United States Patent [19]

Stoeber et al.

[11] **3,869,218**

[45] **Mar. 4, 1975**

[54] **SUPPORT STRUCTURE**

[75] Inventors: **Alfred Stoeber,** Parsippanny; **Bruno Smialkowski,** Irvington, both of N.J.

[73] Assignee: **Art Shelf Product Company,** Parsippany, N.J.

[22] Filed: **May 7, 1973**

[21] Appl. No.: **357,584**

[52] **U.S. Cl.** **403/241,** 211/148, 248/159, 403/349, 285/402, 108/111, 403/298

[51] **Int. Cl.** **F16b 7/20**

[58] **Field of Search** ..... 403/292, 10, 241, 298, 403/349; 248/159, 235; 211/148, 182; 108/111; 52/753 B, 753 K; 285/361, 402

[56] **References Cited**

UNITED STATES PATENTS

2,646,175	7/1953	Beauvais et al.	211/148
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FOREIGN PATENTS OR APPLICATIONS

315,771	8/1956	Switzerland	211/148

Primary Examiner—Jordan Franklin
Assistant Examiner—Conrad L. Berman
Attorney, Agent, or Firm—Bucknam and Archer

[57] **ABSTRACT**

A support structure for book cases, tables, display racks and the like, comprises three elements, the first of which has a lug in the interior for engagement with a groove in the second element. Ridges in the interior of the first and third elements engage with projections at the top of the second element.

11 Claims, 17 Drawing Figures

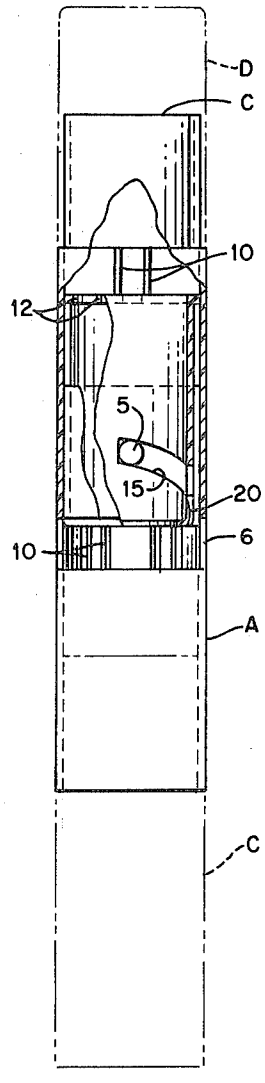


FIG. 1

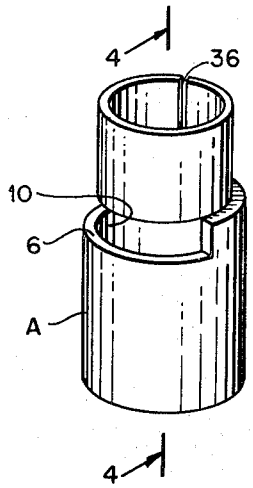


FIG. 2

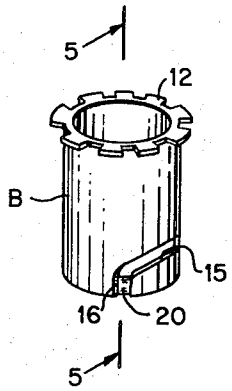


FIG. 3

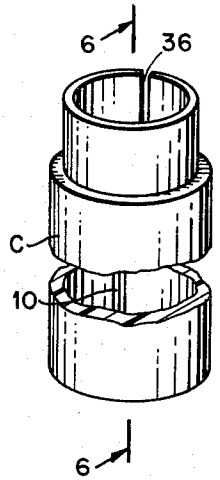


FIG. 4

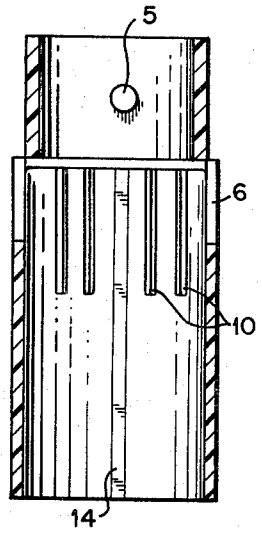


FIG. 5

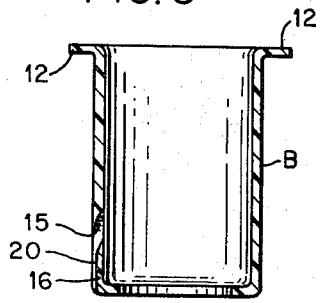


FIG. 6

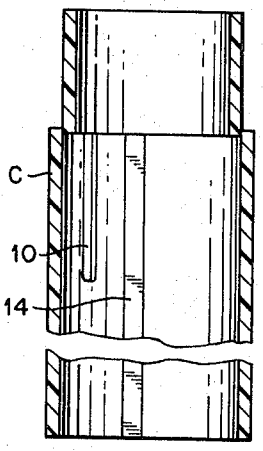


FIG. 7

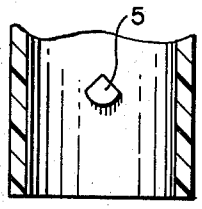


FIG. 8

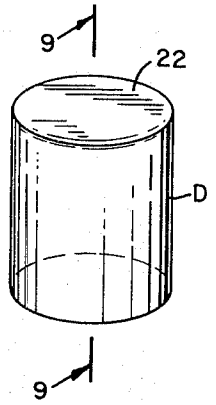


FIG. 9

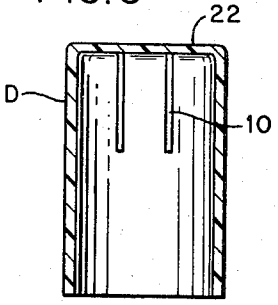


FIG. 10

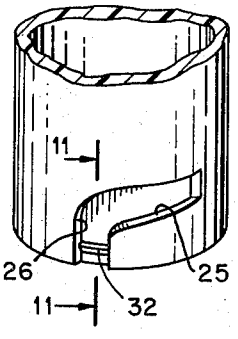


FIG. 11

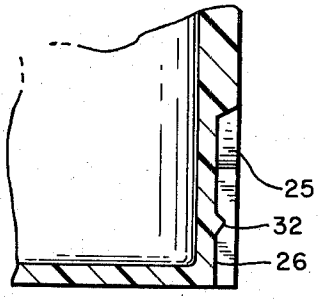


FIG. 12

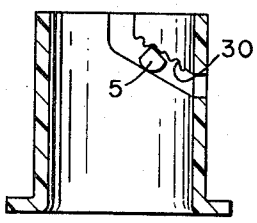
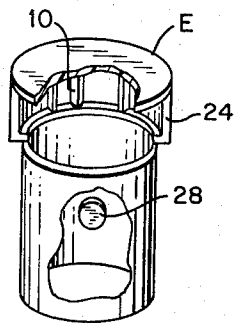


FIG. 13



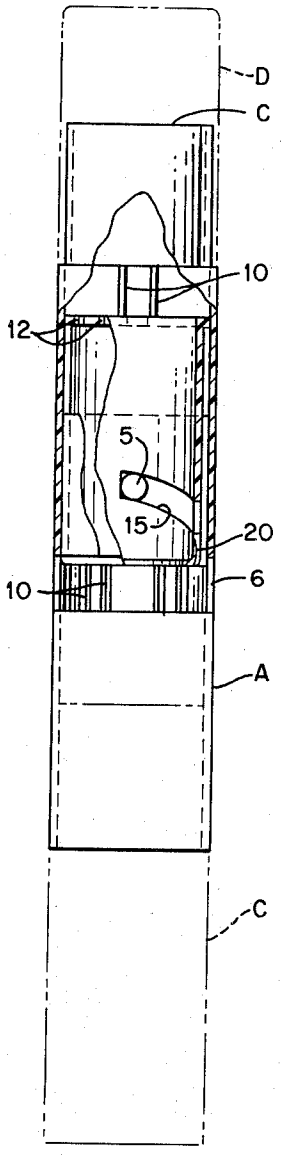


FIG. 14

FIG. 15

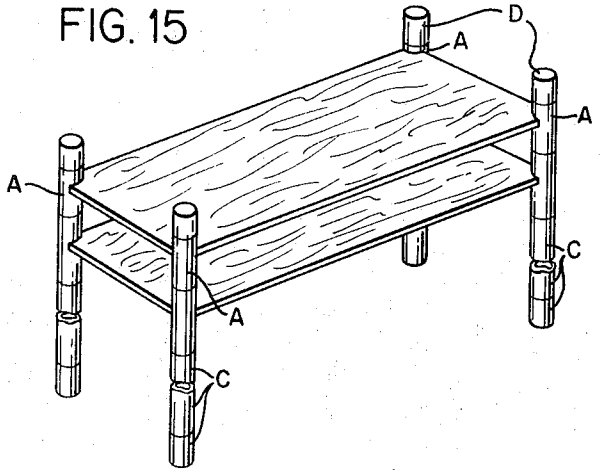
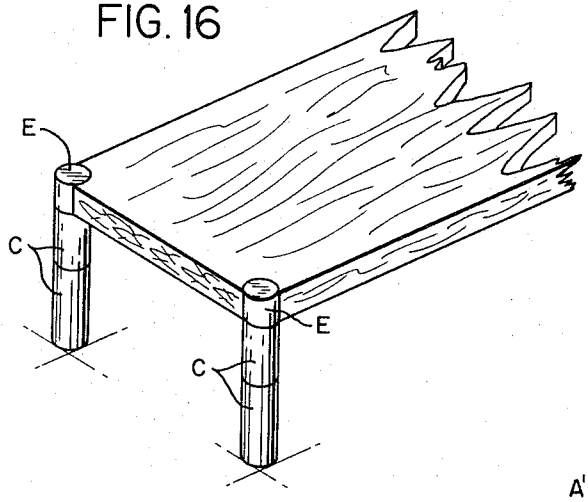


FIG. 16



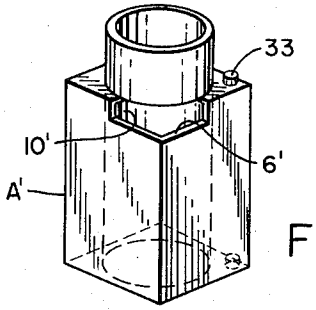


FIG. 17

SUPPORT STRUCTURE

This invention relates to support structures for shelves, room dividers, display racks, desks, tables, footboards, headboards and the like.

U.S. Pat. No. 3,338,605 described structures made of plastic material at a cost lower than steel or other metal. The structures of that patent offered the advantages that they did not require fastening means for the assembly nor tools for the disassembly, such as pegs, glue, screws, bolts, nails and the like, could be easily assembled and disassembled and were capable of supporting heavy loads.

In accordance with the same patent mentioned hereinabove, the support structure comprised three members A, B and C. The receptacle for the board or panel to be supported consisted of a slot in member A, located transversely. Member A engaged with member B by means of a lug in the interior of member A and a groove 16 in member B which was contiguous with an inclined cut out portion in member B. The latter had outer diameter smaller than member A for telescopically mounting therewith. The cut out portion extended over about one half of member B. When member B was placed within member A, the lug of A engaged with the cut out portion of member B in a bayonet-type locking arrangement.

The engagement between members A and C was accomplished by means of a collar at the upper end of both members which engaged with a groove present in the inner wall of both members. Member C engaged with member B by means of a lug in the interior of member C and at least one recess at the upper end of member B. The support structure was also provided with teeth at the base of both members A and C which engaged with notches arranged throughout the circumference of both members A and C in spaced relationship. Vertical splits extended, preferably for about one-half the length of the upper portion of members A and C to provide springing action and another slot was provided throughout the entire wall thickness of member A and C to provide for greater flexibility during the assembly and to give a springing action resulting in a tighter fit.

Although the structure of U.S. Pat. No. 3,338,605 provided adequate support for shelves, tables and the like, it has now been found that the three basic components A, B and C are still fairly expensive to manufacture.

An object of the present invention is to simplify the three basic components and to provide a support structure which may be manufactured from plastic material less expensively by injection molding. Some parts may be manufactured also by extrusion molding.

Another object is to provide a structure which is capable of supporting heavy loads as much as or better than the support structure of U.S. Pat. No. 3,338,605, that is loads as heavy as the panel or board can stand.

Still another object is to provide a structure which may be assembled or disassembled easily without tools and without additional elements, such as pegs, screws, nails, bolts or the like.

In accordance with the present invention, members A, B and C are simplified and less expensive to manufacture. By reference to the drawings,

FIG. 1 represents the first member A in its upright position in perspective.

FIG. 2 represents the second member B also in its upright position and in perspective. FIG. 3 shows the third member C in perspective and in its upright position.

FIG. 4 is a cross section of member A taken along the line 4 — 4 of FIG. 1

FIG. 5 is a cross section of member B taken along line 5 — 5 of FIG. 2.

FIG. 6 is a cross section of member C taken along line 6 — 6 of FIG. 3.

FIG. 7 represents one embodiment of the lug 5.

FIG. 8 is one embodiment of an end portion referred to herein as the cap.

FIG. 9 is a cross section of the cap of FIG. 8 taken along the line 9 — 9 of FIG. 8.

FIG. 10 represents another embodiment of member B.

FIG. 11 is a cross section of the embodiment of member B of FIG. 10, taken along the line 11 — 11 of member B of FIG. 10.

FIG. 12 is another embodiment of member B.

FIG. 13 is a special embodiment of member A particularly advantageous for table tops.

FIG. 14 represents members A, B and C in working assembly.

FIG. 15 is a book case built from horizontal boards and the three elements A, B and C according to the present invention.

FIG. 16 is a table built from member A of FIG. 13.

FIG. 17 represents one embodiment of the invention in which the outer configuration of members A and C is square. Only member A is shown for the purpose of illustrating the invention.

By reference to FIGS. 1 and 4, element A is a tubular cylindrical member of diameter in the upper portion slightly smaller than in the lower portion. It is provided with a lug in its interior designated by numeral 5, which may be of any shape, but preferably it is rounded at the top and pointed at the bottom, similar to a heart, as shown in FIG. 7. The size of the lug may be varied, but the length should not be greater than about one eighth and not smaller than about one twentieth the length of member A. The width of lug 5 is not greater than about one tenth and not smaller than one twentieth the inner circumference of the upper portion of member A.

Member A has a cut-out portion, shown at 6 which serves as the receptacle for the panel or board to be supported. The cut-out portion is located transversely, and about midway the entire length when the structure is to be used for bookcases. The slot extends for about one-half the overall circumference of member A but greater support may be achieved if the cut out portion extends more than one half the entire circumference. The height of the cut out portion 6 may be varied according to the thickness of the panel being supported but should not exceed about one eighth the overall length of member A.

The interior of member A is provided with vertical ridges 10, which extend in the middle portion of member A up to the upper end of the cut-out portion. The total number of the vertical ridges may be varied but a minimum of two and preferably at least four ridges should be provided. Also member C is provided in the interior, in the middle portion, with ridges 10, as shown in FIGS. 3 and 6. Members A and C are held together by friction. Ridges 10 engage with grippers 12 in member B, as it will be described in more detail hereinbelow.

Numeral **14** in the interior of members A and C designates a plurality of flats or small projections which are designed to prevent freezing of the two members when they are assembled in working operation. The total number of the flats may be varied, but should be at least four and preferably eight in each member A and C. The flats extend throughout the length of members A and C. The size of the flats is not crucial, but it should be adequate to prevent freezing between members A and C, for instance about one third inch in width and should project about between one-sixteenth and one-twenty-fifth of one inch. The outer diameter of the upper portion of members A and C is slightly smaller than the lower portion, so that when member B is telescopically mounted within member A and member C placed over it, the assembly appears as in FIG. **14.** When several panels have to be supported as in a bookcase arrangement, each member A interlocks with two members C and each member C interlocks with two members A.

A slot split (not shown) may be provided in member A and C throughout the entire wall thickness to provide for greater flexibility and springing action during the assembly.

FIGS. **2, 10** and **12** represent member B which is to be mounted telescopically within member A. Member B is a tubular member of such diameter that a tight fit is obtained, when member B is telescopically mounted with member A. The overall length of member B is so selected that when it is mounted within member A, in working arrangement, it extends at the bottom, through a portion of the cut out portion of member A and the upper end projects over the upper end of member A as shown in FIG. **14.** In this manner, good clamping action is provided for the panel which is inserted through the slot **6.**

Member B comprises in its lower end a vertical groove, designated by numeral **16** in FIG. **2.** The surface of the groove is not even but is of conical shape the apex of which is shown at **20.** The angle of the conical surface may vary but is preferably a 180° included angle.

Groove **16** is contiguous with the inclined groove section **15,** which extends over about one-third of the entire circumference of member B. The size of the groove **16,** and groove **15** is so selected that when member B is telescopically mounted within member A, lug **5** of member A slides therein and when member B is rotated, a snug fit is obtained, with member B being locked firmly. The inclined groove **15** may be cut through for better engagement with the lug **5.**

Member B is provided at the top with grippers **12** which project as far as the outer diameter of the upper part of member A, so that when the three members are assembled, member B is rotated until at least one gripper fits into the portion between two ridges **10** of member A thus locking the structure. At least one gripper is provided but preferably eight grippers are present throughout the circumference of element B. Similar engagement between the grippers of member B and the ridges of member C is relied on to hold these two elements together.

Member C as shown in FIG. **3** is a cylindrical element of outer diameter smaller in the upper portion, about one third of its height, so that when the three elements are assembled, the bottom of member C abuts the lower portion of member A. The inner diameter of member C must be sufficiently greater than the outer diameter of member B to permit telescopic mounting and to achieve a snug fit. When the structure is assembled, as shown in FIG. **14,** the top of member B reaches the inner ridges **10** of member C. Ridges **10** in the interior of member A and C are present only in the middle portion and extend only as far as the beginning of the portion of lesser diameter. The size of the ridges, is so selected that they fit in the space between the grippers.

FIGS. **8** and **9** show an embodiment of a cap which may be used at the top of the structure. This cap **22,** referred to herein as member D, is provided with two, preferably four inner ridges **10** in the upper portion, so that when the cap is mounted over member C or member A, the bottom of the cap abuts with the lower portion of either A or C which has larger outer diameter and the upper portion of member B reaches the inner ridges **10.**

FIG. **15** shows the upper portion of a bookcase with four caps according to FIG. **8.**

In the embodiment of FIGS. **10** and **11,** member B is the same as in FIG. **2,** but the vertical groove **26** is continuous with a groove **25** which is not cut out. Engagement with lug **5** may be achieved even if groove **25** is not cut through. A boss **32** is preferably provided about in the middle of the vertical groove, to provide a snug fit.

FIG. **13** represents another embodiment of member A, called herein member E, which is particularly suitable when a table is to be assembled because the board is supported by the slot **24** and inner lug **28** engages with the groove **16** or **26** and groove **25** or cut-out portion **15** of member B. An adapter, or extension (not shown), is used to connect with the legs of the table. This embodiment is particularly advantageous when a table is to be assembled because the board remains on the same level as the support structure.

According to a preferred embodiment of the invention, the inclined portion of member B, is cut through and the edge is provided with indentations **30** as shown in FIG. **12.** These indentations permit to achieve a tighter fit and better locking when engaged with lug **5** or **28.**

Although FIGS. **1, 2** and **3** show the exterior shape of members A, B and C as cylindrical, it is manifest that the exterior appearance may be changed, for instance, it may be square, as shown in FIG. **17,** rectangular, or other shape or could be adapted to fit furniture of antique style. Numeral **33** in FIG. **17** represents a small projection, for instance about one-eighth inch in height and one-sixteenth inch in diameter, which serves as a locator and which helps in assembly of the three members.

The support structure of this application may be easily constructed from nylon or other synthetic polymer such as polystyrene. It may withstand loads as high as the board or panel which is inserted through the slot, may withstand. Although the Figures shown here are used for tables or bookcases, it is manifest that according to other embodiments of the invention, the slot could be arranged in a diagonal direction, so that the panel would be in a diagonal direction. This arrangement would be suitable for display racks, room dividers and in general, structures used mainly for decorative puposes.

Manifestly, in the support structure according to the present invention, the engagement between member A

and C is a friction fit. Member B engages with members A and C, and with the caps by means of the grippers **12** and ridges **10**. This engagement between the ridges **10** and the grippers **12** serves both as a locking device as well as a driving mechanism. The conical shape of the groove **16** or **26** permits snug fit. Member B may be provided with ribs **16** in the interior (not shown), if desired.

What is claimed is:

1. A structure for detachably supporting a panel or the like comprising a first, a second and a third member having a bore therethrough, said first member having a cut-out portion in its wall serving as a receptacle for said panel, said second member being of lesser outer diameter for telescopic mounting within said first member, a heart-shaped lug with an apex in the interior of said first member and recess means in said second member comprising a vertical groove having boss means and an inclined groove contiguous therewith, whereby when said second member is telescopically mounted within said first member and rotated, said lug apex interlocks with indentations of said inclined groove, said first and third member each having the upper portion of lesser outer size than the lower portion, whereby when the three members are assembled, an upstanding column results of uniform external dimensions, said second member having an annular flange with at least two projections at the upper end of said second member and at least two ridges in the interior of each of said first and third member, the ridges on said third member engaging said projections, said ridges extending only in the middle portion of each of said first and third member.

2. The structure according to claim **1** wherein four ridges are provided in the interior of each of said first and third member.

3. The structure according to claim **1** wherein said second member is provided at the top thereof with a plurality of projections in spaced relationship throughout the upper edge thereof.

4. The structure according to claim **1** additionally comprising a fourth member serving as an end top portion, said fourth member comprising a tubular member of outer size the same as the outer larger size of said first and third member, said fourth member being open at the bottom and closed at the top and being provided with ridges in the interior thereof extending from the top to about midway of said fourth member.

5. The structure according to claim **1** wherein said inclined groove in said second member is a cut out portion.

6. The structure according to claim **1** wherein the interior of said first and second member is provided with flat portions.

7. The structure according to claim **1** wherein said first and third member contain a split in the lower part thereof.

8. The structure according to claim **1** wherein said first and third members have outer cylindrical configuration.

9. The structure according to claim **1** wherein said first and third members have outer cylindrical configuration.

10. A table comprising four structures according to claim **1**, wherein the panel being placed in the cut-out portion of said four first members is a table top, the cut-out portion is near the top of said four first members whereby the table top is essentially flush with the top of said first members, and said four structures provide the support for the legs of the table.

11. The structure according to claim **10** wherein said first member has outer cylindrical configuration.

* * * * *