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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 03-067980- -00006-0000

Fecha: 2008-06-13 17:53:23 Dep 2020 NUECREACION
Ira. 11 PATENTEIYII Eve: 379 FASENACIONALII
Act. 444 RESPUESTARLEQUE Folios: 14

Señora Jefe de la
DIVISION DE NUEVAS CREACIONES
Superintendencia de Industria y Comercio
E. S. D.

Trámite : 011 Evento : 379 Actuación : 444

Referencia : Expediente No. 03067980
Asunto : Solicitud de patente: CONJUNTO DE
DIRECCION PARA VEHICULOS PARA MONTAR
NIÑOS
Solicitante : MATTEL, INC.
Clase : B60G 007/000, B60K 001/000, B60P 007/000, B62D
007/000, B62K 001/000

1. Yo, Emilio FERRERO, obrando como apoderado del solicitante en el asunto antes identificado, me refiero al Oficio No. 3965 notificado por fijación en lista del 14 de Marzo de 2008.

2. Mediante el Oficio No. 3965 se puso en conocimiento del solicitante el informe del examen de fondo que contiene las observaciones hechas por su Despacho sobre la presente solicitud de patente. Atiendo a las observaciones de la siguiente manera:

3. De la solicitud de patente:

3.1 Reivindicaciones (artículo 30 D.486)

Su Despacho enuncia lo siguiente:

"La solicitud tiene tres (3) reivindicaciones independientes caracterizando el mismo producto (1, 8 y 17). Se sugiere presentar una sola reivindicación independiente para el conjunto de dirección".

Con respecto a lo señalado por su Despacho mi representada desea señalar lo siguiente:

Con el fin de atender la anterior observación y de acuerdo al artículo 34 de la Decisión 486, se presenta un nuevo capítulo reivindicatorio como sustituto del anteriormente presentado. En este nuevo capítulo reivindicatorio se presenta una sola reivindicación independiente 1 que caracteriza el conjunto de dirección para vehículos para montar niños. De tal manera que el nuevo capítulo reivindicatorio esta constituido por dieciséis (16) reivindicaciones y la objeción formulada a este respecto se debe tener por superada.

4. Evaluación de los requisitos de patentabilidad

Su Despacho concluye que el nivel inventivo de las reivindicaciones 1 a 23 de la presente solicitud de patente, se ve afectado por el documento US5845724 (D1).

Su Despacho enuncia lo siguiente:

"La diferencia trascendental entre el documento D1 y la solicitud es la característica de tener un par de manijas movibles adaptadas a los brazos de control y que el sistema de dirección está conectado a las ruedas traseras. En D1 el sistema de dirección trae el elemento tradicional compuesto por un volante de dirección. Por lo tanto se podría afirmar que una persona medianamente versada en la materia de acuerdo a la aplicación del vehículo infantil podría llegar a seleccionar estas manijas como elemento de direccionamiento".

Con respecto a que el documento D1 afecta el nivel inventivo de la presente solicitud, mi representada desea señalar lo siguiente:

La nueva reivindicación independiente 1 se dirige a un vehículo para montar niños que incluye, entre otra materia a reivindicar, la siguiente estructura:

"Un conjunto de dirección configurado para efectuar el giro del vehículo por el manejo de la primera y segunda rueda trasera, el conjunto de dirección comprende":

"Una primera manija desplazable operativamente acoplada a la primera rueda trasera, en donde cuando la primera manija es desplazada, la primera rueda trasera es girada alrededor de un eje generalmente vertical; Una segunda manija desplazable operativamente acoplada a la segunda rueda trasera, en donde cuando la segunda manija es desplazada, la segunda rueda trasera

es girada alrededor de un eje generalmente vertical; y un acoplador adaptado para enlazar el giro de la primera rueda trasera y la segunda rueda trasera, en donde el movimiento de la primera manija en una primera dirección es acompañado de un movimiento recíproco de la segunda manija en una segunda dirección que es opuesta y paralela a la primera dirección y en donde la primera rueda trasera y la segunda rueda trasera giran cooperativamente para dirigir al vehículo en respuesta al movimiento de las manijas".

Adicionalmente, en la especificación de la presente solicitud de patente (página 2) se revela lo siguiente:

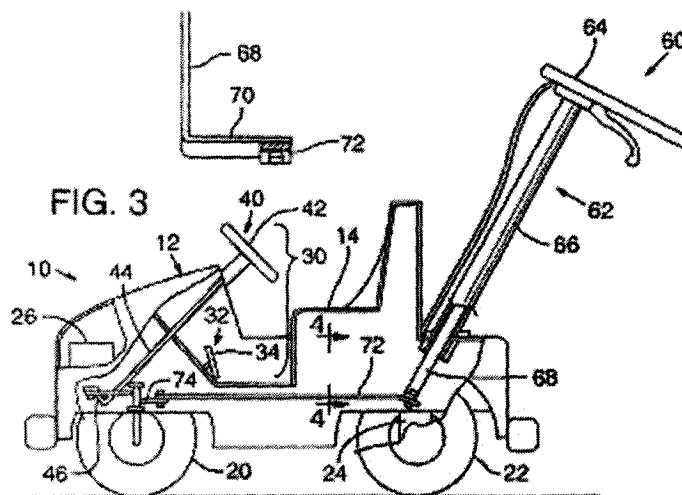
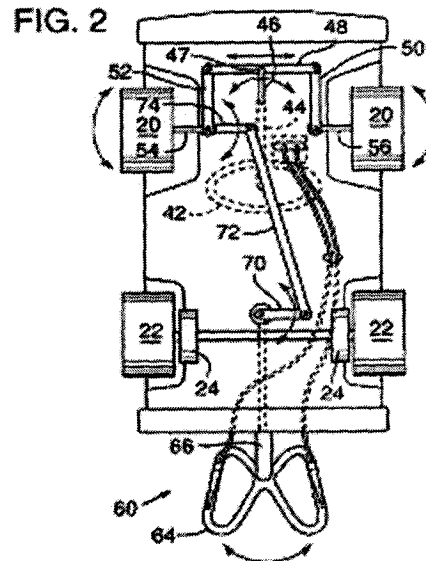
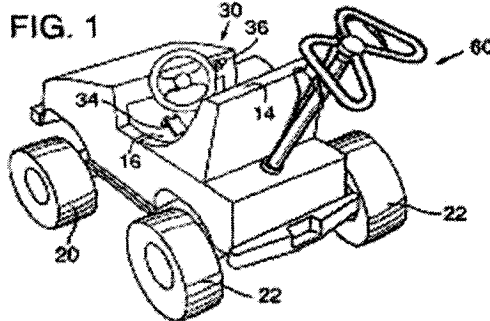
"Los mecanismos de dirección en los vehículos para niños típicamente se asemejan al manubrio o rueda de dirección. Los niños manejan el vehículo haciendo girar el manubrio en la dirección deseada. Sin embargo, otros mecanismos de dirección son conocidos en vehículos de tamaño real, que no utilizan una rueda de manubrio. Por ejemplo, varios vehículos de construcción, tales como los cargadores, pueden incorporar un par de manijas de dirección en lugar de la rueda de dirección. Los vehículos de tamaño reducido pueden querer imitar la apariencia y funcionalidad de tales mecanismos de dirección alternativos. Sin embargo, tal vehículo para niños que usa un mecanismo de dirección alternativo debe estar adaptado para suministrarle características de seguridad y hacer que el vehículo sea adecuado para el uso por niños y especialmente niños muy jóvenes".

Teniendo en cuenta la anterior información sobre la presente invención, procederemos a continuación a demostrar por qué la

misma no podía derivarse de manera obvia y/o evidente del documento citado por su Despacho:

Al estudiar el documento D1, se observa que a diferencia de la presente invención este no divulga una primera manija desplazable operativamente acoplada a la primera rueda trasera, una segunda manija desplazable operativamente acoplada a la segunda rueda trasera, un acoplador adaptado para enlazar el giro de la primera rueda trasera y la segunda rueda trasera, en donde el movimiento de la primera manija en una primera dirección es acompañado de un movimiento recíproco de la segunda manija en una segunda dirección que es opuesta y paralela a la primera dirección y en donde la primera rueda trasera y la segunda rueda trasera giran conjuntamente para dirigir al vehículo en respuesta al movimiento de las manijas, tal como se divulga en la reivindicación 1.

En contraste al sistema de dirección divulgado en la reivindicación 1, D1 divulga un vehículo para montar niños que tiene ruedas delanteras manejables 20, ruedas traseras manejables 22, y un sistema de dirección 40 que incluye un volante de dirección tradicional manejable 42, como se muestra en las figuras 1-3. Específicamente en la figura 2, se puede observar, que el volante de dirección 42 permite que una varilla de acople 48 mueva los brazos manejables 50,52 en la misma dirección de tal forma que las dos ruedas delanteras manejables 20 giren en la misma dirección con el fin de controlar la dirección del vehículo mientras este se desplaza. Por otro lado, D1 también divulga un sistema de dirección 62 que incluye un segundo volante de dirección 64 montado en un poste 62 que se extiende desde la parte posterior del vehículo, el cual puede ser empleado por un padre para dirigir y manejar el vehículo.



Sin embargo, D1 no enseña, o sugiere el conjunto de dirección divulgado en la reivindicación 1, ya que este incluye un par de manijas movibles en donde el movimiento de la primera manija en una primera dirección es acompañado de un movimiento recíproco de la segunda manija en una segunda dirección que es opuesta y paralela a la primera dirección. En particular, no se encuentran primeras ni segundas partes del vehículo divulgadas en D1 que se muevan en una primera y segunda dirección opuesta. En contraste, los brazos manejables 50,52 se mueven o rotan juntos y en la misma dirección -ya sea a la derecha o a la izquierda- para

dirigir el vehículo. Por tanto, el sistema tradicional compuesto de un volante de dirección no llevaría a una persona versada en la materia a seleccionar la primera y segunda manija divulgadas y reivindicadas en la presente solicitud.

Aun más, debido a que esta solución no esta revelada en D1 una persona versada en la materia no consideraría la posibilidad de ir en contra de las sugerencias de la anterioridad, y consecuentemente la presente invención no podía resultar obvia o evidente a partir del sistema de dirección divulgado en D1.

En efecto, D1 en vez de dirigir a una persona versada a obtener el conjunto direccional para vehículos para niños reivindicado, lo alejaría de la misma debido a que D1 específicamente enseña que el vehículo divulgado permite al niño *"simular el proceso de manejar un carro real"*, el cual *"incluiría un volante de dirección para controlar la dirección"* (Columna 1, líneas 13-18).

Adicionalmente, no se encuentra ninguna enseñanza o sugerencia en D1 con respecto a la posibilidad de utilizar otros mecanismos de dirección conocidos en vehículos de tamaño real, como lo son la primera y segunda manija que se acoplan moviéndose en direcciones opuestas y paralelas. Por consiguiente, D1 no puede ser considerado una anterioridad válida al momento de evaluar el nivel inventivo de la presente solicitud de patente.

Por otro lado, se debe tener en cuenta que, en contraste al vehículo para niños reivindicado en la reivindicación 1, D1 no divulga, enseña, o sugiere un vehículo motorizado donde las ruedas traseras son conducidas y manejadas. En cambio, el documento D1 divulga *"dos ruedas delanteras conducibles 20 y dos ruedas traseras manejables 22"* (Columna 2, líneas 53-54).

Finalmente, es claro que para una persona versada en la materia correspondiente, esta invención no podía resultar obvia o derivarse de manera evidente del documento referenciado del estado de la técnica debido a que es difícil imaginar obtener el conjunto de dirección reivindicado en la presente solicitud a partir de un vehículo para montar niños que incluye un volante de dirección tradicional y un segundo volante manejable que rota en la misma dirección; y en el cual no se encuentran primeras ni segundas partes del vehículo que se muevan en una primera y segunda dirección opuesta y no se recomienda emplear mecanismos de dirección alternativos.

Por las anteriores razones, se debe tener por superada la objeción formulada por nivel inventivo.

Puesto que se han atendido a cabalidad las observaciones hechas por su Despacho sobre la presente solicitud de patente, respetuosamente solicito se continúe con su tramitación.

6. Anexos:

- Nuevo pliego reivindicatorio conformado por 16 reivindicaciones.
- Formulario para modificaciones.
- Recibo por concepto de modificaciones en solicitud pendiente.

Señora Jefe,



EMILIO FERRERO

T.P.A. No. 31.929

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**Industria y Comercio**
SUPERINTENDENCIA

Espacio reservado para el adhesivo de radicación

FORMULARIO UNICO DE CORRECCIONES Y MODIFICACIONES

1	SOLICITUD DE: ☐ Corrección de Error Material ☒ Modificación a una solicitud	
2 SOLICITANTE	Nombre: MATTEL, INC. Sociedad constituida y existente bajo las leyes del Estado de Delaware, Estados Unidos de América. Dirección: 333 Continental Boulevard, El Segundo, Estado de California 90245, Estados Unidos de América Domicilio: El Segundo, Estado de California, Estados Unidos de América Teléfono: 546 09 70 Fax: 249 40 70 E-mail: clientes@camyp.com	IDENTIFICACION C.C. ☐ NIT ☐ C.E. ☐ Otro ☐ Número: _____
3 REPRESENTANTE O APODERADO	Nombre: Emilio FERRERO Dirección: Carrera 4ª No. 72-35 Teléfono: 347 36 11 Fax: 217 92 11 E-mail: cavelier@cavelier.com	IDENTIFICACION C.C. ☒ NIT ☐ C.E. ☐ Otro ☐ Número: 438.019 TP 31.929
4	Número de expediente: 03.067.980	
5	Descripción de la corrección o modificación solicitada: Presento nuevo capítulo reivindicatorio compuesto por 16 reivindicaciones con el fin de superar las objeciones hechas por Su Despacho a la presente solicitud de Patente y pido que el examen de patentabilidad sea realizado sobre estas nuevas reivindicaciones presentadas.	
6	Comprobante de pago No. 08-45.884 Fecha: 9 de junio de 2008	
7	Anexos ☒ Comprobante de pago de la tasa por \$103.000, por concepto de modificaciones. ☐ Poderes, si fuere el caso ☐ Documento que acredita la existencia y representación legal de las partes, cuando sean personas jurídicas.	
8	NOMBRE: EMILIO FERRERO	FIRMA: C.C. 438.019 de Usaquén T.P.A. 31.929

REIVINDICACIONES

1. Un vehículo para montar niños, comprende:

- 5 Un cuerpo de vehículo con un asiento adaptado para acomodar un niño;

Una pluralidad de ruedas acopladas de manera giratoria al cuerpo, en donde la pluralidad de ruedas incluye una primera rueda trasera y una segunda rueda trasera;

- 10 Un conjunto de motor adaptado para accionar a por lo menos una de la primera rueda trasera o la segunda rueda trasera;
Un conjunto de batería adaptado para suministrar potencia al conjunto de motor; y

- 15 Un conjunto de dirección configurado para efectuar el giro del vehículo por el manejo de la primera y segunda rueda trasera, el conjunto de dirección comprende:

- 20 Una primera manija desplazable operativamente acoplada a la primera rueda trasera, en donde cuando la primera manija es desplazada, la primera rueda trasera es girada alrededor de un eje generalmente vertical;

- 25 Una segunda manija desplazable operativamente acoplada a la segunda rueda trasera, en donde cuando la segunda manija es desplazada, la segunda rueda trasera es girada alrededor de un eje generalmente vertical; y

- Un acoplador adaptado para enlazar el giro de la primera rueda trasera y la segunda rueda trasera, en donde el movimiento de la primera manija en una primera dirección es
30 acompañado de un movimiento recíproco de la segunda manija en una segunda dirección que es opuesta y paralela a la primera dirección y en donde la primera rueda trasera y la segunda rueda trasera giran cooperativamente para dirigir al vehículo en respuesta al movimiento de las manijas.

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2. El vehículo para niños de la reivindicación 1, en donde el conjunto de dirección comprende adicionalmente un primer

brazo de control y un segundo brazo de control, en donde cada brazo de control está configurado para acoplarse a la rueda trasera respectiva con respecto a la primera manija y la segunda manija.

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3. El vehículo para niños de la reivindicación 2, en donde el conjunto de dirección comprende adicionalmente enlaces de dirección adaptados para enlazar cada manija al brazo de control respectivo.

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4. El vehículo para niños de la reivindicación 2 o 3, en donde el acoplador está adaptado para mantener una relación espaciada entre el primer brazo de control y el segundo brazo de control.

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5. El vehículo para niños de acuerdo a cualquiera de las reivindicaciones 1 a 4, en donde el conjunto de dirección comprende adicionalmente un soporte de conjunto de manija acoplado a cada una de las manijas y adaptado para enlazar el par de manijas juntas.

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6. El vehículo para niños de acuerdo a cualquiera de las reivindicaciones 1 a 4, en donde el conjunto de dirección comprende adicionalmente un soporte de conjunto de manija acoplado al cuerpo y a la primera manija y a la segunda manija, en donde el soporte de conjunto de manija está configurado de forma que la primera manija y la segunda manija pueden pivotar en una primera dirección y una segunda dirección.

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7. El vehículo para niños de la reivindicación 1, en donde: el conjunto de dirección comprende un par de brazos de control pivotantes, cada brazo de control está sujeto a una rueda respectiva de las ruedas traseras, en donde cada una de las ruedas traseras gira cuando el brazo de control asociado es pivotado, el acoplador sujetado operativamente al par de brazos de control y está configurado para enlazar los brazos

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de control para pivotar cooperativamente, y el par de manijas movibles adaptadas para ser agarradas por un niño que está sentado sobre el asiento del vehículo, cada manija está sujeta respectivamente a uno de los brazos de control en donde las manijas operan en paralelo y se mueven de manera recíproca para direccionar las ruedas.

8. El vehículo para niños de la reivindicación 7, en donde el conjunto de dirección comprende adicionalmente enlaces de dirección adaptados para enlazar las manijas movibles a los brazos de control.

9. El vehículo para niños de acuerdo a la reivindicación 7 o 8, en donde cada una de las manijas se mueve entre una posición hacia adelante hacia la parte frontal del vehículo y una posición hacia atrás hacia la parte trasera del vehículo.

10. El vehículo para niños de cualquiera de las reivindicaciones 7 a 9, en donde el vehículo tiene un eje alargado y adicionalmente en donde cada una de las manijas pivota alrededor de un eje que se extiende generalmente en la dirección transversal al eje alargado del vehículo.

11. El vehículo para niños de acuerdo a cualquiera de las reivindicaciones 7 a 10, en donde cada uno de los brazos de control pivota alrededor de un eje recto que se extiende hasta la superficie del suelo.

12. El vehículo para niños de acuerdo a cualquiera de las reivindicaciones 7 a 11, en donde el conjunto de dirección también comprende un soporte de conjunto de manija acoplado a cada una de las manijas y el cuerpo y adaptado para permitir que las manijas pivoten.

13. El vehículo para niños de cualquiera de las reivindicaciones 7 a 12, en donde el acoplador está adaptado

para mantener una relación espaciada entre el par de brazos de control.

14. El vehículo para niños de acuerdo a cualquiera de las reivindicaciones 1 a 13, en donde el cuerpo está formado para
5 parecerse a un cargador de dirección de skid.

15. El vehículo para niños de acuerdo a cualquiera de las reivindicaciones 1 a 14, que comprende adicionalmente un conjunto de cucharón sujeto al cuerpo del vehículo.

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16. El vehículo para niños de cualquiera de las reivindicaciones 1 a 15, que comprende adicionalmente una jaula de rodillos sujeto al cuerpo del vehículo.

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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800176089-2

RECIBO OFICIAL DE CAJA : 08 - 45,884
FECHA : JUNIO 9 DE 2008

***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PAGO	Vr. PAGO
CAVELIER ABOGADOS	CONSIGNACION	BANCO DE BOGOTA	062754387	2678328	09/06/2008	89,445,000.00

***** CONCEPTO *****

CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-03	CAMBIO DE MODALIDAD Y MODIFICA	
		12 MARCAS Y LEHAS COMERCIALES	103,000.00
		TOTAL :	\$ 103,000.00

SDN: CIENTO TRES MIL PESOS

RESPONSABLE : _____

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____

Edo 00573- 891-005-8

United States Patent [19]

Forbes et al.

[11] Patent Number: 4,497,502

[45] Date of Patent: Feb. 5, 1985

[54] RECUMBENT TRICYCLE

4,359,231 11/1982 Mulcahy 280/281 LP

[75] Inventors: Robert C. Forbes, Sun Valley, Calif.;
John VanderKam, Dayton, Ohio

[73] Assignee: Huffy Corporation, Dayton, Ohio

[21] Appl. No.: 462,489

[22] Filed: Jan. 31, 1983

[51] Int. Cl.³ B62D 9/02

[52] U.S. Cl. 280/281 LP; 280/240;
280/269; 280/282

[58] Field of Search 280/281 LP, 282, 240,
280/263, 267, 269

[56] References Cited

U.S. PATENT DOCUMENTS

1,599,223	7/1926	Epps	280/269
2,207,161	7/1940	Roe	280/269
3,311,388	3/1967	Ryan et al.	280/282
3,960,392	6/1976	Read	280/282
4,198,072	4/1980	Hopkins	280/282
4,279,429	7/1981	Hopkins et al.	280/281 LP
4,332,395	6/1982	Zech	280/269

OTHER PUBLICATIONS

"Funcycle!", *Bicycle Journal*, Nov., 1982, p. 11.

Primary Examiner—Joseph F. Peters, Jr.

Assistant Examiner—Kenneth R. Rice

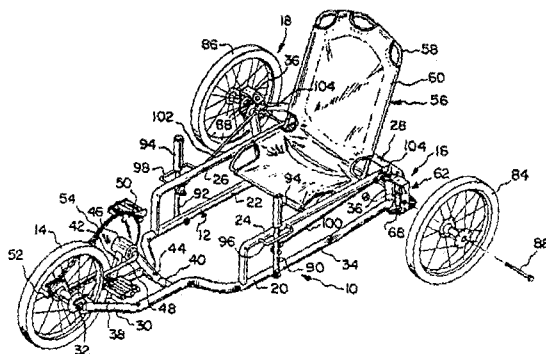
Attorney, Agent, or Firm—Biebel, French & Nauman

[57]

ABSTRACT

A recumbent tricycle including a frame, twin rear wheels pivotally mounted to the frame and steerable by a pair of levers pivotally mounted to the frame on either side of a passenger seat. The rear wheels are oriented substantially vertically and are attached to hubs inclined inwardly toward the frame to create a cambered effect which maintains the rear wheels in a forward-facing position as the tricycle moves in a rectilinear path. The single front wheel is preferably driven by a pedal crank assembly mounted rearwardly of the front wheel and forwardly of the passenger seat.

8 Claims, 6 Drawing Figures



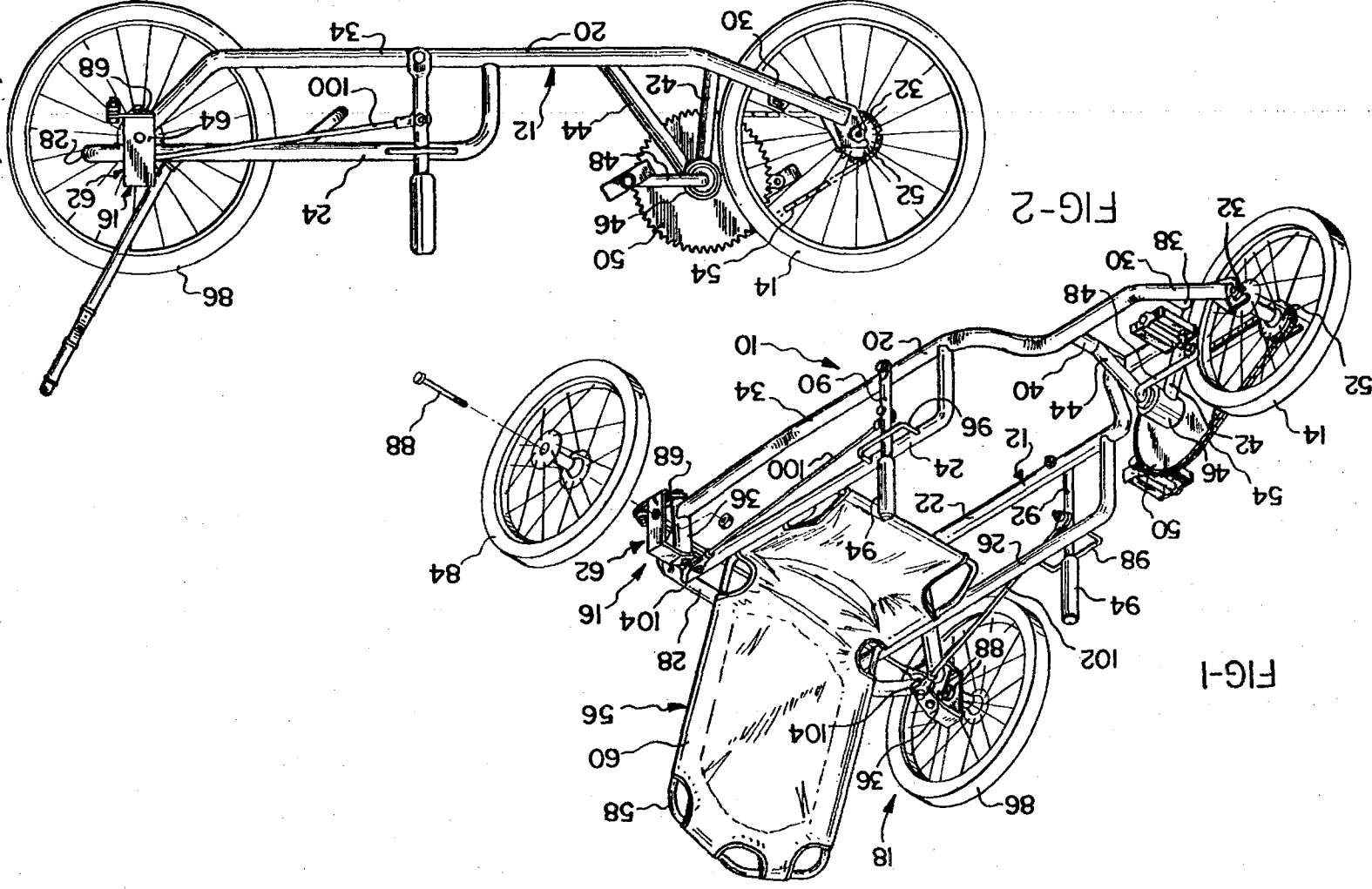
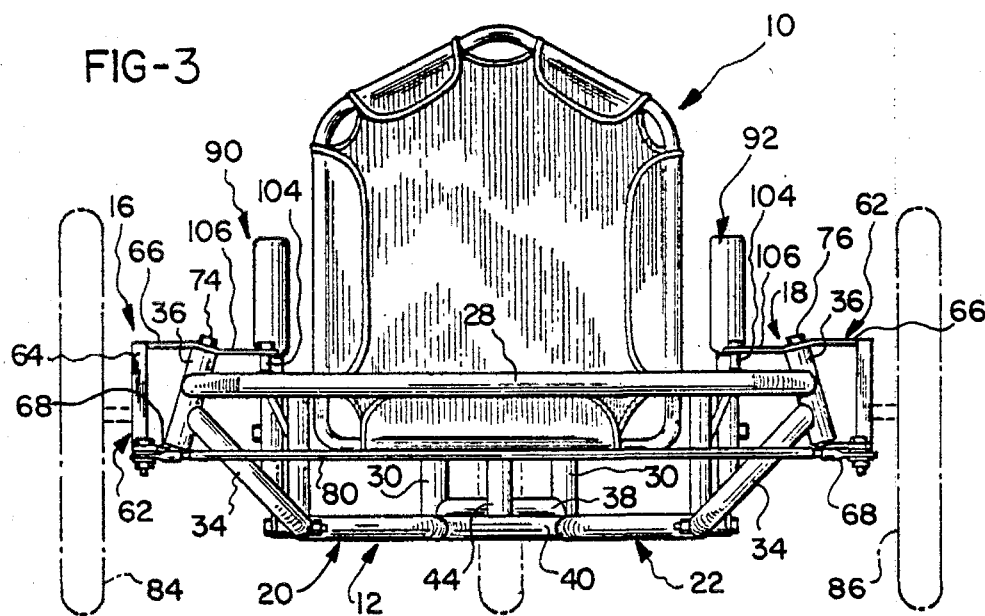


FIG-1

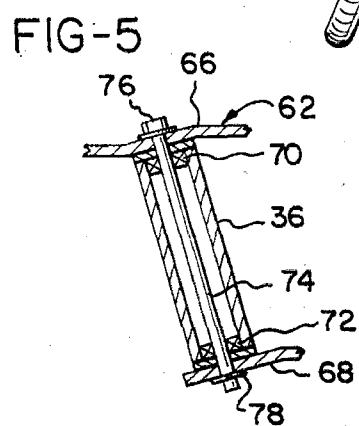
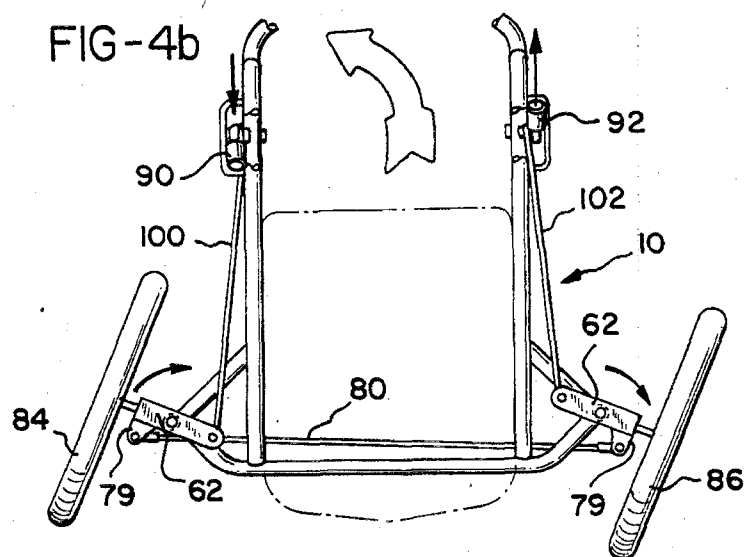
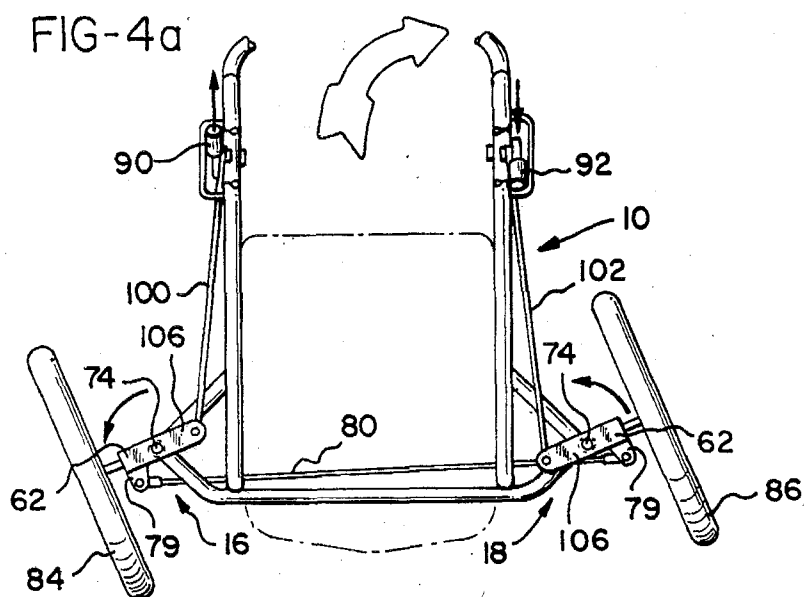
FIG-2

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FIG-3



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RECUMBENT TRICYCLE

BACKGROUND OF THE INVENTION

The present invention relates to tricycles, and more particularly to recumbent tricycles having steerable twin rear wheels.

Of passenger-propelled vehicles, tricycles provide a vehicle which is more stable than a bicycle and has a turning radius which is usually smaller than that of a four-wheeled vehicle. Furthermore, unlike bicycles, a three-wheeled passenger-powered vehicle may include a relatively comfortable seat which provides support for the back of the operator and allows the operator to ride in a recumbent position. Such tricycles are known as recumbent tricycles.

One type of recumbent tricycle consists of a frame, a single pedal-driven rear wheel, and twin steerable front wheels. One disadvantage of this design is that the single rear wheel affords only a single point of support of the rear of the vehicle, which typically bears the bulk of the weight of the operator, and therefore such vehicles often become unstable during sharp turns. Another disadvantage is that the drive mechanism, typically a pedal-driven chain and sprocket drive, requires that a sprocket chain pass beneath the operator's seat to the rear wheel, necessitating a higher seat and hence a higher center of gravity, which reduces stability.

A different type of recumbent tricycle includes a frame mounting a single front wheel and steerable twin rear wheels. The advantage of this design is that the twin wheels each bear a portion of the higher rear load and also provide two spaced apart points of support to the rear of the vehicle which increases the stability of the vehicle when turning.

For example, in the Mulcahy U.S. Pat. No. 4,359,231, a tricycle is disclosed having a single front wheel and two steerable rear wheels. The rear wheels are rotatably mounted to an axle which is pivotally mounted to the frame of the tricycle at a central rearward portion thereof. A pair of steering handles are rigidly mounted to the frame on either side of the passenger seat, and the passenger turns the vehicle by grasping the handles and leaning, thereby causing the rear axle to pivot and point the rear wheels away from a forward facing direction.

A disadvantage with that type of design is that the tricycle lacks a positive steering mechanism which turns either the front or rear wheels in a predictable or gradual manner to effect a predetermined rate of turning. Another disadvantage with this type of steering mechanism is that it would be difficult for the operator to pedal such a vehicle and at the same time maintain the rear wheels in a turning configuration by leaning to the side. Furthermore, it would be difficult for the operator to adjust his weight sufficiently rapidly to vary the direction of the tricycle from a sharp turn in one direction to a sharp turn in the opposite direction. Indeed, such rapid shiftings of the body weight of the operator might cause the tricycle of that design to lose stability.

Accordingly, there is a need for a recumbent tricycle which can support an operator comfortably and have twin steerable rear wheels which can be turned gradually and predictably by the operator so that sharp turns can be effected without significantly affecting the stability of the vehicle. There is also a need for a recumbent tricycle in which the front wheel is powered, thereby obviating the need to raise the operator seat to provide clearance for a rear wheel drive train to pass thereun-

der. It is also desirable to fabricate a tricycle having the aforementioned characteristics such that it includes a relatively lightweight frame and relatively easily constructed steering and propulsion components.

SUMMARY OF THE INVENTION

The present invention provides a recumbent tricycle having a pair of steerable rear wheels which are turned by a pair of levers pivotally mounted to the frame on either side of the passenger seat. The tricycle is propelled by a chain and sprocket crank mechanism which drives the front wheel and thereby eliminates the need to raise the passenger seat—and hence the center of gravity of the vehicle—to provide clearance for a drive train to extend beneath the seat to the rear wheels. Furthermore, the rear wheels of the tricycle of the present invention are mounted to the frame by cambered hinges which maintain the rear wheels in a forward-facing direction and thereby impart a stability to the vehicle as it travels in a rectilinear path.

The tricycle of the present invention consists of a frame having a passenger seat, a non-steerable front wheel rotatably mounted to the frame forwardly of the seat, a pedal crank assembly for rotating the front wheel, a pair of rear wheel assemblies mounted to the frame rearwardly and on either side of the seat, and a pair of steering levers mounted to the frame on either side of the seat for forward and rearward pivotal movement, joined to the rear wheel assemblies by link rods. The rear wheel assemblies each include a substantially vertically oriented rear wheel rotatably mounted to a hinge attached to the frame having a pivotal axis inclined inwardly from the vertical toward the frame. The hinges each includes a link arm projecting inwardly of the pivotal axis of the hinge and attached to the associated link arm. The steering levers may then be pivotally displaced in alternate forward and rearward positions so that the rear wheels are pivoted to turn the tricycle in a direction corresponding to the rearwardly pivoted lever. That is, to effect a left turn, for example, the operator pivots the levers such that the left-hand lever is pivoted rearwardly and the right-hand lever is pivoted forwardly. An advantage of this type of steering structure is that the operator is forced by the resultant positioning of his hands to lean into the turn, thereby maintaining the proper stability of the tricycle. Of course, the operator will be forced to lean to the right when turning the vehicle to the right, thereby leaning into the turn.

To provide strength yet maintain a relatively lightweight vehicle, the frame is made of tubular members and includes a pair of lower rails having an upwardly inclined forward portion rotatably mounting the front wheel, a divergent portion passing below and outwardly of the seat and terminating in an upwardly inclined section which supports the hinges, a rear rail extending between and supporting the hinges at upper portions thereof, and a pair of upper side rails, each extending upwardly from one of the lower side rails and joined to the rear rail. Thus, the frame is generally low slung and provides a low center of gravity when carrying the operator, thereby increasing stability. The steering levers preferably are pivotally mounted to the lower side rails, and the seat is mounted to the upper side rails. The link rods are mounted to the steering levers at a position intermediate the pivotal mounting and the portion grasped by the operator to provide a mechanical

advantage to the operator when turning the wheels, thereby reducing the effort required to steer the vehicle.

Accordingly, it is an object of the present invention to provide a recumbent tricycle having a pair of rear wheels which are positively steerable by hand-operated pivoting steering levers; a tricycle which does not require a raised seat to accommodate a drive train and, therefore, has a relatively low center of gravity; a tricycle with cambered wheel mountings to add stability to the vehicle as it travels in a rectilinear path; and a tricycle with a lightweight yet strong frame which can be easily constructed of relatively inexpensive materials.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the recumbent tricycle of the present invention in which a left rear wheel is exploded therefrom;

FIG. 2 is a side elevation of the tricycle of FIG. 1 with the left rear wheel removed therefrom;

FIG. 3 is a rear elevation of the tricycle of FIG. 1 in which the wheels are shown in phantom;

FIGS. 4a and 4b are details showing the tricycle of FIG. 1 in which the steering levers are oriented to steer the vehicle to the right and to the left, respectively; and

FIG. 5 is a detail showing a rear wheel hinge housing and wheel bracket in section and a hinge pin in full.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIGS. 1 and 2, the recumbent tricycle of the present invention, generally designated 10, includes a frame 12, front wheel 14, and left and right rear wheel assemblies 16,18, respectively. The frame 12 includes left and right lower rails 20,22, respectively, a left and right upper side rails 24,26, respectively, and a rear rail 28.

The lower rails 20,22 each include a forward, upwardly inclined portion 30 which supports the front wheel 14 at the axle 32 thereof, and a rearward portion 34 which diverges outwardly from the forward portion and extends rearwardly and upwardly to a hinge housing 36 at a lower portion thereof which forms a component of the rear wheel assemblies 16,18. The upper side rails 24,26 are attached at forward ends thereof to the lower rails 20,22, respectively, and extend rearwardly to the rear rail 28. The rear rail is generally U-shaped, and extends between the hinge housing to the upper portions thereof, as best shown in FIGS. 2 and 3.

Thus, the contour of the lower rails 20,22 of the frame 12 provides a low-slung appearance concomitant with low center of gravity. The rearwardly protruding rear rail 28 acts as a rear bumper, protecting the operator of the tricycle 10.

The frame 12 includes forward cross members 38,40 which extend between the lower rails 20,22 and in turn support struts 42,44, respectively. Struts 42,44 are joined by a crank housing 46 which mounts a bicycle pedal crank assembly 48, of a type well-known in the art, having a drive sprocket 50. Drive sprocket 50 is operatively joined to a driven sprocket 52 by a sprocket chain 54. Driven sprocket 52 is mounted on the axle 32 of the front wheel 14.

The upper side rails 24,26 support an operator seat 56 consisting of a tubular frame 58 over which is attached a fabric 60 such as nylon.

As best shown in FIGS. 1 and 3, each of the rear wheel assemblies 16,18 includes a cylindrical hinge housing 36 which mounts a rear wheel bracket 62 for pivotal movement relatively thereto. Each rear wheel bracket 62 includes a vertical member 64, an upper flange 66, and a lower flange 68 (also shown in FIGS. 4a and 4b).

As shown in FIG. 5, each hinge housing 36 consists of a hollow cylinder having bearings 70,72 pressed into upper and lower ends thereof, which support a hinge pin 74 for rotation. The hinge pin 74 passes through the upper flange 66 and lower flange 68, thereby mounting the rear wheel bracket 62 for pivotal movement relative to the housing 36. The pin 74 includes a formed head 76 and a lock fastener 78 of well-known design so that it is retained within the housing 36. It is understood that other types of attaching arrangements may be employed to mount the rear wheel bracket to the housing 36 for relative pivotal movement without departing from the scope of the invention.

The lower flanges 68 of the rear wheel assemblies 16,18 include studs 79 joined by a tie rod 80 which is pivotally mounted to the lower flange at its ends by pivot connections 82 of well-known design. Left and right rear wheels 84,86 are rotatably mounted to the vertical members 64 of the rear wheel brackets 62 by nut and bolt combinations 88. Thus, the rear wheels 84,86 are maintained in parallel alignment relative to each other by the tie rod 80, regardless of their radial orientation relative to their respective hinge pins 74.

Left and right steering levers 90,92, respectively, are pivotally mounted at lower ends thereof to the left and right lower rails 20,22, forwardly of the passenger seat 56 and rearwardly of the pedal crank assembly 48. The upper portions of the steering levers 90,92 include hand grips 94, and the forward and rearward pivotal movement of the levers is limited by retaining bars 96,98, mounted to the upper side rails 24,26, respectively.

Left and right link rods 100,102, respectively, are pivotally mounted at their forward ends to the left and right steering levers 90,92, respectively, at a location midway between the ends of the levers. The rearward ends of the link rods 100,102 are pivotally mounted to the upper flanges 66 of the left and right rear wheel assemblies 16,18 by pivot joints 104 of well-known design. As best shown in FIG. 3, the pivot joints 104 are attached to the upper flanges 66 at inboard ends thereof, the portion extending inwardly from the hinge pin 74 acting as a link arm 106 to provide the operator of the tricycle 10 with a mechanical advantage when operating the steering levers 90,92 and to rotate the wheel brackets counter to the direction of link rod 100,102 movement.

As shown in FIG. 3, the hinge housings 36 are inclined inwardly toward the frame 12 such that the hinge pins 74 define pivotal axes for pivotal movement of the rear wheel brackets 62 to provide a camber effect to the rear wheels 84,86. Preferably, this angle of inclination of the pivotal axis is approximately 10° from the vertical. This camber effect forces the rear wheels 84,86 to assume a forward-facing orientation such that, absent a turning force imparted by the operator, they will guide the tricycle 10 in a substantially rectilinear path.

The operation of the tricycle 10 is best shown in FIGS. 1, 4a and 4b. To propel the tricycle 10, the opera-

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tor sits in the seat 56, places his feet on the pedals of the pedal crank assembly 48, then pedals in a manner similar to other pedal-driven cycles. The rotation of the pedal crank assembly 48 rotates the drive sprocket 50 which transmits its rotational movement through the sprocket chain 54 to the driven sprocket 52 to rotate the front wheel 14. Since the crank assembly 48 is positioned on the frame 12 adjacent the driven wheel, there is no need for expensive and cumbersome power transmission means to pass under the seat 56, necessitating the raising of the seat and hence the raising of the center of gravity, thereby reducing the stability of the tricycle 10.

To steer the tricycle 10 to the right, as shown in FIG. 4a, the operator grasps the left and right steering levers 90,92 and simultaneously pushes the left steering lever forwardly and pulls the right steering lever rearwardly. This pivotal movement of the steering levers 90,92 is transmitted through the link rods 100,102 to the rear wheel brackets 62. Since the link rods 100,102 are attached to the wheel brackets 62 at the inboard ends of the link arms 106 on a side of the pivot pins 74 opposite the rear wheels 84,86, the forward movement of the left steering lever 90 and link rod 100 causes the rear wheel bracket to rotate in a counterclockwise direction about pivot pin 74, thereby orienting the left rear wheel to point to the left.

Similarly, the rearward movement of the right steering lever 92 and link rod 102 causes the rear wheel bracket 62 of the right rear wheel assembly 18 to rotate in a counterclockwise direction, thereby turning the right rear wheel 86 to the left. The rear wheels 84,86 are maintained in parallel to each other by the tie rod 80 extending between the studs 79 of the rear wheel brackets 62. Continued driving rotation of the front wheel 14 causes the vehicle to advance, and the leftward orientation of the rear wheels 84,86 causes the rear of the tricycle 10 to swing to the left, thereby turning the nose of the tricycle to the right, thus effecting a right turn.

Conversely, to effect a left turn, the left steering lever 90 is pulled rearwardly by the operator and the right steering lever 92 is pushed forwardly. This movement is transmitted to the rear wheel brackets by the link rods 100,102 and rotates the brackets in a clockwise direction, thereby orienting the rear wheels 84,86 to point to the right. The rear of the tricycle 10 thus swings to the right, thereby pointing the nose of the tricycle to the left.

It should be noted that, since the operator must pull the right steering lever 92 rearwardly to effect a right turn, and the left steering lever 90 rearwardly to effect a left turn, while at the same time pushing forwardly on the opposite levers in each case, the operator is forced to lean into the turn, which results in increased stability. Thus, the attachment of the link rods 100,102 to the rear wheel brackets at a location inboard of the pivotal axes of the rear wheel assemblies 16,18 is preferable to attaching the link rods to the rear wheel brackets immediately adjacent the rear wheels 84,86 and on the same side of the hinge pins 74. To do so would result in the operator having to effect a right turn by pushing the right steering lever forwardly, or a left turn by pushing the left steering lever forwardly, causing him to lean out of the turn and thereby decrease the stability of the tricycle 10 when turning.

The components of the tricycle 10 are all well-known in the cycle art. The frame 12 preferably is made of a relatively strong tubular steel, but can be made of alumi-

num or metal alloys. The wheels 14,84,86 may be bicycle-type pneumatic tires.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus and that changes may be made therein without departing from the scope of the invention.

What is claimed is:

1. A tricycle comprising:

a front wheel;

a frame having a passenger seat and including a pair of lower rails, each having an upwardly-inclined forward portion rotatably and nonsteerably mounting said front wheel, a divergent portion passing below and outwardly of said seat and terminating in an upwardly inclined section, a rear rail extending between said divergent portions and having an arcuate shape protruding rearwardly of said frame thereby providing a rear bumper therefor, and a pair of upper side rails, each extending upwardly from a different one of said lower side rails to said rear rail;

a pair of rear wheel assemblies mounted to said frame rearwardly of and on either side of said seat, each including a substantially vertically oriented rear wheel, hinge means attached to said rear rail at a top portion thereof and to one of said divergent portions of said lower rails at a bottom portion thereof and having a pivotal axis inclined 10° from the vertical inwardly toward said frame and mounting said rear wheel for rotational movement about a horizontal axis and pivotal movement about said pivotal axis;

each of said hinge means including a housing attached to said rear rail and said lower rail, a rear wheel bracket pivotally mounted to said housing to rotate about said pivotal axis and including a vertical member rotatably mounting an associated one of said rear wheels, an upper flange pivotally attached to said housing at an upper portion thereof and including a link arm extending inwardly from said pivotal axis, and a lower flange pivotally attached to said housing and including a stud projecting outwardly from said pivotal axis;

a tie rod attached to and extending between said studs of said hinge means whereby said rear wheels are at all times oriented substantially parallel to each other;

steering means including a pair of levers mounted to different ones of said lower rails on either side of said seat for forward and rearward pivotal movement, a pair of link rods operatively joining each of said levers to one of said link arms on a common side of said frame, such that said levers may be displaced in alternate forward and rearward positions wherein said rear wheels are pivoted to turn said tricycle in a direction corresponding to said rearwardly pivoted lever; and

means for rotating said front wheel including crank means mounted to said frame forwardly of said seat and rearwardly of said rear wheel.

2. A recumbent tricycle comprising:

a frame including a pair of lower rails, each having a forward, upwardly inclined portion and a divergent portion terminating in an upwardly inclined section, a pair of upper side rails, each extending upwardly and rearwardly from a different one of

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said lower side rails, and a rear rail extending between and attached to said upper side rails;
a nonsteerable front wheel rotatably attached to said frame at said upwardly inclined portion;
means for driving said front wheel including a crank assembly mounted on said frame rearwardly of said front wheel;
a seat mounted on said frame rearwardly of and remote from said front wheel, said seat positioned above and inwardly of said divergent portion;
a pair of rear wheel assemblies mounted on said frame adjacent to either side of said seat and rearwardly thereof, each including a substantially vertically oriented rear wheel and hinge means attached at a lower end thereof to said upwardly inclined section of one of said lower rails, and at an upper end thereof to an end of said rear rail, said hinge means having a pivotal axis inclined inwardly toward said frame and mounting said rear wheel for rotational movement about a horizontal axis and pivotal movement about said pivotal axis, said rear wheel assemblies being operatively interconnected such that said rear wheels pivot about said pivotal axes in unison; and
steering means including a pair of levers pivotally mounted on said frame on either side of said seat for forward and rearward movement, a pair of link arms, each projecting inwardly from a different one of said hinge means, and a pair of link rods operatively joining said levers to said link arms, such that said levers may be pivotally displaced in alternate forward and rearward positions wherein said rear wheels are pivoted to turn said tricycle in a direction corresponding to said rearwardly pivoted lever.
3. The tricycle of claim 2 wherein said levers are each pivotally mounted to a different one of said lower side rails.
4. The tricycle of claim 3 wherein said seat is mounted to said upper side rails forwardly of said rear rail.
5. The tricycle of claim 4 wherein said rear rail is generally arcuate in shape, extending rearwardly of said frame, thereby providing a rear bumper therefor.
6. The tricycle of claim 5 wherein said pivotal axes of said hinge means are inclined 10° from the vertical toward said frame.
7. The tricycle of claim 6 wherein each of said hinge means comprises:
a housing attached to said rear rail and said lower rail;

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a rear wheel bracket pivotally mounted to said housing to rotate about said pivotal axis and including a vertical member rotatably mounting an associated one of said rear wheels, an upper flange pivotally attached to said housing at an upper portion thereof and including said link rod, and a lower flange pivotally attached to said housing and including a stud projecting outwardly from said pivotal axis; and
a tie rod attached to and extending between said studs whereby said rear wheels are at all times oriented substantially parallel to each other.
8. A recumbent tricycle comprising:
a frame including a pair of lower rails, each having a forward, upwardly inclined portion and a divergent portion terminating in an upwardly inclined section, a pair of upper side rails, each extending upwardly and rearwardly from a different one of said lower side rails, and a rear rail extending between and attached to said upper side rails;
a nonsteerable front wheel rotatably attached to said forward, upwardly inclined portion of said frame;
means attached to said frame for driving said front wheel;
a passenger seat attached to said frame rearwardly of said driving means, said seat positioned inwardly of and above said divergent portion;
a pair of rear wheel assemblies attached to said frame rearwardly of and on either side of said seat, each of said assemblies including a rear wheel and hinge means, supporting said rear wheel, attached at a lower end thereof to said upwardly inclined section of one of said lower rails, and at an upper end thereof to an end of said rear rail, said hinge means having a pivotal axis inclined inwardly toward said frame and mounting said rear wheel for rotation about a horizontal axis and pivotal movement about said pivotal axis, said rear wheel assemblies being operatively interconnected such that said rear wheels pivot about said pivotal axes in unison; and
steering means including a pair of levers pivotally attached to said frame on either side of said seat for forward and rearward movement, and link means attaching each of said levers to a corresponding one of said hinge means, such that said levers may be pivotally displaced in alternate forward and rearward positions wherein said rear wheels are pivoted to turn said tricycle in a direction corresponding to said rearwardly pivoted lever.
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United States Patent [19]

Berger et al.

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[54] CHILD'S RIDE-ON TOY WITH REVERSING DRIVE FOR REAR WHEELS

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[73] Assignee: Coleco Industries, Inc., West Hartford, Conn.

[21] Appl. No.: 488,050

[22] Filed: Apr. 25, 1983

[51] Int. Cl.³ B62D 11/04

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[58] Field of Search 180/6.66, 6.2, 210, 180/214; 46/263, 212; 74/352, 354, 355

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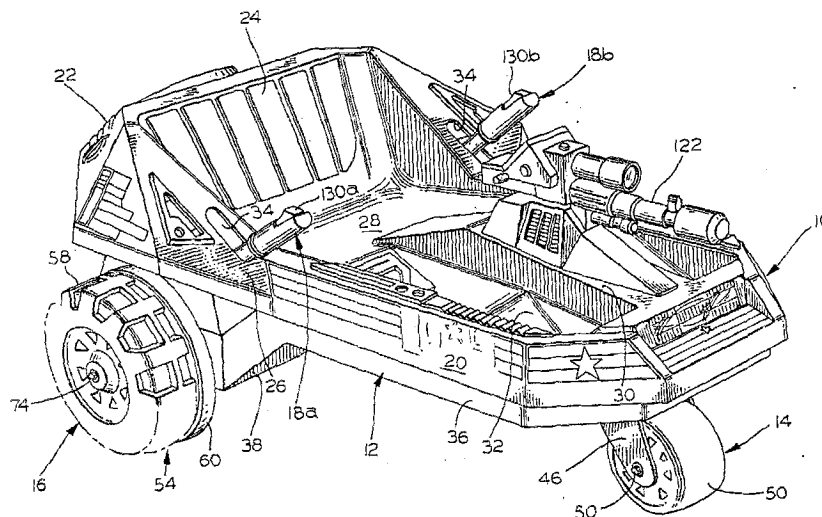
Primary Examiner—David M. Mitchell

Assistant Examiner—Mitchell J. Hill

[57] ABSTRACT

A child's motor powered vehicle utilizes a unidirectional electric motor supported on a drive shaft which carries at its ends drive members which are engageable with either one of a pair of radially spaced drive surfaces on the drive wheels. Control levers support the drive shaft adjacent its ends and are pivotally supported on the vehicle so that they may effect movement of the drive shaft end portions and the drive elements from one drive surface to another to effect a reversal in the direction of rotation of the drive wheels. The drive surfaces are conveniently provided by axial walls of a concentric channel on the inner face of the drive wheels.

19 Claims, 11 Drawing Figures



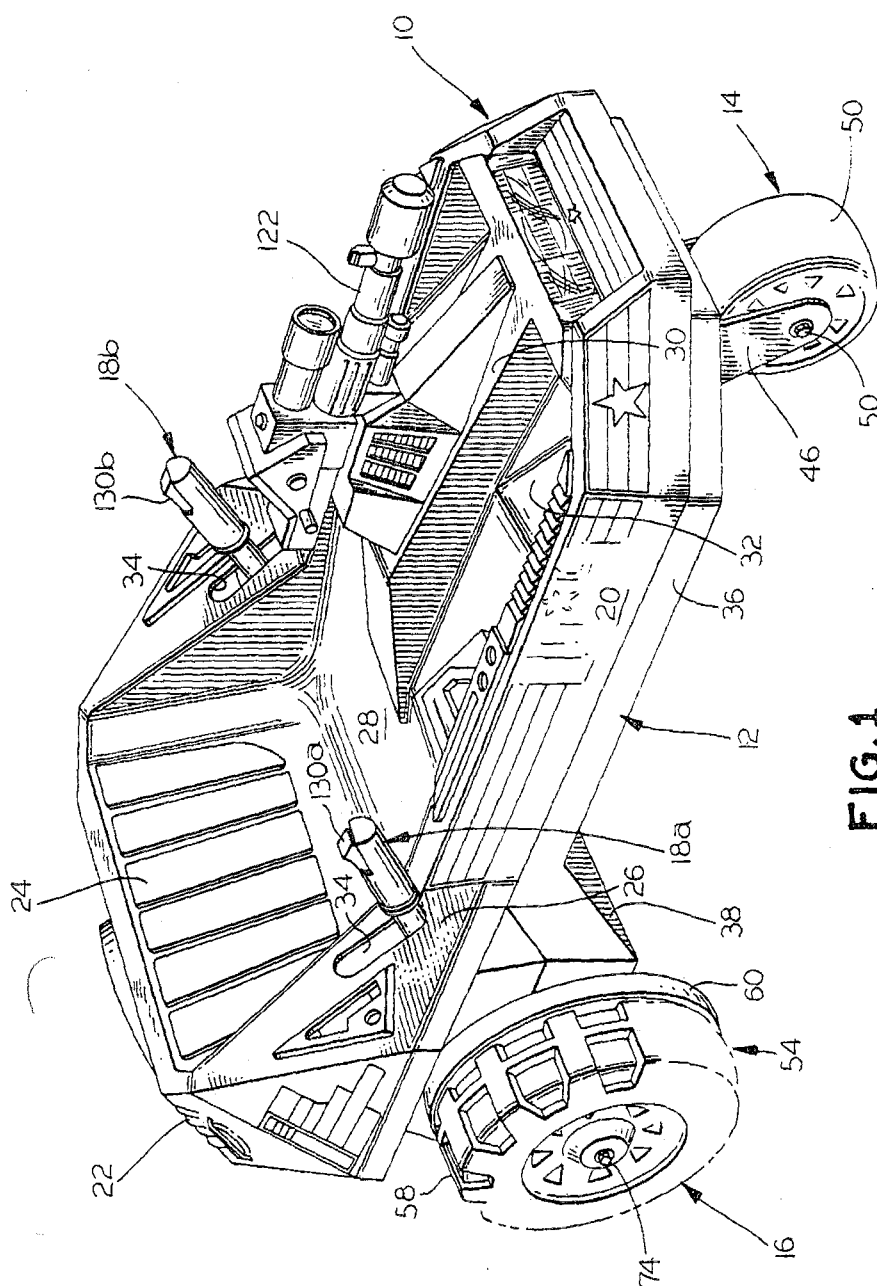
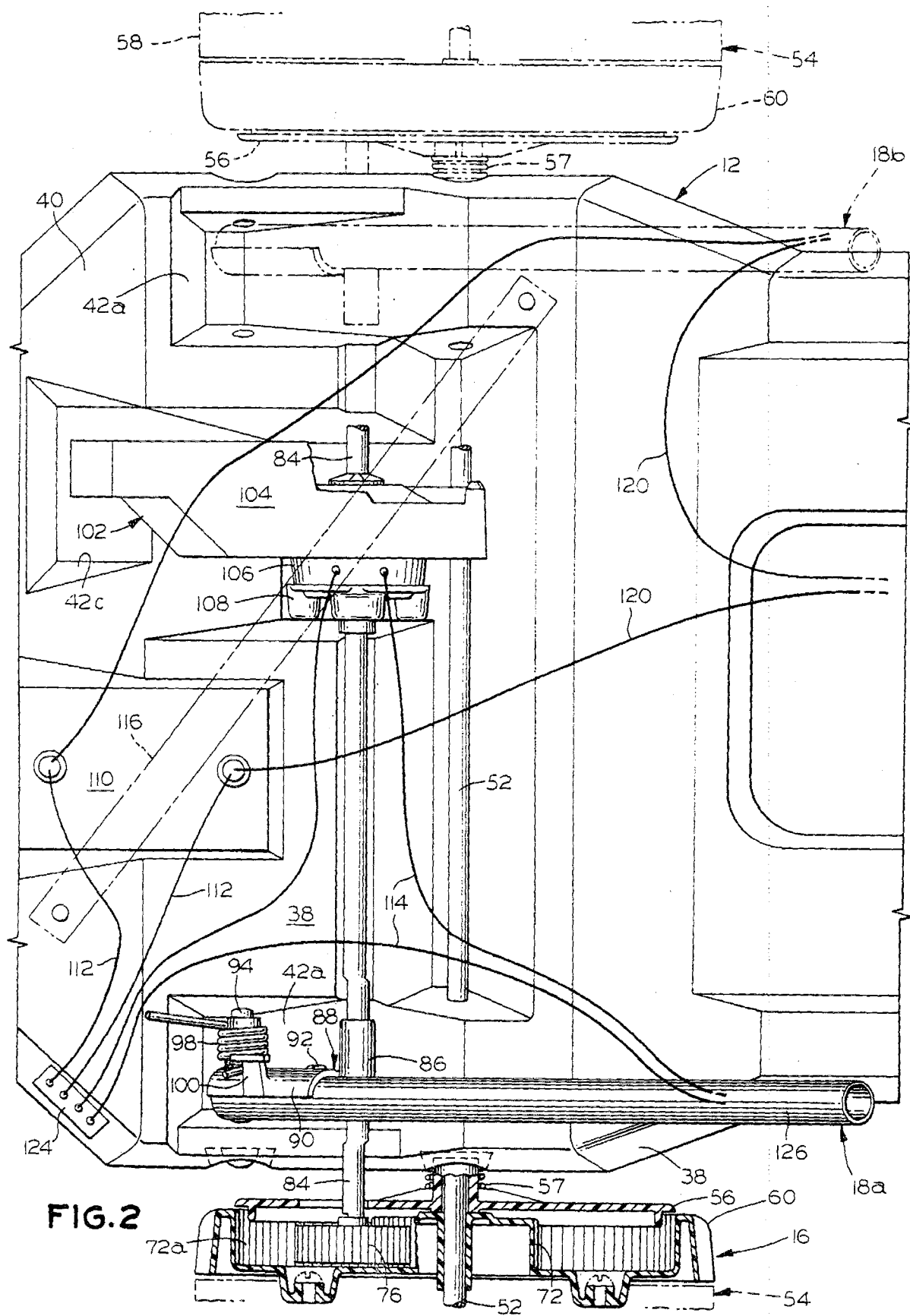
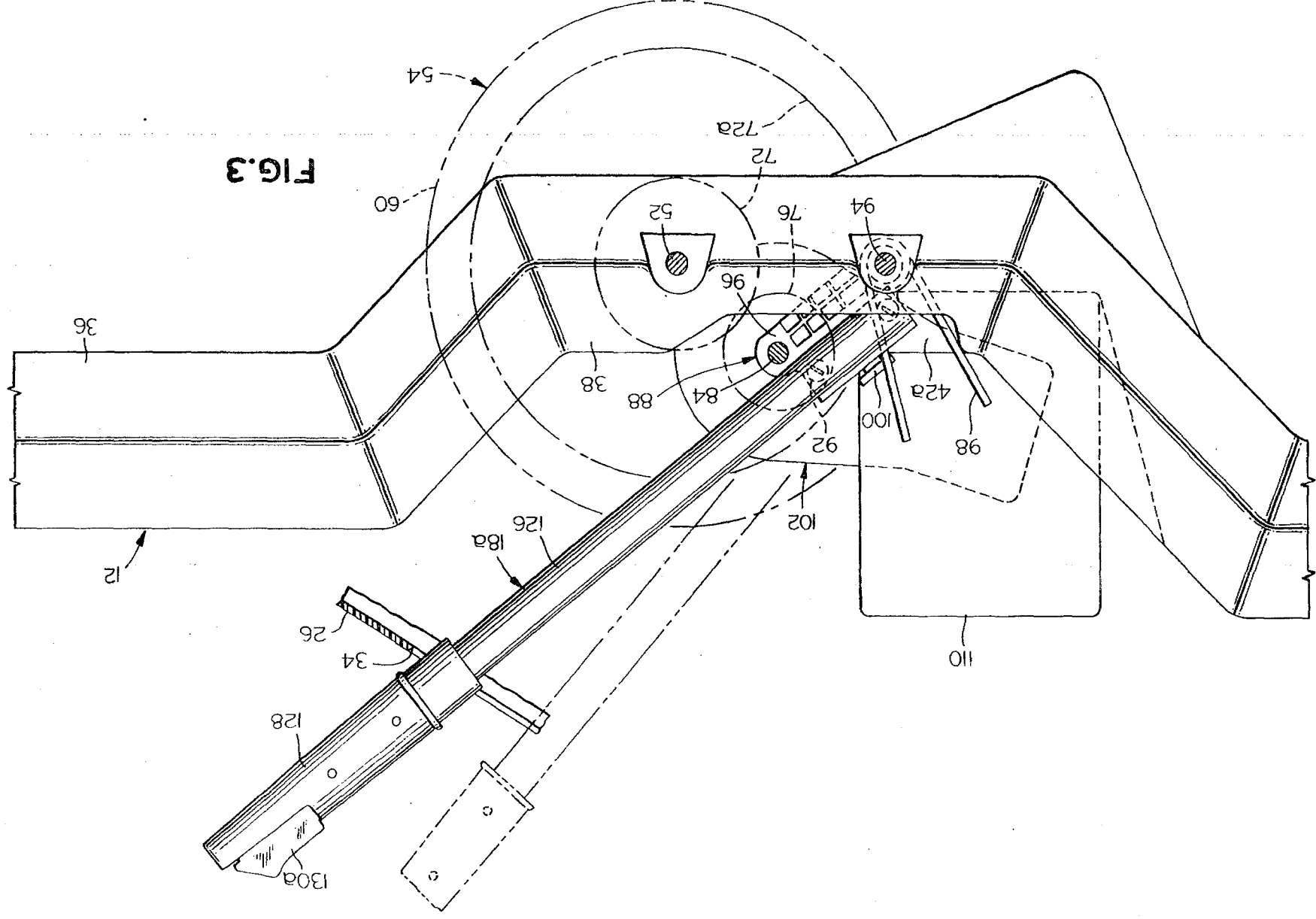


FIG. 1

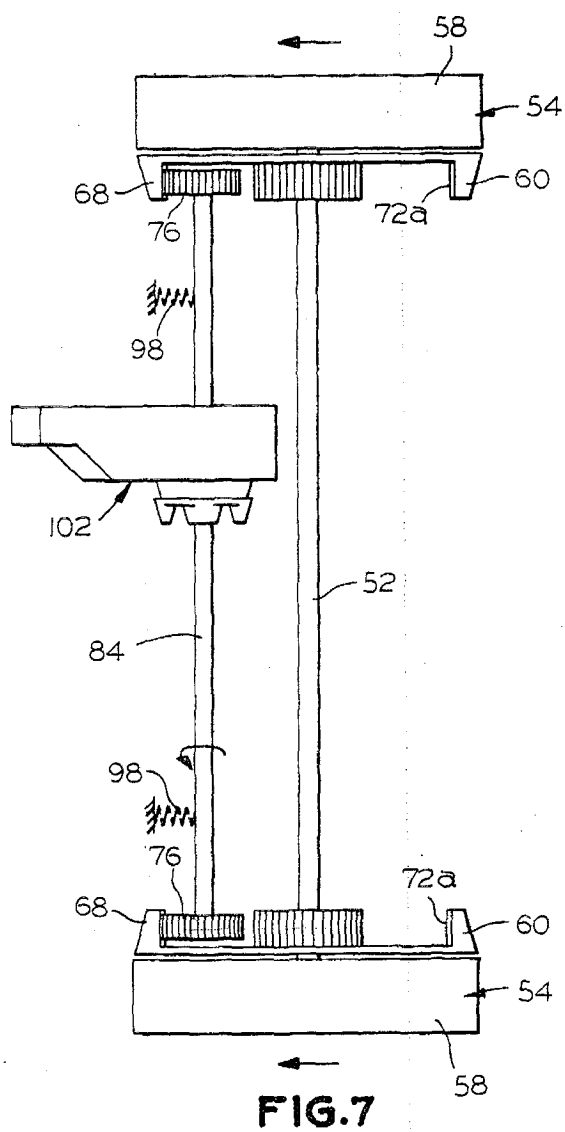
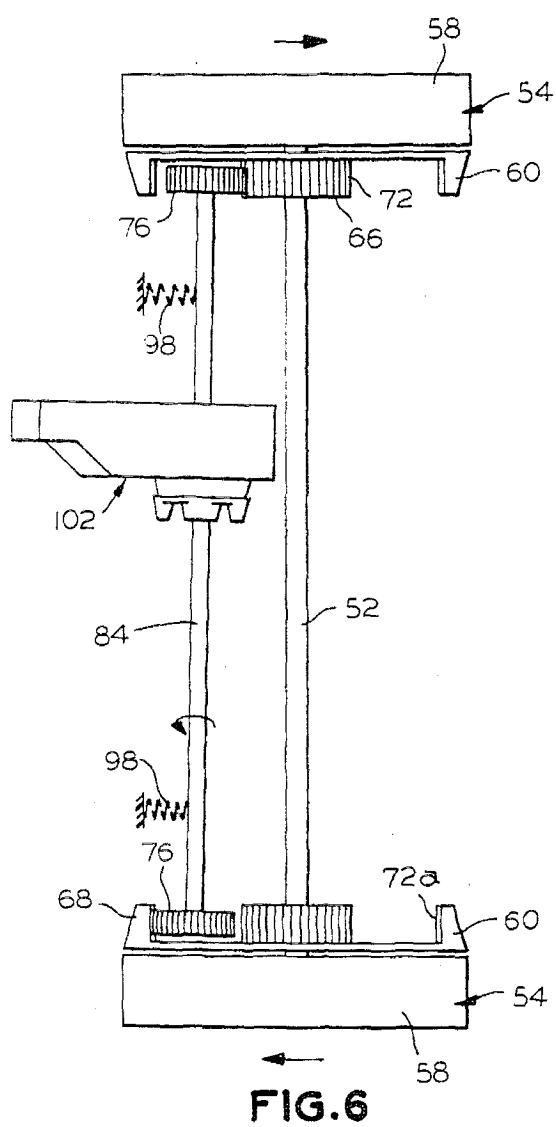
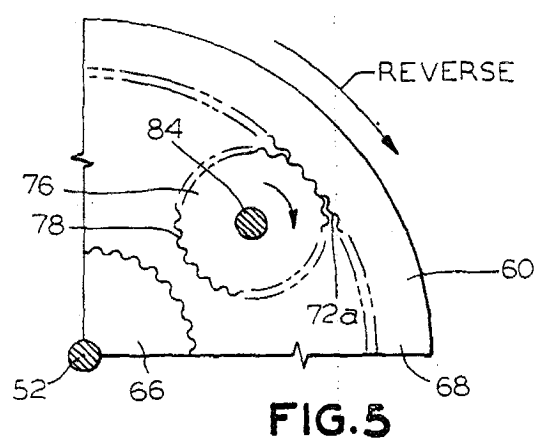
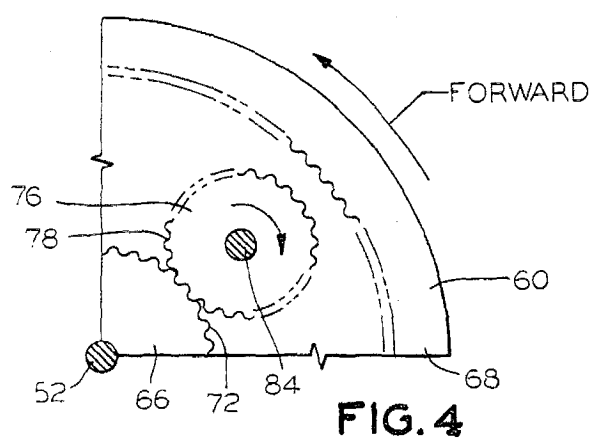
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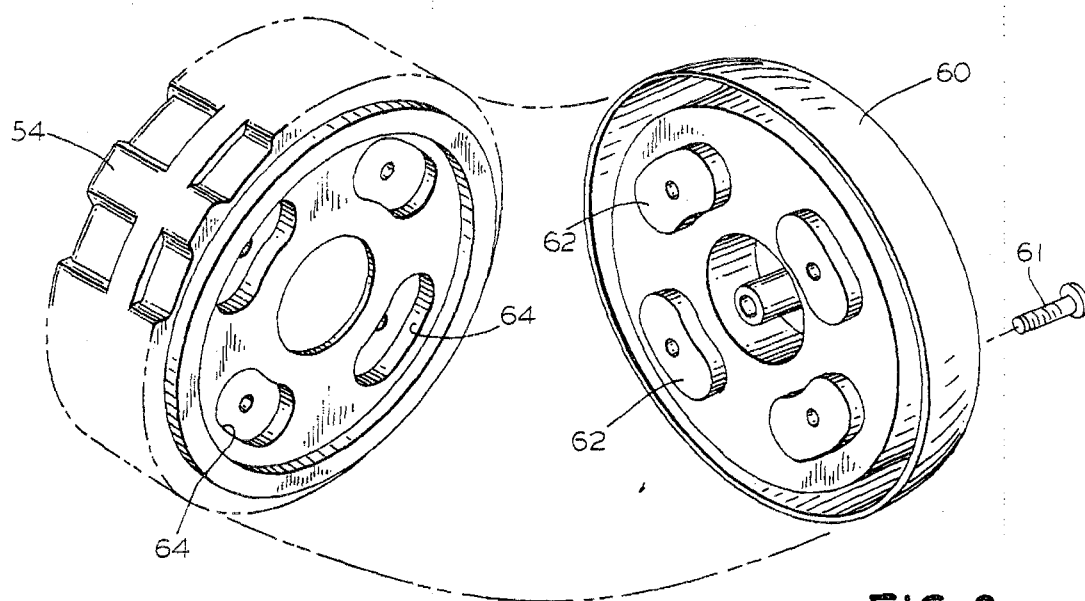


FIG. 8

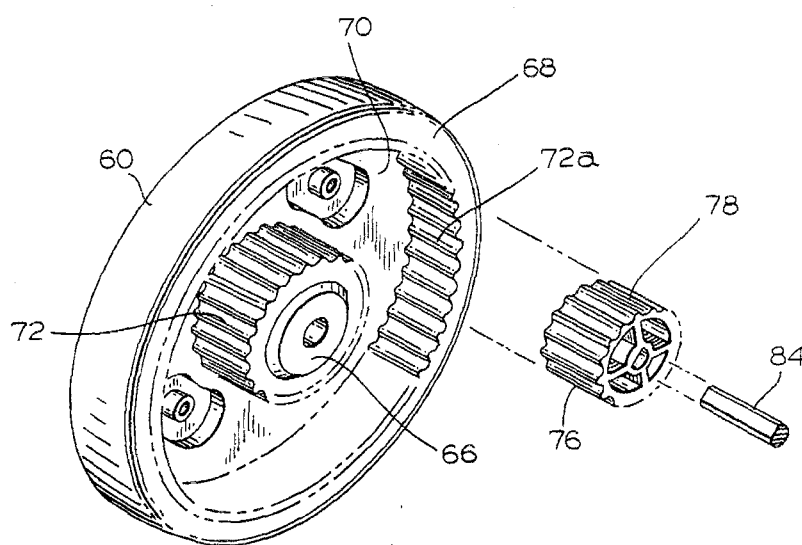


FIG. 9

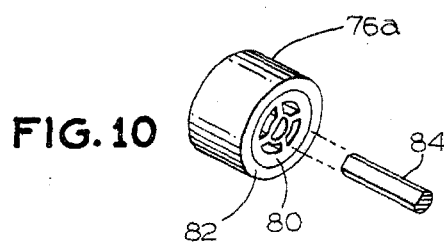


FIG. 10

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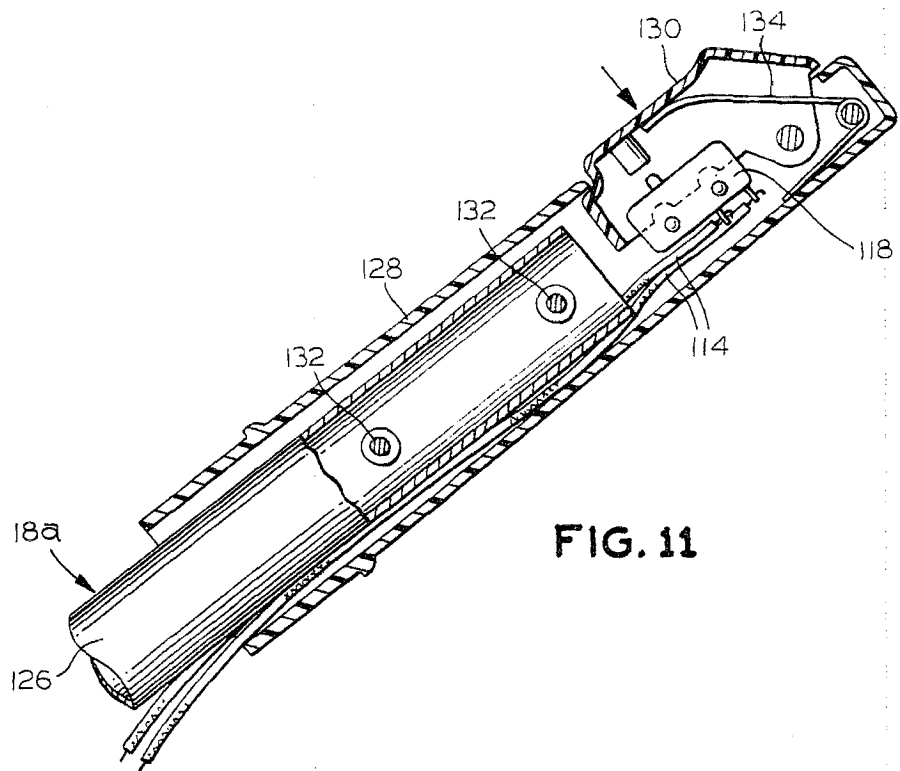


FIG. 11

CHILD'S RIDE-ON TOY WITH REVERSING DRIVE FOR REAR WHEELS

BACKGROUND OF THE INVENTION

In recent years, there has been increasing use of battery-powered motors to drive children's ride-on vehicles. Some of these vehicles use motors with reversible polarity and switches, or with gearing, to effect reversible rotation of the drive wheels, and these approaches generally increase costs and frequently present areas of failure in use.

It is an object of the present invention to provide a novel battery-powered child's vehicle which utilizes a unidirectional motor and a novel drive assembly to effect reversible rotation of the drive wheels.

It is also an object to provide such a vehicle in which steering is effected by independent control of the direction of rotation of two drive wheels.

Another object is to provide such a vehicle utilizing and independently reversible drive means for the rear wheels and a centerline front wheel which is readily pivotable about a vertical axis.

Yet another object is to provide such a vehicle which may be fabricated in large measure from easily formed and economical synthetic resin parts to provide a rugged and reasonably long-lived assembly.

SUMMARY OF THE INVENTION

It has now been found that the foregoing and related objects may be readily attained in a child's vehicle wherein a body is adapted to seat a child with its legs supported thereon, and a first wheel assembly is mounted by suitable means on the body for pivoting about a vertical axis. An axle is supported on the body in spaced relationship to the first wheel assembly, and rotatably supports a pair of drive wheels each having a drive portion including a pair of radially spaced drive surfaces extending coaxially about the axle. Also supported on the body in spaced relationship to the axle and generally parallel thereto in its at rest position is a drive shaft which has on its ends drive members for rotation therewith adjacent the drive surfaces. The drive elements and drive surfaces are engageable to effect driving engagement therebetween upon surface engagement thereof.

Power means is provided for effecting rotation of the drive shaft in one direction of rotation, and a pair of control levers extend upwardly from the body and are pivotably mounted thereon adjacent their lower ends. Each control lever is engageable with an end portion of the drive shaft, and pivoting of the lever from a first position to a second position effects movement of the respective drive shaft end portion and the drive element carried thereby from engagement with one drive surface of the adjacent wheel and into engagement with the other drive surface thereof. As a result, pivoting of the control levers from one position to another will effect a change in direction of rotation of that wheel, and positioning of the two control levers to effect engagement of the drive elements with opposite drive surfaces on the rear wheels will effect rotation of the wheels in opposite directions and turning of the vehicle. Moreover, positioning of the control levers to effect engagement of the drive elements with the same drive surfaces will effect generally straight line motion of the vehicle forwardly and rearwardly.

Desirably, the first wheel assembly is located in the front of the vehicle and the drive wheels and axle are located in the rear of the vehicle. The first wheel assembly includes a vertically extending post, at least one wheel supported for rotation thereon, and means journaling the post in the body for rotation about the vertical axis. Preferably, the post is disposed centrally of the width of the vehicle and in the front portion thereof.

In its preferred aspect, the power means includes an unidirectional electric motor supported on the drive shaft and engaged therewith to effect its rotation, and the electric motor and drive shaft are supported by the control levers. The drive wheels each have a drive portion on the inner face thereof including a concentric annular channel extending axially about the axle and defined by a base wall and opposed axially extending walls providing the drive surfaces. The drive members are disposed in the channels and are of a diameter less than the width of the channel. Moreover, the axially extending walls of the channel have axially extending teeth about their periphery and the drive members have cooperatively dimensioned and configured axially extending teeth about their periphery. To effect normal forward movement of the vehicle, the assembly preferably includes means biasing the control levers into the first position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a vehicle embodying the present invention;

FIG. 2 is a fragmentary plan view to an enlarged scale of the rear end portion with the body top member removed and with other portions broken away for clarity of illustration;

FIG. 3 is a fragmentary, partially diagrammatic side elevational view of the rear wheel and drive assembly with one of the control levers shown in full line in its at rest position and in phantom line in its second pivoted position;

FIGS. 4 and 5 are fragmentary, partially diagrammatic elevational views of the gears on the drive shaft and rear wheel in different positions of the drive shaft and drive gear to effect rotation of that rear wheel for movement of the vehicle in the forward direction and reverse direction, respectively;

FIGS. 6 and 7 are partially diagrammatic plan views of the rear wheels and axle, and the drive shaft and drive gears showing the wheels being driven in different directions of rotation and the same direction of rotation, respectively;

FIG. 8 is an exploded view of a rear wheel;

FIG. 9 is an exploded perspective view of the drive gear, the drive portion of a rear wheel, and a fragmentary portion of the drive shaft;

FIG. 10 is perspective view of an alternate embodiment of drive gear and a fragmentary portion of the drive shaft; and

FIG. 11 is a fragmentary sectional view to an enlarged scale of one of the control levers.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

Turning now in detail to FIG. 1 of the attached drawings, therein illustrated is a child's ride-on vehicle embodying the present invention and which includes a body comprised of the top member generally designated by the numeral 10 and undercarriage generally designated by the numeral 12, a front wheel assembly

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generally designated by the numeral 14, a rear wheel assembly generally designated by the numeral 16, and control levers generally designated by the numerals 18a and 18b. Not seen in this view is the drive assembly which will be described hereinafter.

The top member 10 has a peripheral skirt or sidewall 20, and the top wall is configured to provide a rear deck 22, seat back 24, inclined side extensions 26, seat 28 therebetween, gun pedestal 30, and foot recesses 32. The side extensions 26 have elongated slots 34 therein through which the control levers 18a and 18b extend.

The undercarriage 12 has an elongated front portion 36, a depending housing portion 38, and a generally flat rear portion 40. The housing portion 38 is formed with a series of recesses 42 in its upper surface to seat various elements of the assembly, as will be described more fully hereinafter.

The top member 10 is secured to the undercarriage 12 by a multiplicity of fasteners (not shown) spaced thereabout.

The front wheel assembly 14 is of a caster-type construction and includes a vertically extending post comprised of an inverted U-shaped fork 46 which has a shaft (not shown) extending vertically upwardly from its web portion (not shown) and journaled in the undercarriage 12 for free relative rotation about a vertical axis. The front wheel 48 is rotatably mounted on the front axle 50 which is supported in the legs of the fork 46.

The rear wheel assembly 16 includes an axle 52 which extends through the lower section of the housing portion 38 of the undercarriage 12, the rear wheel outer shell 54 and inner shell 60 which are supported for rotation thereon, and rear wheel covers 56 which are biased outwardly on the axle 52 from the undercarriage 12 against the wheels inner shell 60 by the compression springs 57.

The rear wheel outer shell 54 simulates the appearance of a vehicle tire and mounting rim disc, and are locked onto the axle 52 by the cap nuts 74. The inner shell 60 and outer shell 54 have cooperating bosses 62 and recesses 64 on their opposed faces through which extend fasteners 61 to interlock them against inner shell 60 is configured to provide a central annular post or ring 66 and a circumferential ring 68 defining an annular recess or channel 70 therebetween with a base wall and radially spaced opposed walls. The opposed surfaces of the rings 66,68 are provided with axially extending teeth 72a about the periphery thereof.

Disposed in the recesses 70 of the inner shell 60 are drive members or gears 76 which are of lesser diameter than the radial length of the recess 70. In the embodiment of FIG. 9, the drive member 76 is of pinion gear configuration with axially extending teeth 78 about the circumference thereof which teeth are dimensioned and configured to mesh with the teeth 72, 72a of the rings 66,68.

In the embodiment of FIG. 10, the drive member 76a has a rigid core 80 and a circumferential portion 82 of resiliently compressible material for engagement with the teeth 72, 72a of the rings 66,68. This resilient portion 82 may be formed with gear teeth as in the embodiment of FIG. 9, or it may rely upon deformation during contact to utilize frictional engagement alone.

The drive members 76 are supported on the ends of the drive shaft 84 for rotation therewith, and the shaft 84 extends through and is rotatable in bearing sleeves 86 which are formed as a portion of the socket members generally designated by the numeral 88. Socket portions

90 on the socket members 88 define a cylindrical recess in which is seated the lower end of the control levers 18a and 18b.

Fasteners 92 extend through aligned apertures in the lower portion of the levers 18a and 18b and in the socket portion 90 to secure these members in assembly. The socket members 88 and levers 18a and 18b are disposed in part within recesses 42a in the upper surface of the undercarriage 12, and are pivotably mounted therein by pivot shafts 94 which extend through the body portion 96 of the socket members 88 and are journaled in the sidewalls of the undercarriage 12 defining the recesses 42a. A coil spring 98 is seated on each pivot shaft 94 and acts between the rear wall of the recess 42a and a shoulder 100 on the socket member 88 and thereby biases the control lever 18a and 18b forwardly of the vehicle.

The end portions of the drive shaft 84 extend through slots in the gear covers 56 to protect the gear teeth from intrusion of large objects which might injure them and also to ensure that a child will not be able to insert a finger into the space between the gear teeth and the drive member.

Supported on the drive shaft 84 intermediate the width of the underbody 12 is the electric motor drive assembly generally designated by the numeral 102 which includes a housing 104 containing a motor (not shown) that rotates the gear 106 which engages the gear 108. The latter gear is fixed on the drive shaft 84 and thus effects rotation of the shaft 84 and thereby the drive member 76 and rear wheels 54. Although the housing 104 and gear 106 are supported by the drive shaft 84 and move therewith in response to movement of the central levers 18a and 18b, they are also free to pivot about it, thus accommodating the movement of the drive shaft 84. The amount of pivoting of the drive assembly 102 about the drive shaft 84 is limited by abutment of the housing 104 against the axle 52 and by the strap 116. Moreover, the housing 104 is disposed in registry with, and partially seated in, recess 42b of the undercarriage 12.

Electrical energy is supplied to the motor drive assembly 102 by a storage battery 110 through conductors 112 which connect to a terminal board 124 on the exterior of the undercarriage 12, and conductors 114 which extend from the terminal board to the drive assembly 102 with the switch 118 in the control lever 18a being disposed in one leg thereof to enable control of the operation of the motor drive assembly 102. Conductors 112 between the terminal board 124 and the battery 110 may supply recharging current when a charger (not shown) is connected to the terminal board 124. A second pair of conductors 120 supply current to the simulated gun 122 mounted on the front end of the vehicle and one leg of the pair is interrupted by a switch in the control lever 18b similar to switch 118 in the control lever 18a. The battery 110 seats in the recess 42c of the undercarriage 12 and is secured therein by the tie strap 116.

As seen with respect to the control lever 18a in FIG. 11, the control levers 18a and 18b comprise elongated tubular members 126 with molded plastic handle grips 128 at their outer ends. The grips 128 mount the pivotable triggers 130 which actuate the switches 118 which are supported within the grips. The handle grips 128 are secured to the tubular members 126 by fasteners 132, and the triggers 130 are biased outwardly of the grips 128 by the torsion springs 134.

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In operation of the vehicle, the child is seated on the seat 28 with its feed disposed in the foot recesses 32. To propel the vehicle forwardly and generally in a straight line, the child simply presses the trigger switch 130a on the control lever 18a which actuates the drive assembly 102 and effects rotation of the drive shaft 84 through the gears 106, 108. Because both control levers 18a or 18b are biased forwardly by the springs 98, the drive members 76 are engaged with the teeth 72 on the central post 66 of the inner shell 60 of the rear wheels 54. As the drive shaft 84 rotates, this causes the wheels 54 to rotate in the manner seen in FIG. 4 to effect movement of both wheels in the same direction and to drive the vehicle forwardly.

To effect turning movement of the vehicle, the trigger switch 130a is depressed and the lever 18a or 18b on the side towards which the vehicle is to be turned is pulled backwards against the biasing pressure of the spring 98. This moves the drive member 76 from engagement with the teeth 72 on the central post 66 and into engagement with the teeth 72a on the outer ring 68 as seen in FIG. 5. As a result, the associated rear wheel 54 will be rotated in the reverse direction, causing the front end of the vehicle to turn in the direction of that side of the vehicle. The resultant opposite rotation of the rear wheels 54 is diagrammatically shown in FIG. 6.

To effect rearward motion of the vehicle, the trigger switch 130a is depressed and both levers 18a and 18b are pulled rearwardly simultaneously. As a result, both drive members 76 are engaged with the teeth 72a of the outer rings 68 and rotate the wheels 54 in the reverse direction as shown diagrammatically in FIG. 7.

By varying the lever 18a or 18b which is pulled rearwardly, or by positioning of both levers forwardly or rearwardly, forward or reverse movement, and turning of the vehicle while advancing or backing, can be readily effected.

This control of motion of the vehicle is readily effected since the drive shaft 84 is supported adjacent its ends on the control levers 18, and the drive assembly 102 is carried by the drive shaft 84. As a result, the pivotal movement of a lever 18a or 18b moves that end of the shaft 84, and the drive assembly 102 retains its same orientation with respect to the drive shaft because it moves with it.

The front wheel assembly 14 is of caster-type construction, and the fork 46 pivots freely in the underbody 12 about its vertical axis so that the front wheel 48 will track the direction of movement dictated by the rear wheel assembly 16.

The child can fire the simulated gun 122 by pressing the trigger switch 130b on the lever 18b.

Most of the parts of the vehicle may be readily fabricated from synthetic resin to afford both durability and low cost, and the various parts may be assembled readily and economically.

The top member of the body in conveniently thermofomed from polyethylene although other resins such as polypropylene, ABS and impact polystyrene may also be employed. The undercarriage of the body, the front wheels and the outer shells of the rear wheels are conveniently blow molded from polyethylene although polypropylene and other resins may also be used. The inner shells of the rear wheels and the socket members are desirably injection molded from acetal resin although polycarbonate, polyamide and other wear and impact resistant resins may also be employed.

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The gears of the drive assembly are desirably injected molded from polyamide or other durable, low friction resins. The drive or pinion gears disposed in the rear wheels may be also injection molded of polyamide, acetal or like resins, or preferably they may be molded as of a combination of an injection molded resiliently deformable polyurethane about a rigid polyurethane core as shown in FIG. 10, either with or without teeth, to minimize noise or chatter as the drive gear enters and leaves engagement with the rings.

The gun is readily injection molded from polypropylene or polyethylene resin, and the handle grips may be injection molded from impact styrene and ABS resins.

To effect assembly, the motor drive assembly is secured on the drive shaft, the socket members are then slid thereonto and secured thereto, and the springs are placed thereon. This subassembly is then seated on the undercarriage. The rear axle is passed through the undercarriage, and the contact levers are secured in the sockets. The springs and gear covers are placed on the rear axle, and the drive gears are placed on the drive shaft. The shells of the rear wheels are secured together and mounted on the ends of the axle. The front wheel assembly is then seated in the undercarriage, the battery is placed thereon, and the conductors are run to their several terminals and switches. The top member of the body may then be placed thereon and secured in place by the fasteners.

Thus, it can be seen from the foregoing specification and attached drawings that the battery-powered vehicles of the present invention may utilize a relatively low-cost unidirectional electric motor and a simple but highly effective drive assembly and gearing to effective reversible rotation of the drive wheels. Steering is conveniently effected by controlling the direction of rotation of the drive wheels, and a simple caster-like front wheel readily responds to this motion. Most of the parts may be fabricated readily from synthetic resin and easily assembled to provide a relatively low-cost, durable vehicle.

Having thus described the invention, We claim:

1. In a child's motor powered vehicle, the combination comprising:

- A. a body adapted to seat a child with the legs supported thereon;
- B. a first wheel assembly;
- C. means mounting said first wheel assembly on said body for pivoting about a vertical axis;
- D. an axle supported on said body in spaced relationship to said first wheel assembly;
- E. a pair of drive wheels rotatably supported on said axle, said wheels each having a drive portion on the inner face thereof including a concentric annular channel extending axially about said axle, said channel being defined by a base wall and a pair of radially spaced opposed walls providing drive surfaces extending coaxially about said axle;
- F. a drive shaft supported on said body in spaced relationship to said axle and generally parallel thereto in its at rest position;
- G. drive members on the ends of said drive shaft for rotation therewith and disposed in said channels adjacent said drive surfaces, said drive elements being of lesser dimension than said base wall of said channel, said drive elements and drive surfaces being engageable to effect driving engagement therebetween upon surface engagement thereof;

- H. power means for effecting rotation of said drive shaft in one direction of rotation;
- I. a pair of control levers extending upwardly of said body and pivotably mounted thereon adjacent their lower ends, said control levers each being engageable with an end portion of said drive shaft upon pivoting of said levers from a first position to a second position which effects movement of the respective drive shaft end portions and the drive elements carried thereby from engagement with one drive surface of the adjacent wheel and into engagement with the other drive surface thereof, whereby pivoting of the control levers from one position to another will effect a change in direction of rotation of that wheel and positioning of the two control levers to effect engagement of the drive elements with opposite drive surfaces on said rear wheels will effect rotation of the wheels in opposite directions and turning of the vehicle, and whereby positioning of the control levers to effect engagement of the drive elements with the same drive surfaces will effect generally straight line motion of the vehicle forwardly and rearwardly.
2. The vehicle in accordance with claim 1 wherein said first wheel assembly is located in the front of said vehicle and said drive wheels and axle are located in the rear of said vehicle.
3. The vehicle in accordance with claim 1 wherein said first wheel assembly includes a vertically extending post, at least one wheel supported for rotation thereon, and means journalling said post in said body for rotation about said vertical axis.
4. The vehicle in accordance with claim 3 wherein said post is disposed centrally of the width of said vehicle and in the front portion thereof.
5. The vehicle in accordance with claim 1 wherein said radially spaced opposed walls of said channel have axially extending teeth about the periphery thereof.
6. The vehicle in accordance with claim 5 wherein said drive members have cooperatively dimensioned and configured axially extending teeth about the periphery thereof.
7. The vehicle in accordance with claim 1 including means biasing said control levers into said first position.
8. In a child's motor powered vehicle, the combination comprising:
- A. a body adapted to seat a child with the legs supported thereon;
 - B. a first wheel assembly;
 - C. means mounting said first wheel assembly on said body for pivoting about a vertical axis;
 - D. an axle supported on said body in spaced relationship to said first wheel assembly;
 - E. a pair of drive wheels rotatably supported on said axle, said wheels each having a drive portion including a pair of radially spaced drive surfaces extending coaxially about said axle;
 - F. a drive shaft supported on said body in spaced relationship to said axle and generally parallel thereto in its at rest position;
 - G. drive members on the ends of said drive shaft for rotation therewith and adjacent said drive surfaces, said drive elements and drive surfaces being engageable to effect driving engagement therebetween upon surface engagement thereof;
 - H. power means for effecting rotation of said drive shaft in one direction of rotation, said power means includes an unidirectional electric motor supported

- on said drive shaft and engaged therewith to effect its rotation;
- I. a pair of control levers extending upwardly of said body and pivotably mounted thereon adjacent their lower ends, said control levers each being engageable with an end portion of said drive shaft upon pivoting of said levers from a first position to a second position which effects movement of the respective drive shaft end portions and the drive elements carried thereby from engagement with one drive surface of the adjacent wheel and into engagement with the other drive surface thereof, whereby pivoting of the control levers from one position to another will effect a change in direction of rotation of that wheel and positioning of the two control levers to effect engagement of the drive elements with opposite drive surfaces on said rear wheels will effect rotation of the wheels in opposite directions and turning of the vehicle, and whereby positioning of the control levers to effect engagement of the drive elements with the same drive surfaces will effect generally straight line motion of the vehicle forwardly and rearwardly.
9. The vehicle in accordance with claim 8 wherein said electric motor and drive shaft are supported on said control levers.
10. In a child's motor powered vehicle, the combination comprising:
- A. a body adapted to seat a child with the legs supported thereon;
 - B. a front wheel assembly;
 - C. means mounting said front wheel assembly on said body for pivoting about a vertical axis;
 - D. a rear axle supported on said body;
 - E. rear wheels rotatably supported on said axle, said rear wheels each having a drive portion on the inner face thereof including a generally annular channel extending coaxially about said axle, said channels each being defined by a base wall and opposed, axially extending walls;
 - F. a drive shaft supported on said body in spaced relationship to said rear axle and generally parallel thereto in its at rest position;
 - G. drive members on the ends of said drive shaft for rotation therewith and disposed within said annular channels of said rear wheels, said drive elements being of a diameter less than the radial width of said channels, said drive elements and channel walls having cooperating surfaces to effect driving engagement therebetween upon surface engagement thereof;
 - H. power means for effecting rotation of said drive shaft in one direction of rotation;
 - I. a pair of control levers extending upwardly of said body and pivotably mounted thereon adjacent their lower ends, said control levers each being engageable with an end portion of said drive shaft upon pivoting of said levers from a first position to a second position which effects movement of the respective drive shaft end portions and the drive elements carried thereby from engagement with one axially extending wall of the channel of the adjacent rear wheel and into engagement with the other axially extending wall of said drive channel, whereby pivoting of the control levers from one position to another will effect a change in direction of rotation of that rear wheel and positioning of the two control levers to effect engagement of the drive elements with opposite walls of said channel will effect rotation

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of the rear wheels in opposite directions and turning of the vehicle, and whereby positioning of the control levers to effect engagement of the drive elements with the same channel walls will effect generally straight line motion of the vehicle forwardly and rearwardly.

11. The vehicle in accordance with claim 10 wherein said first wheel assembly includes a vertically extending post centrally of the width of said vehicle, at least one wheel supported for rotation thereon, and means journalling said post in said body for rotation about said vertical axis.

12. The vehicle in accordance with claim 10 wherein said power means includes an unidirectional electric motor supported on said drive shaft and engaged therewith to effect its rotation.

13. The vehicle in accordance with claim 12 wherein said electric motor and drive shaft are supported on said control levers.

14. The vehicle in accordance with claim 10 wherein said axially extending walls of said channel have axially extending teeth about the periphery thereof, and wherein said drive members have cooperatively dimensioned and configured axially extending teeth about the periphery thereof.

15. The vehicle in accordance with claim 10 including means biasing said control levers into said first position.

16. In a child's motor powered vehicle, the combination comprising:

- A. a body adapted to seat a child with the legs supported thereon;
- B. a front wheel assembly;
- C. means mounting said front wheel assembly on said body for pivoting about a vertical axis, said first wheel assembly including a vertically extending post centrally of the width of said vehicle, at least one wheel supported for rotation thereon, and means journalling said post in said body for rotation about said vertical axis;

D. a rear axle supported on said body;

E. rear wheels rotatably supported on said axle, said rear wheels each having a drive portion including a generally annular channel extending coaxially about said axle, said channels each being defined by a base wall and opposed, axially extending walls;

F. a drive shaft supported on said body in spaced relationship to said rear axle and generally parallel thereto in its at rest position;

G. drive members on the ends of said drive shaft for rotation therewith and disposed within said annular channels of said rear wheels, said drive elements being of a diameter less than the radial width of said channels, said drive elements and channel walls having cooperating surfaces to effect driving engagement therebetween upon, surface engagement thereof;

H. power means for effecting rotation of said drive shaft in one direction of rotation, said power means including an unidirectional electric motor supported on said drive shaft and engaged therewith to effect its rotation;

I. a pair of control levers extending upwardly of said body and pivotably mounted thereon adjacent their lower ends, said control levers each being engageable with an end portion of said drive shaft upon pivoting of said levers from a first position to a second positions which effects movement of the respective drive shaft end portions and the drive elements carried thereby from engagement with one axially extending wall of the channel of the adjacent rear wheel and into engagement with the other axially extending wall of said drive channel, said drive shaft and thereby said electric motor being supported on said control levers,

whereby pivoting of the control levers from one position to another will effect a change in direction of rotation of that rear wheel and positioning of the two control levers to effect engagement of the drive elements with opposite walls of said channel will effect rotation of the rear wheels in opposite directions and turning of the vehicle, and whereby positioning of the control levers to effect engagement of the drive elements with the same channel walls will effect generally straight line motion of the vehicle forwardly and rearwardly.

17. The vehicle in accordance with claim 10 wherein said axially extending walls of said channel have axially extending teeth about the periphery thereof.

18. The vehicle in accordance with claim 17 wherein said drive members have cooperatively dimensioned and configured axially extending teeth about the periphery thereof.

19. The vehicle in accordance with claim 16 including means biasing said control levers into said first position.

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