United States Patent [19]

Cheng et al.

[11] **3,918,198**

[45] **Nov. 11, 1975**

[54] **TOY VEHICLE**

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[22] Filed: **Feb. 21, 1974**

[21] Appl. No.: **444,330**

[52] **U.S. Cl.** ..... **46/206;** 46/217; 105/24 R; 105/49; 105/157 T

[51] **Int. Cl.**[2] **A63H 19/02**

[58] **Field of Search** .. 46/206, 217, 243 M, 243 LV; 105/1 T, 34 R, 49, 157 T

[56] **References Cited**

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Attorney, Agent, or Firm—Seidel, Gonda & Goldhammer

[57] **ABSTRACT**

A toy or model vehicle wherein a laterally opening hollow housing or truck is provided with a motor rotor having a horizontal shaft, and drive means are interposed between the motor shaft and running gear.

16 Claims, 6 Drawing Figures

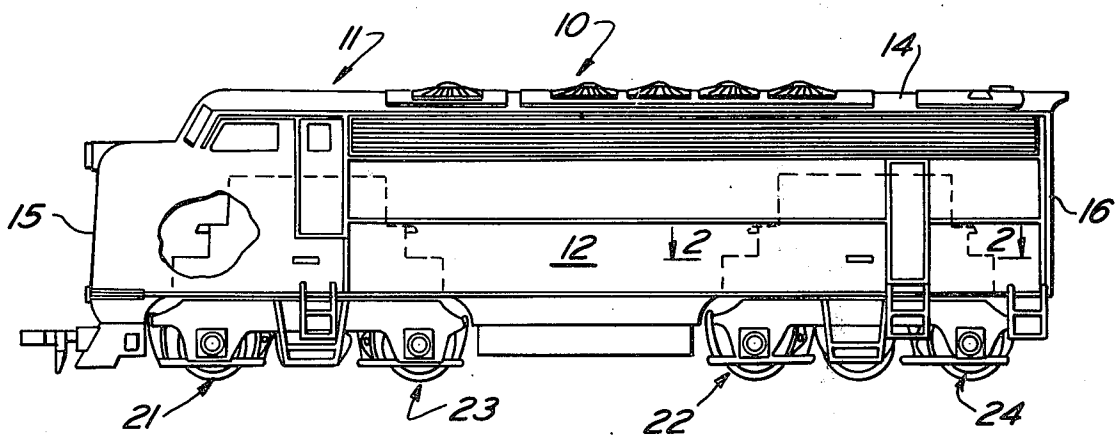
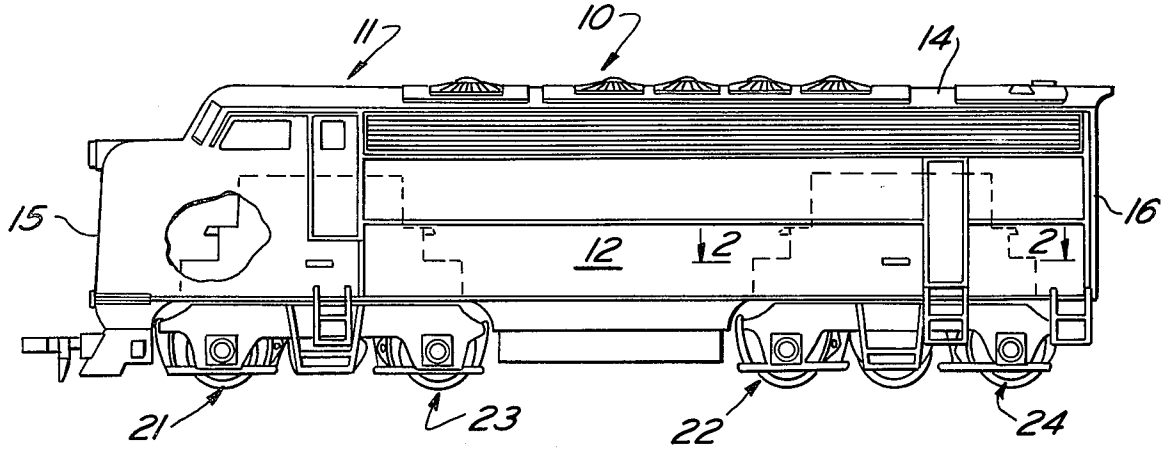


FIG. 1



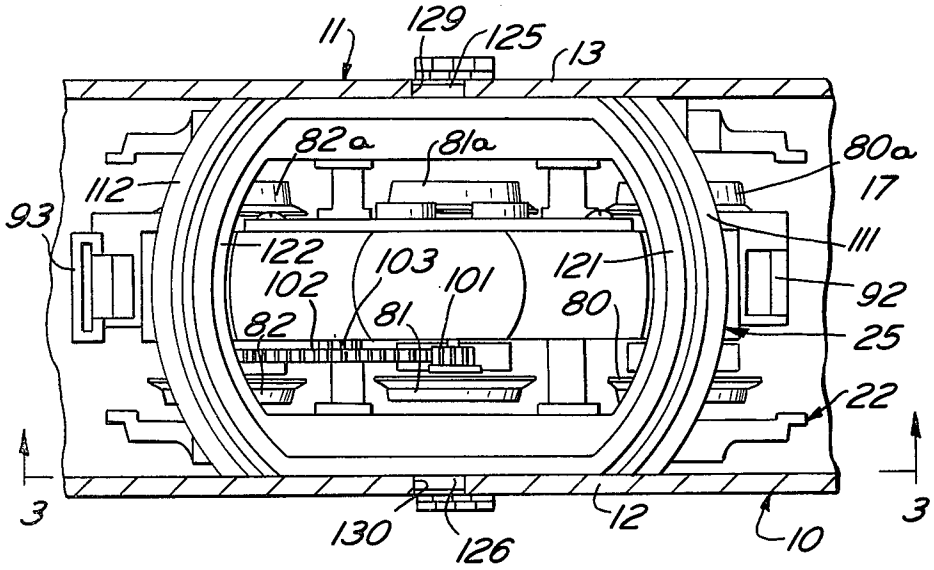


FIG. 2

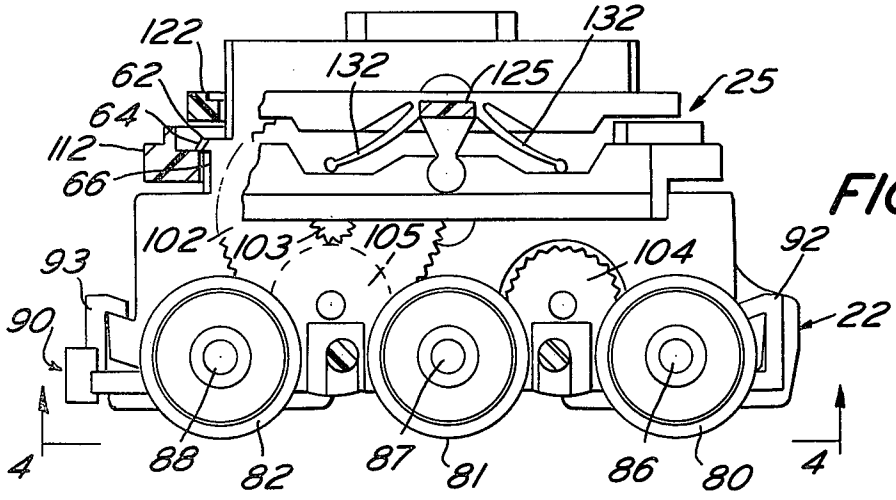


FIG. 3

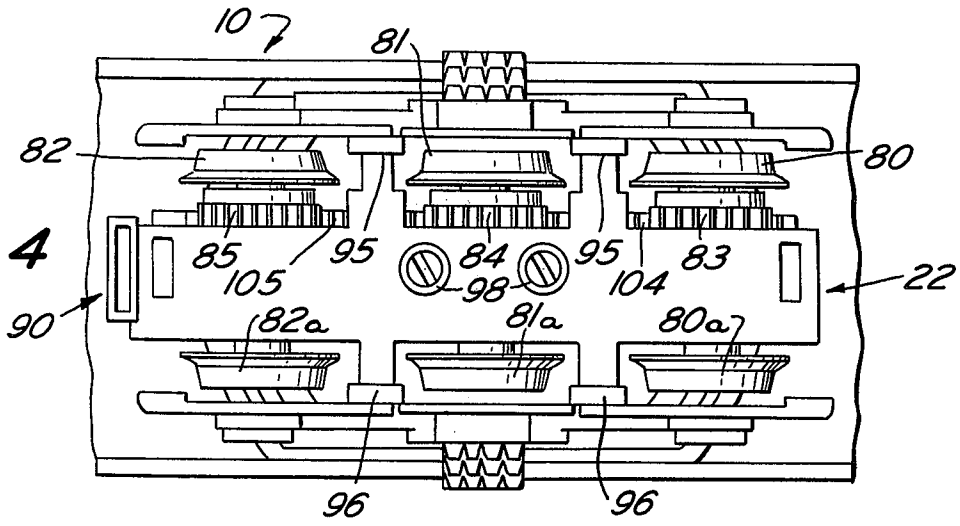

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FIG. 4

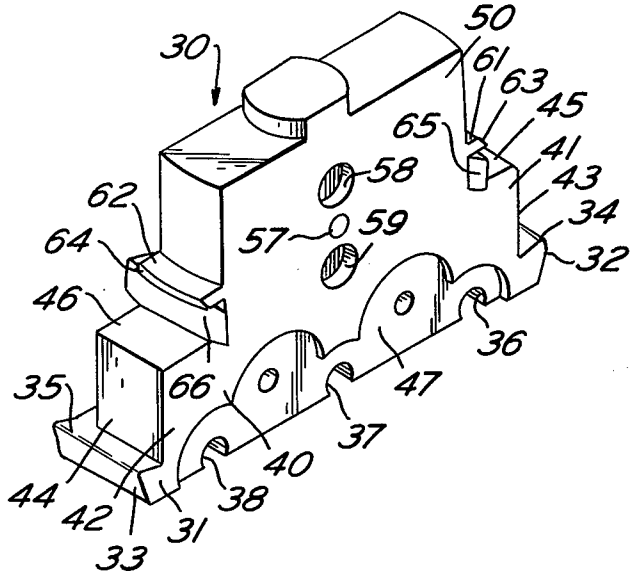

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FIG. 6

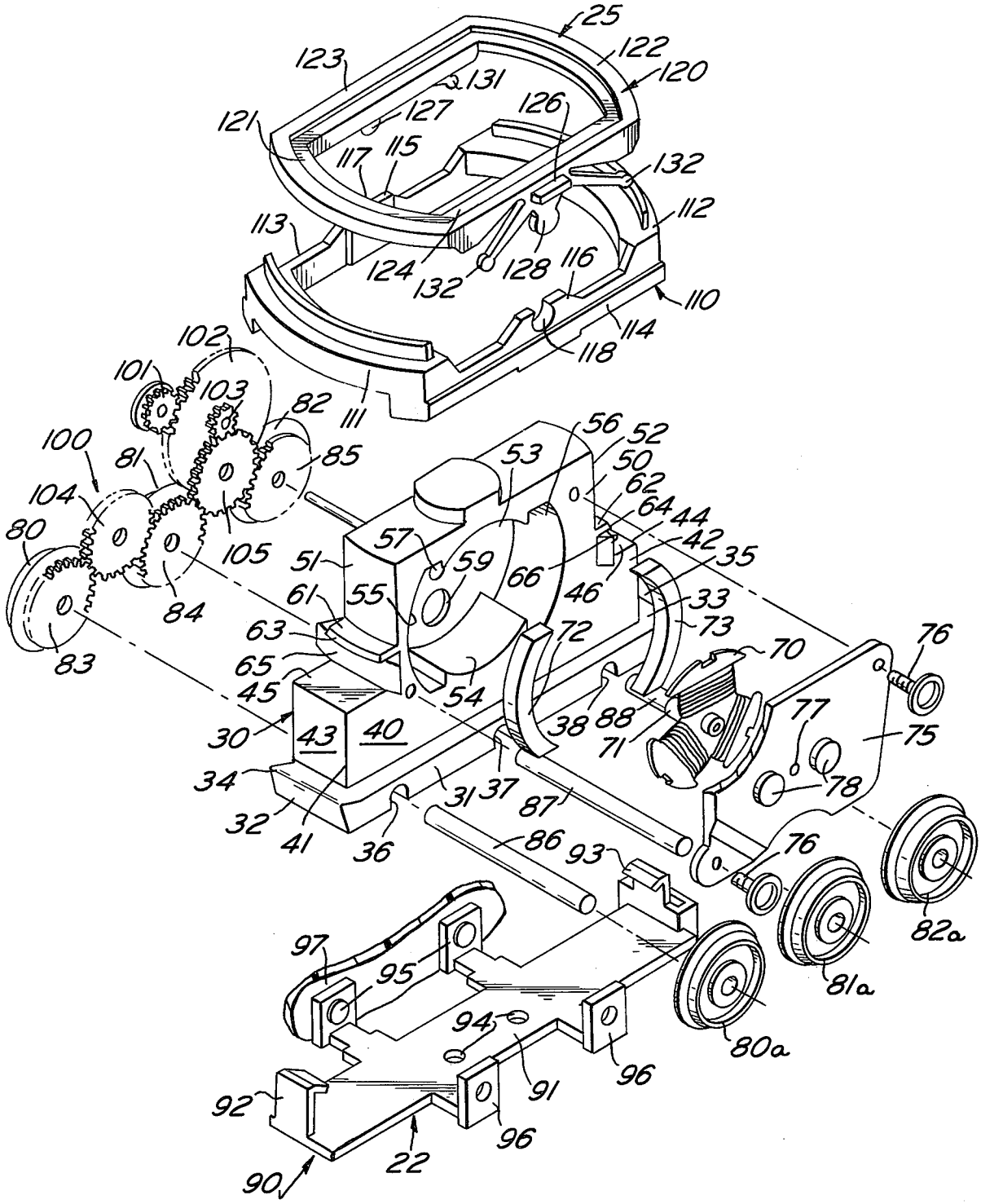

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80a
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FIG.5

TOY VEHICLE

BACKGROUND OF THE INVENTION

While the structure of the present invention has been primarily developed and employed in model railroad vehicles, and will be illustrated and described hereinafter with particular reference thereto, it is appreciated that the improvements disclosed herein are capable of additional application and variations, all of which are intended to be comprehended herein.

Prior traction systems for model vehicles, for instance model railroad locomotives, have been relatively expensive to manufacture, both in the production of component parts and assembly thereof.

SUMMARY OF THE INVENTION

It is, therefore, an important object of the present invention to provide a unique and highly improved traction system for model vehicles, such as model railroad locomotives, which is well adapted to effect substantial savings in manufacturing costs, both in the production of component parts and in their assembly.

It is another object of the present invention to provide a traction system for model vehicles having the advantageous characteristics mentioned in the preceding paragraph, which assures optimum operating characteristics over a long useful life, with a minimum of downtime for repairs, and wherein repairs can be quickly and easily effected without the need for special tools or skills.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings, which form a material part of this disclosure.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts, which will be exemplified in the construction hereinafter described, and of which the scope will be indicated by the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side elevational view showing a model vehicle, such as a model railroad locomotive, showing certain elements of the traction system in dashed lines, and broken away to further illustrate certain elements of the traction system in solid lines.

FIG. **2** is a horizontal sectional view taken generally along the line **2—2** of FIG. **1**, enlarged for clarity.

FIG. **3** is a partial sectional elevational view taken generally along the line **3—3** of FIG. **2**.

FIG. **4** is a bottom view taken generally along the line **4—4** of FIG. **3**.

FIG. **5** is an exploded perspective view of the instant traction system from one side thereof.

FIG. **6** is a perspective view showing a component of the traction system from the other side.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to the drawings, and specifically to FIGS. **1–4** thereof, a vehicle is there generally designated **10**, and for purposes of illustration and without limiting intent is shown as an accurately simulated, model locomotive, such as a diesel locomotive. The vehicle **10** includes an outer hollow body **11**, say suitably configured and decorated to simulate a desired locomotive, and advantageously fabricated of plastic, as by injection molding, or the like. The body **11** includes a pair of opposite side walls **12** and **13**, extending generally longitudinally, in upright, parallel spaced relation and interconnected along their upper extremities by a longitudinally extending, generally transversely horizontal top wall **14**. Extending in closing relation across the front and rear ends of the side and top walls **12, 13** and **14** are front and rear end walls **15** and **16**. The interior of the body **11**, as between the side walls **12** and **13**, top wall **14** and end walls **15** and **16** is hollow, as at **17**, and opens downwardly between the side and end walls.

In the illustrated embodiment of vehicle **10**, there is shown a simulated locomotive having a pair of forward and rearward ground engageable trucks **21** and **22**, one or both of which may be powered, as desired. Of course, other vehicles may, in accordance with the teachings of the present invention have more or less trucks, in accordance with a desired simulation. For simplicity and clarity herein, the forward truck **21** may be considered as unpowered, while the rear truck **22** is powered. In practice, the unpowered truck **21** may be essentially similar to the power truck **22**, the former having rail engageable wheeled running gear **23** identical to the rail engageable wheeled running gear **24** of the latter, and a gimbaled mount similar to the gimbal means **25** of the truck **22**.

More specifically, the power truck **22** is shown in greater detail in FIGS. **2** and **3**, and especially in the exploded view of FIG. **5**. It will there be seen that the truck includes an upright, longitudinally extending block-like member or housing **30**, say die cast or otherwise suitably formed of advantageously heavy material. The housing includes a lower base portion **31** having opposite end extensions **32** and **33** provided respectively with upturned lips **34** and **35**, for a purpose appearing presently. The underside of the housing base portion **31** may be formed, at spaced locations therealong, with a downwardly facing, transversely extending, open ended recesses or grooves, say three in number as at **36, 37** and **38**.

Upstanding from the housing base portion **31** is an elongate block-like intermediate housing portion **40**. The intermediate housing portion **40** terminates in opposite end regions **41** and **42** defining respective end faces **43** and **44**, respectively adjacent to and inward of base portion ends **32** and **33**. Each end region **41** and **42** includes a generally horizontal upper surface, as at **45** and **46**; and, one side of the intermediate housing portion **40** is recessed, as best seen in FIG. **6**, the recess being designated **47** and continuing downwardly in the base portion **31** and opening downwardly through the under surface of the base portion. The downwardly and laterally outwardly opening recess **47** is specifically configured for a purpose appearing presently.

An upper housing portion **50** upstands from the intermediate housing portion **40**, extending longitudinally thereof and terminating in faces **51** and **52** respectively adjacent to and longitudinally inward of intermediate housing portion end faces **43** and **44**. The upper housing portion **50** may be laterally coextensive with the intermediate housing portion **40**, and there may be formed a substantial hollow or recess **53** occupying the major part of the upper housing portion **50**, extending downwardly therefrom slightly into the intermediate housing portion **40**, and opening laterally outwardly from the housing, as best seen in FIG. **5**. The hollow or

recess 53 includes a generally circular or cylindrical central portion 54, and a pair of arcuate segmental portions 55 and 56 adjacent to opposite ends of the housing and opening into the central portion 54. Additionally, the upper housing portion 50 is formed through one side, see FIG. 6, with a through opening or hole 57 opening into the interior of hollow 53, generally coaxially with the central hollow portion 54. Spaced on opposite sides of the through opening or hole 57, say above and below the latter, there may be formed a pair of additional openings, passageways or holes 58 and 59, also communicating with the interior of the central hollow portion 54.

Projecting from opposite end faces 51 and 52 of the uppper housing portion 50, longitudinally thereof, are respective retainer formations or ribs 61 and 62. The ribs 61 and 62 may be laterally coextensive with the end faces 51 and 52, being spaced over the respective nether surfaces 45 and 46, and may be somewhat arcuate, if desired, in the horizontal plane. Further, the retainer formations or ribs 61 and 62 are each advantageously formed with a beveled end surface, as at 63 and 64, which bevels extend obliquely downwardly and longitudinally outwardly. Beneath the retainer ribs 62 and 63, the upper housing portion 50 may be formed with a guide formation or face, spaced longitudinally inward of the respective beveled surfaces 63 and 64, as at 65 and 66. The guide faces 65 and 66 may also be generally arcuate in a horizontal plan, and further, may project laterally outwardly beyond the adjacent region of upper housing portion 50.

As will appear presently in greater detail, the housing 30 serves to house a motor or suitable drive means, which may include a motor rotor 70, see FIG. 5, advantageously of the flat or pancake type. The rotor 70 may be conventional, carrying a shaft 71 and suitable windings and associated commutator. The rotor 70 is rotatably disposed generally coaxially within the central cylindrical region 54 of interior hollow 53, the rotor shaft 71 having one end extending for suitable journaling into the wall opening 59. Conventional magnets or pole pieces 72 and 73 may be associated with the rotor 70, say being of arcuate configuration and respectively conformably engaged in the arcuate regions 55 and 56 of hollow 53. A housing closure or cover plate 75 may be removably secured in closing relation with the hollow 53, as by suitable releasable fastener means, such as threaded members 76 engageable into the housing 30. The closure or cover plate 75 may provide suitable bearing means, as at 77 for journaling the rotor shaft 71, and may also carry suitable electrical contact means, such as motor brushes by brush holders 78.

The running gear 22 may include three pairs or sets of wheels, such as the pair of wheels 80, 80*a*, the wheel pair 81 and 81*a*, and the pair of wheels 82 and 82*a*. The wheels 80, 81 and 82 are arranged in longitudinally spaced relation with each other on one side of the housing 30, carrying respective gears 83, 84 and 85. Each pair of wheels is connected by a respective axle, the wheel pair 80, 80*a* being carried by axle 86, the wheel pair 81, 81*a* being carried by axle 87, and the wheel pair 82, 82*a* being carried by axle 88. The axles 86, 87 and 88 are rotatably received in respective nether formations or grooves 36, 37 and 38 on the underside of housing 30, so that the wheels 80*a*, 81*a* and 82*a* are arranged in longitudinally spaced, side-by-side relation on the side of motor housing 30 opposite to that of wheels 80, 81 and 82. While the embodiment illustrated and described herein discloses a six-wheel truck, it is appreciated that the teachings of the instant invention are equally applicable to trucks having different numbers of wheels, for example a four-wheel truck may be commonly employed.

Disposed in facing engagement with the underside of the motor housing 30 is an axle retainer, generally designated 90, including an elongate, generally flat plate 91 for conforming disposition in facing engagement with the underside of the motor housing 30. At opposite ends of the plate 91, upstanding therefrom are snap fittings, fingers or catches 92 and 93, and the plate may be formed intermediate its ends with fastener receiving openings 94. Projecting laterally outwardly from opposite sides of the plate 91, are brackets or holders 95 and 96 for supporting truck side pieces as at 97, simulative of a desired vehicle.

In assembly, with the plate 91 in facing engagement with the underside of motor housing 30, the snap fittings or catches 92 and 93 are removably engaged over respective lips 34 and 35. That is, by suitably forming the axle retainer means 90, say by integral molding of plastic, sufficient resilience is imparted to permit snap engagement and removal of the retainer with respect to the motor housing 30. Additionally, if desired, more permanent fastening means may be employed, such as screws 98 extending through plate holes 94 into the motor housing 30.

Suitable drive means, such as gearing 100, see FIG. 5, may be interposed in motion transmitting relation between the motor rotor 70 and the wheels 80–82. The drive means may include a pinion 101 carried by the rotor shaft 71 exteriorly of the housing 30, opposite to the closure 75. A spur gear 102 may be rotatably mounted on the housing 30 in meshing engagement with the pinion 101, and may carry a pinion 103. Additionally a pair of spur gears 104 and 105 may be mounted on the housing 30, say located in upper portions of the recess 47, and each in meshing engagement between a pair of wheel carried gears 83, 84 and 85. The wheel carried gears 83, 84 and 85 may be coplanar with each other and with the gears 104 and 105, and be located in lower regions of the recess 47. Thus, it will be appreciated that there is a positive driving connection by the drive means or transmission 100 between the rotor shaft 71 and each of the wheel axles 86, 87 and 88.

As noted hereinbefore, the truck 22 is suitably mounted in the hollow vehicle body 10 by gimbal means 25, so that the truck is afforded, within limits, movement about perpendicular axes relative to the body. The gimbal means includes a collar 110, having a closed outline configuration, and advantageously fabricated of resiliently deformably material, such as being injection molded by plastic, or otherwise formed of suitable material. The collar 110 includes a pair of longitudinally spaced, opposed arcuate segments 111 and 112. In particular, the arcuate segments 111 and 112 may have their concave sides facing toward each other, each having a chordal or lateral dimension approximating the internal dimension of the body 10. Connecting the arcuate segments 11 and 12 together are a pair of generally parallel spaced, longitudinally extending elongate members or sides 113 and 114, which combine with each other and the arcuate end segments to define the collar 110. Carried by each side piece 113

and 114, medially between the arcuate end members 111 and 112 may be an upstanding formation or boss, as at 115 and 116. The bosses 115 and 116 are laterally opposed, and each formed with a substantially circular or cylindrical through hole or socket, as at 117 and 118, which sockets are in axial alignment with each other, transversely of the collar 110, and open upwardly through their respective bosses 115 and 116.

In assembly of the collar 110 with the motor housing 30, slight lateral compression of the collar, just sufficient to slightly flex the arcuate end segments 111 and 112 longitudinally outwardly, will permit of snap engagement of the collar downwardly over the retainer ribs or lips 61 and 62. Upon release of the collar compressive force, the collar returns to its normal, undistended configuration, such that the arcuate end segments 111 and 112 are respectively captured along the guide faces 65 and 66. That is, the arcuate end segment 111 of collar 110 is retained between body face 45 and projecting rib or lip 61, while collar end segment 112 is retained between body face 46 and projecting lip or rib 62. It will thus be apparent that, within limits, the collar 110 is rotatable in opposite directions about a generally vertical axis relative to the motor housing 30, the collar being retained on the housing by the ribs 61 and 62, being shiftably supported on housing faces 45 and 46, and constrained to rotative movement by the guide faces 65 and 66. Viewed otherwise, the truck 22 may be considered as mounted for limited rotatative movement in opposite directions relative to the collar 110, the opposite arcuate collar end segments 111 and 112 defining guides or way means so mounting the truck.

The gimbal 25 further includes an additional annular member of closed outline configuration, such as the yoke 120, superposed over the collar 110. The yoke 120 may include a pair of spaced end members 121 and 122, and a pair of spaced side members 123 and 124, extending between and connecting together the ends of the end members, and combining therewith to define generally annular yoke. The side members 123 and 124 are spaced apart and have their outside dimension approximately equal to the outside dimension of the collar side members 113 and 114 for conforming engagement between the side walls 12 and 13 of the vehicle body 10. Further, there are provided on opposite side members 123 and 124 of the yoke 120 a pair of noncircular lugs or fastener elements 125 and 126.

Depending beneath the underside of each side piece 123 and 124 is carried a pintle or pivot element, as at 127 and 128. That is, the pintle elements or pivots 127 and 128 are axially aligned with each other transversely of the yoke 120, and depend therebeneath for rotative engagement in respective openings or sockets 117 and 118. Thus, the yoke 120 is connected to the collar 110 for limited rotation relative thereto about a transversely extending generally horizontal axis normal to the rotative axis of the collar relative to the truck. Thus, a universal relative movement is afforded between the yoke 120 and the truck 22, and vice versa.

The opposite side walls 12 and 13 of the vehicle body 10 are formed with slots, as at 129 and 130, respectively conformably receiving fastener lugs 125 and 126 to relatively immovably connect the yoke 120 to the vehicle body 10. In this manner, the truck 22 is afforded a limited universal movement relative to the vehicle body. By the inherent resilience of the yoke 120 and the vehicle body 10, the fastener lugs 125 and 126 may be snap engaged into and removed from the body slots 129 and 130.

Advantageously, the yoke 120 is provided with resilient restoring means, such as in the form of a pair of flexible spring fingers 131 and 132 extending from each side piece 123 and 124 into yieldable bearing engagement with the adjacent nether side piece 113, 114 of the lower collar 110. The resilient means or spring fingers 131 and 132 serve to yieldably urge the gimbal elements, namely the yoke 120 and collar 110 to their intermediate position of relative movement about the axis of pintles or pivots 127 and 128. Thus, a resilient restoring force is applied to the truck 22 to urge the latter to an intermediate position of its swinging movement about the pivot axis of pintles 127 and 128. This position is shown in FIG. 3, wherein both spring fingers 132 are approximately equally resiliently distended.

From the foregoing, it will now be apparent that a model toy vehicle is provided in accordance with the teachings of the instant invention which fully accomplishes its intended objects and is otherwise well adapted to meet practical conditions of manufacture, assembly, maintenance and use.

Although the present invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be made within the spirit of the invention.

What is claimed is:

1. In a toy vehicle, the combination comprising a unitary, block-like, upright truck housing having first and second recesses opening laterally from opposite sides of said housing, a motor in said first recess and rotatable about a laterally extending axis, a motor shaft projecting laterally through and from the opposite side of said housing from said first recess, wheeled running gear on the underside of said housing and rotatable about generally laterally extending axes, and drive means in motion transmitting relation between such shaft and said running gear for driving the latter, at least portions of said drive means and said running gear fitting in said second recess and portions of said running gear extending from a downward opening of said second recess.

2. A toy vehicle according to claim 1, said wheeled running gear comprising axle means extending laterally across and removably journaled in the underside of said housing, a retainer plate beneath said housing retaining said axle means, and snap fittings on said retainer plate removably securing the latter to said housing.

3. A toy vehicle according to claim 2, said snap fittings being integral with said retainer plate.

4. A toy vehicle according to claim 1, said motor comprising a pancake type rotor having its shaft generally parallel to said axle means, and said drive means comprising spur gear means.

5. A toy vehicle according to claim 1, in combination with a hollow vehicle body having a downwardly directed opening for spacedly receiving said housing with said running gear beneath said body, and gimbal means interconnecting said housing and vehicle body for limited rotational movement of said running gear about generally vertical and horizontal axes relative to said body.

6. A toy vehicle according to claim 5, said gimbal means comprising pivot means having a generally later-

ally extending pivotal axis, fastener means securing said pivot means in said body, and arcuate way means mounted on said pivot means for limited rotation about said pivotal axis, said arcuate way means holding said housing for limited rotation about a generally upright axis relative to said way means, and resilient means yieldably urging said way means to an intermediate position of said limited rotation about said pivotal axis.

7. A toy vehicle according to claim **6,** said way means comprising a collar rotatably circumposed about said housing, and said pivot means comprising a yoke member, and a pair of laterally opposed aligned pivots on said yoke member pivotally connected to said collar.

8. A toy vehicle according to claim **7,** said resilient means comprising a pair of resilient fingers each extending from one of said yoke and collar into opposite urging engagement with the other of said yoke and collar.

9. A toy vehicle according to claim **8,** said yoke being generally annular and spacedly surrounding said housing.

10. In a model land vehicle, the combination comprising a wheeled truck for rolling engagement with a supporting surface, a body over said truck, and a gimbal structure connecting said body and truck, said gimbal structure comprising a generally horizontal collar circumposed about said truck for limited rotation relative thereto about an upright axis, a yoke pivotally connected to said collar for limited rotation relative thereto about a generally horizontal axis, and fastener means connecting said yoke to said body, whereby said truck is connected to said body and movable relative thereto about generally perpendicular axes.

11. A model land vehicle according to claim **10,** in combination with resilient means interposed between said collar and yoke for yieldably urging the latter toward an intermediate position of its rotative movement.

12. A model land vehicle according to claim **11,** said resilient means comprising spring fingers extending between said yoke and collar.

13. A model land vehicle according to claim **10,** said collar including opposite arcuate segments, and said truck including opposite formations slidably receiving said arcuate segments and mounting said truck for said relative rotation.

14. A model land vehicle according to claim **13,** said collar and truck being configured for snap engagement of said segments into said formations.

15. A model land vehicle according to claim **13,** in combination with interengageable pivot and socket means on said yoke and collar intermediate said arcuate segments to effect said pivotal connection.

16. A model land vehicle according to claim **15,** said collar including opposite sides extending between said segments and spaced apart for conforming engagement in said body to limit lateral collar movement, and said yoke being sized for conforming engagement in said body to limit lateral yoke movement, said pivot and socket means being interengageable upon relative lateral movement between said yoke and collar, whereby said pivot and socket means are interengaged when said yoke and collar are exteriorly of said body and disengagement is prevented when said yoke and collar are in said body.

* * * * *