Oct. 11, 1966 F. W. SINDEN 3,278,187

GAME MACHINE EMPLOYING MULTI-STATE SWINGING GATES

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FIG. 2

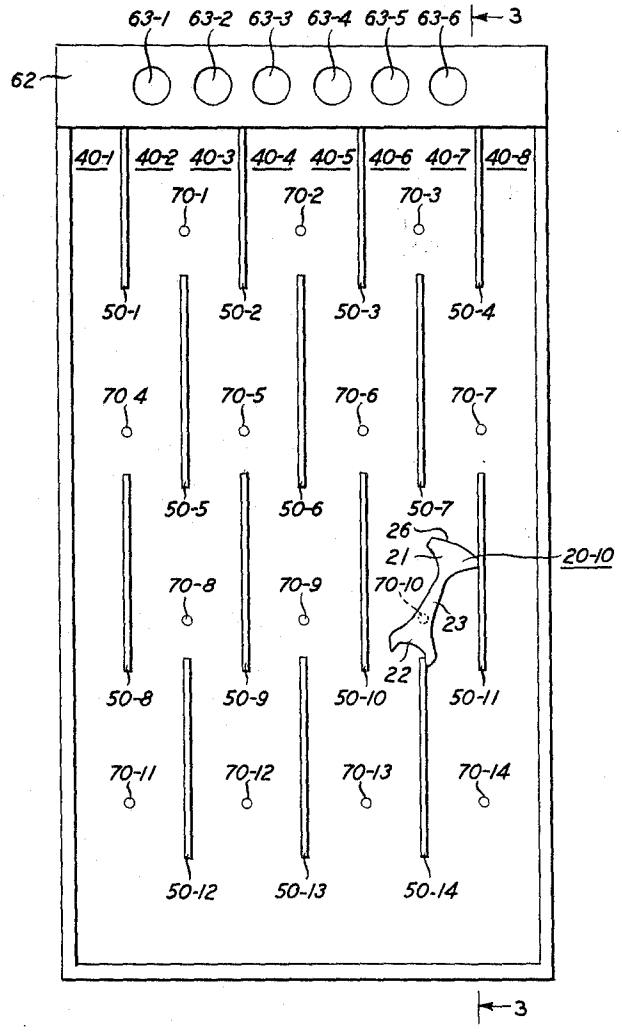



FIG. 3

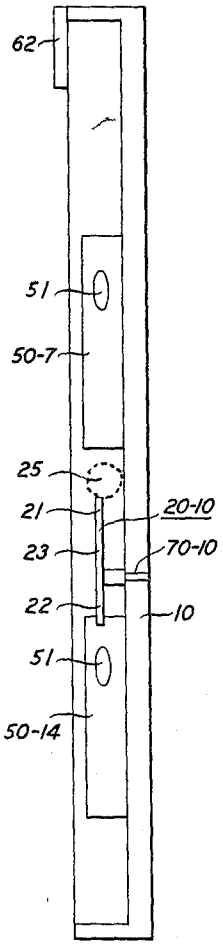
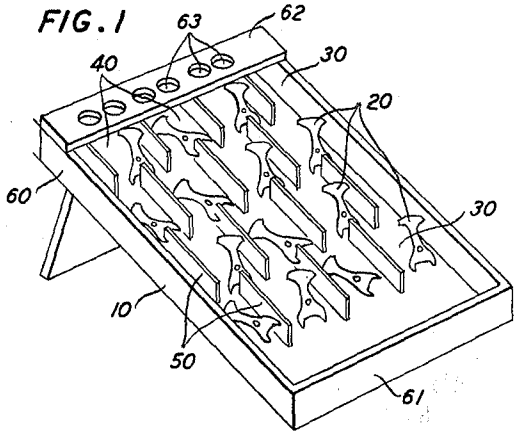



FIG. 1




INVENTOR
F. W. SINDEN
BY G. E. Kersey
ATTORNEY

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# GAME MACHINE EMPLOYING MULTI-STATE SWINGING GATES

Frank W. Sinden, Summit, N.J., assignor to Parker Brothers, Inc., Salem, Mass., a corporation of Maine

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This invention relates to a game machine, and more particularly to a game machine in which a game board is employed in conjunction with rolling objects.

There are various categories of games. Some are games of chance; others are games of skill. In the case of the latter, the degree of required skill increases to the extent that a player can create a large number of situations, to which an opposing player can counter with a suitably corresponding large number of situations. At the same time, interest is heightened if the resolution of a situation is accompanied by mechanical motion. Typically, the provision of such a game has required a structure of considerable complexity.

Accordingly, it is an object of the invention to provide a game structure that will test the skill of the participant while heightening his sense of participation. Another object of the invention is to provide an instrument by which a game can be played with varying degrees of skill. A further object is to achieve the foregoing objects with an instrument of relative simplicity.

To accomplish the foregoing and related objectives, the invention makes use of a base board on which is mounted a plurality of gates, each having a plurality of conditions. The conditions are controlled by encounters of the gates with external objects. The state of a gate following an encounter depends upon its prior condition, as determined by a past encounter. Each external object is able to encounter more than one gate. Thus, the overall condition of the gates is determined by the way in which the external objects are manipulated, taking into account the prior history of the gates.

In one embodiment of the invention, the gates are of a swinging variety and are in alternately staggered rows. Each gate lies astride two channels on the board along with rolling objects, such as marbles, may pass. When a marble encounters a gate, the subsequent action depends upon the prior condition of the gate. If the gate is "unloaded," i.e., there is no earlier marble held by it, it either becomes "loaded," or changes position. If the gate was previously "loaded," the load is released and the oncoming marble simultaneously passes through the gate without affecting its setting. Thus, a succession of rolling objects applied to the channels of the game board produces a controllable set of "loaded" and "unloaded" gate conditions. Ultimately a situation is reached where an additional rolling object will cause a large number of loaded gates to become unloaded. The participant responsible for this result can be designated either the "winner" or "loser," depending upon the "rules" adopted.

Other aspects of the invention will become apparent after considering an illustrative embodiment of the invention, taken in conjunction with the drawing, in which:

FIG. 1 is a perspective view of a game structure, according to the invention, in an illustrative playing position;

FIG. 2 is a top view of the game structure of FIG. 1; and

FIG. 3 is a side sectional view of the structure of FIG. 1.

Turning now to the perspective view of FIG. 1, the game structure includes a base board **10** upon which is mounted a set of swinging gates **20** in staggered rows **30**. Each gate swings in two channels **40** between channel wall separator segments **50**, or, in the case of gates that are



astride the outer channels, between a side wall **60** and a channel separator segment. Enclosing the periphery of the board is a frame **61** that is capped at its upper end by a head board **62** containing access holes **63** through which rolling objects can enter various ones of the channels. In the illustrative playing position of FIG. 1, the board is tilted at an angle of approximately 45 degrees with the horizontal.

As shown in FIG. 2, the illustrative board, from a top view, has eight channels **40–1** through **40–8**, the middle six **40–2** through **40–7** of which are accessible directly through the circular ports **63–1** through **63–6** of the head piece **62**. There are four staggered rows **30–1** through **30–4** of wall segments **50**. The first and third rows **30–1** and **30–3** have four segments and the second and fourth rows **30–2** and **30–4** have three segments. Each pair of wall segments demarks a pair of channels over a restricted length and embraces a pivot position **70** of a swinging gate **20**. For simplicity, only one of the gates, gate **20–10**, is set forth in detail, it being understood that there is a similar gate at each pivot position. A side sectional view of the representative gate **20–10** is given in FIG. 3 in which the pivot **70–10** of the gate extends for an appreciable distance into the base board **10** in order to assure the desired swinging action.

The representative gate **20–10** of FIG. 2 resembles the cross section of an I-beam. It has head and tail sections **21** and **22** that are wider than its stem **23**. The gate spans two channels **40–6** and **40–7**, with its head **21** resting on a right-hand wall segment **50–11**. When a marble is inserted into one of the circular ports of the head piece **62** and reaches either channel **40–6** or **40–7** spanned by the gate **20–10**, the ensuing action will depend upon the previous condition of the gate. If the gate is initially "unloaded," i.e., there is no marble resting on its head **21** from a previous insertion, a marble in the left-hand channel **40–6** of the gate will strike the tail **22** and cause a change of positions, with the head **21** coming to rest on the left-hand wall segment **50–10**. The marble will continue in its same channel.

On the other hand, a marble in the right-hand channel **40–7** of the gate will come to rest on the head **21**, causing the gate to become "loaded." Subsequently, a marble in the left-hand channel **40–6** will strike the tail **22**, initiating a swinging action of the gate and releasing the load marble. The passage of the load marble along the right-hand channel **40–7** restores the gate to its original condition with its head **21** resting on the right-hand wall segment **50–11**. As a result, separate marbles traverse the left-hand and right-hand channels without altering the position of the gate.

Consequently, if the gate is unloaded, a marble striking its tail causes a change of state, while a marble striking its head loads the gate. If the gate is loaded, an oncoming marble in either channel releases the load marble without affecting the state of the gate.

There are many ways of employing the game machine. In one scheme, each player is given a preassigned number of marbles. The players take turns inserting one marble at a time into the various ports, the idea being to selectively load the gates and control their releases and changes of condition. Ultimately, a large number of gates become loaded, after which it is impossible to insert an additional marble without setting off a chain reaction that releases a large number of load marbles. The player causing this effect is declared either the loser or winner according to the rules adopted.

In order to provide the players with predictable control over the gates, various measures are taken.

To prevent an oncoming marble from coming to rest upon a load marble, a recess **51** is made in each wall segment as shown in FIG. 3. This displaces the load

marble sufficiently from the path of an oncoming marble that free passage of the latter is assured. In order to prevent the marbles from bouncing out of their channels after coming into contact with the gates, each gate is positioned so that it is struck above the center of mass of any marble, as shown for the illustrative marble **25** resting on the head of the gate **20–10** in FIG. 3.

To facilitate changes in state of the gates, the peripheral curve **26** of each head, as shown in FIG. 2, is an arc of a circle centered at the pivot position. Consequently, there is no change in potential energy. In addition, switching of a gate when unloaded and struck at its tail is assured by making the equivalent inertia of the gate the same as that of the marble. This allows the energy of the marble to be completely absorbed by the gate and helps control bouncing. For this purpose the mass of the marble times the length of the lever arm to the pivot of the gate is made equal to the mass of the gate times the lever arm from the pivot to the center of mass. A transfer of momentum through the wall segments is prevented by having the head of each gate held back slightly from the segment with which it would otherwise make contact. This is done in FIG. 2 by having the tail **22** of the gate in contact with a wall segment **50–14** from a following row **30–4**.

In one working model of the invention, the base board was made from one-half inch plywood into which plastic wall segments were inserted. This thickness provided for a pivot of appreciable length and helped stabilize the gates. It will be apparent that the entire structure could be molded in one piece, or that the base board could be two relatively thin sheets that are displaced from each other to provide the the desired pivot length.

Further, in order that the force of gravity will maintain each gate in one of two positions when the board is in a playing position, as shown in FIG. 1, the gates are proportioned with their centers of gravity above their pivot points.

Other features, adaptations and employments of the invention will occur to those skilled in the art.

What is claimed is:

**1.** Apparatus comprising a game board for accommodating rolling objects;

a plurality of wall segments upon said game board and bounding channels of travel thereon for said rolling objects,

a plurality of swinging gates upon said game board,

each of said gates being pivotally disposed between adjoining and opposing wall segments and having (1) head section means extending into one channel so configured as to trap one of said rolling objects between said gate and one of said adjoining and opposing wall segments and (2) tail section means extending into an adjoining channel in the vicinity of the other of said adjoining and opposing wall segments.

**2.** Apparatus comprising a game board for accommodating rolling objects;

a plurality of wall segments upon said game board and bounding channels of travel thereon for said rolling objects;

a plurality of swinging gates pivotally mounted upon said game board between adjoining and opposing wall segments;

each of said gates being a flat extended member orthogonally mounted with respect to its pivotal axis and having

(1) head section means extending into one channel so configured as to trap one of said rolling objects between said gate and one of said adjoining and opposing wall segments,

(2) tail section means extending into adjoining channel in the vicinity of the other of said adjoining and opposing wall segments, so that an initial rolling object encountering said head section is captured thereby and is subsequently released by the first encounter of the gate with a subsequent rolling object, while an initial rolling object encountering said tail section causes said head section to swing from said one channel to the other.

**3.** A game machine comprising a base board for accommodating rolling objects;

at least two rows of longitudinal wall segments upon said base board, the segments of the one row being staggered with respect to the segments of the other row; and a plurality of swinging gates upon said base board, the gates being disposed in rows upon said base board between the principal faces of adjoining and opposing wall segments, each gate having head means configured to trap a rolling object against one of said wall segments and tail means adapted to be struck by a second moving object to release the object previously trapped.

**4.** Game apparatus comprising

a base board;

rolling objects upon said base board;

a pair of opposing wall segments upon said base board;

and a swinging gate pivotally mounted upon said base board between said opposing wall segments, said gate comprising

head means extending from the pivot position of said gate and configured to trap a first rolling object between said gate and one of said opposing wall segments, the width of said gate from side to side being greater at said head means than at said pivot position, and

tail means extending from the pivot of said gate and adapted to be struck by a second rolling object to release the trapped first object.

**5.** Game apparatus comprising

a base board;

rolling objects on said base board;

a first plurality of longitudinally extensive wall segments upon said base board in a first row;

a second plurality of wall segments upon said base board in a second row staggered with relation to the wall segments in said first row;

a plurality of pivoted swinging gates pivotally mounted upon said base board, each being disposed between a laterally adjoining pair of wall segments in each of said rows with the gates of one row being longitudinally aligned with the wall segments of the other row, said gates having head means so configured as to trap one of said rolling objects between said head means and one of said wall segments and tail means adapted to be struck by a second rolling object to release a trapped rolling object.


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RICHARD C. PINKHAM, *Primary Examiner.*

L. J. BOVASSO, *Assistant Examiner.*