United States Patent [19]

Lombardo

[11] 3,735,527

[45] May 29, 1973

[54] **VARIABLE SPEED TOY TRANSMISSION**

[76] Inventor: **Joseph Lombardo,** 1103 1st Avenue, New York, N.Y. 10021

[22] Filed: **Feb. 3, 1972**

[21] Appl. No.: **223,263**

[52] **U.S. Cl.** **46/206,** 46/221, 74/350

[51] **Int. Cl.** **A63h 17/00**

[58] **Field of Search**.....46/201, 202, 206, 46/230, 243, 221; 74/350

[56] **References Cited**

UNITED STATES PATENTS

813,734	2/1906	Packham	74/350
592,726	10/1897	Edge	74/350 X

Primary Examiner—Louis G. Mancene
Assistant Examiner—D. L. Weinhold
Attorney—Burton Scheiner

[57] **ABSTRACT**

A variable speed transmission for toy vehicles comprising a motor driven drive shaft mounting drive gear means of progressively changing diameter, the drive gear means selectively engaged at points of different diameter by a driven gear which drives a propulsion means through an elongated shaft. The driven gear is shifted relative to the drive gear means by a manually controlled lever spring biased to releasably retain an engagement of the drive and driven gears. The lever includes a selector bar which cooperates with positioning plates to set selected relationships between the drive and driven gears.

7 Claims, 3 Drawing Figures

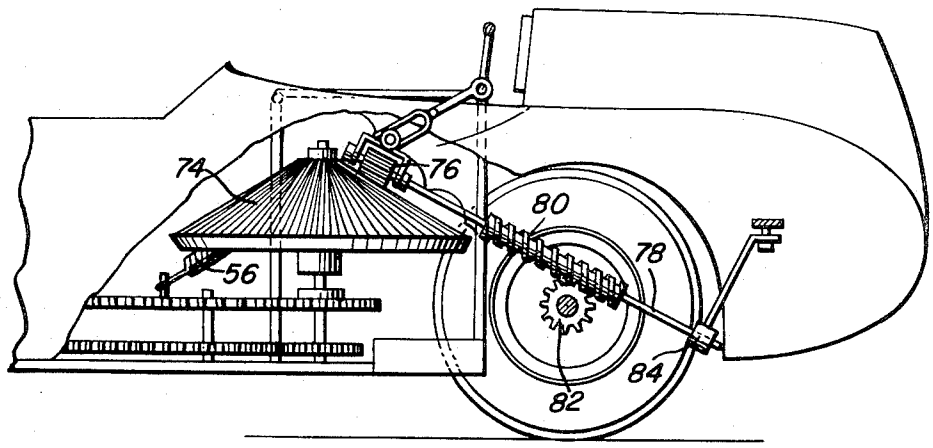


Fig. 1

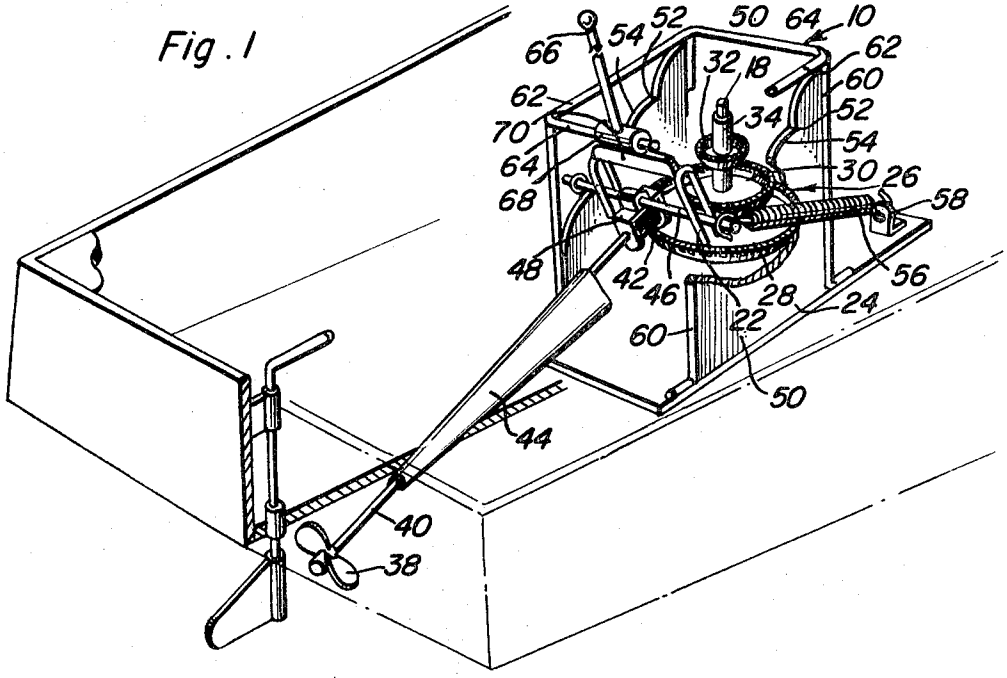


Fig. 2

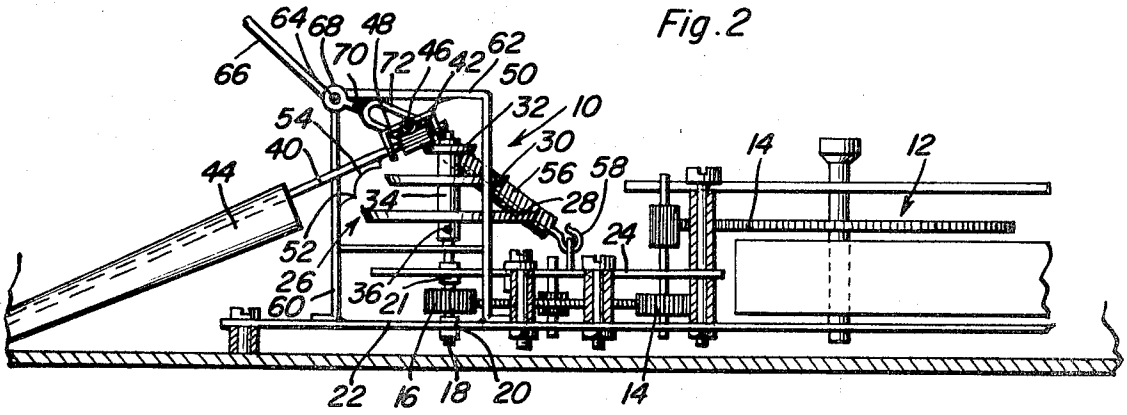
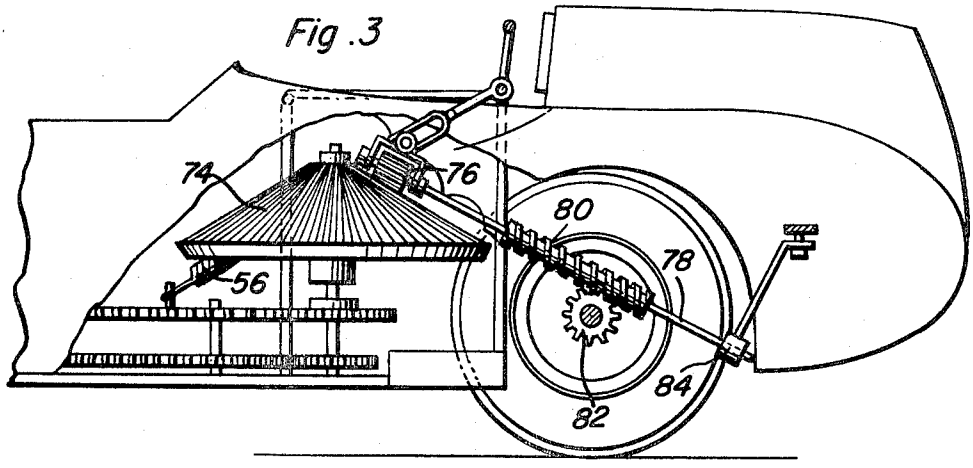


Fig. 3



VARIABLE SPEED TOY TRANSMISSION

The invention is generally concerned with toy vehicles and drive systems therefor, and more particularly relates to a manually controlled transmission for such toy vehicles.

It is a primary object of the present invention to provide a toy vehicle transmission which is unique in its structural stability, versatility and operational simplicity.

In furtherance thereof, the construction of toy vehicle transmission comprising the invention is particularly adapted to easily withstand the to-be-expected "rough" treatment resulting from normal play.

Additionally the construction is such as to make it adaptable for use in conjunction with substantially any power source, including a simple and economical spring motor.

Likewise, the transmission is adapted to be controlled through a manual manipulation of a single control lever, achieving a substantial range of speeds in a smooth and simple manner.

Basically the aims of the invention are achieved through the provision of drive gear means of generally conical configuration and a driven gear which is selectively engaged therewith at points of different diameter to provide variable drive speeds to the driven gear. The driven gear mounts on and drives a shaft which transmits power to the actual propulsion means, for example a propeller. The shifting of the driven gear is effected by a lever controlled selector bar which mounts the driven gear and is in turn adjustably positionable along a pair of opposed positioning plates having a series of alternating cams and seats therealong.

Other objects and advantages of the invention will become apparent from the following detailed description taken in conjunction with the drawing, wherein:

FIG. 1 is a perspective view of the transmission of the invention incorporated into a toy boat with a spring motor;

FIG. 2 is a side elevational view of the transmission and motor; and

FIG. 3 is a side elevational view of a slight variation of the invention utilized in a different type of toy vehicle.

Referring now more specifically to the drawings, reference numeral 10 has been used to generally designate the transmission while the associated motor, presented as a spring motor, is generally designated by reference numeral 12. For purposes of illustration, the invention has been primarily set forth in conjunction with a toy boat.

The spring motor 12, which is of basically conventional construction, is key-wound and, through a series of meshing power transmitting gears 14, drives gear 16 affixed to the lower end of a vertical drive shaft 18.

The drive shaft 18 is mounted for rotation within appropriate bushings 20 and 21 provided in the base plate 22 and a spaced overlying stabilizing plate 24. Drive gear means 26 is mounted on the shaft 18 above plate 24 and defines a generally conical shape with upwardly decreasing diameters providing areas of differing rotational speeds. In the embodiment of FIGS. 1 and 2, the drive gear means 26 comprises three separate spaced gears 28, 30 and 32 of progressively decreasing diameter from the lowermost largest gear 28 to the uppermost smallest gear 32. These gears 28, 30 and 32 are fixed to an elongated sleeve 34 which is in turn telescopically received over and locked to the shaft 18 by set screw 36.

The rotational driving of the gear means 26 is to be transferred to a propulsion means, in this case a propeller 38. This is effected through an elongated propeller shaft 40 fixed to the propeller 38 and projecting upwardly therefrom at an angle generally parallelling the angle of inclination of the "conical" gear means 26. A driven gear 42 is fixed to the upper end of the shaft 40 and is selectively engaged with gears 28, 30 and 32 depending on the particular rotational speed desired. As will be appreciated, a shifting of gear 42 will result in a vertical movement of the propeller 38. As such, the shaft 40 must be of a length sufficient to maintain the propeller 38 below water level throughout the full range of adjustment.

The shaft 40 extends through and is stabilized by an elongated tube 44 which, while restricted so as to closely conform to the shaft 40 at the lower end thereof, is enlarged for the remainder of its length to accommodate lateral movement of the shaft 40 during the actual shifting thereof as shall be explained subsequently. The tube 44 will extend into the interior of the boat to a point above the water level to preclude any tendency for water to flow inward therethrough.

The upper end of the shaft 40 is bracket mounted on a transverse selector bar 46, the bracket 48 engaging the shaft 40 to the opposite sides of the gear 42 with the shaft 40 being freely rotatable within the bracket 48.

Located to the opposite sides of the gear means 26 is a pair of parallel vertical positioning plates 50, each having an upper edge defining a series of seats 52 and intermediate cams 54 transversely aligned with those of the second plate. The selector bar 46 spans the two plates and is resiliently biased into engagement with the upper edges thereof by a pair of tension springs 56 engaged between the opposed ends of bar 46 and a pair of brackets 58 fixed to plate 22 or 24.

The seats 52 selectively receive the selector bar 46 which is retained therein by the springs 56 until forcibly moved therefrom. The arrangement of the seats 52 is such that reception of the selector bar 46 in a transversely aligned pair of seats 52 results in an engagement of driven gear 42 with a corresponding one of the drive gears 28, 30 or 32, three pairs of seats 52 being provided to correspond with the three gears 28, 30 and 32. As the selector bar 46 is moved from one pair of seats 52 to another, the intermediate cams 54 raise the bar 46 to move gear 42 to an outwardly shifted disengaged or "neutral" position to temporarily disconnect the drive during the actual shifting. The movement of propeller shaft 40 as bar 46 moves over the cams 54 is accommodated by the enlarged tube 44 previously described. If so desired, a fourth pair of seats can be provided either above or below the gear engaging seats 52 to accommodate and retain the selector bar 46 with the driven gear 42 in a completely disengaged position.

The two positioning plates 50 are supported by a pair of rod frames, each including front and rear vertical rods 60 rigid with base plate 22 and an interconnecting top rod 62. The front and rear edges of each positioning plate are welded or otherwise affixed to the associated rods 60. The construction is further stabilized by front and rear cross or transverse rods 64 affixed to and extending between the upper ends of the front and rear rods 60 respectively.

The actual shifting of the selector bar **46** is effected by a manipulation of an upwardly angled lever **66.** The lever **66** is rotatably mounted on the rear cross rod **64** by bushing **68** and includes, on the inner end thereof, a cross bar **70** mounting a pair of forwardly extending laterally spaced bifurcated or forked members **72** which slidably receive selector bar **46** to the opposite sides of gear **42.** Thus, as the lever **66** is rotated in either direction, a corresponding shifting of the selector bar **46** against the biasing force of the two springs **56** will be effected with the bar **46** releasably seating in a selected pair of seats **52** upon alignment therewith. The seats receiving the selector bar will determine which gear **28, 30** or **32** is engaged by gear **42** which in turn determines the propeller speed.

Referring to FIG. **3,** a variation of the transmission has been illustrated. In this variation, the drive gear means **74** comprises a single conical gear with the driven gear **76** being adapted for engagement with different diameter selected portions thereon. The mounting and manipulation of the gear **76** and associated selector bar remains the same as with the initially described form. However, as a wheeled vehicle is involved, the driven shaft **78** mounts a worm gear **80** which meshes with and drives axle mounted gear **82.** The lower end of shaft **78** is rotatably and slidably mounted with a bracket mounted bushing **84,** there being sufficient play therebetween to accommodate the shifting of the shaft **78.**

From the foregoing, it will be appreciated that a unique toy transmission has been set forth. This manually shiftable transmission provides for a variation in the speed of a toy vehicle utilizing a distinctive construction which is easily operated, provides a positive drive at any selected speed, and, because of its basic simplicity, is both economical and trouble-free.

While the present invention has been described in detail, it is understood that variations and modifications may be made within the spirit of the invention and the scope of the claims.

What is claimed is:

1. In a toy vehicle, a motor, a drive shaft drivingly connected to said motor, said drive shaft mounting generally conical drive gear means thereon varying from at least a minimum diameter to a maximum diameter, propulsion means, a driven shaft drivingly connected to and extending from said propulsion means, a driven gear connected to said shaft in a manner so as to effect a driving thereof and a corresponding driving of the propulsion means, and means for engaging the driven gear with the drive gear means at selected points on the variable diameter thereof to achieve a particular gear ratio and resultant propulsion means speed.

2. The toy vehicle of Claim **1** wherein said means for engaging the driven gear with the drive gear means including spring means biasing said driven gear into engagement with said drive gear means, and lever means engaged with the driven gear for effecting a shifting of the driven gear relative to and along the drive gear means to engage at different diameters therealong.

3. The toy vehicle of claim **2** including positioning means for releasably retaining said lever means in a plurality of positions corresponding to preselected positions of engagement of the driven gear with the drive gear means.

4. The toy vehicle of claim **3** wherein said positioning means comprises a series of seats and intermediate cams, said lever means being moveable along said positioning means for selective engagement with said cams and in said seats, said driven gear, upon engagement of the lever means in a seat, engaging with the drive gear means at a preselected position, said driven gear, upon engagement of the lever means with a cam, disengaging from the drive gear means.

5. The toy vehicle of claim **4** wherein said lever means includes a selector bar transversely overlying and mounting said driven gear, said positioning means comprising a pair of laterally spaced plates, each having the seats and cams defined along the upper edge thereof, the opposite end portions of said selector bar engaging the plate upper edges.

6. The toy vehicle of claim **1** wherein said drive gear means comprises a plurality of spaced parallel gears of different diameters.

7. The toy vehicle of claim **1** wherein said drive gear means comprises a single gear.

* * * * *