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71 Applicant: **Brooks, Frederick**
509-825 Granville Street
Vancouver British Columbia V6Z 1K9(CA)

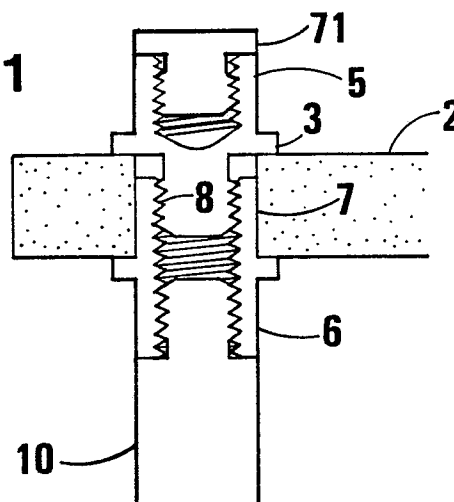
72 Inventor: **Brooks, Frederick**
509-825 Granville Street
Vancouver British Columbia V6Z 1K9(CA)

74 Representative: **Spence, Anne et al**
Stevenson & Schulman Rugby Chambers 2
Rugby Street
London WC1N 3QU(GB)

54 **Hand-assembled self-supporting shelving system.**

57 This invention provides a self-supporting rigid shelving system that may be easily assembled and disassembled by hand without tools. It is comprised of posts (10) and connector pieces (5, 6) that are screwed together through holes in the corner areas of shelves (2) to be joined into a shelving unit. Flanges (3) are integrally located on the post connector pieces (5, 6) to enable the post structure to securely grip each shelf from above and below. The invention may be embodied in a variety of shelf components, permitting the construction of utility or decorative shelving to meet any taste, purpose, or budget, for use in the home, office, workshop, or storage area. The parts of the invention are also suitable for the assembly of other furniture such as coffee and end tables.

Fig. 1



HAND-ASSEMBLED SELF-SUPPORTING SHELVING SYSTEM

FIELD OF THE INVENTION

This invention relates to free-standing rigid shelving systems that may be assembled without tools. In particular, the invention relates to such systems in which the shelves are supported by post pieces that screw together.

BACKGROUND OF THE INVENTION

There is a need for shelving systems that are quickly and easily assembled. One of the best ways to facilitate the assembly is to use pieces that can be assembled without any tools. The advantages of such construction usually also apply to the disassembly of the shelving, and to the rearrangement of the height and placements of the various shelves within the system.

One of the difficulties in making a set of shelves without tools is to fit and interlock the pieces tightly enough that the shelving system is sufficiently rigid to stand securely and to support whatever objects are supposed to be placed on the shelves.

DESCRIPTION OF THE PRIOR TECHNOLOGY

The broad concept of inserting a flange or bracket within a post in order to support the corner of a shelf is very old. An example of a device using this concept is shown in U.S. Patent number 3,981,251. The corner structure is comprised of a few pieces, held in place by a single screw.

A shelving unit that features the greater or lesser insertion of tubes within tubes to obtain the appropriate height of the shelves on the supporting tubes is disclosed in U.S. Patent number 4,257,333. It appears to be readily assembled, but its rigidity would depend on the extent to which the tubes and the spacer used were jammed together, making disassembly correspondingly difficult.

The application of a nut, spacer, and bolt to join two separated panels is illustrated in U.S. Patent number 4,282,977. Vertical panels are there joined, while the double-ended bolt-like extensions are there the supporting surfaces, but the arrangement could be turned sideways ninety degrees to apply the same principle to a shelving system.

Some of the broad concepts embodied in the above-noted inventions are related to this invention, but none of the prior technology reveals the device and means herein disclosed.

SUMMARY AND OBJECTS OF THE INVENTION

This invention is comprised of vertical structure pieces that are screwed together through holes in the corner areas of shelves to be joined into a shelving unit. Flanges are integrally located on the appropriate vertical structure post pieces to enable the structure to securely grip each shelf from above and below.

This invention facilitates the simple and rapid assembly of a free-standing rigid shelving system. No tools are required. Disassembly is correspondingly easy.

The invention may be embodied in a variety of shelf components, permitting the construction of utility or decorative shelving to meet any taste, purpose, or budget, for use in the home, office, workshop, or storage area. The parts of the invention are also suitable for the assembly of other furniture such as coffee and end tables.

GENERAL DESCRIPTION OF THE INVENTION

The shelving system of this invention is comprised of a number of typical rectangular shelves and a special modular post construction.

The shelves have holes drilled, molded, or otherwise formed in their surfaces near each corner (or back somewhat in the case of a cantilevered shelf), extending through each shelf.

There are three main kinds of vertical structure pieces: post connectors, top flange connectors and bottom flange connectors.

The holes and the post structure must match in their dimensions. A good diameter for the holes and the posts for typical shelves would be 7/8 inches, but any appropriate, matching dimension would suffice. The flange that is integral to each of the top and the bottom connectors should be of sufficient extension to grip the shelf securely upon the post being screwed together. A good extension for typical shelves would be 3/16 of an inch.

One flange connector is inserted from the bottom into one of the corner holes in the shelf. The complementary flange connector is then inserted from the top into the hole, and threaded into the bottom flange connector. As the two are screwed together, they first contact and then gradually tighten their grip on the upper and lower surfaces of the shelf. When all the corner holes in the first shelf have been thus secured, post connectors are screwed into the top flange connectors. Bottom flange connectors can then be screwed onto the top of the posts and a second shelf fitted onto

those flange connectors. The second shelf is then secured by screwing top flange connectors into the bottom flange connectors. More posts can be then be added to separate the second shelf from a third shelf, the entire shelving unit being thus built up by layers of the various components until the desired height and number of shelves is achieved.

The shelving unit can be made quite low, for use as a table top, and in fact the unit can be made stable with only one shelf and the supporting posts, secured to the shelf, or table top, by means of top and bottom flange connectors.

The post connectors can be made in sets to match the desired height between any two shelves in the shelving unit. The post connectors are screwed into the flange connectors to achieve a smooth and seamless joint between the connector and the post. The sets of posts for each shelf may be mixed in any combination in the same system for a variety of heights between shelves.

The post components and the shelves can be of any size or material within the structural limits of those materials. The post components can be molded or machined into the correct form for the system.

For long shelves, additional holes and posts could be placed in the middle of the shelf for increased support.

An optional fourth component for the posts is a foot or cap plug, which threads into the either flange connector from either end. Its purpose is to provide a finished cap at the top of the system and a finished foot at the bottom of the system that can be used to level the shelves on uneven floors.

A subsidiary option would be to have rubber feet on the foot plug components to reduce skidding by the shelving unit on a smooth floor. A subsidiary option for the cap plug would be to have it in the shape of a smooth dome for safety and ease of cleaning.

A further option would be to have the posts and flange connectors hollow in order to allow electrical wiring to be placed within the vertical support structure of the shelving unit. Along with entry and exit holes, this feature would enable electrical power to be provided to any accessories or appliances to be used in conjunction with the shelves.

This invention could be sold as a kit, for assembly by the retail purchaser. It would also be suitable for sale from mix-and-match bins containing a variety of shapes and sizes of shelves and vertical structure pieces.

DESCRIPTION OF THE DRAWINGS

Figure 1 is a cross-sectional front view of a corner connection in the shelving system.

Figure 2 is a top view of a post connector.

Figure 3 is a cross-sectional side view of a post connector.

Figure 4 is a cross-sectional side view of a foot or cap plug.

Figure 5 is a cross-sectional side view of a top flange connector.

Figure 6 is a cross-sectional side view of a bottom flange connector.

Figure 7 is a cross-sectional side view of a cap plug.

Figure 8 is a top view of a shelf before assembly into the system.

Figure 9 is a perspective of the shelving system.

DETAILED DESCRIPTION

Referring to Figure 1, the shelf 2 is shown, held in place by the flange 3 and the flange 4 on the top 5 and bottom 6 connectors respectively. The portion 7 of the bottom connector 6 extending within the shelf is always less than the thickness of the shelf in order to allow the shelf to be secured upon the two connectors being screwed together. The portion 8 of the top connector that threads into the bottom flange connector 6 should be of sufficient extension to provide good tensile strength at the threaded join of the two connectors. A post 10 and a cap plug 71 are screwed into the bottom and the top connectors, respectively.

Referring to Figure 2, the top 42 of the post 10 is shown, with the inner 40 and outer 41 shoulders of the threads. The posts should ideally be cylindrical, in order to obviate the misalignment of any asymmetries amongst the posts when they are tightened into a vertical column to join the shelves.

Referring to Figure 3, the post 10 is shown, with top 31 and bottom 32 male threaded protrusions. The posts could alternatively be made with female threaded sockets, or with one male end and one female end, with the flange connectors being made to correspond. The posts could also be made with reversed thread at either end in order to allow posts to be screwed simultaneously into a lower and an upper shelf and flange connector.

Referring to Figure 4, a foot or cap plug 71 is shown, with a capping flange 72 and a male threaded end 73 for screwing into a female flange connector at the bottom or top of the shelving unit.

Referring to Figure 5, the top flange connector 5 is shown, with its flange 3, its male threaded end 51 and its female threaded end 52. Referring to

Figure 6, the bottom flange connector 6 is shown, with its flange 4, and its threaded interior 53. The top and bottom flanges could be reversed without affecting the appearance or functionality of the system. Either could be made integral with the post components, without diminishing the versatility of the system. The flanges could be any shape that provides a grip on the shelf, but a cylindrical shape would be ideal for the same reasons as noted above in regard to the posts.

Referring to Figure 7, a cap plug 81 is shown with a dome-shaped top 82 and a male threaded end 83 for screwing into a female threaded end of a flange connector at the top of the shelving unit.

Referring to Figure 8, the shelf 11 is shown with a hole 21 near each of its four corners. The shelves need not be rectangular, of course. They could be octagonal, for example. The holes should be placed near the extremities of the shelf in order to maximize stability on the floor. They should, however, be somewhat away from the edge of the shelf in order to provide a strong area of the shelf around each hole for the flanges to grip upon.

Referring to Figure 9, the shelves 11 are shown connected by the posts 10, the top flange connectors 5, and the bottom flange connectors 6. A drawing of a man is adjacent to the shelving unit to show a typical scale. A cap plug 12 has been screwed into each of the top flange connectors in the top shelf 13 of the shelving unit.

The within-described invention may be embodied in other specific forms and with additional options and accessories without departing from the spirit or essential characteristics thereof. The presently disclosed embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalence of the claims are therefore intended to be embraced therein.

Claims

1. A shelving unit comprising:

a) at least one shelf, having at least one vertical hole through which a top vertical structure piece and a bottom vertical structure piece are screwed together;

b) the said top and bottom vertical structure pieces each having an integral flange that grips the horizontal surface area of the shelf surrounding the hole, from above and below respectively;

c) the said pieces being screwed together by means of one of the said pieces having a male threaded protruding end and the other of the said pieces having an end portion forming a corresponding female threaded socket;

d) the said end portion fitting within the said hole.

2. The shelving unit of Claim 1 above, in which each corner of each shelf has a hole adjacent to it through which top and bottom vertical structure pieces are screwed together.

3. The shelving unit of Claim 1 above, in which a spacing post vertical structure piece is screwed together with the said bottom vertical structure piece, by means of one of the pieces having a male threaded protruding end and the other of the pieces having an end portion forming a corresponding female threaded socket.

4. The shelving unit of Claim 1, 2 or 3 above, in which the vertical structure pieces are generally cylindrical.

5. The shelving unit of Claim 1, 2, or 3 above, in which the flanges have greater width than the rest of the vertical structure piece of which each flange is a part.

6. The shelving unit of Claim 1, 2, or 3 above, in which the vertical structure pieces are hollow.

7. The shelving unit of Claim 1, 2, or 3 above, in which there is additionally a cap and a foot plug for each column of vertical structure assemblage.

8. The shelving unit of Claim 1, 2, or 3, above, in which there is a plurality of shelves and a plurality of sets of vertical structure pieces that are screwed together to join the shelves into a rigid unit of vertically spaced parallel shelves.

9. The shelving unit of Claim 1, 2, or 3, above, in which there is a plurality of shelves and a plurality of sets of vertical structure pieces that are screwed together to join the shelves into a rigid unit of vertically spaced parallel shelves, and in which there are sets of vertical structure pieces having a variety of heights.

10. A shelving kit comprising the elements of Claim 1, 2, or 3 above.

Fig.1

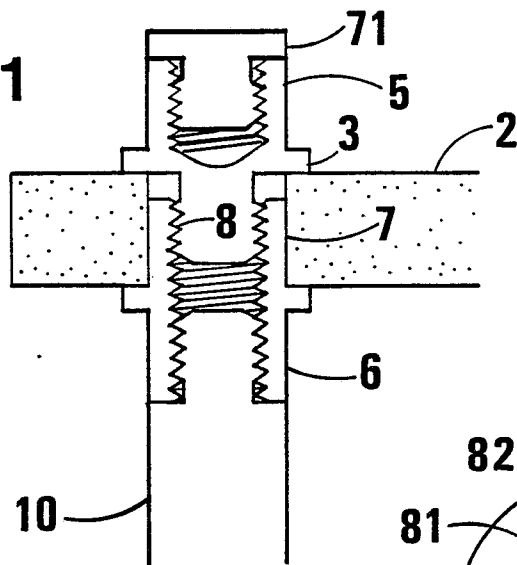


Fig.4

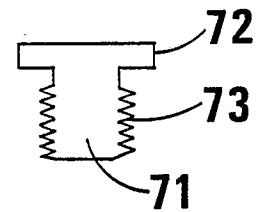


Fig.5

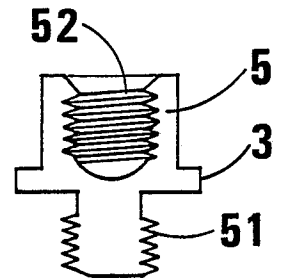


Fig.2

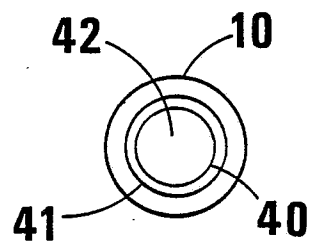


Fig.7

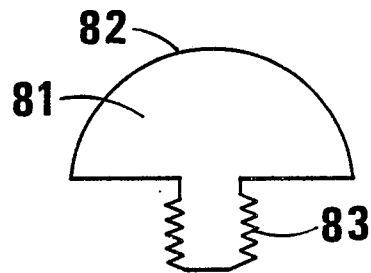


Fig.6

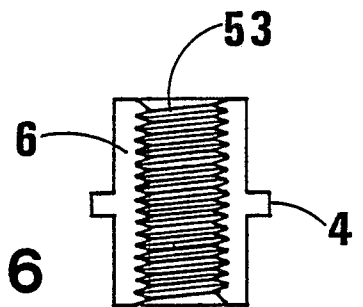


Fig.3

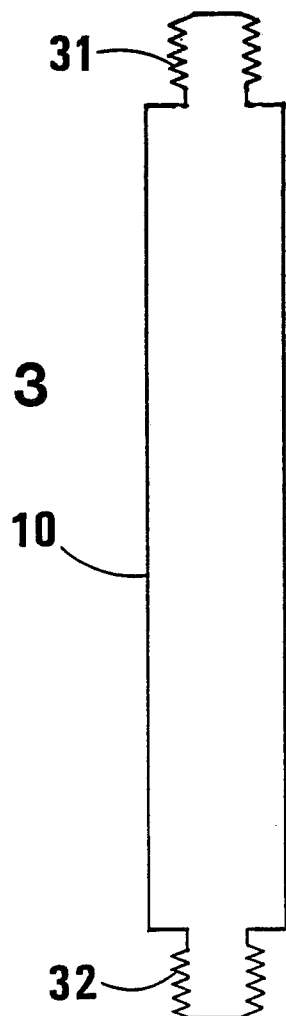


Fig.8

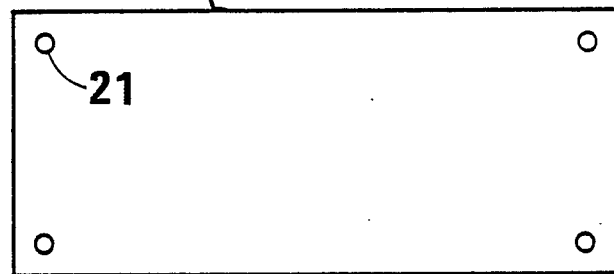
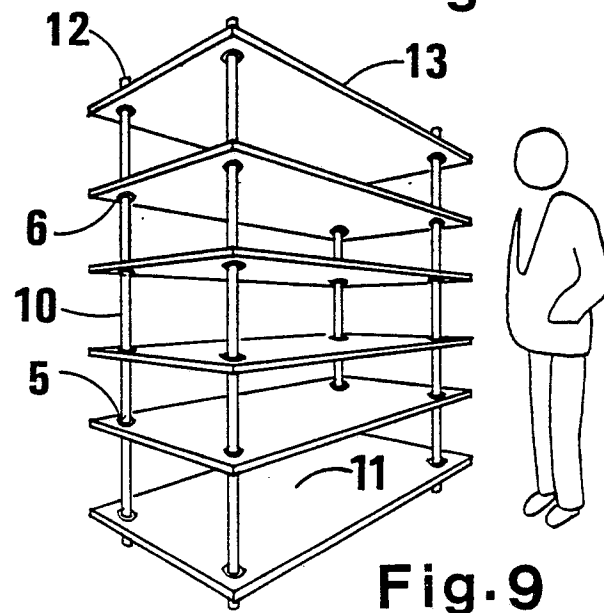


Fig.9





DOCUMENTS CONSIDERED TO BE RELEVANT			EP 88306297.8
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	DE - A1 - 3 501 099 (ROMAN DIETSCHKE KG.) * Page 6, lines 15-23; page 7, line 1 - page 8, line 8; fig. 1,2,4 * --	1,2,4, 6-9	A 47 B 45/00 F 16 B 12/00
X	US - A - 3 831 533 (KELLOGG) * Column 3, lines 27-34; column 4, lines 6-12,33-48; column 5, lines 37-47; fig. 1-3 * --	1,2,4, 6-8	
A	DE - A1 - 3 416 770 (PALM ENGINEERING AB & CO.) * Page 6, paragraph 2; fig. 1 * ----	1,3-6	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			A 47 B F 16 B
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 12-10-1988	Examiner VELINSKY-HUBER
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	