

Sept. 10, 1963

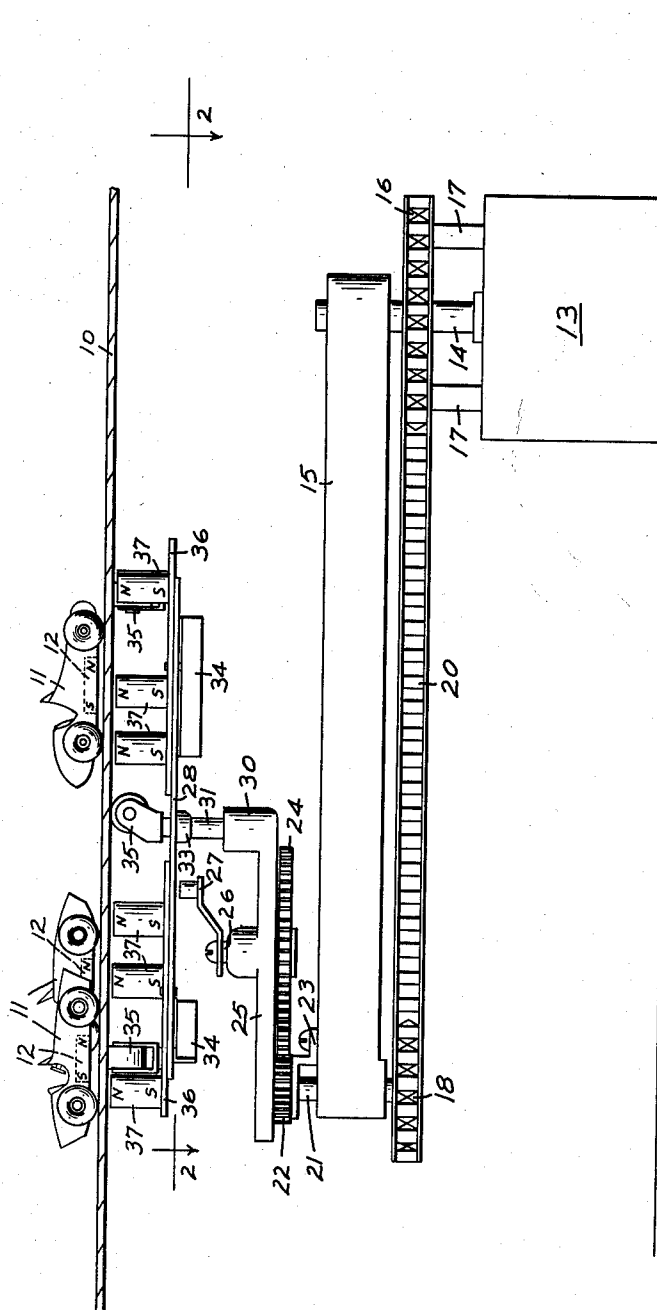
A. V. MILLER ETAL
ELECTRICAL RACING DEVICE

3,103,360

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3 Sheets-Sheet 1

FIG 1



INVENTORS
Archey V. Miller
Carl Muller
BY *Halla & St. John*
Attys.

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Fig. 2

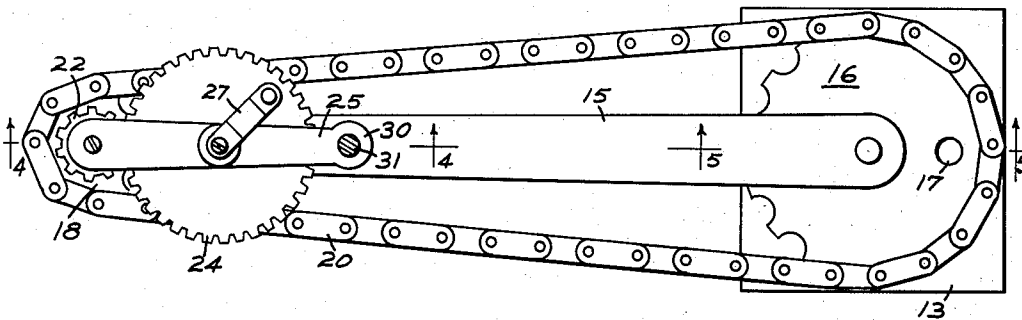
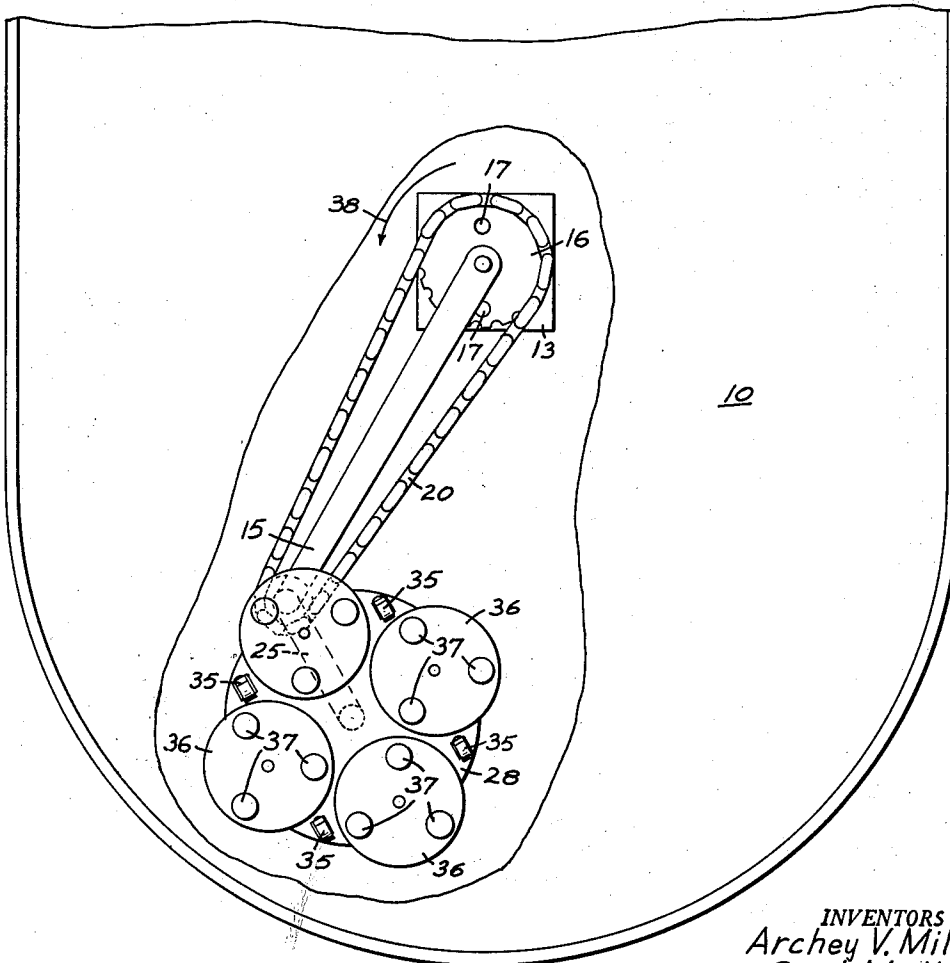


Fig. 3



INVENTORS
Archey V. Miller
Carl Muller
BY *Hells & St. John*
Attys.

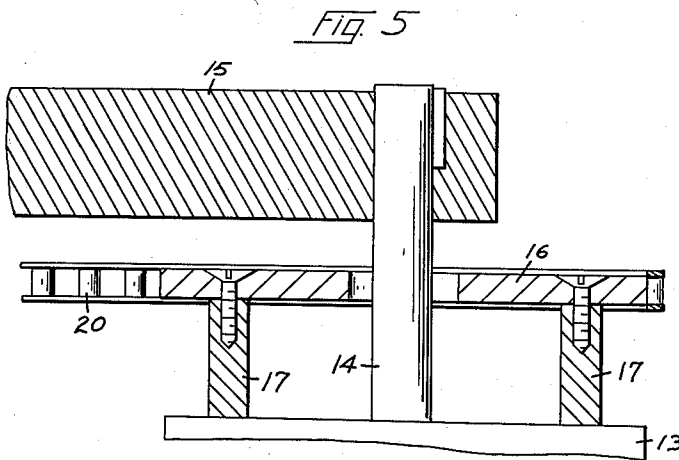
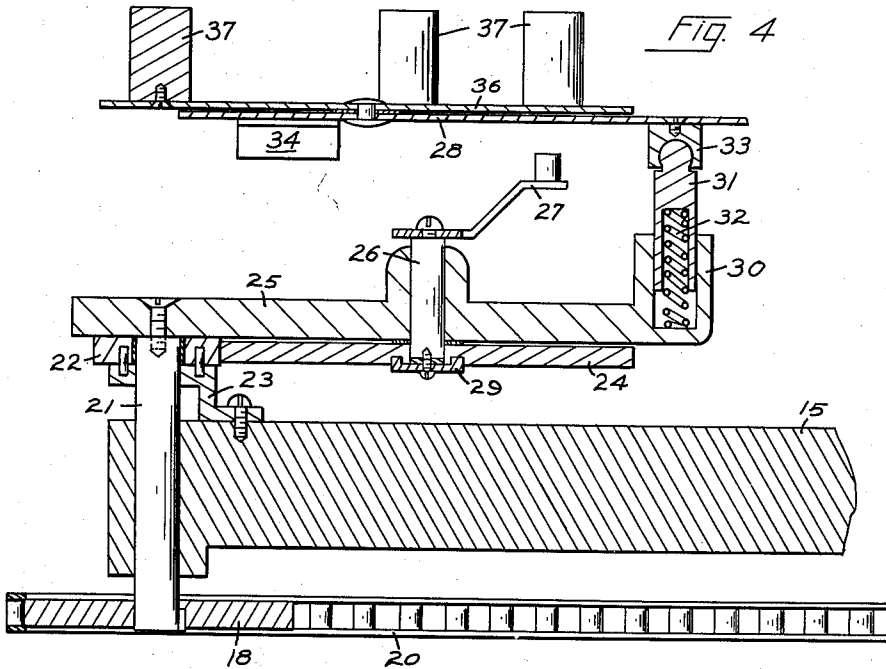
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INVENTORS
Archey V. Miller
Carl Muller
BY *Halla & St. John*
Attys

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ELECTRICAL RACING DEVICE

Archey V. Miller, E. 1928 Liberty, and Carl Muller,
N. 2427 Standard, both of Spokane, Wash.

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4 Claims. (Cl. 273-86)

This invention relates to a novel electrical racing device.

The present invention relates to an amusement device wherein magnetic objects are moved about an orbital path along a smooth topped table, there being no mechanical connection between the objects being moved and the driving device which forms the present invention. The present invention is particularly well adapted for public installation but may also be used in a private manner such as in toys or other similar devices designed for home use. The device may be arranged for coin operation by utilizing suitable controls which are conventional and will not be described in the following disclosure.

It is a first object of this invention to provide an electrical racing device wherein there is no direct mechanical connection between the moving objects and the driving mechanism. The only force exerted between the two systems is that produced by the respective magnetic fields involved in the separate mechanical arrangements.

It is another object of this invention to provide a magnetic support which will move the driving magnets in a non-circular orbit so as to better simulate actual track conditions. The objects which are moved across the table in this non-circular locus are not hindered by any fixed obstructions. The track itself is perfectly smooth, the only directional forces being those produced by the driving magnets.

It is another object of this invention to provide random movement of the driving magnets while utilizing a single drive unit and drive shaft to propel the entire mechanism. By insuring random movement of the magnets the present invention guarantees that no one object at the outside of the track will become locked to a magnet in that position and thereby relieves the device of operation of chance in determining the final winner, that is, the object which first crosses a line drawn across the track of the table.

These and further objects will become evident from a study of the following disclosure taken in conjunction with the accompanying drawings which illustrate a preferred form of the invention. It is to be understood that this form is exemplary and is not intended to limit or restrict the invention except as it is limited by the claims which follow.

In the drawings:

FIGURE 1 is a vertical sectional view through the supporting table showing the racing device as it would actually be installed;

FIGURE 2 is a sectional view taken along line 2-2 in FIGURE 1, showing the main driving components;

FIGURE 3 is a top plan view of the track showing the table top partially broken away;

FIGURE 4 is an enlarged sectional view of the driving apparatus as seen along line 4-4 in FIGURE 2; and

FIGURE 5 is an enlarged sectional view taken along the line 5-5 in FIGURE 2 with the motor being broken away.

This invention contemplates an electrical racing device which would be normally mounted in a suitable cabinet (not shown). The device consists of a table top 10 which is suitably supported in a horizontal plane. The top surface of the table top 10 is perfectly smooth and need not be obstructed by any fixed abutments. However, to simulate an actual track any suitable miniature fence or other device may be installed on this top surface of the table top 10. The material used in the construction of the

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table top 10 must be non-magnetic and is preferably made of wood. Mounted on the top surface of the table top 10 are a plurality of miniature objects 11. The design of the objects 11 is immaterial. They may consist of small racing autos, as shown, or may be miniature horses, dogs or other suitable racing elements. Each of the autos shown in FIGURE 1 is provided with a suitable magnet 12 which is designed to be engaged by the magnetic field created below the table top 10.

The drive mechanism for this racing device is propelled by a single electronic motor 13 which is suitably fastened to any fixed base so as to be positioned in fixed relation with respect to the table top 10. The drive shaft 14 of the motor 13 extends vertically upward. The axis of the shaft 14 is therefore perpendicular to the plane of the table top 10. The main support arm 15 for the driving apparatus is suitably keyed to the shaft 14. This arm 15 is therefore revolved about the axis of the shaft 14 when the motor 13 is energized by a suitable control apparatus (not shown). A sprocket 16 is mounted concentrically about shaft 14 and is provided with a central aperture larger than shaft 14 so as to insure proper clearance between these two elements. The sprocket 16 is fixed to a pair of posts 17 which lock the sprocket 16 to the fixed housing of the motor 13. Thus the sprocket 16 is fixed relative to the table top 10 and is mounted in a position concentric with the driving shaft 14. At the outboard end of the arm 15 is rotatably journaled a pivot shaft 21. The axis of shaft 21 is parallel to the axis of shaft 14 but is radially displaced therefrom. The lower end of shaft 21 has fixed thereto a driven sprocket 18 whose diameter is one half that of the fixed sprocket 16. The two sprockets 16 and 18 are encompassed by a suitable chain 20. Due to the relative sizes of sprockets 18 and 16 the shaft 21 will revolve about its axis twice during each revolution of the arm 15 about the axis of shaft 14. It is this relation which provides the oval track locus utilized in the propelling of the objects 11.

At the upper end of shaft 21 is fixed an eccentric arm 25. This arm 25 has a length less than that of arm 15. Rotatably journaled about the intermediate portion of shaft 21 is a pinion 22 which is fixed to arm 15 by a suitable bracket 23. The pinion 22 meshes with a larger gear 24 which is joined by a friction clutch 29 to a shaft 26 rotatably journaled in the intermediate area of the eccentric arm 25. Shaft 26 has fixed at its upper end a flipper arm 27 which extends upwardly from the area of the eccentric arm 25. Thus as the arm 15 is revolved by shaft 14, the eccentric arm 25 will be revolved about its axis due to the action of sprocket 18 and the flipper arm 27 will also be revolved about the axis of shaft 26 due to the action of pinion 22 and gear 24. Clutch 29 prevents damage to flipper arm 27 due to jamming.

At the outer end of the eccentric arm 25 is formed an upstanding boss 30. Boss 30 is recessed to receive a vertical shaft 31. The shaft 31 is spring biased by a compression spring 32 which forces the shaft 31 in an upward direction. Shaft 31 is capped by a suitable spherical joint 33 which is fixed to the lower surface of a large circular disk 28. The disk 28 is the first element of the magnet support. Fixed to the lower surface of the disk 28 are three downwardly protruding abutments 34. These abutments 34 extend downwardly to a point where they intersect the locus of the flipper arm 27. The flipper arm 27 is designed to strike the abutments 34 in a random fashion to thereby spin the disk 28 about the axis of joint 33. The upper surface of the large disk 28 is provided with four conventional caster units 35 which bear against the under surface of the table top 10. The casters 35 are suitably swivelled so as to ride along the under surface of the table top 10

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regardless of the position of the disk 28. The casters 35 are maintained in this position against the table top 10 due to the action of spring 32. Rotatably mounted on the large disk 28 are four small disks 36 which have three magnets 37 fixed to each of them. The magnets 37 are suitably aligned so as to attract the magnets 12 imbedded within the driven objects 11. The disks 36 are free to spin about their axes in response to the eccentric driving action of the arms 25 and 15.

The operation of this invention is quite simple and can be fully understood by a study of the accompanying drawings. As motor 13 drives shaft 14 the arm 15 will revolve in a circular orbit. At the same time the arm 25 will revolve about its axis twice during each revolution of arm 15 about the axis of shaft 14. This will be suitably timed relative to the table dimensions so as to insure that the arm 25 will be fully extended at the farthest length of the table top 10 and will be fully contracted along its narrow side. Such a relation can be seen in FIGURE 3 wherein arrow 38 designates the direction of motion of shaft 14 and arm 15. The random movement of flipper arm 27 will result in its contact with the abutments 34 at periodic intervals to thereby spin the large disk 28 about the substantially vertical axis of the spherical joint 33. The magnets 37 will be maintained in a position adjacent the table top 10 due to the spring biasing action of the spring 32. The strength of the magnets 37 and 12 is such that the objects 11 will trail the nearest magnet 37. Since these magnets will be continually in motion about both the axes of disks 36 and disk 28, no one object 11 will be able to lock onto a single magnet 37. Instead each object 11 will be picked up by succeeding magnets 37 and thereby propelled about the table top 10 with random efficiency. This motion will provide a racing device whereby one cannot foretell which object 11 will be in a leading position relative to the remaining objects 11 at any time. In order to simulate a race one need only to set the number of revolutions of arm 15 at a predetermined quantity, dependent upon the race conditions desired. By drawing a finish line across the top surface of the table top 10, one can then determine the leading object 11 at the completion of the predetermined number of revolutions of shaft 14 and arm 15. Each revolution of arm 15 will constitute a single lap of the race across the table top 10.

The present invention may be modified without disturbing the basic concepts embodied in the above embodiment. For instance the particular locus utilized in this device may be varied by changing the relative sizes of sprockets 16 and 18. If desired, a circular track may be utilized, in which case the arm 25 will be maintained in a fixed position by using a sprocket 18 of the same size as the fixed sprocket 16. The most important concept in this invention is the random motion of the magnet 37 which is insured by the positive drive to flipper arm 27 and its random striking of the abutments 34.

Having thus described our invention, we claim:

1. An amusement device, comprising:
 - a table top having a plane upper surface;
 - a base positioned beneath said table top and fixed relative thereto;
 - a plurality of magnetic objects independently positioned on said plane upper surface and movably supported thereon;
 - a rotatable arm journaled on said base about a fixed vertical axis;
 - an eccentric arm journaled on said rotatable arm about an axis radially spaced from said fixed axis, said eccentric arm being located above said rotatable arm;
 - drive means mounted on said base operatively connected to said rotatable arm adapted to rotate said rotatable arm about said fixed axis;

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- a first sprocket fixed to said base adjacent said rotatable arm and centered about said fixed axis;
 - a second sprocket fixed to said eccentric arm and centered about the axis of said eccentric arm on said rotatable arm, said second sprocket having a different number of teeth than does said first sprocket;
 - an endless chain operatively engaged about said first and second sprockets;
 - a magnet support rotatably journaled on said eccentric arm for movement about a substantially vertical axis, said support being positioned adjacent the underside of said table top;
 - a plurality of magnets mounted on said support directly adjacent the underside of said table top;
 - a plurality of downwardly extending projections fixed to said support and radially positioned from the central axis of said support;
 - a flipper arm assembly rotatably extending about a vertical axis intermediate the rotatable axis of said eccentric arm and said magnet support, said flipper arm having one end adapted to intersect the locus of said projections as said magnet support revolves about its central axis;
 - a first gear fixed to said flipper arm assembly;
 - and a second gear fixed to said second sprocket and being in mesh with said first gear, whereby rotation of said rotatable arm will result in relative motion of said eccentric arm and said rotatable arm and simultaneous relative motion between said flipper arm assembly and said eccentric arm.
2. An amusement device, comprising:
 - a table top having a plane horizontal top surface;
 - a plurality of magnetic objects independently positioned on said surface and movably supported thereon;
 - a magnet support located adjacent the underside of said table top, said magnet support being located in a plane substantially parallel to said plane upper surface;
 - a plurality of magnets carried by said magnet support intermediate said table top and said magnet support, the magnetic field of said magnets being sufficient to exert an attractive force on said magnetic objects when the individual magnets are vertically positioned below the individual magnetic objects;
 - carrier means operatively supporting said magnet support, said magnet support being rotatably journaled thereon about a substantially vertical central axis, said carrier means being mounted on a fixed base and being adapted to carry said magnet support about a predetermined locus in a plane parallel to said table top surface;
 - downwardly projecting abutments fixed to the lower surface of said magnet support, said abutments being radially spaced from the center of the support and being circumferentially spaced from one another;
 - and flipper means rotatably mounted about a vertical axis on said carrier means, said flipper means including a protruding portion adapted to intersect the rotational paths of said abutments about the center of said magnet support, said carrier means including drive means operatively connected to said flipper means adapted to effect the rotational motion of said flipper means about its vertical axis.
 3. The device as defined in claim 2, wherein said magnet support comprises:
 - a first disk rotatably supported on said carrier means by a universal fitting spring biased in an upward direction toward said table top;
 - a plurality of circumferentially spaced casters mounted on the upper surface of said first disk, said casters being adapted to ride on the underside of said table top;
 - a plurality of smaller disks independently rotatably mounted on said first disk about circumferentially

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spaced vertical axes, said magnets being fixed to the upper surfaces of said smaller disks;
said abutments being fixed to the lower surface of said first disk.

4. An amusement device, comprising:

- a table top having a plane upper surface; 5
- a base positioned beneath said table top and fixed relative thereto;
- a plurality of magnetic objects independently positioned on said plane upper surface and movably supported thereon; 10
- a rotatable arm journaled on said base about a fixed vertical axis;
- an eccentric arm journaled on said rotatable arm about an axis radially spaced from said fixed axis, said eccentric arm being located above said rotatable arm; 15
- drive means mounted on said base operatively connected to said rotatable arm adapted to rotate said rotatable arm about said fixed axis;
- a magnet support located adjacent the underside of said table top and mounted on said eccentric arm for rotation about an axis parallel to and radially offset from the axis of said eccentric arm on said rotatable arm; 20
- a plurality of magnets carried by said magnet support 25

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intermediate said table top and said magnet support, the magnetic field of said magnets being sufficient to exert an attractive force on said magnetic objects when the individual magnets are positioned below the individual magnetic objects;

means operatively connected to said rotatable arm, said base and said eccentric adapted to effect rotation of said eccentric arm about its axis on said arm in response to motion of said rotatable arm about said fixed axis;

and means on said eccentric arm operatively engageable with said magnet support adapted to effect random rotational movement of said magnet support relative to said eccentric arm in response to rotational movement of said eccentric arm relative to said rotatable arm.

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