

[54] **MOTOR-ACTUATED TOYS**

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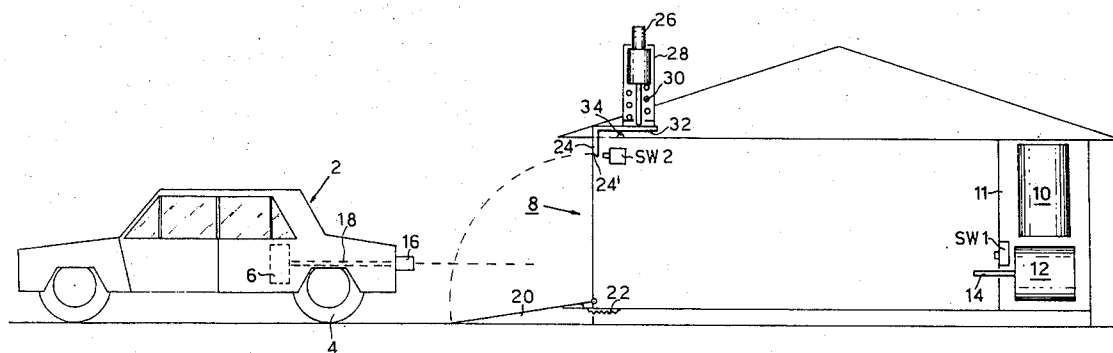
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ABSTRACT

Motor-actuated toys comprise a first member simulating a movable object having a moving part and containing motive means for driving the moving part, and energy storage means for storing energy for the motive means; and a second member simulating a fixed object normally associated with the movable object and including recharging means for recharging the energy stored in the storage means when the simulated movable object member is placed at a predetermined location with respect to the simulated fixed object member. In one described embodiment, the first member simulates a wheeled vehicle actuated by a spring motor, and the second member simulates a garage containing an electric motor adapted to rewind the spring motor when the simulated vehicle member is placed within the garage. In a second described embodiment, the first member is also a wheeled vehicle, but the second member is a simulated gasoline station; and in a third described embodiment, the first member simulates an animal, and the second member simulates a cage for the animal.

10 Claims, 7 Drawing Figures



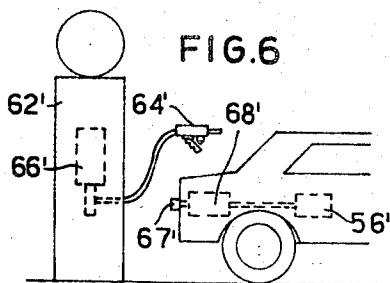
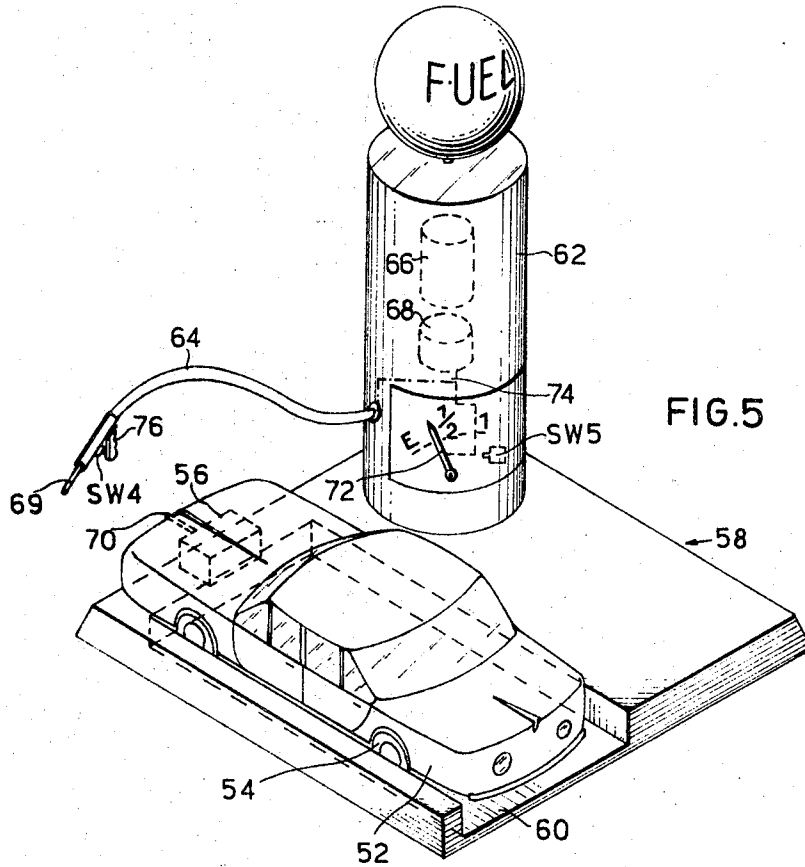
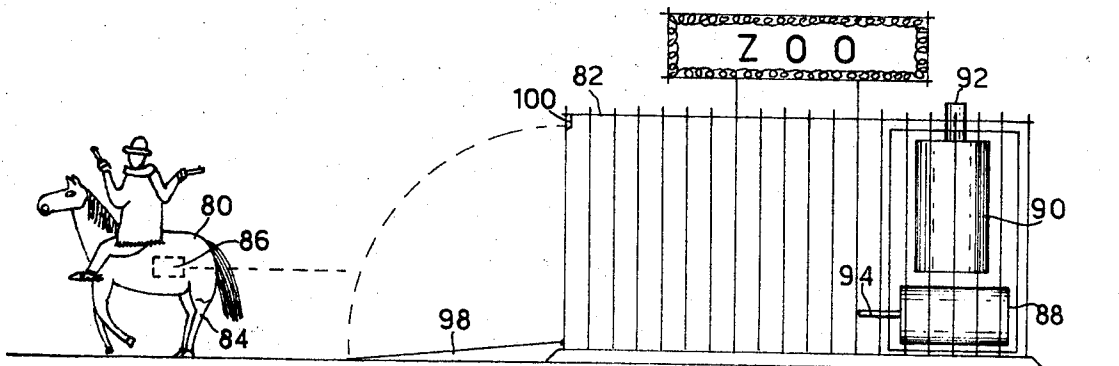


FIG. 7



MOTOR-ACTUATED TOYS

BACKGROUND OF THE INVENTION

The present invention relates to toys and particularly to motor-actuated toys, an object of the invention being to provide new forms of motor-actuated toys for children.

SUMMARY OF THE INVENTION

According to a broad aspect of the invention, the novel toy includes a first member simulating a movable object having a moving part, and a second member simulating an enclosure normally associated with the movable object. The movable member contains motive means for driving the moving part and energy storage means for storing energy for the motive means. The second member includes recharging means for recharging the energy stored in the storage means of the movable member when the latter is placed at a predetermined location with respect to the fixed member.

Preferably, the motive means and the energy storage means of the movable member are constituted by a spring motor carried by that member.

The invention may take a large number of forms, three of which are described below.

In one form, the movable member simulates a wheeled vehicle, and the fixed member simulates a garage for the vehicle, the recharging means comprising an electric motor adapted to rewind the spring motor of the wheeled vehicle when the latter is placed within the garage.

In a second described embodiment, the movable member is again a wheeled vehicle, but here the fixed member simulates a gasoline station having a gasoline hose for providing the connection for recharging the spring motor of the vehicle member.

In yet a third described embodiment, the movable member simulates an animal, and the fixed member simulates a cage for the animal and contains the recharging means for recharging the spring motor in the animal when the latter is in its cage.

Toys constructed in accordance with the invention have a high amusement and entertainment value particularly for children. For example, in the first embodiment mentioned above, the child may place the simulated vehicle into the garage, close the door, whereupon the spring motor of the vehicle will be recharged by the electric motor within the garage. When the child opens the garage door, as by depressing a push button, the charged vehicle will automatically propel itself out of the garage and continue travelling until the energy of its spring motor is spent. The child then may return the vehicle to the garage for recharging. Thus, the garage can be considered as a "magic garage," which "mysteriously" recharges or gives new life to the vehicle.

In the second described embodiment the mysterious recharging of the vehicle is effected through the gasoline hose of the simulated gas station; and in the third described embodiment it is effected whenever the animal is placed into the "magic cage," which "mysteriously" gives new life to the animal. Additional embodiments as well as further features of the invention will be apparent from the description below.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is herein described, somewhat dia-

grammatically and by way of example only, with reference to the accompanying drawings, wherein:

FIGS. 1 and 2 diagrammatically illustrate one embodiment of the invention, with FIG. 3 showing a simple electrical circuit that may be used;

FIG. 4 illustrates a variation in the embodiment of FIGS. 1-3;

FIGS. 5 and 6 diagrammatically illustrate another embodiment of the invention; and

FIG. 7 illustrates a further embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The embodiment of the invention illustrated in FIGS. 1-3 comprises a first movable member 2 simulating a wheeled vehicle, namely an automobile, having wheels 4 driven by a spring-motor 6 of the type commonly used in toy automobiles. The toy further includes a fixed member 8 simulating a garage for the automobile 2. Garage 8 includes means for recharging or rewinding the spring of motor 6. For this purpose, garage 8 includes a battery 10 adapted to drive a small electrical motor 12 having a drive shaft 14 which may be coupled to a part of the automobile 2, such as to its exhaust pipe 16, for driving the winding shaft 18 of spring motor 6. A partition wall 11 conceals battery 10 and motor 12.

Garage 8 further includes a door 20 pivotably mounted at its lower end and spring-urged by spring 22 to its open position as illustrated in FIG. 1. A door latch 24 is provided at the upper end of the door opening and has a slanted cam face 24' which is engaged by the outer edge of door 20 when the door is pivoted upwardly to its closed position, the latch 24 thereby retaining the door in its closed position.

Latch 24 may be raised to release door 20 by means of a push button 26 mounted, for example, in the chimney 28 of the garage. Push button 26 is urged upwardly by means of a spring 30 within the chimney, the lower end of the push button being attached to a lever 32 which is fulcrummed at 34, the opposite end of the lever being linked to latch 24. It will thus be seen that when push button 26 is depressed against spring 30, lever 32 is rocked clockwise, thereby raising latch 24 and releasing door 20 to pivot downwardly by gravity and spring 22.

Garage 8 further includes an electric switch SW1 mounted next to the partition wall 11 of the garage so as to be actuated when the automobile 2 is placed within the garage with drive shaft 14 of motor 12 received within the exhaust tube 16 of the automobile for winding the automobile spring motor 6. The floor of the garage is preferably formed with tire tracks 40 (FIG. 2) for guiding the automobile into position wherein the motor drive shaft 14 of the garage is coupled to the winding shaft 18 of the automobile spring motor 6. When the automobile is placed in this position, switch SW1 is closed by engaging the back end of the automobile. However, the electric motor 12 is not yet energized.

In order to energize the electric motor, it is also required that the garage door 20 be closed, which actuates a second switch SW2 engageable by the outer end of the door when closed.

As shown in FIG. 3, when the above two conditions are met, i.e. the automobile 2 is in proper position within the garage 8 so that the drive shaft 14 is coupled

to the winding shaft 18, and the garage door is closed, both switches SW1 and SW2 are closed, whereby electric motor 12 is energized by battery 10. The electric motor 12, which would also include the appropriate speed-reduction gearing, then drives shaft 18 of the automobile thereby rewinding the spring of motor 6. It is preferred that motor 12 including its speed-reduction gearing, be designed so as to provide a spring-rewinding time of about 5 - 10 seconds.

As shown in FIG. 3, a third switch SW3 is provided in the energization circuit of motor 12, this switch being normally closed, but being opened automatically by a timer 42 after the elapse of a predetermined time of operation of motor 12. Timer 42, e.g. a bimetallic thermostatic switch in the motor 12 circuit, would be set to provide a sufficient time for the rewinding of spring motor 6 so as to prevent overloading the motor and also to conserve the power of the battery. Instead of a bimetallic element timer, there could also be used a revolutions counter timer, which opens the switch after a predetermined number of motor shaft revolutions.

It will be seen that when the user places the automobile 2 within the garage with its spring motor winding shaft 18 coupled to drive shaft 14 of electric motor 12, and then closes the garage door, electric motor 12 will be energized to rewind the spring of the vehicle motor 6. Now if the user depresses push button 26, latch 24 will be raised, whereupon door 20 will automatically open. This will cause switch SW2 to open, thereby terminating the energization of motor 12 if it had not been terminated earlier by timer 42. At the same time, since spring motor 6 of the automobile is now recharged, and the door of the garage 20 is open, the automobile will propel itself out of the garage, and will continue to travel until the energy of the spring motor is spent. The automobile can then be recharged by placing it back into the garage and closing its door.

The length of garage 8 should be such that when door 20 is closed, it bears against the front bumper of the vehicle and holds the winding shaft 18 of the spring motor 6 in coupling engagement with the drive shaft 14 of the electric motor 12. A spring (not shown) could be provided on the garage wall which spring would be compressed by the vehicle when the garage door is closed, the spring giving a thrust to the vehicle when the door is opened to assure decoupling same from drive shaft 14.

The switches illustrated may be small microswitches or contacts that are engaged by a movable metal element (e.g., the vehicle rear bumper in the case of switch SW1) to complete the electrical circuit.

A number of variations may be made in the embodiment of FIGS. 1 - 3. For example, garage door 20 may be omitted, in which case the user would hold the automobile in place within the garage in order to recharge the spring motor. Also, push button 26 could be used purely for controlling the energization of electric motor 12 and thereby the recharging of spring motor.

FIG. 4 illustrates a further variation, wherein drive shaft 14 of the winding motor 12 carries a gear 40 meshing with a much larger gear 42 rotatably mounted on axle 44. The latter gear carries a pin 46 which, upon completing a single revolution of the gear (i.e., after a predetermined number of revolutions of motor 12 according to the gear-ratio) engages an arm or cam 48 carried at one end of a lever 50, the opposite end of

which carries door latch 24. Thus, after motor 12 has been energized for a predetermined time, pin 46 of gear 42 engages arm 48, causing the latter to release latch 24, whereupon door 20 will automatically open and the recharged automobile will propel itself out of the garage.

It will be appreciated that the toy could include a set of automobile vehicles 2, which may be individually recharged by placing them into the "magic garage"; or that the garage could accommodate a number of the vehicles side-by-side which may be raced against each other when the door is opened. Also, the garage could be in the form of a space station or other enclosure for the vehicle.

FIG. 5 illustrates another embodiment of the invention, wherein the toy includes a motor vehicle 52 whose wheels 54 are driven by a spring motor 56. The second member of the toy simulates a gasoline station 58, including a platform 60 for the automobile, a gasoline tank 62, and a gasoline filling hose 64. The gasoline tank 62 contains the battery 66 and the electric motor 68 for rewinding spring motor 56, there being a rotary mechanical coupling 69 extending through the filling hose 64 to the winding shaft 70 of the spring motor. Winding shaft 70 would terminate within the gasoline tank inlet opening (not shown) of the automobile, so that when the filling hose 64 is applied to the gasoline tank inlet, the mechanically coupling 69 extending from electric motor 68 and through hose 64 drives winding shaft 70 to recharge the spring of spring motor 56.

Preferably, the fuel tank 62 includes a simulated fuel indicator 72 which indicates how much "fuel" has been introduced into the fuel tank of the automobile 52. The fuel indicator 72 may be driven by a mechanical coupling, schematically indicated at 74, from electric motor 68.

A switch SW4 may be actuated by the simulated valve operator 76 of gasoline hose 64, which switch starts the energization of electric motor 68. A limit switch SW5 may be provided in the fuel indicator 72, which is engaged by the needle of the fuel indicator when the gasoline tank registers "full," to terminate the energization of electric motor 68.

FIG. 6 illustrates a variation in the embodiment of FIG. 5, wherein the fuel tank 62' includes the battery 66', but the electric motor 68' is provided within the vehicle and not within the tank. Thus, when the gasoline hose 64' is applied to the gasoline tank 67', an electrical circuit is completed from battery 66' to electric motor 68', energizing the latter and causing it to rewind spring motor 56' of the automobile. The completion of the circuit to electric motor 68' from battery 66' may be made by using a valve operator switch, similar to switch SW4 in FIG. 4, or merely by providing an electrical contact on hose 64' which is brought into contact with a corresponding electrical contact (not shown) in the gasoline tank 67' of the automobile.

In the third embodiment illustrated in FIG. 7, the movable member of the toy simulates an animal 80, and the fixed member of the toy simulates a zoo cage 82. The simulated animal member 80 includes movable legs 84 driven by spring motor 86. The animal may be placed into cage 82 for rewinding the spring motor 86 by means of an electric motor 88 energized by a battery 90. The cage includes a push button 92 which, when

depressed, energizes electric motor 88 from battery 90, and when released, terminates the energization.

The simulated animal member 80 may be placed into the cage and the winding shaft of spring motor 86 coupled to drive shaft 94 of electric motor 88. To rewind spring motor 86, push button 92 is depressed causing motor 88 to be energized and to rewind spring motor 86. When the push button is released, the energization terminates.

One possible variation in the embodiment of FIG. 7 would be to include an arrangement similar to that in the embodiment of FIGS. 1 - 3, wherein cage door 98 would be closed in order to recharge the spring motor, being retained closed by a latch 100, and depression of the push button 92 would automatically open the door, thereby permitting the recharged animal 80 to move out of the cage under its own power. The cage would thus act as a "magic cage" which recharges the animal member, similar to the "magic garage" of the FIGS. 1 - 3 embodiment which recharges the automobile. The animals in this embodiment could have wheels, serving as the movable part.

The invention has been described herein with respect to spring motor toys, but it will be appreciated that it could also be used with respect to toys wherein the energy is stored in a fly wheel or other inertia device, such toys being sometimes called friction motor toys. In such a case, the charging means (e.g. the electric motor within the garage, in the FIGS. 1 - 4 embodiment) would spin the wheels of the vehicle or a fly wheel carried by the vehicle, and as soon as the door is opened, the vehicle would propel itself out of the garage and travel until the energy supplied by the garage motor has been spent.

In all cases, it is contemplated that the time for recharging the vehicle would take about 5 - 10 seconds, and that the energy stored in the vehicle would be sufficient to propel the vehicle for about 1 minute or less.

Many other variations, modifications and applications of the illustrated embodiments will be apparent.

What is claimed is:

1. A motor actuated toy including a first member simulating a movable object and having a moving part, said movable member containing motive means for driving said moving part, and energy storage means for storing energy for said motive means; and a second member simulating an enclosure for said movable member, said enclosure member containing recharging means including an electric motor for recharging the

energy stored in said storage means when the movable member is placed at a predetermined position with respect to the enclosure member; said enclosure member further including a closable door, an electric circuit enabling the energization of said electric motor only when the movable member is within the enclosure member and the door is closed, means for opening the door, and an electrical switch in said electrical circuit and effective upon opening of the door to automatically cause the electric motor to deenergize and the movable member to leave the enclosure member under the power of its own motive means.

2. A toy as defined in claim 1, wherein said door opening means is actuated by a manually manipulatable member.

3. A toy as defined in claim 1, wherein said enclosure member includes a latch retaining the door closed, said electrical switch being engageable by the door when in its closed position, and a push-button effective upon depression thereof to release said latch to permit the door to open and thereby to open said electrical switch.

4. A toy as defined in claim 1, wherein said door opening means is actuated by a timer after a predetermined period of operation of the electric motor.

5. A toy as defined in claim 1, wherein said enclosure member includes a latch for retaining the door closed, said electrical switch being engageable by the door when in its closed position, and means automatically effecting, after the motor has been energized for a predetermined time, the release of said latch and thereby the opening of said electrical switch.

6. A toy as defined in claim 1, wherein said motive means and energy storage means of the movable member are constituted by a spring motor carried by that member.

7. A toy as defined in claim 1, wherein said movable member simulates a wheeled vehicle, and said enclosure member simulates a garage for said vehicle.

8. A toy as defined in claim 1, wherein said movable member simulates an animal and said enclosure member simulates a cage for said animal.

9. A toy as defined in claim 1, wherein said energy storage means requires a recharging time of about 5-10 seconds.

10. A toy as defined in claim 1, wherein said energy storage means stores sufficient energy to propel the movable member for a period of time of less than 1 minute.

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