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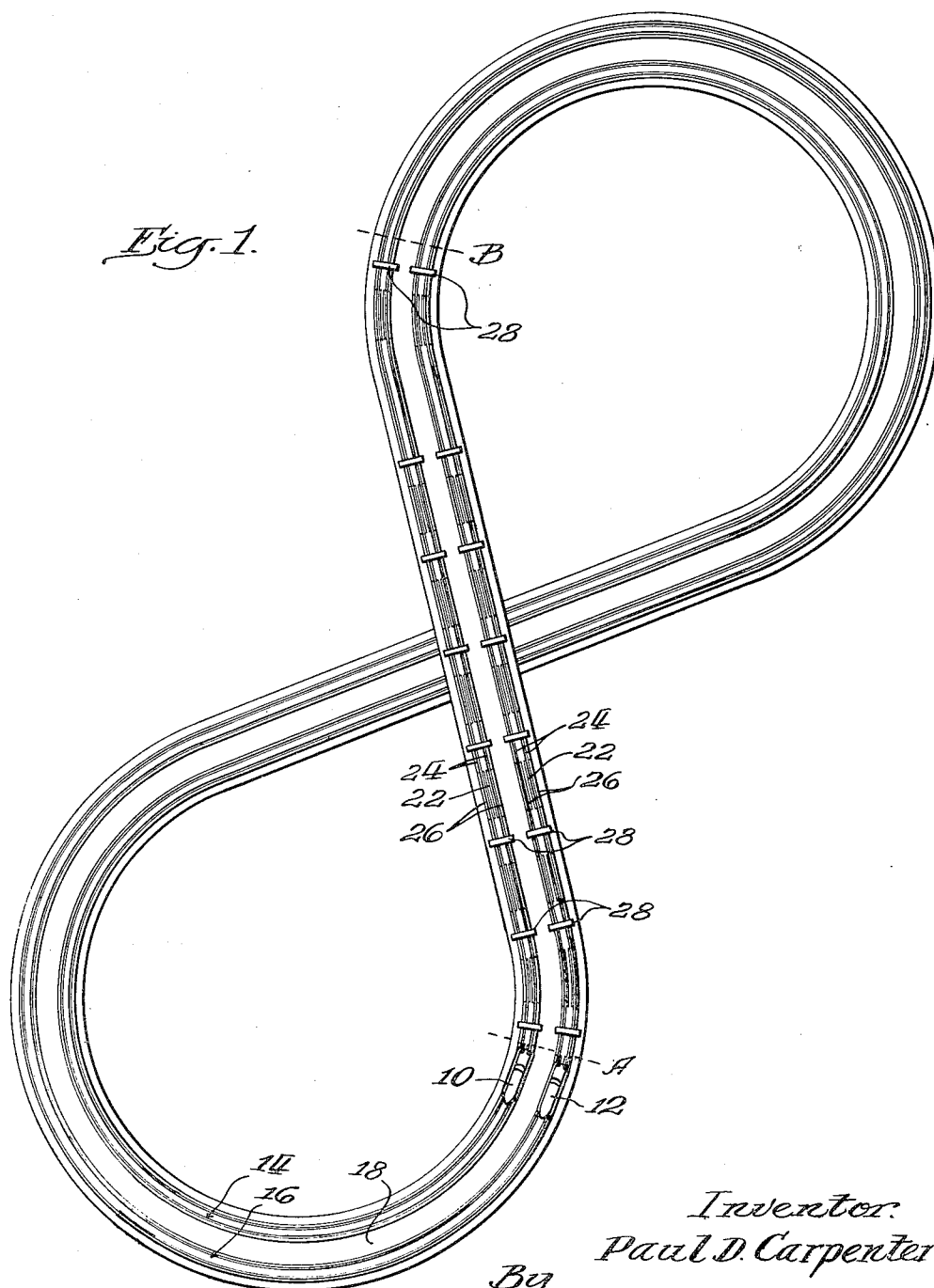
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2,218,164

GAME APPARATUS

Filed Oct. 15, 1938

5 Sheets-Sheet 1



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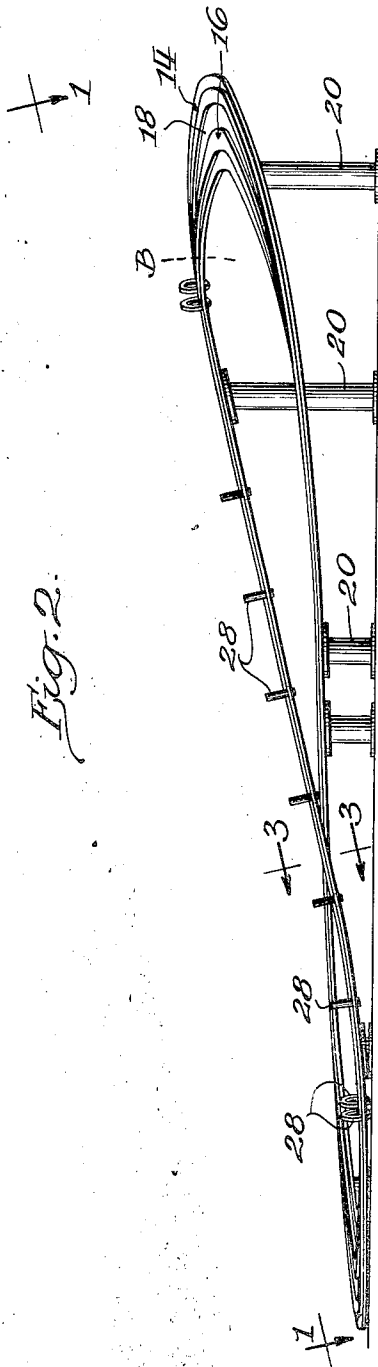
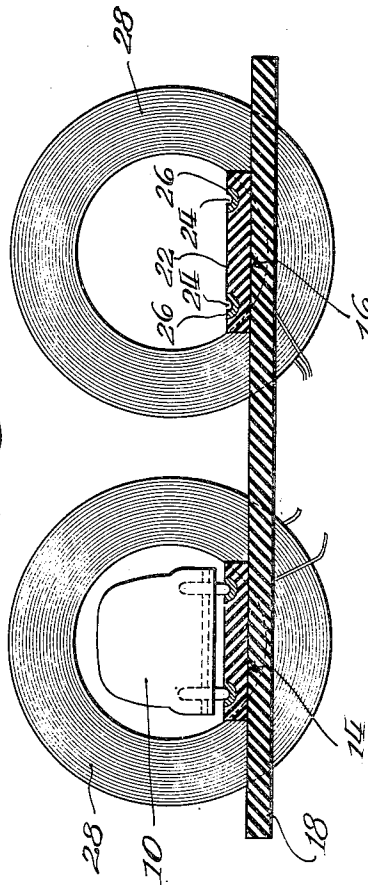


Fig. 3.



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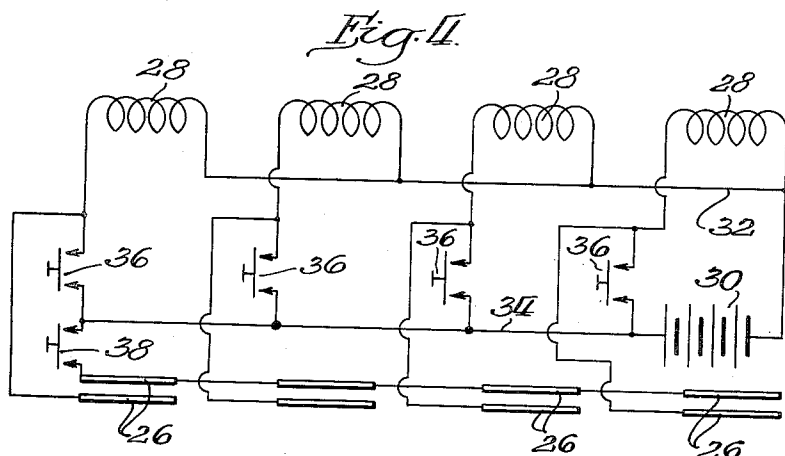
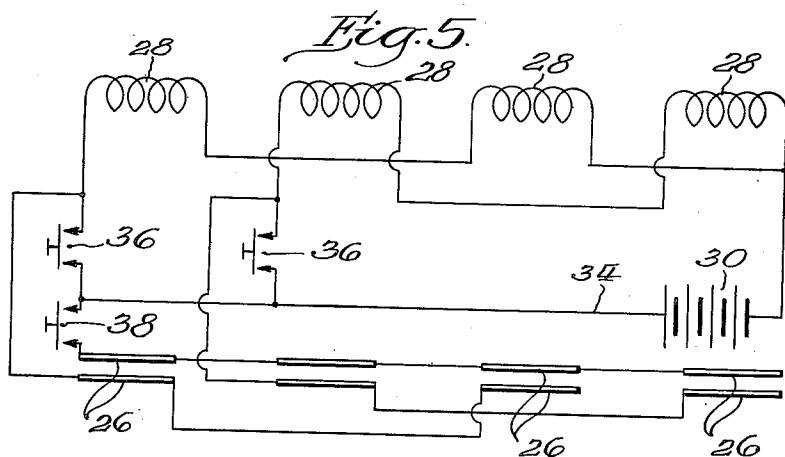
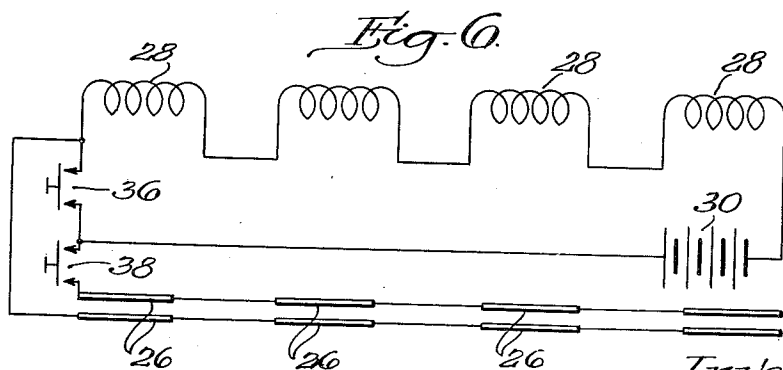
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GAME APPARATUS

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Fig. 7.

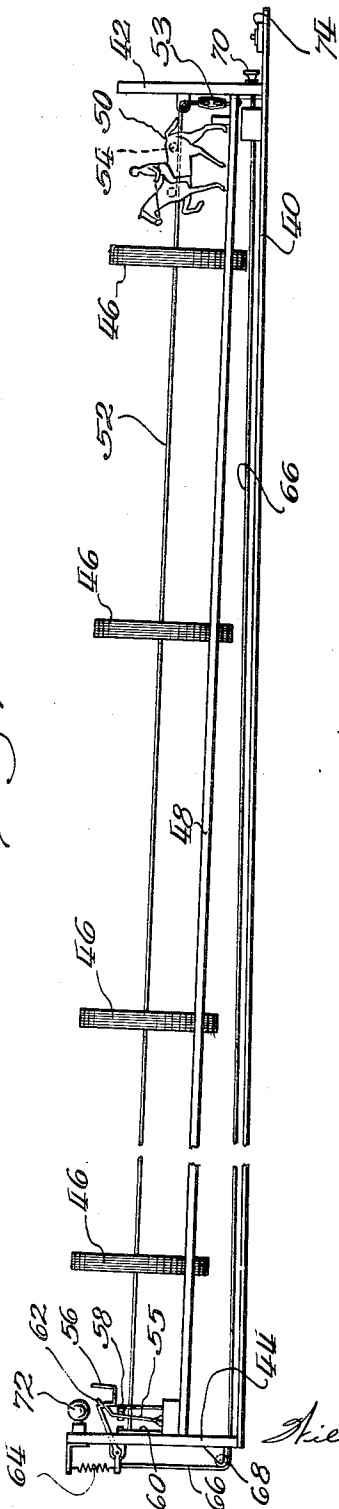
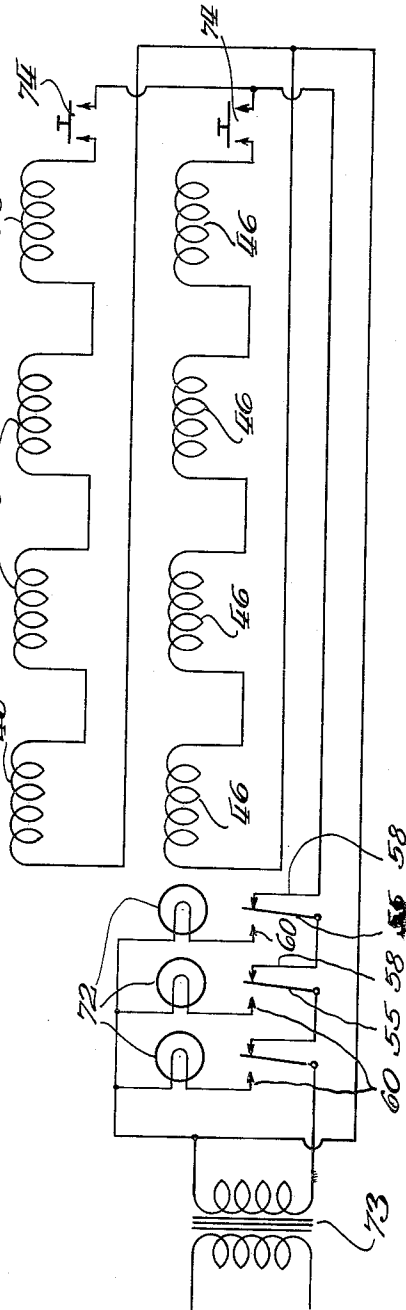


Fig. 8.



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Fig. 9.



Fig. 10.

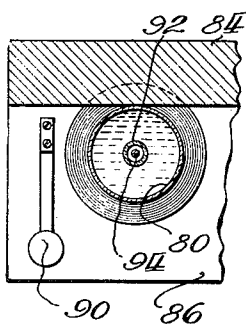
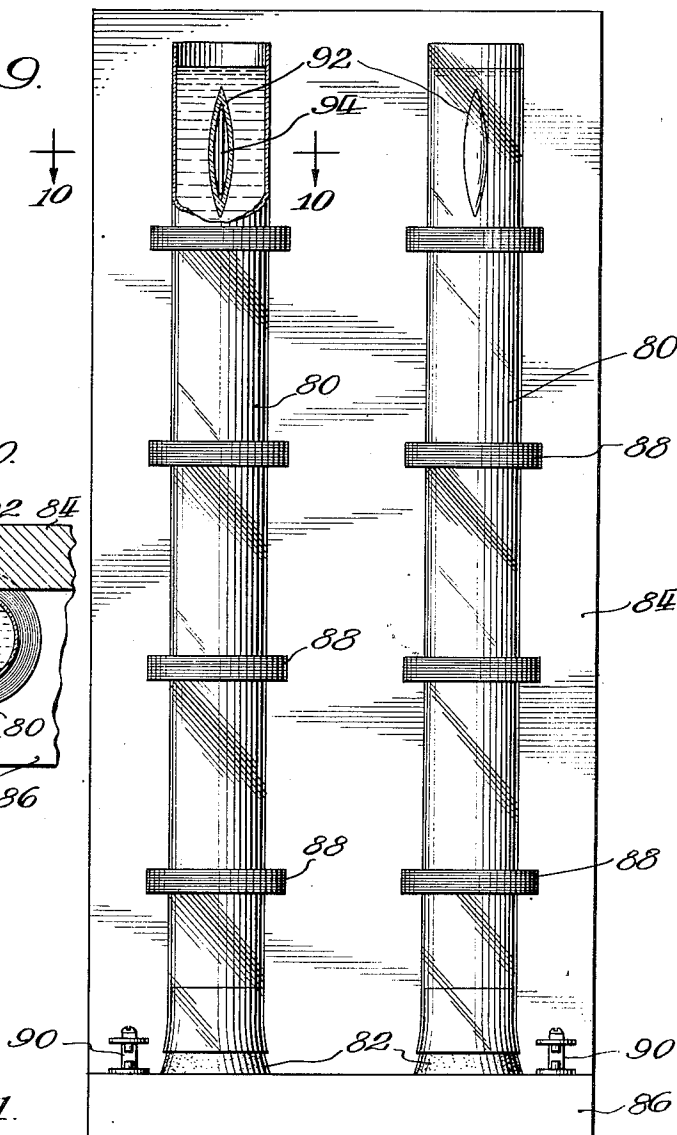
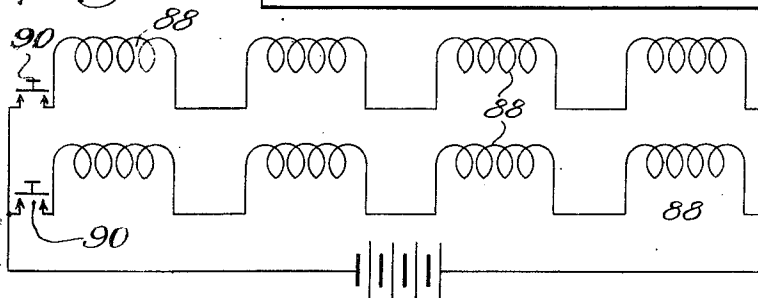


Fig. 11.



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UNITED STATES PATENT OFFICE

2,218,164

GAME APPARATUS

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Application October 15, 1938, Serial No. 235,172

5 Claims. (Cl. 273-86)

My invention relates generally to a game apparatus in which ferrous objects are electromagnetically motivated by manually operated switch controlled solenoids.

It is an object of my invention to provide an improved game apparatus in which an article of magnetic material is advanced along a predetermined path by progressive energization of solenoids located along the path of movement of the article.

A further object is to provide an improved game apparatus in which the speed of operation of an object made in part at least of magnetic material may be controlled by the closing of switches in proper sequence, the switches serving to control the energization of solenoids spaced along the path of movement of the object.

A further object is to provide an improved game apparatus which may be economically manufactured, which is rugged and simple in construction, and which will furnish a high degree of entertainment and amusement to the players.

Other objects will appear from the following description, reference being had to the accompanying drawings, in which:

Fig. 1 is a plan view of one form of the invention;

Fig. 2 is a side elevation of the apparatus shown in Fig. 1;

Fig. 3 is a transverse sectional view taken on the line 3-3 of Fig. 2;

Figs. 4, 5, and 6 are various forms of circuits which may be used in connection with the form of the invention shown in Figs. 1, 2, and 3;

Fig. 7 is a side elevation of a modified form of the invention;

Fig. 8 is a wiring diagram of the apparatus shown in Fig. 7;

Fig. 9 is a front elevational view, partly in section, of a modified form of my invention;

Fig. 10 is a transverse sectional view taken on the line 10-10 of Fig. 9; and

Fig. 11 is a wiring diagram of the form of the invention shown in Fig. 9.

In the form of the invention shown in Figs. 1 to 6 inclusive, a pair of closed parallel tracks is provided for vehicles 10, 12, which may be miniature automobiles, locomotives, or the like. These miniature vehicles are preferably made of soft steel or any other suitable magnetic material, or may be made of non-magnetic material and have a bar of magnetic material incorporated therein. The wheels, however, are made of metal and are joined by a metal axle. Each of the miniature

vehicles is provided with a closed track designated generally by the reference characters 14 and 16, these tracks being illustrated in the form of a figure 8. The tracks consist of two portions, as a rising inclined substantially uncurved portion extending from the dotted line A to the dotted line B, and a downwardly sloping curved portion forming the remainder of the closed track. The tracks are supported on a suitable base 18 held at the proper elevations by pedestals 20. Each of the pair of tracks 14, 16 is composed of a plurality of sections 22, provided with grooves 24 to guide the wheels of the miniature vehicles. Portions of the grooves in the track are lined with arcuately formed metal strips which are suitably spaced along the upwardly sloping portion of the track and are insulated from each other by the track 22. As will hereinafter appear, the strips 26 of one track are adapted to be electrically connected upon the passage of the miniature vehicle thereover, the circuit being completed through the wheels and axles of the vehicle. Likewise spaced along the upwardly inclined portion of the track are a plurality of coils 28 which are supported by the base 18 and have sufficiently large openings to surround the tracks 22 and to permit passage therethrough of the miniature vehicles 10, 12.

The coils may be energized in any one of several ways, as illustrated in the circuit diagrams of Figs. 4, 5, and 6. Each of the coils 28 has one terminal permanently connected to one terminal of a source of electrical energy indicated as a battery 30 by a common conductor 32, as shown in Fig. 4. The other terminal of the battery 30 is connected to a common conductor 34, and the circuits, through the various coils, are adapted to be completed by the operation of switches 36 of the push button type. There will be a push button switch 36 for each coil so that the coils 28 may be selectively energized. In utilizing the circuit of Fig. 4, the two players will each have accessible to him a set of switches 36 for controlling the energization of coils 28 associated respectively with tracks 14, and 16. The two players may then, by successive energization of the coils 28 in properly timed sequence, cause the miniature vehicles 10, 12 to be electromagnetically propelled up the inclined portion of the track until they have reached the highest point thereof, whereupon the vehicles will coast to the lowermost portion, in which they are shown in Fig. 1, under the influence of gravity. Considerable skill is required to operate the switches 36 in the timed sequence necessary to cause the toy vehicle

to be propelled up the inclined portion of the track at its maximum speed. If a switch 36 is held closed after the magnetic center of the miniature vehicle has passed the center of the coil energized by such switch, the vehicle will be retarded rather than accelerated up the track. In fact, unless the switches are carefully operated in the proper timed sequence, the vehicles will come to a stop or possibly even roll backwardly. Thus, two players may compete to determine which has the greater skill in the manipulation of the switches 36, the measure of the skill being the speed at which the toy vehicle can be made to travel the full length of the track.

When the apparatus is used as a toy for children, a switch 36 may be closed, thus connecting one of each pair of the metal track strips 26 to the conductor 34. The other of each of the pairs of track strips is connected to the terminal of a coil 28 which is placed slightly in advance of the associated metallic track strips. When the switch 36 is closed, it is unnecessary to operate the switches 36 since the vehicle will automatically complete and break the circuits through the coils 28 in proper sequence as it is magnetically propelled up the inclined portion of the track.

In order to reduce the cost of manufacture of the apparatus, alternate coils 28 may be controlled by a common switch 36, as shown in Fig. 5. The operation of the apparatus using the circuit of Fig. 5 will be substantially the same as that of Fig. 4 since one of the coils 28 of the pair connected in series will always be so remote from the miniature vehicle that the latter will not be affected by its magnetic field.

To further eliminate parts, it is possible to connect all of the coils 28 in series (or in parallel, if desired) and use but a single switch 36 to control the simultaneous energization of all of the coils. With this arrangement using but a single switch, it is slightly more difficult to secure uniformly accelerated travel of the miniature vehicle up the inclined portion of the track, since, unless the switch is closed at exactly the right time with respect to the relative positions of the coil and vehicle, the magnetic force will act in a direction to retard rather than to accelerate the vehicle.

The invention may be embodied in a variety of forms to produce different effects. One such modified form of the invention is shown in Figs. 7 and 8, wherein the apparatus is intended to simulate a horse race. The apparatus consists of a baseboard 40 having a front upright board 42 and a rear upright board 44. A plurality of coils 46 are mounted in spaced relation upon an inclined support 48. The coils 46 may be similar in shape to the coils 28 previously described, or may be elliptical so that their center openings will conform more closely to the shape of the magnetic elements which are propelled thereby, shown in the form of horses 50 made of a suitable ferrous metal. The horse-shaped elements 50 are provided with a longitudinal passageway for a wire 52 which is stretched taut between the vertical boards 42 and 44 by any suitable means, such as a turn buckle 53. Suitable grooved sheave wheels 54 are rotatably mounted within the horse simulating element 50 so that the latter may travel freely along the wire 52 with a minimum of friction. There will ordinarily be a plurality of horses, each provided with a number of coils 46 for propelling it along its wire 52, and a number of players will compete to cause the horses respectively controlled by them to travel

the full length of the wire 52 in the shortest interval of time. In order that there may be no question concerning which horse won the race, there is provided near the end of each wire a switch arm 55 having a forwardly projecting bumper plate 56 adapted to be struck by the nose of the horse as the latter reaches the end of the track. When this switch arm is thus struck by a horse, it will swing rearwardly and break contact with a switch contact element 58, and immediately thereafter make contact with a switch contact element 60. A latch arm 62 is adapted to engage the upper end of the switch arm 55 when the latter is in its rearmost position and completing contact with the contact element 60, the latch being actuated by a spring 64. A cord or wire 66 is attached to the end of the latch arm 62 and passes over a pulley 68, extending forwardly to a release knob 70, slidably mounted in the front upright. A lamp 72 is arranged to be illuminated upon closure of the circuit through the switch arm 55 and switch contact 60. It will be understood that there will be a switch 55, 58, 60, and a lamp 72 for each of the wires 52, but that the latch arm 62 may be so arranged that they may be released by a common cord or wire 66. As shown in the wiring diagram of Fig. 8, the coils 46 are connected in series and are adapted to be connected to the secondary of a transformer 73 upon closure of an associated push button switch 74.

The circuits through the lamps 72 are in parallel, each lamp being adapted to be supplied with current through its associated contact 60 when the switch arm 55 is flexed rearwardly. The switches composed of the contacts 58 and the switch arm 55 are, however, connected in series so that whenever one of these latter switches is opened, the supply of current to all of the push button switches 55 is interrupted and the losing players will be unable further to advance their horses after the winning horse has opened the switch 55, 58 on its track. At the completion of the race, and after one of the switches 55, 58 has opened, the horses will return to starting position due to the slope of the wires 52.

A further modification of my invention is shown in Figs. 9, 10, and 11, in which there are a plurality of glass tubes 80, the bottoms of which are closed by corks 82. The tubes are secured to a suitable support consisting of an upright member 84 and a base 86. A plurality of coils 88 are wound around the tubes 80 at suitable spaced intervals, the coils being preferably connected in series as shown in Fig. 11, and the coils for each of the tubes being separately energized by a switch 90 which, as shown in Fig. 9, may be mounted upon the base 86. Each of the tubes is substantially filled with water and contains a diver 92, the specific gravity of which is very slightly less or greater than 1. The diver 92, if made of non-ferrous material, will have a bar 94 of magnetic material incorporated therein. The diver may be made in any suitable form, such as that of the deep sea divers' uniform or may be made in the form of a fish, balloon, or other similar suitable shape. When the diver is made heavier than water, the object of the game will be to cause it to rise to the surface as rapidly as possible by closing the associated switch 90 at properly timed intervals. When the coils 88 are thus energized from a suitable source of current, upon closure of the switch 90, the diver will be drawn toward the denser portion of the magnetic field of the nearest coil so that by observing the

position of the diver, and closing the switch 90 at the proper time, the diver may be made to move either upwardly or downwardly in the tube. It will, of course, sink under the influence of gravity, providing the coils are not energized. Of course, if the diver is made buoyant with respect to the liquid contained in the tubes, it may be made to sink upon properly timed energization of the coils 88. By having a plurality of the devices arranged side by side, a number of players can engage in competition to determine which of them is able to cause the diver to complete one or more cycles of its movement from end to end of the tube in the shortest period of time.

From the foregoing, it will appear that I have devised a number of different modified forms of game apparatus operating generally on the common principle of securing the advancement of a magnetic object along a predetermined path by selective energization of solenoids placed along the path of movement, the arrangement being such that the magnetic element passes through the center of the coil to utilize to a maximum the magnetic attractive forces produced by the coils.

It will be apparent to those skilled in the art that numerous further modifications and variations of the invention may be made without departing from the underlying principles embodied in the forms disclosed herein. I therefore desire, by the following claims, to include within the scope of my invention all such equivalent constructions whereby substantially the results of my invention may be obtained by substantially the same means.

I claim:

1. In a game apparatus, the combination of a frame, a plurality of sloping wires secured to said frame, a group of apertured coils surrounding each of said wires, an element of magnetic material mounted for longitudinal movement on each of said wires, a source of electrical energy, a switch completed circuit for selectively connecting said groups of coils to said source, a plurality of electrical indicators, and two-way

switches operable by said elements respectively when the latter reach predetermined positions along said wires to open said circuits and connect said indicators to said source.

2. In a game apparatus, the combination of a frame, a plurality of sloping wires secured to said frame, a plurality of apertured coils surrounding each of said wires, elements of magnetic material, each of said elements bearing a pair of sheaves supporting it for longitudinal movement on said wires respectively, a source of electrical energy, a switch completed circuit for selectively connecting said coils to said source, a plurality of indicators, and switches operable by said elements respectively when they reach predetermined positions along said wires to open said circuits and cause operation of said indicators.

3. In a game device, the combination of a frame, a sloping wire secured to said frame, a plurality of apertured coils spaced along said wire, an element of magnetic material movable along said wire and through the apertures in said coils, a source of electrical energy, and a switch completed circuit connecting all of said coils to said source.

4. In a game device, the combination of a frame, a sloping wire secured to said frame, a plurality of coils spaced along said wire and having apertures formed therein, a wire secured to said frame and extending through the apertures in said coils, an element of magnetic material freely movable along said wire and through the apertures in said coils, a source of electrical energy, and a switch for simultaneously connecting all of said coils to said source.

5. In a game device, the combination of a frame, a guide wire secured to said frame, a plurality of apertured coils spaced along said wire, an element of magnetic material movable along said wire and through the apertures in said coils, a source of electrical energy, and selectively operable switch completed circuits for connecting said coils to said source.

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