

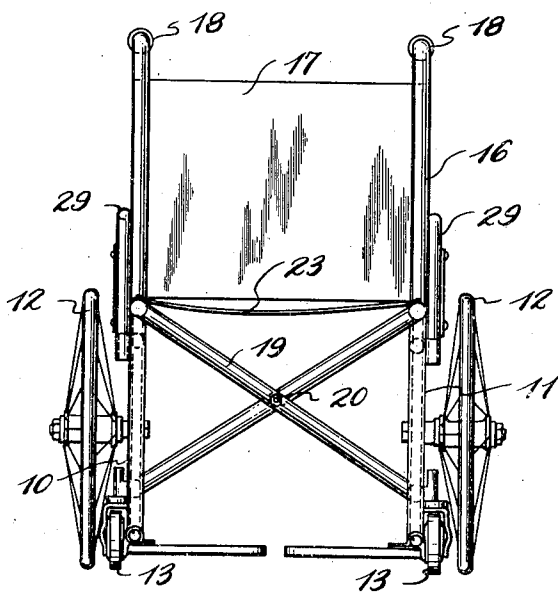
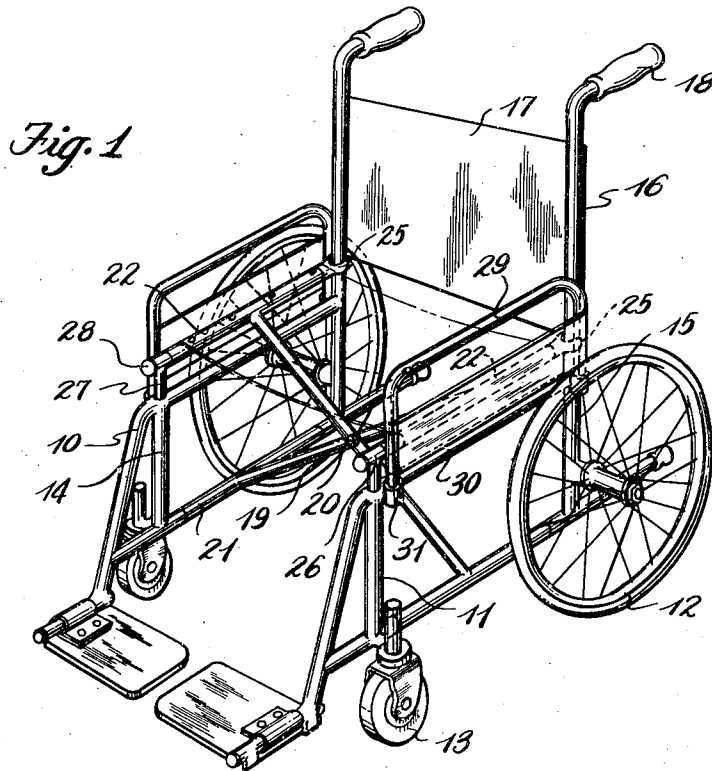
Oct. 25, 1949.

H. A. EVEREST ET AL  
COLLAPSIBLE WHEEL CHAIR

2,486,015

Filed Oct. 1, 1945

3 Sheets-Sheet 1



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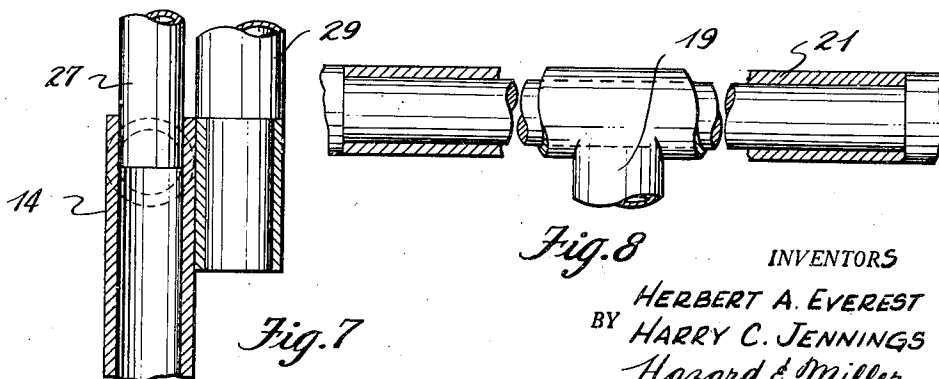
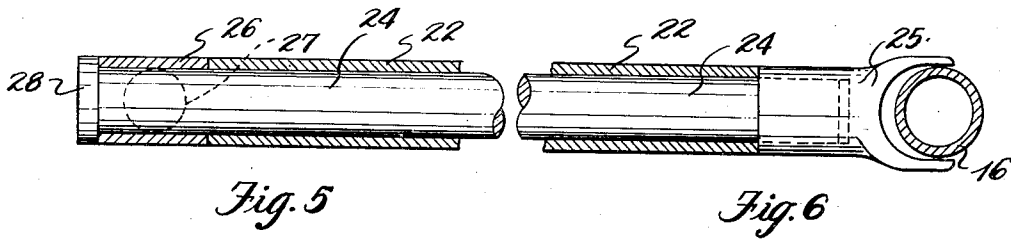
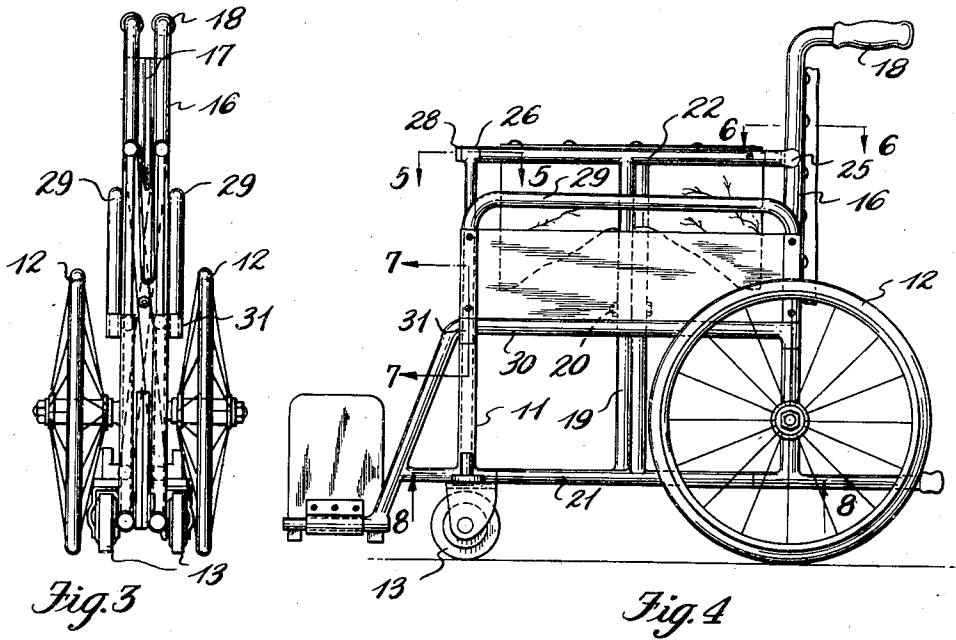
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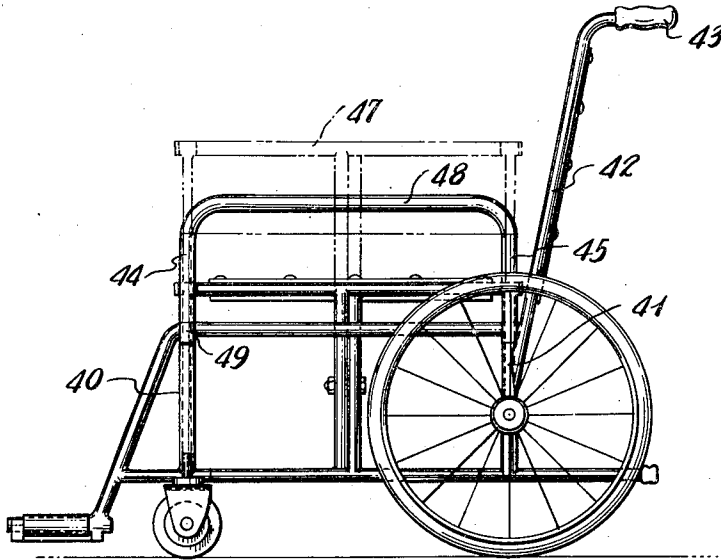


Fig. 9

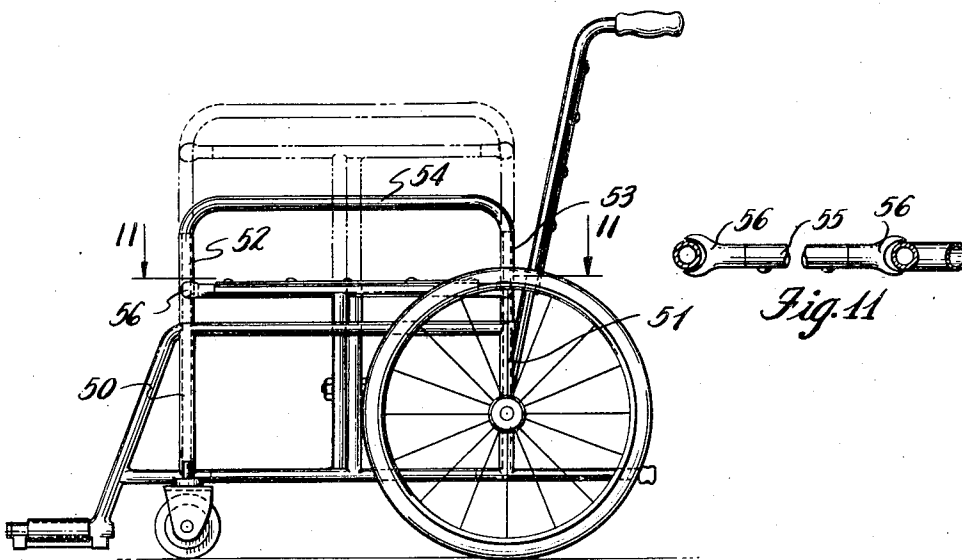


Fig. 10

Fig. 11

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# UNITED STATES PATENT OFFICE

2,486,015

## COLLAPSIBLE WHEEL CHAIR

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6 Claims. (Cl. 155—140)

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This invention relates to improvements in collapsible chairs and has been particularly designed for use in conjunction with collapsible wheel chairs although the invention may be employed on collapsible chairs of the stationary type.

An object of the invention is to provide an improved collapsible chair which employs two opposed normally spaced side frames connected by a collapsible connecting means such as an X brace wherein the collapsible means or X brace is slidably guided on the side frames during collapsing movement and the X brace can be made adequately wide for a wide chair but the guide means on the side frame need not be made abnormally high to accommodate the X brace during its collapsing movement.

Heretofore collapsible chairs of this general character have been developed wherein there are one or more X braces connecting the opposed side frames with the lower ends of the X brace construction pivotally or hingedly connected to the bottoms of the side frames and the upper ends of the X brace slidably guided on vertical portions such as legs and arm rests of the side frames. In such constructions the width of the chair is limited by the height of the guides afforded by the side frames. Thus if the legs are extended upwardly and are connected to arm rests and the upper ends of the X brace are slidable on the legs the width of the chair cannot exceed the height to which the arm rests will limit upward movement of the upper ends of the X brace. On the other hand if the arm rests are extended upwardly to make adequately high guides and thus accommodate an X brace suitably proportioned for a wide chair such arm rests are abnormally high above the seat level which is objectionable.

By means of the present invention a collapsible chair is provided which employs an X brace construction between two spaced side frames and the chair may be made adequately or even abnormally wide. During the collapsing movement of the chair the upper ends of the X brace will be adequately guided on the side frames and at the same time the arm rests or other guiding means may be maintained at the desired level with respect to the level of the seat.

With the foregoing and other objects in view, which will be made manifest in the following detailed description and specifically pointed out in the appended claims, reference is had to the accompanying drawings for an illustrative embodiment of the invention, wherein:

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Figure 1 is a perspective view of a collapsible wheel chair embodying the present invention the seat being illustrated in phantom lines for purposes of clarity and the chair being illustrated in expanded or extended position.

Fig. 2 is a view in front elevation of the chair illustrated in Fig. 1.

Fig. 3 is a view in front elevation of the chair illustrated in Fig. 1 but illustrating the chair in collapsed position.

Fig. 4 is a view in side elevation of the chair in its collapsed position.

Fig. 5 is a horizontal section through the forward portion of the top of the X brace construction and may be regarded as taken substantially upon the line 5—5 upon Fig. 4.

Fig. 6 is a horizontal section taken substantially upon the line 6—6 upon Fig. 4.

Fig. 7 is a vertical section taken substantially upon the line 7—7 upon Fig. 4.

Fig. 8 is a horizontal section taken substantially upon the line 8—8 upon Fig. 4.

Fig. 9 is a view in side elevation of an alternative form of construction embodying the invention illustrating the positions assumed by parts when in collapsed position in dotted lines.

Fig. 10 is a view similar to Fig. 9 illustrating still another alternative form of construction embodying the invention.

Fig. 11 is a horizontal section taken substantially upon the line 11—11 upon Fig. 10.

Referring to the accompanying drawings wherein similar reference characters designate similar parts throughout, the improved collapsible chair consists of two opposed side frames generally indicated at 10 and 11. These side frames may be of any conventional or preferred design and are pivotally constructed of tubing sections suitably bent or shaped and welded together. The side frames are illustrated as being mounted on traction wheels 12 and caster wheels 13 although the presence of such wheels is immaterial insofar as the present invention is concerned. The side frames in the construction illustrated in Fig. 1 have tubular front legs 14 which are open at their top. They also have rear legs 15 which are extended upwardly as indicated at 16 to provide side for a back rest 17 formed of flexible material such as fabric and bent rearwardly to provide handles 18.

An X brace construction 19 is disposed between the side frames and while there may be several X braces connecting the side frames normally a single X brace is adequate and in many instances is preferred, particularly in collapsible wheel

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chairs to embody the inventions disclosed in our prior Patents No. 2,181,420, issued Nov. 28, 1939; and No. 2,095,411, issued October 12, 1937.

The X brace illustrated consists merely of two cross members pivotally connected by a pivot bolt 20 and having knuckles 21 at their lower ends which are rotatable on tubes which connect the lower ends of the legs 14 and 15. Any pivot or hinge connection between the lower ends of the X-brace and the lower portions of the side frames may be employed insofar as the present invention is concerned. The upper ends of the X brace are equipped with knuckles 22 on which a flexible or fabric seat 23 may be mounted. These knuckles have tubes 24 extending therethrough and on the rear ends of the tubes 24 there are rotatably mounted slide tips 25 which are slidable on the extensions 16 of the rear legs 15. The forward ends of the tubes 24 rotatably extend through tubular heads 26 which are formed on the upper ends of telescopic leg sections 27 that telescope into and are slidable in the hollow front legs 14. End caps 28 may be mounted on the tubes 24 to retain the tubes in proper position in the heads 26. The arm rests 29 may be suitably formed and are rigidly and permanently attached to horizontal tubes or bars 30 that connect the top ends of the front leg 14 with the lower legs 15, or they may be detachably positioned in sockets 31 provided on the sides of these tubes or bars. If desired, the arm rests may be omitted entirely.

In collapsing the chair from the position shown in Figs. 1 and 2 to the position shown in Figs. 3 and 4, the two side frames 10 and 11 are merely forced towards each other causing the members of the X-brace 19 to pivot relatively to each other. During such pivotal movement the upper ends of the X brace or the knuckles 22 are caused to move upwardly relatively to the side frames and during this movement the slide tips 25 merely slide upwardly on the extensions 16. These extensions are adequately long to accommodate any reasonable vertical movement of the slide tips 25 occasioned by the collapse of the X brace regardless of the X brace when in its fully extended position. During the collapsing of the X brace the knuckles 22 lift and cause the telescopic leg sections 27 to slide upwardly within the tubular front legs 14 and as illustrated in Figs. 3 and 4 the upper ends of these telescopic leg sections may be lifted to a height that is materially above the tops of the arm rests 29. The lower ends of the telescopic leg sections 27 remain in the tubular forward legs 14 at all times and thus serve to guide the forward ends of the knuckles 22 throughout the entire collapsing movement.

It will be appreciated that if the forward legs 14 were merely extended upwardly above the horizontal tubes 30 and connected to the tops of the arm rests and that if the forward ends of the knuckles 22 were equipped with slide tips that would slide on such extensions that the upward movement of the knuckles 22 would be limited by the height of such extensions on the tops of the front legs 14. It is undesirable to have the arm rests 29 abnormally high above the seat level and if the upward movements of the knuckles 22 were limited by the height of the arm rests 29 the width of the X brace in its extended position is consequently limited. By means of this invention the width of the X brace and consequently the width of the chair can be made any dimension desired within reasonable limits and if the width of the X brace is such that during its collapse it extends above the desired height of the

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arm rests 29 as shown in Fig. 4 the telescopic forward leg sections 27 accommodate such movement and still function to guide the forward ends of the knuckles 22.

When the chair is extended, downward movement of the knuckles 22 will be limited by the seat 23 being drawn taut or the knuckles 22 may be allowed to descend until they engage the horizontal members 30.

In Fig. 9 there is disclosed an alternative form of construction which differs from the construction previously described in the following respects: In this form of construction each side frame has relatively short tubular vertical front and rear legs indicated at 40 and 41 respectively. Uprights 42 which are inclined rearwardly are welded or otherwise rigidly secured to the back sides of the rear legs 41 and provide sides for the flexible back rest and handles 43 at their tops. Telescopic leg sections 44 and 45 are telescopically slidable in both the front and rear legs and the knuckles 47 on the upper ends of the X brace are pivotally connected at their ends to the tops of these telescopic sections. The arm rests 48 may be welded or otherwise rigidly secured to the outer sides of the legs 40 and 41 or be detachably positioned in sockets 49 or be omitted entirely. In this form of construction as is illustrated by dotted lines when the X brace is caused to collapse it will lift both of the telescopic leg sections 45 and 46 from the front and rear legs 40 and 41 respectively. Also as illustrated in this figure if the X brace is unusually long as in making a wide chair the knuckles 47 are in no way restricted by the height of the arm rests 48. Consequently the arm rest 48 may be maintained in a low position relative to the seat and at the same time the chair may be made of any desired width. As the knuckles on the X brace rise they are effectively guided by the telescopic sections which merely slide upwardly in the front and rear legs.

In Figs. 10 and 11 still another form of construction is illustrated wherein the side frames have tubular vertical front and rear legs 50 and 51 within which are slidable telescopic leg sections 52 and 53 which are connected at their tops by the arm rests 54. These arm rests are positioned at a suitable height above the seat. The knuckles 55 on the tops of the end brace have tubes disposed therein on which the slide tips 56 are rotatable. These slide tips are slidable on the telescopic leg sections 52 and 53. In this form of construction when the chair is collapsed the slide tips 56 slide upwardly upon the telescopic leg sections 52 and 53 until the curvature at the ends of the arm rests 54 are engaged. Thereafter further closing movement of the X brace causes the arm rests 54 and the telescopic leg sections 52 and 53 to be bodily lifted as illustrated by dotted lines. During such lifting the telescopic leg sections merely slide upwardly within the tubular legs 50 and 51 and continue to guide the X brace during its collapsing movement. On opening the chair the telescopic leg sections merely descend in the legs and the arm rests 54 descend to their normal position relatively to the seat.

From the above described constructions it will be appreciated by those skilled in the art that a collapsible chair has been provided employing an X brace between two side frames and that during collapse of the chair the X brace is guided by a structure on the side frames. However, the width of the X braces and consequently the width of the chair is in no way restricted or

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limited by the height of the legs above the seat of the chair or the height of the arm rests if these are present. If the arm rests are present they may always be maintained at a proper elevation with relation to the seat and do not have to be excessively high even though the seat may have to be excessively wide.

Various changes may be made in the details of construction without departing from the spirit and scope of the invention as defined by the appended claims.

We claim:

1. A collapsible chair having normally spaced side frames, on which there are arm rests, means vertically slidable on the side frames adapted to be extended above the arm rests, an X brace construction of pivoted cross members between the side frames pivotally connected thereto at its lower ends and pivotally connected to said means at its upper ends whereby on collapse of the chair said means may slide upwardly on the side frames to a position above the arm rests to accommodate closing of the X brace construction.

2. A collapsible chair having normally spaced side frames in which there are tubular legs, telescopic leg sections slidable in the legs, an X brace construction of pivoted crossed members between the side frames having its lower ends pivotally connected thereto, the upper ends of the X brace construction having pivoted means slidable on the telescopic leg sections and arm rests connecting the telescopic leg sections which when engaged by the upward sliding movement of the X brace relative to the telescopic leg sections will lift the telescopic leg sections from within the tubular legs of the side frames.

3. A collapsible chair having normally spaced side frames, each side frame having a front leg and a rear leg, back rest supports rigid with the rear legs and extending upwardly therefrom, leg sections telescopically slidable in the front legs of the side frames, collapsible means between the side frames by which they may be brought close together or spaced apart, means pivotally connecting the collapsible means to the bottom portions of the side frames, means pivotally connecting the collapsible means to the leg sections in the front legs, and means forming a slidable connection between the collapsible means and the rear legs enabling the collapsible means to slide up and down on collapse or extension thereof relatively to the rear legs and the back rest supports without increasing the overall height of the chair.

4. A collapsible chair having normally spaced side frames, each side frame having a tubular front leg, each frame having at the rear thereof a rear leg and back rest supporting means extending upwardly thereabove, an X brace of pivoted crossed members between the frames the lower ends of which are pivotally secured to the bottoms of the side frames respectively, leg sections telescopically slidable in the front legs,

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means pivotally connecting the upper ends of the X brace to the leg sections respectively, and means pivotally connected to the upper ends of the X brace at the rear thereof having a slidable engagement with the rear legs of the side frames so as to be guided thereby, whereby upon collapse of the chair the leg sections may be elevated from the front legs by the X brace and the pivotally connected means at the rear of the X brace may slide upwardly relatively to the rear legs and the back rest supporting means without increasing the overall height of the chair.

5. A collapsible chair having normally spaced side frames, each side frame having a tubular front leg, each frame having at the rear thereof a rear leg and back rest supporting means extending upwardly thereabove, an X brace of pivoted cross members between the frames the lower ends of which are pivotally secured to the bottoms of the side frames respectively, leg sections telescopically slidable in the front legs, means pivotally connecting the upper ends of the X brace to the leg sections respectively, and means pivotally connected to the upper ends of the X brace at the rear thereof having a slidable engagement with the rear legs of the side frames so as to be guided thereby, whereby upon collapse of the chair the leg sections may be elevated from the front legs by the X brace and the pivotally connected means at the rear of the X brace may slide upwardly relatively to the rear legs and the back rest supporting means without increasing the overall height of the chair, and arm rests stationarily mounted on the side frames outwardly of the upper ends of the X brace.

6. A collapsible chair having normally spaced side frames, said side frames having tubular legs, leg sections telescopic within the tubular legs, arm rests connecting the upper ends of the leg sections, and an X brace of pivoted crossed members between the frames, means pivotally connecting the lower ends of the X brace to the bottoms of the side frames, and means pivotally mounted upon the upper ends of the X brace having slidable connections with the leg sections whereby upon collapse of the chair the last-mentioned means may slide upwardly on the leg sections until the arm rests are engaged thereby and the arm rests and leg sections will then be elevated relatively to the side frames.

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