CONVERTIBLE WHEEL CHAIR

Fig. 8

Fig. 9

Fig. 10
CONVERTIBLE WHEEL CHAIR
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This invention relates to improvements in convertible wheel chairs.

Wheel chairs are commonly made either for outdoor use with large wheels located at the rear thereof to facilitate pushing of the chair and manipulation thereof to pass over curbs and other paving irregularities, or they are made for indoor use with large wheels thereof having associated smaller handgrip wheels located at the front thereof for convenient gripping and manipulation thereof by the occupant of the chair. Attempts have been made previously to produce a convertible chair, but previous convertible chairs as produced have been characterized by one or more of the following disadvantages: High cost of construction, complicated character of construction, a construction requiring the use of tools to effect conversion of the unit, and constructions requiring laborious time-consuming manipulation and operation to convert the same.

It is the primary object of this invention to produce a convertible wheelchair which overcomes the difficulties aforementioned, and provide a wheelchair of simple and inexpensive construction which can be converted rapidly without the use of tools.

A further object is to provide a convertible wheelchair having a main frame portion with wheeled support and a back-rest support frame having multiple releasable telescopic joint connections with parts of the main frame interfitting at two lateral portions of the main frame without requiring absolute initial accuracy of fabrication in welding or formation of the respective body frame and backrest frame.

A further object is to provide a device of this character having a removable backrest, having tubes adapted for telescopic fit with tubes of a main frame unit, which telescoping tubes have associated therewith spring-latched means which are readily manipulable manually.

A further object is to provide a convertible wheelchair having a main unit assembly consisting of a collapsible frame, a seat, armrests and wheels, and separate units in the nature of collapsible footrest and backrest units readily mountable in either of two selected positions upon the first unit.

Other objects will be apparent from the following specification.

In the drawings:
FIG. 1 is a perspective view of my improved wheelchair as assembled to locate the large wheels thereof at the front for ready manual manipulation by the user;
FIG. 2 is a perspective view of a wheelchair in which the large wheels thereof are located at the back;
FIG. 3 is a view in side elevation with parts broken away, illustrating the frame of the wheelchair and associated backrest and footrest portions;
FIG. 4 is an enlarged fragmentary detail sectional view taken on line 4—4 of FIG. 3;
FIG. 5 is an enlarged fragmentary detail sectional view taken on line 5—5 of FIG. 3;
FIG. 6 is an enlarged transverse sectional view taken on line 6—6 of FIG. 3;
FIG. 7 is a fragmentary detail sectional view taken on line 7—7 of FIG. 6;
FIG. 8 is a vertical sectional view of a wheelchair in expanded position, taken on line 8—8 of FIG. 9;
FIG. 9 is a view taken on line 8—8 of FIG. 3 and illustrating the wheelchair in collapsed position;

FIG. 10 is a fragmentary detail sectional view taken on line 10—10 of FIG. 8.

Referring to the drawings, the numeral 10 designates a collapsible main frame unit to which is detachably mounted a backrest unit 22 and a pair of footrest units 24.

The collapsible main frame unit consists of a pair of complementary rigid frame sections 30, each having a short upright 32, a long upright 34, a lower longitudinal frame part 36, an intermediate longitudinal frame part 38, and an armrest supporting longitudinal frame part 40. The parts 32, 34, 36, 38, and 40 are preferably formed of metal tubing stock and are welded or otherwise fixedly interconnected to provide strong or rigid frame sections 30. The opposite ends of each intermediate frame part 38 and of each armrest supporting frame part 40 are open for purposes to be described. An armrest 42 is fixedly mounted upon each frame part 40 in any suitable manner. Protective side plates 44 are preferably secured to the frame parts 32 and 34 spaced at the level of the frame parts 38. The lower end portion of each long upright 34 carries a stub axle shaft 46 upon which is journaled a large supporting wheel 48, which preferably is of the type having a large diameter rubber tired rim and an outwardly offset and spaced hand wheel portion 50. The lower frame part 36 preferably includes an upwardly offset end portion 52, and at the junction of offset 52 and short upright 32 is provided a swivel 54 journaling on a substantially vertical axis a small supporting wheel unit 56.

Intermediate the length of each lower frame part 36 spaced from the offset 52 thereof is journaled a sleeve 60 to which is secured a cross-arm 62. The cross-arms are pivotally connected at 64 and each mounts a rigid seat carrier 66 at its upper end which preferably is of tubular construction. At each end thereof each rigid seat carrier tube 66 rotatably receives a short tube 68 having secured thereto a part-cylindrical or U-shaped guide 70. Each guide 70 fits slidably upon the adjacent one of the upright members 32 and 34. A flexible or foldable seat 72, such as a fabric seat, is anchored at its margins to the opposite rigid seat carriers 66. In the extended position of the seat, the spacing of the opposed rigid frame section of the frame is determined by the length of the armrests 62 with the intermediate frame parts 38 at the low level position illustrated at FIG. 8 and the collapsed position of the frame is determined by contact of the cross member 63 with the frame parts 38, as illustrated in FIG. 9.

The backrest unit comprises a pair of rigid frame members 80 which preferably are of tubular construction and to which are fixedly secured opposite margins of a flexible or foldable backrest sheet 82. At their upper ends the backrest frame members 80 preferably terminate in handgrip members 84. Intermediate its height, each backrest frame member 80 has fixedly secured thereto a substantially perpendicularly extending rigid tube 86 which is adapted for snug sliding removable interfit in one of the end portions of the armrest supporting frame part 40. In the lower end portion of each backrest frame member 80 is rotatably mounted an inset 88 which projects below the lower end of member 80 and by which is fixedly secured a perpendicularly extending pin or tube 90 adapted for snug sliding fit within one end of an intermediate frame member 38. Any suitable retaining means 89 may be provided to interconnect the inset 88 and the frame member 80 in a manner to accommodate limited relative rotation of the parts and a limited extent of relative longitudinal sliding of the parts. This free play of the rotatable parts 88 and 90 relative to the backrest frame insures that the pins or tubes 86 and 90 may be so located as to accommodate fitting thereof within the ends of tubes 38 without requiring exact or precision fabrication. In other words, this construction insures that
the backrest frame member will fit and be interchangeable upon opposite ends of main frame units as long as the upper and intermediate frame parts 40 and 38 of the main frame are substantially parallel and are spaced approximately a predetermined distance. Each of the footrest units 24 has a rigid substantially L-shaped inverted frame part 94 from whose upper end projects a reduced diameter tube part 96 adapted to project into and fit snugly within an end portion of an intermediate frame part 38. A substantially horizontal strut 98 is fixedly secured to frame part 94 intermediate its height and terminates in an arcuate abutment member 100 adapted to engage one of the upright frame parts 32, 34. A footrest member 102 is carried by the lower end of each rigid frame part 94 and preferably is provided with a pivot mount 104 accommodating pivotal movement of the footrest between an operative horizontal position, as shown in FIG. 2, and a substantially upright inoperative position.

Suitable means are provided for locking the backrest unit and the footrest units to the main frame unit, and such means are preferably carried by the perpendicular rigid tube and projecting from each backrest frame member and by the reduced diameter tube part 96 carried by each frame part 94. Such releasable lock means may be of the character illustrated in FIGS. 6 and 7 and constitue a locking button 110 having an enlarged flange 112 at one end thereof. Each of the parts 86 and 96 is provided with an opening spaced from the end thereof a slight distance and receiving and mounting the body of the button 110 with the flange 112 thereof disposed inwardly. An elongated C-shaped spring 114 extends longitudinally within each member 86 and 96 and terminates in an out-turned end portion 116 which seats in a bore in the button 110, as illustrated in FIG. 6. Each of the intermediate frame part 38 and armrest supporting part 40 has an aperture adjacent each end thereof which is adapted to register with and to receive the outer end of the button 110 to hold the button-carrying part in a selected longitudinal interfitting relation to the tubular frame part which receives it. Release of the parts to facilitate separation thereof is readily accommodated by pressing the button 110 inwardly against the action of the spring 114 to clear the outer receiving tube as a pull is exerted upon the interfitting parts in a direction to separate them longitudinally thereof.

The construction provides a wheel chair of adequate strength to meet all normal usage requirements wherein a firm and strong connection is effected between each of the backrest unit and footrest units with the main frame unit. Solidity of the construction and rigidity are provided by the multiple contact of each detachable unit with the main frame unit while avoiding need for high degree of accuracy fabrication of parts. Thus all that is required to assure trouble-free telescopic interfitt of parts 86 and 90 of the backrest unit with the main frame is perpendicular projection thereof from a common axis, that is, from the axis of the interfitting parts 80 and 88. Any irregularity of the parts is accommodated by the limited rotary end longitudinal free play of the part 88 in the frame part 80 which insures that the parts 86 and 90 will enter the frame parts 40 and 38, respectively, with a free sliding fit where the dimensions of those parts are such as to accommodate a snug telescopic interfitt which will give adequate support in the unit. The locking button 110 will normally effect locking of the backrest frame when it registers with the receiving opening therefor in the frame member 40. It will be noted that the independent mounting of each of the two backrest frame members 80 to each of the rigid frame sections 39, coupled with the flexibility of the backrest sheet 82 insures interconnection of backrest parts with the frame parts while the frame is collapsed and extended, as between the FIG. 8 and FIG. 9 positions. The construction also permits the separation of one backrest frame member 80 from one rigid frame section 30 before separation of the other backrest frame member from the other frame unit, and a minimum number of conditions need to be met for such separation and to effect reassembly. In other words, it is not necessary to connect both of the backrest members 80 simultaneously.

In the event it is desired to close the ends of the armrest supporting frame parts 40 which are not used for supporting purposes in any adjustment, releasable end caps or closures 120 may be provided, as shown in FIG. 2.

Each of the footrest units has releasable multiple point support with the main frame, and each is individually applied and removed. The elongated telescopic interfitt of parts 96 and frame parts 38 and their anchorage by the locking buttons 110 positions the footrest units vertically, and engagement of the abutment members 100 with the frame part 32 spaced below the parts 96 provides a combination of fore and aft stability and lateral stability. The same advantage of rapid connection and disconnection of parts, as discussed above, is applicable with reference to the footrest units.

It will be noted that the same firm anchorage of the backrest unit and the footrest units, and the same movability, is provided in each of the two adjusted positions or reversed positions, as illustrated in FIGS. 1 and 2 respectively. Note that the frame members 38 provide for telescopic interfitt of parts of both backrest and the footrests in all adjustments thereof. This limits the need to protect an open end of a horizontal frame part in each conversion to one end only of each of the armrest parts 40 at which the end caps may be removable or applied.

It will be understood that, while the invention has been illustrated as applied to a collapsible wheel chair, it is also applicable to a non-collapsible or rigid wheel chair. It will also be understood that, while the preferred embodiment of the invention has been illustrated and described, changes may be made in the construction within the scope of the appended claims without departing from the spirit of the invention.

I claim:
1. A convertible wheel chair comprising a wheeled main frame unit mounting a seat and having a pair of vertically spaced substantially parallel and longitudinal frame members at each side thereof, and a backrest unit having a pair of frame parts carrying a backrest member extending therebetween, a pair of connector members carried by each backrest frame part in spaced relation and each adapted to have an elongated releasable sliding interfitt with a longitudinal frame member at either end of the latter, and manually manipulable lock means releasably interlocking one of said connector members of each backrest frame part with a longitudinal frame member.
2. A convertible wheel chair as defined in claim 1, and a footrest unit having a connector member adapted for elongated releasable sliding interfitt with a longitudinal frame member at either end of the latter and an abutment member engaging said main frame spaced below said connector member, and manually manipulable lock means releasably interlocking said footrest connector member with said main frame.
3. A convertible wheel chair as defined in claim 1, wherein said parallel longitudinal main frame members constitute metal tubes open at both ends, and said backrest connector members have a snug sliding fit in said tubular main frame members.
4. A convertible wheel chair, as defined in claim 1, wherein said parallel main frame members constitute open ended metal tubes slidably receiving said backrest connectors, one of said backrest connectors of each pair being fixed to a backrest frame part, and the other connector
of each pair being rotatable on said backrest frame part.

5. A convertible wheelchair as defined in claim 1, wherein said backrest frame members constitute metal tubes, and one connector carried by each backrest frame member includes a part rotatable therein and projecting from the end thereof, and means retaining each rotatable part and accommodating limited sliding thereof in said backrest frame member.

6. A convertible wheelchair as defined in claim 1, wherein one of said interfitting main frame parts and one of said backrest connectors constitute telescoping metal tubes, and said lock means is spring-urged and is carried by the telescoped tube and includes a button shiftable laterally and normally projecting through an aperture in the telescoped tube and adapted to seat in an aperture in the telescoping tube in the operative position of the backrest unit on said main frame unit.

7. A convertible wheelchair as defined in claim 1, wherein one of said interfitting main frame parts and one of said backrest connectors constitute telescoping metal tubes, each having an aperture adapted to register with an aperture of the other in operative interfitting position, a locking button slidable in the aperture of the telescoped part and adapted to project into the aperture of the telescoping parts, and a spring in said telescoping part connected to and pressing outwardly upon said locking button.

8. A convertible wheelchair as defined in claim 2, wherein said footrest unit has an inverted substantially L-shaped frame member carrying said abutment member and whose upper end portion constitutes said connector member and is slidably in a socket of one of said main frame longitudinal members.

9. A convertible wheelchair as defined in claim 1, wherein said frame is collapsible and constitutes a pair of rigid side frame sections interconnected by a foldable seat and by pivotally connected cross-arms, each pivoted to one side frame section and slidably connected to the other side frame section, and wherein said backrest member is foldable.

10. A convertible wheelchair comprising a wheeled main frame unit mounting a seat and having a pair of rigid side frame sections, each including a pair of vertically spaced substantially parallel and longitudinal tubular frame members open at both ends thereof, a backrest unit having a pair of frame parts carrying a backrest extending therebetween, each backrest frame part including a fixed connector member projecting angularly therefrom and a rotatable angularly projecting connector member, said connector members fitting telescopically in said longitudinal tubular frame member at one end of the latter, a pair of footrest units each having a rigid frame including a portion projecting angularly therefrom for elongated slide fit in the opposite end of one of said tubular main frame members and an abutment projecting therefrom for engaging said main frame unit vertically spaced from said first named portion, and manually manipulable lock means carried by said first named lateral portion of each footrest unit and by one of said backrest connector members to releasably interlock the same with said tubular main frame members.

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