Aug. 28, 1962 W. L. MORSE 3,050,904

MOBILE TOY VEHICLE

Filed Feb. 16, 1961 2 Sheets-Sheet 1

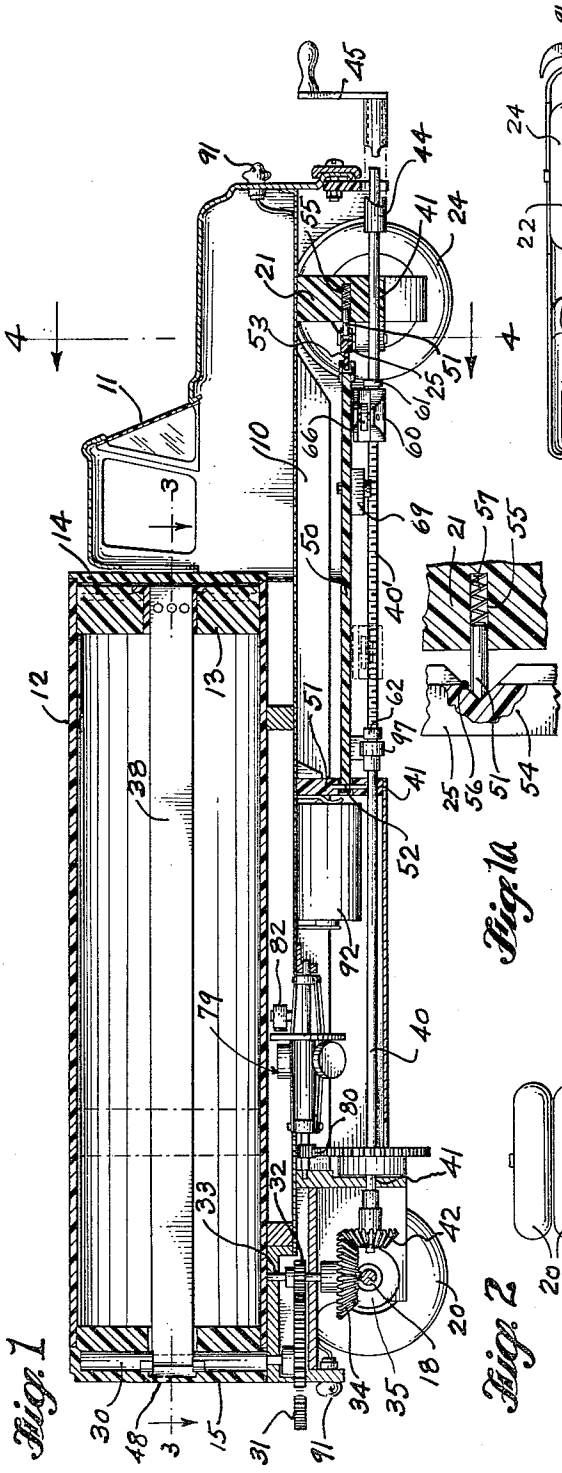


Fig. 1

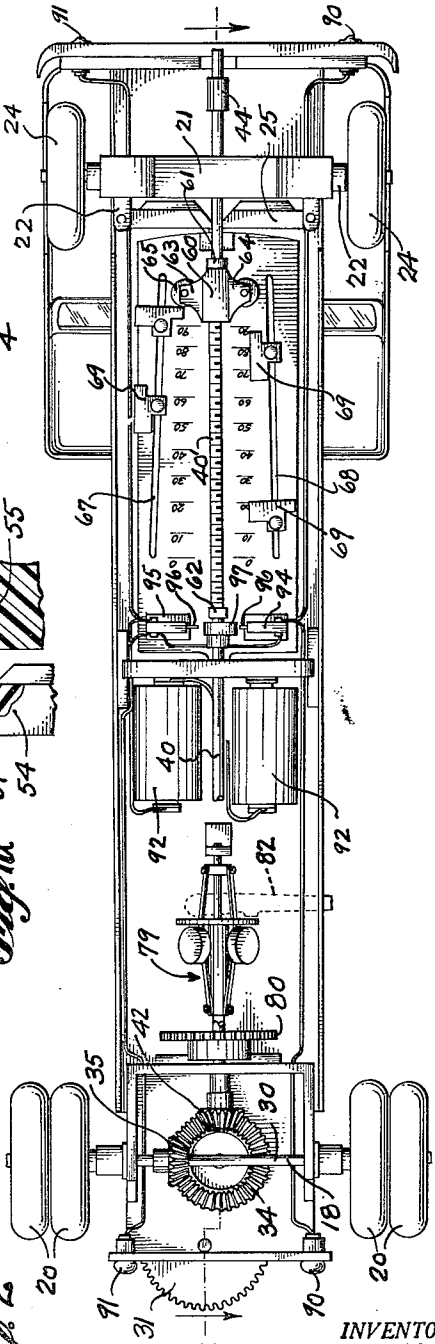


Fig. 1a

Fig. 2

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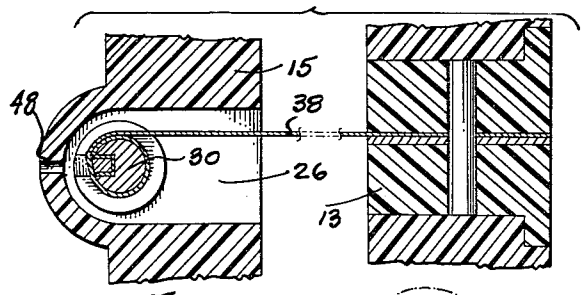


Fig. 3

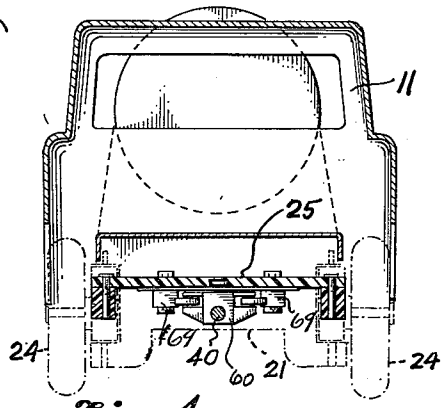


Fig. 4

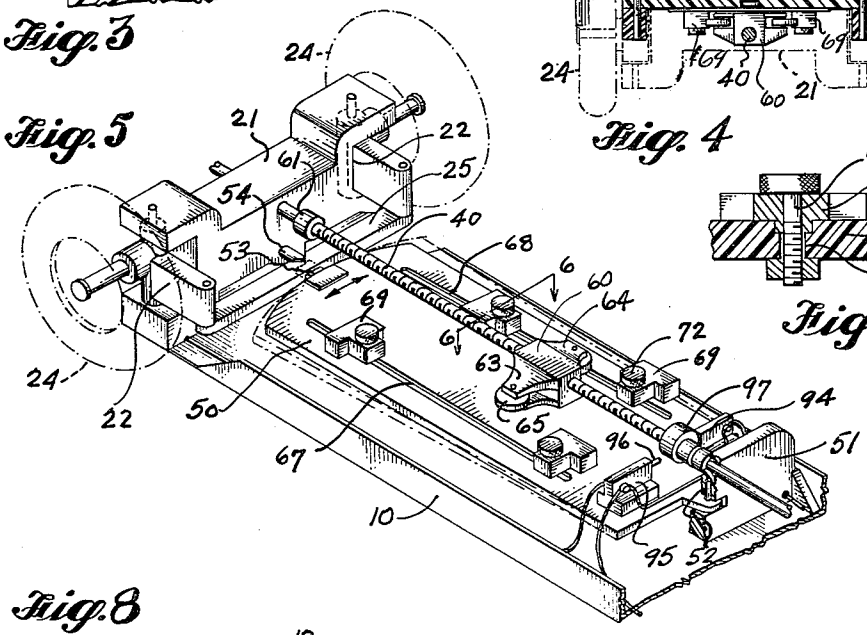
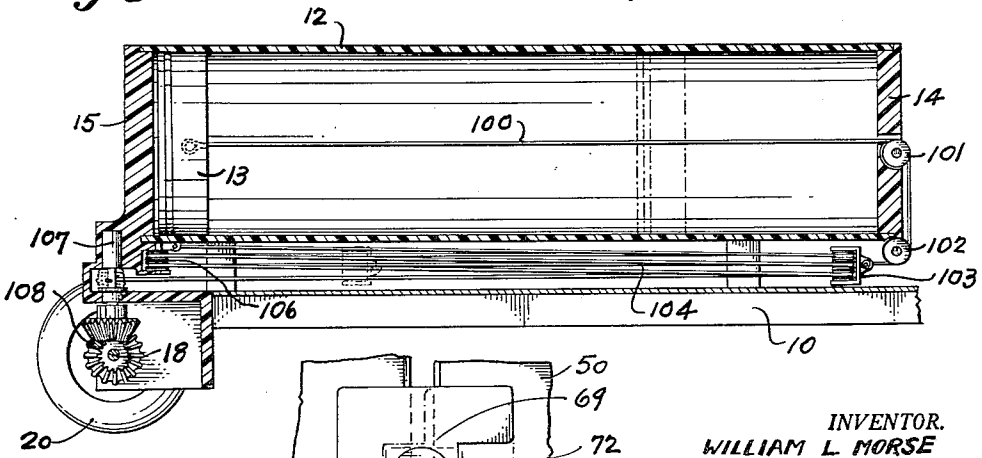


Fig. 5

Fig. 6

Fig. 8



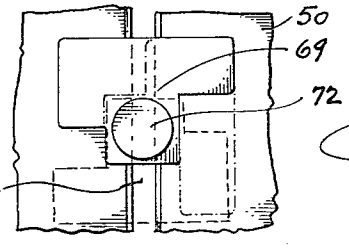


Fig. 7

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MOBILE TOY VEHICLE

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6 Claims. (Cl. 46—213)

This invention relates to improvements in mobile toy vehicles and more particularly to a toy that simulates an automobile oil truck and which is equipped with novel means for its self propulsion and also with novel means for controlling its direction of travel while being propelled.

It is the principal object of this invention to provide a toy vehicle of the character above stated wherein the power for its propulsion is derived from and by novel use of a vacuum cylinder in which a vacuum may be drawn by the retraction of a piston contained therein, and which piston may then be moved by the force of atmospheric air acting against it, to effect the propulsion of the vehicle through its propelling gearing.

It is also an object of this invention to provide the toy vehicle of this invention with a steering mechanism whereby the normal forward direction of its travel may be altered so as to effect lateral turning in either direction and to various degrees or arcuate extent at selected locations along a course of travel.

Yet, another object of this invention resides in the provision of "right turn" and "left turn" indicating lamps on the vehicle and a novel means for operation of their circuit controlling switches.

Still further objects and advantages of the invention reside in the details of construction and combination of parts for powering the vehicle; in the vehicle propelling gearing and in its steering devices and their controls, as will hereinafter be fully described.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein:

FIG. 1 is a central longitudinal section of a toy vehicle embodying the improvements of the present invention therein.

FIG. 1*a* is an enlarged fragmental detail view showing a part of the steering control means.

FIG. 2 is an underside plan view of the vehicle shown in FIG. 1;

FIG. 3 is an enlarged, fragmental sectional view, taken on line 3—3 in FIG. 1, particularly illustrating the steel belt connection operatively connecting the piston of the vacuum cylinder with a power transmission or drive shaft contained in the rear end closing wall of the vacuum cylinder;

FIG. 4 is a vertical cross-section of the vehicle, taken on line 4—4 in FIG. 1.

FIG. 5 is a perspective view of the wheel steering direction control means as seen from its underside.

FIG. 6 is an enlarged sectional view taken on line 6—6 in FIG. 5.

FIG. 7 is a plan view of one of the direction changing tabs or cams as applied to the wheel steering plate, indicating it in various positions of adjustment.

FIG. 8 is a longitudinal section of the vacuum cylinder wherein the piston is equipped with an alternative form of power transmission means in connection with the vehicle driving gearing.

Referring more in detail to the drawings.

As shown best in FIGS. 1 and 2, the present mobile toy vehicle is designed to simulate a present day oil truck comprising a chassis or frame structure **10** mounting a cab **11** at its forward end and equipped rearwardly of the cab, with an elongated air tight cylinder **12** in which

a piston **13** is reciprocally fitted. At its forward and rearward ends, the cylinder **12** is closed by walls **14** and **15**, respectively.

At its rear end the chassis is mounted on and is supported by a cross axle **18** equipped at its end with the vehicle rear supporting and driving wheels **20—20** and at its forward end is supported by a rigidly fixed cross-bar **21** equipped at its ends with the usual steering knuckles **22—22** mounting the front end steering wheels **24—24**; the knuckles at opposite end of the cross-member **21** being joined by a cross-bar **25**.

The rear end closure wall **15** of the vacuum cylinder **12** is recessed as shown at **26** in FIG. 3 and rotatably mounts a power transmission shaft **30** therein which shaft, at its lower end, has a fixed driving connection with a power transmission gear **31** operating in driving mesh with a relatively small gear wheel **32**, see FIG. 1, that is fixed on a vertical shaft **33** which, at its lower end, mounts a bevel gear wheel **34** which is in driving mesh with a smaller bevel gear wheel **35** fixed on the cross axle **18**.

Fixed centrally to the piston **13** is one end of a thin, ribbon-like strip of spring steel **38** which, at its other, or rear end, is attached to and adapted to be wound onto the vertical transmission shaft **30**, as has been illustrated in FIG. 3; this ribbon-like strip **38** being the means through which the driving power is transmitted from the piston **13** to the transmission shaft **30**.

It is further to be observed by reference to FIGS. 1 and 2 that a shaft **40** extends lengthwise of and beneath the chassis and is rotatably supported near its ends and at a medial point in bearings **41** formed in parts of the chassis. At its rear end, this shaft **40** has a bevel gear pinion **42** keyed thereon meshing with the bevel gear wheel **34**. At its forward end the shaft **40** is equipped with a clutch collar **44** with which a driving connection may be made by a crank **45** for manually turning the shaft **40** in such direction as to effect, through the connecting train of gears **31, 33, 34** and **42**, the winding of the steel belt **38** on shaft **30** and in this way effect pulling of the piston **13** from a position at the forward end of the cylinder **12**, back to the rear end thereof and by this movement of the piston to establish a condition of vacuum in the forward end of the cylinder **12**. Provision has been made for admittance of air into the cylinder through a hole **48** in its rear end wall **15** thus to cause atmospheric air pressure to force the piston forwardly in the cylinder and by its movement to unwind the belt **38** from shaft **30** thus to cause the rotation of the shaft **30** and the cross-shaft **18** for forward propulsion of the vehicle. Air pressure against the piston remains constant throughout its full distance of travel.

Steering of the vehicle is effected by means well shown in FIGS. 1, 2 and 5 to comprise a flat plate **50** that is disposed horizontally and longitudinally within the forward end portion of the chassis symmetrically between its opposite side limits. It is shown in FIG. 1 that plate **50** is pivotally supported at its rear end in a cross member **51** of the chassis as at **52** and at its forward end has a pivotal connection as at **53** with the steering knuckle connecting cross-bar **25**. Normally, the vehicles front steering wheels are held in a straight ahead steering position by a pin **54**, shown in FIG. 1*a* to be slidably contained for endwise movement in a hole **55** in the front end supporting cross-member **21** of the chassis, with its pointed outer end seated in a forwardly facing V-shaped notch **56** in the steering knuckle connecting cross-bar **25**. A spring **57** acts yieldingly against the pin to resist its forward movement and cause its rear end to act with camming pressure against the side walls of the V-shaped notch to yieldingly retain the wheels **24** in

straight forward steering position, but yieldable to permit turning under control of the means now to be described:

It is to be observed by reference to FIGS. 1, 2 and 5, that the forward portion of shaft 40 is threaded as at 40', and that a nut 60 is threaded thereon for travel between forward and rearward stops 61 and 62 fixed on the shaft. The nut 60 has horizontal wings 63 and 64 extending to opposite sides mounting rollers 65 and 66 therein.

Extending lengthwise of the plate 50 at opposite sides thereof in slightly diverging relationship in the rearward direction, are slots 67 and 68 and mounted for adjustment to various positions along these slots are tabs or blocks 69 whereby lateral turning of the vehicle, as it is forwardly propelled, is effected.

It has been shown in the several views that there are two tabs 69 applied to the plate slots at each of the opposite sides of shaft 40. Each tab is here shown to be in the form of a three armed block, see FIG. 7, that is adjustably fixed in position by a bolt 72 that extends rotatably through the block and the plate slot 67 or 68 with which the tab is associated. The tabs may, when their bolts are loosened, be moved to selected positions along the plate slots and there secured by tightening their securing nuts. Also, it is to be understood that each tab may be rotatably adjusted to cause any one of its three arms to become effective in the steering operation by their contact with a roller of the nut 60, as the nut 60 moves along the shaft 40.

It is the intent that, preparatory to placing the vehicle on a surface for travel, that the crank 45 will be applied to the forward end of shaft 40 and that it shall be turned in such direction as to wind the belt 38 on the transmission shaft 30 to such extent that the piston 13 will be pulled thereby to the rear end of cylinder 12. Then, when the vehicle is placed on the floor or surface for travel, the piston is forced forwardly by atmospheric pressure and power for vehicle propulsion is exerted by belt 38 to turn shaft 30 and the vehicle is thus caused to travel forwardly as the shaft turns.

The rate of travel of the vehicle may be controlled by use of a governor device 79. This is shown in FIGS. 1 and 2 to be driven by geared connection, as at 80, from shaft 40; the governor being equipped with a speed regulating lever 82, that extends to one side of the chassis for easy adjustment.

It is to be understood that, as the shaft 40 rotates with the forward travel of the vehicle, the nut 60 moves forwardly on the threaded portion 40' of the shaft 40 and by camming contact of the rollers 65 and 66 on the nut with the tabs or blocks 69 as positioned on plate 50 that the plate 50 is actuated to one or the other side and the steering wheels 24 are directed accordingly to effect turning, and the extent of turning is established by the length of contact time. It will be understood by reference to FIG. 2, that as the nut 60 shifts forwardly, the rollers 65 and 66 will engage the inwardly directed arms of tabs 69 with camming action and affect the swinging of plate 50 for turning the steering wheels to the extent provided for, depending on the location of the tabs along the plate slots and the length of contact surface of the tab arms that are engaged.

In further explanation of this steering operation, it is to be noted in FIG. 2, that the plate 50 has a succession of graduations marked thereon by which the positions of tabs may be judged for effecting turning after predetermined distances of vehicle travel, thus to cause the vertical to go any selected distance within its limits, then to turn right, or left and to return to starting position if such is desired.

The tab 69 as shown in FIG. 7 has its arms so established in length and in contact surface, as to provide for a right angle turn, a U-turn, a 45° turn, and "no turn." The forwardly converging relationship of the slots as observed in FIG. 2 is to compensate for the greater

distance of angular swing of the plate 50 effected by the nut 69 as it approaches the pivoted end of plate 50.

Operating in conjunction with the vehicle steering devices is a direction signal system which utilizes "right" and "left" turn signal lamps at front and rear ends of the vehicle. These lamps are of the usual small battery operated type and are designated in FIG. 2 at 90—90 and 91—91. Batteries for their lighting are designated at 92. The circuit connections for the lamps are designated by numeral 93 and are conventional. It is shown that the two lamps at each of the opposite sides are controlled individually by switches 94 and 95, mounted at opposite sides of the shaft 40 as shown best in FIG. 2. These switches are normally open, but each has a yieldable push rod 96 for closing it. A cam 97 mounted eccentrically on shaft 40 can be caused to contact with these push rods momentarily with rotation of shaft 40 incident to any lateral swinging of plate 50 such as that as effected by the engaging of a tab 69 by a roller of the traveling nut 60. Therefore, as the vehicle starts to turn, the slight lateral swing of the threaded portion of shaft 40 will cause the eccentrically mounted cam 97 to engage the push rod 96 of the switch toward which the turn is being made thus to cause the lamps at that side to intermittently flash. When the wheels straighten up for forward travel, the flashing will be discontinued by reason of the shifting of the cam 97.

It is anticipated also that instead of utilizing a governor mechanism, as shown in FIGS. 1 and 2, to control rate of travel of the vehicle, that the admittance of atmospheric air to the cylinder might be controlled by use of an adjustable air valve for permitting a faster or slower admittance of air to the cylinder thus to cause a faster or slower rate of travel.

In FIG. 8, an alternative driving connection for the wheels 39 is shown. This view shows the piston 13 as moved to the rear end of the cylinder 12 by atmospheric pressure. A strong wire strand 100 extends forwardly from the piston over a sheave wheel 101 mounted in the front end closing wall 14 then down over a sheave wheel 102 and rearwardly where it connects with a block 103. Block 103 is attached by a wire strand 104 leading in a succession of loops 105 between block 103 and a fixed pulley block 106, and at its end is anchored to and wound about a wheel driving shaft 107 with a geared driving connection as at 108, with cross-shaft 18. This form of cable connection 100 serves the same purpose as the belt 38 previously described but in the several loops 105 as provided in the cable 104 connection between blocks 103 and 104 provides for a greater length of vehicle travel and has certain advantages, such as, for example, it is lighter than a reduction gear train, and it is less expensive.

What I claim as new is:

1. In a wheel mounted toy vehicle of the character described; a vacuum cylinder fitted with a piston; said cylinder being sealed against entry of atmospheric air at one end, and having an atmospheric air passage in its other end, a rotatably mounted drive shaft for the vehicle wheels located adjacent the last mentioned end of the cylinder, a flexible belt connected at one end to said piston and at its other end to said shaft for winding onto and from it, means for manually turning said drive shaft to effect the winding of said belt thereon with the incident pulling of the piston away from the sealed end of the cylinder and the establishment of a condition of vacuum in that end whereby the pressure of atmospheric air against the piston will cause its travel in the cylinder and by the incident rotation of said drive shaft with the unwinding of the belt therefrom, will cause the driving of the vehicle wheels.

2. In a wheel mounted toy comprising a frame that is equipped at its front and rear ends, respectively, with steering and driving wheels, a vacuum cylinder fixed in the frame and fitted with a piston; said cylinder being sealed against entry of atmospheric air at one end and

having an atmospheric air port at its other end, a rotatably mounted drive shaft for said driving wheels, a flexible band connected at one end to said piston and at its other end to said rotatably mounted drive shaft for winding said band from and onto it, a manually operable winding shaft geared to the drive shaft and operable to effect the winding of said belt thereon and the incident travel of the piston in the cylinder to establish a condition of vacuum at one side thereof; said winding shaft having a non-rotatable nut threaded for travel thereon, a steering plate pivoted at one end in the vehicle for lateral adjustment at its other end and having operative connection at said other end with means for steering control of said steering wheels, and tabs applied to said plate engageable by said nut in its travel on said winding shaft as it rotates with travel of the vehicle to actuate the steering plate and effect steering adjustment of said steering wheels.

3. A combination according to claim 2 wherein said non-rotating nut as threaded for travel on said winding shaft is equipped with camming rollers at opposite sides of the shaft, and wherein said steering plate, as pivotally supported at one end and operatively connected at its other end with the means for actuation of the steering wheels, horizontally overlies the winding shaft and is formed along opposite sides of the shaft with longitudinal slots and said tabs are adjustable in and along said slots and are adapted to be secured for engagement by said rollers to effect lateral turning of the vehicle to the extent

provided for by the camming action of the nut rollers with the tabs and at predetermined points along the course of travel of the vehicle according to the location of the tabs along the threaded shaft.

4. A combination as recited in claim 1 wherein said means for manually turning said drive shaft includes a rotatably mounted winding shaft, and means at one end of said winding shaft for the functional application of a winding crank for turning the winding shaft.

5. A combination of parts according to claim 4 wherein said winding shaft rotates in accordance with the rotation of said drive shaft in driving the vehicle and a governor mechanism having a driving connection with said winding shaft and operable thereby to control travel speed of the vehicle.

6. A combination according to claim 4 wherein said winding shaft is threaded along a part thereof and a nut is threaded onto said threaded part of the winding shaft for travel therealong and wheel steering means for the vehicle actuatable by the said nut in its travel along the winding shaft to change the direction of travel of the vehicle.

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