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Beckley

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[54] **FOLDING CHAIR**

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[52] **U.S. Cl.** **297/16,** 297/441, 297/457, 297/440

[51] **Int. Cl.** **A47c 4/32**

[58] **Field of Search** 297/16, 35, 39, 440, 441, 297/457, 37; 108/35, 132

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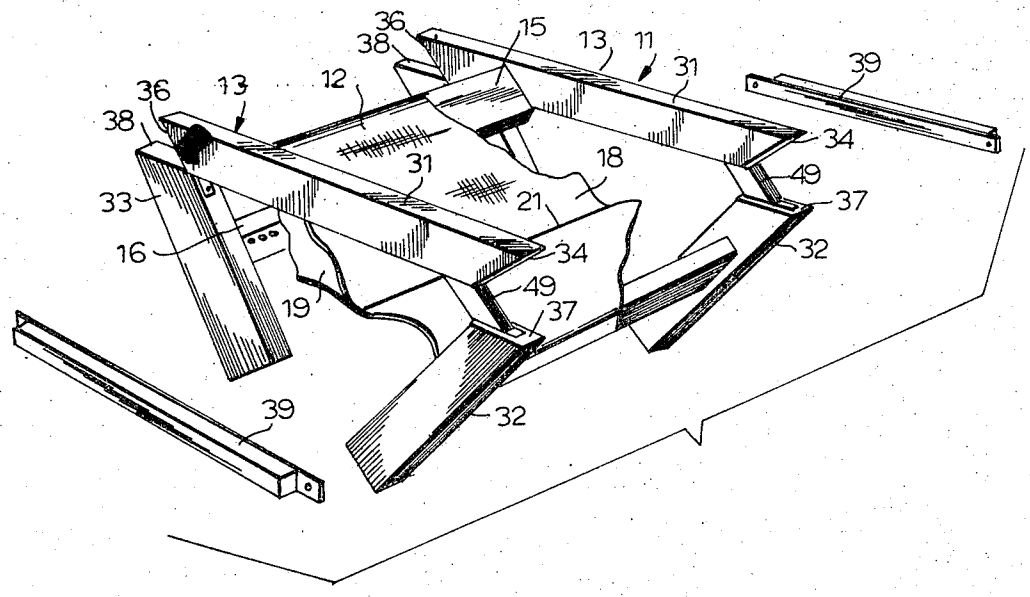
Primary Examiner—Francis K. Zugel

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[57] **ABSTRACT**

A folding seat includes a web which is supported between a pair of folding frames by three detachable cross members extending between the frames. The web forms a sling in which a person may sit. The frame members each include a horizontally extending arm with a front leg pivoted to one end thereof and a rear leg pivoted to the other end thereof. The rear leg is pivoted to fold against and along the arm while the front leg is equipped with a dogleg so that it pivots over and along the rear leg.

16 Claims, 6 Drawing Figures



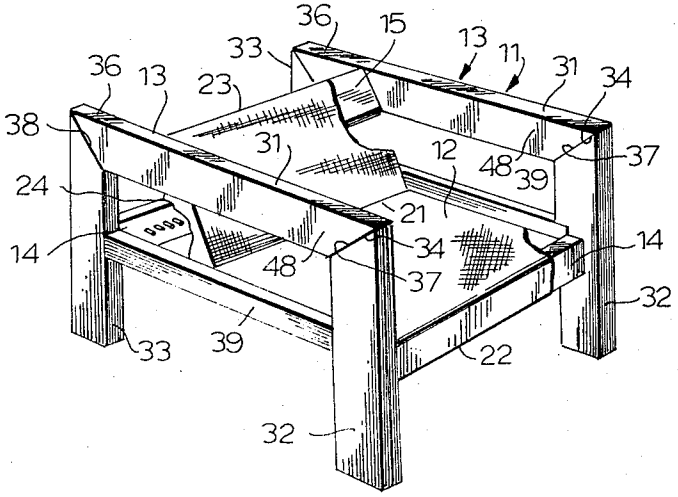


FIG.1

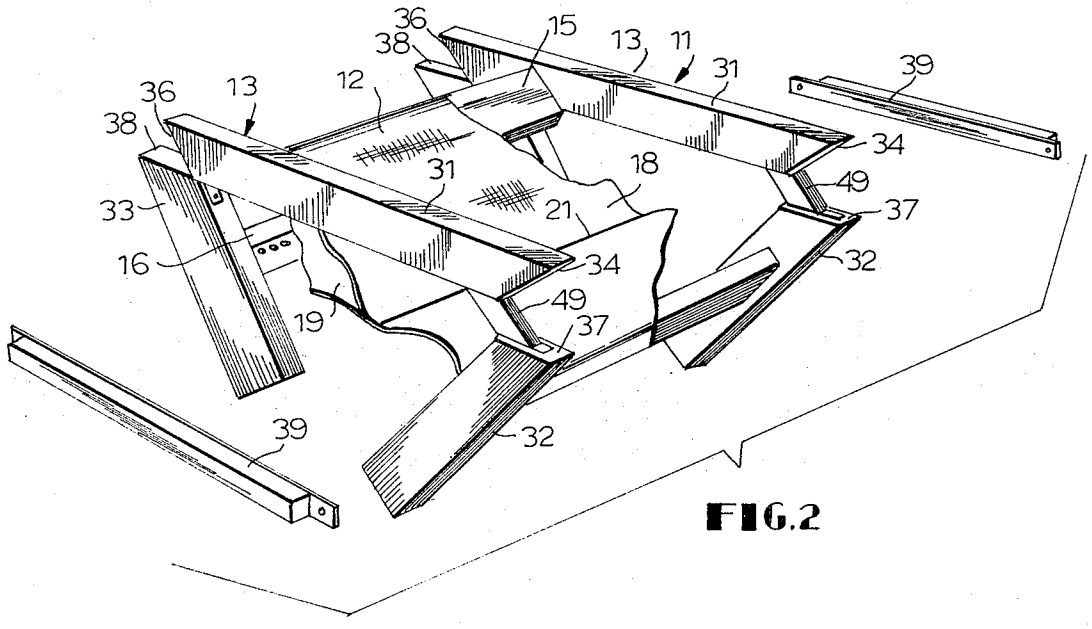


FIG.2

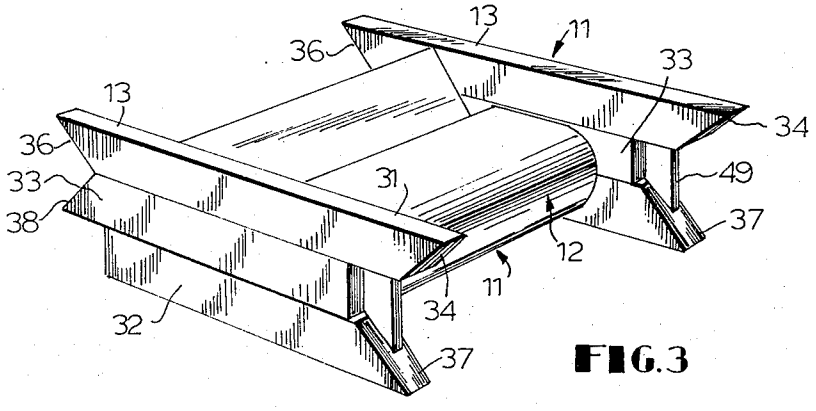


FIG.3

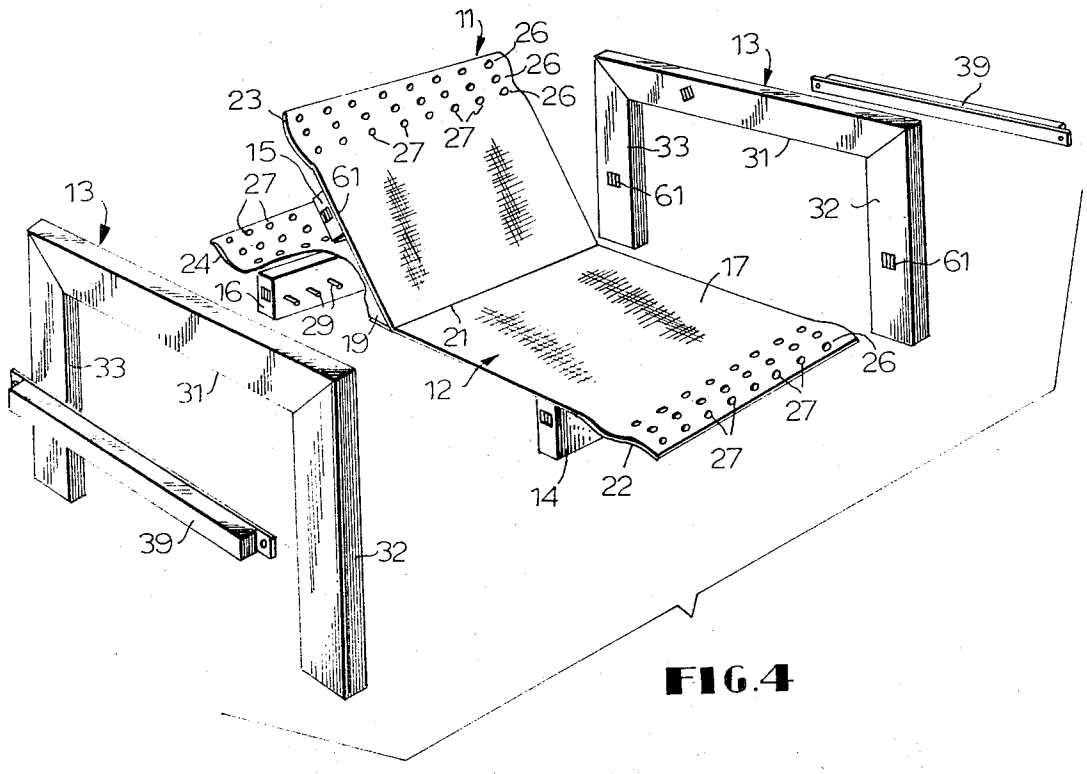


FIG. 4

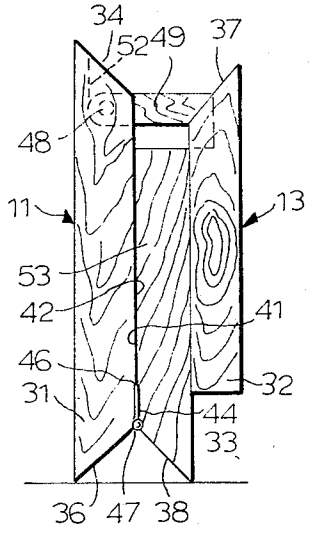


FIG. 5

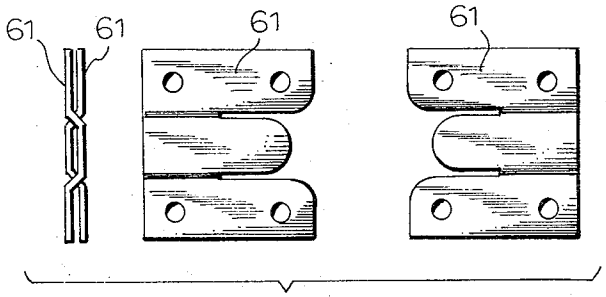


FIG. 6

FOLDING CHAIR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to seats and, more particularly, this invention relates to seats which fold from an erect position for seating a person to a collapsed position for storage and transport.

2. Technical Considerations and Prior Art

It is often desirable to have a chair, bench or the like fold from an erect seating position to a collapsed storage position. Many modern chairs have a generally rectangular configuration which can not be folded to a convenient storage position using prior art techniques.

The general idea behind most folding chairs is to reduce one dimension of the chair so that most of the chair's structure is confined within a two dimensional reference frame. This allows several chairs to be stored within the space ordinarily occupied by one chair. To accomplish this several basic approaches have been taken by the prior art. In one general arrangement, the two front legs of a chair are pivoted to one another and the two rear legs to one another. By having a flexible back and a flexible seat, the chair readily folds upon pivoting the legs into alignment. another arrangement is to pivot the front legs to the seating portion and to connect the seating portion to the back and rear legs with a sliding pivot so that the front legs and seating portion can be collapsed against the back and rear legs. There are of course other approaches and variations to these arrangements; however, none of these are adaptable to the modern rectangular seat or chair.

SUMMARY OF THE INVENTION

This invention is directed to a foldable seat which includes a web portion supported between a pair of frame members. Each frame member has an arm which has front and back legs pivoted thereto. One of the legs on each arm pivots to lie directly along the arm while the second leg on each arm has a link projecting therefrom which is pivoted to the arm to allow the second leg to pivot and overlie the first leg.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an isometric view of a seat, according to the invention, which is in an erect position so that a person may sit in it;

FIG. **2** is an isometric view of the seat of FIG. **1** being folded to a collapsed position;

FIG. **3** is an isometric view of the seat of FIG. **1** after it is completely collapsed;

FIG. **4** is an exploded view of the seat of FIG. **1** showing detachable parts of the seat separated from one another;

FIG. **5** is a side view of the seat of FIG. **1** showing the seat in a collapsed position but supported on its end for storage, and

FIG. **6** is a view of a coupling composing a pair of mating brackets which may be used to assemble parts of the seat.

DETAILED DESCRIPTION

Referring now to FIG. **1**, there is shown a seat, designated generally by the numeral **11**, which for purposes of illustration is in the form of a chair. It should be kept in mind that the seat **11** could also be in the form of other seating structures and arrangements such as a sofa, a bench or any other seating structure designed to accommodate one or more persons. The seat **11** includes a web, designated generally by the numeral **12**, which is supported between a pair of frame members, designated generally by the numerals **13—13**. The web **12** is made of a fabric such as canvas, vinyl or the like and serves to receive and support a person seating in the seat. In order to support the web **12** between the frames **13—13**, the web is secured to front, top, and rear cross members **14, 15** and **16** which extend between the frame members to define the front, top, and rear respectively of the seat **11**.

In the illustrated embodiment the web **12** is divided into a front segment **17**, a back segment **18**, and a rear segment **19**. The front, back and rear segments **17, 18** and **19** radiate from a seam **21** with the front segment having its free end **22** attached to the front cross member **14**, the back segment **18** having its free end **23** attached to the top cross member **15** and the rear segment **19** having its free end **24** attached to the rear cross member **16**. The front segment **17** serves to support the buttocks and thighs of a person sitting in the seat **11** while the back segment **18** supports the back of a person sitting in the seat **11**. In order to help define a comfortable sitting contour, the rear segment **19**, limits its forward movement of the seam **21** by limiting the distance from the rear cross member **16** that the seam can move when a person sits in the seat **11**.

By choosing various lengths for each of the segments **17, 18** and **19** the shape of the web **12** can be changed so as to create different seating contours and positions allowing the seat **11** to accommodate different seating positions and body dimensions comfortably. In the illustrated embodiment, the shape of the web **12** is controlled by making the lengths of the segments **17, 18** and **19** readily adjustable. This is accomplished by equipping the free ends **22, 23** and **24** of the segments **17, 18** and **19** with rows **26—26** of eyelets **27—27** (see FIG. **4**) which receive rows **28—28** of headed pins **29—29** projecting from the cross members **14, 15** and **16**. To adjust the length of any of the segments **17, 18** or **19**, different rows **26—26** of eyelets **27—27** are registered with the rows **28—28** of headed pins **29—29** on the cross member **14, 15** and **16**. For example, to adjust the back segment **18** in order to lift the seam **21** and raise the rear of the front segment **17** a row **26** of eyelets **27—27** closer to the seam **21** is engaged by the row **28** of pins **29** on the cross member **15**. Although the free ends **22** and **24** of the front and rear segments **17** and **19** are shown to be adjustable they, for the sake of convenience, may be made with only one row **26** eyelets **27—27**. After the initial adjustment of the free ends **22** and **24** is manufactured into the seat **11** subsequent adjustments may be made by increasing or decreasing the length of the segment **18** as previously discussed.

In order to prevent the headed pins **29—29** from sticking into a person sitting in the seat **11** the pins are positioned to project inwardly from the cross members **14, 15** and **16**. In other words, the pins **29—29** on the front cross member **14** project rearward while the pins **29—29** on the rear cross member **16** project forward and those on the top cross member **15** project downward. The free ends **22, 23** and **24** then loop over their respective cross members **14, 15** and **16** before receiving the pins **29—29** in the eyelets **26—26**. In addition

to obviating the hazard of the pins 29—29 this arrangement imparts a pleasing appearance to the seat 11 enhancing its value as a piece of furniture.

While the illustrated embodiment discloses utilizing rows 28 of headed pins 29—29 and rows 26 of eyelets 27 to secure the web 12 to the cross members 14, 15 and 16 it should be understood that other arrangements such as strips of "VELCRO" material, zippers or the like may be used to attach the web 12. Of course the web 12 may be simply looped around the cross members 14, 15 and 16.

The frame members 13—13 between which the cross members 14, 15 and 16 extend include arm members 31—31, front leg members 32—32 and rear leg members 33—33. The arm members 31—31 are spaced by and joined to the top cross member 15 while the front legs 32—32 are spaced by and joined to the front cross member 14 and rear legs are spaced by and joined to the rear cross member 16. In the illustrated embodiment, the arm members 31—31 each have front and rear ends 34 and 36 respectively which bevelled so that each form 45 degree angles with the horizontal extent of the arm members. The front legs 32—32 and rear legs 33—33 each have tops 37 and 38, respectively, which are bevelled to form 45° angles with the vertical extent of the legs and therefore complement the 45° angles of the arm ends 34 and 36 so that the legs project normally from the arms 31—31 when the tops of the legs abut the ends of the arms. If it is desired to alter the angles at which the legs 32—32 and 33—33 project from the arms then the angles of the various ends 34 through 38 may be changed. For example, if for some reason it is desired to slant the front legs 32—32 forward and the rear legs 33—33 rearward the angles at which the legs abut the ends 34 and 36 of the arms may be increased.

In order to provide a means for folding the seat 11 from the erect position shown in FIG. 1 to the collapsed position shown in FIGS. 3 and 5, the front and rear legs 32—32 and 33—33 are hinged to the front and rear ends 34 and 36 of the arms 31—31. Before folding the seat 11 a pair of detachable bars 39—39 which extend between the legs 32 and 33 are removed. The bars 39—39 ordinarily help retain the legs 32 and 33 of each frame 13 spaced apart when the seat 11 is in the erect position. as seen in FIG. 2, upon removing the bars 39—39, the rear legs 33—33 pivot forward or counterclockwise as shown in the drawings and the front legs 32—32 pivot rearward or clockwise. The legs 32—32 and 33—33 pivot until they extend along the arms 31—31 as shown in FIG. 3.

In order to collapse the seat 11 from the FIG. 1 to FIG. 3 position, the front and rear legs 32—32 and 33—33 must be hinged so that the rear legs nest between the front legs and the arms 31—31. This is accomplished by hinging each of rear legs 33—33 to pivot about a line defining the juncture between the front surfaces 41 of the rear legs and the bottom surface 42 of the arms. In the illustrated embodiment, a butterfly hinge 43 (see FIG. 5) provides the pivot by having a first wing 44 secured to the surface 41 and a second wing 46 secured to the surface 42 with a joining pintle 47 aligned with the juncture of the surfaces. This arrangement allows each rear leg 33 to fold, both along and flat against its respective arm 31.

After the rear legs 33—33 are folded to the FIG. 3 position, the front legs 32—32 are pivoted about pivots 48. Each leg 32 has a dog or link 49 projecting therefrom which is pivoted to one of the pivots 48. In the illustrated embodiment, the dogs 49 are rigidly secured to the front legs 32—32. By rigidly securing the dogs 49 to the front legs 32—32, the legs can be folded without having to deal with additional articulation which would result from having a pivotal connection between the legs and dogs. As seen in FIG. 3, the lengths of dogs 49 are slightly greater than the widths 51 of the rear legs 33—33. This enables the front legs 32—32 to fold over the rear legs 33—33 so that the front legs overlay the rear legs and extend therealong.

In order to accommodate the dogs 49 in the arms 31—31 when the seat 11 is in the erect position the arms have slots 52 shown in dotted formed in the front ends 34 thereof. When the front legs 32—32 are moved from the FIG. 3 position to the FIG. 1 position the dogs 49 simply pivot into the slots 52 where they are hidden from signt.

Although the illustrated embodiment shows the dogs 49 attached to the front legs 32—32 and pivoted to the front ends 34 of the arms 31—31, it should be kept in mind that the dogs 49 could be attached to the rear legs 33—33 and pivoted to the rear ends 36 of the arms without departing from the spirit of this invention.

Referring now to FIG. 4, the seat 11 is shown in its folded or collapsed condition while resting upright on the tops 38 of the rear legs 33—33 and rear ends 36 of the arms 31—31. By designing the seat 11 as shown in the illustrated embodiment the center of gravity 53 of the seat is positioned so that it is between the tips of arm rear ends 36 and the tip of the leg tops 38. Consequently, the seat 11 will remain in a vertical attitude when rested on the ends 36 and tops 38. In the illustrated embodiment, the center of gravity 53 is located in the rear legs 33—33 because the rear legs 33—33 and arms 31—31 have the two cross members 15 and 16 attached thereto which tend to counter-balance the single cross member 14 attached to the front legs 32—32 and thereby shift the center of gravity back toward the arm members 31—31.

On some occasions, it may be desirable to break the seat 11 down further so that it can be stored in even less space than it occupies in the FIG. 3 or FIG. 4 position. As shown in FIG. 5 this is accomplished by making the cross members 14, 15 and 16 detachable from the frame members 13—13. When each frame 13 is folded and the bars 39—39 and cross members 14, 15 and 16 are laid parallel to the frame members the seat 11 is reduced to a convenient package which can be wrapped with the web 12 for convenient transport or storage. Any convenient coupling which detachably secures the ends of cross members 14, 15 and 16 and the bar members 39—39 to the frames 13—13 may be used. An example of such a coupling is shown in FIG. 6 which shows a pair of brackets generally designated by the numerals 61—61. One of the brackets 61—61 is attached to each of the legs 32—32 and 33—33 and to the arms 31—31 of the frame members 13—13 while another bracket is attached to the ends of the members 14, 15 and 16. The brackets 61—61 on the members are simply slid into engagement with the corresponding brackets on the frames 13—13 to detachably join the members to the frames.

The seat 11 shown in the illustrated embodiment is most conveniently made of wood, however, other materials such as metal or plastic may be used. By using

wood, the frames **13—13** and cross members **14, 15** and **16** can be conveniently manufactured from "**2×4,**" "**2×3**" or similar lumber stock which will provide dimensions which are sufficient to readily provide stops between the ends **34** and **36** of the arms **31—31** and the tops **37** and **38** of the front and rear legs **32—32** and **33—33.** In addition "**2×4**" "**2×3**" lumber provides the seat **11** with an attractive appearance.

What is claimed is:

1. A seat which is foldable to assume either an erect sittable condition or a collapsed condition wherein the seat includes at least two folding frame members, each of which comprises:

an arm having first and second ends and extending generally in a horizontal direction when the seat is in the erect condition;

a first leg for supporting the first end of said arm when the seat is in the erect condition;

means for pivoting one end of the first leg adjacent to the first end of the arm to extend the first leg from the arm at an angle thereto when the seat is in the erect condition and to fold the first leg to extend along the arm in close proximity thereto when the seat is in the collapsed condition, said first end of said arm and the adjacent end of said leg forming means for supporting the seat in self-supporting, collapsed, storable condition with the arm and leg extending vertically;

a second leg for supporting the second end of said arm member when the seat is in the erect condition; and

a link member pivoted adjacent to the second end of the arm and secured to the second leg, wherein said link member extends from said arm and past said first leg when the seat is in the collapsed condition to fold said second leg to extend along said first leg in close proximity thereto and wherein the link member extends generally along said arm to project said second leg at an angle from said arm when the seat is in the erect condition.

2. The seat of claim **1** wherein the link member is rigidly secured to the second leg to form an integral unit with the second leg.

3. The seat of claim **1** further including stop means for retaining the first and second legs at their respective angles with the arm.

4. The seat of claim **3** wherein the stop means include portions of the arm located adjacent to the ends of the arm which engage portions of the legs located adjacent to the ends of the arms.

5. The seat of claim **1** wherein the arm, the first leg and the second leg are substantially linear in geometry and fold in the same plane.

6. The seat of claim **1** further including means for holding the first and second legs positively in position to support the arm when the seat is erect.

7. The seat of claim **6** wherein the holding means includes a bar which extends between the first and second legs at locations thereon spaced from said arm.

8. The seat of claim **5** wherein the first and second ends of the arm member form acute angles with the horizontal extent of the arm member and wherein the first and second legs have ends which are angled to complement those angles when the seat is in the erect condition.

9. A seat which is foldable to assume either an erect sittable condition or a collapsed storable condition wherein the seat includes at least two folding frame members, each of which comprises:

an arm having first and second ends and extending generally in a horizontal direction when the seat is in the erect condition, said ends of said arm being bevelled to define a surface which faces downwardly when the seat is in the erect condition;

a first leg for supporting the first end of said arm when the seat is in the erect condition;

means for pivoting one end of the first leg adjacent to the first end of the arm to extend the first leg from the arm at an angle thereto when the seat is in the erect condition and to fold the first leg to extend along the arm in close proximity thereto when the seat is in the collapsed condition, said end of said first leg being bevelled to define a surface which engages the surface defined by the associated bevelled end of the arm to support the arm when the seat is in the erect condition;

a second leg for supporting the second end of said arm member when the seat is in the erect condition, said second leg having an end adjacent to said second end of said arm wherein said end of said second leg is bevelled to define a surface which engages the surface defined by the associated bevelled end of the arm to support the arm when the seat is in the erect condition; and

a link member pivoted adjacent to the second end of the arm and secured to the second leg, wherein said link member extends from said arm and past said first leg when the seat is in the collapsed condition to fold said second leg to extend along said first leg in close proximity thereto and wherein the link member extends generally along said arm to project said second leg at an angle from said arm when the seat is in the erect condition.

10. The seat of claim **9** wherein when the first leg is folded to extend along the arm and the second leg is folded to extend along the first leg, the first end of the arm cooperates with the adjacent end of the first leg to form a support for retaining the seat in the collapsed storable condition with the arm and the legs extending vertically.

11. A seat which is foldable to assume either an erect sittable condition or a collapsed storable condition, comprising:

A. a pair of frame members which define sides of the seat wherein each frame member includes:

1. an arm having first and second ends and extending generally in a horizontal direction when the seat is in the erect condition;
2. a first leg pivoted adjacent to the first end of the arm for extending therefrom when the seat is erect and for extending therealong when the seat is collapsed;
3. a second leg pivoted adjacent to the second end of the arm for extending therefrom when the seat is erect and for extending along the first leg when the seat is collapsed;
4. a link extending from the second leg and joined by a pivot to the arm at a location adjacent to the second end of the arm, said link extending past the first leg when the seat is collapsed; and
5. a slot extending in the arm back from the second end of the arm to receive the link therein when the seat is erect, said slot supporting and concealing said link;

B. a system of joining members which combine with the pair of frame members to define a top, a front and a back of the seat wherein at least one joining member extends between the arms of the frame, at least one joining member extends between the first legs of the frame and at least one joining member extends between the second legs of the frame; and

C. a web supported from the joining members for forming a sling to seat a person.

12. The seat of claim **11** wherein the joining members are movable relative to the frames to allow the frame members to collapse toward one another.

13. The seat of claim **12** wherein the joining members are detachable from the frame members to move relative to the frame members to allow the frame members to move toward one another.

14. The seat of claim **11** wherein the web includes a first portion which extends between the joining member connecting the first legs and the joining member connecting the second legs to form a sitting support and a second portion which extends between the first portion and the joining member connecting the arms to form a back support.

15. The seat of claim **14** wherein the second portion of the web is adjustable in length to adjust the sitting position of the seat.

16. The seat of claim **14** wherein the web is detachable from the joining members.

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