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TOY VEHICLE

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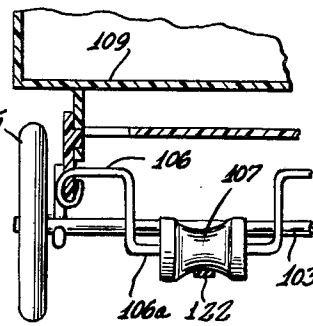
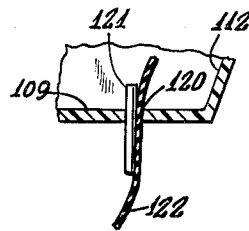
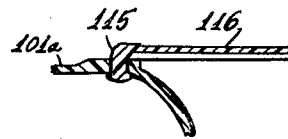
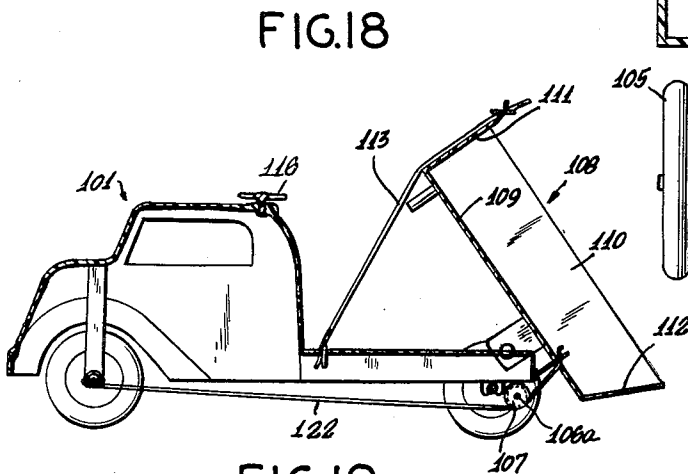
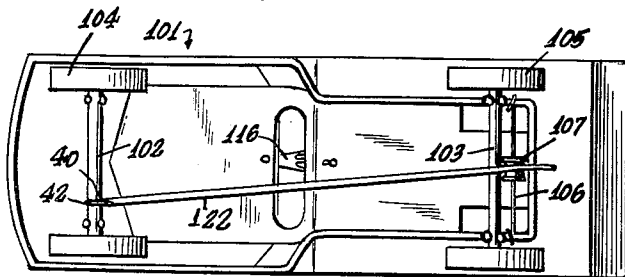
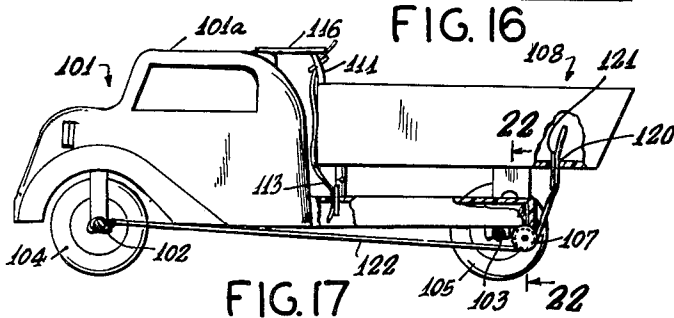
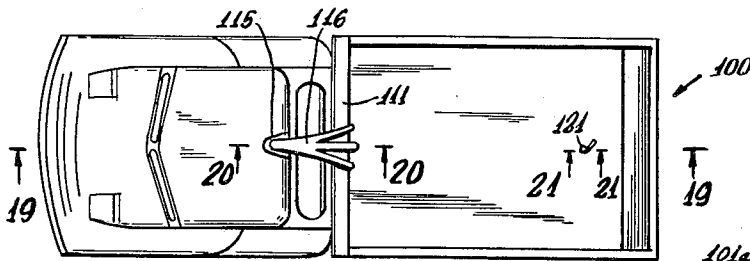


FIG. 18

FIG. 19

FIG. 20

FIG. 21

FIG. 22

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This invention relates to toy vehicles. It is particularly directed to drives for such vehicles which include an elastic element, such as a rubber band or strip, and means to wind the element on the shaft when the shaft is rotated in one direction, for rotating the shaft in the opposite direction when the shaft is released, and permitting free wheeling of the shaft after the element is fully unwound.

An object of this invention is to generally improve the construction shown in my Patent No. 2,677,915 issued May 11, 1954, for "Freewheeling Resilient Cord Drive."

In my patent, the elastic element had a loop at one end and the element passed through the loop forming a means to encircle the shaft. Such loop construction has been found to be difficult to manufacture. Said patent also discloses a construction in which a loop at the end of the elastic cord caught onto a hooked element fixed on the shaft, and disconnectable therefrom at each unwinding of the elastic element. Such construction also presented problems in manufacture and operation which seriously reduced its practical application.

It is hence an object of this invention to provide a device of the character described which will overcome these objections, by provision of a separate member rotatably mounted on the shaft and connected to the elastic element and adapted to permit free rotation of the shaft in one direction, and to catch onto an engaging means on the shaft when the latter is rotated in an opposite direction, to rotate said member with the shaft and wind the elastic element on the shaft.

Still another object of this invention is to provide a device of the character described in which said separate member is made of metal wire and has a portion encircling the shaft and an extension to which one end of the elastic element is connected.

Yet another object of this invention is to provide in a device of the character described, means to limit movement of the wound elastic element longitudinally of the shaft.

Another object of this invention is to provide a wheeled toy of the character described comprising a chassis carrying front and rear axles with wheels thereon, and a dump body hinged to the chassis, an elastic element, and means for winding the element on the front axle when said axle is rotated rearwardly, to rotate said axle forwardly when the vehicle is released and said element unwinds, and to permit free wheeling of the axle forwardly when the element is fully unwound, and the rear end of said element being attached to said dump body for tilting said body upwardly as the element is being wound on the front axle and tensioned while the front axle is being rotated rearwardly, and whereby when the vehicle is released, and the element unwinds, and decreases in tension, the dump body will again drop down.

Another object of this invention is to provide in a toy vehicle of the character described, resilient means to aid in pulling the dump body down when the elastic element decreases in tension; and also releasable means to lock the dump body against being tilted upwardly by the tensioning elastic element.

A still further object of this invention is to provide a strong and durable toy vehicle drive construction of the character described which shall be relatively inexpensive to manufacture, easy to manipulate, sure and positive in action, and yet practical and efficient to a high degree.

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Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts, which will be exemplified in the construction hereinafter described, and of which the scope of invention will be indicated in the following claims.

In the accompanying drawings in which is shown an illustrative embodiment of this invention,

FIG. 1 is a side view of a toy vehicle embodying the invention;

FIG. 2 is a bottom plan view of the toy vehicle shown in FIG. 1;

FIG. 3 is a partial plan of the rear end of the vehicle shown in FIG. 2 but with the elastic element wound on the shaft;

FIG. 4 is a partial, enlarged, perspective view of the shaft, looking down on the vehicle, as shown in FIG. 2, showing the position of the parts with the elastic element unwound and the shaft rotating freely in the free wheeling direction and in the direction of the arrow in FIG. 4 (counterclockwise looking at FIG. 1);

FIG. 5 is a view similar to FIG. 4 but showing the shaft beginning to rotate in a direction of the arrow, to begin to catch the member rotatable on the shaft and attached to the elastic element;

FIG. 6 is a view similar to FIG. 4 but illustrating a modification;

FIG. 7 is a view similar to FIG. 5 but showing the construction of FIG. 6;

FIG. 8 is a cross-sectional view taken on line 8-8 of FIG. 2, showing use of a rubber band;

FIG. 9 is a view similar to FIG. 8 but illustrating a modified construction;

FIG. 10 is a cross-sectional view taken on line 10-10 of FIG. 9;

FIG. 11 is a view similar to FIG. 8 but showing a modified construction using a single elastic strip instead of a rubber band;

FIG. 12 is a cross-sectional view taken on line 12-12 of FIG. 11;

FIG. 13 is a view similar to FIG. 8 and disclosing still another modification;

FIG. 14 is a perspective view of a modified clamp for a single elastic strip;

FIG. 15 is a top view of an elastic strip with a hole;

FIG. 16 is a top plan view of a toy vehicle embodying a modified form of the invention;

FIG. 17 is a side elevational view of the toy vehicle of FIG. 16, with parts broken away and in cross-section;

FIG. 18 is a bottom plan view of the toy vehicle of FIG. 16;

FIG. 19 is a cross-sectional view taken on line 19-19 of FIG. 16 and showing the dump body tilted upwardly;

FIG. 20 is an enlarged cross-sectional view taken on line 20-20 of FIG. 16;

FIG. 21 is an enlarged cross-sectional view taken on line 21-21 of FIG. 16; and

FIG. 22 is an enlarged cross-sectional view taken on line 22-22 of FIG. 17.

Referring now in detail to the drawing 10 designates a toy vehicle embodying the invention. Said vehicle 10 comprises a chassis or body 11 having a front wall 12, a rear wall 13, side walls 14, a front top wall 15 and a rear top wall 16.

Extending down from the front top wall 15 are parts 17 having bearings rotatably supporting a front shaft or axle 18 for the front wheels 19 which are fixed thereto. On the side walls 14 of the chassis or body are bearings 20 for rotatably supporting a rear shaft or axle 21 to which the rear wheels 22 are fixed in any suitable manner.

Any suitable top body 30 may be mounted in any suitable manner on the chassis or body 11.

Improved drive means is provided for said rear shaft. To this end, said shaft is formed with an annular groove 40 in a plane perpendicular to said shaft and from one side of which extends a branch groove 41 inclined in a clockwise direction looking at FIG. 4. Rotatably mounted on the shaft is a connector or adaptor member 42. Said member 42 may comprise a split circular portion 43 rotatably received in groove 40 and having an end 44 at one end of said circular portion. Extending from the other end of circular portion 43 is a downwardly and forwardly inclined, tangential portion 45 from which extends a bent back rearwardly and upwardly inclined hook portion 46 disposed above (FIG. 4) tangential portion 45. These parts are shown reversed in FIGS. 4 and 5 because in said figures, the views are looking down on the vehicle which is turned upside down. Member 42 may be made of metal wire.

Hooked to or engaged with the bent back portion 46 is one end of an elastic rubber band 50.

The groove 40 in the shaft is preferably located close to one of the bearings 20, and the inclined branch 41 of the groove 40 is on an opposite side of said groove, that is on the side toward the other bearing 20.

The front end of band 50 may be hooked over a hook 51 which may be integrally formed or attached to the middle of the front wall 12 of body 11, at the inside of the body, as shown in FIG. 8 of the drawing.

The rubber band 50 may also be connected to the front wall 12 by means of an S-shaped hook 52 having one curved end 52a engaging one end of the rubber band, and an oppositely curved end 52b engaged in a hole in an apertured central ear 53 integrally formed with or attached to front wall 12.

It will be noted that the rubber band is attached at its front end to the middle of wall 12, and at its rear end near one side wall 14. The rear end of the rubber band hence has a tendency to move member 42 lengthwise of the shaft toward groove 41.

It will now be understood that when the rear wheels 22, and the shaft 21 to which they are fixed, are rotated in a clockwise direction, looking at FIG. 1, the member 42 will catch in branch groove 41, and then said member will be rotated with the shaft to wind the elastic element 50 helically about the shaft to tension and stretch said element.

Integrally formed with one side wall 14 (the side opposite the side near groove 40), is a stop post 60 projecting down below the rear shaft 21, to stop the wound element 50 from getting entangled with the adjacent bearing 20.

To wind the shaft 21, the vehicle can be put on the floor and moved rearwards.

When the shaft is fully wound, the vehicle is released, and the tensioned band 50 will rotate the shaft 21 in a counterclockwise direction, looking at FIG. 1, to move the vehicle forwardly. When the band 50 is fully unwound, the vehicle will continue moving forwardly, being under momentum, and such free wheeling is permitted because the shaft can rotate freely in a counter-clockwise direction, looking at FIG. 1. Member 42 will be journalled in groove 40, and the shaft can turn without turning said member.

In FIGS. 6 and 7 there is shown a modified construction. In said figures shaft 21a has no groove. However, on said shaft is either force fitted, tightly fitted or attached, a wire or ridge forming member 70 having a part circular portion 71 having one end 72. The wire member 70 may be somewhat less or greater than 360° in extent. Its other end 73 is inclined to one side, and is hence offset from end 72. Member 70 may be helical in shape. Member 42 is rotatably mounted on the shaft 21a and is pulled against the wire member 70 by the

elastic band 50. The end 73 is inclined in the same direction as is branch groove 41. Rotation of the shaft in the direction of the arrow in FIG. 6 is free without turning member 42. However, rotation of said shaft 21a in the direction of the arrow in FIG. 7 will cause end 72 of member 70 to catch member 42 and rotate said member to wind up the band 50 on the shaft.

The groove 40 and member 70 serve as means to control the resilient split wire member 42.

In FIGS. 11 and 12 there is employed a single elastic strip or cord 80 instead of a looped band 50. The front end of the strip 80 is attached by means of an anchor member 81 integrally formed with, or fixed to front wall 12. Member 81 has a horizontal portion 82 from which extends upwardly a pin 83. Pin 83 has a split or V-grooved upper end 84. One end 80a of strip 80 is placed lengthwise against pin 83, then put through the split or groove 84, and then wound around the pin and portion 80a as at 80b. The rear end of strip 80 may be clamped between portions 45 and 46 of member 42.

In FIG. 13 the band 50 is shown passing through an opening 12a in front wall 12. A ring 90 passes through band 50 to anchor the front end of the band to the front wall.

In FIG. 14, wire 42a has a portion 43a encircling the shaft 21a. Extending from portion 43a is a portion 45a bent back at its side to form a portion 46a, the outer end of which curves outwardly as at 46b. The band 50 is gripped between portions 45a and 46a.

When a single elastic strip is used, it may be formed with a hole to receive the bent back hook portion 46 of member 42. Such strip is shown at 100 in FIG. 15 and it is formed with hole 101.

Referring now to FIGS. 16 and 22, there is shown therein a toy vehicle 100 embodying a modified form of the invention. Said vehicle 100 comprises a chassis 101 having a cab 101a at its front end and carrying a front axle 102 and a rear axle 103. Fixed on axle 102 are wheels 104 and fixed on axle 103 are wheels 105. At the underside of the rear end of chassis 101 is a shaft 106 having a downwardly extending portion 106a carrying a rotary grooved roller 107 projecting below rear axle 103.

Hinged to the chassis 101 at its rear end, as at 107 is a dump body 108. Said body 108 has a bottom wall 109, side walls 110, a front wall 111 and a rear wall 112. Wall 111 is connected to chassis 101 by an elastic string 113 to bias the dump body downwardly. Pivoted to the top of cab 101a as at 115 is an arm 116 to engage top of front wall 111 to hold the dump body down.

Bottom wall 109 has, adjacent its rear end, a hole 120 through which projects a pin 121 which serves to wedge one end of an elastic string 122. Said string 122 engages the grooved roller 107 and is attached at its front end to a member 42 such as shown in FIGS. 4 and 5. Said member 42 is rotatably received on front shaft 102 and is partially received in an annular groove 40 (like in FIGS. 5 and 4) in said shaft. Said shaft also has a branch groove 41 similar to groove 41 of FIGS. 4 and 5. Instead of grooves 40, 41, the wire 70 may be substituted, to get the free wheeling feature.

When the dump body 108 is tilted up, the lower end of wedge 121 contacts the chassis to limit the degree of tilt of the dump body.

By reversing the direction of the branch groove 41, the element 122 will wind under the shaft 102, as shown, when the vehicle is rolled rearwardly, to thereafter reverse the direction of the vehicle and move it forwardly as the element unwinds (permitting free wheeling movement in forward direction).

It has been found that when the element 122 winds under the shaft, as shown, when the vehicle is rolled backward, to wind the element, said vehicle turns around before being moved forwardly. This is due to an upward

force applied to the front shaft which tends to raise the front end of the vehicle off the floor. As the front end of the vehicle raises slightly at the end of the rearward rolling movement, it has a tendency to spin around about the rear end of the vehicle and thus change its direction.

It will be understood that instead of a dump body, any other object may be hinged to the chassis, or in fact, otherwise movable (slidably) mounted thereon, so that as the elastic element is wound and tightened, the movably mounted object is moved thereby in one direction; and when unwound, said object is moved in an opposite direction either by its weight (gravity) or under the influence of another elastic or resilient element such as rubber string 113.

As shown in FIGS. 16-22, the vehicle must be rolled rearwardly to wind the elastic element, and tilt the dump body upwardly, whereby the wound element will move the vehicle forwardly (when released), and the dump body to come down.

It will thus be seen that there is provided an apparatus in which the several objects of this invention are achieved and which is well adapted to meet the conditions of practical use.

As possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A toy vehicle comprising a toy vehicle chassis, a shaft rotatably mounted thereon, wheels fixed to the shaft for rotation therewith, a resilient member rotatably mounted on said shaft and having a split circular portion encircling said shaft and said member having an arm extending from one end of said split circular portion, an elongated elastic element having one end anchored to said vehicle and its other end connected to said arm, and means on the shaft to control said member, said means having a circular portion contacting the circular portion of said member, and said means having a portion offset from the circular portion of said means, whereby rotation of said shaft in one direction will cause said member to catch onto said offset portion of said control means, to cause said member to be rotated with said shaft to draw said elastic element toward said shaft, and to wind said element on said shaft and to thereby tension said element whereby said wound and tensioned element will rotate said shaft in an opposite direction as the element unwinds, with said member rotating with said shaft in said opposite direction, until said element is fully unwound, to permit said shaft to continue rotating in said opposite direction without rotating said member.

2. The combination of claim 1, said circular portion of said means on said shaft comprising an annular groove formed in said shaft, said encircling portion of said member being received in said groove, and said offset portion of said means being a branch groove inclined away from and joining said annular groove.

3. The combination of claim 1, said circular portion of said means on said shaft comprising a ridge on said shaft, said offset portion of said means being formed by one end of said ridge being offset from the other end thereof.

4. The combination of claim 1, said member comprising a single piece of metal wire.

5. The combination of claim 1, said control means being located near a bearing at one end of said shaft, and

said elastic element being inclined longitudinally of the chassis from said member toward another bearing near the opposite side of said chassis, whereby to press said member toward the opposite end of the shaft while engaging said circular portion of said control means, and said offset portion of said control means extending from said circular portion of the control means toward said opposite end of said shaft.

6. The combination of claim 5, in combination with stop means adjacent the other bearing to limit movement of the wound elastic element short of said other bearing.

7. The combination of claim 5, said member comprising a piece of wire, said arm comprising a portion extending tangentially from the circular portion and inclined downwardly and forwardly, and a bent back portion extending from said tangential portion and inclined upwardly and rearwardly, said element being engaged between said tangential and bent back portions.

8. The combination of claim 6, said member comprising a piece of wire, said arm comprising a portion extending tangentially from the first portion and inclined downwardly and forwardly, and a bent back portion extending from said tangential portion and inclined upwardly and rearwardly, said element being engaged between said tangential and bent back portions.

9. The combination of claim 8, said circular portion of said means on the shaft comprising an annular groove in said shaft, and said offset portion of said means being a branch groove inclined from and communicating with said annular groove toward said other bearing in a counterclockwise direction with the front of the vehicle directed to the left.

10. The combination of claim 8, said means on said shaft comprising a wire on said shaft having said circular portion encircling said shaft and having its ends offset from one another longitudinally of said shaft to provide said offset portion of said means.

11. The combination of claim 1, said elastic element comprising an elastic strip with a hole and said member having means engaging in said hole.

12. The combination of claim 1, an object movably mounted on the chassis, the anchor of said other end of said element being to said object whereby to move said object in one direction relative to said chassis upon said element being wound on said shaft.

13. The combination of claim 12, in combination with an idler roller on said chassis engaging said element between its connections to said arm and object.

14. The combination of claim 12, in combination with resilient means to bias said object in an opposite direction.

15. The combination of claim 12, in combination with releasable means to prevent movement of said object relative to said chassis.

16. The combination of claim 12, said object being hinged to the chassis and resilient means connecting said object and chassis to bias said object against tilting.

17. The combination of claim 16, in combination with releasable stop means to prevent tilting of said object.

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