United States Patent

[11] 3,590,523

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[54] **TOY VEHICLE WITH TRACK DRIVE MECHANISM HAVING AN INTERNAL POWER SOURCE**
17 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** ..... **46/243 M,** 180/9.6
[51] **Int. Cl.** **A63h 17/24**
[50] **Field of Search** 46/243, 244; 180/5, 9.64

[56] **References Cited**
UNITED STATES PATENTS

3,517,457	6/1970	Peno	46/243
3,041,485	6/1962	Jolley	46/244 X
2,584,512	2/1952	Strait	180/9.64 X
3,023,824	3/1962	Bombardier	180/9.64
3,065,569	11/1962	Nielson et al.	46/244

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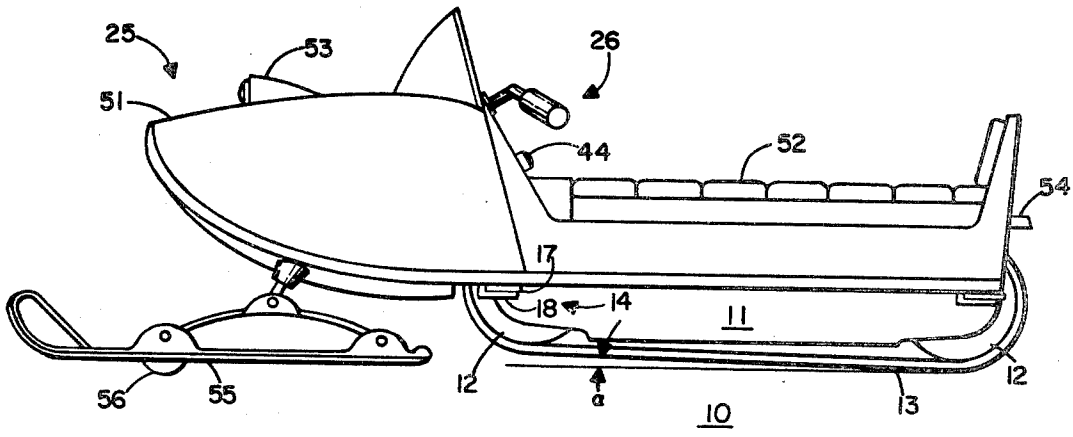
ABSTRACT: This application discloses a track drive mechanism which may be utilized for toys or the like. All of the necessary parts of the mechanism are physically mounted inside of an endless track. The mechanism is detachably secured to any one of a wide variety of body designs to provide a high-velocity track driven device.



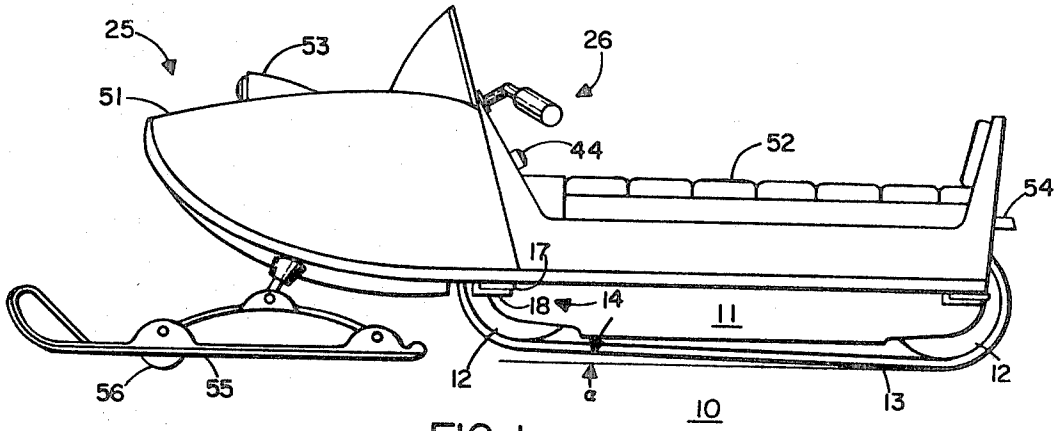


FIG. 1

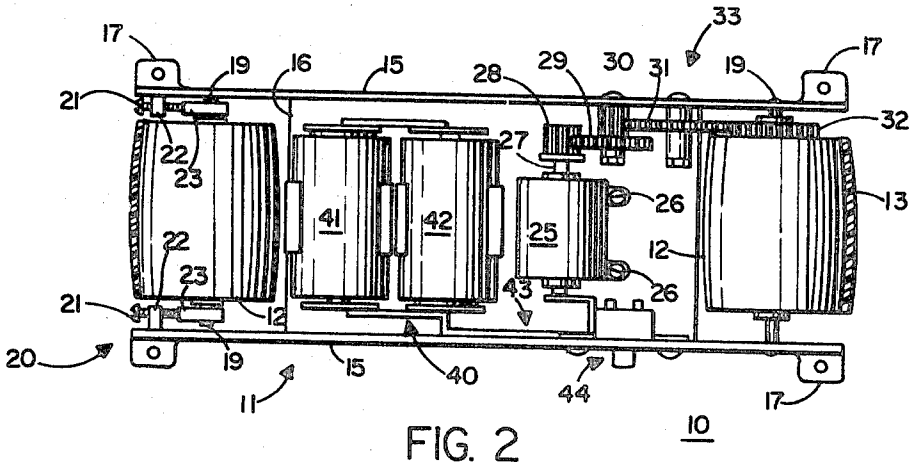


FIG. 2

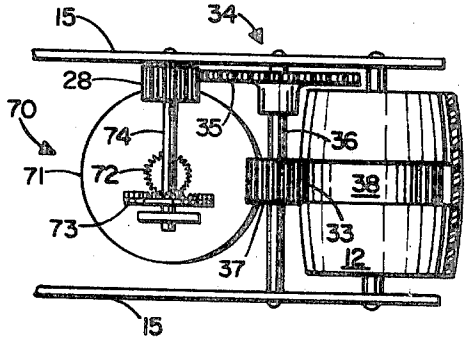


FIG. 3

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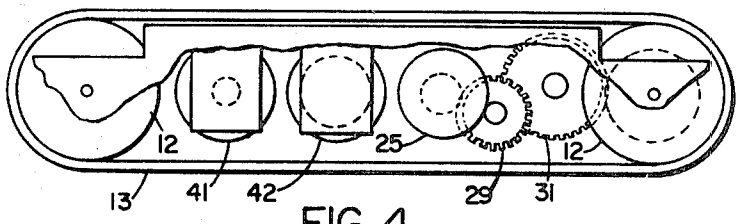

FIG. 4

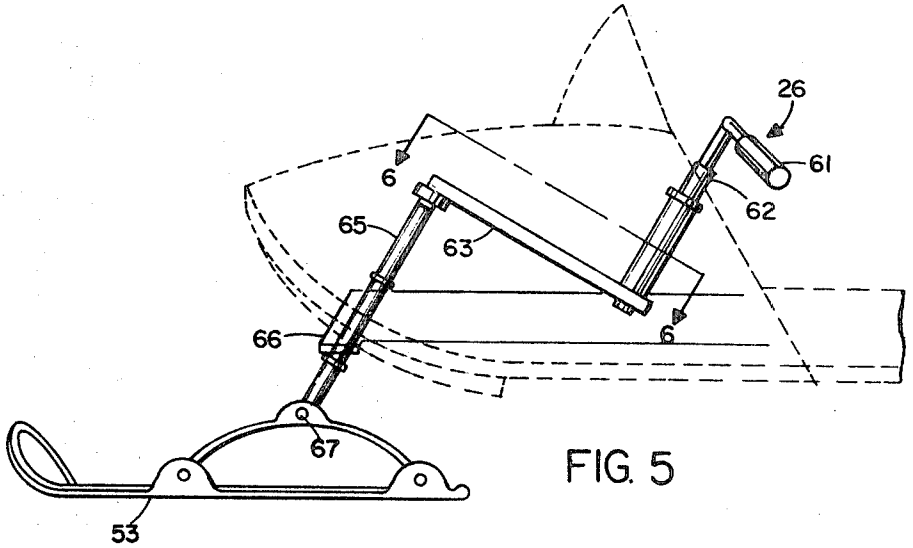

FIG. 5

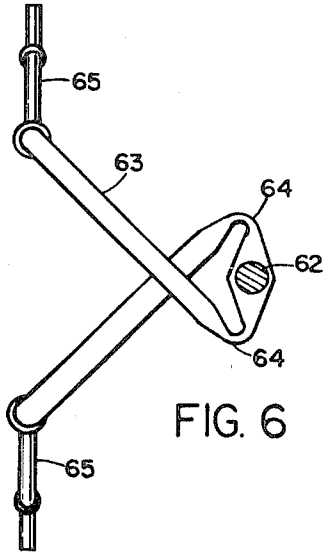

FIG. 6

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TOY VEHICLE WITH TRACK DRIVE MECHANISM HAVING AN INTERNAL POWER SOURCE

BACKGROUND OF THE INVENTION

This invention pertains to amusement devices and more particularly self-contained motor-operated devices.

There are many prior-art toys which utilize a track drive. However, these toys are expensive to manufacture and thus have a fairly limited market. In addition, these prior-art toys, such as the tanks and tractors now offered for sale, are relatively large and heavy. This precludes obtaining a high-velocity drive because the power source is limited and the track drive must be geared down to obtain sufficient driving force. In addition, high-velocity operation is also limited in such devices because of the inability to retain the track on the roller suspension. Still another limitation is the increased friction in the prior art devices due to the fact that the necessary drive elements mounted remote from the tracks.

SUMMARY OF THE INVENTION

The applicant's invention is an improvement over the prior art, low-velocity track drive mechanisms which mount the necessary elements of the track drive remote from the tracks. The applicant has overcome the disadvantages of the prior art by utilizing an extremely compact, lightweight and low-cost design which places all of the necessary parts of the track drive mechanism inside of the track. Various design features are utilized to obtain a high-velocity track drive mechanism. The track drive mechanism is easily attached to any of various toy body constructions allowing the manufacturer a wide option of body choices while utilizing the same track drive mechanism design.

The applicant's invention comprises a track drive mechanism including an endless track rotatably mounted relative to a housing by means of two spaced-apart rollers. Motor means and means connecting the motor means to at least one of the rollers are positioned inside of the track between the two rollers. That is, the track circumscribes all of the necessary elements of the drive mechanism. The track drive mechanism is detachably secured to various toy body elements.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevation view of the applicant's track drive mechanism attached to a toy snowmobile body;

FIG. 2 is a plan view of the track drive mechanism with the track cut away;

FIG. 3 is a partial plan view of an alternate track drive mechanism;

FIG. 4 is a partial cross-sectional elevation view of the track drive mechanism of FIG. 2;

FIG. 5 is an elevation view of the steering assembly utilized in the snowmobile body; and

FIG. 6 is a view taken along line 6–6 of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1, reference numeral 10 generally depicts the applicant's unique track drive mechanism. The mechanism includes the drive chassis or housing 11 having a pair of roller cups 12 rotatably mounted thereto. An endless track or belt 13 circumscribes roller cups 12 which are spaced a distance apart.

The track drive mechanism is detachably secured by suitable mounting means 14 to a toy body 25. In this particular embodiment, the toy body resembles a snowmobile, but, of course, it may take any shape or form. Track high-velocity and skis, steering, make it ideal for this type of toy. Toy body 25 includes a steering assembly 26 which will be described in more detail hereinafter. In order to reduce the frictional forces on track 13, track drive mechanism 10 may be positioned in body 25 by mounting means 14 so that track 13 is at a small angle to the horizontal surface.

Referring now to FIGS. 2 and 4, the track drive mechanism is shown in more detail. Like parts will utilize like reference numerals. Drive chassis or housing 11 comprises two vertical sidewalls 15 which are connected by means of cross strut 16. Housing 11 may be easily fabricated out of sheet metal by a simple stamping operation in keeping with the extremely low-cost design of the drive mechanism. Sidewalls 15 each have a tab 17 on either end thereof. Tabs 17 coact with clips 18 located on body 25 to form mounting means 14 which detachably secures track drive mechanism 10 to the body.

Roller cups 12 are rotatably mounted in the sidewalls 15 of housing 11 by means of pins 19. It is not necessary to utilize bearings in housing means 11 in mounting roller cups 12 therein and this results in considerable cost savings. It should be noted that roller cups 12 are generally cylindrical in shape but are slightly crowned. That is, the diameter of rollers 12 is slightly greater in the center than at the ends. This assists in the proper alignment of track 13, particularly at high velocities.

Another design feature which may be utilized to insure proper track alignment is adjustment means 20. Various devices may be utilized to make one of the rollers 12 adjustable relative to the other. In FIG. 2, an arrangement comprising a pair of screws 21 threaded to engage with both a bracket 22 attached to housing unit 11 and receiver 23 in which pins 19 are rotatably mounted provides the adjustment. Only one screw, nut and receiver need be utilized in some embodiments.

Motor means 25 is mounted on housing 11 by suitable means such as screws 26. In this particular embodiment, motor means 25 is a unidirectional, single speed electric motor. However, the applicant's invention can utilize a bidirectional motor, a multiple speed motor or a combination of both.

Motor means 25 has an output shaft 27 having a pinion 28 rigidly attached thereto. Pinion 28 engages a spur gear 29 mounted upon housing 11. Spur gear 29 had a pinion 30 integral therewith. Pinion 30 engages another spur gear 31 mounted on housing 11. Spur gear 21 engages spur gear 32 rigidly attached to roller 12. The means 33 connecting motor 25 to roller cup 12 (pinion 28, gear 29, pinion 20, gears 31, 32) are chosen to provide the proper power and velocity to roller 12. In the particular embodiment illustrated, motor means 25 comprises a 1.2 oz. in statled torque motor which drives through a gear ratio of 10 to 1 to obtain a velocity of 5 feet per second. This is several times faster than any prior-art toy. Of course, various gear combinations can be utilized.

A power source 40 comprising dry cell batteries 41 and 42 is mounted between roller cup 12 in housing 11. Dry cell batteries 41, 42 are typical D size, commercially available batteries. Only a single battery can be utilized.

Batteries 41, 42 are connected in series by means of a suitable wiring harness or printed circuit 43 which connects them to motor 25. Wiring means 43 includes a switch 44 positioned therein for interrupting the current to motor 25. When a multiple speed motor is utilized, switch 44 is effective to control the amount of current to motor means 25 so as to vary the speed thereof. One approach is to switch from two battery operation to a single battery. Switch 22 may also be located on body 25 as illustrated in FIG. 1.

Thus, it is seen that power source 40, motor 25 and the means 33 connecting motor 25 to roller 12 are all positioned between the pair of rollers and track 13 circumscribes all of the track drive mechanism. The single track is made wide enough to provide sufficient area for high stability at the lowest possible cost. The track can be driven in either direction and at various speeds.

In an alternate embodiment, batteries 41 and 42 are positioned inside of rollers 12 to further simplify the packaging of the components of the track drive assembly. This embodiment can take the form of the batteries 41, 42 acting as the rollers per se, by merely rotatably mounting the batteries in housing 11. Placing the batteries at each end of the housing concentrates much of the weight of the assembly close to the track so

as to provide maximum traction and excellent climbing capability. It also reduces the cost of fabrication of the assembly by reducing of the number of components.

In operation, switch 44 is positioned so as to complete the circuit between power source 40 and motor means 25. More specifically, batteries 41, 42 are connected in series through switch 44 to motor means 25 by means of wiring harness 43. Wiring harness 43 may take the form of a plated wire construction deposited along the sidewall of housing means 11. This not only provides an extremely compact packaging arrangement, but facilitates easy battery replacement in the track drive mechanism without detaching from the toy body. Furthermore, it provides a highly reliable circuit between the power source 40 and motor means 25.

When switch 44 closes the circuit between power source 40 and motor 25 current from the batteries 41, 42 cause the motor means to rotate output shaft 27. Output shaft 27 rotates pinion 28 which in turn rotates spur gear 29 and pinion 30. Pinion 30 engages spur gear 31 which in turn engages spur gear 24 rigidly attached to the shaft-supporting roller 12. If motor means 25 rotates in a clockwise direction about its axis as viewed in FIG. 4, it is clear that means 33 connecting the motor to roller 12, will cause it to rotate in a counterclockwise direction as viewed in FIG. 4. This results in track drive mechanism 10 to be driven to the left as viewed in FIG. 4 as track 13 rotates with roller 12.

Referring back to FIG. 1, body 25 depicts a skimobile shape including a hood 51, a seat 52 and a light 53. Body 25 also has a hitch 54 thereon. Track drive mechanism 10 has sufficient power and speed to pull accessories attached to hitch 54. Such accessories may take the form of a sled or toboggan when operating in snow or a wheeled trailer when operating on a firm surface.

Steering assembly 26 is more clearly illustrated in FIGS. 5 and 6. Handlebars 61 are attached to a handlebar hub 62. Handlebar 61 and hub 62 are cast as one part in order to maintain a low cost assembly. Handlebar hub 62 is connected to steering linkage 63 which is best illustrated in FIG. 6. Steering linkage 63 is molded out of plastic, such as polyethelene. In order to maintain the proper directional relationship with handle bar 61, steering linkage 63 must have the crossover-shape indicated. The necked-down portion 64 of steering linkage 63 functions as a spring to allow slight displacement of the linkage. Steering linkage 63 is connected to ski arms 65 which are held in position by means of steering chassis 66. Steering chassis 66 is rigidly attached to body means 25. Ski arms 65 connect to a pair of skis 55 by means of a pin 67. It is clear from the above description that rotating handlebar 61 about the axis of handlebar hub 62 will cause skis 55 to pivot about the longitudinal axis of steering arm 65 as viewed in FIG. 5.

Skis 55 may be adapted with wheels 56 as illustrated in FIGURE to reduce the friction level and increase the velocity when operating over a firm surface. Another design feature which may be utilized to reduce friction and increase velocity is to mount bogey wheels upon housing 11. More specifically, the bogey wheels would be mounted on the outside of sidewalls 15 and would run free of track 13.

Body 25 can be easily removed from the track drive mechanism by sliding it rearwardly to uncouple mounting means 14. This allows easy replacement of the power source and good accessibility for repairing any part of the mechanism.

The high-velocity track mechanism utilized in this toy snowmobile body will allow high-velocity operation heretofore not available in flexible track toys. This toy snowmobile will appeal to a child because it will run, climb, jump, and generally maneuver very similar to a full-size snowmobile.

An alternate motor means 70 is illustrated in FIG. 3. An inertia motor is attached to housing 11, and includes a heavy flywheel 71 rotatably mounted on housing 11 by suitable means (not shown). A pinion 72 is rigidly attached to flywheel 71 and rotates therewith. Pinion 71 engages a gear 73 positioned perpendicular thereto and rotatably mounted on housing 11 by means of a shaft 74. Shaft 74 has a pinion 75 rigidly attached to the other end thereof. Pinion 75 engages a large spur gear 35 mounted on a shaft 35 rotatably mounted in sidewall 15 of housing means 11. A pinion 37 is mounted at the center of shaft 36 and engages a corresponding gear section 38 placed on roller 12. This particular gearing arrangement has the advantage of balancing the forces exerted upon roller cup 13 while reducing the number of gears. The inertia motor on gear arrangement illustrated in FIG. 3 may be fabricated at a lower cost than the embodiment illustrated in FIG. 1 since a few components are required. For example, a power source is not necessary.

In operation, track drive mechanism 10 is manually pushed against a firm surface in a repeated manner so as to drive track 13 and cause high-speed rotation of flywheel 71. Energy is stored in the heavy rotating flywheel. This energy is then transferred back to the track after the pushing has terminated. More specifically, if flywheel 71 is rotating in a clockwise direction as viewed in FIG. 3, pinion 72 will cause gear 73 to rotate shaft 74 and pinion 28. The rotation of pinion 28 will be in a counterclockwise direction when viewed in the plane including the bottom sidewall 15 of housing 11 in FIG. 3. Pinion 28 engages spur gear 35 which is mounted on a common shaft with pinion 37. Thus, spur gear 35 and pinion 37 rotate in a clockwise direction so that roller cup 12 is driven in a counterclockwise direction about its axis, thereby driving track 13 in such a manner as to move track drive mechanism 10 to the left as viewed in FIG. 3.

Although the invention has been described and illustrated in detail, it is to be clearly understood that the same is by way of illustration and example only and is not to be taken by way of limitation. The spirit and scope of this invention being limited only by the terms of the appended claims.

I claim:

1. A toy track drive mechanism comprising:
a drive chassis;
a pair of spaced-apart roller cups rotatably mounted on said drive chassis;
power source means mounted on said drive chassis between said roller cups;
electric motor means on said chassis between said roller cups;
conductor means connecting said power source to said motor means so as to provide current thereto;
gear means mounted on said drive chassis and connecting said motor means to one of said pair of roller cups; and
track means circumscribing said pair of roller cups, said power source, said motor means, said conductor means and said gear means; and
said power source being effective to cause said motor means and said gear means to rotate said one of said pair of roller cups and move said track means relative to said drive chassis.

2. The toy track drive mechanism of claim 1 wherein said pair of roller cups are crowned to provide track alignment at high velocity.

3. The toy track drive mechanism of claim 2 wherein said power source means includes a switch member for regulating the current to said motor means.

4. The toy track drive mechanism of claim 3 wherein said power source comprises at least one dry cell battery.

5. The toy track drive mechanism of claim 4 further including adjustment means mounted on said drive chassis for varying the position of one of said pair of roller cups relative to the other of said pair of roller cups.

6. The toy track drive mechanism of claim 5 further including body means and mounting means for detachably securing said body means to said drive chassis.

7. The toy track drive mechanism of claim 6 further including steering means and ski means attached to said body.

8. A toy track drive mechanism comprising: an endless track rotatably mounted on a housing by at least two spaced-apart rollers;
motor means;

means connecting said motor means to at least one of said rollers;

said motor means and

said last-named means being positioned wholly inside of said track with said motor means being effective to rotate said at least one of said rollers and drive said track when energized by a power source.

9. The toy track drive mechanism of claim 8 further including a power source connected to said motor means and positioned wholly within said endless track.

10. The toy track drive mechanism of claim 9 wherein said power source is mounted in at least one of said rollers.

11. The toy track drive mechanism of claim 8, and including a body which has the shape of a snowmobile with steerable skis at one end of the same and a cavity on the bottom surface of the body over a partial extent of the same, and mounting means securing the toy drive mechanism within the cavity of said body means, said skis having roller means journaled thereon and projecting below the undersurface of the skis to support one end of the body with the track means supporting the other end of the body.

12. The toy track drive mechanism of claim 11 wherein the skis of the body with the roller means thereon elevate the body so that contact of the track means with a surface upon which the body is adapted to be positioned is at the end of the body remote from the skis.

13. The toy track drive mechanism of claim 12 in which the body with the steerable skis includes a journaled shaft and linkage connected to the steerable skis to simultaneously pivot

the skis with movement of the shaft.

14. The toy track drive mechanism of claim 8 including a body having the shape of a toy vehicle with steering wheels at one end of the same, and means mounting the toy drive mechanism on the undersurface of the body remote from the steerable wheels such that one extremity of the track means supports the other end of the body.

15. A toy track drive mechanism comprising: drive chassis means; a pair of track roller cups, means mounting said track roller cups near the extremities of the drive chassis means in spaced parallel relationship and for rotation relative thereto, a drive source for said track roller cups connected to at least one of said roller cups, and flexible track means positioned over the drive chassis means with the pair of track roller cups thereon and said drive source enclosing the same.

16. The toy track drive mechanism of claim 15 in which the drive source for the track roller cups includes motive means and a power source therefore.

17. The toy track drive mechanism of claim 16 and including a body for a toy having a steerable support at one end of the same and a cavity on the undersurface of the body over the partial extent of the same, and means included in part on the drive chassis means and in part on the body for detachably securing the drive chassis within the cavity of the body such that the steerable support of the body and the end of the track means remote from the steerable support are adapted to contact the surface upon which the apparatus is placed for movement thereon.