A new simple and inexpensive futon frame which can be converted from a bed to a sofa. The frame is fabricated in a three-section, tri-fold configuration with three sections hingedly joined together. When opened, the segments of the frame form a horizontal bed support frame. The hinge points of the frame are offset to allow for folding of the frame into the sofa and/or into a small, compact unit for ease in shipping. Each of the frame sections has support legs, some of which are foldably mounted to the frame. The back legs of the frame (when it is a bed) become a support for the back of the frame (when it is a sofa). The use of a steel mesh as the futon mattress supporting surface adds great benefit to the product in that it allows use of a much thinner (less costly) futon mattress.
E-FRAME FUTON
BACKGROUND

[0001] 1. Field of the Invention

This invention is directed to a furniture product, in general, and to a futon frame which is convertible from a bed to a sofa configuration (and vice versa), in particular.

[0002] 2. Prior Art

There are many types of furniture products known in the art. One such furniture product is a futon (a thin mattress-like device) used with a support frame. The typical frame, which can be fabricated of metal, wood or other suitable materials, supports the futon-mattress off the floor (or similar surface) in order to provide a greater comfort level to the user.

[0003] However, the known support frames are usually fairly limited in configuration, i.e. a bed-like support. Also, the conventional frame uses slats for supporting the futon mattress. The known arrangements provide limited variation in the utilization of the frame, as well as in the configuration of the furniture. Moreover, the slat support requires a fairly thick futon mattress in order to provide any reasonable expectation of comfort by the user.

[0004] One type of known apparatus, frequently referred to as a pine lounger, is a convertible futon. However, among other short comings, it rests directly on the floor and does not include support legs. Consequently, a sofa-height configuration (as intended in this description) cannot be achieved. Likewise, securing a sofa back in position is not readily achievable.

[0005] Another type of known convertible futon apparatus is often referred to as an A-frame device. However, this device incorporates separate arms, crossbars and similar supports and components. These requirements render this device difficult to utilize and expensive to fabricate.

[0006] As a consequence, a new and improved configuration of the frame is highly desirable in order to provide a less expensive, more adaptable convertible futon.

SUMMARY OF THE INSTANT INVENTION

[0007] A new simple and inexpensive futon frame which can be converted from a bed to sofa configuration. The frame includes three sections. To form a bed, the sections of the futon frame are unfolded into a substantially horizontal planar configuration and a futon mattress placed thereon. To form a sofa, the sections of the frame are folded into a generally A-frame configuration, wherein portions of the frame form the seat and back of the sofa. The futon is folded as well and placed on the folded frame. Typically, the frame is fabricated of round tubes which are cradled by half pipe receptacles supported by the support legs of the frame although rectilinear tubes are also contemplated. The hinge points of the frame are offset to allow for folding and unfolding the frame to form one configuration to another and, as well, for convenience in packaging and shipping. A steel mesh is used as the support surface for the futon and permits use of a relatively thin futon mattress while providing uniform support thereon.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 is an oblique view of the frame of the instant invention in the configuration of a bed.

[0009] FIG. 2 is an oblique view of the frame of the instant invention in the configuration of a sofa.

[0010] FIGS. 3A and 3B are a detailed views of the offset hinge used in the frame of the instant invention.

[0011] FIG. 4 is an end view of the middle support leg and the associated hinge.

[0012] FIG. 5 is a side view of the frame of the instant invention in the configuration of a bed with a futon mattress thereon.

[0013] FIG. 6 is a side view of the frame of the instant invention in the configuration of a sofa with the futon mattress thereon.

DESCRIPTION OF A PREFERRED EMBODIMENT

[0014] Referring now to FIG. 1, there is shown an oblique view of the frame 100 in the bed configuration and without a futon or mattress thereon. The frame 100 includes three separate sections, namely the foot section 101, the midsection 102 and the head section 103. The foot section 100 is a generally rectangular frame with two rounded corners at the front side of the section for convenience. The rounded corners tend to eliminate an undesirable “shin barking” hazard for users of the unit. The rectangular frame 101 is generally comprised of a strong, rigid tubular material such as but not limited to steel. The tubular material is, typically, hollow and cylindrical in configuration. A reinforcing member 104 such as a rod or a tube fabricated of material similar to the frame 100 is mounted to the frame section 101 for additional support. This additional support strength is desirable as will be discussed infra. A steel mesh 105 is attached to the foot frame section 101 in any suitable fashion such as by rivets, nuts and bolts, welding or the like.

[0015] The midsection frame 102 is also comprised of a generally rectangular frame fabricated of the tube or rod as described relative to the foot frame section 101. A steel mesh 106 (similar to mesh 105) is attached to the midsection frame 102 in the same or similar manner as in the case of the mesh attachment to foot frame 101.

[0016] The head section frame 103 is substantially similar to the foot frame section 101 and the midsection frame 102. That is, the frame 103 is fabricated of a rod or a tubular metal and a steel mesh 107 is attached thereto. In the head section frame 103, preferably, the rounded outer corners are provided for convenience and for safety, i.e. avoiding a sharp corner, as described supra.

[0017] As shown, the tubular frame of the foot frame section 101 is joined to the tubular frame of midsection 102 by suitable hinges 108 and 109. The hinges 108 and 109 are arranged to permit the midsection 102 to fold upwardly relative to the foot frame section as described infra.

[0018] Similarly, the tubular frame of the head frame section 103 is joined to the tubular frame of the midsection 102 by suitable hinges 110 and 111. The hinges 110 and 111 are similar to hinges 108 and 109. However, the hinges 110 and 111 are arranged to permit the head section 103 to fold downwardly relative to the midsection frame 102.

[0019] Thus, in the embodiment described in FIG. 1, the three sections of the futon are joined together, in parallel,
along the longer axes thereof and folding of these sections relative to each other is provided.

[0022] As is shown, head section support legs 112 are attached to the outer sides of the head frame section 103. The head support legs 112 are preferably formed of a rectilinear tube as will be discussed further infra. Typically, the head support legs 112 are attached to the frame 102 by rivets, bolts, screws, welding or the like. The legs 112 (which can be integrally formed within the frame 102) are joined to the frame 102 near the outer side of the head frame section 103 to support this section in the horizontal plane when the frame 100 is used in the bed configuration.

[0023] The foot section support legs 114 are attached to the outer sides of the foot frame section 101.

[0024] The foot support legs 114 are, preferably, formed of an inverted U-shaped, rectilinear tube as will be discussed further infra. Typically, the foot support legs 114 are attached to the outer sides of frame 102 by rivets, bolts, screws, welding or the like. A half pipe receptacle 115 may be attached to the foot support legs 114 to retain the round tube frame 101. The legs 114 (which can be integrally formed within the frame 101) are joined to the frame 101 near the outer side of the frame to support the foot frame section in the horizontal plane when the frame 100 is used either in the bed or the sofa configuration.

[0025] The midsection support leg 113 is attached to the outer sides of the midsection frame section by hinges 116 and extends along the length of the midsection frame. The midsection support legs 113 are preferably formed of an inverted U-shaped tube as will be discussed further infra. Of course, the midsection support leg 113 may be formed of two or more pieces for convenience.

[0026] One end of the middle support leg 113 is mounted to the midsection frame 102 by hinge 116. The hinge 116 permits the leg 113 to fold slightly toward the foot section 101 but restrains the motion of the leg 113 toward the head section 103. Thus, the support leg 113 is restrained in rearward pivoting around hinge 115 and provides support to midsection 102 when the frame 100 is in the bed configuration as shown in FIG. 1.

[0027] However, the leg 113 can pivot slightly forwardly (i.e. clockwise in FIG. 1) and thereby be positioned in close proximity to the midsection 102 when the frame 100 is in the sofa configuration as shown in FIG. 2.

[0028] Referring now to FIG. 2, there is shown an oblique view of the frame 100 in the sofa configuration and without a futon mattress thereon.

[0029] In this configuration, the foot frame section 101 remains in the horizontal plane with the inverted U-shaped foot section support legs 114 attached thereto as shown and described relative to FIG. 1.

[0030] As shown in FIG. 2, the midsection frame 102 has been folded upwardly around the hinges 108 and the head section 103 has been folded downwardly around the hinges 110. In this configuration, the midsection support leg 113 has folded around the hinges 116 and into close proximity to the back or underside of the midsection 102. This arrangement precludes interference by the midsection support legs 113 with either the upwardly hinged midsection 102 or the downwardly hinged head section 102.

[0031] The position of the middle support leg 113, thus, permits the outer end of the head section 103 to fold into contact (or near contact) with the rearward end of the inverted U-shaped foot section support legs. Also, as will be noted, the head support legs 112 rest upon the upper surface of the foot support legs 114. This arrangement provides a rest position for the head section 103 which supports the midsection 102 as a comfortable “back” for the frame 100 in the sofa configuration.

[0032] When the head support leg 112 and the inverted U-shaped foot support legs 114 are fabricated of rectilinear tubing (or the like), a flat abutment surface is provided for the legs. Thus, the folded frame is quite secure in the sofa configuration.

[0033] Alternatively, the head support legs 112 can be fabricated of round tubular material. In this situation, it may be desirable to include a half pipe receptacle (similar to receptacle 115) on the upper surface of the foot support legs.

[0034] FIGS. 3A and 3B are a detailed view of the hinges 108-111, inclusive. The structure of all of the hinges is substantially similar. That is, each hinge includes connector arms 330 and 331 with a suitable spacer 332 therebetween. The spacer 332 is a washer-like element which maintains the connector arms 330 and 331 in substantially parallel, spaced-apart relationship. The spacer 332 can be a washer, a grommet or similar component fabricated of hard rubber, metal or the like.

[0035] A pivot axis 304 passes through the connector arms 220 and 331 as well as through the grommet 332. The pivot axis retains the connector arms and the grommet in a rotatable relationship each of the connector arms 330 or 331 is joined to one of the adjacent frame sections. Thus, the frame sections are positioned adjacent to each other yet free to rotate around the pivot axis of the hinges. By mounting the hinges in a particular position, the hinges permit about 90° rotation in each direction wherein the hinge connector arms 330 and 331 move from 180° open to 0° relative to each other.

[0036] FIG. 4 is an end view of the middle support leg 113 and the middle leg hinge 116. The hinge pivot 416 passes through the end of leg 113 and the hinge support 116. The hinge support permits the leg 113 to rotate clockwise about 90° (as shown in FIG. 4) but limits the counterclockwise rotation to the position shown in FIG. 4. Thus, leg 113 can rotate clockwise into close proximity to the frame 102 (as shown in dashed outline) but remains at approximately 90° to form a support as shown in solid line in FIG. 4.

[0037] FIG. 5 is a side view of the frame 100 of the instant invention with a futon mattress 500 thereon in the configuration of a bed. In this embodiment, the frame 100 is shown in the horizontal configuration as depicted in FIG. 1. The mattress 500 is, typically, a relatively thin flat mattress and effectively covers the entire frame.

[0038] FIG. 6 is a side view of the frame 100 of the instant invention with a futon mattress 600 thereon in the configuration of a sofa. The mattress 600 shown in FIG. 6 is the same mattress shown in FIG. 5. However, the mattress 600 has been folded so that the midportion 602 thereof overlies the foot portion 601 thereof to form a double-thick seat cushion 605. The head portion 603 of the mattress 600 is
now disposed against the upright midsection 102 of the frame 100 to form the back cushion 606 of a sofa.

[0039] Thus, there is shown and described a unique design and concept of an e-frame futon. While this description is directed to a particular embodiment, it is understood that those skilled in the art may conceive modifications and/or variations to the specific embodiments shown and described herein. Any such modifications or variations which fall within the purview of this description are intended to be included therein as well. It is understood that the description herein is intended to be illustrative only and is not intended to be limiting. Rather, the scope of the invention described herein is limited only by the claims appended hereto.

1. A furniture unit comprising,
   first, second and third frame sections joined together by hinged joints,
   first support means attached to and supporting said first frame section,
   second support means attached to and supporting said second frame section,
   said first, second and third frame sections adapted to fold together at the hinged joints such that said second support means is selectively placed in supportive abutment with said first support means.
2. The unit recited in claim 1 wherein,
   each of said first, second and third frame sections comprises a first, second and third outer frame respectively and a separate support surface attached to the respective outer frame.
3. The unit recited in claim 2 wherein,
   each said support surface is formed of a mesh.
4. The unit recited in claim 1 including,
   third support means attached to and supporting said third frame section
5. The unit recited in claim 4 wherein,
   said third support means is attached to said third frame section by hinged joints.
6. The unit recited in claim 2 wherein,
   each of said first, second and third outer frames has a generally rectangular configuration.
7. The unit recited in claim 6 wherein,
   each of said first, second and third outer frames has substantially the same length.
8. The unit recited in claim 7 wherein,
   each of said first, second and third outer frame has a different width.
9. The united recited in claim 1 including,
   a foldable mattress adapted to be placed on at least two of said first, second and third frame sections.
10. The united recited in claim 1 wherein,
   said first support means includes an inverted U-shaped support leg fixedly attached to said first frame section.
11. The united recited in claim 1 wherein,
   said second support means includes a support leg fixedly attached to said second frame section.
12. The unit recited in claim 4 wherein,
   said support means comprises an inverted U-shaped support leg hingedly attached to said third frame section.
13. The unit recited in claim 1 wherein,
   said first support means selectively supports a portion of said third frame section.
14. The united recited in claim 5 wherein,
   each of said hinged joints includes first and second arms with a spacer therebetween and a common axis therethrough.
15. The united recited in claim 4 wherein,
   each of said first and second arms of each of said hinged joints is attached to the sides of adjacent pairs of said first, second and third frame sections.
16. A furniture unit comprising,
   first, second and third frame sections joined together by hinged joints,
   first support means attached to and supporting said first frame section,
   second support means attached to and supporting said second frame section,
   said first, second and third frame sections adapted to fold together at the hinged joints such that said second support means is selectively placed in supportive abutment with said first support means,
   each of said first, second and third frame sections comprises a first, second and third outer frame respectively and a separate support surface attached to the respective outer frame,
   third support means attached to and supporting said third frame section,
   each of said first, second and third outer frames has a generally rectangular configuration.

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