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GAME APPARATUS

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2 Sheets-Sheet 1

Fig. 1.

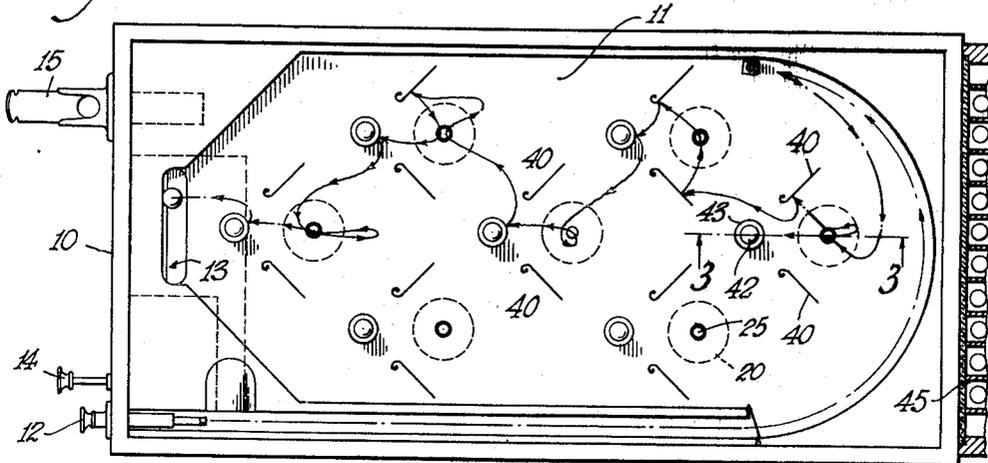


Fig. 2.

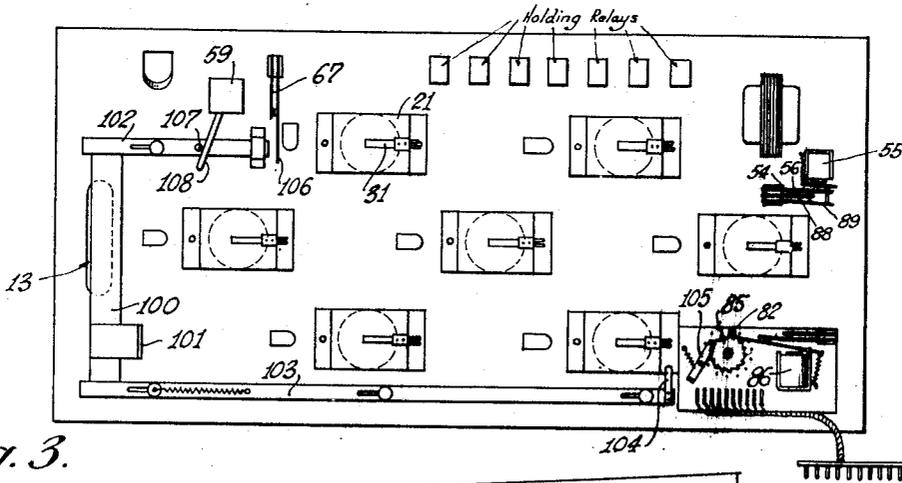
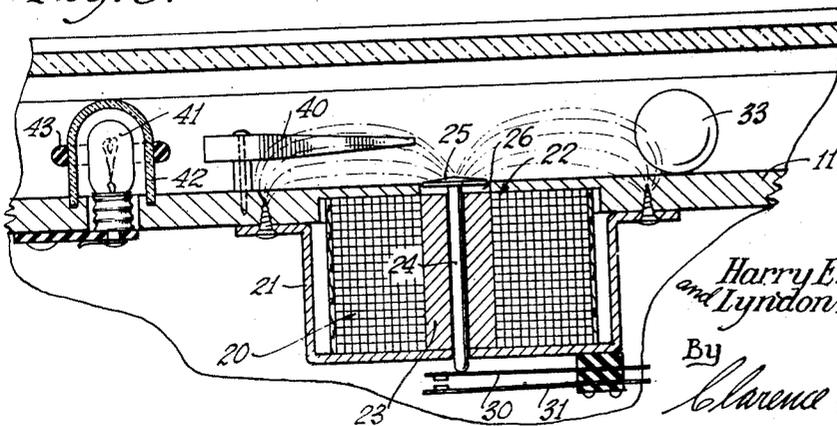


Fig. 3.



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# UNITED STATES PATENT OFFICE

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## GAME APPARATUS

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3 Claims. (Cl. 273—119)

This invention relates to improvements in amusement apparatus and has as its principal object the provision of a novel ball activating device for use in bagatelle, pin ball, and analogous games, the device serving to impart novel and varied movements to a ball projected on a playboard.

Viewed from another aspect, the invention provides a novel electromagnetic ball activator for use in game apparatus of the type including a ball playing board over which magnetically attractable balls are projected, there being control means associated with each activator and arranged to be struck by a ball attracted by the electromagnet so as to deenergize the latter and free the ball for further migratory movement into and out of the attracting fields of other adjacent activating devices.

Another object is the provision in a game of the class characterized of an electromagnet arranged beneath a playboard to attract a paramagnetic ball, switch means associated with the electromagnet and arranged to be struck by the ball when the latter is attracted to the electromagnet, whereby to deenergize the latter for movement away from the electromagnet and out of its field of force, the invention further providing rebound means associated with the electromagnet whereby novel movement effects are imparted to the balls.

Another object is the provision in an electromagnetic ball activator of the class characterized of switch means arranged to be contacted by a projected ball to control an electromagnetic activator, the switch being constructed and designed to effect rebound of the ball in various directions for engagement with associated rebound means.

Other objects, advantages, and economies residing in the invention relate to certain details of construction and operation of the apparatus hereinafter described in view of the drawings, in which:

Fig. 1 is a top plan view of a playboard incorporating the invention;

Fig. 2 is a bottom plan view of the playboard;

Fig. 3 is an enlarged fragmentary vertical section through one of the activators as viewed in the direction of line 3—3 of Fig. 1; while

Fig. 4 is a circuit diagram.

A preferred embodiment of the invention is illustrated in the drawings in association with an arrangement such as that of Fig. 1, wherein there is shown a form of pin ball or bagatelle game including a cabinet 10 provided with a horizontally

inclined playboard 11 and means such as the plunger 12 for projecting balls out onto the board for engagement with various rebound members and other instrumentalities arranged on the board, including the novel ball activating means of the present invention, the balls ultimately gravitating into an out pocket 13 from which they descend below the board for engagement with an elevating device (not shown) which may be actuated by a member 14 to feed balls one at a time into projecting position before the plunger 12. Some form of master control, such as the reciprocable coin slide 15, is preferably provided so that a limited number of balls may be projected for each release of the game.

The balls used with the novel activator are magnetically attractable, preferably steel bearing balls, and their course over the playboard is influenced by electromagnetic activating means, such as that illustrated in Fig. 3, and including in a preferred arrangement an electromagnet 20 mounted beneath the playboard by bracket means 21, with one of its polar ends 22 flush against the under side of the board, and as close as possible to the top playing surface thereof for maximum dispersion of the field of force. Each of the magnet windings 20 is provided with a magnetic core 23 having a bore in which there is slidably seated a diamagnetic plunger 24 constructed of brass fiber or some other non-magnetic substance. In the present instance, it is preferred to use fiber because of its relatively light weight.

The plunger 24 constitutes part of a control element to be actuated by a ball brought under the influence of the corresponding electromagnet, the remainder of the control element including a ball contacting member 25 mounted at the upper end of the plunger 24 and preferably having a downwardly sloping surface contour adapted to cause a ball contacting the same to roll away therefrom in any direction. The ball engaging or contacting members 25 are adapted to lower into a hole 26 in the board when contacted by a ball.

The ball-operated control means for each of the magnetic activators includes a control element such as a leaf spring switch mounted beneath each electromagnet on the bracket 21 thereof and having a pair of light-weight contact springs 30 and 31 which are normally diverged and out of contact, that is, in open circuit condition, and the upper spring 30 of which is positioned beneath the lower end portion 32 of the plunger 24 and normally engages said end portion to move the same and said ball engaging cap 25 thereof

upwardly into position for actuation by a ball. The tension of the spring members 30 and 31 is so regulated that the plunger 24 may be easily lowered when a magnetically attractable ball 33 (Fig. 3) engages the cap 25, and the control means 30—31 is further devised so that as soon as the circuit is closed between these members, the electromagnet 20 will be deenergized by circuit connections hereinafter to be described, thus releasing the ball and hence the plunger, and the plunger will be moved quickly upward by action of spring member 30 with sufficient force to urge the ball 33 quickly away from the contacting cap 25 so that the ball has time to move an appreciable distance out of the maximum field density of the electromagnet before the latter is again energized upon opening of the switch control means 30—31.

Another novel feature of the ball activating means is the provision of resilient rebound members 40 (Figs. 1 and 3) arranged adjacent the control element 25 of each activator in such manner that when attracted balls are released and moved out of the center of the field of force, the released balls will in all probability encounter one of the resilient rebound arms 40 and be deflected in various manners, as indicated by the tracer arrows in Fig. 1, into the fields of adjacent activators or against other rebound members, and as a result the movement of a ball over the playboard is varied continuously, and amazing and fascinating migratory movements are imparted thereto.

Mounted on the upper side of the playboard in association with each activator 20—25 is a signal preferably in the form of an electric lamp 41 (Figs. 1 and 3) disposed within a translucent protective shell 42 having a rubber rebound member or buffer 43 arranged thereabout. Conveniently mounted at the rear of the cabinet is a score indicator 45 in which there is a bank of lamps with corresponding indicia indicating the score achieved by each player.

The circuit connections for the electromagnetic activators, the signal means, the score indicating means, and the master control, are such that whenever a ball is drawn into the field of an activator and strikes the corresponding control element, the corresponding signal means or lamp 41 will be lighted and remain lit, and the corresponding indication set up on the score board 45.

Referring conveniently between the several figures and particularly to the circuit diagram of Fig. 4, the several electromagnetic activators 20 are electrically connected in series as by conductors 50, one side of the series connecting as at 51 to one side 52 of the power line, the opposite end of the serially connected electromagnets 20 having connection through a conductor 53 with the normal contact 54 of a main or magnet-breaking relay 55. The armature 56 of this relay is connected by a conductor 57 to the return side 58 of the power line, there being a master time-delay control switch 59 in series with the conductor 57, and when the latter switch is closed as by operation of the coin slide 18, the serially connected electromagnets 20 are all energized.

One side of the magnet-breaking relay 55 is connected through a conductor 60 to one side 6 of the secondary of a step-down transformer, the primary of which is bridged across the power line connections 52—57 so that the transformer primary is constantly energized when the time switch 59 is closed; and the opposite side of the

relay winding 55 is connected by a conductor 62 in common with one of the contacts 31 of each of the ball-controlled switches, and the companion contacts 30 of each of the control switches are connected to the armature 63 of a particular holding relay and also to one side 64 of the same relay winding. The opposite sides 65 of the several holding relay windings are connected to a common conductor 66 which connects through a cut-off switch 67 to a return terminal 68 on the transformer secondary. The switch 67 opens the power circuit through the transformer secondary whenever the coin slide control 18 is moved inwardly (see also Fig. 2), as will be explained hereinafter.

Thus, when any of the ball-actuated switches 30—31 is closed, the magnet-breaking relay 55 and the corresponding holding relay winding 64—66 will be energized with a resulting opening of the circuit through the electromagnets 20 when the armature 56 of the breaking relay pulls up and out of engagement with the contact 54.

Each of the signal means or lamps 41 is connected by a conductor 70 to the common power connection 66 and by a conductor 71 to a contact 72 on the corresponding holding relay, and when the latter relay pulls up, the lamp 41 associated therewith will be illuminated and remain in this condition as a result of a locking circuit effected through engagement of the armature 63, having connection with one terminal 64 of the relay winding, and a normally open relay contact 73 connected by conductor 74 to the central tap 75 on the transformer secondary, while the opposite side 65 of this same holding relay is connected with this same common secondary connection 66—68. Thus, whenever any of the ball-actuated switches 30—31 is closed by a ball, one of the holding relays will pull up and establish its own locking circuit and energize the corresponding signal lamp, in addition to energizing the magnet-breaking relay for momentarily breaking the circuit through all of the activator magnets 20.

The score indicating mechanism includes a bank of lamps numbered serially from 1 to 10 in Fig. 4, and each having one contact connected to a common conductor 80, which in turn is connected with the common conductor 66 from the transformer, the remaining contacts of the several lamps each being connected with one of the serial stationary contacts 81 on a sequence or step-up switch. The sequence switch has a rotating contact 82 connected by a conductor 83 with the contact 72 of each holding relay, so that whenever one of the latter relays pulls up, battery will be placed on the wiping contact 82 from the central tap 75 of the transformer, and hence on whichever lamp contact the wiper 82 happens to be resting at the time, so that that lamp will be energized.

The stepping mechanism for the sequence switch includes a pawl and ratchet mechanism 85 (Fig. 2) actuated by an electromagnet 86, one contact 87 of the winding of which is connected to a contact 88 (Fig. 4) which is engaged by an insulated armature contact 89 on the magnet-breaking relay armature 56 when the latter pulls up, the contact 89 being connected by a conductor 90 to the conductor 66 and transformer tap 61, so that each time the master magnet-breaking relay 55 is energized, the stepping magnet 86 is likewise energized to move the wiper 82 one step through the agency of the ratchet mech-

anism 85, whereby the next score indicating lamp in the sequence will be illuminated.

Means for resetting the apparatus to an initial condition and releasing such of the holding relays as may be energized, includes a shuffle bar 100 (Fig. 2) having a cleat 101 engaged by the inner end of the coin slide when the latter is operated to shift the bar 100, and a pair of side arms 102 and 103 attached thereto, inwardly. The bar 103 is provided with an arm 104 which engages and releases a spring-urged detent 105 to free the wiper ratchet 85 for return movement by the usual spring means (not shown), to an initial position.

When the shuffle moves inwardly, the innermost end of the arm 102 engages the end portion 106 of the cut-off switch 67, thus breaking the circuit through all of the holding relays so that the lamps 41 are extinguished substantially the same time the score indicator sequence switch is restored to normal.

When the shuffle arm 102 moves inwardly, a pin 107 thereon engages a time-switch-actuating arm 108 to set the time switch 59, so that the master power circuit will again be closed for further operation of the game, but in the event that a player sets up a score and leaves the game without again manipulating the control slide 15, the switch 59 will open after a determined lapse of time and deenergize the circuits and particularly the holding circuits.

The electromagnet activators may be placed in various positions around the board, and the deflecting means 40 cooperable therewith may be arranged in a great variety of positions to effect entertaining movement of the projected balls, additional ball-operated devices being placed on the board if desired.

The invention is not limited to the specific structural and functional details set forth herein in the illustrative embodiment, but includes as well the broad combination of an electromagnetic ball attractor with ball deflecting means and rebound means arranged to draw a ball into the field of the magnet so that it will engage the deflector and thereby be caused to engage the rebound means for the purpose of accomplishing the varied and entertaining movement of the attracted ball. In addition, invention is claimed in the provision of an electromagnetic attractor having a control element for deenergizing the same when the control element is contacted by a ball, and further in the provision of a control element adapted to positively deflect the attracted ball when the associated electromagnet is deenergized. The invention is, therefore, not to be limited to the recitations of the foregoing specification except as may be provided in the appended claims.

Having thus described our invention, what we claim as new and desire to protect by Letters Patent is:

1. In a device of the class described, ball activating means for cooperation with a magnetically attractable ball moving on an inclined surface, and comprising an electromagnet and means mounting the same relative to said surface to propagate its field of force for attraction of said ball, a normally closed switch connecting said electromagnet in a power circuit therefor, and a switch-operating member mounted with a part disposed in said field of force to be engaged and moved by the ball when attracted as aforesaid to open said switch and deenergize the electromagnet, and means yieldingly urging said switch-operating member into a normal position for operation by said ball with said switch in normally closed circuit condition.

2. Attracting means for use with a magnetically attractable ball on a playing surface, said means comprising an electromagnet and means for mounting the same with a polar portion close to said surface for propagation of a field of force relative to said surface to attract said ball, a control switch supported by said mounting means adjacent said electromagnet, and a switch-operating member having a ball-engaging part and mounted for cooperation with said switch and electromagnet with said ball-engaging part disposed in said field of force for engagement and movement by an attracted ball to actuate said switch, said switch being adapted for connection to control a normally closed power circuit for the electromagnet, the operation of the device being such that operation of said switch by an attracted ball will effect deenergization of the electromagnet to free the attracted ball for movement away from said switch-operating member so that the electromagnet may again be energized for attraction of the same or another ball.

3. Ball activating means for use in apparatus having an inclined play board and means for projecting a magnetically attractable ball onto said board, said activating means comprising an electromagnet positioned close to said board to attract said ball to a particular position, a power control circuit normally connecting said electromagnet to a power source, switch means operatively associated with said power control circuit and operable from a normal condition to actuate said power control circuit and effect deenergization of said electromagnet, and switch control means including a ball engaging member arranged to be engaged and moved from a normal position by a ball attracted to said particular position and operable to actuate said switch means and deenergize said electromagnet as aforesaid, and means for effecting restoration of said ball engaging member and switch means to said normal condition when said ball is freed by deenergization of the electromagnet.

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