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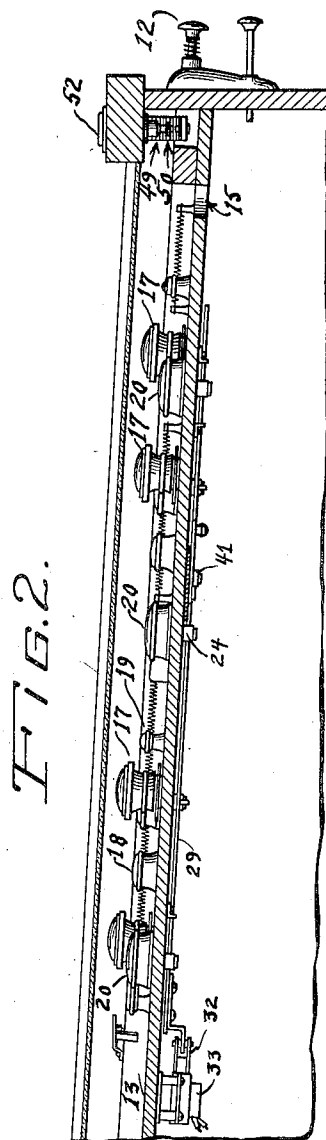
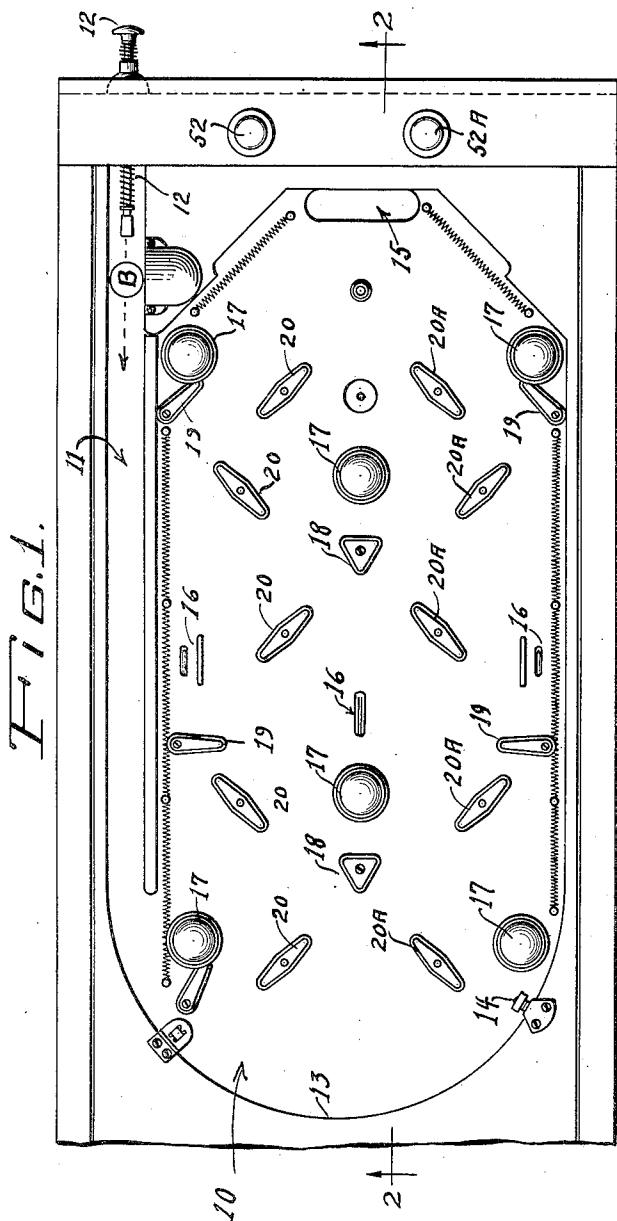
D. PEARL ET AL

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OSCILLATING BALL BUMPER AND ACTUATING MECHANISM

Filed Dec. 31, 1947

2 Sheets-Sheet 1



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FIG. 3.

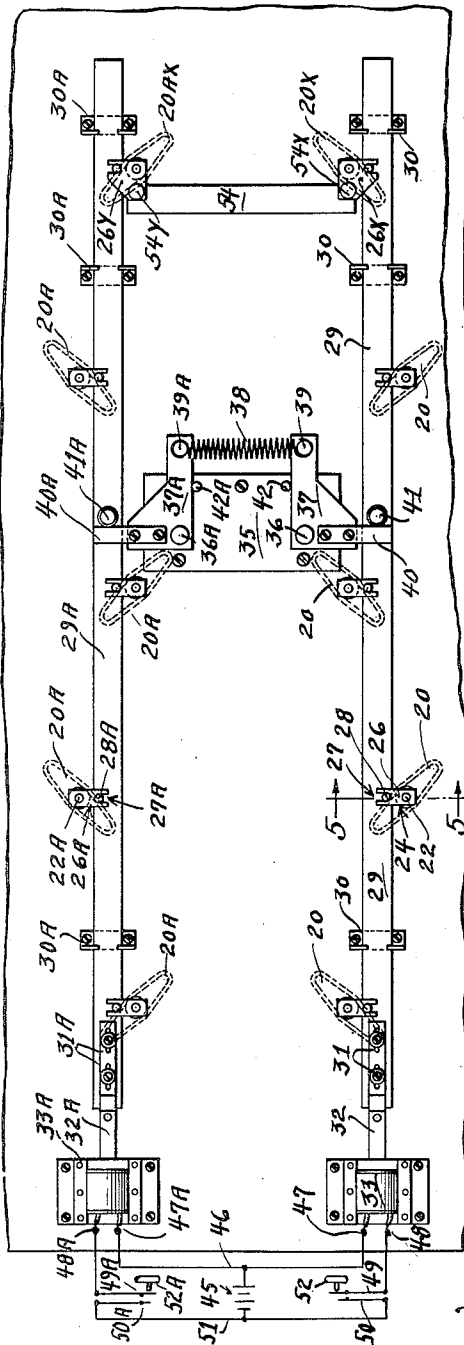


FIG. 4.

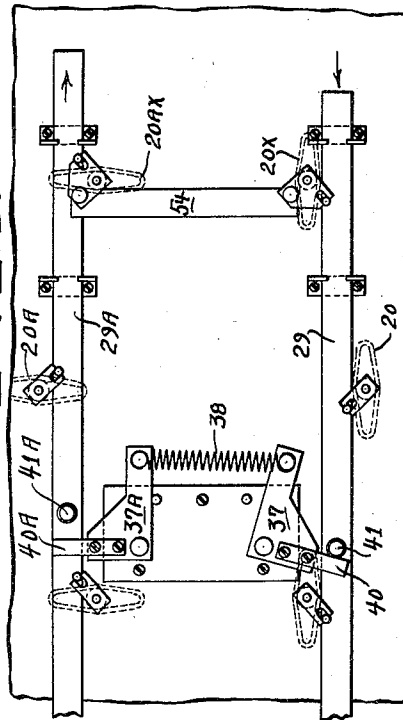
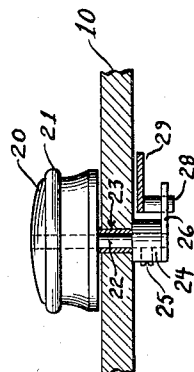


FIG. 5.



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The invention disclosed herein pertains to ball rolling games, particularly the mechanical type adapted for coin-freed operation, the principal object being the provision in such a game of a shiftable ball bumper the movements of which can be controlled by the player for the purpose of altering or attempting to alter the course of a ball rolling over the playing field in a direction to strike such bumper.

In the type of ball rolling game for which the novel bumper is originally intended, one or more small balls are freed for use by the player, and these balls are usually positioned automatically before a plunger-like projector which the player manipulates as he sees fit to propel the ball out toward the upper reaches of an inclined playing board or field, down which the ball will roll with directional and velocity components dependent in part upon the player's operation of the plunger or projector.

On the ball rolling field there are usually numbers of obstacles, commonly called bumpers, which deflect the balls striking them and add interest and action to the game. Generally, previously known types of bumper are fixed in position on the field, and while some old types have movable parts, generally the player has no discretionary control over the functional reactions of such bumpers.

According to the present invention, one or more pivoted or analogously movable bumpers are provided on the playing field, together with mechanism controlled by the player for causing the bumper or bumpers to shift or change position at a desired instant, as when a ball seems to be travelling toward impact therewith and it is desired to avoid such impact, or vice versa.

Further objects are the provision of a plurality of shiftable bumpers, selectively operable means for actuating the bumpers to cause them to shift in more than one direction and for reversing that direction at will, and means for equalizing the shifting action of the several bumpers with respect both to the shifting and normalizing or at-rest condition thereof.

Additional objects and aspects of novelty and utility relate to details of the construction and operation of the illustrative form of the invention depicted and described hereinafter in view of the annexed drawings, in which:

Fig. 1 is a top plan view of a ball rolling game incorporating the novel bumpers;

Fig. 2 is a vertical section of the same along lines 2-2 of Fig. 1;

Fig. 3 is a fragmentary bottom plan view of

the ball rolling table or board shown in Fig. 1;

Fig. 4 is a fragmentary bottom plan view identical with part of Fig. 3 but showing the bumper shifting mechanism in operated condition;

Fig. 5 is a vertical sectional detail, to magnified scale, along lines 5-5 of Fig. 3, showing one of the bumpers.

The form of ball rolling game shown in Fig. 1 includes a playing field or board 10, which is usually provided with a glass cover (not apparent) as part of a cabinet structure, and this board has a projecting alley 11 at the end of which is a ball shooter or projecting plunger 12. Balls B are automatically delivered into shooting position before said plunger by conventional mechanism, not shown, and the player withdraws and lets go the projecting plunger 12 and shoots the ball B up alley 11 to follow the curved ramp 13 and possibly strike and rebound from a bumper 14. In any event, the projected ball will ultimately continue a downward course over the board from the region of the ramp 13 toward the lower end and an exit opening 15.

In the course of travel as aforesaid, the projected ball may encounter a number of scoring switches 16 or the like, controlling conventional score register means, and these scoring switches or instrumentalities are guarded by numbers of other bumpers or deflectors 17, 18 and 19, the latter three designations indicating different styles or shapes of bumper, all known in the art, to distinguish particularly from the novel shiftable bumpers indicated at 20 and 20A. The bumper or deflector members such as indicated by references 17, 18, and 19, are fixed in position, while bumpers 20 and 20A are shiftable under control of the player, as will hereinafter appear.

The construction of the shiftable bumpers is best understood from an inspection of Fig. 5, wherein the bumper 20, of somewhat elongated, oblate, shape (as in Fig. 1) and preferably made of plastic equipped with a rubber rebound band 21, is mounted on a stem 22 rotatable in a bushing 23 secured in the playing board 10. The lower end of the stem projects below said board and is fitted with some form of lever or crank, consisting, for example, of a collar 24 secured to said stem as by set screw 25 and having affixed thereto a crank or lever arm 26, the end of which (see Fig. 3) is slotted as at 27 for driving engagement with means such as the pin 28 on a shifting member or bar 29.

All of the bumper structures 20-27 and

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20A—27A are of the same construction, the suffix A in these reference numerals simply indicating the second set of shiftable bumpers, the characteristic of which is that they shift in a different direction from the bumpers 20 of the first set, as will appear.

Thus, the bumpers 20A have similar stems 22A with actuating crank levers 26A having pin-and-slot driving connection 27A—28A with a shifting member or bar 29A.

Means common to each set of shiftable bumpers for shifting or actuating the same, includes, in the case of the bumpers 20 of one set, Fig. 3, the elongated bar or member 29; and in the case of the bumpers 20A of the second set, the bar 29A; these actuating bars 29 and 29A and associated operating mechanisms are identical, so that parts identified by reference numerals having the suffix A will be understood to be identical to parts having the same numeral without the suffix.

Thus, the bar 29 is mounted to reciprocate or slide on the underside of the ball playing board in brackets 30 attached thereto; at one end, each said actuating bar is connected, as at 31, to the plunger arm 32 of an electromagnetic solenoid or coil 33, which, when energized, draws the plunger 32 in and slides the bar 29 in a direction toward the solenoid 33.

Means for normalizing the bars 29 and 29A, and for equalizing the displacements thereof and the bumpers associated therewith, includes the equalizer structure consisting of a plate 35 secured to the underside of the board and having pivoted at 36 and 36A thereon equalizer levers 37 and 37A.

The adjacent ends of said levers are joined by a common equalizer spring 38 anchored on pins 39, 39A, while the opposite or working ends of said levers are respectively equipped with fingers 40, 40A adapted to bear against corresponding stud rollers 41 and 41A on the corresponding actuating bars, there being a pair of stop pins 42, 42A on the equalizer base plate against which the equalizing levers are urged by spring 38 in normalized condition. Accordingly, one equalizing spring is utilized for all bumpers, but the driving connection between said spring and the bumpers is impossible, for reasons to appear.

Either solenoid 33 or 33A may be energized by the player at will; and in Fig. 3, a simple circuit for this purpose is shown to include a power source, for example the battery 45, having one terminal connecting with a common conductor 46 to one terminal, each, at 47 and 47A, of the two solenoids. The remaining terminal 48 or 48A of each solenoid connects to one contact 49 or 49A of a player control switch, while the remaining terminals 50, 50A of said switches connect with a common conductor 51 to the return terminal of power source or battery 45.

Each pair of player control contacts 49—50 or 49A—50A may be closed by depressing an operating button 52 or 52A (Fig. 1) on the front of the game cabinet, with a resultant energization of the corresponding solenoid.

If preferred, each set of bumpers may be separately shifted by its corresponding control switch button 52 or 52A; however, additional novelty and action effects are procured by the provision of means linking the two actuating bars 29 and 29A for coaction, this means being shown in Fig. 3 to include a link bar 54 pivotally connected as at 54X and 54Y to special crank levers or arms 26X and 26Y for the special endmost bumpers 20X and 20AX of each set.

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As depicted in Fig. 4, if it is assumed that the solenoid 33 is energized, then bar 29 will shift in the direction of the arrow, i. e. toward said solenoid; but the bar 29A will shift in the opposite direction, as indicated by the arrow, by reason of the connection afforded by link means 54, 26X, 26Y, since in the latter action, crank 26X tends to move clockwise, thus shifting the link 54 toward bar 29A, so that crank 26Y also rotates clockwise, causing bar 29A to move in a direction opposite to the motion of bar 29.

Accordingly, bumpers 20 in one set will rotate in one direction, and bumpers 20A in the other set will rotate in the same sense or direction. If solenoid 33A is the one energized, however, the bumper action is reversed or anticlockwise as to both groups.

In Fig. 4, the action just described, i. e. shifting of bar 29, urges roller stud 41 against finger 40 to pivot equalizer lever 37 clockwise against the tension of spring 38, while lever 37A remains at rest and the impossible driving linkage afforded by rollers means 41A permits the latter and its bar 29A to shift in the opposite direction under urgency of linking means 54. Thus, when the solenoid is de-energized, spring 38 returns bar 29 to normal through impossible connection 37—40—41, and 29A is similarly normalized through the normalizing motion of link 54. When the additional solenoid means 33A is actuated, the normalizing action is effected through equalizing lever means 37A, 40A, 41A and 54.

It will now be apparent, by way of summary, that the invention provides, in a known type of ball rolling game, a plurality of shiftable bumpers arranged for coaction in sets, with mechanism for actuating each set, a common normalizing and equalizing means for the sets or groups, and a correlating or linking means by which the groups can be actuated together and in reverse directions, as well as control means for the player for effecting these actions.

Having thus particularly described the invention and the construction and operation thereof, what we point out and claim as our invention is:

1. Bumper apparatus of the class described and comprising in combination, parallel shift bars, equalizer mechanism common to said bars and having spring-normalizing and equalizing lever means oppositely engaging with said bars and urging the same into a normal position, electromagnetic means for each said bar and operable to move the same out of said normal position, bumper means moved by each said bar, and means linking said bars for joint movement responsive to movement of either bar by the electromagnetic means aforesaid.

2. In a bumper actuating mechanism for ball-rolling games, at least two reciprocable shift bars and means for mounting the same beneath a ball-rolling board, equalizing spring mechanism for moving said bars to normal position, a group of bumpers associated with each bar, the bumpers of each group being pivoted on opposite sides of the corresponding associated bar with their pivotal axis normal to the plane of reciprocation of such bar, link means drivingly interconnecting the bumpers of each group with the corresponding associated bar such that the bumpers of each said group which are on one side of a given bar turn in a direction opposite from the bumpers of said group on the opposite side of said bar, and electro-mechanical actuating mechanism for selectively moving said bars simultaneously in the same or opposite directions from normal position.

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3. Shiftable bumper means for a ball rolling game having a playing surface, said means including a pair of parallel shift bars, means mounting said bars for reciprocation in said game beneath said surface, means linking said bars for joint reciprocatory motion in opposite directions, a pair of equalizing levers mounted for pivotal movement between said bars, stop means limiting movement of said levers toward each other, spring means common to said levers and yieldingly urging the same in directions toward each other to the limit of movement determined by said stop means, electromagnetic means energizable to shift either bar in the same direction, means providing an impositive driving connection between each said bar and one of said equalizing levers in the respective directions of shift of the bars by the electromagnetic means as aforesaid, bumpers disposed at said playing surface and pivoted for motion about axes normal to the plane of movement of said bars, crank means drivingly interconnecting some of said bumpers

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to one said bar and the remainder of the bumpers to the other said bar, shifting of said bars causing pivoting of the bumpers interconnected therewith, and player-controlled means for energizing said electromagnetic means to effect shifting of either bar, selectively.

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