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A. W. SWENSON

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SPRING MOTOR ACTUATED TOY VEHICLE

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2 SHEETS—SHEET 1

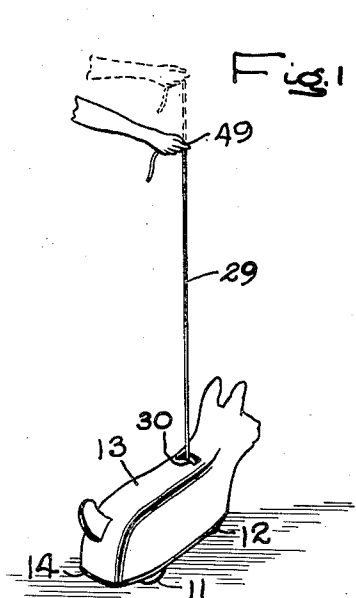
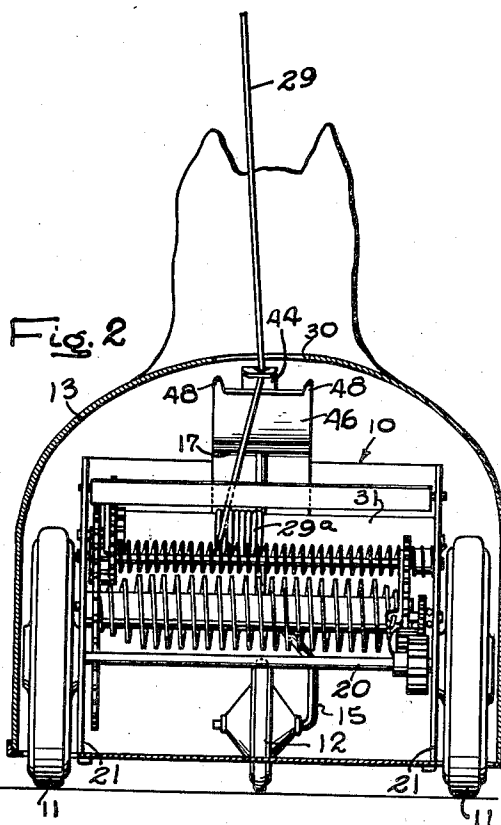
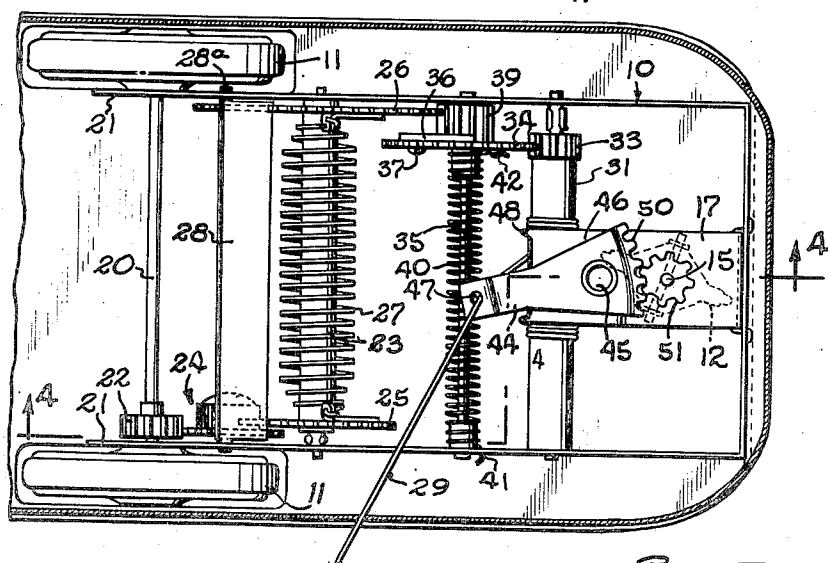


Fig. 3



INVENTOR
Arthur O. Swenson
By Carlson, Pitzner, Huthaus & Wolfe
ATTORNEY

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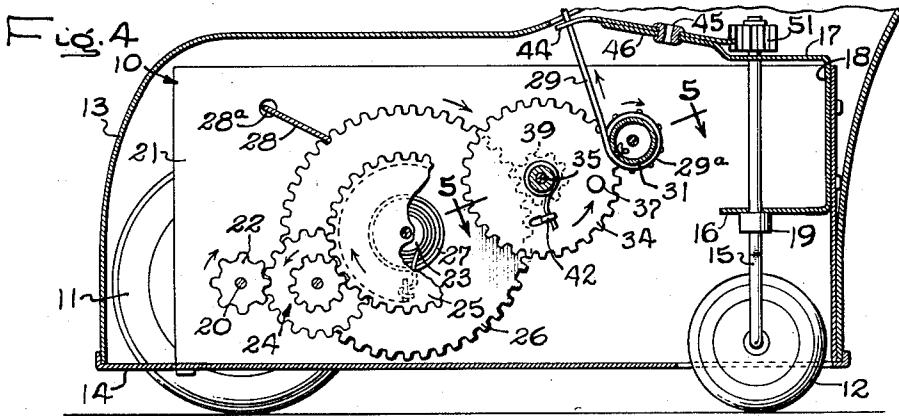
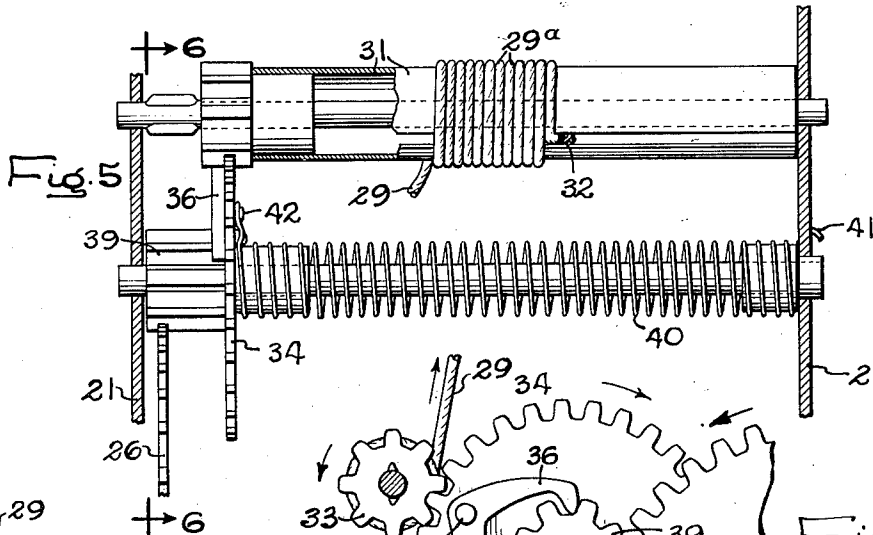
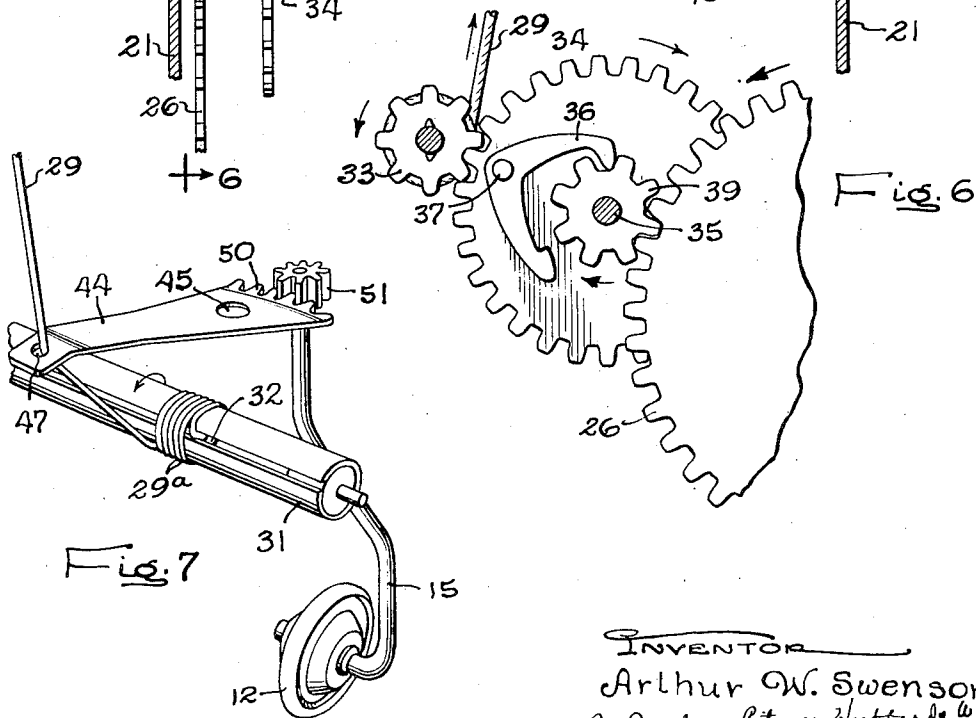
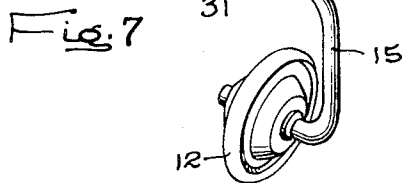
A. W. SWENSON

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2 SHEETS—SHEET 2



INVENTOR
Arthur W. Swenson
By Carleton, Pittenger, Shuttles & Wolfe
ATTORNEY

UNITED STATES PATENT OFFICE

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SPRING MOTOR ACTUATED TOY VEHICLE

Arthur W. Swenson, Rockton, Ill.

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10 Claims. (Cl. 46-103)

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This invention relates to a wheeled toy driven by a spring motor and adapted to be steered along a supporting surface through the medium of a flexible cord.

One object is to provide a wheeled toy of the above character in which the spring motor is wound up or stressed in response to successive upward pulls on a cord connected to the toy.

A more detailed object is to provide a wheeled toy having a pull cord connected thereto and driven by a spring motor which may be wound up by applying to the cord a pull of lesser magnitude than the gravitational force acting on the toy.

Another object is to provide a toy of the above character in which the pull cord for winding the spring motor is also utilized to steer the toy along a support surface.

A further object is to provide for steering of the toy by lateral motion of a single cord extending upwardly from the toy.

The invention also resides in the novel structural arrangement utilized in carrying out the foregoing objects simply and cheaply.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

Figure 1 is a perspective view of the improved toy illustrating its manner of use.

Fig. 2 is a rear elevational view of the toy chassis, the enclosing casing being shown in section.

Fig. 3 is a plan view of the chassis.

Fig. 4 is a section taken along the line 4-4 of Fig. 3.

Figs. 5 and 6 are fragmentary sectional views taken respectively along the lines 5-5 of Fig. 4 and 6-6 of Fig. 5.

Fig. 7 is a fragmentary perspective view of the steering and winding mechanism.

The toy shown in the drawings to illustrate the present invention comprises a generally rectangular chassis frame 10 supported by two rear wheels 11 and a front steerable wheel 12 and enclosed in a casing 13 which is supported by the base 14 of the frame and contoured as desired to represent an animal or the like. The steering wheel 12 is journaled on the laterally extending lower end of an upright shaft 15 swiveled in vertically spaced arms 16 and 17 of a bracket 18 which is secured to the front wall of the chassis. A collar 19 on the shaft bears against the lower bracket arm 16 to locate the shaft vertically while permitting free swiveling of the steering wheel.

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The rear wheels 11 are fast on opposite ends of an axle 20 journaled in opposite sides 21 of the chassis frame and carrying a pinion 22 which is driven from a shaft 23 through speed increasing gearing 24 mounted on one frame plate 21 and including a terminal gear 25. The latter is fast on one end of the shaft 23 which is journaled at opposite ends in the frame plates 21 and carries at its opposite end a loose gear 26. A torsion spring 27 encircles the shaft 23 and is connected at opposite ends to the gears 25, 26 to form a spring motor by which the vehicle is propelled. A plate-like pawl 28 is pivoted at 28^a on the frame and is urged into engagement with the teeth of the gear 26 so as to permit clockwise (see Fig. 4) turning of this gear to wind up the spring 27 but preventing reverse turning of the gear.

In accordance with one aspect of the invention, the spring motor is wound up by energy derived from successive upward pulls on a flexible element or cord 29 such as a length of string connected at its lower end to the vehicle and extending upwardly through a laterally elongated hole 30 in the top of the casing 13. The lower end portion of the cord indicated at 29^a is wound around a drum in the form of a shaft 31 having end trunnions journaled in the frame plates 21, the end of the cord being attached at 32 to the center of the winding drum. The rotary motion of the drum resulting from unwinding of the cord by an upward pull is transmitted to the gear 26 of the spring motor through a torque amplifying connection including a pinion 33 fast on one end of the drum 31 and meshing with a gear 34 which is loose on an intermediate cross-shaft 35.

A double pawl 36 pivoted at 37 on the gear 34 cooperates with a pinion 39 fixed to the shaft 35 to provide a one-way or over-running drive connection between the gear 34 and the gear 26 which meshes with the pinion 39. Thus, the rotation of the drum 31 caused by unwinding the string 29 is transmitted to the spring motor gear 26 as indicated by the arrows in Fig. 6. One or the other end of the pawl 36 is always effective irrespective of the position of the pawl pivot 37 about the axis of the gear 39. As the gear 34 turns reversely, the pawl 36 overrides the pinion 39 while the pinion 39 and the gear 26 are held stationary by the pawl 28 thereby retaining the energy previously imparted to the motor spring 27.

Constantly acting means is provided for urging the drum 31 in a direction to wind up the string

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29 on the drum. This means comprises a torsion spring 40 considerably weaker than the motor spring 27 preferably encircling the shaft 35 with one end fastened to the frame at 41 and the other end secured at 42 to the gear 34. The spring 40 is thus wound up simultaneously with the motor spring during each upward pull on the cord 29 and the energy stored in the spring 40 acts, when the cord is released, to reverse the rotation of the loose gear 34 and the drum to rewind the cord back onto the drum. Thus, as the cord is pulled upwardly and then released successively, the spring motor is wound up step by step.

The strength of the two springs 27 and 40 and the ratios of the speed reduction gearing between the drum 31 and the spring 40 and between the shaft 35 and the spring motor are correlated with each other and the total weight of the vehicle in a manner such that the springs will be overcome and wound up in response to an upward pull on the cord 29 of substantially lesser magnitude than the weight of the vehicle. Thus, the vehicle is held against the supporting surface under sufficient gravitational force to provide proper traction for the drive wheels 11. As a result of alternately pulling upwardly on the cord 29 and then releasing the same repeatedly, energy may be imparted to the spring motor at a rate sufficient to cause the vehicle to be propelled continuously.

The invention also contemplates using the manually operated pull cord 29 to perform the additional function of steering the vehicle as the latter advances. To this end, the cord is engaged by a member mounted on the frame for movement laterally of the vehicle by a corresponding lateral movement of the cord. Herein, the motion transmitting member takes the form of a lever 44 fulcrumed intermediate its ends on an upright pivot 45 secured to an upwardly and rearwardly inclined extension 46 of the bracket arm 17. The cord 29 extends through a hole 47 in the rear end of the lever. Thus, this end of the lever is swung to the right of the vehicle as shown in Fig. 3. Such lateral swinging of the lever to either side of the centered position shown in Fig. 2, is limited by lugs 48 laterally spaced across the rear end of the extension 46.

The lateral motions of the lever 44 are utilized to turn the vehicle wheel 12 and thereby steer the vehicle. Preferably, this is accomplished through a motion reversing connection so that the vehicle will turn in the same direction in which the user's hand 49 is moved to change the course of the vehicle. Herein, this connection comprises a gear segment 50 formed on the forward end of the lever 44 and meshing with a pinion 51 fast on the upper end of the shaft 15. As illustrated in Fig. 2, the steering wheel 12 will be turned to turn the vehicle to the right when the taut portion of the cord 29 is swung to the right of the vehicle. The turned position of the steering wheel will be retained, as by slight friction, when the pull cord is slack and being wound back onto the drum 31.

In operation, the toy with the spring motor unwound is placed on a suitable supporting surface. The cord 29 is pulled upwardly and released successively until sufficient energy has been imparted to the spring 27 to initiate advance of the vehicle. The latter starts forwardly in a direction determined by the position of the user's hand 49 during the last upward pull on the cord. The upward pulls are repeated in

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order to continue the motion of the vehicle, the course of which may be changed as desired by shifting the cord laterally in a corresponding direction. Thus, by proper manipulation of the cord, the motion of the vehicle may be continued indefinitely along any desired path, and this without touching the vehicle or stopping to rewind the motor. It will be observed that the cord simulates a leash attached to the collar of a dog and the operation of the toy is much like that of leading a dog around a given path.

I claim as my invention:

1. A vehicle toy comprising a frame, wheels supporting one end of said frame, a spring motor on said frame for driving at least one of said wheels, a vertical shaft journaled in said frame, means of supporting the other end of said frame including a steering wheel having an operative connection with said shaft and turned back and forth by oscillation of the shaft, a lever pivoted on said frame intermediate its ends to swing laterally of the vehicle about an axis spaced from said shaft, a pinion and gear segment connection between said shaft and one end of said lever, a guide on the other end of the lever, a second shaft journaled on said frame and urged in one direction of rotation, means providing a one way connection between said second shaft and said motor and operable to wind up the latter during rotation of the second shaft in the opposite direction, and a cord wound around said second shaft and extending upwardly through said guide whereby the spring of said motor will be wound by pulling on said cord and the vehicle will be steered by lateral movement of the cord.

2. A vehicle toy comprising a frame, wheels supporting one end of said frame, a spring motor on said frame for driving at least one of said wheels, means supporting the other end of said frame including a steering wheel, a support for said steering wheel mounted on said frame to swivel about a vertical axis and steer the vehicle, a lever pivoted intermediate its ends on said frame to swing laterally of the vehicle, means connecting one end of said lever to said wheel support to swivel the latter in a direction opposite to the direction of movement of the lever, a shaft journaled on said frame and urged in one direction of rotation, means providing a one way connection between said shaft and said motor and operable to wind up the latter during rotation of the shaft in one direction, and a cord wound around said shaft and extending through a guide on the end portion of said lever remote from said connecting means.

3. A vehicle toy comprising a frame, wheels supporting one end of said frame, a spring motor on said frame for driving at least one of said wheels, a vertical shaft journaled in said frame, means supporting the other end of said frame including a steering wheel turned back and forth by oscillation of said shaft, a lever pivoted on said frame to swing laterally of the vehicle and connected to said shaft to oscillate the latter as the lever is swung back and forth, a horizontal shaft journaled on said frame and urged in one direction of rotation, means providing a one way connection between said second shaft and said motor and operable to wind up the latter during rotation of the shaft in one direction, and a cord wound around said second shaft and extending through a guide on said lever spaced from the pivot thereof.

4. A vehicle toy comprising a frame, wheels supporting said frame including a steerable

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wheel, a spring motor on said frame connected to one of said wheels for driving the same to move the vehicle along a supporting surface, a rotary member on said frame, a cord having one end portion wound onto said member, means providing a driving connection between said member and said spring motor operable to wind up the latter in response to successive upward pulls on said cord, an element engageable with said cord and mounted on said frame for movement laterally of the vehicle by corresponding lateral movement of the cord, and means actuated by said element for swiveling said steering wheel.

5. A vehicle toy comprising a frame, wheels supporting said frame including a steerable wheel and a support therefor mounted on said frame to swivel about an upright axis, a spring motor on said frame for driving one of said supporting wheels, a rotary shaft on said frame, a cord having one end portion wound onto said shaft, means providing a driving connection between said shaft and said spring motor operable to wind up the latter in response to successive upward pulls on said cord, an element engageable with said cord and mounted on said frame to move laterally of the vehicle by corresponding lateral movement of said cord, and a motion reversing connection between said element and said steering wheel support.

6. A vehicle toy comprising a frame, wheels supporting one end of said frame, a spring motor on said frame for driving at least one of said wheels, means supporting the other end of said frame including a wheel adapted to be swiveled back and forth to steer the vehicle, a horizontal shaft journaled on said frame and urged in one direction of rotation, means providing a one way connection between said shaft and said spring motor and operable to wind up the latter during rotation of the shaft in the opposite direction, a cord wound around said shaft for turning the latter when the cord is pulled upwardly, and means actuated by lateral movement of the cord to swivel said steering wheel.

7. A vehicle toy comprising a frame, wheels supporting said frame including a steerable wheel, a spring motor for driving the vehicle, a cord connected to said frame, means responsive to successive upward pulls on said cord to wind up the spring of said motor, and means responsive to movement of said cord laterally of the vehicle when the cord is taut to actuate said steerable wheel and change the course of travel of the vehicle, said last mentioned means including a motion reversing mechanism for causing the vehicle to be turned in the direction of lateral movement of the cord.

8. A vehicle toy comprising a frame, wheels supporting said frame including a steerable

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wheel, a spring motor for driving the vehicle, a cord connected to said frame, means responsive to successive upward pulls on said cord to wind up the spring of said motor, and means responsive to movement of said cord laterally of the vehicle when the cord is taut to actuate said steerable wheel and change the course of travel of the vehicle.

9. A toy comprising a wheeled vehicle, a motor for propelling the vehicle along a supporting surface including energy-storing means, means for steering said vehicle, a pull-cord connected to and normally retracted into the vehicle but extensible in response to an upward pull of lesser magnitude than the weight of the vehicle, means actuated in response to successive pulls on said cord to energize said energy-storing means, and means operable by movement of said cord laterally of said vehicle to actuate said steering means and thereby change the direction of advance of the vehicle by said motor.

10. A toy vehicle comprising a body, a motor on said body for propelling the vehicle including energy-storing means, a pull cord connected to and normally retracted into said body but extensible therefrom in response to an upward pull of lesser magnitude than the weight of said vehicle, means actuated in response to successive pulls on said cord to energize said energy-storing means, wheels supporting said body for movement along a supporting surface including a wheel swiveled on the body to swing about a vertical axis, and an operative connection between said swiveled wheel and said cord and operable automatically in response to inclination of said cord laterally of the body and away from the vertical while being pulled upwardly, the direction of such swiveling of the wheel turning the body in a direction corresponding to the direction of lateral movement of the cord.

ARTHUR W. SWENSON.

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