SURPRISE TOY VEHICLE

Fig. 1.

Fig. 2.

Fig. 6.

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The present invention relates to a toy vehicle primarily intended for the amusement of a child.

A purpose of the invention is to provide a toy vehicle having high amusement appeal for children within the age range of about 2 to 8 or older, and free from factors which will interfere with enjoyment such as the necessity to wind up, ease of breakage or wear, requirement of mechanical aptitude, monotony, requirement of complex components to assemble, need for explanation by the parent, requirement of cooperation by others for play, or limitation in locale, as for example to indoor areas or outdoor areas.

A further purpose is to obtain an unusual amount of surprise, activity and excitement in a toy vehicle, with variation in behavior with each different child, and with the same child in different moods, so as to hold the attention of a child for a considerable period of time notwithstanding the short attention limit.

A further purpose is to produce a toy vehicle which can be used with amusing results on carpets, wooden floors, linoleum, tile, stone, concrete, grass, earth, and even bed covers.

A further purpose is to produce a toy vehicle which can assume in the child's mind the personality of any of a wide variety of objects or characters, including trains, motor cars, trucks, tanks, and various animals.

A further purpose is to make a vehicle which will expand over a wide range, but will snap back or lunge forward, and which, on the other hand, can be shipped and stored in a small space.

A further purpose is to obtain thrilling sound effects by the swoosh of the spring as the vehicle elongates and then suddenly shortens longitudinally. A further purpose is to produce a vehicle which will simulate a wreck by turning over or causing one part (either the front or the rear) to turn over, but which will suddenly and unpredictably right itself by restoring the inverted element into upright position due to torsion of the spring.

A further purpose is to make a toy vehicle which is equally well suited for use as a pulling toy, as a pushing toy, or as a push-and-let-her-go toy.

Further purposes appear in the specification and in the claims.

In the drawings I have chosen to illustrate one only of the numerous embodiments in which my invention may appear, selecting the form shown from the standpoint of convenience in illustration, satisfactory operation and clear demonstration of the principles involved.

Figure 1 is a perspective of the toy of the invention shown with the spring relatively short.

Figure 2 is a perspective of the toy of Figure 1 with the spring elongated.

Figures 3, 4 and 5 are longitudinal sectional views which show the manner of snapping or lunging of the toy, Figure 3 illustrating the toy before the front is pulled forward, Figure 4 showing the front being pulled forward, and the spring elongating due to the retardation of the rear, while Figure 5 shows the sudden lungeing forward of the rear with shortening of the spring.

Figure 6 is a side elevation showing the embodiment of the invention in the form of an animal. Describing in illustration but not in limitation and referring to the drawings:

The present invention preferably employs a spring of the character described and claimed in Richard T. James, United States Patent 2,415,012, granted January 28, 1947, for Toy and Process of Use. Numerous attempts have been made without success to embody this toy in the form of a vehicle or animal which will be attractive and interesting.

I have developed a toy vehicle or animal which comprises a front, a separate rear, and a helical resilient spring interconnecting the front and the rear and simulating a body, the front and rear being free to move relatively toward and away from one another over a range of movement which is effectively restrained only by the compression and expansion of the spring. Thus the toy is capable of producing a wide variety of unpredictable effects, stimulating the interest of the child by activity, surprise and excitement. While these effects are obtained to some extent by connecting the front and the rear by an ordinary resilient helical spring, much more vital and intriguing performance results from using the spring of the James patent above referred to, which is incorporated herein by reference.

If the toy is used as a pull toy, whether on carpet, wood, linoleum, stone, concrete, tile, grass, or bed covers, the frictional drag is different in different areas. Initially in starting to pull on the front of the vehicle from a position in which the spring is shortened, the front will move forward and the vehicle will first elongate before the rear moves forward, and then after considerable elongation the rear will begin to move forward. As soon as the rear encounters an area of lower coefficient of friction, the retardation on the rear will reduce and the rear will suddenly snap forward, shortening the length to the delight of the child.

In the case particularly of small children who do not thoroughly coordinate in the use of the fingers, the pulling force as the vehicle advances, thus causing an effect of intermittent shortening and lengthening of the helical spring which is very interesting to watch. An infinite variety of behavior of the vehicle depending upon the normal activity of the particular child, and also depending upon the mood of the child, is possible, thus avoiding monotony.

Older children alert to these possibilities will vary the pulling force as the vehicle advances, thus causing an effect of intermittent shortening and lengthening of the helical spring which is very interesting to watch. An infinite variety of behavior of the vehicle depending upon the normal activity of the particular child, and also depending upon the mood of the child, is possible, thus avoiding monotony.

In some cases, the child will prefer to crawl or kneel beside the vehicle and push it forward either by pushing the front or pushing the rear, or alternately pushing on the front and the rear. This makes it possible for the child to vary the length of the vehicle, depending upon whether in his imagination it is functioning as a train, a car, a truck, a tanker or some species of animal such as a snake or lizard. Of course the front and rear can be made to simulate any of the objects or personalities which may be preferred to add verisimilitude. The toy is thus capable of assuming many different sizes, and for example it can expand in one embodiment from 4 to 180 inches.

In some cases, children will prefer to push the toy and let-her-go, thus causing a peculiar motion having unpredictable undulations which are hilarious to watch. Competitions as to distance and accuracy on target in
pushing toys competitively can provide a game for the children. One aspect of the invention which has great appeal to parents is that there is no key or handle which must be wound up, no components to assemble and be left on the stairs, no fragile parts which are likely to wear or break, and no requirement for any appreciable mechanical aptitude. In fact the toy can be used readily by children of a wide variety of capabilities in the range from toddlers of about 2, to children of 8 or older.

The invention can be used by children who are forced to play alone, as well as by children in groups, and it can be employed in the back yard, garden, park or on the sidewalk, as well as in the nursery, living room, hall or cellar.

Children instinctively form their own play patterns using the toy of the invention. For example in one method of play the front or the back of the toy turns over and the child announces with delight that the train has been wrecked. On further pulling the inverted portion automatically rights itself by tortional action of the spring, restoring the wreck.

Good results can be obtained using any one of a wide variety of ground-gripping appliances whether gliders, runners, treads or wheels, but for best results, the vehicle should be a wheeled vehicle with wheels applied to the front and to the rear.

The snapping back or snapping forward or lunge of the vehicle is accompanied by a swooshing sound which is much appreciated by small children.

Considering now the drawings in detail, a vehicle front 26 is separated from a vehicle rear 21 and the two are interconnected by a helical spring 22 which is secured at one end to the vehicle front at 23 and secured at the other end to the vehicle rear at 24 by any suitable means which may be adhesive or metallic fastening, the detail being unimportant.

The vehicle front in the preferred embodiment simulates a locomotive front including a cow-catcher 25, a stack 26, a boiler front 27 and a boiler top and side portions 28. A truck is simulated at 30 mounting operative wheels 31 on each side which support and roll the front of the locomotive.

The rear 21 of the vehicle desirably simulates the rear of a locomotive, including a top and side portion 32 of the rear of the boiler, a steam drum 33 and a cab 34. The rear of the vehicle mounts operative wheels 35 on which the rear rolls, the wheels desirably simulating the drivers of a locomotive.

The body of the boiler is simulated by the helical spring 22 which as shown is the entire interconnection between the front and the rear of the vehicle, there being no articulated linkages, driving shafts, rods or the like, which would tend to restrain the activity of the front and the rear in moving relatively toward and away from one another or which would restrict the activity of the body in snaking or oscillating both forwardly and rearwardly and also laterally as the vehicle advances or turns around corners.

A pull cord 36 is connected to the vehicle front suitably at the middle of the front of the boiler, and is used by the child in pulling. In pushing the child can grasp the top of the boiler of either the front or the rear portion or the top of the cab of the rear portion.

While some advantage of the invention can be obtained using a helical spring of ordinary metallic wire of round cross section, the spring properties associated with ordinary springs are undesirable since they would tend to make the spring remain elongated and remain relatively straight rather than responding to slight differences in longitudinal and force action to produce dramatic changes in position. It is therefore decidedly desirable to use a spring of the character of the James patent above referred to so that the unusual effect in transferring turns from one and to the other present in a spring of that character will be exhibited in causing surprising changes of relative positions of the front and back and in changes of the relative position of the turns along the spring. This will be particularly true when the vehicle moves over a hump in the floor or rug, or when it moves up or down a slope.

In the preferred spring, the turns are of rectangular cross section with an axial cross sectional dimension which is less than the radial cross section dimension of the spring stock.

The coil should be wound without any substantial compression or tension (lateral force) is closed position between the turns when no external force is acting in this position the turns should be in lateral engagement with one another without any external compression on the coil. As the coil is extended it obeys Hooke's law.

Any one of a wide variety of materials may be used, but spring steel such as SAE 1050 to 1095, or stainless steel spring stock are preferred.

As set forth in the James patent, the spring should have a low natural frequency between the limits of 10 and 100 cycles per minute, with substantially no tension or compression between turns in closed position when no external force is acting and for dimensions and proportions which permit handling by a child.

A circular cross section gives the greatest stiffness for a given amount of material, and is quite undesirable. A rectangular cross section with the longest dimension radial and the shortest dimension axial is much more desirable. This also makes the spring stack in a minimum of space.

As explained in the James patent, the cross sectional dimension of the spring turn in a radial direction should not be less than 1.1 and not more than 10 times the cross sectional dimension of the spring turn in an axial direction, the preferable value being between 2 and 5 times and the most desirable value being about 4 times. An oval may be used instead of a rectangular section to give results similar to a rectangle.

For practical operation the outside diameter of the coil should be between 4 and 100 times the radial dimension of the coil section, the preferable value being between 10 and 50 times and the most desirable value being about 30 times. Reasonable limitation should also be imposed on length. The range of solid height of the springs should preferably be between ¾ and 5 times the outside diameter, the preferable range being between ¾ and 1.5 times and the most desirable value being substantially equal to the outside diameter.

Without limiting to any particular dimension but merely to set forth a desirable set of dimensions, the following values are given:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axial dimension of coil section</td>
<td>0.025</td>
</tr>
<tr>
<td>Radial dimension of coil section</td>
<td>0.100</td>
</tr>
<tr>
<td>Outside diameter of coil</td>
<td>3</td>
</tr>
</tbody>
</table>

Figure 6 shows an embodiment in the form of an animal, specifically a dog. It comprises a vehicle front 20' having the characteristics of the front portion of the animal, and provided with wheels 31' and 31', a vehicle rear 21' having the characteristics of the rear portion of the animal and including wheels 35' and a connecting helical spring 22 of the character already discussed having the characteristics of the body of the animal. Since the animal shown is a dachshund, the elongated character of the body when the spring is extended is rather characteristic of the actual animal and the front portion is at an angle of about 30 degrees.

The tail is desirably a helical coil spring 37 anchored to the rear portion 21' of the vehicle, tapering toward the tip, and desirably carrying a bell 38 to provide the necessary accompaniment of noise. In operation the dog or animal toy can be used in the same way as the locomotive or other form of the device.

It will be evident that while the invention is believed
to find its best embodiment in a toy intended for children
as above described, many aspects of the invention also
have an appeal to the playful spirit in adolescents and
adults.
In view of my invention and disclosure variations and
modifications to meet individual whim or particular need
will doubtless become evident to others skilled in the
art, to obtain all or part of the benefits of my invention
without copying the structure shown, and I therefore,
claim all such insofar as they fall within the reasonable
spirit and scope of my claims.
Having thus described my invention what I claim as new
and desire to secure by Letters Patent is:
1. A toy vehicle comprising a vehicle front portion and
a vehicle rear portion and a resilient coil spring extend-
ing lengthwise between said vehicle portions and having
its opposite ends respectively connected with said vehicle
portions, coil turns of said spring abutting each other
with substantially zero lateral force in the longitudinally
contracted position of the spring and said vehicle portions
being adapted for movement on the floor by force applied
to said vehicle front portion to the exclusion of said vehi-
cle rear portion and said spring being free of restraint
in transverse and longitudinal directions so that the
amount of separation and directional deviation of said
vehicle portions is determined consistent with the strength
properties of said spring, said spring being sufficiently
weak under load developed by the force applied to said
vehicle front portion and an accompanying lagging effect
of said vehicle rear portion to tolerate a considerable
separation of said coil turns longitudinally of the spring
and for sniffing to occur when said vehicle front portion
is turned from a straight-away course on the floor with
respect to said vehicle rear portion, and said spring never-
theless being sufficiently strong to fully contract bringing
the lagging vehicle rear portion toward the vehicle front
portion, said coil turns of the spring accordingly impacting
against each other as an incident to the spring recovering
its fully contracted condition.
2. A toy vehicle according to claim 1, in which the
vehicle front portion and the vehicle rear portion simulate
respectively front and rear portions of a locomotive, and
the coil spring simulates a boiler thereof.
3. A toy vehicle according to claim 1, in which the
vehicle front portion and the vehicle rear portion simulate
respectively front and rear portions of an animal and
said coil spring simulates the intermediate body portion
thereof.
4. A toy vehicle according to claim 1, in which the
spring has a natural frequency between 10 and 100 cycles
per minute and in which the spring cross section is of a
shape which has essentially lower torsional stiffness for
a given cross sectional area than a square.
5. A toy vehicle according to claim 4, in which the
radial dimension of the cross section of an individual turn
of the coil spring is between 1.1 and 10 times the axial
dimension of the cross section, the outside diameter of
the spring is between 4 and 100 times the radial dimen-
sion of the cross section and the solid height is between
0.5 and 5 times the outside diameter.
6. A toy vehicle according to claim 4, in which the
radial dimension of the cross section is between 2 and 5
times the axial dimension of the cross section, the outside
diameter of the spring is between 10 and 50 times the
radial dimension of the cross section, and the solid height
is between 0.75 and 1.5 times the outside diameter.

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