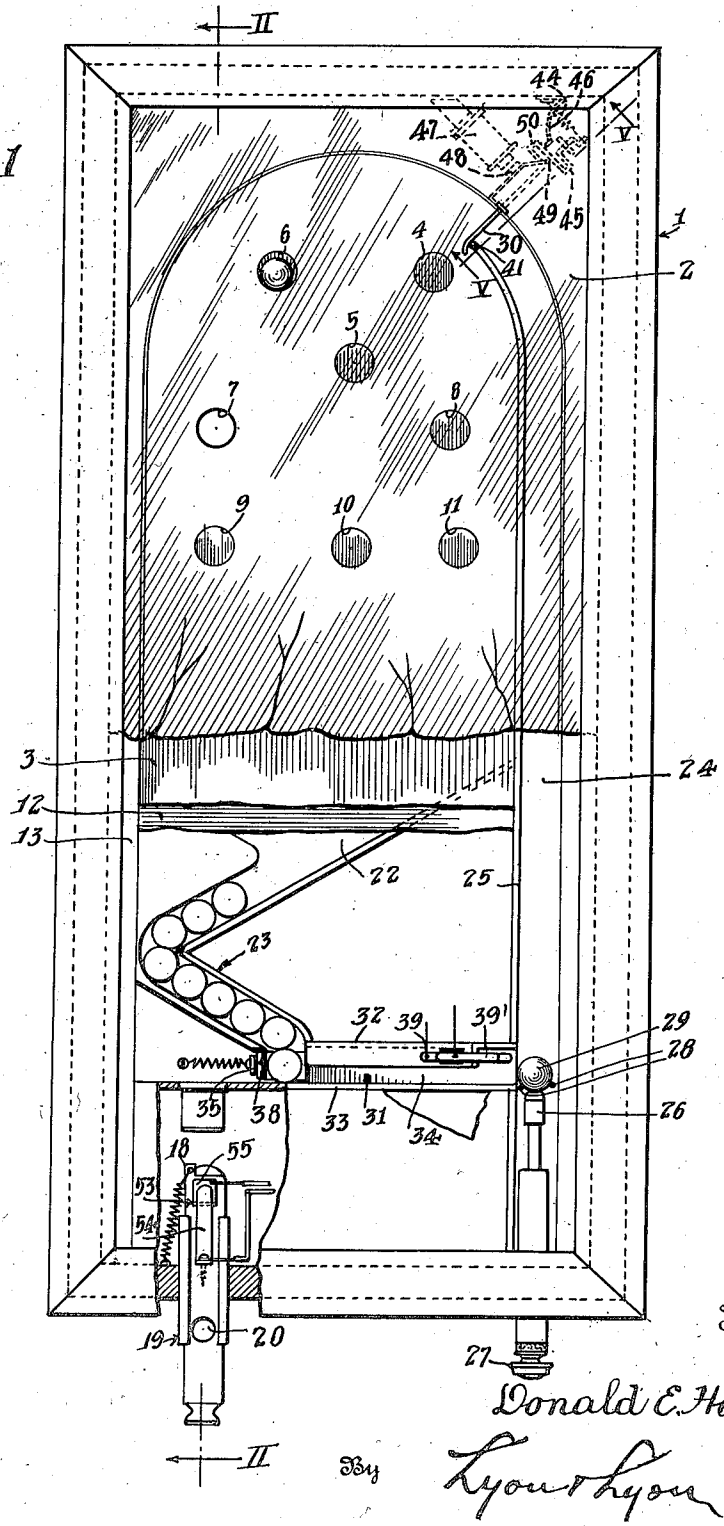
Jan. 19, 1937. D. E. HOOKER 2,068,178

MARBLE SHIFTING MECHANISM FOR GAME BOARDS

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Fig. 1



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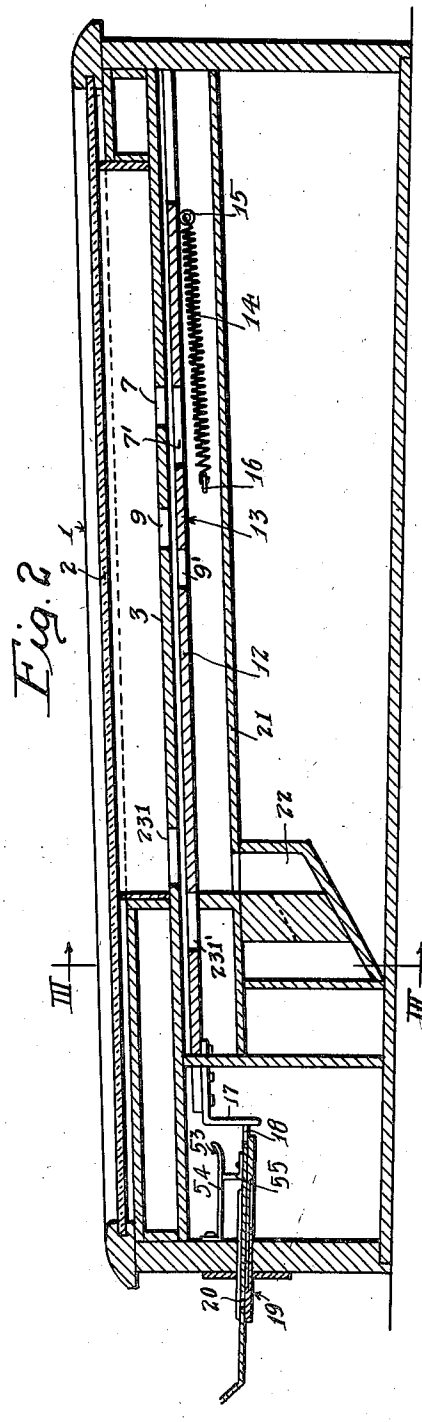
Donald E. Hooker

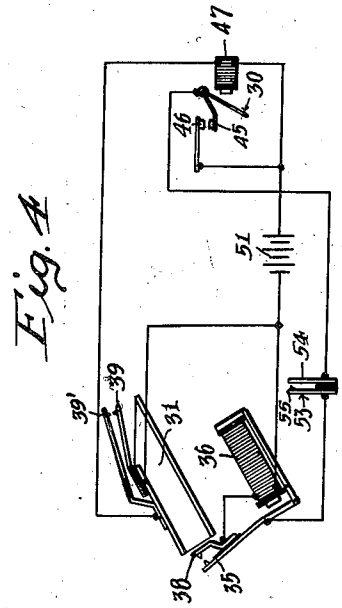
By Lyon & Lyon Attorneys

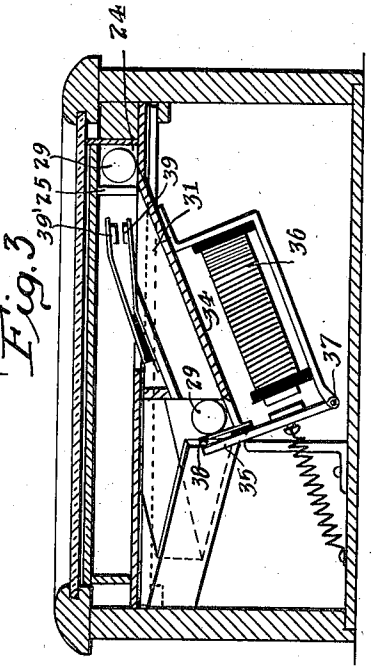
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MARBLE SHIFTING MECHANISM FOR GAME BOARDS

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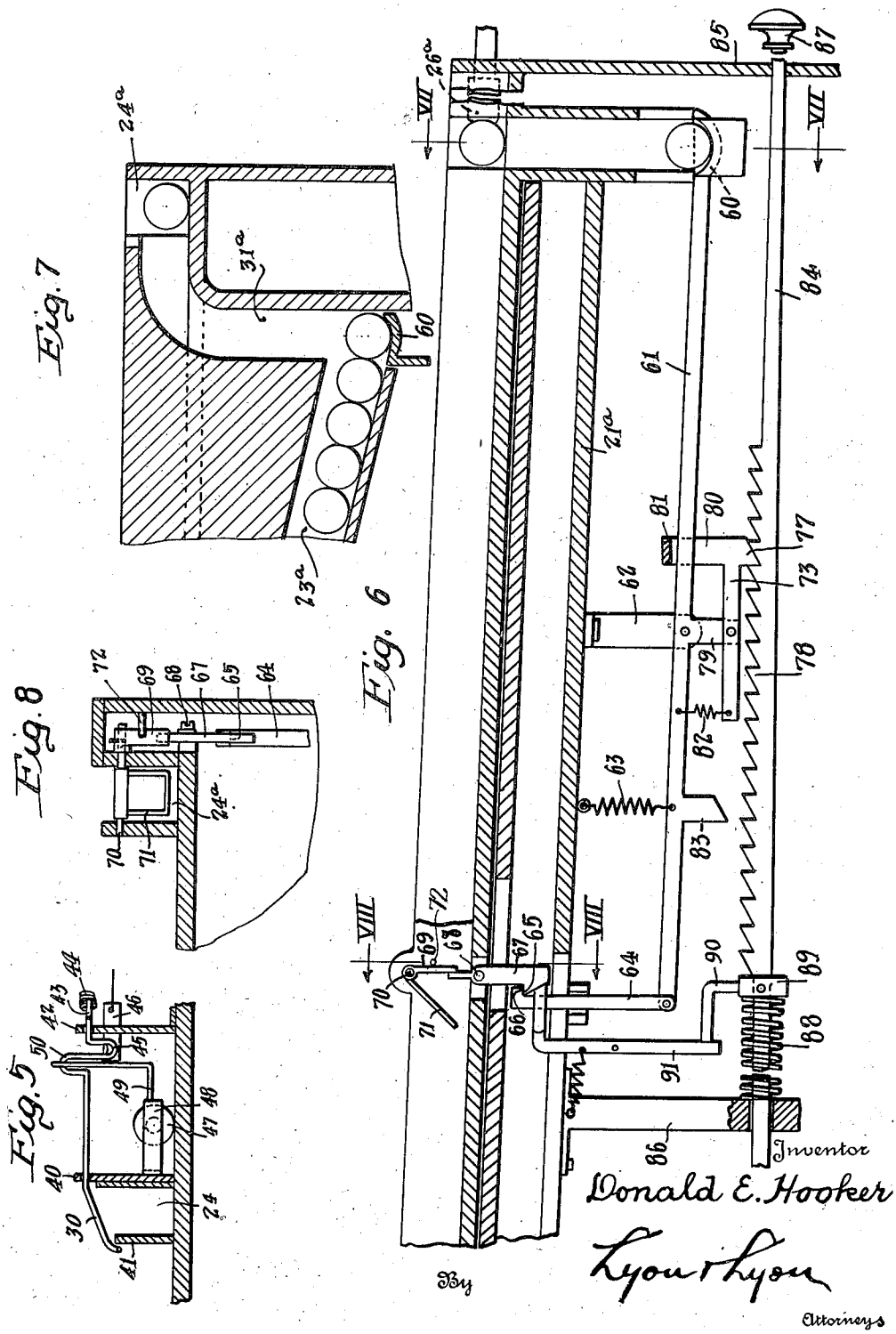


Inventor
Donald E. Hooker
By Lyon & Lyon
Attorneys

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MARBLE SHIFTING MECHANISM FOR GAME BOARDS

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Fig. 9

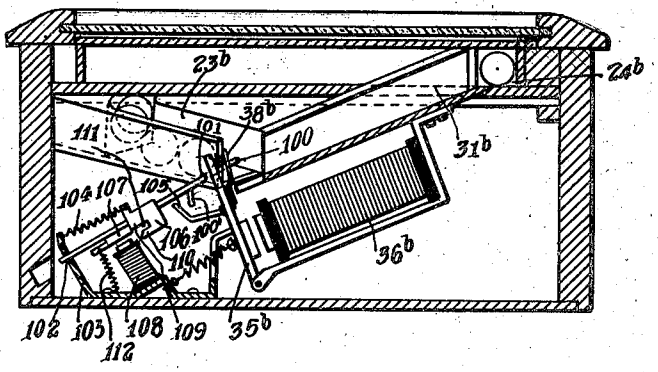


Fig. 11

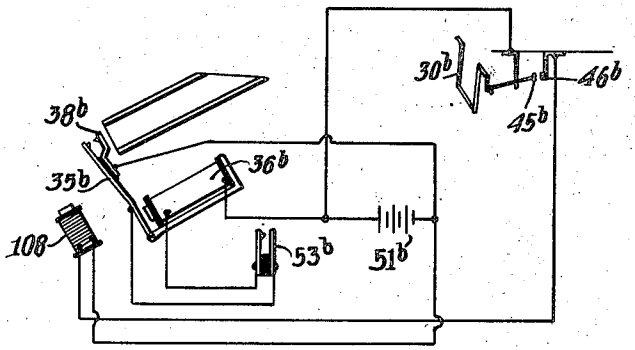
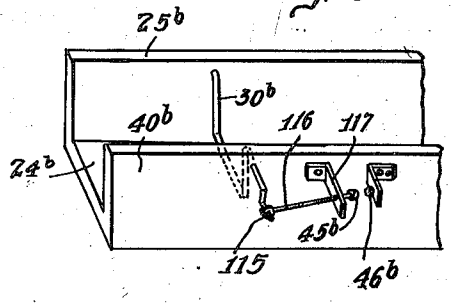


Fig. 10



Inventor

Donald E. Hooker

By Lyon & Lyon

Attorneys

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UNITED STATES PATENT OFFICE

2,068,178

MARBLE SHIFTING MECHANISM FOR GAME BOARDS

Donald E. Hooker, Los Angeles, Calif., assignor of one-half to Joseph Vierling, Jr., Los Angeles, Calif.

Application July 14, 1934, Serial No. 735,185

19 Claims. (Cl. 273—121)

This invention relates broadly to feeding mechanisms for transferring balls or marbles from one point to another and has particular application in connection with marble game boards in which marbles are shot through a chute onto a playing deck and then returned either immediately or at the completion of the game to a reservoir from which they are fed one at a time to a projecting mechanism adapted to again discharge them through the chute.

A broad object of the invention is to automatically transfer the marbles from the reservoir to the projection chute in response to the discharge of the preceding marble from the chute.

In present marble game board devices of which I am aware, it is the practice to provide a manually actuated shifting device for shifting a marble from the magazine to the discharge chute following the discharge of the preceding marble. This means that the player has to perform an additional operation following the shooting of each marble to prepare for the next shot. This is annoying to the player and also works to the disadvantage of the proprietor of the game since it slows up the playing of the game. It has been found that if a marble is automatically fed to the playing chute following the shooting of the preceding marble, the player shoots the next marble immediately whereas he usually takes quite a bit of time before shooting the next marble if he has to first place the marble into shooting position by an additional manual operation.

In accordance with the present invention, I have provided an automatic marble feeding mechanism which may be either electrically or mechanically actuated and which is simple, inexpensive in construction and positive in operation. A full understanding of the construction and operation of the invention, together with various specific objects and features of the invention, will be apparent from the following detailed description which refers to the drawings.

In the drawings:

Fig. 1 is a plan view, with portions broken away, of a marble game board in which there is incorporated an automatic electrically actuated marble feeding mechanism in accordance with the invention;

Fig. 2 is a vertical sectional view in the plane II—II of Fig. 1;

Fig. 3 is a vertical sectional view in the plane III—III of Fig. 2;

Fig. 4 is a schematic wiring diagram of the electrical circuit employed in the mechanism shown in Figs. 1, 2, and 3;

Fig. 5 is a detailed sectional view in the plane V—V of Fig. 1, showing the construction of one of the switches employed in the electrically actuated device;

Fig. 6 is a vertical sectional view through a game board of the general type disclosed in Fig. 1 but employing a mechanically actuated marble feeding mechanism instead of an electrically actuated mechanism;

Fig. 7 is a vertical sectional view in the plane VII—VII of Fig. 6.

Fig. 8 is a vertical sectional detailed view of Fig. 6 and taken in the plane VIII—VIII of Fig. 6.

Fig. 9 is a vertical sectional view corresponding to that of Fig. 3, showing a modified construction.

Fig. 10 is a perspective view of a modified form of runway switch to be employed in a gameboard having a mechanism of the type shown in Fig. 9; and

Fig. 11 is a schematic wiring diagram of the electrical circuit employed in the mechanism shown in Figs. 9 and 10.

Referring first to Figs. 1 and 2, there is shown a typical marble game-board comprising a casing 1 having a glass cover 2, below which is positioned a playing deck 3 having a plurality of apertures 4 to 11, inclusive, of sufficient dimensions to receive the playing marbles. These apertures constitute the pockets in which the marbles are to be placed. Various barriers, usually consisting of pins driven into the playing deck 3, may be employed to increase or decrease the difficulty of placing the marbles in the various pockets, but since the present invention does not relate to any particular design of playing deck, these pins or barriers have been omitted from the drawings.

It is desirable to retain the marbles in some at least of the pockets until the completion of the game. To this end, a secondary board 12 is positioned immediately below the playing deck 3. This secondary board 12 is mounted in grooves 13 in the opposite side walls of the casing 1 so that it can be reciprocated longitudinally and is normally maintained in forward position, as shown in Fig. 2, by a spring 14 which is secured at its rear end by a screw eye 15 to the secondary board 12 and at its forward end to the side wall of the casing by a screw eye 16. The forward end of the secondary board 12 is provided with a downwardly extending brack-

et 17 adapted to be engaged by the plunger 18 of a coin controlled mechanism 19 employed to reset the board for a new game. The setting operation is performed by placing a coin in an aperture 20 provided therefor in the plunger 18 and forcing the latter inwardly by pushing on the projecting forward end thereof. This forces the secondary board 12, through the bracket 17, rearwardly a sufficient distance to bring apertures provided in the secondary board 12 below the apertures in the playing deck 3, thereby permitting all marbles caught in the apertures in the playing deck to fall therethrough onto a marble return floor 21. The marble return floor 21 (and also the playing deck 3 and secondary board 12) is inclined forwardly so that the marbles discharged thereon roll to the forward end and are discharged into a chute 22 leading to a marble magazine 23. Of course, a player frequently fails to place all of the marbles in the various playing pockets provided in the playing deck 3. Such marbles roll to the forward end of the playing deck where they accumulate in a relatively large pocket 231 and are discharged through an opening 231' in the secondary board 12 when the latter is shifted rearwardly at the end of the game. It will be noted from Fig. 2 that all of the apertures in the secondary board 12 bear the same reference numerals as the associated apertures in the playing deck 3 with the prime sign added. It will be observed that the aperture 7' is so dimensioned and positioned as to clear the aperture 7 in the playing deck at all times. This arrangement is sometimes employed in marble game boards to give the player an extra, free shot if the marble happens to land in that hole.

The marbles are projected onto the playing deck 3 through a runway 24 extending along one side of the playing deck and separated therefrom by a partition wall 25, the projection being accomplished by a spring actuated plunger 26 mounted in the forward end of the runway 24 and provided with an actuating handle 27 on the exterior of the case. The velocity with which the marble is projected is determined by the distance the plunger is retracted before being released. A pair of pins 28 are provided to retain the marble 29 being played in suitable position to be struck by the plunger 26. At the rear end of the runway 24 a gate 30 is commonly provided which opens outwardly in response to impact of a marble thereon, permitting the marble to come onto the playing deck but preventing accidental return of a marble from the playing deck into the runway 24.

The construction so far described is old and well known and does not constitute a part of my invention, the latter residing in the mechanism next to be described for delivering marbles from the magazine 23 to the runway 24. Heretofore this transfer has been effected by a manually actuated elevator mechanism which the player manipulated before each shot.

Referring to Fig. 1, it will be observed that the magazine 23 comprises a channel of such dimensions as to retain the marbles in a single line. At its forward end the magazine 23 opens into an inclined chute 31 which leads up to the runway 24 and connects therewith at a point immediately rearward of the pins 28. The chute 31 includes side walls 32 and 33 for guiding the marble and a floor 34 for it to roll upon. The wall 32, of course, is cut away at the lower end to provide a passageway from the end of the magazine 23 into the chute. The lower end of the chute immediately beyond the end of the magazine 23 is closed by a projector gate 35 which constitutes an armature of an electromagnet 36 and is pivotally connected thereto by a hinge 37. The gate 35 is provided with an electrical contact 38 of resilient material which is insulatingly supported on the forward face of the member 35.

It will be observed from Fig. 1 that the first marble in the magazine 23 rolls (due to the inclination of the magazine 23) into the discharge chute 31 and rests against the contact member 38, the latter being so resiliently mounted that the weight of a marble resting thereagainst forces the contact against the armature 35 to complete an electrical circuit (to be described later) for energizing the electromagnet 36. Energization of the electromagnet 36 causes the latter to attract the armature 35 with sufficient force to project the marble lying thereagainst up through the chute 31 and into the runway 24 where it lies against the pins 28 in proper position to be shot from the runway by manipulation of the plunger 26.

During its travel from the lower end of the chute 31 into the runway 24, each marble passes under and contacts with an electrical contact 39 and forces it upwardly into contact with a cooperating contact 39' to complete another electrical circuit to be described later.

The electromagnet 36 is deenergized the instant the projected marble leaves the armature 35 since the contact 38 opens with the ejection of the marble. Thereupon the armature returns to its normal position and the next marble in the magazine 23 rolls into the position previously occupied by the marble last ejected.

In accordance with the present invention, the gate 30 at the end of the runway 24 is employed to control the operation of the ejecting mechanism. To this end the gate 30, as shown to best advantage in Fig. 1 and the detail view of Fig. 5, consists of a wire rotatably mounted in a bearing member 40 positioned adjacent one edge of the runway 24, the wire being bent downwardly within the runway into the path of marbles projected through the runway, (the wire being shown in lowermost or closed position in Fig. 1 and in uppermost or open position in Fig. 5). The inner end of the wire 30 normally rests against a stop pin 41 which limits the rotation in one direction of the gate but permits it to rotate upwardly and forwardly in response to impact of a marble to carry it clear of the runway. The wire 30 is rotatably supported adjacent its outer end in second bearing member 42 and is bent beyond the bearing 42 to constitute a crank 43 to which a spiral spring 44 is attached. The crank 43 is so oriented with respect to the downwardly bent inner end of the wire 30 that the spring 44 tends to retain the wire in whichever extreme position it has last been moved to. In other words, the crank 43 is so oriented that it moves past dead center, with respect to the tension exerted by the spring 44, in shifting from closed position (that shown in Fig. 1) into open position, in which the inner end is elevated above the path of the marbles ejected from the runway 24, as shown in Fig. 5.

The primary function of the gate 30 is to complete the electric circuit for the electromagnet 36. To this end, the wire 30 is bent outwardly to constitute a loop 45 at a point immediately

adjacent the bearing member 42 and contact metal is secured thereto to constitute an electrical contact adapted to close upon a stationary electrical contact 46 when the gate 30 is opened by passage of a marble thereunder. If no restoring means were provided, the gate 30 after once being opened would remain permanently in that position and would be inoperative to perform desired functions. I therefore provide a restoring mechanism which includes an electromagnet 47 having an armature 48, to which is secured a curved pin 49 adapted to engage with a crank portion 50 of the wire 30 which is bent radially in the opposite direction to the loop 45. When the gate wire 30 rotates into open position, the loop 50 is rotated into a position closely adjacent the upper end of the pin 49. Thereafter upon energization of the electromagnet 47 the movement of the armature 48 and associated pin 49 causes the latter to engage the loop 50 and restore the gate 30 into the closed position shown in Fig. 1.

Referring now to Fig. 4 of the drawings, it will be observed that the energizing circuit for the electromagnet 36 includes a source of energy represented as battery 51, the contacts 45 and 46, a switch 53, the armature 35 and contact 38, all in series. Therefore, the electromagnet 36 cannot be energized unless all three sets of contacts are closed simultaneously. The switch 53 is associated with the coin unit 19 and is closed at all times except when the plunger 18 is forced inwardly to reset the machine. Thus referring to Fig. 2, the switch 53 comprises a stationary contact member 54 and a movable contact member 55 which is secured to the plunger 18. When the plunger 18 is in normal position, the contact 55 bears against the contact 54 as shown. However, when the plunger 18 is moved into its forward position the contact 55 is moved clear of the contact 54. The particular purpose of this switch 53 will be described later. It may be assumed at the present time that switch 53 is always closed.

As previously stated, the contact 38 will be closed on the armature 35 by the weight of a marble in the chute 31 and the switch contacts 45 and 46 on the gate 30 will be closed if the gate is in open position. Under these conditions, the electromagnet 36 is energized to project the marble in the chute up into the runway 24.

The gate 30 is automatically restored to closed position by passage of a marble from the chute 31 into the runway 24 through the agency of the contacts 39' and 39. Thus it will be observed from Fig. 4 that the energizing circuit for the electromagnet 47, which restores gate 30, includes the battery 51 and the contacts 39' and 39 in series. Therefore, immediately following the projection of the marble through the chute 31 by the armature 35, the marble contacts and closes the contacts 39' and 39, actuating the electromagnet 47 and restoring the gate 30 to closed position.

Thereafter the marble in the runway is played by pulling back and releasing the plunger handle 27. As the marble leaves the runway it contacts and opens the gate 30, thereby closing the contacts 45 and 46 and again completing the energizing circuit for electromagnet 36, causing the latter to project the next marble from the magazine 23 into the runway 24. Likewise as this marble passes under the contacts 39' and 39, it momentarily closes them to restore the gate 30 to closed position.

Summarizing the operation of the board, so long as there are marbles in the magazine 23, a marble will be projected through the chute 31 into the runway 24 in response to the passage of the preceding marble from the runway, that is, past the gate 30. Likewise the gate 30 will be restored in response to the passage of each new marble into the runway 24. The actuation of the electromagnet 36 follows the opening of gate 30 so closely that the gate 30 is normally closed (by the passage of the next marble under the contacts 39' and 39) before the marble which opens gate 30 has time to rebound back against the gate. Therefore, the gate performs its desired function of preventing return of marbles from the playing deck to the runway 24 during the major portion of each game. It does not close, however, following the discharge of the last marble from the magazine 23 and from runway 24 because there is nothing to close the contacts 39' and 39 and energize the electromagnet 47 following the shooting of the last marble from the runway 24. This is a desirable condition because it leaves the electrical circuit for the electromagnet 36 in condition to eject the first marble from the magazine 23 into the runway 24 following the release of the marbles for a new game by actuation of the coin unit 19.

The mechanism described will also function just as long as any marble can reach the magazine 23. Thus assume that all of the marbles but one have been caught in various pockets in the playing deck and that the last marble shot enters hole 7 and is returned to the magazine. The gate 30 will remain open following the shooting of this last marble until the marble passes through the magazine 23 into the chute 31, whereupon it is discharged into the runway 24 by closure of contact 38 on armature 35 since the contacts 45 and 46 are already closed.

Some patrons of marble games of the general type described have attempted at times to "beat the game" by holding the coin unit plunger in and shooting marbles continuously until a marble entered a desirable high counting aperture in the playing deck 3 whereupon they would release the plunger 18 quickly to permit the secondary board 12 to return and close the aperture, retaining the marble in the high counting pocket. Thereupon they would begin a new game with a marble already in a high counting pocket. Such manipulation is impossible with the board described herein for the reason that when the plunger 18 of the coin unit 19 is pressed inwardly to release the marbles from the pockets the contacts 54 and 55 of switch 53 are open, thereby rendering the marble feeding mechanism inoperative. The system, of course, is immediately restored to operative position upon release of the plunger 18.

In Figs. 6, 7, and 8 there is depicted a modified form of mechanism which is purely mechanical and is intended more particularly for use in small marble game boards not provided with a source of electricity. In this modification the energy for shifting the marbles is obtained from a spring which is compressed at the beginning of each game. Thus portions of the board not disclosed in Figs. 6, 7, and 8 correspond substantially to the construction shown in Fig. 1 and corresponding parts bear the same reference numerals with the suffix "a".

Referring first to Fig. 7, which is a transverse vertical sectional view in the plane VII—VII of Fig. 6, it will be observed that the marbles are

stored in an inclined magazine runway 23a which terminates at a point closely adjacent to but below the runway 24a and is connected thereto by a passage 31a, which corresponds to the chute 31 in Fig. 1 but differs therefrom in being substantially vertical with a right angle bend in the upper end to direct the marbles into the runway 24a. The lower end of the passage 31a is closed by a movable cup 60 which is mounted (Fig. 6) upon the forward end of a lever 61 extending longitudinally of the device and is fulcrumed at a point adjacent its center to a bracket 62 secured to the under side of the marble return floor 21a. The lever 61 is normally retained with its forward end in lowermost position, as shown in the drawings, by a spring 63. The rear end of lever 61 is pivotally connected to the lower end of a link 64 which extends upwardly through a passage provided therefor in the marble return floor 21a and is provided with a shoulder 65 at its upper end adapted to be engaged by a cooperating shoulder 66 on a trigger lever 67 which is pivotally mounted on a pin 68. The trigger lever 67, as shown in Fig. 8, is positioned exterior of the runway 24a and is contacted at its upper end by a crank arm 69 mounted on a shaft 70 which extends across the runway 24a and is journaled in the side walls of the runway. Rigidly secured to the shaft 70 for rotation therewith and depending downwardly therefrom in the runway 24a is a gate 71. The pin 72 is provided to act as a stop for the crank arm 69 and limit its movement in one direction to prevent the gate 71 opening rearwardly to admit a marble from the playing deck into the runway. However, the gate can open in the opposite direction in response to impact of a marble discharged through the runway and, in opening, actuates the trigger lever 67 to release the link 64 and permit the lever 61 to be swung through a short arc to throw a marble positioned on the gate 60 up through the passage 31a into the runway 24a.

For the purpose of actuating the lever 61, there is secured to the latter a pawl lever 73 having a pawl 77 thereon adapted to engage with the teeth of a ratchet rack 78. The pawl lever 73 is fulcrumed to a downward extension 79 on the lever 61 and is also provided with an upwardly extending arm 80, the upper end of which is bent over to overhang the lever 61, as shown at 81. The pawl 77 is normally maintained in engagement with the rack 78 by a small spring 82. The lever 61 is also provided with a downwardly extending pawl 83 adapted to engage the rack 78 under certain conditions.

Rack 78 is rigidly secured to a rod 84 which is slidably supported at its forward end in the front wall 85 of the cabinet and in a bracket 86 at the rear end. The forward end of rod 84 projects through the wall 85 and is provided with a knob 87. A helical spring 88 is positioned about the rod 84 adjacent its rear end and is adapted to be compressed between the bracket 86 and a collar 89 by pushing the knob 87 inwardly. The collar 89 is also provided with an arm 90 adapted to contact the lower end of a lever 91 which is bent at the upper end to contact with the lower end of the trigger lever 67.

Assume that all of the marbles have been returned to the magazine 23a. The mechanism is then energized by forcing the knob 87 in as far as it will go. Initial inward movement of the knob 87 and rod 84 compresses the spring 88 and slides the ratchet rack 78 rearwardly past the pawl 80, the latter rising and dropping as each tooth of the ratchet rack passes thereunder, until the rod 84 reaches the position shown in Fig. 6, in which the arm 90 on collar 89 has contacted the lever 91. Thereafter further inward movement of the rod 84 deflects the lever 91 in a clockwise direction, thereby deflecting the trigger lever 67 in a counterclockwise direction until the shoulder 66 clears the shoulder 65. Further movement of the rod 84 compresses the spring 88 to its limit and shifts the rack 78 substantially the pitch distance of the teeth thereon with respect to the pawl 80. The operator then releases the knob 87 and the force of the spring 88 quickly retracts the rod 84 and the rack 78. Since the pawl 80 is in engagement with the rack, it moves with it, thereby suddenly rotating the lever arm 61 in a counterclockwise direction and tossing the marble supported on the cup 60 up through the passage 21a into the runway 24a. Just before the forward end of lever reaches its uppermost position, it engages the overhanging portion 81 of the arm 80 on the pawl lever 73 and the final upward movement of the forward end of lever 61 carries the pawl 77 out of engagement with the rack 78. However, the counterclockwise rotation of lever 61 has brought the pawl 83 into engagement with the rack 78 so that the latter is prevented from continuing its forward movement.

After the pawl 77 has been disengaged from the rack 78, the lever 61 is immediately restored to its normal position by the spring 63. This movement disengages the pawl 83 from the rack 78 but simultaneously reengages the pawl 77 with the next tooth of the rack. The force of the spring 88, of course, is urging the rack 78 forwardly at this time but the lever 61 is prevented from repeating its upward oscillation at this time by reason of the fact that when the rear end of lever 61 moved upwardly, the shoulder 65 on the upper end of link 64 was reengaged by the shoulder 66 on the trigger lever 67.

The mechanism remains in the condition described until the marble that was elevated to the runway 24a is discharged from the runway by the plunger 26a. The marble, of course, in leaving the runway impacts the gate 71 and lifts it sufficiently for the marble to pass thereunder. The motion of the gate 71 is transmitted through the shaft 70 and the crank arm 69 to the trigger lever 67, causing the letter to disengage its shoulder 66 from the shoulder 65 on the link 64 and permitting the lever 61 to oscillate in a counterclockwise direction to toss the next marble from the magazine up through the passage 31a into the runway 24a. This action is repeated following the shooting of every marble, the passage of each marble under the gate 71 tripping the mechanism to cause the transfer of the next marble from the magazine. When all the marbles have been shot, the mechanism is reset for the next game by simply pushing in the knob 87 to compress the spring 88.

If desired, the rod 84 may be coupled to the coin operated mechanism for releasing the marbles from the deck pockets so that the device may be reset for a new game by actuation of a single handle.

I have shown in Figs. 9, 10, and 11 a modification of the electrically actuated mechanism dis-

closed in Figs. 1, 2, 3, 4, and 5. This modification differs essentially from the first electrical mechanism described in that marbles are automatically discharged from the chute to the runway immediately upon delivery to the chute but a gate is provided for admitting a marble from the magazine to the chute only in response to the discharge of the preceding marble from the runway to the playing deck.

In Figs. 9 to 11 elements corresponding to elements in the construction disclosed in Figs. 1 to 5 bear the same reference numerals with the suffix "b". Thus a chute 31b extends upwardly from the end of the magazine 23b to the runway 24b and the lower end of the chute 31b is closed by an ejector member which is constituted by the armature 35b of an electromagnet 36b. The armature 35b is likewise provided with a contact 38b which is adapted to be closed on the armature 35b by the weight of a marble in the chute 31b. In this modification, however, a gate rod 100 is provided for controlling the delivery of marbles from the magazine 23b to the discharge chute 31b, this gate rod being slidably supported at its upper end in an aperture 101 in the wall of the magazine 23b through which it projects and at its lower end in an aperture 102 in a bracket member 103. The rod is constantly urged downwardly and to the left (referring to Fig. 9) by a tension spring 104, which spring tends at all times to retract the rod 100 sufficiently to permit the marbles to feed from the magazine 23b into the chute 31b.

To move the rod 100 into closed position (the position shown in Fig. 9) an arm 100' is provided on the rod, which arm is positioned to be engaged by an arm 105 on the armature 35b when the latter is attracted by the magnet 36b. The rod 100 is normally retained in closed position after having been moved into that position by the actuation of armature 35b by a latch mechanism which comprises a plate 106 secured to rod 100 and the armature 107 of an electromagnet 108. The plate 106 is provided with a shoulder 109 and a shoulder 110, both of which are adapted to be engaged by the armature 107 and which are spaced apart to provide a slot 111 therebetween into which the armature 107 may extend. The armature 107 is normally retained in retracted position (the position shown in Fig. 9) by a spring 112.

I prefer to employ, in connection with the mechanism shown in Fig. 9, a switch of the type shown in Fig. 10, corresponding parts of which bear the same reference numerals as shown in Figs. 1 and 5. Thus the switch comprises a wire 30b, the ends of which are journaled in the side walls 40b and 25b of the runway 24b and the midportion of which is bent downwardly to be intercepted and lifted by marbles discharged through the runway. The outer end of the wire 30b beyond the partition wall 40b is bent downwardly to constitute a crank 115, to which is pivotally connected a switch arm 116 slidably mounted for longitudinal and oscillatory movement in a bracket 117 and having a contact 45b on its end adapted to close on a stationary contact 46b when the loop 30b is rotated by passage of a marble thereunder.

The operation of the mechanism shown in Figs. 9 and 10 will now be explained with reference to the circuit diagram of Fig. 11.

Assume that a marble is positioned in the runway 24b and that the gate rod 100 is in closed position, as shown in Fig. 9. When the marble in the runway 24b is discharged through the runway onto the playing deck it deflects the wire 30b sufficiently to momentarily close contact 45b on contact 46b. This completes a circuit from battery 51b through the electromagnet 108, causing the latter to attract its armature 107. Downward movement of armature 107 disengages the shoulder 109 on block 106, permitting the latter and the rod 100 to be shifted slightly by the spring 104. The shift is only slight, however, for the reason that when the armature 107 is in lowermost position it engages the shoulder 110. However, since the magnet 108 is only energized during the momentary closure of contacts 45b and 46b, the armature 107 is immediately retracted by the spring 112. It thereupon releases the shoulder 110, permitting the block 106 to be completely retracted by the spring 104, the armature 107 entering the slot 111. Retraction of the rod 100 permits the next marble in the magazine 23b to roll into the chute 31b. The dimension of the chute is such that only one marble at a time can enter the chute from the magazine. The weight of the marble in the chute against the contact 38b immediately closes the latter on the armature 35b, completing a circuit from battery 51b through the contacts 53b on the coin control switch and the electromagnet 36b. The attraction of the magnet 36b on its armature 35b thereupon moves the latter sharply to kick the marble in the chute up into the runway 24b. As the armature 35b moves upwardly the arm 105 attached thereto engages the arm 100' on the rod 100 and retracts the latter into closed position, preventing entry of the next marble into the chute 31b. The armature 107 is retracted by the spring 112 at the same time into engagement with shoulder 109 on block 106 to retain the rod 100 in uppermost position so that no marble is admitted from the magazine to the chute despite the fact that the armature 35b returns to lowermost position immediately. Of course, as soon as the marble last delivered to the chute 24b is discharged therefrom, the sequence of operations just described is repeated to feed the next ball from the magazine 23b to the runway 24b.

It is possible for a marble to be discharged through the runway 24b with just sufficient force to elevate the wire 30b into contact closing position and become lodged below the wire, thereby maintaining the contacts 45b and 46b closed. In this event, if a special provision was not made to prevent such action, all the marbles in the magazine might be successively discharged into the runway 24b. Such an occurrence, however, is prevented by the construction of the block 106. Thus if the contacts 45b and 46b are maintained in closed condition, the magnet 108 is permanently energized to attract its armature 107. However, this attraction cannot result in the release of a marble from the magazine 23b to the chute 31b for the reason that the armature engages the shoulder 110 on block 106 and does not permit the latter to be retracted sufficiently by the spring 104 to release a marble from the magazine 23b. It will be observed that with the construction provided a marble is released from the magazine not in response to the closure of contacts 45b and 46b but only in response to the closure and subsequent opening of those contacts.

In the embodiment shown in Fig. 10, the gate wire 30b is shown positioned in a runway at a

point spaced from the end of the runway so that it does not perform the extra function of preventing return of marbles from the playing deck to the runway. It is to be understood that in either the modification shown in Figs. 1 or 10 the gate wire 30 or 30b may be positioned at any desired point along the runway.

It is to be understood that the invention as disclosed and described is subject to modification in many particulars without departing from the essential principles of the invention and the invention is therefore to be limited only as set forth in the appended claims.

I claim:

1. In a marble game board device of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a reservoir below the deck for containing marbles to be played and a projector in said runway for projecting marbles through said runway onto said deck; means for transferring marbles one at a time from said reservoir to said runway, and means responsive to ejection of a marble from said runway to said deck for actuating said first means, whereby another marble is automatically transferred from said reservoir to said runway.

2. In a marble game board device of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a reservoir below the deck for containing marbles to be played and a projector in said runway for projecting marbles through said runway onto said deck; means for transferring marbles one at a time from said reservoir to said runway, trigger means positioned to be contacted by a marble in transit from said runway for actuating said first means, whereby a new marble is automatically transferred from said reservoir to said runway in response to ejection of the preceding marble.

3. In a marble game board device of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a reservoir below the deck for containing marbles to be played and a projector in said runway for projecting marbles through said runway onto said deck; marble shifting means for transferring marbles one at a time from said reservoir to said runway, trigger means movable from a first position into a second position, means for moving said trigger means from said first position to said second position in response to passage of a marble through said runway, means for actuating said marble shifting means in response to movement of said trigger means from said first position to said second position, whereby a new marble is automatically transferred from said reservoir to said runway in response to movement of said trigger means from its first position to its second position by a marble discharged from said runway, and means operable by transit of a marble from said reservoir to said runway to restore said trigger means from its second to its first position, whereby said trigger means is restored to its first position in response to the movement of a new marble from said reservoir to said runway.

4. In a marble game board device of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a reservoir below the deck for containing marbles to be played and a projector in said runway for projecting marbles through said runway onto said deck; marble shifting means for transferring marbles one at a time from said reservoir to said runway, a first control means responsive to a marble in said reservoir, second control means responsive to the passage of a marble through said runway, and means for actuating said marble shifting means in response to simultaneous actuation of said first and second control means, whereby said marble shifting means functions only when there is a marble in said magazine and the preceding marble is discharged through said runway.

5. In a marble game board device of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a magazine below the deck for containing marbles to be played, and an ejector in said runway for ejecting marbles through said runway onto said deck; means for transferring marbles one at a time from said magazine to said runway, said means comprising a chute extending upwardly from said magazine to said runway, means for feeding marbles in a single line from said magazine into the lower end of said chute, a movable closure member in the lower end of said chute for supporting a marble positioned within said chute, means for suddenly shifting said movable member to eject a marble positioned thereagainst through and out of said chute into said runway, and means for controlling said shifting means.

6. A device as described in claim 5, in which said shifting means comprises an electromagnet and an armature therefor with an energizing circuit for said electromagnet, and in which said control means includes a switch in said energizing circuit.

7. In a marble game board device of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a magazine below the deck for containing marbles to be played, and an ejector in said runway for ejecting marbles through said runway onto said deck; means for transferring marbles one at a time from said magazine to said runway, said means comprising a chute extending upwardly from said magazine to said runway, means for feeding marbles in a single line from said magazine into the lower end of said chute, a movable closure member in the lower end of said chute for supporting a marble positioned within said chute, an electromagnet having an armature connected to said movable member, contact means positioned adjacent the inner face of said movable member and adapted to be closed by pressure of a marble against said member, and an energizing circuit for said electromagnet, said circuit including said contact means, whereby said electromagnet can be energized only when a marble is in said chute, and also including switch means in series with said contact means, for controlling the feeding of marbles from said chute.

8. In a marble game board device of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a reservoir below the deck for containing marbles to be played, and an ejector in said runway for ejecting marbles through said runway onto said deck; first electromagnetic means for transferring marbles one at a time from said reservoir to said runway, first switch means adapted to be moved from open to closed position by passage of a marble through said runway, an energizing circuit for said first electromagnetic means including said first switch

means, a second switch means adapted to be closed in response to transit of a marble from said reservoir into said runway, second electromagnetic means for restoring said first switch means to open position, and an energizing circuit for said second electromagnetic means including said second switch means.

9. In a marble game board device of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a reservoir below the deck for containing marbles to be played, and an ejector in said runway for ejecting marbles through said runway onto said deck; first electromagnetic means for transferring marbles one at a time from said reservoir to said runway, first switch means adapted to be moved from open to closed position by passage of a marble through said runway, second switch means adapted to be closed by the presence of a marble in said reservoir, an energizing circuit for said first electromagnetic means including said first and second switch means in series, a third switch means adapted to be closed in response to transit of a marble from said reservoir into said runway, second electromagnetic means for restoring said first switch means to open position, and an energizing circuit for said second electromagnetic means including said third switch means.

10. In a marble game board device of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a reservoir below the deck for containing marbles to be played, an ejector in said runway for ejecting marbles through said runway onto said deck, said deck having pockets therein for receiving and releasably retaining marbles, releasing means movable to release marbles from said pockets, means for transferring marbles one at a time from said reservoir to said runway, means responsive to ejection of a marble from said runway to said deck, for actuating said first means, whereby a new marble is automatically transferred from said reservoir to said runway in response to ejection of the preceding marble, and means actuated by said releasing means for rendering said marble transferring means inoperative while said releasing means is in position to release marbles from said pockets.

11. In a marble game board device of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a reservoir below the deck for containing marbles to be played, an ejector in said runway for projecting marbles through said runway onto said deck, said deck having pockets therein for receiving and releasably retaining marbles, and releasing means movable to release marbles from said pockets; electromagnetic means for transferring marbles one at a time from said reservoir to said runway, first switch means adapted to be closed in response to passage of a marble through said runway, second normally closed switch means associated with said releasing means and adapted to be maintained in open position while said releasing means is positioned to release marbles from said pockets, and an energizing circuit for said electromagnetic means including said first and second switch means in series, whereby said electromagnetic means is inoperative to shift marbles from said reservoir to said runway when said marble releasing means is actuated into releasing position.

12. In a marble game board device of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a reservoir below the deck for containing marbles to be played, and an ejector in said runway for ejecting marbles through said runway onto said deck; means for transferring marbles one at a time from said reservoir to said runway, spring motor means for actuating said transferring means, stop means for stopping said transfer means following the transfer of each marble, and trigger means responsive to ejection of a marble from said runway to said deck for releasing said stopping means, whereby a new marble is automatically transferred from said reservoir to said runway in response to ejection of the preceding marble from the runway.

13. In a marble game board of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a reservoir below the deck for containing marbles to be played, and an ejector in said runway for ejecting marbles through said runway onto said deck; oscillatable means for transferring marbles one at a time from said reservoir to said runway, spring motor means for oscillating said transferring means, stop means for stopping said oscillatable means at the end of each oscillation, and trigger means responsive to ejection of a marble from said runway to said deck for releasing said stopping means to cause said oscillatable means to oscillate through a cycle and transfer a marble from said reservoir to said runway.

14. In a marble game board of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a reservoir below the deck for containing marbles to be played, and an ejector in said runway for ejecting marbles through said runway onto said deck; means for transferring marbles one at a time from said reservoir to said runway including an oscillatable lever having means on one end thereof for engaging with a marble in said reservoir in one position and ejecting said marble from said reservoir to said runway by movement into its other position, a ratchet rack positioned adjacent said lever and mounted for longitudinal movement, spring means for urging said ratchet rack longitudinally, pawl means on said lever engageable with said rack, whereby movement of the rack in response to said spring means tends to rotate said lever in a direction to discharge a marble from said magazine to said runway, latch means for locking said lever against movement by said rack, trigger means responsive to ejection of a marble from said runway to said deck for releasing said locking means to permit marble ejecting movement of said lever by said rack, means for releasing said pawl from said rack, means for restoring said lever to normal position with said pawl again in engagement with said rack in a new position, and means for limiting movement of said rack during the period when said pawl is disengaged from said rack, said locking means functioning to again lock said lever in normal position upon its restoration.

15. In a marble game board device of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a reservoir below the deck for containing marbles to be played and an ejector in said runway for ejecting marbles through said runway onto said deck, means for transferring

marbles one at a time from said magazine to said runway, said means comprising a chute leading to said runway, means including an orifice dimensioned to pass one marble at a time for automatically feeding marbles into said chute, means in said chute automatically responsive to the presence of a marble in the chute for delivering that marble from the chute to the runway, gate means at said orifice for controlling the feeding of marbles therethrough, means for opening said gate means, and means actuated in response to operation of said marble delivering means for closing said gate means.

16. In a marble game board device of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a magazine below the deck for containing marbles to be played, and an ejector in said runway for ejecting marbles through said runway onto said deck; means for transferring marbles one at a time from said magazine to said runway, said means comprising a chute extending upwardly from said magazine to said runway, means for feeding marbles in a single line from said magazine into the lower end of said chute, a movable closure member in the lower end of said chute for supporting a marble positioned within said chute, means for suddenly shifting said movable member to eject a marble positioned thereagainst through and out of said chute into said runway, means responsive to the presence of a marble in said chute for actuating said shifting means to eject that marble through the chute to the runway, gate means for normally preventing passage of marbles from said magazine into said chute, means for opening said gate to feed another marble from said magazine into said chute, means for closing said gate in response to actuation of said shifting means, whereby marbles are successively delivered from said magazine to said chute in response to ejection of marbles from said runway and each marble admitted to said chute is immediately ejected from the chute to the runway.

17. In a marble game board device of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a magazine below the deck for containing marbles to be played, and an ejector in said runway for ejecting marbles through said runway onto said deck; means for transferring marbles one at a time from said magazine to said runway, said means comprising a chute extending upwardly from said magazine to said runway, means for feeding marbles in a single line from said magazine into the lower end of said chute, a movable closure member in the lower end of said chute for supporting a marble positioned within said chute, means for suddenly shifting said movable member to eject a marble positioned thereagainst through and out of said chute into said runway, means responsive to the presence of a marble in said chute for actuating said shifting means to eject that marble through the chute to the runway, gate means for normally preventing passage of marbles from said magazine into said chute, means for opening said gate in response to discharge of the preceding marble from said runway to said deck, to feed another marble into said chute, and means for closing said gate in response to actuation of said shifting means, whereby marbles are successively delivered from said magazine to said chute in response to ejection of marbles from said runway and each marble admitted to said chute is immediately ejected from the chute to the runway.

18. In a marble game board device of the type having a playing deck, a runway leading to the deck through which marbles may be projected onto the deck, a magazine below the deck for containing marbles to be played, and an ejector in said runway for ejecting marbles through said runway onto said deck; means for transferring marbles one at a time from said magazine to said runway, said means comprising a chute extending upwardly from said magazine to said runway, means for feeding marbles in a single line from said magazine into the lower end of said chute, a movable closure member in the lower end of said chute for supporting a marble positioned within said chute, means for suddenly shifting said movable member to eject a marble positioned thereagainst through and out of said chute into said runway, means responsive to the presence of a marble in said chute for actuating said shifting means to eject that marble through the chute to the runway, gate means for normally preventing passage of marbles from said magazine into said chute, spring means for resiliently urging said gate into the open position, latch means for normally maintaining said gate closed, means for releasing said latch means in response to discharge of the marble from said runway, and means actuated by said shifting means for closing said gate against the tension of said spring, whereby marbles are successively delivered from said magazine to said chute in response to ejection of marbles from said runway and each marble admitted to said chute is immediately ejected from the chute to the runway.

19. In a game played with marbles, having a reservoir for containing the marbles to be played, means for transferring marbles from said reservoir into position from which they may be put into play, and means actuated directly by the movement of a marble from said position into play for actuating said first means so that by playing one marble another marble is automatically put into position from which it may be put into play.

DONALD E. HOOKER.