United States Patent

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[33] **Great Britain**
[31] **27,141/69;**
May 29, 1969, Great Britain, No. 27,142/69; June 25, 1969, Great Britain, No. 32,159/69

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[54] **ARTICLES OF FURNITURE**
3 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** ..... **248/188.8,** 287/54 C, 287/103 R
[51] **Int. Cl.** **A47b 13/06**
[50] **Field of Search** ..... 248/188.8, 165, 158; 287/103 R, 54 R, 54 A, 54 B, 54 C, 56

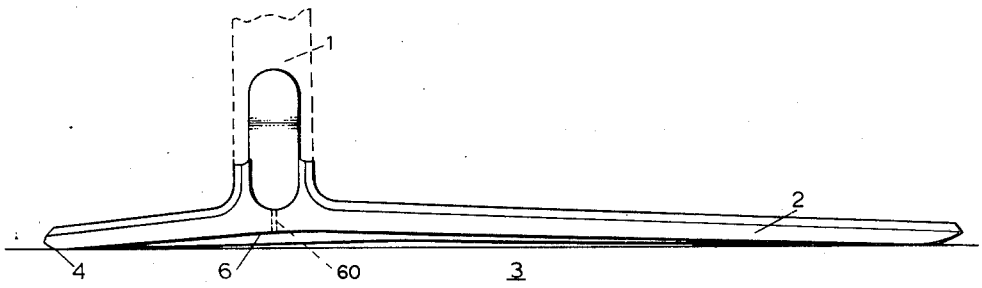
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ABSTRACT: The present invention relates to furniture joints and ground-engaging i.e. foot, members of furniture associated with such joints. There is provided a joint in an article of furniture between two interengaging members, the joint having a first part with an H cross section elongated element and a second part including a pair of bosses spaced apart by a distance generally equal to the width of the H central web. These joint parts are a push fit together and are bonded by a heat-treated resin adhesive. A ground-engaging member associated with one part of the joint is so curved that in an unloaded state only the end regions of the curve engage the ground whereas in a loaded state not only the end regions but also at least some intermediate regions engage the ground. There is also provided an improved method of making a part of the joint disclosed.



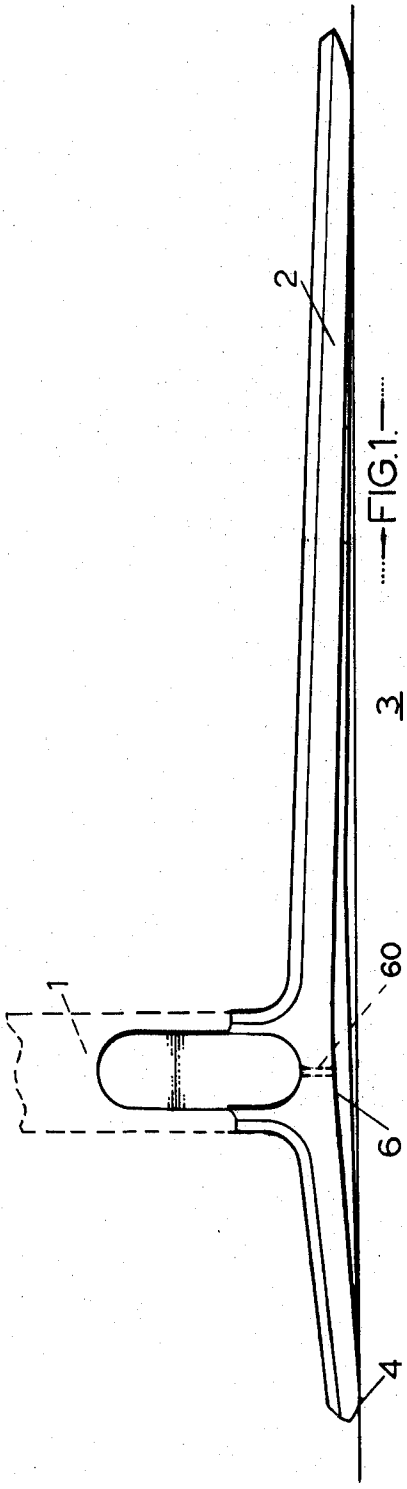


FIG.1.

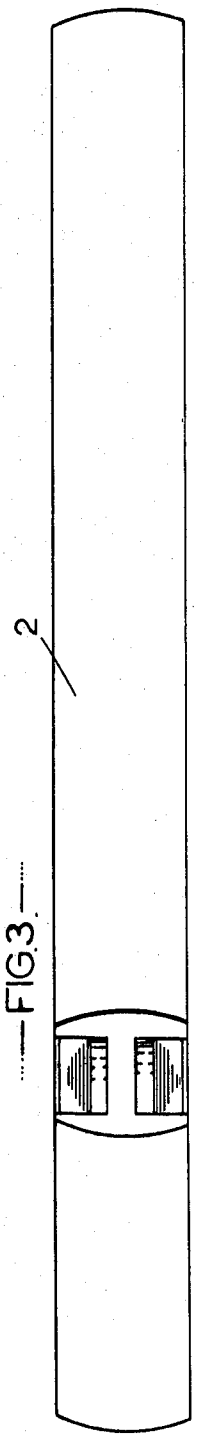


FIG.3.

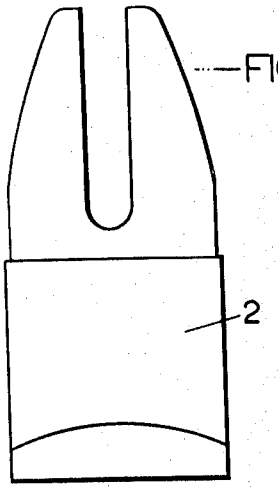


FIG.2

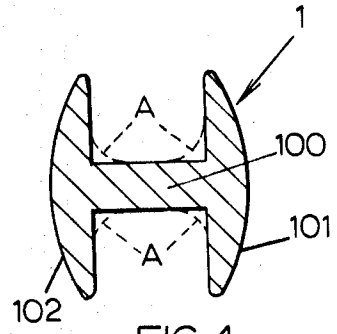


FIG.4

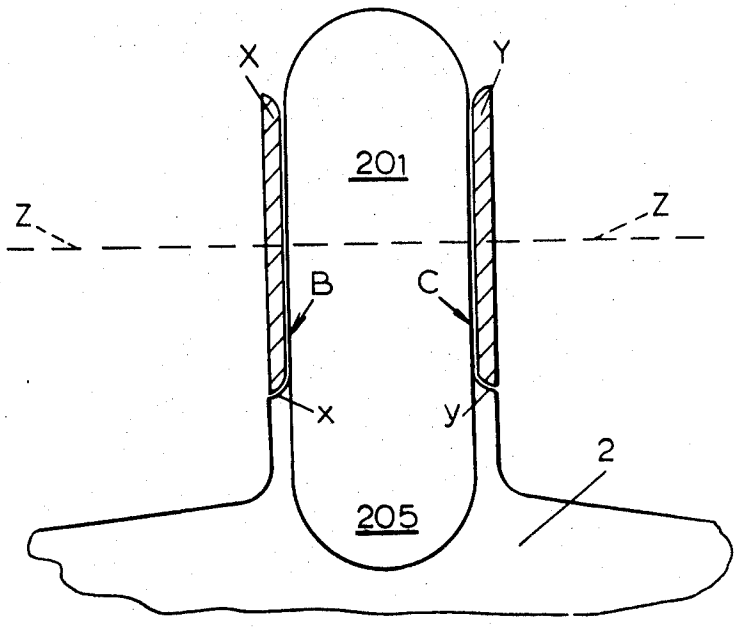


FIG.6

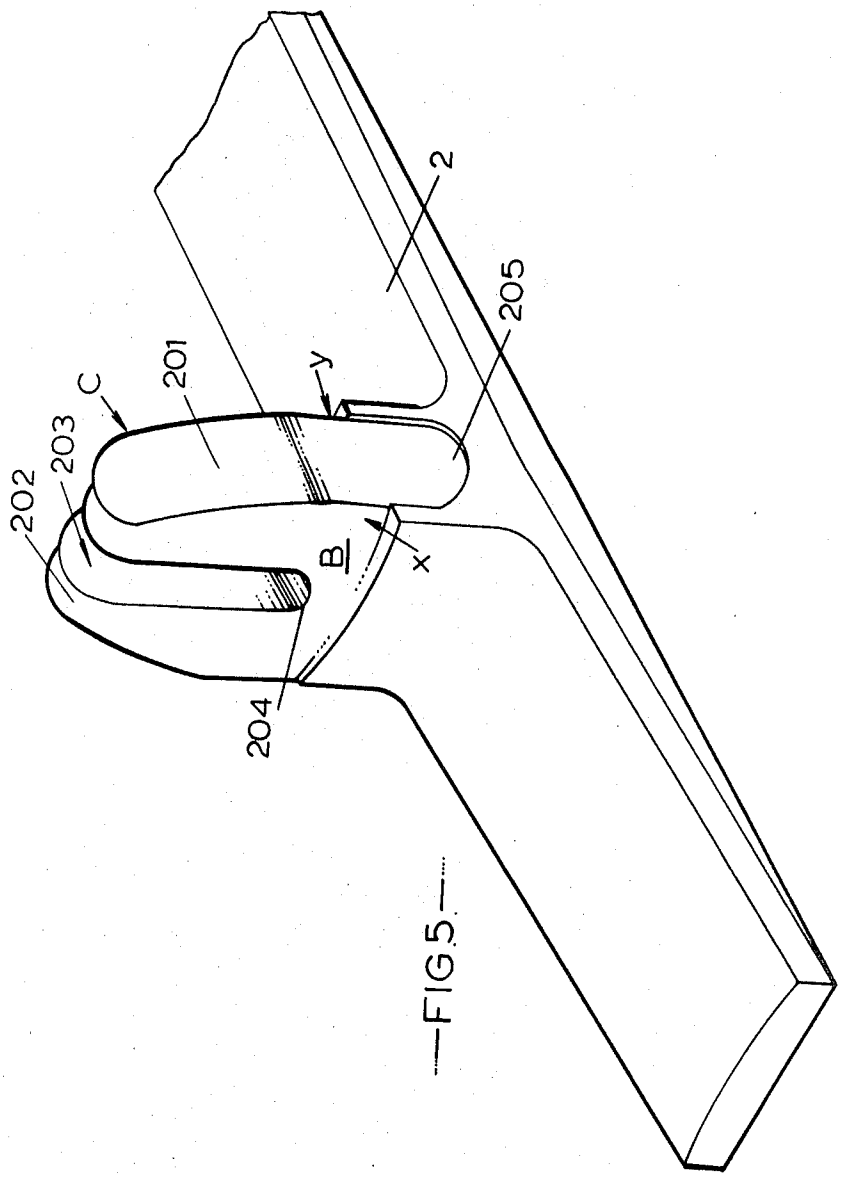


FIG. 5

ARTICLES OF FURNITURE

Prior applications: In Great Britain
on May 29, 1969 and numbered 27141/69
on May 29, 1969 and numbered 27142/69
on June 25, 1969 and numbered 32159/69

The invention relates to improvements in articles of furniture and more particularly to improvements in the construction of joints between members thereof, e.g., between foot members thereof and leg members thereof. The invention relates to a particular form of such foot member and to a method of making a joint part.

There exist numerous proposals relating to methods and means for attaching generally vertical or upright leg members to generally horizontal foot members but the majority of such proposals involve the use of screws or rivets. The former have the disadvantage that they may easily become loosened in use and the latter have the disadvantage that, even with extensive finishing, their presence is apparent.

It is thus an object of the present invention to provide an article of furniture comprising at least one joint between two members, such as a leg member and a foot member, which joint does not rely for its strength on screws or rivets, is attractive or unobtrusive to the eye and is mechanically secure.

It is a further object of the invention to provide an improved method of machining a part of such a joint.

Furthermore, it is known that most chairs and the like suffer from the disadvantage that when they are loaded i.e. sat on, the sitter often experiences a degree of shock e.g. in the region of his spine.

It is thus a still further object of the present invention to provide an article of furniture which, although mechanically sound and not unduly springy, exhibits sufficient inherent "give" to ensure that such loading shocks are at least substantially obviated.

In accordance with these and other object there is provided in an article of furniture, a joint between two interengaging members e.g. a foot member and a leg member, which joint comprises a first part, either constituting or associated with one said member, including an elongated element, e.g. extruded of generally H cross section with an elongated central web and two elongated flanges terminating said web, the joint further comprising a second part, either constituting or being associated with the other said member, including a pair of bosses spaced apart by a distance generally equal to the width of the said central web thereby to define a slot therefor, two joint parts being a push fit one with the other and being retained in interengaging relation by bonding with a heat-treated resin adhesive.

Advantageously, at least some of the load-bearing areas of the joint are radiused thereby to ensure that stresses, e.g. resulting from dropping of the article of furniture, are not confined to a single point of a sharp angle but instead to a radiused change of direction, i.e. are not localized.

In accordance with a preferred embodiment of the invention, all the load bearing areas are radiused with the exception of the faces of the bosses facing inwards and closing on the said central web.

Preferably, the externally directed faces of the flanges are radiused and the regions of the other joint part with which they abut are similarly radiused.

Advantageously, the base of the slot between the two bosses is raised above the level where at the said bosses originate and the flanges terminate. Similarly, it is advantageous for the central web to be machined short of its abutting member, i.e. the base of the slot, thereby to ease problems of manufacturing tolerance and provide a chamber for resin accumulated during the bonding process.

In such a case, it is a further preferred feature of the invention to provide a drilling to vent the chamber to atmosphere thereby to ensure that resin trapped therein will not force the parts of the joint apart as a result of expansion during heat treatment.

Also in accordance with the present invention there is provided an improved method of machining a part of the said joint which method involves the utilization of a pair of parallel rotary cutters with bevelled edges, which cutters machine the side faces (i.e. those interrupted by the slot) of the second part of the joint (as defined above) in true parallelism in all planes and bevel the lower edges of the said faces to avoid localization of stresses.

Advantageously bevelling of various other regions of the previously proposed joint is effected, also for the purposes of avoiding localization of stresses.

Also in accordance with the present invention there is provided in association with such a joint at least one ground-engaging member which is so curved that in an unloaded state only the end regions of the curve engage the ground whereas in a loaded state not only the end regions but also at least some intermediate regions engage the ground. It will be evident that the change of conditions (on loading) from limited to greater engagement provides the aforementioned degree of "give" and that in this way the article of furniture does not shock in use e.g. when sat on.

These and other objects and advantages of the invention will appear from the following description given with reference to the accompanying drawings in which:

FIG. 1 shows a part of a leg of an article of furniture such as a chair in side view, said leg comprising a generally upright leg member, a generally horizontal foot member and a joint according to the invention therebetween,

FIG. 2 shows a part of the leg in end view,

FIG. 3 is a view from above,

FIG. 4 is a section through an upright leg member illustrating in broken lines the nature of preferred bevelling,

FIG. 5 is an isometric projection of a part of the foot member, and

FIG. 6 shows in schematic view the rotary machining method.

Explanation will first be given of the shock absorbing feature of the invention and reference will thereafter be made to the manner in which a member incorporating such a feature is associated with the joint of the present invention and the manner in which a part of the said joint may be machined.

Thus, in FIG. 1 there is shown the leg in side view, and in FIG. 2 there is shown a part of the leg in end view.

As illustrated the leg comprises a vertical leg member 1 (shown in broken lines in FIG. 1) which is terminated by a foot member 2, the members 1 and 2 being interengaged.

As illustrated in FIG. 1, the member 2 is so constructed as to be in the form of a curve along its length concave with respect to the ground or a supporting surface 3 on which the article of furniture rests. In the unloaded state of the furniture, the member 2 contacts the ground only by its end regions 4 and 5. When the article is loaded, however, the force exerted on the member 2 through the member 1 causes the former member to flatten. As a result, contact between the ground 3 and the member 2 is no longer only at regions 4 and 5 but also at regions therebetween including or approaching a central region 6. The said region 6 represents the highest point of the curved member 2 above the ground 3 and conveniently this region 6 is directly in line with the axis of the member 1.

As will be evident, a sudden shock transmitted to the member 2 via the member 1 causes a temporary flattening of the member 2 so that the shock is absorbed. Thus, a person loading e.g. sitting on, the article of furniture is afforded the comfort of a degree of "give" thereby.

If desired, the member 2 is also concave in cross section as illustrated by FIG. 2.

In one particular embodiment of the invention, the member 2 is formed from a metal with a degree of inherent resilience suited to the anticipated loading range for the article of furniture. As suitable materials, there may be instanced aluminum alloy, but other materials such as brass, bronze, cast iron or steel could be used. In practice, it is found that a clearance of one-eighth inch between the region 6 and the ground 3 is often advantageous.

As shown in FIG. 4, the leg member 1 comprises an elongated element of H section—preferably extruded—with a central web 100 machined back to a selected but not critical distance and with two outer flanges 101, 102 radiused by similarly noncritical distances.

The nature of the foot member 2—which is preferably gravity die cast—will now be more carefully considered with reference to FIGS. 5 which shows essential features of its jointing area. Thus, as shown, this area comprises two upright bosses 201, 202, separated by a slot 203 and as will be evident by reference also to the sectional shape of the leg member 1 shown in FIG. 4, the leg and foot joint areas (or parts) are a push fit one over the other with the central web 100 engaging in the slot 203. The engaging surfaces are mutually secured by bonding them together with a heat-treated resin adhesive of any suitable type.

In order to enhance the strength, simplicity and visual appeal of the joint, various further preferred features are generally adopted. Thus, in order to avoid the concentration of stresses in the joint, e.g. resulting from dripping of the article of furniture, every load area is radiused with the exception of the vertical faces directed inwards and closing to the central web 100. As a result, stresses are not confined to the single point of a sharp angle but to a radiused change of direction, i.e. stresses are not localized.

In accordance with a further preferred feature of the invention the radiusing of the flanges 101, 102 matches the radiusing of the regions of the foot 2 with which there is abutment in the finished joint.

The various areas of radiusing are not referenced in the drawing as they are clearly visible in their own right.

In accordance with a still further preferred feature, the radiused base 204 of the slot 203 between the two bosses 201, 202 is raised as to a height above the level where the said bosses originate and flanges terminate. As a result of this arrangement, there is presented a greater area of metal to receive the impact load which will result from dropping of the article.

It is also preferred that the central web of the member 1 be machined short of the distance required for exact mating. Such an arrangement is adopted not only to ease manufacturing tolerance problems by providing a degree of clearance but also to provide a chamber for the resin used in bonding which may be scraped down the inner sides of the bosses and trapped.

Resin variously expands, becomes more viscous and produces gases on heating and because of all or some of these effects any resin trapped in the chamber would force the joint apart. Thus it is preferred that a hole be drilled vertically through the central part of foot 2 at region 6 which hole vents the aforementioned chamber to atmosphere. Such a hole is shown in broken lines at 60 in FIG. 1.

As a final embellishment, recesses 205 are provided where the lower parts of the bosses 201 and 203 merge with the remainder of the foot 2. Such an arrangement renders the finished joint visually more attractive and assists in stress dispersal.

Various modifications of the described article are, of course, possible. For instance, although it is convenient to form the various members from an aluminum alloy, other materials such as brass, bronze, cast iron or cast steel may be used. Also, as previously indicated, it is to be noted that joints as previously described may be used in various articles of furniture and at various positions and angles other than that particularly described.

As variously shown in FIGS. 4, 5 and 6 the faces marked B and C of the joint second part i.e. the joint lower part, are mutually truly parallel in all planes (see FIGS. 5 and 6). The mating faces of the first, i.e. upper, joint part are similarly parallel (see FIG. 4), such parallelism (as opposed to tapering) being adopted for two reasons. Firstly, because it is found that, by the use of parallel engaging surfaces of the two joint parts, the stresses created in the joint during use are predominantly in shear rather than in tension, in practice such an arrangement being advantageous from the point of view of joint strength. Secondly, because it is found that the adoption of such a parallel relationship of the various faces enables the preferred method of machining illustrated in FIG. 6 to be adopted.

Thus, in FIG. 6 there is illustrated in purely schematic form the manner in which the faces B are machined in accordance with this proposal. As shown, two parallel rotary cutters X and Y are arranged on a common spindle z, the cutters X and Y being bevelled at their peripheral edges as shown to provide a bevelled region x or y at the base of each face B,C. By the adoption of such an arrangement and technique it is possible to machine lengths of materials merely by movement of the cutters X, Y therealong.

The resultant bevelled edges at x, y are, of course, advantageous for reasons concerning the localization of stresses and the parallel faces produced are advantageous for reasons concerning reliance for the most part on shear stresses.

As will be readily evident the adoption of such a machining technique also reduces overall cost.

Simultaneous reference to FIGS. 4 and 5 will assist in a better understanding of the above references to parallelism "in all planes."

Reference to FIG. 4 will also assist in an understanding of a further present proposal. Thus, as shown in exaggerated manner in FIG. 4 by broken lines at A it is preferred, in accordance with the said further proposal, to bevel the right angles existing between the internal flange faces of the first joint part and the web thereof. Such bevelling avoids localization of the forces as may happen where a right angle is used, and it is advantageous to similarly bevel the mating faces of the second joint part.

I claim:

1. In an article of furniture, a joint between two interengaging members, such as a ground-engaging member and a leg member, the said joint comprising a first part and a second part, the said first part including an elongated element of generally H cross section with an elongated central web and two elongated flanges terminating said web, and the said second part including a pair of bosses spaced apart by a distance generally equal to the width of the said central web thereby to define a slot therefor, the said two joint parts being a push fit one with the other and being retained in interengaging relation by bonding with a heat-treated resin adhesive; and wherein the base of the said slot defined between the two said bosses is raised above the level where the said bosses originate and the said flanges terminate; and where the said central web is machined short of its abutting member, i.e. the base of the said slot defined between the two bosses, thereby to provide a chamber for accumulated resin; and wherein a said joint part is drilled to vent the said chamber to atmosphere.

2. A joint as defined in claim 1 wherein to avoid localization of stresses load-bearing areas of the joint, other than the faces of the said bosses facing inwards and closing on the said central web, are radiused.

3. In an article of furniture, a joint as defined in claim 1 and at least one ground-engaging member which is so curved that in an unloaded state only the end regions of the said curve engage the ground, whereas in a loaded state not only the said end regions but also at least some intermediate regions engage the ground.

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