

[54] CONNECTOR SYSTEM

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[51] Int. Cl. F16b 13/00

[58] Field of Search.....85/7, 67, 14, 42,
85/85, 80; 287/127, 20.92 E

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[57]

ABSTRACT

A connector system comprising plastic male and female elements provided with interlocking barbs and serrations so dimensioned that attempted separations of the elements acts to tighten the interlocking forces between them.

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2 Claims, 4 Drawing Figures

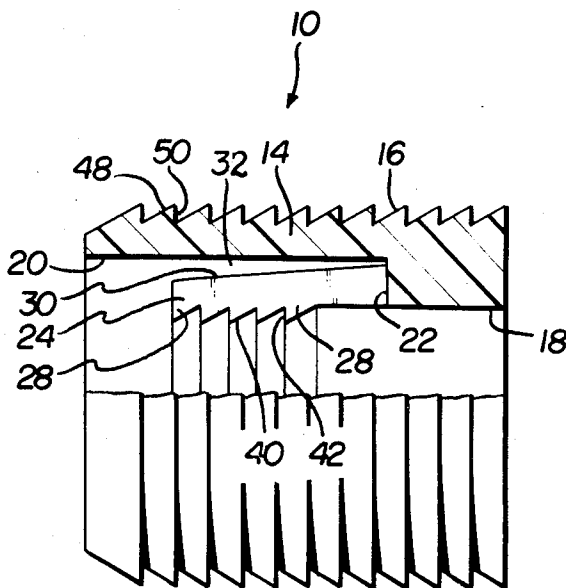


FIG. 1

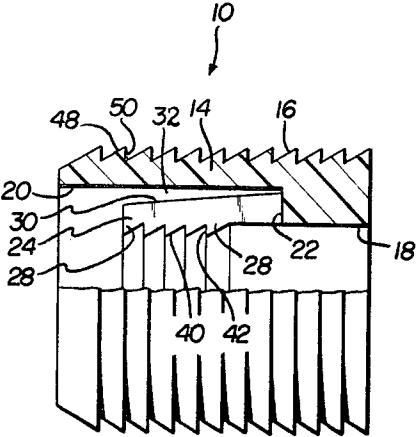
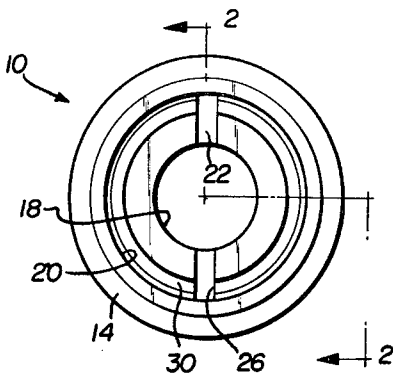


FIG. 2

FIG. 4

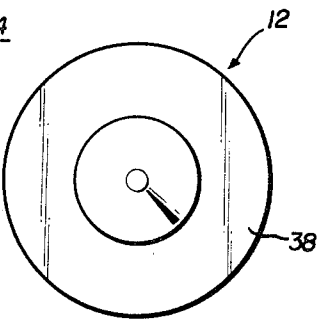
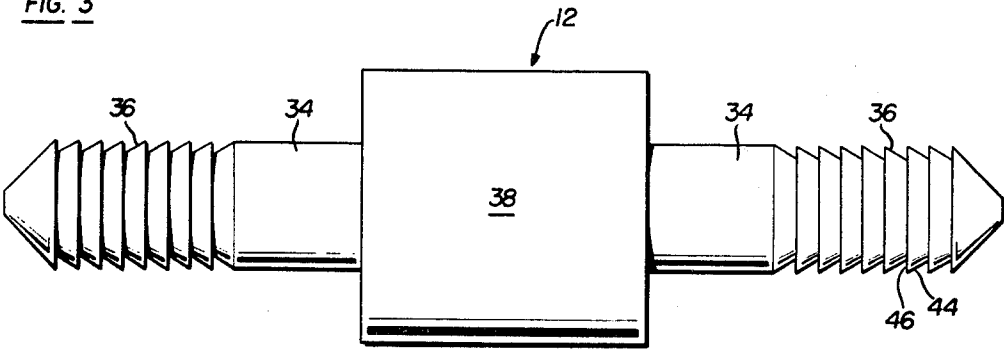


FIG. 3



CONNECTOR SYSTEM

BACKGROUND OF INVENTION

The present invention is concerned with the provisions of a connector system suitable for securely assembling together members such as the wood panels of a cabinet. More specifically, it is desired to provide a connector system which lends itself to high speed production and assembly techniques, wherein the connectors themselves are inexpensive and may be utilized by unskilled workmen.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an end view of the female connector of this invention.

FIG. 2 is a cross-sectional view of the female connector of FIG. 1, viewed in the direction of arrows 2—2 of FIG. 1.

FIG. 3 is a side elevation of a male connector of this invention.

FIG. 4 is an end view of the male connector of FIG. 3.

DETAILED DESCRIPTION OF THE INVENTION

The connector system of this invention generally comprises a female connector element 10 illustrated in FIGS. 1 and 2 and a male connector element 12 illustrated in FIGS. 3 and 4.

As best illustrated in FIG. 2, female connector 10 is generally a cylindrical tube having an outer wall 14 provided with a series of axially spaced peripheral barbs or serrations 16, for a purpose to be described below. The interior of female connector 10 includes a small diameter bore portion 18 adjacent its outer or left end and a larger diameter bore 20 adjacent its inner or right end, these bores being interconnected by a radial peripheral shoulder 22.

An inner split gripping sleeve 24 extends in an axial direction toward the inner or right end of the connector, this sleeve being cantilevered from shoulder 22. As best shown in FIG. 1, sleeve 24 is split along its entire length at 26 to permit it to flex in the radial direction. The inner surface of sleeve 24 is provided with a series of axially spaced serrations 28 which cooperate with the barbs on the male connector element, described below, to provide an effective interlock. The outer circumference 30 of sleeve 24 is tapered to provide additional clearance as it flexes radially outwardly within annular gap 32 separating it from bore 20.

Male connector element 12, illustrated in FIGS. 3 and 4, has a pair of oppositely extending shanks 34 each provided with axially spaced peripheral barbs 36. The intermediate body 38 has an enlarged diameter to resist shear forces, as will be described below.

The inner serrations 28 of the female connector each comprise a conically shaped follower ramp 40, which converges inwardly toward the second or inner end of the element, and a shoulder 42. These elements are dimensioned and shaped to complement the barbs 36 of the male element, each of which comprises a conical camming ramp 44 and a shoulder 46.

Similarly, the outer serrations 16 on female element 10, each comprise a conical ramp 48, which slopes inwardly toward the inner or righthand end of the connector, and a shoulder 50.

The relative dimensions of the cooperating male and female elements are important to the effective func-

tioning of the connector system. By way of example, with an outer diameter of 0.175 inches on barbs 36 of the male element, the smaller bore diameter 18 of female connector element 10 may be 0.180 inches to provide a 0.005 inch clearance permitting free insertion until barbs 36 reach inner serrations 28. Then, since the inner diameter of serrations 28 is about 0.146 inches, camming or lead-in ramps 44 of barbs 36 engage the corresponding conical ramp surfaces 40 of inner serrations 28, spreading the two halves of gripping sleeve 24 apart to permit complete insertion. Annular gap 32 accommodates this spreading of sleeve 24, without affecting the outer diameter of the female connector.

It will be observed from FIG. 2 that the diameter of the shoulders 42 of inner serrations 28 is less than the diameter at shoulder 22. This is a significant relationship, since any attempt to withdraw the male connector element results in an axial force at the point of engagement between shoulders 46 of barbs 36 and shoulders 42 of inner serrations 28, which force is at a smaller radius from the axis of the connector than the point at which shoulder 22 provides a reaction for such force. Hence, a couple is created tending to rotate or swing the split sleeve segments inwardly towards the axis of the connector, thus tightening the interlocking action between the connector elements.

In practice, using Delrin as the molding material for the connector elements, and utilizing the dimensions specified above, tests show that it takes approximately 20 pounds of force to assemble the two connector elements, and about 100 pounds of force to pull them apart. The application of 100 pounds of tension to pull the members apart usually results in partial destruction of one or both of the connector elements.

To assemble two wood panels, as in a cabinet, aligned holes are drilled in the panels to receive female connector element 10. With an overall diameter of the female connector of 0.390 inches, it is preferable to drill a hole of 0.375 inches in diameter, to provide a slight interference fit between the outer serrations 16 and the wall of the hole. This interference fit, coupled with the barb-like contour of serrations 16 in the form of lead-in ramp 48 and shoulder 50 results in a strong and positive interlock preventing withdrawal of the connector element from the hole in the receiving panel. The female connector element can be simply inserted with the wrap of mallet, for example. The annular gap 32 effectively isolates the inner split sleeve 24 from any possible distortions that would occur as a result of the interference fit, thus assuring that the essential dimensional relationships between the male and female connector elements are preserved.

Next, male connector element 12 is inserted into the female element of one of the two panels, and then the female connector element already inserted in the other panel is guided onto the opposite end of the male connector element projecting from the first panel, and the two panels pressed together to complete the assembly. The enlarged central diameter 38 of the male connector element, having a diameter of 0.375 inches corresponding to the diameter of the drilled holes which receive the female connector element, provides increased strength to resist any shearing force at the joint between the two connected panels.

The above described connector system fulfills the objectives set forth above. The elements are simple and

inexpensive to manufacture, can be rapidly assembled by unskilled workmen into previously located and drilled holes, and provide an invisible and effective connection between the connected elements.

This invention may be further developed within the scope of the following claims. Accordingly, the above specification is to be interpreted as illustrative of only a single operative embodiment of this invention, rather than in a strictly limited sense.

I now claim:

1. A female connector element adapted to receive and interlock with a male connector element having radially projecting conically shaped axially spaced peripheral barbs, comprising:

a hollow generally cylindrical tube having first and second open ends;

the bore of said tube being of substantially constant diameter for a first portion of its axial length inward from said first end, said first portion diameter being greater than the maximum diameter of the male connector element barbs, said first portion of said bore terminating in a shoulder which interconnects said first portion with a second coaxial bore portion of substantially constant but larger diameter than said first portion, said second portion extending from said shoulder toward said second end of said tube;

a longitudinally split generally cylindrical inner gripping sleeve cantilevered from said shoulder and ex-

tending axially therefrom toward said second end of said tube and radially spaced throughout its length from said second portion of said tube bore by an annular gap;

the bore of said gripping sleeve being provided with a plurality of axially spaced inwardly extending conically shaped serrations shaped and dimensioned to complementarily engage the barbs on the male connector element, each serration being defined by a follower surface sloping radially inwardly toward said second end and a shoulder connected with the adjacent serration, the complementary dimensions of said gripping sleeve serrations and the male connector element barbs producing an interference fit which results in said split gripping sleeve being temporarily radially displaced outwardly as the conical lead-in face of each axially spaced barb of the male element cams said serrations outwardly, said serration shoulders cooperating with the reverse side of the barbs to prevent withdrawal of the male element from said female connector element.

2. The female connector element of claim 1 wherein the outer circumference of said cylindrical tube is provided with a plurality of axially spaced radially projecting conically shaped barbs to assist in retaining the female connector element within its associated member.

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