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[56]

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[54] VERTICALLY ADJUSTABLE BUMPER FOR BALL ROLLING GAMES

3 Claims, 3 Drawing Figs.

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(A)—125 (A), 108, 129; 124/32

ABSTRACT: In order to provide for random or controlled variations in ball-rolling games, which include a ballfield and means for causing balls to enter upon the field and engage elements permitting scoring depending upon the skill of the player, this application discloses a bumper which is normally flush with the surface of the field, but which may be moved by that surface in order to impede the passage of balls used in the game. The bumper may be arranged to have its movement controlled in a random fashion or may be arranged to be subject to the ability of a game player to direct the passage of the ball. A solenoid is used to retract the bumper to its flush position in which it is held by a latch which may be released by energizing a coil.

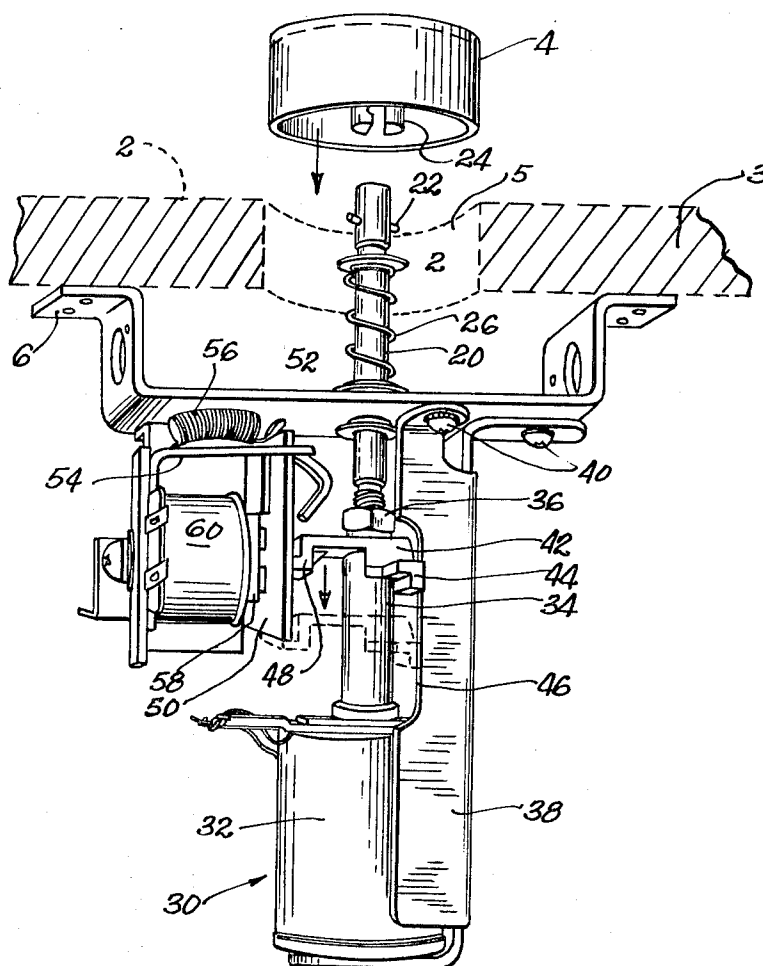


FIG. 1

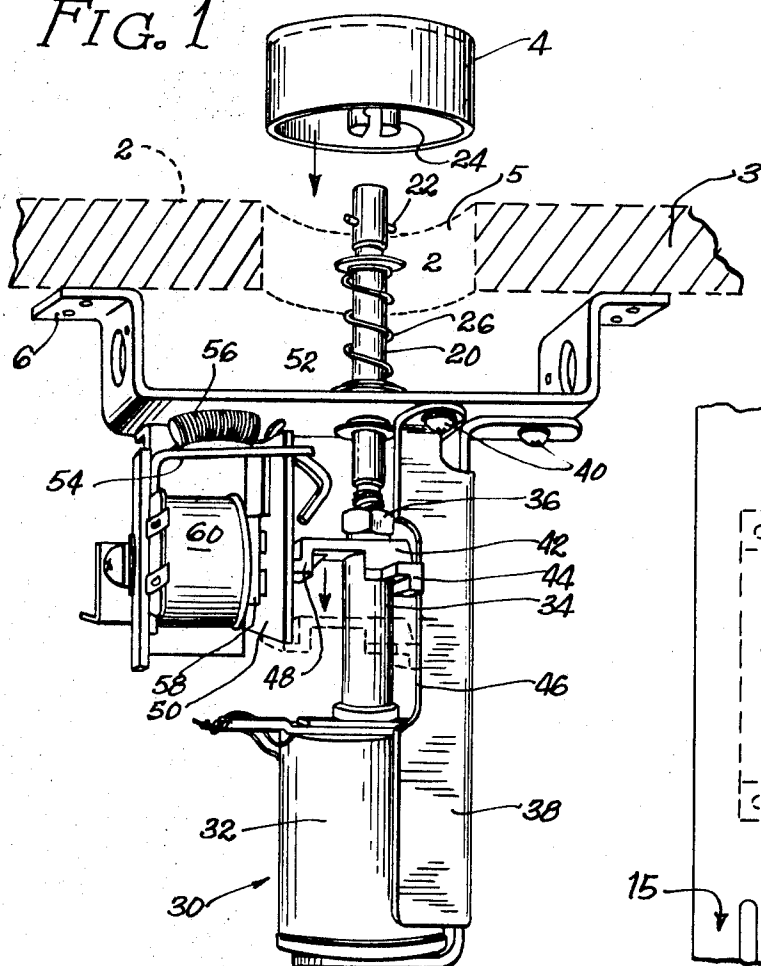


FIG. 3

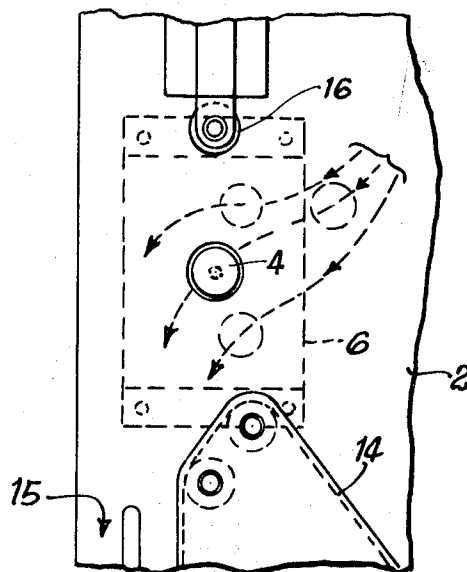
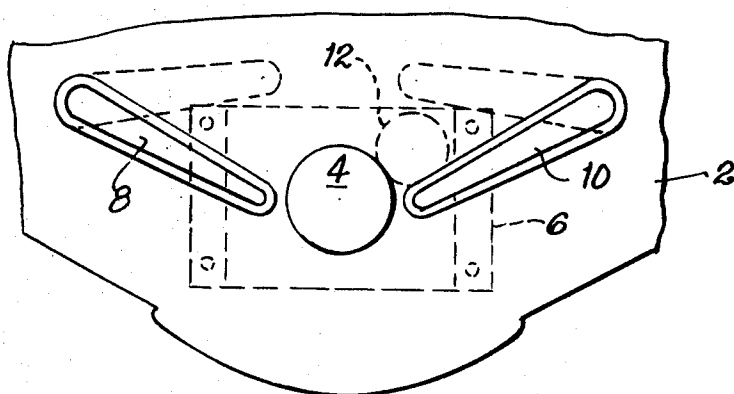


FIG. 2



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VERTICALLY ADJUSTABLE BUMPER FOR BALL ROLLING GAMES

This invention relates to ball-rolling games. More specifically it relates to means for randomly or controllably impeding the passage of the balls in such games.

BACKGROUND OF THE INVENTION

The ball rolling game's various techniques have been employed to subject a ball moving on a ballfield to variably moveable surfaces or elements in order to direct its passage into and out of the path of scoring elements. Prior art devices have involved mechanically and electrically complicated apparatus which has been expensive to build and, by virtue of its complexity, subject to failure, thus requiring excessive maintenance.

Therefore, it is an object of this invention to provide a novel device for variably controlling the passage of a ball in a ball-rolling game which is simple in its construction and therefore economical and tends to minimize the possibility of failure.

It is another object of this invention to provide a novel device for controlling the passage in a ball-rolling game which may be connected in such a way to be operated in a random fashion or alternatively operable according to the skill of the player.

It is still another object of this invention to a novel means which may be randomly or controllably actuated to impede or to permit unimpeded passage of balls in a ball-rolling game.

These and other objects are achieved in one embodiment of the invention by providing a plunger which may be arranged to be normally flush with the surface of a ballfield in a ball-rolling game, but which is capable of movement above the plane of that surface in order to impede the passage of a ball.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of this invention will hereinafter appear and for purposes of illustration, but not of limitation, an embodiment of the invention is shown in the accompanying drawings in which:

FIG. 1 is a side view of a bumper and its actuating apparatus in accordance with this invention;

FIG. 2 is a plan view of a portion of a ball-rolling field showing in diagrammatic fashion one manner in which a bumper, in accordance with the invention, may be incorporated therein; and

FIG. 3 is a plan view of another arrangement illustrating the incorporation of a bumper in accordance with this invention in the ballfield of a ball-rolling game.

DETAILED DESCRIPTION

Referring first to FIG. 2, there is shown a ball-rolling field having a flat surface 2 which surface may be inclined slightly in the manner well known in the art in order that gravity may cause the ball to roll from the top of the field as shown in the drawing toward the bottom thereof. Moveable through the field 2 there is a bumper 4 actuated by a mechanism shown in FIG. 1 and to be described in greater detail hereinafter, which mechanism and bumper are supported from the material constituting the ballfield 2 by means of a suitable bracket 6. As may be seen in FIG. 2, in this embodiment of the invention, the bumper is disposed between a pair of moveable flippers 8 and 10 which are mounted on spindles (not shown) and are arranged to be actuated or subject to the control of a player in the manner well known in the art.

When the bumper 4 is moved vertically by the apparatus of FIG. 1, it extends above the surface of the ballfield 2 and in this embodiment of the invention it and the flippers 8 and 10 are dimensioned so that when the bumper is extended or in its upward position there is insufficient room between the periphery of the bumper and a flipper, such as that designated by reference numeral 10, to permit the passage of a ball 12 therebetween. When this condition exists, the player may then operate the flippers to their dotted line positions and impel the

ball over the surface of the field in order to have further play. When the bumper 4 is in its retracted position so that its upper surface is flush with the surface of the field, it will not impede the passage of the ball between the flippers, in which case the ball may leave the field or be continued in play by operation of the flippers depending upon the skill of the player.

FIG. 3 illustrates another embodiment of the bumper in the ballfield 2. In this embodiment the bumper is disposed in the path of a scoring or exit alley 15 in which contact actuators may be provided in the manner well known in the art to permit a score to be registered by the game player or to allow the ball to leave the playing field. As illustrated, there is provided above and below the bumper 4 a pair of plastic posts 14 and 16 which are customarily provided adjacent the entry to such scoring or exit alleys to restrict that entry in order to enhance the pleasure achieved in playing the game by requiring skill on the part of the game player in order to cause the ball to enter or not enter the scoring alley. By disposing the bumper 4 in the position illustrated, the amount of skill required can be selectively or randomly increased so that at various times the bumper 4 will rise from its flush position in the field and further restrict the passage to the entry of the scoring or exit alley.

In the embodiment of FIG. 3 the bumper is shown as dimensioned so as to nearly restrict the passage to entry of a scoring alley 15, that is, its diameter is such that the distance between it and the fixed bumpers 16 and 14 is such that a ball may still pass through to the scoring or exit alley. Alternatively, the bumper 4 could be dimensioned to completely restrict that passage when it is in its extended or upper position above the surface of the field.

A means for actuating the bumper 4 is illustrated in FIG. 2. This embodiment shows a plunger 20 on which the bumper 4 may be mounted. The plunger 20 passes through suitable openings in the mounting bracket 6 and is provided with a means at its upper end, such as the horizontally extending projections 22, on which the bumper 4 may be mounted by virtue of their engagement in a slot 24 formed on the under surface of the bumper and held by a friction fit. As may be seen the mounting 6 may be secured to the underside of a platform the upper surface of which provides the playing surface 2. An opening 5 in the platform is provided into which the bumper 4 may be recessed so that top may be flush with the surface 2 when the plunger 20 is retracted.

In order to urge the bumper 4 to an upward or extended position, there is provided a coil spring 26 which surrounds the plunger 20 and bears its lower end against the bracket 6 and at its upper end against a suitable bearing surface 28 secured to the plunger 20.

A means to retract or withdraw the bumper 4 to its downward position so that it is flush with the surface of the ballfield may be constituted by a cylindrical solenoid 30 having a coil 32 and a reciprocating armature 34 which may be secured to the lower end of the plunger 20 by any suitable means, such as the screw and thread arrangement shown at 36. The solenoid 30 is mounted on a bracket 38 which depends from the bracket 6 and is secured thereto as shown by reference numeral 40. When the coil 32 of the solenoid 30 is energized, the magnetic forces involved will tend to pull the armature 34 toward the center of the coil, thus pulling down the plunger and consequently the bumper 4 from a position above the surface of the ballfield to a position where it is flush with that surface. This force is opposite to that exerted between spring 26 on the plunger 20, and consequently, unless it is maintained, the plunger will tend to rise to its extended position so that the bumper is above the surface of the field, impeding the passage of the balls. Rather than maintain this retracting force by the solenoid 30 and run the risk of overheating the coil 32 of that solenoid, it has been found desirable to provide a latching structure to maintain the plunger and bumper in their retracted positions. One embodiment of such a latching structure comprises a latching member 42 secured to the armature 34 and provided with horizontally guiding ex-

tensions 43 one of which is designated by the reference numeral 44 to ride in a cutout portion 46 of the bracket 38. The latching member is provided with a latching surface 48 which is engaged on its upper portion by a latch plate 50 which is mounted on a suitable hinge 52 at the end of a horizontally extended arm 54 anchored at one end to the arm 54 and attached to an upper end of the latch plate 50. Above the hinges 52 is a coil spring 56 which is arranged to cause the latch plate to pivot outwardly in a counterclockwise direction as shown in the drawing. Thus, as the solenoid 30 retracts the plunger 20 against the action of the coil spring 26 to a point where the latching member 42 is below the bottom of the latch plate 50 (the dotted line position of FIG. 1), the bottom of that plate will engage the latch surface 48 to maintain the plunger in its retracted position.

In order to withdraw the latch plate 50 from the latch surface 48 that plate is formed of a magnetic material and positioned to one side of its is a core 58 on which a coil 60 is wound so that when the coil 60 is energized the latch plate 50 will be pulled toward the core 58 withdrawing it from the latch surface 48, permitting the coil spring 26 to be effective to urge the plunger in an upward direction.

Suitable electric circuits may be provided to control the energization of the coils 30 and 60. Such circuits may be responsive to the travel of a ball over the ballfield 2 or may be responsive to other events, such as the action of a time control switch. Thus, a switch controlling the energization of the coil 60 may be closed by the action of a ball hitting a contact actuator on the ballfield or alternatively, it may be closed by the action of an electromechanical timer. As may be seen, only a momentary closure of such a switch is necessary for the time constant of the system need only be long enough to permit the latch plate 50 to be withdrawn from the latch surface 48 and the plunger 20 to move upwardly. Likewise the coil 30 may be energized by the closure of a switch in either of these two fashions.

It is obvious that a plunger in accordance with the invention may be disposed at any number of places on the ballfield other than those shown in this application. It is equally obvious that

the control of the action of the plunger is subject to a great number of variations depending upon the type of action desired to be provided in the game by the designer. By virtue of this arrangement a relatively simple structure is provided capable of the wide variety of applications in games of the type described and one which is relatively simple, so as to facilitate construction and maintenance.

It will be understood that any number of changes may be made in the details of construction, arrangement, and operation without departing from the spirit of the invention, especially as defined in the following claims.

We claim:

1. The combination of a ball-rolling game of a ballfield; a plunger mounted beneath said ballfield and movable substantially vertically therein; means mounted beneath said ballfield and engaging said plunger to retract it from said ballfield; means on said plunger urging it upwardly into said ballfield against the action of said first mentioned means; a bumper carried by said plunger at its upper end; said plunger and bumper dimensioned so that when retracted by said first mentioned means the top of said bumper is flush with said ballfield so as not to impede passage of the balls and when urged upwardly by said second mentioned means said bumper assumes a position above said ballfield and impedes passage of the balls; and a releasable latching means engageable with said plunger to maintain it in a retracted position.

2. The combination of claim 1 wherein said latching means comprises a latch member on said plunger having a latching surface thereon, a latch plate engageable with said latching surface, means urging said latch plate into engagement with said latch surface and means for selectively disengaging said latch plate from said latch surface whereby said second mentioned may be effected to urge said plunger upwardly.

3. The combination of claim 2 wherein said first mentioned means comprises a solenoid having an armature connected to said plunger to retract it when energized so that said latch plate may engage said latching surface to maintain said plunger in a retracted position.