A frame assembly for making furniture such as tables, shelves and the like comprises a plurality of post and beam bars of uniform and the like cylindrically segmentally annular cross-sectional shape and size and having a pair of coaxial cylindrically concave and convex outer and inner sides centered on bar axis lying external of the respective bar. A plurality of junction pieces formed with three projections of the same cross-sectional shape and size as the bars and each having a respective projection axis lying perpendicular to and intersecting at a common point external of these respective junction pieces the other projection axis of these junction pieces. The ends of the bars are secured to the projections on the junction pieces so that the inner and outer sides of the bars and of the projections are contiguous and the axis of the inner and outer sides of the bars is coincident with that of the inner and outer sides of the respective projection. The bars are quarter cylindrical and hollow and the projections are formed with outwardly extending tongues which fit snugly within the ends of the bars and are securable therein by means of screws. Each bar is formed adjacent each of its ends with a recess and a U-shaped clip is provided having one bent-over end engageable in the recess of one bar and another bent-over end engageable in the recess of a bar lying coextensively next to this bar. Thus an assembly can be formed having smooth round outer surfaces and offering considerable structural rigidity.

10 Claims, 13 Drawing Figures
MODULAR FRAME ASSEMBLY FOR MAKING FURNITURE SUCH AS TABLES, SHELVES, AND THE LIKE

FIELD OF THE INVENTION

The present invention relates to a modular frame assembly. More particularly this invention concerns an assembly usable for manufacturing furniture such as tables, bookshelves, chairs, and the like.

BACKGROUND OF THE INVENTION

There are known modular furniture assemblies comprising two general types of pieces: bars and junctions. The bars are elongated and adapted to be fitted into the junctions which form the corners of the frame. In a typical such arrangement bars are extruded synthetic-resin tubes and the junctions are blocks from which project one or more cylindrical bosses adapted to fit within the ends of the bars. The junction pieces are provided in seven principal types: pieces with one projection and adapted to cap a tube, pieces with two extensions in line with one another adapted to join two tubes in line with one another, pieces with two projections at right angles to one another to form an elbow, pieces with three projections, four projections, five projections, and six projections. It is necessary for the user to buy the exact junction pieces needed, since these pieces are functionally highly specialized.

Such a system, which is typical of the systems known in the art, is relatively unitary, having numerous cracks and crennel which dust collects and which eventually present an unattractive appearance. Furthermore it is impossible to add to existing structures made with such arrangements without going through the difficulty of disassembling the structure and rebuilding at least that side of it corresponding to the side on which the extension is to be made. Furthermore such arrangements are frequently unattractive and insufficiently rigid to function as a table or a stool.

OBJECTS OF THE INVENTION

It is therefore an object of the present invention to provide an improved modular frame assembly.

Another object of this invention is to provide an improved furniture frame which overcomes the above-given disadvantages.

SUMMARY OF THE INVENTION

These objects are attained in a frame according to the present invention comprising a plurality of post and beam bars of uniform and like cylindrically segmentally annular cross-sectional shape and size and each having a cylindrically concave outer side centered on a bar axis external of the respective bar and a cylindrically concave inner side. Junction pieces are provided which are each formed with three projections of the same cross-sectional shape and size as the bars and each having a cylindrically concave outer side centered on a projection axis line perpendicular to and intersecting at a common point external of the respective piece the other projection axes of the piece. Means is provided for rigidly securing the bars to the junctions to the bars with the bar axes coincident with the respective projection axis and the outer and inner sides of the bars contiguous with the respective outer and inner sides of the respective projections.

Such an assembly when formed of at least one group of four coplanar horizontal beam bars forming a rectangle joined at its corners with at least four junction pieces down from which extend four parallel post bars has a generally parallelepipedal shape with the concave outer sides of the bars turned outwardly.

The same assembly according to the present invention has the considerable advantage that the junction pieces are all identical. It is possible in accordance with this invention to form a parallelepipedal frame using eight identical beam bars and four identical post bars, interconnected with eight identical junction pieces.

Use of beam and post bars of identical lengths gives the frame a cubical shape. It is, of course, possible to use the post bars as legs of a table whose tabletop rests on four beam bars.

In accordance with further features of this invention means is provided for securing two bars coextensively together with the bar axes coincident. This allows a cellular frame to be constructed which is particularly advantageous for storing books and the like.

This means for securing two bars coextensively together comprises in accordance with the present invention a spring-steel clip having a U-shape with a pair of inwardly bent feet each adapted to engage in a recess of a bar lying coextensively along another bar having a recess in which the other foot is received.

In accordance with another feature of the invention each clip is provided with an outwardly directed lip on which is restable a flat plate, serving as tabletop, bookshelf, or the like. A plurality of such clips interconnecting a plurality of such beam elements rigidly and firmly support such a plate.

The bars according to the present invention are quarter-cylindrically arcuate and hollow. The junction pieces are formed at their projections with outwardly extending tongues adapted to engage within the ends of the bars. A screw is passed through a hole in the bar at the end and threaded into a registering hole in the tongue so as to secure the two firmly together.

In accordance with another feature of this invention there is provided a support clip or element which has an offset inner end adapted to be fitted through a hole in the side of a bar to the interior thereof and locked in place. The other end of the support element is formed with another support clip adapted to hold a plate such that the upper surface thereof lies in a plane with the edge of the bar in which the support element is fitted. Such an arrangement allows a table to be built with the assembly according to the present invention in a manner such that the edges of the tabletop will not project above the upper surface thereof.

BRIEF DESCRIPTION OF THE DRAWING

The above and other objects, features, and advantages will become more readily apparent from the following, reference being made to the accompanying drawing in which:

FIGS. 1a, 1b and 1c are side, top, and end views, respectively of the table according to the present invention;

FIGS. 2a, 2b and 2c are top, side, and end views respectively, of a bookshelf arrangement according to the present invention;

FIG. 3 is a perspective, partially exploded view of a simple closed frame in accordance with this invention;
FIG. 4 is a view of the assembled frame as shown in FIG. 3, and adjoining frames of like construction;
FIGS. 5a, 5b, and 5c are sections taken along line Va—Va, Vb—Vb, and Vc—Vc of FIGS. 4, 5a, and 5b, respectively;
FIG. 6a is a cross-section through another part of a frame as shown in FIGS. 3 and 4; and
FIG. 6b is a view taken in the direction of arrow Vb of FIG. 6a.

SPECIFIC DESCRIPTION
With reference first to FIGS. 3, 4, and 5a—5c, it can be seen that the frame according to the present invention comprises beam bars 2 and post bars 3 of identical cross-sectional shape and size but of different lengths, interconnected by junction pieces 4. The bars 2 and 3 are straight and hollow and each shaped in cross section as a quarter-cylindrical annulus. The bars 2 and 3 have planar edges 7 and 6, respectively, and respective outwardly directed cylindrically concave sides 2a and 3a centered on axes 8. These bars 2 and 3 thus each form a quarter of a cylindrical tube indicated in dot-dash lines at 5 and centered on the axis 8. The outwardly directed cylindrically convex faces 16 of the bars 2 and 3 are also centered on the respective axes 8.

The junction pieces 4 are each formed with three tongues 13 of identical shape as the tubes 2 and 3 and adapted to fit into the ends thereof. Each of the tongues 13 is formed with a threaded hole 14 into which fits a setscrew 15. Each setscrew 15 passes through a corresponding hole in the end of a bar 2 or 3 and thereby secures this bar rigidly to the respective tongue 13. The tongues 13 are also centered on the axis 8, so that when three bars 2 and 3 are connected to a junction piece 4 their axes 8 coincide and meet at right angles to one another at a point 9 lying without this junction piece 4. The junction pieces 4 each have edges 11 which are contiguous in an assembled frame with the edges 6 of the bars 2 and 2a and edges 10 which are contiguous to the edges 7 of the bars 2 and lie in a common plane therewith. The edges 10 and 11 are joined smoothly together at 2 so that an assembled frame 1' as 1 as shown in FIG. 3 presents on each of its faces a flat planar surface. In such an assembly 1', 1' the axes 8 and the points 9 all lie externally of the frame or cell. Each of the bars 2 and 3 is formed adjacent its end and inward of the hole receiving the screw 15 with a slot 23 into which is adapted to fit one foot 22 of a clip 17 having a cylindrically arcuate central portion 21 extending between the feet 22. As best shown in FIG. 5b each clip 17 is adapted to extend between two adjoining bars 2 or 3 and has one of the feet 22 engaged in each of the holes 23 so as to secure these two bars coextensively together. The clip 17 is made of spring steel that has a width 1 equal to slightly less than the length of the slot 23 so that these clips 17 lock the bars 2 and 3 tightly together, preventing transverse as well as longitudinal relative displacement between two attached bars.

As shown also in FIG. 5c each of the clips 17 can be provided with an outwardly extending lip or nose 18 on which a plate 19 is adapted to rest. In this manner a table as shown in FIGS. 1a—1c can be formed, or a shelf system as in FIGS. 2a—2c. Holes 24 in the assembly can be plugged or fitted with a reinforcing rod.

FIGS. 6a and 6b show a clip 17' having a foot adapted to rest against the inside of the inner face 2a of a beam bar 2 and a offset portion 20 adapted to engage against the inside of the outer face 16 of this bar 2 so that the lip 18 extends parallel to the edge 7 but offset therefrom. In this manner the tabletop 19 can rest on these lips 18 with its upper surface level with the edges 7.

I claim:
1. A frame assembly comprising:
a plurality of post and beam bars of uniform and like cylindrically quarter-segmentally annular cross-sectional shape and size and each having a cylindrically concave outer side centered on a bar axis external of the respective bar and a cylindrically convex inner side;
a plurality of junction pieces each formed with three projections of the same cross-sectional shape and size as said bars and each having a cylindrically concave outer side centered on a projection axis lying perpendicular to and intersecting at a common point external of the respective piece the other projection axes of said respective piece and a cylindrically convex inner side; and
means rigidly securing the ends of each of said post and beam bars to a respective projection to define said assembly with the respective bar axes coincident with the respective projections with the respective bar axes coincident with the respective projection axes and the respective outer and inner sides of the bars contiguous with the respective outer and inner sides of the respective projections, said assembly having an exterior and an interior with the outer sides of the bars corresponding to the exterior of the assembly and with the inner sides of the bars corresponding to the interior of the assembly, all of said axes lying outside said assembly, whereby an assembly of at least one group of four coplanar beam bars, at least one group of four such pieces, and at least four parallel post bars has a generally parallelepipedal shape with said concave faces turned outwardly.
2. The assembly defined in claim 1, further comprising
means securing two such bars coextensively together with their bar axes coincident.
3. The assembly defined in claim 2 wherein said first-mentioned means includes a tongue extending outwardly from each of said projections in line with the projection axis thereof, said bars having hollow ends, said tongues being snugly receivable within said hollow ends.
4. The assembly defined in claim 3 wherein said first means includes a plurality of screws each engageable through a respective hollow end and into a respective tongue received therein.
5. The assembly defined in claim 2 wherein said second-mentioned means includes a deformable clip, each of said bars being formed with at least one recess, said clip being simultaneously engageable in the recesses of said pair of coextensive bars.
6. The assembly defined in claim 5 wherein said clip is generally flat and arcuate and has a pair of feet each engageable in a respective recess of a respective bar with said clip partially overlying the convex inner sides of said respective bars.
7. A frame assembly comprising:
a plurality of post and beam bars of uniform and like cylindrically segmentally annular cross-sectional
shape and size and each having a cylindrically concave outer side centered on a bar axis external of the respective bar and a cylindrically convex inner side;
a plurality of junction pieces each formed with three projections of the same cross-sectional shape and size as said bars and each having a cylindrically concave outer side centered on a projection axis lying perpendicular to and intersecting at a common point external of the respective piece the other projection axes of said respective piece and a cylindrically convex inner side; and
means for rigidly securing the ends of each of said bars to a respective projection with the respective bar axes coincident with the respective projection axes and the respective outer and inner sides of the bars contiguous with the respective outer and inner sides of the respective projections, whereby an assembly of at least one group of four coplanar beam bars, at least one group of four such pieces, and at least four parallel post bars has a generally parallel-pipedal shape with said concave faces turned outwardly;
means for securing two such bars coextensively to gether with their bar axes coincident,
said second-mentioned means including a deformable clip, each of said bars being formed with at least one recess, said clip being simultaneously engageable in the recesses of a pair of coextensive bars,
said clip being generally flat and arcuate and having a pair of feet each engageable in a respective recess of a respective bar with said clip partially overlying the convex sides of said respective bars, said clips each being formed with an inwardly projecting lip; and
a flat rigid plate dimensioned to rest on a plurality of such lips on such clips secured between beam bars.
8. The assembly defined in claim 6 wherein said clips are cylindrically arcuate and are made of spring steel.
9. The assembly defined in claim 1 wherein said inner and outer sides of said bars are coaxial and said inner and outer sides of said projections are coaxial.
10. The assembly defined in claim 1 wherein said junction pieces are integrally formed with said projections.

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