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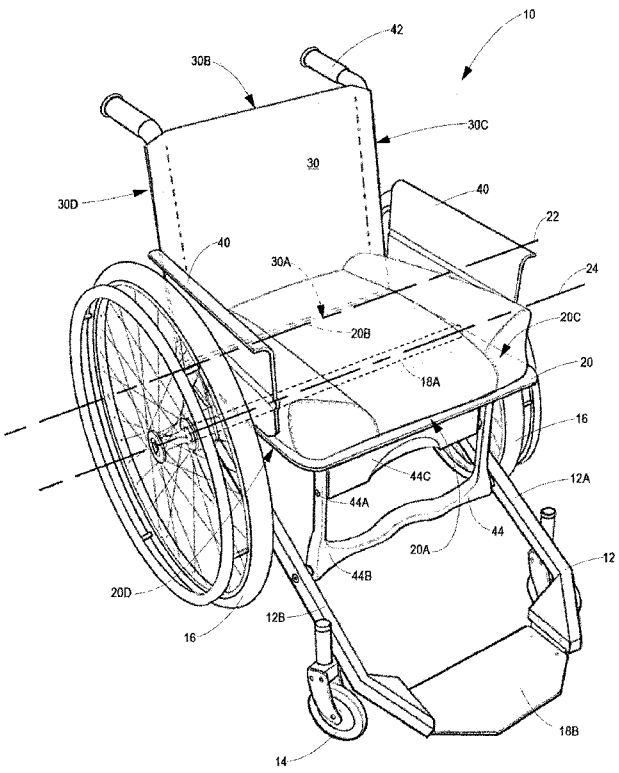
(54) Title: WHEEL CHAIR



(57) Abstract: This invention relates to a wheel chair. More specifically, the invention relates to a wheel chair being collapsible in a substantially top-down or vertical direction into a compact form. The wheel chair includes a frame supported on operatively front and rear wheels, a seat and backrest. The wheel chair seat and the backrest are rotatably mounted on the frame about a common axis of rotation enabling the seat and backrest to vertically collapse over one another and/or the frame into a compact form. The seat further comprising hinged seat side members for providing lateral support to a user, the hinged seat side members being collapsible between the seat and the backrest on collapsing the wheel chair.

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WHEEL CHAIR

BACKGROUND OF THE INVENTION

THIS invention relates to a wheel chair. More specifically, the invention relates to a wheel chair being collapsible in a substantially top-down or vertical direction into a compact form.

Many different variations of collapsible wheel chairs are known. Although collapsible, many of these wheel chairs do not collapse into a compact enough form to be easily stored in the trunk of a normal vehicle.

Accordingly, it is an object of the present invention to provide a vertically collapsible wheel chair collapsible into a compact form that is light and easy to store in the trunk of a vehicle.

SUMMARY OF THE INVENTION

According to the invention there is provided a wheel chair including:

a frame having a first end and an opposite second end;

at least one operatively front wheel mountable at or near the first end of the frame;

a pair of operatively rear wheels, each rear wheel being rotatably mountable at or near the second end of the frame;

a seat having a first end, a second end and opposing sides, the seat being rotatably movable with respect to the frame between an extended position, wherein at least the first end of the seat is spaced from the frame, and a collapsed position, wherein the first end of the seat lies adjacent the frame, the seat being rotatably movable with respect to the frame about a first axis of rotation;

a backrest having a first end, a second end and opposing sides, the backrest being rotatably movable with respect to the seat and/or the frame between an extended position, wherein at least the first end of the backrest is spaced from the seat and/or the frame, and a collapsed position, wherein the first end of the backrest lies adjacent the seat and/or the frame, wherein the backrest is rotatably movable with respect to the seat and/or the frame about the first axis of rotation.

Typically, the frame comprises frame side members spaced apart from one another by one or more cross members extended therebetween. Generally, the cross members are first and second cross members extending between the frame side members at or near the first and/or second ends of the frame respectively.

Preferably, the first cross member is a footrest member. More preferably, the second cross member is coaxial with a second axis of rotation about which the operatively rear

wheels are rotatable with respect to the frame. More preferably, the second cross member is an axel upon which the operatively rear wheels are rotatably mountable. The first and second axes of rotation may be spaced apart from one another or alternatively coaxial.

In one alternative embodiment, the side frame members may each have mounting plates across and between which the axes of rotation pass. The spacing between the first and second axes of rotation may be adjustable thereby to adjust the centre of gravity of the wheel chair.

Furthermore, the spacing of the first and/or second axes of rotation with respect to the footrest member may be adjustable thereby enabling the wheel chair to be customised to accommodate users of differing heights. In a particularly preferred embodiment, the spacing between the side frame members of the frame is adjustable thereby enabling the wheel chair to be customised to accommodate users of differing widths. The spacing between the side frame members may be adjustable with replaceable cross members of differing lengths, and/or with one of more spacers being co-operative with the cross members and/or the side frame members.

Typically, the at least one operatively front wheel is two castors, fixed or removably mounted to the side frame members.

Generally, the at least one operatively front wheel is two castors, each fixed or removably mounted to the frame. Preferably, the operatively rear wheels, being the wheels that are hand driveable by the user, are fixed or removably mounted to the frame, the frame being substantially planar and in use, with the operatively front and rear wheel mounted on the frame, slanted upwardly between the front wheels and rear wheels.

The seat and the backrest in the collapsed position may lie substantially parallel with the frame enabling, with at least the rear wheel removed from the frame, the wheel chair to be compactly collapsed into a shallow depth. Preferably, the seat and the backrest in the collapsed position lie substantially within and/or coplanar with the frame. More preferably, the dimensions of length, width and depth of the wheel chair in

the fully collapsed position are no more than 800 millimetres, 500 millimetres and 250 millimetres respectively. Most preferably, the dimensions of length, width and depth of the wheel chair in the fully collapsed position are about 725 millimetres, 425 millimetres and 190 millimetres respectively.

The wheel chair preferably includes seat side members each being hingedly mounted to one of the opposing sides of the seat, the seat side members being movable with respect to the seat between an erected position, wherein the seat side members are spaced from the seat, and a collapsed position, wherein the seat side members lie adjacent and over the seat.

Generally, the seat side members in the erected position abut the backrest and releasably lock the backrest in its erected position relative to the seat. The seat side members in the erected position may further act as lateral support to the user and as protection to the user against contact with the operatively rear wheels.

Typically, handles in an erected position extend operatively rearwardly from the backrest, the handles being hingedly mounted on the backrest and movable between the erected position and a collapsed position, wherein the handles in the collapsed position lie adjacent the backrest.

Preferably, the wheel chair includes means for releasably locking any one or more of the seat, the backrest, the seat side members and/or handles in the erected position. The releasable locking means is typically a strut, engageable with the frame and the seat at opposing first and second ends respectively to releasably lock the seat in the erected position.

In one preferred embodiment of the invention, the strut is hingedly connected to the frame at the first end, hingedly connected to the seat at the second end and collapsible upon itself about a joint intermediate the first and second ends thereby dividing the strut into two jointed strut members. Generally, the strut members are retainable in a substantially aligned erected position by a pin movable between an extended position, wherein the pin extends from one of the strut members into engagement with the other

of the strut members, and a retracted position, wherein the pin is retracted from engagement with the other of the strut members.

Preferably, the retractable pin is receivable with in a correspondingly sized pin receiving aperture in the other of the strut members. More preferably, the retractable pin is biased toward the extended position and retractable toward the retracted position by pulling on a pull chord.

The wheel chair may include a park brake acting on at least one of the rear wheels. Typically, the park brake is a cable operable park brake. Generally, a lever for operating the park brake is movable between "in use" and "not in use" positions, the lever in the "not in use" position being out of the way of the user.

For user comfort, the wheel chair preferably includes a removable cushion for the seat. Furthermore, the backrest may be a fabric backrest stretched between backrest side posts extending between the first and second ends of the backrest.

The wheel chair is typically collapsible between the erected and collapsed position in an operatively top to bottom direction. In other words, the wheel chair is collapsible substantially vertically.

The wheel chair is typically manufactured from lightweight materials, weighing in total 15 kilograms or less. Preferably, the wheel chair weighs between 5 and 12 kilograms.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings in which:

Figure 1 shows a perspective view of a wheel chair in accordance with the present invention in an extended "in use" position;

Figure 2 shows a perspective view of the wheel chair of figure 1 in a partially collapsed position;

Figure 3 shows a perspective view of the wheel chair of figure 1 in a fully collapsed position;

Figure 4 shows a schematic side view of the wheel chair of figure 1 in the extended "in use" position;

Figure 5 shows a schematic side view of the wheel chair of figure 1 being moved from the extended position toward the collapsed position;

Figure 6 shows a schematic side view of the wheel chair of figure 1 in the partially collapsed position; and

Figure 7 shows a schematic side view of the wheel chair of figure 1 in the fully collapsed position.

DETAILED DESCRIPTION OF THE DRAWINGS

A wheel chair according to a preferred embodiment of the invention is designated generally with the reference numeral 10 in figures 1, 2 and 3. The wheel chair 10 includes a substantially planar frame 12 supported on operatively front wheels 14 and operatively rear wheels 16 such that the frame 12 in use is slanted upwardly between the front wheels 14 and rear wheels 16. In the preferred illustrated embodiment, the front wheels 14 are castors while the rear wheels are hand propelled wheels.

The frame 12 is formed from side frame members 12A,12B held in spaced relation with respect to one another by one or more cross members 18A,18B. As illustrated, the cross members may be an axle 18A on which the rear wheels 16 are rotatably mountable and a footrest 18B on which a user (not shown) of the wheel chair 10 may support his/her legs. It will be appreciated that the side frame members 12A,12B held in spaced relation by cross member other than those illustrated, for example where

there is no axle 18A and the read wheels 16 are rotatably mounted on independent stub axles extending outwardly from each of the side frame members 12A,12B.

A seat 20 having a first end 20A, a second end 20B and opposing sides 20C,20D is rotatably mounted on the frame 12 about a first axis of rotation 22. It will be appreciated that the seat 20 is rotatably movable with respect to the frame 12 and about the first axis of rotation 22 between an erected position and a collapsed position.

A backrest 30 having a first end 30A, a second end 30B and opposing sides 30C,30D is rotatably mounted on the frame 12 about the same first axis of rotation 22. It is this feature that enables the wheel chair 10 to be collapsed into such a compact form in a substantially operatively top-down or vertical direction. It will be appreciated that the backrest 30 is rotatably movable with respect to the seat 20 and/or the frame 12 about the first axis of rotation 22 between the erected position and the collapsed position.

In the fully erected position, as illustrated in figures 1 and 4, the first end of the seat 20A is spaced from the frame 12 while the first end 30A of the backrest 30 is spaced from both the seat 20 and the frame 12. In the fully collapsed position, as illustrated in figures 3 and 7, the first end of the seat 20A lies adjacent the frame 12 with the backrest 30 lying adjacent and over the seat 30 and frame 12. It will be appreciated that in the collapsed position, the frame 12, seat 20 and backrest 30 lie substantially parallel and adjacent one another. It will be appreciated further that the seat 20 and backrest 30 may lie within the frame 12 and substantially coplanar therewith.

In the preferred embodiment of the invention illustrated in the accompanying figures, the first axis of rotation 22 is spaced relative to a second axis of rotation 24, being the longitudinal axis of the axle 18A. It will be appreciated that in an alternative embodiment, the first and second axes 22,24 may be coaxial and that the rear wheels 16, seat 20 and backrest 30 are all rotatatably movable about one and the same common axis.

Mounting plates 26A,26B, integral with or securable to the side frame members 12A,12B, support the axle 18A and the member (not shown) about which the seat 20 and the backrest 30 are rotatable about and through which the first axis of rotation 22

passes. The mounting plates 26A,26B define a plurality of apertures therein enabling the dimensions of the wheel chair 10 to be adjusted.

Movement of the first axis of rotation 22 relative to the second axis of rotation 24 enable adjustment of the centre of gravity of the wheel chair 10. Movement of the mounting plates 26A,26B, and as a result both axes of rotation 22,24, relative to the side frame member 12A,12B and nearer and/or farther away from the footrest cross member 18B enables the wheel chair 10 to be customised to accommodate users of differing heights.

The wheel chair 10 may also enable lateral adjustment enabling customisation for users of differing widths. It will be appreciated that lateral adjustment between the frame member 12A,12B may be accommodated by making the cross members 18A,18B interchangeable with similar cross members of differing lengths. Alternatively, spacers, positioned between the cross members and respective side frame members might be used to provide the require lateral adjustment.

Seat side members 40 are hingedly mounted to each of the opposing sides 20C,20D of the seat 20 and movable with respect to the seat 20 between an erected position, wherein the seat side members 40 are spaced from the seat 20 extending operatively upwardly therefrom, and a collapsed position, wherein the seat side members 40 lie adjacent and over the seat 20.

In the erected position, the seat side members 40 abut the backrest 30 thereby preventing the backrest 30 from moving into the collapsed position without first collapsing the seat side members 40. Furthermore, the seat side members provide lateral support to the user and guard the user's torso from coming into contact with the rear wheels 16.

Although the user may propel himself/herself in the wheel chair 10, handles 42 are provided for another person to push the wheel chair 10. The handles 42 are mounted on the backrest 30 and are to movable between the erected and collapsed positions. In the erected position, the handles 42 extend operatively rearwardly from the backrest

30, while in the collapsed position, the handles are hinged to lie adjacent and over the backrest 30.

Figures 5 and 6 illustrate how the wheel chair 10 moves between the erected and collapsed positions. A releasable locking means, in the form of a collapsible strut 44, has a first end hingedly connect to the frame 12 and a second end hingedly connected to the seat 20. The strut 44 comprises a joint 44A dividing the strut into strut members 44B,44C. Although a releasable locking means is illustrated only between the frame 12 and the seat 20 in the accompanying figures, it will be appreciated that the wheel chair 10 may comprise other locking means for example, to releasably lock the backrest 30, the seat side members 40 and/or the handles 42 in the erected position.

Strut member 44B comprises a portion extending beyond the joint 44A in which a pin receiving aperture 46 is defined. The other strut member 44C houses a locking pin (not shown) movable between an extended position, wherein the locking pin extends outwardly from the strut member 44C to pass through the aperture 46 thereby locking the strut 44 in an aligned erected position, and a retracted position, wherein the pin is retracted from the aperture 46 enabling the strut to collapsed as illustrated. In a particularly preferred embodiment, the pin is spring loaded (not shown) and biased towards the extended position and retractable against the bias of the spring by a pull chord (not shown) operable by the user or any other person.

Although the invention has been described above with reference to preferred embodiments and examples, it will be appreciated that many modifications or variations of the invention are possible without departing from the spirit or scope of the invention.

For example, the wheel chair 10 may comprise a park brake, preferably cable operated and preferably having a lever movable between "in use" and "not in use" positions. For increased user comfort, the wheel chair 10 may include a removable seat cushion and the the backrest may be a fabric backrest stretched between backrest side posts extending between the first and second ends of the backrest.

CLAIMS

1. A wheel chair including:

a frame having a first end and an opposite second end;

at least one operatively front wheel mountable at or near the first end of the frame;

a pair of operatively rear wheels, each rear wheel being rotatably mountable at or near the second end of the frame;

a seat having a first end, a second end and opposing sides, the seat being rotatably movable with respect to the frame between an extended position, wherein at least the first end of the seat is spaced from the frame, and a collapsed position, wherein the first end of the seat lies adjacent the frame, the seat being rotatably movable with respect to the frame about a first axis of rotation;

a backrest having a first end, a second end and opposing sides, the backrest being rotatably movable with respect to the seat and/or the frame between an extended position, wherein at least the first end of the backrest is spaced from the seat and/or the frame, and a collapsed position, wherein the first end of the backrest lies adjacent the seat and/or the frame, wherein the backrest is rotatably movable with respect to the seat and/or the frame about the first axis of rotation.

2. A wheel chair according to claim 1, wherein the frame comprises frame side members spaced apart from one another by one or more cross members extended therebetween.

3. A wheel chair according to claim 2, wherein the cross members are first and second cross members extending between the frame side members at or near the first and/or second ends of the frame respectively.

4. A wheel chair according to claim 3, wherein the first cross member is a footrest member.

5. A wheel chair according to claim 3 or claim 4, wherein the second cross member is coaxial with a second axis of rotation about which the operatively rear wheels are rotatable with respect to the frame.

6. A wheel chair according to claim 5, wherein the second cross member is an axel upon which the operatively rear wheels are rotatably mountable.

7. A wheel chair according to claim 6, wherein the first and second axes of rotation are spaced apart from one another or coaxial.

8. A wheel chair according to claim 7, wherein the spacing between the first and second axes of rotation is adjustable thereby to adjust the centre of gravity of the wheel chair.

9. A wheel chair according to claim 7 or claim 8, wherein the spacing of the first and/or second axes of rotation with respect to the footrest member is adjustable thereby enabling the wheel chair to be customised to accommodate users of differing heights.

10. A wheel chair according to claim 9, wherein the spacing between the side frame members of the frame is adjustable thereby enabling the wheel chair to be customised to accommodate users of differing widths.

11. A wheel chair according to claim 10, wherein the spacing between the side frame members is adjustable with replaceable cross members of differing lengths, and/or with one of more spacers being co-operative with the cross members and/or the side frame members.

12. A wheel chair according to claim 11, wherein the at least one operatively front wheel is two castors, fixed or removably mounted to the side frame members.

13. A wheel chair according to claim 12, wherein the operatively rear wheels are fixed or removably mounted to the frame, the frame being substantially planar and in use, with the operatively front and rear wheel mounted on the frame, slanted upwardly between the front wheels and rear wheels.

14. A wheel chair according to claim 13, wherein the seat and the backrest in the collapsed position lie substantially parallel with the frame enabling, with at least the rear wheel removed from the frame, the wheel chair to be compactly collapsed into a shallow depth.

15. A wheel chair according to claim 14, wherein the seat and the backrest in the collapsed position lie substantially within and/or coplanar with the frame.

16. A wheel chair according to claim 15, including seat side members each being hingedly mounted to one of the opposing sides of the seat, the seat side members being movable with respect to the seat between an erected position, wherein the seat side members are spaced from the seat, and a collapsed position, wherein the seat side members lie adjacent and over the seat.

17. A wheel chair according to claim 16, wherein the seat side members in the erected position abut the backrest and releasably lock the backrest in its erected position relative to the seat, the seat side members in the erected position further act as lateral support to the user and as protection to the user against contact with the operatively rear wheels.

18. A wheel chair according to claim 17, wherein handles in an erected position extend operatively rearwardly from the backrest, the handles being hingedly mounted on the backrest and movable between the erected position and a collapsed position, wherein the handles lie adjacent the backrest.

19. A wheel chair according to claim 18, including means for releasably locking any one or more of the seat, the backrest, the seat side members and/or handles in the erected position.

20. A wheel chair according to claim 19, wherein the releasable locking means is a strut, engageable with the frame and the seat at opposing first and second ends respectively to releasably lock the seat in the erected position.

21. A wheel chair according to claim 20, wherein the strut is hingedly connected to the frame at the first end, hingedly connected to the seat at the second end and collapsible upon itself about a joint intermediate the first and second ends thereby dividing the strut into two jointed strut members, the strut members being retainable in a substantially aligned erected position by a pin movable between an extended position, wherein the pin extends from one of the strut members into engagement with the other of the strut members, and a retracted position, wherein the pin is retracted from engagement with the other of the strut members.

22. A wheel chair according to claim 21, wherein the retractable pin is receivable with in a correspondingly sized pin receiving aperture in the other of the strut members.

23. A wheel chair according to claim 22, wherein the retractable pin is biased toward the extended position and retractable toward the retracted position by pulling on a pull chord.

24. A wheel chair according to claim 23, wherein the wheel chair includes a park brake acting on at least one of the rear wheels.

25. A wheel chair according to claim 24, wherein the park brake is a cable operable park brake.

26. A wheel chair according to claim 25, wherein a lever for operating the park brake is movable between "in use" and "not in use" positions, the lever in the "not in use" position being out of the way of the user.

27. A wheel chair according to claim 26, including a removable cushion for the seat.

28. A wheel chair according to claim 27, wherein the backrest is a fabric backrest stretched between backrest side posts extending between the first and second ends of the backrest.

29. A wheel chair according to claim 28, wherein the wheel chair is collapsible between the erected and collapsed position in an operatively top to bottom direction.

30. A wheel chair according to claim 29, wherein the wheel chair is collapsible substantially vertically.

31. A wheel chair according to claim 30, wherein the wheel chair is lightweight weighing 15 kilograms or less.

32. A wheel chair according to claim 31, wherein the wheel chair weighs between 5 and 12 kilograms.

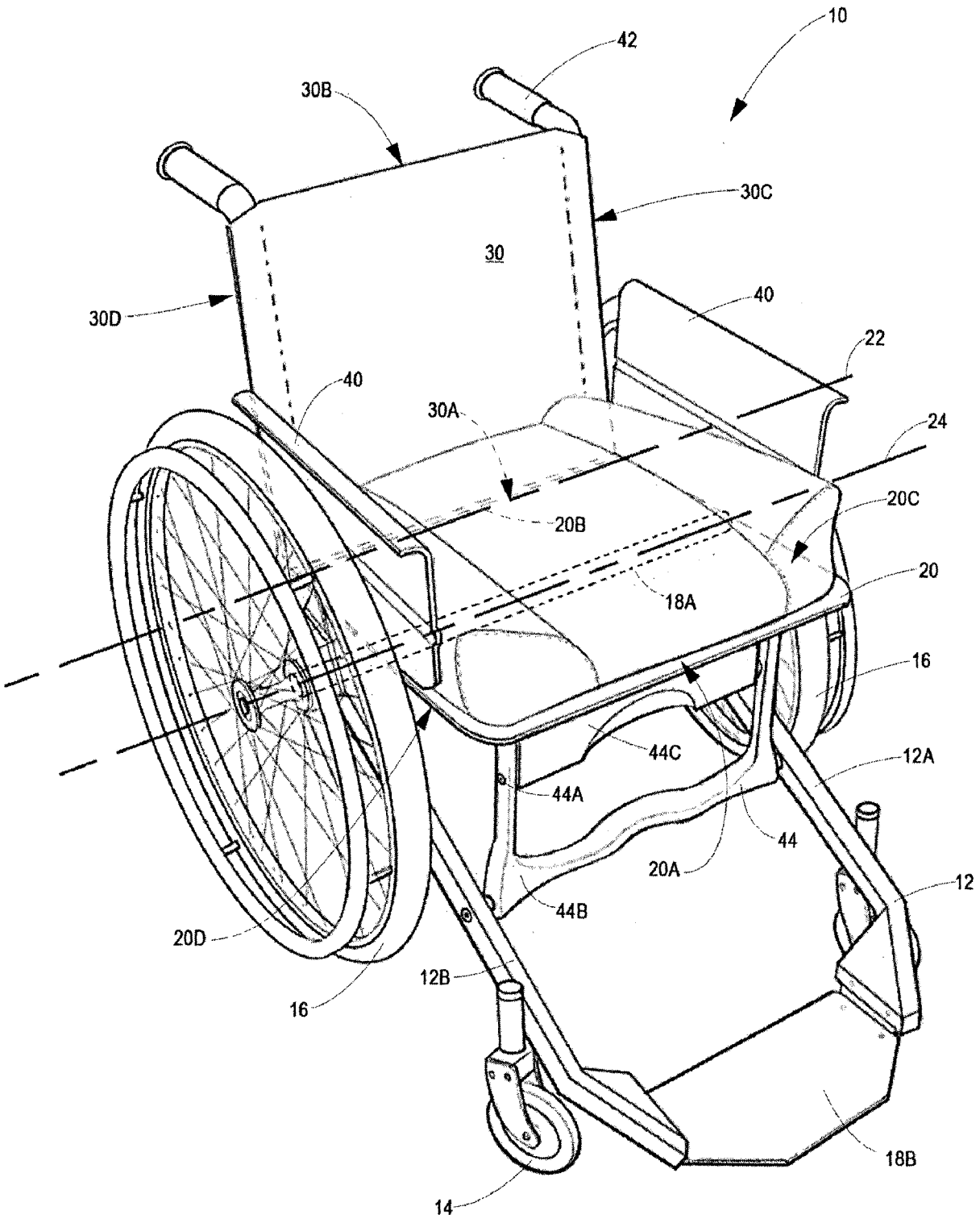
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Figure 1

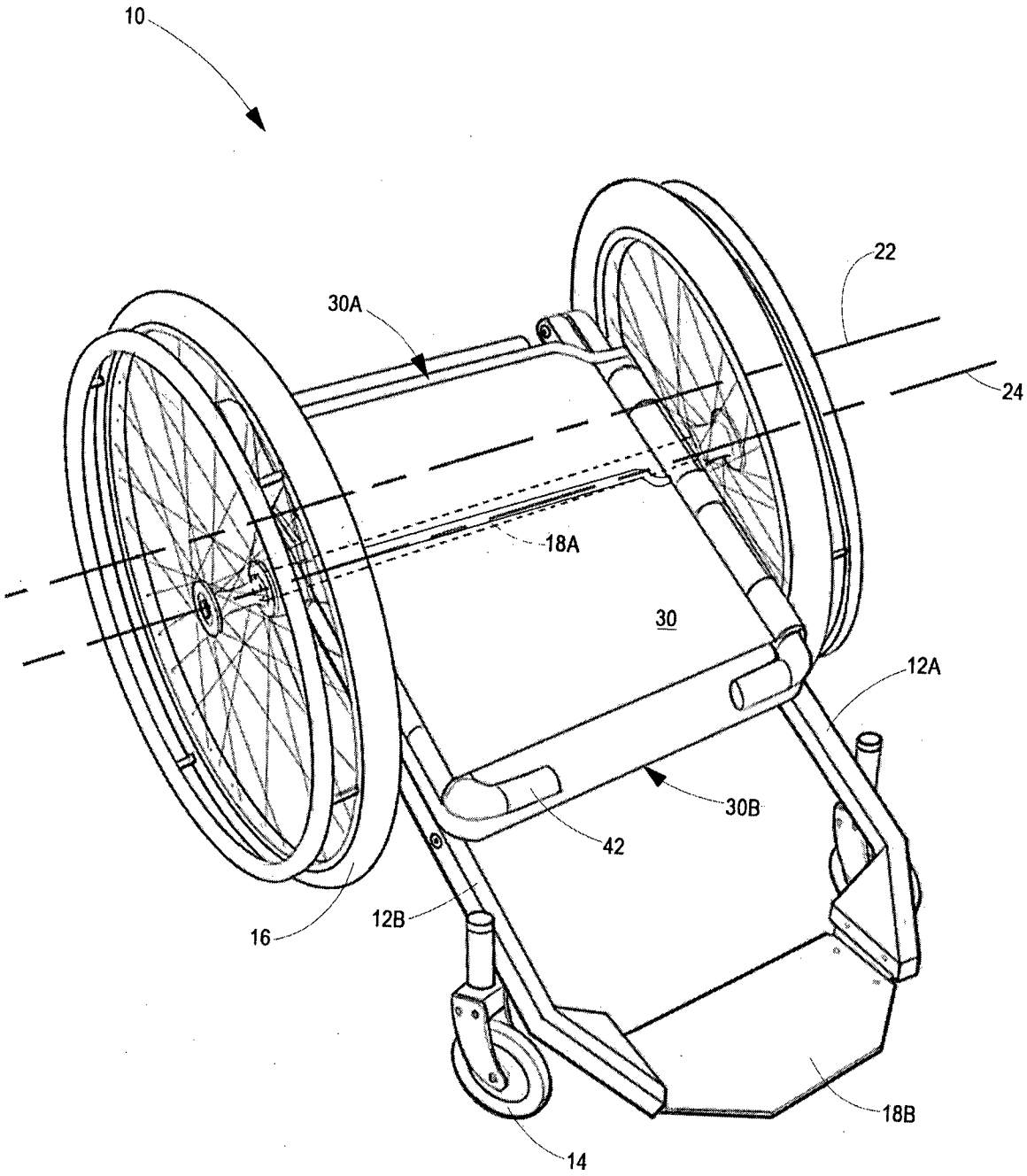

Figure 2

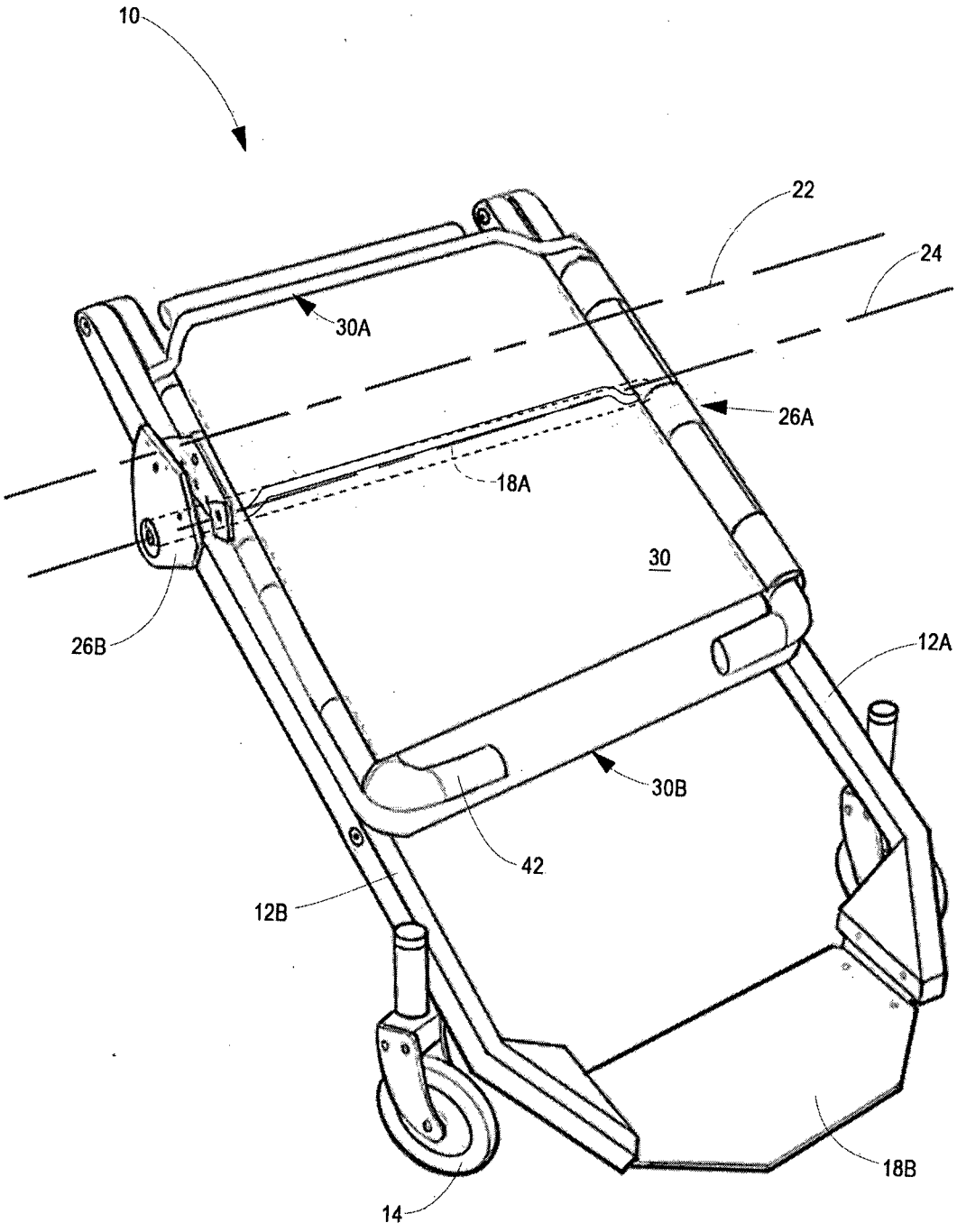

Figure 3

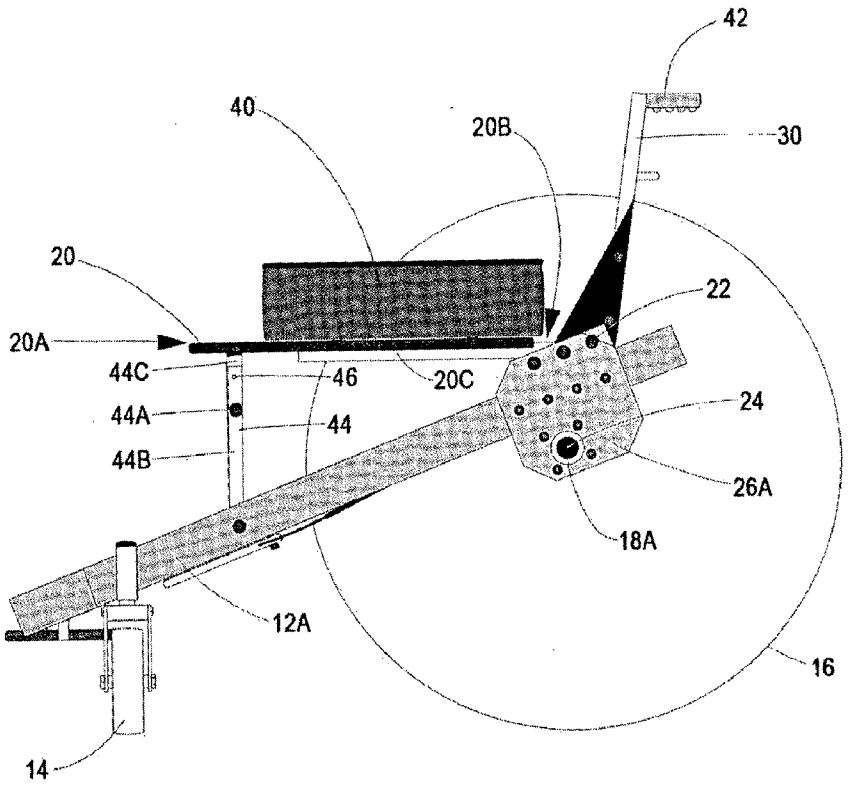

Figure 4

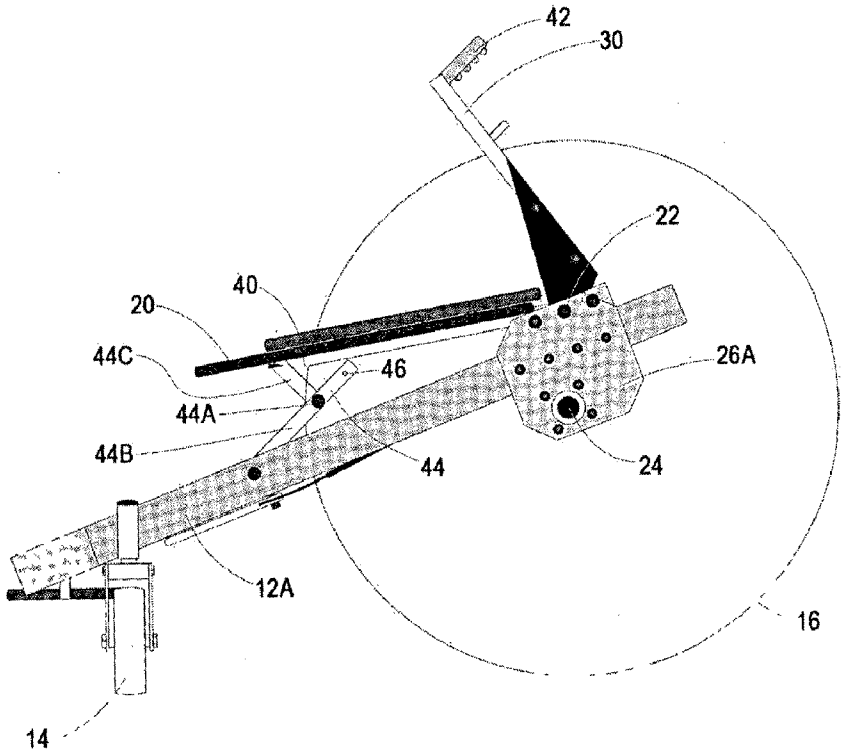

Figure 5

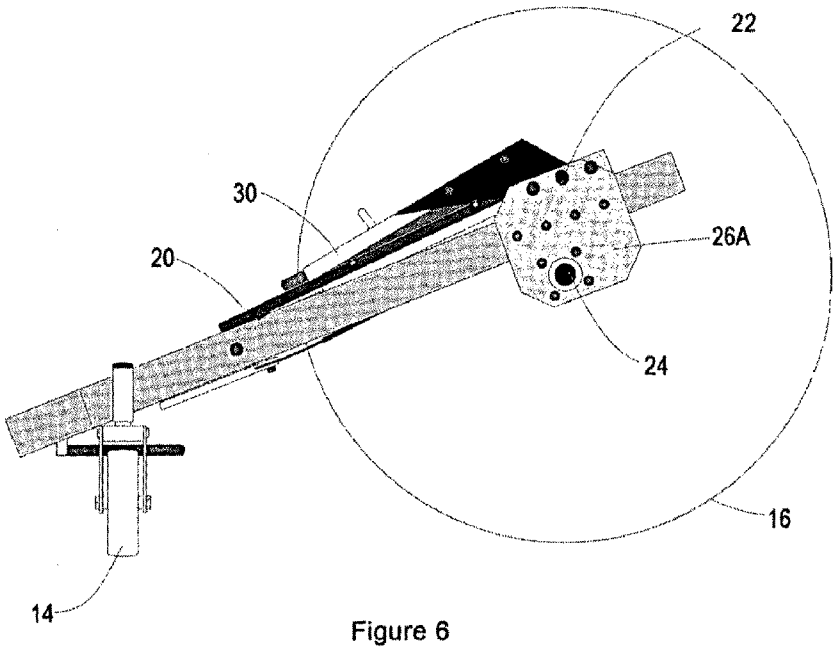

Figure 6

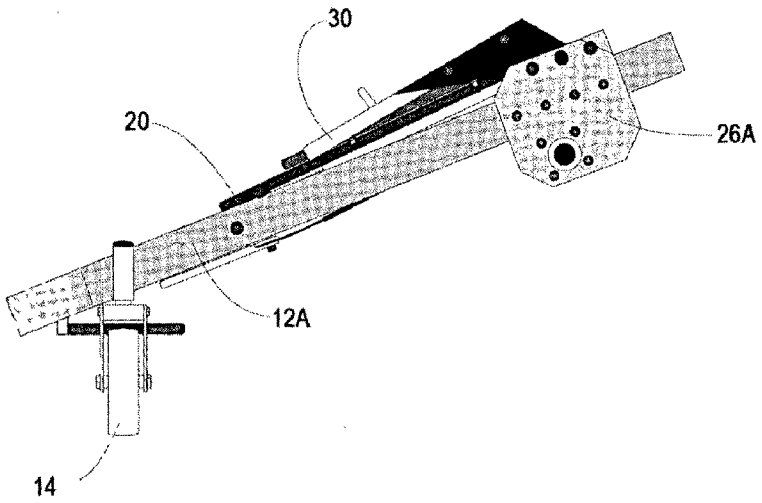

Figure 7