27**, which space narrows at the base section **26** in converging fashion to form somewhat of a wedging area between the base section **26** and a member overlying the surface **27** as will be discussed hereinafter.

As illustrated in FIGS. **1** and **2**, the tongue-like members **25** are spaced preferably relatively close to one another along the uprights **21**, the shelves, hanger rods and the like being movable vertically from one to the other to achieve the desired vertical spacing between article supporting members. Ordinarily, of course, the components will be fabricated such that the vertical position of each of the tongue-like members on a particular upright will correspond to one of the tongue-like members on the attached upright as well as upon the remainder of the uprights in the system such that the shelves, hanger rods and the like may be positioned in generally horizontal fashion between any two of the load-bearing members **20** when desired.

As illustrated best in FIG. **4**, the tongue-like members are formed preferably by die-cutting or lancing the stock utilized in the fabrication of the upright prior to its being rolled or otherwise formed in its U-shaped configuration. Such a procedure may be accomplished easily, as will be readily appreciated by those skilled in the art and the tongue-like members can be given the desired configuration as illustrated in FIG. **4** with little difficulty and with little fabricating expense.

The two uprights **21***a* and **21***b* forming a particular load-bearing member **20** may be maintained in spaced relationship

by means of a continuous sheet spacer **30** such as illustrated in FIG. **1**, or by means of spaced non-continuous spacers **31** such as are illustrated in FIG. **2** depending upon the desirability of maintaining a solid boundary between vertical rows of shelves. In either case, the wooden spacer is preferably routed as indicated at **32** in FIG. **3** along the edges thereof which are to fit into the interior of the U-shaped uprights **21**. Each of the vertical edges of the continuous spacer or barrier **30** or of the spacers **31** will be so routed and the uprights affixed thereto such that the openings in their U-shaped cross section face one another. The uprights may be secured to the filler **30** or spacers **31** by any suitable means such as screws or, alternatively, by crimping the edges of the plates **23** to the wood in a manner similar to be described later in conjunction with FIG. **7**.

The spacers **30** or **31** will be installed, ordinarily, at the point of fabrication of the various system components and the load-bearing members **20** or **20'** will be shipped to the installation situs in assembled configuration. By following such a procedure, desirable tolerances can be maintained with ease and, the rather flat nature of the members when rotated to a horizontal position presents little shipping problems.

At the situs of installation they may be oriented vertically at the desired locations and, as illustrated in FIG. **1**, have conventional sway braces **33** affixed thereto in crossing fashion as necessary. If desirable, additionally, a screen or other barrier may be affixed to the rear of the units and a top **21** positioned along the upper extremities thereof. In the embodiment illustrated in FIG. **1**, of course, two of the load-bearing members have been positioned in aligned relationship with respect to one another along the length of the entire unit and access to the various article storage members so formed is gained from opposite sides of the unit.

Referring now additionally to FIGS. **5** through **8**, the shelves **40** include a middle section or panel **41** formed from wood or metal. In accordance with the preferred embodiment of this invention, this panel is formed from wood and the shelf includes two rigid end supports **42** (FIGS. **5** through **7**) or **42'** (FIG. **8**). Either of the embodiments of the end supports **42**, **42'** are generally U-shaped in cross section and include a connecting web **43** having legs **44** extending perpendicularly therefrom. Near the base of the legs (adjacent the connecting web **43**) at each extremity and on both sides of the rigid members **42** elongated apertures or slots **45** are formed by a suitable punching process. The length of apertures **45** exceeds, preferably, the width of tongue-like members **25** slightly. It has been found, for example, that if the tongue-like members have a width of three-quarters of one inch, the slots **45** should be approximately seven-eighths of one inch in length. With proper vertical spacing of the members **25**, this difference in dimension permits not only the installation of the shelves with relative ease but, additionally, allows one or more shelves to be suspended in slanted fashion to retain bulk goods on the shelves in such a manner that they will not tend to fall outwardly into the aisles.

As illustrated specifically in FIG. **10**, the instant invention contemplates the penetration or engagement of the tongue-like members **25** through the apertures **45** when the shelf is suspended between four uprights **20**. This necessitates, of course, the provision of a space between the connecting web **43** and the ends of the wooden members **41**. Such provision is accomplished in the embodiment illustrated in FIGS. **5** through **7** by providing a series of three dimples **46** extending inwardly into the channels a distance such that, when the channel is slid onto the extremity of the shelf, the dimples will arrest its inward movement at the proper position. The dimples **46**, of course, must be offset laterally from the apertures or slots **45** so that they will not foul penetration of the tongue-like members **25**. The edges of the rigid members **42** may then be rolled into wood or fiber shelf member as indicated at **48** in FIG. **7** to secure the rigid end members **42** to the shelving member **41**.

Alternatively, as illustrated in FIG. **8**, the shelf extremities may be routed as indicated at **47** to receive the rigid members thereover, the dimensions of the routed area being controlled such that the edge of the legs **44** contacts the non-routed portion of the shelf when the proper spacing between web **43** and the shelf extremity is achieved. The rigid members **42'** can thereafter be affixed to the wooden members by rolling the edges thereof over as indicated at **48'**, by screwing or by any other suitable means.

It should be noted that in either of the embodiments illustrated in FIGS. **5** through **8**, it is desirable that the finished shelf **40** be as nearly as planar as possible along its entire length which, of course, includes the leg portions **44** of the rigid support members **42** and **42'**. Such is accomplished most easily, of course, by the routing procedure illustrated in FIG. **8**, although it is possible to sufficiently flatten the leg portions **44** during the rolling process to achieve the desired result.

Referring now additionally to FIG. **9**, there is illustrated a hanger rod support **50** suitable for utilization in the system of the instant invention. Support **50** includes a rod-receiving aperture **51** having hanging apertures **52***a*, **52***b*, **52***c*, and **52***d* in the ends thereof. The vertical spacing between apertures **52***a* and **52***c* and apertures **52***b* and **52***d* is equal, of course, to the vertical spacing between tongue-like members **25** in the system. The horizontal spacing between apertures **52***a* and **52***b* and apertures **52***c* and **52***d*, similarly, is equal to the horizontal spacing between the tongue-like members **25** on a particular load-bearing member as utilized in the system. Such dimensions permit the hanger rod support **50** to be suspended between the uprights **21***a* and **21***b* of a particular load-bearing member, a similar bracket to be so suspended on the adjacent member, and a pipe or other suitable rod to be suspended therebetween through the apertures **51**. The pipe or rod **54** (FIG. **10**) may be secured into position through any conventional means such as a cotter key, clip or the like.

The support **50** illustrated in FIG. **9** is particularly adapted for utilization with the load-bearing member **20'** illustrated in FIG. **2** since, of course, there will be no room for the pipe to extend through the aperture **51** where a solid spacer such as indicated at **30** in FIG. **1** is utilized. To obviate this particular difficulty, the hanger rod support may be made of a generally boxed configuration (not illustrated) wherein those portions containing the hanging apertures **52** are laterally offset from the rod retaining portion. In such a situation, as will again be readily appreciated by those skilled in the art, sufficient clearance will be provided between the face **53** of the support and the solid spacer **30** to permit the rod **54** to slide into apertures **51** and bear against the edges thereof for support.

Referring now to FIGS. **11** and **12**, the instant invention also contemplates the provision of a dress skirt or kick-plate **60** adapted to be suspended on the uprights **21** between the lowest shelves of a particular unit and the floor. The front or dress skirt **60** includes a planar dress member **61** having curled upper and lower edges **62**. Extending rearwardly in perpendicular fashion from the extremities of the member **61** are hangers **63**, the hangers **63** being provided with hook structures **64**.

The assembly of any particular storage system necessitates initially, of course, a plan or design as to heights, widths, shelf positions, hanger rod positions, etc. Once such a plan has been completed, the necessary components are either chosen from existing components or purchased. With the components on hand, the installers begin by placing two of the load-bearing members **20** illustrated in FIG. **1** (or **20'** as illustrated in FIG. **2**) in spaced relationship and suspending one or more shelves, hanger rods or the like therebetween in the manner described. In the case of a shelf such as illustrated in FIG. **10**, the unit is slid laterally through an appropriate space **70** (FIG. **2**) between the tongue-like members **25** and, when the apertures or receiving slots **45** come into vertical registry with the four tongue-like members **25**, shifted downwardly. The shelf in question will then be suspended as indicated in FIG. **10** at each of the four corners thereof. The installation of two such

shelves between any two particular load-bearing members **20**, of course, will effect stabilization of the unit.

The rigid end members **42** on the shelves, because of their U-shaped configuration, contribute significantly to the structural integrity of the shelf so installed, distributing localized bearing forces on the shelf fairly equally between the four tongue-like members **25**. The acute angle of divergence of the base sections **26** of the tongue-like members **25** from the surfaces **27** (see FIG. **10**) cause the connecting web **43** of the shelves (or the hanger rod support) to wedge or nest into the base of the members **25** and, thus, prevent direct cantilevered loading of the members **25**. Such prevention, of course, also adds markedly to the structural capabilities of the system.

In addition, the rounded edge **35** (FIG. **4**) of upper sections **28** of the tongue-like members act as guides when the shelves are installed. Since it is not always easy to see the tongues when a shelf is installed, slots **45** are not always aligned exactly with respect to tongue-like members **25**. However, the sloped or curved edges **35** guide the tongues into slots **45** in the event that they are slightly misaligned.

If, for one reason or another, it is desired to create a storage bin or area having a width equal to more than the modular width being utilized, such can be accomplished easily as indicated in FIG. **1** by providing a load-bearing member **20***a* having a height equal to the combined heights of dress strip **60** and the shelves **40***a*. The shelves **40***a* can then be suspended in elevated relationship with respect to the floor between the two regular-height members **20** on either side thereof and the shorter bearing member **20***a* in the conventional fashion described heretofore.

Once the desired number of load-bearing members **20** have been initially positioned in the desired configuration through the insertion of shelves, hanger bars or the like, the wire netting may be applied to the rear thereof if desired. It may be desirable at this time, additionally, to add the sway braces **33** at regular intervals along the back of the structure to further stabilize the system. At this time, or at a later time, another row of storage shelves **10B** behind row **10A** as shown in FIG. **1**, may be positioned in back-to-back relationship with the partially or completely assembled row **10A** so as to minimize necessary aisle space. Upon the addition of the unit **10B**, suitable dress strips **13** may be added to the exterior ends thereof and, additionally, horizontal braces **11** and **12** added if necessary.

The dress strips **60** are positioned in the manner shown preferably prior to installation of the bottom shelves. This is accomplished, with reference to FIG. **12**, by merely sliding them rearwardly over the two lower tongue-like members on adjacent uprights **21***a* and moving them downwardly such that the portions **65** slide into the space between the tongue-like members in their respective surfaces in a manner similar to that illustrated in conjunction with member **50** in FIG. **10**.

After a particular installation has been completed, should it become desirable to change the position of shelves, etc., such may be easily accomplished by merely shifting the shelves upwardly and withdrawing them through the space **70** between the vertically adjacent tongue-like members **25**. It should be noted, in this regard, that because apertures or slots **45** are provided on both sides of the members **42**, a shelf may be slid into position with either side facing up and with either end facing back. This particular facet of the invention, in addition to aiding in installation of a particular system, permits one side of a shelf to be utilized for articles which might leave debris or the like and the other side of the shelf, when turned over, to be utilized for articles requiring a clean surface.

The instant invention, as noted previously, contemplates the fabrication of the shelves, uprights, etc., for particular systems in modular widths and lengths so as to permit at least partial if not complete interchangeability of the various components. In the example illustrated in FIG. **1**, two of the load-bearing members have sections **14** extending above the top boundary **21** to permit stacking of large articles therebetween. While these particular components may contribute to the efficacy of the system in a particular storage environment and, thus, be necessary, they are at least to some extent "custom" in nature. Despite the presence of these particular members, however, all of the shelves remain interchangeable, and certain of the load-bearing members may be removed if desirable and replaced with shorter members such as **20A**. The system, thus, in short, remains extremely flexible despite the presence of two rather "non-standard" components embodied therein.

The rigidity of the present system permits units to be cascaded atop one another. This may be accomplished, for example, by interlocking vertically aligned uprights **21** through the utilization of a channel or the like fitting over the exterior surfaces thereof and containing hooks adapted to engage two or three of the tongue-like members upon each of the vertically aligned uprights. The integrity of the system permits, additionally, the suspension of structural members on the tongues **25** across aisles and the placement atop thereof of suitably supported grating or the like. In this case, of course, the system will become a highly versatile, self-supporting storage system having two or more separate floors of storage area, the grating permitting access to the upper floors.

The selective utilization of metal and wood combinations as described herein adds not only to the structural rigidity of the system but, additionally, to the ease with which the various components may be assembled and disassembled. It reduces significantly, additionally, the amount of fabrication labor involved in the manufacture of the units, thus affording a functionally superior but less expensive unit when compared with all-wood installations.

The system permits, however, the use of all metal shelving which may take the form of a metal shelf surface having a depending skirt about its entire periphery. The vertical measurement of the skirt should exceed the height of tongue-like members **25** and the width thereof should be less than the space **29** at least at the points of engagement. The shelf so constructed may then be supported from the uprights in a fashion similar to that already discussed by nesting the skirt portion thereof between the tongue-like members **25** and the surfaces **27**.

While a preferred embodiment of this invention along with minor modifications thereof has been described in detail, it will be readily appreciated by those skilled in the art that other embodiments may be conceived and fabricated without departing from the spirit and scope of this invention. Such other embodiments are to be deemed as included within the scope of the following claims unless these claims, by their language, expressly state otherwise.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In an improved article storage system having a series of elongated load-bearing members adapted to be positioned vertically in spaced, side-by-side relationship with respect to one another, each of said members having at least two spaced uprights, each of said uprights having opposed, spaced surfaces, each of said surfaces having a series of upwardly extending tongue-like members, the upper portions of said tongue-like members being spaced from the plane of the surfaces from which they extend, the improvement comprising shelf means adapted to be suspended between two of said load bearing members, said shelf means including an elongated mid-portion, each end of which is affixed to a rigid end support extending the width of said shelf, each of said end supports including a pair of spaced openings for receipt of a pair of aligned tongue-like members extending from said load bearing members for suspending said shelf therebetween, said shelf means including means defining a space between the outer portion of said end supports and the outer ends of said mid-portion to permit said tongue-like members to be inserted within said openings so that the outer surface of said end supports abuts said spaced uprights of said load bearing members.

2. The improved article storage system according to claim **1** wherein said mid-portion includes upper and lower spaced support surfaces, and said end supports include a generally U-

shaped channel having a connecting web with leg portions extending generally perpendicular therefrom and generally coplanar with said elongated mid-portion, at least one of said leg portions being affixed to one of said spaced surfaces, said connecting web being in abutment with said uprights when said shelf means is suspended from said load bearing members.

3. The improved article storage system according to claim 2 wherein the ends of said mid-portion are sandwiched between said leg portions with the outer extremities of said mid-portion being spaced from said web.

4. The improved article storage system according to claim 3 wherein said pair of spaced openings on each of said end supports are positioned adjacent said connecting web in one of said leg portions for receipt of said tongue-like members so that said web portion is in abutment with the surfaces on said uprights from which said tongue-like members extend.

5. The improved article storage system according to claim 4 wherein each of said end supports includes a pair of said spaced openings in each of said leg portions to permit suspension of said shelf means between said load bearing members with either of said spaced surfaces facing upwardly.

6. The improved article storage system according to claim 2 wherein said mid-portion of said shelf means is formed from non-metallic material and wherein said rigid end supports are formed from metallic material.

7. The improved article storage system according to claim 6 wherein the outer extremities of said leg portions of said rigid end supports are embedded into said non-metallic mid-portions.

8. The improved article storage system according to claim 6 wherein the outer extremities of said non-metallic mid-portions has a reduced thickness approximately equal to the thickness of said leg portions so that the outer surface of said leg portion forms substantially a planar continuation of the surfaces of said mid-portions.

9. The improved article storage system according to claim 2 wherein the uppermost edge of said upper portions of said tongue-like members are sloped downwardly on each side from the mid-portion thereof to facilitate the insertion of said tongue-like members in said end support openings in the event that they are slightly misaligned.

10. An article storage system comprising in combination: a plurality of uprights, each of said uprights having a series of upwardly extending tongue-like members, the base portions of said members being affixed to the surfaces from which they extend, the upper portions of said members being spaced from the plane of said surfaces to which they are affixed; shelf means adapted to be suspended from said uprights, said shelf means including an elongated mid-portion having spaced upper and lower support surfaces, each end of which is affixed to a rigid end support extending the width of said mid-portion, said end portions comprising a generally U-shaped channel having a connecting web with leg portions extending generally perpendicular therefrom, said ends of said mid-portion being sandwiched between said leg portions and spaced from said web, said end portions including a pair of spaced openings for receipt of said tongue-like members of said uprights, said tongue-like members extending through said openings and into said space between said connecting web and said mid-portion extremity.

11. The article storage system according to claim 10 wherein said pair of spaced openings on each of said end supports are positioned adjacent said connecting web in one of said leg portions for receipt of said tongue-like members so that said web portion is in abutment with the surfaces on said uprights from which said tongue-like members extend.

12. The improved article storage system according to claim 10 wherein said end supports include spacer means offset from said openings to physically prevent the outer extremities of said mid-portions from engaging said web to insure said space for inserting said tongue-like members into said openings.

13. The improved article storage system according to claim 12 wherein said space means includes a reduced-width section on each extremity of said end portions of said shelf means, the relative length and width of said reduced-width portion and said channel being such that the edges of said leg portions will strike the boundaries between the reduced-width and non-reduced width sections of said mid-portions as said channel is positioned thereon to provide said clearance space.

14. The improved article storage system according to claim 13 wherein the thickness of said leg portions is approximately equal to the amounts by which the width of said shelf mid-portions are reduced on either side thereof whereby said leg portions forms substantially a planar continuation of the surfaces of said shelf members.

15. The improved article storage system according to claim 12 wherein said spacer means comprises simple means on the interior surface of said connecting web.

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