March 3, 1942. K. A. BEVINGTON 2,275,005

ELECTRICAL REBOUND DEVICE

Filed April 5, 1939

Fig. 1.

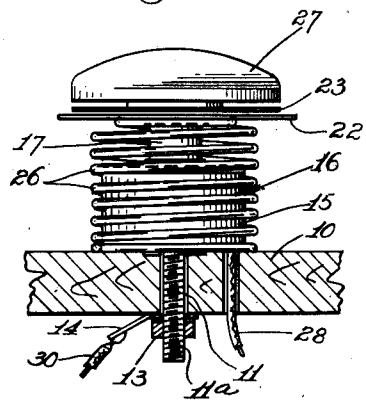


Fig. 2.

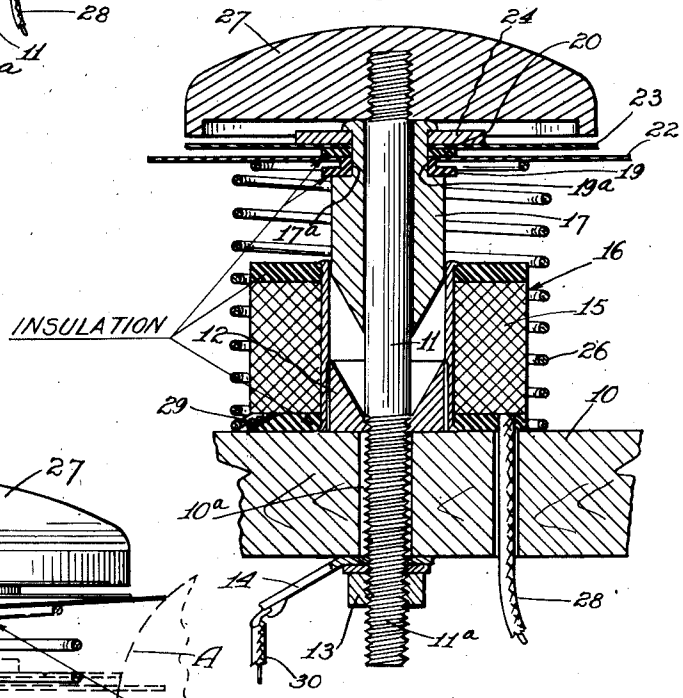
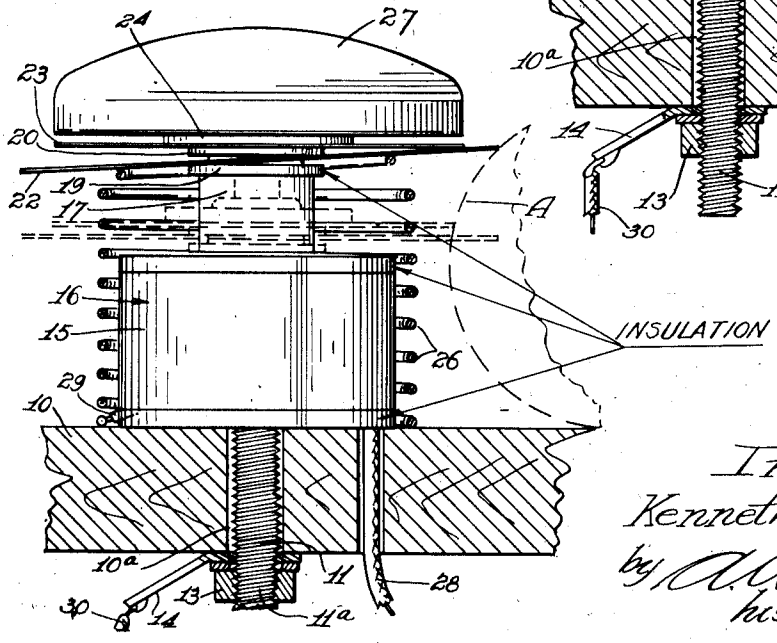


Fig. 3.



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ELECTRICAL REBOUND DEVICE

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8 Claims. (Cl. 273—118)

The present invention pertains to rebound devices of the type employed in connection with amusement game devices, such as "pin games," wherein one or more balls or projectiles are caused to be impelled over the surface of the playing field of the game. Such devices are usually so positioned on the playing field as to afford substantial possibility of encounter by a ball.

It has been quite generally recognized that the degree of success accorded "pin ball" games is, to a large extent, dependent upon the action or movement of certain of the elements of the game for increasing, stimulating and maintaining the interest of the player. Devices of this general class have heretofore been employed so that in some instances it increases, and in other instances decreases, the element of chance in causing the ball to pursue a desired path of travel, and, in general, said devices cause action or movement of the ball over the playing field for stimulating the interest of the player.

More particularly, this invention is directed to electrically actuated rebound devices, adapted upon engagement by a ball, to complete an electrical circuit including an electro-magnet positioned for forcibly reprojecting the ball over the playing field. One form of electrically operated device of this class, which has been accorded substantial success in such game devices, is constructed so that it may be actuated only by a ball traveling in a certain general direction.

The primary object of this invention is to provide a novel and improved form of electrically actuated device of the character indicated which is adapted to be actuated upon encounter with a ball, traveling in any direction over the playing field, for forcibly reprojecting the ball over the field.

Another object is to provide a novel form of electrically actuated device of the character indicated, including a substantially horizontally disposed movable disc mounted above the playing field in position to be encountered and moved by a ball to complete an electrical circuit which actuates means for quickly moving said disc in a downward direction in wiping engagement with the surface of the ball to forcibly project the ball away from the device, over the playing field.

A further object of this invention is to provide a device of the character described, which will be simple in construction, relatively positive in operation, and which may be economically manufactured.

Other objects and advantages of the present invention will be apparent from the following description, taken in connection with the accompanying drawing, in which:

Fig. 1 is an elevational view of the electrical rebound device embodying this invention, shown mounted on a playing field board.

Fig. 2 is an enlarged vertical axial section through the device.

Fig. 3 is an enlarged elevational view, with parts in section, showing the ball-engaging disc in circuit-closing position, ready to impinge upon the ball.

The device constituting the present invention is desirably mounted on a playing field, as indicated at 10, a substantial distance inwardly of the marginal edges thereof to permit encounter therewith by a ball or projectile moving in any direction over the surface of said playing field. Generally, in "pin ball" games the playing field is disposed at a slight inclination to horizontal and the ball or balls or other projectiles are usually projected upon the upper end of the field, so as to permit them to gravitate toward the lower end of the playing field. The playing fields of such games are usually provided with a plurality of variously arranged pockets, traps or other devices for arresting or engaging the balls in their downward movement over the field. The present form of rebound device thus, due to reprojection of the ball over the field each time the device is encountered by the ball, maintains the ball in motion for an increased period of time, and thereby affords greater opportunity for directing the ball into pockets, etc., as well as stimulating and increasing player interest in the game.

The device comprising my invention includes a standard, 11, mounted in upright position on the board, 10, and is provided with a threaded portion, 11a, at its lower end projecting through a hole, 10a, in said board. Said standard is rigidly secured in position on the board by a plug, 12, having threaded engagement with the upper part of said threaded portion, 11a, and seated against the upper surface of the board, 10, and the lower end of the standard is provided with a nut, 13, with a terminal conductor clip, 14, surrounding the end of said standard and interposed between the nut and the under side of the board. Said plug, 12, is drive-fitted into the lower end of a coil, 15, of an electro-magnet, indicated at 16, seated against the top of the board and surrounding the standard, 11. Slidably mounted on said standard for movement

into and out of said coil, 15, is an armature or core, 17, which is adapted to be magnetically attracted into the coil upon electrical energization of the latter. The upper end of the core is formed with a reduced portion forming a shoulder, 17a, on which is seated a pair of insulating rings, 18 and 20, maintained in vertically spaced relation by a central hub, 19a, on the lower ring, 18. A metallic conductor disc, 22, of substantial diameter is loosely mounted between the rings, 18 and 20, to permit vertical movement thereof, by encounter of the marginal edge thereof by a ball rolling over the playing field, 10, as indicated fragmentarily in dotted outline at A, for engaging and completing an electrical circuit through a fixed metallic conductor disc, 23, which is of smaller diameter than disc, 22. Disc, 23, is mounted on top of ring, 20, in direct engagement with the armature, 17, for completing a portion of the electrical circuit including the coil, 15. Mounted on top of the disc, 23, is a metallic washer, 24, which, together with disc, 23, and rings, 18 and 20, is rigidly secured as a unit on said reduced upper portion of the armature by peening over of the top of the armature against washer, 24, as seen in Fig. 2. If desired, said conductor disc, 22, may be fixedly mounted and formed of relatively flexible material to permit movement of the marginal edge thereof into engagement with disc, 23, to complete the electrical circuit when the former is engaged by a ball traveling over the playing field.

The plug, 12, in addition to assisting in supporting the standard on the board, 10, also functions as a magnet when coil, 15, is energized, and increases the magnetic force for attracting the armature into the coil. The plug and adjacent end of the armature are cooperatively tapered in a conventional manner to decrease the air gap therebetween, and which further increases the power of magnetic attraction of the armature to the plug, when said coil, 15, is energized.

Surrounding the electro-magnet, 16, is a compression coil spring, 26, seated against the top of the board, 10, and having its upper end abutting against the under side of disc, 22, tending to maintain same in spaced-apart relation to disc, 23, and normally sustaining the assembly of discs and washers together with the armature, 17, in the position seen in Fig. 2. Threaded on the upper end of the standard, 10, is an ornamental cap or head, 27, against the under side of which the upper end of armature, 17, is yieldingly pressed.

The electrical circuit includes a conductor wire, 28, connected to one end of the coil, 15, and the other end of said coil is connected by a conductor wire, 29, to the spring, 26, and the upper end of said spring is in constant engagement with conductor disc, 22. A conductor wire, 30, is connected to the terminal clip, 14, which, through standard, 11, and armature, 17, completes one side of the circuit to the disc, 23. It is to be understood that said conductor wires, 28 and 30, are connected to a suitable source of electrical energy. Thus, when a ball or projectile engages the marginal edge of disc, 22, 22, due to its flexible character or mounting, said disc is moved upwardly into contact with disc, 23, as seen in Fig. 3, to complete the electrical circuit for energizing coil, 15, which rapidly attracts armature, 17, therein, which causes forcible downward movement of the disc assembly therewith so as to cause the marginal edge of disc, 22, to impart a sharp, hard wiping blow to the ball, causing it to be rapidly reprojected over the playing field. It will be apparent that during the downward movement of the assembly, the discs 22 and 23 are maintained in contact with each other and thereby maintain the electrical circuit during such movement of the assembly. Upon movement of the ball away from disc, 22, due to the sharp impact, said disc is free to move away from disc, 23, under its own spring action or due to its loose mounting and uniform pressure exerted thereon by the upper end of spring, 26, thereby breaking the electrical circuit. Obviously, when the armature, 17, together with the disc and washer assembly, moves downwardly, spring, 26, is compressed, so that upon breaking of the electrical circuit, by separation of discs, 22 and 23, said spring causes return of the assembly to the position seen in Fig. 2.

Although I have herein shown and described a preferred embodiment of my invention, manifestly it is capable of modification and re-arrangement without departing from the spirit and scope thereof. I do not, therefore, wish to be understood as limiting this invention to the precise form herein disclosed, except as I may be so limited by the appended claims.

I claim:

1. A device of the character described, adapted for use with a game board over which a ball is impelled, comprising a vertically movable control switch adapted to be connected in an electrical circuit and including a fixed switch element and a substantially horizontally disposed, disc-form, switch element mounted above the board in position to be encountered and moved by a ball traversing the board in any direction, and an electro-magnet connected in the electrical circuit with the control switch and having an armature positively connected to said control switch, said electro-magnet being energized by such movement of the disc element of the switch into engagement with the fixed element to complete the electrical circuit for causing said armature to move said control switch rapidly in a downwardly direction, substantially perpendicularly to the surface of the game board, thereby causing the disc element to impose a wiping stroke upon the ball for reprojecting it over the surface of the game board.

2. A device of the character described, adapted for use with a game board over which a ball is impelled, comprising a vertically movable control switch adapted to be connected in an electrical circuit and including a fixed switch element and a substantially horizontally disposed, disc-form, switch element mounted above the board in position to be encountered and moved by a ball traversing the board in any direction, an electro-magnet connected in the electrical circuit with the control switch and having an armature positively connected to said control switch, said electro-magnet being energized by such movement of the disc element of the switch into engagement with the fixed element to complete the electrical circuit for causing said armature to move said control switch rapidly in a downwardly direction, substantially perpendicularly to the surface of the game board, thereby causing the disc element to impose a wiping stroke upon the ball for reprojecting it over the surface of the game board, and spring means acting to return said switch and armature to normal position after reprojection of the ball.

3. A device of the character described, adapted

for use with a game board over which a ball is impelled, comprising a vertically movable control switch including a normally substantially horizontally disposed flexible disc element, and a cooperating element mounted in substantially fixed relation to said flexible disc element, said flexible element being normally disposed in spaced-apart relation to said fixed element and positioned to be encountered by a ball traversing the board for causing engagement with said fixed element to complete an electrical circuit, and an electro-magnet connected in said circuit and having an armature positively connected to said control switch, whereby engagement of said switch discs completes the electrical circuit and energizes the electro-magnet for causing the armature to move the control switch rapidly in a downwardly direction, thereby causing the flexible disc element to impose a wiping stroke upon the ball for reprojecting it over the surface of the game board, and thereby permitting said flexible disc element to move out of engagement with the fixed element to break said circuit.

4. A device of the character described, adapted for use with a game board over which a ball is impelled, comprising a vertically movable control switch including a normally substantially horizontally disposed flexible disc element, and a cooperating element mounted in substantially fixed relation to said flexible disc element, said flexible element being normally disposed in spaced-apart relation to said fixed element and positioned to be encountered by a ball traversing the board for causing engagement with said fixed element to complete an electrical circuit, an electro-magnet connected in said circuit and having an armature positively connected to said control switch, whereby engagement of said switch discs completes the electrical circuit and energizes the electro-magnet for causing the armature to move the control switch rapidly in a downwardly direction, thereby causing the flexible disc element to impose a wiping stroke upon the ball for reprojecting it over the surface of the game board, and thereby permitting said flexible disc element to move out of engagement with the fixed element to break said circuit, and a coil spring surrounding the electro-magnet and reacting against the under side of said disc element for returning said switch and said armature to normal position.

5. A device of the character described, adapted for use with a game board over which a ball is impelled, comprising a vertically movable control switch including a normally substantially horizontally disposed flexible disc element, and a cooperating element mounted in substantially fixed relation to said flexible disc element, said flexible element being of larger diameter than, and normally disposed in spaced-apart relation to said fixed disc element and positioned to be encountered by a ball traversing the board for causing engagement with said fixed disc element to complete an electrical circuit, and an electro-magnet connected in said circuit and having an armature positively connected to said control switch, whereby engagement of said switch discs completes the electrical circuit and energizes the electro-magnet for causing the armature to move the control switch rapidly in a downwardly direction, thereby causing the flexible disc element to impose a wiping stroke upon the ball for reprojecting it over the surface of the game board, and thereby permitting said flexible disc element to move out of engagement with the fixed disc element to break said circuit.

6. A device of the character described, adapted for use with a game board over which a ball is impelled, comprising a standard adapted to be mounted in upright position on said board, a control switch mounted for vertical movement on the standard and including a disc element fixedly mounted on said standard and having electrical connection to said standard, and a flexible disc element mounted below said fixed disc element, said flexible disc element being of larger diameter than, and normally disposed in spaced-apart relation to and insulated from said fixed disc element and said standard and positioned to be encountered by a ball traversing the game board for causing movement thereof into engagement with said fixed disc element to complete an electrical circuit, and an electro-magnet surrounding the standard and having an armature connected to said switch and slidably mounted directly on said standard, said electro-magnet being connected in the electrical circuit with said switch and adapted when energized to cause said armature and switch to rapidly move downwardly, causing the flexible disc to impose a wiping stroke upon the ball for reprojecting it upon the surface of the game board and thereby permitting the flexible disc element to move out of engagement with the fixed disc element to break said circuit.

7. A device of the character described, adapted for use with a game board over which a ball is impelled, comprising a standard adapted to be mounted in upright position on said board, a control switch mounted for vertical movement on the standard and including a disc element fixedly mounted on said standard and having electrical connection to said standard, and a flexible disc element mounted below said fixed disc element, said flexible disc element being of larger diameter than, and normally disposed in spaced-apart relation to and insulated from said fixed disc element and said standard and positioned to be encountered by a ball traversing the game board for causing movement thereof into engagement with said fixed disc element to complete an electrical circuit, an electro-magnet surrounding the standard and having an armature connected to said switch and slidably mounted directly on said standard, said electro-magnet being connected in the electrical circuit with said switch and adapted when energized to cause said armature and switch to rapidly move downwardly, causing the flexible disc to impose a wiping stroke upon the ball for reprojecting it upon the surface of the game board, and a coil spring surrounding the electro-magnet and reacting against the under side of said flexible disc element tending to move it in spaced relation to the fixed disc element to break said circuit and serving to return said switch and armature to normal position.

8. A device of the character described, adapted for use with a game board over which a ball is impelled, comprising a standard adapted to be mounted in upright position on said board, a control switch mounted for vertical movement on the standard including a disc element fixedly mounted on said standard and having electrical connection to said standard, and a flexible disc element mounted below said fixed disc element, said flexible disc element being of larger diameter than, and normally disposed in spaced-apart relation to and insulated from said fixed disc element and said standard and positioned to be encountered by a ball traversing the game board for causing movement thereof into engagement with said fixed disc element to complete an electrical circuit, an electro-magnet surrounding the

standard and having an armature connected to said switch and slidably mounted directly on said standard, said electro-magnet being connected in the electrical circuit with said switch and adapted when energized to cause said armature and switch to rapidly move downwardly, causing the flexible disc to impose a wiping stroke upon the ball for reprojecting it upon the surface of the game board, and a coil spring surrounding the electro-magnet and reacting against the under side of said flexible disc element tending to move it in spaced relation to the fixed disc element to break said circuit and serving to return said switch and armature to normal position, said spring being connected to one end of the coil of the electro-magnet to complete the portion of electrical circuit from said flexible disc element to said electro-magnet.

KENNETH A. BEVINGTON.