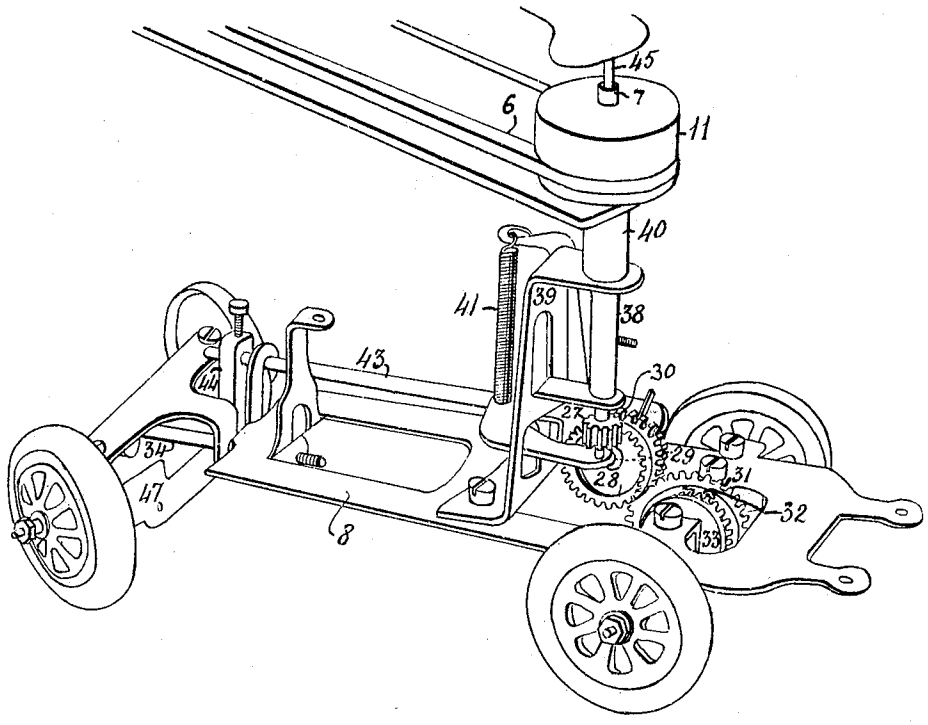
Sept. 19, 1933. A. R. FORNER 1,927,233

MECHANICAL TOY

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FIGURE I



INVENTOR

AGUSTIN REDO FORNER

By Emil Bönnelycke

ATTORNEY

Sept. 19, 1933. A. R. FORNER 1,927,233

MECHANICAL TOY

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FIGURE 2

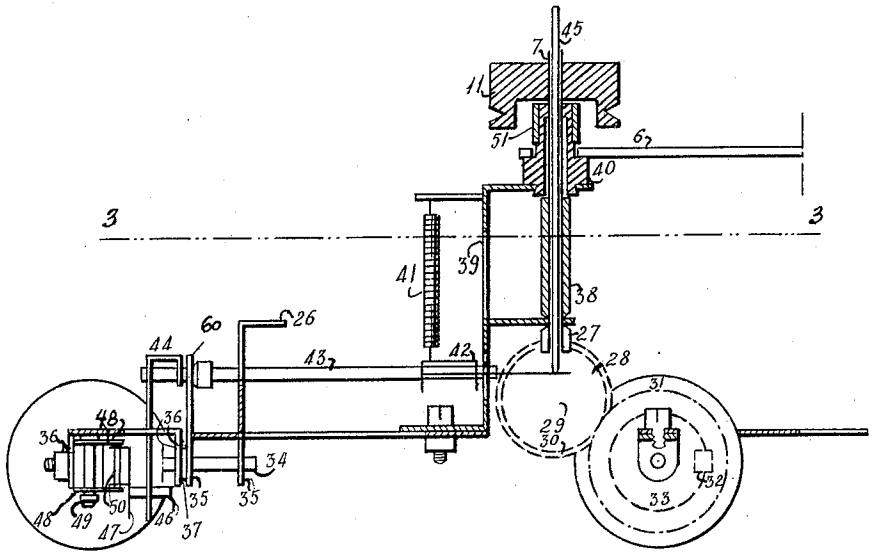
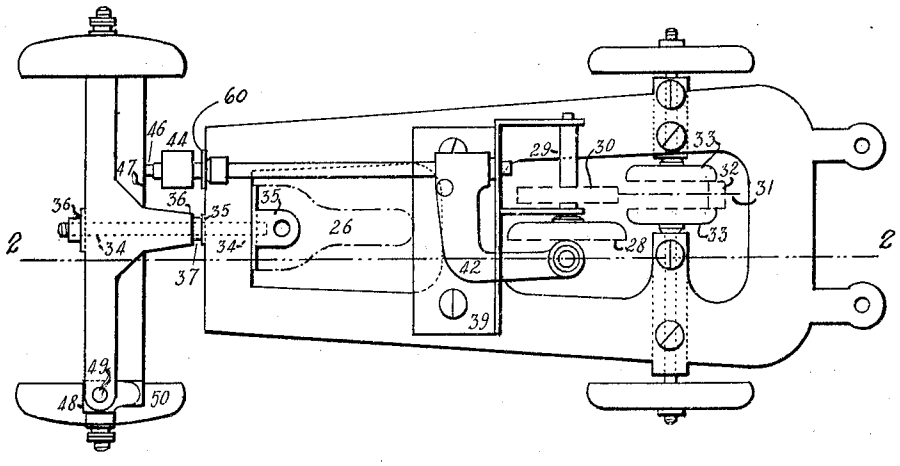


FIGURE 3



INVENTOR

AGUSTIN REDO FORNER

By Emil Bönnehycke

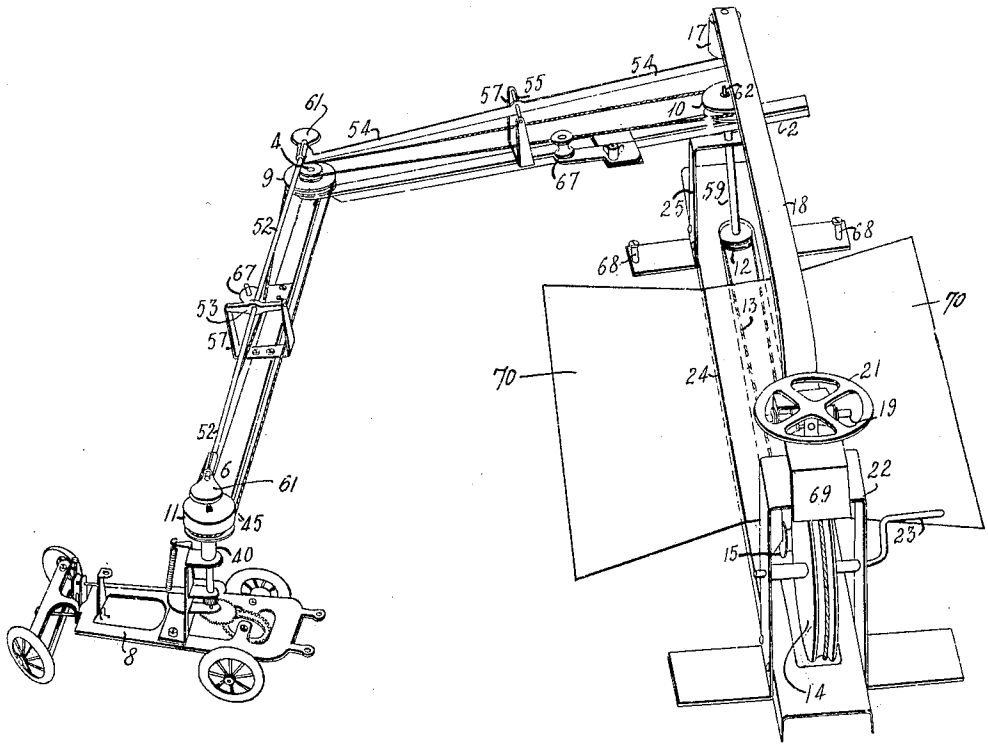
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MECHANICAL TOY

Filed June 1, 1932 4 Sheets-Sheet 3

FIGURE 4



INVENTOR

AGUSTIN REDO FORNER

By Emil Bönnelycke

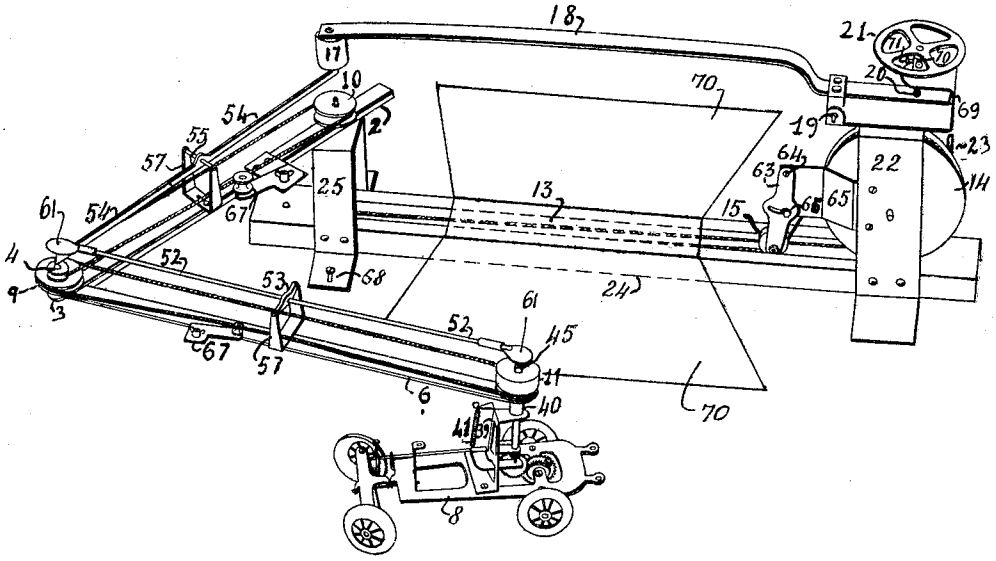
ATTORNEY

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MECHANICAL TOY

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FIGURE 5



INVENTOR

AGUSTIN REDO FORNER

By Emil Bönnelycke

ATTORNEY

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1,927,233

MECHANICAL TOY

Agustín Redó Forner, Denia, Spain

Application June 1, 1932, Serial No. 614,835, and in Spain June 26, 1931

21 Claims. (Cl. 46—48)

This invention relates to a mechanical toy and more particularly has reference to a miniature vehicle constituted by an assembly of mechanisms which is propelled and steered by means external thereto.

An object of this invention is to provide a mechanical toy vehicle which is driven and steered by remote control mechanism.

In the accompanying drawings I have shown means for carrying the concept of my invention into practical effect, without limiting the improvements in their useful application to the particular construction, which, for the purpose of explanation, have been made the subject of illustration.

In the drawings:

Figure 1 is a perspective view of the toy vehicle constructed in accordance with this invention.

Fig. 2 is a sectional view taken on the vertical plane 2—2 of Fig. 3.

Fig. 3 is a sectional view taken on the horizontal plane 3—3 of Fig. 2.

Fig. 4 is a perspective view of the entire assembly.

Fig. 5 is also a perspective view of the entire assembly in a different position.

In all the figures, the body portion of the vehicle is shown removed, this body usually simulating that of the conventional full size.

In accordance with the present invention, a miniature automobile is universally connected by means of a two-bar linkage with a fixed control unit and power is transmitted from the control unit to the miniature automobile through elements associated with the two-bar linkage. Means are provided for transmitting motion from the control unit to the driving wheels of the miniature vehicle and additional means are provided for transmitting steering movement from the control unit to the steering wheels of the miniature vehicle. The connections between the control unit and the toy vehicle is so made that the vehicle may be operated to traverse the area defined by the extended limit of the two-bar linkage.

As shown in Figs. 4 and 5, the control unit comprises fixed standards 22 and 25 connected by a horizontal frame member 24 to form supporting structure for the control mechanism. The lower ends of the standards 22 and 25 are provided with horizontally extending flanges which serve as a base for the control unit. In order to insure the proper leveling of the frame of the control unit the horizontal base flanges of the standard 25 are provided with leveling screws 68.

Mounted in the standard 25, herein designated as the inner standard, there is a vertical hollow shaft 59 which extends through and above the top of the standard and to the upper end of which is connected an arm 2. Arm 2 is freely swingable about shaft 59 and carried at its end 3 a pin 4 by means of which the end 5 of arm 6 is pivotally connected to arm 2. The pivotally connected arms 2 and 6 form the linkage hereinbefore referred to. Means are provided for pivotally connecting the toy automobile to the free end of the link or arm 6. With the connections described between standard 25 of the control unit and the toy automobile, the vehicle can occupy any position within a circle having the axis of the hollow shaft 59 for its center and the sum of the lengths of the arms 2 and 6 for its radius. The connection between the arm 6 and the vehicle is effected by means of a bushing 40 extending through a circular opening in arm 6 which permits free turning of the vehicle relative to arm 6. This is clearly shown in Fig. 2.

It will be realized from the foregoing description that the toy automobile 8 can be moved in any direction within the circle defined by a radius equal to the sum of the lengths of arms 2 and 6. Now, by transmitting tractive power to the drive wheels of the toy vehicle, it can be driven within the aforementioned radius. In order to transmit power to the vehicle, the following described structure is employed:

Inside the hollow vertical shaft 59 is arranged a vertical spindle 62 which extends beyond the hollow shaft at its top and bottom and carries a pulley 10 at its upper end and a pulley 12 at its lower end. On the joint pin 4 between the two arms, there is arranged a pulley 9 with two grooves of which the upper one is lined with rubber. The pulley 14 mounted on the standard 22 transmits motion through a cord to the pulley 12, and the pulley 10 transmits the drive to the upper groove of the pulley 9. The lower groove of the latter transmits the motion to the pulley 11 mounted on the hollow vertical shaft 7 of the vehicle. The three transmission cords between all these pulleys are each provided with a tensioning roller. The cord 13 between the pulleys 12 and 14 is guided by a pulley 15 on a horizontal axis which also serves to change the direction of the cord. This pulley is mounted in an arm 63 which can rotate on a horizontal pin 64 fixed to a bracket 65 connected

to the standard 22. The arm 63 can be secured in adjusted position by a clamp screw 66 extending through a slot therein. Tension rollers 67 adapted to regulate the tension in the several cords are mounted on arms 2 and 6.

With this structure rotary motion imparted to pulley 14 by the crank 23 will be transmitted through the various belts or cords and the pulleys 12, 10 and 9 to pulley 11 mounted on shaft 7. Thus, motion of crank 23 is transmitted to shaft 7 on the toy vehicle and from shaft 7 it is transferred to the drive wheels, as will be hereinafter described.

As mentioned above, pulley 11 (Figs. 1, 2 and 3) is connected to a hollow vertical shaft 7 which, at its lower end, carries a pinion 27 engaging a crown gear 28 on a horizontal shaft 29. On this shaft 29 is also mounted another gear wheel 30 engaging a gear wheel 31 carrying a small satellite pinion 32. This satellite pinion meshes with crown gears 33 connected to the shafts of the driving wheels of the vehicle in a manner similar to that ordinarily employed in the construction of the differential of full-sized automobiles.

The hollow shaft 7 rotates in two bearings and is held between them by means of a collar in the form of a tube 38 which is connected thereto by a screw. The lower bearing is formed in a horizontal extension constituted by a bracket 39, which is flanged at its lower end for connection to the rear part of the frame by means of screws and nuts enabling the bracket to be removed. The upper bearing is a bore located at the uppermost portion of a bushing 40 connected to a horizontal flange formed on the top of the bracket 39. Adjustment or contact is effected only at the upper part of the said bushing 40 and all the rest of it has an interior diameter which exceeds by approximately one-half a millimeter that of the hollow shaft 7. The pulley 11 may be made of wood and is connected to its shaft 7 by means of a screw terminating in a knurled knob adapted for manual operation. The horizontal shaft 29 carrying gears 28 and 30 rotates in bearings formed in two lugs extending from the bracket 39. Thus, it will be realized that bracket 39 serves to support most of the mechanical movements carried by the toy vehicle.

From the foregoing description, it will be realized that movement of the pulley 14 will be transferred through the three belts and pulleys 12, 10 and 9 to pulley 11 which is fixed to hollow shaft 7. From shaft 7 motion is transmitted through pinion 27 fixed thereto to crown gear 28 fixed to the horizontal shaft 29. Since gear 30 is fixed to shaft 29 and meshes with the ring gear 31 of the differential, rotation of shaft 29 is transmitted to the ring gear. As stated before, the ring gear 31 carries the small pinion which meshes with the two bevel or crown gears 33 fixed to the right and left rear wheel shafts, respectively. Just as in the case of a full-sized automobile, rotation of the ring gear 31 will impart motion to the rear wheels and the toy vehicle will be placed in motion.

In order that the four wheels of the vehicle may bear constantly and simultaneously on the surface of the floor, the frame of the vehicle is made of two parts connected by a horizontal shaft 34 at right angles to the shaft of the rear wheels. One of these parts is the chassis proper and the other is the front wheel assembly. Shaft 34 is firmly secured in lugs 35 depending from the front end of the chassis proper. The front part of the shaft traverses two other lugs 36 extending from the front wheel assembly. Between the two parts of the frame there is inserted a washer 37, and on the foremost portion of the shaft 34 there is mounted a nut in order to prevent the separation of the frame members, which nut may be removed to dismantle the device. The part of the vehicle body above the front part of the frame permits the latter to turn about the shaft 34 and limits the amplitude of movement of the same in both directions. The rotation should not be greater than about 5° on each side, that is to say, 10° in all.

To provide for steering the toy vehicle, the foremost member of the two-part frame which constitutes a front wheel assembly has vertically extending king pins 49 positioned on each side thereof. The spindles carrying the front wheels are mounted on brackets 48 having upper and lower horizontal flanges through which the king pins 49 extend. Each of the brackets 48 has a vertical pin 50 extending between the upper and lower flanges. To pins 50 are pivotally connected the ends of a tie rod 47. The tie rod is formed of a flat piece of material provided with horizontally extending ears on each end thereof which are apertured to receive the pins 50.

Adjacent one end of tie rod 47 is a rearwardly extending pin 46. It will be realized that by shifting the tie rod 47 from side to side the front wheels may be turned to guide the vehicle in the desired direction.

To effect steering by shifting of the tie rod, a horizontal shaft 43 is provided. Shaft 43 is mounted in two bearings, one of which is provided by the bracket 39 and the other of which is provided by an upwardly extending bracket 60 at the front of the chassis. This bracket may be notched to permit ready removal of shaft 43. On the forward end of shaft 43 is fixed a lever or arm 44 the lower free end of which is bifurcated to provide a slot for the reception of the rearwardly extending pin 46 carried by the tie rod 47. With this construction, rocking of shaft 43 will cause the steering wheels to be turned.

Rocking of shaft 43 is effected by moving a lever 42. Movement of lever 42 is produced by depressing a steel rod 45 extending axially through the hollow shaft 7. The free end of lever 42 is bent, as shown in Fig. 3, to extend through an opening in bracket 39 and under the lower end of rod 45 to receive movement therefrom without interfering with the bracket 39 and its associated structure. A spring 41 extends between lever 42 and a lug carried by bracket 39 for urging the lever in an upward direction. Upward movement of lever 42 is limited by bracket 39 and the lower end of shaft 7. As clearly shown in Figs. 1 and 2, rod 45 extends upwardly through shaft 7 and is depressed by a mechanism to be described hereinafter to effect steering of the toy vehicle.

Now, in order to effect steering from the control unit, I employ a series of levers associated with links or arms 2 and 6 and the control unit. As more clearly shown in Figs. 4 and 5, link 6 has a bracket 57 with upwardly extending arms mounted midway thereof. This bracket has the fulcrum 53 of a lever 52 mounted therein. Each end of lever 52 is provided with a plate-like member 61. One of the plates 61 engages the upper end of rod 45 and on rocking of lever 52 about its fulcrum 53 the rod 45 is moved axially down-

wardly. The plate at the other end of lever 52 is mounted over the center of pin 4.

Arm 2 has a lever 54 mounted thereon by a bracket 57 supporting the fulcrum 55 thereof. The free ends of lever 54 are upturned and pointed so as to reduce friction in movement of the linkage. One of the upturned ends engages the lower surface of plate 61 over pin 4 and the other end engages the lower surface of a plate-like member 17 mounted over the center of shaft 59. With this arrangement, downward movement of the member 17 will cause rocking of levers 54 and 52 and downward movement of the rod 45.

Member 17, which is of appreciable weight, is carried on one end of a lever 18 fulcrummed on a horizontal pin 19 supported by a bracket formed on the top of standard 22. The other end of lever 18 is engaged by the end of a screw 20 vertically mounted in a threaded aperture in bracket 69. A hand wheel 21 is fixed to screw 20 and serves as a means of rotating the same. Collars 70 with set screws 71 are mounted on screw 20 on each side of the member 69 to limit the movement of the screw 20.

Since member 17 is of appreciable weight and is mounted on the long arm of lever 18, a slight turning of screw 20 will either lift or lower weight 17 and thereby effect movement of the steering wheels of the toy vehicle.

From the foregoing description it will be appreciated that the vehicle may be driven and steered in any desired direction within the circle defined by a radius equal to the sum of the lengths of arms 2 and 6.

As stated before, the connection between lever 6 and the vehicle is such as to permit free relative turning.

Reference character 51 designates a collar mounted on the upper end of the bushing 40 to retain the arm 6 in position thereon. The end of arm 6 has an aperture traversed by the bushing 40 which is formed with a shoulder supporting the said arm. The connection of the arm 6 and bushing 40 is very loose to permit free movements of the vehicle and the conforming of its four wheels to the inequalities of the surface over which the vehicle travels. The collar 51 fits smoothly on the bushing 40 and is connected thereto by a small screw embodied in the bore formed in the bushing, which latter in its upper portion is a direction indicator.

All the various parts of the body or cover, including the fore and rear bumpers, the roof, bonnet, wind-screen, headlights, mudguards, steps, spare wheels, etc., form one single piece which, by means of rubber washers, is united to the rear part of the chassis at three points: two of them are in the tongues situated at the extreme part thereof and the other is on the mount 26 26 (Figures 2 and 3), which mount, developed and flattened, appears drawn in dot-and-dash lines in Figure 3. The connection is effected by means of screws so that the whole body can be mounted and dismounted easily.

In order to permit the vehicle to run over the member 24, small ramps 70, which may be made of cardboard, can be provided.

From the foregoing description it will be gathered that the present invention provides a novelty toy which will be very amusing and instructive.

I claim:—

1. A mechanical toy comprising in combination: a miniature vehicle, a fixed frame comprising a central standard and an outer standard connected by a longitudinal member, connections between the central standard and the vehicle permitting the movement of the vehicle in any direction and sense around the central standard within a radius defined by said connections, means for imposing movements of rotation to the wheels of the vehicle from a point on the outer standard, and means for steering the vehicle at will from another point of the outer standard.

2. In a mechanical toy according to claim 1, a vehicle mounted on a frame comprised of two parts which can rotate about a horizontal shaft, each of said parts carrying a pair of wheels of which the front wheels are steering wheels and the rear wheels are driving wheels, the axles of said driving wheels, which geometrically lie in alignment, being perpendicular to the shaft of rotation of the two parts composing the frame.

3. In a mechanical toy according to claim 1, a hollow vertical shaft extending from the vehicle and rotating in vertically spaced bearings mounted on the latter, the exterior portion of the upper bearing projecting from the vehicle and serving to provide a pivotal connection between the vehicle and the means connecting it to the central standard of the frame, the vertical hollow shaft carrying at its upper end a pulley for receiving rotary motion from a source external to the vehicle, and carrying at its lower end a pinion for transmitting the motion to the rear or driving wheels of the vehicle, and a sliding rod in the interior of the hollow vertical shaft of the vehicle for the transmission of steering motion from an external source to the steering mechanism carried by the vehicle.

4. In a mechanical toy according to claim 1, a hollow vertical shaft extending from the vehicle and rotating in vertically spaced bearings mounted on the latter, the exterior portion of the upper bearing projecting from the vehicle and serving to provide a pivotal connection between the vehicle and the means connecting it to the central standard of the frame, the vertical hollow shaft carrying at its upper end a pulley for receiving rotary motion from a source external to the vehicle, and carrying at its lower end a pinion for transmitting the motion to the rear or driving wheels of the vehicle, a sliding rod in the interior of the hollow vertical shaft of the vehicle for the transmission of steering motion from an external source to the steering mechanism carried by the vehicle, a gear wheel the geometric axis of which coincides with the geometric axis of the driving wheels, a satellite pinion carried by said gear wheel and meshing with two gear wheels, each of which is fixed to the shaft of a vehicle driving wheel to constitute a differential mechanism similar to the differential mechanisms of ordinary automobiles.

5. In a mechanical toy according to claim 1, a frame comprising two portions connected by a longitudinal horizontal shaft permitting relative rotation between the front and rear portions, the front portion carrying only the front wheels with their steering mechanism connecting them, and a rear frame member carrying the drive wheels and all the rest of the vehicle including the vehicle body with all its accessories, one member being capable of rotating relatively to the other about the said shaft for the purpose of permitting the four wheels of the vehicle to conform constantly and simultaneously to the other quali-

ties and obstacles of the surface over which the vehicle travels.

6. In a machincal toy according to claim 1, a hollow vertical shaft extending from the vehicle and rotating in vertically spaced bearings mounted on the latter, the exterior portion of the upper bearing projecting from the vehicle and serving to provide a pivotal connection between the vehicle and the means connecting it to the central standard of the frame, the vertical hollow shaft carrying at its upper end a pulley for receiving rotary motion from a source external to the vehicle, and carrying at its lower end a pinion for transmitting the motion to the rear or driving wheels of the vehicle, a sliding rod in the interior of the hollow vertical shaft of the vehicle for the transmission of steering motion from an external source to the steering mechanism carried by the vehicle, a horizontal longitudinal shaft mounted in the forward portion of the vehicle frame and having connected thereto two levers, one of which levers engages and is actuated by the lower portion of said rod which slides in the hollow vertical shaft of the vehicle, a spring which tends to move said lever and rod upwardly, the other lever having a groove in the free end thereof in which slides a projection of a member which directly controls the direction of the steering wheels.

7. In a mechanical toy according to claim 1, a hollow vertical shaft extending from the vehicle and rotating in vertically spaced bearings mounted on the latter, the exterior portion of the upper bearing projecting from the vehicle and serving to provide a pivotal connection between the vehicle and the means connecting it to the central standard of the frame, the vertical hollow shaft carrying at its upper end a pulley for receiving rotary motion from a source external to the vehicle, and carrying at its lower end a pinion for transmitting the motion to the rear or driving wheels of the vehicle, a sliding rod in the interior of the hollow vertical shaft of the vehicle for the transmission of steering motion from an external source to the steering mechanism carried by the vehicle, a horizontal longitudinal shaft mounted in the forward portion of the vehicle frame and having connected thereto two levers, one of which levers engages and is actuated by the lower portion of said rod which slides in the hollow vertical shaft of the vehicle, a spring which tends to move said lever and rod upwardly, the other lever having a groove in the free end thereof in which slides a projection of a member which directly controls the direction of the steering wheels, a vertical bracket connected to the rear portion of the frame in which bracket are formed five flanges, two of which provide upper and lower journals for the vertical hollow shaft of the vehicle, the lower journal consisting in a bore formed in one of the flanges and the upper journal being provided by the upper portion of a member connected in another flange of the bracket, two other flanges each having bores for a shaft carrying gears for transmitting rotation from the pinion of the hollow vertical shaft to the driving wheels, and the other flange having a hook receiving the end of said spring, said bracket also having an opening through which extends the lever to which the other end of the spring is connected.

8. In a mechanical toy according to claim 1, a body similar to an automobile with a motor formed of a single member comprising front and rear bumpers, roof, hood, wind shield, headlights, mud guards, steps, spare wheels, which single body is connected to the rear portion of the vehicle frame at three points, two of which are in tongues situated at the outer rear end of the said member and the other in a small lug at the opposite end of the vehicle frame.

9. In a mechanical toy according to claim 1, in which the longitudinal member of the fixed frame is in the form of a channel member underneath which passes a transmission belt for transmitting motion from the means on the external standard to drive the vehicle around the central standard, while the exterior standard is located far enough away from the central standard so that the vehicle can traverse the space between the standards.

10. In a mechanical toy according to claim 1, connecting means between the central standard and the vehicle comprising a vertical hollow shaft, the upper and lower bearings of which are located respectively in the upper portion of the central standard and in the longitudinal member to which the standard is connected, said hollow shaft extending from the top of the central standard and connected at its upper end to an arm, the other end of which carries a vertical pin to which is jointed a second arm, the other end of the second arm having a bore for connecting the arm to a bushing extending from the upper part of the vehicle, said connecting means permitting the vehicle to move in all directions around the central standard and to adapt itself to all the inequalities or obstacles of the surface on which it travels and to ride over the edge presented by the longitudinal member to which are connected the fixed central and outer standards, the vehicle remaining always connected to the central standard by means of the aforesaid two articulated arms.

11. In a mechanical toy according to claim 1, cardboard ramps extending from both sides of the horizontal channel member to which the central and outer standards are connected, said ramps permitting the vehicle to ride over the horizontal channel bar.

12. In a mechanical toy according to claim 1, connecting means between the central standard and the vehicle comprising a vertical hollow shaft, the upper and lower bearings of which are located respectively in the upper portion of the central standard and in the longitudinal member to which the standard is connected, said hollow shaft extending from the top of the central standard and connected at its upper end to an arm, the other end of which carries a vertical pin to which is jointed a second arm, the other end of the second arm having a bore for connecting the arm to a bushing extending from the upper part of the vehicle, said connecting means permitting the vehicle to move in all directions around the central standard and to adapt itself to all the inequalities or obstacles of the surface on which it travels and to ride over the edge presented by the longitudinal member to which are connected the fixed central and outer standards, the vehicle remaining always connected to the central standard by means of the aforesaid two articulated arms, rotatable in the hollow vertical shaft mounted in the central standard and projecting from the top and bottom of the hollow shaft, said spindle having at each of its ends grooved pulleys for transmitting driving power from the outer standard to the vehicle, the groove of the lower pulley being lined with rubber.

13. In a mechanical toy according to claim 1, connecting means between the central standard and the vehicle comprising a vertical hollow shaft, the upper and lower bearings of which are located respectively in the upper portion of the central standard and in the longitudinal member to which the standard is connected, said hollow shaft extending from the top of the central standard and connected at its upper end to an arm, the other end of which carried a vertical pin to which is jointed a second arm, the other end of the second arm having a bore for connecting the arm to a bushing extending from the upper part of the vehicle, said connecting means permitting the vehicle to move in all directions around the central standard and to adapt itself to all the inequalities or obstacles of the surface on which it travels and to ride over the edge presented by the longitudinal member to which are connected the fixed central and outer standards, the vehicle remaining always connected to the central standard by means of the aforesaid two articulated arms, a pulley fixed on a horizontal shaft in the outer standard, a guided cord for transmitting rotary movement from said pulley to a lower pulley on a spindle which rotates inside said hollow vertical shaft mounted in the central standard, another pulley on the upper end of said shaft connected by a transmission cord engaging the upper groove of a pulley mounted at the jointed articulation between the two arms, the movement of this pulley being transmitted by a belt to a pulley mounted on a hollow vertical shaft extending through said bushing of the vehicle, and means for transmitting movement from said latter shaft to the driving wheels of the vehicle.

14. A mechanical toy comprising a stationary member, a toy vehicle, a multi-bar linkage connecting the toy vehicle with the stationary member, and means carried by the linkage for transmitting driving and steering motion from the stationary member to the toy vehicle.

15. A mechanical toy comprising a stationary member, a toy vehicle, a link pivoted to swing horizontally about said stationary member, a second link pivoted to the free end of the first link, the free end of the second link being pivotally connected to a vertical bushing on the vehicle, a hollow vertical shaft carried by the vehicle and mounted in said bushing, said shaft being connected to the drive wheels of the vehicle for transmitting motion thereto, a pulley fixed to the hollow shaft, a pulley carried by the joint between the links, a belt connecting said pulleys, a pulley on the stationary member, a belt connecting this pulley with the pulley at the link joint, and means for moving the pulley on the stationary member.

16. A mechanical toy comprising a stationary member, a toy vehicle, a link pivoted to swing horizontally about said stationary member, a second link pivoted to the free end of the first link, the free end of the second link being pivotally connected to a vertical bushing on the vehicle, a horizontal fulcrum carried by each link between its ends, a lever mounted on each fulcrum, the levers on the links engaging each other, means on the stationary member for moving the free end of the lever carried by the first link, and means on the vehicle for transmitting movement of the free end of the lever on the second link to the steering mechanism of the vehicle.

17. A mechanical toy according to claim 16, in which the means on the stationary member for moving the levers on the links comprises a lever mounted on a horizontal fulcrum, one end of which engages the end of a screw, a weight on the other end adapted to engage the free end of the lever on the first link, and a hand-wheel carried by said screw for operating the connected levers to steer the vehicle.

18. A mechanical toy comprising a control unit, a movable toy member, a multi-bar linkage connecting the toy member with the control unit, and means for transmitting operating and steering motion from the control unit to the toy member.

19. A mechanical toy comprising a control unit, a movable toy member, a multi-bar linkage connecting the toy member with the control unit, and means carried by the linkage for transmitting operating and steering motion from the control unit to the toy member.

20. A mechanical toy comprising a control unit, a movable toy member, a multi-bar linkage connecting the toy member with the control unit, and means for transmitting operating and steering motion to the toy member.

21. A mechanical toy comprising a stationary member, a toy vehicle, a multi-bar linkage connecting the toy vehicle with the stationary member, and means for transmitting driving and steering motion from the stationary member to the toy vehicle.

AGUSTÍN REDÓ FORNER.