

[54] TOY VEHICLE WITH STEERABLE DRIVE ASSEMBLY

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[58] Field of Search .... 180/13, 26, 65; 280/1.1, 1.11, 280/87.01, 87.02, 296

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[57] ABSTRACT

A toy vehicle to be ridden by a child has a body to be straddled by the rider, a pair of freely rotatable rear wheels, and a steerable unitary drive assembly that comprises a frame turnably mounted at the front of the body, a single drive wheel rotatably mounted within the frame and driven through reduction gearing by an electric motor also mounted within the frame and powered by batteries preferably held in casings mounted at the opposite sides of the turnable frame, and a pair of freely rotatable outrigger wheels mounted at opposite sides of the frame, preferably on fixed axles projecting from bow members of the frame that embrace the battery-holding casings, and which are normally spaced from the supporting surface so as to engage the latter only to prevent toppling of the vehicle, as when making a sharp turn.

2 Claims, 5 Drawing Figures

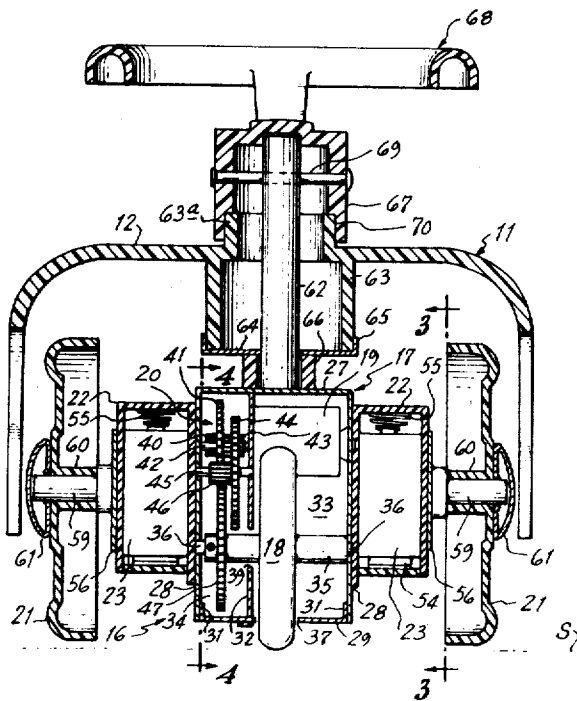


Fig. 1.

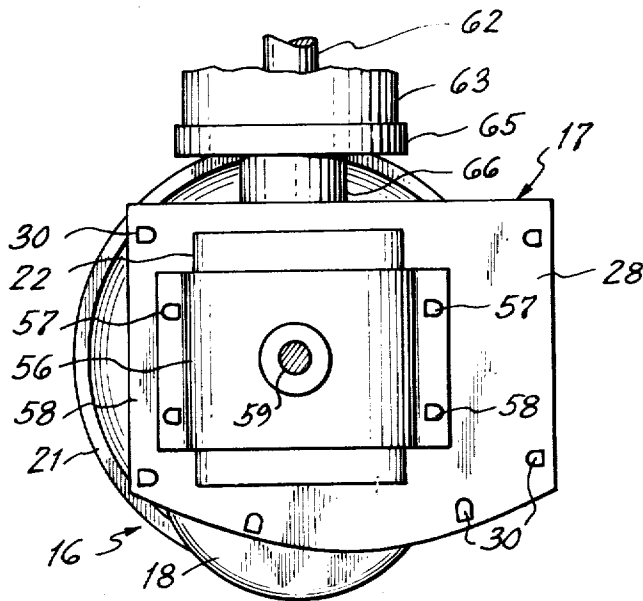
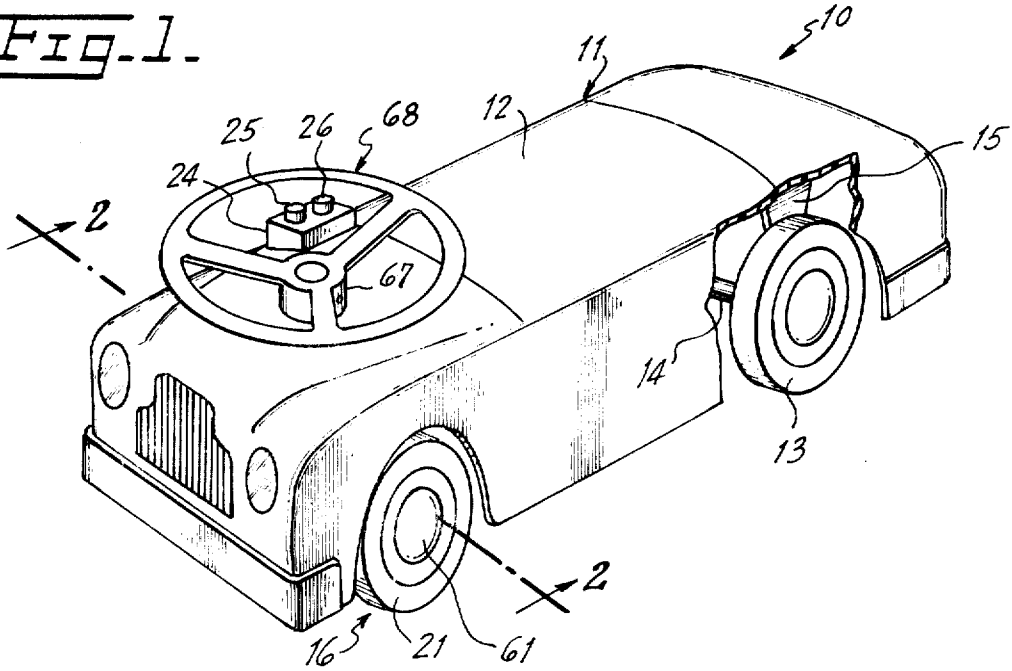
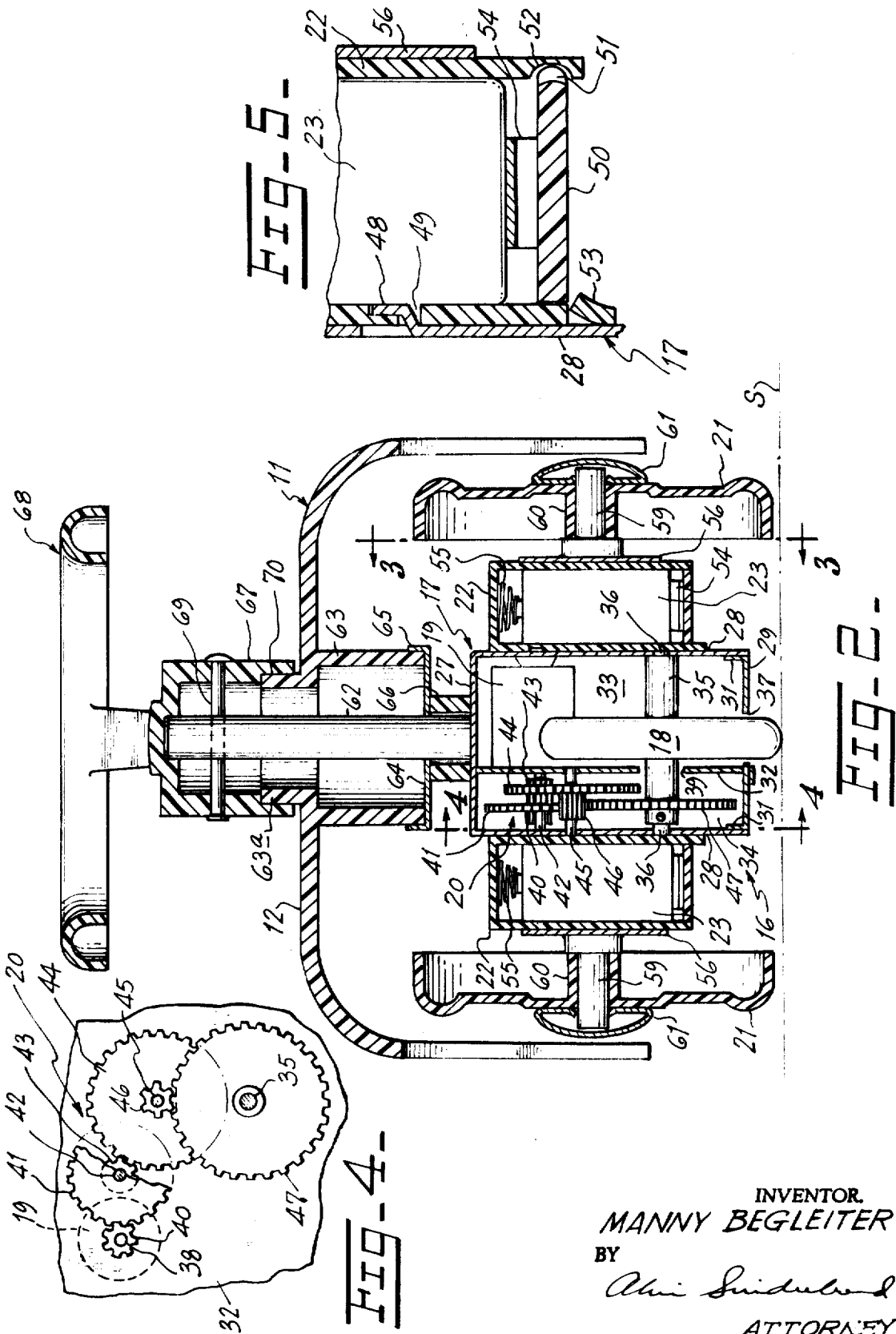


Fig. 3.

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## TOY VEHICLE WITH STEERABLE DRIVE ASSEMBLY

This invention relates generally to toy vehicles, and more particularly is directed to toy vehicles of the type which are driven by battery powered motors and adapted to be ridden by a child.

Existing toy vehicles of the described type are relatively expensive and complex and are powered by relatively large rechargeable batteries. Apparently, as a result of the relative inefficiency of the existing drive and the resulting rapid drain of current from the battery, a feasible period of operation could be achieved only with a large, and hence relatively expensive battery, and the latter has to be rechargeable in order to extend the useful life thereof to an extent consistent with its high cost.

It is an object of this invention to provide a toy vehicle of the described type with a battery powered drive which is simple and inexpensive and which affords a surprisingly long period of useful operation when employing a number of relatively inexpensive dry cell batteries, such as the conventional D-batteries used in flashlights.

Another object is to provide a toy vehicle of the described type with a battery powered drive, as aforesaid, which efficiently utilizes current drained from the battery and yet affords the desired stability to the vehicle, particularly when making sharp turns.

Still another object of the invention is to provide a battery powered drive having the foregoing advantages, and which may be produced as a standardized steerable unit or assembly capable of incorporation in a variety of different vehicles so that the costs of the battery powered drive unit may be reduced through mass production thereof.

In accordance with an aspect of this invention, a toy vehicle to be ridden by a child has a body that can be straddled by the rider, a pair of freely rotatable, laterally spaced rear wheels mounted with respect to the body so as to have a fixed axis of rotation, and a steerable, unitary drive assembly that comprises a frame turnably mounted at the front of the body, a single centrally located drive wheel rotatably mounted within the frame and driven through reduction gearing by an electric motor also mounted within the frame and powered by batteries preferably held in casings mounted at the opposite sides of the turnable frame, and a pair of freely rotatable outrigger wheels mounted at opposite sides of the frame, preferably on axles projecting fixedly from bow members of the frame that embrace the battery-holding casings, and which are normally spaced from the supporting surface so as to engage the latter only to prevent toppling of the vehicle, as when making a sharp turn.

The above, and other objects, features and advantages of the invention, will be apparent in the following detailed description of an illustrative embodiment which is to be read in connection with the accompanying drawings, wherein:

FIG. 1 is a perspective view of a toy vehicle embodying this invention and which is shown with its body partly broken away;

FIG. 2 is an enlarged transverse sectional view taken along the line 2—2 on FIG. 1 to show details of the unitary drive assembly;

FIGS. 3 and 4 are detail sectional views taken along the lines 3—3 and 4—4, respectively, on FIG. 2; and

FIG. 5 is a further enlarged, fragmentary sectional view showing the bottom portion of one of the battery-holding casings included in the unitary drive assembly.

Referring to the drawings in detail and initially to FIG. 1 thereof, it will be seen that a toy vehicle 10 in accordance with this invention generally comprises a body 11 preferably molded of a suitable plastic so as to simulate the appearance of an automotive or other vehicle and which constitutes a downwardly opening shell having a top portion 12 on which a child may be seated while straddling the vehicle. A pair of laterally spaced apart wheels 13, only one of which is visible on FIG. 1, is suitably mounted adjacent the back end of body 11 so as to be freely rotatable about a fixed axis. For example, as shown, the rear wheels 13 may be freely rotatable on an axle 14 which is securely held by posts 15 depending from the underside of top portion 12 of the body at the back end portion of the latter. The toy vehicle 10 further generally comprises a unitary drive assembly 16 which is mounted at the front end portion of body 11 and turnable relative to the latter so as to provide for both the propulsion and steering of the vehicle.

As shown particularly on FIG. 2, the steerable, unitary drive assembly 16 according to this invention includes a frame 17, preferably of sheet metal, turnably mounted with respect to vehicle body 11, as hereinafter described in detail, a single, centrally located drive wheel 18 rotatably mounted within frame 17 and projecting downwardly therefrom for driving engagement with a support surface S, an electric motor 19 also mounted in frame 17 and connected with drive wheel 18 through reduction gearing 20 within the frame, and a pair of freely rotatable outrigger wheels 21 mounted at opposite sides of frame 17 and positioned vertically with respect to drive wheel 18 so as to be normally raised from the support surface S engaged by the drive wheel. Further, in a preferred embodiment of the invention, as illustrated, the steerable, unitary drive assembly 16 further includes casings 22 carried by frame 17 and adapted to hold batteries 23 for powering the electric motor 19.

In order to control the operation of motor 19, the vehicle 10 is further provided with a commercially available reversing switch assembly 24 (FIG. 1) mounted at the top of body 11 so as to be conveniently accessible, and preferably having two actuating buttons 25 and 26 that are alternately depressible for causing either forward or reverse operation, respectively, of motor 19. Of course, a suitable electric circuit of electrical conductors (not shown) is provided to connect motor 19, batteries 23 and reversing switch assembly 24 in a manner to achieve the desired forward and reverse operation of the motor in response to selective depressing of button 25 or button 26.

The frame 17 is shown to include a top wall 27 (FIG. 2), side walls 28 depending integrally from the opposite side edges of top wall 27, and a peripheral wall 29 which extends between side walls 28 along the front, bottom and back edges of the latter. Wall 29 is suitably secured to side walls 28, as by bent tabs 30 (FIG. 3) struck from flanges 31 (FIG. 2) provided along the opposite side edges of peripheral wall 29 and extending

through suitably located slots in side walls 28. Frame 17 further includes a partition 32 (FIG. 2) located between side walls 28 and arranged parallel thereto to provide a relatively wide space 33 between partition 32 and one of side walls 28 and relatively narrow space 34

between partition 32 and the other of side walls 28. The single drive wheel 18 is located in space 33 on an axle 35 having its ends 36 suitably journaled in side walls 28, and the lower portion of drive wheel 18 projects downwardly through an elongated opening 37 in the lower portion of peripheral wall 29 for engagement with the supporting surface S. The motor 19 is located in the upper portion of space 33 behind drive wheel 18 and is suitably mounted on partition 32 and the adjacent side wall 28, and the shaft 38 of motor 19 (FIG. 4) extends through an opening in partition 32 into space 34. The axle 35 of drive wheel 18 also extends through an opening 39 in partition 32 into space 34 and the reduction gearing 20 is located within space 34 to provide a driving connection or transmission from motor shaft 38 to wheel axle 35.

As shown particularly on FIGS. 2 and 4, reduction gearing 20 includes a pinion 40 fixed on motor shaft 38 and meshing with a gear 41 on an idler shaft 42. A pinion 43 is integral or fixed for rotation with gear 41 and meshes with a gear 44 on an idler shaft 45. A pinion 46 is integral or fixed for rotation with gear 44 and meshes with a gear 47 suitably fixed on wheel axle 35. The idler shafts 42 and 45 are rotatably mounted at their opposite ends in partition 32 and in the side wall 28 which cooperates with the partition in defining the space 34. In a particular example of a drive according to this invention, the pinions 40, 43 and 46 are each provided with ten teeth, and the gears 41, 44 and 47 are provided with 50, 60 and 80 teeth, respectively, to afford a reduction ratio of 1:240 between wheel axle 35 and motor shaft 38. With such reduction ratio, a conventional, commercially available 1/6th horsepower D.C. motor powered by D-cell, 6.0 volt batteries is capable of driving the vehicle for over two hours during continuous operation with a load of seventy pounds on the vehicle, and for much longer periods of operation, for example, as much as 45 hours, during intermittent operation.

The casings 22 for holding the batteries 23 are preferably molded of plastic and are secured to the outer surfaces of the opposite side walls 28, as by tabs 48 (FIG. 5) struck from each frame side wall 28 and extending through slots 49 formed in the adjacent walls of casings 22. Each of the casings 22 is dimensioned to receive two of the batteries 23 and opens downwardly to permit the insertion and removal of the batteries. The bottom of each casing 22 is closed by a removable cover 50 which, at its outer side, is hingedly connected to casing 22, as by lugs 51 projecting from cover 50 and engaging loosely in recesses 52 formed in the outer side wall of casing 22 adjacent the bottom thereof. The inner side of cover 50 remote from lugs 51 is adapted to be releasably held in its closed position, as shown (FIG. 5) by a resilient tab 53 formed in the inner side wall of casing 22. It will be apparent that, by reason of the flexibility of the plastic material forming the casing 22, the tab 53 can be flexed toward the plane of the inner side wall of casing 22 to release cover 50 and thereby permit downward swinging of the latter and the release of

lugs 51 from recesses 52, whereby to open the bottom of casing 22 and permit installation or replacement of the batteries 23. A bowed, leaf spring contact 54 may be secured to the upper surface of cover 50 so that, when cover 50 is installed, as shown, contact 54 will resiliently urge the respective batteries 23 into engagement with helical spring contacts 55 (FIG. 2) provided at the top of each casing.

The frame 17 is further shown to include generally U-shaped bow members 56 (FIGS. 2 and 3) extending outwardly from side walls 28 and each embracing the casing 22 at the respective side of the frame. The ends of each bow member 56 are suitably secured to the adjacent frame side wall 28, for example, as by tabs 57 struck from such side wall 28 and engaging in suitably located slots provided in end portions 58 of bow member 56 (FIG. 3). An axle 59 projects outwardly from the middle portion of each bow member 56 and is fixed to the latter, as by welding or the like. The outrigger wheels 21, which may be molded of plastic, have central hubs 60 (FIG. 2) freely rotatable on the axles 59 extending from bow members 56, and the outrigger wheels are suitably held on axles 59, as by conventional caps 61. The axles 59 are vertically located with respect to axle 35 of central drive wheel 18, and the outrigger wheels 21 are diametrically dimensioned so that the bottom portions of outrigger wheels 21 will be slightly elevated with respect to the bottom portion of drive wheel 18, whereby to normally space outrigger wheels 21 from the supporting surface S, as previously mentioned.

In order to mount the unitary drive assembly 16 turnably with respect to vehicle body 11, a spindle or shaft 62 which is welded or otherwise secured to top wall 27 extends upwardly from frame 17 through a hollow boss 63 which is molded integrally with the top portion 12 of vehicle body 11 (FIG. 2). A metal bearing washer 64 extends around spindle 62 and has a peripheral flange 65 that engages closely around the lower edge portion of hollow boss 63 to center spindle 62 with respect to the hollow boss, and a tubular plastic spacer 66 extends around spindle 62 between washer 64 and top wall 27 of frame 17. The upper end portion of spindle 62 projects above hollow boss 63 and is seated in the roof of a hollow hub 67 of a steering wheel 68. The upper end portion of spindle 62 is secured in hub 67, as by a bolt or rivet 69 extending through aligned diametrical bores in hub 67 and spindle 62. The lower edge portion of hub 67 may be rabbeted, as at 70, to engage rotatably around the upper edge portion 63a of boss 63. Thus, the engagement of hub 67 with upper portion 63a of boss 63 and the engagement of flanged washer 64 with the lower edge portion of boss 63 serve to define the axis of rotation of spindle 62 when wheel 68 is turned for steering of the vehicle.

It is believed that the described relatively high efficiency of the unitary drive assembly according to this invention results from the fact that only the single drive wheel 18 is driven by motor 19. During normal movement of the vehicle 10 over the supporting surface S only the drive wheel 18 of drive assembly 16 engages the supporting surface thereby to minimize the frictional resistance to movement. However, when making a sharp turn, one or the other of the outrigger wheels 21 is engageable with supporting surface S to prevent

toppling of the vehicle toward the outside of the turn. Further, it will be seen that the steerable, unitary drive assembly 16 can be mass produced, as a unit, and employed in various different vehicles thereby to make possible the achievement of the economy inherent in such mass production.

Although an illustrative embodiment of the invention has been described in detail herein with reference to the drawings, it is to be understood that the invention is not limited to that precise embodiment, and that various changes and modifications may be effected therein without departing from the scope or spirit of the invention.

What is claimed is:

1. In a toy vehicle having a body and a pair of laterally spaced apart wheels mounted adjacent one end of the body so as to be freely rotatable about a fixed axis; a steerable unitary drive assembly for the vehicle comprising a frame mounted adjacent the opposite end of said body and being turnable relative to the latter for steering of the vehicle, said frame including parallel, spaced apart side walls and a partition thereto, a single drive wheel located between said partition and one of said side walls and having an axle journaled at its ends in said side walls so that said drive wheel projects downwardly from said frame for driving engagement with a support surface, an electric motor also mounted between said partition and one side wall and having a drive shaft extending through said partition into a space between the latter and the other of said side walls, gear means located in said space and including gears on said drive shaft and said axle, respectively, for rotating said drive wheel in response to operation of said motor, battery means for powering said motor, switch means for controlling the operation of said motor by said battery means, said frame further

including bow members extending outwardly from said side walls and each having a fixed axle projecting outwardly from its middle and rotatably carrying a respective outrigger wheel which is freely rotatable and positioned vertically with respect to said drive wheel so as to be normally raised from the support surface engaged by said drive wheel, and casings for holding said battery means secured to said side walls of the frame within said bow members.

2. In a toy vehicle having a body and a pair of laterally spaced apart wheels mounted adjacent one end of the body so as to be freely rotatable about a fixed axis; a steerable unitary drive assembly for the vehicle comprising a frame mounted adjacent the opposite end of said body and being turnable relative to the latter for steering of the vehicle, a single drive wheel rotatably projecting downwardly from said frame for driving engagement with a support surface, an electric motor, gear means connected to said motor and drive wheel to rotate the latter in response to operation of said motor, a pair of freely rotatable outrigger wheels mounted at opposite sides of said frame and positioned vertically with respect to said drive wheel so as to be normally raised from the support surface engaged by said drive wheel, battery means for powering said motor, switch means for controlling the operation of said motor by said battery means, and casings for holding said battery means, and in which said frame includes parallel, spaced apart side walls and bow members extending outwardly from said side walls and each having a fixed axle projecting outwardly from its middle and rotatably carrying the respective one of said outrigger wheels, and further in which said drive wheel, motor and gear means are located between said side walls of the frame and said casings for the battery means are secured to said side walls within said bow members of the frame.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3684046 Dated August 15, 1972

Inventor(s) MANNY BEGLEITER

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the heading of the patent:

"Manny Begleiter, 2824 Morris Ave., Bronx, N.Y. 10468" should be -- Manny Begleiter, Bronx, New York, assignor to Miner Industries, Inc., New York, New York, a corporation of Delaware --.

Signed and sealed this 9th day of January 1973.

(SEAL)  
Attest:

EDWARD M. FLETCHER, JR.  
Attesting Officer

ROBERT GOTTSCHALK  
Commissioner of Patents