United States Patent [19]

Karchak, Jr. et al.

[11] **3,905,436**

[45] **Sept. 16, 1975**

[54] **ADJUSTABLE WHEELCHAIR**

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[73] Assignee: **Wheelchairs, Inc.,** Paramount, Calif.

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[52] **U.S. Cl.**..... **180/6.5;** 180/DIG. 3; 296/65 R; 297/71; 297/330; 297/DIG. 4

[51] **Int. Cl.**[2].. **A61G 5/04;** B60N 1/08; B62D 11/04

[58] **Field of Search**..... 180/6.5, DIG. 3; 296/65 R; 297/71, 330, DIG. 4

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Assistant Examiner—John A. Pekar
Attorney, Agent, or Firm—William W. Haefliger

[57] **ABSTRACT**

An adjustable wheelchair includes

a. a carriage including support wheels,

b. a seat and a support frame therefor,

c. a motor driven elevator and guides for supporting the seat and frame for movement relative to the carriage while maintaining the frame and seat firmly connected with the carriage, and

d. the frame includes a portion proximate the seat configured for retention by chair retaining structure integral with a motor vehicle body in response to seat and frame movement relative to the carriage.

7 Claims, 7 Drawing Figures

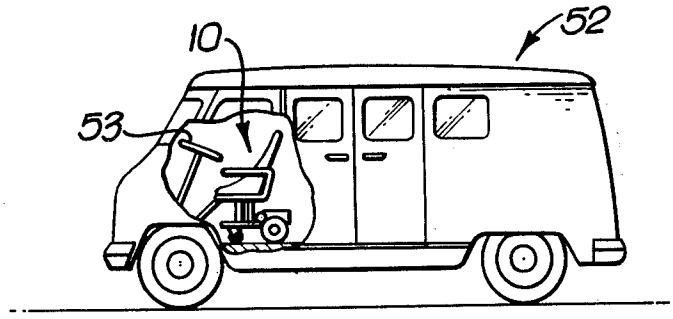


FIG. 1.

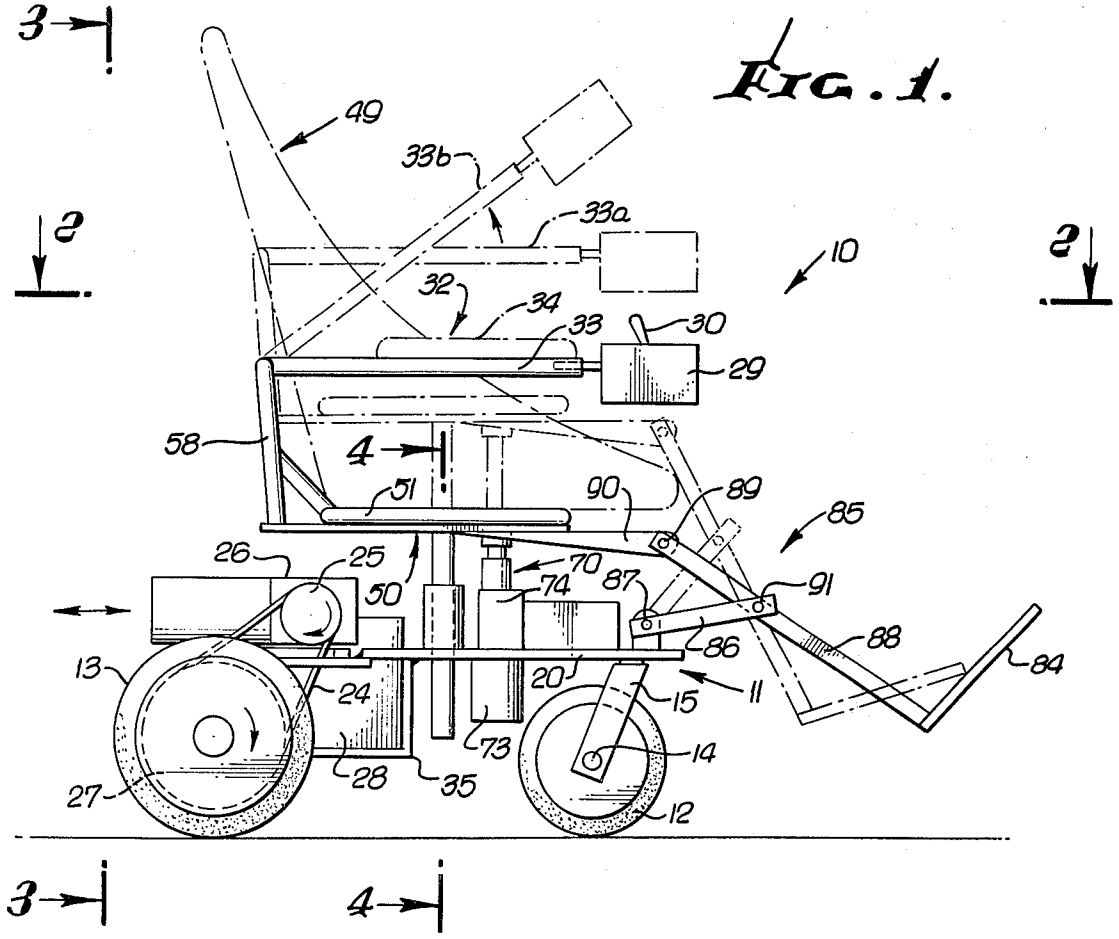

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FIG. 2.

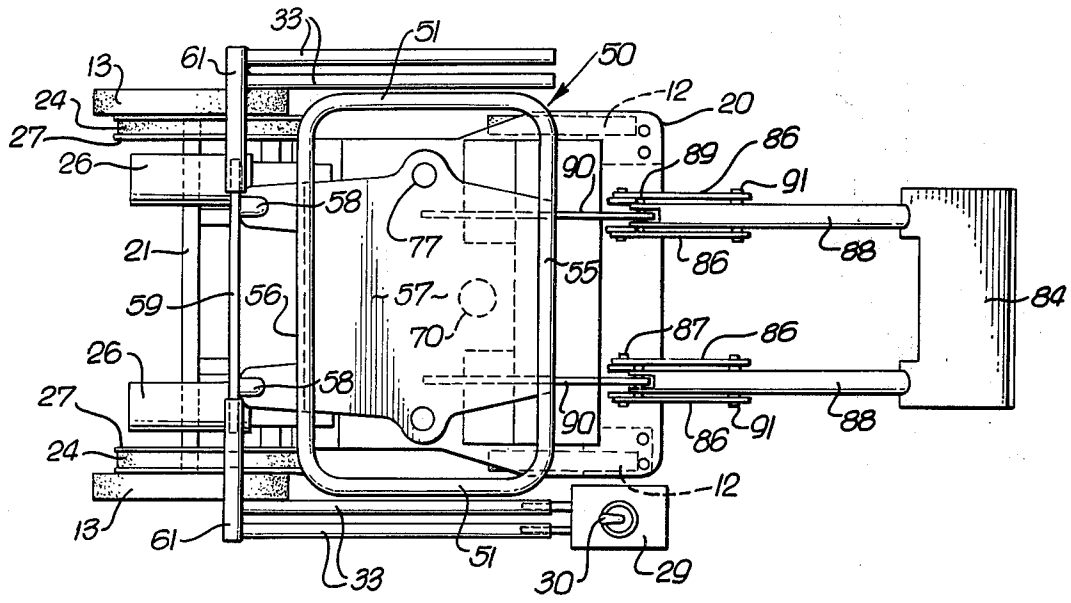

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FIG. 3.

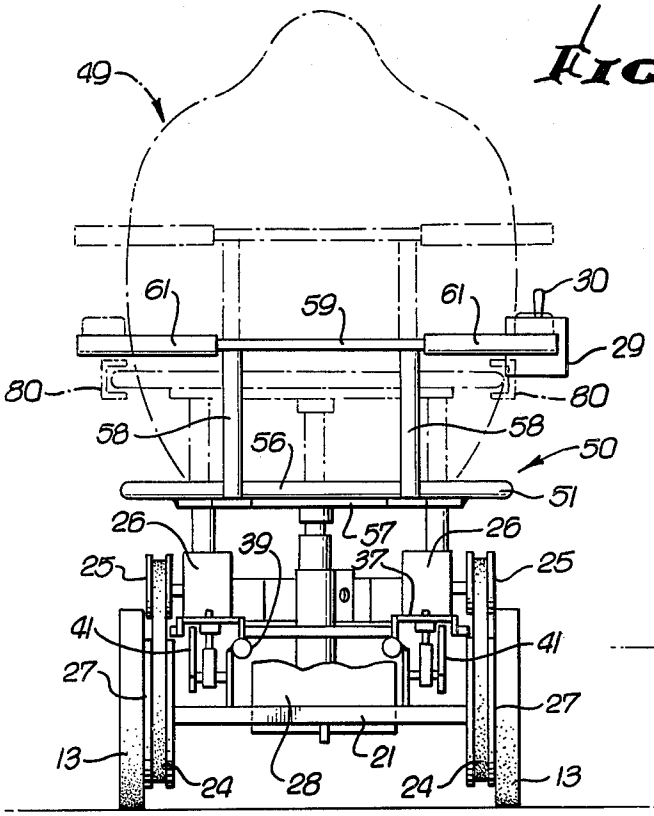


FIG. 7.

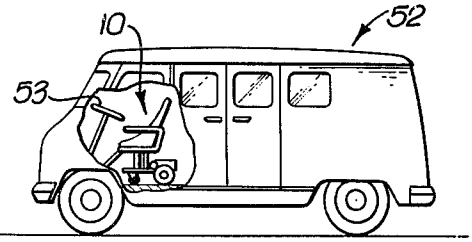
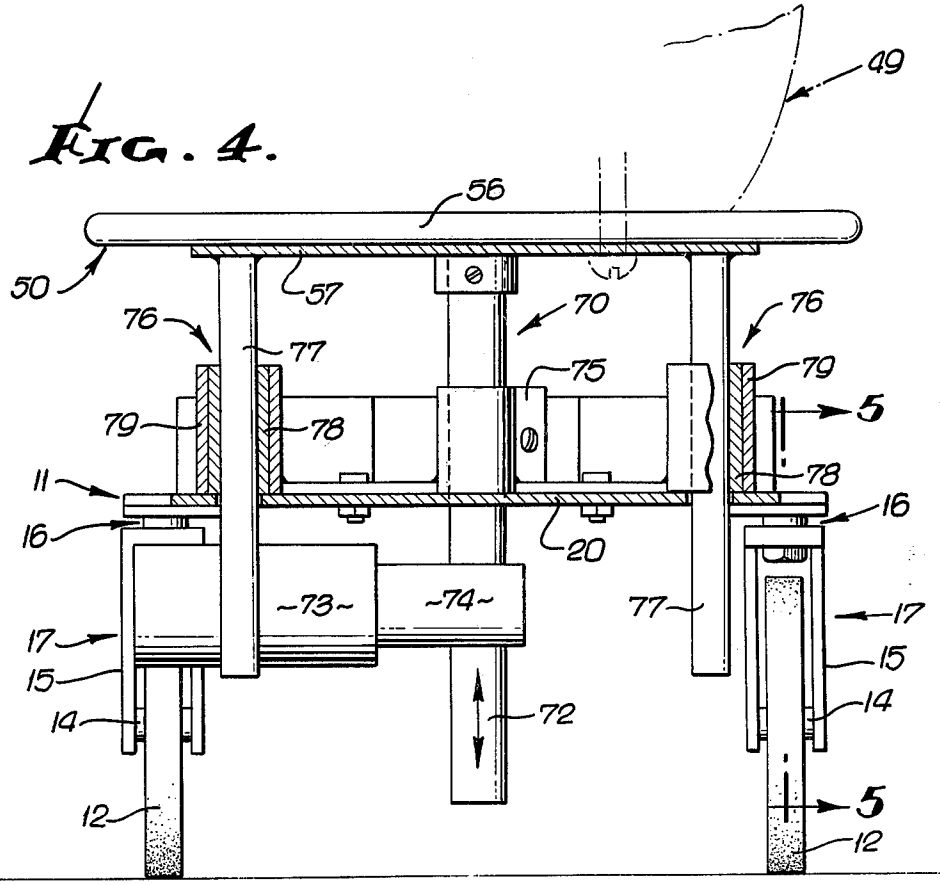


FIG. 4.



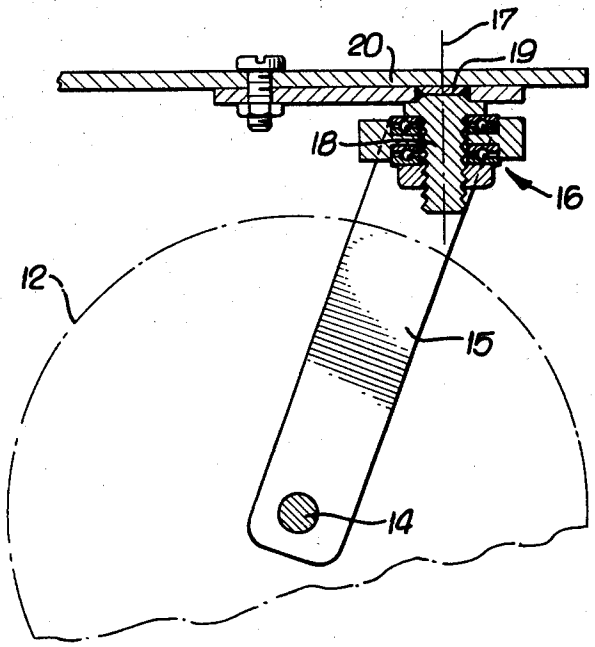
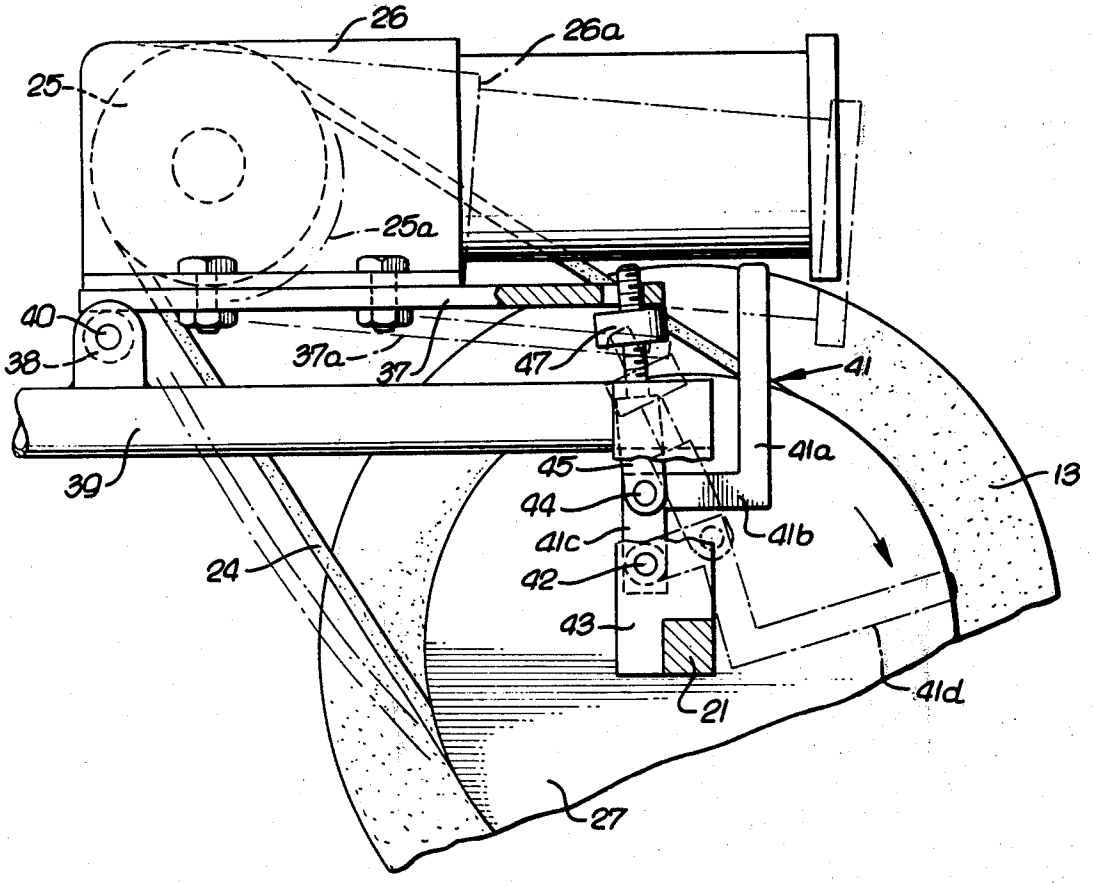

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FIG. 5.

FIG. 6.


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ADJUSTABLE WHEELCHAIR

BACKGROUND OF THE INVENTION

This invention relates generally to wheelchairs, and more particularly concerns adaptations of wheelchairs to motor vehicles, as well as improvements in the adjustment of wheelchair seats and the drive of such chairs.

Persons who are confined to wheelchairs may desire to operate motor vehicles such as vans; however the lifting of such persons into and out of driver's seats in such vehicles is a time consuming task and requires the aid of other people. According a need exists to provide a better and more convenient solution to this problem, and which will enable wheelchair occupants to drive and operate motor vehicles.

SUMMARY OF THE INVENTION

It is a major object of the invention to provide a solution to the above problem, and which will enable wheelchair occupants to safely operate motor vehicles while remaining in such chairs. Basically, the invention is embodied in an adjustable wheelchair wherein the seat and support frame therefor are supported for movement relative to a wheeled carriage, as for example up and down relative to the carriage. As will be seen, a portion of the frame such as rails proximate the seat is configured for retention by chair retaining structure, as for example channels, integral with the motor vehicle, and typically up and down movement of the seat and frame adjusts the frame rails to channel height for reception and retention thereby.

Another object of the invention concerns the provision of a motorized drive optionally connected with the chair wheels in such a manner as to allow motor driving as well as optional manual pushing of the chair, the drive also serving when denergized to brake the chair against forward and rearward travel. As a result, when the chair is located in a driver or other position in a vehicle, it may be locked in that position.

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 side elevation of a wheelchair embodying the invention;

FIG. 2 is a plan view taken on lines 2—2 of FIG. 1;

FIG. 3 is a rear elevation on lines 3—3 of FIG. 1;

FIG. 4 is an enlarged fragmentary section on lines 4—4 of FIG. 1;

FIG. 5 is an enlarged sectional elevation on lines 5—5 of FIG. 4;

FIG. 6 is an enlarged fragmentary elevation showing details or rear wheel drive; and

FIG. 7 is a schematic showing of a van, broken away to show the wheelchair of FIG. 1 mounted in driver's position in the van.

DETAILED DESCRIPTION

The adjustable wheelchair **10** seen in the drawings includes a carriage **11** having front support wheels **12** and rear support wheels **13.** Referring to FIG. **5,** the front wheels may be supported as by axles **14,** yokes **15** and bearing assemblies **16** to freely pivot about vertical axes **17;** the assemblies **16** include shafts **18** connected at **19** with a carriage frame or base plate **20,** as shown.

As seen in FIGS. **1–3** and **6,** the rear wheels **13** may be supported and driven so as to enable manually controllable activation and deactivative of motor drives, which also control steering, whereby the chair may be driven in drive activated mode, and may alternatively be advanced as by pushing in motor deactivated mode. To this end, the motorized drive means connected with the wheels **13** may include two endless flexible drive elements, such as V-belts **24,** each operatively connected with a rotor or sheave **25** driven by an electric motor **26** and with a rotor or sheave **27** connected with a wheel **13.** A battery **28** selectively supplies current to the motors under the operator's control via a control box **29** carrying a directional control toggle lever **30.** Operation of the control may be as described in U.S. Pat. No. **3,749,192** to Karchak. Box **29** may be carried on arm rest unit **32** including frame member **33** and cushion **34.** Battery **28** is carried by the frame structure **35** supported by base plate **20.**

Further, means is provided to adjustably pivotally support the motors to control the tension in the flexible drive elements or belts **24,** thereby to activate the transmission of drive to the rear wheels for motor driven mode, and to relieve tension in the belts when it is desired to "free-wheel" the wheelchair, as during manual pushing or pulling mode. As seen in FIG. **6,** such means may include a mount in the form of a plate **37** (for example) for the two motors, the plate pivotally supported at **38** to tubular frame parts **39** so as to pivot about transverse axis **40.** Accordingly, when the plate is pivoted downwardly to broken line position **37***a*, for example, the motors move to positions **26***a* relatively closer to the wheels **13,** so that slack is produced in the belts **24,** disabling transmission of drive to the wheels **13.** A lever or levers **41** controls such pivoting, and includes legs **41***a*, 41*b* and **41***c*, the latter pivoted at **42** to the strut **43** which connects axle **21** to the frame **39,** and leg **41***a* serving as a handle. Leg **41***b* pivotally supports, at **44,** a post **45** carrying a threaded part **46** in which a belt tension adjusting nut **47** is rotatably carried. The nut supports the motor mount **37,** with the upper end of part **46** projecting into a bore **47***a* in the mount, as shown. When the lever **41** is swung to broken line position **41***d*, stopping against the axle, the motor mount pivots downward to position **37***a*, as described. Conversely, when the lever is swung upwardly, the belts are tensioned for motor drive mode, the position of the nut **47** on part **46** determining the degree of belt tension.

An important aspect of the invention concerns the provision of means supporting the wheelchair seat **49** and support frame **50** therefor for movement relative to the carriage **11** while maintaining the frame **50** and seat **49** firmly connected with the carriage. In this regard, the frame **50** may include a portion, as for example forwardly extending rails **51** at opposite sides of the seat, configured for connection with chair retaining structure integral with a motor vehicle body, and in response to such seat and frame movement relative to the carriage. As a result, the wheelchair may be driven into and firmly positioned within a motor vehicle, such as van **52** in FIG. **7,** so that the occupant may drive the van, the steering wheel of which appears at **53** directly in front of the received wheelchair.

In the example, the frame also includes transverse tubular elements **55** and **56** integral with the tubular rails,

a second horizontal plate 57 supporting the elements 52, 55 and 56, uprights 58 integral with rear extent of plate 57, and transverse bar 59 integral with the uprights. Seat 49 may be carried by the plate 57 or other frame structure. Arm rests 33 extend generally horizontally forwardly above the lever of the rails 51, and means such as sleeves 61 telescopically receiving opposite ends of rod or bar 59 hinge the arm rests for swinging movement, as for example upwardly as indicated by broken lines 33*b* in FIG. 1. Note elevated arm positions indicated by broken lines 33*a*. In this regard, and as will appear, the arm rests are thereby swung out of normal position so that the wheelchair occupant may steer the vehicle, without interference. If desired, the arm rests may be swung upwardly to vertical position and retained.

Referring to FIGS. 3 and 4, the means supporting the seat and frame for movement may include a motor driven elevator, as for example jackscrew 70, mounted on carriage 11 and connected with the frame 50, as at 71, to raise and lower the frame and seat. The jackscrew includes a threaded or cogged plunger 72 operatively connected with electric drive motor 73 via a stepdown transmission unit 74, the motor and transmission being supported by carriage 11. A vertical guide for the plunger 72 is shown at 75 in FIG. 4. Linear guide units are also provided as at 76 to guide the raising and lowering of the seat and frame, and also to block undesired lateral movement thereof, relative to the carriage. Such units may include vertical guide pins 77 attached to plate 57, and sleeve bearings 78 within sleeves 79 attached to plate 20, the bearings closely receiving and guiding the pins.

FIG. 3 shows the provision of chair retaining structure, integral with the motor vehicle body, for receiving the rails 51 in raised condition of the seat, thereby to safely retain the wheelchair in driver position in the vehicle. Such structure as shown in the form of channels 80 extending longitudinally forwardly to receive the raised rails as the wheelchair is advanced or driven into driving position. Lifting of the levers 41 into raised position then locks the chair against forward and rearward movement, with the drive motors deenergized, due to the rotary motion blocking action of output speed reducing transmissions associated with motors 26. Up and down movement of the seat and frame enables adjustment of the rails 51 to channel height.

A foot rest 84 is operatively connected with the frame 50 and carriage 11, as via linkage 85, to raise the foot rest relative to the seat in response to lowering of the seat relative to the carriage, and to lower the foot rest relative to the seat in response to raising of the seat relative to the carriage. Linkage 85 includes links 86 pivotally connected with the carriage at 87, links 88 pivotally connected at 89 with the frame extensions 90, and pins 91 pivotally interconnecting links 86 and 88. Foot rest 84 is carried by links 88.

We claim:

1. In an adjustable wheelchair,
   a. a carriage including support wheels,
   b. a seat and a support frame therefor,
   c. means supporting the seat and frame for movement relative to the carriage while maintaining the frame and seat firmly connected with the carriage, said means including a motor driven elevator mounted on the carriage and connected with the frame to raise and lower the seat, and linear guides also mounted on the carriage and connected with the frame to guide said raising and lowering of the seat and to block lateral movement of the seat and frame relative to the carriage, and
   d. the frame including a portion proximate the seat configured for retention by chair retaining structure integral with a motor vehicle body in response to said seat and frame movement relative to the carriage, said portion integral with the frame.

2. The combination that includes the wheelchair of claim 1 together with said structure having the form of channels located to receive said portion having the form of rails at opposite sides of the seat.

3. The combination that includes the wheelchair and structure of claim 2 together with said motor vehicle body rigidly supporting said chair retaining structure.

4. The wheelchair of claim 1 including a drive means connected with said wheels for controllably rotating the wheels to advance the wheelchair in a selected direction.

5. The wheelchair of claim 4 wherein said drive means includes two endless flexible drive elements each operatively connected with a motor driven rotor and a wheel driving rotor, and means adjustably pivotally supporting the motors to control element tension, thereby to enable and disable the transmission of drive to the wheel driving rotors.

6. In an adjustable wheelchair,
   a. a carriage including support wheels,
   b. a seat and a support frame therefor,
   c. means supporting the seat and frame for movement relative to the carriage while maintaining the frame and seat firmly connected with the carriage, said means including a motor driven elevator mounted on the carriage and connected with the frame to raise and lower the seat, and linear guides also mounted on the carriage and connected with the frame to guide said raising and lowering of the seat and to block lateral movement of the seat and frame relative to the carriage, and
   d. a foot rest, and a linkage operatively connecting the foot rest with the frame and carriage to raise the foot rest relative to the seat in response to lowering of the seat relative to the carriage, and to lower the foot rest relative to the seat in response to raising of the seat relative to the carriage.

7. In an adjustable wheelchair,
   a. a carriage including support wheels,
   b. a seat and a support frame therefor, and
   c. means supporting the seat and frame for movement relative to the carriage while maintaining the frame and seat firmly connected with the carriage,
   d. the frame including a portion proximate the seat configured for retention by chair retaining structure integral with a motor vehicle body in response to said seat and frame movement relative to the carriage, said portion comprising rails at opposite sides of the seat, the chair having arm rests extending in generally horizontal positions above the level of said rails, and means hinging the arm rests to the frame for swinging movement away from said positions so that the wheelchair occupant may freely steer said motor vehicle without arm rest obstructions.

* * * * *