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(56) Documents cited
GB 1510566 A **GB 1472811 A** **EP 0256837 A2**

(58) Field of search
UK CL (Edition J) **A4J, A4L LBPF LBPG LBPK LBPP LBPQ**
INT CL[4] **A47C**

(54) Foldable chair

(57) A foldable chair, comprises a pair of complementary X-shaped side frames; a transverse X-frame support stay, (4, 5) hinged at its mid point, whereby folding of the side frames causes simultaneous and corresponding folding of the support stay; a pair of upper extension members (7, 7'), a foldable, substantially X-shaped support (16, 17, 18, 19, 25) articulated at its ends to the respective upper and lower ends of the side frames remote from the X-frame support stay; a cross member (11) supportable between the upper ends of the upper extension members; and a flexible seat material (15) supported by and extendable between the cross member and the upper limbs of the substantially X-shaped support.

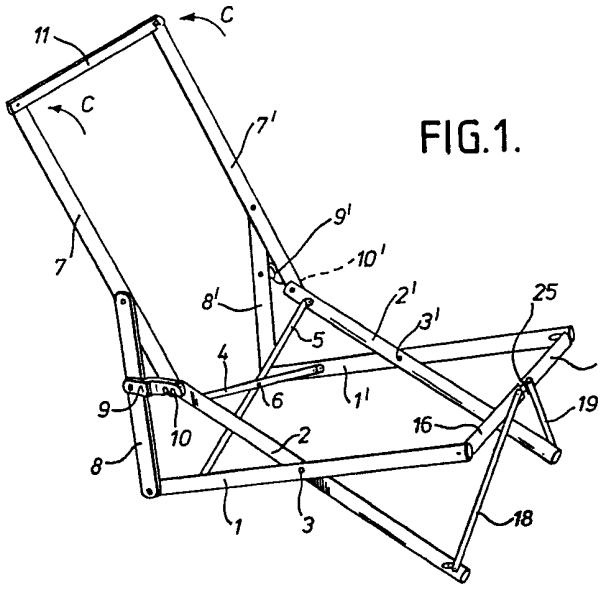

FIG.1.

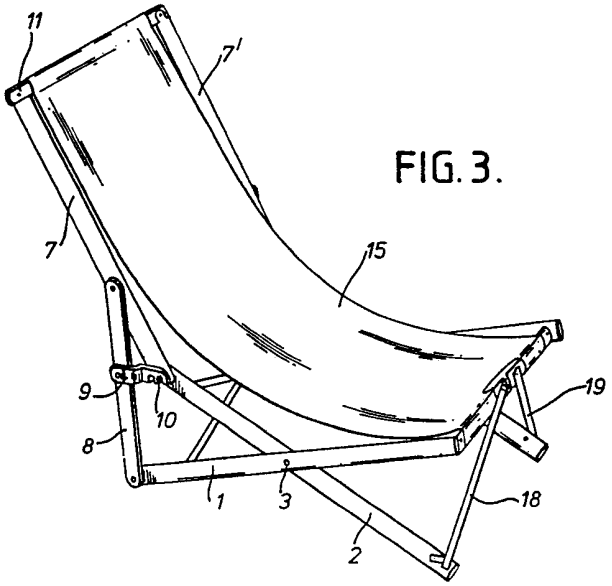

FIG.3.

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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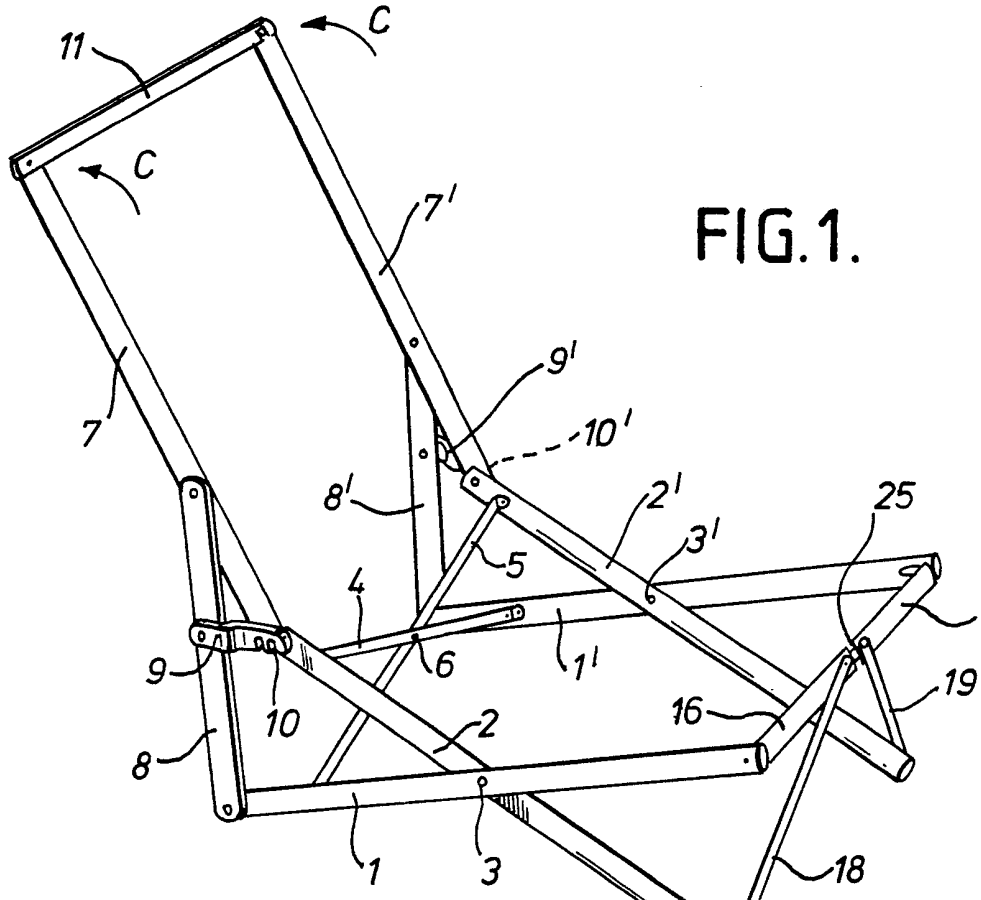

11
C
C
7'
7
9'
10'
8'
2'
25
3'
5
4
6
1'
9
10
2
16
19
8
1
3
18

FIG.1.

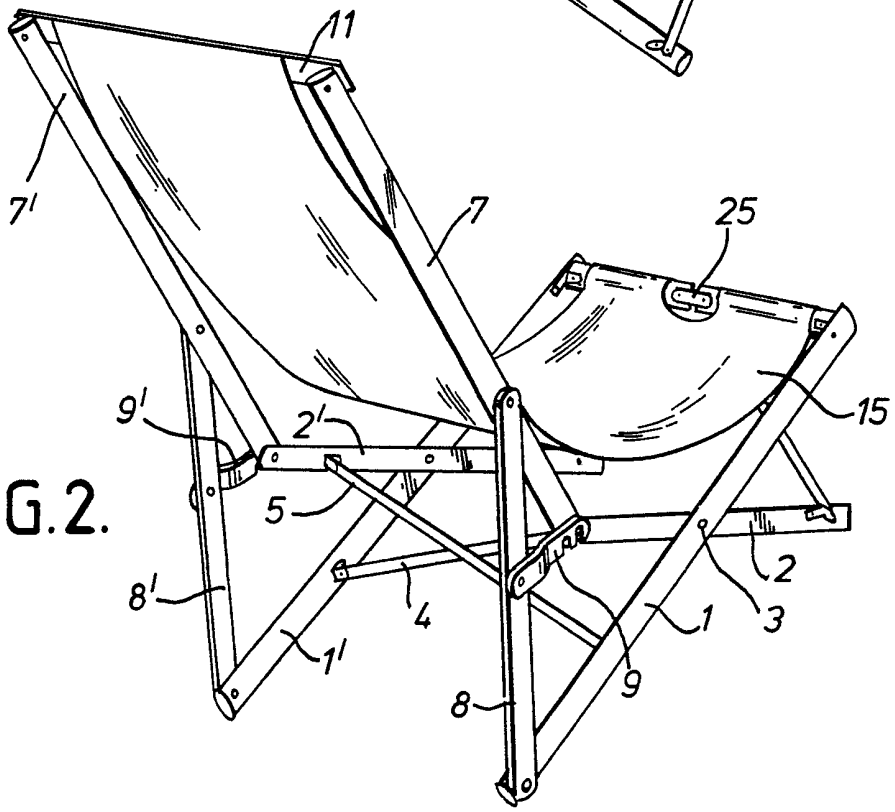

11
7'
7
25
9'
2'
15
5
8'
4
1'
1
3
2
9
8

FIG.2.

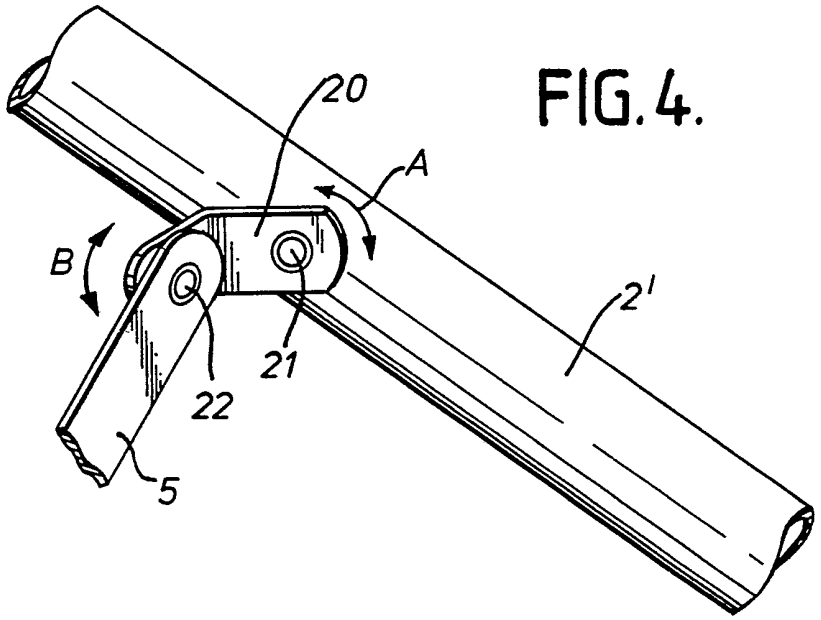


FIG. 4.

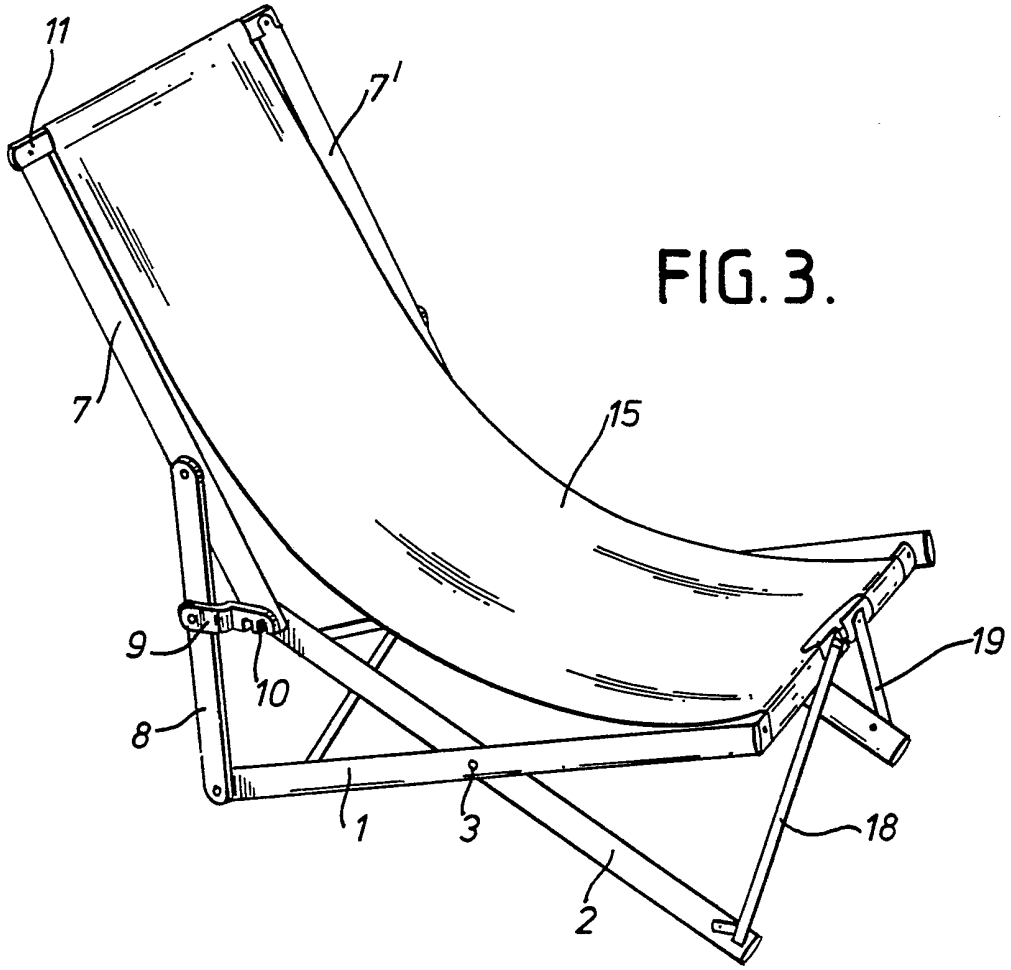


FIG. 3.

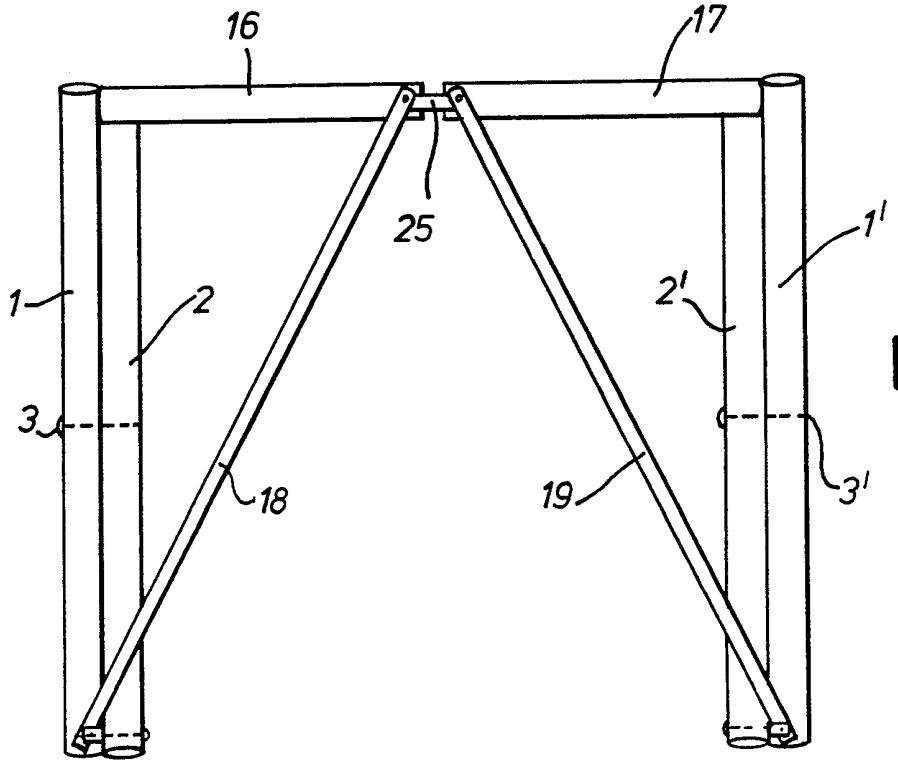


FIG.5.

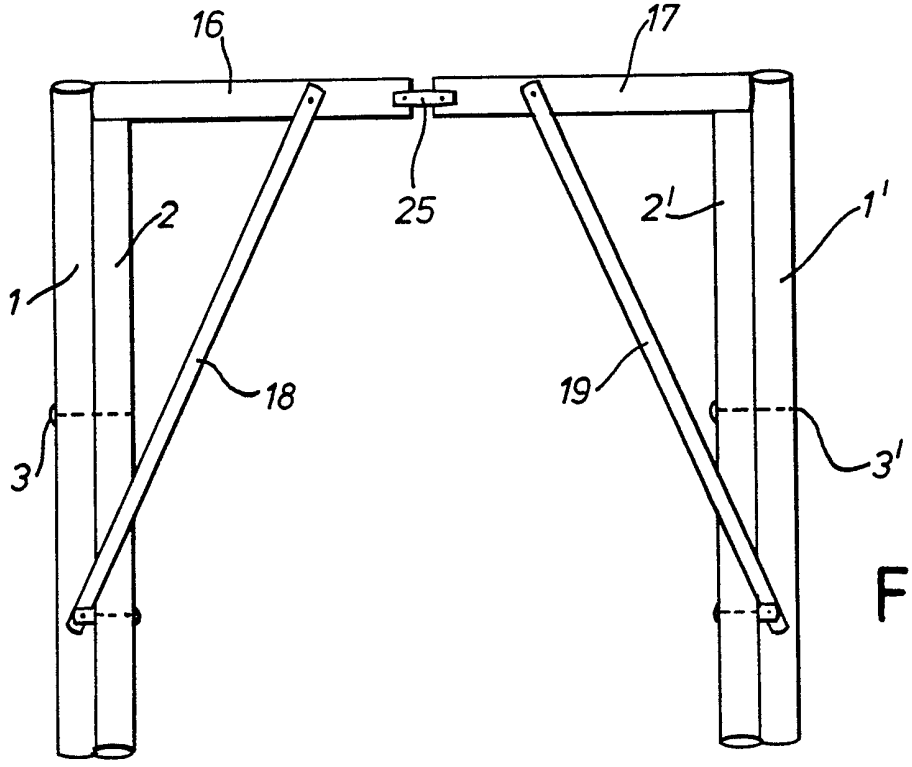


FIG.6.

FIG. 7.

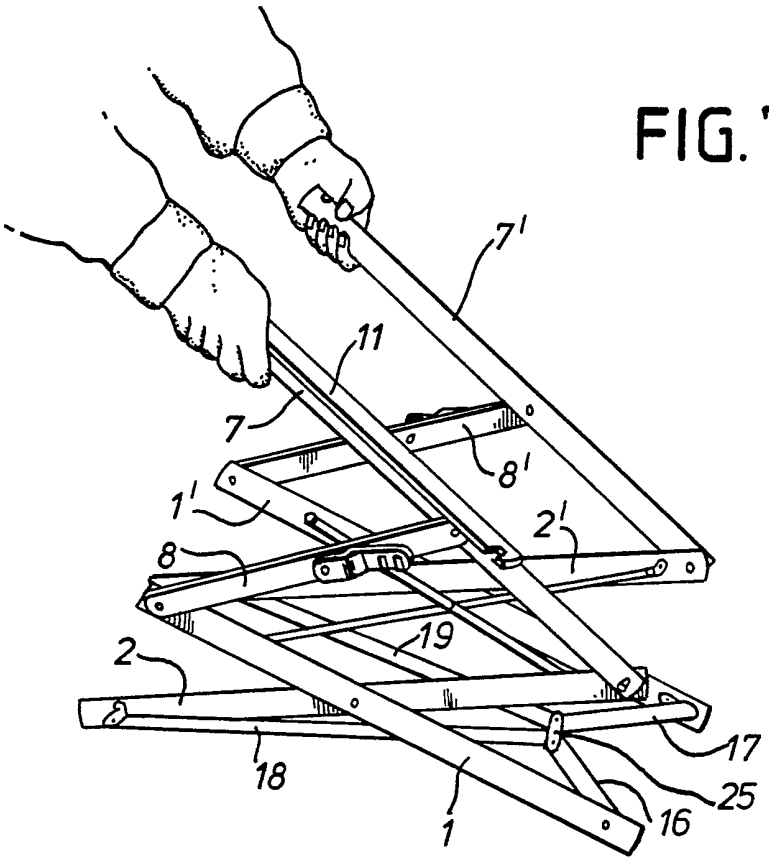
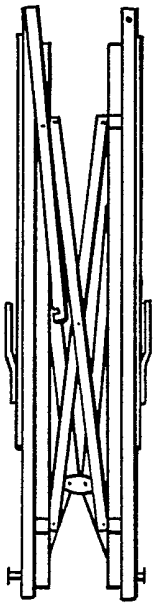


FIG. 8.



FOLDABLE CHAIR

This invention relates to a foldable chair.

EP-A-0 256 837 discloses a foldable chair based on a pair of complementary X-shaped side frames and a pair of centrally hinged transverse X-frame support stays, these units forming a foldable frame assembly which is foldable in two directions simultaneously, so that it can be reduced to a minimum size for storage and carrying. One disadvantage of this chair is that the seat material is provided as a separate package compared to the basic frame assembly, so that it is necessary to unfold the frame assembly and then in a separate operation attach the seat material. An object of the present invention is to overcome this disadvantage by providing a foldable frame assembly which actually incorporates the seat material.

The present invention accordingly provides a foldable chair, comprising a pair of complementary X-shaped side frames each consisting of two bar members hinged together intermediate their ends to permit

folding and unfolding in the plane of the X, the two side frames being mutually parallel and in register with each other; a centrally hinged transverse X-frame support stay, consisting of two substantially straight stay members hinged together at their mid points to permit folding and unfolding in the plane of the X which is perpendicular to the plane of the side frames, an end of each stay member being hinged to an end of a side frame bar member so as to permit pivoting both in the plane of the stay members and in the plane of the respective bar members, whereby folding and unfolding of the side frames causes simultaneous and corresponding folding and unfolding of the support stay; a pair of upper extension members respectively hinged to an upper end of a side frame bar member and to the upper end of the complementary side frame bar member adjacent the upper ends of the X-frame support stay, said upper extension members being pivotable in the respective planes of the side frames; a pair of brace members hinged at their lower ends to the respective lower ends of the side frame bar members below the hinge points of the upper extension members, adjacent the lower ends of the X-frame support stays, and hinged at their upper

ends respectively to the upper extension members intermediate the ends of the latter; latch means for detachable locking of at least one of the side frames in an unfolded position; a foldable, substantially X-shaped support articulated at its ends to the respective upper and lower ends of the side frames remote from the X-frame support stay, said support being foldable and unfoldable in correspondence with the X-frame support stay; a cross member supportable between the upper ends of the upper extension members; and a flexible seat material supported by and extendable between the cross member and the upper limbs of the substantially X-shaped support.

Reference is now made to the accompanying drawings, in which:

Figure 1 is a perspective view from the side and above of a foldable chair according to a preferred embodiment of the invention, with the seat material omitted for clarity;

Figure 2 is a perspective view from the rear and

side of the same chair, but including the seat material;

Figure 3 is a view corresponding to Figure 1, but including the seat material;

Figure 4 is a view on a larger scale of an embodiment of two-way hinge for use in the invention;

Figure 5 is a partial front elevation showing the substantially X-shaped support;

Figure 6 corresponds to Figure 5 but shows an alternative embodiment;

Figure 7 shows the foldable chair of Figure 1 in a partially folded state;

Figure 8 is a view of the completely folded chair.

In the preferred embodiment shown in the drawings, the foldable chair incorporates a foldable frame

assembly comprising two X-shaped side frames hingedly interconnected with a transverse X-frame support stay. The first side frame has two rigid bar members 1 and 2 which are hinged together at a point 3 halfway along to form an X shape. Hinging about the point 3 permits the bar members 1 and 2 to be folded and unfolded in the plane of the X. The second side frame is parallel and in register with the first, and comprises corresponding components 1', 2' and 3'.

A transverse X-frame support stay links one set of corresponding upper ends of the bar members 1 and 1' respectively with the corresponding lower ends of the bar members 2 and 2'. More particularly, this stay assembly comprises a substantially straight stay member 4 linking the upper end of the bar member 2 to the lower end of the bar member 1', and a substantially straight stay member 5 linking the lower end of the bar member 1 to the upper end of the bar member 2'. The stay members 4 and 5 are hinged together at their mid points 6 to form an X shape and to permit folding and unfolding of the stay members in the plane of this X, which is perpendicular to the plane of the side frames. Each end

of the stay members 4 and 5 is hinged by a two-way hinge to the end of the respective side frame bar member so as to permit pivoting at such hinge point both in the plane of the stay members and in the plane of the respective bar members, as shown in more detail in Figure 4.

The hinge is formed by a right-angled plate metal bracket 20. One limb of the bracket is hinged by a bolt 21 or the like to the member 2' to permit turning according to arrow A. The other limb of the bracket is hinged by a rivet 22 to the member 5 to permit turning according to arrow B. The turning planes of arrows A and B are at right angles to each other.

The mutual hinging described above of the side frame bar members and the stay member has the result that the folding and unfolding of the side frames causes simultaneous and corresponding folding and unfolding of the support stay. Thus, if the frame assembly starts in the completely folded position, then gradual unfolding of the side frames will cause gradual unfolding of the support stay to a corresponding extent, so the frame assembly will open both lengthwise and widthwise

simultaneously. Similarly, when the open assembly is gradually folded, both the side frames and the support stays will fold up simultaneously to a corresponding extent.

A pair of upper extension members 7 and 7' is hinged at the lower ends respectively to the upper ends of the side frame bar members 2 and 2', adjacent the hinge points of the upper ends of the X-frame support stay. The upper extension members are thus pivotable in the planes of the respective side frames. Two brace members 8 and 8' are hinged at their lower ends to the respective lower ends of the side frame bar members 1 and 1' approximately beneath the hinge points of the upper extension members 7 and 7' respectively, and adjacent to the hinge points of the lower ends of the X-frame support stay. The brace members 8 and 8' are hinged at their upper ends respectively to the upper extension members 7 and 7' intermediate the ends of the latter. Two adjustable latches 9 and 9' are respectively hinged intermediate the ends of the brace members 8 and 8', and can engage respectively with

latching points 10 and 10' to outer extensions of the same bolts which hinge the upper ends of the limbs 2 and 2' with the lower ends of the upper extension members 7 and 7'. When the latching means are in engagement, both of the side frames are locked in an unfolded position as shown in Figure 1. The upper extension members and brace members are also correspondingly locked. A plurality of latching points is provided on the latches 9 and 9' so that the chair can be locked in a variety of positions with the upper extension members at various angles.

A collapsible, substantially X-shaped support is articulated with its ends at the upper ends of the members 1 and 1' and at the lower ends of the members 2 and 2'. It is thus parallel to the X-frame support stay and can fold and unfold in conjunction therewith when the foldable frame assembly is folded and unfolded. This front support comprises a pair of upper limbs 16,17 and a pair of somewhat longer lower limbs 18, 19. The upper limbs 16,17 are hinged at their upper ends respectively to the upper ends of the members 1,1' so

that hinging can take place in two planes, i.e. within the plane of the front support itself, and within the plane of the side frames. The lower ends of the limbs 18,19 are correspondingly hinged to the lower ends of the members 2,2', again so that hinging can take place in the same two planes. A linking plate 25 is provided to link the lower ends of the limbs 16,17 and the upper ends of the limbs 18,19. Two hinge points are provided in this plate, one for hinging the lower end of the limb 16 to the upper end of the limb 18, and another for hinging the lower end of the limb 17 to the upper end of the limb 19. In each case, hinging is provided by a bolt or the like.

In the alternative embodiment shown in Figure 6, the lower limbs 18,19 are shorter. They are therefore hinged to the limbs 2,2' respectively at slightly higher points. They are also hinged to the upper limbs 16,17 respectively rather than to the linking plate 25. This arrangement provides slightly more rigidity to the front support, but otherwise functions in the same way as the arrangement of Figure 5.

A cross member 11 is provided, which is hinged at one end to the top end of the upper extension member 7, and which can be latched at its opposite end to a corresponding point at the upper end of the upper extension member 7'.

A flexible seat material 15 is provided. This can be made of canvas, but synthetic materials or any kind of flexible construction are also possible. The seat material is substantially rectangular, and is formed with a loop along one side for attaching onto the cross member 11. The opposite end of the seat material is provided with a loop in two parts, which are formed around the respective upper limbs 16,17 of the front support.

The seat is shown in Figure 1 in the erected state. In order to fold it up, the cross member 11, together with the seat material attached thereto, is detached at its free end from the top of the upper extension member 7' and folded parallel to the upper extension member 7. The latches 9 and 9' are then disengaged from the latch points 10 and 10' and the

upper ends of the extension members 7 and 7' are pulled back in the directions shown by the arrows C (Figure 1). This causes the chair frame to gradually fold up, the side frames folding simultaneously with the support stay and front support assemblies. An intermediate position is shown in Figure 7, and it will be noted that the lower angle formed between each upper extension member and the corresponding side frame bar member linked thereto has changed from a reflex angle (as in Figure 1) to an acute angle (as in Figure 7). Folding of the chair frame is then completed until the folded frame forms a compact package as shown in Figure 8. It will be noted that the seat material 15 is automatically folded together with the seat frame.

Erection of the chair from the folded position is the reverse of the folding procedure described above. The frame assembly is first unfolded and then locked in the unfolded position by the latch means. The cross member 11 is then latched at its free end onto the top end of the upper extension member 7'. The seat material is then in the correct position for use.

CLAIMS

1. A foldable chair, comprising a pair of complementary X-shaped side frames each consisting of two bar members hinged together intermediate their ends to permit folding and unfolding in the plane of the X, the two side frames being mutually parallel and in register with each other; a centrally hinged transverse X-frame support stay, consisting of two substantially straight stay members hinged together at their mid points to permit folding and unfolding in the plane of the X which is perpendicular to the plane of the side frames, an end of each stay member being hinged to an end of a side frame bar member so as to permit pivoting both in the plane of the stay members and in the plane of the respective bar members, whereby folding and unfolding of the side frames causes simultaneous and corresponding folding and unfolding of the support stay; a pair of upper extension members respectively hinged to an upper end of a side frame bar member and to the upper end of the complementary side frame bar member adjacent the upper ends of the X-frame support stay, said upper extension members being pivotable in the respective

planes of the side frames; a pair of brace members hinged at their lower ends to the respective lower ends of the side frame bar members below the hinge points of the upper extension members, adjacent the lower ends of the X-frame support stays, and hinged at their upper ends respectively to the upper extension members intermediate the ends of the latter; latch means for detachable locking of at least one of the side frames in an unfolded position; a foldable, substantially X-shaped support articulated at its ends to the respective upper and lower ends of the side frames remote from the X-frame support stay, said support being foldable and unfoldable in correspondence with the X-frame support stay; a cross member supportable between the upper ends of the upper extension members; and a flexible seat material supported by and extendable between the cross member and the upper limbs of the substantially X-shaped support.

2. A foldable chair substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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