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Lemelson

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[54] TOY VEHICLES

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[52] U.S. Cl.46/202, 46/209

[51] Int. Cl.A63h 11/10

[58] Field of Search46/202, 209, 212

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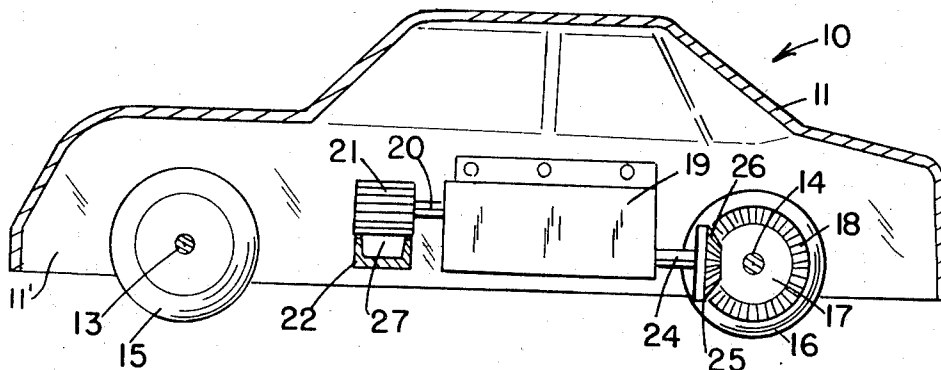
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[57]

ABSTRACT

A vehicular toy having an inertially operated mechanism for driving the wheels of said toy to power operate the toy across a surface. The mechanism is composed of an inertia wheel having an input means including a circular gear which is rotated by means of a gear strip inserted through an opening and guideway accessible to the exterior of the toy. The gear strip is pulled rapidly past the gear, thereby accelerating the inertia wheel of the toy. The inertia wheel is coupled to one or more wheels of the toy and operates to rotate said wheel or wheels to cause the toy to be driven across a surface. Both direct and clutch-type coupling means between the inertia wheel mechanism and the wheels of the toy are provided.

5 Claims, 5 Drawing Figures



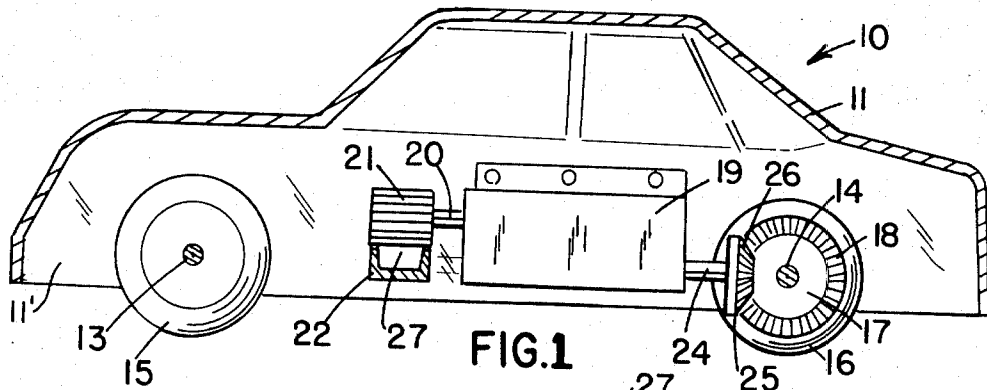


FIG. 1

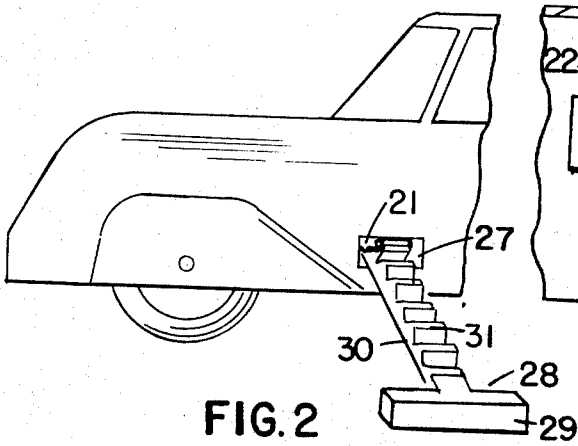


FIG. 2

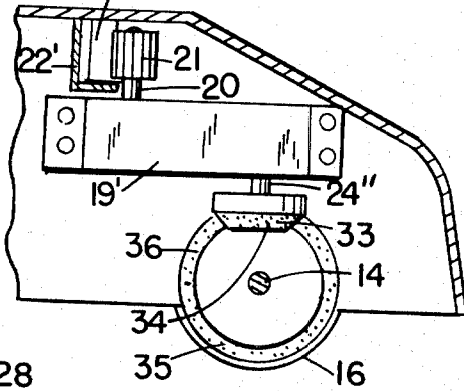


FIG. 3

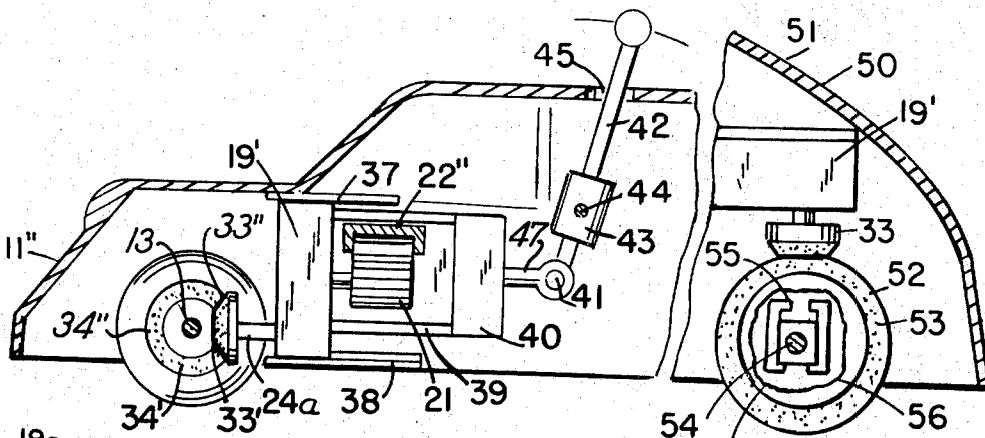


FIG. 4

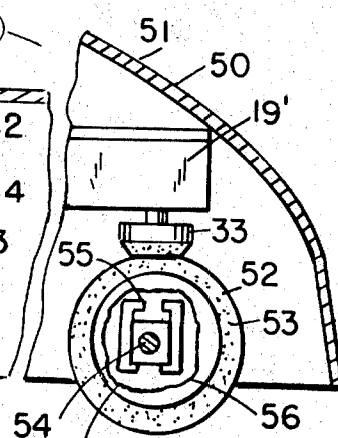


FIG. 5

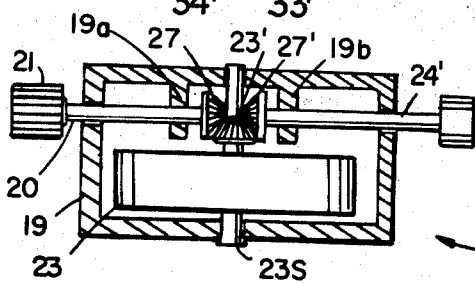


FIG. 1'

TOY VEHICLES

This application is a continuation of my copending application Ser. No. 53,832, now abandoned filed July 10, 1970.

SUMMARY OF THE INVENTION

This invention relates to inertially operated toys and, in particular, to improvements in the structures of wheel toys driven by an inertially operated mechanism.

The conventional so-called friction-motor operated wheel toy employs an inertially driven mechanism which is accelerated by rapidly moving the toy by hand across a surface, picking up off the surface and then setting it down again. This particular mode of activation is not only unrealistic and difficult for small children to effect in a manner to provide sufficient speed for the toy to operate and travel a prolonged distance but it also frequently requires that the toy be swept across the surface a number of times in order to attain proper operating speed.

The instant invention is concerned with a mechanism employing a so-called inertia-motor which mechanism is provided with removable means in the form of a flexible rack or gear strip which may rapidly accelerate the inertia mechanism by a simple, single pulling action to provide sufficient power to drive the toy a substantial distance. The mechanism provided is simple and easy to operate and permits rotational speeds of the inertia wheel which are substantially higher than those which are generally obtainable by conventional friction motor toys. Accordingly, it is a primary object of this invention to provide new and improved inertia motor operated toys.

Another object is to provide an inertially operated toy vehicle which may be easily activated to attain substantial power and high traveling speeds. Another object is to provide a wheeled toy vehicle having a mechanism employing an inertia wheel which is easily, rapidly accelerated by a pulling action and is operable to drive the toy vehicle at relatively high scale speed for substantial distances.

Another object is to provide an inertia motor operated toy vehicle having but a few parts for the motor thereof, which inertia motor may be activated without the need for directly pushing the vehicle.

Another object is to provide an inertia motor operated vehicle having simple clutch means for engaging the wheels of the vehicle with the inertia motor mounted therein.

With the above and such other objects in view as may hereinafter more fully appear, the invention consists of the novel construction, combination and arrangements of parts, as will be hereinafter more fully described and illustrated in the accompanying drawings, wherein are shown embodiments of this invention, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawings:

FIG. 1 is a side view with parts broken away for clarity of a toy vehicle containing an inertially operated motor mounted within the vehicle and a simple coupling means for a separate gear strip operative to be inserted into and removed from the vehicle in the act of winding the inertia motor;

FIG. 1' shows further details of the inertia motor of FIG. 1;

FIG. 2 is a partial view of part of the vehicle of FIG. 1 showing access of a manually operated gear strip to the interior of the vehicle;

FIG. 3 is a partial side view with parts broken away for clarity of a modified form of the vehicle and mechanism of FIG. 1; and

FIG. 4 is a side view of another form of vehicle and mechanism employing an inertially operated wheel of the types provided in FIGS. 1-3 and clutching drive means therefore.

The mechanisms of this invention are preferably operated when the teeth of an elongated strip-like, flexible member are engaged and drawn past the teeth of a circular gear member or pinion wheel which is connected to drive an inertia wheel assembly. The toothed strip, which will hereinafter be referred to as a driver strip or gear strip is preferably flexible to a degree whereby it will not jam or shatter if bent and is molded of a suitable plastic such as a medium-density polyethylene or polypropylene with a T-shaped handle integrally molded at one end thereof to permit grasping and drawing the strip through the inertia motor mechanism after the other end thereof is inserted in the mechanism and guided through the toy to permit the strip to be completely withdrawn therefrom so that it will not interfere with the operation of the mechanism and toy.

In FIG. 1 is shown a toy vehicle 10 having a shell-like body 11 made of suitable plastic or metal and having a plurality of wheels, two of which 15 and 16 are shown, rotationally supported on axles 13 and 14 which are supported by the side walls of the body shell 11, one of which side walls 11' is shown in the sectioned view. An opening 27 is provided in the side wall 11' through which opening a gear strip drive member may be inserted in the manner illustrated in FIG. 2. A channel-like guideway 22 is shown extending from the side wall 11' and is preferably supported thereby and the opposite wall (not shown) of the body 11 in a position such that it is aligned with the opening 27 and serves to guide the gear strip through the center of the channel and past a toothed wheel or pinion 21 so that the teeth of the gear strip intermesh with the teeth of the pinion. The pinion wheel 21 is secured to the end of a shaft 20 which extends from a housing 19 containing an inertia wheel rotationally mounted within said housing. Notation 24 refers to an output shaft for the inertia motor in housing 19, which shaft may be directly connected to the inertia wheel at its axis of rotation or to one or more gears defining a gear train driven by the inertia wheel within the housing as illustrated in FIG. 1'. A bevel gear 26 is shown connected to the end of shaft 24 and its teeth engage teeth 18 molded in the inside surface of a wheel 16 which may be a single rear wheel of the vehicle or may comprise one or two rear wheels thereof. The hub 17 of the wheel 16 is connected to a wheel shaft 14 which is supported by the side walls of the shell 11. Thus, when the gear strip is inserted into the opening 27 and pushed past the pinion gear 21 and thereafter rapidly pulled out of the housing, intermeshing of the teeth of the gear strip and wheel 21 will cause the wheel to be driven at a relatively high speed so that it will rapidly accelerate and drive the inertia wheel in the housing 19 which, because of the energy imparted to the wheel, will drive the rear wheel or wheels of the vehicle for a substantial period of time and thereby

power drive the vehicle for a substantial distance across a surface.

While the shaft 20 may be directly connected to a weighted wheel at the axis of rotation of said wheel to directly or indirectly drive the vehicle across a surface, in FIG. 1' details of the inertia wheel motor provided in housing 19 are shown wherein an inertia wheel 23 is secured to a shaft 23S which is supported in bearing for rotation by opposite walls of the housing 19 and contains a bevel gear 23' which intermeshes with a bevel gear 27 on the end of shaft 20 supporting the pinion gear 21. Thus, when shaft 20 is rotated by drawing a gear strip past and in mesh with the teeth of pinion wheel 21, the inertia wheel 23 will be rotationally accelerated within housing 19. Notations 19a, 19b and 19c refer to supports for rotationally supporting shafts 20, the shaft 23S supporting inertia wheel 23 and a third shaft 24' which is the motor output shaft. One end of shaft 24' contains a bevel gear 27' which meshes with the bevel gear 23' which is connected to the end of the shaft which directly supports the inertia wheel. The other end portions of shafts 20 and 24' are supported in bearing by portions of the wall of the housing 19. Thus, continued rotation of inertia wheel 23 will be effective in maintaining the output shaft 24' rotating and the gear 25' at the end of shaft 24' may be applied directly to drive the wheel or wheels of the toy vehicle by meshing with a gear attached thereto or forming part of at least one of said wheels or by frictional engagement therewith.

While the shafts 20, 23S and 24' are shown supported in bearing by the end walls of the housing 19 and brackets 19a, 19b and 19c extending therefrom, small plastic or metal bearings may also be inserted into said walls and brackets and support said shafts at low friction.

Thus, as the teeth of a rack or gear strip are drawn past the pinion wheel 21, motion is imparted through gears 27 and 23' to the inertia wheel 23 which is accelerated and continues to rotate for some time after the gear strip is completely withdrawn from the housing of the toy so as to drive output shaft 24' for some time, thereby permitting it to operate a mechanism of the toy such as a wheel or wheels driving the toy across a surface.

It is noted that the inertia wheel 23 may also be directly connected to the pinion wheel shaft 20, thereby eliminating the need for gears as illustrated and said wheel may be used as a drive wheel per se for the toy vehicle. The output shaft 24' or the shaft of the inertia wheel may also be utilized to drive other toy mechanisms for imparting an action to the toy for generating a noise.

FIG. 2 merely illustrates a T-shaped gear strip drive unit 28 having an elongated shape 30 extending from a T-shaped head 29 and having teeth 31 molded in one side of the shank 30. The unit 28 is preferably made of a semi-flexible plastic such as a medium density polyethylene and is preferably in the order of 10 to 18 inches long. The opening 27 in the side wall of the body or shell 12 of the toy is preferably slightly larger than the cross section of the shank 30 of the driving device 28 to permit easy insertion and guidance of said shank through the toy. An opening similar to opening 27 is preferably provided in the opposite wall of the toy so

that the end of the elongated shank 30 extends beyond the toy vehicle, thereby providing sufficient length to permit it to be used to substantially accelerate the inertia wheel mounted within the toy.

In FIG. 3, the inertia motor is shown mounted in a housing 19' disposed in the upper rear portion of the toy vehicle body with the shaft 20 of the pinion gear protruding upwardly from housing 19'. The opening 27 is provided in the upper wall of the toy and a box-shaped channel 22' extends completely across the toy between the two side walls and has an opening in one wall thereof to accommodate the pinion wheel 21 so that the gear strip will be guided with its teeth intermeshing with the teeth of said pinion 21.

While the shaft 20 of FIG. 3 may be connected directly to the inertia wheel and an extension thereof coupled directly or indirectly to drive the rear wheels of the toy vehicle, an arrangement is shown in FIG. 3 whereby gears are provided connecting shaft 20 with an inertia wheel shaft and connecting the shaft of the inertia wheel with a second shaft 24'' which extends downwardly from the rear portion of housing 19' and is coupled by frictional means either directly to one of the rear wheels of the vehicle or to a center wheel 35 which is connected to the rear axle of the vehicle. The drive wheel 33 has a tapered surface 34 made of frictional material such as rubber or particles coated thereon which engages a tapered surface 36 of wheel 35, to frictionally drive the rear axle 14 of the vehicle and the wheels connected thereto.

FIG. 4 illustrates another arrangement whereby the inertia motor may be accelerated to high speed while its output shaft is disengaged from driving relationship with the wheels of the vehicle after which engagement may be made when it is desired to release the vehicle.

The vehicle body 11'' contains a body shell 12'' supporting front wheels and rear wheels 52. Connected to the front axle 13 is a center wheel 34' having a tapered face 34'' operative to be engaged by the tapered face 33'' of a wheel 33' mounted on the output shaft 21a of an inertia motor, constructed as described above, and mounted within a housing 19''. The housing 19'' may be slidably moved longitudinally within the vehicle to bring the tapered face 33'' of drive wheel 33' into and out of engagement with the tapered face 41 of center wheel 34'. Thus when housing 19'' is retracted towards the rear of the vehicle, the inertia wheel mounted therein may be rotated by pulling the described gear strip past the pinion wheel 21 extending from the other face of housing 19'' while the vehicle remains stationary on the surface but when housing 19'' has advanced toward the front end of the vehicle, its output shaft 24 becomes coupled to the center wheel 34' by means of engagement of the tapered surfaces of the center wheel and the drive wheel 33', thereby permitting the vehicle to be driven across a surface.

Engagement and disengagement of the clutch assembly described above is effected by means of pivoting arm 42 which extends through a slotted opening 45 in the roof of the toy. Arm 42 is pivoted on a pin 44 supported by the side walls of the toy housing 12''. The lower end of arm 42 contains a pin 46 which is supported in a slotted hole 48 in an arm 47 extending from a bracket 49 connected to a frame 50 which is secured at its other end to the housing 19'' for the inertia wheel

motor. Thus, as arm 45 is moved forward, it retracts housing 19'' thereby declutching its output shaft from the center wheel secured to the front axle 13 of the vehicle. When arm 45 is pulled rearwardly, it advances frame 50 and housing 19'' causing the tapered front end of wheel 42 to engage and become frictionally coupled to the center wheel 40 and thereby rotating said center wheel and axle 13 to rotationally drive the wheels connected to the axle and cause the vehicle to be driven across the surface on which it is resting.

In FIG. 5 which shows a modified form of the drive means of FIG. 3 taken through a cross section part of the rear portion of a toy vehicle 50, the inertia motor housing 19' is shown mounted above a drive wheel 52 and is operatively disengaged therefrom. The wheel 52 is rotatably supported on a shaft 54 extending across the vehicle body 51. The ends of shaft 54 are supported in bearings, one of which denoted 55 is shown through the broken away center portion of the wheel and is slidably supported to move up and down in a slide bearing composed of spaced apart C-shaped member or formations 56 and 57 secured to or forming part of the inside surface portions of the opposite walls of the vehicle body shell 51. Thus, when the vehicle body is lifted off a surface, the wheel or wheels 52 will drop downwardly into the position shown in FIG. 5 disengaging the tapered surface 34 of wheel or gear 33 which is connected as described to the output shaft of the drive motor in housing 19'. Said output shaft may thus rotate freely until the vehicle wheels are placed on the surface on which the vehicle is to ride whereupon the shaft bearings 55 will be forced upwardly in the guideway defined by members 56 and 57 thereby bringing the tapered surface 53 of the wheel 52 into surface engagement with the tapered surface 34 of wheel 33 causing wheel 52 to be driven thereby. It is noted that the ends of members 56 and 57 are shaped to restrict the upward and downward travel of the bearing 55 so that when the vehicle is lifted off the ground, the wheel 52 will just disengage wheel 33, yet engagement of the two may be effected to provide a clutching action when wheel 52 engages a supporting surface and the weight of the vehicle body causes the body to move downwardly. If two wheels are provided instead of the single wheel 52, they may be mounted exterior of the side walls of the body 51 and bearing 55 may extend substantially completely across the width of the vehicle body with its ends engaging in C-like slide formations 56 and 57 and both sides of the vehicle body to permit both wheels to move up and down simultaneously as the vehicle is put down and picked up off a surface.

I claim:

1. A self-propelled toy vehicle comprising

a. a body shell having an external surface substantially in the shape of the toy vehicle and defining a chamber therein, said body shell having aligned openings in the opposite walls thereof,

b. wheel means depending from said body shell for supporting the body shell as the toy vehicle is driven across a surface,

c. drive means for said toy vehicle including a weighted inertia wheel rotationally supported by said body for driving said toy vehicle,

d. input means for driving said inertia wheel, said input means including a pinion gear and means rotationally supporting said pinion gear spaced from the opposite walls of said body shell within said chamber,

e. a drive member supporting an elongated gear strip having teeth formed along the length of said strip and defining a rack gear, and

f. guide means for said gear strip comprising a channel-like formation defining a trackway in said chamber between and in alignment with said openings in the opposite walls of said body shell, said channel-like formation having an open side adjacent to said pinion gear,

g. whereby when said gear strip is positioned in said channel-like formation and is drawn therethrough, said teeth on said gear strip mesh with and drive said pinion gear to rapidly accelerate said inertia wheel and drive said toy vehicle.

2. A self-propelled toy vehicle as defined in claim 1 wherein

said guide means is supported at its opposite ends by the opposite walls of said body shell whereby said channel-like formation extends between the aligned openings in the opposite walls.

3. A self-propelled toy vehicle as defined in claim 1 wherein

said inertia wheel is housed within said chamber.

4. A self-propelled toy vehicle as defined in claim 1 further comprising

transmission means for operatively connecting said inertia wheel with said wheel means to drive said wheel means, said transmission means being housed within said chamber.

5. A self-propelled toy vehicle as defined in claim 4 wherein

said transmission means includes means for engaging and disengaging said wheel means from said inertia wheel.

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