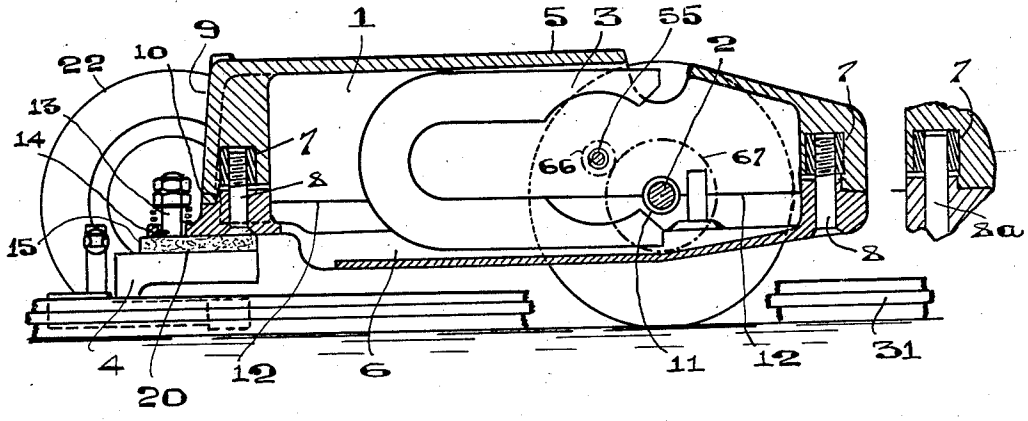
Dec. 31, 1935. P. G. KENNEDY 2,026,181

RACE GAME APPARATUS

Filed March 16, 1933 4 Sheets-Sheet 1

Fig. 1.



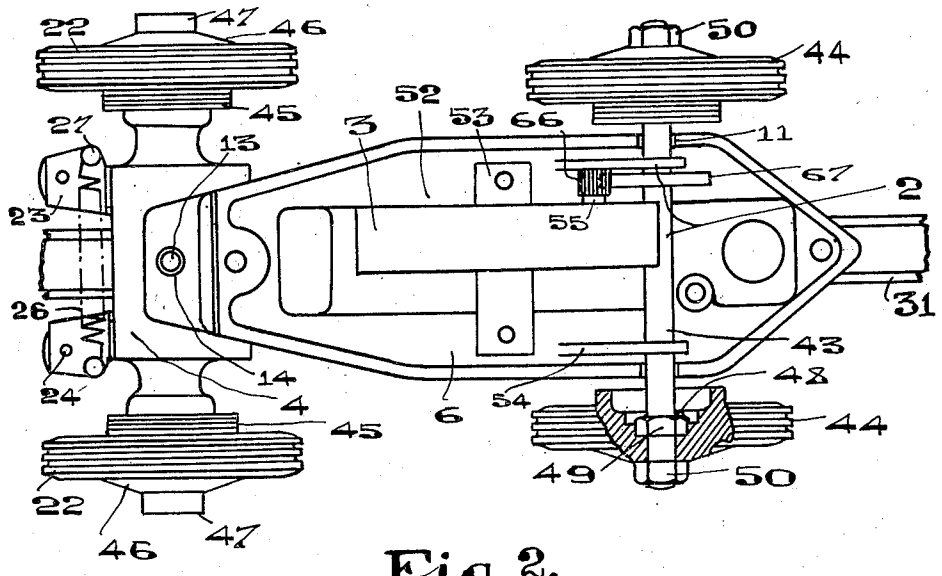


Fig. 2.

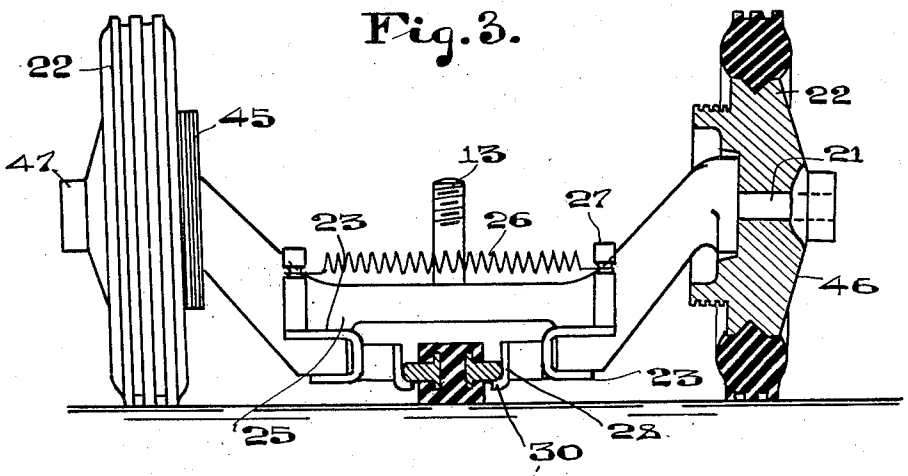
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Dec. 31, 1935. P. G. KENNEDY 2,026,181

RACE GAME APPARATUS

Filed March 16, 1933 4 Sheets-Sheet 2

Fig. 3.



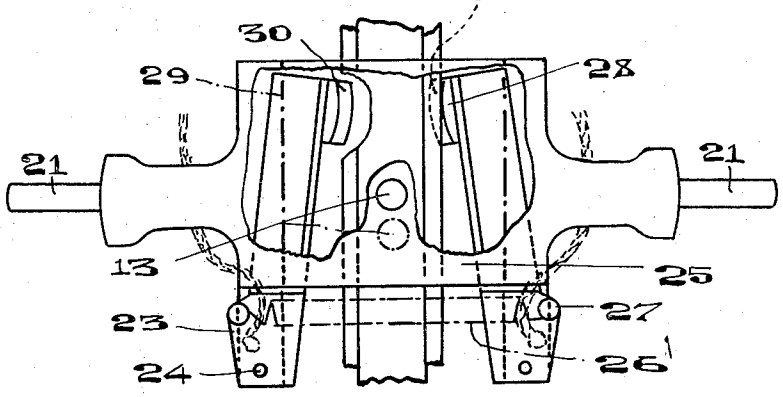


Fig. 4.

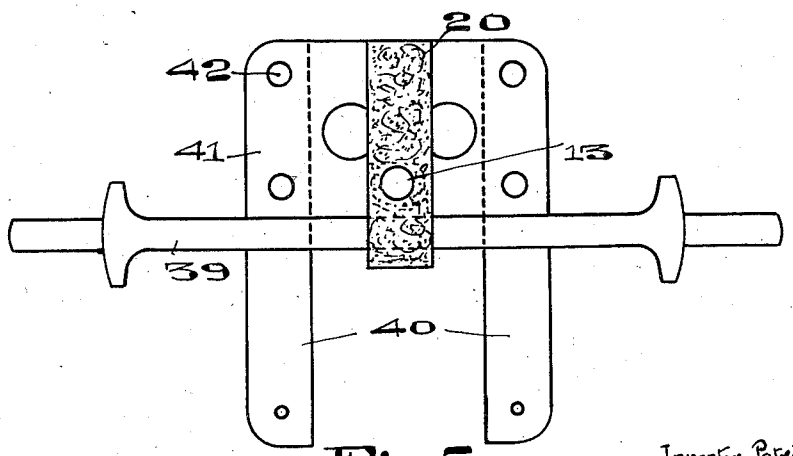


Fig. 5.

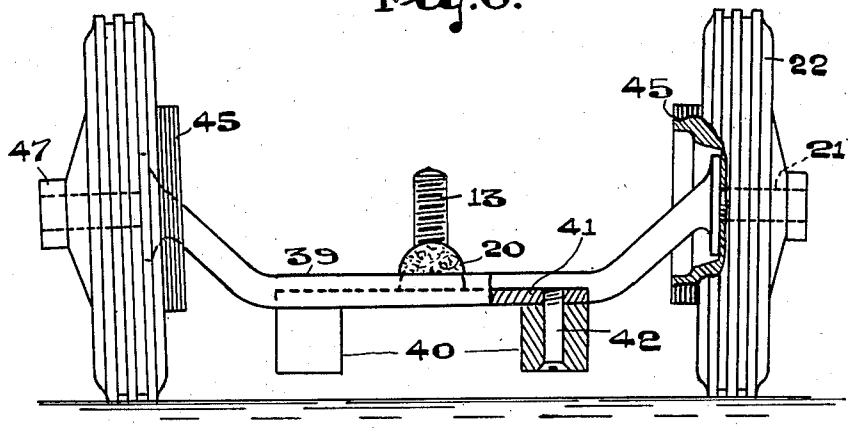
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William A. Davis. Attorney

Dec. 31, 1935. P. G. KENNEDY 2,026,181

RACE GAME APPARATUS

Filed March 16, 1933 4 Sheets-Sheet 3

Fig.6.



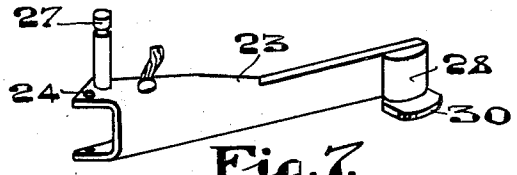


Fig.7.

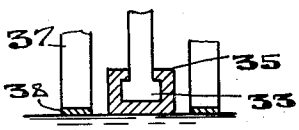


Fig.8.



Fig.9.

Fig.10.

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Dec. 31, 1935. P. G. KENNEDY 2,026,181

RACE GAME APPARATUS

Filed March 16, 1933 4 Sheets-Sheet 4

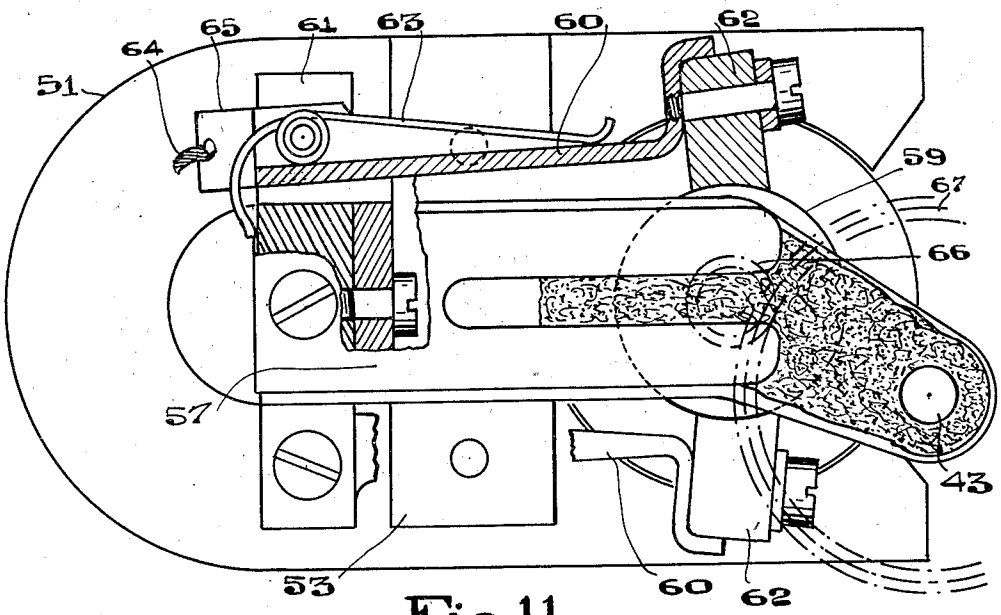


Fig. 11.

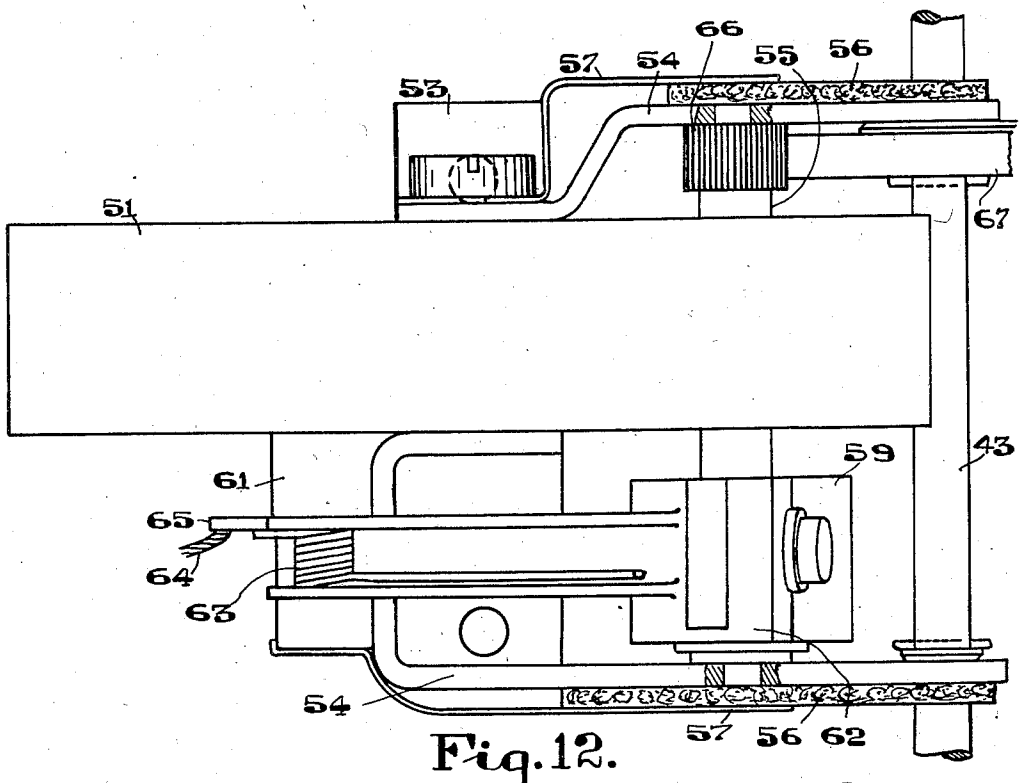


Fig. 12.

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2,026,181

UNITED STATES PATENT OFFICE

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RACE GAME APPARATUS

Patrick Gilbert Kennedy, London, England

Application March 16, 1933, Serial No. 661,062
In Great Britain May 12, 1932

14 Claims. (Cl. 46—211)

This invention relates to apparatus for use in race games and more particularly to those which employ miniature automobiles or like self-propelled vehicles.

Apparatus of the said kind includes a plurality of tracks or guide-ways and a plurality of miniature electrically-driven automobiles or the like adapted to be guided by said tracks.

One object of the present invention is the provision of race game apparatus by which the excitement and interest associated with motor car racing is capable of reproduction in an inexpensive manner. For the vehicles to be effective in their reproduction of motor car racing, it is necessary for them to be capable of traversing the tracks at high speeds and of executing lateral sideslips or skids when negotiating the curves or corners with which the track is provided.

The provision of vehicles which meet the above-recited conditions is another object of the present invention and this object is attained by the provision of improved self guiding means by which the front of the vehicle is held to its course notwithstanding the lateral movements of the rear of the vehicle under the influence of centrifugal force. Such force may operate to skid the vehicle to the right or to the left of the track viewed in the direction of travel and an essential part of my invention consists in guiding means which engage the guide-way so that the restraining or constraining function is exercised whether the lateral force be exerted to move the vehicle to the right or to the left relative to the track, such characteristic being referred to in the appended claims as bi-lateral. In combination with guiding means constructed to operate in the manner described, I employ means for supplying electric current to the motor of the vehicle arranged to maintain contact with conductor rails during slewing movements of the rear of the vehicle and allow the driving force applied to the rear driving wheels to be continued undiminished. Means of articulation between the front axle and the vehicle structure are adapted to bring about a slowing of the vehicle when slewing occurs under the influence of centrifugal force on curves or corners, by allowing the rear wheels to contact with the guide-way.

The invention further consists in the novel combinations of parts described in the annexed specification, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

To facilitate a clear understanding of the invention, I have appended hereto four explanatory sheets of drawings wherein:—

Figure 1 is a part sectional elevation of a miniature automobile incorporating the present invention.

Figure 2 is a plan view of the vehicle shown in Figure 1 with the upper part of the body removed.

Figure 3 is an elevation looking from the front of the front axle assembly included in Figure 1.

Figure 4 is a plan view of the parts shown in Figure 3 with the steering wheels removed.

Figure 5 is a plan view of another construction of front axle.

Figure 6 is a front elevation of the front axle construction shown in Figure 5.

Figure 7 is a perspective view of an electric current pick-up.

Figure 8 is a cross-sectional elevation of another form of bi-lateral guiding device.

Figure 9 shows in cross-section a further form of bi-lateral guiding device.

Figure 10 illustrates relative positions which can be assumed by the front and rear axles during the continuance of the guiding action.

Figure 11 is a part sectional elevation of an electric motor driving unit.

Figure 12 is a plan of Figure 11.

In the drawings is illustrated a model or miniature automobile but the general shape of the body or cover may be adapted to simulate other configurations such as those appertaining to airplanes, airships, motor boats, etc. while retaining the characteristics of the invention. Since the vehicles are intended to travel at high so as to emulate the thrills associated with motor car racing, the construction of the vehicles presents problems or requirements of an engineering character not usually met with in game apparatus; they must be reliable under the high stresses set up by the high speeds to avoid breakdown, and controversy between players during the progress of a race.

A construction which takes the shape and form of a miniature motor car of the racing type is shown in Figures 1 and 2 wherein the model comprises a body **1**, a rear axle and wheel unit **2**, an electric driving unit motor **3**, and a front axle unit **4**.

The body is built up or composed of two main parts the upper of which denoted by **5** acts as a cover and is shaped in imitation of the stream line formation of a racing motor car, while the lower part forms the platform **6** or backbone of the structure whereon are mounted the electric

motor 3 and the front axle unit 4. Sheet metal may be adopted as the basic material for the upper body part 5 or as shown a moulded composition may be used and provided with moulded-in inserts 7 tapped to receive holding screws 8 at front and rear. As an alternative, dowels 8a shown in the fragmentary view at the right of Figure 1 may be moulded in the platform member 6 to engage plain holes in the inserts 7 with push-fit limits to facilitate quick access to the mechanism of the driving unit. The body front 9 is sloped backwards to reduce head resistance and formed at 10 with an inclined locating ledge. For convenience, the dividing plane 12 of the two body parts passes horizontally through the centre of the rear axle, support for which is not provided directly from the body but indirectly by way of the electric driving unit as will be described more particularly hereinafter. A clearance aperture 11 is disposed half in the upper body part 5 and half in the platform part 6 to allow freedom for rotation of the rear live axle.

To permit of the vehicle negotiating the curves or corners at high speed without overturning except under extreme conditions, a controlled degree of freedom is desirable in the coupling between the front axle unit and the main structure, and one simple illustrated construction which meets the required conditions comprises a pin and hole connection in conjunction with resilient material. In the construction shown, a pin 13 is fixed in the front axle structure and the hole 14 is provided in a forward extension of the lower body part 6 with sufficient clearance to allow of the required amount of relative universal movement between the connected parts. Such relative displacement of the front and rear axles is shown in Figure 10 in which the rear axle is horizontal and the front axle inclined, the former being able to supply the driving movement which propels the vehicle while the latter unit continues to hold the vehicle to its pre-determined path. Control of the relative of the two axles is exercised by a pair of coiled compression springs 16, 17 Figures 1 and 10, placed one above the platform extension 15 and the other placed intermediate the platform extension and the axle structure. Such springs are put into a state of compression before the initial run of the vehicle and the force exerted by them may be varied by means of an adjustable abutment such as a nut 18 with a locknut 19 screwed on to the upper end of the upstanding pin 13.

In Figures 5 and 6 are illustrated means for frictional damping of the relative movement between the front axle unit and the main structure consisting of a resilient frictional pad 20 of rubber or the like.

The front axle structure extends outwardly to carry the stub axles 21 on which the road wheels 22 are journalled and may in addition incorporate the means by which electrical contact is made between the moving vehicle and the conductor rails to which electric current is supplied. Such electric contact means may be adapted to guide the vehicle along the designed path while permitting of slewing or side-slipping of the rear of the vehicle when lateral skidding occurs on the curves or corners. With this object in view, the front axle structure may be provided with contact slippers 23 Figures 3, 4, and 7 hinged at 24 to the forward part of the axle bed or beam 25 and caused to press inwardly against the relevant contact rail by a spring 26 conveniently of the coiled compression type looped over upright insulated pillars 27 on the slipper body. Channel section is suitable for the forward part of the slipper arm and angle section for the rear part thereof which includes the slipper proper 28 curved to accommodate the various relative positions of the axle structure and the guide-way during the travel of the vehicle. It will be seen from Figure 4 that the width across the outsides of the trailing ends of the hinged arms 23 is less than the space between the depending parts of the front axle structure indicated at 29 by which the front of the car can either move bodily in relation to the guide or the front axle can turn around the upstanding pin 13 without losing contact electrically or without ceasing to be guided by the guide-way. The spring 26 ensures that the two arms follow the movement of the vehicle in relation to the guide-way, but under extreme conditions it will yield and the vehicle may overturn in a similar manner to that which occurs in full scale motor car racing. The game is rendered more spectacular by this provision and some measure of safety is obtained for the electric driving device by the interruption of the electric supply when the contacts are broken.

While the foregoing description indicates how a vehicle may be constrained to follow a prescribed path in a more or less horizontal plane, it is desirable to incorporate means whereby the front of the vehicle is prevented from leaving the guide-way in an upward direction so that the only direction in which the vehicle has complete freedom of movement is lengthwise of the track. Means of this character may be combined with or form part of the electric current pick-up device, and in Figure 3 a horizontally-projecting tongue 30 on the pivoted contact arm 23 is positioned at the lower edge of the slipper face 28 to operate by engagement with the under side or face of the conductor rail 31 and so hold down the front of the vehicle unless subjected to forces of a sufficiently high order to overturn the vehicle. Current is conveyed from the contact slippers to the electric motor through suitable leads 32 soldered or otherwise fixed to the pivoted arm.

A construction in which the guiding means are separate from the current pick-up means is illustrated in Figure 8 wherein the bi-lateral guiding means comprise a headed member of T cross-section marked 33 in Figure 8 and one of L section in Figure 9 marked 34, arranged to engage a slot or groove in the guide rail 35 or 36. The electric current pick-up means may in this case be simple curved strips 37 disposed to press yieldingly or springily on the conductor rails 38, and maintain contact therewith during the lateral and lengthwise movements of the front of the machine.

I have illustrated two different types of front axle, one of which is built up of steel with attached parts of insulating material while the other is produced by a moulding process. In an example of the latter shown in Figures 3 and 4, the axle beam 25 and stub axles 21 are integrated as a moulded composition body which enables a realistic shape to be imparted to the axle; the metallic stub axles and the coupling pin 13 are roughened or shaped polygonally at their ends to ensure effective fixation in the moulded composition in a manner known in the art. As such material, usually a synthetic resin or formaldehyde product, has a high specific resistance to the passage of electric currents, the pivoted members by which electric contact is made can be mounted directly on an extension of the axle beam. In another construction shown in Figures 5 and 6,

the axle structure comprises a transverse metal bar **39** upswept at its ends to form the stub axles; two longitudinal spaced strips **40** of fibre or other insulating material to the front ends of which the contact arms are hinged; and a flat connecting plate **41** of metal for joining the axle bar and the fibre strips conveniently by means of screws **42**.

In the interest of standardization, the road wheels are preferably duplicate blanks with an appropriate variation introduced to adapt them either for running free on the stub axles **21** for use as front steering wheels **22**, or for fixing to the live rear axle **43** to function as driving wheels **44**. Metal or moulded composition may be used but in either material it is desirable to include ribbed brake drums **45**, to provide a conoidal formation **46** on the outer face of the wheel, and to cant or incline the stub axles so that the model follows closely the lines of a racing car. The front wheels may be held on to their stub axles in a lateral sense by collars **47** screwed, pegged, soldered or otherwise fixed in position, while a convenient driving fixing for the rear wheels consists of a polygonal recess **48** in the inner face of the hub, a nut **49** fixed by screw to the axle shaft, and a nut **50** on the end of the said axle shaft. This method is suitable for a wheel of moulded material but for a metal wheel, the hub may be tapped to engage the thread on the shaft end.

The coupling between the front axle unit and the main structure of the car may be situated at a point substantially in alignment with the axes of the steering wheels **1** to **4**, or as shown in Figure 5 the coupling point may be arranged rearward of the said axes. If a trailing action is desired, the coupling point is placed in advance of the steering wheel axes.

It is preferred to space the rear driving wheels **44** so that the track or width between the wheels is less than the track of the steering wheels **22**.

The electric driving unit must be able to meet the conditions of high speed developed by the miniature machines and the possibility of damage through overturning, and in Figures 11 and 12 the unit is constructed so that the horseshoe type of permanent magnet constitutes the foundation on which the mechanism is built. Said magnet **51** rests on the floor **52** of the platform body part **6** and is fixed thereto by screws and brackets **53** which may be extended to form bearer bars **54** for journally supporting the armature shaft **55** and the live driving axle **43**. Lubrication of these small bearings is an important factor in the life of the unit, and provision is made for supplying oil continuously and in a manner easy of replenishment by the incorporation of absorbent pads **56** of felt or other suitable material conveniently held in position by tongues of springy material **57** which press on the outer face of the pads. The latter are in contact with the ends of the armature shaft **55** and encircle the live driving axle **43**.

Appropriate brush gear for conveying current to the commutator **59** includes a pair of arms **60** hinged at one end to an H-section fibre block **61** and provided at their free ends with brushes **62**; springs **63** apply pressure to the brushes to maintain them in contact with the commutator **59**, and current-carrying leads **64** are soldered or otherwise fixed to extensions **65** on the arms **60**.

Gearing for reducing the velocity ratio conveniently comprises a pair of spur wheels the smaller one **66** of which is fixed to the armature shaft while the larger one **67** is secured to the rear live axle **43**.

By my invention is provided a vehicle capable of high speed travel with mechanical and electrical reliability; capable of executing lateral side-slips on the curves or corners of the track while being held to its course in respect to the front part of the vehicle; and in general embodying appearance and other characteristics associated with racing motor cars whereby the players are enabled to participate in and enjoy the thrills of motor car racing but in an inexpensive manner not hitherto available.

Having described my invention, what I claim is:—

1. A miniature automobile or like vehicle for use in a race game comprising in combination, a rear driving axle, an electric motor operatively connected to said rear axle, a front steering axle, and a spring-controlled guiding means which holds the front of the vehicle bi-laterally to a guide and permits of a restricted amount of lateral movement of the front of the vehicle relative to said guide.

2. In a miniature automobile or like vehicle for use in a race game, a front axle unit comprising in combination, stub axles for journally carrying the road wheels, an axle beam supporting said stub axles, means of articulation on said beam for coupling to the vehicle structure, and a pair of spaced yieldingly-mounted current pick-up and guiding devices on said axle beam for co-operation with a guide.

3. In a miniature automobile or like vehicle for use in a race game, a front axle unit comprising in combination, stub axles for journally carrying the road wheels, an axle beam supporting said stub axles, means of articulation on said beam for coupling to the vehicle structure, a pair of current pick-up and guiding arms hinged to said axle beam, a spring tending to close said arms on to a guide, and stops on said arms to co-operate with the axle beam and limit the lateral movement of said arms in relation to the said axle beam.

4. In a miniature automobile or like vehicle for use in a race game, a front axle unit comprising in combination stub axles, an axle member supporting said stub axles, means of articulation on said axle for coupling to the vehicle structure, a pair of spaced yieldingly-mounted current pick-up devices at the front of the vehicle, and a bi-lateral guiding device at the front of the vehicle for co-operation with a guide.

5. In a miniature automobile or like vehicle for use in a race game, a front axle, an axle bed plate secured to said axle, a pair of parallel spaced insulating members attached to said axle bed plate, a pair of spaced current pick-up and guiding arms hinged on said insulating members, and means of articulation on said bed plate for coupling to the vehicle structure.

6. In a miniature automobile or like vehicle for use in a race game, a moulded front axle bed plate, stub axles inserted in said bed plate, a pair of integral strips disposed longitudinally on said bed plate, a pair of spaced current pick-up and guiding arms hinged on said bed plate, and means of articulation on said bed plate for coupling to the vehicle structure.

7. In a miniature automobile or like vehicle for use in a race game, a front axle, a pair of spaced yieldingly-mounted current pick-up devices on said axle for contact with conductor rails, a guiding device on said axle for co-operation with a

guide, an articulated coupling permitting universal movement between the said front axle and the vehicle structure, resilient means for restraining movement of said coupling, and stops for positively limiting the movement of said coupling.

8. In a race game employing a plurality of electrically-driven automobile or like vehicle, the combination in a vehicle, of a rear driving axle, driving road wheels thereon, means for self-steering the vehicle comprising a guide, a front steering axle, steering road wheels journalled thereon, means positioned at the front of the vehicle to engage bi-laterally with said guide to render the vehicle self-steering, means of articulation between the said front axle and the vehicle structure to allow the rear wheels to slew in relation to the front wheels and to contact with said guide, and current pick-up means positioned at the front of the vehicle.

9. In a miniature automobile or like vehicle for use in a race game, a front axle, means of articulation on said axle for coupling to the vehicle structure, a pair of spaced yieldingly-mounted current pick-up and guiding devices on said axle for co-operation with a guide, and means projecting horizontally from each of said guiding devices for engagement with a horizontally-projecting part of said guide to resist upward movement of said axle in relation to the ground.

10. In a miniature automobile or like vehicle for use in a race game, a front axle, means of articulation on said axle for coupling to the vehicle structure, a pair of spaced yieldingly-mounted current pick-up and guiding devices on said axle for co-operation with a guide, each of said guiding devices including an arm hinged at one end to the axle on an upright axis, a spring attached to said arms tending to close them on to said guide, and a horizontally-projecting tongue at the free end of each of said arms for engagement with a horizontally-projecting part of said guide to resist upward movement of said axle in relation to the ground.

11. In a miniature automobile or like vehicle for use in a race game, a front axle, means of articulation on said axle for coupling to the vehicle structure, a pair of spaced arms hinged at one end to the axle on an upright axis, and resilient means tending to close said arms on to a guide.

12. In a miniature automobile or like vehicle for use in a race game, a front axle, means of articulation on said axle for coupling to the vehicle structure, a pair of spaced arms hinged at one end to the axle on an upright axis, L shaped contact pads at the free ends of said arms, a spring anchorage on each of said arms, and a spring attached to said anchorages tending to close said arms on to a guide.

13. In a miniature automobile or like vehicle for use in a race game, a front axle for journally carrying the road wheels, a pair of spaced yieldingly-mounted current pick-up and guiding devices on said axle for co-operation with a guide, and means of articulation on said axle for coupling to the vehicle structure having a body part, said articulation means comprising an upstanding pin on the axle, a clearance hole in the body part encircling said pin, a spring abutment at the upper end of said pin, a spring positioned intermediate said spring abutment and the upper horizontal face of said body part, and a spring positioned between the lower horizontal face of said body part and the said axle.

14. In a miniature automobile or like vehicle for use in a race game, a front axle for journally carrying the road wheels, a pair of spaced yieldingly-mounted current pick-up and guiding devices on said axle for co-operation with a guide, and means of articulation on said axle for coupling to the vehicle structure having a body part comprising a pivot pin upstanding from said axle, a clearance hole in the body part encircling said pin, a spring abutment at the upper end of said pin, a spring positioned intermediate said spring abutment and said body part, and a frictional damping pad inserted between the underside of said body part and the said axle member.

PATRICK GILBERT KENNEDY.