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DRIVE MECHANISM FOR TOY WHEELED VEHICLE

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2 Sheets-Sheet 1

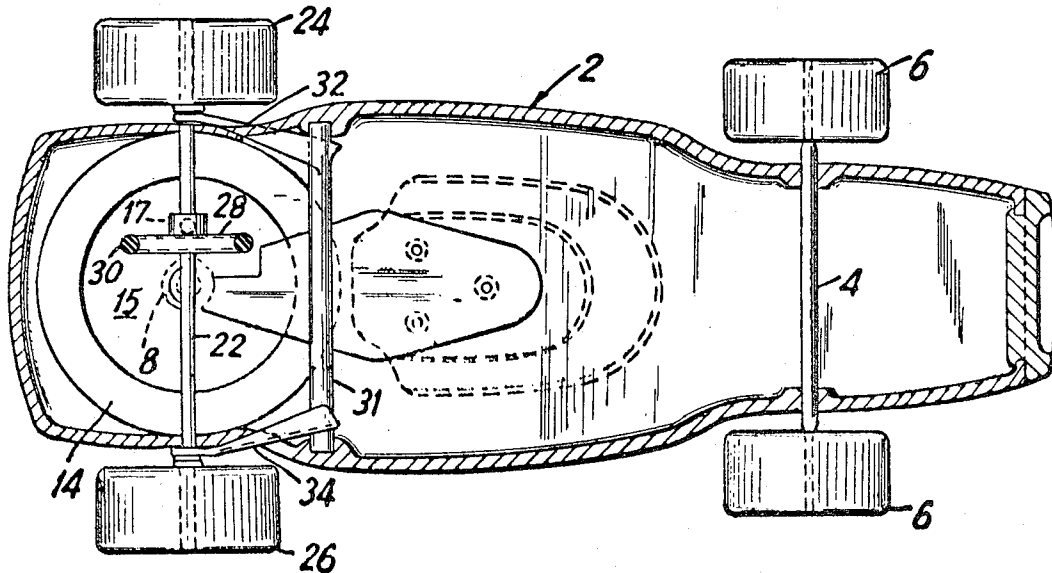


FIG. 1

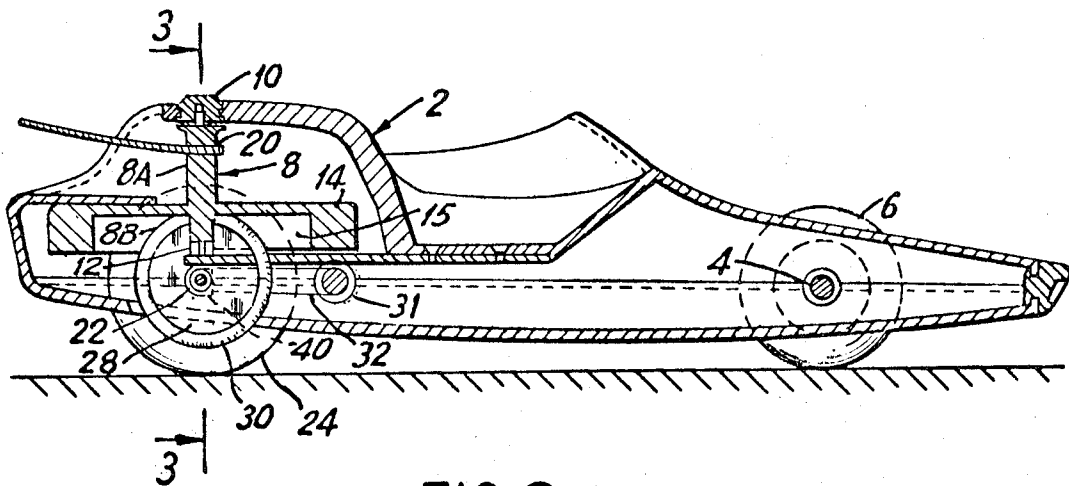


FIG. 2

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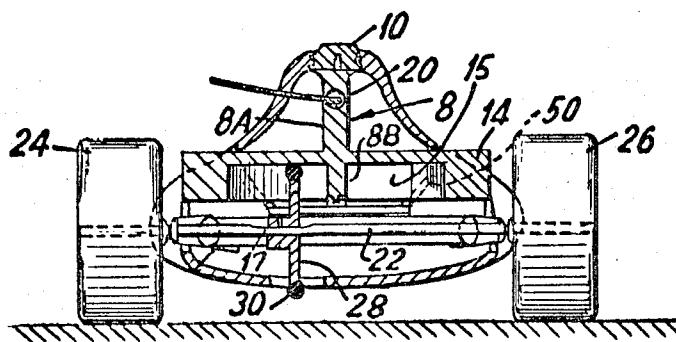


FIG. 3

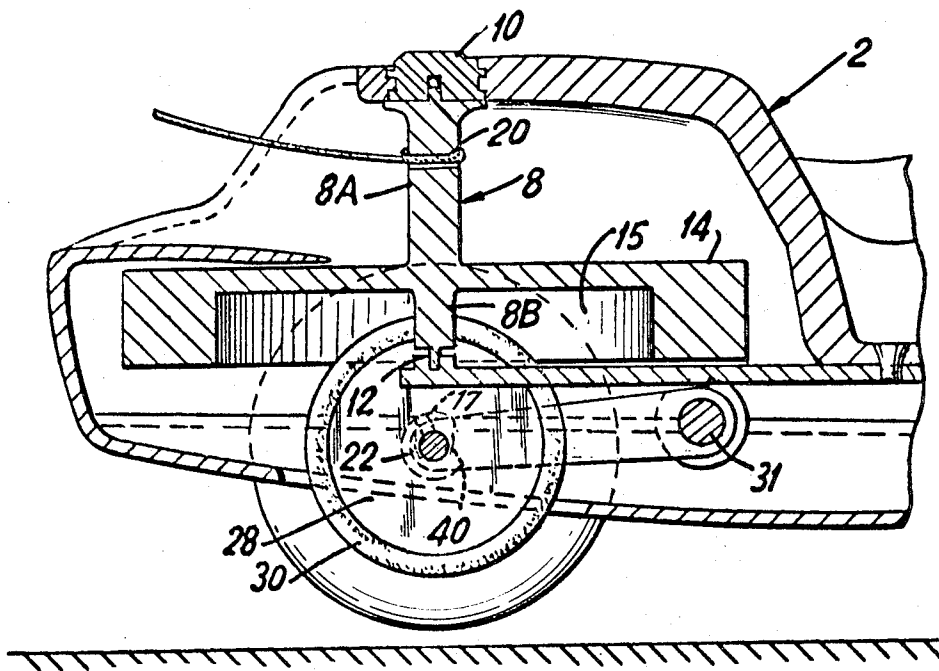


FIG. 4

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1

2

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**DRIVE MECHANISM FOR TOY
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7 Claims

ABSTRACT OF THE DISCLOSURE

A drive mechanism for a toy wheeled vehicle with a vertical starting shaft having an aperture through which a string or cord can be inserted and then wrapped around the starting shaft.

The starting shaft is connected to a horizontally positioned flywheel having a mass which may be but is not necessarily considerably greater than the remainder of the vehicle structure depending on the performance desired. The largest proportion of the flywheel mass is located at the periphery of the wheel so that upon rotation a large amount of energy is stored which can be used to drive the wheeled vehicle.

A driving shaft having driving wheels at each end thereof is connected to the frame. Mounted on the driving shaft is a vertically disposed transmission wheel adapted to frictionally engage the flywheel to thereby drive the transmission wheel, the driving shaft and hence the vehicle.

The driving shaft is connected to the frame by means such as an articulated yoke, such that when the vehicle is suspended from the frame, the transmission wheel is automatically disengaged from the flywheel and so that when the vehicle is supported by its wheels, the transmission wheel automatically engages the flywheel to thereby drive the vehicle.

It is to be understood that the above Abstract of Disclosure is submitted in compliance with the requirements of the United States Patent Office, Rule 72(b), Rules of Practice in Patent Cases, and is not to be used in the construction of, or as limiting, the scope of the invention as hereinafter defined in the appended claims.

BACKGROUND OF THE INVENTION

There are in the prior art numerous toy wheeled vehicles which are propelled along the floor by a drive mechanism. Some such toys may be in the form of automobiles or other similar land vehicles but such toys may also be toy lawnmowers or even boats. Most commonly, such toys are of the type where the toy is held in the hand and pushed along the floor or ground at a very rapid rate over a short distance and then lifted from the floor and placed again on the floor in the desired position.

Conventionally, the drive mechanism for such a toy vehicle includes gear means connected to the driving axle or shaft which is caused to rotate as a result of the initial push or thrust along the floor. Toys having such a mechanism are typically referred to as "push toys" or "friction toys."

The disadvantage of this type of mechanism is that the gear and drive shaft are always connected so that there is a great deal of inertia lost through the gearing and friction of the mechanism with the result that when placed on the floor the toy runs for only a relatively short period of time over a relatively short distance at a relatively low speed. Furthermore, unless such a toy is placed on the floor almost immediately after starting the mechanism there will be virtually no driving force left to move the toy along the floor or ground.

Accordingly, although this type of toy automobile is in widespread use, its performance is rather poor and its usefulness is rather limited.

This invention is related to a drive mechanism for a toy vehicle and more particularly to a drive mechanism which increases the performance of the vehicle in speed and distance travelled.

It has in recent years become quite popular for individuals to race their toy cars against one another. A typical example of this type of activity is "slot-car" racing which has become quite popular. However, to participate in such a sport requires expensive toy cars and even more expensive track equipment. Moreover, since special track equipment is required, this sport generally cannot be accomplished out of doors or even in a home without the expenditure of large sums of money.

The drive mechanism of the present invention is adapted to drive a toy vehicle such as a car as far as two hundred feet at speeds up to about 20 feet per second. Accordingly, since the mechanism is such that it can drive the vehicle over any relatively flat surface it can be used to power toy cars for speed and/or distance races on drive ways, parking lots, lawns or other similar surfaces.

It is therefore an object of this invention to provide a new and improved drive mechanism for a toy wheeled vehicle.

A further object of this invention is to provide a new and improved drive mechanism which is hand operated and capable of driving a wheeled toy vehicle at greater speeds and for further distances than has heretofore been possible as a practical matter.

A still further object of this invention is to provide a new and improved drive mechanism for a toy wheeled vehicle which is hand operable consists of but a few parts and results in increased performance characteristics.

A still further object of this invention is to provide a new and improved drive mechanism for a toy wheeled vehicle having an inertia system capable of accelerating the vehicle.

Additional objects and advantages of the invention will be set forth in the description which follows and in part will be obvious from the description or may be learned from practice of the invention, the objects and advantages being realized and obtained by means of the instrumentalities particularly pointed out in the appended claims.

Briefly described, the present invention includes a drive mechanism which serves to drive the toy wheeled vehicle and also to stabilize the vehicle in a manner similar to a gyroscope to maintain the vehicle in its horizontal position as it moves across the floor or ground surface at a rapid rate.

The invention is such that it can be used for driving vehicles having 1, 2, 3, 4 or any desired number of wheels.

The drive mechanism of the present invention utilizes an inertia wheel in the form of a horizontal flywheel having its maximum mass at the periphery which can be rotated very rapidly simply by pulling on a string or cord connected to a starting shaft for the flywheel.

The drive wheels which engage the floor or ground surface are mounted on a drive shaft which also has connected to it a transmission wheel in a vertical plane adapted to engage the flywheel and transmit the motion thereof to the drive shaft and its associated drive wheels.

The drive shaft is mounted on the vehicle so that the transmission wheel will automatically engage the flywheel when the vehicle wheels support the weight of the vehicle such as when it is on the floor or ground surface.

The mounting means for the drive shaft also insures that the transmission wheel will automatically be disengaged from the flywheel when the vehicle is suspended

3

by its frame which will occur, for example, when the vehicle is lifted from the floor or ground surface by the user and held by the frame.

The invention consists of the novel parts, steps, constructions and improvements shown and described.

The accompanying drawings which are incorporated in and constitute a part of this specification illustrated an embodiment of the invention and together with the description serve to explain the principles of the invention.

In the drawings:

FIG. 1 is a bottom plan view of an embodiment of the invention.

FIG. 2 is a longitudinal sectional view of an embodiment of the invention with vehicle on the floor.

FIG. 3 is a sectional view taken along line 3—3 of FIG. 2.

FIG. 4 is a partial enlarged view similar to FIG. 2 but with the vehicle lifted above the floor.

Reference will now be made to the drawings which disclose an embodiment of the present invention and wherein the same reference numerals are used to designate the same elements.

As shown in the drawings the invention is particularly useful when embodied for use in connection with a toy automobile. As embodied, the wheeled toy vehicle includes a frame 2 which in this instance has the appropriate form of a racing automobile. The toy automobile includes a front or driven axle 4 having at each end thereof driven wheels 6.

In accordance with this invention a new and novel inertia drive means is provided for self-propelling the vehicle so that the motive force for the mechanism can be effectively supplied by even a child.

The drive mechanism of the present invention includes a vertically disposed starting shaft 8 having its upper end mounted in a bearing 10 on the frame 2. Desirably, but not necessarily, the bearing 10 may be of the ball bearing type. The lower end of the starting shaft 8 is mounted in bearing 12 on a lower portion of the frame 2.

It should be understood that, as shown in the drawings, the starting shaft and other associated elements are positioned on or with respect to the car frame 2. However, it should be recognized that a separate frame for the drive means could be provided if so desired, in which case the car frame would be primarily for decorative purposes.

The vertical starting shaft 8 includes an aperture 20 adjacent its upper end which is adapted to receive a string or cord which after being passed through the aperture is adapted to be wrapped around the starting shaft 8. The aperture is rounded at its terminal ends so that the string is automatically removed after the flywheel has been started by yanking on the string or cord.

As shown herein, the starting shaft has connected thereto a flywheel 14 which may have a mass substantially greater than the mass of the remainder of the vehicle. Moreover, the weight of the flywheel 14 is at the periphery thereof so that the flywheel stores a large amount of energy upon rotation. Thus, the flywheel is cutaway at 15 which results in a more compact device in addition to providing a driving surface for a transmission wheel.

The invention further includes a driving shaft 22 which is mounted on the frame 2 as explained hereinafter. Mounted on the terminal ends of the driving shaft are the driven wheels 24, 26. It will be understood that a greater or lesser number of driving wheels may be provided depending on the type of vehicle involved. Mounted on the driving shaft 22 is a transmission wheel 28. The transmission wheel has on its outer periphery a friction surface or tire 30 which may be made of rubber or some other substance which will facilitate frictional engagement with the flywheel. The transmission wheel has a set screw 17 on its hub so that the position of the transmission wheel on the shaft 22 can be changed to vary the operating characteristics of the vehicle.

4

Means are provided, in accordance with this invention, for automatically engaging and disengaging the transmission wheel and the flywheel, as desired.

Thus, in accordance with the present invention, the transmission wheel and flywheel are automatically engaged when the weight of the vehicle is placed on the wheels. On the other hand, the transmission wheel and the flywheel are automatically disengaged when the vehicle is suspended from the frame and the weight thereof is not on the wheels.

This means, as embodied, includes an articulated yoke having a transverse shaft 31 which is pivotally connected to and extends transversely of the frame 2. The transverse shaft has yoke arms 32, 34 at its terminal ends. The yoke arms 32, 34 have bearings at their outer ends through which the driving shaft 22 extends. By virtue of this construction the driving shaft and wheels pivot about the shaft on axis 31. Thus, if the vehicle is lifted, for example, by grasping the frame, the driving shaft will move downwardly (FIG. 4) so that the transmission wheel no longer engages the flywheel and will not be driven thereby. On the other hand when the vehicle is placed so that the weight thereof is on the wheels, the wheels can move upwardly until the transmission wheel engages the flywheel.

While it is not necessary to the functioning of the device, it is desirable that means be provided for limiting the distance the transmission wheel can move from the flywheel.

As embodied, the frame is provided with slot 40 in each side of the frame through which the driving shaft passes. The bottom of the slot serves as a stop to limit the downward movement of the shaft 22. Other and different stops could be used in accordance with this invention.

It will be noted that the upper portion of 8A of the shaft has a larger diameter than the lower portion 8B of the shaft. The reason for this difference is that the upper portion of the shaft should have an optimum diameter to obtain the maximum revolutions per minute of the flywheel with a reasonable length of string and with a reasonable amount of pulling force applied to the string. The diameter of the lower portion of the starting shaft 8B should have a relatively small diameter so that the transmission wheel can be located as close as possible to the center of the flywheel. When in this position the flywheel and transmission wheel have, in effect, the lowest possible gear ratio so that the vehicle moves at a relatively slow speed but for a longer period of time. On the other hand, as to transmission wheel engages the flywheel nearer to its periphery the vehicle moves with a higher velocity but for a shorter period of time. Thus the operator can change the speed and power characteristics of the vehicle by changing the point of engagement of the transmission and flywheels.

It will be appreciated that when the toy is in operating position, i.e., with the weight of the vehicle on the wheels, the upper bearing 10 carries the main downward thrust of the vehicle by virtue of the engagement of transmission wheel with the flywheel. In order to alleviate this thrust it may be desirable to position a leaf spring 50 which bows between the frame and the yoke which carries the driven wheels. This leaf spring can also control the amount of slippage between the transmission wheel and the flywheel by varying its position or strength.

OPERATION

In operation, the vehicle is held or suspended from the frame by hand. A string or cord is inserted into the aperture 20 and by turning the flywheel 12 the string or cord is wrapped around the upper portion 8A of the starting shaft 8. This can be accomplished by turning the flywheel by hand or by placing the vehicle on the floor and moving it rearwardly.

After the string has been wrapped around the upper portion 8A of the starting shaft it gives a sharp pull such

5

as used in starting a top and the flywheel begins rotating at an increasing speed. By virtue of the fact that the flywheel is not at this time in contact with the transmission wheel there are virtually no losses due to friction.

When the vehicle is now placed with the weight thereof on the heels, it will accelerate and reach an unusually high velocity. The vehicle will move until such time that the energy of the flywheel is dissipated, but if desired the vehicle can be picked up before the energy of the flywheel has been dissipated, and again be suspended from the frame in which event the energy of the flywheel will be dissipated at a very slow rate, permitting it again to be placed on the ground.

By changing the position of the transmission wheel on the driving shaft and hence the place of engagement of the transmission wheel and the flywheel, the speed of the vehicle can be changed, as desired.

It is to be understood that the invention in its broader aspects is not limited to the specific elements shown and described, but also includes within the scope of the accompanying claims any departures made from such elements which do not sacrifice their chief advantages.

I claim:

1. A mechanism for driving a toy wheeled vehicle comprising:

- (a) a frame,
- (b) a horizontally disposed driving shaft having a rotatable driving wheel at each end thereof mounted on said frame,
- (c) a vertically disposed transmission wheel mounted on said driving shaft,
- (d) a vertically disposed starting shaft positioned above said driving shaft, and rotatably mounted on said frame,
- (e) a horizontally disposed flywheel mounted on said starting shaft,
- (f) means for mounting said driving shaft with respect to said frame to permit relative movement therebetween so said transmission wheel engages said flywheel when the weight of said toy vehicle is on said driving wheels and for disengaging said flywheel and said transmission wheel when the weight of the vehicle is not on said driving wheels, and
- (g) means operatively connected to said flywheel and independent of said driving wheels for rotating said flywheel without substantial dissipation of energy when the weight of said toy vehicle is not on said driving wheels so that the energy of the rotating flywheel can be used to rotate said driving wheels by placing the weight of said toy vehicle thereon.

2. A device as defined in claim 1 wherein said means for mounting said driving shaft is pivotally connected to

6

said frame and to said driving means and pivotally mounts the driving shaft on the frame.

3. A device as defined in claim 2 wherein said mounting means for mounting said driving shaft is an articulated yoke.

4. A device as defined in claim 3 wherein the transmission wheel is adjustably mounted on said driving shaft.

5. A device as defined in claim 1 wherein the greater proportion of the flywheel mass is at its periphery.

6. A device as defined in claim 5 where the center of the flywheel has an inverted hollowed-out portion for the transmission wheel.

7. A mechanism for driving a toy wheeled vehicle comprising:

- (a) frame,
- (b) a horizontally disposed driving shaft having a rotatable driving wheel at each end thereof mounted on said frame,
- (c) a vertically disposed transmission wheel mounted on said driving shaft,
- (d) a vertically disposed starting shaft positioned above said driving shaft, and rotatably mounted on said frame,
- (e) a horizontally disposed flywheel mounted on said starting shaft,
- (f) an articulated yoke pivotally connected to said frame and to said driving shaft to permit relative movement therebetween so said transmission wheel engages said flywheel when the weight of said toy vehicle is on said driving wheels and for disengaging said flywheel and said transmission wheel when the weight of the vehicle is not on said driving wheels, and
- (g) a string or cord releasably connected to said starting shaft for rotating said flywheel without substantial dissipation of energy when the weight of said toy vehicle is not on said driving wheels so that the energy of the rotating flywheel can be used to rotate said driving wheels by placing the weight of said toy vehicle on said driving wheels.

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