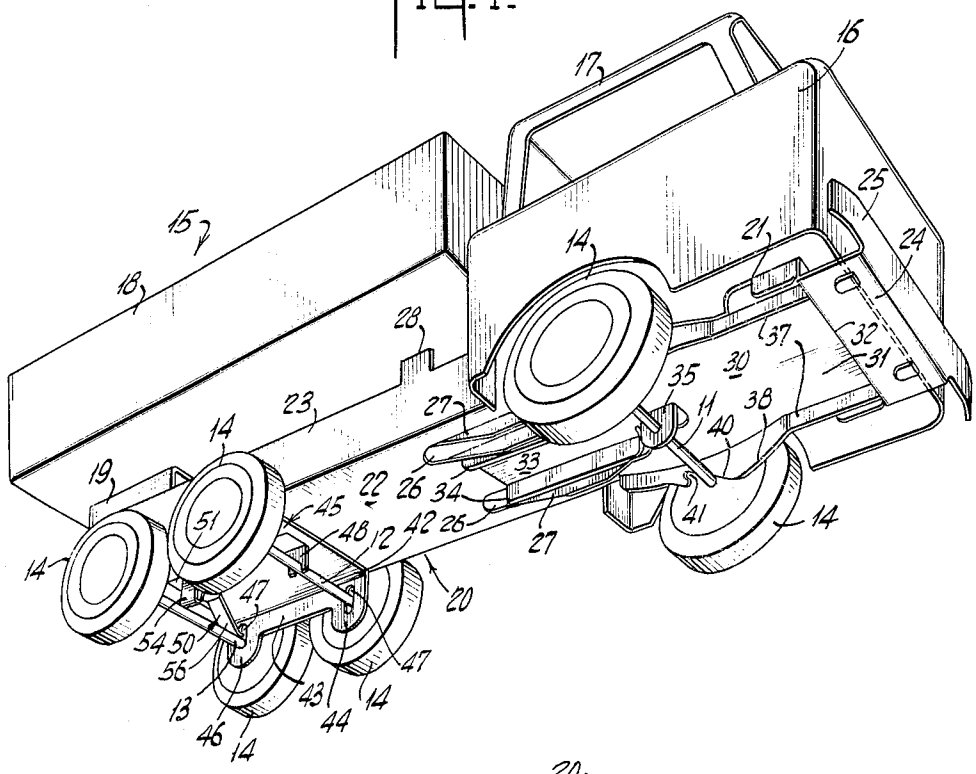
Sept. 14, 1965 W. E. NISPERLY 3,205,616

TOY TRUCK

Filed Dec. 27, 1962 4 Sheets-Sheet 1

Fig. 1.



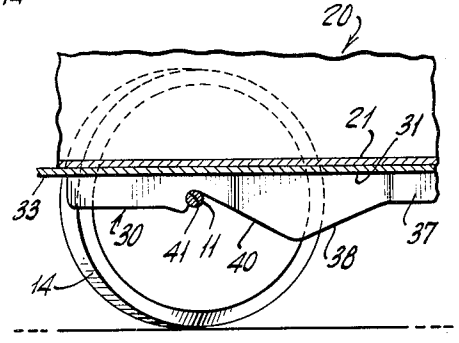


Fig. 10.

INVENTOR.
WALTER E. NISPERLY
BY Blum, Moscovitz, Friedman and Blum
ATTORNEYS

Sept. 14, 1965 W. E. NISPERLY 3,205,616

TOY TRUCK

Filed Dec. 27, 1962 4 Sheets-Sheet 2

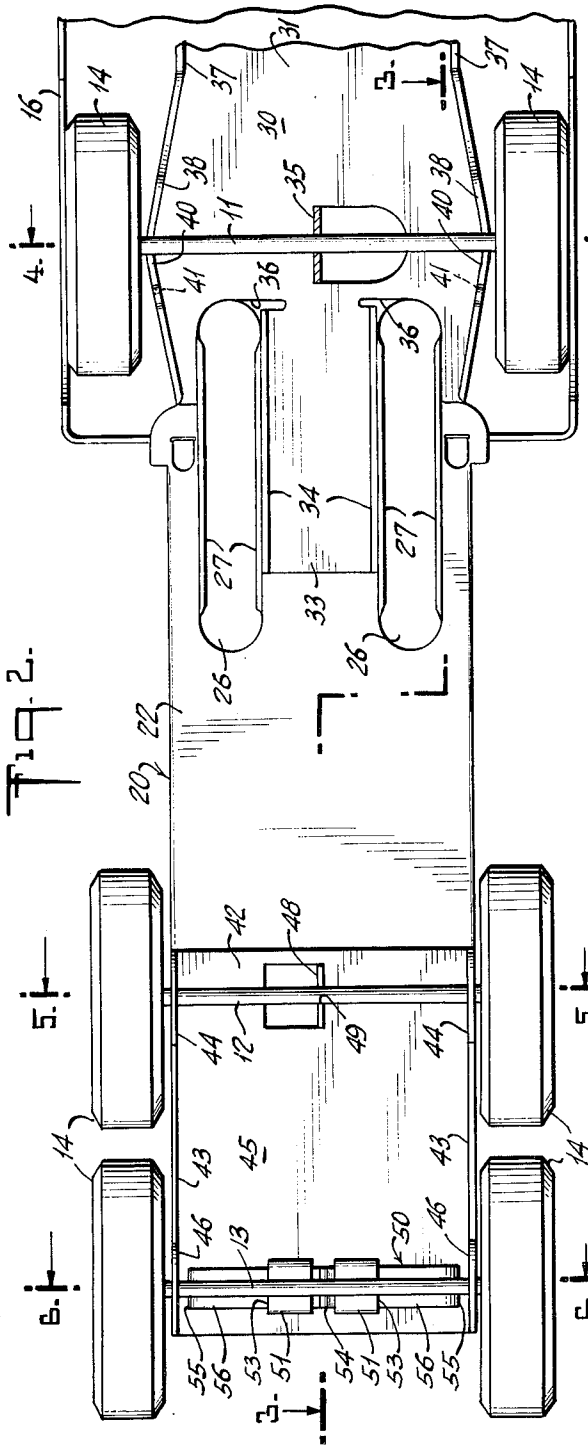


Fig. 2.

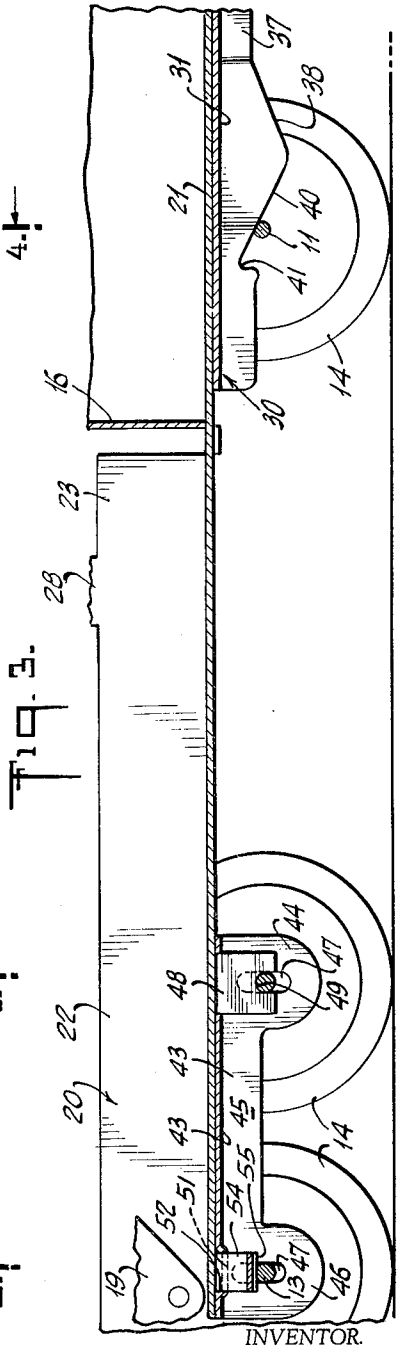


Fig. 3.

INVENTOR.
WALTER E. NISPERLY
BY Blum, Moscovitz, Friedman and Blum
ATTORNEYS

Sept. 14, 1965 W. E. NISPERLY 3,205,616

TOY TRUCK

Filed Dec. 27, 1962 4 Sheets-Sheet 3

Fig. 4.

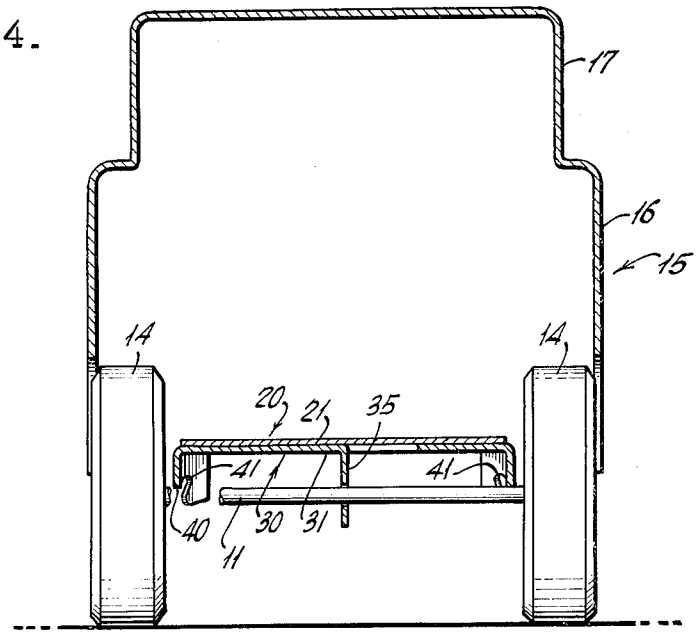


Fig. 5.

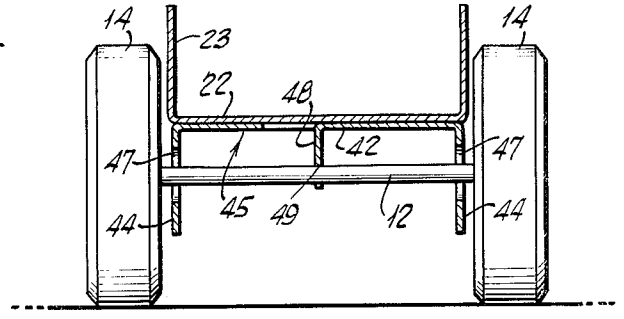
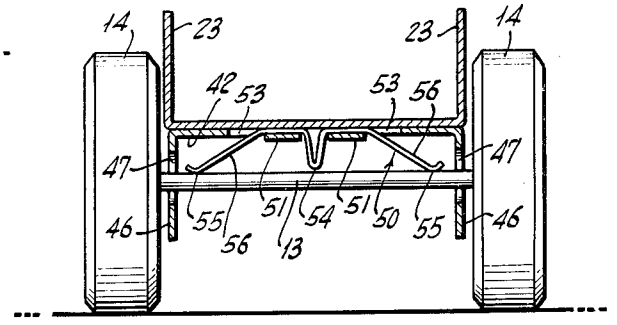


Fig. 6.



INVENTOR.
WALTER E. NISPERLY
BY Blum, Moscovitz, Friedman and Blum
ATTORNEYS

Sept. 14, 1965 W. E. NISPERLY 3,205,616

TOY TRUCK

Filed Dec. 27, 1962 4 Sheets-Sheet 4

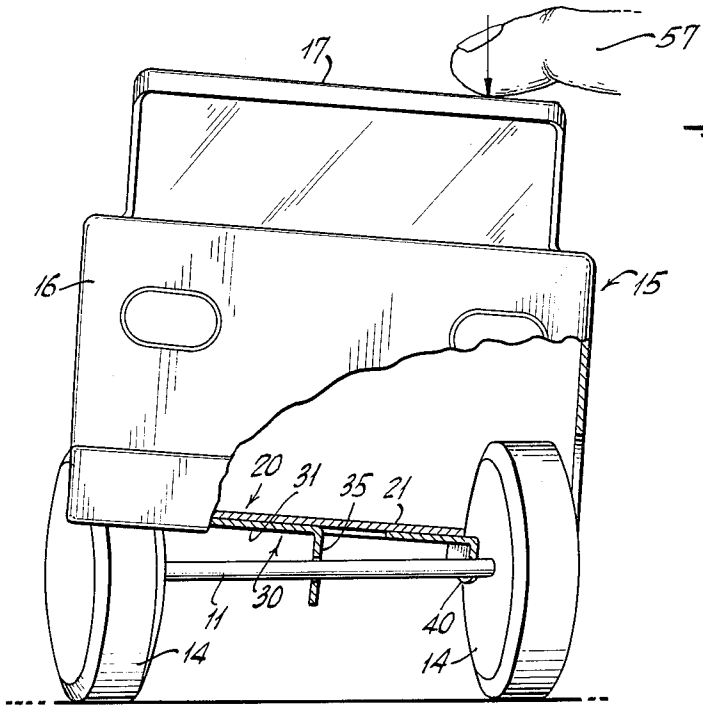
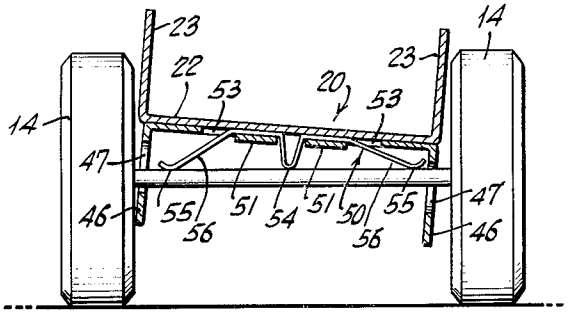


Fig. 7.

Fig. 8.



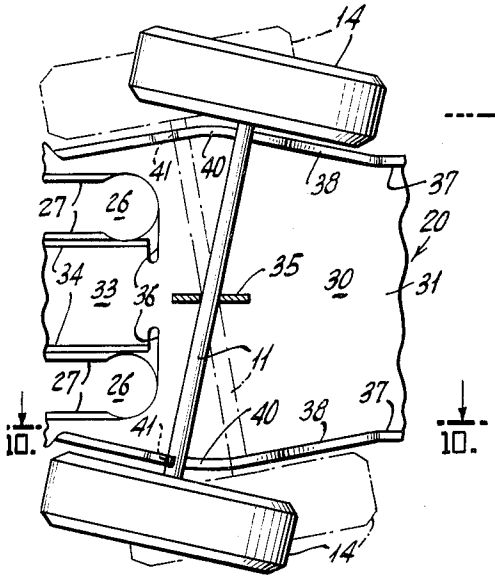


Fig. 9.

INVENTOR.
WALTER E. NISPERLY
BY Blum, Moscovitz, Friedman and Blum
ATTORNEYS

United States Patent Office 3,205,616 Patented Sept. 14, 1965

3,205,616

TOY TRUCK

Walter E. Nisperly, Glen Dale, W. Va., assignor to Louis Marx & Co., Inc., New York, N.Y., a corporation of New York

Filed Dec. 27, 1962, Ser. No. 247,621
4 Claims. (Cl. 46—201)

This invention relates generally to toy vehicles, such as trucks, capable of being steered by tilting and, more particularly, to novel means to cause the truck to return to a level position upon removal of the tilting pressure for normal straight-line travel.

Known toy vehicles of this type have several undesirable characteristics. If tilting pressure is applied to the vehicle to put the vehicle into a turn, the vehicle will continue to describe that turn because there is no means to cause it to return to the level position upon release of the tilting pressure. Furthermore, these toy vehicles have proven very unstable. They will not continue in a straightforward motion properly because the dirigible axle will keep tending to turn, thus causing the vehicle to turn in one direction or the other. If the toy vehicle happens to be of the truck variety, and there is an off-balance load within the truck body with the center of gravity to one side, the vehicle will tend to turn in the direction of the resultant tilt.

Accordingly, it is a broad object of the present invention to provide a tilting dirigible toy vehicle having an automatic leveling device which will normally keep the vehicle moving in a straight and level motion.

It is a further object of the present invention to provide a toy truck capable of being steered by means of tilting pressure applied on its cab, and which, when the pressure is removed, automatically levels itself.

It is a further object of the present invention to provide a toy truck of the character described which will be easy to move in a straight direction.

It is another object of the present invention to provide a toy truck which will have a tendency to automatically level itself when carrying an unbalanced load.

It is a general object of the present invention to provide an improved toy vehicle of the type mentioned, which is of simple structure and operation, and durable and reliable in use, and which can be economically manufactured and assembled for sale at a reasonable price.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings which form material parts 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.

In the drawings:

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

FIG. 2 is a partial bottom plan view illustrating the front and rear sections of the chassis;

FIG. 3 is a longitudinal sectional view taken along line 3—3 of FIG. 2;

FIGS. 4, 5 and 6 are transverse sectional views taken along the correspondingly numbered lines of FIG. 2;

FIG. 7 is a front elevational view, partially cut away and partially in section, showing a tilting force being applied to steer the vehicle;

FIG. 8 is a view corresponding to FIG. 6 showing the relative position of the transverse leaf spring and the rear axle during a turn;

FIG. 9 is a partial bottom plan view of the front axle and front section, showing the two extreme positions of the front axle for left and right turns; and

FIG. 10 is a sectional view taken on line 10—10 of FIG. 9.

Referring now to the drawings, and more particularly to FIG. 1, a toy vehicle, such as a truck 15, is illustrated as comprising a chassis, generally indicated at 20, a cab 16, supported upon chassis 20 and having a roof 17, and a body 18. Chassis 20 includes a main frame member 21 which extends substantially the full length of the truck, a front chassis section 30, and a rear chassis section 45. Rearwardly of cab 16, main frame member 21 is formed as an upwardly opening channel 22 having flanges 23. The forward portion of main frame 21 is substantially flat and terminates at its front end in what might be termed a transversely extending "box girder" 24, which may be continued as a front bumper 25, although this is optional. For a purpose to be described, main frame member 21 further is formed with a pair of laterally spaced elongated slots 26 having rims extending around the periphery thereof and formed as side flanges 27 rising from each end of each slot, to substantially the center portion thereof.

Optionally, the body 18 may be a dump-type body and, for this purpose, be formed integral with or have secured thereto a bracket 19 which may be hinged between the flanges 23 of channel section 22 of main frame 21. The body 18 has its forward portion supported upon uprights 28 extending upwardly from adjacent the forward end of each flange 23.

Truck 15 is supported upon two or more axles. In the particular embodiment shown in the drawing, there are three axles 11, 12 and 13, each provided with a pair of rotatable wheels 14. These axles include the front dirigible axle 11, which is mounted upon the front chassis section 30, and a pair of rear axles 12 and 13, which are mounted upon the rear chassis section 45.

The front chassis section 30 comprises a piece of sheet material, such as sheet metal, suitably cut and formed to shape. Section 30 has a top wall 31 which is flat so as to lie flat against the main frame member 21, and top wall 31 is provided with a rectilinear front edge 32 adapted to abut against the "box girder" 24 of frame member 21. It is further formed with a rearwardly extending downwardly opening channel extension 33 having side flanges 34 substantially juxtaposed to the inner flanges 27 of the rim bounding the slots 26. The combination of the rectilinear front edge 32 engaging the "box girder" 24, with the channel section 33 fitting between the flanges 27 bounding the notches 26, serves to properly longitudinally align front chassis section 30 with the main frame 21 of the chassis, and such alignment is further facilitated by notches 36 adjacent the inner ends of the channel section 33. When thus properly positioned, the front chassis section 30 may be integrated with the main frame 21 by spot welding, brazing, riveting or any other suitable method.

Somewhat forwardly of the inner ends of the notches 26, an apertured ear or central plate 35 is bent centrally from the front chassis section 30 and serves as a pivoting mount for the dirigible front axle 11 which extends through the apertured ear. Section 30 is formed with a pair of side flanges or cam plates 37 which, in their forward portions extending rearwardly from front edge 32, are substantially parallel and of substantially uniform height. From a point somewhat in advance of the front wheels 14, the flanges 37 diverge outwardly to the transverse line extending through the aperture of ear 35, and then converge inwardly. The diverging and converging portions of the flanges 37 are longitudinally symmetrical relative to the axle 11 or the transverse line through

the aperture of ear **35**. The diverging portions of the flanges **37** increase in height, as indicated at **38**, to a point somewhat forwardly of the ear **35**, and then decrease in height, or slope upwardly, as indicated at **40**, until the depth of the flanges is somewhat less than that of the forward portions thereof. The sloping portions **40** provide cam surfaces engaged by the axle **11**, as best seen, for example, in FIG. 3. At the rearward ends of the sloping portions **40**, each flange **37** is formed with a forwardly and downwardly opening notch or hook portion generally indicated at **41**.

It will be noted, particularly from FIG. 3, that at the points where the sloping edges **40** intersect the transverse line through the aperture of ear **35**, the height of the sloping portions **40** is substantially that of the uniform height of the forward portions of the flanges **37**. In normal straight line travel of the truck, the axle **11** engages cams **40** at about these points, as best seen in FIG. 3.

The aperture in the ear **35**, which acts as a pivot for dirigibility of the axle **11**, is somewhat larger than the axle so as to allow swinging of the axle in a substantially horizontal plane. In such swinging, it will be noted that one end of the axle will ride up its cam surface **40** and the other end of the axle will correspondingly ride down its cam surface **40**. Thus, by applying tilting pressure to either side of the cab **17**, as indicated in FIG. 7, the end of the axle **11** on that side will ride upwardly and rearwardly along its cam surface **40** so as to turn the wheels toward that side to which pressure is applied. The other end of the axle will ride downwardly and forwardly of its cam surface **40**. It should further be noted that the flanges **37**, along substantially the entire length of the cam surfaces **40**, are curved about radii which are substantially centered in the aperture of the ear **35**.

Rear chassis section **45** comprises a piece of sheet material, such as sheet metal, suitably bent to form a channel including a base **42** and flanges **43** providing rear axle supports. Base **42** is spot welded, brazed, riveted, or otherwise integrally secured to the frame or to the chassis **20**, and particularly the channel portion **22** thereof. The front ends of flanges **43** are increased in depth to form a pair of forward ears **44**, and the rear ends of flanges **43** are increased in depth to form a pair of rearward ears **46**. Each ear **44** or **46** is vertically slotted, as indicated at **47**. Intermediate the forward ears **44**, and transversely aligned therewith, an ear or tab **48** is bent out of the base **42** and is formed with a downwardly opening slot **49**. The upper or inner edge of slot **49** is somewhat below the upper or inner edges of the slots **47** in the forward ears **44**. The central portion of intermediate axle **12** rests in the slot **49**, and the end portions of this axle extend through the slots **47** of the forward ears **44**. Thus, axle **12** is able to tilt with respect to the truck chassis, while being maintained in lateral alignment by the slots **47**.

An important feature of the invention is the means for normally maintaining the truck level horizontally, and for restoring it automatically to a level position when the truck has been tilted to steer the same, and after the tilting pressure has been released. As best seen in FIGS. 2, 3, 6 and 8, for this purpose base **45** is formed with a relatively shallow and transversely elongated offset portion **51** between the rearward ears **46** and aligned substantially with the slots in these ears. Intermediate its ends and at substantially the center line of the chassis **20** and the chassis section **45**, off-set portion **51** is formed with a slot **52**, and slots **53** are formed in base **45** at either end of the off-set **51**.

Off-set **51** seats a leaf spring generally indicated at **50**. Leaf spring **50** has a downwardly bent fold **54** at its center forming a bearing plate which extends through the slot **52**, and which thus serves, in cooperation with the slot **52**, to center and properly position the spring **50** relative to the rear chassis member **45**. Spring **50** has its ends **56** bent downwardly to extend through the slots **53**, and these ends terminate in curved portions **55** which ride on the rear axle **13**.

The rear axle **13** extends through the slots **47** of the rearward ears **46** of chassis section **45**, and is vertically movable in these slots while being restrained against displacement in a horizotnal plane. The rear axle **13** is normally biased toward the bottom ends of the slots **47** by means of the fingers **56** and ends **55** of the leaf spring **50**, and upward movement of the rear axle **13** is limited by the center fold **54** of the spring **50**. This center fold also acts as a pivot about which the rear axle **13** may rock in a vertical plane upon tilting of the truck. Normally, the rear axle is positioned slightly above the lower ends of the slots **47** and in engagement with the center fold **54**.

To steer the truck, a tilting force is applied by a finger **57** (FIG. 7) on roof **17** of cab **16** over one of the wheels **14** of axle **11**. The resulting force causes axle **11** to pivot and the end to which pressure is applied to ride upwardly along its cam surface **40** until it is stopped by abutment or hook **41**. At this position, as shown in FIG. 10, the wheels will be turned in the direction (in this case for a left hand turn) to describe a turn.

As the front wheels are describing a turn, intermediate axle **12** will rock about slot **49** in ear **48** with guiding by slots **47** of ears **44**.

A similar rocking motion will be described by axle **13**. As seen in FIG. 8, the finger **56** of leaf spring **50** toward the side of the truck opposite to that being pressed deflect upwardly, and the other finger **56** will be deflected downwardly due to the resultant change of relative position of axle **13**. This will result in an increased reaction force being exerted against the depressed side of the truck.

When the force exerted by finger **57** is removed, leaf spring **50** will tend to cause truck **15** to resume its normal transversely level position. This in turn will cause axle **11** to resume its normal position parallel to the truck chassis, and will further cause axle **11** to assume a normal forward, straight direction. It can also be seen that leaf spring **50** will always tend to maintain the axle **11** in a normal straight ahead position in the absence of any force on the cab. This will of course prevent axle **11** from riding along its cam surfaces **40** upon passing over any uneven surfaces in the ground.

The leaf spring will also tend to right unbalanced loads carried within the load body over the rear wheels, further permitting general straight forward motion in the absence of any directional force.

As can be seen from FIGS. 5 and 6, any relative vertical displacement, during straight and level travel, of axles **12** and **13** can be easily accommodated, much in the manner of shock absorber constructions.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

I claim:

1. A dirigible toy vehicle comprising a longitudinal frame having front and rear ends, a front transverse axle having a wheel mounted at each end thereof, means swingably mounting said front axle to said frame proximate said front end of said frame, said means being constructed and arranged to effect a turning of said front axle in a steering direction when said frame is rocked about its longitudinal axis, a rear transverse axle having a wheel mounted at each end thereof, a pair of spaced axle supports projecting downwardly from said frame proximate to the rear end thereof, a vertical elongated slot in each of said axle supports, said slots being in alignment on a line transverse to the longitudinal axis of said frame, said rear transverse axle being freely received through said elongated slots, said wheels being outboard

of said axle supports, spring means acting between said frame and said rear transverse axle immediately inboard of said axle supports, to urge said rear transverse axle away from said frame and a bearing plate extending downwardly from said frame substantially within the vertical plane passing through the central longitudinal axis of said frame, the lower edge of said bearing plate extending toward said rear transverse axle and extending below a line connecting the uppermost edges of said vertical elongated slots in said axle supports, whereby on deflection of said rear transverse axle against said spring means, the central portion of said axle will strike said bearing plate to limit the vertical movement of said axle within said elongated slots while permitting said frame to rock relative to said axle about the pivot formed between the lowermost edge of said bearing plate and said rear transverse axle.

2. The structure defined in claim 1 wherein said bearing plate and said spring means are formed from a single leaf spring having a central depending portion and outer downwardly projecting ends, said outer ends adapted to contact said rear transverse axle immediately inboard of said axle supports, portions of said leaf spring intermediate said central depending portion and said outer projecting ends being secured to said vehicle frame.

3. A dirigible toy vehicle comprising a longitudinal frame having front and rear ends, a front transverse axle having a wheel mounted at each end thereof, means swingably mounting said front axle to said frame proximate said front end of said frame, said means being constructed and arranged to effect a turning of said front axle in a steering direction when said frame is rocked about its longitudinal axis, a rear transverse axle having a wheel mounted at each end thereof, a pair of spaced axle supports projecting downwardly from said frame proximate to the rear end thereof, a vertical elongated slot in each of said axle supports, said slots being in alignment on a

line transverse to the longitudinal axis of said frame, said rear transverse axle being freely received through said elongated slots, said wheels being outboard of said axle supports, and spring means acting between said frame and said rear transverse axle immediately inboard of said axle supports, to urge said rear transverse axle away from said frame, wherein said means swingably mounting said front axle to said frame comprise a central plate depending from said frame in the vertical plane passing through the central longitudinal axis of said frame, an aperture through said plate through which said front transverse axle is freely received, a cam plate projecting downwardly from said frame immediately inboard each of the wheels mounted at the ends of said front axle, the lower edge of each cam plate forming a cam surface, the cam surface at the point of contact of said front transverse axle when said transverse axle is perpendicular to the longitudinal axis of said frame being the same distance from said frame as the uppermost edge of the aperture through said depending plate, the distance of said cam surface from said frame increasing toward the front end of said frame and decreasing toward the rear end of said frame.

4. The structure defined in claim 3 wherein the cam surface of each cam plate defines a curved line formed on a radius whose center approximates the point of pivot contact between said front transverse axle and the aperture through said depending plate.

References Cited by the Examiner

UNITED STATES PATENTS

2,216,497	10/40	McHenry	46—201
2,870,566	1/59	Hofler	46—214
2,908,997	10/59	Handler	46—111

RICHARD C. PINKHAM, *Primary Examiner.*