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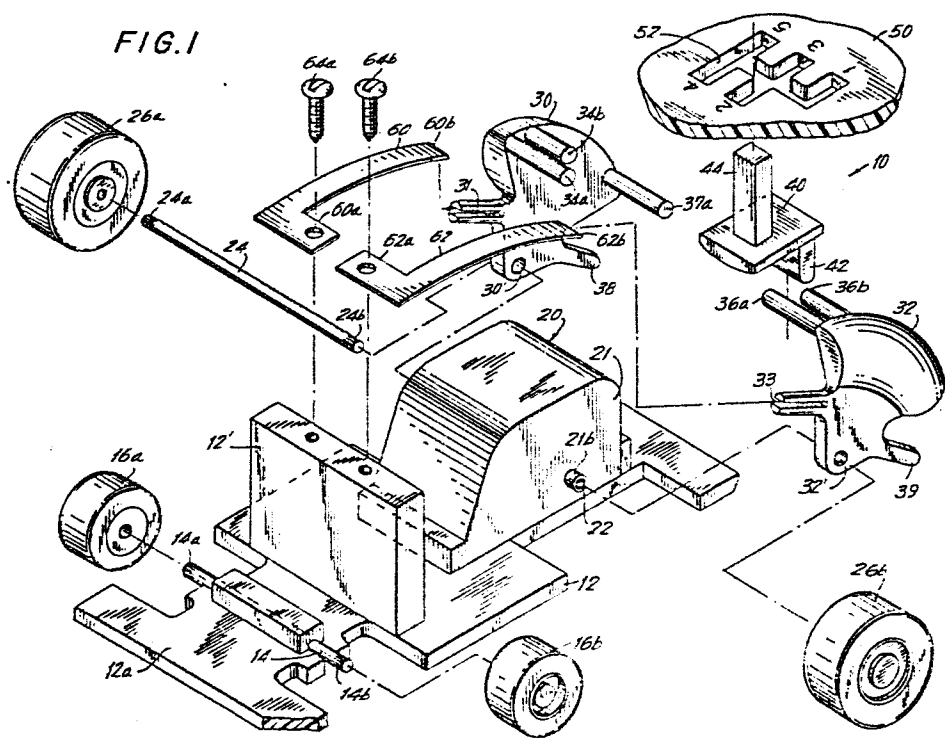
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**Toy vehicle.**

A toy vehicle (10) comprising a base or frame (12) and wheels (16a, 16b, 26a, 26b) and a movable weight (30,32) coupled to a lever (40) which is manually operable to alter the centre of gravity. There may be two weights (30,32) one adjacent each of the rear wheels which are pivotally movable by the lever, or there may be a sliding platform (230) to which the rear wheel are coupled so that the wheel base of the toy vehicle can be adjusted, or the lever may be weighted (332) and connected to movable first and second arms (300, 302) each with a projection (314, 332) pivotally supported on the frame proximate the first and second rear wheels. Movement of the weight or weights alters the centre of gravity and this varies the performance of the moving toy vehicle. Projections either immovable (260, 262, 264) or movable (38, 39, 314, 322) with the positioning of the weight may be provided which projections contact the surface (8) on which the toy vehicle is riding to further vary the performance of the vehicle.

FIG. 1



1.

TOY VEHICLE.

The present invention relates to a toy vehicle and, in particular, to a toy vehicle whose physical behaviour and operating characteristics can be selectively altered by a child playing with the toy vehicle, preferably by

5. moving a simulated gear-shift lever, which permits the toy vehicle to perform multiple actions depending on the position of the operative components as selected by the gear-shift lever.

Toy vehicles, such as toy automobiles which simulate

10. the appearance and operation of real automobiles and which are capable of being self-propelled by an internal motor or the like, have become popular with children of all ages. One such type of toy vehicle includes what has been commonly known as a pull-back motor. In such vehicles, the rear

15. wheels of the toy vehicle are coupled to a motor which includes a spring which is tightened as the rear wheels are rolled backwards along a surface. In such fashion, the spring becomes tightened so that when the vehicle is released, the spring will relax and transfer its energy

20. via torque to the rear wheels causing them to rotate in a forward direction to propel the toy vehicle in a forward direction. Mechanisms of this type are described in US-A-4,077,156 and US-A-3,798,831. Other than being capable of changing the acceleration and speed of such toy vehicles

25. depending upon the amount of energy stored in the spring, only one type of action, namely forward action on all four wheels is possible.

## 2.

It would be extremely desirable if a toy vehicle having a motor which permits self-propulsion could be developed to perform multiple actions such as wheel stands, turning, spinning-out and the like. It would

5. be even more desirable if such a toy vehicle could perform such multiple actions as controlled by a lever which simulates a real gear-shift lever in an automobile having a manual transmission whereby the placing of the gear-shift lever in a desired gear position in

10. the toy vehicle results in different types of action to be performed by the toy vehicle. The present invention provides such a multi-action toy vehicle.

The present invention has various objects. These objects may include one or more of the following: the

15. provision of a multi-action toy vehicle; the provision of a multi-action toy vehicle in which a simulated gear-shift lever is manually actuatable to change the operating characteristics and physical behaviour of the toy vehicle, the provision of a toy vehicle whose charact-

20. eristics, such as the centre of gravity including changing the length of the wheel base, can be altered in response to manual actuation of a lever to provide the vehicle with multiple actions and varying operating characteristics so that the movement of the vehicle is altered;

25. the provision of a multi-action toy vehicle in which a weighted simulated gear-shift lever is manually actuatable to change the operating characteristics and physical behaviour of the toy vehicle; the provision of a toy vehicle whose characteristics such as the centre of

30. gravity can be altered in response to manual actuation of a weighted lever to provide the vehicle with multiple-actions; the provision of a multi-action toy vehicle which includes pivotable arms having projections which selectively project through the base, frame or chassis of the

35. vehicle; and the provision of a toy vehicle capable of multiple actions which has a greatly enhanced play value.

## 3.

According to a first aspect of the present invention a toy vehicle comprises a base and wheels and means to alter the position of the centre of gravity.

Variation of the centre of gravity varies the

5. operating characteristic and physical behaviour of the toy vehicle.

Preferably there is a lever, for example a manually operable lever, coupled to the means to alter the position of the centre of gravity.

10. In a first embodiment the toy vehicle comprises a movable weight proximate a wheel. A preferred embodiment provides a toy vehicle having two front wheels and two rear wheels, a weight being pivotally supported on the base proximate each of the rear wheels, each weight.  
15. being pivoted to a number of positions to alter the position of the centre of gravity. One weight may be heavier than the other.

- In a second embodiment the toy vehicle has a sliding weight supported on the base to alter the centre of  
20. gravity. The wheel base of the toy vehicle may be varied and this is conveniently achieved by the sliding weight.

- In a third embodiment the toy vehicle has a weighted lever. Preferably the lever is connected to an arm positioned adjacent a wheel, the arm having a projection  
25. which selectively projects through the base depending on the position of the lever. A preferred embodiment provides two arms each positioned adjacent a rear wheel and a projection on each arm which selectively projects through the base depending on the position of the lever.  
30. The projections may be operated together or separately.

The toy vehicle may be provided with a projection which project through the base towards the surface on

4.

which the toy vehicle is placed. The projection may be movable and selectively projects through the base according to the position of the centre of gravity.

Such projections may thus be immovable or movable and

5. both may be provided on the same vehicle. Immovable projections may conveniently be located on the underside of the base and movable projections may conveniently form part of the weight or be connected to the weight, for example when the weight is the weighted  
10. lever, and thus project through the base selectively in certain positions of the weight. A projection may be provided with rollers. The projections further vary the operating characteristics of the toy vehicle.

- Preferably the toy vehicle has a motor and the  
15. lever is movable to a number of selected positions in the manner of an automobile gear stick, the positions corresponding to variations in the centre of gravity.

- Thus, according to an aspect of the present invention a toy vehicle comprises a chassis, wheels  
20. rotatably supported on the chassis to permit the chassis to roll on a surface, changing means supported on the chassis for changing the centre of gravity of the toy vehicle and control means operatively coupled to the changing means in response to manual manipulation  
25. thereof. The term chassis refers to the base or frame and excludes the wheels.

- Preferably the changing means comprises a weight movably supported on the chassis, the control means selectively adjusting the weight to adjust the centre  
30. of gravity of the toy vehicle. Preferably the control means is a lever coupled to the weight for selectively positioning the weight on the chassis.

Preferably the toy vehicle includes a front end and a rear end, a first front wheel rotatably supported on

## 5.

the front end of the chassis and first and second rear wheels rotatably supported on the rear end of the chassis. The weight is preferably supported on the chassis proximate the first or second rear wheels.

5. A first embodiment provides a first weight pivotally supported on the chassis proximate the first rear wheel and a second weight pivotally supported on the chassis proximate the second rear wheel, the lever being operatively coupled to the first and second weights to
10. selectively pivot the first and second weights whereby the centre of gravity of the toy vehicle is changed. One weight may be heavier than the other. First and second projections are preferably provided which selectively project through the chassis towards the surface on which
15. the toy vehicle is rolling, which projections preferably selectively contact the surface as the toy vehicle is rolling on the surface dependent upon the position of the first and second projections as set by the lever and the manner in which the toy vehicle is riding on the surface.
20. One or more of the projections may include a roller.

- Motor means are preferably supported on the chassis and operatively coupled to the first and second rear wheels for powering the toy vehicle. Conveniently the motor may be an energy storing mechanism such as a pull-
25. back or wind-up motor which is tightened when the first and second rear wheels are rolled in a reverse direction over the surface, the pull-back motor driving the rear wheels in a forward direction when the toy vehicle is released. This allows the vehicle to be self-propelled.

30. A preferred embodiment provides the lever in a form simulating a gear shift lever, and the chassis preferably includes a toy car body attached thereto, the toy car

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- body having a slot formed therein in the shape of a gear shift pattern, the lever extending through the slot. The slot may define a plurality of gear shift positions, the lever being manually movable between
5. the gear shift positions to set the lever means in a selected one of the positions, each gear shift position corresponding to a position of the first and second weights as controlled by the lever. Biasing means are preferably provided for movably biasing the first
10. and second projections in a neutral position. The lever may contact the motor when the lever is in a selected one of the gear shift positions to provide a continuous braking drag at that one position.

- In a second embodiment a toy vehicle comprises a
15. pair of front wheels and a pair of rear wheels, the changing means comprising a platform slidably supported on the chassis and coupled to the rear wheels, the control means selectively moving the platform to move the rear wheels with respect to the front wheels. The
20. control means may be a lever means operatively coupled to the platform and the chassis for moving the platform and the rear wheels with respect to the chassis.

- The lever preferably simulates a gear shift lever and the chassis preferably includes a toy vehicle body
25. attached thereto, the body having a slot formed therein, the lever extending through the slot. Projections may be provided which selectively contact the surface on which the toy vehicle is riding depending on the position of the rear wheels. These projections may be immovably fixed
30. to the underside of the chassis. The motor may be slidably supported on the chassis, the rear wheels being operatively coupled to the motor means for rotation thereby and sliding therewith, the platform moving the motor means and the rear wheels in response to displacement of the lever.



## 7.

In a preferred embodiment the platform and chassis cooperate to define a detent means for releasably holding the rear wheels in a selected gear position.

In the various embodiments the projections

5. selectively contact the surface on which the toy vehicle is placed to further vary its operating characteristics, for example to enable the vehicle to perform a wheel stand.

Thus, there may be provided a toy vehicle having

10. a projection extending toward the surface on which the toy vehicle is riding and adapted to contact the surface depending on the selected distance between the pairs of front and rear wheels and the driving characteristics of the toy vehicle. Thus a projection may be
15. provided which extendstoward the surface and selectively contact the surface as the toy vehicle is driven by the motor. A projection may also be provided which is pivotally supported on the chassis and this may be provided as a projection on a weight as in the first embodi-
20. ment or as a projection on an arm coupled to the weight or as a projection on an arm coupled to the lever. Thus first and second projections which selectively project from the chassis and selectively contacts the surface, may be provided, the first and second projections being
25. pivotally supported on the chassis. The projection or projections are movably connected to the lever and a selection of the position of the lever controls the projections. Thus a toy vehicle may be provided comprising a projection movably supported on the chassis,
30. the lever moving the projection in response to manual manipulation thereof, whereby the projection selectively contacts the surface on which the toy vehicle is riding dependent upon the position of the first projection as

set by the lever means and the manner in which the toy vehicle is riding on the surface. A second projection movably supported on the chassis and adapted to be selectively moved by the lever means to selectively

5. project from the chassis toward the surface may be provided. Biasing means are preferably present and bias the projections in a neutral position where the projections do not contact the surface as the toy vehicle is riding thereon.
10. In a third embodiment the lever is weighted to provide a toy vehicle comprising a chassis, first and second rear wheels rotatably supported on the chassis, and a weighted shift lever movably supported on the chassis, the positioning of the shift lever on the
15. chassis in selected positions acting to alter the balance of the toy vehicle. Preferably the toy vehicle comprises a toy vehicle body coupled to the chassis having a slot defining a simulated gear-shift pattern having a plurality of shift positions, the weighted
20. shift lever extending through the slot out of the toy vehicle body to permit manual manipulation thereof. Preferably there is a first arm pivotally supported on the chassis proximate the first rear wheel and a second arm pivotally supported on the chassis proximate the
25. second rear wheel, the shift lever selectively contacting the first and second arms when in selected shift positions. A preferred embodiment provides that the first arm includes a first projection and the second arm includes a second projection which selectively
30. project through the chassis toward the surface on which the toy vehicle is riding depending upon the manner in which the shift lever contacts the first and second arms.

Various preferred features discussed with regard to the above embodiments are equally applicable to this embodiment including discussion of the motor, the lever as a gear lever and the projections.

5. Preferably the lever extends through the top of the vehicle body and the first and second arms are preferably weighted and there is preferably biasing means for biasing the arms in a selected neutral position. The biasing means may include leaf springs coupled intermediate the chassis and the first and second arms.

10. Thus, a toy vehicle may be provided comprising a chassis, first and second rear wheels rotatably supported on the chassis which permit the toy vehicle to ride on a surface, a first arm having a first projection pivotally supported on the chassis proximate the first rear wheel, a second arm having a second projection pivotally supported on the chassis proximate the second rear wheel, and a weighted lever moveably supported on the chassis for selectively changing the balance of the toy vehicle, the lever selectively contacting the first and second arms to cause the first and second projections to extend through the chassis proximate the surface on which the toy vehicle is riding.

20. The toy vehicle body preferably has a slot defining a plurality of positions, the lever extending through the slot to permit manual manipulation thereof and the slot defining a simulated gear-shift pattern, the lever being a simulated gear-shift lever having a weighted top and the weighted top of the shift lever is positioned on the top of the vehicle body.

30. Any feature or features described in relation to a particular embodiment may, if applicable, be included with any other embodiment. Similarly combinations of embodiments are also within the scope of the present invention.

The invention may be put into practice in various ways but three toy vehicles and a number of modifications according to the present invention will now be described by way of example with reference to the accompanying drawings in which:

5. Figure 1 is an exploded perspective view of a multi-action toy vehicle, with only a portion of the toy vehicle body being shown;  
Figure 2 is a bottom plan view of the toy vehicle of Figure 1, when assembled;
10. Figure 3 is an enlarged sectional view taken along line 3-3 of Figure 2;  
Figure 4 is a sectional view taken along line 4-4 of Figure 3;  
Figure 5 is a sectional side elevational view
15. similar to Figure 4 but taken through a different portion of the toy vehicle, with the lever in a neutral position;  
Figure 6 is a sectional view taken along lines 6-6 of Figure 5;  
Figure 7 is a partial side elevational view of the
20. toy vehicle shown in Figure 1 performing a wheel stand with the lever in the first gear position;  
Figure 8 is a sectional view taken along line 8-8 of Figure 7;
25. Figure 9 is a partial elevational view of the rear wheels of the toy vehicle shown in Figure 7;  
Figures 10, 11 and 12 are views similar to Figures 7, 8 and 9 but showing the toy vehicle in the second gear position;
30. Figures 13, 14 and 15 are views similar to Figures 7, 8 and 9 but showing the toy vehicle in the third gear position;

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Figures 16, 17 and 18 are views similar to Figures 7, 8 and 9 but showing the toy vehicle in the fourth gear position;

Figures 19, 20 and 21 are views similar to

5. Figures 7, 8 and 9 but showing the toy vehicle in the fifth gear position;

Figure 22 is an elevational view of an alternative construction of pivotable weight for a toy vehicle;

10. Figure 23 is an enlarged sectional view taken along lines 23-23 of Figure 22;

Figure 24 is a partial front sectional elevational view showing an alternative embodiment of the pivotable weights for a toy vehicle;

15. Figure 25 is a partial elevational view of several gears in the motor and lever for incorporation into a toy vehicle;

20. Figure 26 is a perspective view of a toy vehicle constructed in accordance with a second embodiment of the present invention with the vehicle body shown in phantom lines;

Figure 27 is a bottom plan view of the toy vehicle shown in Figure 26;

25. Figure 28 is an exploded perspective view of the toy vehicle shown in Figure 26;

Figures 29, 30, 31, 32 and 33 are side elevational views of the toy vehicle shown in Figure 26 shown with the lever in different gear positions to explain the operation of the toy vehicle shown in Figure 26;

30. Figures 29A, 30A and 31A are associated respectively with Figures 29, 30 and 31 and are sectional views thereof and show the rear wheels and projections of the toy vehicle shown in Figure 26;

12.

Figure 34 is an exploded partial perspective view of a third embodiment of toy vehicle;

Figure 35 is a top plan view of the construction shown in Figure 34; and

5. Figure 36 is a sectional view taken along line 36-36 of Figure 35.

Reference is first made to Figures 1 to 3 which show a toy vehicle, generally indicated at 10, constructed in accordance with a first embodiment of

10. the present invention. Toy vehicle 10 includes a toy vehicle frame or chassis 12 on which the components of the toy vehicle 10 are disposed. A front axle 14 is rotatably supported on a front end 12a of the chassis 12. A pair of front wheels 16a and 16b are

15. secured to opposite ends 14a and 14b, respectively, of the axle 14 so as to be rotatable therewith. Terms such as right and left as used herein are defined as viewed when facing the front of the toy vehicle as specified above.

20. An energy storing mechanism such as a motor or other energy storing mechanism 20 is secured to the chassis 12. The motor 20 includes a through hole 22 in which a rear axle 24 is inserted. A pair of rear wheels 26a and 26b are secured to ends 24a and 24b, respectively, of the axle 24 so as to be rotatable therewith.

25. The motor 20 may be a pull-back motor of the type described in US-A-4,077,156 and US-A-3,798,831 in which a spring is tightened by rolling the rear wheels in a reverse direction over a surface to store energy,

30. which energy, when the vehicle is released, will cause the vehicle to be projected forward. Accordingly, the rear axle 24 will be appropriately linked to the

13.

motor 20 so that torque created thereby can be applied to the rear axle 24 to cause it to rotate in a forward direction. It is noted that other types of energy storing mechanisms may be used, such as a conventional

5. wind-up motor or the like. However, it is also recognized that the present invention may operate under manual propulsion although a self-propelled toy vehicle is preferable.

First and second weights 30 and 32 are pivotably

10. supported intermediate rear wheels 26a and 26b, respectively, and motor 20. In this regard, a housing 21 of the motor 20 may include cylindrical open projections 21a and 21b which respectively pivotably support the weights 30 and 32 through respective

15. openings 30' and 32'. As will be described below in detail, the weights 30 and 32 are pivotable to selected positions to alter the centre of gravity of the toy vehicle 10 in order to provide the vehicle 10 with different operating conditions and physical

20. behavior dependent upon the position of the weights 30 and 32.

A simulated gear-shift lever or control knob 40 is provided for selectively positioning the weights 30 and 32. The control knob 40 has a platform and includes

25. a downwardly extending projection 42 which is held between pegs 34a and 34b of weight 30 and pegs 36a and 36b of weight 32. The control knob also includes an upwardly extending rod or shift lever 44. A toy vehicle body 50 is appropriately coupled to chassis 12.

30. The body 50 includes a cutout pattern or slot 52 in the form of a gear-shift pattern and is appropriately marked with indicia such as the numbers 1 to 5 as shown

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in Figure 1 to denote the plurality of positions and in order to further simulate a gear-shift pattern of an actual automobile. The shift lever 44 extends through the slot 52 and is movable between the positions 5. indicated.

First and second leaf springs 60 and 62 each have a first end 60a and 62a, respectively, which is secured to vertical block 12' on chassis 12 by means of screws 64a and 64b. Opposite ends 60b and 62b of the 10. leaf springs 60 and 62 extend into slots 31 and 33 formed in the weights 30 and 32, respectively. The leaf springs 60 and 62 apply a force to the weights 30 and 32 so that they remain in a neutral position, as described below in detail, and which also return the 15. weights 30 and 32 to their neutral position when the shift lever 44 is returned to its neutral position after being moved from one of the five gear positions. The weights 30 and 32 include additional extending rods 37a and 37b, respectively, which aid in stabilizing the 20. weights 30 and 32 and to ensure proper pivoting thereof.

The weights 30 and 32 include projections 38 and 39, respectively, which will contact the surface on which the vehicle 10 is riding under certain operating conditions, that is when the shift lever 44 is positioned 25. in certain of the gear positions, as will also be described below in detail.

Reference is now made additionally to Figures 3 to 21, to describe the use and operation of the toy vehicle 10. Figures 3 to 5 show the toy vehicle 10 30. when the shift lever 44 is in a neutral position, that is when the shift lever 44 is not set in one of the numbered gear slots as best shown in Figure 6. In the neutral position, the weights 30 and 32 remain in their



15.

- central, neutral position as positioned by the leaf springs 60 and 62. The projections 38 and 39 on the weights 30 and 32 do not substantially extend through the chassis 12 and will not contact surface 8 on which
5. the toy vehicle 10 is riding even if the toy vehicle 10 performs a wheel stand where the front end 12a of the chassis 12 is lifted into the air. The centre of gravity of the toy vehicle 10 will be in a normal position such that, after torque is applied by the motor 20 to the
10. rear wheels 26a and 26b, as the toy vehicle 10 moves forward, the vehicle will either run straight on all four wheels or will perform a wheel stand if a sufficient amount of rotational energy is supplied to the rear wheels to cause the front of the toy vehicle to lift up.
15. When the shift lever 44 is moved into the first gear position as shown in Figures 7 to 9, the toy vehicle 10 will exhibit a different physical behaviour as described hereinafter. It is noted that sufficient friction is provided between the slot 52 and the shift
20. lever 44 so that the shift lever 44 is held in the first gear position until manually forced back to the neutral position. The same is also true for gear positions 2 to 5 where the shift lever 44 will be held in those gear positions until manually forced back to
25. the neutral position.
- In the first gear position, the weight 32 on the left side of the toy vehicle 10 is pivoted rearwardly and locked in a rearward position. The projection 39 protrudes through the chassis 12 as best shown in
30. Figures 7 and 9. Since the weight 32 is pivoted, the centre of gravity of the toy vehicle 10 will be shifted back to 50% of its maximum rear position as measured

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- from a neutral or unweighted position. After the motor 20 is energized and the toy vehicle 10 is released on the surface 8 to ride in a forward direction, the front wheels of the vehicle will lift off the ground causing
5. the toy vehicle to perform a wheel stand and the toy vehicle 10 will turn to the left as the projection 39 contacts the surface 8.

- The toy vehicle 10 with the shift lever 44 in the second gear position is shown in Figures 10 to 12. In
10. the second gear position, the projection 42 contacts both the peg 34a of the weight 30 and the peg 36a of the weight 32 causing the weights 30 and 32 to pivot and move in a forward direction. The centre of gravity of toy vehicle 10 is moved forward to its maximum forward position. This moves the centre of gravity forward
15. sufficiently so that the toy vehicle will run in a straight line when driven by the motor 20 and will not perform a wheel stand.

- Figures 13 to 15 shown the toy vehicle 10 when
20. the shift lever 44 is moved to the third gear position. In third gear, both the weights 30 and 32 are pivoted in the rearward direction since the projection 42 on the control knob 40 contacts both the peg 34b on the weight 30 and the peg 36b on the weight 32. Both the
25. projections 38 and 39 are lowered through the chassis 12. The centre of gravity of the toy vehicle 10 is moved to its maximum rear position.

- As the motor 20 causes the toy vehicle 10 to move in the forward direction, the front wheels of the toy
30. vehicle will readily lift off the ground and the vehicle will turn right or left depending upon the friction characteristics of the surface on which it is running. In addition, the projections 38 and 39 will

contact the ground as the toy vehicle 10 performs wheel stands to cause the toy vehicle to adopt different physical behaviour and operating characteristics.

In the fourth gear position as shown in Figures 5. 16 to 18, the right weight 30 is pivoted forward. The centre of gravity of the toy vehicle 10 will be moved forward 50% of its maximum since only one of the weights is pivoted forward. As the motor 20 releases its stored energy to the rear wheels, the toy vehicle 10 10. will either ride forward with all four wheels on the ground or the vehicle will perform a wheel stand. This will depend on the weighting of the vehicle body.

Figures 19 to 21 show the toy vehicle 10 when the shift lever 44 is in the fifth gear position. In this 15. position, the right weight 30 is pivoted to the rear lowering the projection 38 thereof below the chassis 12 to contact the ground, the toy vehicle performing a wheel stand. When in fifth gear, the centre of gravity of the toy vehicle 10 is moved back to 50% of 20. its maximum since only one weight is pivoted to the rear. The toy vehicle 10, when driven by the motor 20, will turn to the right as the front wheels are lifted and a wheel stand is performed.

A further gear may be provided similar to the 25. fourth gear but with weight 32 forward, this further gear being related to first gear in an equivalent relationship to fourth and fifth gears.

In accordance with the above description there is provided a multi-action toy vehicle which exhibits 30. different physical behaviour and operating characteristics depending upon the position in which the simulated gear-shift lever is placed. Such a toy provides enhanced play value with respect to a convent-

ional motorised or propelled toy vehicle. The objects and advantages of the present invention are achieved through a construction as described above and such a toy vehicle is simple and relatively inexpensive to manufacture. It is noted that the objects and advantages may be obtained in the first embodiment even if a single movable weight is used.

Figure 22 shows an alternative embodiment of a weight 132 having a projection 139 including a roller 140 which, when the weight 132 is pivoted in the rearward direction, will contact and roll on the surface 8. The roller 140 will reduce the running friction of the projection 139 as it rolls along the surface 8. It is noted that both weights in the toy vehicle may have such rollers.

The embodiment of Figure 24 shows one of the two pivotable weights heavier than the other to permit further variations between left and right turns of the toy vehicle. In Figure 24, the left hand side weight 138 is more massive and larger than the right hand side weight 30.

Figure 25 shows another alternative embodiment of the present invention where a portion 40' of a platform 40 of the shift lever contacts a gear 19 of the motor 20 when the shift lever 44 is in a neutral position so that a braking action by means of friction on gear 19 can be provided.

Reference is now made to Figures 26 to 28 which shows a toy vehicle, generally indicated at 200. The toy vehicle 200 includes a chassis 202 which supports a toy vehicle body 204. A pair of front wheels 206a and 206b are rotatably supported on front end 202a of chassis 202 by means of a front axle 208. Opposing

- side rails 210 and 212 are provided on opposing sides of the chassis 202 on the upper surface thereof. An energy storing mechanism 220 such as a pull-back motor or other wind-up motor or the like is slidably supported
5. on the chassis 202 between the rails 210 and 212. A rear axle 214 extends through an opening 219 in the motor 220 and is operatively coupled to the motor 220 so as to be rotated thereby. A pair of rear wheels 216a and 216b are secured to opposite ends of the rear axle 214.
  10. A sliding motor retainer cover 230 is positioned over the motor 220 and includes a slot 232 through which the rear axle 214 may extend. The cover 230 is positioned over the motor 220 and includes side wings 230a and 230b which are held within cutouts 210a and 212a formed in
  15. the rails 210 and 212, respectively. This permits the cover 230 and the motor 220 thereunder to be slidable on the chassis 202 in the directions indicated by arrow A (Figure 28).

- A shift lever mechanism 240 is provided and
20. includes a U-shaped section 242 having downwardly extending arms 244 and 246 and a shift arm lever 248 which extends in an upward direction through a slot 204a in the car body 204. Pivot pins 244a and 246a on the outer surface of the legs 244 and 246 respectively are
  25. held in openings 210b and 212b formed in the rails 210 and 212 respectively. Slide pins 244b and 246b on the inner surface of the legs 244 and 246 respectively ride in U-shaped slots 231 and 233, respectively, formed on the sliding motor cover 230. A shift knob 250 is
  30. secured to the top of the shift lever 248.

Three projections 260, 262 and 264 preferably of different lengths are secured in openings 270, 272 and 274 so as to extend from the underside of the chassis

20.

202. The motor cover 230 includes an extension 235 having a detent 237. Detent position recesses 211 are formed on the upper surface of the chassis 202 so as to cooperate with the detent 237 in order to hold the
5. motor cover 230 in a selected position. By moving the shift lever 248 along the slot 204a formed in the vehicle body 204 in the directions of arrow B, the wheel base, that is, the distance between the front wheels and the rear wheels, can be changed to alter the balance of
10. the vehicle, its centre of gravity and the vehicle's running stability.

Reference is now made additionally to Figures 29 to 33 to explain the operation and use of the toy vehicle 200.

15. When the shift lever 248 is in its forward-most position in the first gear position as shown in Figures 29 and 29A, the rear wheels will be moved to their forward-most position thereby producing the shortest wheel base. The front end 235a of the extension 235 presses against the front axle 208 so as to
20. apply a force there-against. The rear wheels 216a and 216b will be forward of all three projections 260, 262 and 264. As the motor 220 drives the vehicle 200 in a forward direction, the toy vehicle will perform
25. a wheel stand as shown in Figure 29. When a wheel stand is performed, the longest projection 260 which is to the left of centre when viewed facing the front will contact the ground 8. When the projection 260 contacts the ground during a wheel stand, the right rear wheel
30. 216b will be lifted off the ground causing the left rear wheel 216a to power the vehicle in a spin to the left. Surface 235a pressing against the front axle will cause a braking action when the front wheels 206a and 206b are attempting to roll on the ground.

21.

- Figures 30 and 30A show the toy vehicle 200 with the shift lever 248 in the second gear position. The front surface 235a of the extension 235 is released from engagement with the front axle 208. The detent
5. 237 engages in a second detent position recess 211. The wheel base is lengthened slightly so that the longest projection 260 is positioned only slightly behind the rear wheels. As the motor 230 drives the vehicle 200 in a forward direction and a wheel stand
10. is performed, the projection 260 will move up and away from the ground and the right projection 264 will contact the ground thereby lifting the left rear wheel 216a. This causes the right rear wheel 216b to power the vehicle in a spin or turn to the right.
15. Figures 31 and 31A show the toy vehicle 200 with the shift lever 248 in the third gear position. In this third gear position, the rear wheels are moved further back thereby lengthening the wheel base and moving the right projection 264 behind the rear wheels.
20. Accordingly, during a wheel stand as the vehicle 200 is powered forward, the projections 260 and 264 will move upward and the shortest centre projection 262 will contact the ground. This action aids the toy vehicle 200 in running in a straight line during the wheel stand since
25. the projection 262 is centrally located.
- Figure 32 shows the toy vehicle 200 with the shift lever 248 in the fourth gear position. In the fourth gear position, the rear wheels are moved back a sufficient amount to create a relatively stable wheel base for the
30. toy vehicle. There is generally sufficient weight in front of the rear axle to prevent the toy vehicle from performing a wheel stand while moving forward. This

forward movement will be in straight lines if weighted uniformly of the central axis from front to back. Movement to left or right can be achieved by appropriate weighting to one side of this central axis. However,

5. in an alternative embodiment, the front wheels may be elliptical in shape which would cause the front end to be raised when in fourth gear since the front end of the vehicle would be thrown upward by the rotating elliptical wheels. Other forms of weighting may also
10. be employed to provide this effect.

Figure 33 shows the toy vehicle 200 in a fifth gear position. The distance between the front and rear wheels is greatest in the fifth gear position so that the wheel base is longest. This produces a

15. stable ride without wheel stands being performed by the toy vehicle.

- The present embodiment under discussion like the embodiment shown in Figures 1 to 3 provides a multi-action toy vehicle in which the physical behaviour and
20. operating characteristics of the toy vehicle can be determined by the operator by setting a simulated gear-shift lever in a selected gear position. Whereas the first embodiment utilizes pivoting weights to change the centre of gravity of the toy vehicle, the
  25. present embodiment utilizes a change in the wheel base length to alter the physical behaviour and centre of gravity of the toy vehicle. Such multi-action toy vehicles as those described in detail herein provide a toy having a high level of play value to children.
  30. Reference is now made to Figures 34 to 36 which show a third embodiment of the present invention. In this embodiment, T-shaped arms 300 and 302 are pivotally supported on a rear axle 24, which extends through open-



ings 301 and 303 in the arms 300 and 302, respectively.

The arms 300 and 302 each include an upwardly extending portion 306 and 308, respectively, which respectively include inwardly projecting rods 309 and 310 at

5. the upper ends 306a and 308a thereof.

Arm 300 includes a first shoulder 312 having a slot 313 formed therein and a ~~second shoulder 314~~ defining a projection. Similarly, arm 302 includes a shoulder 320 having a slot 321 formed therein and a shoulder 322

10. defining a projection.

A simulated gear-shift lever or control knob 330 includes an upper weighted portion 332 which permits manual manipulation thereof and an extending rod 334 which extends through a slot 52 in a vehicle body 50, which extends through a slot 52 in a vehicle body 50, the lever being movable in a gear-shift pattern. The rod 324 is a tight fit in the slot 52 to prevent it slipping. A disk 340 includes an opening 342 in which the shaft 334 of the lever 330 is fitted and secured. A washer 344 may also be provided.

20. When constructed as shown in Figures 34 to 36 the weight 332 of the lever 330 is adapted to be manually shifted between five shift positions 52a to 52e plus a neutral position 52f in the pattern marked out by the shaped slot 52. It is noted that each of the five shift positions 52a to 52e are slightly larger in diameter than the slot 52 so that the lever 330 can be releasably locked therein. The disk 340 is adapted to securely, shiftably mount the lever 330 within the slot 52. The lower portion of the lever 330 is adapted to contact the extensions 308 and 310 of the arms 300 and 302, respectively, dependent upon the position in which lever 330 is situated.

When in the first gear position, the lower portion of the lever 330 will press against the extension 310 to thereby pivot the arm 302 such that the projection 322 extends through the chassis 12 to raise the rear wheel 26b when the toy vehicle is performing a wheel stand. Since the weight 332 is shifted to the rear of the toy vehicle, the addition of this weight to the rear will cause the vehicle to perform a wheel stand. The left rear wheel 26b is raised turning the toy vehicle to the left.

In the second gear position, the weight 332 is shifted forward centrally and the vehicle will move forward on all four wheels in a straight line if not otherwise weighted.

In the third shift position, the weight 332 is shifted to the rear, but the lower portion of the lever 330 does not sufficiently contact extensions 308 or 310, and hence, projections 314 and 322 do not project through the chassis 12. In the third gear, the toy vehicle will perform a wheel stand while travelling in the forward direction, its front wheels being lifted off of the running surface.

In the fourth gear position, the weight 332 is again shifted forward but to the right side of the vehicle. Extensions 308 and 310 are not contacted, and the vehicle will essentially run forward on all four wheels. Depending on the relative weighting, the weight is to the right of the vehicle and this will tend to pull the vehicle to this side.

In the fifth gear position, the weight 332 is shifted to the rear right side of the toy vehicle and the lower portion of the lever 330 presses against the extension 308 to cause the projection 314 to project

25.

through the bottom of the chassis 12. The vehicle will perform a wheel stand in the forward direction and the projection 314 will contact the surface on which the toy vehicle is riding, thereby lifting the rear wheel 26a  
5. off of the ground as shown in Figure 36.

The slots 313 and 321 are provided in the arms 300 and 302, respectively, to receive a leaf spring such as a leaf spring 350 as shown in Figure 36. The leaf springs provide a bias to the arms 300 and 302 such  
10. that they remain in a neutral position when not pressed by the disk 340.

It is noted that the arms 300 and 302 may be weighted as in the embodiment shown in Figures 1 to 21. Also the second embodiment of vehicle may be weighted as shown  
15. in Figures 1 to 2. Further the second and third embodiments may also be combined.

CLAIMS

1. A toy vehicle (10, 200) comprising a base (12, 202), wheels (16a, 16b, 26a, 26b; 206a, 206b, 216a, 216b) and means to alter the position of the centre of gravity.
2. A toy vehicle as claimed in Claim 1 in which there is a lever (40, 240, 344) coupled to the means to alter the position of the centre of gravity.
3. A toy vehicle as claimed in Claims 1 or 2 in which the means comprises a movable weight (30, 32) proximate a wheel (26a, 26b).
4. A toy vehicle as claimed in Claims 1, 2 or 3 in which there are two front wheels (16a, 16b) and two rear wheels (26a, 26b) a weight (30, 32) being pivotally supported on the base proximate each of the rear wheels, each weight being pivoted to a number of positions to alter the position of the centre of gravity.
5. A toy vehicle as claimed in any one of the preceding claims in which there is a sliding weight (220) supported on the base to alter the centre of gravity.
6. A toy vehicle as claimed in any one of the preceding claims in which the length of the wheel base is varied.
7. A toy vehicle as claimed in any one of Claims 2 to 6 in which the lever (334) is weighted (332).
8. A toy vehicle as claimed in Claim 7 in which the

27.

lever (334) is connected to an arm (300, 302) positioned adjacent a wheel (26a 26b), the arm having a projection (314, 322) which selectively projects through the base depending on the position of the lever.

9. A toy vehicle as claimed in any one of the preceding claims comprising a projection (38, 39; 260, 262, 264; 314, 322) which projects through the base towards the surface (8) on which the toy vehicle is placed.

10. A toy vehicle as claimed in Claim 9 in which the projection is movable and selectively projects through the base according to the position of the centre of gravity.

11. A toy vehicle as claimed in any one of Claims 2 to 10 comprising a motor (20, 220) and the lever being movable to a number of selected positions in the manner of an automobile gear stick, the positions corresponding to variations in the centre of gravity.

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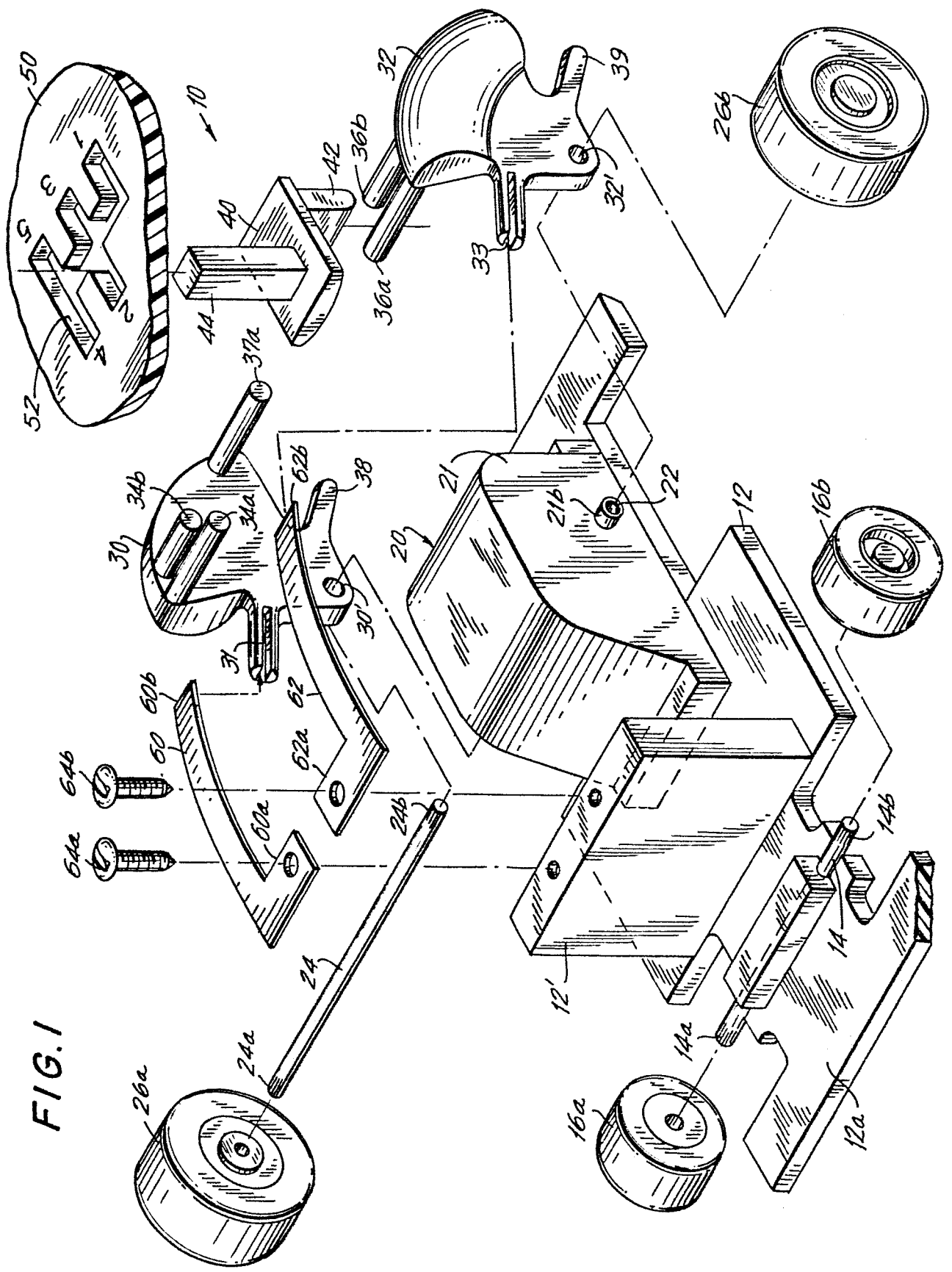


FIG.1

FIG. 2

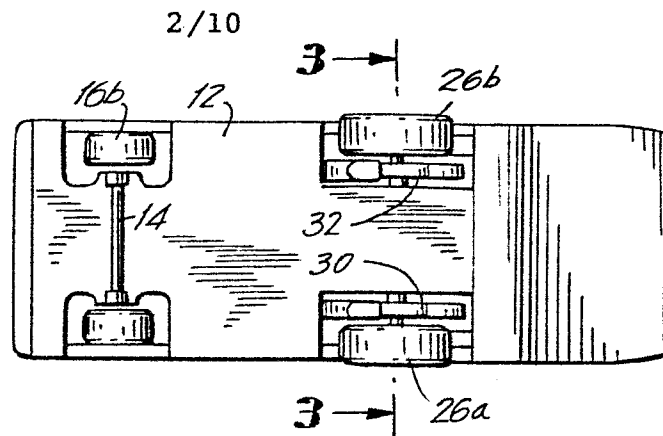


FIG. 3

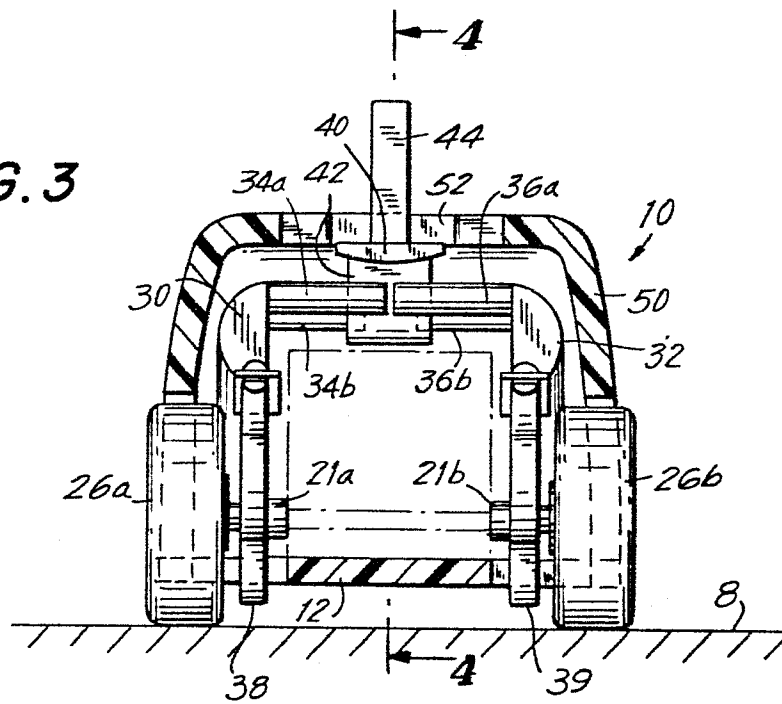
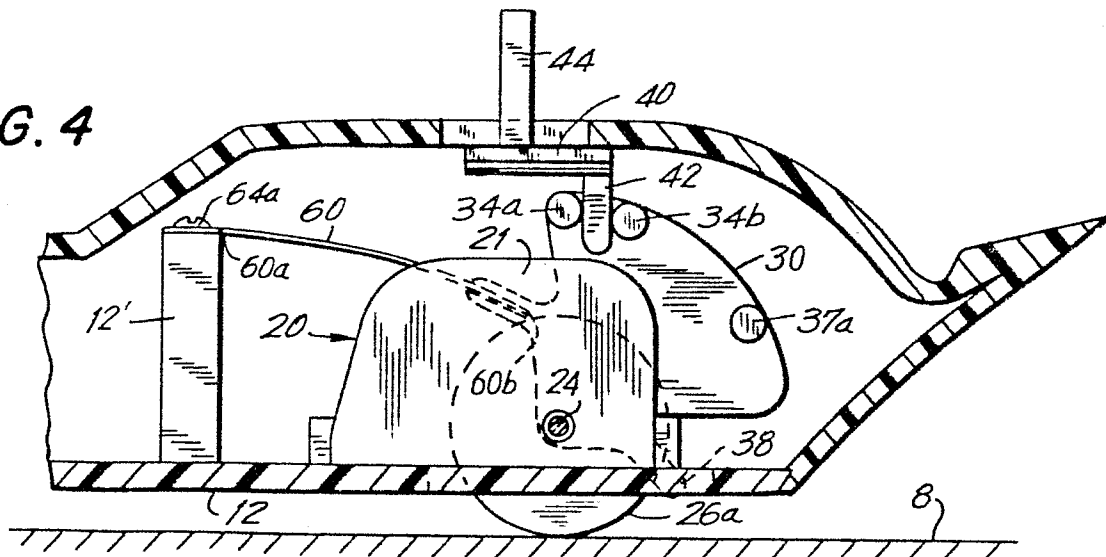
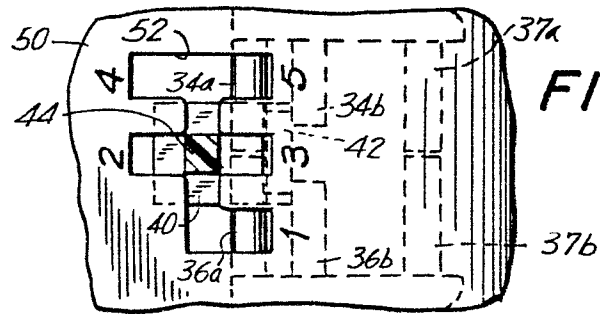
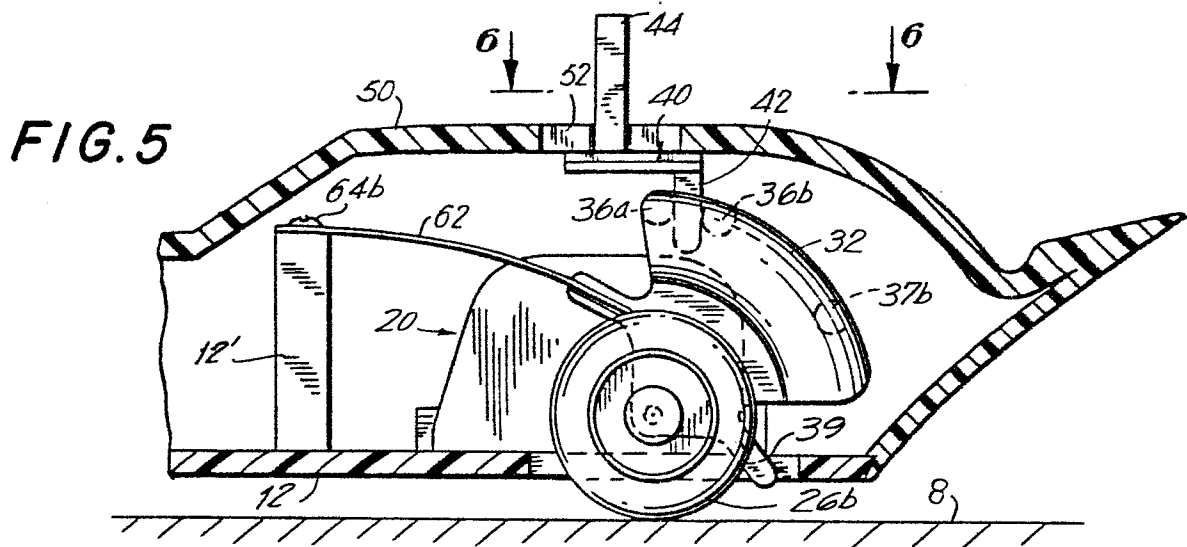


FIG. 4

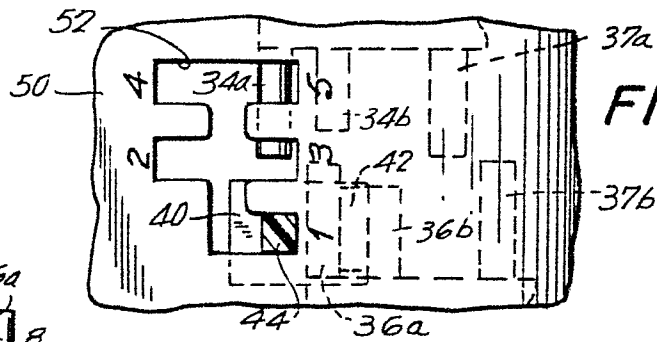




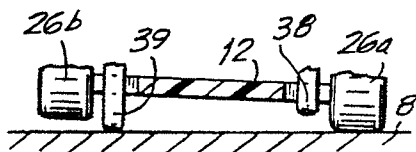
**FIG. 6**



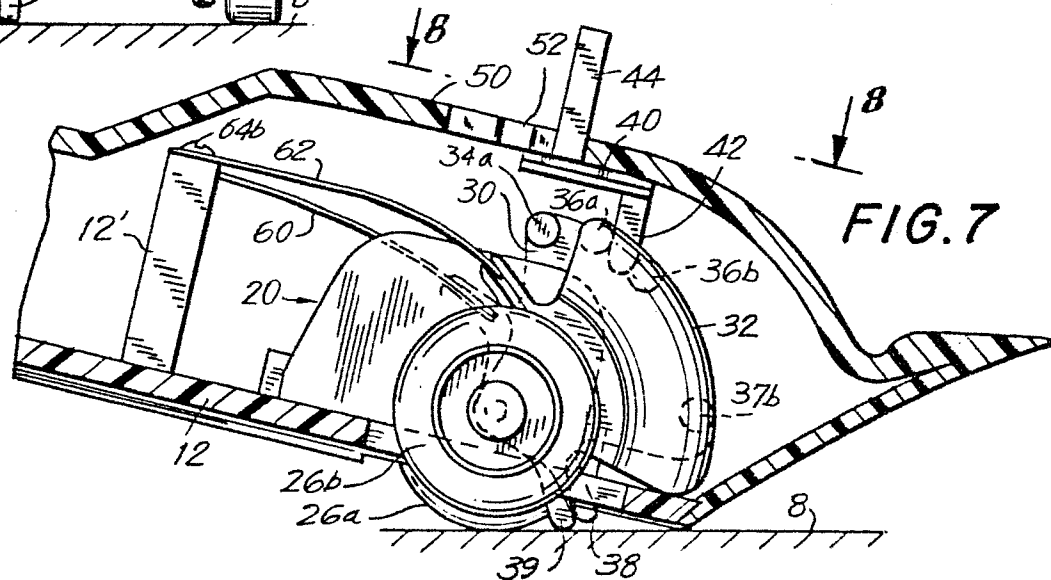
**FIG. 5**



**FIG. 8**



**FIG. 9**



**FIG. 7**



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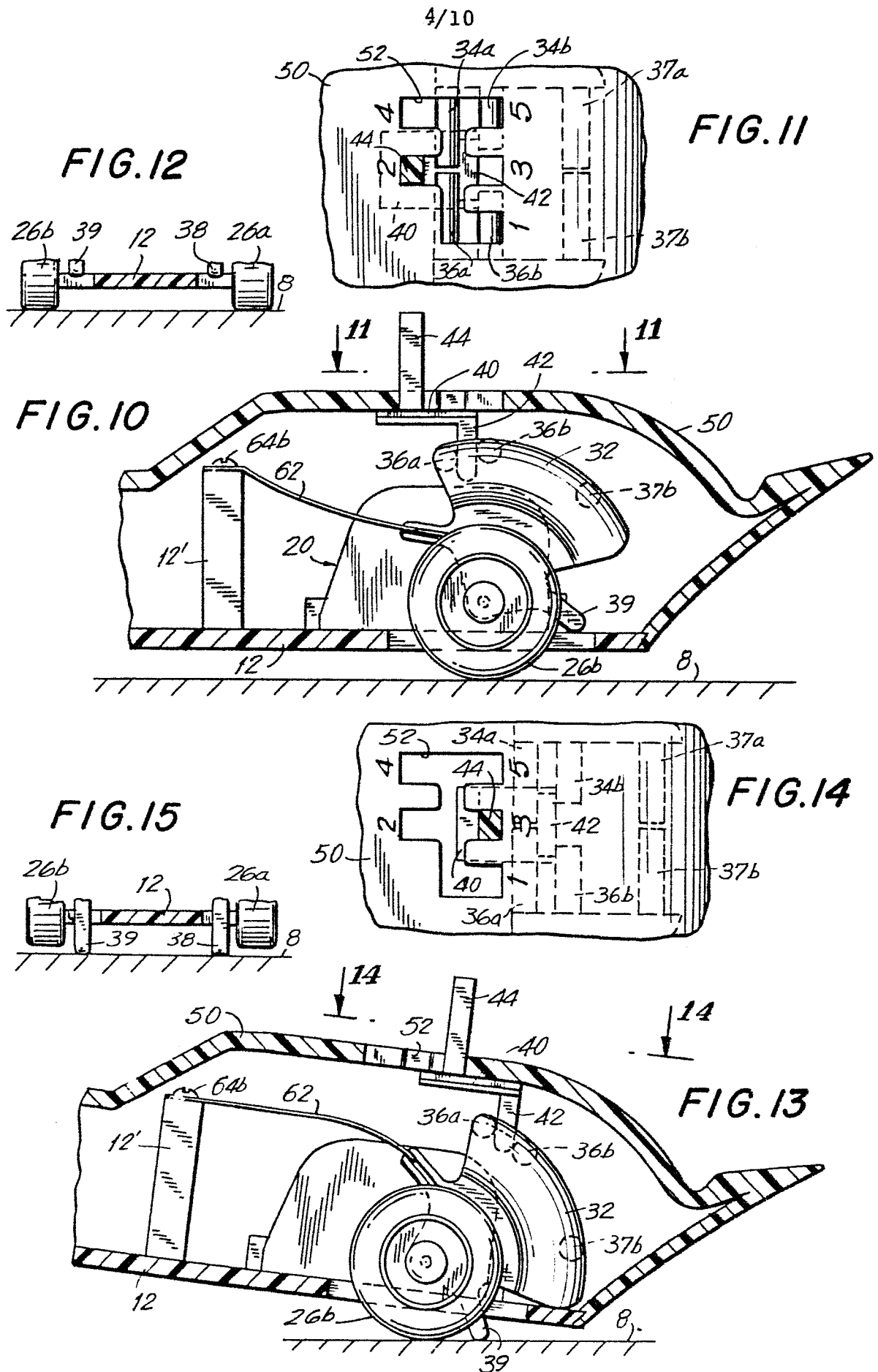


FIG.18

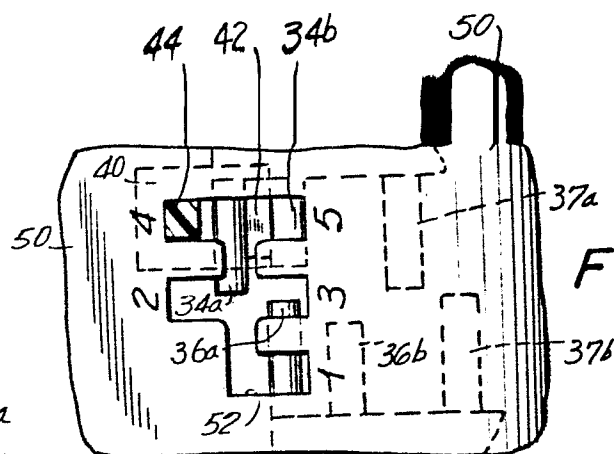
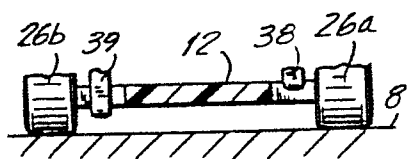


FIG.17

FIG.16

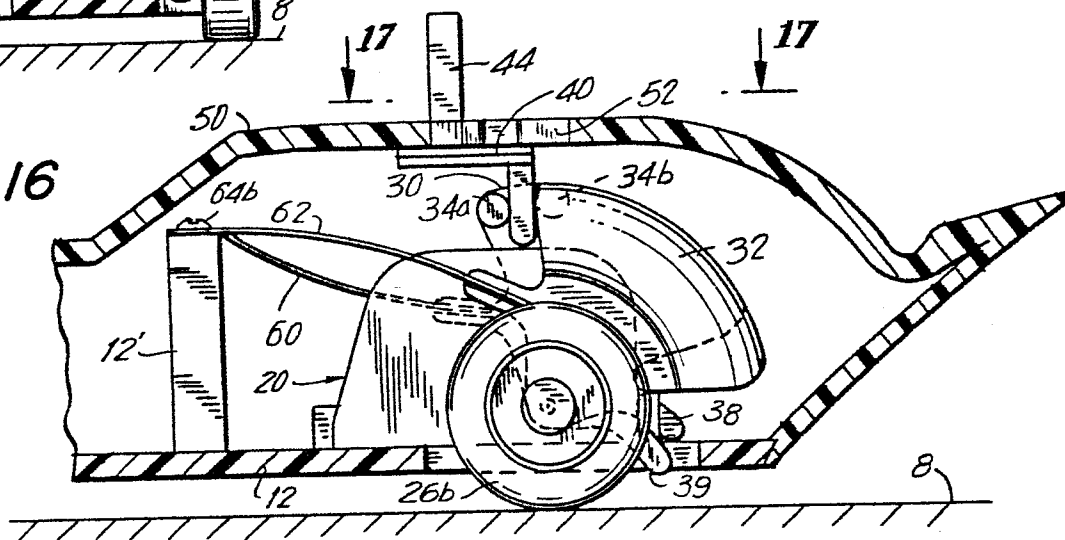


FIG.21

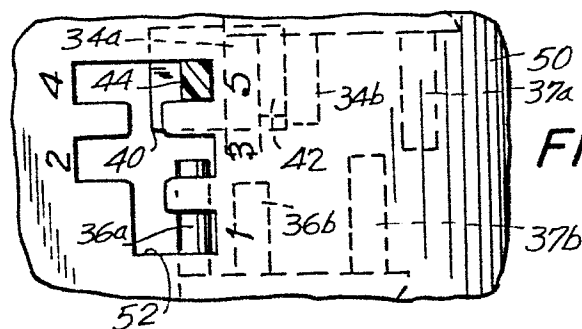
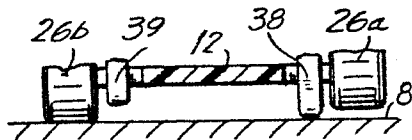


FIG.20

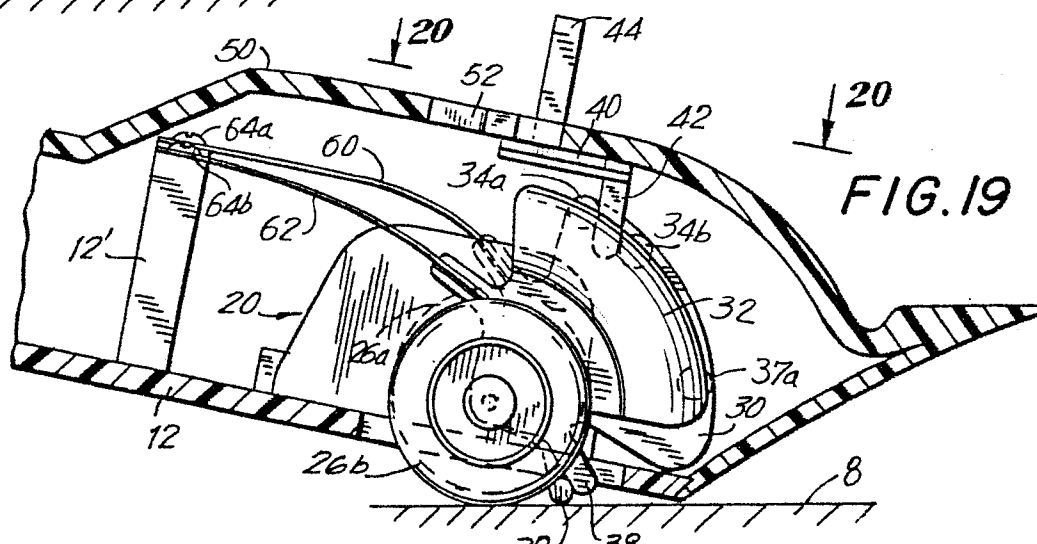


FIG.19

FIG. 22

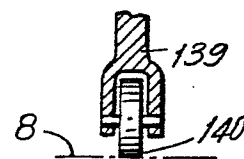
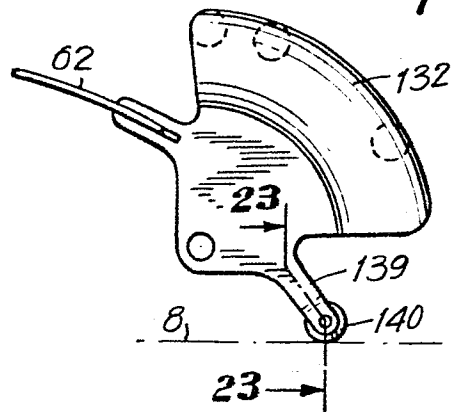


FIG. 23

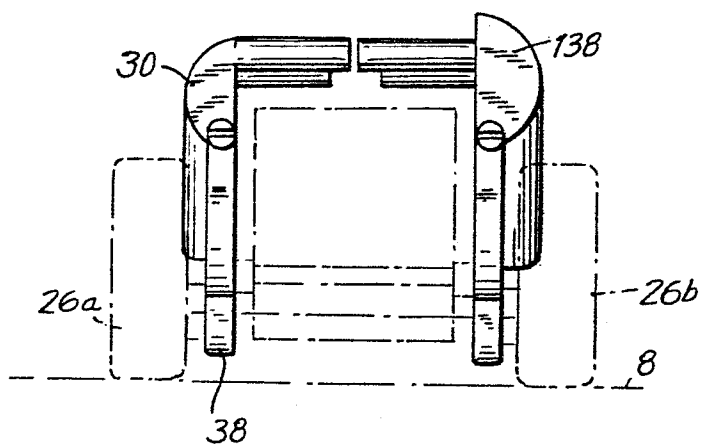


FIG. 24

FIG. 25

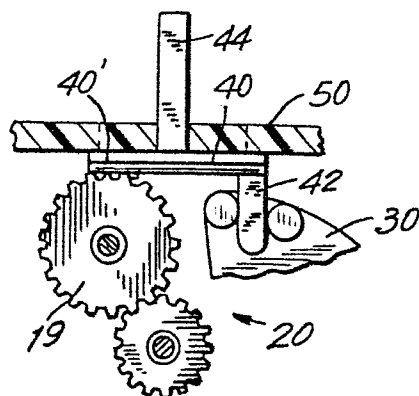




FIG. 28

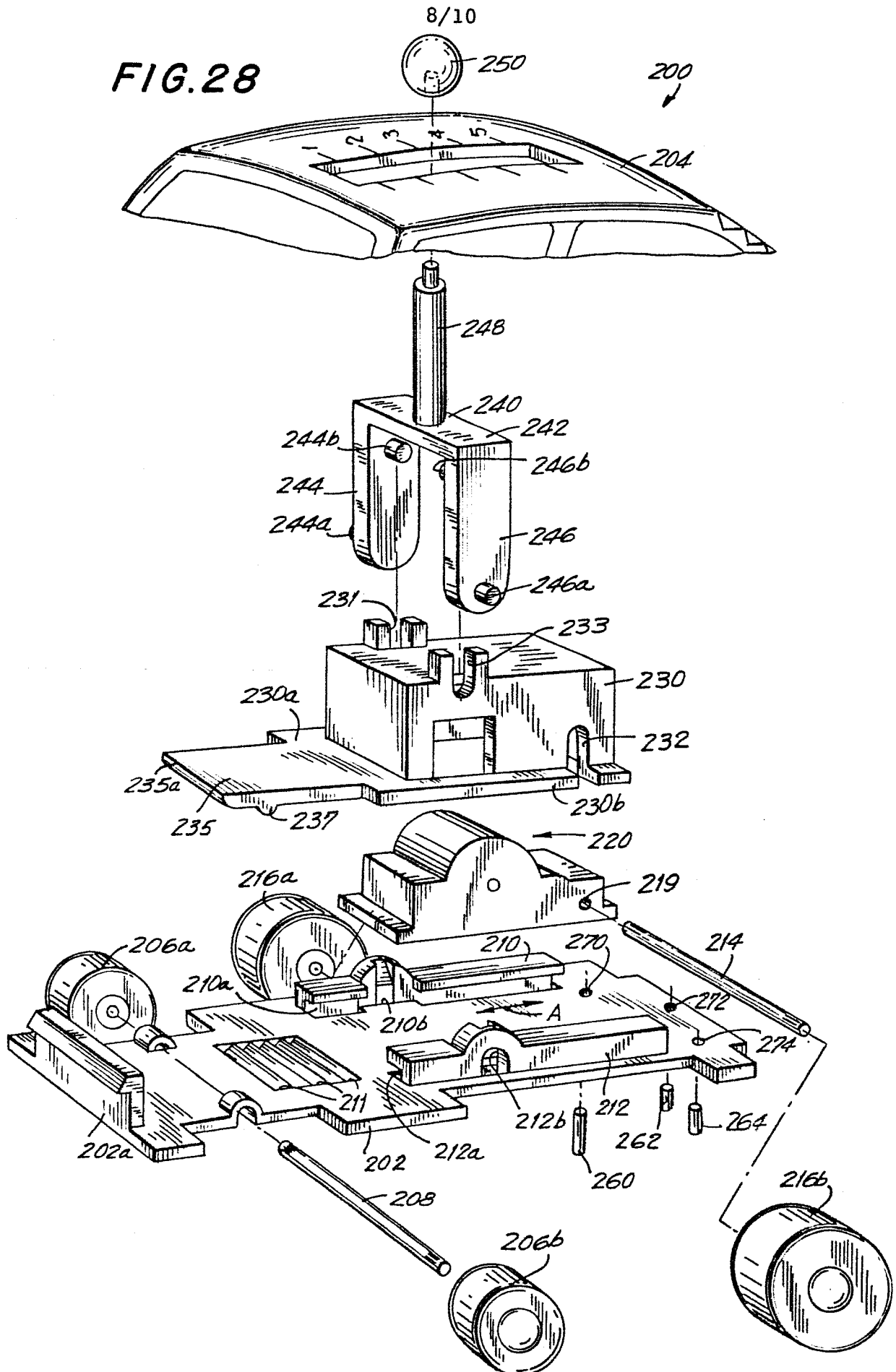


FIG. 29

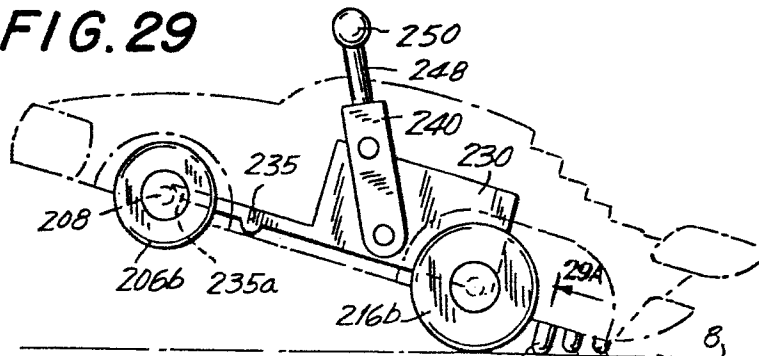


FIG. 29A

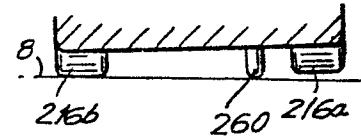


FIG. 30

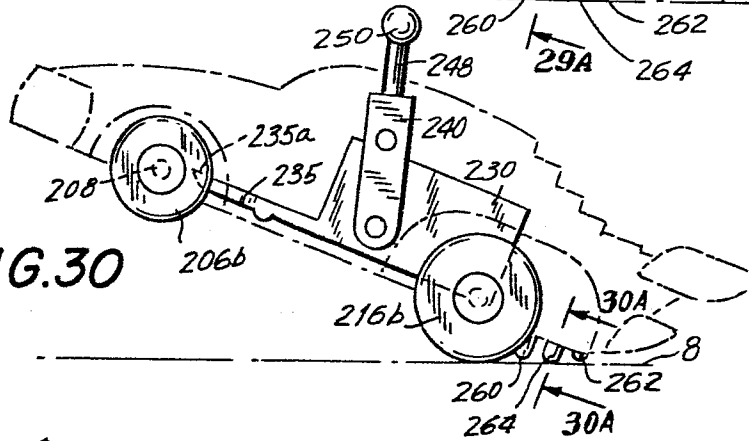


FIG. 30A

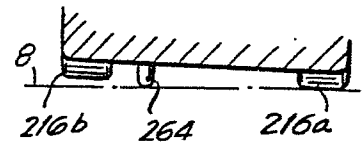


FIG. 31

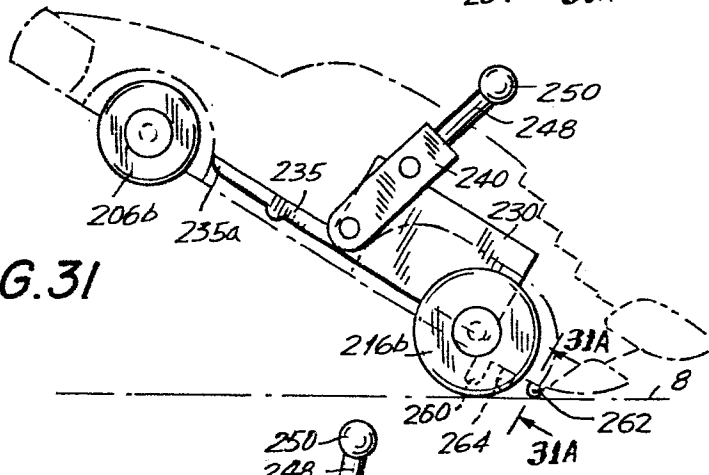


FIG. 31A

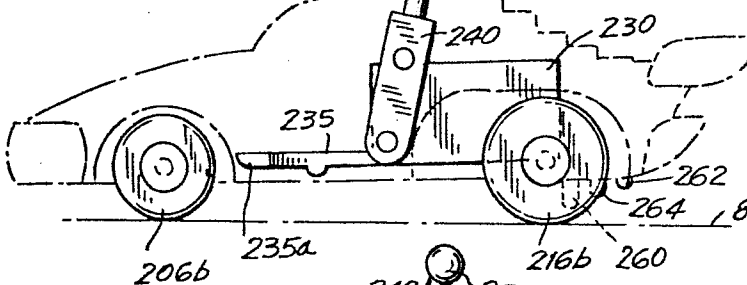
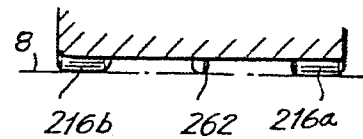


FIG. 32

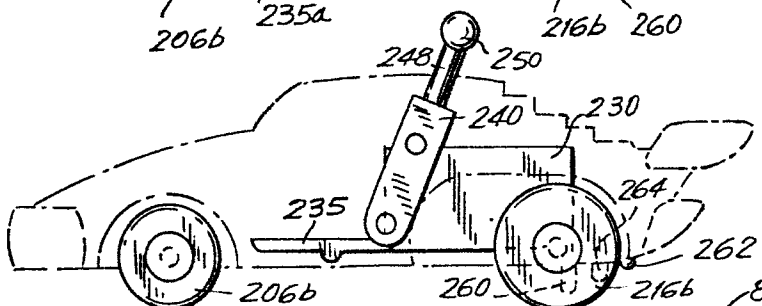


FIG. 33

