

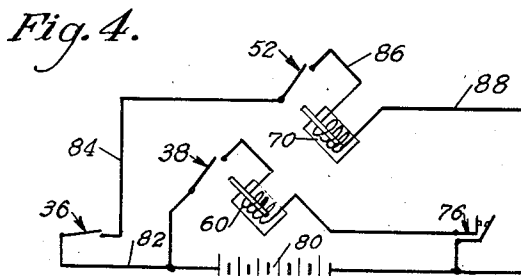
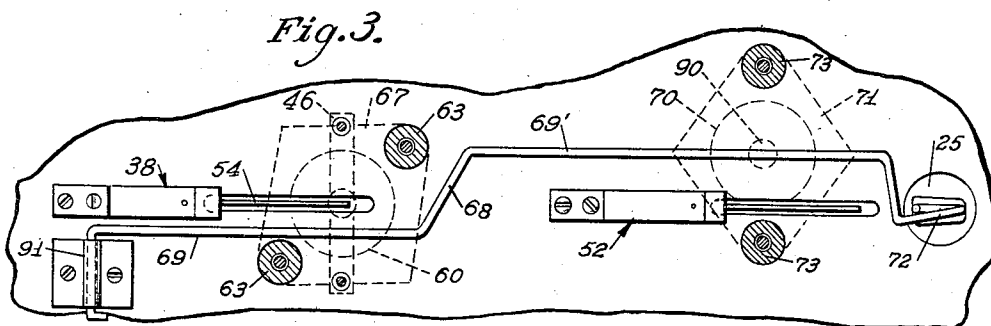
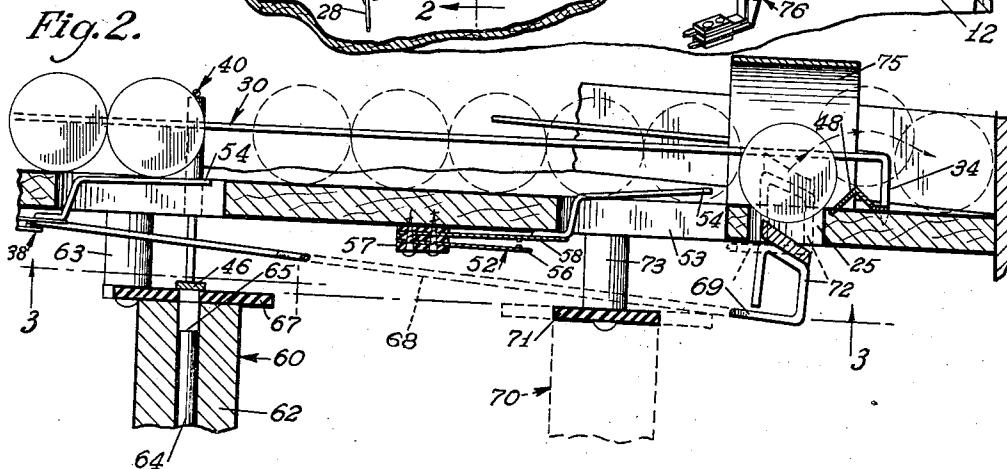
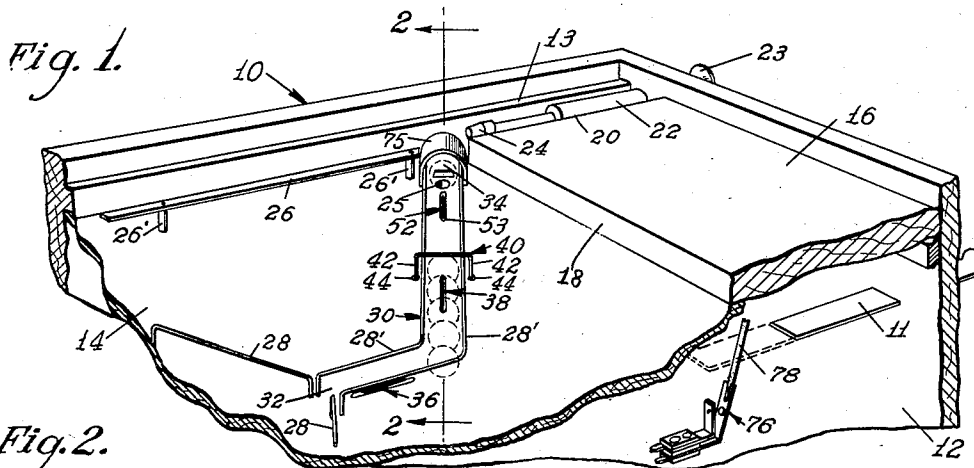
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E. KRAMER ET AL

**2,120,440**

# GAME APPARATUS

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## UNITED STATES PATENT OFFICE

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## GAME APPARATUS

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This invention relates to game apparatus and to an improved ball control mechanism for use with the type of game having an inclined ball playing surface or field and a mechanism for projecting balls upon the playing surface, and a coin control mechanism for releasing a predetermined number of balls into playing position.

The invention resides in the novel construction and combination of parts to be particularly hereinafter described and claimed, and the invention will be best understood with reference to the attached drawing in which:

Fig. 1 is a fragmentary perspective view of a game apparatus incorporating the present invention;

Fig. 2 is a vertical section taken along the lines 2—2 of Fig. 1;

Fig. 3 is a bottom plan view partly in section taken along the lines 3—3 in Fig. 2; and

Fig. 4 is a schematic wiring diagram for the novel control device.

The game apparatus generally indicated at 10, Fig. 1, comprises a housing member having a vertical front wall 12 and an inclined horizontal ball playing surface or field 14 including an end block 16 having vertical edge portions 18 and 20, the latter being disposed parallel to the housing side wall portion 13 and spaced therefrom for the accommodation of a plunger type of ball projector 22.

Forming a race-way for the balls projected from the projector 22, is an elongated strip 26 extended above the surface 14 by suitable spacers 26' parallel to and at a distance from the side wall portion 13 of the housing member and substantially co-extensive with the edge portion 20 of the block 16.

Guideways for returning and storing balls are provided in the form of rail portions 28 suitably and variously disposed upon the playing surface 14 in a manner to guide played or returning balls moving under force of gravity into a substantially elongated guideway 30, comprised of a pair of parallel guides 28' having an upper entrance end 32 and a lower exit end 34 disposed adjacent the plunger 24 of the projecting mechanism 22.

The directional disposition of the guide rails 28' of the guideway 30 is not necessarily restricted to the particular form shown in Fig. 1, but may be varied conveniently depending, among other things, upon the tilt of the playing surface 14 and the particular arrangement of the game or playing surface desired in a given instance.

Positioned at the upper entrance end 32 of the guideway 30 is a passover or return switch 36 of

a construction to be particularly described hereafter. Intermediate the entrance end 32 and the exit 34 of the guideway 30 is a second passover switch 38, and positioned relative thereto in a descending direction toward the lower end 34 is a gate or barrier 40 which may be suitably formed from U-shaped wire or the like having vertically disposed legs 42 adapted to pass through holes 44 in the surface 14 and supportably engage a crossbar lift 46 therebelow, in such manner that the gate 40 may be raised relative to the guideway 30 to permit the passage or descent of balls from the entrance 32 toward the exit 34 of the guideway.

At the lower exit end 34 of the guideway is a barrier or restraining means 48 disposed on the surface 14 and across the longitudinally extensive path between the side rails 28' of the guideway 30 in a manner normally to obstruct the passage of balls through the exit end of the guideway and into the race-way 15. Immediately behind the barrier 48 is an aperture 25 through the horizontal surface partition 14 and communicating with the interior of the housing therebelow. Immediately behind the aperture 25 is a third passover switch 52 which, like the first and second passover switches 36 and 38, respectively, already mentioned, are disposed with their actuating fingers or arms 54 (Fig. 2) co-extensive with the longitudinal axis of the guideway 30.

The passover switches 36, 38 and 52, as shown in enlarged detail in Fig. 2, are comprised of a pair of elongated and relatively flexible or yieldable conducting members having contacts 56 and 58 in substantially confronting relation adjacent one of the extremities of said members, and secured in confronting relation to one another by insulating spacers 57 in the usual and well known manner; the uppermost contact spring carrying the contact 58, for example, has an operating arm or finger 54 secured thereto and adapted to lie in an elongated slot 53 and to protrude therefrom slightly above the surface of the ball playing field 14 in such manner that the ball rolling over the finger 54 will cause the upper contact spring bearing the contact 58 to engage the lower contact 56. The switches 36 and 38 are identical in construction with that just described.

An electro-magnetic gate operating means generally indicated at 60 in Fig. 2, is provided for the gate 40 and comprises a solenoid 62 suspended with its longitudinal axis normal to the ball playing surface 14 underneath the latter and spaced therefrom by a suitable spacing collar, 63.

The plunger 64 of the solenoid is adapted to

rest under direction of gravity in such manner that its upper end 65 lies an appreciable distance below the uppermost end of the solenoid 60 and the latter is mounted respective to the gate 40, so that the lift bar 46 of the latter will overlies an apertured end plate 67 of the solenoid and is adapted to be engaged by the upper end 65 of the plunger or core 64 when the latter is pulled up under influence of the solenoid winding so that the gate 40 is raised in a vertical direction away from the upper surface of the ball playing member 14.

Also disposed beneath the horizontal partition member or ball playing member 14 is a ball release arm 68 (Fig. 3) pivoted at one extremity 91 on the under side of the member 14 and extended in a direction substantially parallel to the longitudinal axis of the guideway 30 to have its right-hand extremity suitably bent or formed with a laterally extensive ball engaging portion 72 which normally underlies the aperture 25 at the lower exit end 34 of the guideway.

This ball releasing member 68 is bent between two relatively offset longitudinally extensive portions 69 and 69', and the latter portion in the assembled device overlies the upper end plate 71 of a second solenoid 70 and also an apertured portion 90 therein through which the plunger of the solenoid extends when the latter is energized, in such manner that the ball release arm 68 can be raised into effective position so that the ball engaging arm 72 thereof will assume the dotted line position shown in Fig. 2. The solenoid 70 is suspended by suitable spacing collars 73 and in general is mounted on the under side of the panel 14 in the same manner as the companion solenoid 60.

It will be observed that either of the solenoids 60 or 70 is operable to raise the release arm 68 into effective position, and it is pointed out that the energization of solenoid 60 not only raises the arm 68 but the gate 40 as well, while the energization of solenoid 70 similarly raises the arm 68 and is effective to move a ball resting in the aperture 25 over the barrier 48 for positioning before the plunger 24.

In order to provide against the possibility of a ball's being ejected from the guideway by the operation of the ball release arm 68, a hood 75 is positioned over the aperture 25 and is dimensioned to provide adequate clearance for balls rising over the barrier 48.

Mounted in the front wall 12 of the housing of the game apparatus is a conventional coin release mechanism of which only the slide 11 is shown, this type of device being widely known in the art, and in the present instance forming no part of the invention per se, the structure and operation thereof is not set forth in detail.

Positioned relative to the coin slide 11 within the housing is a master switch 76 having an extended arm 78 disposed for operative engagement with the slide member 11 when the latter is pushed inwardly of the wall 12 to assume the dotted line position shown in Fig. 1 whereby the switch 76 is closed to initiate the operation of the control mechanism, as will be hereafter fully described.

#### Operation

Assuming a given number of balls, for example five, to have gravitated into the guideway 30 from the upper or entrance end 32 thereof, these balls will be retained by the gate 40 in its normally lowered or obstructing position as shown in Figs. 1 and 2.

At this time it will be observed that the "pass-over" or "rollover" switch 38 will be in closed circuit condition by the weight of the balls resting thereon. At this time also a sixth ball, also shown in dotted lines in Fig. 1 and in full lines in Fig. 2, will be resting in the aperture 25 at the lower or exit end 34 of the guideway 30.

If now the coin slide 11 be moved inwardly to assume the dotted line position of Fig. 1, the master switch 76 will be closed and the solenoid 60 will be energized (see general circuit of Fig. 4) and both the gate 40 and the ball release arm 68 will be raised (see Fig. 2) by impact of the upper end 65 of armature 64 against the crossbar 46 on gate 40, such that the ball heretofore resting in the aperture 25 will be raised to a height corresponding to that of the barrier 48 and will thereafter roll over the barrier and into position before the plunger member 24. By manipulation of the handle 23 the ball positioned before the plunger may be projected out upon the playing board eventually to find its way back into the entrance 32 of the guideway 30, and the ball will pass over the switch 36 and close a circuit from the battery 80 (Fig. 4) through the solenoid 70 to cause the plunger 72 thereof to be raised and consequently the ball releasing arm 68 to be raised also for movement of another ball over the barrier 48.

Referring particularly to Fig. 4, the circuit connections for this latter operation include a conductor 82 to one side of switch 36, conductor 84 from the other side of switch 36 to one side of switch 52, conductor 86 from the other side of switch 52 to the winding of solenoid 70 and thence by conductor 88 back to the battery 80.

During the cycle of operation just above described, it will be recalled that there were a number of balls positioned behind the aperture 25 at the time the played ball returned to the entrance end 32 of the guideway 30, this latter ball actuating switch 36 as it moved toward the gate 40, so that when the switch 36 was closed by the returning ball the switch 52 was closed by the waiting balls in the lower end of the guideway and the circuit of solenoid 70 thereby completed for the ejection of another ball as described.

The foregoing operation will be repeated so long as there is a ball resting upon the lower rollover switch 52 and so long as there are returning balls to operate the switch 36. Beginning with the first ball played, the spent or played balls pass successively over the switch 36 and are aligned behind the gate 40 awaiting subsequent release for another cycle of operation, and the number of balls provided for such a cycle of operation corresponding to the insertion of one coin in the machine, is such that the total number of balls, less one, to be played when aligned behind the gate 40 will leave the last ball of the group out of contact with the switch 36 so that it will be apparent that one ball will always be left over the aperture 25 after the last ball of the aligned group of played or spent balls has passed over the switch 36, there being no further balls to operate the switch 52. This condition is illustrated in Fig. 1 by the dotted line representation of balls awaiting release behind the gate 40 and one ball awaiting release in the aperture 25, it being observed that there is no ball on the switch 52 while the switch 38 is closed by the aligned balls awaiting operation of the coin slide switch to raise the gate and release the group for a cycle of play.

It will be apparent that our novel ball con-

trol mechanism in addition to providing an effective and simple means of releasing balls for play, has in the novelty of the operation and disposition of its working parts an additional amusement or entertainment utility, and while we have recited in specific detail the construction and features of our invention for illustrative purposes we do not desire to be restricted to such recitations but wish to avail ourselves of all the modifications and variations coming within the scope of the appended claims.

Having thus described our invention, what we claim as new and desire to protect by Letters Patent is:

1. Ball controlled means for use in ball game apparatus having ball moving means and an inclined playboard, said ball controlled means being operable to automatically release a determined number of stored balls for play one at a time and including an inclined storing member with electrically operable means for releasing balls therefrom one at a time, a manually operable control device for initially actuating said last mentioned electrical means, and the latter thereafter being operable by the return of played balls to said storing means until all but one of said determined number of balls have been played and returned to said storing member.

2. A control device for game apparatus of the type having means for projecting balls or marbles upon a playing field and means for returning played balls to a ball retaining and guiding means, the said control device comprising: inclined retaining means for guiding balls and having ball entrance and exit extremities; a gate member intermediate said extremities and a ball-restraining member and a ball-ejector at said exit end and operable to eject balls for gravitating movement to said projector; electrical means for opening said gate and operating said ejector simultaneously; electrical means for operating said ejector independently of said gate; switch means within said guiding means operated by played balls returning to said guiding means for operating said ejector once for each returning ball, and switch means adjacent the exit end of said guiding means for preventing operation of said ejector by said first switch means after a predetermined number of balls have been ejected.

3. Ball controlled mechanism for use in a game apparatus of the type having an inclined playing surface and means for projecting balls thereon, and a master control, said ball control means comprising an inclined guideway on said surface and having an entrance and an exit opening with said entrance opening positioned to receive projected balls, a gate member positioned between said openings, a barrier at said exit opening, ball releasing means for moving a ball into position to gravitate past said barrier, means for opening said gate member and simultaneously operating said ball releasing member, means for actuating said releasing member independently of said gate member, means actuated by projected balls for operating said ball releasing member independently of said gate a predetermined number of times, and means operable by said master control for actuating the aforesaid means which simultaneously opens said gate and operates said ball releasing member.

4. Means for releasing a predetermined number of balls for play in a game apparatus of the type having an inclined playboard and means

for projecting balls and the like thereon, said means comprising a ball-storing guide having an entrance and an exit end for receiving played balls and guiding them in gravitating movement toward said projecting means; restraining means operatively associated with said guide for preventing movement of balls therein toward said exit end; a second restraining means for preventing issuance of balls from said exit end; a first electrically operable means for rendering said first restraining means operatively ineffective; a second electrically operated means for issuing balls from said exit end of said guide past said second restraining means; means controlled by a ball-operated switch and a manually controlled switch to operate said first electrically operable means to release a determined number of balls in said guide toward said second restraining means and also to actuate said second electrically operated means to issue a ball from said exit end; a third switch means operatively associated with said guide for actuation by a ball therein to connect said second electrically operated means in an actuating circuit; and switch means operated by a played ball moving in said guide toward said first restraining means for operating said second electrically operated means to issue balls from said exit end in said guide so long as there is a ball in said guide to actuate said third switch means.

5. Automatic control mechanism for use in game apparatus of the type having an inclined ball playing board and means for propelling a ball onto said board, said mechanism comprising an inclined guideway having an entrance at its upper end and an exit at its lower end, a gate between said ends and dividing said guideway into upper and lower sections, means blocking said exit end, discharge mechanism operable to position a ball for movement past said blocking means, gate operating mechanism to move said gate into ineffective position, means operable by said gate operating mechanism when the latter is actuated to operate said discharge mechanism, ball operated means in said upper section controlling the operation of said discharge mechanism, ball operated means in said lower section effective to prevent the operation of said discharge mechanism when there are fewer than two balls in said lower section, ball operated means in said upper section for actuating said gate operating mechanism, and manually operable means co-operable with said last mentioned ball operated means to actuate said gate operating mechanism and move the same into ineffective position so as to permit balls restrained by said gate to move into said lower section.

6. Object storing and releasing mechanism including an inclined guideway having an upper entrance end and a lower exit end, a stationary barrier at said lower end, a movable barrier between said ends and dividing said guideway into upper and lower sections, a determined number of objects normally positioned in said upper section, one object normally positioned in said lower section, an ejecting device in said lower section for positioning an object for gravitating movement past said stationary barrier, a first control means in said lower section, at a point above the position of the said object normally therein and operable when there is more than one said object in said lower section to render said ejecting device operative, a second control device in said upper section near said movable barrier, manually

operable control means and mechanism co-operable with said second control means for operating said movable barrier to permit movement of objects from said upper to said lower sections, said second control device being operated by an object in said upper section, together with a third control device near the entrance of said guideway and engageable by said objects as the latter gravitate toward said movable barrier to operate said ejecting device once for each object moving into said upper section, means for moving an object ejected from said exit end back to said entrance end, and mechanism operable by said movable barrier to operate said ejecting device.

7. A control device for game apparatus of the type having means for moving objects onto an inclined playing field and means for effecting return of said objects to a retaining means, said control device comprising an inclined guideway for said objects and having entrance and exit portions, said exit portion being positioned near said object-moving means for gravitating movement of objects to the latter, a gate member between said entrance and exit portions, an object restraining member and an object ejector at said exit portion, manually controlled electrical means for opening said gate and operating said ejector simultaneously, electrical means for operating said ejector independently of said gate, return switch means positioned for operation by objects returning into said guideway for operating said ejector once for each object returned, switch means near said exit portion of the guideway for rendering said ejector inoperative by said first mentioned return switch means after a predetermined number of objects have been ejected from said exit portion, together with switch means arranged in said guideway between said return switch and said gate member and operably associated with said manually controlled electrical means for rendering the latter ineffective when there are no objects between said gate member and said entrance portion.

8. Automatic control mechanism for game apparatus of the type having means for propelling balls one at a time onto an inclined playing field, means for returning played balls to a storage member, and a master control, said automatic control device comprising an inclined guideway for balls on said playing field and having an entrance end and a lower exit end, a gate positioned between said ends and dividing said guideway into upper and lower sections, said gate being normally disposed to block movement of balls from the upper to the lower section, blocking means at said exit end preventing movement of balls therefrom, an ejector near said exit end and operable to position a ball for movement past said blocking means, electrically operated means for opening said gate and operating said ejector simultaneously, electrical means for operating said ejector independently of said gate, return switch means positioned for operation by played balls returning to said guideway and effective to operate said ejector once for each ball returned, switch means adjacent said exit end of the guideway for preventing operation of said electrical ejector operating means by said first mentioned return switch means after a predetermined number of balls have been ejected from said lower section, together with switch means operated by said master control for opening said gate to release balls stored in said upper section for movement into said lower section.

9. Ball control mechanism including an inclined

ball guideway having an upper entrance and a lower exit, a normally closed gate between said entrance and exit, an obstruction at said exit end to prevent movement of balls out of the guideway, an ejector near said obstacle for discharging balls one at a time out of the guideway past the obstacle, electrical mechanism for simultaneously opening said gate and operating said ejector, and control means for said electrical mechanism, electrical means for operating said ejector independently of said gate, a ball operated switch positioned in said guideway near said entrance end for operating said last-mentioned electrical means each time a ball moves into the guideway, a ball-operated switch in said guideway between said gate and said obstacle and operable to prevent the operation of said last-mentioned electrical ejector operating means by said switch near the entrance end when there are fewer than a predetermined number of balls in the guideway between said gate and said obstacle, together with means for causing the movement of ejected balls one at a time back into the entrance end of the guideway.

10. Control mechanism including an inclined runway having an exit at its lower end and an entrance at its upper end, a determined number of movable objects normally disposed in said runway, a movable barrier between said ends and dividing the runway into upper and lower sections, mechanism operable to move said barrier into ineffective position to permit said objects to move into said lower section, a control device in said runway between the entrance end thereof and said barrier and co-operable with said barrier moving mechanism to render the latter operable when there is an object in said upper section engaging said control device, an obstacle near said exit end, ejecting mechanism operable to raise an object for movement past said obstacle, a second control device in said runway near said obstacle and co-operable with said ejecting mechanism to render the latter operative when there is an object engaging said second control device in said lower section, together with a third control device in the upper section of said runway and co-operable with said ejecting mechanism and said second control device to operate the ejecting mechanism each time an object moves into said upper section toward said barrier, means operable to cause the movement of objects ejected from said exit end back toward said entrance end of the runway, and means operatively relating said ejecting mechanism with said barrier moving mechanism to eject an object when the latter mechanism is operated.

11. Control mechanism including inclined guiding means for storing gravitating objects in alignment, means normally preventing movement of objects out of the lower end of said guiding means, means for discharging an object from said lower end of the guiding means, object-operated means near the upper end of said guiding means for causing the operation of said discharging means each time an object moves into said upper end, movable barrier means in said guiding means, mechanism operated by a manual control for moving said barrier means into ineffective position and simultaneously operating said discharging means, and control means near said stopping means and operable when there are less than a determined number of objects aligned behind said stopping means to render said discharging means inoperative

by said object-operated means in the manner aforesaid.

12. Ball control mechanism including an inclined guideway having an upper entrance end and a lower exit end with stopping means at said exit end to prevent movement of balls out of the guideway, a movably mounted barrier in said guideway between said ends, a predetermined number of balls normally disposed in said runway behind said movable barrier, a ball normally stored in the lower part of said runway beyond said movable barrier, and behind said stopping means, an ejector operable to move a ball positioned behind said stopping means into a position to gravitate past said stopping means, an electrical device to operate said movable barrier and said ejector simultaneously, manually operable switch means to operate said electrical device so as to release said predetermined number of balls for movement past said barrier into position behind said stopping means and also to effect movement of said ball normally behind said stopping means out of the guideway, electrical means for operating said ejector independently of said barrier, together with switch means near said entrance end for operating said last-mentioned electrical means each time a ball moves into said guideway from said entrance end, and means for causing the movement of ejected balls back into the upper entrance end of the guideway.

13. Ball control mechanism for game apparatus including an inclined ball playing board and means at the lower end of said board for projecting a ball toward the upper end thereof, said ball control mechanism including spaced guide means arranged on said board and providing a guideway having an upper entrance end, into which projected balls are adapted to gravitate, and a lower exit end, the latter terminating adjacent said projecting means, a gate arranged across said guideway between said entrance and exit ends, electro-magnetic means for opening said gate to permit balls to pass toward said

exit end, barrier means arranged at said exit end, a pivoted ejector arm arranged below said board and having an end portion movable up through the latter to engage and eject a ball positioned before said barrier means for movement toward said projecting means; said electro-magnetic gate-operating means being operably associated with said ejector arm to move the latter in ejecting operation when said gate is open, a second electro-magnetic means arranged to operate said ejecting arm independently of the operation of said first-mentioned electro-magnetic means, said guideway normally having a predetermined number of balls aligned therein behind said gate and adapted when said gate is open to gravitate into position behind said barrier for successive engagement of the lowermost ball by said ejecting arm when the latter is operated, manually operable switch means for energizing said first-mentioned electro-magnetic means to open said gate and eject the lowermost ball behind said barrier, return switch means arranged near said entrance end for operation by projected balls entering said guideway to energize said second electro-magnetic means and effect operation of said ejecting arm once for each projected ball entering said entrance end, together with switch means arranged behind said barrier and in circuit with said second electro-magnetic means and effective to render the latter inoperative when there are fewer than two balls behind said barrier, whereby one ball will always be retained behind the barrier.

14. The device of claim 13 further characterized by the provision of switch means in said guideway between said gate and said entrance end and arranged in circuit with said manually operable switch so as to render the latter inoperative when there are no balls in the guideway between said entrance and said gate.

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