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(54) OBJECT DROP FEATURE FOR A GAMING MACHINE

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(57) **ABSTRACT**

A chance game feature for a gaming machine is controlled by a processor in response to a wager. The feature comprises a matrix, a plurality of moving targets, and an object. The matrix defines an entrance end, an exit end, and a plurality of paths extending between the entrance end and the exit end. The moving targets are proximate the exit end. The object traverses one of the paths and is received by one of the targets. The receiving target is randomly selected from among the plurality of targets prior to the object traversing the one of the paths. A position of the receiving target when the object reaches the exit end is calculated, and one of the paths that lead to the position of the receiving target is randomly selected. A payout is awarded based on the receiving target.

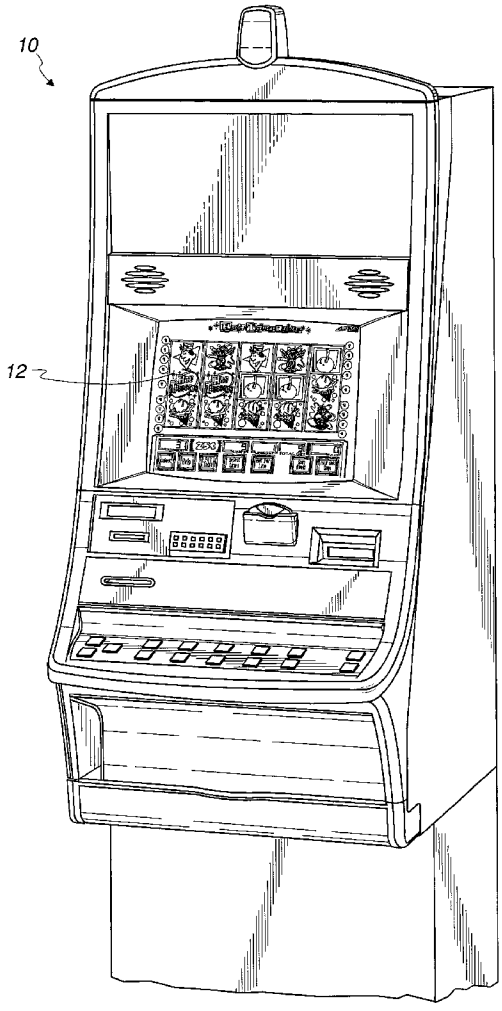


Fig. 1

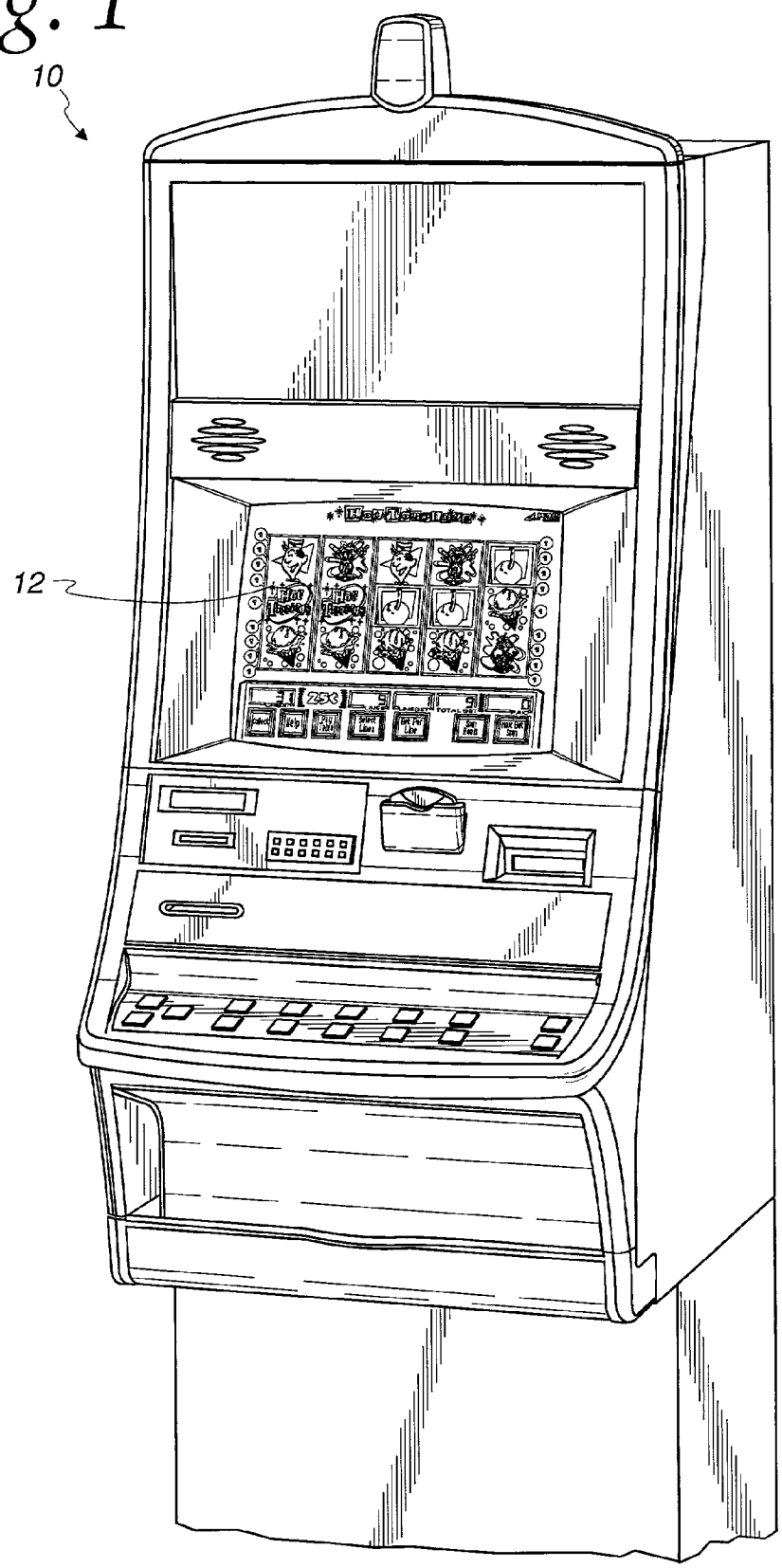


Fig. 2

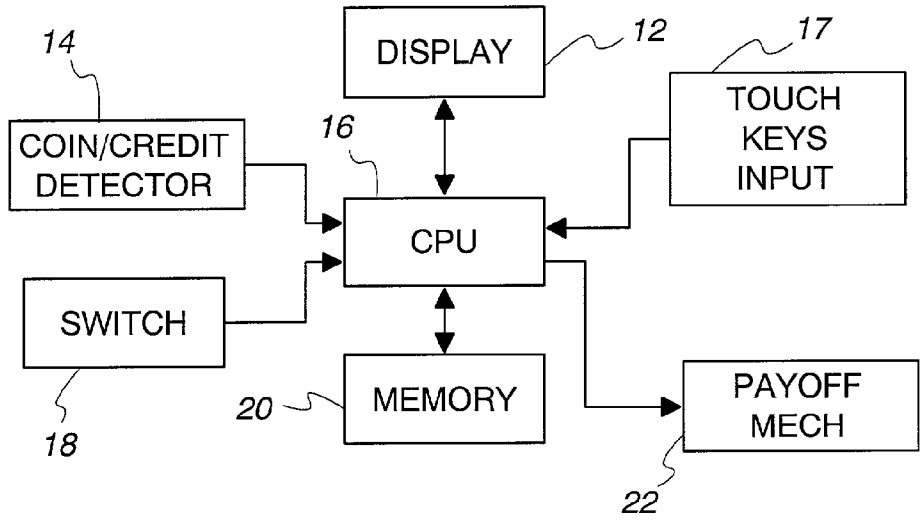

14
DISPLAY
12
17
TOUCH KEYS INPUT
COIN/CREDIT DETECTOR
16
CPU
SWITCH
18
20
MEMORY
PAYOFF MECH
22

Fig. 3

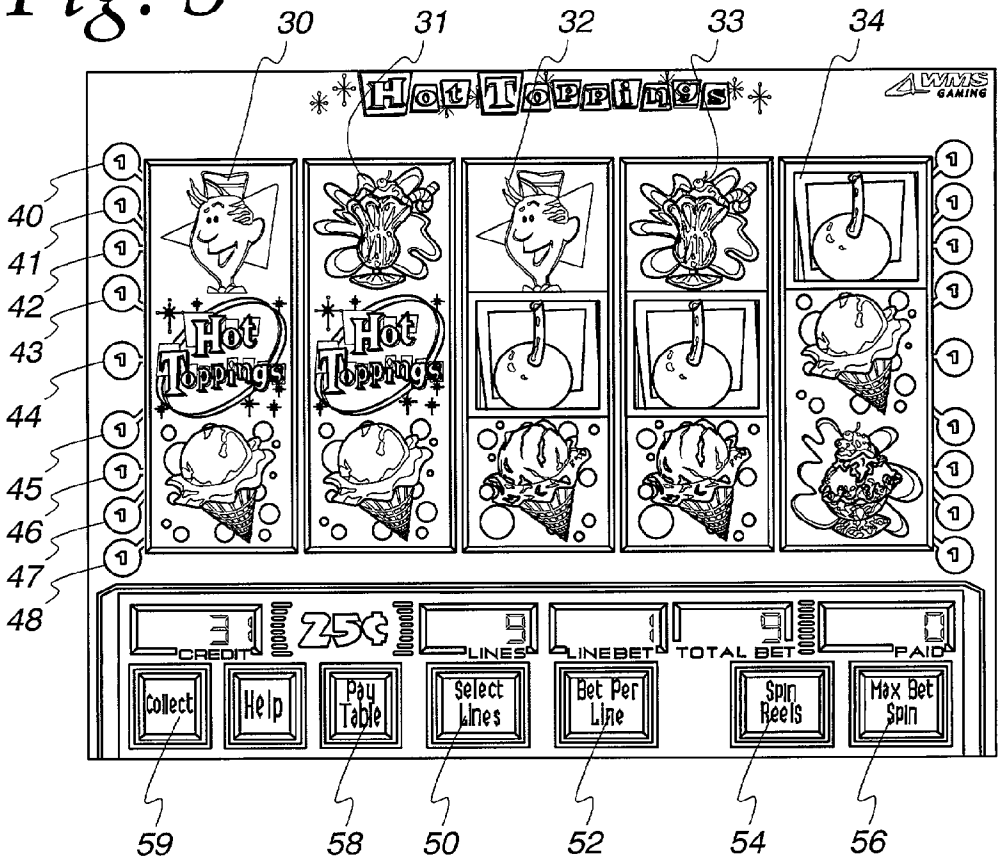

30
31
32
33
34
Hot Toppings
WMS GAMING
40
41
42
43
44
45
46
47
48
CREDIT
25¢
LINES
LINEBET
TOTAL BET
PAID
Collect
Help
Pay Table
Select Lines
Bet Per Line
Spin Reels
Max Bet Spin
59
58
50
52
54
56

Fig. 4

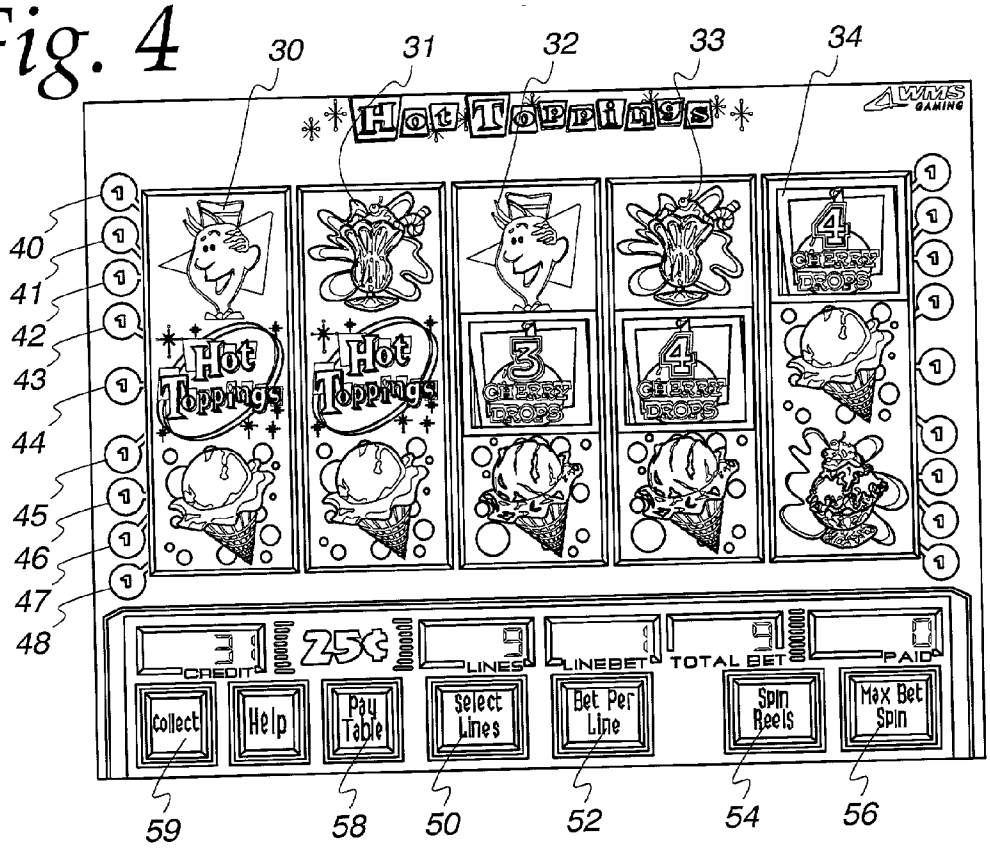

Hot Toppings
WMS GAMING
Hot Toppings
Hot Toppings
4 CHERRY DROPS
3 CHERRY DROPS
4 CHERRY DROPS
CREDIT
25¢
LINES
LINEBET
TOTAL BET
PAID
Collect
Help
Pay Table
Select Lines
Bet Per Line
Spin Reels
Max Bet Spin
30
31
32
33
34
40
41
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48
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58
50
52
54
56

Fig. 5

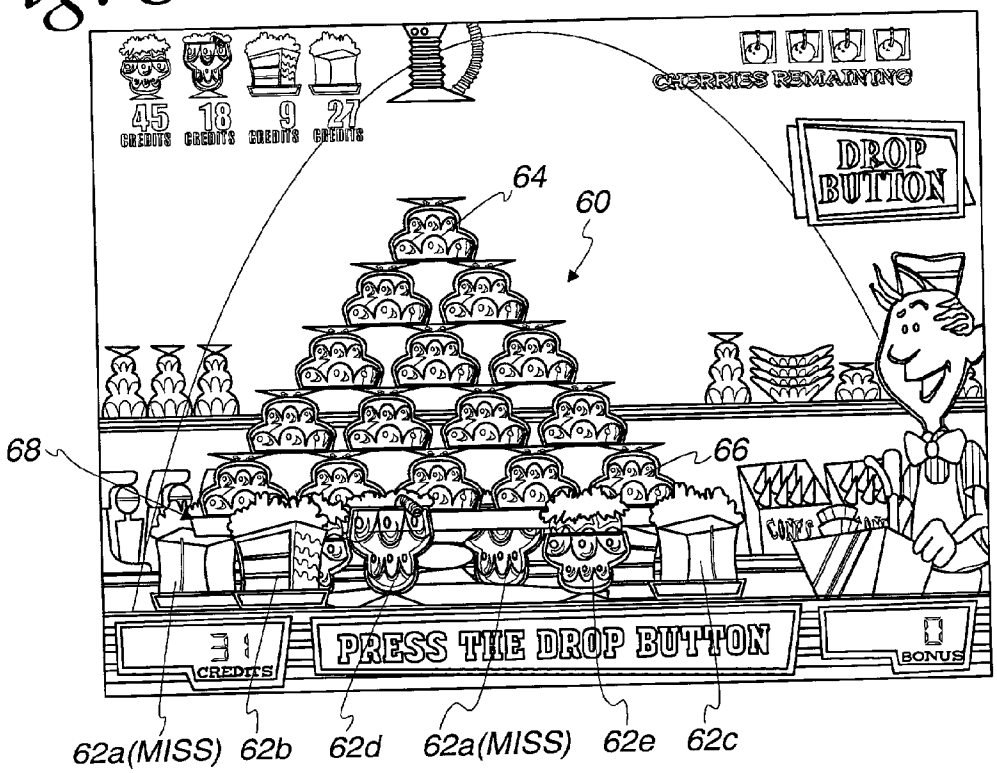

45 CREDITS
18 CREDITS
9 CREDITS
27 CREDITS
CHERRIES REMAINING
DROP BUTTON
64
60
68
66
CREDITS
PRESS THE DROP BUTTON
BONUS
62a(MISS)
62b
62d
62a(MISS)
62e
62c

Fig. 6

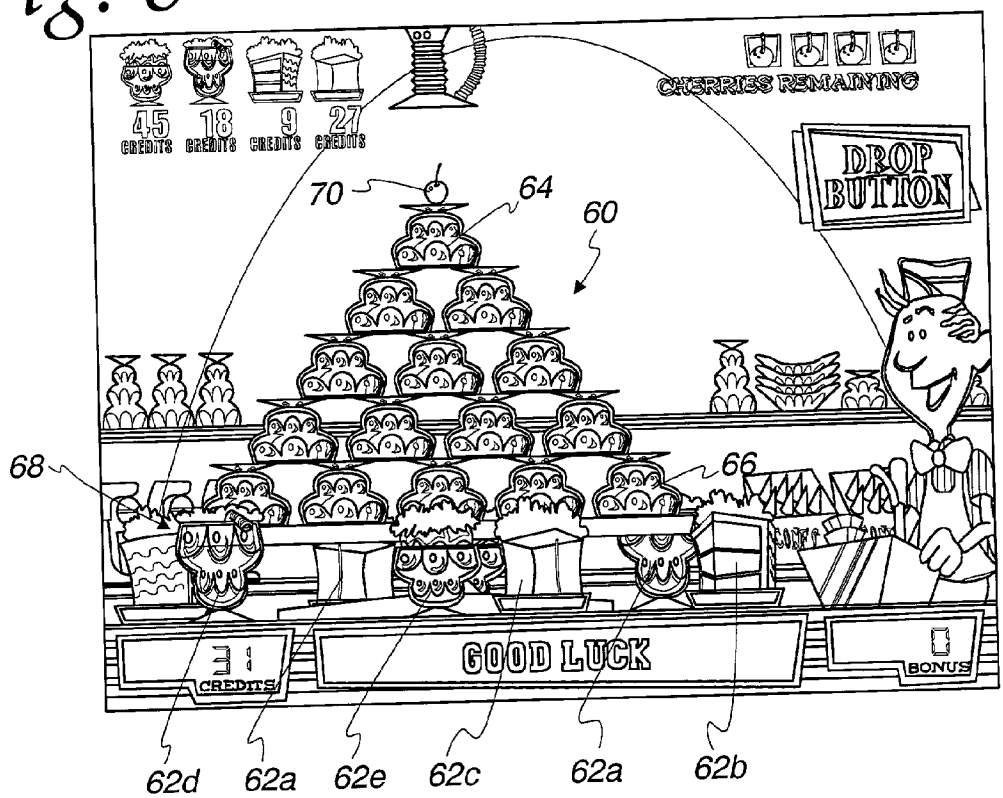

45 CREDITS
18 CREDITS
9 CREDITS
27 CREDITS
CHERRIES REMAINING
DROP BUTTON
70
64
60
68
66
31 CREDITS
GOOD LUCK
0 BONUS
62d
62a
62e
62c
62a
62b

Fig. 7

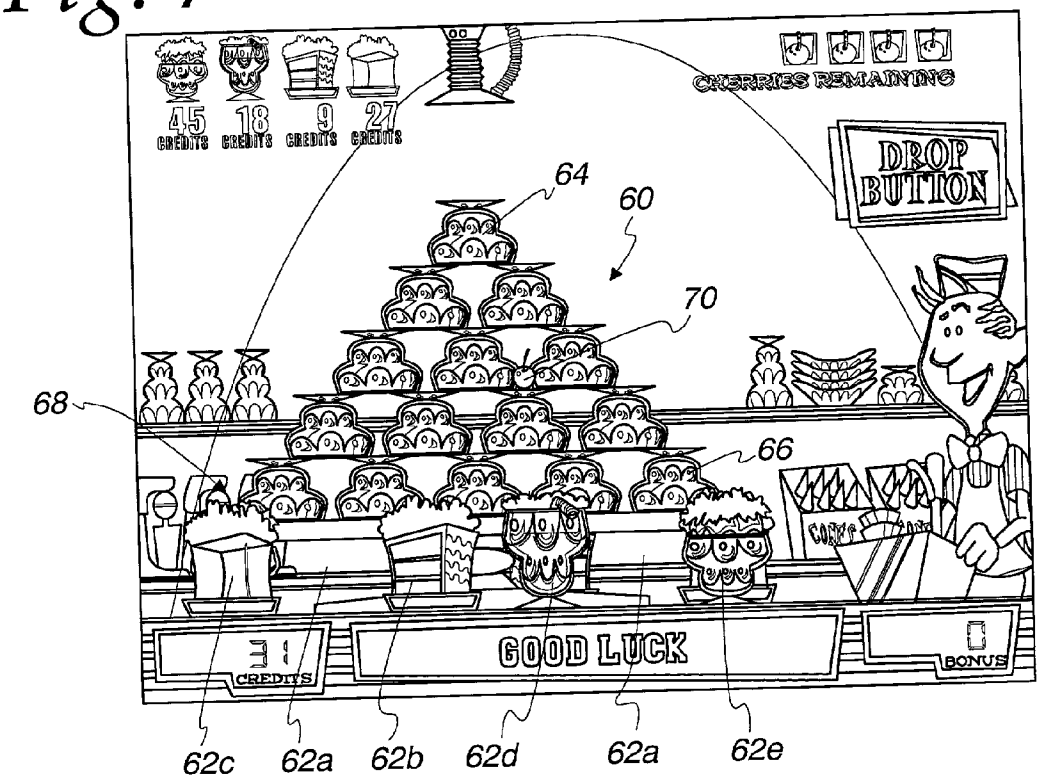

45 CREDITS
18 CREDITS
9 CREDITS
27 CREDITS
CHERRIES REMAINING
DROP BUTTON
64
60
70
68
66
31 CREDITS
GOOD LUCK
0 BONUS
62c
62a
62b
62d
62a
62e

Fig. 8

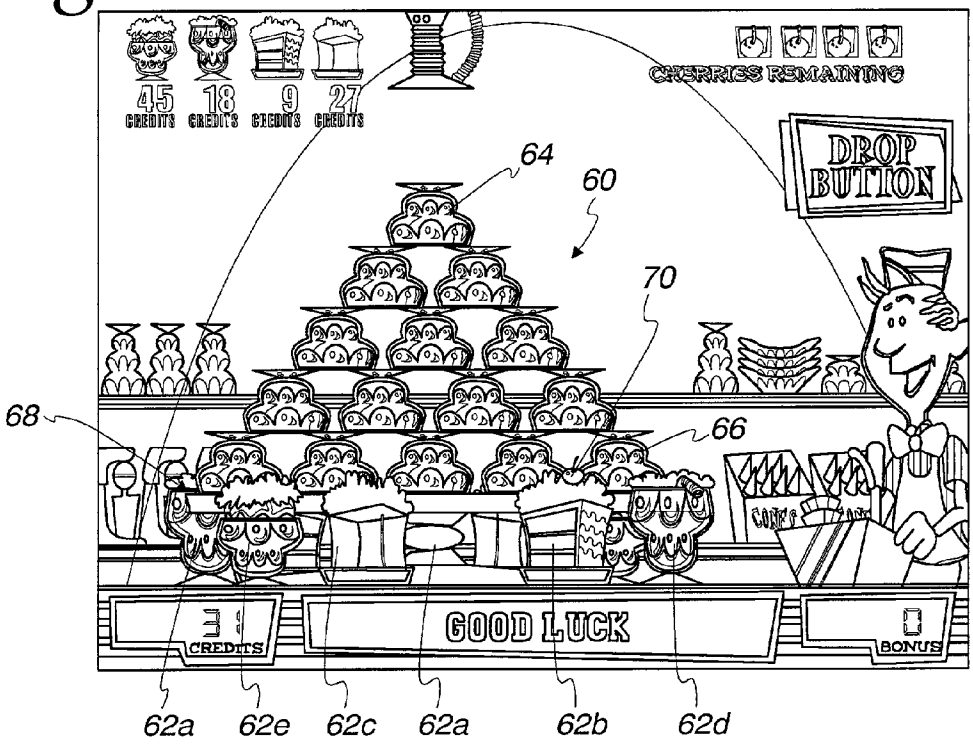
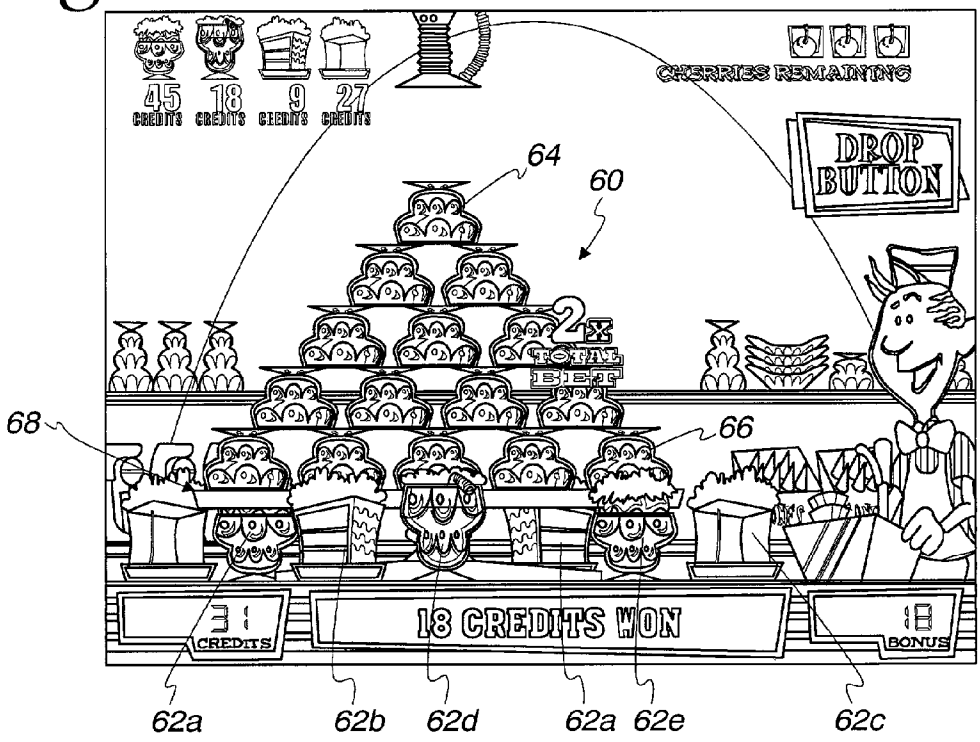

45 CREDITS
18 CREDITS
9 CREDITS
27 CREDITS
CHERRIES REMAINING
DROP BUTTON
64
60
70
68
66
31 CREDITS
GOOD LUCK
0 BONUS
62a
62e
62c
62a
62b
62d

Fig. 9


45 CREDITS
18 CREDITS
9 CREDITS
27 CREDITS
CHERRIES REMAINING
DROP BUTTON
64
60
2X TOTAL BET
68
66
31 CREDITS
18 CREDITS WON
18 BONUS
62a
62b
62d
62a
62e
62c

OBJECT DROP FEATURE FOR A GAMING MACHINE

FIELD OF THE INVENTION

[0001] The present invention relates generally to gaming machines for playing games of chance and, more particularly, to an object drop feature for a gaming machine.

BACKGROUND OF THE INVENTION

[0002] Gaming machines, such as slot machines, video poker machines and the like, have been a cornerstone of the gaming industry for several years. Generally, the popularity of such machines with players is dependent on the likelihood (or perceived likelihood) of winning money at the machine and the intrinsic entertainment value of the machine relative to other available gaming options. Where the available gaming options include a number of competing machines and the expectation of winning each machine is roughly the same (or believed to be the same), players are most likely to be attracted to the most entertaining and exciting of the machines. Shrewd operators consequently strive to employ the most entertaining and exciting machines available because such machines attract frequent play and hence increase profitability to the operator. Accordingly, in the competitive gaming machine industry, there is a continuing need for gaming machine manufacturers to produce new types of games, or enhancements to existing games, which will attract frequent play by enhancing the entertainment value and excitement associated with the game.

[0003] One concept that has been successfully employed to enhance the entertainment value of a game is the concept of a "secondary" or "bonus" game that may be played in conjunction with a "basic" game. The bonus game may comprise any type of game, either similar to or completely different from the basic game, which is entered upon the occurrence of a selected event or outcome of the basic game. Because the bonus game concept offers tremendous advantages in player appeal and excitement relative to other known games, and because such games are attractive to both players and operators, there is a continuing need to develop new features for bonus games to satisfy the demands of players and operators. Preferably, such new bonus game features will maintain, or even further enhance, the level of player excitement offered by bonus games heretofore known in the art. The present invention is directed to satisfying these needs.

SUMMARY OF THE INVENTION

[0004] A chance game feature for a gaming machine is controlled by a processor in response to a wager. The feature comprises a matrix, a plurality of moving targets, and an object. The matrix defines an entrance end, an exit end, and a plurality of paths extending between the entrance end and the exit end. The moving targets are proximate the exit end. The object traverses one of the paths and is received by one of the targets. The receiving target is randomly selected from among the plurality of targets prior to the object traversing the one of the paths. A position of the receiving target when the object reaches the exit end is calculated, and one of the paths that lead to the position of the receiving target is randomly selected. A payout is awarded based on the receiving target.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The foregoing and other advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings in which:

[0006] **FIG. 1** is a perspective view of a gaming machine embodying the present invention;

[0007] **FIG. 2** is a block diagram of a control system suitable for operating the gaming machine;

[0008] **FIG. 3** is a display screen capture showing a start-bonus symbol combination in a basic slot game for triggering a cherry drop bonus feature;

[0009] **FIG. 4** is a display screen capture feature, responsive to a player's selection of one of the symbols in the start-bonus combination, showing a number of cherry drops to be exercised in the cherry drop bonus feature;

[0010] **FIGS. 5 through 9** are display screen captures showing the cherry drop bonus feature.

[0011] While the invention is susceptible to various modifications and alternative forms, specific embodiments have been shown by way of example in the drawings and will be described in detail herein. However, it should be understood that the invention is not intended to be limited to the particular forms disclosed. Rather, the invention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

DESCRIPTION OF SPECIFIC EMBODIMENTS

[0012] Turning now to the drawings and referring initially to **FIG. 1**, there is depicted a gaming machine **10** executing a game of chance including an cherry drop bonus feature according to the present invention. The gaming machine **10** includes a visual display **12** preferably in the form of a dot matrix, CRT, LED, LCD, electro-luminescent, or other type of video display known in the art. The display **12** preferably includes a touch screen overlaying the monitor. In the illustrated embodiment, the gaming machine **10** is an "upright" version in which the display **12** is oriented vertically relative to the player. Alternatively, the gaming machine may be a "slant-top" version in which the display **12** is slanted at about a thirty-degree angle toward the player of the gaming machine **10**.

[0013] In one embodiment, the gaming machine **10** is operable to play a game of chance entitled HOT TOPPINGS having an ice cream parlor theme. The HOT TOPPINGS game features a basic slot game with five simulated spinning reels and one or more bonus games triggered by respective start-bonus outcomes in the basic game. It will be appreciated, however, that the gaming machine **10** may be implemented with themes other than an ice cream parlor.

[0014] **FIG. 2** is a block diagram of a control system suitable for operating the gaming machine **10**. Coin/credit detector **14** signals a central processing unit ("CPU") **16** when a player has inserted a number of coins or played a number of credits. Then, the CPU **16** operates to execute a game program that causes the display **12** to display the basic game that includes simulated symbol-bearing reels. The player may select the number of pay lines to play and the

amount to wager via touch screen input keys **17**. The basic game commences in response to the player activating a switch **18** (e.g., by pulling a lever or pushing a button), causing the CPU **16** to set the reels in motion, randomly select a game outcome, and then stop the reels to display symbols corresponding to the pre-selected game outcome. In one embodiment, one of the basic game outcomes causes the CPU **16** to enter a bonus mode whereby the display **12** shows a bonus game with animation of a cherry dropped down a sundae dish matrix.

[**0015**] A system memory **20** stores control software, operational instructions and data associated with the gaming machine **10**. In one embodiment, the memory **20** comprises a separate read-only memory (ROM) and battery-backed random-access memory (RAM). However, it will be appreciated that the system memory **20** may be implemented on any of several alternative types of memory structures or may be implemented on a single memory structure. A payoff mechanism **22** is operable in response to instructions from the CPU **16** to award a payoff of coins or credits to the player in response to certain winning outcomes which might occur in the basic or bonus games. The payoff amounts corresponding to certain combinations of symbols in the basic game is predetermined according to a pay table stored in system memory **20**. The payoff amounts corresponding to certain outcomes of the bonus game are also stored in system memory **20**.

[**0016**] As shown in **FIG. 3**, the HOT TOPPINGS basic game is implemented on the display **12** on five video simulated spinning reels **30-34** with nine pay lines **40-48**. Each of the pay lines **40-48** extends through one symbol on each of the five reels **30-34**. Generally, game play is initiated by inserting a number of coins or playing a number of credits, causing the CPU **16** (**FIG. 2**) to activate a number of pay lines corresponding to the number of coins or credits played. In one embodiment, the player selects the number of pay lines (between one and nine) to play by pressing a "Select Lines" key **50** on the video display **12**. The player then chooses the number of coins or credits to bet on the selected pay lines by pressing the "Bet Per Line" key **52**.

[**0017**] After activation of the pay lines, the reels **30-34** may be set in motion by touching the "Spin Reels" key **54** or, if the player wishes to bet the maximum amount per line, by using the "Max Bet Spin" key **56** on the video display **12**. Alternatively, other mechanisms such as, for example, a lever or push button may be used to set the reels in motion. The CPU **16** uses a random number generator to select a game outcome (e.g., "basic" game outcome) corresponding to a particular set of reel "stop positions." The CPU **16** then causes each of the video reels **30-34** to stop at the appropriate stop position. Video symbols are displayed on the reels **30-34** to graphically illustrate the reel stop positions and indicate whether the stop positions of the reels represent a winning game outcome.

[**0018**] Winning basic game outcomes (e.g., symbol combinations resulting in payment of coins or credits) are identifiable to the player by a pay table. In one embodiment, the pay table is affixed to the machine **10** and/or displayed by the video display **12** in response to a command by the player (e.g., by pressing the "Pay Table" button **58**). A winning basic game outcome occurs when the symbols appearing on the reels **30-34** along an active pay line correspond to one of the winning combinations on the pay table. A winning combination, for example, could be three or more CHOCOLATE CONE symbols along an active pay line, where the award is greater as the number of CHOCOLATE CONE symbols along the active pay line increases. If the displayed symbols stop in a winning combination, the game credits the player an amount corresponding to the award in the pay table for that combination multiplied by the amount of credits bet on the winning pay line. The player may collect the amount of accumulated credits by pressing the "Collect" button **59**. In one implementation, the winning combinations start from the first reel **30** (left to right) and span adjacent reels. In an alternative implementation, the winning combinations start from either the first reel **30** (left to right) or the fifth reel **34** (right to left) and span adjacent reels.

[**0019**] Included among the plurality of basic game outcomes is a start-bonus outcome for triggering play of a bonus game. A start-bonus outcome may be defined in any number of ways. For example, a start-bonus outcome occurs when a special start- bonus symbol or a special combination of symbols appears on one or more of the reels **30-34**. The start-bonus outcome may require the combination of symbols to appear along an active pay line, or may alternatively require that the combination of symbols appear anywhere on the display regardless of whether the symbols are along an active pay line. The appearance of a start-bonus outcome causes the CPU to shift operation from the basic game to the bonus game.

[**0020**] Three or more CHERRY symbols anywhere on the display trigger a cherry drop bonus feature. In **FIG. 3**, three CHERRY symbols are depicted on the display. In response to triggering the cherry drop bonus feature, the CHERRY symbols begin to animate and swing back and forth. The player is prompted to touch one of the CHERRY symbols. As shown in **FIG. 4**, the touched CHERRY symbol reveals a number of cherries (e.g., **4** cherry drops) to be dropped down a sundae dish matrix in the cherry drop bonus feature. The non-selected CHERRY symbols reveal what the player would have received had the player selected those symbols.

[**0021**] Referring to **FIG. 5**, the video display then depicts a matrix **60** and a plurality of moving targets **62**. The matrix **60** is preferably in the form of a pyramid of stacked sundae glasses have a single glass **64** at its top and five glasses **66** at its base. The top glass **64** defines an entrance end to the pyramid **60**, while the base glasses **66** lead to an exit end **68** of the pyramid **60**. A plurality of paths extend between the top glass **64** and the exit end **68**.

[**0022**] The moving targets **62** are proximate the exit end **68** of the pyramid **60**. The moving targets **62** are preferably in the form of eight desserts and four Misses **62***a* (blank/empty areas) on a revolving carousel. The eight desserts include two Cakes **62***b*, two Gelatins **62***c*, two Malts **62***d*, and two Sundaes **62***e*. The desserts are arranged so that at any given time one of each type of dessert **62***b*, **62***c*, **62***d*, and **62***e* and two Misses **62***a* are located in front of the pyramid **60** and visible to the player, while the remaining four desserts and two Misses are behind the pyramid **60**.

[**0023**] To the right of the pyramid **60** is Stan the Ice Cream Man adjacent to his cherry drop machine controls, and above Stan is a "Drop" cherry touch key. In response to the "Drop" key being pressed by the player, Stan animates to operate his

controls and drop a cherry out of the machine onto the top glass **64** of the pyramid **60**. As shown in **FIGS. 6, 7, 8**, and **9**, the dropped cherry **70** bounces down the pyramid **60** toward the exit end **68**. If the cherry **70** lands on a dessert **62***b*, **62***c*, **62***d*, or **62***e* (as opposed to a Miss **62***a*), the CPU awards a multiplier based on which dessert the cherry **70** landed. In **FIG. 9**, for example, the CPU awards a multiplier of 2 for a cherry landing on the Cake **62***b* in **FIG. 8**. The above process a dropping a cherry **70** down the pyramid **60** and onto either a dessert or a Miss is repeated until the player uses up all of the awarded number of drops. The final multiplier for the bonus feature is equal to the sum of the individual multipliers awarded for each cherry drop, plus a "gratuity" multiplier equal to the number of drops the player received. This final multiplier is multiplied by the player's original wager for playing the basic slot game to generate a bonus credit amount.

[**0024**] The CPU executes the cherry drop bonus feature as follows. First, to associate a number of drops with each CHERRY symbol in **FIGS. 3 and 4**, the CPU randomly selects an entry from the following drop table for each CHERRY symbol:

3	3	3
4	4	5

[**0025**] In the table, each entry represents a number of cherry drops. Because three drops appears in three out of six entries in the drop table, the probability that a CHERRY symbol will be associated with three drops is 50 percent. Because four drops appears in two out of six entries in the drop table, the probability that a CHERRY symbol will be associated with four drops is approximately 33.33 percent. Finally, because five drops appears in one out of six entries in the drop table, the probability that a CHERRY symbol will be associated with one drop is approximately 16.67 percent.

[**0026**] Second, in response to the "Drop" cherry key being pressed by the player in **FIG. 5** but prior to the cherry **70** dropping through the pyramid **60**, the CPU randomly selects an entry from the following dessert table to determine on which of the moving targets **62** the cherry **70** will land:

$Miss_1$	Sundae	Cake	Gelatin	Malt
$Miss_2$	Sundae	Cake	Gelatin	Malt

[**0027**] Because each type of target appears in two out of ten entries in the dessert table, the probability that the cherry **70** will land on each type of target is 20 percent. In the dessert table, each possible moving target **62** is associated with a multiplier that varies depending upon the number of CHERRY symbols that triggered the bonus feature. These multipliers are shown in the following multiplier table:

	3 CHERRY	4 CHERRY	5 CHERRY
Miss	0	0	0
Cake	2	4	10
Gelatin	2	4	10
Malt	3	5	20
Sundae	4	10	40

[**0028**] For example, if three CHERRY symbols triggered the cherry drop bonus feature as in **FIGS. 3 and 4**, the Miss **62***a* is associated with a multiplier of 0, the Cake **62***b* is associated with a multiplier of 2, the Gelatin **62***c* is associated with a multiplier of **2, the Malt 62***d* is associated with a multiplier of 3, and the Sundae **62***e* is associated with a multiplier of 4. The greater the number of triggering CHERRY symbols, the greater the multiplier for each dessert.

[**0029**] At any given time, each type of moving target **62** and its associated multiplier is always available because of the manner in which the targets **62** are arranged. The targets **62** are arranged in the following sequence: Gelatin, $Miss_1$, Cake, Malt, $Miss_2$, Sundae, Gelatin, $Miss_1$, Cake, Malt, $Miss_2$, and Sundae. At the exit end **68** of the pyramid **60**, there are six target positions on which the cherry **70** can land. Based on the foregoing sequence, it can be seen that, at any given time, these six target positions are occupied by two Misses **62***a* (i.e. $Miss_1$ and $Miss_2$) and one of each type of dessert **62***b*, **62***c*, **62***d*, and **62***e*. The two Misses **62***a* are treated separately in the dessert table and the target sequence as $Miss_1$ and $Miss_2$ so that if either $Miss_1$ or $Miss_2$ is selected by the CPU from the dessert table, the dropped cherry **70** will be directed to the selected one of $Miss_1$ and $Miss_2$.

[**0030**] Third, after the CPU randomly selects one of the moving targets **62** on which the cherry **70** will land, the CPU calculates the position in front of the pyramid **60** of the selected target **62** at the time the cherry **70** reaches the exit end **68**. This calculation may be illustrated with an example in which the selected target **62** is the Cake **62***b*. Referring to **FIG. 6**, the cherry **70** may, for example, require 50 frames of animation to travel from the top glass **64** of the pyramid **60** to any of the six target positions at the exit end **68** of the pyramid **60**. In 50 frames of animation, each target **62** may traverse just over five target positions at the exit end **68** of the pyramid **60**. Therefore, if the Cake **62***b* is the selected target and is about to be located at the first (leftmost) target position when the cherry **70** begins its descent from the top glass **64** (note the Cake **62***b* trailing the Malt **62***d*), the Cake **62***b* will be located at the fifth (second from rightmost) target position when the cherry **70** reaches the exit end **68** of the pyramid **60**. Therefore, in the illustrated example, the calculated position when the cherry **70** reaches the exit end **68** is just over five target positions ahead of the position of the selected target **62** at the time the cherry **70** begins its descent down the pyramid **60**. Of course, if the selected target **62** will no longer be visible after it travels five target positions, the CPU instead calculates the position of the selected target's matching counterpart (there are pair of each type of target **62** and one of each pair is visible at any given time) at the time the cherry **70** reaches the exit end **68** of the pyramid **60**.

[0031] Fourth, after the CPU calculates the target position of the selected target **62** at the time the cherry **70** reaches the exit end **68**, the cherry **70** animates down the pyramid **60** to this target position via a path chosen at random from all paths leading to this target position. In the illustrated example, the CPU randomly selects one of five paths (shown in dotted lines in **FIG. 8**) leading to the fifth target position.

[0032] While the present invention has been described with reference to one or more particular embodiments, those skilled in the art will recognize that many changes may be made thereto without departing from the spirit and scope of the present invention. For example, instead of simulating the reels on a video display, the reels may be mechanical and driven by respective stepper motors. If the reels are mechanical, the bonus game is animated on a separate video display. Each of these embodiments and obvious variations thereof is contemplated as falling within the spirit and scope of the claimed invention, which is set forth in the following claims.

1. A chance game feature for a gaming machine controlled by a processor in response to a wager, comprising:

a matrix defining an entrance end, an exit end, and a plurality of paths extending between the entrance end and the exit end;

a plurality of targets proximate the exit end;

an object traversing one of the plurality of paths and being received by one of the plurality of targets;

target selection means for randomly selecting the receiving one of the plurality of targets from among the plurality of targets prior to the object traversing the one of the plurality of paths; and

payout means for awarding a payout based on the receiving one of the plurality of targets.

2. The game feature of claim 1, further including path selection means for randomly selecting one of any of the plurality of paths that lead to the receiving one of the plurality of targets.

3. The game feature of claim 2, wherein the plurality of targets are moving, and further including means for calculating a position of the receiving one of the plurality of moving targets when the object reaches the exit end.

4. The game feature of claim 1, wherein the plurality of targets are moving, and further including means for calculating a position of the receiving one of the plurality of moving targets when the object reaches the exit end.

5. The game feature of claim 4, further including path selection means for randomly selecting one of any of the plurality of paths that lead to the position of the receiving one of the plurality of moving targets.

6. The game feature of claim 1, wherein the matrix is shaped as a pyramid with only one entrance at the entrance end.

7. A method of operating a chance game feature for a gaming machine controlled by a processor in response to a wager, the method comprising:

providing a matrix defining an entrance end, an exit end, and a plurality of paths extending between the entrance end and the exit end;

providing a plurality of targets proximate the exit end;

randomly selecting one of the plurality of targets from among the plurality of targets;

after randomly selecting the one of the plurality of targets, depicting an object traversing one of the plurality of paths and being received by the selected one of the plurality of targets; and

awarding a payout based on the selected one of the plurality of targets.

8. The method of claim 7, further including randomly selecting one of any of the plurality of paths that lead to the selected one of the plurality of targets.

9. The method of claim 8, wherein the plurality of targets are moving, and further including calculating a position of the selected one of the plurality of moving targets when the object reaches the exit end.

10. The method of claim 7, wherein the plurality of targets are moving, and further including calculating a position of the selected one of the plurality of moving targets when the object reaches the exit end.

11. The method of claim 10, further including randomly selecting one of any of the plurality of paths that lead to the position of the selected one of the plurality of moving targets.

12. The method of claim 7, wherein the matrix is shaped as a pyramid with only one entrance at the entrance end.

13. A chance game feature for a gaming machine controlled by a processor in response to a wager, comprising: a matrix defining an entrance end, an exit end, and a plurality of paths extending between the entrance end and the exit end;

a plurality of moving targets proximate the exit end;

an object traversing one of the plurality of paths and being received by one of the plurality of moving targets; and

payout means for awarding a payout based on the receiving one of the plurality of moving targets.

14. The game feature of claim 13, further including target selection means for randomly selecting the receiving one of the plurality of moving targets from among the plurality of moving targets.

15. The game feature of claim 14, wherein the target selection means randomly selects the receiving one of the plurality of moving targets prior to the object traversing the one of the plurality of paths.

16. The game feature of claim 15, further including means for calculating a position of the receiving one of the plurality of moving targets when the object reaches the exit end.

17. The game feature of claim 16, further including path selection means for randomly selecting one of any of the plurality of paths that lead to the position of the receiving one of the plurality of moving targets.

18. The game feature of claim 13, wherein the matrix is shaped as a pyramid with only one entrance at the entrance end.

19. A method of operating a chance game feature for a gaming machine controlled by a processor in response to a wager, comprising:

providing a matrix defining an entrance end, an exit end, and a plurality of paths extending between the entrance end and the exit end;

providing a plurality of moving targets proximate the exit end; depicting an object traversing one of the plurality of paths and being received by one of the plurality of moving targets; and

awarding a payout based on the receiving one of the plurality of moving targets.

20. The method of claim 19, further including randomly selecting the receiving one of the plurality of moving targets from among the plurality of moving targets.

21. The method of claim 20, wherein randomly selecting the receiving one of the plurality of moving targets occurs prior to the object traversing the one of the plurality of paths.

22. The method of claim 21, further including calculating a position of the receiving one of the plurality of moving targets when the object reaches the exit end.

23. The method of claim 22, further including randomly selecting one of any of the plurality of paths that lead to the position of the receiving one of the plurality of moving targets.

24. The method of claim 19, wherein the matrix is shaped as a pyramid with only one entrance at the entrance end.

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