COLLAPSIBLE FURNITURE JOINTING SYSTEM

Inventor: Leah Kenttämaa-Squires, West Lafayette, IN (US)

Assignee: PURDUE RESEARCH FOUNDATION, West Lafayette, IN (US)

App. No.: 13/185,029

Filed: Jul. 18, 2011

Related U.S. Application Data

Provisional application No. 61/365,113, filed on Jul. 16, 2010.

Publication Classification

Int. Cl. A47B 47/00 (2006.01)

U.S. Cl. 312/265.2

ABSTRACT

Methods for constructing and apparatus for furniture. In some embodiments, the furniture includes a plurality of subassemblies, with each component within the subassembly being interlocked with adjacent components. Preferably, there is additional interlocking between adjacent subassemblies. Preferably, the furniture is easily and simply constructed without the use of fasteners or tools. Prior to assembly, the components are generally planar, which facilitates storage of the disassembled furniture. In some embodiments, each of the components within a subassembly are substantially identical to the other components, thus minimizing fabrication costs.
COLLABSIBLE FURNITURE JOINTING SYSTEM

CROSS REFERENCE TO RELATED APPLICATION


FIELD OF THE INVENTION

[0002] The present invention pertains to furniture and, in particular, to methods of joining furniture components in a manner not requiring fasteners.

SUMMARY OF THE INVENTION

[0003] One aspect of the present invention pertains to a furniture assembly. Some embodiments further include a first plurality of separable frame pieces, each said piece of said first plurality being interlockable with each adjacent said piece of said first plurality. Yet other embodiments include a second plurality of separable frame pieces, each said piece of said second plurality being interlockable with each adjacent said piece of said second plurality. Still other embodiments include a plurality of separable panels, each said panel being interlockable with each adjacent said panel, each panel having a top and a bottom; and wherein the bottom of each said panel is interlockable with a corresponding different one of said first plurality of frame pieces, and the top of each said panel is interlockable with a corresponding different one of said second plurality of frame pieces.

[0004] Another aspect of the present invention pertains to a furniture assembly. Some embodiments further include a first plurality of separable frame pieces, each said piece having two ends, one end of each said piece having a first frame interlocking pattern including at least one laterally directed fingor and at least one recess, and the other end of each said piece having a second pattern that is complementary in shape to the first interlocking pattern, each said piece of said first plurality being interlockable with each adjacent said piece of said first plurality, each said frame piece having a top defining at least one slot and a bottom defining at least one slot. Yet other embodiments include a plurality of separable panels, each said panel having two ends, one end of each said panel having a third interlocking pattern, the third interlocking pattern of one said panel being interlockable with the third interlocking pattern of the adjacent said panel and wherein the bottom slot of each said frame piece is interlockable with the third interlocking pattern of a corresponding said panel, and the top slot of each said frame piece is interlockable with a third interlocking pattern of a different corresponding said panel.

[0005] Yet another aspect of the present invention pertains to a furniture assembly. Some embodiments include a first plurality of separable frame pieces, each said piece of said first plurality being laterally and slidingly interlockable with each adjacent said piece of said first plurality to form a first closed shape, each said frame piece having a top. Other embodiments include a second plurality of separable panels, each said panel of said second plurality being vertically and slidingly interlockable with each adjacent said panel of said second plurality to form a second closed shape, each said panel having a bottom. Still further embodiments include wherein the bottom of each said second plurality of panels is vertically and interlockingly interlockable with the top of a corresponding different one of said first plurality of frame pieces, and the first closed shape and the second closed shape have substantially the same planform.

[0006] It will be appreciated that the various apparatus and methods described in this summary section, as well as elsewhere in this application, can be expressed as a large number of different combinations and subcombinations. All such useful, novel, and inventive combinations and subcombinations are contemplated herein, it being recognized that the explicit expression of each of these combinations is unnecessary.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Some of the figures shown herein may include dimensions. Further, some of the figures shown herein may have been created from scaled drawings or from photographs that are scalable. It is understood that such dimensions, or the relative scaling within a figure, are by way of example, and not to be construed as limiting.

[0008] FIG. 1a is a side perspective view of a floor lamp according to one embodiment of the present invention, with the lighting illuminated.

[0009] FIG. 1b is a side perspective view of the floor lamp of FIG. 1a, with the lighting turned off.

[0010] FIG. 1c is a close-up perspective view of a portion of the apparatus of FIG. 1b.

[0011] FIG. 2a is a side perspective view of a floor lamp according to another embodiment of the present invention with the lighting illuminated.

[0012] FIG. 2b is a close-up perspective view of a portion of the apparatus of FIG. 2a.

[0013] FIG. 3 is a side and top perspective view of a small side panel according to one embodiment of the present invention and marked to correlate to the dimensions of Table 1.

[0014] FIG. 4a is a top and side perspective view of a frame part according to one embodiment of the present invention and marked to correlate to the dimensions of Table 2.

[0015] FIG. 4b is a top and side perspective view of a frame part according to another embodiment of the present invention.

[0016] FIG. 5 is a top and side perspective view of a leg according to one embodiment of the present invention and marked to correlate to the dimensions of Table 3.

[0017] FIG. 6 is a top and side perspective view of a large side panel according to one embodiment of the present invention and marked to correlate to the dimensions of Table 4.

[0018] FIG. 7 is a top and side perspective view of a top detail piece according to one embodiment of the present invention and marked to correlate to the dimensions of Table 5.

[0019] FIG. 8 is a top and side perspective view of a shelf according to one embodiment of the present invention and marked to correlate to the dimensions of Table 6.

[0020] FIG. 9a is a top and side perspective view depicting the interlocking of a frame subassembly with a leg subassembly, according to one embodiment of the present invention.

[0021] FIG. 9b depicts the completed interlocking of FIG. 9a and the addition of a side panel.

[0022] FIG. 9c is a top perspective view of the apparatus of FIG. 9b showing the interlocking of a plurality of side panels.

[0023] FIG. 9d is a top perspective view of the apparatus of FIG. 9b showing the interlocking of a plurality of side panels.
FIG. 9e depicts the interlocking of a second frame subassembly with the partial assembly of FIG. 9d.

FIG. 10 is a close-up of a portion of the apparatus of FIG. 2a.

FIG. 11 is a close-up of a lower portion of FIG. 1b.

FIG. 12 is a partial side and top perspective sketch of a frame piece according to another embodiment of the present invention.

FIG. 13 is a line drawing of the apparatus of FIG. 12.

FIG. 14 is a top and side perspective view of a side panel according to another embodiment of the present invention.

FIG. 15 is a side and top perspective photographic image of furniture according to one another embodiment of the present invention.

FIG. 16 is a close-up of a portion of the apparatus of FIG. 15.

FIG. 17 is a side and top perspective photographic image of a partial assembly of the apparatus of FIG. 15.

FIG. 18 is a side and top perspective photographic image of a portion of the apparatus of FIG. 17.

DESCRIPTION OF THE PREFERRED EMBODIMENT

For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiments illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, such alterations and further modifications in the illustrated device, and such further applications of the principles of the invention as illustrated therein being contemplated as would normally occur to one skilled in the art to which the invention relates. At least one embodiment of the present invention will be described and shown, and this application may show and/or describe other embodiments of the present invention. It is understood that any reference to "the invention" is a reference to an embodiment of a family of inventions, with no single embodiment including an apparatus, process, or composition that should be included in all embodiments, unless otherwise stated. Further, although there may be discussion with regards to "advantages" provided by some embodiments of the present invention, it is understood that yet other embodiments may not include those same advantages, or may include yet different advantages. Any advantages described herein are not to be construed as limiting to any of the claims.

The use of an N-series prefix for an element number (NXX.XX) refers to an element that is the same as the non-prefixed element (XX.XX), except as shown and described thereafter. As an example, an element 1020.1 would be the same as element 20.1, except for those different features of element 1020.1 shown and described. Further, common elements and common features of related elements are drawn in the same manner in different figures, and/or use the same symbology in different figures. As such, it is not necessary to describe the features of 1020.1 and 20.1 that are the same, since these common features are apparent to persons of ordinary skill in the related field of technology.

Although various specific quantities (spatial dimensions, temperatures, pressures, times, force, resistance, current, voltage, concentrations, wavelengths, frequencies, heat transfer coefficients, dimensionless parameters, etc.) may be stated herein, such specific quantities are presented as examples only, and further, unless otherwise noted, are approximate values, and should be considered as if the word "about" prefaced each quantity. Further, with discussion pertaining to a specific composition of matter, that description is by example only, and does not limit the applicability of other species of that composition, nor does it limit the applicability of other compositions unrelated to the cited composition.

One embodiment of the present invention pertains to floor lamps designed to be easily mass produced and shipped. Each piece of the lamp is designed around a jointing system that requires minimal or no tools or fasteners for assembly and breakdown. The use of flat materials during construction facilitates the fitting of the unassembled lamp into a small box. These characteristics also allow the structure to be readily collapsed and reassembled, aiding in minimal transport requirements. In addition to being easily mass produced and shipped, the construction of these lamps leaves only a small amount of wasted materials from the panel stock. Preferably, each piece has the same rectangular shape and can be nested within centimeters of another before being cut out on a CNC router. This reduction in wasted materials is helpful for eliminating some of the manufacturing costs. Although what will be shown and described is an embodiment pertaining to a floor lamp, it is understood that the present invention is not so constrained and contemplates the assembly of knock down furniture adaptable for a variety of uses.

In some embodiments pertaining to floor lamps, the assembly includes panels that are adapted and configured to include regions that are translucent and other regions that are substantially not translucent. These two regions are designed to be aesthetically pleasing when backlit. For example, in some embodiments the lamp assembly has a closed cross sectional shape, with a source of light in the interior of the shape. In some embodiments, the translucent portions are created by removing material from a planar piece of wood, such that the translucent section of panel is sufficiently thin to allow light to pass through. However, yet other embodiments of the present invention are not so constrained, and contemplate other methods of providing aesthetically pleasing patterns when illuminated by light, including for example, the complete removal of some sections of a panel that are subsequently covered with a translucent material such as a plastic sheet or cloth.

FIGS. 1 and 2 show various views of a floor lamp 20 and 20' according to two embodiments of the present invention. Preferably, each lamp 20 is of similar construction, but it can be seen that the panels of FIG. 1 include a different aesthetic appearance than the panels shown in FIG. 2. Referring to FIG. 1b, it can be seen that a panel 30' includes an aesthetically chosen arrangement of translucent areas 38' generally bounded by one or more non-translucent regions 39'. Likewise, a panel 60' includes one or more translucent regions 68' bounded by one or more nontranslucent regions 69'. In some embodiments, the nontranslucent regions 69' are created so as to visually interconnect with adjacent nontranslucent regions 39', so as to create an overall flowing pattern from the top to the bottom of lamp 20'.
Referring to FIG. 2b, it can be seen that any type of design can be integrated into the panels 30 and 60. In one particular embodiment, a panel 30 includes a translucent region 60 that evokes images of a bird in a tree. It can be seen that the less translucent region 60 can be variable in their transmission of light, such that there is an intermediate translucent region (represented by the five petal flowers).

In addition, as can be seen and will be discussed with regard to FIG. 11, the frame pieces 40 have a different joint configuration than frame pieces 30. Reference will not be made to various aspects of floor lamp 20', it being appreciated that the same comments, except with regards to aesthetic features and some aspects of the joining of frame pieces, also apply to floor lamp 20'.

Floor lamp 20 is constructed of a plurality of subassemblies stacked and interlocked one into another. Referring to FIG. 2a, it can be seen that floor lamp 20 is an alternating arrangement of panel subassemblies (either large panel subassemblies 26 or small panel subassemblies 23) and frame subassemblies 24. Preferably, each subassembly comprises a plurality of interlocking separate components. In some embodiments, each of the adjacent subassemblies interlock with each other.

Although an alternating pattern of small/large/ small/large panel subassemblies 23, 26, 23, 26, respectively, (with frame subassemblies 24 therebetween) are shown, it is appreciated that other arrangements of side panel assemblies are contemplated (for example, floor lamps constructed only of alternating arrangements of small panels and frame pieces, or only of large panels and frame pieces). Further, the invention is not constrained to a floor lamp comprising four vertical sections of side panel subassemblies, and other configurations are contemplated (for instance, floor lamps comprised of 1, 2, or 3 side panel subassemblies). The top of floor lamp 20 includes an interlocking subassembly 27 of top pieces 70. Further, although what has been shown and described is a floor lamp, it is also understood that shorter versions could include a top piece subassembly adapted and configured for use as a tabletop.

The decorative panels 30, legs 50, and top detail piece 70 are created and assembled to each other in substantially the same way. These pieces preferably use a simple slit, sliding joint to create a square. Grooves are located at the corners of these pieces to hold to frame sections and creating an appealing intersection or externally and outwardly facing corner 35 between the parts (as best seen in FIG. 2b). In addition, this outwardly facing corner 35 is created by substantial overlapping of adjacent side panels, which also provides stiffness and stability to lamp 20.

In one embodiment of the present invention components such as small side panels 30, legs 50, large side panels 60 and top pieces 70 are designed to be substantially symmetrical about their vertical centerlines (for example, such as centerline 31 shown in FIG. 3). Right and left sides of components 30, 50, 60, and 70 have features on one side that are substantially mirror images of features on the other side. Preferably, these pieces each include an open slit on each side that is about one half of the vertical height of the piece. These slits (i.e., 32, 52, 62, and 72 in their respective components) are adapted and configured to receive within them a corresponding slit of an adjoining component of the same type.

When components are arranged in a subassembly (such as the interlocking of four frame pieces into a frame subassembly 24), the subassembly preferably projects a closed planform. In furniture 20 and 20', the closed planform is substantially square, and defines an interior. However, yet other embodiments of the present invention are not so constrained. For example, the present invention contemplates subassemblies of three, five, and six components, which would therefore define planforms that are triangular, pentagonal, or hexagonal, respectively. Those of ordinary skill will appreciate that in such non-rectangular embodiments the interlocking joints preferably have angled interlocking surfaces corresponding to the planform shape.

FIG. 3 shows a small side panel 30 according to one embodiment of the present invention. Side panel 30 is generally symmetric about a centerline 31. Preferably, panel 30 is generally planar and fabricated from a single piece of material, such as wood. Preferably, the overall outside shape is rectangular, with a height of G and a length of A.

Each side panel 30 includes interlocking features at the two edges that are mirror images of each other. A slot 32 extends from the bottom of the panel 30 vertically for a height of about one-half of the overall height G of the panel. Although what has been shown and described are interlocking features that are mirror images of each other, other embodiments are not so constrained and contemplate interlocking features that are not mirror images of each other.

In some embodiments, the interlocking edge pattern includes a pair of recesses 36 (or notches) formed at the top and bottom of edge 33. Each recess 36 is adapted and configured to be received within a corresponding slot of a frame piece 40, as will be described later.

Slot 32 and edge 33 co-act to form a projection 34 therebetween. A portion of this projection 34 proximate to recess 36 fits behind an adjacent frame piece 40, and further below the corresponding slot of the frame piece. In some embodiments, lateral edges 33 of panel 30 extend outwardly from slots 32 sufficient amount to form external corners 35 when adjacent panels 30 are interlocked together. The width of projection 34 can create external, outwardly facing corners 35 that are both strong and aesthetically pleasing.

FIG. 4a shows a frame piece 40 according to one embodiment of the present invention. Side frame piece 40 is generally symmetric about a centerline 41. Preferably, frame piece 40 is generally planar and fabricated from a single piece of material, such as wood. Preferably, the overall outside shape is rectangular, with a height of G and a length of A.

Each frame piece 40 includes interlocking features at the two edges that are inverted mirror images of each other. Preferably, the interlocking features at one edge have a shape that is complementary to the shape of the interlocking features at the other edge. Each frame piece 40 includes two pairs of slots 42 that are adapted and configured to interlock with adjacent panels. Top 40.1 of frame piece 40 includes right and left vertically oriented slots 42. Bottom 40.2 of frame piece 40 includes right and left vertically oriented slots 42.

Each edge includes a pair of laterally projecting fingers 44, and a pair of recesses 46. On the left side of FIG. 4a it can be seen that a recess 46 is adjacent to top left slot 42. On the right side, a finger 44 is adjacent to the top right slot 42. Although what has been shown and described is a pair of fingers alternating with a pair of recesses, this is by way of example only, yet other embodiments of the present invention contemplating different numbers and arrangements of fingers and recesses. The interlocking ends of a frame piece 40 are adapted and configured such that a male member (such as rectangular projection 44) of one framed piece is received.
within a female portion (recess 46) of an adjacent frame piece 40 within a frame assembly 24. Although what has been shown and described are interlocking features that are mirror images of each other, other embodiments are not self constrained and contemplate interlocking features that are not mirror images of each other.

FIG. 4b shows a frame piece 40' according to another embodiment of the present invention. A plurality of frame pieces 40' are interlocked into a generally rectangular planform to create a frame subassembly 24', (as best seen in FIGS. 1C and 11). Side frame piece 40' is generally symmetric about a centerline 41'. Preferably, frame piece 40' is generally planar and fabricated from a single piece of material, such as wood. Preferably, the overall outside shape is rectangular, with a height of G and a length of A.

Each side frame piece 40' includes interlocking features at the two edges that are complementary in shape to each other. The interlocking shape at the right end of frame 40' (referring to FIG. 4B) includes a centrally located recess 46' located between adjacent laterally-extending fingers 44'. The opposite end of frame piece 40' includes a centrally located finger 44' located between a pair of recesses 46'. It can be seen that projection (male feature) 44' is received within recess (female feature) 46'. Likewise, laterally extending the fingers 44' are received within recesses 46' of an adjacent frame piece, when a frame subassembly 24' is constructed. Although what has been shown and described are interlocking features that are mirror images of each other, other embodiments are not self constrained and contemplate interlocking features that are not mirror images of each other.

FIG. 5 shows a small leg piece 50 according to one embodiment of the present invention. Leg piece 50 is generally symmetric about a centerline 51. Preferably, leg piece 50 is generally planar and fabricated from a single piece of material, such as wood. Preferably, the overall outside shape is rectangular, with a height of D and a length of A.

Each leg piece 50 includes interlocking features at the two edges that are mirror images of each other. A slot 52 extends from the bottom of the leg piece 50 vertically for a height of about one-half of the overall height G of the leg piece. Although what has been shown and described are interlocking features that are mirror images of each other, other embodiments are not self constrained and contemplate interlocking features that are not mirror images of each other.

In some embodiments, the interlocking edge pattern includes a pair of recesses 56 (or notches) formed at the top and bottom of edge 53. Each recess 56 is adapted and configured to be received within a corresponding slot of a frame piece 40, as will be described later.

Slot 52 and edge 53 co-act to form a projection 54 therebetween. A portion of this projection 54 proximate to recess 56 fits behind an adjacent frame piece 40, and further below the corresponding slot of the frame piece. In some embodiments, lateral edges 73 of top piece 70 extend outwardly from slots 72a sufficient amount to form external corners 75 when adjacent legs 50 are interlocked together. The width of projection 74 can create external, outwardly facing corners 75 that are both strong and aesthetically pleasing. It is to be noted that in some embodiments leg subassembly 25 includes two leg panels 50 having upwardly oriented slots 52, and two other leg panels that include downwardly extending slots (i.e., slots that extend from about midway down to the floor that contacts the floor.

FIG. 6 shows a small side panel 60 according to one embodiment of the present invention. Side panel 60 is generally symmetric about a centerline 61. Preferably, panel 60 is generally planar and fabricated from a single piece of material, such as wood. Preferably, the overall outside shape is rectangular, with a height of G and a length of A.

Each side panel 60 includes interlocking features at the two edges that are mirror images of each other. A slot 62 extends from the bottom of the panel 60 vertically for a height of about one-half of the overall height G of the panel. Although what has been shown and described are interlocking features that are mirror images of each other, other embodiments are not self constrained and contemplate interlocking features that are not mirror images of each other.

In some embodiments, the interlocking edge pattern includes a pair of recesses 66 (or notches) formed at the top and bottom of edge 63. Each recess 66 is adapted and configured to be received within a corresponding slot of a frame piece 40, as will be described later.

Slot 62 and edge 63 co-act to form a projection 64 therebetween. A portion of this projection 64 proximate to recess 66 fits behind an adjacent frame piece 40, and further below the corresponding slot of the frame piece. In some embodiments, lateral edges 63 of panel 60 extend outwardly from slots 62a sufficient amount to form external corners 65 when adjacent panels 60 are interlocked together. The width of projection 64 can create external, outwardly facing corners 65 that are both strong and aesthetically pleasing.

FIG. 7 shows a small top piece 70 according to one embodiment of the present invention. Top piece 70 is generally symmetric about a centerline 71. Preferably, top piece 70 is generally planar and fabricated from a single piece of material, such as wood. Preferably, the overall outside shape is rectangular, with a height of G and a length of A.

Each top piece 70 includes interlocking features at the two edges that are mirror images of each other. A slot 72 extends from the bottom of the top piece 70 vertically for a height of about one-half of the overall height G of the top piece. Although what has been shown and described are interlocking features that are mirror images of each other, other embodiments are not self constrained and contemplate interlocking features that are not mirror images of each other.

In some embodiments, the interlocking edge pattern includes a pair of recesses 76 (or notches) formed at the top and bottom of edge 73. Each recess 76 is adapted and configured to be received within a corresponding slot of a frame piece 40, as will be described later.

Slot 72 and edge 73 co-act to form a projection 74 therebetween. A portion of this projection 74 proximate to recess 76 fits behind an adjacent frame piece 40, and further below the corresponding slot of the frame piece. In some embodiments, lateral edges 73 of top piece 70 extend outwardly from slots 72a sufficient amount to form external corners 75 when adjacent top pieces 70 are interlocked together. The width of projection 74 can create external, outwardly facing corners 75 that are both strong and aesthetically pleasing. It is to be noted that in some embodiments top subassembly 27 includes two top panels 70 having upwardly oriented slots 72, and two other top panels that include downwardly extending slots (i.e., slots that extend from about midway down to the foot that contacts the floor.

FIG. 8 shows a shelf 80 adapted and configured for support of a light fixture (not shown). Shelf 80 includes a recess 86 at each of its four corners. These recesses are
adapted and configured to receive a projection 74 from an inverted top piece 70. A support platform 89 extends toward the middle of shelf 80 and provides a location from which to securely attach a light source.

Figs. 9a, 9b, 9c, 9d, and 9e show various steps in the assembly of a lamp 20 according to one embodiment of the present invention. Preferably, lamp 20 is comprised of various interlocking subassemblies. Each subassembly includes a plurality of separable components that are preferably substantially identical to one another. Further, each of these subassemblies not only interlocks within itself, but further interlocks into the subassemblies that are vertically adjacent to it.

As one example of this construction, a subassembly of small side panels 23 comprises four substantially identical panels 30. Figs. 9a and 9b show the beginning of construction. Fig. 9a shows a plurality of four leg pieces 50 that have been interlocked into a closed planform having the shape of a square. Each pair of adjacent leg pieces 50 coat each other to create an outwardly facing corner 25 on each of the four corners. A frame subassembly 24 is placed on top of, and interlocks to, leg assembly 25. Frame assembly 24 includes four frame pieces 40 that are interlocked at their edges, creating substantially the same closed planform shape as that of leg assembly 25. The frame subassembly 24 is positioned on top of, and interlocked to, leg subassembly 25. Referring to Fig. 9b, it can be seen that the edges 53 forming an outwardly facing corner 55 having ends that are nested within respective slots 42 of the frame subassembly 24.

Fig. 9c further shows a first panel assembly 23" positioned to interlock with frame subassembly 24. It should be noted that the panels 30" of subassembly 23" appearing in Figs. 9b, 9c, 9d, and 9e include four vertically-oriented projections along each lateral edge of the panel 30". This differs from the frame piece 30 shown previously in Fig. 3, and is a variation of frame piece 30. In some embodiments, these projections provide additional stability by extending further along the interior side of the slot 42 of the adjacent frame panel 40.

As best seen in Figs. 9c, and 9d, the panels 30" are arranged in subassembly 23 in a rectangular arrangement. Panels on opposite sides of the rectangle are arranged with slots 32" facing upward, and panels 30" on the other two opposing sides of the subassembly are arranged with slots 32" facing downward. The downward facing slot of one panel 30" is aligned and received within the upward facing slot of an adjacent panel 30". When assembled, the outside edges 33" of adjacent panels project outwardly so as to form an interior corner 35" (as best seen in Figs. 10 and 11). Fig. 9e shows a completed panel subassembly 23 having substantially the same closed planform shape as that of subassemblies 24 and 25. Note that all three of these planform shapes are preferably closed, such that the individual components of the subassemblies interlockingly form a continuous boundary around an interior. However, the present invention also contemplates those embodiments in which the planform shapes are not closed.

In addition, subassembly 23 is interlocked a frame subassembly 24. A recess 36 near each edge 33 of a panel is received within a corresponding slot 42 of the vertically adjacent frame piece 40. When so received, projection 34 is located along the inner, back surface of the panel 40, which is an assist in stabilizing the sliding attachment of subassemblies 23 and 24.

Each frame subassembly 24 comprises four individual frame panels 40. As can be seen best in Fig. 4, panel 40 is not a mirror image about a vertical centerline 41. Instead, the joining features on the right side of each frame piece 40 are complementary in shape to the features on the left side of the same frame piece. As can be seen on the right hand side of Fig. 4, the outer edge 43 is arranged in an alternating pattern of recesses 46 and projections 44. The outer edge 43 on the other side of panel 40 also has an alternating pattern of projections 44 and recesses 46, except in a pattern rotated 180 degrees about a horizontal centerline of panel 40. The interlocking pattern on one side of frame 40 is an inverted mirror image of the interlocking pattern on the other edge of panel 40.

As can be seen best in Fig. 10 at the top, the left edge 43 of a first frame piece 40 is received within the alternating projections and recesses of the right edge of the adjacent frame piece 40. Further, it can be seen that the edges 43 of adjacent corner pieces 40 when connected together extend within the interior corners 35 of the vertically adjacent panel subassemblies.

A subassembly 26 of large panels 60 is constructed in a manner similar to that described for small panel subassembly 23, and is interlocked with vertically adjacent frame assemblies 24 likewise in a similar manner. A subassembly 27 of top detail pieces 70 (as best seen in Fig. 7) is constructed in a manner similar to that of subassembly 23. A leg subassembly 25 comprises a plurality of leg pieces 50 (as best seen in Fig. 5), and is interlocked together similar to that of panels 30 or sixty. Note that the interlocking of leg pieces 50 results in the creation of outwardly facing corners 35 at the four intersections of the four leg pieces within a leg subassembly 25.

Yet another method for interlocking frame pieces is shown in Fig. 11. Frame pieces 40 are different from frame pieces 40 by having a single projection between two recesses on one edge, and a complementary-shaped single recess between two projections on the other edge. Yet other embodiments of the present invention contemplate higher order alternating arrangements of recesses and projections, including as one example an alternating pattern of three projections and three recesses.

Fig. 11 (along with Figs. 1a, 1b, and 1c) show a frame piece 40 (also shown in Fig. 4h) that includes interlocking features different than the interlocking features of frame piece 40. Also seen in Fig. 4h, frame piece 40 preferably includes a single central projection 44.2 of a first panel 40 that interlocks in the recess 46.1 formed between a pair of projections 44.1 on an adjacent panel 40.

The following Tables 1-6 provide exemplary dimensions of one embodiment of the present invention. It is appreciated that the present invention is not so constrained, and contemplates components having different dimensions.

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>Small panel 30 (refer to FIG. 3)</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>14&quot;</td>
<td>0.25&quot;</td>
</tr>
</tbody>
</table>
The frame pieces 40 are used for both appearance and stability. These parts allow the tall structure to be collapsed into multiple pieces of a small size. Each of the frame pieces 40 have substantially the same shape and fit into one another via a simple finger joint. The corners of these parts have grooves to hold the panels 50 or 60, legs 50, or top detail piece 70 in place. The grooves can also create a pleasing intersection (35, 55, 65, 75) for the sections. The grooves are placed so that when the frame is assembled, the other sections fit within them with little clearance which enhances stability. The frame section of the lamp can be glued together during manufacture for ease of assembly by the user. If not glued during construction, the finger joints of each frame part 40 are preferably tight with little clearance. Once the lamp is fully assembled, the joined panels hold the finger joints together while the frame sections hold the panels in place.

Each of the six sections is assembled in substantially the same way and the frames are placed between them. Assembly of a section begins by putting the panels in groups by their cut-out pattern for quick assembly. Each piece has long slits on each side that are used to interlock the panels. Once they are grouped, one of the panels with slots facing up is placed onto one of the frames. There are two available grooves for each panel located on all four sides of the frame. This step is repeated with the other panel on the opposite side of the frame. The two panels will stand on their own once they have been set into the grooves. One of the remaining panels is then put into place by sliding its downward facing slots into the slots of the two panels already in place. This step is repeated with the last panel, concluding the section’s assembly. Once each section has been assembled, the lamp is put together by stacking each layer on top of one another, beginning with the legs 50 and ending with the top detail 70. The lighting is added by placing shelves 80 between two of the sections, or on top of top detail 70. A fluorescent light fixture fits into grooves on each of the shelves in some embodiments and is suspended into the center, illuminating the structure.

Other possible uses of some embodiments of the present invention include as temporary storage containers, temporary fencing, room divider, a closet, portable toilet hide-away or temporary housing.

The dimensions of the center cut out of the shelf may be dependent on the light fixture dimensions.
onto a completed frame subassembly 224. FIG. 18 shows a completed frame subassembly 224.

[0086] It can be seen in these figures that the slot 236 of panels 230, and the slots 266 of panels 260, interlock with one of the top or bottom of a captured frame assembly 224. As best seen in FIG. 16, a slot 266 receives within it a portion of frame piece 240. In some embodiments, such as the one shown in FIG. 16, frame piece 240 includes a slot 242. The slots 242 and 266 are substantially aligned vertically when subassemblies 226 and 224 are interlocked. However, yet other embodiments of the present invention contemplate frame pieces 240 that do not include a slot 242, such that the top edge of frame piece 240 is received within slot 266. FIG. 16 further shows that edges 237 and 267 have been extended vertically to reduce any lengthwise gaps between the externally oriented corners 235 and 265.

[0087] As best seen in FIG. 17 the interlocking of one panel 260 with an adjacent panel 260 is achieved in some embodiments by vertically sliding one panel 260 over an inverted panel 260 (such as that shown in FIGS. 9c and 9d). Prior to the interlocking of adjacent panels, the respective slots 262 are aligned.

[0088] The interlocking of a pair of adjacent frame pieces 240 includes aligning fingers of one panel with corresponding recesses of another panel, and laterally sliding the frame pieces so as to interlock them (as seen in FIG. 16). Thus, frame pieces shown in some of the embodiments herein interlock laterally, whereas panel pieces of some embodiments shown herein interlock in a sliding fashion vertically. However, the present invention also contemplates those embodiments in which the interlocking of frame pieces is accomplished vertically, and further those embodiments in which panel pieces are interlocked laterally.

[0089] FIG. 16 shows an additional sliding interface between a panel and a corresponding frame piece that further interferes with the removal of a frame piece of an assembled frame subassembly 224 after it is interlocked with a corresponding panel 260 or 230 of a respective panel subassembly 226 or 223. FIG. 16 shows that the fingers 267 and 237 extend outwardly from the exterior face of an interlocked frame piece 240. These outward extensions of edge 263 or 233 form a projection 267 or 237, respectively, that interferes with any attempt to laterally remove a frame piece 240 from a furniture assembly 220.

[0090] Although what has been shown and described are panels 230 and 260 that each include second slots 236 and 226, respectively, it is understood that yet other embodiments of the present invention contemplate having only one panel 260 or 230 that interferences interlocks with a frame piece 240. Further, although what is shown and described are frame pieces 240 that include slots 242 that align with slots 236 or 266, it is understood that in some embodiments slots 242 are not included, such that a portion of edge (either top or bottom) of a frame piece 240 is captured within a corresponding panel second slot 236 or 266.

[0091] While the inventions have been illustrated and described in detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character, it being understood that only certain embodiments have been shown and described and that all changes and modifications that come within the spirit of the invention are desired to be protected.

What is claimed:
1. A furniture assembly, comprising:
   a first plurality of separable frame pieces, each said piece of said first plurality being interlockable with each adjacent said piece of said first plurality;
   a second plurality of separable frame pieces, each said piece of said second plurality being interlockable with each adjacent said piece of said second plurality; and
   a plurality of separable panels, each said panel being interlockable with each adjacent said panel, each said panel having a top and a bottom;
   wherein the bottom of each said panel is interlockable with a corresponding different one of said first plurality of frame pieces, and the top of each said panel is interlockable with a corresponding different one of said second plurality of frame pieces.

2. The assembly of claim 1 wherein each of said first pieces interlock with each other without the use of fasteners, each of said second pieces interlock with each other without the use of fasteners, and each of said panels interlock with each other without the use of fasteners.

3. The assembly of claim 1 wherein each piece of said first plurality has two ends, and each end of one said first piece interlocks with the end of another said first piece.

4. The assembly of claim 3 wherein each piece of said second plurality has two ends, and each end of one said second piece interlocks with the end of another said second piece.

5. The assembly of claim 4 wherein each said panel has two ends, and each end of one said panel interlocks with the end of another said panel.

6. The assembly of claim 1 wherein the number of pieces in said first plurality is the same as the number of pieces in said second plurality, and is the same as the numbers of panels.

7. The assembly of claim 1 wherein each of said first pieces, said second pieces, and said panels are generally planar.

8. The assembly of claim 1 wherein each of said first pieces and each of said second pieces have substantially the same shape.

9. The assembly of claim 1 wherein the interlocked first pieces, the interlocked second pieces, and the interlocked panels each have substantially the same predetermined planar shape.

10. The assembly of claim 9 wherein the shape is rectangular.

11. The assembly of claim 9 wherein the shape is triangular.

12. The assembly of claim 1 wherein said interlocked first plurality of pieces support the weight of said second plurality of pieces and the weight of said plurality of panels.

13. The assembly of claim 1 which further comprises a source of light located within the interlocked plurality of said panels, wherein said assembly is a lamp.

14. The assembly of claim 13 wherein each said panel is at least partly translucent.

15. The assembly of claim 1 wherein the interlocked plurality of frame pieces and panels comprise an article of furniture.

16. A furniture assembly, comprising:
   a first plurality of separable frame pieces, each said piece having two ends, one end of each said piece having a first frame interlocking pattern including at least one laterally directed finger and at least one recess, and the other
end of each said piece having a second pattern that is complementary in shape to the first interlocking pattern, each said piece of said first plurality being interlockable with each adjacent said piece of said first plurality, each said frame piece having a top defining at least one slot and a bottom defining at least one slot; and a plurality of separable panels, each said panel having two ends, one end of each said panel having a third interlocking pattern, the third interlocking pattern of one said panel being interlockable with the third interlocking pattern of the adjacent said panel; wherein the bottom slot of each said frame piece is interlockable with the third interlocking pattern of a corresponding said panel, and the top slot of each said frame piece is interlockable with a third interlocking pattern of a different corresponding said panel.

17. The assembly of claim 16 wherein the second pattern is an inverted mirror image of the first pattern.

18. The assembly of claim 16 wherein each said panel interlocks with a corresponding one said frame piece at a location inboard of the one said frame piece interlocks with another said frame piece.

19. The assembly of claim 16 wherein the interlocking of one said panel to another said panel forms an outwardly facing corner.

20. The assembly of claim 16 wherein each said panel has a height and the third interlocking pattern includes a third slot extending for about one half of the panel height.

21. The assembly of claim 20 wherein the third slot of one said panel aligns with the third slot of an another said panel when the one said panel is interlocked with the other said panel.

22. The assembly of claim 20 wherein each said panel includes an edge located outboard of the third slot, the edge being received within a top slot when one said panel is interlocked with one said frame piece.

23. The assembly of claim 20 wherein each said frame has a height and the third interlocking pattern includes a fourth slot extending from less than half of the frame height, the fourth slot being adapted and configured to be received within said top slot.

24. The assembly of claim 16 wherein each finger has a dovetail shape.

25. The assembly of claim 16 wherein the interlocked plurality of frame pieces and panels comprise an article of furniture.

26. A furniture assembly, comprising:
a first plurality of separable frame pieces, each said piece of said first plurality being laterally and slidingly interlockable with each adjacent said piece of said first plurality to form a first closed shape, each said frame piece having a top; and
a second plurality of separable panels, each said panel of said second plurality being vertically and slidingly interlockable with each adjacent said panel of said second plurality to form a second closed shape, each said panel having a bottom;
wherein the bottom of each said second plurality of panels is vertically and interferingly interlockable with the top of a corresponding different one of said first plurality of frame pieces, and the first closed shape and the second closed shape have substantially the same planform.

27. The assembly of claim 26 wherein each said panel includes a pair of vertical slots, the vertical slots of each said panel being aligned with the vertical slots of each adjacent interlocked said panel.

28. The assembly of claim 27 wherein the vertical slots are first slots extending about one half of the height of said panel, each said panel further including at least one second slot located between a first slot and the lateral edge of said panel nearest to the one first slot.

29. The assembly of claim 28 wherein the top of each frame piece includes a third slot that aligns with the second slot of the interlocked said panel.

* * * * *