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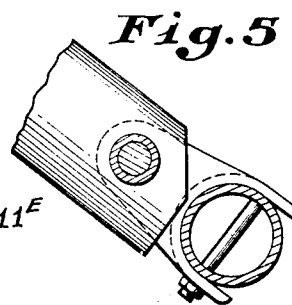
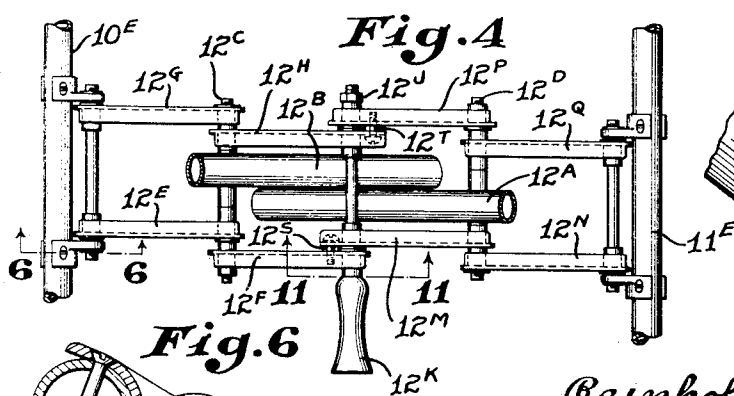
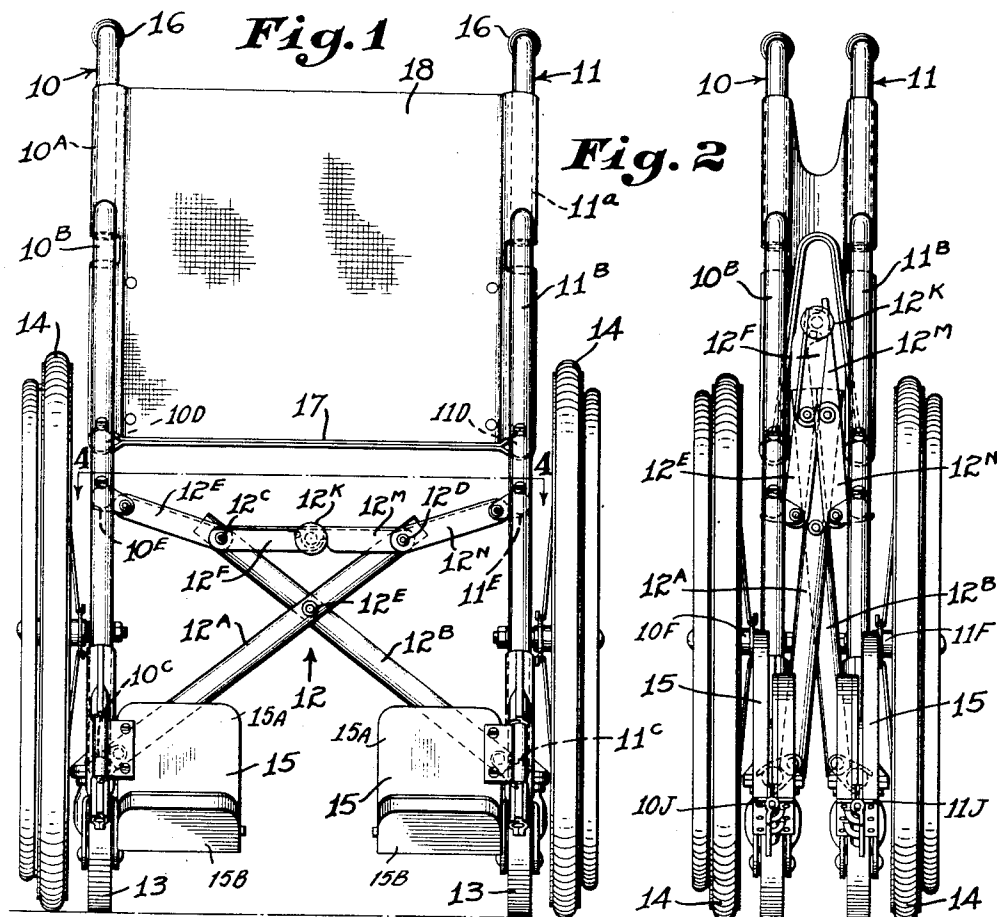
R. M. KRASKA

2,460,459

FOLDING ARTICLES

Filed March 13, 1947

2 Sheets-Sheet 1



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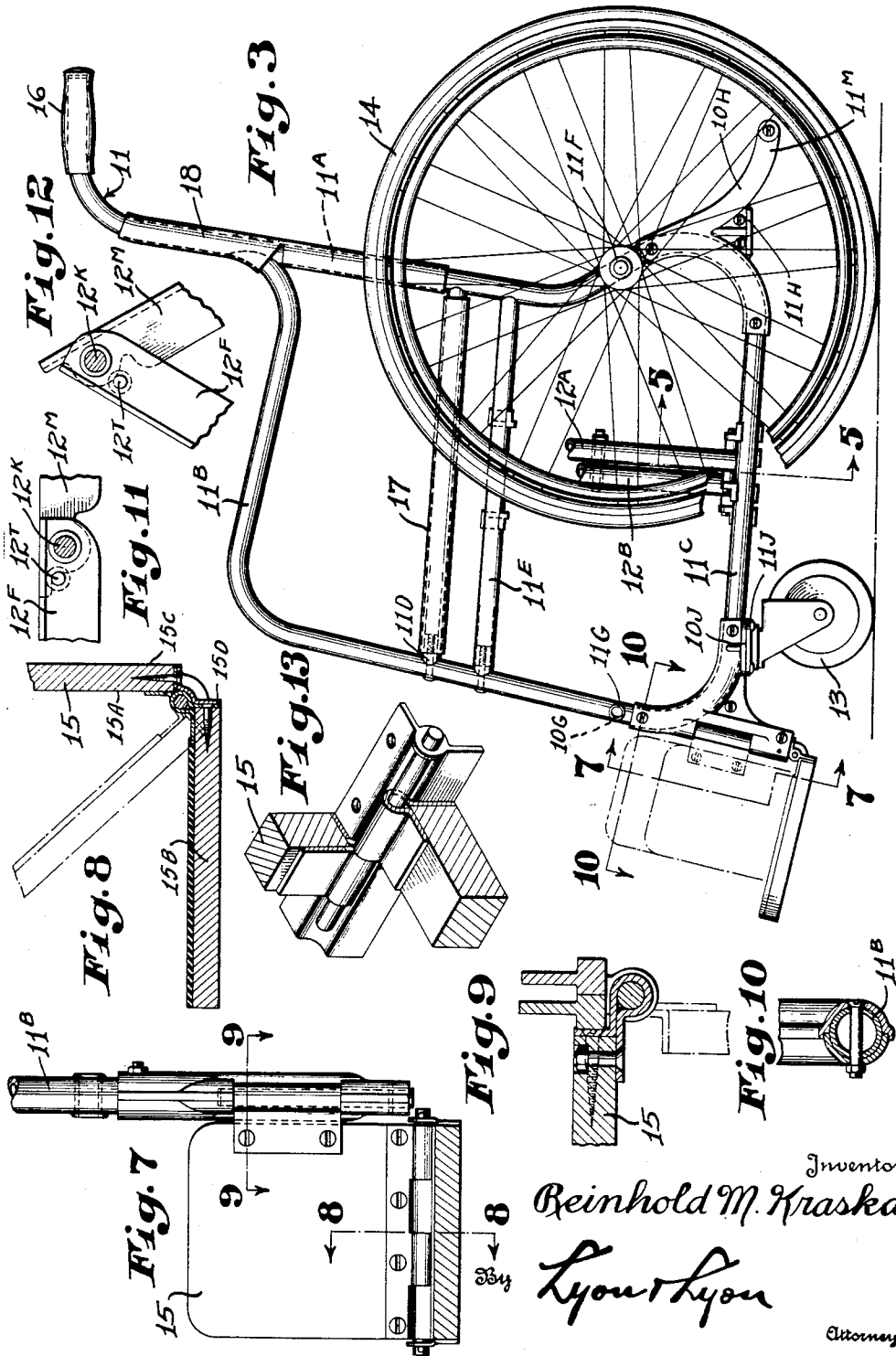
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FOLDING ARTICLES

2,460,459

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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

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FOLDING ARTICLE

Reinhold M. Kraska, Altadena, Calif., assignor,
by mesne assignments, to Al R. Brooks, doing
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Application March 13, 1947, Serial No. 734,352

4 Claims. (Cl. 155—140)

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The present invention relates to folding articles of the type in which the framework thereof may be collapsed to provide a compact article for storage purposes or for carrying in an automobile. In a more narrow aspect of the present invention it relates to a folding wheel chair which may be easily and readily folded and extended.

An object of the present invention is to provide improved means whereby articles such as folding wheel chairs, tables and the like may be easily and readily folded and extended as the occasion requires.

A specific object of the present invention is to provide an improved wheel chair characterized by the improved manner in which the collapsible structure thereof may be manipulated to fold or extend the chair.

Another specific object of the present invention is to provide an improved wheel chair having a collapsible framework whereby the chair may be moved from its folded to its extended position and vice versa, the framework being so constructed and assembled that when the chair is used in its extended position the weight of the person sitting on the chair acts to advantage in rendering the chair stable.

Another specific object of the present invention is to provide an improved wheel chair having a collapsible framework with at least one caster wheel and one propelling wheel mounted thereon, the caster and propelling wheels being capable of being journaled at different points on the framework to thereby allow conversion of the wheel chair for convenient propulsion by the person in the chair or by a maid or nurse or other person who may conveniently shove the chair.

Still another specific object of the present invention is to provide an improved wheel chair having the seat and back portion thereon of flexible material and the manual control handle for collapsing and extending the framework of the chair at a convenient conveyed position underneath the seat of the chair.

Yet another specific object of the present invention is to provide an improved collapsible wheel chair having steering handles thereon, the collapsible framework of the chair being movable from its folded or its collapsed position to its extended position by simply moving the steering handles apart.

Still a further object of the present invention is to provide an improved wheel chair, the framework of which includes a pair of steering handles and which may be easily and readily moved from its folded or collapsed position to its extended

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position by merely moving the handles apart; but, for safety purposes, the framework of the wheel chair may not be collapsed by movement of the steering handles, manipulation of a control member not too conveniently accessible, being necessary.

Still a further specific object of the present invention is to provide a collapsible framework for a chair, table or the like having a pair of crossed diagonal pivoted brace members which may be locked in an extended position by an improved linkage, the specific construction of which embodies certain important aspects of the present invention.

Yet a further specific object of the present invention is to provide an improved suitable wheel chair characterized by its lightness and construction of a pair of end frame members which remain parallel to one another in their movement from one another from retracted to extended positions and vice versa, whereby the wheel chair may be propelled and collapsed and extended without much effort.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. This invention itself, both as to its organization and manner of operation, together with further objects and advantages thereof, may be best understood by reference to the following description taken in connection with the accompanying drawings in which:

Figure 1 shows a front elevational view of a wheel chair in its extended position embodying the present invention.

Figure 2 shows the front elevational view of the wheel chair shown in Figure 1 in its retracted, folded or collapsed position.

Figure 3 shows a side elevational view of the wheel chair shown in Figure 1, the propelling and caster wheels being mounted on the chair for convenient movement by a person grasping the steering handles 16.

Figure 4 is a sectional view taken substantially on the line 4—4 of Figure 1.

Figure 5 is a sectional view taken substantially on the line 5—5 of Figure 3.

Figure 6 is a sectional view taken substantially on the line 6—6 of Figure 4.

Figure 7 is a sectional view taken substantially on the line 7—7 of Figure 3.

Figure 8 is a sectional view taken substantially on the line 8—8 of Figure 7.

Figure 9 is a sectional view taken substantially on the line 9—9 of Figure 7.

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Figure 10 is a sectional view taken substantially on the line 10—10 of Figure 3.

Figure 11 is a sectional view taken substantially on the line 11—11 of Figure 4.

Figure 12 shows the elements in Figure 11 in different positions; and

Figure 13 is a perspective view of a hinge structure shown in Figure 1.

The collapsible wheel chair comprises in general a pair of rigid side members having the general reference numerals 10 and 11 which are held together in spaced parallel relationship with respect to one another in all positions thereof by the connecting pivoted linkage having the general reference numeral 12, each rigid side member having mounted thereon a caster wheel 13, a propelling wheel 14, a collapsible footrest 15, a steering handle 16 and an adjacent end of a flexible leather seat member 17 and flexible leather back member 18.

The rigid side members 10 and 11 are identical in construction and may comprise an aluminium framework made of tubing suitably assembled.

The steering handles 16 are extensions of the vertical tubing 10A, 11A of end members 10, 11 respectively, which are either welded or plug-fitted at points intermediate their respective ends to the combined arm rests and vertical supporting tubing 10B, 11B, the other end of such tubing 10B, 11B being rigidly secured to the forward end of the bottom horizontal frame member 10C, 11C having its rear end rigidly secured to the bottom end of the frame member 10A, 11A, respectively. Further, the rigid end members 10 and 11 have a pair of intermediately disposed horizontal tubing members 10D, 11D and 10E, 11E, respectively, with opposite ends thereof welded or plug-fitted to tubular frame members 10A, 10B and 11A, 11B, respectively. It is noted that the end frames have the general reference numerals 10 and 11 and individual parts thereof have respectively, the general reference numeral with a characterizing letter appended thereto.

The propelling wheels 14 may be journaled for rotation at either one of two spaced points on each one of the end frame members 10 and 11, there being provided for this purpose hollow bearing members 10F, 11F and 10G, 11G, respectively in tubing members 10A, 11A and 10B, 11B. Correspondingly, in similar manner the casters 13 may be mounted at either one of two spaced points 10H, 11H or 10J, 11J, respectively on the bottom horizontal tubing members 10C, 11C, respectively, or suitable extensions thereof.

The interchangeability of the propelling wheels 14 and caster wheels 13 in the manner indicated immediately above allows the chair to be self propelled by the occupant thereof or to be conveniently propelled by one grasping the steering handles 16. In the latter case, to facilitate the lifting of the chair over obstructions such as curbstones and the like, the rigid end members 10, 11 are each provided with an extension 10M, 11M, respectively. It is apparent that both the propelling wheel 14 and the caster wheel 13 as shown in the tubings, may be releasably affixed to the end members 10, 11 in such a manner that the chair may be converted conveniently into one for self propulsion and one for movement by a person grasping handles 16. In such case, the propelling wheel is disassembled and assembled merely by unscrewing and screwing a fastening nut and the caster wheel is correspond-

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ingly moved into position by unscrewing and screwing a plurality of fastening bolts.

The footrest 15 comprises two pivoted members 15A and 15B each pivotally mounted as a unit on the bottom ends of tubular members 10B, 11B, respectively, or extensions thereof, pivotal movement on the tubular members being limited by the faces 15C on member 15A and pivotal movement of the members 15A and 15B with respect to one another being limited by the face 15D on member 15B.

An important factor of the present invention is the manner in which the end members 10, 11 are secured to one another for parallel movement from their retracted positions to their extended position and vice versa by the connecting linkage having the general reference numeral 12.

The linkage 12 comprises: a pair of diagonal members 12A, 12B pivotally mounted at one of their ends respectively on frame members 10C, 11C and at their other ends on the pivot pins 12C and 12D with an intermediate point of each of such members 12A, 12B pivotally mounted on a common pivot pin 12E; the pivot pin 12C serves to pivotally connect adjacent ends of link members 12E, 12F, 12G and 12H, the other ends of link members 12E and 12G being pivotally mounted on the frame member 10E and the other ends of the link members 12F and 12H be pivotally mounted on the pivot pin 12J having the manually operable actuating handle 12K affixed to one end thereof; the pivot pin 12D serves also to pivotally connect adjacent ends of link members 12M, 12N, 12P, 12Q the other ends of link members 12M and 12P being pivotally connected to the pivot pin 12J and the other ends of the link members 12N and 12Q being pivotally connected to the frame member 11E. Stop means 12S and 12T serve to limit relative movement between link members 12F and 12M on the one hand and 12H and 12P on the other hand.

In order to move the parts of the wheel chair from their retracted, collapsed or folded position shown in Figure 2 to their extended positions shown in Figure 1, it is necessary only that the steering handles 16 be grasped and moved apart whereupon the side frame members 10 and 11 move parallel to one another by the flexible linkage 12. Then, in order to fold or collapse the chair, it is essential that the manuable operable control handle 12K be manipulated by moving it upwardly against the flexible leather seat member 17. It is noted that in the extended position of the chair, the pivot pin 12J is effectively over its dead center position, in such case the axis of pivot pin 12J is somewhat lower than the axis of the parallel pivot pins 12C and 12D. Thus, in the extended position of the chair, essentially all of the weight of the person is transmitted from the person sitting on the chair to the supporting ground or floor directly through the end frames 10 and 11 inasmuch as opposite ends of the seat member 17 are attached to the end members 10 and 11; and any equalizing force between such end members being transmitted on the one hand through link members 12N, 12Q and 12A and on the other hand through link members 12E, 12G and 12B and to a lesser extent through the link members 12F, 12M, 12H and 12P, which link members remain in their "over center" position.

One feature of the present invention is that the chair may be extended rather smartly with a snap action by tilting upwardly on the steering handles in Figure 2 to raise the propelling

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wheels 14 and then by sharply moving the handles 16 apart whereupon the linkage 12F, 12M, 12H and 12P is moved to overcenter position.

Needless to say the chair cannot be collapsed while a person is sitting thereon inasmuch as he interferes with movement of the handle 12K, the upward movement of which is essential to collapsing the chair.

The seat member 17 and back member 18 may be of flexible material such as leather. The seat member 17 may be fastened to the frame members 10 and 11 at opposite edges thereof by providing loops at such edges through which the tubular portions 10D and 11D are slipped through, these tubular members 10D and 11D are preferably semi-permanently mounted by screws or the like to the tubular members 10B and 11B, respectively, whereby the seat member 17 may be easily replaced. The back members 18 may be fastened to the tubular members 10A and 11A by looping opposite ends thereof and maintaining such ends in looped position by means of snap fasteners or the like thereby to also allow the back member 18 to be easily replaced as desired.

While I have described my invention in detail with respect to a folding wheel chair, it is understood, as is apparent to one skilled in the art that certain features of the wheel chair in particular, the pivoted link structure 12 may be incorporated in other chairs, folding invalid walkers, camping equipment, lawn, steamer and patio chairs, as well as in picnic, card and tennis tables and similar articles.

While the particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspects and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of this invention.

I claim:

1. In folding articles of the character described, a pair of end frame members, a pivoted linkage connecting said end frame members, said pivoted linkage including a pair of diagonal brace members, each having one of their ends pivotally connected to an adjacent end member and being pivotally connected at a point intermediate its ends to said other diagonal brace member, the other end of each diagonal brace member being pivotally mounted on a respective pivot pin, a pair of link members each pivoted to a corresponding one of said pivot pins and also being pivotally mounted on the corresponding frame member, and a second pair of link members having their adjacent ends pin connected and their other ends pivotally connecting to a corresponding one of said pivot pins.

2. In folding articles of the character described, a pair of end frame members, a pivoted link structure connecting said end frame members and providing parallel movement of the frame members when and as said frame members are moved

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relative to one another, said pivoted link structure comprising: a pair of diagonal brace members each having one of their ends pivotally connected to a corresponding frame member, said diagonal brace members being pivotally connected at a point intermediate their ends, the free ends of said diagonal brace members each being pivotally mounted on a corresponding pair of link pins, a pair of link members each having one of their ends pivotally connected to a different frame member and the other one of their ends connected to a different link pin, a pair of link members extending between and pivotally attached to said pair of link pins and being pivotally mounted on a third link pin, and an operable handle affixed to said third link pin.

3. In folding articles of the character described, a pair of spaced frame members, a pivoted linkage interposed between said frame members to provide parallel movement of one frame member with respect to one another from an extended position to a retracted position and vice versa, said pivoted linkage comprising: four pivoted link members serially connected between the frame members, each of the said four link members being pivotally mounted with respect to the adjacent one thereof, a pair of diagonal brace members, each having one of their ends pivotally connected to a different frame member and being pivotally connected intermediate its ends to said other diagonal brace member, the free ends of said diagonal brace members each being pivotally connected at intermediate pivotal points on said four serially connected link members.

4. In folding articles of the type described, a pair of spaced frame members, two pairs of link members serially connected between said frame members, adjacent ends of said link members being pivotally mounted with respect to one another, a manually operable handle member mounted on said serially connected link structure at the central pivot thereof and substantially midway between said frame members, a pair of diagonal brace members each having one of their ends pivotally connected to a different frame member and being pivotally connected at a point intermediate their ends to said other diagonal brace member, the free end of each one of said diagonal brace members being pivotally connected at different spaced points on said serially connected link members.

REINHOLD M. KRASKA.

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