

Oct. 7, 1941.

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2,258,329

BALL ROLLING GAME

Filed Dec. 15, 1938

3 Sheets-Sheet. 1

Fig. 1.

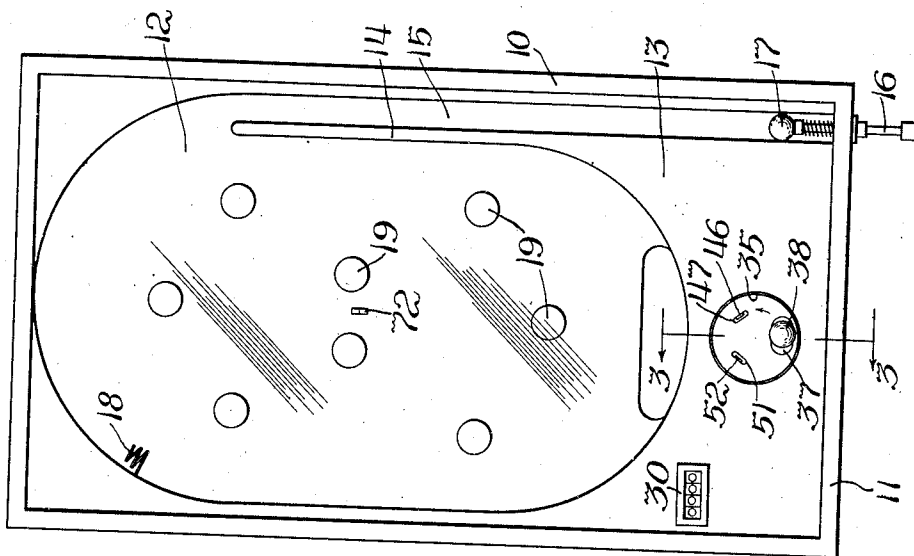
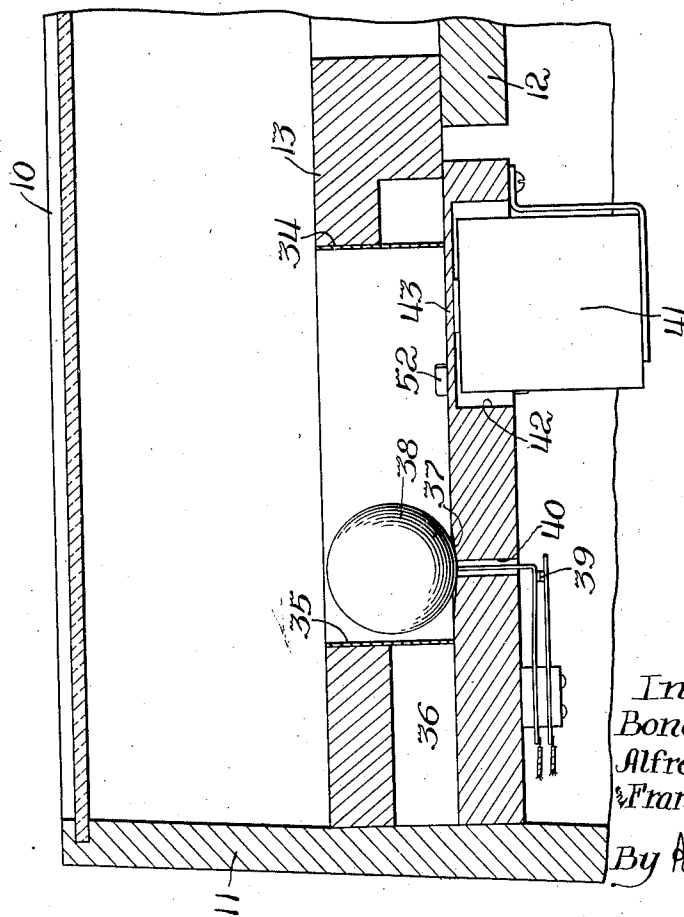


Fig. 3.



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3 Sheets-Sheet 2

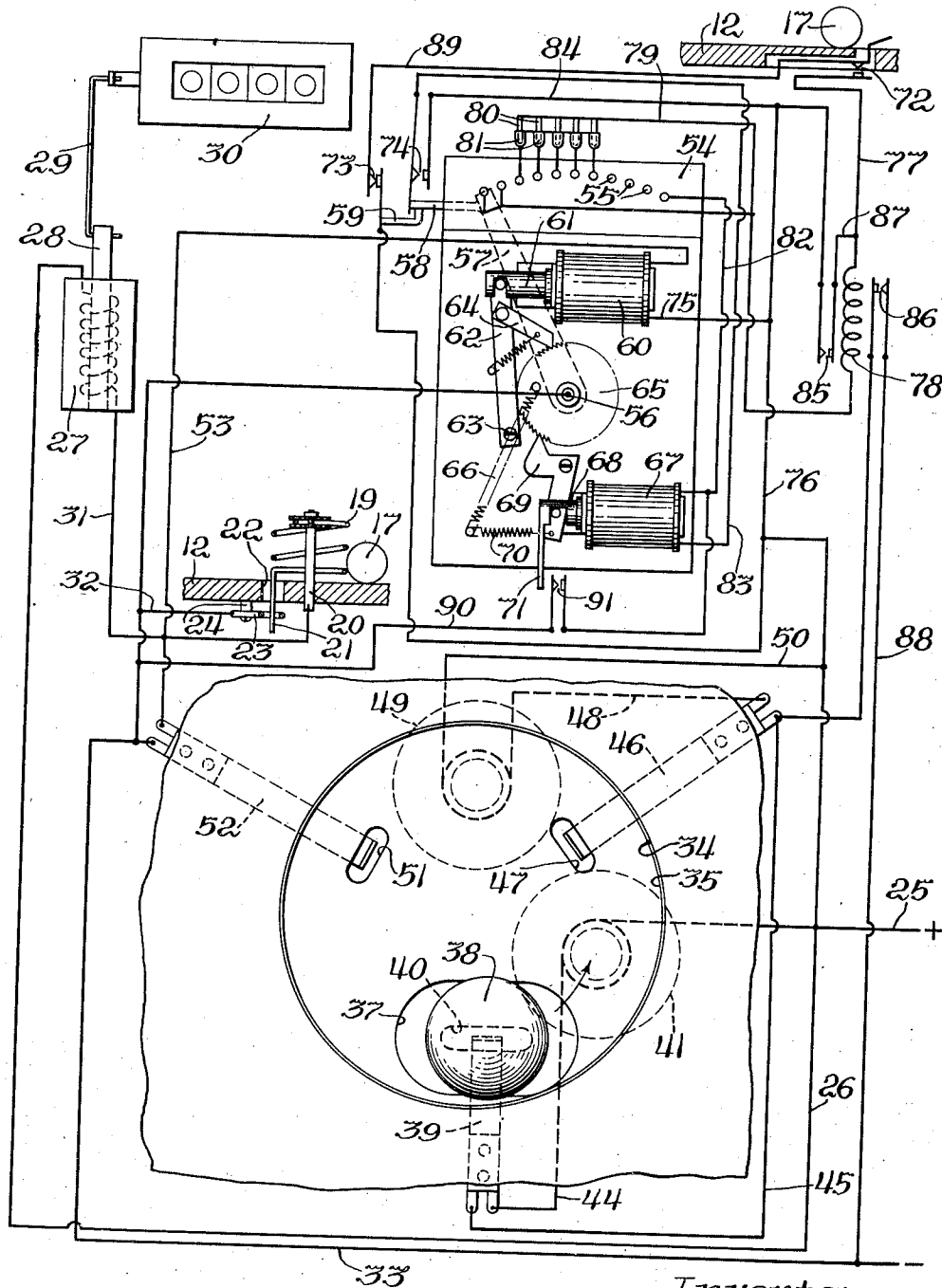


Fig. 2.

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3 Sheets-Sheet 3

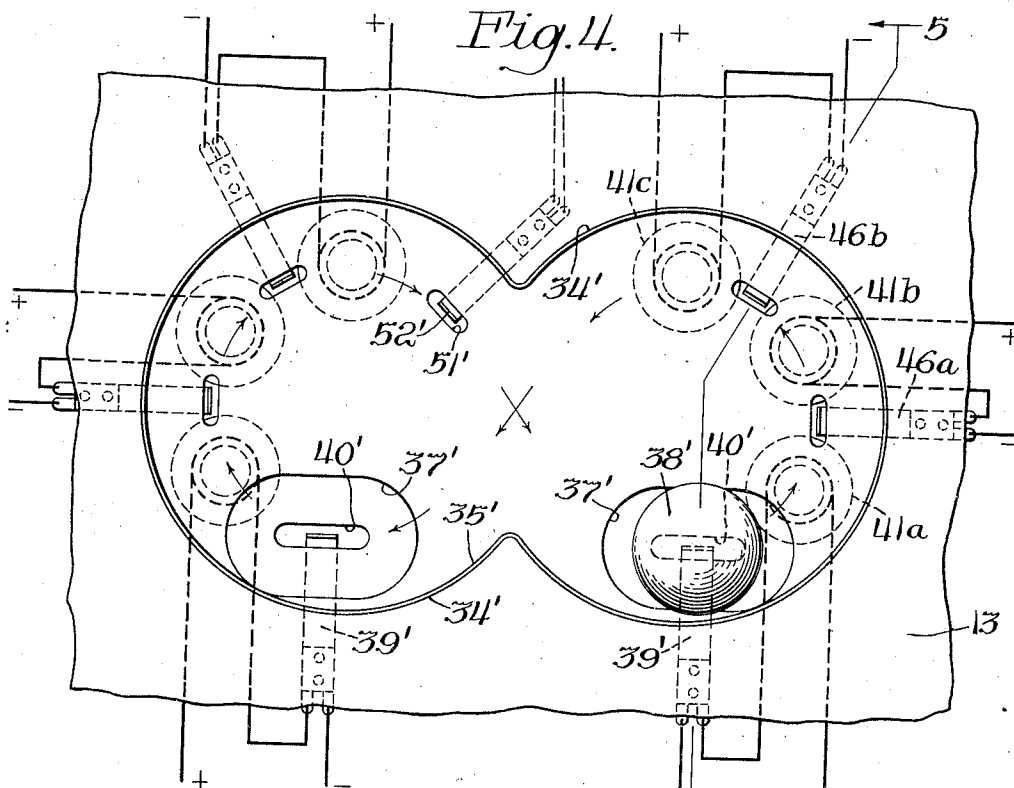
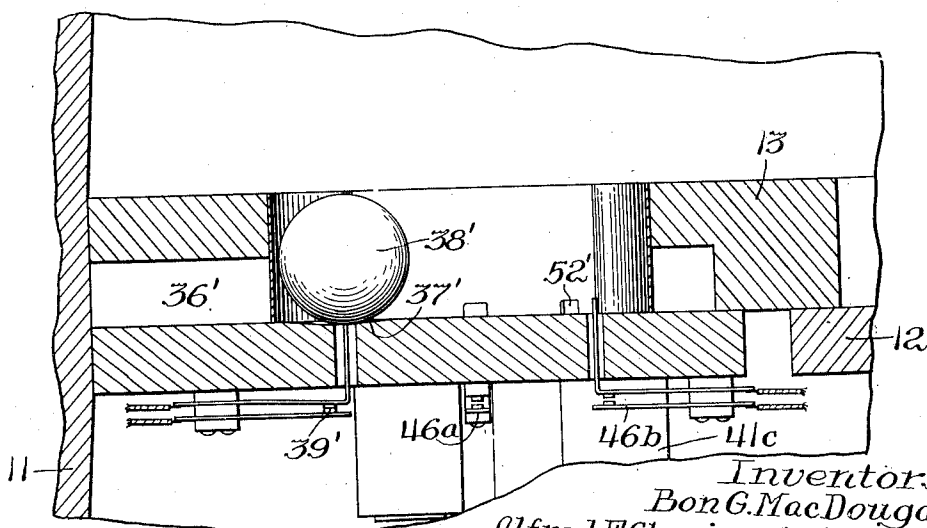


Fig. 5



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UNITED STATES PATENT OFFICE

2,258,329

BALL ROLLING GAME

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13 Claims. (Cl. 273—118)

The invention relates to a ball rolling game of the pin ball type.

In these games the usual table providing the ball rolling surface is sloped slightly from the horizontal and balls are rollable thereover to engage obstacles arranged in spaced relation on the table. Bumper type electric switch contacts are commonly utilized as the obstacle members and such members are associated in an electric circuit with a score registering or counting device to tally the number of ball engagements with the obstacle members. In certain games of this type it is of amusement value to enable the player to achieve a high score and thus it is desirable to provide a game action that will make possible such achievement.

Accordingly, this invention more particularly relates to a game utilizing an auxiliary magnetizable ball which may be moved under a combination of kinetic and magnetic forces to achieve an interesting game action to enhance score values, the effect being produced as the result of the operation of a previously played ball.

The main object of the invention is to provide a novel magnetizable ball game action for ball rolling games.

Another object is to provide an auxiliary magnetizable ball held captive in a pocket or well arranged on the game table, said ball adapted to be magnetically and gravitationally moved by electrical means controlled by the movement of another ball rolling on the table proper by the skill of the player in the manipulation of a ball projecting plunger.

Another object is to cause a captive ball to whirl as the direct result of the player skilfully projecting another ball onto the table to roll over a switch which will set into operation magnetic means to whirl the captive ball.

Still another object is to provide means controlled by the captive ball to augment the score value to be achieved in playing the game.

Another important object is to provide means to predetermine and control the number of whirls or revolutions the captive ball can make in its pocket or well, thereby interposing an element of control on the score value to be achieved.

Still another object is to provide a captive well for the magnetizable ball of circular shape in one form; and, in the form of a figure 8 in another embodiment.

A further object is to create a magnetic field electrically to attract a magnetizable ball and cause it to move under the influence of the magnetic force and then when the magnetic force is

stopped to cause the ball to move by inertia and gravity until it comes to a position of rest.

Another object is to provide a magnetizable ball cooperable with means creating magnetic fields to attract the ball, in combination with means controlled by the ball to deenergize the magnetic field.

Still another object is to provide a rollable magnetizable ball which alternately as it rolls makes and breaks one or more fields of magnetic attraction, in succession or otherwise.

Briefly, these desirable objects may be achieved by the illustrative examples herein disclosed, wherein the usual ball rolling game of the pin ball type has a ball rolling table slightly inclined from the horizontal and provided at spaced intervals with bumper type contact obstacles to be hit or engaged by a ball rolling over the surface of the table. When a bumper obstacle is so hit a score register is electro-mechanically operated for scoring purposes. An auxiliary magnetizable ball is held captive in a pocket or well formed in a suitable place on the table apart from the main ball rolling surface thereof. Thus when a certain switch is hit by a played ball, means is operative to cause the captive ball to move by the attraction of an electromagnetic coil which is energized to attract the captive ball. As the captive ball begins to move the first magnetic field is deenergized and a second one is then energized by the rolling action of the captive ball itself in rolling over switches located in the well. Automatic operation of a step-up mechanism through these latter switches thereafter determines the whirling action of the captive ball under the force of magnetic attraction, and means is also present to govern the number of whirls or revolutions the ball will make. The score registering mechanism is operated for each revolution or complete circle of the captive ball in its well to raise the scoring and when the predetermined number of operations has been effected, a release circuit is closed to cause resetting of the step-up mechanism to starting position and deenergize the magnetic fields whereby the captive ball comes to a normal rest position by gravity with all parts thus set for a repeat operation. In the form herein disclosed it is desirable to hit an auxiliary switch first rather than a bumper obstacle switch because when the step up moves off zero position the high score magnetic whirling ball cannot be set into operation.

In the drawings:

Figure 1 is a general plan view of a ball rolling

game utilizing the magnetic ball rolling means of this invention;

Figure 2 is an enlarged plan view of the well and captive ball, the view also showing the step up control mechanism, scoring mechanism, and electric circuits for the various parts;

Figure 3 is an enlarged sectional view through the captive ball well, taken along the line 3—3 of Figure 1, looking in the indicated direction;

Figure 4 is a plan view of another form of well, in which the captive ball is made to whirl in a figure eight course; and,

Figure 5 is a cross sectional view of said modified construction, taken along the line 5—5 of Figure 4.

Looking first to Figures 1, 2 and 3 a pin ball type of ball rolling game is shown, the same having the usual cabinet 10 including a front wall 11. Said cabinet in the usual way carries a table 12 sloped slightly from the horizontal with its low end at the front wall end of the cabinet. An arch plate 13 is positioned on the table to delineate a generally oval shaped ball rolling surface as is conventional in this art. The plate 13 includes a narrow extension 14, providing a ball projection passage 15 along which a ball may be projected by a manually operable spring plunger projector 16 carried in the front wall 11. A ball is shown at 17 in said passage, the same being projectable by the plunger 16 around the curved upper arch portion to hit and rebound from a cushion spring 18, the ball thereafter rolling gravitationally down the sloped table 12 in the usual way.

Arranged in the desired spaced relation on the table 12 are a number of spring bumper contact switch obstacle members 19, each carried on a conductor spindle 20 disposed vertically on the table 12 as appears in Figure 2. Each member 19 comprises a coiled spring having a depending leg portion 21 passed through a suitably enlarged hole 22 in the table or board 12 so that said leg may pass normally centrally down into and through a conductor contact ring 23 supported by a bracket 24 underneath the table as shown. When a ball 17 rolling on the table 12 bumps a spring 19, the spring will be sufficiently deflected to cause the leg 21 to engage the contact ring 23 to pass electrical current, since the bumper contact parts described are conductors.

From a suitable source of electrical energy, a positive line wire 25 connects with a wire 26 that goes to one side of an electromagnet 27 having a core 28 connected by a link 29 to operate some suitable form of counting device 30, which may be positioned as shown in Figure 1. A wire 31 goes from the other side of the device 27 and connects to the spindle 20 of the bumper obstacle shown. In any well known way all obstacles 19 may be so connected with the counting device 30. From the contact ring 23 is lead a wire 32 which connects with the main negative return lead wire 33, as shown. Thus, when a bumper obstacle 19 is hit by a ball 17 the parts 21, 23 contact to close the circuit described to operate the counter 30 and register the hit for scoring purposes. One scoring operation then follows every time a bumper obstacle 19 is hit by a ball 17 rollable on the surface 12.

It is desirable, as has been stated, to provide a game action which will enable the player for his amusement, to achieve a high score and accordingly means now to be described is provided to bring about such result.

In an appropriate place on the table or game

board, such as in the front end of the plate 13 is provided in the form shown in Figures 1, 2 and 3, a pocket or well 34 having a non-conductor lining 35 around its periphery. The main table part 12 can serve as the floor for this pocket and preferably the pocket is shaped to provide a rounded boundary, which in the one form shown in these figures happens to be circular. Side pocket extensions 36 may be provided in which may be positioned electric lamps to illuminate the pocket 34 if desired, in which case the lining 35 will be made of transparent or translucent material. The bottom of the pocket 34 takes the same slope as the table 12 as appears in Figure 3, and the low end thereof is provided with a shallow recess 37 on which normally comes to rest by gravity a captive ball 38 made of a metal that will respond to magnetic attraction. This captive ball which always remains in the well or pocket, and is therefore referred to as captive, normally in its recess 37 rests on an extension of a spring blade contact switch 39, to hold same closed, a slot 40 in the table 12 making this possible, in an obvious manner.

Looking to Figures 2 and 3 it will be seen that an electromagnetic coil 41 is positioned in any suitable way into an under recess 42 formed in the board 12, the recess thus leaving a thin bottom portion 43 through which a magnetic field created by the coil 41 is effective to attract the ball 38 off its seat 37 and pull it in a counter-clockwise direction, as indicated by the arrow in Figure 2. A wire 44 leads from one side of the switch 39 to the coil 41. The main line wire 25 heretofore mentioned goes into the other side of the said coil.

From the other side of the switch 39, a wire 45 leads to one side of another switch 46 similar to the switch 39 in all respects and having an up-standing extension sticking up into the pocket through a slot 47 for that purpose provided. This upstanding exposed portion of the normally open blade switch 46 lies in the path of the ball 38 when the latter rolls or whirls around the pocket 34. As has been said, the wire 45 goes to one side of this switch 46, and a wire 48 leads from the other side of the said switch and into one side of a second electromagnetic coil 49 disposed under the pocket 34 in the same manner as the first coil 41. This second coil is also positioned in the path of rolling movement of the ball 38. A wire 50 leads from the coil 49 and connects to the wire 26 as shown.

Within the pocket 34 in the path of the ball 38 is positioned through a slot 51 the exposed end of still another normally open spring blade switch 52 of the same kind as the switch 39 described. The main lead wire 33 connects to one side of this switch 52 and another wire 53 leads from the other side of said switch 52 to the wire 31 that goes to the counter control relay 27. It becomes apparent now that the switch 52 is ball operated to actuate the counting mechanism 30. The switch 52 may thus be termed the counting switch.

A step-up and release wiper switch control mechanism is included in the game to control when the whirling ball 38 is to be operated, as well as to govern the number of revolutions or complete whirls the said ball is to make when it does operate.

Accordingly, in any suitable place under the table or board 12 is positioned a carrying plate 54 of insulated material, the same carrying, in the present form of the invention, eleven con-

tact buttons 55 in an arcuate spaced series as shown in Figure 2. The plate 54 carries a conductor shaft 56 and turnable therewith is a conductor, wiper switch arm that cooperates with the contact buttons 55. Said arm has an insulated first extension 58 and a second similar offset extension 59, as shown. Carried on the plate 54 is an electromagnet 60 having a movable core 61 pivotally connected at its free end to an arm 62 in turn pivotally connected by a pin 63 to the plate 54, as shown. A spring pulled pivoted pawl 64 is connected to the arm 62. The pawl 64 is operatively associated with a ratchet wheel 65 also turnable with the shaft 56 on the side of the plate 54 opposite from the wiper arm 57. A coil spring 66 connects between the wheel 65 and plate 54, the spring acting to restore the released wheel to a zero or starting position.

The plate 54 also carries a reset electromagnet 67 having an armature core 68 to which is pivotally connected a stop dog 69 pivotally mounted, in turn, on the plate 54 and pulled by a spring 70 to be held normally in engagement with the teeth of the wheel 65 to prevent retrograde movement of the latter. The core 68 carries an extension arm 71 for a purpose to appear.

A ball roll-over switch 72 is positioned in a desired place on the table 12 and in attempting to attain a high score the player will at the appropriate time attempt to project a ball 17 in such a manner as to make it roll over and close the said switch 72. Two other spring blade, control switches 73 and 74 are provided which are not directly ball operated but are positioned somewhere beneath the table 12. By means of the extensions 58 and 59 it can be seen that when the switch 73 is held closed, the other switch 74 is held open, and, of course, vice versa, as appears in Figure 2.

The wire 53 leads current from wire 33 to one side of the step up coil 60 by wires 32 and 31, when switch 20, 21 is closed, and a wire 75 connects with a wire 76 that connects with wire 26 and input wire 25. The normally open bumper switch 20, 21 keeps the coil 60 deenergized. Thus the wiper 57 is normally in the position shown in Figure 2 on the first button 55 at the left hand end as viewed in Figure 2. The switch 73 is thus closed and switch 74 is open. It follows now that when a bumper 19 is hit by a ball 17 to close a switch 20, 21 that the step-up coil 60 is energized to operate the pawl 64 and turn the ratchet one step, clockwise as viewed, with the result that the arm 57 also moves one step off the first button 55 and onto the next button in a clockwise direction. As a result switch 73 opens and switch 74 closes. In this latter position, that is when the wiper arm 57 is away from its home or initial starting position on the left hand contact 55, it is not possible in the disclosed form of the invention to cause operation of the whirlable captive ball 38. In other words, if it is desired to achieve a high score, a bumper obstacle 19 must not be first hit by a ball 17 but instead the roll-over switch 72 should be the player's initial objective.

A wire 77 leads from one side of the ball roll-over switch 72 and goes into a relay 78, the circuit continuing as wire 79 which terminates in a switch plug having a series of five male elements 80 which respectively may be plugged into five female elements 81 as seen in Figure 2, these latter elements cooperable with the third to the seventh inclusive contact button 55, as shown. A wire 82 connects the last or right hand button

55 with one side of the reset coil 67 and another wire 83 leads from the said coil 67 to one side of the switch 74. The other side of the switch 74 is connected by a wire 84 to one side of a spring blade switch 85 held closed when the relay 78 is energized. Another similar switch 86 is also held closed when the relay 78 is energized. One side of switch 85 is connected by a wire 87 to the wire 77. The wire 45 is connected to one side of the switch 86 and the other side of said switch 86 is connected by a wire 88 to the main line wire 33.

The other side of the roll-over switch 72 is connected by wire 89 to one side of the switch 73. The wire 76 already mentioned connects to the opposite side of the switch 73. A wire 90 connects between wire 33 and wire 82, there being a normally open blade switch 91 in said wire disposed in a position to be held closed by the extension arm 71 when the reset coil 67 is energized.

In Figures 4 and 5 a modified captive ball pocket and action is shown, the pocket comprising two circular wells arranged to form a figure 8 which the captive ball 38' must travel as indicated by the path marked by the arrows. In these figures the pockets are marked 34'; the lining 35'; the side pockets 36'; the ball recesses 37' (one for each side); the ball rest switches 39' and the slots 40' therefor, all corresponding to similar parts shown in Figure 3.

In this figure 8 arrangement, under each well part or pocket portion 34' is carried in the path of rolling movement of the ball 38' a series arrangement of three electromagnet coils 41^a, 41^b and 41^c and for each coil is provided a switch to control energization and deenergization thereof. For instance, switches 39' are for coils 41^a; a switch 46^a serves associated coil 41^b; and a switch 46^b is provided for each coil 41^c. In one of the pockets is a slot 51' for an upstanding part of a switch 52' to tie up with a suitable counting mechanism. The wiring for the various switches and coils is indicated in Figure 4 and it will be understood by those skilled in the art that this arrangement can in the desired way be tied into the wiring diagram shown in Figure 2. This completes the details of the description of the parts and the mode of operation will now be summarized.

In the starting position (considering the structure of Figures 1, 2 and 3) the parts are disposed as appears in Figures 1 and 2. A ball 17 is in position to be projected by the plunger 16 and the captive ball 38 is by gravity on the switch 39 in the recess 37 in the pocket 34. This switch 39 and the switch 73 are the only ones closed; all others being open. When a bumper switch 19 is hit first by a ball 17, that is before the roll-over switch 72 is hit, the coil 27 is energized to operate the counter 30, and at the same time the step-up coil 60, since it is in a parallel hookup, will also be energized. This causes the arm 57 to be moved up one step by the pawl and ratchet mechanism, causing left to right movement as shown in Figure 2. The switch 73 consequently opens and switch 74 closes. It follows that thereafter if a ball 17 rolls over switch 72 the circuit is open which would cause energization of the first magnet coil 41 and thus the ball 38 remains stationary in the well or pocket and for a given game cycle the opportunity for achieving a high score by whirling or spinning the ball 38 is gone. This is so because with the switch 73 open and switch 74 closed no current can be passed to coils

41 and 49. Subsequent hits of the obstacles 19 would successively step up the arm 57, and operate the counter 30 for each step, until the arm 57 contacts the last button 55, whereupon the releaser coil 67 is energized to free the ratchet wheel 65 and enable the spring 66 to drive these parts back to their initial starting positions. In this instance the arm 71 holds switch 91 closed long enough to permit complete return of the arm 57. When the extension 59 abuts switch 73 a limit stop action results to insure proper resetting of these parts in an obvious manner. Enough obstacles 19 and balls 17 will in practice be provided to insure enough contacts to operate the step up coil 60 and insure that the arm 57 will get to cooperate with the last contact 55 and result in the resetting operation as described.

The purpose of the game is to get a high score and this is achieved by rolling a ball 17 over the switch 72 before an obstacle contact 19 would cause the arm 57 to leave its home position where the switch 73 remains closed. Now, when a ball 17 rolls over switch 72 the relay 78 is energized and both switches 85 and 86 are momentarily closed, permitting current to pass to magnet coil 41, since the captive ball 38 is holding switch 39 closed. It follows that a strong magnetic field is created by coil 41 to pull and attract the ball 38 up around the edge of the pocket in a counterclockwise direction. The instant the ball 38 leaves the switch 39 the field 41 is deenergized, but the inertia of momentum imparted to the said ball is sufficient to cause said ball to roll over the next switch 45 and close same to cause energization of the succeeding coil 49. Thus another field of magnetic attraction pulls the ball up and around. The instant the ball leaves the switch 47 the field 49 is deenergized, but by this time the ball has sufficient kinetic energy and plus the force of gravity (since it is now on the downhill side) as the bottom of the pocket is sloped, the ball continues to roll around and around the pocket so long as the magnetic fields can be so energized and deenergized. Each time the ball 38 rolls over the switch 52 the counter 30 is operated to register the score.

Each time the ball rolls over the counter switch 52 current passes through wire 53 to energize the step-up coil 60 to operate the wiper arm 57 over the contacts 55 in a step by step manner, until the arm 57, which carries current, contacts the last button 55 to cause operation of the reset device 67 in the manner already described. In the form shown seven contacts 55 are available to force the ball 38 to whirl seven times around the pocket 34. Centrifugal force holds the ball to the periphery of the pocket. There are shown four more contacts 55, three of which are dead and provided merely because the inertia of the moving ball 38, it is found, will carry same around three more turns and, of course, each turn will close the switch 51 and operate the step-up means. By the time the captive ball comes to rest on the recess 37 the arm 57 will have reached the last button contact 55 to enable the reset means to function.

By moving wire 82 one step over to one of the other dead contacts 55 and sliding over the male plugs 80 to the left in relation to the female parts 81 a like amount, one less whirl of the ball 38 will be made. By moving these parts two steps to the left, two less whirls can be made, and so on. Thus, the manufacturer can assemble the game in the first instance to regulate the number of whirls a captive ball is to make.

In the construction shown in Figures 4 and 5, the mode of operation would be the same except that the ball 38' would be made to follow a figure 8 course to create a different and novel effect.

When a succeeding played ball 17 hits a bumper obstacle 19 the roll-over switch 72 is made ineffective because when the arm 57 leaves its home position the magnets 41, 49 can only be energized by their associated switches in the well and closed by the captive ball.

It can now be appreciated that a magnetizable ball can be moved by the magnetic force of successively acting magnetic fields, the rolling ball itself controlling the making and breaking of said magnetic fields. Also another ball rolling on the game table can be utilized to control a circuit to initiate the magnetic ball rolling action. Another interesting aspect of the invention is making the magnetizable ball captive in a pocket having a rounded periphery and a sloped bottom, so that magnetic, gravitational and centrifugal forces combine to produce the spinning or whirling ball action.

It is the intention to cover herein all changes and modifications of the illustrative examples shown and described for the purposes of the disclosure, which do not in material respects constitute departures from the spirit and scope of the invention, as covered in the appended claims.

What is claimed is:

1. A ball rolling game having a table provided with a pocket, a magnetizable ball remaining captive in the pocket but free to roll therein, a normally open electric circuit provided in the game and including a coil disposed below the pocket, and a switch disposed in the circuit and acting when closed to energize the coil and create a magnetic field to attract and cause the ball to move in the pocket.

2. A ball rolling game having a table formed with a pocket, a magnetizable captive ball in the pocket, a plurality of energizable coils arranged below the pocket in spaced relation, a circuit for the coils including a control switch in the pocket for each coil, means to energize one coil to create a magnetic field to attract the ball from a position of rest and cause its movement along a path determined by the shape of the pocket, said ball in its movement closing the switches to successively energize and deenergize the coils to keep the ball moving in the pocket.

3. A ball rolling game having a table provided with a pocket formed with a bottom sloped from the horizontal, and containing a captive magnetizable ball, said pocket having a rounded periphery, and a circuit in the game including electromagnetic means operatively associated with the pocket and acting when energized alternately to attract and release the ball to cause it to whirl under magnetic and gravitational forces in said pocket.

4. A ball rolling game having a table provided with a pocket formed with a bottom sloped from the horizontal and containing a captive magnetizable ball, said pocket having a rounded periphery, and a number of electromagnetic coils positioned under the pocket in spaced relation with switches arranged in the pocket respectively for the coils, said switches being operable by the ball to close a circuit including the coils, whereby the ball is attracted and released by magnetic attraction of the coils operating successively to move the ball, said ball rolling by gravity and inertia of momentum when released.

5. A game having a table formed with a rounded pocket having a bottom sloped from the horizontal, a magnetizable ball confined in the pocket, said pocket being generally in the shape of a figure eight, means operatively associated with the pocket for subjecting the ball to the forces of magnetism and gravity to cause the ball to travel in the path of a figure eight in the pocket and held by centrifugal force to whirl from one loop of the eight to the other against the periphery of the pocket.

6. A ball rolling game having a table provided with a pocket formed with a bottom sloped from the horizontal and containing a captive magnetizable ball, said pocket having a rounded periphery, electromagnetic means operatively associated with the pocket alternately to attract and release the ball to cause it to spin around the pocket under magnetic and gravitational forces, a circuit for said means including a starting switch normally held closed by the captive ball in a position of rest in the pocket, and another switch on the table for said circuit to be closed by another ball rollable on the table for controlling the spinning of the captive ball.

7. A ball rolling game having a table provided with a pocket formed with a bottom and containing a captive magnetizable ball, said pocket having a rounded periphery, electromagnetic devices operatively associated with the pocket including switches for the devices causing them alternately to attract and release the ball to cause it to spin around the pocket, said switches being controlled by the ball, a circuit for said means including a starting switch, and means for adjusting the circuit to control the number of times the ball is to spin around the pocket.

8. A game having a ball rolling surface formed on a table, a second ball rolling surface formed in a pocket on the table, a free ball rollable on the first surface, a captive magnetizable ball rollable on the second surface in the pocket, and electromagnetic means controlled by the ball on the first surface to cause movement of the captive ball in its pocket, said means when energized serving magnetically to attract and move the ball.

9. A game having a ball rolling surface formed on a table, a second ball rolling surface formed in a pocket on the table, a free ball rollable on the first surface, a captive magnetizable ball rollable on the second surface in the pocket, said pocket being rounded, electromagnetic

means operatively associated with the pocket and controlled by a ball on the first surface to cause whirling movement of the captive ball around its pocket, and means controlled by the captive ball to determine the number of times said ball will whirl around the pocket, said electromagnetic means when energized serving magnetically to attract and move the ball.

10. A game having a ball rolling surface formed on a table, a second ball rolling surface formed in a pocket on the table, a free ball rollable on the first surface, a captive magnetizable ball rollable on the second surface in the pocket, said pocket being rounded, electromagnetic means operatively associated with the pocket and controlled by a ball on the first surface to cause whirling movement of the captive ball around its pocket, means comprising a series of contacts and a step-up wiper switch, and switch means in a circuit for the latter means operable by the whirling ball to control the number of whirls the ball can make, and means for resetting the wiper switch to a starting position when the said ball has made its said number of whirls.

11. In a ball rolling game having a non-magnetic table sloped slightly from the horizontal so that a magnetizable ball may roll thereover, an electromagnet positioned under the table to create a magnetic field on the table when the magnet is energized to attract a ball rolling on the table, and means including a circuit for the magnet with a source of energy and a ball operated switch to deenergize the magnet.

12. In a ball rolling game having a substantially horizontal table, a circuit included in the game embodying an electromagnet located below the table to create when energized a magnetic field to attract a magnetizable ball therein and move same, a switch positioned adjacent the field to be closed by said ball, and another circuit including the switch and an electromagnetic device operable when said switch is closed.

13. In a game apparatus having an inclined playing board over which balls are being propelled, a circular runway on said board, a metal ball in said runway, and electro-magnet means controlled by one of said propelled balls for causing spinning of said ball in said runway for a limited time.

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