A winding device for providing a torque input to a mechanically powered toy vehicle situated remotely from the winding device, the torque being produced by the winding device and coupled to the toy vehicle through flexible coupling means such as a Bowden cable, for example. The winding device may be disposed in a housing simulating an automobile service station pump, and the Bowden cable may represent a fuel delivery hose. The housing may also be mounted on a base which includes a section of toy vehicle track whereon the vehicle travels, and, gate and twist restraining arrangement may be mounted on the base to stabilize the toy when the torque is introduced. The toy vehicle may preferably include a negator type mechanical motor in which spring-wound drums are horizontally mounted to provide a compact and low profile.

10 Claims, 6 Drawing Figures
TOY VEHICLE REMOTE WINDING APPARATUS

BACKGROUND OF THE INVENTION

The background of the invention will be set forth in two parts.

1. Field of the Invention

The present invention pertains to the field of toy vehicles, and more particularly to winding apparatus disposed remotely of the vehicles.

2. Description of the Prior Art

Toy car constructions which employ a self-contained wind-up motor are well known. The mechanical motors in these toys are generally of two basic types, (1) a spring-wound motor in which energy is stored in a mainspring that is wound by torque applied through a manually operated key or crank attached to the toy, and (2) an inertia motor in which an inertia wheel is initially rotated at high speed by an input torque, the torque being provided, for example, by the user rapidly rolling the vehicle on the floor. In both of these cases, there is presented the distinct disadvantage that the toy must be held and usually lifted in order to store the energy in the mechanical motor.

Another disadvantage in the use of the first mentioned group of mechanically driven toy vehicles is that these motors provide a very strong initial force to the driven wheels which soon dissipates to a much lesser force for the remainder of the motor's activity. This characteristic leads to the toy being hard to keep on a track just after being "wound up," and thereafter not having enough drive power or speed to negotiate rises and to stay on a banked turn.

It has also been found that in order to instill an initial interest and desire to own a certain toy and to keep the interest after purchase, the toy must usually resemble an actual vehicle or one that has likelihood of being built in the future.

SUMMARY OF THE INVENTION

In view of the foregoing factors and conditions characteristic of mechanically driven toy vehicle construction, it is a primary object of the present invention to provide a new and improved remote winding apparatus for use with a mechanically powered toy vehicle which is not subject to the disadvantages enumerated above and which has a novel flexible coupling arrangement that couples the toy's mechanical, torque activated motor to a remotely disposed winding apparatus.

Another object of the present invention is to provide a remote winding apparatus for use with a mechanically powered toy vehicle which apparatus closely resembles an automobile service station gasoline pump having a simulated fuel hose which is in fact a flexible torque coupling cable.

Still another object of the present invention is to provide a remote winding apparatus for use with a mechanically powered toy vehicle having a very efficient, long running, mechanical motor that exhibits a relatively flat power output characteristic.

Yet another object of the present invention is to provide a remote winding apparatus which includes stabilizing means for holding a toy vehicle in a proper position while torque energy is being coupled thereto.

Still a further object of the present invention is to provide a remote winding apparatus for use with a mechanically powered toy vehicle, wherein the driven wheels of such vehicle are prevented from contacting the roadway surface during the time that the vehicle's motor is being energized.

According to the present invention, a remote winding apparatus is provided for use with a mechanically powered toy vehicle having a torque input receptacle, the apparatus including a winding mechanism including an output torque terminal and a flexible coupling means having an elongated torque transmitting flexible coupling member. One end of the coupling member is operatively coupled to the output torque terminal of the winding mechanism, and the other end thereof is removably coupled to the torque input receptacle of the toy vehicle whereby torque developed in the remotely disposed winding mechanism is introduced into the toy vehicle.

The flexible coupling member may be an elongated tightly wound metal or plastic spiral shaft or it may be a Bowden cable having an elongated elastic shaft disposed within and extending beyond the ends of an elongated outer flexible sleeve. Furthermore, the winding mechanism may be fabricated to simulate an automobile service station gasoline pump and the flexible coupling member may be made to resemble a fuel delivery hose for the pump.

Additionally, the toy vehicle preferably includes a negator type spring-wound motor with its spools arranged horizontally for a very compact and low silhouette and for highly sustained operation.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The present invention, both to its organization and manner of operation, together with further objects and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings in which like reference characters refer to like elements in the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of the remote winding apparatus according to the invention, the toy vehicle being shown prior to applying torque thereto;

FIG. 2 is a view similar to that of FIG. 1, but now the toy vehicle is shown receiving torque energy input;

FIG. 3 is an elevational view partially in section of the invention wherein the winding apparatus and the coupling cable simulate an automobile service station gasoline pump, the view being taken along the line 3—3 of FIG. 1;

FIG. 4 is a sectional view of the winding arrangement as seen in FIG. 2 taken along line 4—4;

FIG. 5 is also a sectional view, this time illustrating the operation of the gate arrangement for holding the toy vehicle in FIG. 2, as seen from line 5—5; and

FIG. 6 is a sectional view of the drive wheel portion of the toy vehicle taken along line 6—6 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT:

Referring again to the drawings and more particularly to FIGS. 1–3, there is shown a remote winding apparatus generally designated 11 for use with a mechanically powered toy vehicle 13 having a torque input
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receptacle 15, wherein the apparatus 11 includes generally a winding mechanism 17 including an output torque terminal 19 and also includes a flexible coupling means generally designated 21, including an elongated torque transmitting coupling member 23, one end of which being operatively coupled to the output torque terminal 19 and the other end being removably coupled to the vehicle's torque input receptacle 15 as illustrated by arrow 25 in FIG. 3, whereby torque developed in the remotely disposed winding mechanism 17 is introduced into the toy vehicle 13.

The winding mechanism 17 is disposed in a housing 27 preferably fabricated by any well known process, such as injection or vacuum molding, using any conventional moldable material such as high impact styrene, for example. The housing 27 is mounted either by conventional fastening means or is molded integral with a base plate 29 which includes a track section 31. The track 31 may include vehicle retaining sidewalks 33 at each side of a track surface 35, whereupon the vehicle 13 travels. The track portion is shown by dashed lines to include conventional track section coupling tabs 37 for attaching the apparatus 11 to track section 39 of the type described and claimed in U.S. Pat. No. 3,487,999, assigned to the assignee of the present invention.

Within the housing 27 is rotatably mounted crank shaft 41 having end portion 43 and 45 journaled in bushings 47 and 49 respectively formed in sidewalks 51 and 53, as best seen in FIG. 1. The end 43 is keyed to receive a crank handle 55 which includes a rotatably attached manually gripped pin 57 for turning the crank 55 in a direction indicated by arrow 59.

As shown in FIG. 4, mounted on the shaft 41 is a gearing arrangement 61 comprising a clutch mechanism portion 63 and a drive gear portion 65. Directly attached to a square cross-sectioned portion 67 of the shaft 41 is a pawl-clutch member 69 having a curved spring-like arms 71 adapted to act on an inner surface ratchet head portion 73 of the clutch mechanism portion 63. The arms 71 engage ratchet step 75 only in one direction, as indicated by arrow 77. When the shaft 41 is rotated in the opposite direction, the pawls 71 ride over the ratchet step 75 and the ratchet is free. However, where a predetermined amount of torsion in the direction 77 is exceeded, as where the toy vehicle's motor is fully wound, the pawls 71 will jump over the ratchet step 75 so as not to allow the gearing arrangement, the coupling cable or the spring motor in the toy to be damaged.

In order to allow the toy vehicle's motor to be activated without requiring the user to hold the toy while not detracting from the realistic appearance, the vehicle 13 is maintained at a convenient position on the track 31 adjacent the housing 27 by a movable gate assembly 79 including a gate post 81 and an oppositely spaced release member 83 both conventionally attached to or integrally formed with the base plate 29. The release member 83 includes an upper tab portion 85 with an adjacent lip 87. Also, a gate arm 89, with a horizontal portion 91, is pivotally attached adjacent a first end 93 to the gate post 81 by means of a pivot pin 95. The gate arm 89 is biased to rotate upwardly to an "open" position as indicated by arrow 97 through the action of a conventional coil spring 99, one end of which 101 is hooked about a lower edge 103 of the arm 89 and the other end 105 is anchored to the post 81 as shown in FIG. 5.

It can be easily realized that the application of torque or a twisting or a turning force to the vehicle's input receptacle 15 will cause the vehicle 13 to turn or twist in the same direction unless restrained by appropriate means. Such means is here provided in the form of a fixed barrier wall 107 and an inverted L-shaped bracket 108 both extending upwardly from the base plate 29, and a resilient restraint arm 109 extending from a vertical base mounted post 111. Thus, when the toy 13 is in its captured position with its front portion 113 prevented from moving forward in a direction 115 by the gate arm 89 and from moving upward and over the arm by the arm's horizontal portion 91, the rear portion 117 of the toy will move toward the housing 27, since the torque applied by the remote winding mechanism 17 is counterclockwise as shown by arrow 119 in FIG. 1.

The sideward movement allowed by the resilient member 109 and ultimately by the barrier 107 and bracket 108 is such that in this position the toy's rear wheels 121 are positioned over a pair of associated grooves 123. So located, the rear portion of the vehicle is supported above the track surface 35 by a suitably positioned support block 125 as illustrated in FIG. 6. Here, the toy's driven wheels 121 are free to rotate and will not provide an undesired load on the vehicle's gearing arrangement or on the winding device. It can be seen in FIG. 2, that the uppermost portion of the inverted L-shaped bracket 108, prevents the rear portion 117 of the toy 13 from raising up over the barrier 107 and out of contact with the resilient arm 109. It should be further appreciated that when the input torque from the winding device is terminated, the arm 109 will push the vehicle's rear portion 117 back to a position illustrated in FIG. 1, so that the vehicle is again aligned with the track (the drive wheels now bearing on the track surface thus preventing unwinding of the spring motor) and ready to be released when the gate arm 89 is raised as shown by the arrow 79 and the dashed outline 127 in FIG. 5. This is accomplished by a manually applied downward pressure (arrow 129) on the tab portion 85.

The toy vehicle 13 illustrated in FIGS. 1–3 and 6, utilizes a spring wound mechanical motor 131 constructed to utilize what is commonly known in the art as a negator type principle. Basically, the motor 131 includes a storage drum 133, an adjacent output drum 135, and a flexible spring in the form of a band or strip 137 wound in opposite directions about the drum.

Unlike conventional negator arrangements, the drums in the toy 13 are disposed with their axes of spring rotation in a vertical plane so that the broad area of the drums or spools are horizontal for a lower silhouette. Descriptions of the negator type motor may be found by referring to suitable publications and texts and to U.S. patents such as, for example, U.S. Pat. Nos. 2,835,344 and 3,194,343.

Another distinction between the presently described negator type motor and those known in the past is the present use of a longer negator spring band with many more turns on the spools or drums than is conventionally used. This, coupled with the gearing arrangement having a lower gearing ratio (1:40) to the driven
wheels 121 provides a much higher efficiency. In any form, it may be said that the negator type motor is an energy storage device which transfers energy at nearly a constant rate for driving a device, such as a toy vehicle 13, at a more uniform rate of speed over more nearly the entire span of stored energy.

Energy is stored in the motor 131 by providing torque energy to the output drum 135 by coupling the Bowden cable 21 through its square coupling pin 139 inserted in a correspondingly configured opening 141 in the torque input receptacle 15 fixedly secured to the drum 135. The handle 55 of the winding mechanism 17 is then turned to rotate the drum 135 in the direction 119. By this action, the ribbon spring 137 is pulled from its tightly coiled position on the storage drum 133 and is wound about the output drum's inner hub 143.

The cable 21 may then be uncoupled from the vehicle to allow the output drum to be turned in a clockwise direction by the action of the spring tending, to again, wind about the storage drum 133. In order to couple the stored energy from the negator mechanism to the driven wheels 121, an output gear 145 is fixedly attached to turn with the output drum 135. The output gear 145 is meshed with a smaller pinion gear 147 which is fixed to and shares a common shaft 149 with a larger intermediate pinion gear 151. The latter gear is in turn meshed with a final pinion 153 rotatably mounted on a horizontal portion 155 of an L-shaped bracket member 157, attached to or part of the vehicle's chassis 159. The portion 155 also rotatably supports the vertical shaft 149 between itself and the chassis 159, as best viewed in FIG. 3.

Attached to the pinion 153 and rotating with it is a crown gear 161. The crown gear meshes with the drive pinion 163 fixedly mounted on a rotating drive shaft 165, upon which the drive wheels 121 are mounted. In this manner, the output energy from the motor 131 is directly coupled through a gearing arrangement to the drive wheels 121 and no clutch is provided. It will be noticed that all the gears except the drive pinion are mounted on parallel vertical shafts so that the advantages of the motors low silhouette and compactness is complemented. It has been found that a very satisfactory gearing ratio between the output drums and the driven wheels is that of 1 to 40.

As noted previously, the housing 27 may be configured to resemble or simulate a conventional service station gasoline pump so that the toy will have a realistic appearance for attractiveness to its users. In this regard, the handle 55 resembles a crank on an actual gasoline pump and an upper head portion 167 of the housing 27 includes a face 169 which simulates windows indicating the amount and cost of fuel pumped.

From the foregoing, it will be evident that the invention provides a new and entertaining toy that very closely simulates an actual service station gasoline pump and which provide torque energy through a flexible coupling cable to a mechanically powered toy vehicle.

Although specific embodiments of the invention have been described in detail, other organizations of the embodiment shown may be made within the spirit and scope of the invention.

Accordingly, it is intended that the foregoing disclosure and drawings shall be considered only as illustrations of the principles of the invention and are not to be construed in a limiting sense.

What is claimed is:

1. Remote winding apparatus and a mechanical powered toy vehicle having a torque input receptacle, comprising:

- toy vehicle track upon which said toy vehicle travels;
- winding mechanism housing disposed adjacent said track, said housing including a winding mechanism with an output torque terminal;
- flexible coupling means including an elongate torque transmitting flexible coupling member, one end of said coupling member being operatively coupled to said output torque terminal and the other end thereof being removable coupled to said torque input receptacle whereby torque developed in said winding mechanism is transmitted to a toy vehicle standing on said track;
- toy vehicle restraining means associated with said track adjacent said housing for restraining movement of said toy vehicle when said torque is being transmitted thereto;
- said restraining means including restraining barrier means positioned adjacent said housing along a side of said track for limiting the twisting of a toy vehicle when said torque is being transmitted thereto and a fixed barrier wall diagonally disposed with respect to the longitudinal axis of said track and a separate resilient restraint arm means for providing a return vehicle-track alignment force to said vehicle when said torque is no longer being transmitted thereto.

2. Remote winding apparatus according to claim 1, wherein said vehicle track and said housing are an integral part of a base, and wherein said restraint arm means includes a resilient arm having a first end fixedly attached to said base and a second end contacting one end of said toy vehicle.

3. Remote winding apparatus according to claim 2 wherein said toy vehicle includes a rear portion and drive wheels at the rear portion thereof, and wherein said second end of said resilient arm contacts said rear portion.

4. A remote winding apparatus according to claim 3, wherein said drive wheels turn with the introduction of said torque and wherein said base includes friction relieving means allowing said driven wheels to turn freely while said torque is being introduced to said vehicle.

5. A remote winding apparatus according to claim 4, wherein said friction relieving means includes depressions under said driven wheels when said torque is being introduced into said vehicle.

6. Remote winding system and a toy vehicle having a self-contained mechanical motor and a torque input receptacle to wind said motor, comprising:

- a frame to positionably locate said toy vehicle when torque is transmitted thereto;
- manually actuable means mounted on said frame, said means including a gearing arrangement; and coupling means operatively coupled to said gearing arrangement removably engaging said torque input receptacle and transmitting torque supplied by said manually actuable means to said mechani-
7. Remote winding apparatus according to claim 6, wherein said toy vehicle includes a spring driven motor operatively coupled to said input receptacle, and wherein said to limiting means includes a clutch means preventing over-winding of said spring driven motor.

8. A remote winding apparatus according to claim 7, wherein said toothed gearing arrangement provides a step-up gearing ratio.

9. A remote winding apparatus according to claim 7, wherein said clutch mechanism includes means for allowing the transmission of torque in only one direction.

10. Remote winding system and a toy vehicle having a self-contained mechanical motor permanently drivingly connected to drive wheels and a torque input receptacle to wind said motor, comprising:

   a frame to positionably locate said toy vehicle when torque is transmitted thereto and a trackway on said frame for rollably supporting said vehicle; manually actuable means mounted on said frame, said means including a gearing arrangement; coupling means operatively coupled to said gearing arrangement removably engaging said torque input receptacle and transmitting torque supplied by said manually actuable means to said mechanical motor of said toy vehicle; and means responsive to delivery of torque to said input receptacle to disengage said drive wheels from said trackway whereby said drive wheels may rotate freely while said motor is being wound.

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