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Smith, III et al.

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[54] TOY VEHICLE

[75] Inventors: **Jay Smith, III,** Pacific Palisades; **Gerald W. Schmidt,** Woodland Hills; **Lawrence Temple Jones,** Pacific Palisades, all of Calif.

[73] Assignee: **California R & D Center,** Pacific Palisades, Calif.

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[21] Appl. No.: **169,922**

[52] **U.S. Cl.**.....**180/6.2,** 280/1.11 R, 280/211

[51] **Int. Cl.**.....**B62d 11/06**

[58] **Field of Search**.....180/6.2, 6.38, 64 MM, 74; 280/1.1 R, 1.11 R, 28.5, 211; 46/202, 243 LV

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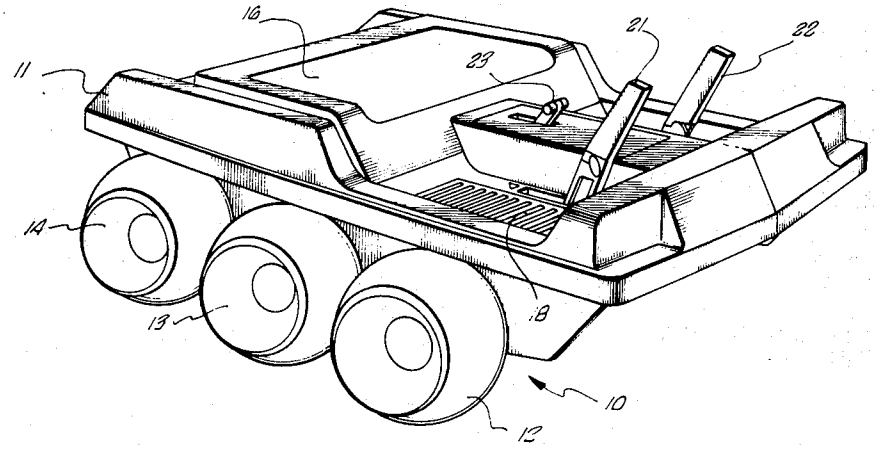
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Primary Examiner—Leo Friaglia
Assistant Examiner—Leslie J. Paperner
Attorney—Jackson & Jones

[57] **ABSTRACT**

A toy vehicle, simulating an all-terrain vehicle, is disclosed in which the vehicle body is supported on three pairs of coaxial wheels. The middle pair of wheels, which is the driving pair, is adapted to be individually braked to enable the vehicle to corner about the locked wheel. This wheel braking is accomplished by raising either side of the vehicle body with respect to the axle supporting the drive wheels to move the drive wheel out of engagement with a drive pinion and into locking engagement with a stationary gear sector mounted on the body. The relative positioning of the drive wheel axle with respect to the body is controlled by a pair of hand levers pivotally mounted on the housing and connected at their extremities to both ends of the drive wheel axle.

15 Claims, 9 Drawing Figures



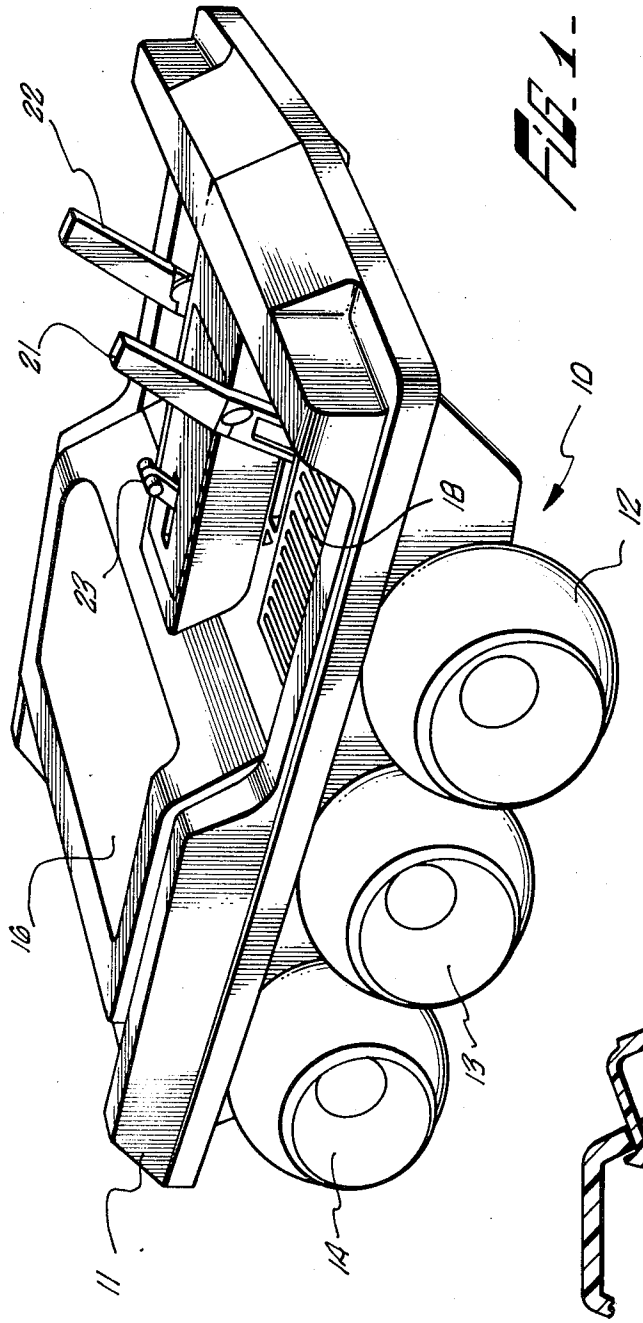
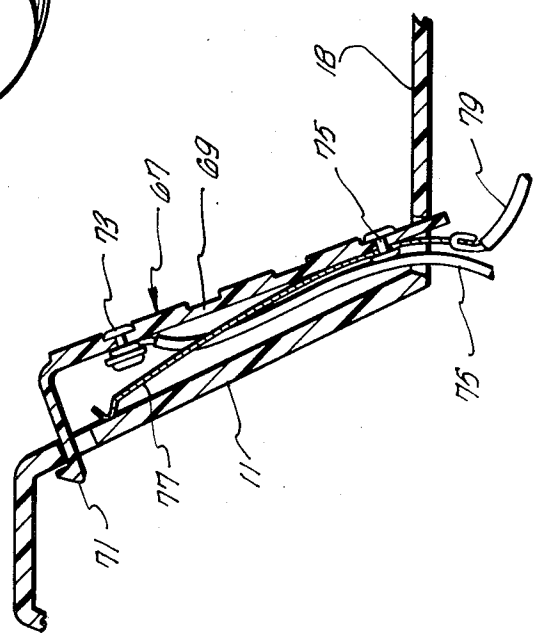


FIG. 1.

FIG. 2.



INVENTORS.
JAY SMITH III
GERALD W. SCHMIDT
LAWRENCE T. JONES
BY Jackson & Jones
ATTORNEYS.

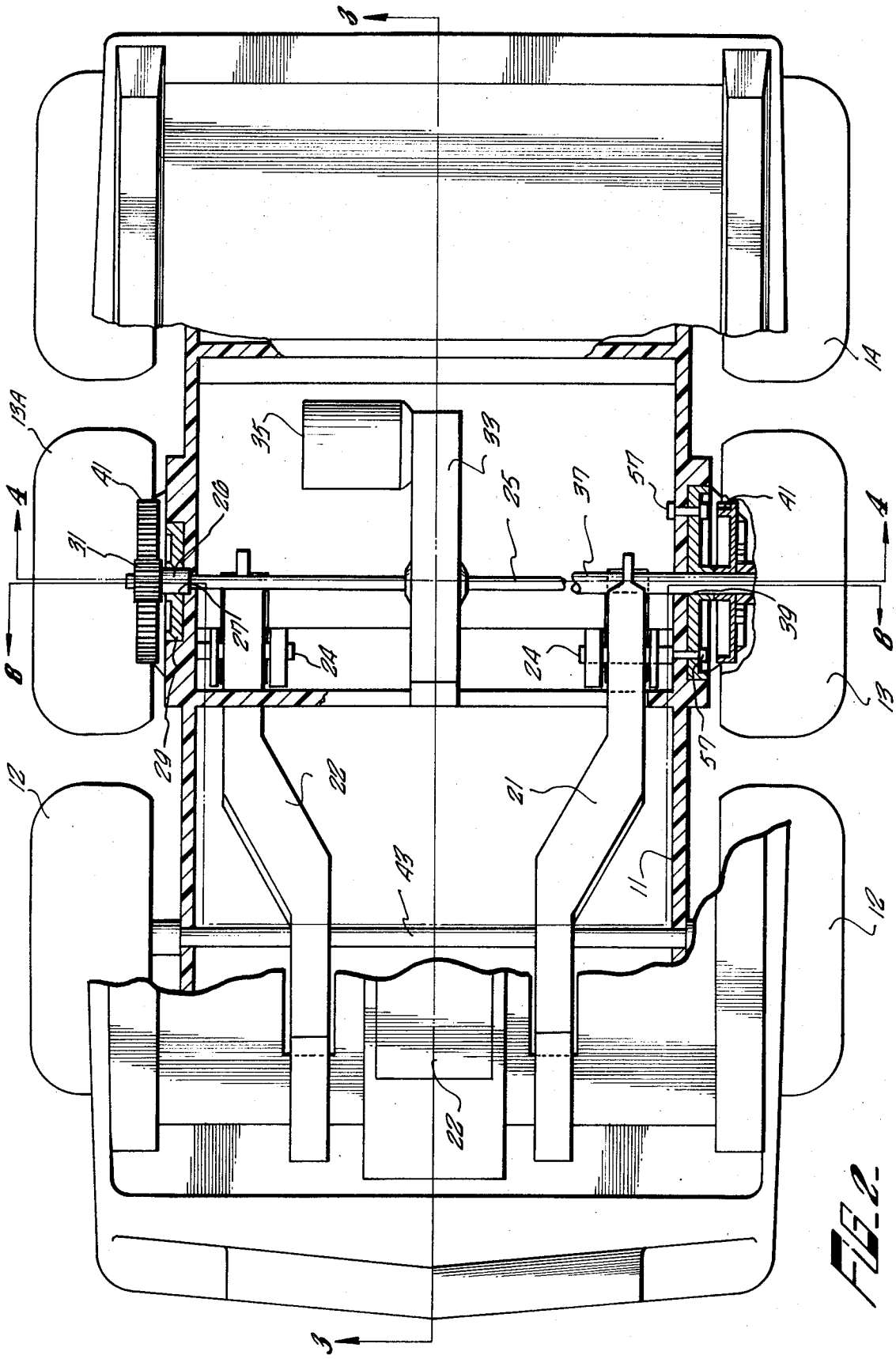
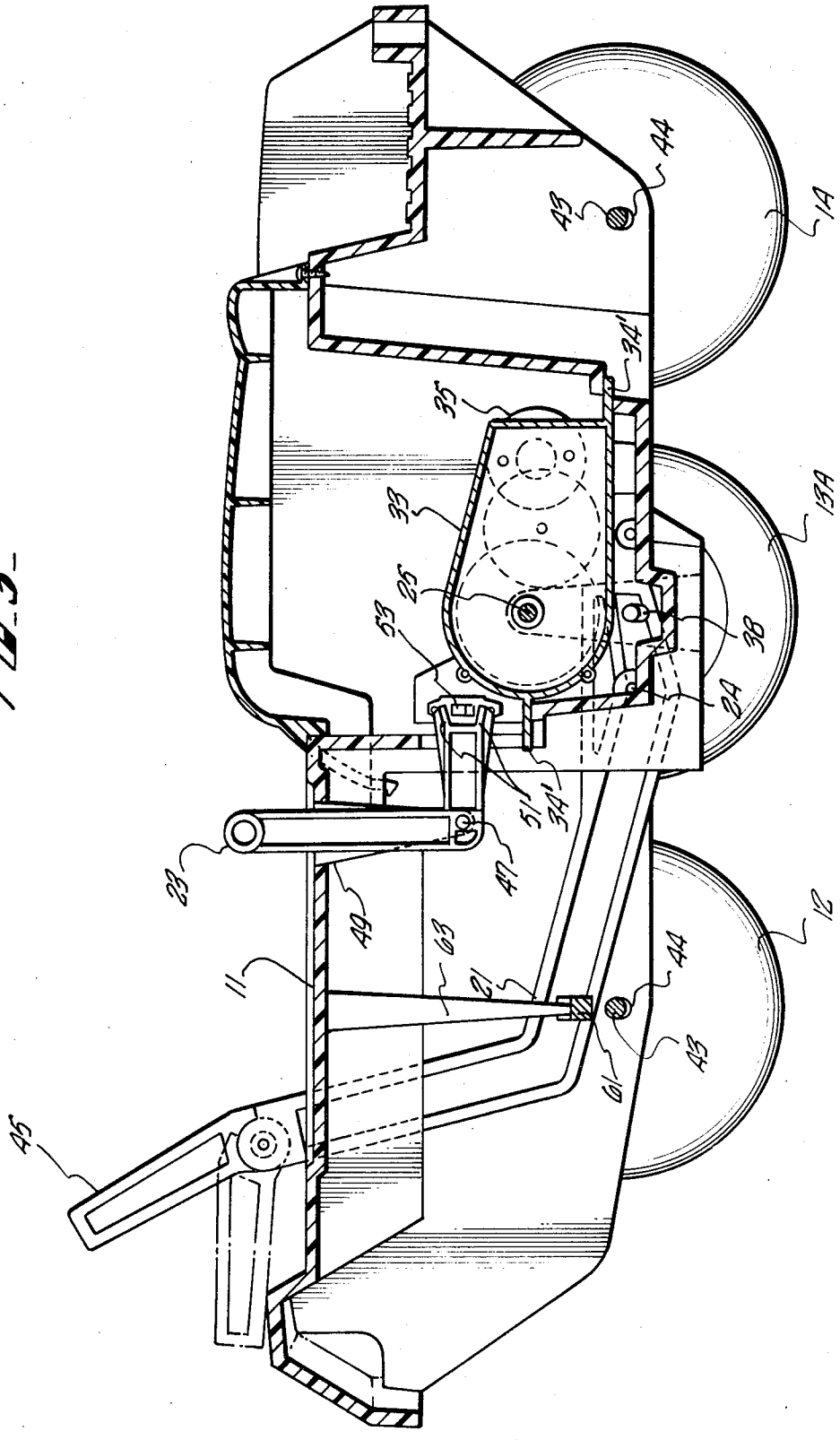

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FIG. 2

FIG. 3



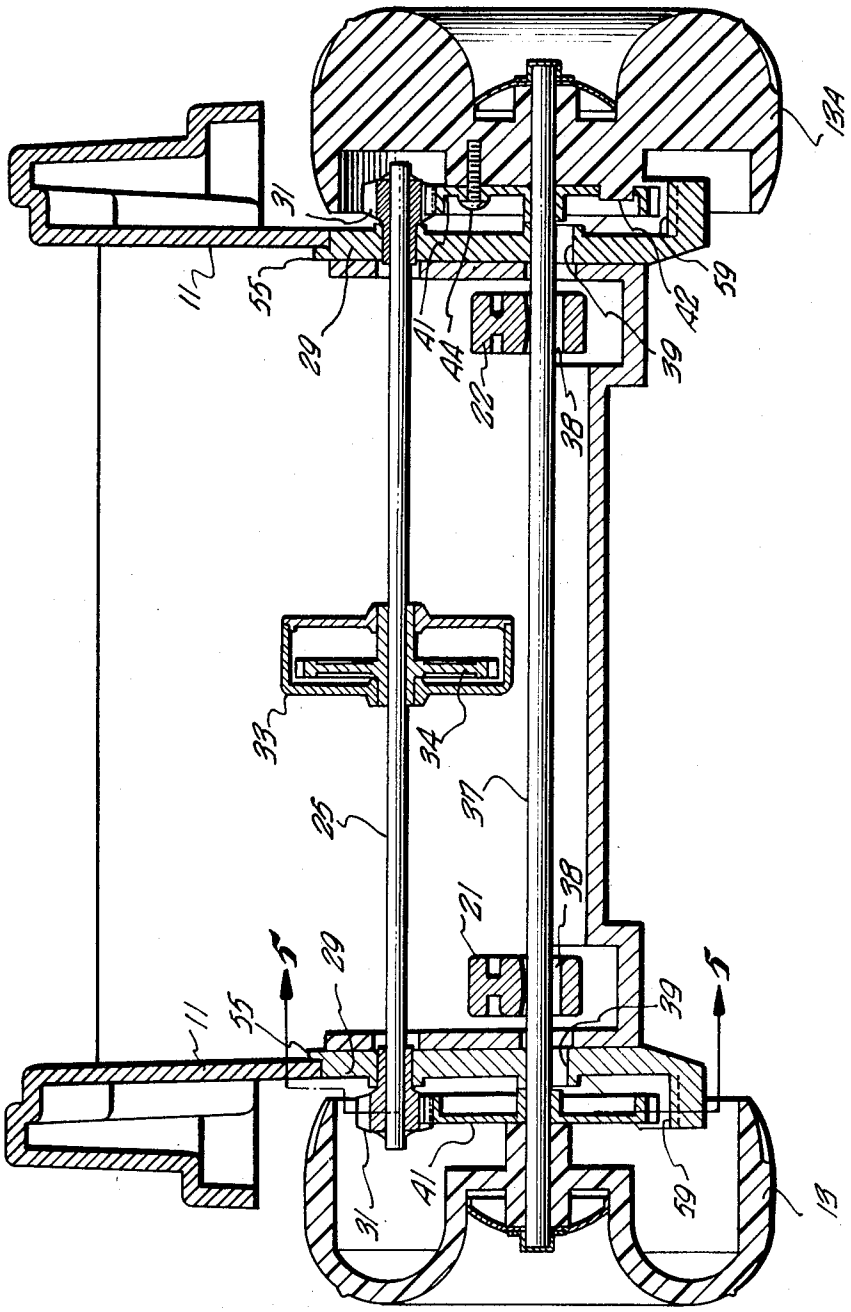


FIG. 4

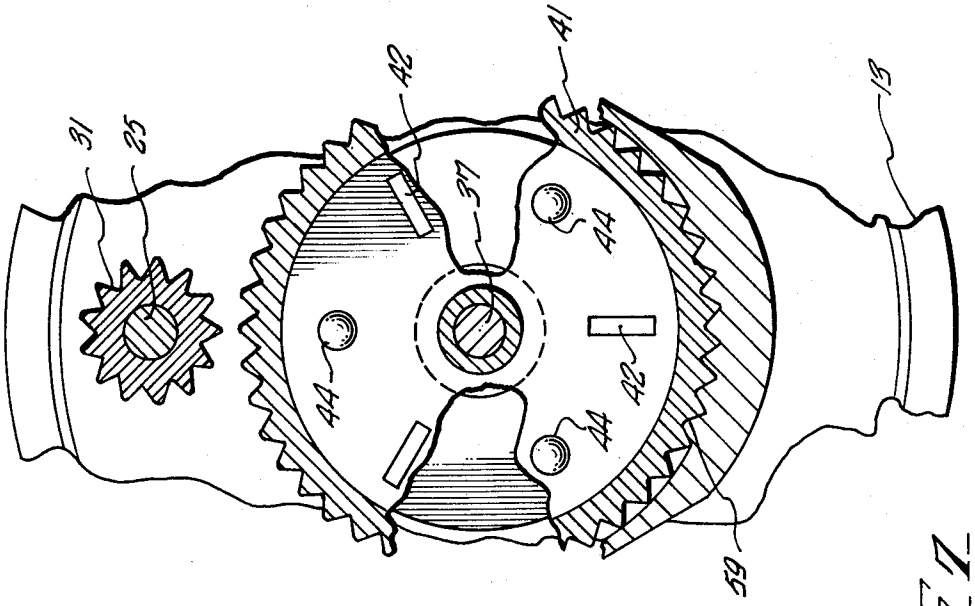


FIG 4

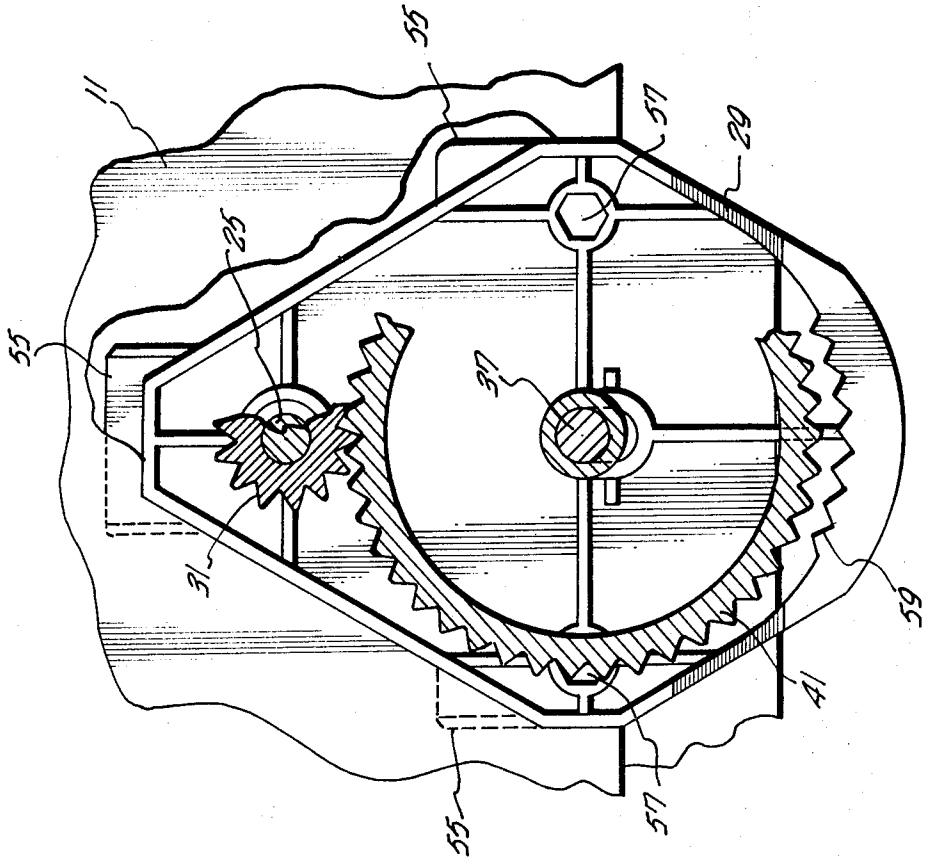


FIG 5

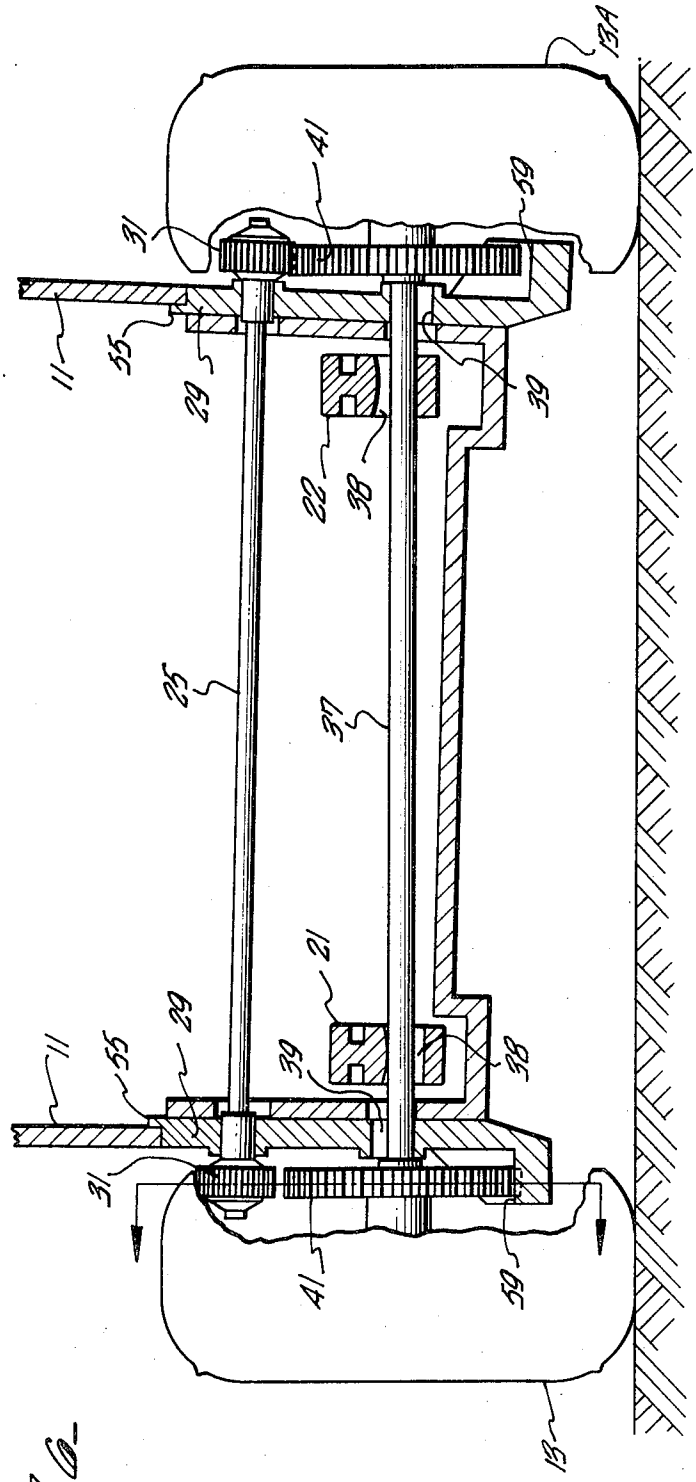

13A
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FIG. 6

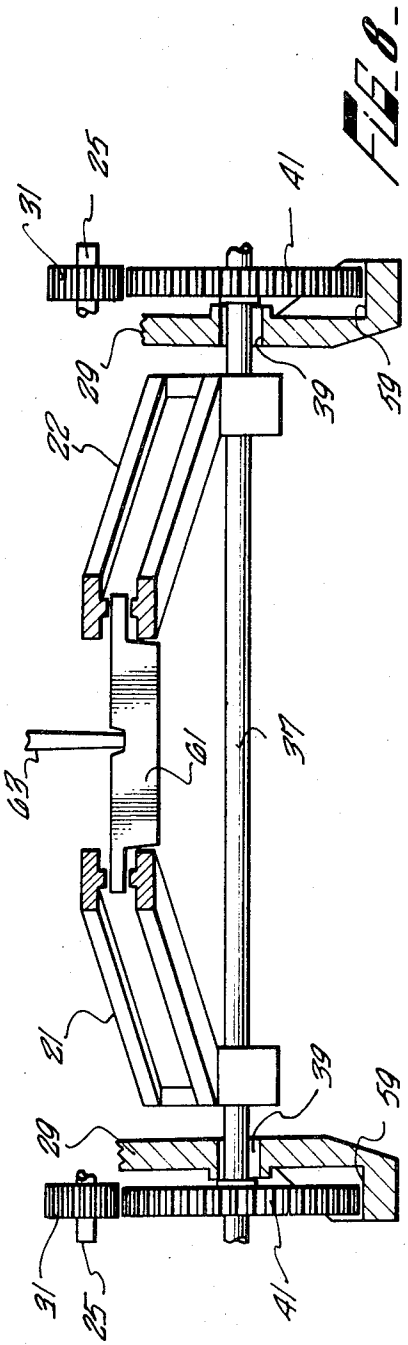

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FIG. 8

TOY VEHICLE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to motor driven toy vehicles, and more particularly to the drive assemblies utilized in steering such vehicles.

2. Description of the Prior Art

Motor driven toy vehicles capable of supporting and transporting children have met with a great deal of commercial success in recent years. These vehicles have been made to simulate all types of large-scale vehicles, such as automobiles, tractors, trains, and many others.

The present invention simulates yet another type of vehicle, the all-terrain vehicle. Although such vehicles are constructed in various types, the type simulated comprises a body supported on three pairs of coaxial wheels. The three axles supporting the wheels are all drivingly interconnected by a chain drive to provide positive traction for propelling and steering the vehicle.

SUMMARY OF THE INVENTION

Like the all-terrain vehicle, the toy vehicle body of the present invention is supported on three pairs of coaxial wheels. The middle pair of wheels are the drive wheels and are supported on an axle which is pivotally mounted on the body. The body is adapted to be raised on either side thereof with respect to the drive wheel axle to move each wheel into either of two positions, a drive position or a brake position. In the drive position, each drive wheel, which includes a gear integrally connected thereto, is moved into engagement with a drive pinion rotatably mounted on the body. In the braked position, the desired end of the body is raised with respect to the drive wheel axle to lower the drive wheel gear out of engagement with the drive pinion and into a locked engagement with a stationary gear sector which is fixedly mounted on the body. The raising and lowering of the body with respect to the drive wheel axle is controlled by a pair of hand levers pivotally mounted on the housing and connected at their extremities to both ends of the drive wheel axle. In operation, if both drive wheels are in engagement with the drive pinions, the vehicle is driven forwardly or rearwardly, depending upon the rotational direction of the drive wheels. If one of the drive wheels is shifted to the locked position, the other drive wheel, which is still in the drive position, will cause the vehicle to turn about the axis created by the locked wheel. Moreover, the raising of the side of the body adjacent the locked drive wheel causes the other two support wheels on that same side to be raised off the ground to enable the vehicle to pivot about the locked drive wheel without any wheel dragging resistance. In this manner, the vehicle can be easily maneuvered to corner in either direction by pulling the desired hand lever.

A primary object of the present invention is to provide a motor driven toy vehicle that is highly maneuverable and easy to operate.

Another object of the present invention is to provide a novel steering assembly for a toy vehicle that is completely different in operation than prior assemblies.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of operation, together with further objects and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the toy vehicle of the present invention;

FIG. 2 is a plan view, partly in section, of the toy vehicle shown in FIG. 1;

FIG. 3 is a sectional view of the toy vehicle taken along lines 3—3 of FIG. 2;

FIG. 4 is a sectional view of the toy vehicle taken along lines 4—4 of FIG. 2;

FIG. 5 is a fragmentary sectional view of the wheel gear assembly taken along lines 5—5 of FIG. 4;

FIG. 6 is a sectional view of the toy vehicle, similar to FIG. 4, showing one of the wheels in the locked position;

FIG. 7 is a fragmentary sectional view of the wheel gear assembly taken along lines 7—7 of FIG. 6;

FIG. 8 is a fragmentary sectional view of the toy vehicle taken along lines 8—8 of FIG. 2; and

FIG. 9 is a fragmentary sectional view of the foot pedal of the toy vehicle.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, FIG. 1 shows a toy vehicle, generally indicated by arrow **10**, which simulates an all-terrain vehicle. The toy vehicle **10** comprises a body or housing **11** supported on three sets of wheels **12**, **13** and **14**. The body **11** is of a unitary molded plastic construction having a removable seat portion **16**, two floor sections **18** and a console **20**. The console **20** comprises a pair of hand levers **21** and **22** and a directional lever **23**. The operation of these components will be described hereinafter.

Referring now to FIGS. **2–4**, a drive shaft **25** is journaled within the body **11** with the outer extremities thereof comprising a bearing portion **26** rotatably mounted within a bore **27** formed within a bearing plate **29**. A drive pinion **31** is mounted on each extremity of the drive shaft **25** while the center section thereof extends through a gear box **33**. A gear train **34** is located within the gear box **33**, one end of which is connected to the drive shaft **25** while the other end is connected to a battery-powered motor **35**. The gear box **33** includes a pair of tongues **34'** which are adapted to be inserted into appropriate slots formed in the body. This floating mount enables the gear box **33** to be self aligning and capable of being easily assembled.

The hand levers **21** and **22** are pivotally mounted to the interior of the body **11** via pins **24**, while their lower ends are operatively connected to an axle **37** which supports the second set of wheels **13** and **13A** hereinafter referred to as the drive wheels. This connection is accomplished by having the axle **37** extend through an elongated bore **38** formed at the lower extremity of each lever. The extremities of the axle **37** extend through the side walls of the body **11** and are journaled within a pair of elongated bores **39** formed within the bearing plates **29**.

Each drive wheel **13** and **13A** includes a gear **41** integrally connected thereto and rotatable about the axis

of the axle 37. The gear 41 of each drive wheel 13 and 13A is located within the inner rim thereof for safety reasons and for a greater power transfer efficiency. As shown in FIGS. 4 and 7 each drive wheel 13 and 13A includes a plurality of load bearing projections 42 which extend into slots formed within the gear 41. A plurality of bolts 44 are also provided to secure the two members together. Each gear 41 is adapted to engage a respective drive pinion 31 to be rotatably driven thereby. The other two sets of wheels 12 and 14 are rotatably mounted on axles 43 which in turn are journaled within elongated slots 45 formed in the side walls of the body 11. It should be noted that the central axle 37 is mounted lower than the axles 43 for the purpose of which will be described hereinafter.

As shown in FIG. 3, each of the hand levers 21 and 22 includes a handle portion 45 which is adapted to be locked into two positions. The first position is the operative position shown in solid lines while the second position, shown in broken lines, is the position used for storage. The direction of movement for the vehicle is controlled by the directional lever 23 which is pivotally mounted to the chassis via two pin extensions 47 journaled within a pair of downwardly extending flanges 49. The flanges 49, which extend on both sides of the switch 23, are separable to enable the pin extensions 47 of the lever 23 to be snapped into engagement therewith. The lower end of the switch lever 23 is bent 90° and includes a pair of tines 51 which extends on both sides of a switch 53. The switch 53 is electrically connected to the motor 35 for controlling the rotational direction thereof.

Referring more particularly to FIG. 4, the toy vehicle 10 is shown with the two drive wheels 13 and 13A having their wheel gears 41 engaging the drive pinions 31 of the drive shaft 25. In this position, the body 11 is supported on the axle 37 by the upper portion of the bore 39 bearing thereon. The bearing plate 29, more clearly shown in FIG. 5, includes three flanges 55 which extend behind the side walls of the body 11 for engagement therewith. After the bearing plates 29 are inserted into the body side walls, they are secured thereto by a plurality of bolts 57. Two of the bolts 57 are elongated to form the pins 24.

The bottom portion of the bearing plate 29 further comprises a gear sector 59 which is integrally formed thereon. This stationary gear sector 59 is adapted to receive the wheel gear 41 of the drive wheels 13 and 13A in order to lock the respective wheel against rotation. As shown in FIGS. 6 and 7, this wheel locking is accomplished by pulling back on one of the two hand levers 21 or 22. For illustrative purposes, the drive wheel 13 is the wheel to be locked, while the drive wheel 13A continues to be driven. The pulling back of the hand lever 21 causes the hand lever to pivot about the axle 37 and act through the pin 24 to raise one side of the body 11 with respect to the axle 37. As a result, the load of the chassis 11 on the axle 37 is shifted from acting through the bearing plate 29 to where it now acts through the lever 21. Because of this raising of the body 11, the drive pinion 31 is raised out of engagement with the wheel gear 41 and the gear sector 59 is brought into engagement therewith. The opposite side of the body 11 is uneffected by this movement and the wheel 13A remains in engagement with the pinion gear 31. As a result, the drive wheel 13 is locked against rotation while the drive wheel 13A continues to be rotatably driven.

It is important to note that at any one time the vehicle is supported on only four of the six wheels. This can be accomplished because the central set of wheels 13 and 13A are mounted lower than the wheels 12 and 14. As a result, the vehicle must be balanced in a desired manner to either have the vehicle supported on two wheels 12 and the wheels 13 and 13A or wheels 13, 13A and the two wheels 14. If the vehicle were balanced forward, it would be supported on the first group of wheels 12, 13 and 13A. In this position, the rear end of the vehicle would be raised and the axles 43 of the wheels 14 would drop to the bottom of the slots 39 in a non-supporting position. In this position, however, the wheels 14 would still be contacting the floor to give the illusion that they are supporting the vehicle.

Getting back to the movement of the vehicle, the locking of the drive wheel 13 causes the vehicle to turn about the wheel 13 as it is being driven by the drive wheel 13A. As a result, the vehicle pivots about the wheel 13A while being supported on the two wheels 12 and wheels 13 and 13A.

To turn the vehicle in the other direction, the hand lever 22 is pulled back to raise the opposite side of the vehicle. In this manner, the wheel 13A is dropped out of drive by the raising of the body side and shifted into the locked position. The other drive wheel 13 then functions to drive the vehicle around the pivot point of wheel 13. Again, the group of four wheels supporting the vehicle will depend on how the vehicle is balanced.

It should be noted that if both of the hand levers 21 and 22 are unactuated, both of the drive wheels 13 and 13A will remain in engagement with the drive pinions 31 to enable the toy vehicle to be driven in a straight line in a forward direction or a reverse direction, depending on the rotation of the drive motor 35. As described above, if the operator wished to turn to the left, he would pull back on lever 21. It also follows that if one wished to turn the toy vehicle to the right, the hand lever 22 is pulled back to raise the opposite side of the body 11 to enable the wheel gear 41 of wheel 13A to disengage the drive pinion 31 and engage the gear sector 59. As a result, the toy vehicle will pivot about the stationary drive wheel 13A and be rotatably driven by the rotating drive wheel 13.

It is not desirable to actuate both hand levers 21 and 22 simultaneously because if both sides of the body 11 were raised to disengage both drive pinions 31 from their respective wheel gears 41, no load would be placed on the motor 35. This, of course, would be detrimental to the operation thereof since you must re-engage the gears at high motor speed. This occurrence is prevented by providing a bar 61 extending through both of the hand levers 21 and 22 and be supported thereby as shown in FIG. 8. A flange 63 extends downwardly from the body 11 to a position directly over the center section of the bar 61. The flange 63 is dimensioned to enable the bar 61 to pivot about a fulcrum created at the lower end of the flange 63. However, because of the proximity of the flange 63, it is not possible to raise the bar 61 horizontally by simultaneously actuating both levers 21 and 22. If this were done, the bar 61 would abut the flange 63 and hold the levers

21 and 22 from moving any further. As a result, only one lever can be actuated at a time. During actuation of one of the levers, the movement of that lever would cause the end of the bar **61** connected to that lever to pivot upwardly. Because of the fulcrum created by the flange **63**, the other end of the bar **61** would pivot downwardly, carrying the unactuated lever with it. This, in turn, causes the end of the unactuated lever adjacent the axle **37** to pivot upwardly. That end of the lever will be able to move upward freely without putting a load on the axle **37** because of the elongated bore **38**. As can be seen, the smooth operation of the vehicle **10** is guaranteed by the bar **61**.

In order to stop, the vehicle motor **35** must be shut off. This is accomplished by a foot pedal **67** located in one of the floor sections **18**. This foot pedal shown in FIG. **9** functions as a shut-off switch for the motor **35** when released. The foot pedal **67** comprises a pedal portion **69** pivotally mounted within the body **11** having its upper portion forming a hooked portion **71** which functions to prevent the pedal **69** from becoming disengaged with the body **11**. The pedal **69** further includes a contact **73** which is connected to a wire **75** leading back to the battery and electric motor combination. A second contact **76** is mounted at the lower half of the pedal **69** and is connected to a spring terminal **77** which, in turn, is electrically coupled to a second wire **79**. The spring terminal **77** functions as a spring bias to keep the foot pedal **69** in a raised position when unactuated. The spring terminal **77** further functions to extend upwardly to engage the first contact **73** when the pedal **69** is depressed. This contact closes the electrical circuit between the battery and the motor **35** to supply the energy thereto. Therefore, if it is desired to start the motor, the foot pedal **67** is depressed to close the circuit. If one wishes to stop the vehicle, he would take his foot off the foot pedal **67** to permit the foot pedal to be biased upwardly to break the electrical circuit between the battery and the motor **35**.

As can be seen, a toy vehicle is provided that is highly maneuverable and very easy to operate.

It should be noted that various modifications can be made to the apparatus while still remaining within the purview of the following claims.

What is claimed is:

1. A toy vehicle simulating an all-terrain vehicle comprising:

a body having a seat portion and a console;

a pair of coaxial drive wheels rotatably mounted below said body for supporting and motivating said body, each drive wheel comprising a wheel portion, and a wheel gear coaxially mounted with and integrally connected to said wheel portion;

means for rotatably driving each of said drive wheels, each of said drive means comprising a pinion gear rotatably mounted in said body and adapted to interengage the wheel gear of the respective drive wheel;

means for locking each of said drive wheels against rotation, each of said wheel locking means comprising a gear sector fixedly mounted to said body and adapted to interengage the wheel gear of the respective drive wheel; and

means for selectively disengaging each drive wheel from its respective drive pinion and subsequently engaging said selected drive wheel with its respective locking gear sector to enable said vehicle to turn about an axis created by the locked wheel.

2. The invention of claim **1** wherein said means for selectively disengaging and engaging said drive wheel gears from its respective drive pinions and gear sectors comprises:

an axle pivotally mounted within said body, said axle having said drive wheels rotatably mounted on the outer extremities thereof; and

means for raising each side of the vehicle body with respect to each end of said axle.

3. The invention of claim **2** wherein said raising means comprises a pair of levers pivotally mounted to said vehicle body, one end of each lever extending through said console, the other end of each lever being pivotally connected to an outer extremity of said axle.

4. The invention of claim **3** further comprising means for preventing both wheel gears from simultaneously disengaging said pinion gears.

5. The invention of claim **4** wherein said means for preventing both wheel gears from simultaneously disengaging said pinion gears comprises:

a bar interconnected at its ends to both of said levers; and

a flange extending downwardly from said body to a point directly above the center section of said bar to prevent the bar from being raised simultaneously from both ends thereof.

6. The invention of claim **3** wherein said vehicle further comprises a front and rear pairs of coaxially mounted wheels for supporting said vehicle body.

7. The invention of claim **6** wherein said front and rear pairs of wheels are journaled within elongated slots formed in the sides of the vehicle body.

8. The invention of claim **1** wherein said pinion gears are mounted on a drive shaft.

9. The invention of claim **8** wherein said drive shaft is drivingly connected to a motor.

10. The invention of claim **9** wherein said motor is an electric motor electrically connected to a battery through a circuit.

11. The invention of claim **10** further including means for opening and closing said motor-battery circuit.

12. The invention of claim **11** wherein said circuit opening and closing means comprises a pair of contacts mounted on a foot pedal, said contacts being connected to wires interconnecting said battery to said electric motor.

13. The invention of claim **12** wherein said contacts are adapted to be interconnected by a spring biased metal strip which is biased against said foot pedal to maintain said pedal in a raised position where said circuit is open, whereby upon depressing said pedal against the bias of the metal strip, both contacts engage the metal strip to close the circuit.

14. The invention of claim **8** wherein said drive shaft extends through and is keyed to an output gear of a gear train and said motor includes a shaft which extends through and is keyed to an input gear of the gear train.

15. The invention of claim **14** wherein said gear train includes a housing floatingly mounted within said body.

* * * * *