

[72] Inventor **Sadao Haji**
No. 3, No. 7, 3-chome, Kotobuki, Daito-ku,
Tokyo, Japan

[21] Appl No **777,249**

[22] Filed **Nov. 20, 1968**

[45] Patented **Aug. 10, 1971**

[32] Priority **Nov. 22, 1967, Oct. 14, 1968**

[33] **Japan**

[31] **42/98319 and 43/89468**

[56]

References Cited

UNITED STATES PATENTS

2,387,859	10/1945	Schmidt	46/206
2,784,527	3/1957	Sarff	46/243

Primary Examiner—Louis G. Mancene

Assistant Examiner—A. J. Heinz

Attorney—McGlew and Toren

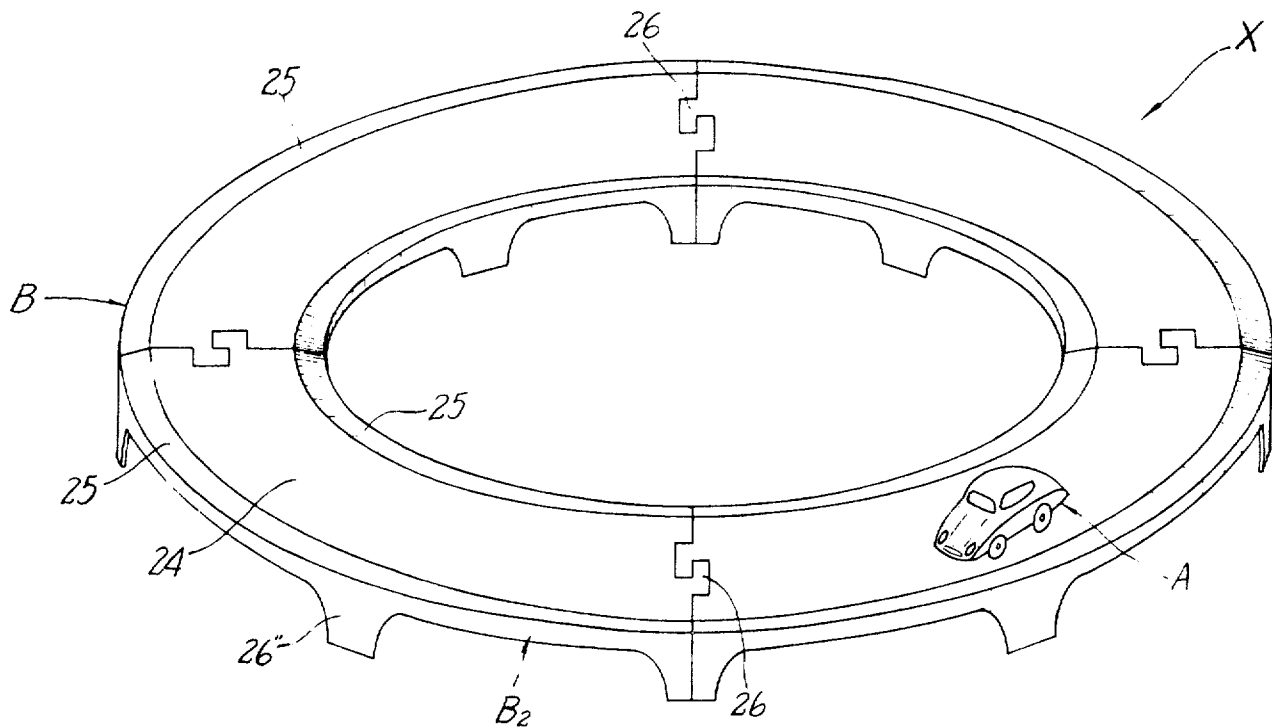
[54] **TOY ROADWAY SET**
9 Claims, 14 Drawing Figs.

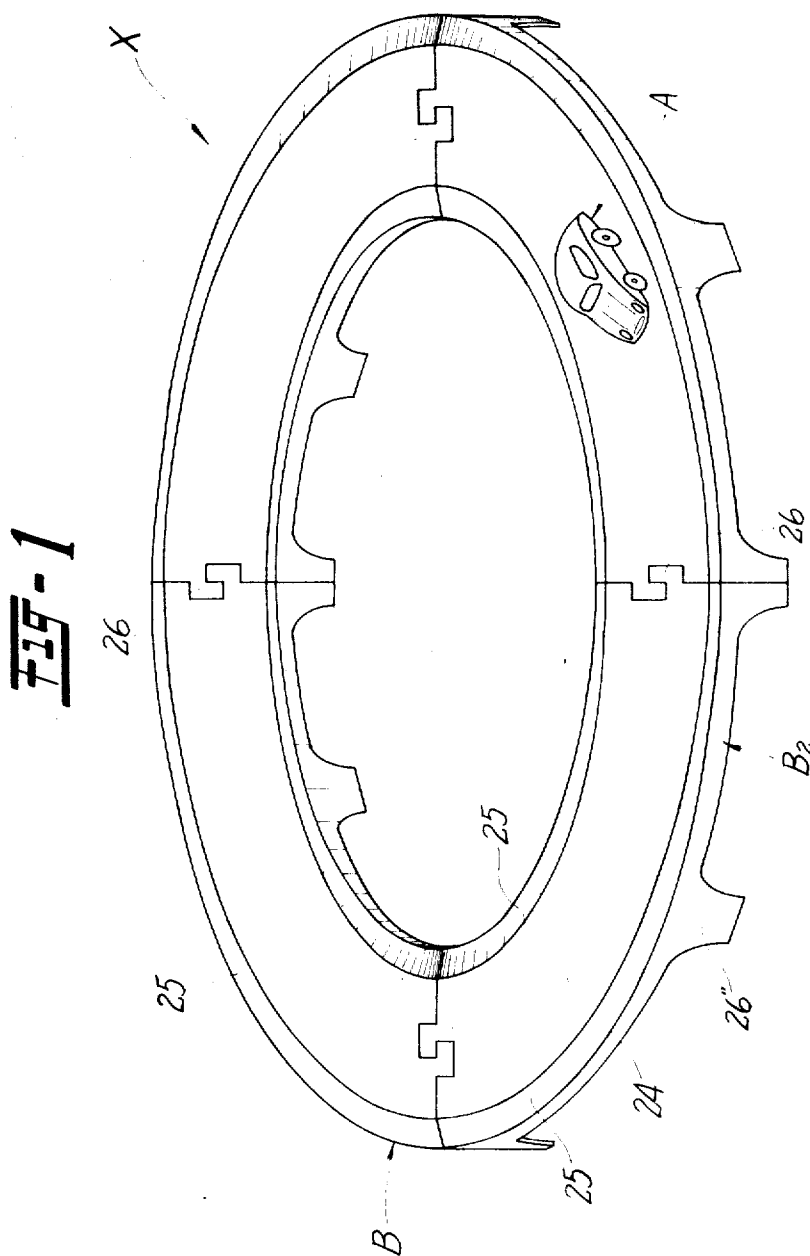
[52] U.S. Cl. **46/202,**
46/206, 46/213, 46/243

[51] Int. Cl. **A63h 11/10**

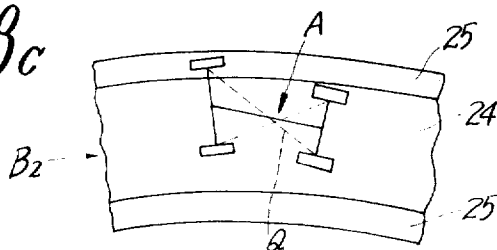
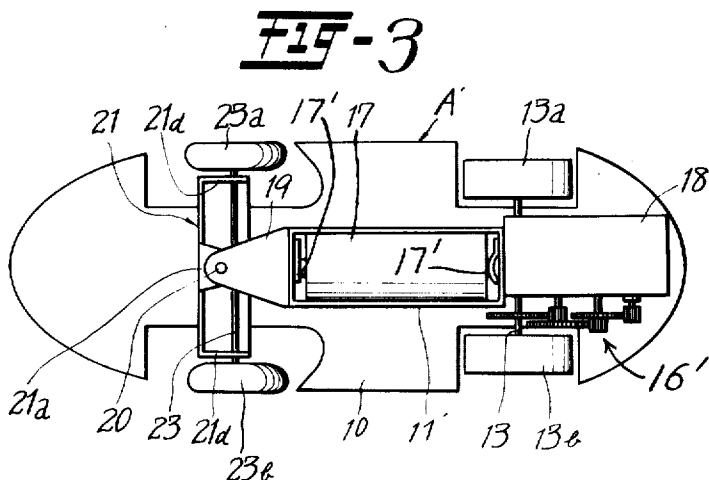
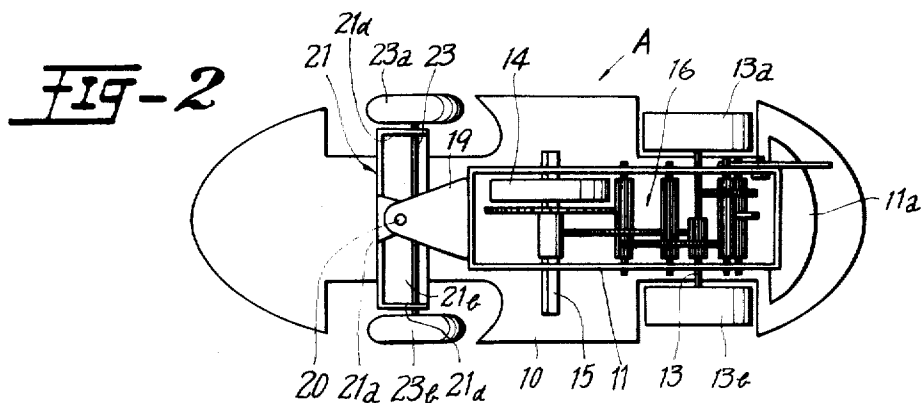
[50] Field of Search 46/206,
243, 202, 213, 211

ABSTRACT: A motor-driven toy vehicle and a track adapted to guide it therealong in a zigzag manner in combination with guide means provided in the vehicle. The track is composed of a plurality of track sections, each of the track sections having a level surface portion, a pair of inclined surface portions and joint means, the inclined portions being formed along the side edges of the track and adapted to serve for steering the vehicle.



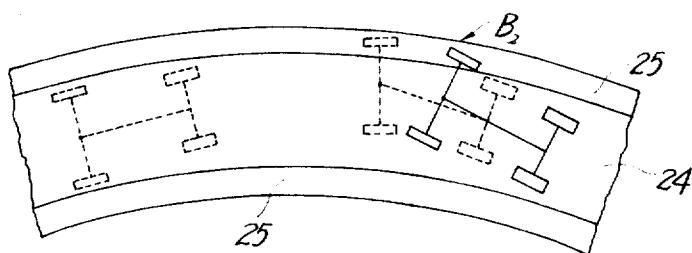
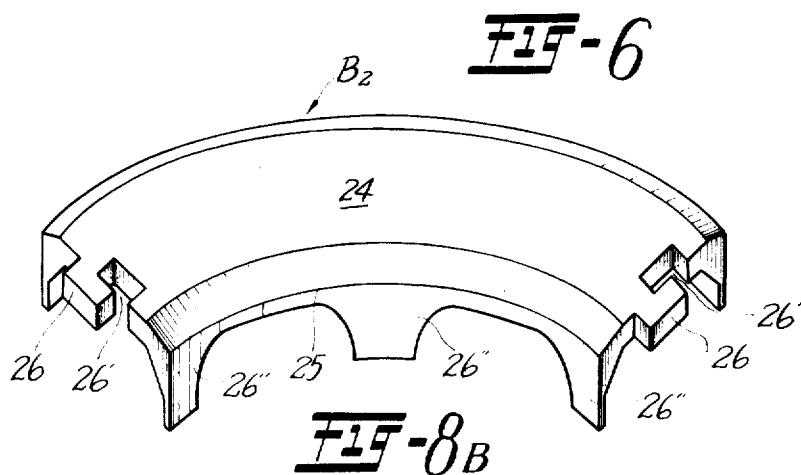
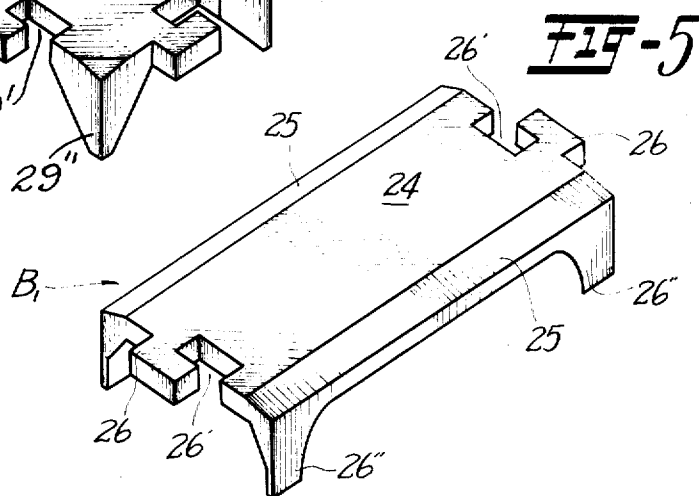
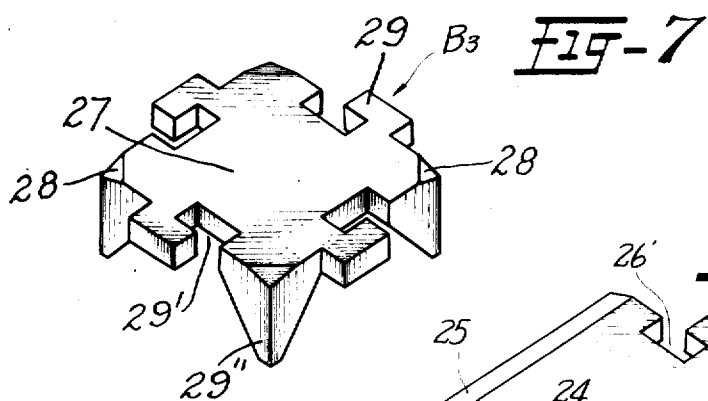


INVENTOR
SADAO HAJI



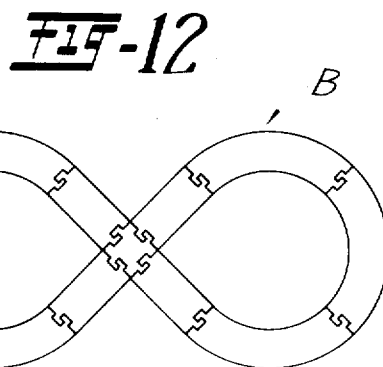
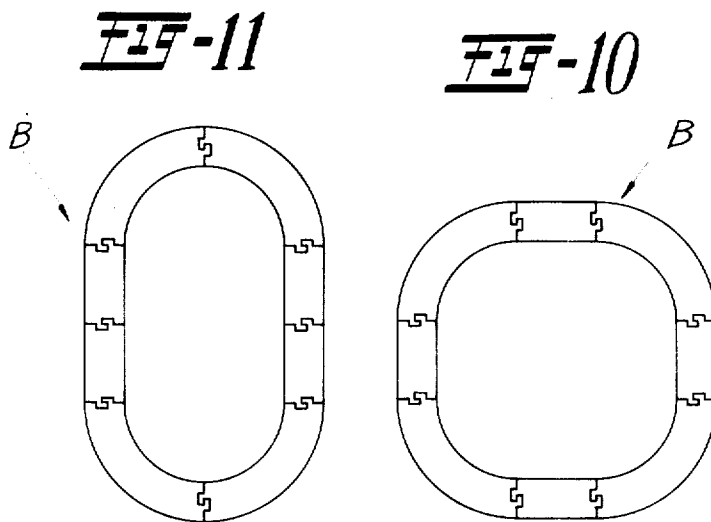
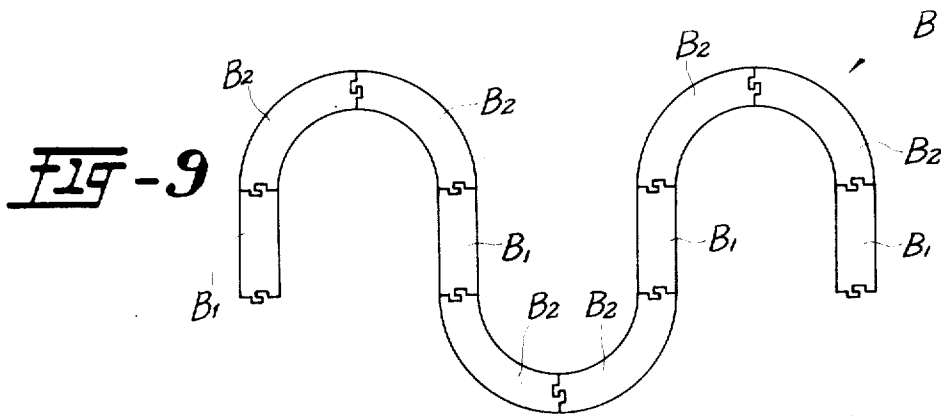
INVENTOR
SADAO HASEI

BY *McGraw and Toren*
ATTORNEYS



INVENTOR
SADAO HAJI

34 *McLew and Toren*
ATTORNEYS



INVENTOR
SADAO HAJI

BY *Mayhew and Toren*
ATTORNEYS

TOY ROADWAY SET

SUMMARY OF THE INVENTION

This invention relates to a new toy and more particularly to a new roadway assembly having a motor-driven toy vehicle adapted to run on a track in a zigzag manner.

A number of prior art toy vehicles of the type adapted to travel along a track have heretofore been proposed. Most of these are driven by a battery-operated motor and guided by the track therefor. In other words, in prior art toy vehicles of this type, the track on which the vehicle runs is provided with certain conventional guide means for guiding the vehicle along the track, such as, for example, a rail or rails, a groove or grooves, etc.

However, with such tracks, the toy vehicle is made to run only along such predetermined path formed in or on the track and is unable to travel on the track in a zigzag manner. Accordingly, it may be said that such prior art toys have the drawback of lacking in so-called "play value" or "playing effect." Another drawback indicated with such prior art toys is that such toys are, in general, bulky and require a relatively large space for playing.

It is, therefore, an object of the present invention to provide entertainment and amusement for children by avoiding such drawbacks and by providing a new toy roadway assembly in which a toy vehicle is adapted to run on a track in a zigzag manner without falling off the track.

It is another object of the present invention to provide a new toy vehicle which is adapted to be automatically steered by a track having portions for steering the toy vehicle.

It is a further object of the present invention to provide a novel toy roadway set comprising various track sections, such as a straight track section, a curved track section and a square track section, to permit the user to form various shapes of the roadways with such roadway set that are adapted to steer the toy vehicle travelling thereon.

It is a still further object of the present invention to provide a novel roadway set for a toy vehicle, comprising various track sections which can be easily jointed together and assembled into various forms of tracks, such as closed or open tracks of the different shape.

Yet another object of the present invention is to provide a miniature roadway assembly for toy vehicles which does not require a large space for playing and which can be produced and sold at a reasonable cost.

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

FIG. 1 is a perspective view of one embodiment of the present invention, comprising, in combination, a closed track formed by a plurality of curved track sections, and a toy vehicle;

FIG. 2 is a plan view of a spring-motor-driven toy vehicle of the present invention, from which the body has been removed, illustrating the internal structure of the vehicle;

FIG. 3 is a plan view of an electric motor-driven toy vehicle of the present invention, from which the body has been removed, illustrating the internal structure of the vehicle;

FIG. 4 is a partial vertical cross-sectional view of a suspension structure of the front wheel assembly according to the present invention;

FIG. 5 is a perspective view of a straight track section;

FIG. 6 is a perspective view of a curved track section;

FIG. 7 is a joint unit to form crossroads by connecting other track sections thereto;

FIG. 8A is a front view of the toy vehicle shown in FIG. 2, illustrating the position in which one of the front wheels of the travelling vehicle has run off a level surface portion of a track

and is situated on one of the inclined surface portions formed along the side edges of the track;

FIG. 8B is a diagram illustrating how the toy vehicle is automatically steered during its travel on a track;

FIG. 8C is a diagram illustrating what part of the vehicle weight should be added to;

FIG. 9 is a plan view of one form of an open track; and

FIGS. 10 to 12 are plan views of closed tracks formed by a plurality of track sections of the different shape, respectively.

Referring now, in greater detail, to the embodiments of the present invention illustrated in the drawings, a combination constituting one embodiment of the present invention, generally designated as X in FIG. 1, comprises a toy vehicle A and a roadway or track B therefor.

In FIG. 2 there is shown a spring-motor-driven toy vehicle A. As shown, the toy vehicle A is provided with a frame 10 on which a gearbox 11 is fixedly mounted. The gearbox 11 supports a rear axle 13 for rotation, and rear wheels 13a and 13b for driving the vehicle are fixedly mounted on the ends of the axle 13. Within the gearbox 11 is housed a spring motor 14 and a gear train 16. The spring motor 14 is energized by manipulation of a winding shaft 15, which is rotatably supported by the gearbox 11, and transmits its power to the rear axle 13 through the medium of the gear train 16.

FIG. 3 shows another toy vehicle A' which is driven by an electric motor 18. As shown, this vehicle A' is almost the same as the one shown in FIG. 1, except the differences of the type of motor means and the necessary arrangements therefor. That is, except the provision of a battery-operated motor 18, a battery box 11' receiving a dry cell 17, a gear train 16', electric contacts 17' in circuit with the dry cell 17 and the motor 18, etc., there are no essential structural differences between the two vehicles A and A'. Therefore, to avoid repetition description will be omitted as to the same parts and portions of the vehicle A' as those of said vehicle A. However, it is to be noted that, both the vehicles A and A' should be constructed so as to have weight added to a portion adjacent the middle of the rear axle 13 of the vehicle so as to maintain the equilibrium thereof and to prevent the same from falling off during its travel on a track B. For example, a weight 11a may be mounted on the rear portion of the vehicle as shown in FIG. 2. More specifically, as shown in FIG. 8C, the vehicle should be designed so that the center of gravity exerted upon the vehicle will not be deviated from the triangular range Q formed at the rear portion of the vehicle by the two intersected dotted lines extending bias between the ends of front and rear axles, respectively and by the rear axle, even when the vehicle is biased toward one of the side edges of the track and inclined at a certain angle during its travel on the track.

As shown in FIGS. 2 and 3, a supporting frame 19 is fixed to the front end of the box 11 or 11'. This supporting frame 19 consists of an upper plate 19a, a bottom plate 19b and a back plate 19c, the upper plate 19a and the bottom plate 19b projecting horizontally forwardly from the upper and lower ends of the back plate 19c which is fixed to the box by an appropriate means. As clearly shown in FIG. 4, the upper and bottom plates 19a and 19b support a vertical shaft 20 which is slightly forwardly inclined. This slightly forwardly inclined vertical shaft 20 rotatably supports a rotatable supporting frame 21 which comprises a tongue-like horizontal upper plate 21a, a rectangular horizontal lower plate 21b, a substantially triangular front plate 21c connecting said upper and lower plates 21a and 21b, and a pair of vertical lugs or upright ears 21d and 21d projecting upwardly from the both ends of said lower plate, respectively.

The rotatable supporting frame 21 is rotatably mounted on said vertical shaft 20 in such a way that the upper and lower plates 21a and 21b are pierced by the shaft through circular apertures formed in said plates, so that the rotatable frame 21 can be rotated on the shaft 20 in a plane perpendicular to said shaft, and that it can be facilitated to rotate by the frictional force applied to one of the front wheels as will be described latter. Preferably, a ring member 20' is mounted on the

slightly forwardly inclined vertical shaft 20 at a portion between the upper plate 21a of said rotatable supporting frame and the upper plate 19a of said stationary frame 19, so that the rotatable frame 21 is smoothly rotatable on said vertical shaft 20. The vertical lugs or upright ears 21d of said rotatable frame 21 rotatably support the front axle 23 through circular apertures provided therein, and front wheels 23a and 23b are fixedly mounted on the ends of the axle 23, respectively. Accordingly, the front wheel assembly carried by the rotatable frame 21 is adapted to freely swivel together with said rotatable frame in a plane perpendicular to said shaft 20.

In the illustrated embodiments shown in FIGS. 2 and 3, the span of the rear axle 13 is made shorter than that of the front axle 23, and the width of each rear wheel 13a, 13b is widened more than that of each front wheel 23a, 23b. This construction will also serve to prevent the vehicle from falling off during its travel on the track B.

Referring now to FIGS. 5 to 7, there are shown three different forms of roadway or track sections B1, B2 and B3 which can be used to form any desired form of track B as illustrated in FIGS. 1 and 9 through 12. Each of the straight track section B1 and the curved track section B2 is provided with a level surface portion 24, a pair of inclined planes 25, hooklike joints 26, recesses 26', and with legs 26''. The level surface portion 24 of the straight track section B1 is formed straight on the track along its longitudinal axis and has an even width. The inclined surface portions or planes 25 of the straight track section B1 are formed straight along the side edges of the track and in parallel with each other. The joints 26 and the recesses 26' are provided at the ends of the track B1, respectively. Each joint 26 projects horizontally from each end of the track and defines the recess 26', as shown in FIG. 5.

The curved track section B2 is provided, as shown in FIG. 6, with a curved level surface portion 24 which is formed on the track along its curve and which has an appropriate even width. The inclined planes 25 of the curved track section are formed along the curved side edges of the track and arranged in parallel with each other. The track section B2 is also provided at its ends with hooklike joints 26 and recesses 26' corresponding to those of the straight track section B1. The joint unit B3, which is used to form crossroads by connecting the aforementioned track sections B1 and B2 thereto, is of a substantially square shape and has a substantially square level surface portion 27, inclined surface portions 28 provided on the four corners thereof, a hooklike joint 29 projecting horizontally from each side of the square, a recess 29' formed in each side of the square and defined by the joint 29, and four legs 29''. Each of said joints and recesses is formed so as to correspond to any of the joints 26 and recesses 26' of other track sections B1 and B2 in size and shape, so that desired crossroads may be formed by connecting those track sections B1 and/or B2 to the four sides of the square B3.

Each of the track sections B1 and B2 has the same width and the same height so that a roadway having uniform width and height may be formed by these track sections. These track sections B1 and B2 and the joint unit B3 can be molded from plastics material and can be produced at a low cost. Preferably, the level surface portions 24 and 27 of the track sections and the unit B3 are provided with roughened surfaces for the purposes which will be described later.

In order to assemble the track sections B1 and B2 into a track, the user has only to connect them together in such manner that a joint 26 of a track section B1 or B2 is inserted into a recess 26' of another track section B1 or B2. If the user uses only curved track sections B2, the track B assembled will be of an oval shape as shown in FIG. 1. If the user combines straight track sections B1 with curved track sections B2, the track B assembled will be one such as shown in FIG. 9, 10 or 11. Also, if one joint unit B is combined with these track sections B1 and B2, a closed track having crossroads, such as shown in FIG. 12, will be formed. In this connection, it should be noted that the tracks B in FIGS. 1 and 9 through 12 have been shown only by way of example and that many other

forms of tracks may be formed, especially when a number of track sections B1 and B2 and joint unit B3 are used.

When the track sections B1 and B2 are assembled into a track in such manner as described above, each track section will be snugly connected to the adjacent track sections, bringing all of the level surface portions and the inclined surface portions into alignment with each other, respectively.

Referring now in particular to FIGS. 8A and 8B, there is shown the important principle of the present invention. In operation, the toy vehicle A or A' is put on the track B and made to run on the level surface 24 of the track in a conventional manner. When the vehicle is caused to be biased toward one side of the track, for example, on the right side, due to clockwise swivel of the front wheel assembly, and the front wheel 23a of the right hand has run off the level surface 24 as shown in FIG. 8A and come into contact with the inclined plane 25 on the right side of the track, most of the weight of the vehicle will be imposed upon the rear wheels 13a and 13b and upon the other front wheel, i.e., the front wheel 23b of the left hand, and the load imposed upon said front wheel 23a will be lessened, since the vehicle is constructed with weight added to a portion adjacent the middle of the rear axle 13 of the vehicle to thereby maintain the equilibrium thereof, as previously referred to.

As a result, on one hand, the frictional force produced by the frictional contact between the level surface 24 and the surface-contacting portion of the front wheel 23b will be increased, and, on the other hand, the frictional force produced by the contact between the inclined surface 25 on the right side of the track and the surface-contacting portion of the other front wheel 23a will be decreased. In this case, if the level surface 24 is suitably roughened, the frictional force produced and applied to the front wheel 23b will be greatly increased. Hence, the frictional force thus increased and transmitted to the front wheel 23b will then cause the front wheel assembly carried by the rotatable supporting frame 21 to be swiveled counterclockwise in a plane perpendicular to the slightly forwardly inclined vertical shaft 20 on said shaft, in other words, the rotatable frame 21 will be urged to rotate in the counterclockwise direction on the shaft 20, accompanying the front wheel assembly. In this connection, it is to be noted that the structure of the shaft 20, on which the rotatable frame 21 carrying the front wheel assembly is slightly forwardly inclined, facilitates the swiveling action of the rotatable frame 21 either clockwise or counterclockwise.

Then, when the front wheel assembly swivels in the counterclockwise direction, the front wheel 23a will be turned in that direction while rotating and at the same time will be urged to climb the inclined plane 25 by the turning force transmitted from the other wheel 23b. Thus, the vehicle can be automatically returned onto the level surface 24. As long as the vehicle A or A' is kept in motion, the vehicle will repeat such action on the track without falling off. It should be noted, however, that, as previously referred to, if the weight means for maintaining the equilibrium of the vehicle is not disposed in place, the vehicle will lose its balance and fall off during its travel on the track. Thus, the toy vehicle, according to the present invention, is adapted to run on the track in a zigzag manner without falling off.

It is to be understood that the foregoing is only illustrative of the principles of this invention, and that numerous modifications and additions may be made by one skilled in the art without departing from the spirit and scope of this invention.

What I claim is:

1. A toy comprising, in combination, a motor-driven wheeled toy vehicle and a track for said toy vehicle, said track comprising a plurality of track sections with each said track sections having joint means for interconnecting it to adjacent said track sections, each of said track sections comprising a longitudinally extending level traveling surface and an inclined surface extending along and sloping downwardly and outwardly from each longitudinal edge of said level traveling surface, said toy vehicle having a front portion and a rear por-

5

tion and comprising a frame, and means for driving said toy vehicle, said means for driving said toy vehicle comprising a box member located on the rear portion of said toy vehicle and being fixedly secured to said frame, a rear axle arranged to be driven by said means, a pair of rear wheels mounted on said rear axle, a supporting frame fixedly secured to the front end of said box member, an upwardly extending shaft being secured at its upper and lower ends into said supporting frame, said shaft being inclined from the vertical between its points of attachment to said supporting frame, a front wheel supporting frame being rotatably mounted on said shaft for rotation in a plane perpendicular to said shaft, a front axle rotatably supported on said front wheel supporting frame, a pair of front wheels secured to said front axle, said toy vehicle being weighted at its rear portion so that when traveling on said track and one of said front wheels runs off the level traveling surface onto an inclined surface said toy vehicle will not overturn, and when one of said front wheels runs off the level traveling surface onto an inclined surface the other said front wheel due to the weighted condition of said toy vehicle is disposed in increased frictional contact with the level traveling surface relative to the frictional contact of the one of said front wheels which is in decreased frictional contact with the inclined surface whereby the frictional differential causes said front wheels mounted on said front wheel supporting frame to pivot about said upright shaft for returning said front wheels onto the level traveling surface.

2. A toy, as set forth in claim 1, wherein a weight being mounted on the rear portion of said toy vehicle for weighting said toy vehicle so that its center of gravity is located within a triangular range defined by the rear axle on one side and on the other two sides by intersecting lines extending forwardly from the ends of said rear axle to the diagonally disposed ends of said front axle.

3. A toy, as set forth in claim 1, wherein said front wheel supporting frame comprises a rectangularly shaped horizontally arranged lower plate, a tongue-like horizontally arranged

6

upper plate spaced above said lower plate, and a substantially triangularly shaped front plate extending vertically between said lower plate and said upper plate, and said lower plate and upper plate each having an opening therethrough for rotatably mounting said front wheel supporting frame on said shaft.

4. A toy, as set forth in claim 1, wherein said front axle being longer than said rear axle so that said front wheels are positioned laterally outwardly from said vehicle relative to said rear wheels for preventing said rear wheels from running off the level traveling surface of said track.

5. A toy, as set forth in claim 1, wherein said means for driving said toy vehicle comprises a spring motor mounted on said frame intermediate said front axle and rear axle, and a gear train in operative engagement with said spring motor and said rear axle for transmitting the driving power of said spring motor to said rear axle.

6. A toy, as set forth in claim 1, wherein said means for driving said toy vehicle comprises an electric motor mounted on said frame, a dry cell positioned on said frame and in circuit with said electric motor, a gear train in operative engagement with said electric motor and said rear axle for transmitting the driving force to said rear axle.

7. A toy, as set forth in claim 1, wherein said track sections are curved and interconnected for forming a closed oval track.

8. A toy, as set forth in claim 1, wherein said track sections comprises a plurality of curved said track sections and a plurality of straight said track sections, said curved track sections and said straight track sections being arranged to form continuous serially arranged level traveling surfaces and inclined traveling surfaces.

9. A toy, as set forth in claim 1, wherein said track comprises a rectangular joint unit and said joint unit having joint means on each of its sides for interconnecting it to adjacent said track sections and forming a four-sided intersection in said track.

40

45

50

55

60

65

70

75