

[54] RUBBER BAND DRIVE FOR TOY VEHICLE

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[58] Field of Search **46/202, 206, 208**

[56] **References Cited**

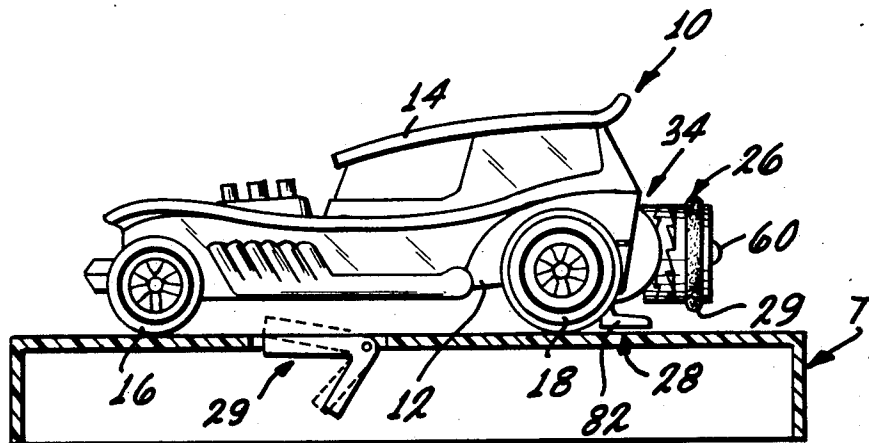
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[57] **ABSTRACT**

A toy vehicle with a large knob at the rear and a rubber band motor that is wound by rolling the knob back and forth on the ground. The vehicle may then be released and run under the influence of the rubber band. Alternatively, the knob may be pulled back to prevent immediate unwinding of the motor. The vehicle may then be started by tipping it back to a "wheelie" position so that a release member behind the rear wheels is pressed up to release the rubber band motor or the vehicle may be pushed by hand or otherwise propelled until it is desired to press the release member and release the rubber band motor.

11 Claims, 9 Drawing Figures



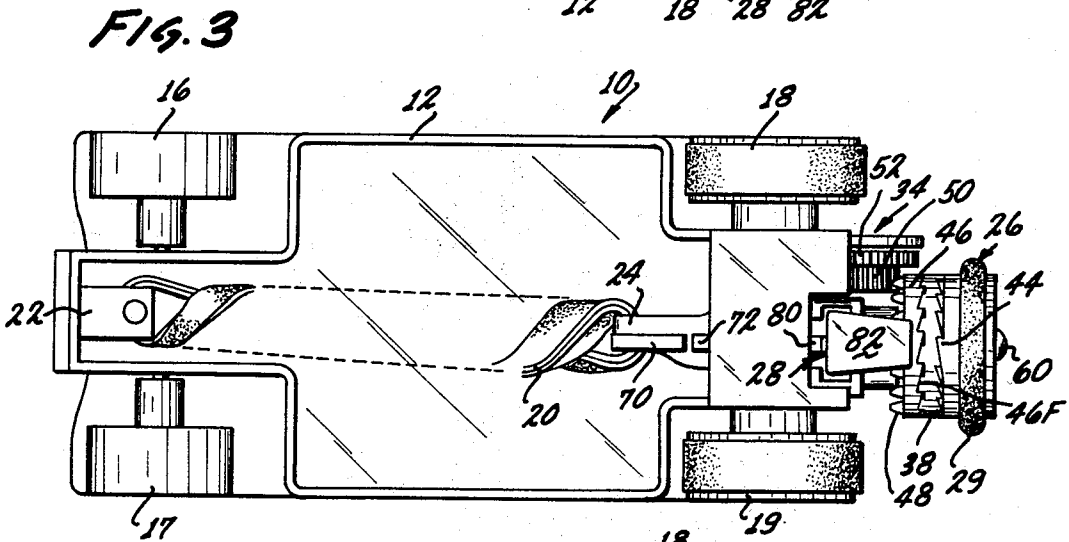
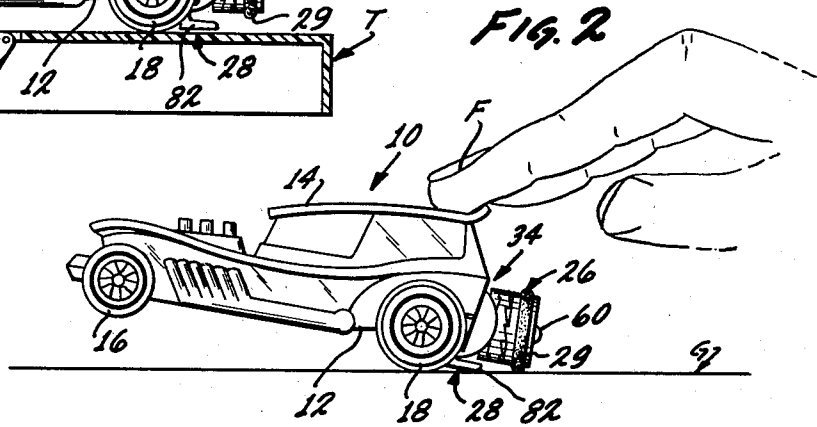
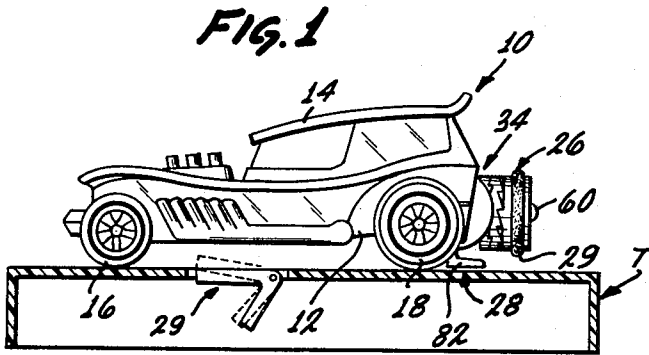
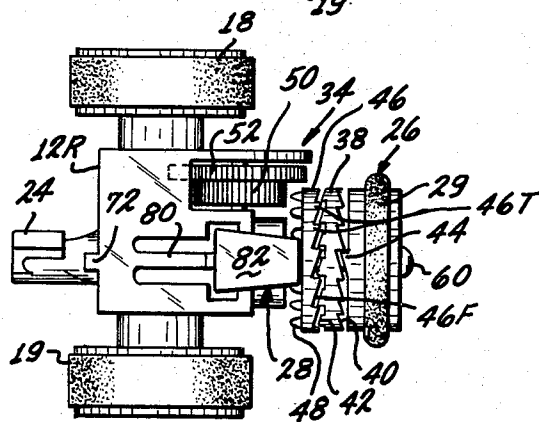
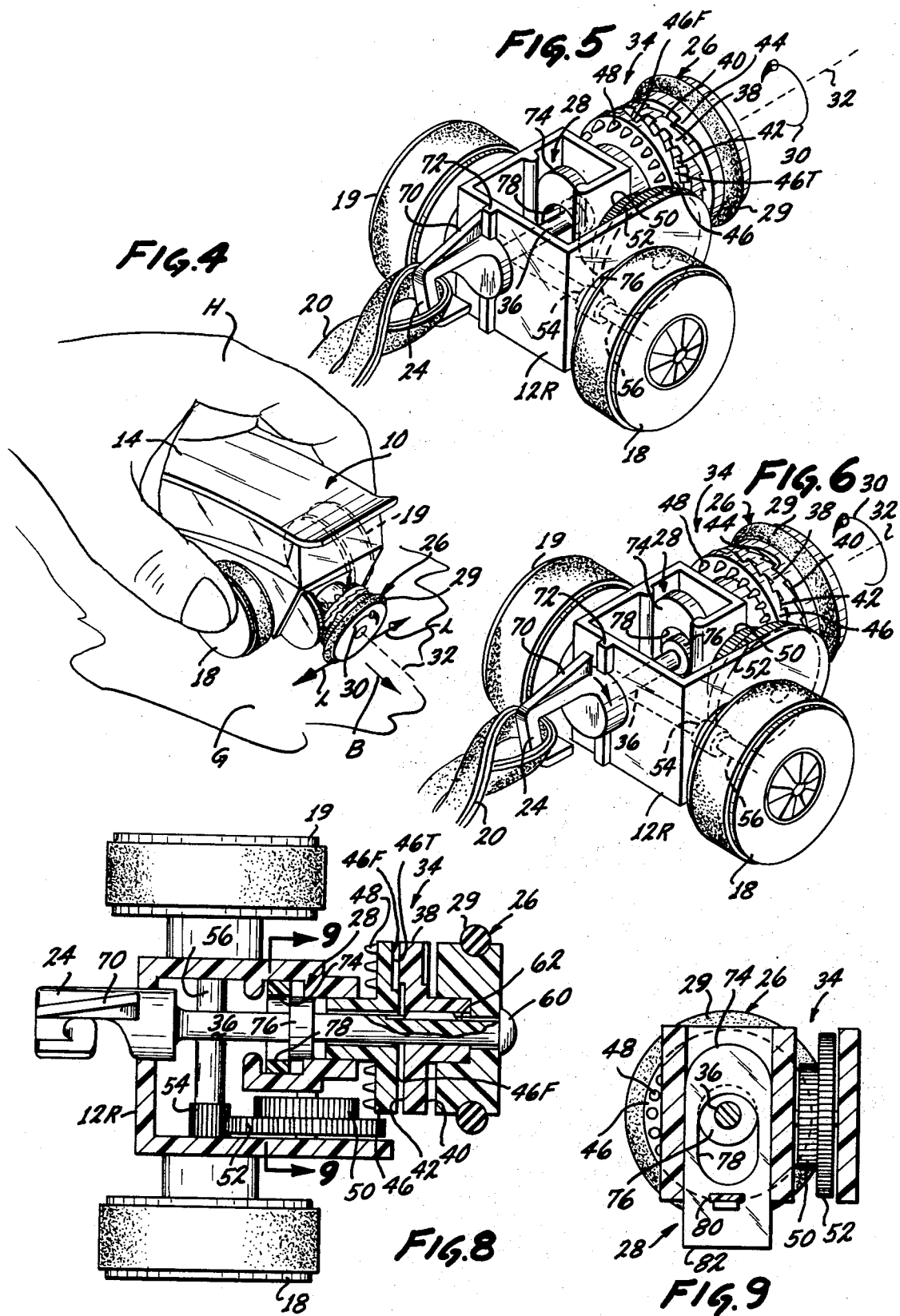


FIG. 7





RUBBER BAND DRIVE FOR TOY VEHICLE

BACKGROUND OF THE INVENTION

This invention relates to toy vehicles designed to roll along the ground and which have wind up motors for propelling them.

Toy vehicles with wind up motors are often provided with a key which is turned by hand to wind the motor and a lever that prevents unwinding until the vehicle has been laid on the ground. Generally, both the winding and release operations are artificial movemets that can detract from the play situation. If these functions could be performed in a more exciting and novel manner, the entertainment value of the toy vehicles could be enhanced.

SUMMARY OF THE INVENTION

In accordance with a presently preferred embodiment of the invention, a toy vehicle is provided which has a wind up motor that is both wound and released in a novel and entertaining manner. The vehicle includes four wheels that rollably support the vehicle frame on the ground and a rubber band motor for propelling the vehicle. A wind up knob is located behind the vehicle and rotates about an axis oriented along the length of the vehicle. A child winds the motor by picking up the vehicle in a manner that prevents rotation of the rear wheels, and rolling the wind up knob back and forth on the ground to wind the rubber band. The child may then pull back on the knob to latch the motor against unwinding or the child may place the vehicle on the ground without latching the motor for immediate operation of the vehicle by the rubber band motor. If the child chooses to latch the motor, the vehicle may be pushed by hand or otherwise propelled until it is desired to release the rubber band motor. This may be accomplished by placing the vehicle on the ground and then tipping it backward to a "wheelie" orientation with its front wheels off the ground. A release member extending downwardly from the rear of the vehicle is pressed up when the vehicle is tipped to the wheelie position. Such upward pressing of the release member releases the motor so it can immediately propel the vehicle when the child lets go of it. Thus, the vehicle is started merely by tilting it backward to a wheelie position assumed by drag racing vehicles, and the vehicle initially begins moving in this position. The motor release is therefore accomplished in an entertaining manner and the vehicle movement is enhanced because the vehicle begins moving in a racing position. Alternatively, the release member may be pressed upwardly by a lever, or the like, swingably mounted on a track upon which the vehicle moves.

The novel features of the invention are set forth with particularity in the appended claims. The invention will best be understood from the following description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation view of a toy vehicle constructed in accordance with the invention, shown in its normal position on a section of track;

FIG. 2 is a view similar to FIG. 1, but showing how the vehicle may be tipped to a wheelie position on the ground to start it;

FIG. 3 is a bottom elevation view of the vehicle of FIG. 1;

FIG. 4 is a perspective view of the vehicle of FIG. 1, showing how the motor thereof is wound;

FIG. 5 is a partial perspective view showing the driving mechanism of the vehicle of FIG. 1 in a latched position wherein the motor is wound but prevented from driving the vehicle;

FIG. 6 is a view similar to FIG. 5, but showing the mechanism after it has been released to drive the vehicle;

FIG. 7 is a bottom view of the mechanism of FIG. 5;

FIG. 8 is a plan view of the mechanism of FIG. 5;

FIG. 9 is a view taken on the line 9-9 of FIG. 8.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1-3 illustrate a vehicle 10 constructed in accordance with the invention, which includes a frame 12 with a decorative body portion 14, and four wheels 16, 17, 18 and 19 for rollably supporting the vehicle on a suitable supporting surface, such as a track T, as shown in FIG. 1, or the ground G, as shown in FIG. 2. The vehicle can be propelled along the track T or the ground G either by hand or by a motor which includes a rubber band 20 that can be twisted. The rubber band is held taut between a front hook 22 fixed to the front of frame 12 and a rear hook 24 that is rotatably mounted in a motor module or driving mechanism 34 mounted at the rear of the frame. The rubber band is wound by rotating a winding knob 26 which is part of driving mechanism 34 and which lies at the rear of the vehicle for rotation about a longitudinal axis 32. After winding the rubber band motor, a child may pull back on the winding knob 26 to latch rear hook 24 and prevent the motor from immediately unwinding. Alternatively, the wheel may be placed upon track T or ground G without latching the motor so that the vehicle will immediately operate under the influence of rubber band 20.

Unlatching of the motor may be accomplished by pushing up a release or unlatching member 28 that depends from motor module 34 at the rear of the frame. As soon as the release member 28 is pushed up, the rubber band 20 can begin rotating the hook 24 which is connected to the rear wheels 18, 19, to thereby drive the vehicle along the ground. The rear wheels are carried by motor module 34 and are free wheeling, so that, when the vehicle is not being propelled by the rubber band motor, the vehicle can be easily pushed along the ground. The vehicle may also be pushed or otherwise propelled along track T with the motor wound and latched. Unlatching may then be accomplished by swinging a lever 29 into the path-of-travel of release member 28.

Winding of the motor is accomplished in the manner shown in FIG. 4. A child picks up the vehicle in his hand H so that his fingers rest against the rear wheel 18, 19. The child holds the vehicle in a tilted orientation, and with only the high friction rim 29 of the winding knob 26 engaged with the ground G. The child then moves the vehicle laterally from side-to-side as indicated by the arrows L so that the winding knob 26 rotates first clockwise and then counterclockwise. Every time the knob 26 rotates clockwise, as indicated by arrow 30, rubber band 20 is wound up further. No winding occurs during counterclockwise rotation. As rubber band 20 becomes wound, it tends to rotate the

rear wheels 18, 19. However, so long as the child holds at least one of these wheels, the wheels will not rotate and the rubber band will not become unwound. After the motor is wound up, the child may latch it against unwinding by pulling back on the knob 26 in the direction of arrow B.

After the vehicle has been wound and latched against unwinding, the child may place it on track T or the ground. To start the vehicle, the child may tip it backwardly in the manner shown in FIG. 2, by pressing down with his finger F on the rear of the body portion 14 at a location behind the center of the rear wheels. This causes the front "wheelie" orientation. This is the orientation often assumed by vehicles which are rapidly accelerating during drag races. When the vehicle is tipped back to a wheelie orientation, the release member 28 is pressed against the ground and it is pushed up with respect to the frame 12. Alternatively, release member 28 may be moved upwardly by swinging lever 29 to the broken line position shown in FIG. 1 and by pushing the vehicle over lever 29 so that it will engage lever 29. Such upward movement of the release member releases the motor so that it immediately delivers torque to the rear wheels to rotate them. As soon as the child removes his finger F from the vehicle, the vehicle is propelled forwardly by the motor.

FIGS. 5-9 illustrate details of the drive mechanism 34 which permits winding, latching, and unlatching in the manner described above. The frame 12 of the vehicle includes a separate rear frame portion 12R which forms a portion of drive mechanism 34 and which supports several drive components. A drive shaft 36 is rotatably mounted on the frame portion 12R about the longitudinal axis 32. The forward end of the drive shaft 36 forms the front hook 24 which is engaged with the rubber band 20. A middle clutch member 38 is connected by splines to a rear portion of the drive shaft, so it rotates with the drive shaft. The middle clutch member 38 has a driven face 40 and a drive face 42, both of which have ratchet teeth. The wind knob 26 is freely rotatable about the rear end of the drive shaft 36, but the knob 26 has a toothed wheel 44 fixed thereto which can engage the middle clutch member 38. When the wind knob 26 is rotated in the clockwise direction of arrow 30, it rotates the middle clutch member 38 and therefore the drive shaft 36, so that the hook 24 turns the rubber band 20 to wind it. When the wind knob 26 rotates in a counterclockwise direction, however, the ratchet wheel 44 can slip on the middle clutch member 38, so that the rubber band is not unwound.

When the rubber band 20 unwinds to drive the vehicle, it rotates the drive shaft 36 and middle clutch member 38 thereon. The middle clutch member 38 engages an output ratchet wheel 46 which is connected through a gear train to the rear wheels 18, 19 to rotate them. The output ratchet wheel 46, which is freely rotatable on the drive shaft 36, has a crown gear 48 formed thereon which engages an idler pinion 50. The idler pinion 50 is fixed to an idler gear 52, and the idler pinion and gear are rotatably mounted on the rear frame portion 12R. The idler gear 52 is engaged with an axle gear 54 which is formed on a rear axle 56. The rear axle 56 is rotatably mounted on the frame and fixed to the rear wheels 18, 19.

As illustrated in FIGS. 5 and 8, the drive shaft 36 is constantly pulled in a forward direction by tension in the rubber band 20. The rear end of the drive shaft has

an enlarged head 60 which bears against the wind knob 26 to pull it forwardly. The wind knob 26 and its ratchet wheel 44 press forwardly against the middle clutch member 38 which, in turn, presses forwardly against a plurality of ratchet teeth 46T provided on a face 46F of the output ratchet wheel 46. Thus, the middle clutch member 38 is constantly biased into engagement with the ratchet wheels 44, 46, but can resiliently separate from them. The drive shaft 36 has a spline 62 engaged with a slot formed in the middle clutch member 38, so that the middle clutch member 38 can slide relative to the shaft but is rotatably fixed to it. When the wind knob 26 turns clockwise, it turns the middle clutch member 38 to wind the rubber band. However, when the wind knob rotates counterclockwise its ratchet wheel 44 can slip on the middle clutch member so the rubber band is not unwound. Similarly, the wheels 18, 19 can rotate on the ground when a child pushes the vehicle along the ground, even though the middle clutch member 38 may be prevented from rotating, because the output ratchet wheel 46 then rotates in a direction to readily slip on the middle clutch member 38.

The latching of the mechanism to prevent unwinding of the rubber band 20 is accomplished by a projection 70 (FIG. 5) formed on the front of the drive shaft 36 near the front hook thereof. This projection 70 can engage another projection 72 formed on the rear frame portion 12R, which serves as a latch means to prevent rotation of the rubber band motor. The drive shaft 36 is slideable, so that it can slide forward a short distance to disengage the projections 70, 72 and permit the drive shaft to rotate the rear wheels and propel the vehicle. The drive shaft 36 is slideable, so that it can slide forward a short distance to disengage the projections 70, 72 and permit the drive shaft to rotate the rear wheels and propel the vehicle. The drive shaft 36 can be prevented from sliding forward under the pull of the rubber band by the release member 28. The member 28 has a flat stem 74 (FIGS. 8 and 9) that can lie in front of an enlarged drive shaft part 76. The stem 74 of the release member has a hole 78 formed therein which can receive the enlarged drive shaft part 76 to permit the drive shaft to move forward so that the projections 70, 72 are disengaged. However, the release member 28 is normally biased downwardly by a leaf spring 80 so that the hole 78 is not aligned with the enlarged shaft part 76 and cannot receive it. The leaf spring 80 is formed in the rear frame part 12R which is constructed of a resilient material.

When the release member 28 is pushed upwardly, the hole 78 therein becomes aligned with the enlarged shaft part 76 to receive it and permit the drive shaft 36 to move forward a small distance to the forward position shown in FIG. 6. The projections 70, 72 on the shaft and frame are therefore disengaged and the wound rubber band 20 is then free to rotate the shaft 36. The drive shaft 36 rotates in a counterclockwise direction, which is the direction opposite to arrow 30, so that the middle clutch member 38 positively engages the output ratchet wheel 46 and delivers power through the gear train to the rear wheels to drive the vehicle along the ground. The release member 28 has a wide flat flange 82 at its lower end that extends rearwardly from the stem 74. The flange 82 is at a level close to the bottom of the rear wheels 18, 19, and its rear end lies behind the axis of the rear wheels. Accordingly, the

flange 82 and the entire release member 28 may be pushed upwardly with respect to the frame which the vehicle is either tipped to a wheelie position as indicated in FIG. 2 or moved over the elevated lever 29 shown in FIG. 1. The rearwardly extending flange 82 not only serves to move the pressing point rearwardly, but also helps to prevent sagging of the release member on a rug or the like when the vehicle starts moving.

Thus, the invention provides a toy vehicle which can be started in an entertaining manner, and which has a wind up motor that can be wound in a simple and entertaining manner. Powered starting may be accomplished by the use of a release mechanism that extends downwardly behind the rear wheels of the vehicle. Winding is accomplished in a manner that involves holding the vehicle in one hand and moving it back-and-forth laterally on the ground. This winding technique requires the use of only one hand and is a more novel and entertaining movement than the winding of a key or the like. The fact that the winding knob extends from the rear of the car results in a child normally touching the rear wheels and preventing them from rotating as he holds the vehicle to wind the knob along the ground. The drive mechanism has a relatively simple construction so that the vehicle can be produced at low cost, and yet it permits operation in a simple and entertaining manner.

Although particular embodiments of the invention have been described and illustrated herein, it is recognized that modifications and variations may readily occur to those skilled in the art and consequently it is intended that the claims be interpreted to cover such modifications and equivalents.

What is claimed is:

1. In a toy vehicle which includes wheel means rollably supporting said vehicle on a supporting surface and drive means coupled to said wheel means to impart movement thereto, the improvement comprising:

latch means engageable with said drive means to prevent actuation thereof, thereby preventing powered movement of said vehicle while it is being positioned on said surface to be run;

a release member extending from said vehicle, said release member being spaced from said surface when said vehicle is approximately level; and means for disengaging said latch means from said drive means when said release member is moved.

2. The improvement described in claim 1 wherein said drive means includes:

a motor having a rotatable output member;
a drive shaft connected to said rotatable output member for rotation thereby; and
means connecting said drive shaft to said wheel means, whereby rotation of said drive shaft imparts rotation to said wheel means.

3. The improvement described in claim 2 wherein: said motor includes a first hook mounted at one end of said vehicle, said drive shaft being mounted at the other end of said vehicle for rotation and axial sliding about a longitudinal axis having a second hook thereon and an enlarged portion spaced behind said second hook, said rotatable output member comprising an elastic band extending between said hooks, said elastic band urging said drive shaft to rotate and to slide toward said first hook when said elastic band is twisted;

said release member is vertically movable on said vehicle, and said release member has a portion with a hole therein slightly larger than said enlarged drive shaft portion, said hole being aligned with the enlarged shaft portion when the release member is moved upwardly; and

said drive shaft and vehicle have projections which are positioned to engage one another and prevent drive shaft rotation when the drive shaft is moved away from said first hook so that the enlarged shaft portion is behind the release member portion and which are disengaged to permit drive shaft rotation when the drive shaft is moved toward said first hook so that the enlarged shaft portion is received in the hold of the release member.

4. The improvement described in claim 2 wherein: said release member includes a downwardly extending stem and a rearwardly extending flange at the bottom of the stem.

5. In a toy vehicle which includes a frame, wheels rollably supporting the frame on the ground, a drive shaft coupled to at least one of the wheels, and a windable motor coupled to said drive shaft to rotate it when the motor is wound, the improvement wherein:

said drive shaft is axially slideable between latched and unlatched positions and said drive shaft and frame have projections engageable or disengageable when said drive shaft is respectively in said latched and unlatched axial positions; and including

a release member movably mounted on said frame for moving between a nonrelease position wherein it prevents movement of said drive shaft to said unlatched axial position, and a release position wherein it permits axial movement of said drive shaft to said unlatched position;

a winding knob; and

means for rotatably coupling said winding knob to said motor to wind it and to said drive shaft to axially slide said shaft to said latched position, whereby a child can turn the knob and then axially move it to prevent unwinding of the motor until he moves the release member.

6. The improvement described in claim 5 wherein: said vehicle includes a pair of laterally spaced rear wheels coupled to said drive shaft and at least one front wheel; and

said release member extends downwardly to a location behind said rear wheels, and said release member is upwardly movable to said release position when the front wheel is lifted high off the ground while the rear wheels are held against the ground, whereby the vehicle automatically begins to be powered when it is moved to a wheelie position.

7. The improvement described in claim 5 wherein: said frame has a first hook fixed at one end of the frame, said drive shaft has a second hook thereon, and said motor includes an elastic band extending between said hooks, said band urging said second hook to move axially as well as to rotate; and

said drive shaft has an enlarged portion, and said release member has walls forming a hole for receiving said enlarged shaft portion to permit sliding of the shaft to said unlatched position thereof, said hole being moved into alignment with the enlarged shaft portion when the release member is moved to said release position thereof.

8. A toy vehicle comprising:

a frame;

a plurality of wheels rotatably mounted on the frame, including at least one drive wheel;

first hook means mounted on said frame for engaging 5 an end of a rubber band;

second hook means for engaging an opposite end of the rubber band opposite the first hook means, said second hook means rotatably mounted on the frame;

first power transmitting means coupling the second hook means to said drive wheel including a slippable clutch to permit the rubber band to drive the drive wheel while also permitting free wheeling of the drive wheel;

wind knob means rotatably mounted on the frame;

second clutch means coupling said wind knob means to said second hook means, to permit net winding of the rubber band when the wind knob means is repeatedly turned in opposite directions, said wind knob means being axially slideable;

latch means responsive to axial sliding of the knob means to a predetermined position for restraining said second hook means against rotation in a direction to unwind the rubber band; and

means manually operable to release the second hook means from the latch means, to permit the rubber band to drive the drive wheel.

9. The toy vehicle described in claim 8 wherein:

said wind knob means includes a wind knob extending from the rear of the vehicle and rotatably mounted about an axis substantially perpendicular to the axis of said drive wheel, said wind knob having a high friction rim portion for rolling on the ground; and

said wheels include two drive wheels at the rear of

the chassis, so they can be held against rotation while the vehicle is moved sidewardly with only the wind knob contacting the ground.

10. The toy vehicle described in claim 8 wherein:

said latch means includes a member extending downwardly from the rear of the chassis and spring means urging said member downwardly, said member being upwardly movable by tilting the frame to a wheelie orientation on the ground.

11. In a toy vehicle including wheels rollably supporting said vehicle on a supporting surface, a drive shaft coupled to at least one of said wheels, and a windable motor coupled to said drive shaft to rotate it when said motor is wound, improved winding apparatus for winding said motor, comprising:

an output ratchet wheel rotatably mounted on said drive shaft, said ratchet wheel including gear means drivingly coupled to said at least one of said wheels and a face which is provided with ratchet teeth;

a winding knob rotatably mounted on said drive shaft, said winding knob being provided with ratchet teeth facing said ratchet teeth on said output ratchet wheel;

a clutch member keyed to said output shaft intermediate said winding knob and said output ratchet wheel, said clutch member being provided with a first set of ratchet teeth engagable with said ratchet teeth on said winding knob and a second set of ratchet teeth engagable with said ratchet teeth on said output ratchet wheel; and

resilient means drawing said winding knob into engagement with said clutch member which, in turn, is drawn into engagement with said output ratchet wheel.

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