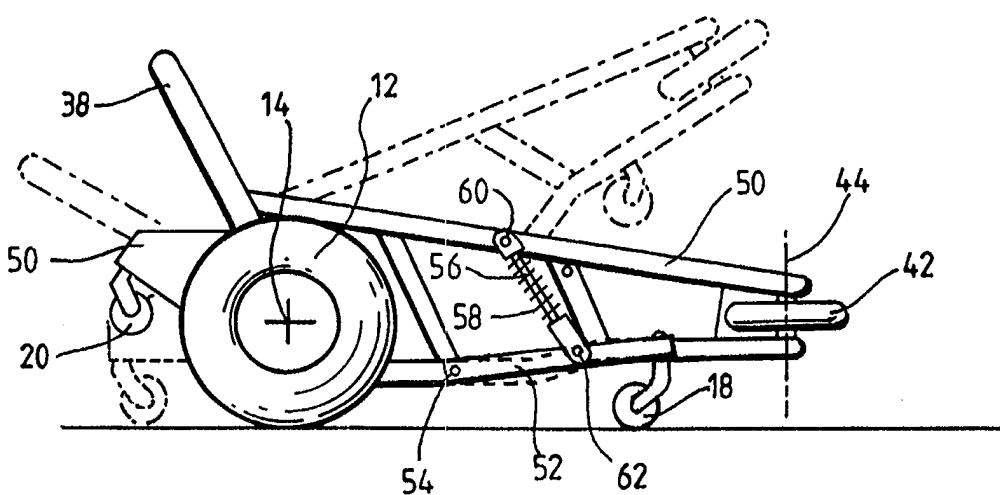




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<p>(51) International Patent Classification <sup>6</sup> : <b>B62D 61/00, 37/00, B62K 17/00, A63G 25/00</b></p>	<p><b>A1</b></p>	<p>(11) International Publication Number: <b>WO 98/18669</b> (43) International Publication Date: 7 May 1998 (07.05.98)</p>
<p>(21) International Application Number: PCT/GB97/02916 (22) International Filing Date: 22 October 1997 (22.10.97) (30) Priority Data: 9622301.1 26 October 1996 (26.10.96) GB 9716346.3 4 August 1997 (04.08.97) GB (71) Applicant (for all designated States except US): IMTEC LIMITED [GB/GB]; Gill Birks Farm, Wilshaw, Huddersfield, West Yorkshire HD7 3DZ (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): BAKER, Peter, Malcolm [GB/GB]; Gill Birks Farm, Wilshaw, Huddersfield, West Yorkshire HD7 3DZ (GB). (74) Agent: LONG, Edward, Anthony; Hulse &amp; Co., Eagle Star House, Carver Street, Sheffield S1 4FP (GB).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i></p>

(54) Title: VEHICLE



(57) Abstract

A vehicle for leisure or competitive use has a chassis (50) supporting two wheels (12) on a common axis (14) which can be independently driven by respective battery-powered electric motors (22) or internal-combustion engines or be independently kept stationary. Two laterally-spaced castor wheels (18) are disposed in one plane at a longer distance on one side of the axis, and are mounted on the chassis by independent resilient suspension means (52, 54, 56, 58, 60 and 62). Two laterally-spaced castor wheels (20) are disposed in another plane inclined to said one plane at a shorter distance on the other side of the axis, and are mounted directly on the chassis. A seat (32) protected by a roll-bar (38) is provided in the vicinity of the axis, and two twist grip speed controllers (64) for the respective motors or engines are located on the chassis within reach of the seat. A wheel (42) acts simply as a deflector. The disposition of the seat and the batteries relative to the axis is so arranged that there is insufficient weight on the castor wheels (18) to resist the torque exerted at the wheels (12) during sudden acceleration, as a result of which the vehicle will perform a so-called "wheely" whereby it rears up until the castor wheels (20) contact the ground as shown in broken lines. Deceleration will cause the vehicle to fall back onto its castor wheels (18). The vehicle can also be caused to turn rapidly in tight circles by appropriate independent control of the motors or engines. A remotely-controlled toy vehicle can employ the same principle of operation.

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"Vehicle"

This invention relates to a vehicle which is primarily designed as a fun-kart for leisure or competitive use, but which may also be a remotely-  
5 controlled toy.

There are various kinds of fun-karts already in existence which approximate to miniature motor-cars. They usually have four, or occasionally three, wheels which normally remain in contact with the ground, and the  
10 occupant's disposition relative to the plane of the ground does not change. They are usually steered by operating a steering wheel or handle-bar arrangement to turn the front wheel or wheels.

There are also in existence electric wheel-chairs for  
15 the disabled having two wheels on a common axis which can be independently power-driven or kept stationary under the control of a joy-stick for the purpose of steering, and two castor wheels disposed not far in front of said axis. Such wheel-chairs sometimes have elevating and/or  
20 reclineable seats, but the driveable wheels and the castor wheels are intended to remain in contact with the ground whilst, in order to prevent these wheel-chairs from accidentally overturning rearwardly, they usually have stabiliser means in the form of two small non-castoring  
25 wheels disposed behind said axis a short distance above ground level. Another known design of electric

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wheel-chair for the disabled has two wheels on a common axis which can be independently power-driven or kept stationary under the control of a joy-stick for the purpose of steering, and two castor wheels disposed not  
5 far behind said axis, no stabiliser means being provided.

Remotely-controlled toy vehicles are also well known.

The object of the present invention is to provide a novel kind of vehicle in which its disposition, and that of its occupant unless it is a toy, is deliberately  
10 variable relative to the plane of the ground whilst exhibiting rapid turning and a higher degree of manoeuvreability than a conventionally steered vehicle. To this end, it utilises some of the features of electric wheel-chairs in a considerably modified form.

15 According to the invention, a vehicle comprises a chassis supporting two wheels on a common axis which can be independently power-driven or kept stationary, stabiliser means disposed in one plane on one side of said axis, and stabiliser means disposed in another plane  
20 inclined to said one plane on the other side of said axis, whereby the vehicle can be supported on the power-driven wheels and either of said stabiliser means, or balanced on the power-driven wheels alone, depending upon the weight distribution and the torque exerted at the wheels.

25 The stabiliser means in each plane preferably consist of at least one castor wheel.

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Preferably, the stabiliser means in each plane consist of two laterally-spaced castor wheels in order to reduce the possibility of the vehicle tipping sideways.

Preferably, also, the stabiliser means in one plane  
5 are disposed at a longer distance from said axis and the stabiliser means in the other plane are disposed at a shorter distance from said axis.

At least the stabiliser means which are disposed at a longer distance from said axis are preferably mounted on  
10 the chassis by independent resilient suspension means.

A secondary seat may be provided in the vicinity of the stabiliser means which are disposed at a longer distance from said axis.

Preferably, a seat is provided in the vicinity of  
15 said axis.

Control means for the power-driven wheels are preferably located within reach of the seat or of both seats.

Preferably, the control means comprise independent  
20 speed controllers for the respective wheels.

Preferably, also, the speed controllers are twist grips.

Alternatively, the control means comprise a joystick.

Each of the power-driven wheels may be driveable in  
25 either direction of rotation.

(4)

The power-driven wheels may be driven by respective electric motors powered by battery means.

Preferably, the battery means are so disposed relative to said axis as to contribute to the requisite  
5 weight distribution.

Alternatively, the power-driven wheels are driven by respective internal combustion engines.

The invention will now be described, by way of example, with reference to the accompanying diagrammatic  
10 drawings of which:-

Figure 1 is a plan view of one specific embodiment of a fun-kart;

Figure 2 is a side elevation of said one embodiment shown in full lines with front castor wheels in contact  
15 with the ground and in broken lines with rear castor wheels in contact with the ground.

Figure 3 is a plan view corresponding to Figure 1 of another specific embodiment of a fun-kart; and

Figure 4 is a side elevation corresponding to Figure  
20 2 of said other embodiment.

Referring now to Figures 1 and 2 of the drawings, one specific embodiment of a fun-kart includes a chassis comprising a short rear portion 10 which supports two wheels 12 on a common axis 14, and a longer front portion  
25 16 of tubular space-frame type connected to the rear portion 10 by hinge means (not shown) adjacent and

(5)

parallel to said axis and disposed a short distance on the front side thereof. The chassis portions 10 and 16 are urged apart by resilient means (not shown) thus providing a shock-absorbing suspension system for the fun-kart.

5 Stabiliser means comprising two castor wheels 18 supported towards the front end of the chassis portion 16 are disposed in one plane at a longer distance on the front side of the axis 14, and stabiliser means comprising two castor wheels 20 supported at the rear end of the rear  
10 chassis portion 10 are disposed in another plane inclined to said one plane at a shorter distance on the rear side of said axis. The wheels 12 can be independently power-driven in either direction of rotation or kept stationary by respective electric motors 22 of permanent  
15 magnet twenty-four-volt direct current type connected to the wheels by respective worm-and-wormwheel speed reduction gearboxes 24 and powered by two twelve-volt batteries 26. The motors 22 provide regenerative  
20 braking. The motors 22, gearboxes 24 and batteries 26 are supported by the rear chassis portion 10, and the distance of the batteries to the rear of the axis 14 is variable to enable the balance of the fun-kart to be adjusted. The speed and regenerative braking of the wheels 12 are  
25 controlled by a twin-channel controller 28 of the type employed in electric wheel-chairs, which enables the fun-kart to be steered and controlled rapidly and

(6)

precisely by a single joy-stick 30. A main occupant's seat 32 with a back-rest 34 and a head-restraint 36 is secured at the rear of the front chassis portion 16, and said portion has an integral roll-bar 38 to protect the main occupant if the fun-kart should overturn. However, this is unlikely as the seat 32 is disposed very close to the ground in order to provide stability when cornering. The seat 32 is also disposed just forward of the axis 14 so that the weight of the main occupant, partially counter-balanced by the batteries 26, normally holds the front castor wheels 18 in contact with the ground. A secondary occupant's seat 40 is provided near the front end of the front chassis portion 16 above the castor wheels 18. The disposition of the seat 32 and/or the seat 40 relative to the axis 14 may be variable to assist in adjusting the balance of the fun-kart. The controller 28 is secured to one side of the front chassis portion 16 so that the joy-stick 30 is located within reach of the seats 32 and 40. At the front end of the front chassis portion 16 there is fitted a pneumatic-tyred wheel freely rotateable about an axis 44 which is substantially vertical when the front castor wheels are in contact with the ground. The wheel 42 is not intended to make any contact with the ground, being provided to deflect the fun-kart safely away from walls and the like, to guide the kart around corners on a track, and to act as a



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shock-absorbing bumper in the event of a head-on collision.

Referring now to Figures 3 and 4 of the drawings, another specific embodiment of a fun-kart is in most respects similar to the embodiment of Figures 1 and 2, and like parts are identified by the same reference numerals. One difference is that a one-piece chassis 50 is employed, each of the two castor wheels 18 being mounted on the chassis 50 by independent resilient suspension means shown in Figure 4. One of said means is disposed at each side of the chassis 50 and comprises an arm 52 which is pivoted at its rear end at a point 54 on the chassis 50 and carries one of the castor wheels 18 at its front end, and a telescopic strut 56 which is urged into extended condition by a helical compression spring 58 and is connected between a point 60 on the chassis 50 and an intermediate point 62 on the arm 52. Another difference is that the wheels 12 are controlled by independent speed controllers and associated electronic twist grips 64 best seen in Figure 3 which are located within reach of the seats 32 and 40. The twist grips 64 can control both the direction of rotation and the speed of the motors 22, or alternatively they control only the speed and a manually-operated switch is provided to reverse said motors.

In the operation of both specific embodiments

(8)

hereinbefore described, a single occupant can use either of the seats 32 and 40, or two occupants can use both of said seats. When a single occupant uses the main seat 32, or two occupants include a light-weight person such as a child using the secondary seat 40, and the dispositions of the seats 32 and 40 and the batteries 26 relative to the axis 14 are adjusted as necessary, the torque reaction produced during forwards acceleration of the fun-kart will cause it to perform a so-called "wheely" whereby the front 5 castor wheels 18 lift from the ground and the kart rears up until the rear castor wheels 20 contact the ground as shown in broken lines in Figure 2 so as dramatically to change the longitudinal inclination, and also in the case of the seat 40 the height, of the occupant or occupants 15 relative to the ground. Deceleration will cause the kart to fall back onto its front castor wheels 18. Regardless of whether it is stabilised on its front or rear castor wheels, or even balanced on the wheels 12 alone, the fun-kart can be caused to turn in progressively tighter 20 circles by slowing, stopping or, where suitable provision is made, reversing either one of the motors 22. An occupant of the seat 40 will then experience a feeling of being centrifuged. Where suitable provision is made, the fun-kart can also be driven and turned in reverse by 25 appropriate control of the motors 22, but "wheelies" are not then possible. Acceleration, deceleration, turning

(9)

and reversing can all be controlled from either of the seats 32 and 40, but the controls will of course feel to be reversed for an occupant of seat 40. The fun-kart can be used for leisure or for competitive racing.

5           Numerous modifications are possible within the scope of this invention. The secondary seat 40 can be omitted. The relative positions of the batteries 26 and the main seat 32 can be reversed when the secondary seat 40 is provided, in which case the arrangement of the seats can  
10 be such that occupants of both seats can experience a "wheely" and the feeling of being centrifuged. A three-seat configuration can also be provided, with one seat in the middle and one seat at each end. The two electric motors 22 can be replaced by two internal-  
15 combustion engines, especially two-stroke engines which can desirably rotate at very high speeds, together with associated clutch/brake means or by a single electric motor or a single internal-combustion engine in  
conjunction with suitable means for independently driving  
20 and braking the wheels 12. The joy-stick or the twist grips can be replaced by other control means such as a steering wheel, foot pedals, and hand levers. The speed reduction gearboxes can be of other than worm gear type. The fun-kart can be designed so as to be readily  
25 dismantled, either to facilitate its transportation or to allow its drive means to operate other attachments. As

(10)

well as adjustable batteries and seat or seats, ballast weights can be used to balance the fun-kart for different numbers and weights of occupants. Such ballast weights can be adjustable in position, and this can be effected by 5 motorised means while the fun-kart is in motion to allow very undulating terrain to be negotiated. The height of the rear castor wheels 20 above the ground when the front castor wheels 18 are in contact with the ground can be adjustable to vary the angle to which the fun-kart rears 10 up when a "wheely" is performed. The rear castor wheels can incorporate resilient suspension means as well as or instead of the front castor wheels. Instead of providing a suspension hinge adjacent to the axis 14, it can be provided adjacent to the front castor wheels 18. If 15 desired, there need be no suspension means at all. A single castor wheel disposed on the longitudinal centre-line of the fun-kart can be employed at the front and/or at the rear, with a corresponding reduction in cornering ability. Stabiliser means in the form of skids 20 can take the place of the front and rear castor wheels when the fun-kart is used on sand, snow or other soft or slippery surfaces. The fun-kart can be small in size for a child, or large and very powerful for more than one adult. A remotely-controlled toy vehicle can employ the 25 same principle of operation as the fun-kart.

(11)

## Claims:

1. A vehicle comprising a chassis supporting two wheels on a common axis which can be independently power-driven or kept stationary, stabiliser means disposed in one plane  
5 on one side of said axis, and stabiliser means disposed in another plane inclined to said one plane on the other side of said axis, whereby the vehicle can be supported on the power-driven wheels and either of said stabiliser means, or balanced on the power-driven wheels alone, depending  
10 upon the weight distribution and the torque exerted at the wheels.
2. A vehicle according to claim 1, wherein the stabiliser means in each plane consist of at least one castor wheel.
- 15 3. A vehicle according to claim 2, wherein the stabiliser means in each plane consist of two laterally-spaced castor wheels in order to reduce the possibility of the vehicle tipping sideways.
4. A vehicle according to any one of the preceding  
20 claims, wherein the stabiliser means in one plane are disposed at a longer distance from said axis and the stabiliser means in the other plane are disposed at a shorter distance from said axis.
5. A vehicle according to claim 4, wherein at least the  
25 stabiliser means which are disposed at a longer distance from said axis are mounted on the chassis by independent

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resilient suspension means.

6. A vehicle according to claim 4 or claim 5, wherein a secondary seat is provided in the vicinity of the stabiliser means which are disposed at a longer distance  
5 from said axis.

7. A vehicle according to any one of the preceding claims, wherein a seat is provided in the vicinity of said axis.

8. A vehicle according to claim 7, wherein control means  
10 for the power-driven wheels are located within reach of the seat or of both seats.

9. A vehicle according to claim 8, wherein the control means comprise independent speed controllers for the respective wheels.

15 10. A vehicle according to claim 9, wherein the speed controllers are twist grips.

11. A vehicle according to claim 8, wherein the control means comprise a joy-stick.

12. A vehicle according to any one of the preceding  
20 claims, wherein each of the power-driven wheels is driveable in either direction of rotation.

13. A vehicle according to any one of the preceding claims, wherein the power-driven wheels are driven by respective electric motors powered by battery means.

25 14. A vehicle according to claim 13, wherein the battery means are so disposed relative to said axis as to

(13)

contribute to the requisite weight distribution.

15. A vehicle according to any one of the preceding claims, wherein the power-driven wheels are driven by respective internal combustion engines.

5 16. A vehicle constructed, arranged and adapted to operate substantially as hereinbefore described with reference to, and as illustrated by, Figures 1 and 2 of the accompanying drawings.

10 17. A vehicle constructed, arranged and adapted to operate substantially as hereinbefore described with reference to, and as illustrated by, Figures 3 and 4 of the accompanying drawings.

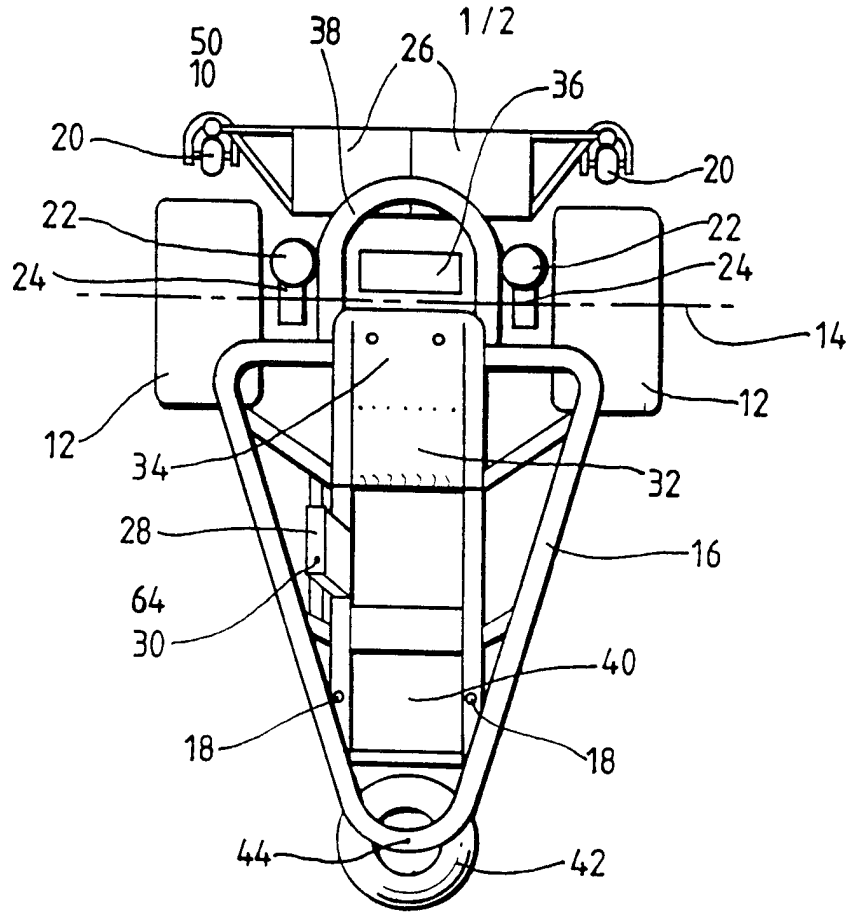


FIG.1.

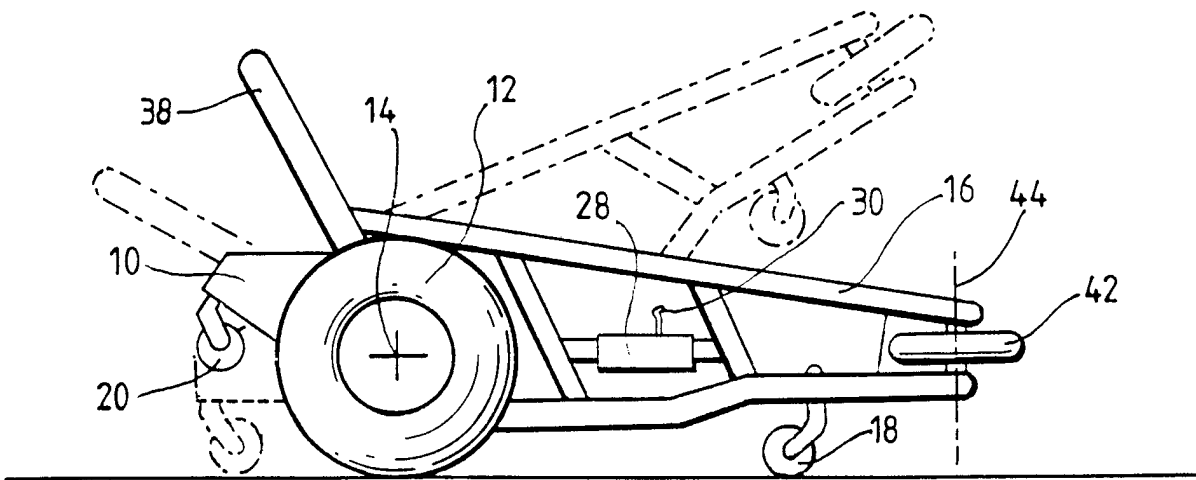


FIG.2.



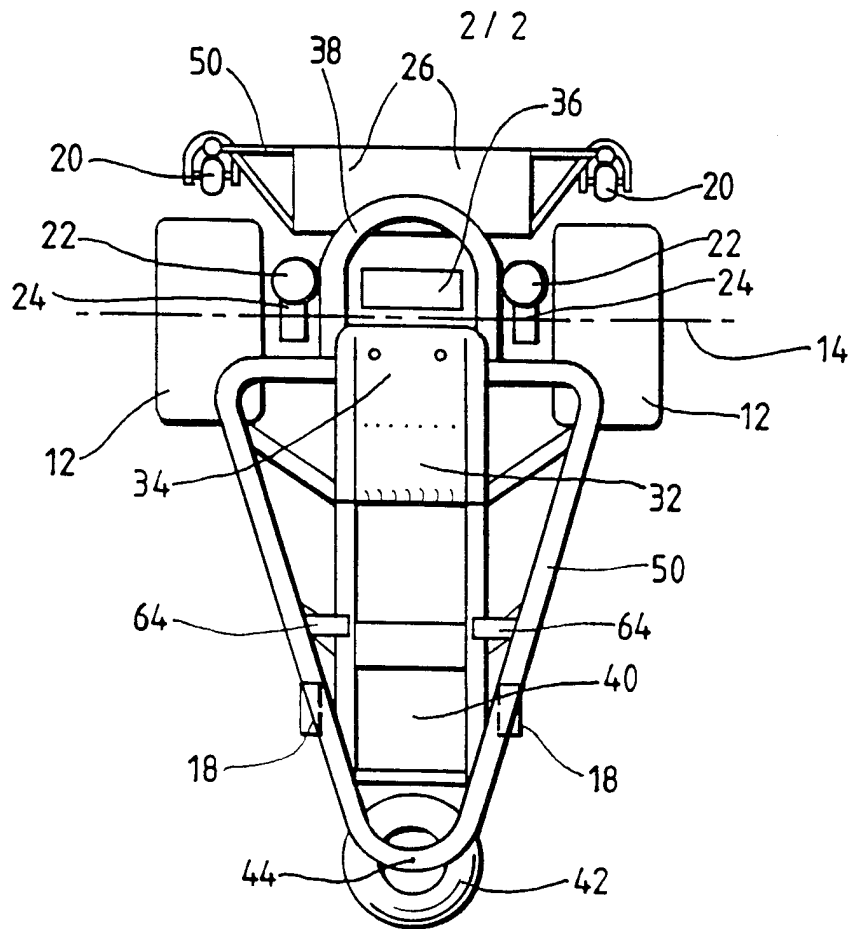


FIG. 3.

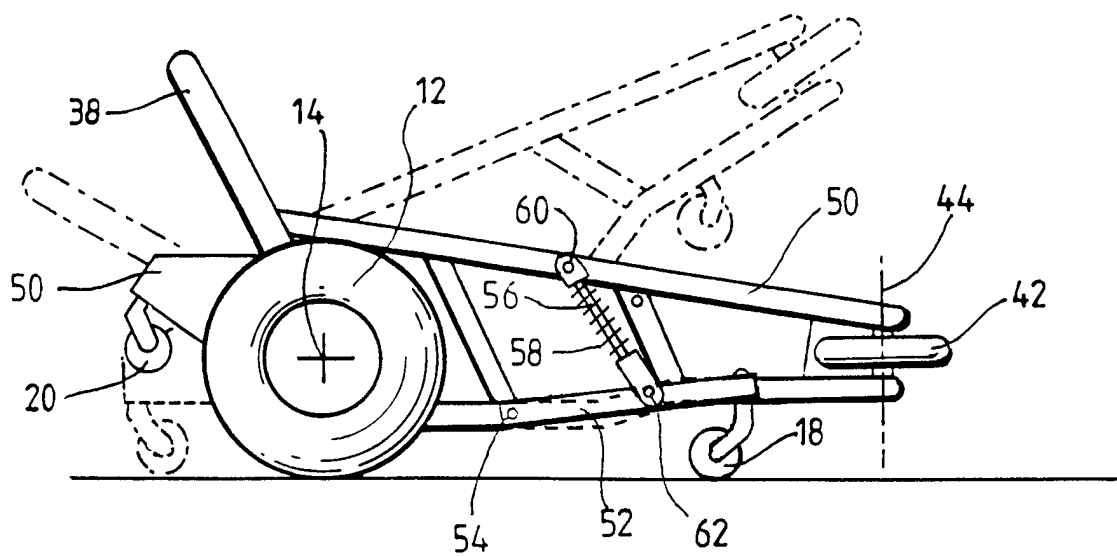


FIG. 4.

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 97/02916

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 6 B62D61/00 B62D37/00 B62K17/00 A63G25/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**  
 Minimum documentation searched (classification system followed by classification symbols)  
 IPC 6 B62D B62K B62M A63G A63B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 763 945 A (DANIELSON O) 9 October 1973 see column 3, line 21 - column 5, line 30 see column 8, line 15 - column 10, line 68; figures 1-12 -----	1
X	WO 89 06117 A (ANSCHUETZ & CO GMBH) 13 July 1989 see page 7, paragraph 5 - page 8, paragraph 6; figures 1,3,4 -----	1
X	US 5 314 034 A (CHITTAL NANDAN R) 24 May 1994 see the whole document -----	1
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Further documents are listed in the continuation of box C.       Patent family members are listed in annex.

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28 January 1998	03/02/1998

Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer  Chlostá, P
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## INTERNATIONAL SEARCH REPORT

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 010, no. 249 (M-511), 27 August 1986 & JP 61 077576 A (TOYODA AUTOM LOOM WORKS LTD), 21 April 1986, see abstract ---	1
X	DE 31 03 961 A (BASTANI HESSARI NAVID) 2 September 1982 see page 5, line 27 - page 12, line 22; figures 1-3,33-35 ---	1
A	WO 90 06097 A (MERCADO MEDIC AB) 14 June 1990 see page 3, line 1 - page 4, line 21; figures 1,2 -----	5

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No  
PCT/GB 97/02916

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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