Nov. 12, 1968 K. N. KAISER ET AL 3,410,556

POWER ACTUATED BALL EJECTING AND RETURN APPARATUS FOR TABLE TENNIS

Filed Sept. 3, 1965 4 Sheets-Sheet 1

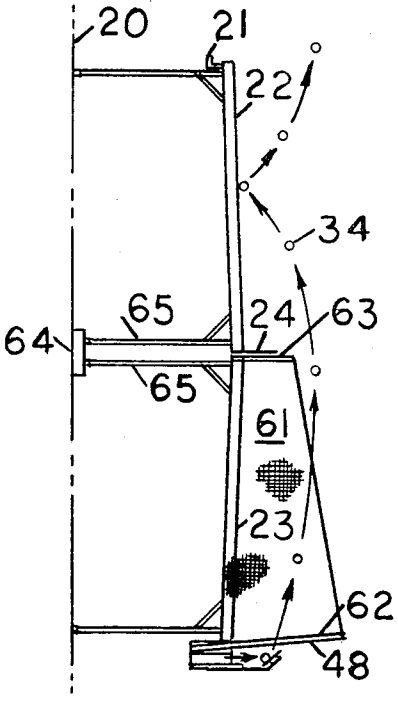


FIG. 2.

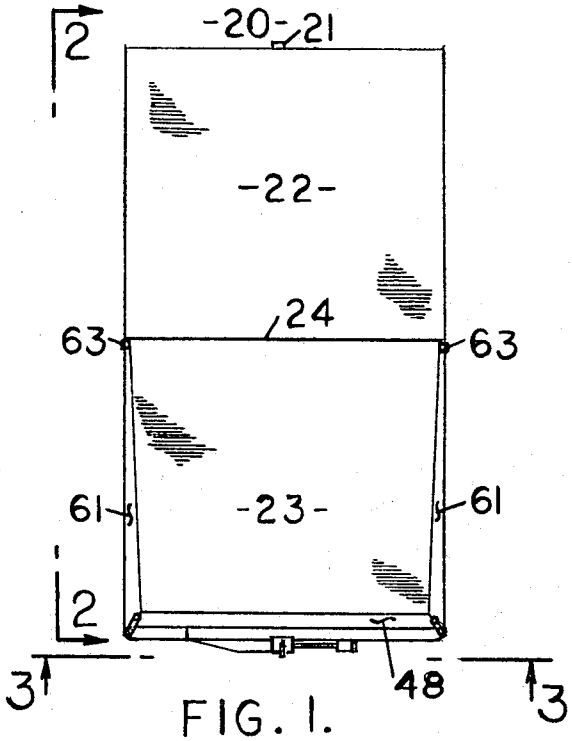


FIG. 1.

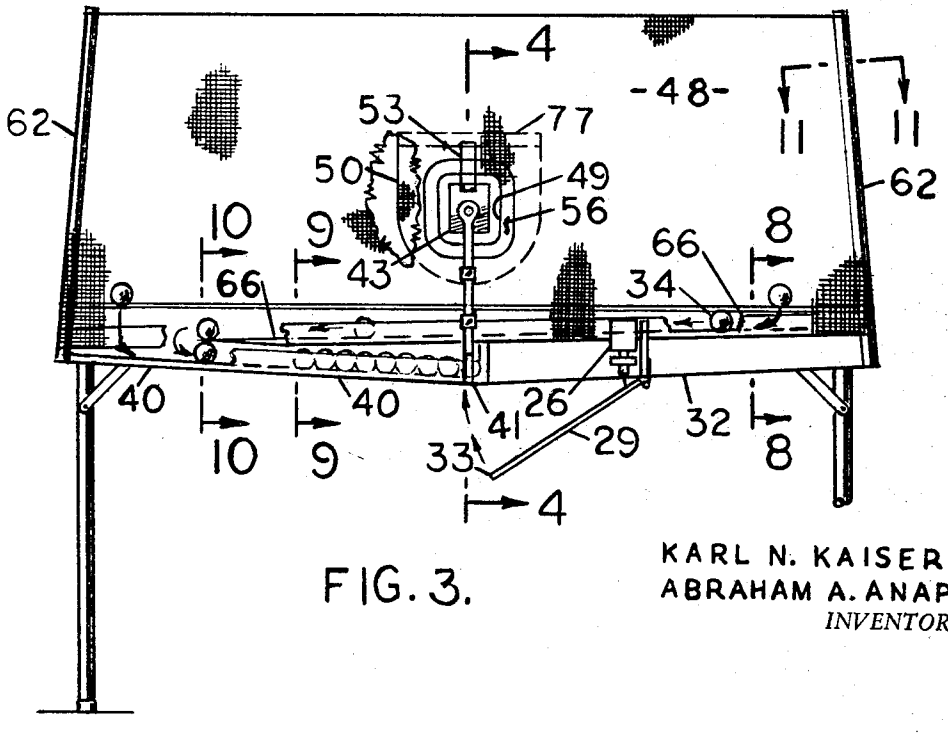


FIG. 3.

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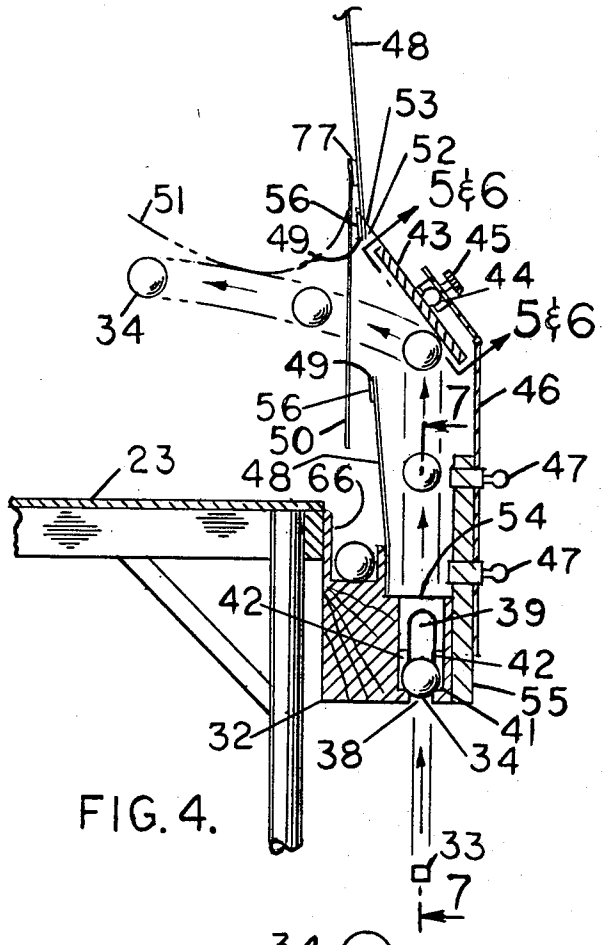


FIG. 4.

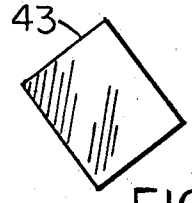


FIG. 5.

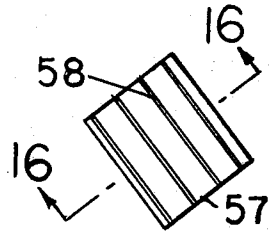


FIG. 6.

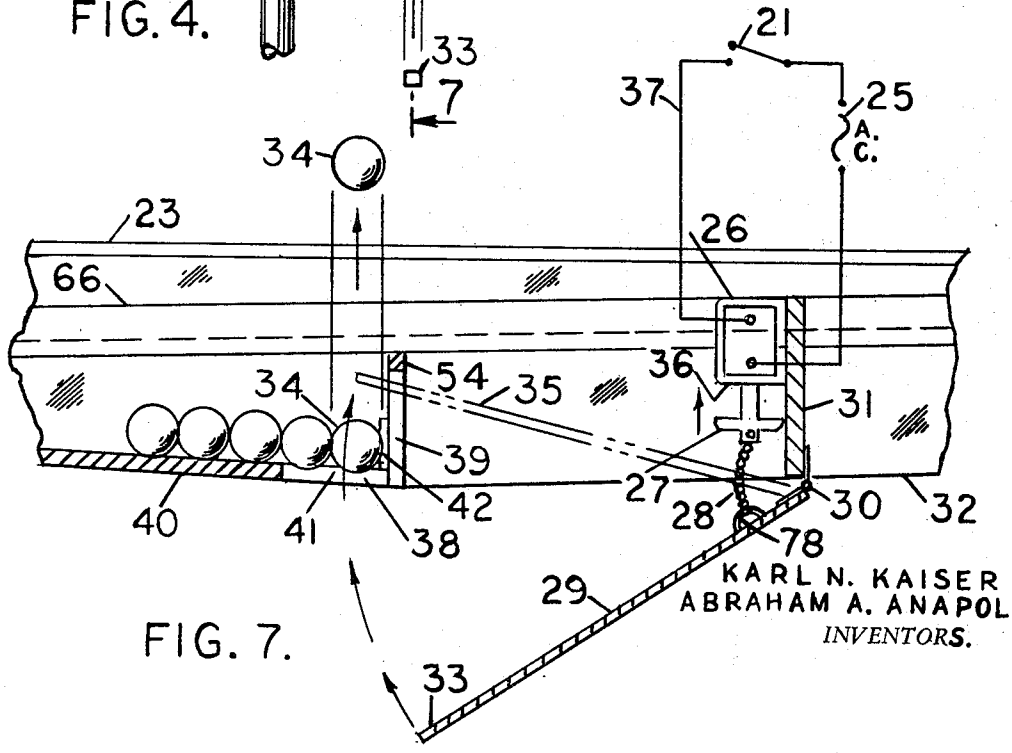


FIG. 7.

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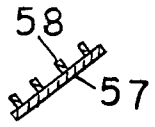


FIG. 16.

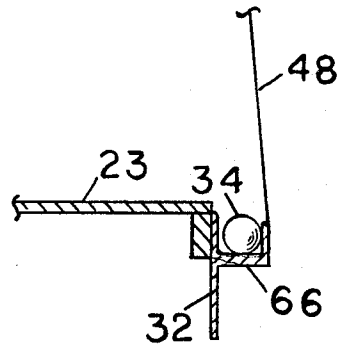


FIG. 8.

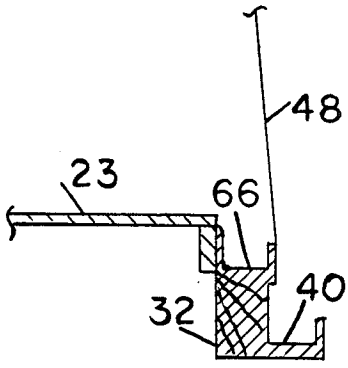


FIG. 9.

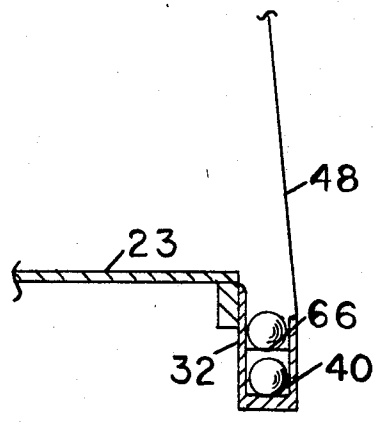


FIG. 10.

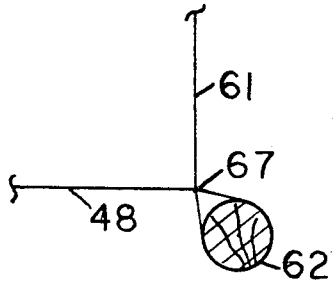


FIG. 11.

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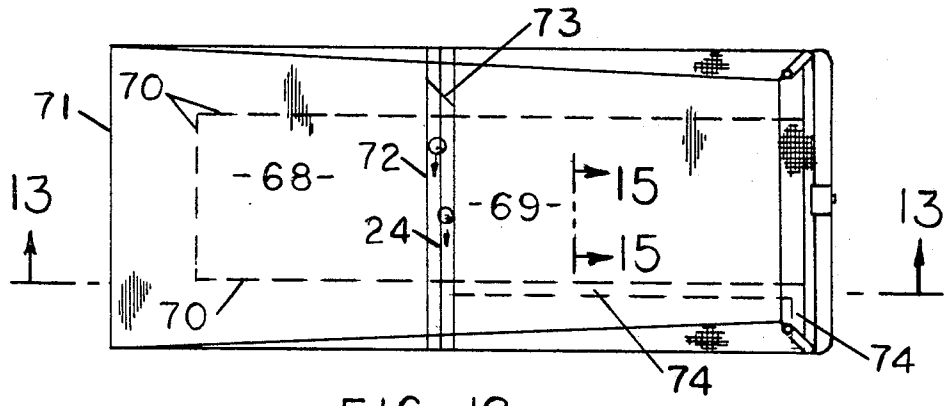


FIG. 12.

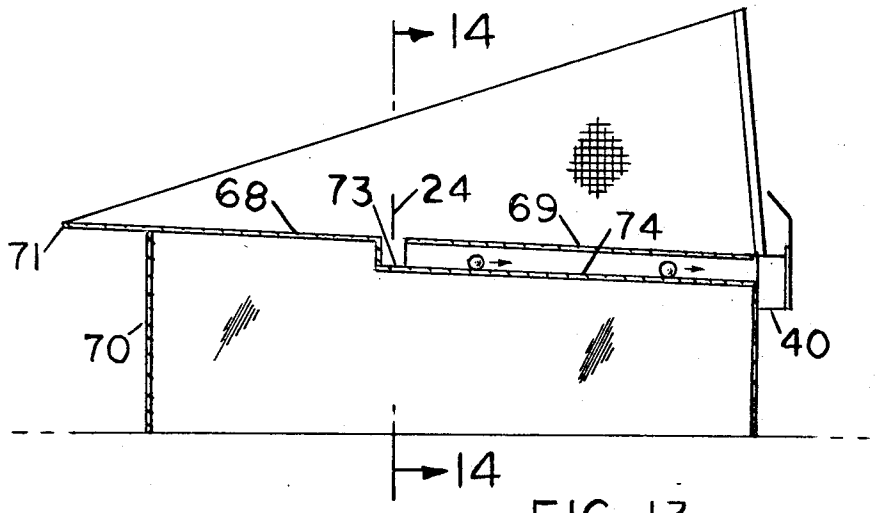


FIG. 13.

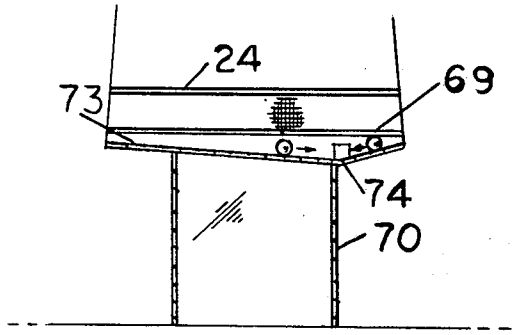


FIG. 14.

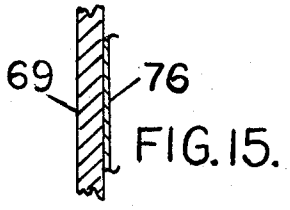


FIG. 15.

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3,410,556

POWER ACTUATED BALL EJECTING AND RETURN APPARATUS FOR TABLE TENNIS

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2 Claims. (Cl. 273—30)

ABSTRACT OF THE DISCLOSURE

The invention provides a unique ball delivery and ball return system for table tennis enabling a single player to play the game. An attachment is provided at the far end of a table tennis table, which comprises net collecting means, ball storage and delivery means, and power actuated ball delivery means comprising means to impel a ball sharply vertically upward, and an obliquely inclined deflector plate which changes the course of the ball's trajectory from purely vertical to approximately horizontal. In a further embodiment of the invention, the glance or deflecting plate is a mirror, enabling the ball to be seen while still at rest and before vertical actuation.

This invention relates to games and amusement devices within the classification of table tennis.

In conventional table tennis for a singles match two opponents, each holding a racket (paddle), face each other across a table having a six-inch high net errected transversely at the table mid-point. The table playing surface measures 108 inches long, 60 inches wide and 30 inches high. In the play of the game, the 1.47 inch diameter plastic ball weighing 2.53 grams is struck back and forth by the two players.

The object of this invention is to provide a unique ball delivery system and ball return system whereby only one player can practice table tennis or play for amusement upon touching a button or actutaing device at his end of the table and have a ball or succession of balls automatically propelled toward him, which he strikes with a racket and returns across the net. By the use of curtains, the returned bouncing or rolling ball is restrained within the confines of the return section of the table, then automatically the ball rolls back to the rear of the table and is automatically stored for recycling.

Another object of the invention is to utilize a simple ball delivery system which imparts translational motion to the ball from an ejecting chamber located about five inches below and at about the middle of one end of the table. A striker rapidly propels the ball upward in a vertical direction, and the ball path is converted to approximately a right angle or to a horizontal path and passes over the net from a direction approximating an opponent's return shot. The directional change of the ball path is accomplished by means of a glance surface mounted about twelve inches directly over the ball ejection chamber. The glance surface is at a fixed incline of approximately 45 degrees from the vertical.

Another object of the invention is that the glance surface can be adjusted to alter the direction and trajectory of the propelled ball.

Another object of the invention is that the glance surface is a mirror reflective surface permitting the player to visually see the ball prior to shooting while the ball is still at rest in the ejecting chamber.

Another object of the invention is that an irregular surface can be substituted for the mirrored glance surface permitting a random ball delivery as to trajectory, spin and direction toward the player.

Another object of the invention is a simple method of automatically collecting a number of balls in play and storing the balls in a storage chute adjoining the ball ejecting chamber. This permits the player, on pressing a button or actuating device, to have balls ejected one at a time toward the player, at the rate of one ball per second, if desired.

Another object of the invention is to apply the principles of the invention to a coin-operated amusement device having slight modification in the overall concept.

Other objects of the invention will become apparent as the invention is set forth.

Although this invention is a self-contained unit which attaches to a conventional table tennis table and can be readily removed from the table so that a normal game of table tennis can be played on the table, the mounting bracket design is not included in this specification.

For a complete understanding of the invention and the objects thereof, reference is made to the accompanying figures, wherein two versions of the invention are shown, and the following specifications described.

In the accompanying figures:

FIGURE 1 is a top plan view of the table tennis table fitted with the power actuated ball ejecting and return apparatus embodying this invention.

FIGURE 2 is a side view of FIGURE 1.

FIGURE 3 is a rear end view of FIGURE 1.

FIGURE 4 is a partial sectional view taken on line 4—4 of FIGURE 3.

FIGURE 5 is a partial view taken on line 5—5 of FIGURE 4.

FIGURE 6 is a partial view taken on line 6—6 of FIGURE 4, showing another version of the surface.

FIGURE 7 is a partial sectional cut at 7—7 of FIGURE 4. FIGURE 7 also shows a schematic of the electrical diagram.

FIGURE 8 is a partial sectional cut at 8—8 of FIGURE 3.

FIGURE 9 is a partial sectional cut at 9—9 of FIGURE 3.

FIGURE 10 is a partial sectional cut at 10—10 of FIGURE 3.

FIGURE 11 is a partial sectional cut at 11—11 of FIGURE 3.

FIGURE 12 is a top plan view of a coin-operated table tennis unit having an integral power-actuated ball ejecting and return apparatus.

FIGURE 13 is a sectional cut at 13—13 of FIGURE 12.

FIGURE 14 is a sectional cut at 14—14 of FIGURE 13.

FIGURE 15 is a partial sectional cut at 15—15 of FIGURE 12.

FIGURE 16 is a sectional cut at 16—16 of FIGURE 6.

Similar reference characters refer to similar parts throughout FIGURE 1 through FIGURE 11 inclusive and FIGURE 16. FIGURE 12 through FIGURE 15 inclusive contain essentially the same parts as detailed in the other figures, therefore the reference characters noted in FIGURES 12 to 15 inclusive are those unique or discussed relative to the coin-operated apparatus.

Although many if not all styles of table tennis tables can be fitted with this invention, FIGURES 1 and 2 show the most common type of table tennis table with a power-actuated ball ejecting and return apparatus fitted thereon. The table surface of 60 inches by 108 inches is made in two equal sections, thus each table section is 60 inches wide and 54 inches long. Each table section has 4 legs, one at each corner of the section. The table sections butt against each other at the mid-point directly under the net. The player stands at **20**, at the front end of the front table section **22** and by pressing button or actuating bar **21**,

a ball 34 is delivered toward the player. When the ball bounces on the front section 22, the player strikes the ball with a racket and returns the ball over the net to bounce on the rear (or return) table surface 23.

For descriptive purposes, the invention can be broken down into two basic functions. Function One is the striking mechanism and ejecting scheme which delivers the ball 34 over the net and toward the player after he pushes a conveniently located button or actuating bar 21. Function Two is the automatic collection of balls struck onto table surface 23 by the player, and the storage of the balls for recycling in a chute adjoining the ejecting chamber.

Function One of the apparatus consists of the striking mechanism and ejecting scheme which delivers the ball over the net 24 and toward the player after he pushes button 21. FIGURE 7 shows a schematic of the electrical circuit 37. The electrical circuit 37 contains a power source 25, a solenoid 26 having a pull-bar core 27. Core 27 in FIGURE 7 is shown at a rest position, extended by gravity, having a built-in- stop within the unit.

Solenoid core 27 is linked by chain 28 to ball striker 29 at lug 78. Ball striker 29 has a hinge 30 at one end, attached to a mount 31 which also mounts solenoid 26. Mount 31 is attached to basic apparatus structure 32. When button 21, FIGURE 7, is closed, the electrical circuit 37 energizes solenoid 26 which in turn rapidly moves pull-bar core 27 vertically upward to seat at 36. This motion is imparted to ball striker 29 by chain link 28 attached by lug 78 to striker 29. The motion imparted to the striker tip 33 is thus leveraged by a mechanical advantage to sharply slap table tennis ball 34 and follow through to the maximum swing of striker tip at 35. Chain link 28 is capable of transferring a tension force, but not a compression force; therefore the striker 29 can be jerked into motion by solenoid core 27 and not be hampered by solenoid core 27 on strike follow-through because the striker 29 swing arc is completed by the inertia of the striker 29; the solenoid core 27 does not dampen the striker 29 swing because of the relief in chain 28 linkage.

Striker tip 33 swings up through slot 38 in bottom piece 40 and slot 39 in end piece 54 as shown in FIGURES 4 and 7, to strike ball 34 at the ejection chamber 41. The ball ejecting chamber 41 is equal to one ball diameter (1.47 inches) at the end of ball storage chute 40. Thus striker tip 33 makes contact with ball 34 in ejecting chamber 41 and propels the ball 34 vertically upward. To prevent the ball 34 from binding against the sides of ejecting chamber 41, small centering blocks 42 are fastened to the end piece 54. The width of the ejecting chamber 41 is about 1¾ inches, allowing about ⅛-inch clearance on each side of ball 34 at rest in ejecting chamber 41 as viewed in FIGURE 4.

The ejecting chamber 41 is located about five inches below playing surface 23, FIGURES 4 and 7, so as to conveniently collect and store balls 34 by use of gravity as explained later. Thus to deliver the ball 34 over the table tennis net 24, the ball after being struck in the ejecting chamber 41, rises vertically for about twelve inches, at which point the ball 34 makes contact with glance surface 43, FIGURE 4.

The glance surface 43 is mounted on a universal ball joint 44 which has locking provisions by screw 45. The ball-joint 44 mounts to adjustable height bracket 46 which clamps at 47 (two places) to apparatus structure 55 as shown in FIGURE 4. The glance surface 43 is positioned to change the ball 34 path from a vertical trajectory to a horizontal trajectory when the ball 34 contacts the glance surface 43. The ball 34 then passes through the back curtain 48, FIGURES 3 and 4, since ejecting chamber 41 is behind the back curtain 48. Ball 34 passage through back curtain 48 is achieved by means of an oversized reinforced hole 49 which is about 4½ inches square, with the inside corners slightly rounded and located in back curtain 48. Hole 49 is reinforced by a light plastic frame 56 bonded by adhesive to rear curtain 48. The ball 34 passes through hole 49, then strikes a light fabric mesh flap 50 which normally drapes over and covers hole 49. The force of ball 34 turns up the flap 50 to position 51 momentarily, as shown in FIGURE 4, permitting ball 34 to travel out on a fly over table surface 23, over net 24 (FIGURE 2) to bounce in table area 22, where ball 34 is struck with a racket by the player and returned across the net 24 onto table area 23. The ball 34 then returns automatically to the ejecting chamber 41 as described later in Function Two of the invention.

Flap 50, shown in FIGURE 4 in a sectional view and FIGURE 3 in an end view, serves the purpose of allowing the ejected ball 34 to pass through back curtain 48 by being directed through hole 49 and at the same time prevents ball 34, after being struck by the player, from passing back through hole 49 and falling down into the ejecting chamber 41. Flap 50 is mounted to rear curtain 48, FIGURE 3, by an adhesive strip 77 along the top edge of flap 50. The flap 50 amply covers hole 49 area and closes hole 49 to passage in one direction only, that is, to the direction of balls returned by the player. The glance surface 43 is located such as to have only a small gap 52 of about ½-inch between it and rear curtain 48, so that flap 50 is supported by glance surface 43 as a ball 34, hit swiftly by the player directly at hole 49, said hole is effectively sealed. A cord attachment 53, FIGURES 3 and 4, joins the rear curtain 48 to glance surface 43, permitting a control over positioning the curtain 48 relative to the glance surface 43 in the plane of cut section FIGURE 4.

Glance surface 43 is a mirror reflective surface (FIGURES 4 and 5) so that the player can see if a ball 34 is in the ejecting chamber 41 ready to be put in play. Visually seeing the ball 34 at rest in the ejecting chamber 41 gives the player something to focus attention onto when the ball 34 is driven up to the glance surface 43 and across net 24 toward him. The glance surface 43 is mounted on swivel ball joint 44 and locking screw 45 so as to be adjustable and fixed in the longitudinal and lateral planes and adjustable in height by bracket 46 and clamps 47, so as to vary ball 34 ball delivery. In this configuration, the balls 34 are consistently delivered to one spot onto table area 22 because after tightening adjustments 45 and 47, the balls 34 strike a solid, smooth surface 43 and these adjustments are locked in normal play.

If the player wants the challenge of being unaware as to where to expect ball 34 to be delivered onto table area 22, another version of the glance surface is the random glance surface 57, FIGURES 6 and 16. In this version an irregular glance surface formed by ribbed protrusions attached to a flat plate is substituted for the mirror glance surface 43, causing a series of balls 34 when struck upward from the ejecting chamber 41 to the random glance surface 57 to produce a variety of trajectories, spins and directions as the balls 34 pass over net 24 toward the player and bounce onto table area 22. This random delivery is achieved because as balls 34 strike the irregular surface as shown in section cut. FIGURE 16, the balls obliquely glance off the rib protrusions 58 creating a variety of ball 34 deliveries toward the player.

For the apparatus to perform Function Two, the automatic collection of balls struck onto table surface 23 by the player, and the storage of the balls for recycling in chute 40 adjoining the ejecting chamber 41, the invention incorporates two side curtains 61, FIGURES 1 and 2, and back curtain 48, FIGURE 3. The curtains are made from an open mesh fabric similar to conventional table tennis netting. Curtains 61 and 48 are supported by rear corner posts 62 and front brackets 63. The curtains 61 and 48 restrain balls that would normally bounce off or roll off the return table section 23 if it were not enclosed. Thus the rear table section 23 is enclosed on three sides by curtains 61 and 48 and on the

fourth side by the conventional table tennis net **24** at the mid-point of the table. The entire table surface **23** is propped at a tilted angle, slightly sloping to the rear, by block **64**, about 2½ inches high, inserted permanently under the four center legs **65**, FIGURE 2. Thus all loose balls **34** after bouncing in table area **23** roll directly backward on the 2½ degree slope to the rear edge of the table where an open collecting chute **66** collects the balls **34**.

Collecting chute **66** is open at the top, FIGURES 8, 9 and 10. The rear curtain **48** attaches on the aft or rear side of chute **66**, between corner posts **62**. The collecting chute **66** mounts transversely at the rear end of the table section **23** and is inclined down at approximately 2½ degrees from the right corner of the table to the left corner of the table viewing from the rear, FIGURE 3, and extends the entire width of the table (60 inches) between corner posts **62**.

All balls **34** rolling down the inclined table surface **23** drop into collecting chute **66** and the balls **34** roll down the inclined chute **66** to the left table corner as viewed from the rear, FIGURE 3, to ball storage chute **40**.

Ball storage chute **40** is mounted transversely at the table end and is inclined down at 2½ degreees from the left side, FIGURE 3, toward the center of the table so that the ball **34** automatically reverses direction at the end of chute **66** where the bottom of the chute **66** is cut away letting the ball **34** drop to chute **40**, 1¾ inches directly below, and roll down chute **40** toward the rear-center of the table where the ejecting chamber **41** is located, FIGURE 7. Storage chute **40** is directly below collecting chute **66** (FIGURE 10) on the left side juncture with chute **66**, but chute **40** veers slightly aft (FIGURE 9) approaching the ejection chamber **41**, and at the ejection chamber **41**, chute **40** is behind the rear curtain **48**, FIGURE 4, so that balls **34** do not roll off or bounce off table surface **23** directly into storage chute **40** and become jammed on top of each other. FIGURE 7 shows a number of balls **34** lined up in storage chute **40** adjoining the ejection chamber **41**. Fifteen or more balls **34** can be stored in storage chute **40** ready for play in this manner. Thus without any moving parts or mechanisms the apparatus automatically collects all balls from table surface **23** by the use of the inclined plane principle and by the use of gravity and lines the balls up in an orderly manner adjoining the ejection chamber **41** about five inches below the table surface **23** and at the rear-center of the table. At that point the ball ejecting system described in Function One delivers the balls **34**, one at a time, across the table tennis net **24** toward the player. As the balls **34** are struck up and out of the ejection chamber **41** by striker tip **33**, other balls which are lined up in the storage chute **40** roll down the chute to fill up the gap left by the ejected ball **34**.

The forward table playing surface **22** is also inclined 2½ degrees by blocks **64**, FIGURE 2, so that no sharp discontinuity exists between table areas **22** and **23** where they butt together. The table tennis net **24** may be lowered somewhat to compensate for the height addition to the table where the blocks **64** are inserted under legs **65**. As a result of table surface **22** being inclined slightly toward the player, balls **34** which the player strikes into the net **24** roll back toward the player where he can conveniently retrieve the balls **34** and manually toss over net **24** into the enclosed area **23**. Once the balls **34** are in table area **23**, gravity automatically directs the ball **34** roll until it reaches the storage chute **40** adjoining the ejecting chamber **41**.

The side curtains **61** are canted about five degrees inward from the vertical by corner posts **62** as shown in FIGURE 3 and by front brackets **63** to better capture and restrain high bouncing balls **34** within table area **23**. The same five-degree cant is given to rear curtain **48** as shown in FIGURE 2, for the same reason.

FIGURE 11 details the construction of corner posts **62**. A dowell section **62** supports curtains **61** and **48**. A seam **67** provides a loop in curtains **61** and **48**; the corner posts are thus about ½ inch behind and outside curtains **61** and **48**. This prevents ricochet if the balls are struck by the player directly toward the corner posts **62** since the posts are remote from the back and side curtains where the balls are restrained.

FIGURES 12, 13, 14 and 15 show a coin-operated unit in accordance with our invention. The general specification described in the foregoing description, FIGURES 1 to 11 inclusive and FIGURE 16, apply to the coin-operated version, but with the exceptions described herein. The table surfaces **68** and **69** are mounted on a pedestal **70** in a manner in which table surface **68** is inclined down from edge **71** to edge **72** at about three degrees. The three-degree slope is also maintained in table surface **69**, permitting all balls being collected by gravity to roll away from the player in a direction toward the rear of the table. At a transverse line beneath where a conventional table tennis net **24** is stretched, a ball chute **73** is recessed into the table. Chute **73** is about four inches wide and slopes on an incline of three degrees or more to pedestal **70** edge, FIGURE 14, where another chute **74** permits balls to roll to the rear of the table to deposit in storage chute **40**. Table surface **69** is covered with a suitable sound and bounce deadening material such as cork sheeting **76**, FIGURE 15. A coin-operating device is mounted near table edge **71**.

While but two general forms of the invention are shown in the figures and described in the specification, it is not desired to limit this application for patent to these particular forms as it is appreciated that other forms of construction could be made that would use the same principles and come within the scope of the appended claims.

Having thus described the invention, what is claimed is:

1. In combination, a table having a top surface, a ball projector means mounted adjacent one end of said table, means for positioning a supply of balls below said top surface, a ball ejector chamber below said top surface, means connecting said ball positioning means to said ball ejector chamber to feed one ball at a time from said supply to said chamber, striker means mounted at one end in said chamber positioned to strike and eject a ball substantially vertically from said chamber, manually controlled power means for actuating said striker means, by imparting a sharp upward motion thereto, and a deflector means positioned above said table at an angle to deflect an ejected ball at an angle to the vertical against said top surface of the table, wherein said striker means is pivotally mounted at one end thereof, and said power means actuates said striker means adjacent the end thereof.

2. The device of claim **1** wherein said deflector means has a mirror deflecting surface enabling the player to see the ball at rest in the ejection chamber prior to the ball being struck toward him.

References Cited

UNITED STATES PATENTS

2,199,009	4/1940	Perryman	273—30
2,765,171	10/1956	Cook	273—30
3,033,568	5/1962	Achterberg	124—1
3,043,592	7/1962	Lohr	273—30
3,084,680	4/1963	Goldfarb	124—16
3,088,735	5/1963	Clark	273—30
3,310,312	3/1967	Peeples	124—1

FOREIGN PATENTS

926,492	5/1963	Great Britain.

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