July 31, 1962 R. D. VANDERMINDEN 3,047,334

FOLDABLE SWING CHAIR

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Fig. 3.

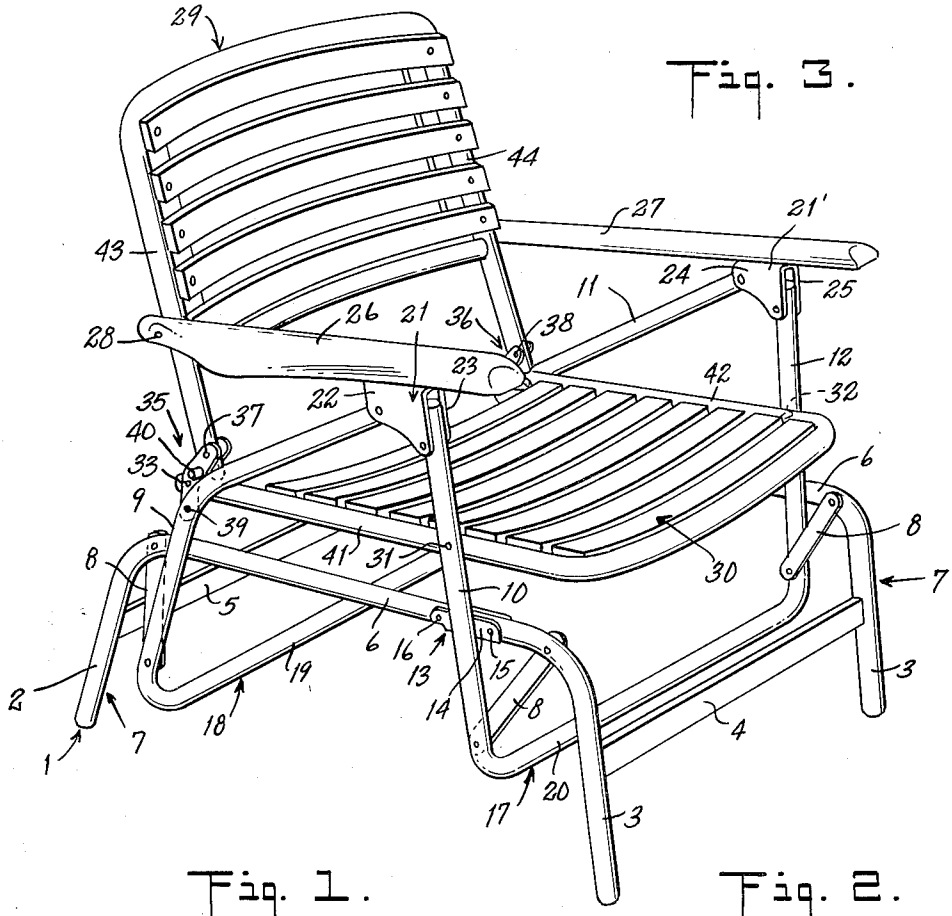

Fig. 1.

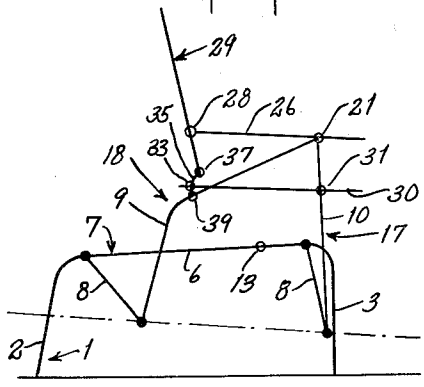

Fig. 2.

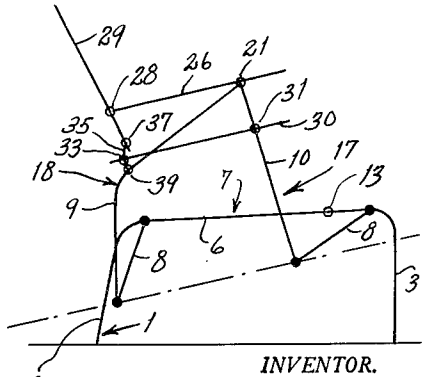

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Fig. 4.

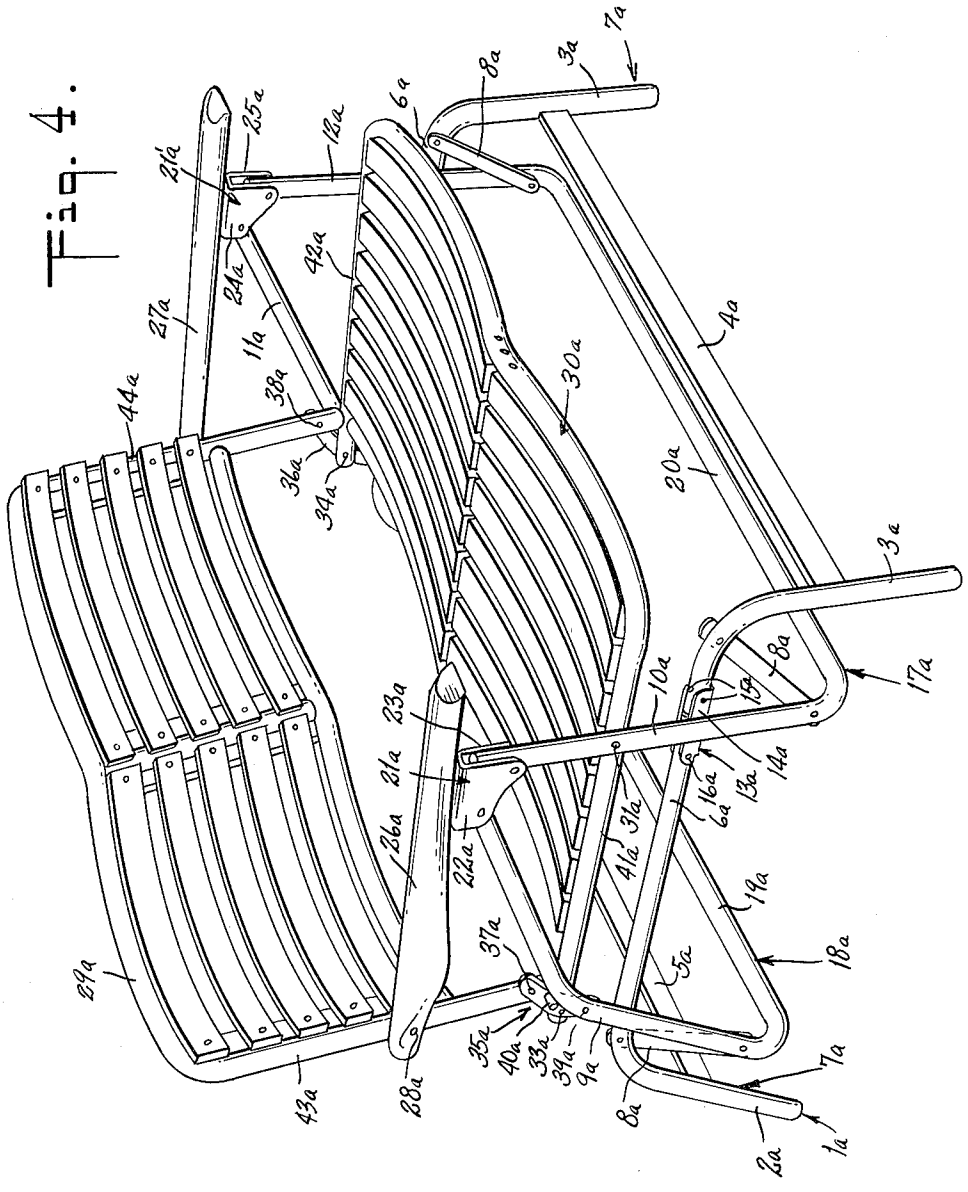

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Fig. 5.

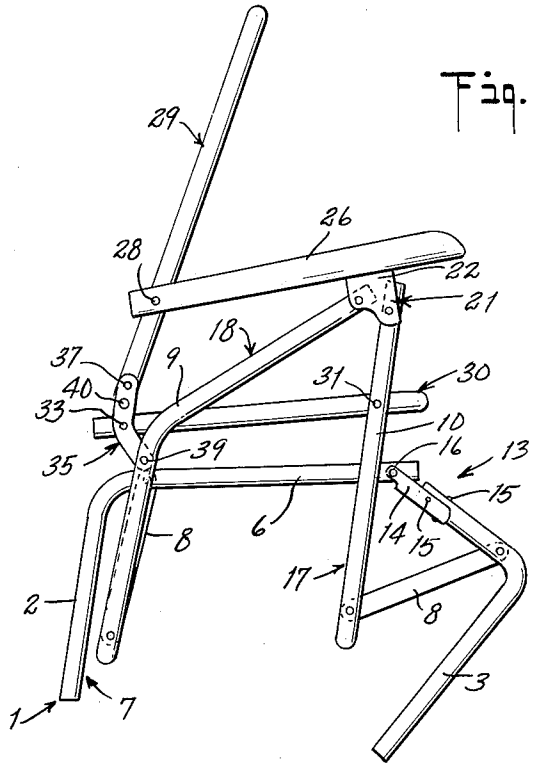
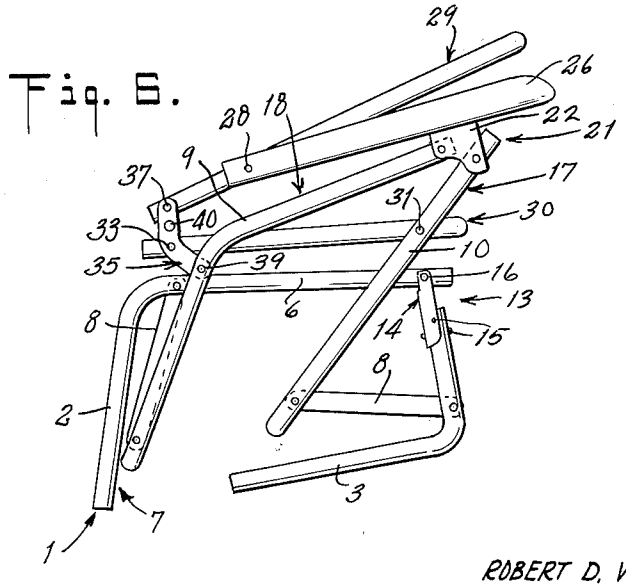


Fig. 6.



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FOLDABLE SWING CHAIR

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6 Claims. (Cl. 297—39)

This invention relates to a novel construction for a foldable swing chair or seat.

The chair, which may be of a size to seat one or more persons, is of a light-weight construction that can be easily shifted to its unfolded position, and can be folded for easy carrying or storing. When folded the chair retains its unfolded dimensions of height and side to side width, but its front to back width dimension is reduced, thus allowing for compact storing or stacking either leaning against wall, or lying flat on the ground. The chair is provided with a seat portion, a back rest portion and arm rests and has, as an integral part, a collapsible base structure which rests firmly on the ground. The seat portion with back rest portion and arm rests are slung from the base structure in such a way that they may be made to swing or glide in a forward and backward movement by foot action of a seated person or persons.

The chief problems inherent in the construction of a really successful foldable chair, particularly for gardens or porches, are the provision of a light, durable construction having a sufficient degree of foldability with the minimum number of hinges or links, and the positioning of such hinges and links in such a manner that the chair may be easily folded while in its standing-upright position, and easily unfolded from its carrying position into an upright position, in one or two simple movements, without the operator having to engage, disengage or adjust locking means associated with its hinges. These problems are obviously aggravated when the construction of the chair is complicated by providing a body-structure that can swing or glide relatively to the base structure.

Principal objects and features of the invention are the provision of foldable chair structure intended to solve the foregoing problems simply and effectively.

Other objects and features of the invention are the provision of a simple foldable swing that is easy and inexpensive to produce.

I achieved my objects partly by causing the seat portion, arm-rests and back-rest portion of the chair to be supported by two supporting frame-structures each substantially U (or square-U) shaped, i.e., each being composed of a cross-bar with two upright bars rising therefrom to form the U-shape. These two supporting frame-structures are hinged together at their upper open ends, i.e., each upright of one supporting frame-structure is hinged to the corresponding upright of the other supporting frame-structure. So hinged together and with their lower cross-bars thus parallel, the latter are aligned running in a direction from side to side of the chair, and one of these supporting frame-structures supports the rear parts of the chair structure and the other the front parts, as will be described below. These rear and front supporting structures are preferably each composed of a separate continuous metal tube; but if desired may be composed of a number of lengths of metal or wood bolted together in the required formation. Upon these two supporting structures, the seat portion, back-rest portion and arm-rests of the chair are supported by hinges, pivots and links in such a way that when the two supporting members are pivotally swung apart about the two hinges which hold their upper ends together, the seat portion and arm-rests are disposed substantially horizontally, and when the two supporting members are swung together, by

being pivoted about the two last-named hinges, the seat portion and arm-rests move into planes more or less parallel to those of the back-rest portion and the closed supporting members.

These two supporting structures are suspended adjacent the lower ends of their uprights from four links which depend from a foldable base structure in such a way that in use the supporting structures, and the body of the chair suspended thereon, may be swung backwards and forwards by a user by the pivoting movement of the four links. The base structure comprises four leg-parts which stand upon the ground and four cross-parts which join each adjacent leg-part rectangularly; the two of these cross-parts which run from back to front of the chair being foldable and affording the support for the aforementioned links.

Other objects and features of the invention will become apparent from the following specification and the accompanying drawings forming a part hereof, wherein:

FIGURES 1 and 2 represent diagrammatically the pivoting and hinging structure of the foldable swing chair in two successive positions of swing;

FIGURES 3 and 4 represent in perspective views practical single and double seat embodiments of the invention each showing in perspective a chair in its unfolded position; and

FIGURES 5 and 6 show in side elevation the hinging details of either of these embodiments in two successive stages of folding.

More particularly the construction comprises: (*a*) a body structure of the chair foldable into a relatively flat compass so that when folded the back-rest portion, seat portion, arm-rests and seat supporting structure lie in planes extending in much the same parallel direction, without increasing the height or width which the chair possesses when in its unfolded position; and (*b*) a foldable base structure from which the body structure is slung from pivoted links which, when the chair is unfolded, make possible a forward and backward swinging movement of the body structure.

Referring to the figures, the foldable base structure **1** comprises two rear legs **2**, and two front legs **3**. The two front legs **3** are held together by a front cross piece **4** and two rear legs **2** by a rear cross piece **5**. Each rear leg **2** is joined rigidly to its corresponding front leg **3** by a side cross member **6**. Preferably (as shown in FIGURES 3 to 6) the base structure **1** comprises of two tubular metal inverted U-shaped members **7**, each providing a rear and front leg **2** and **3**, joined by a horizontal side cross member **6**. Each cross member **6** is the bridge of one of the inverted U-shaped members **7**. These two inverted U-shaped members **7** are held rigidly together by the rear and front cross pieces **4** and **5**.

Four links **8** are pivoted at their upper ends to the respective side cross members **6** and are pivoted at their lower ends adjacent the lower ends of the four upright parts **9**, **10**, **11**, **12** of the seat supporting frame-structure to be described in detail hereafter.

The base structure **1** is foldable in such a manner that the front legs **3** may be swung from a limiting operative position of use as shown in FIGURES 1 and 2 towards the rear legs as shown in FIGURES 5 and 6. This is achieved by providing a severance in each cross member **6** and suitable hinge **13** at each side cross-member **6** severance. These hinges **13** are located between the pivot support points of the two links **8** on each side cross member **6**. These hinges **13** may, in order to afford easy folding to collapsed, or unfolding to operative positions of the base without the user having to fix or release a joining device, and in order to afford a limiting stop to prevent the front and rear legs from moving beyond their

required positions when in unfolded position of use, conveniently be constructed in the following manner. Referring to FIGURES 3 to 6, the cross members 6 are each completely severed at the point of hinging. Hinge structure 13 is provided to rejoin these severed pieces of each cross member 6, and permit a swing action between the severed pieces of each cross member 6. For this purpose each hinge structure 13 comprises a half-sleeve or channel 14. Each half-sleeve of channel 14 conforms in section to the cross-sectional shape of the lower half of the adjoining ends of severed cross members 6. It is bolted as at 15 to one of the severed ends of a cross member 6, and hinged or pivoted to the adjoining other severed end of such cross member as at 16; alternatively it may be hinged or pivoted to both adjoining severed ends. When the adjoining severed ends of each of the side cross members 6 are respectively in horizontal alignment, each rests firmly in its half-sleeve or channel 14 and is maintained in such alignment. The members 14 then act as a limit stop. When the base structure 1 is folded, the sleeves 14 act as pivot or hinge parts.

Front and rear seat supporting structures 17 and 18 respectively, are suspended from the links 8. Each supporting structure 17 and 18 is preferably integral, being made of a single metallic tube, the rear structure 18 consisting of a cross piece 19 and the two aforementioned uprights 9 and 11, and the front one similarly consisting of a cross-piece 20 and the two aforementioned uprights 10 and 12.

The upper ends of the two uprights 9 and 11 of the rear supporting structure 18 are pivotally or hingedly joined as at 21 and 21′ to the upper ends of the corresponding front upright parts 10 and 12 of the front supporting structure 17. Most preferably (as shown in FIGURES 3–6) this hinging or pivoting is achieved not by pivoting the corresponding upper ends directly to each other, but by pivoting each corresponding upper end of the rear and front uprights 9 and 10 to a pair of parallelly aligned plates 22 and 23 which embrace the upper ends of the uprights respectively pivoted thereto. In the alternative one of the two plates 22 and 23 may be omitted. In this way the front and rear corresponding uprights 9 and 10 can be kept in vertical co-planar relationship, which would be impossible if they were directly pivoted together by a common pivot pin. A similar and second pivoting arrangement at 21′ employing a similar pair of plates 24 and 25 provides for the pivoting or hinging together of the upper ends of uprights 11 and 12. The pairs of plates 22, 23 and 24, 25 (or single plates, if used) at each side of the chair are each rigidly affixed to the respective underside near the front end of the corresponding one of the two arm-rests 26 and 27. The rear end of each such arm-rest is pivoted or hinged as at 28 to the adjacent side of a back-rest member 29 of the chair at a height which gives the arm-rests 26 and 27 when the chair is in use, a suitable degree of slope if desired from the horizontal that may be comfortable for the sitter.

The seat portion 30 of the chair is pivoted at the front part of its either side as at 31 and 32 to an intermediate point on each of the front upright supporting parts 10 and 12, and is pivoted at either side at its rear as at 33 and 34 to the approximate mid-points of two links 35 and 36. Said links 35 and 36 are preferably obtuse-angled and elbow shaped. The upper arm of each of the said links is pivoted as at 37 and 38 adjacent to the lower end of the corresponding side of the back-rest member 29. The lower arm of each link is pivoted as at 39 to an intermediate point on the corresponding rear upright parts 9 and 11. The links 35 and 36 are positioned so that when the chair is in use their obtuse angles face forward. The upper arm of each of the said links has a lateral detent as at 40 which is adapted in the unfolded condition of the chair to contact and rest against the corresponding upper surfaces of rear upright parts 9 and 11, thus serving as limit stops for the seat portion 30 and back-rest portion 29 in the open condition of the chair. Other types of detent means for effecting similar limit stop action could be provided.

It will be seen that the use of such links 35 and 36 as pivoting mechanisms permits the side frame parts 41 and 42 of the seat portion 30 and the side frame parts 43 and 44 of the back-rest portion 29 to lie in co-planar relation (which would not be possible if, being constructed of tubular metal, they were pivoted together by a single pivot). Additionally, the links 35 and 36 provide leverage which facilitates the drawing together of the front of the seat portion 30 and the top of the back-rest portion 29 in the action of folding the chair.

The two rear uprights 9 and 11 are preferably bent or curved in their lengths as illustrated so as to lend compactness to the chair construction.

The chair as depicted in FIGURE 3 is a single seat type. That depicted in FIGURE 4 is a double seat type. The component parts of each are substantially identical except for the span between opposite sides of the chair. Parts in FIGURE 4 corresponding to those in FIGURE 3 are indentically numbered with the added suffix *a*. Although FIGURES 1 and 2 bear reference characters corresponding to those of FIGURES 3, 5 and 6, the two figures also depict diagrammatically the pivotal structure and linkage arrangement of FIGURE 4.

In operation of the chair, with the chair in open and unfolded condition, as seen in FIGURE 1, gliding action of the seat and back-rest portions 29 and 30 with respect to the base structure 1 is readily effected by the sitter. This action occurs as a result of pivotal swing of the links 8 between their extreme positions shown in FIGURES 1 and 2. During this period the seat portion 29 and back-rest portion 30 moves generally forwardly and backwardly in a gliding motion.

When it is desired to fold the chair away the operations depicted in FIGURES 5 and 6 are effected. First the top of back-rest frame 29 is swung forwardly toward the front of the seat portion 30 at the pivotal joints at the links 35 and 36. When the seat and back-rest have been partially moved together, the front legs 3 of the base structure 1 are swung about the hinges 13 toward the rear legs 2 to an underlying position with respect to the seat as shown in FIGURE 5. Folding down of the back-rest 29 toward the seat 30 is then completed bringing the chair into the completely compact folded condition of FIGURE 6. The chair in this compactly folded condition may be stored for future use. In unfolding of the chair, reverse procedure is followed. This same manner of folding and unfolding is practiced for the chairs of either FIGURE 3 or FIGURE 4.

Although specific embodiments of the chair construction have been disclosed, variations in structural detail within the scope of the appended claims are possible and are contemplated. There is no intention of limitation to the exact details shown and described.

What is claimed is:

1. A foldable swing chair comprising a seat portion, a back-rest portion and arm-rests, pivotal means for joining said seat portion, back rest portion and arm-rests to move into substantially parallel planes and to move into a disposition in which said seat portion and arm-rests are in planes substantially at right angles to the plane of said back-rest, a base member, frame means comprising two substantially U-shaped structures hinged together at their open ends on which said seat portion, back-rest portion and arm-rests are carried, link means pivotally secured to the base member and to the frame means to permit relative gliding movement of said seat and back-rest portions with respect to said base member, and said base member including side pieces each including front and rear legs joined by a cross member and forming an inverted substantially U-shaped side piece, said side pieces having their front and rear legs joined by rigid transverse

members, and each cross member having hinging means to permit the collapse of the base member to a compass substantially smaller than that of its uncollapsed compass with its front legs extending towards its rear legs in a plane substantially parallel to said substantially parallel planes.

2. A foldable swing chair comprising a seat portion, a back-rest portion and arm-rests, pivotal means for joining said seat portion, back-rest portion and arm-rests to move into substantially parallel planes and to move into a disposition in which said seat portion and arm-rests are in planes substantially at right angles to the plane of said back-rest, a base member, frame means comprising two substantially U-shaped supporting structures each including two upright members, each said upright member of each said supporting structure being pivotally joined at its upper end to the corresponding upright member of the other supporting structure, said seat portion, back-rest portion and arm-rests being pivotally secured to said upright members in such manner that when the said upright members swing apart about their pivotal junctions at the said upper ends of the said upright members, the said seat portion and arm-rests lie in substantially horizontal planes and when the said upright members are drawn together about their said pivotal junctions with the said seat portion, back-rest portion and arm-rests lie in substantially parallel planes, link means pivotally secured to the base member and to the frame means to permit relative gliding movement of said seat and back-rest portions with respect to said base member, and said base member including side pieces each including front and rear legs joined by a cross member, said side pieces being joined by rigid transverse members and each cross member having hinging means to permit the collapse of said base member to a compass substantially smaller than that of its uncollapsed compass with its front legs extending towards its rear legs in a plane substantially parallel to said substantially parallel planes and underlying said seat portion.

3. A foldable swing chair comprising a seat portion, a back-rest portion and arm-rests, pivotal means for joining said seat portion, back-rest portion and arm-rests to move into substantially parallel planes and to move into a disposition in which said seat portion and arm-rests are in planes substantially at right angles to the plane of said back rest, a base member, frame means comprising two U-shaped structures each including a cross piece and two upright pieces of continuous metal tube, two pivot means, one said pivot means pivotally joining together the open upper ends of one said upright piece of each said U-shaped structure, the other said pivot means pivotally joining together the open upper ends of the other said upright piece of each said U-shaped structure, said seat portion, back-rest portion and arm-rests being pivotally secured to said upright members in such manner that when the said upright members swing apart about their pivotal junctions at the said upper ends of the said upright members, the said seat portion and arm-rests lie in substantially horizontal planes and when the said upright members are drawn together about their said pivotal junctions the said seat portion, back-rest portion and arm-rests lie in substantially parallel planes, link means pivotally secured to the base member and to the frame means to permit relative gliding movement of said seat and back-rest portions with respect to said base member, and said base member including side pieces each including front and rear legs joined by a cross member, said side pieces being joined by rigid transverse members, and each cross member in its length having hinging means to permit the collapse of the base member to a compass substantially smaller than that of its uncollapsed compass with its front legs extending toward its rear legs in a plane substantially parallel to said substantially parallel planes and underlying said seat portion.

4. A foldable swing chair comprising a seat portion, a back-rest portion and arm-rests, pivotal means for joining said seat portion, back-rest portion and arm-rests to move into substantially parallel planes and to move into a disposition in which said seat portion and arm-rests are in planes substantially at right angles to the plane of said back-rest, a base member, frame means including two front upright members, a cross member joining said front upright members at their lower ends and two rear upright members, a cross member joining said rear upright members at their lower ends, two pivot means, one said pivot means pivotally joining together the upper end of one said front upright member to the upper end of one said rear upright member, and the other said pivot means pivotally joining together the upper end of the other said front upright member to the upper end of the other said rear upright member, the front portions of said arm-rest being pivoted to the upper ends of said frame means, the rear ends of said arm-rests being pivoted to intermediate points on the said back-rest portion, the front portion of said seat portion being pivoted at intermediate points on said front upright members, two obtuse angled links pivoted at their upper ends to the lower part of the back-rest portion, said links being also pivoted at intermediate points thereon to the rear part of the said seat portion, and said links being pivoted at their lower ends to intermediate points on the said rear upright members, detents provided to maintain the said links in such a position that the said obtuse angles of said links face forwardly, link means pivotally secured to the base member and to the frame means to permit relative gliding movement of said seat and back-rest portions with respect to said base member, and said base member including side pieces each including front and rear legs joined by a cross member, said side pieces being connected together by rigid transverse members joined to their legs, and each cross member in its length having hinging means to permit the collapse of said base member to a compass substantially smaller than that of its uncollapsed compass with its front legs extending toward its rear legs in a plane substantially parallel to said substantially parallel planes and underlying said seat portion.

5. A foldable swing chair comprising a seat portion, a back-rest portion and arm-rests, pivotal means for joining said seat portion, back-rest portion and arm-rests to move into substantially parallel planes and to move into a disposition in which said seat portion and arm-rests are in planes substantially at right angles to the plane of said back-rest, a base member, frame means on which said seat portion, back-rest portion and arm-rests are carried, link means pivotally secured to the base member and to the frame means to permit relative gliding movement of said seat and back-rest portions with respect to said base member, and said base member comprising two rear and two front substantially vertical leg-portions and two side, one front, and one back substantially horizontal cross pieces joining said leg-portions rectangularly, and the two said side cross pieces having on each a severance thereof at an intermediate point thereon, and hinged means comprising a half-channel affixed to the underside of one severed end, the said half channel being also pivoted to the other severed end to rejoin the severed pieces and to permit a swinging action between the severed pieces by which the said front leg-portions may be folded towards the said rear leg-portions beneath said seat portion to extend in a plane substantially parallel to said substantially parallel planes so as to permit the said base member to collapse to a compass substantially smaller than that of its uncollapsed compass.

6. A foldable swing chair comprising a seat portion, a back rest portion and arm rests, pivotal means for joining the arm rests to the back rest portion, obtuse angled link members, pivotal means for joining said back rest portion to points of said link members, pivotal means

for joining said seat portion to other points of said link members, frame means including two front upright members joined at their lower ends and two rear upright members joined at their lower ends, said rear upright members being bent forwardly in upper parts of their lengths toward the front upright members, pivotal means joining said link members to said rear upright members below their forwardly bent portions, plate means secured to the arm rests, means for pivotally joining upper ends of the front and rear upright members to said plate means, detent means on said link members engageable with said rear upright members to limit pivotal movements of the back rest portion and seat portion in the open condition of the chair, a base member comprising side pieces each including front legs and rear legs and a cross member forming an inverted substantially U-shaped side piece, said side pieces being joined by rigid transverse members attached to the legs and each cross member having hinged means in its length to permit the collapse of the base member to a compass substantially smaller than that of its uncollapsed compass with its front legs extending substantially perpendicularly towards its rear legs beneath said seat portion, and link means pivotally secured to the cross members of said side

pieces of said base member and to said front and rear upright members of said frame means to permit relative gliding movement of said seat and back rest portions in the open condition of said chair and the uncollapsed condition of said base member.

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