June 20, 1967 C. W. WARREN 3,326,555

TOY RACING GAME WITH ROTATING ARM AND SEPARATE SUB-ROTOR DRIVE

Filed July 3, 1963 3 Sheets-Sheet 1

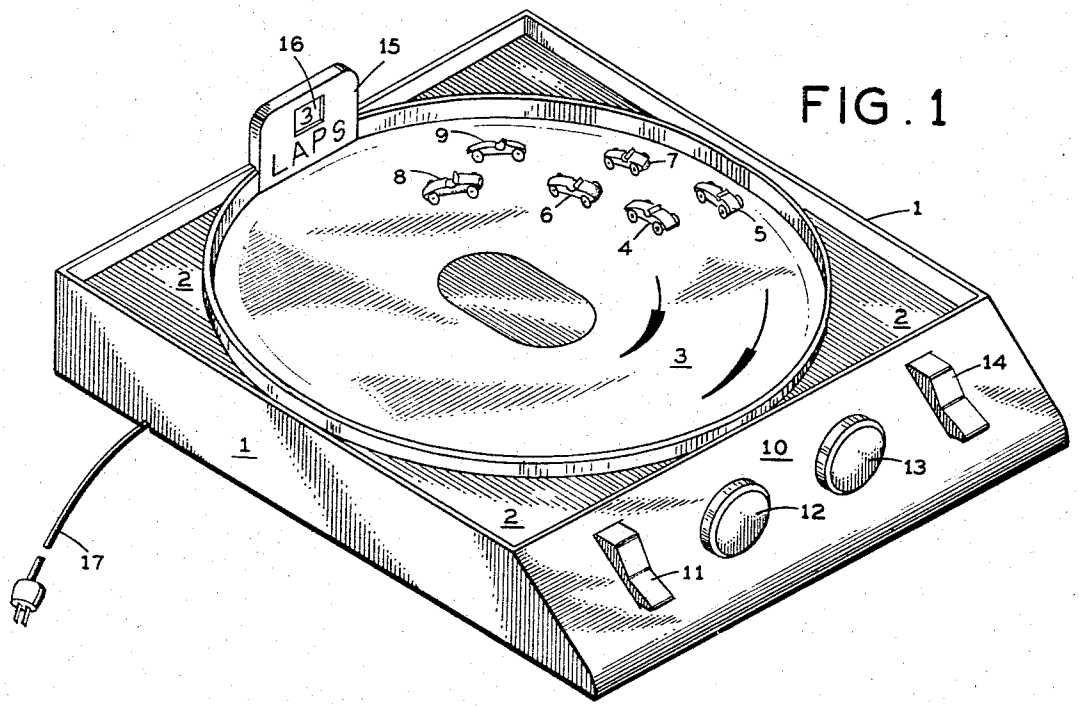


FIG. 1

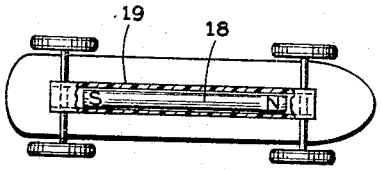


FIG. 2

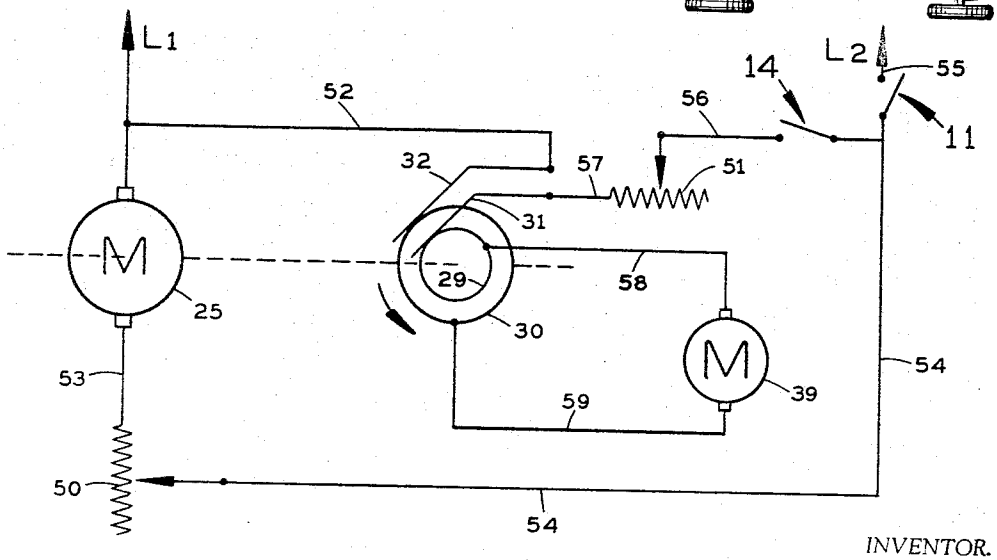


FIG. 9

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TOY RACING GAME WITH ROTATING ARM AND SEPARATE SUB-ROTOR DRIVE

Filed July 3, 1963 3 Sheets-Sheet 2

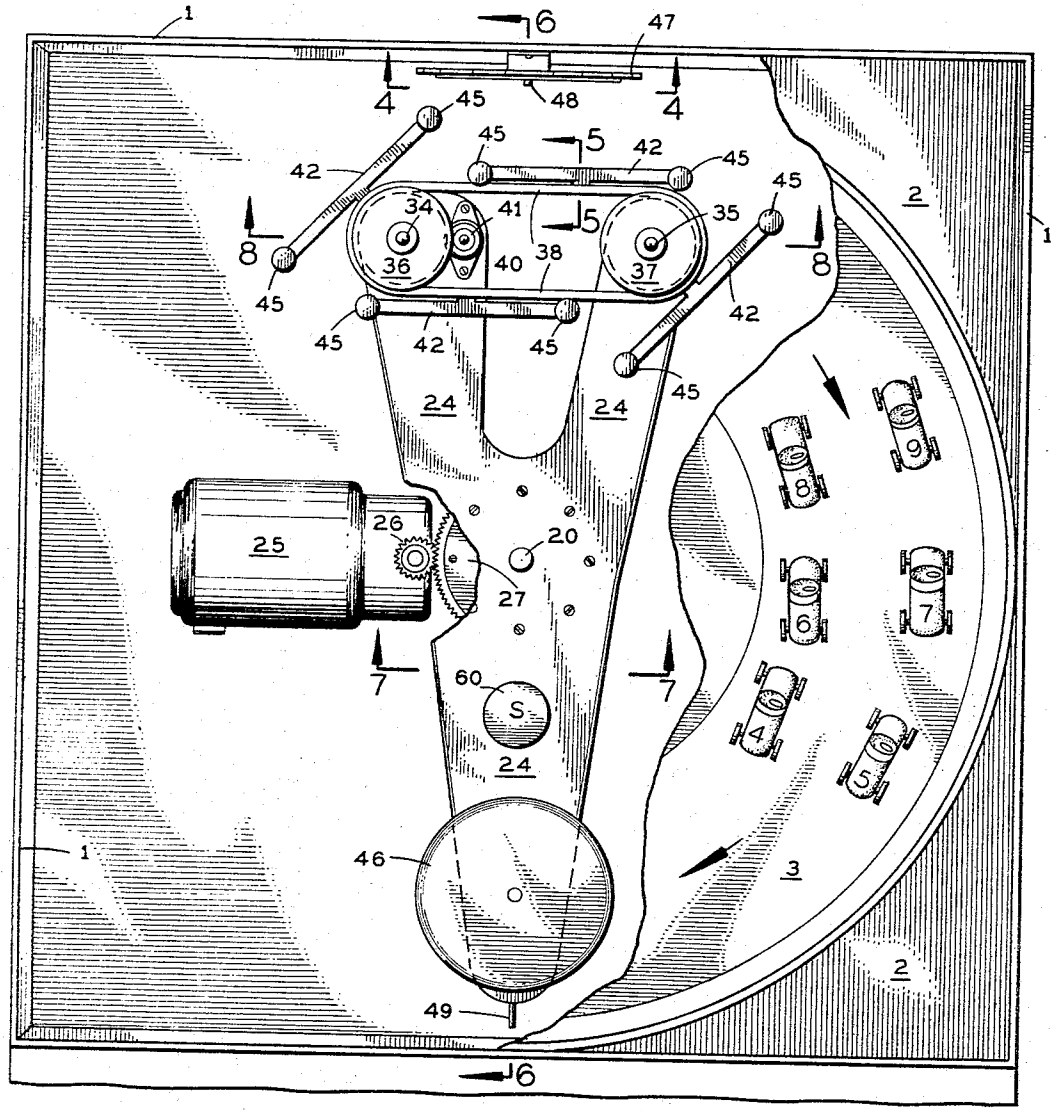


FIG. 3

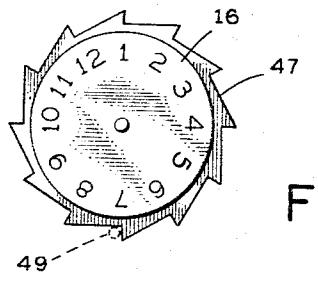


FIG. 4

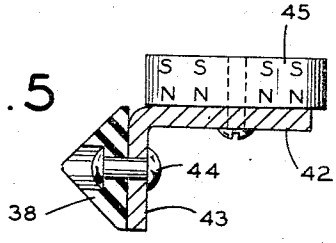


FIG. 5

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TOY RACING GAME WITH ROTATING ARM AND SEPARATE SUB-ROTOR DRIVE

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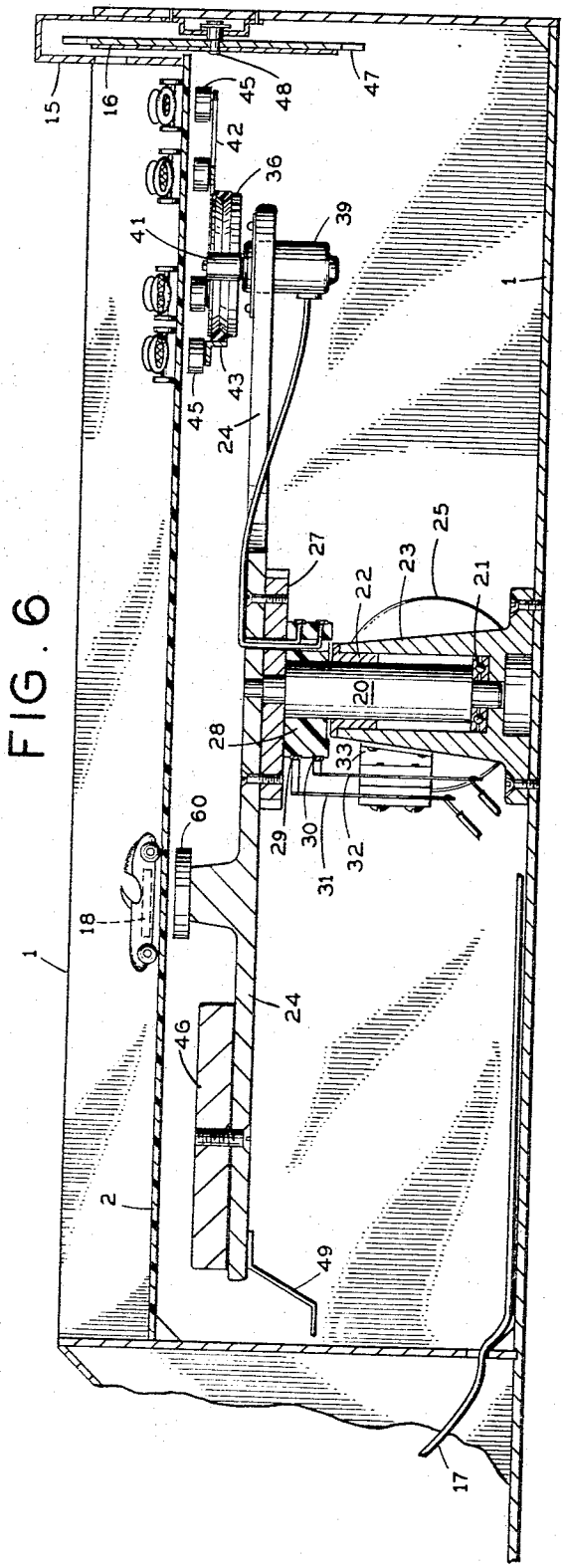


FIG. 6

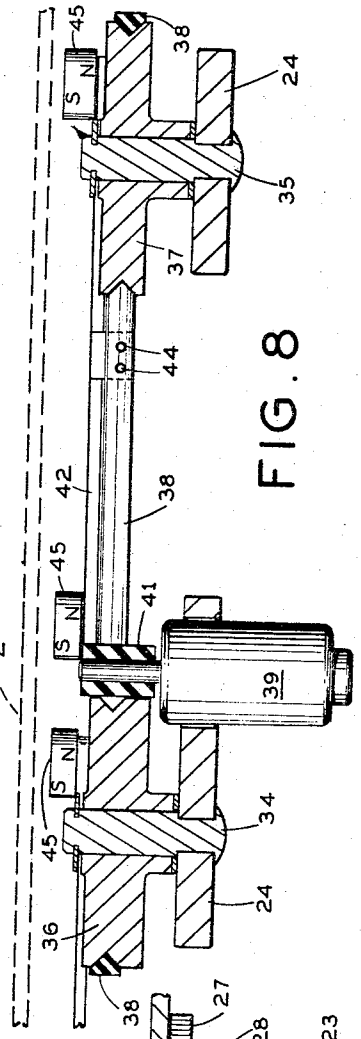


FIG. 8

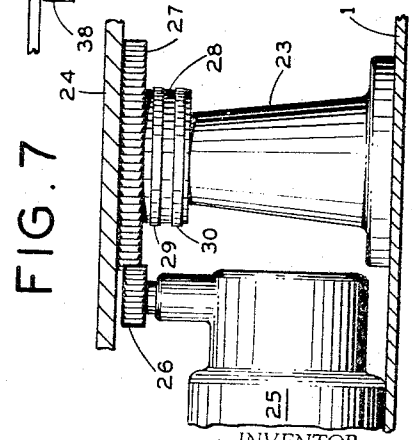


FIG. 7

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United States Patent Office

3,326,555

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3,326,555

TOY RACING GAME WITH ROTATING ARM AND SEPARATE SUB-ROTOR DRIVE

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Filed July 3, 1963, Ser. No. 292,622
1 Claim. (Cl. 273—86)

This invention relates in general to mechanical toys and more particularly to a game simulating auto racing.

Auto racing games prior to this invention fail to maintain participant interest largely because of the relatively few cars involved and known sequence of operation which resulted in anticipation of the so-called winners by the operator. Furthermore, prior games of this general character fail to provide desired entertainment because of constant speed operation and the predictable results resulting from predetermined operation.

The present invention overcomes the above objections and disadvantages by the provision of an auto racing game in which several rows of cars may participate in a realistic manner including means for controlling the speed of the cars and the relative positions of the competing cars are radically altered by a relatively non-predictable position control, which features are principal objects of the invention.

A further object of the invention is the provision of a magnet means for forming a plurality of rows of miniature cars for travel in a circular course including means whereby during their travel on the course, each car in each row can successively and intermittently change positions in any one of the rows under the skilled but not definite manipulation of a position control.

Another object of the invention is the provision of a motor driven rotor positioned to rotate about a vertical axis including speed control means for rotating a plurality of permanent magnets around a predetermined course including separate means for moving the magnets on the rotor for independent variable speeds during the rotation of the rotor.

A further object of the invention is the provision of a motor driven rotor means for moving a plurality of magnets around a predetermined course at predetermined variable speeds including an independent motor driven belt means for driving said magnets through a predetermined minor course at predetermined variable speeds while driven by said rotor means for changing the relative position of each of a plurality of cars moved by said magnets on a planar board positioned above and in close proximity with said magnets.

These and other objects and advantages in one embodiment of the invention are described and shown in the following specification and drawings, in which:

FIG. 1 is a perspective view of the auto racing game in reduced scale.

FIG. 2 is a bottom view of one of the toy cars shown in FIG. 1 with a portion thereof broken away.

FIG. 3 is a plan view of the racing game in reduced scale with a portion of the track broken away.

FIG. 4 is a cross sectional view taken through section line 4—4, FIG. 3.

FIG. 5 is an enlarged cross sectional view taken through section line 5—5, FIG. 3.

FIG. 6 is a cross sectional view taken through section line 6—6, FIG. 3.

FIG. 7 is a fragmentary cross sectional view taken through section line 7—7, FIG. 3.

FIG. 8 is a cross sectional view taken through section line 8—8, FIG. 3.

FIG. 9 is a schematic diagram of the electric circuit of the game.

Referring to FIG. 1, a casing **1** serves as a housing for the entire game and a planar sheet of dielectric material **2** is secured in the top as shown which contains a circular curb therein marking the outer perimeter of a smooth planar race course **3** marked thereon. In this embodiment, six miniature race cars, numbered **4**, **5**, **6**, **7**, **8**, and **9**, are positioned in starting formation in three rows of two. Each car is provided with four anti-friction free rotating wheels, better shown in FIG. 2. The casing **1** is provided with a front control panel **10** which retains a start-stop switch **11**, a speed control **12** and a position control **13** and stop-start switch **14** therefor. A housing **15** secured to the rear of the game encloses a lap indicator **16** to be hereinafter described. A power cord **17** is provided for insertion in a source of electric power.

Each miniature car, shown FIG. 2, is preferably made of plastic material and contoured to simulate professional race cars and is provided with a permanent magnet rod **18**, poled as shown, secured in a tube **19** fixed in the base of each car.

Referring to FIGS. 3 and 6 a vertical shaft **20** is retained by thrust bearing **21** and bushing **22** for rotation in a vertical standard **23** fixed to the base of casing **1**. A rotor member **24** is secured to the upper end of shaft **20** for rotation therewith. A variable speed drive motor **25** includes a self contained speed reducer which terminates in a drive pinion **26** for rotation about a vertical axis, and referring to FIG. 7, the pinion **26** is meshed with driven gear **27** secured to rotor member **24** and positioned coaxial with shaft **20**. A commutator assembly comprises a dielectric bushing **28** secured to the upper portion of shaft **20** including a pair of concentric slip rings **29** and **30** positioned in spaced relation thereon.

A pair of brushes **31** and **32** are secured and insulated by dielectric means to a bracket **33** fixed to standard **23** as shown. The internal connections to the slip rings will be hereinafter described.

Referring to FIGS. 3 and 8, a pair of vertical shafts **34** and **35** are secured in the outer ends of the forked portion of the rotor member **24**. A pair of wheels **36** and **37** having a V groove in the outer peripheries thereof are journalled for rotation on shafts **34** and **35**, respectively, including a V belt **38**, preferably made from rubber-fabric composition engaged in driving relation on both pulleys **36** and **37** forming a sub-rotor, as shown. A second electric motor **39** is secured to rotor member **24** by a bracket **40** which has a friction drive bushing **41** on the shaft extension thereof as shown, with the bushing in frictional engagement with the periphery of wheel **36**.

Thus it is apparent when the motor **39** is energized the wheel **36** will drive the belt and wheel **37** at a speed determined by the speed of the motor. Four cross arms **42** are centrally secured to the belt in equi-spaced relation by integral projections **43** positioned normal to each arm and secured to the belt by rivets **44** as shown in FIG. 5.

A permanent drive magnet **45**, preferably of the ceramic type, is secured to each outer end of the cross arms **42** with the polarity of the upper side poled "south" in order to provide attraction to the "north" pole of the magnet in each of the cars which corresponds to the front end thereof.

The weight of the magnet drive means at the forked end of the rotor member **24** is balanced by counterweight **46** secured to the opposite end of the rotor member.

Referring to FIG. 4, a toothed disc **47** is provided with the numbered lap indicator thereon for indicating the number of laps for each race. The disc is pivoted for rotation on a stud **48** secured in casing **1** as shown in FIG. 6. A finger **49** secured to the rotor member **24** projects therefrom for sequential engagement with each tooth on the

disc **47** for moving the disc a segment corresponding to each rotation of the rotor member, thus indicating the number of laps in any given race.

In this particular embodiment of the invention, the speed of the cars in traversing the course is governed by a variable resistor **50** illustrated in FIG. 9, and controlled by knob **12** (FIG. 1). The velocity of the belt **38** of the corresponding cyclic movement of magnets **45** is controlled by a variable resistor **51** under the control of knob **13** of motor **39**.

Referring to FIG. 9 a conductor **52** is connected to one conductor in power cord **17**, to the motor **25**, and to brush **32**. The remaining terminal of motor **25** is connected by conductor **53** to one terminal of resistor **50**. The remaining terminal of resistor **50** is connected by conductor **54** to both poles of switches **11** and **14**. The remaining terminal of switch **11** is connected by conductor **55** to the remaining conductor in power cord **17**. The remaining terminal of switch **14** is connected by conductor **56** to resistor **51** and the remaining terminal of resistor **51** is connected by conductor **57** to brush **31** and the mating slip ring **29** thereof is connected by conductor **58** to one terminal of motor **39**. The remaining terminal of motor **39** is connected by conductor **59** to slip ring **30** which is mated with brush **32**.

Thus it is apparent that when the switch **11** is closed, the motor **25** will be energized and the speed thereof controlled by resistor **50** and it is also apparent that when the switch **14** is closed a circuit will be completed to the motor **39** through slip rings **29** and **30** and the speed thereof controlled by the adjustment of resistor **51**.

Referring to FIGS. 3 and 6, an auxiliary magnet **60** is secured to the rotor member **24** for rotation in proximity with the inner edge of the race course **3** for the purpose of attracting and moving a race car which is moved into the infield, out of the range of the magnets **45**. When the rotor completes a revolution, the magnet **60** will attract an infield stationary car and move same back into the course where it can be picked up by one of the magnets on the rotor member and again driven around the course.

In operation and referring to FIG. 1, the six toy cars are placed in three rows, as shown, and the switch **11** moved into "start" position. This will energize the motor **25** and begin the rotation of the rotor member and the magnets **45**. As the magnets **45** are moved under each car, the latter will be attracted thereby to roll on the surface of the course **3** in predetermined alignment since only the forward end of the magnet in each car will be attracted by the opposite polarity of the moving magnet. The speed of the cars traversing the course is controlled by the knob **12** which will increase or decrease the speed of the rotor according to the settings of the resistor **50**.

The relative positions of the cars in traversing the course are controlled by the magnets **45** while the rotor member is in operation. The magnets **45** on the sub-rotor are cycled by the belt **38** by closing the switch **14** and adjusting the speed of the motor **39** and the cyclic movement of the magnets **45** by adjusting the position of knob **13**.

Thus by manipulating the controls **12** and **13**, it is possible to produce a very realistic race in which positions of various cars are interchanged while traveling at predetermined speeds. It is also apparent that it is possible to adjust the speed of the rotary member and the motion of the magnets **45** to produce unpredictable events, such as collisions, off track crashes, and surprise winners.

It is also apparent and comprehended that the speed of the rotor member can be controlled by mechanical drive means rather than the resistor control of a variable speed motor.

It is also apparent that other groups of magnets **45** may be driven by similar belt means having a longer or irregular shape in order to accommodate more toy cars on the course at one time and to modify their paths of movement.

It is understood that certain modifications to the above construction using the features described are intended to come within the scope of the appended claim.

Having described my invention, I claim:

In a toy racing game of the character described a means forming a housing, said housing including a non-magnetic platform of uniform thickness and having a planar upper surface forming a race course, a main rotor journalled for rotation in said housing under said platform about an axis normal to and substantially central therewith, an electric drive means in said housing coupled to said rotor for rotating same when energized, a sub-rotor journalled for rotation on one end portion of said main rotor about an axis normal to said platform, an electric motor on said main rotor coupled to said sub-rotor constructed and adapted to rotate same when energized, a plurality of permanent traction magnets secured in spaced relation on said sub-rotor positioned for movement in close parallel proximity with the under surface of said platform, a plurality of mobile simulated race objects resting by gravity on said platform surface for movement on said course, each of said objects including a permanent magnet therein positioned for predetermined mutual attraction with a corresponding said traction magnet, a source of electric energy, independent electric control means connecting said drive means and said electric motor with said source of energy respectively adapted to manually and independently control the speed of said drive means and said electric motor when operated, whereby each of said traction magnets will move each corresponding said object in a plurality of paths around said course when each of said electric means is operated.

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