

[54] **COLLAPSIBLE WHEEL CHAIR**

[76] Inventors: **Andrew Karchak, Jr.**, 9530 Ardine St.; **James R. Allen**, 10418 Chaney, both of Downey, Calif. 90241

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[58] Field of Search 180/6.5, DIG. 3; 280/242 WC; 297/300, 301, 416, 423, 429, 440, 443, DIG. 4; 318/55, 58, 139, 420, 421, 422

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Primary Examiner—Leo Friaglia

Assistant Examiner—Leslie J. Paperner

Attorney—White, Haefliger & Bachand

[57] **ABSTRACT**

A collapsible wheel chair comprises:

- a. a base carrying wheel means,
- b. a seat unit, and
- c. there being tubular shaft means carried by the base and seat unit to provide a resiliently yieldable support for the seat, and having releasable telescopic interconnection characterized in that loading transmitted via said shaft means from the seat unit to the base frictionally interlocks said telescopic interconnection.

7 Claims, 4 Drawing Figures

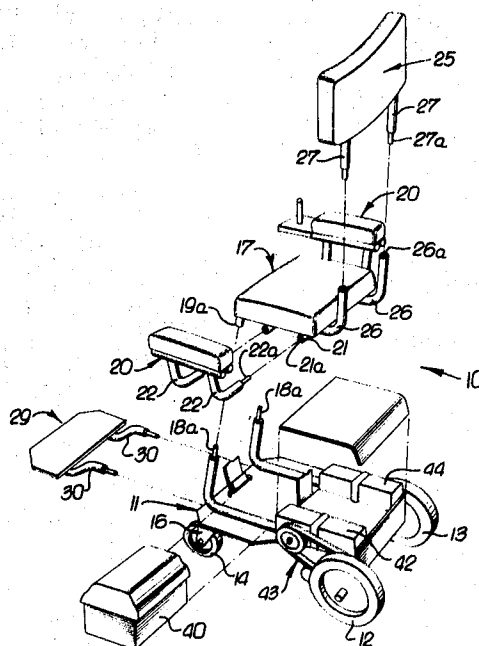


FIG. 1.

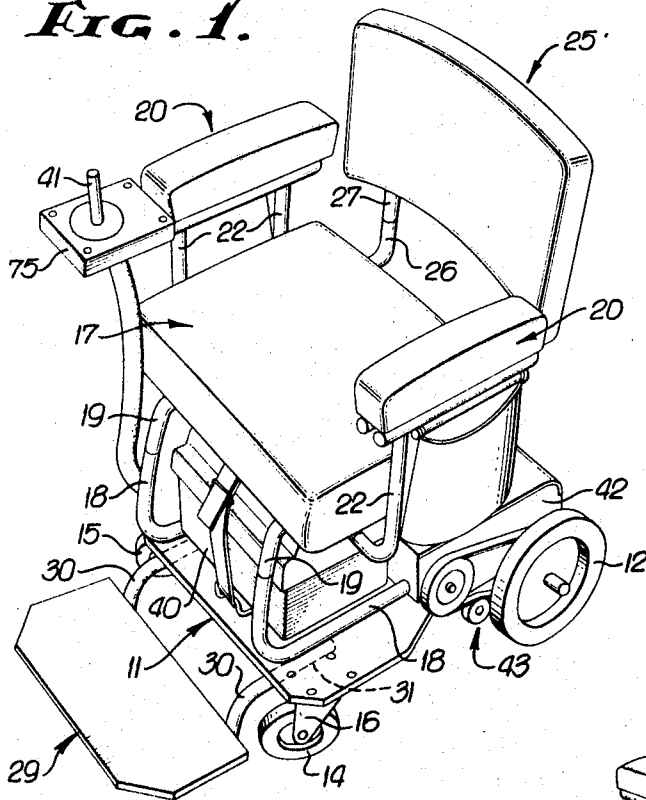


FIG. 3a.

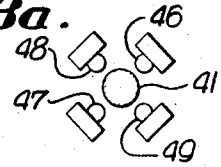


FIG. 2.

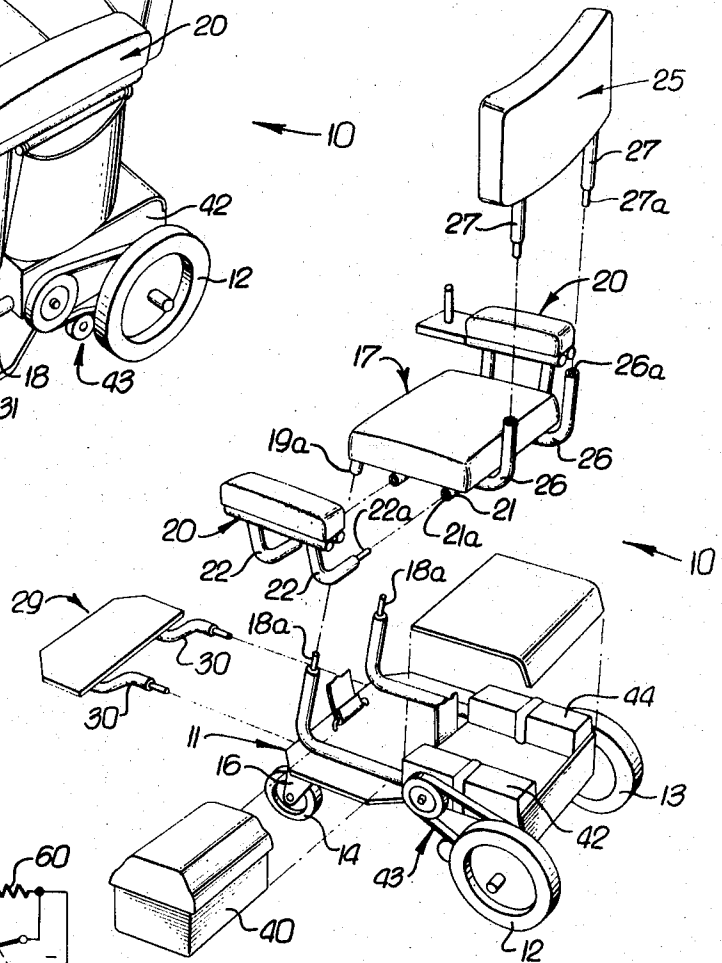
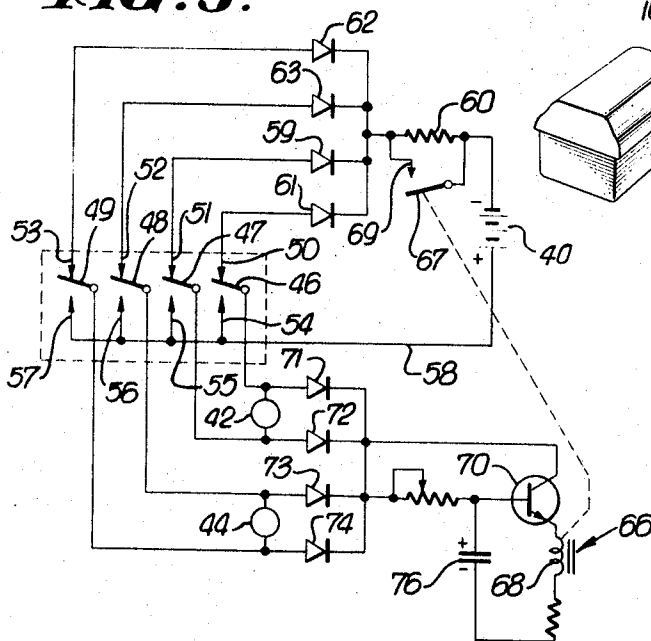


FIG. 3.



INVENTORS.
ANDREW KARCHAK, JR.
JAMES R. ALLEN

BY
White, Haylign & Bachand
 ATTORNEYS.

COLLAPSIBLE WHEEL CHAIR

BACKGROUND OF THE INVENTION

This invention relates generally to wheel chair construction and operation, and more particularly concerns a portable wheel chair capable of rapid assembly and disassembly.

The bulky construction of wheel chairs has in the past made their transportation in automobiles or small vehicles difficult if not impossible. While disassembly of such chairs was possible, in order to accommodate such transportation, their design made such disassembly inconvenient and time consuming. Further, in the case of electrical power driven chairs, the controls therefor have lacked the simplicity as afforded by the present chair construction.

SUMMARY OF THE INVENTION

It is a major object of the invention to provide a collapsible, power-driven wheel chair construction capable of rapid disassembly and assembly, and characterized by simplicity and compactness. Basically, the invention is embodied in a combination that comprises a base carrying wheel means; a seat unit; and tubular shaft means carried by the base and seat unit to provide a resiliently yieldable support for the seat, and having releasable telescopic interconnection characterized in that loading transmitted via the shaft means from the seat unit to the base frictionally interlocks the telescopic interconnection. As will be seen, the shaft means is defined by like tubular shaft assemblies, each of the latter including a first tubular member integral with the base and a second tubular member integral with the seat unit, each assembly typically having U-shape.

Another object is to provide a pair of arm rest elements, and other tubular means carried by the seat unit and arm rest elements and having releasable telescopic interconnection. Further, a back rest element may be assembled to the seat unit by releasable telescopically interconnected tubular members; and a foot rest unit may be similarly releasably connected to the base.

A further object is to provide unusually simple and effective means, including reversible electric motors, and drives, for connecting a battery power unit with left and right rear wheels, and a manually operable directional control connected, as via switches, with the battery power unit to effect controlled driving of the chair in directions corresponding to directional movement of the manual control. Finally, provision is made for automatic low and high speed drive of the chair, as will be seen.

These and other objects and advantages of the invention, as well as the details of an illustrative embodiment, will be more fully understood from the following description and drawings, in which:

DRAWING DESCRIPTION

FIG. 1 is a perspective showing of a wheel chair incorporating the invention;

FIG. 2 is an exploded perspective view of the FIG. 1 chair; and

FIG. 3 is a circuit diagram, and FIG. 3a is a directional control diagram.

DETAILED DESCRIPTION

The portable, collapsible chair 10 comprises a base

11 carrying wheel means such as rear wheels 12 and 13 and front wheels 14 and 15 swiveled on casters 16. The base supports a seat unit 17 in such a way as to enable rapid disassembly of the seat from the base, while affording yieldable spring support during assembly. For this purpose, tubular metallic shaft means includes like parallel shaft members 18 on the base and like parallel shaft members 19 on the seat unit. The members 18 and 19 have releasable telescopic interconnection as at terminals 18a and 19a characterized in that loading transmitted via the shafts 19 and 18 from the seat unit to the base frictionally interlocks the telescopic interconnections, preventing disconnection. This occurs due to the bending moment transmitted from shaft terminals 19a to shaft terminals 18a, these terminals being upright and offset at the front side of the seat unit, as is clear from FIG. 1. Each assembly of members 18 and 19 has sidewardly directed U-shape, as is clear from the drawing.

A pair of left and right arm rest elements 20 have quickly releasable connection to the seat unit, as seen in FIGS. 1 and 2. For this purpose, tubular means carried by the seat unit and the arm rest elements have releasable telescopic interconnection. For example, the tubular means may include lateral tubular members 21 carried by and at the underside of the seat unit, and longitudinally spaced, L-shaped, lateral tubular members 22 carried by the arm rest elements, the member terminals 21a and 22a having telescopic interfit along lateral and horizontal axes, as shown. Terminals 21a may be at opposite ends of members 21. Accordingly, loading applied downwardly on the arm rest elements frictionally interlocks the interfitting (push-fit) terminals due to bending moment development.

A back rest elements 25 has quickly releasable connection to the seat unit, as is also clear from FIG. 2. In this regard, additional tubular means carried by the seat unit and back rest element has releasable telescopic (push-fit) interconnection. The tubular means may include laterally spaced, L-shaped tubular members 26 carried by and at the underside of the seat unit to project upwardly at the rear thereof, and laterally spaced upright tubular members 27 carried by the back rest element. The member terminals 26a and 27a have telescopic interfit along upright axes, as shown. Therefore, these terminals are kept in interengagement by gravity forces.

A foot rest part 29 has rapidly releasable connection to the base 11, as is also clear from FIG. 2. For this purpose, further tubular means carried by part 29 and base 11 have releasable telescopic (push-fit) interconnection. The tubular means may include laterally spaced, S-shaped tubular members 30 carried by the foot rest part, and adapted to interfit with longitudinal members 31 extending beneath the base. The terminals of such members may have push-fit telescopic interconnection the same as referred to at 21a and 22a. Downward loading on the foot-rest creates a bending moment acting to frictionally retain the terminals in interfitted condition.

Accordingly, it is clear that the foot rest 29 and the seat unit 17 may be rapidly and easily demounted from the base; and, that the arm rests 20 and back rest element 25 may be likewise easily and quickly demounted from the seat unit so that the chair components may be stored in a small space, such as an automobile trunk compartment, for transportation, after which the ele-

ments may be quickly reassembled. Also, when assembled, these components are frictionally held together, by applied loading.

A further aspect of the invention concerns the provision of means for interconnecting a battery power unit 40 (mounted on base 11) and the wheels 12 and 13, together with a manually operable directional control, as at 41, connected with that means, to selectively control power transmission to those wheels to drive the chair in a selected direction corresponding to directional movement of the control. As shown, the referred to means includes a first reversible electrical motor 42 operatively connected (as by pulley and belt mechanism 43) to the left rear wheel 12, a second reversible electrical motor 44 operatively connected (as by pulley and belt mechanism similar to 43) to the right rear wheel 13; and, electrical circuitry responsive to directional control movement or manual actuation to selectively control electrical power delivery to the motors.

More specifically, the circuitry shown in FIG. 3 includes four switches including arms 46 - 49 and associated contacts 50 - 57 to control forward and reverse power delivery from lead 58 to the motors. When arm 46 is moved to engage contact 54, current flows to motor 42 (driving it forwardly), and then returns via arm 47, diode 59, and resistor 60 to the battery 40; and, when arm 47 is moved to engage contact 55, current flows to motor 42 (driving it reversely) and then returns via arm 46, diode 61, and resistor 60 to the battery. Likewise, closing of arm 48 against contact 56 effects forward drive of motor 44, with current return to the battery via arm 49 and diode 62; and, closing of arm 49 against contact 57 effects reverse drive of motor 44, with current return to the battery via arm 48 and diode 63.

Arms 46 - 49 may be spring urged to "up" position, as shown, and they may be arranged to be operated in pairs, as seen in FIG. 3a, and as set forth in the following table:

TABLE

Manual Control Movement	Switches Operated	Chair Maneuver
Forward	46, 48	Forward
Right	46, 49	Turn Right
Left	47, 48	Turn Left
Reverse	47, 49	Back Up

Finally, the resistance 60 serves to limit power application to the motors and therefore to the chair wheels, whereby the chair may initially achieve low speed. High or full speed is achieved automatically after a predetermined time delay. For this purpose, a relay 66 includes an arm 67 operated upon sufficient energization of coil 68 to close against contact 69 and establish a direct bypass connection around the resistance 60, whereby greater power is applied to the motors. Coil 68 is energized through power transistor 70 connected as shown, and after charging of capacitor 76, which establishes the time delay. Diodes 71 - 74 supply current from the motor inputs to the time delay circuitry.

Manual control 41 may be carried on a platform 75 associated with either arm rest, as shown, and may be of toggle or joy-stick design.

We claim:

1. In a collapsible wheel chair, the combination comprising

- a base unit including a platform carrying wheel means, and a first pair of shafts having terminals projecting upwardly from the forward extent of the base unit,
- a seat unit including a seat and a second pair of shafts projecting forwardly and rearwardly beneath the top of the seat and having forward terminals projecting downwardly for releasable telescopic interconnection with the terminals of the first pair of shafts, the second pair of shafts also having rearward terminals projecting upwardly rearwardly of the seat, the seat unit including additional shaft side terminals projecting sidewardly and in pairs at opposite sides of the unit and beneath the top level of the seat,
- a back rest unit including a third pair of shafts having terminals projecting downwardly for releasable telescopic interconnection with the upwardly projecting rearward terminals of the second pair of shafts, and
- a pair of arm rest units each including a fourth pair of shafts having terminals projecting sidewardly for releasable telescopic interconnection with a pair of said additional shaft side terminals projecting at a side of said seat unit,
- said seat unit being connected to said back rest unit, arm rest units and base unit solely via said terminal interconnections,
- whereby the seat unit may be completely and rapidly disconnected from the base unit, back rest unit and arm rest units, as during transportation of all of said units.

2. The combination of claim 1 wherein all of said shafts are tubular.

3. The combination of claim 1 including a foot rest unit, and further shaft means carried by the foot rest unit and said base unit and having releasable telescopic interconnection.

4. The combination of claim 1 including a battery power unit carried by the base, means for interconnecting said power unit and wheel means, and a manually operable directional control connected with said means to selectively control power transmission to the wheel means to drive the chair in a direction corresponding to directional movement of said control, said manually operated control carried by and generally forwardly of one of said removable arm rest units.

5. The combination of claim 4 wherein the means for interconnecting the power unit and wheel means includes a first reversible electrical motor operatively connected to a left rear wheel, a second reversible electrical motor operatively connected to a right rear wheel, and electrical circuitry responsive to said directional control to selectively control electrical power delivery to said motors.

6. The combination of claim 5 wherein said circuitry includes four switches to control forward and reverse power delivery to said motors in response to operation of said directional control.

7. The combination of claim 6 including resistance through which electrical current is delivered to said motors to limit power application to said wheel means, and a relay including another switch operable to bypass said resistance to permit increased power delivery to said wheel means only after a predetermined time elapse following closure of one of said four switches.

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