

[54] TOY VEHICLE

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- [22] Filed: May 19, 1970
- [21] Appl. No.: 38,758

Related U.S. Application Data

- [63] Continuation-in-part of Ser. No. 782,113, Dec. 9, 1968, Pat. No. 3,605,331.
- [52] U.S. Cl. ....46/201, 46/213
- [51] Int. Cl. ....A63h 17/05
- [58] Field of Search .....46/201, 213, 214, 223

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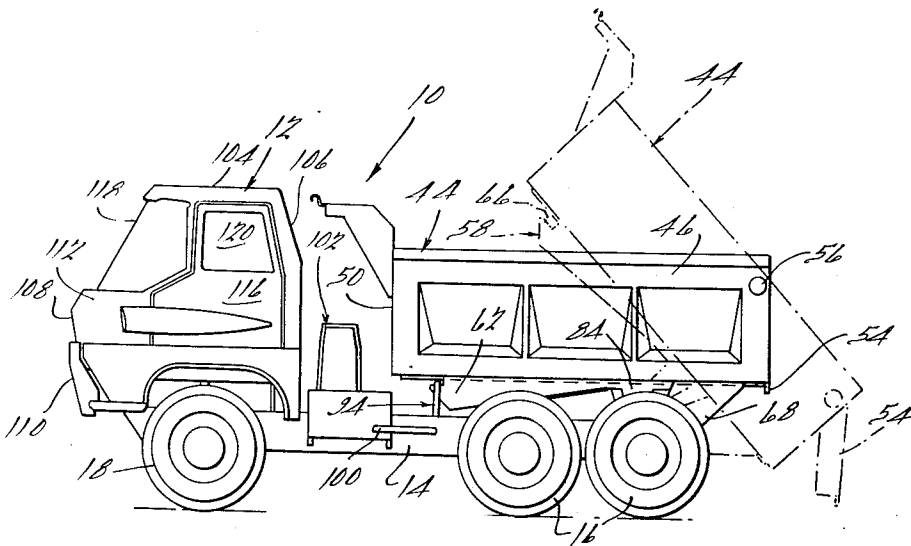
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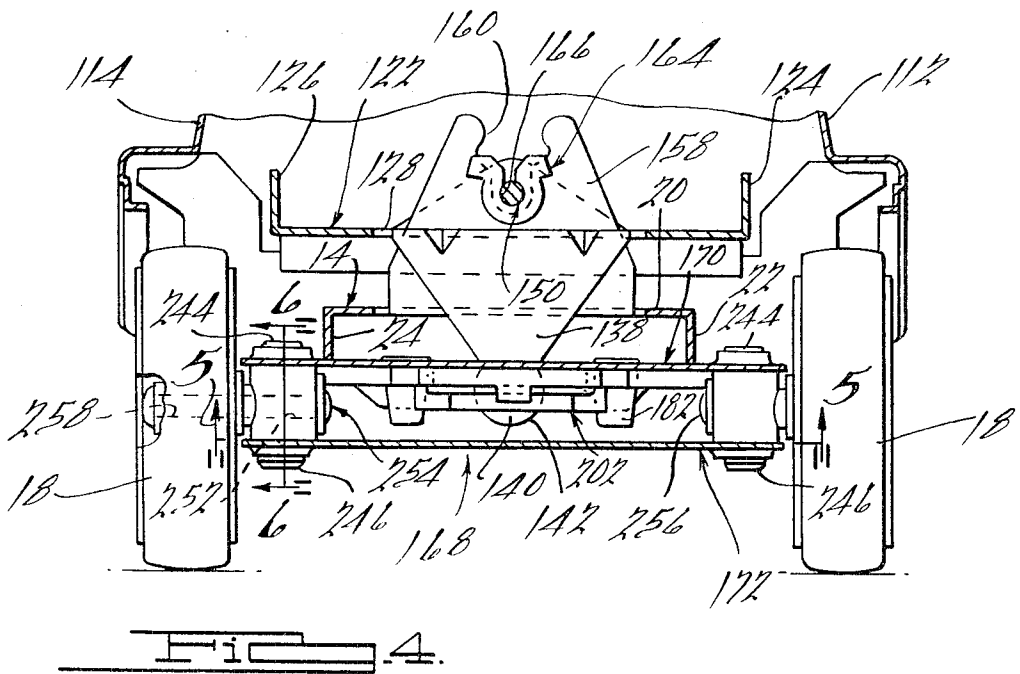
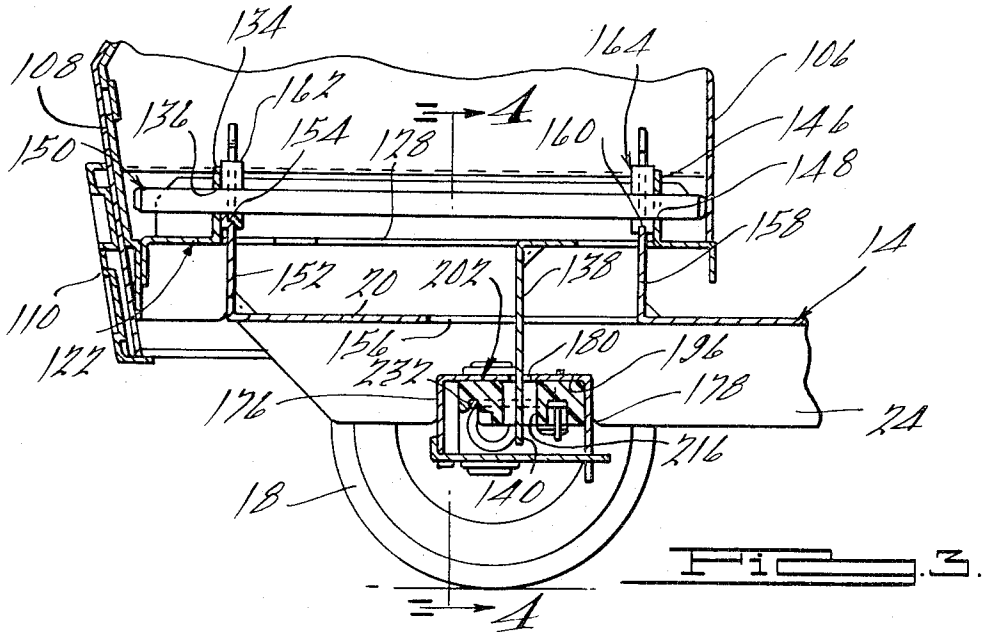
[57] ABSTRACT

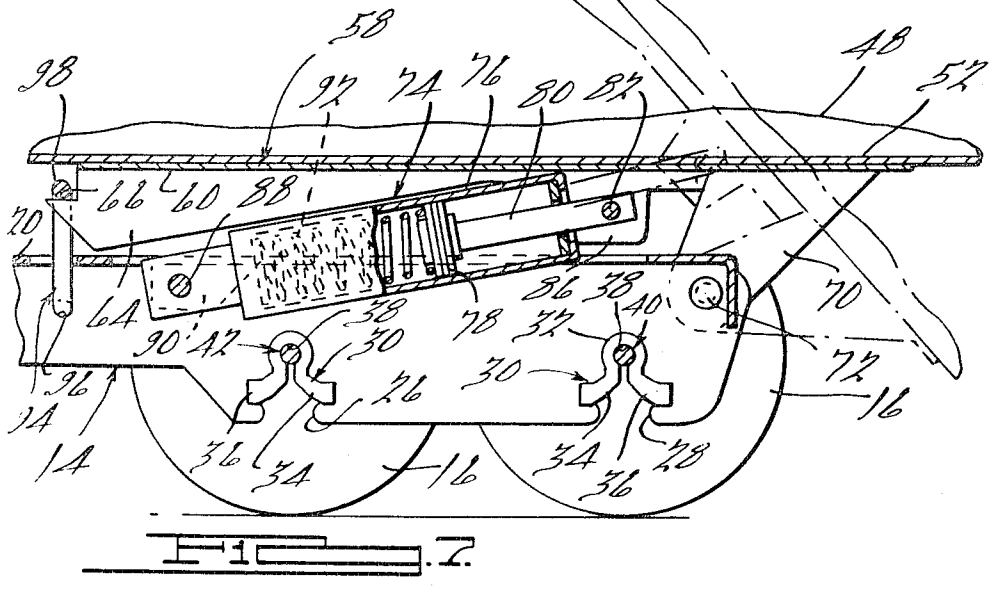
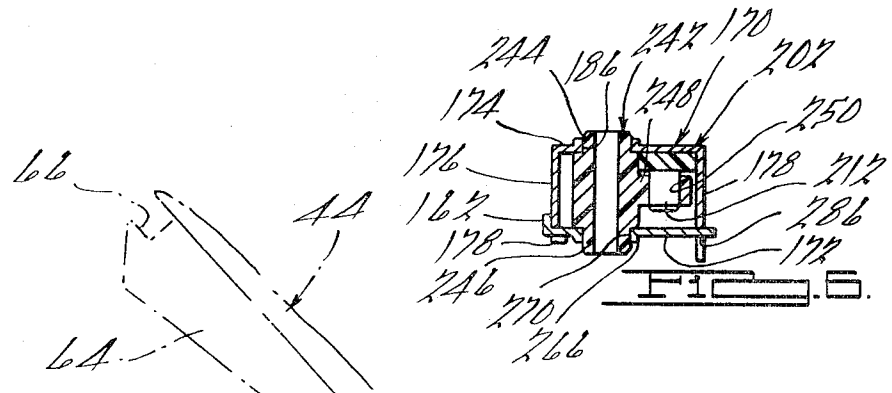
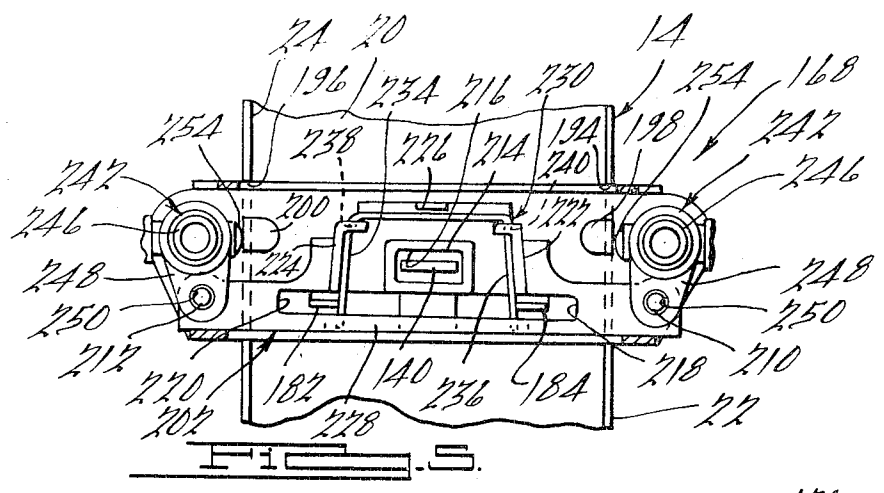
A toy vehicle comprising a chassis portion, a body portion and at least two steerable wheels; the chassis portion being provided with a steering mechanism including a tie rod extending generally laterally thereof, means supporting the tie rod for lateral sliding movement, a pair of kingpins disposed adjacent the opposite ends of the tie rod, means supporting the kingpins for pivotal movements about generally vertical axes, means rotatably supporting the steerable wheels on the kingpins, and pivot arm means pivotably connecting the laterally outer ends of the tie rod with the kingpins; the body portion being supported on the chassis portion for relative tilting movement about an axis extending generally longitudinally of the chassis portion, whereupon tilting of the body portion relative to the chassis portion effects lateral sliding movement of the tie rod, with the further result that the kingpins will be pivoted in a manner so as to effect steering movement of the vehicle wheels; the vehicle having the chassis and body portions initially, substantially preassembled and adapted to be operatively connected by merely snappingly engaging a pair of resilient bearing members provided on the body portion into engagement with a longitudinally extending pivot member or shaft provided on the chassis portion.

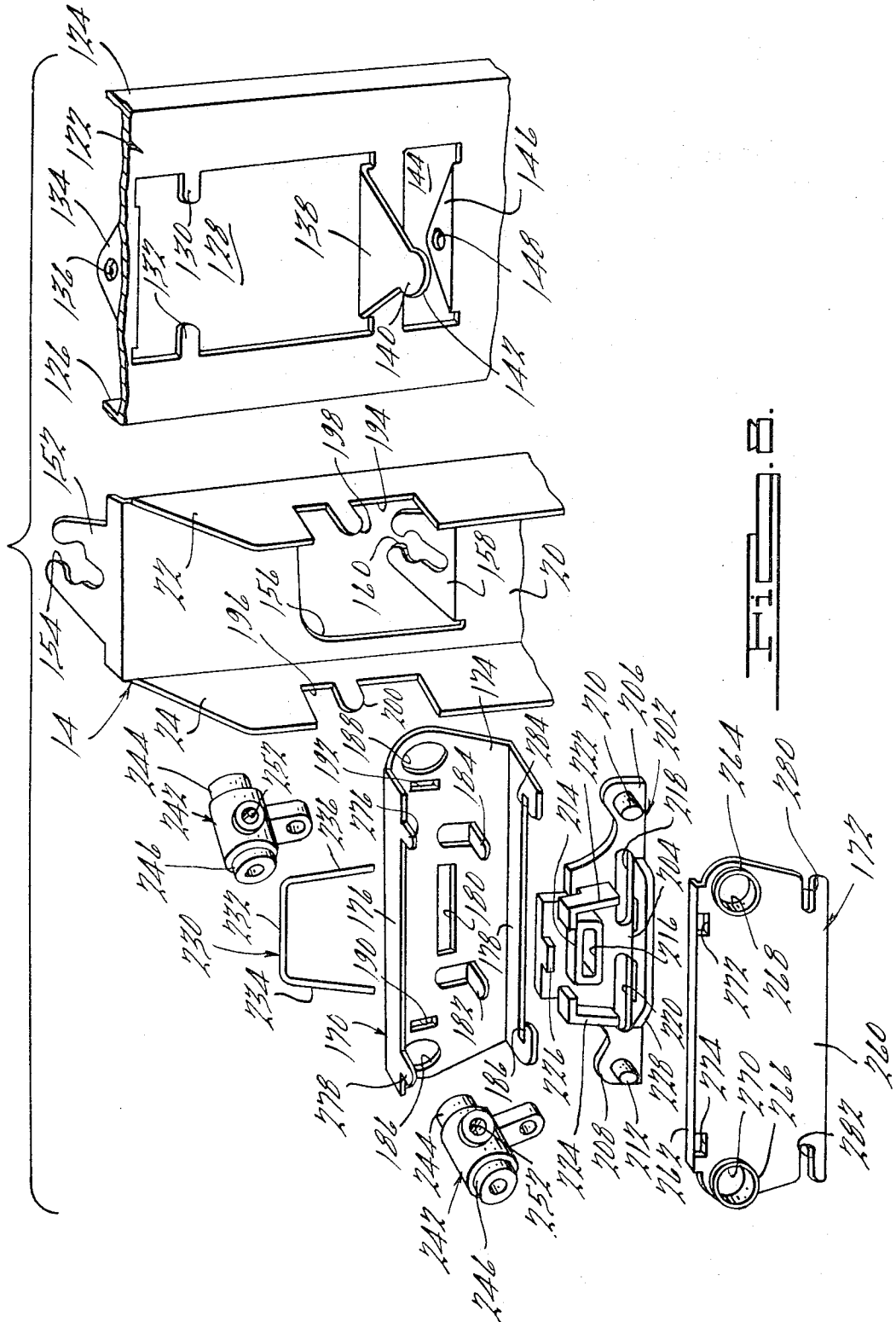
32 Claims, 13 Drawing Figures

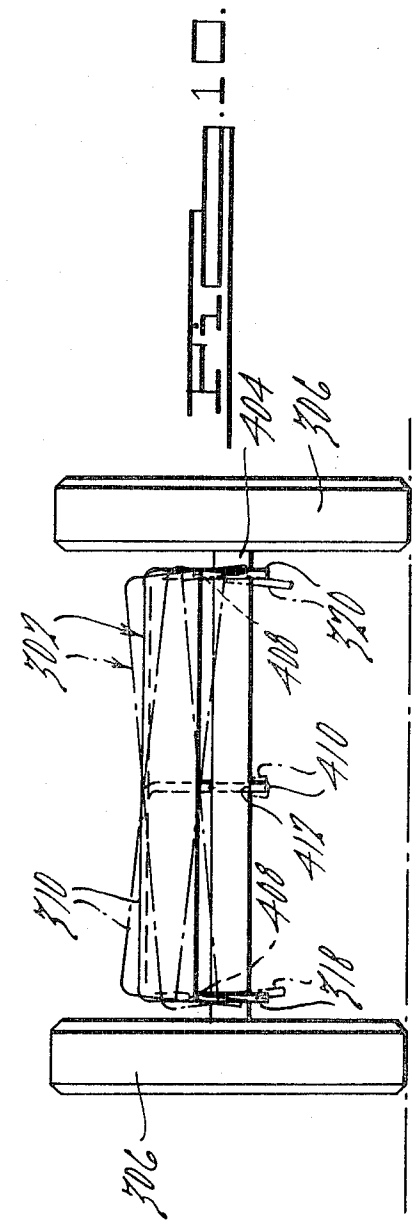
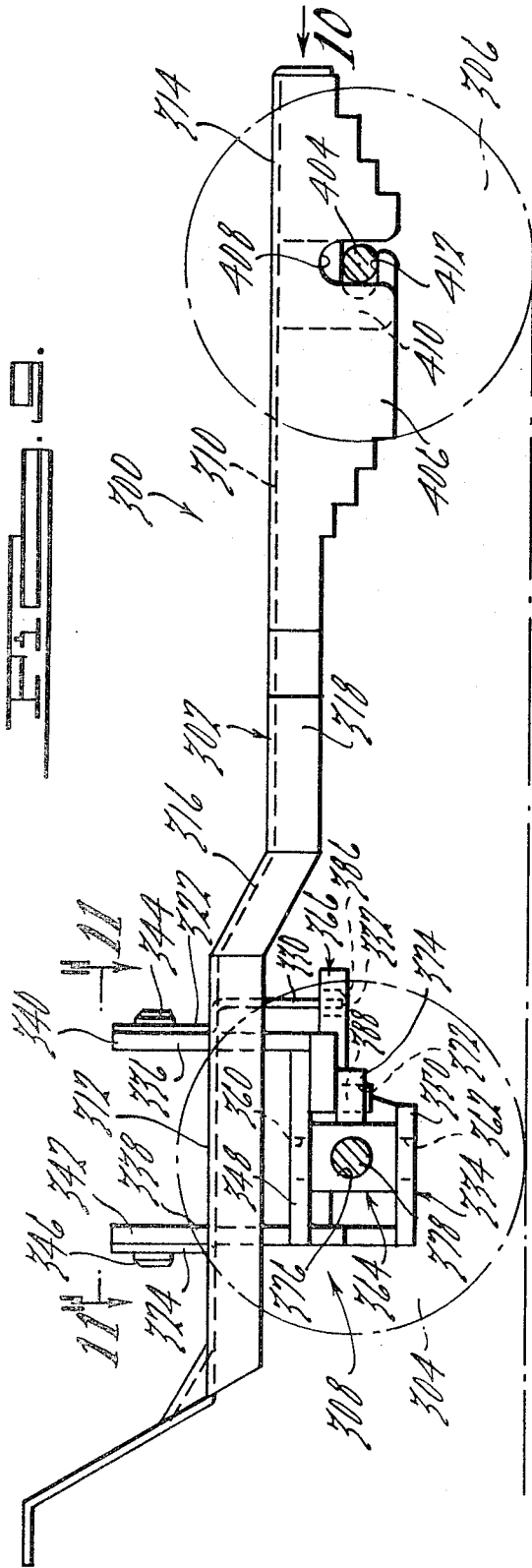




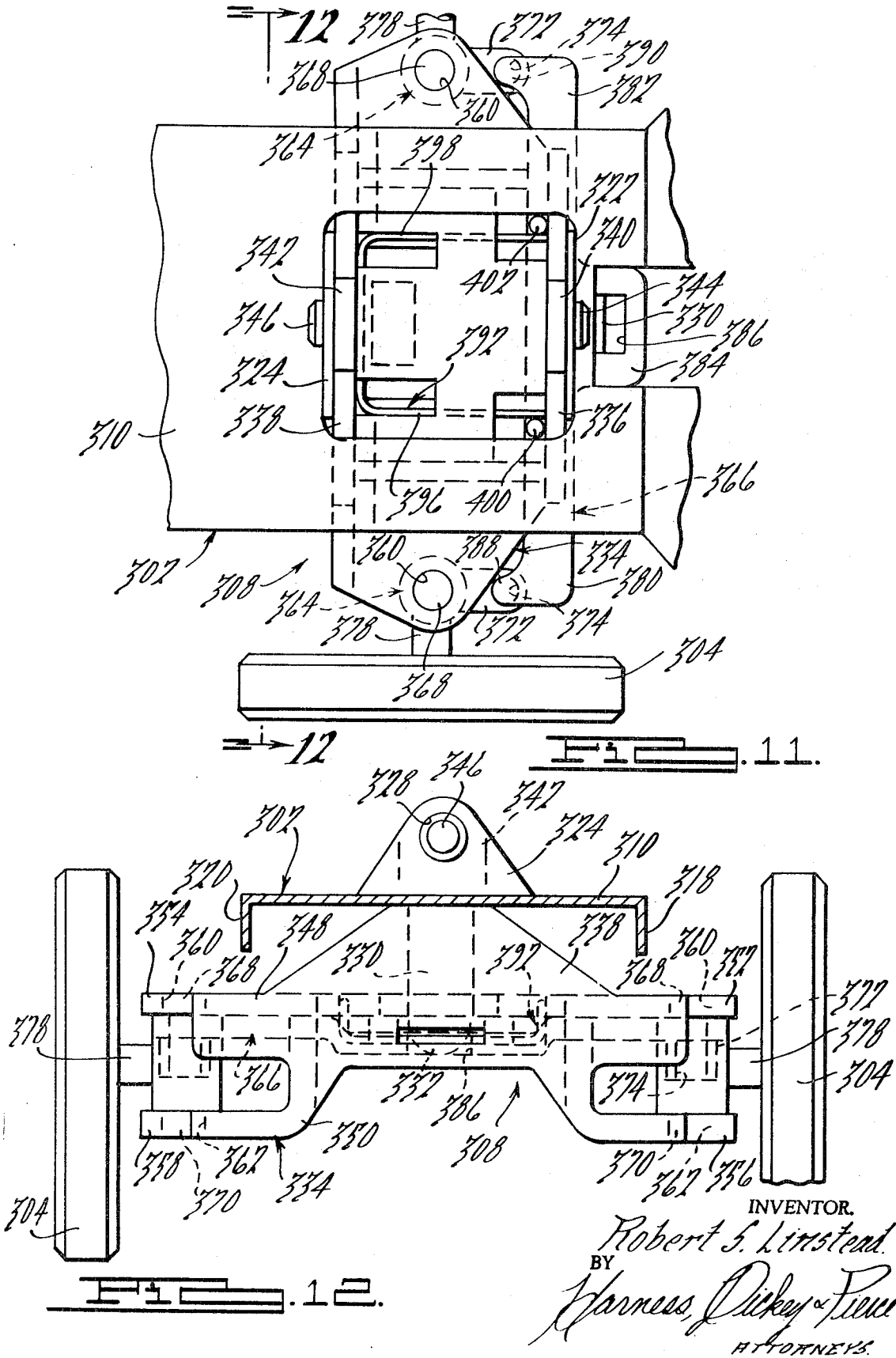








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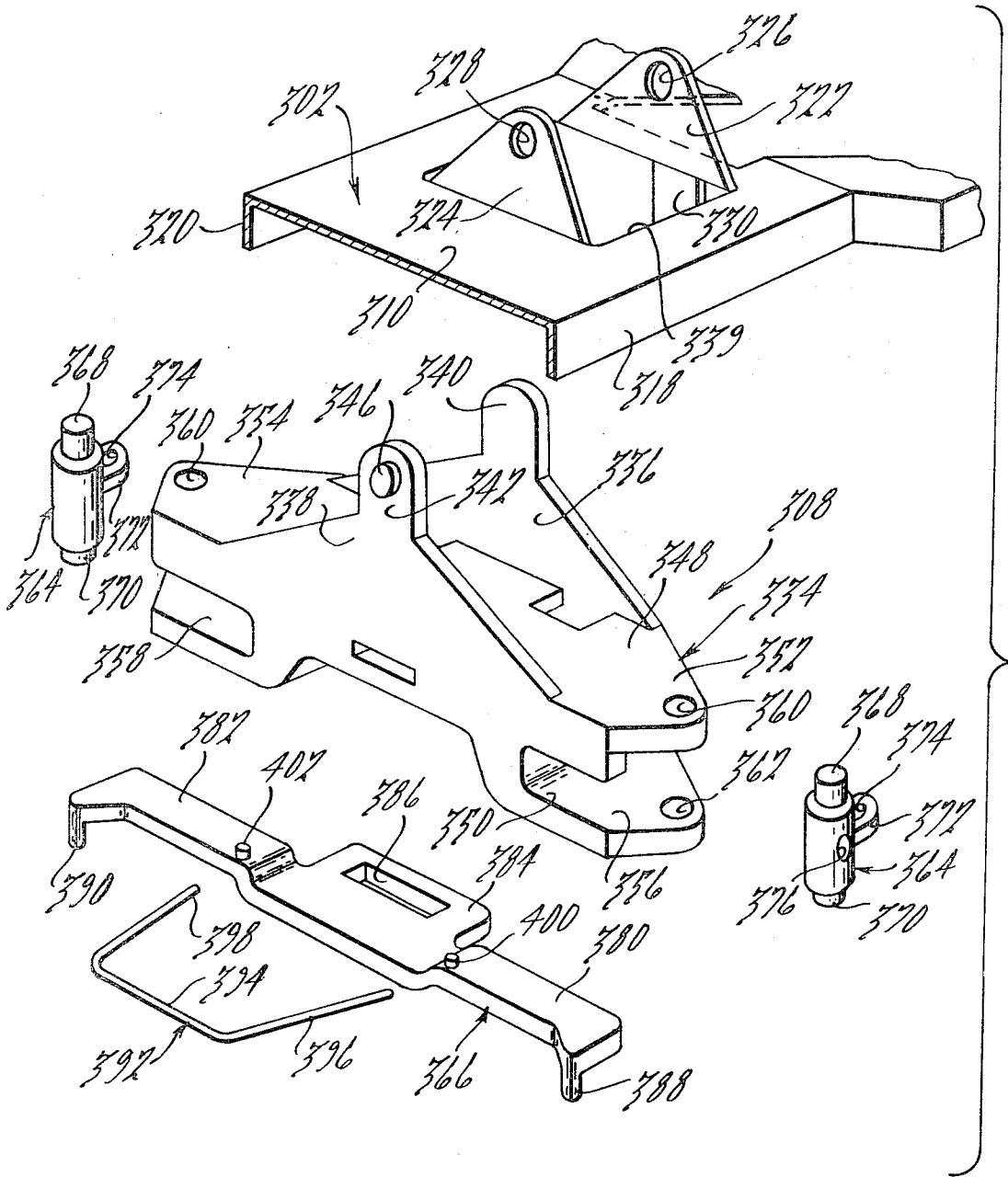


FIG. 13.

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## TOY VEHICLE

This is a continuation-in-part of U.S. Pat. application Ser. No. 782,113, filed Dec. 9, 1968, now Pat. No. 3,605,331, for toy vehicle.

## BACKGROUND OF THE INVENTION

In order to simulate as closely as possible the handling characteristics of actual vehicles, such as cars, trucks and the like, it has heretofore been suggested to provide toy or model vehicles with some type of steering mechanism in which a child may control the direction of travel toward which the toy vehicle is propelled. Originally, it was proposed to provide toy vehicles with a steering wheel or handle, for instance, located above the body of the vehicle, with the handle being connected to the steerable wheels of the toy through a suitable steering shaft or the like. Although such original designs have lent some degree of realism to toy vehicles, such a construction does not readily lend itself to one hand operation such as would occur when a child propels the toy along the floor or similar surface.

By virtue of the natural tendency of a child to push a non-steerable toy vehicle in the direction which it is desired to steer the vehicle, a steering mechanism was developed in the prior art which took advantage of this tendency by making the body portion of the toy tiltable or pivotable with respect to the vehicle chassis portion and steerable wheels, such that the tilting body was utilized as a means to effect steering of the vehicle wheels, with the degree of tilt or angular displacement of the body portion determining the angle of steering. Such a concept is shown and described in U.S. Pat. No. 2,386,744, issued to Yarbrough on Oct. 9, 1945.

Generally speaking, the toy vehicle of the present invention is related to toy vehicles of the type which embody the above described tilting concept in achieving preselected steering movement of the toy vehicle steerable wheels. More particularly, however, the present invention is directed toward a toy vehicle which incorporates a new and improved steering mechanism which is actuatable in response to tilting movement of the body portion of a toy vehicle to effect preselected movement of the steerable wheels of the vehicle. The steering mechanism incorporated in the toy vehicle of the present invention is of an extremely simple design, both from the standpoint of the number of moving parts embodied therein, as well as the minimum number of manufacturing and assembling procedure required in the construction thereof.

A particular feature of the toy truck of the present invention resides in the fact that the steering mechanism employed therein is entirely devoid of any gear teeth, i.e., rack, pinions and the like, as has been utilized in related prior art devices, thereby minimizing manufacturing costs to a minimum. Another feature of the present invention resides in the method of assembly thereof. More particularly, the toy vehicle of the present invention is designed to be initially assembled in the form of two separate subassemblies, which subassemblies are adapted to be conveniently operatively connected together during a final assembly operation. With this design, the toy vehicle of the present invention readily lends itself to modern manufacturing techniques, such as for example, wherein each of the two subassemblies comprising the vehicle are manufactured and preassembled at different geographical locations and are transferred to some third location for final assembly.

## SUMMARY OF THE INVENTION

This invention relates generally to toy vehicles and more particularly, to toy vehicles where steering is achieved by merely tilting the body portion of the vehicle in the direction toward which the vehicle is to be steered or directed.

It is accordingly a general object of the present invention to provide a new and improved toy vehicle.

It is a more particular object of the present invention to provide a new and improved toy vehicle which is adapted to be steered by merely tilting the body portion thereof toward the

right or the left, depending upon the direction in which the vehicle is to be steered.

It is still a more particular object of the present invention to provide a new and improved vehicle which incorporates a novel steering mechanism for steering the vehicle wheels in response to tilting movement of the vehicle body.

It is yet a more particular object of the present invention to provide a new and improved steering mechanism as above described which is of an extremely simple design, is easy to assemble and economical to manufacture.

It is another object of the present invention to provide a new and improved toy vehicle which may be assembled in a manner which minimizes to the extreme assembly time and expense.

It is a further object of the present invention to provide a toy vehicle wherein the chassis and body portions thereof are provided in the form of unitized subassemblies which may be readily engaged or coupled to one another by merely snappingly engaging one or more resilient bearing members into pivotal engagement with a longitudinally extending pivot member provided on one of the subassemblies.

It is still a further object of the present invention to provide a new and improved toy vehicle which may be provided in various configurations or forms, ranging from toy passenger and truck vehicles to toy construction vehicles and the like.

Other objects and advantages of the present invention will become apparent from the following detailed description taken in conjunction with the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a toy vehicle embodying the principles of the present invention;

FIG. 2 is an end elevational view of the toy vehicle illustrated in FIG. 1;

FIG. 3 is an enlarged fragmentary cross sectional view taken substantially on the line 3—3 of FIG. 2;

FIG. 4 is an enlarged fragmentary cross sectional view taken substantially along the line 4—4 of FIG. 3;

FIG. 5 is a fragmentary cross sectional view taken substantially along the line 5—5 of FIG. 4;

FIG. 6 is a fragmentary cross sectional view taken substantially along the line 6—6 of FIG. 4;

FIG. 7 is a cross sectional view of a portion of the toy vehicle illustrated in FIGS. 1 and 2, and illustrates the dump box lift mechanism incorporated therein;

FIG. 8 is an exploded assembly view of the steering mechanism incorporated in the toy vehicle of the present invention;

FIG. 9 is a longitudinal side elevational view of a toy vehicle in accordance with an alternate embodiment of the present invention;

FIG. 10 is an end elevational view of the vehicle illustrated in FIG. 9;

FIG. 11 is a cross-sectional view taken substantially along the line 11—11 of FIG. 9;

FIG. 12 is a transverse cross-sectional view taken substantially along the line 12—12 of FIG. 11; and

FIG. 13 is an exploded assembly view of the steering mechanism incorporated in the toy vehicle illustrated in FIG. 9.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

For purposes of clarity, the terms "inner," "outer" and derivatives thereof will have reference to the geometric center of the toy vehicle of the present invention and the various component parts thereof. Similarly, the terms "forwardly," "rearwardly" and the like will have reference to the forward and rearward ends of the toy vehicle of the present invention, with the forward end thereof being located at the left side of FIG. 1 and the rearward end thereof being located at the right side of this figure.

Referring now in detail to the drawings, a toy vehicle 10, in accordance with a preferred embodiment of the present invention, is shown as comprising a body portion or cab 12 and frame portion or chassis 14, the latter of which is provided with a plurality of rotatable, but otherwise immovable rearward wheels, generally designated 16, and with a pair of forward steerable wheels, generally designated 18. As will hereinafter be described, the body portion 12 is mounted on the frame portion 14 in a manner such that the portion 12 may be tilted, either toward the left or toward the right along a pivotal axis extending longitudinally of the vehicle 10, with the result that the forward wheels 18 will turn in the same direction toward which the body portion 12 is tilted, whereby the vehicle 10 may be steered by the vehicle operator by merely tilting the body portion 12 relative to the chassis portion 14. It will be noted that although the vehicle 10 is shown in the form of a toy dump truck, the principles of the present invention may be readily incorporated in virtually all other types of toy vehicles, such as toy passenger cars, toy military vehicles, construction vehicles and the like, without departing from the scope of fair meaning of the present invention.

As best seen in FIGS. 3 and 4, the chassis 14 extends longitudinally of the vehicle 10 and comprises a generally horizontally extending upper bed section 20 and a pair of vertically extending, spaced side sections 22 and 24 which depend downwardly from and are integrally connected to the lateral side edges of the bed section 20. The side sections 22, 24 are formed with a pair of upwardly extending recessed portions 26 and 28, with the recessed portions 26 and 28 of each of the side sections 22, 24 being laterally aligned. The recessed portions 26, 28 are adapted to each receive and support one of a plurality of plastic axle keepers, generally designated by the numeral 30, which are preferably fabricated of a flexible resistant polyethylene or other suitable plastic material which is expendable and compressible within predetermined limits. Each of the keepers 30 comprises an intermediate, generally U-shaped section 32 and a pair of downwardly and outwardly extending leg sections 34 and 36. The intermediate sections 32 define generally cylindrical recesses 38 which are adapted to receive and rotatably support a pair of longitudinally spaced, laterally extending axle members 40 and 42 that extend laterally outwardly from the side sections 22, 24 and have the plurality of rear wheels 16 mounted thereon. The keepers 30 are slotted around the outer periphery thereof and are thereby adapted to be inserted into the recessed portions 26, 28 in a manner such that the peripheral slots nestingly receive the marginal edges of the recessed portions 26, 28 to positively retain the keepers 30 in their respective operative positions. Although the keepers 30 may be of various constructions, they are preferably of one of the constructions shown and described in U.S. Pat. Nos. 3,389,495; 3,389,497 or 3,389,498 which are incorporated herein by reference as a descriptive portion of the applicant's specification.

Mounted upon the chassis 14 at a position above the rear wheels 16 is a generally parallelepiped shaped dump box, generally designated 44, which comprises a pair of longitudinally extending, spaced parallel side sections 46 and 48, a generally laterally extending front or forward section 50, a generally horizontally extending bottom section 52 and a laterally extending rearward section or tailgate 54 which is preferably pivotably connected by a pair of suitable pivot pins or the like 56 to the upper rearward ends of the side sections 46, 48. The dump box 44 is provided with a support frame, generally designated 58, on the lower side thereof, which frame 58 comprises a horizontally extending upper section 60 which is secured, as by spot welding or the like, to the lower side of the bottom section 52. The support frame 58 also comprises a pair of spaced parallel, longitudinally extending side sections 62 and 64 which define generally horizontally extending shoulders 66 at the forward end thereof. The rearward end of the frame 58 is provided with a pair of laterally spaced, parallel and downwardly extending sections 68, 70 which are

disposed directly adjacent the laterally outer sides of the side sections 22 and 24 of the chassis 14 and are pivotably connected thereto by suitable pivot pin means or the like, as seen at 72 in FIG. 7. By virtue of the pivotal connection between the support frame 58 and the chassis 14, the dump box 44 is adapted to be pivotably biased between the solid and phantom line positions shown in FIG. 1, whereby to simulate the dumping action and operation of an actual dump truck vehicle.

As best seen in FIG. 7, the vehicle 10 is provided with a power cylinder, generally designated 74, adapted to normally resiliently bias the dump box 44 toward the phantom line position in FIG. 1. The cylinder 74 may be of any suitable construction known in the prior art, but preferably consists of a generally cylindrical housing 76 having a piston 78 and a piston rod 80 reciprocally mounted therein and movable coaxially thereof. The upper end of the piston rod 80 is connected through a suitable pivot pin, cotter key or the like 82 interjacent a pair of downwardly extending flange sections 84, 86 which are formed integral of the support frame 58. The lower, forward end of the power cylinder 74 is pivotably connected through a suitable pivot pin, cotter key or the like 88 between a pair of spaced parallel flange sections, generally designated 90, which project downwardly from the bed section 20 of the chassis 14 and one of which is shown in FIG. 7. The cylinder 74 is provided with an internal helical coil spring 92 which is adapted to exert a resilient outwardly directed force against the piston 78 and thereby bias the piston rod 80 longitudinally outwardly from the housing 76, as will be apparent, with the result that the dump box 44 will be pivotably biased towards the phantom line position in FIG. 1.

Means for selectively maintaining the dump box 44 in a retracted or lowered position is provided by a generally laterally extending tripping lever, generally designated 94, which is pivotably supported within a pair of laterally aligned openings 96 formed in the side sections 22, 24 of the chassis 14. The lever 94 comprises an upwardly, generally inverted U-shaped section 98 which is adapted to extend over the shoulders 66 and thereby maintain the dump box 44 in the lowered position. The lever 94 also comprises a manually engageable section 100 which extends longitudinally of the vehicle 10 at a position spaced laterally outwardly from one side of the chassis 14, the section 100 being adapted to be pivoted in a counterclockwise direction in FIG. 1, whereby to rotate the lever section 98 out of engagement with the shoulders 66 to permit the power cylinder 74 to bias the dump box 44 to a raised position. Suitable spring means (not shown) is provided on the tripping lever 94 to maintain the same in the position shown in FIG. 1, whereby the lever 94 will resiliently "snap" into engagement with the shoulders 66 when the dump box 44 is biased toward its lowered position.

Disposed directly forwardly of the dump box 44 and rearwardly of the body portion or cab 12 is a simulated fuel tank assemblage, generally designated 102, which is secured to the upper side of the chassis 14 and is adapted to simulate the fuel tank or other structural member of an actual dump truck type vehicle.

Referring now in detail to the body or cab portion 12 of the vehicle 10, as best seen in FIGS. 1 and 2, the portion 12 comprises a generally flat, horizontally extending top section 104, a generally vertically extending back or rearward section 106 spaced immediately forwardly of the assemblage 102, a front section 108 including a front bumper 110, and side sections 112 and 114 which are provided with simulated entrance and exit doors 116. The cab portion 12 is provided with a suitable transparent windshield 118 and side windows 120 and may be and preferably is provided with internal seats and an instrument panel (not shown) which simulate the actual seats and instrument panel of an authentic truck vehicle. In a preferred construction of the present invention, the aforesaid seats and instrument panel, as well as the internal flooring, etc., is provided in the form of a one-piece molded plastic member which is inserted into the cab portion 12 through the open bottom end thereof prior to the cab portion 12 being assembled into the chassis portion 14, as will hereinafter be described.

Extending longitudinally of the cab portion 12 adjacent the lower or underside thereof is a generally flat, horizontally disposed bottom member 122 which is formed with a pair of upstanding, spaced parallel flange sections 124 and 126. The member 122 is formed with a central, generally rectangular shaped opening 128, the marginal side edges of which define laterally inwardly extending tab portions 130 and 132. Extending vertically upwardly from the forward end of the opening 128 is a generally triangularly shaped support member 134 which is formed with a circular opening 136 at the upper end or apex thereof, as best seen in FIG. 8. The bottom member 132 is preferably fabricated by a metal stamping operation from a flat or generally planar workpiece. The support member 134 is preferably formed integral of the member 122 and is deformed to its vertical position during the aforesaid stamping operation wherein the opening 128 is "stamped out" of the member 122. The end of the opening 128 opposite that at which the support member 134 is located has a generally triangularly shaped actuating tongue, generally designated 138, depending downwardly therefrom and integrally connected to the member 122. The lower terminal end of the tongue 138 is formed with a generally circular or disc-shaped actuating portion 140 defining an annular camming face or edge 142. Disposed directly rearwardly of the opening 128 is another opening 144 which is also generally rectangular in shape but is somewhat smaller in longitudinal dimension than the opening 128. Disposed along the rearward, laterally extending edge of the opening 144 is an upwardly extending, generally triangularly shaped support member 146 which is formed integrally of the member 122 and is substantially identical to and longitudinally aligned with the support member 134. The support member 146 is formed with a circular opening 148 adjacent the upper end thereof, which opening 148 is longitudinally aligned with the opening 136 and is adapted to cooperate therewith in receiving and supporting the opposite ends of a longitudinally extending pivot shaft 150 which extends through the openings 136, 148 and terminates interiorly of the front and rear sections 108, 106, respectively, of the cab portion 12. The shaft 150 adapted to function in a manner hereinafter to be described in supporting the cab portion 12 for pivotal movement, in the manner indicated by the phantom lines in FIG. 2, about a longitudinally extending axis defined by the shaft 150.

As best illustrated in FIG. 8, the forward end of the chassis 14 is formed with an upwardly extending bearing support arm 152, the upper end of which is of a generally bifurcated configuration and defines a downwardly extending recess 154. The bed section 20 of the chassis 14, immediately rearwardly of the support arm 152, is formed with a central opening 156 which is formed as a result of "stamping" another upwardly extending bearing support arm 158 from the bed section 20, which support arm 158 extends vertically upwardly in spaced parallel longitudinally aligned relation to the support arm 152. The upper end of the support arm 158 is formed in a bifurcated configuration identical to the support arm 152 and defines a downwardly extending recess 160 that is longitudinally aligned with the recess 154. The recesses 154, 160 in the upper ends of the support arms 152, 158, respectively, are adapted to nestingly receive a pair of plastic keeper members 162 and 164 which may be and preferably are similar or identical in construction and operation to the axle keepers 30 provided on the chassis portion 14 for operatively supporting the axle members 40, 42 thereon. As illustrated in FIG. 4, the keepers 162, 164 define upwardly extending recesses 166 which are adapted to nestingly receive the pivot shaft 150 during assembly of the cab portion 12 on the chassis 14, in a manner hereinafter to be described.

Assembly of the cab portion 12 may be accomplished by initially inserting into the cab 12, the windshield 118 and side windows 120, which may, if desired, be in the form of a one-piece unit. Thereafter, the seat insert may be placed within the cab 12, and finally the bottom member 122 may be secured across the lower open end of the cab 12, as by suitable locking tabs (not shown) on the cab 12 being fixedly engaged with the

bottom member 122. The seat insert is preferably provided with suitable downwardly extending legs (not shown) which are adapted to be engaged by the laterally inwardly extending tab portion 130, 132 such that upon fixedly securing the bottom member 122 within the cab 12, the tab portions 130, 132 fixedly secure the seat insert in its proper operative position. Prior to securing the bottom member 122 to the cab 12, the pivot shaft 150 is mounted within the openings 136, 148, such that when the bottom member 122 is operatively mounted, the shaft 150 is prevented from being longitudinally displaced from within the openings 136, 148 by the front and back sections 108, 106 of the cab 12. After the cab 12 is thus preassembled, the same may be operatively mounted on the chassis 14 which itself has the dump box 44, wheels 16, etc. preassembled thereon. Assembly of the cab 12 on the chassis 14 is accomplished by laterally aligning the pivot shaft 150 with the open upper ends of the recesses 166 defined by the keepers 162, 164. Thereafter, the cab 12 is forced downwardly, whereupon the pivot shaft 150 snaps into the keepers 162, 164 and is retained therein by the natural resiliency of the keepers 162, 164, with the result that the cab 12 is secured to the upper side of the chassis 14 for pivotal movement about the longitudinal axis defined by the shaft 150.

Generally speaking, the aforesaid pivotal movement of the cab 12 relative to the chassis 14, in the manner indicated by the various phantom positions shown in FIG. 2, is adapted to effect movement of the front wheels 18 of the vehicle 10 in the direction in which the cab 12 is pivoted or tilted. That is, if the cab 12 is tilted toward the right, the front wheels 18 are designed to turn toward the right, whereby the vehicle 10 will steer toward the right when pushed forward. Similarly, when the cab 12 is tilted toward the left, the front wheels 18 of the vehicle 10 will move toward the left, thereby rendering the vehicle 10 to steer toward the left. Such pivotal or steering movement of the front wheels 18 of the vehicle 10 in response to tilting movement of the cab 12 is achieved through a new and improved steering mechanism, generally designated 168, which embodies certain principles of the present invention, and the construction and operation of which are hereinafter described in detail.

As best seen in FIGS. 5 and 8, the steering mechanism 168 is enclosed within upper and lower housing sections 170 and 172, respectively which are mounted on the lower side of the chassis 14. The upper housing section 170 comprises a generally flat, horizontally extending upper section 174 and a pair of spaced parallel, laterally extending sections 176 and 178 which depend downwardly from the upper section 174. The upper section 174 is formed with a central laterally extending opening 180 and includes a pair of downwardly extending, laterally aligned guideway tabs or projections 182 and 184. The section 174 is also formed with a pair of laterally aligned annular openings 186, 188 and with a pair of longitudinally extending, laterally aligned slots 190 and 192 which are spaced laterally inwardly from the openings 186, 188, respectively. The upper housing section 170 is adapted to be operatively mounted within a pair of laterally aligned, generally rectangular shaped upwardly extending recesses 194 and 196 which are formed in the side sections 22, 24, respectively of the chassis 14. The recesses 194, 196 define downwardly extending tab portions 198 and 200 which are adapted to be received within the slots 192, 190, and be bent or deformed laterally inwardly under the section 174 of the housing section 170 in order to fixedly secure the same to the chassis 14.

Disposed interiorly of the upper housing section 170 is a laterally extending tie rod member, generally designated 202. The member 202 comprises an intermediate section 204 and a pair of laterally outwardly extending arm sections 206 and 208 which are formed with downwardly extending, generally cylindrically shaped pivot pin portions 210 and 212, respectively. The intermediate section 204 is provided with an enlarged thickness portion 214 which defines a vertically disposed, laterally extending opening 216, that is vertically aligned with

the opening 180 in the housing section 170 and the lateral length of which is slightly greater than the diameter of the circular actuating portion 140 of the actuating tongue 138 such that upon insertion of the portion 140 within the slot 216, the camming edge 142 is juxtapositioned between the opposite ends of the slot 216. The intermediate section 204 is also formed with a pair of laterally aligned slots 218 and 220 which are adapted to slidably receive the downwardly extending guideway projections 182 and 184. Extending downwardly from the lower side of the section 204 is a pair of generally L-shaped projections 222 and 224 and a pair of longitudinally spaced, laterally extending projections 226 and 228, the latter of which are disposed adjacent the forward and rearward edges of the member 202. The tie rod member 202 is provided with a generally C-shaped spring member 230 which comprises an intermediate, laterally extending section 232 and generally longitudinally extending leg sections 234 and 236. As best illustrated in FIG. 5, the spring 230 is adapted to be retained directly rearwardly of the projection 226 with the leg sections 234, 236 extending rearwardly through suitable openings 238 and 240 formed in the L-shaped projections 224, 222, respectively. The rearward ends of the leg sections 234, 236 are adapted to bear against the laterally inner sides of the guideway projections 182, 184, whereby the spring 230 is adapted to function in continuously biasing the tie rod member 202 toward a position wherein it is centered with respect to the longitudinal axis of the vehicle 10. More particularly, when the tie rod member 202 is biased toward the right in FIG. 5, the leg section 236 thereof will exert a resilient force against the guideway projection 184, thereby resiliently urging the member 202 back toward the left to a centralized position. Similarly, when the tie rod member 202 is biased toward the left in FIG. 5, the leg section 234 of the spring 230 will exert a resilient force against the guideway projection 182 to resiliently urge the member 202 toward its respective centered position.

It will be seen that upon assembly of the cab 12 upon the chassis 14 in the manner hereinabove described, the actuating tongue 138 will be inserted downwardly through the opening 180 to a position wherein the actuating portion 140 thereof is received within the opening 216 in the tie rod member 202, with the camming edge 142 engaged with the laterally outer ends of the opening 216. With this arrangement, upon tilting movement of the cab 12 with respect to the chassis 14, the actuating portion 140 of the tongue 138 will bias or laterally slide the tie rod member 202 in the opposite direction. That is, when the cab 12 is tilted toward the right about the longitudinal axis defined by the shaft 150, the tie rod member 202 will be biased laterally toward the left, and upon tilting movement of the cab 12 toward the left, the tie rod member 202 will be laterally biased toward the right. As previously mentioned, the spring member 230 resiliently resists such lateral displacement of the tie rod member 202 and hence functions to center the member 202 and, via the actuating tongue 138, acts to resiliently bias the cab 12 from its tilted position to a normal upright position shown by the solid lines in FIG. 2.

Disposed adjacent the laterally outer ends of the arm sections 206, 208 of the tie rod member 202 is a pair of kingpin members, generally designated 242, which are adapted to effect steering movement of the front wheels 18 of the vehicle 10 in response to lateral sliding movement or displacement of the tie rod member 202. The kingpin members 242 are of a generally cylindrical configuration and have reduced diameter, cylindrically shaped bearing portions 244 and 246 at the upper and lower ends thereof, respectively. The upper bearing sections 244 are adapted to be rotatably or pivotably received within the annular openings 186, 188 of the upper housing section 170, and the lower bearing sections 246 are adapted to be rotatably supported by the lower housing section 172 in a manner later to be described. As best seen in FIG. 5, the kingpin 242 are provided with longitudinally rearwardly extending pivot arms 248 are provided with longitudinally rearwardly extending pivot arms 248 which are formed with vertically ex-

tending bores 250 therein. The bores 250 are adapted to pivotably receive the downwardly extending pivot pin portions 210 and 212 therein, whereby the arm sections 206, 208 are pivotably connected to the kingpins 242. It will be seen in FIG. 5, that with the above described construction, lateral displacement of the tie rod member 202 toward the right will effect pivotal movement of the kingpins 242 about generally vertical axes defined by the bearing portions 244, 246 thereof in a counterclockwise direction. Similarly, lateral displacement of the tie rod member 202 toward the left in FIG. 5 will result in clockwise rotation of the kingpins 242.

Each of the kingpins 242 is formed with a laterally outwardly extending bore 252 (see FIG. 4) within which is located a laterally outwardly extending stub shaft 254. The shafts 254 are provided with enlarged diameter head sections 256 at the innermost ends thereof which bear against the laterally inner sides of the kingpins 242. The outer ends of the shafts 254 project laterally outwardly from the outer sides of the kingpins 242 and are adapted to be attached by any suitable means, for example, as by press-fitting or the like, within suitable axially extending bores 258 formed in the front wheels 18 of vehicle 10. In a preferred construction of the present invention, the bores 252 are slightly larger in diameter than the shafts 254, whereby the shafts 254 and wheels 18 carried thereon, are freely rotatable with respect to the kingpins 242.

The kingpins 242 and tie rod member 202 are designed to be operatively retained within the confines of the upper housing section 170 by the aforementioned lower housing section 172. As best seen in FIG. 8, the housing section 172 comprises a generally flat or planar horizontally extending body portion 260 which is formed with a generally vertically extending upper lip portion 262 along the forward or leading edge thereof. The body portion 260 is provided with a pair of downwardly extending, annular sleeve bearing portions 264 and 266 which define annular openings 268 and 270. The openings 268 and 270 and sleeve bearing portions 264 and 266 are coaxially aligned with the openings 188, 186 and are thereby adapted to receive and cooperate in rotatably supporting the lower bearing portions 246 or the kingpin 242, whereby the kingpins 242 are pivotably supported along laterally spaced vertically extending pivotal axes in the manner best shown in FIGS. 2 and 4. The body portion 260 is formed with a pair of laterally spaced slots 272 and 274 which are adapted to receive a pair of downwardly extending tab portions 276 and 278 formed on the lower edge of the section 176 of the upper housing 170, which tab portions 276, 278 may be bent or similarly deformed rearwardly or forwardly to retain the forward edge of the housing section 172 on the housing section 170. The rearward edge of the lower housing section 172 is formed with a pair of laterally extending recesses 280 and 282 which are adapted to nestingly receive and cooperate with a pair of laterally extending recesses 284 and 286 on the section 178 of the upper housing 170 and thereby secure the rearwardmost portions of the housing sections 170, 172 together.

In operation, it will be seen that the cab 12 will be free to pivot toward the left or right about the longitudinal axis defined by the pivot shaft 150, as above described. Such pivotal movement of the cab 12 will effect lateral sliding movement of the tie rod member 202 and rotation of the kingpins 242 and front vehicle wheels 18 supported thereon. Accordingly, when the cab 12 is tilted toward the right, the tie rod member 202 will be biased toward the left in FIG. 5; thereby rotating the kingpins 242 in a clockwise direction, with the result that the wheels 18 supported on the kingpins 242 will be turned or steered toward the right. Similarly, when the cab 12 is tilted toward the left, the tie rod member 202 will be laterally displaced toward the right in FIG. 5, thereby effecting rotation of the kingpins 242 in a counterclockwise direction, resulting in the wheels 18 being moved or steered toward the left. Thus, it will be seen that the vehicle wheels 18 will be steered in the same direction as the cab 12 is tilted. As

previously mentioned, the spring 230 will function to normally center the tie rod member 202 and hence will resiliently bias the wheels 18 toward a position where they are directed straight ahead of the vehicle 10 so that the vehicle will normally traverse a substantially straight or rectilinear path until such time as the cab 12 thereof is tilted toward either the left or the right with respect to the chassis 14.

It will be seen from the foregoing description that the present invention provides a new and improved toy vehicle which is provided with a novel steering arrangement which is of an extremely simple design in that it is entirely devoid of any gear teeth, racks, pinions or the like, as has been employed in similar type toy vehicles heretofore known in the prior art. Accordingly, the vehicle of the present invention may be manufactured at a substantial savings in assembly time and attendant costs as compared with such heretofore known vehicles. Another feature of the present invention resides in the design of the pivotal connection between the cab and chassis portion thereof. Such a design permits convenient preassembly of the various components of the cab and chassis portions prior to assembly thereof, thus adapting the vehicle 10 of the present invention to modern mass production techniques. A further feature of the present invention resides in the convenient means for assembling and pivotably securing the cab portion to the chassis portion through the provision of the pivot shaft provided on the lower side of the cab and the bearing support arms and plastic bearings or keepers that are provided on the chassis and adapted to "snap" into operative engagement with the shaft by merely aligning the pivot shaft therewith and subsequently exerting a downwardly directed force against the cab. Thus, the present invention is not only characterized by an extremely simple steering mechanism that may be produced at a considerable savings in manufacturing time and expense, but is also characterized by a design which permits diversified manufacturing and rapid final assembly.

FIGS. 9 through 13 illustrate a slightly modified embodiment of the present invention wherein a toy vehicle 300 is shown as comprising an elongated chassis 302 adapted to be supported on a pair of steerable front wheels 304 and a pair of non-steerable rear wheels 306. The chassis 302 may be provided with any suitable "super structure" such as with a cab and dump box, for example, or with a toy passenger car body or the like (not shown), as will be apparent to those skilled in the art. The vehicle 300 is provided with a steering mechanism, generally designated 308, which is similar in construction to the steering mechanism incorporated in the aforescribed vehicle 10 and which is adapted to effect preselected movement of the front wheels 304 upon tilting movement of the chassis 302. As will hereinafter be described in detail, the basic difference between the vehicle 10 and the vehicle 300 is that the wheels 304 are movable in response to tilting movement of the chassis 302, as opposed to tilting movement of any part of the super structure which is to be provided therein, such as the cab or body portion 12 provided on the vehicle 10.

The vehicle chassis 302 is provided with a generally flat bed 310 which comprises forward and rearward sections 312 and 314, respectively, and a downwardly and rearwardly inclined intermediate section 316. A pair of laterally spaced, generally vertically disposed, downwardly projecting marginal flange portions 318 and 320 are formed along the sides of the bed 310 and are coextensive of the chassis 302, as illustrated. The forward section 312 of the chassis 302 is provided with a pair of longitudinally spaced, laterally disposed, upwardly projecting support sections 322 and 324 which are formed integrally of the bed 310 and are generally triangular-shaped, as shown. The sections 322, 324 are formed with a pair of longitudinally aligned openings 326 and 328, respectively, which are adapted to function in operatively supporting the steering mechanism 308, as will be described. Disposed immediately rearwardly of the support section 322 is a downwardly extending actuating tongue section 330 which is located centrally of the chassis 302 and is formed integrally of the bed 310, the

lower end of the tongue section being formed with a semi-circular disc portion 332 which functions in a manner hereinafter to be described. The support sections 322, 324 and actuating tongue section 330 may be formed on the chassis 302 by any suitable forming or stamping technique well known in the art.

The steering mechanism 308 comprises an enclosure member 334 which is analogous to the aforescribed housing sections 170 and 172. The member 334 is formed with a pair of longitudinally spaced, upwardly projecting sections 336 and 338. The sections 336, 338 are adapted to project upwardly through a central opening 339 formed in the chassis 302 interjacent the support sections 322 and 324, with the sections 336, 338 being juxtapositioned against the forward and rearward sides of the support sections 322 and 324, respectively, as illustrated. The 336 and 338 are formed with upwardly extending journal arm portions 340 and 342 which are formed with central rearwardly and forwardly extending annular embossments 344 and 346, respectively, that are of substantially the same diameter as the openings 326, 328 and are adapted to be received within said openings in a manner best illustrated in FIG. 11 and thereby operatively secure the enclosure member 334 upon the underside of the chassis 302. The embossments 344 and 346 and openings 326, 328 cooperate to permit relative tilting movement of the chassis 302 with respect to the steering mechanism 308, as will be apparent.

The enclosure member 334 comprises a pair of vertically spaced, laterally extending upper and lower sections 348 and 350 which define marginal end portions 352, 354 and 356, 358. The end portions 352, 354 are formed with vertically disposed openings 360, while the end portions 356, 358 are formed with vertically disposed openings 362 which are vertically aligned with the openings 360. The openings 360, 362 are adapted to operatively support a pair of kingpin members 364 which function to effect steering movement of the front wheels 304 in response to lateral sliding movement or displacement of a laterally extending tie rod member, generally designated 366. The members 364 are provided with upper and lower annular bearing portions 368 and 370, respectively, which are adapted to be rotatably received within the openings 360 and 362, respectively, whereby to permit the members 364 to be independently rotatable about laterally spaced vertical axes. The kingpin members 364 are provided with longitudinally rearwardly extending pivot arms 372 which are formed with vertically extending bores 374 therein. The bores 374 are adapted to cooperate with the tie rod member 366 in a manner hereinafter to be described. Each of the members 364 is formed with a laterally outwardly extending bore 376 within which is located a laterally outwardly extending stub shaft or axle 378 adapted to be attached by any suitable means to the front wheels 304 of the vehicle 300.

The tie rod member 366, as best seen in FIG. 13, comprises laterally outwardly projecting aligned end portions 380 and 382 which are interconnected by an integral intermediate section 384 that is formed with a generally vertically disposed, laterally extending vertically disposed slot or opening 386. The slot 386 is adapted to receive the disc-shaped portion 332 provided on the lower end of the actuating tongue section 330 similar to the analogous construction in the vehicle 10 hereinabove described. The end portions 380 and 382 of the tie rod member 366 are formed with downwardly projecting pivot pin portions 388 and 390, respectively, which are adapted to be pivotably received within the openings 374 of the kingpin members 364, whereby to pivotably connect the opposite ends of the tie rod member 366 to the members 364. The steering mechanism 308 is provided with a generally C-shaped spring 392 which is similar to the aforescribed spring 230 and comprises an intermediate section 394 and laterally spaced, longitudinally extending side sections 396 and 398. As best seen in FIG. 11, the spring is adapted to be retained upon the enclosure member 334 and have the side sections 396, 398 thereof bear against the laterally inner sides of a pair of upwardly extending embossments 400 and 402, respectively, on the tie rod member 366, and thereby function

to continuously bias the tie rod member 366 toward a position wherein it is centered with respect to the longitudinal axis of the vehicle 300, as was described in connection with the spring 230 on the vehicle 10.

Referring now to the rear wheels 306 of the vehicle 300 and more particularly, to the means for operatively securing the same to the chassis 302, as best illustrated in FIGS. 9 and 10, it will be seen that the wheels 306 are operatively supported on the opposite ends of a laterally extending axle, generally designated 404. The axle 404 is of a generally uniform diameter cylindrical-shape and projects laterally outwardly from the opposite sides of the marginal flange portions 318, 320 of the chassis 302. The flange sections 318, 320 are formed with downwardly projecting portions 406 at the rearward end of the vehicle 300 and are formed with a pair of laterally aligned vertically upwardly extending slots, generally designated 408. The slots 408 are slightly larger in cross section than the diameter of the axle 404 and are adapted to have the opposite ends thereof extend therethrough in a manner such that the axle 404 is freely rotatable therewithin. The vertical dimensions of the slots 408 are somewhat larger than the diameter of the axle 404 so that the opposite ends thereof may move upwardly and downwardly within the slots in a manner hereinafter to be described. Formed centrally of the bed 310 of the chassis 302 at a position longitudinally aligned with the slots 408 is a downwardly projecting flange section, generally designated by the numeral 410, the section 410 preferably being integral of the bed 310 and being formed by a suitable stamping operation or the like, as will be apparent. The flange section 410 is formed with a rearwardly opening slot 412 which is approximately the same longitudinal width as the slots 408 and is adapted to have a central portion of the axle 404 extend therethrough and be rotatable therewithin, as illustrated in FIG. 9. The slot 412 is formed at a vertical position within the flange section 410 so as to be arranged or aligned approximately midway between the upper and lower ends of the slots 408. With this arrangement, it will be seen that once the axle is inserted laterally through the aligned slots 408 and 412, the forward and rearward edges of the slots 408 will prevent any rearward or forward movement of the axle 404, while the upper and lower edges of the slot 412 will prevent the center of the axle 404 from moving upwardly and downwardly; however, due to the length of the slots 408 at the opposite ends of the axle 404, said opposite ends will be permitted to move upwardly and downwardly within the slots 408 about the center of the axle 404 which is retained within the slot 412 in the flange section 410. Thus, the flange section 410, in effect, acts as a fulcrum which permits tilting movement between the laterally opposite ends of the axle 404 and the chassis 302. Accordingly, the rearward end of the chassis 302 is free to tilt toward either the right or left in the manner best illustrated in FIG. 10.

In operation of the toy vehicle 300, it will be seen that the forward end of the chassis 302 is free to pivot toward the right or left about the longitudinal axis defined by the annular embossments 344, 346, while the rearward end thereof will be free to pivot or tilt toward the right and left by virtue of the above described construction of the vertical slots 408 in the marginal flange portions 318, 320 and the horizontal slot 412 formed in the central flange 410. Such pivotal movement of the chassis 302 will effect lateral sliding movement of the tie rod member 366 and rotation of the kingpins 364 and thus steering movement of the front wheels 304 of the vehicle 300. Accordingly, when the chassis 302 is tilted toward the right, for example, the tie rod member 366 will be biased toward the left, thereby rotating the kingpins 364, with the result that the wheels 304 supported on the kingpins 364 will be turned or steered toward the right. In a similar manner, leftward tilting movement of the chassis 302 will result in rightward movement of the tie rod member 366, which will in turn cause the front wheels 304 of the vehicle 300 to be turned toward the left.

While it will be apparent that the preferred embodiments illustrated herein are well calculated to fulfill the objects above stated, it will be appreciated that the present invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

I claim:

1. In combination in a toy vehicle, a vehicle chassis adapted to be laterally tilted about a generally longitudinally extending axis, a pair of relatively steerable wheels operatively mounted on said chassis, at least one relatively non-steerable wheel operatively mounted on said chassis at a position spaced longitudinally from said steerable wheels, a steering mechanism for selectively moving said steerable wheels relative to said chassis, said mechanism including a tie rod extending generally laterally of said chassis, means supporting said tie rod for lateral sliding movement, a pair of kingpins disposed adjacent the opposite ends of said tie rod for operatively supporting said wheels, means supporting said kingpins for pivotal movement about generally vertical axes and supporting one end of said chassis for relative tilting movement about an axis extending longitudinally of the vehicle, means including pivot arm means pivotably connecting the laterally outer ends of said tie rod with said kingpins, whereby lateral sliding movement of said tie rod results in pivotal movement of said kingpins and said steerable wheels supported thereon, means permitting tilting movement of said chassis with respect to said steerable and non-steerable wheels, and means for laterally sliding said tie rod in response to said tilting movement of said chassis with respect to said wheels.

2. A toy vehicle as defined in claim 1 wherein said means supporting said chassis for relative tilting movement comprises at least one journal arm projecting upwardly from said means supporting said tie rod and means on said chassis pivotably engaged with said arm.

3. A toy vehicle as defined in claim 1 which includes a pair of longitudinally spaced journal arm portions extending upwardly from said means supporting said tie rod, and a pair of support sections on said chassis pivotally engaged with said journal arm portions.

4. A toy vehicle as defined in claim 3 which includes means on the upper ends of said journal arm portions and said support sections disposed along a common longitudinal axis and pivotally supporting said chassis for relative pivotal movement.

5. A toy vehicle as defined in claim 4 which includes a pair of annular embossments and a pair of embossment receiving openings for pivotally connecting said journal arm portions with said support sections.

6. A toy vehicle as defined in claim 1 which includes a generally laterally extending enclosure means for supporting said tie rod for lateral sliding movement, a pair of longitudinally spaced upwardly projecting journal arm portions on said enclosure means, and a pair of longitudinally spaced support sections on said chassis pivotally engageable with said journal arm portions for supporting the forward end of said chassis for relative tilting movement with respect to said enclosure means.

7. A toy vehicle as defined in claim 6 which includes means depending from said chassis and movable in response to tilting movement thereof to effect lateral sliding movement of said tie rod.

8. A toy vehicle as defined in claim 7 wherein said depending means comprises a downwardly projecting tongue section, wherein said tie rod comprises a central, generally laterally extending recessed portion, and wherein said tongue section is received within said recessed portion and adapted to effect

lateral sliding movement of said tie rod in response to tilting movement of said chassis.

9. A toy vehicle as defined in claim 8 which includes housing means on said chassis, and wherein said kingpins include generally cylindrically shaped upper and lower support sections rotatably supported within the housing means.

10. A toy vehicle as defined in claim 9 wherein said tie rod comprises generally vertically disposed pivot pins, and wherein said pivot arm means are formed integrally of said kingpins and define means pivotably engageable with said pivot pins, whereby said kingpins are pivotably connected to said tie rod.

11. A toy vehicle as defined in claim 1 which includes an axle extending transversely of said chassis adapted to support a pair of non-steerable wheels, and means for operatively securing said axle to said chassis and permitting relative tilting movement therebetween.

12. A toy vehicle as defined in claim 11 which includes means for securing a central portion of said axle to a central portion of said chassis, and means connecting the laterally outer edges of said chassis to said axle in a manner such that said edges are movable toward and away from said axle.

13. A toy vehicle as defined in claim 12 which includes means located centrally of said chassis defining a generally longitudinally extending recess adapted to receive a central portion of said axle therewithin, and means adjacent the lateral edges of said chassis defining a pair of generally vertically disposed recesses adapted to receive the laterally outer ends of said axle therewithin and permit said lateral edges of said chassis to be tilted about a generally longitudinal axis extending perpendicular to said axle toward and away from said axle.

14. A toy vehicle comprising a chassis and a pair of steerable wheels,  
a steering mechanism for selectively moving said wheels relative to said chassis, and  
means providing for relative tilting movement of said chassis with respect to said steering mechanism and simultaneous actuation of said steering mechanism.

15. A toy vehicle as set forth in claim 14 wherein said steering mechanism includes a tie rod extending generally laterally of said chassis,  
means supporting said tie rod for lateral sliding movement, a pair of kingpins disposed adjacent the opposite ends of said tie rod for operatively supporting said wheels,  
means supporting said kingpins for pivotal movement about generally vertical axes and supporting one end of said chassis for relative tilting movement about an axis extending longitudinally of the vehicle,  
means including pivot arm means pivotably connecting the laterally outer ends of said tie rod with said kingpins, whereby lateral sliding movement of said tie rod results in pivotal movement of said kingpins and said steerable wheels supported thereon, and  
means for effecting lateral sliding movement of said tie rod in response to tilting movement of said chassis.

16. A toy vehicle as set forth in claim 15 which includes pivot means extending between said chassis and steering mechanism.

17. A toy vehicle as defined in claim 16 wherein said pivot means includes a pair of longitudinally spaced journal arm portions extending upwardly from said means supporting said tie rod, and a pair of support sections on said chassis pivotally engaged with said journal arm portions.

18. A toy vehicle as defined in claim 17 which includes means on the upper ends of said journal arm portions and said support sections disposed along a common longitudinal axis and pivotally supporting said chassis for relative pivotal movement.

19. A toy vehicle as defined in claim 18 which includes a pair of annular embossments and a pair of embossment receiving openings for pivotally connecting said journal arm portions with said support sections.

20. A toy vehicle as defined in claim 15 which includes a generally laterally extending enclosure means for supporting said tie rod for lateral sliding movement, a pair of longitudinally spaced upwardly projecting journal arm portions on said enclosure means, and a pair of longitudinally spaced support sections on said chassis pivotably engageable with said journal arm portions for supporting the forward end of said chassis for relative tilting movement with respect to said enclosure means.

21. A toy vehicle as defined in claim 14 which includes an axle extending transversely of said chassis adapted to support a pair of relatively non-steerable wheels, and means for operatively securing said axle to said chassis and permitting relative tilting movement therebetween.

22. A toy vehicle as defined in claim 17 which includes means for securing a central portion of said axle to a central portion of said chassis, and means connecting the laterally outer edges of said chassis to said axle in a manner such that said edges are movable toward and away from said axle.

23. A toy vehicle as defined in claim 18 which includes means located centrally of said chassis defining a generally longitudinally extending recess adapted to receive a central portion of said axle therewithin, and means adjacent the lateral edges of said chassis defining a pair of generally vertically disposed recesses adapted to receive the laterally outer ends of said axle therewithin and permit said lateral edges of said chassis to be tilted about a generally longitudinal axis extending perpendicular to said axle toward and away from said axle.

24. In combination in a toy vehicle,  
a chassis,  
a pair of relatively steerable wheels mounted at one end of said chassis and a pair of relatively nonsteerable wheels mounted at the opposite end of said chassis,  
a steering mechanism for selectively moving said steerable wheels relative to said chassis, and  
means providing for relative tilting movement of said chassis with respect to said wheels and simultaneous operation of said steering mechanism.

25. A toy vehicle as set forth in claim 24 wherein said steering mechanism includes a tie rod,  
means supporting said tie rod for lateral sliding movement, a pair of kingpins for operatively supporting said wheels,  
means supporting said kingpins for pivotal movement about generally vertical axes,  
means pivotably connecting the laterally outer ends of said tie rod with said kingpins, whereby lateral sliding movement of said tie rod results in pivotal movement of said kingpins and said steerable wheels supported thereon, and  
means for effecting lateral sliding movement of said tie rod in response to tilting movement of said chassis.

26. A toy vehicle as set forth in claim 25 which includes pivot means extending between said chassis and said steering mechanism.

27. A toy vehicle as defined in claim 26 wherein said pivot means includes a pair of longitudinally spaced journal arm portions extending upwardly from said means supporting said tie rod, and a pair of support sections on said chassis pivotally engaged with said journal arm portions.

28. A toy vehicle as defined in claim 27 which includes means on the upper ends of said journal arm portions and said support sections disposed along a common longitudinal axis and pivotally supporting said chassis for relative pivotal movement.

29. A toy vehicle as defined in claim 28 which includes a pair of annular embossments and a pair of embossment receiving openings for pivotally connecting said journal arm portions with said support sections.

30. A toy vehicle as defined in claim 25 which includes a generally laterally extending enclosure means for supporting said tie rod for lateral sliding movement, a pair of longitudinally spaced upwardly projecting journal arm portions on

said enclosure means, and a pair of longitudinally spaced support sections on said chassis pivotably engageable with said journal arm portions for supporting the forward end of said chassis for relative tilting movement with respect to said enclosure means.

31. A toy vehicle as defined in claim 24 which includes an axle extending transversely of said chassis adapted to support said relatively non-steerable wheels, and means for operative-

ly securing said axle to said chassis and permitting relative tilting movement therebetween.

32. A toy vehicle as defined in claim 31 which includes means for securing a central portion of said axle to a central portion of said chassis, and means connecting the laterally outer edges of said chassis to said axle in a manner such that said edges are movable toward and away from said axle.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,662,488 Dated May 16, 1972

Inventor(s) Robert S. Linstead

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 13, "chile" should be --child--. Column 4, line 74, "into" should be --onto--. Column 7, line 74, after "248" delete "are provided with longitudinally rearwardly extending pivot arms 248". Column 10, line 15, after "The" insert --sections--. Column 13, line 47 (claim 15), "move-ment" should be --movement-- and line 52, "connect-ing" should be --connecting--. Column 14, line 16 (claim 22), "17" should be --21-- and line 21 (claim 23), "18" should be --22--.

Signed and sealed this 26th day of December 1972.

(SEAL)  
Attest:

EDWARD M. FLETCHER, JR.  
Attesting Officer

ROBERT GOTTSCHALK  
Commissioner of Patents