United States Patent [19]

Werner

[11] **3,711,133**

[45] **Jan. 16, 1973**

[54] **EXPANDABLE AND CONTRACTIBLE TUBING SUPPORT STRUCTURE**

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[22] Filed: **June 2, 1971**

[21] Appl. No.: **149,181**

[52] **U.S. Cl.** .....**287/54 A,** 248/188.1

[51] **Int. Cl.** **F16b 7/00**

[58] **Field of Search** ..248/188.1; 211/182; 287/54 A, 287/54 B, 54 C, 126, 20.92 E; 85/8.3, 5

[56] **References Cited**

UNITED STATES PATENTS

2,926,941	3/1960	Thompson	287/54 B
3,074,203	1/1963	Paksy	287/126
3,093,027	6/1963	Rapata	85/5 R
3,169,439	2/1965	Rapata	85/5 R
3,392,947	7/1968	Keliehor	211/182
3,412,437	11/1968	Bennett	85/5 R

FOREIGN PATENTS OR APPLICATIONS

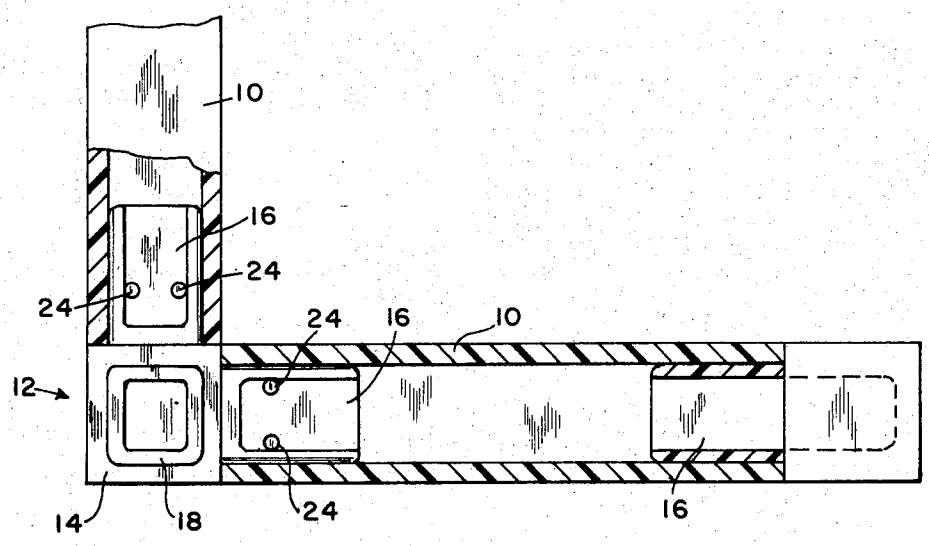
226,905	2/1960	Australia	248/188

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[57] **ABSTRACT**

A tubing structure including a plurality of non-round, hollow, open-ended tubing sections with a plurality of end connectors. The structures may be selectively expanded or contracted according to the user's requirements. The end connectors maintain a frictional connection of considerable strength between the adjacent tubing sections. The tubing structure, when assembled, is a strong, rigid, and stable support for a variety of uses.

7 Claims, 6 Drawing Figures



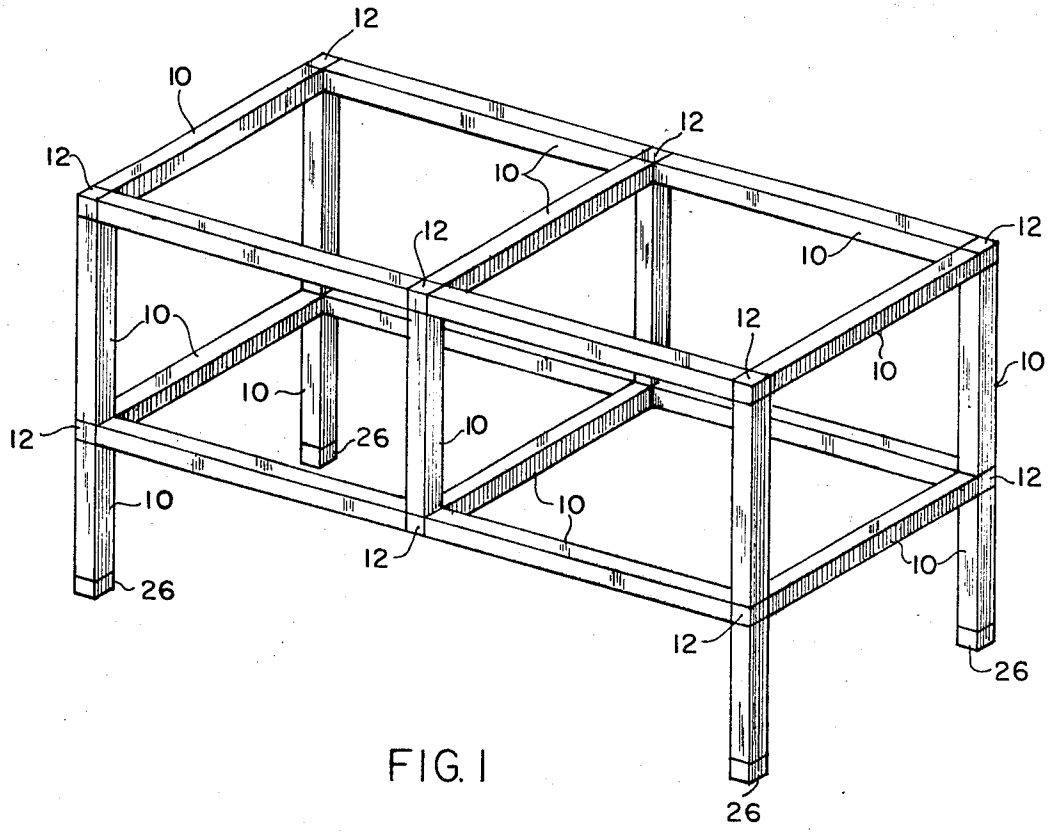


FIG. 1

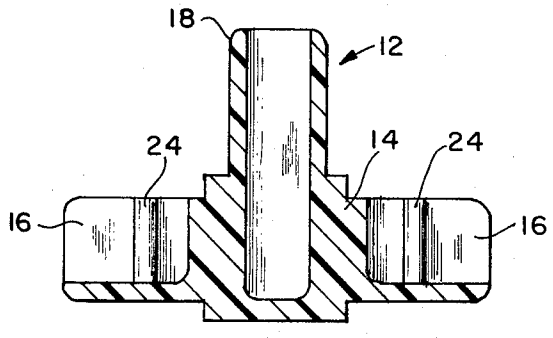


FIG. 6

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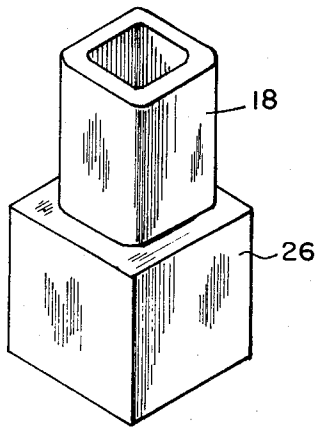


FIG. 4

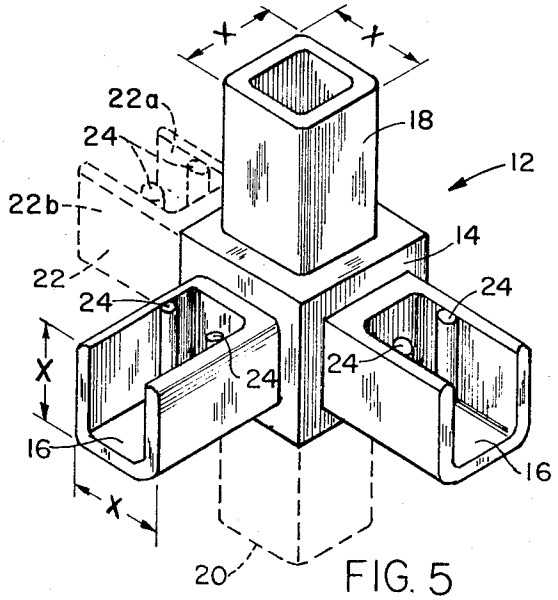


FIG. 5

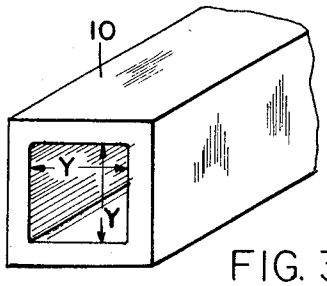


FIG. 3

FIG. 2

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EXPANDABLE AND CONTRACTIBLE TUBING SUPPORT STRUCTURE

This invention relates to a tubing support system which is frictionally held together and which can be expanded or contracted to form a desired configuration.

An object of the present invention is to provide a plurality of interfitting tubing parts being rectangular in cross section.

Another object of the present invention is to provide interfitting rigid tubing sections having high strength characteristics.

A further object of the present invention is to provide hollow tubing end connectors that can connect a multiplicity of tubing sections, such as two-way, three-way, and four-way connectors.

Another object of the present invention is to provide tubing sections in clear or colored plastic in order to achieve a decorative effect for the tubing structure.

The objects and advantages derived by the use of this invention will be better understood by reference to the following detailed specification when considered in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of an assembled tubing support structure constructed in accordance with the teachings of the present invention.

FIG. 2 is an enlarged cross-sectional view of two tubing sections and a connector element interconnecting the sections.

FIG. 3 is a partial perspective view of an end of one section of hollow tubing.

FIG. 4 is a perspective view of a leg end plug.

FIG. 5 is a perspective view of a hollow tubing connector with variations thereof shown in dotted lines; and

FIG. 6 is a sectional view of another type of connector.

DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

Referring to the drawings, the present selectively expandable and contractible tubing support structure comprises a plurality of hollow tubing sections **10**, which are rectangular in cross-section and may be constituted of a high density, rigid plastic such as 89129 ABS, manufactured by the B. F. Goodrich Company, or Butyrate, manufactured by Eastman Chemical Corporation. The ABS material is a polymer resin made by combining a styrene-acrylonitrile resin component with a butadrene-acrylonitrile resin. The tubing may be optically transparent or colored from a variety of selected colors for aesthetic reasons. The tubing sections **10** are preferably removably interconnected, however, this can be accomplished only by the use of considerable force. Nevertheless, if it is desired to have the tubing sections permanently combined, the assembled tubing sections may be chemically fused, bonded or welded resulting in a rigid, permanently combined integral structure.

Each of the adjacent tubing sections **10** are interconnected by means of selected connectors **12**, as seen in FIGS. 1,2,5, and 6. The connectors **12** comprise a base portion **14** provided with inserts **16** that project laterally from the base portion. As seen in FIG. **5**, an additional projection **18** and additional projection **20** (shown in dotted lines) function to erect the tubing structure in stages, vertically as well as horizontally. As

also seen in FIG. **5** in full lines, the connector **12** is a three-way coupling which is adapted for use on the corner of the structure, while the connector having the additional insert **22** (shown in dotted lines) is a four-way coupling that is adapted for use interiorly, where four hollow tubing sections are interconnected.

Each of the inserts **16**, **22** is U-shaped and is provided with stiffening ribs **24** extending along the inner walls of the legs **16***a*, **16***b*, **22***a*, and **22***b* of the inserts. It will be noted that the ribs **24** are positioned a distance from the free ends of the inserts thereby permitting a limited flexibility to the free ends thereof. It should also be observed that the outer periphery of inserts **16** and **22** shown by the dimensions X is almost identical with the inner periphery of the hollow tubing sections shown by the dimensions Y so that the connectors **12** are inserted by force fit into the adjacent hollow tubing sections **10**, forming a rigid support structure of high strength. In this manner, a positive coupling of the tubing sections is effected which can be uncoupled only by the use of extreme force, for example by mallet blows. As seen in FIG. **4**, end caps **26** are provided for the open ends of the hollow tubing section legs.

The diameter of the hollow tubing sections **10** may vary according to required use. Moreover, the tubing may be optically clear, or of a desired color for aesthetic reasons. It should be apparent that a large variety of configurations can be constructed with the hollow tubing sections and selected connectors. Thus, the structure can be used as a support for a work bench, supports for displays, supports for furniture, as well as a variety of other uses.

I claim:

1. A selectively expandable and contractible tubing support structure comprising a plurality of hollow tubing sections that are rectangular in cross-section, a plurality of connecting members for said hollow tubing, each having a base block and a plurality of U-shaped inserts, each of said inserts projecting from said base block substantially perpendicular to each other, and having an outside diameter substantially corresponding to the inside diameter of said hollow tubing sections and rear wall section adjacent to said base block, a stiffening rib for each leg of each of said inserts which is located a predetermined distance from the respective open end of each insert, and the portions of said inserts forward of said stiffening ribs and remote from said rear wall section being slightly flexible while the portions of said inserts rearward of said stiffening ribs being rigid, thereby permitting frictional coupling of said inserts to adjacent tubing sections.

2. The combination as claimed in claim 1 wherein said U-shaped insert is provided with a relatively thick rear wall whereby when said insert is rigidly coupled to a tubing section, said fitting is liquid tight.

3. The combination as claimed in claim 1, wherein said hollow tubing sections have relatively thick wall sections.

4. The combination as claimed in claim 1, wherein some of said tubing sections are legs and further comprising leg end caps which are frictionally held therein.

5. The combination as claimed in claim 1, wherein said hollow tubing sections are constituted of a high density rigid plastic.

6. The combination as claimed in claim 1, wherein said connector elements are constituted of a high density rigid plastic.

7. The combination as claimed in claim 1 wherein said hollow tubing sections and corresponding connector elements are permanently combined.

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