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(54) **METHOD FOR OPERATING MECHANICAL CASINO BONUS GAME IN THE PRESENCE OF MECHANICAL BIAS**

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(51) **Int. Cl.**
A63F 3/00 (2006.01)

(52) **U.S. Cl.** ..... **273/121 B**; 273/126 A

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See application file for complete search history.

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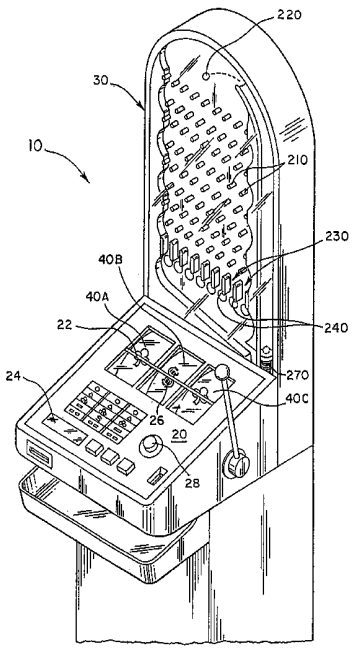
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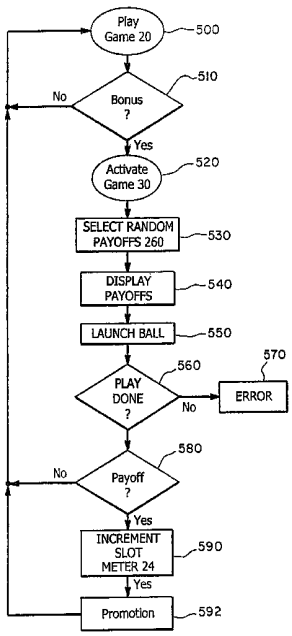
Primary Examiner—Robert E Pezzuto
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(57) **ABSTRACT**

A method for operating a mechanical casino bonus game to provide a constant player expected value for play of a mechanical casino bonus game in the presence of mechanical bias. When play of the bonus game commences, a bonus payoff is randomly assigned from a set of bonus payoffs to each game outcome.

15 Claims, 7 Drawing Sheets





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Fig. 1

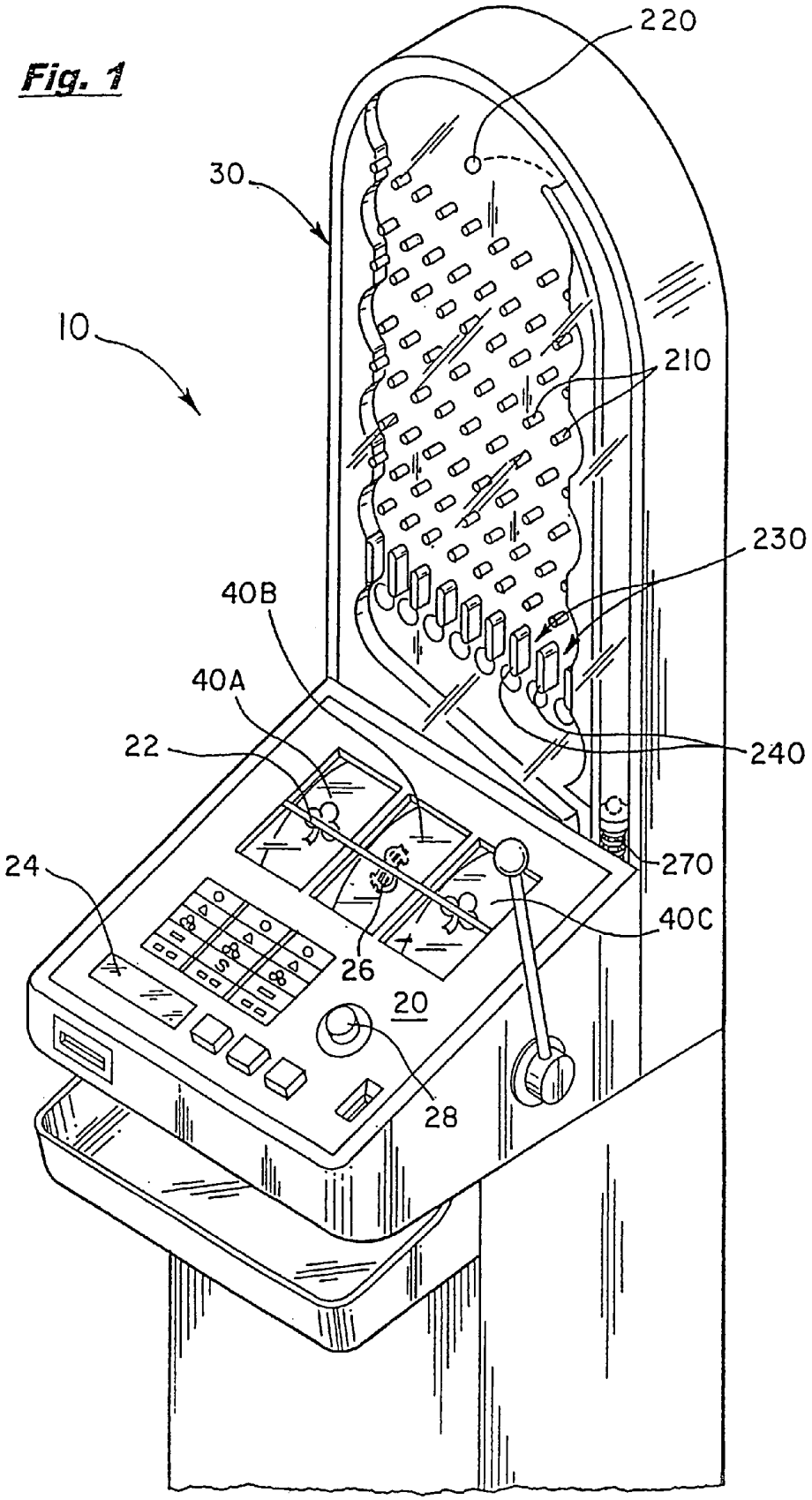


Fig. 2

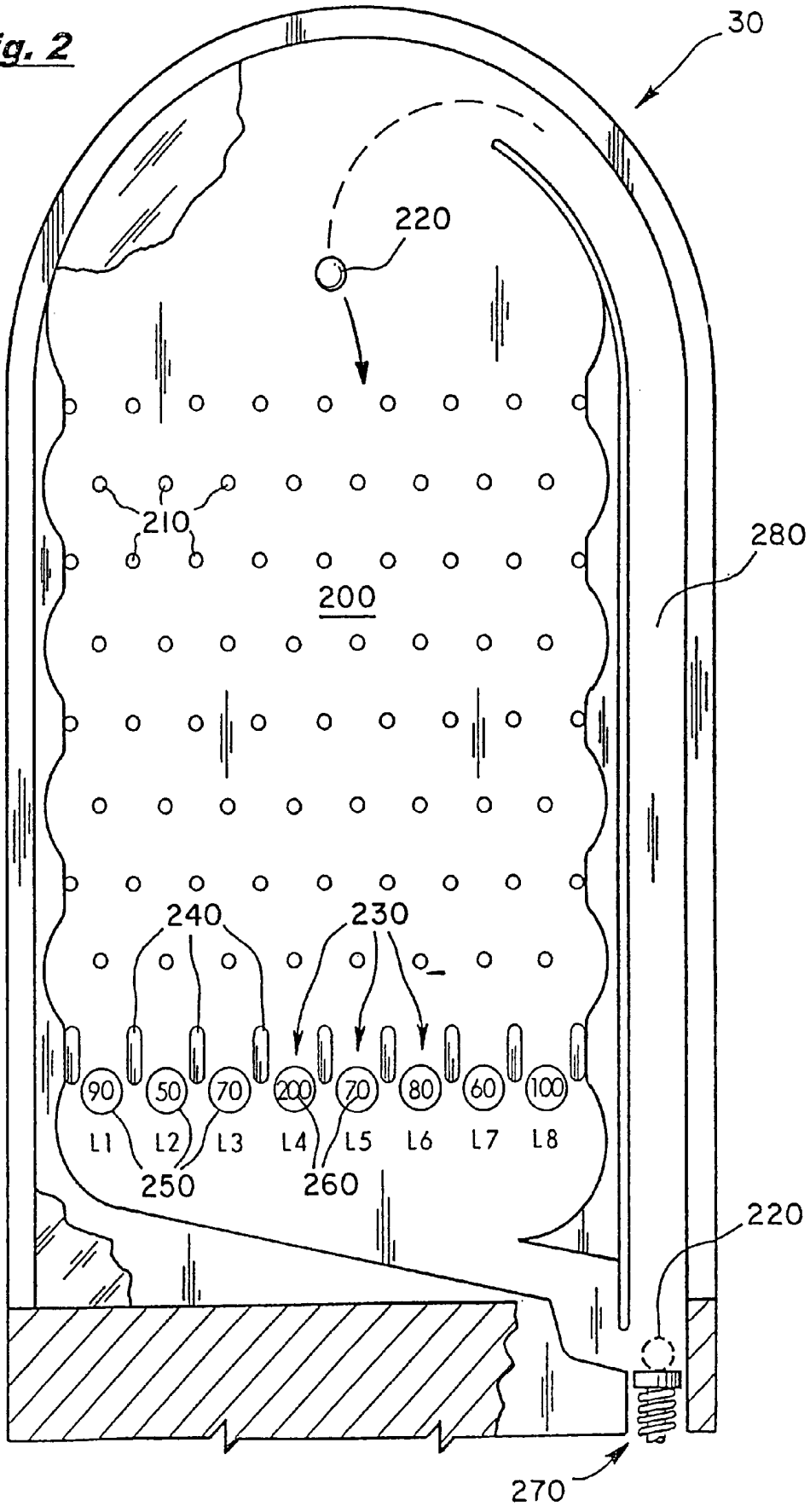
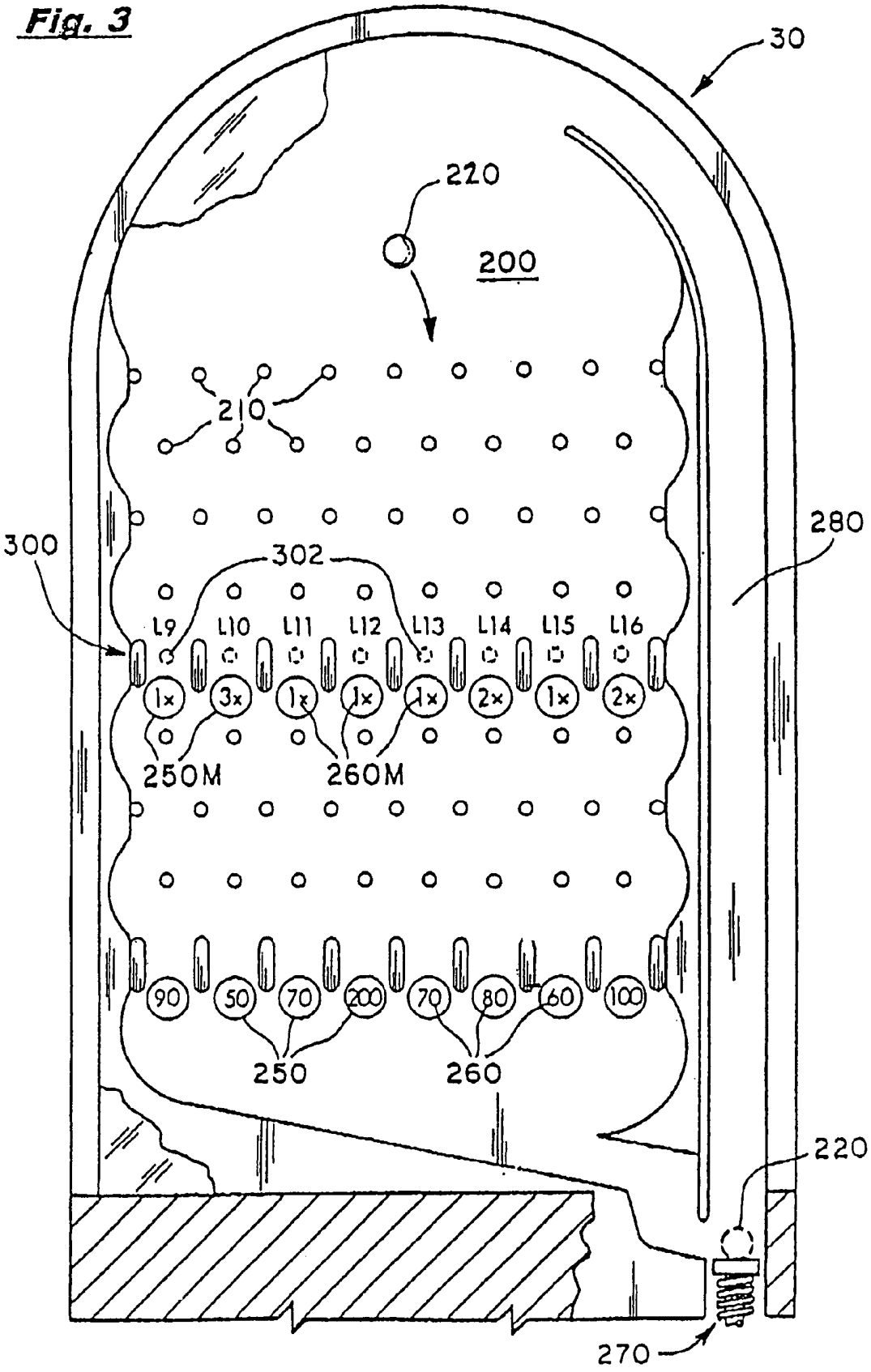

30
220
210
200
280
240
230
90
50
70
200
70
80
60
100
L1
L2
L3
L4
L5
L6
L7
L8
250
260
220
270

Fig. 3


30
220
200
210
280
300
302
L9
L10
L11
L12
L13
L14
L15
L16
1x
3x
1x
1x
1x
2x
1x
2x
250M
260M
90
50
70
200
70
80
60
100
250
260
220
270

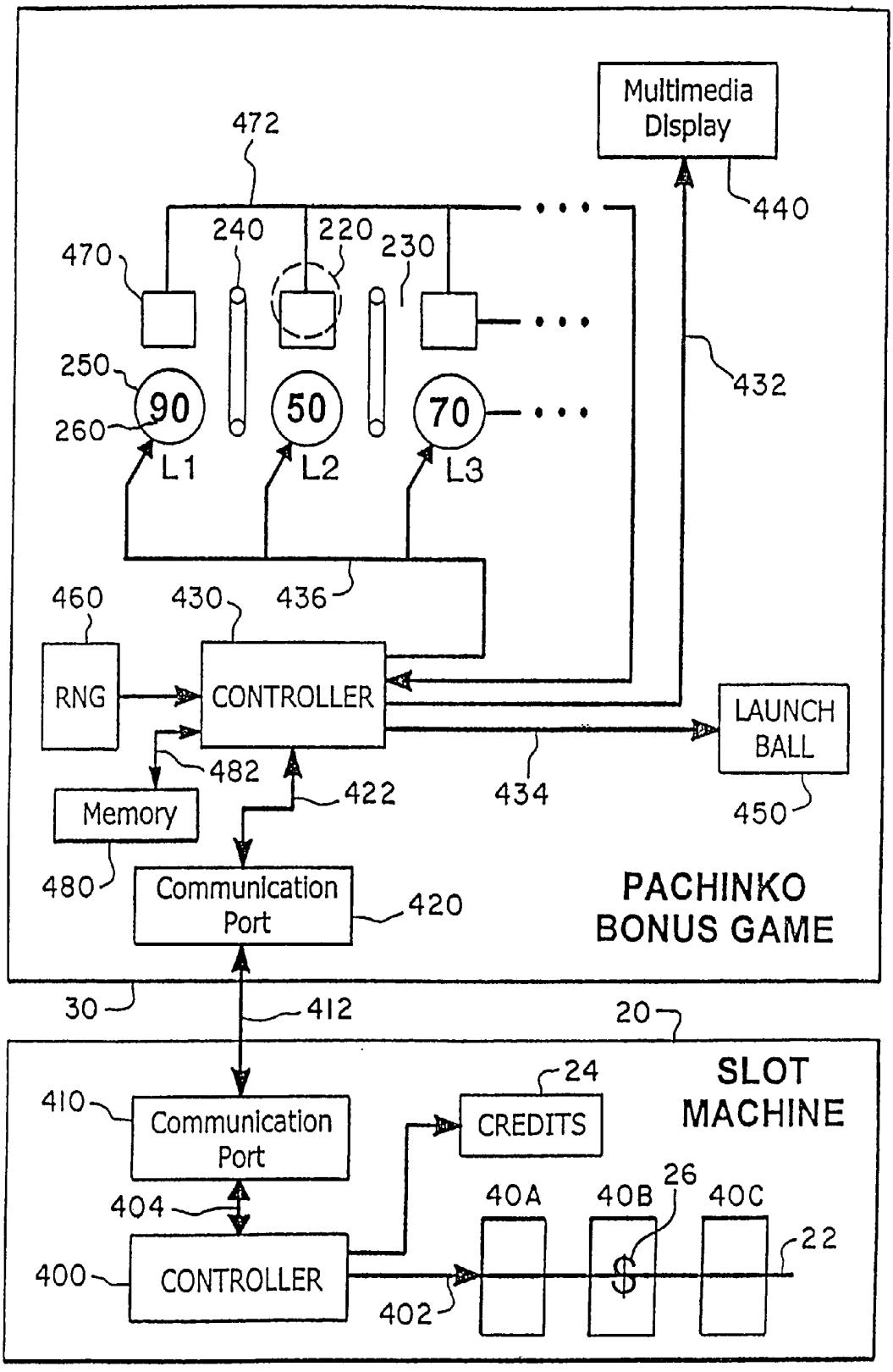

Multimedia Display
472
440
240
220
230
470
250
90
50
70
260
L1
L2
L3
432
436
460
430
RNG
CONTROLLER
LAUNCH BALL
482
422
434
450
Memory
480
Communication Port
420
PACHINKO BONUS GAME
30
412
20
SLOT MACHINE
24
410
Communication Port
CREDITS
26
404
40A
40B
40C
22
400
CONTROLLER
402
$

Fig. 4

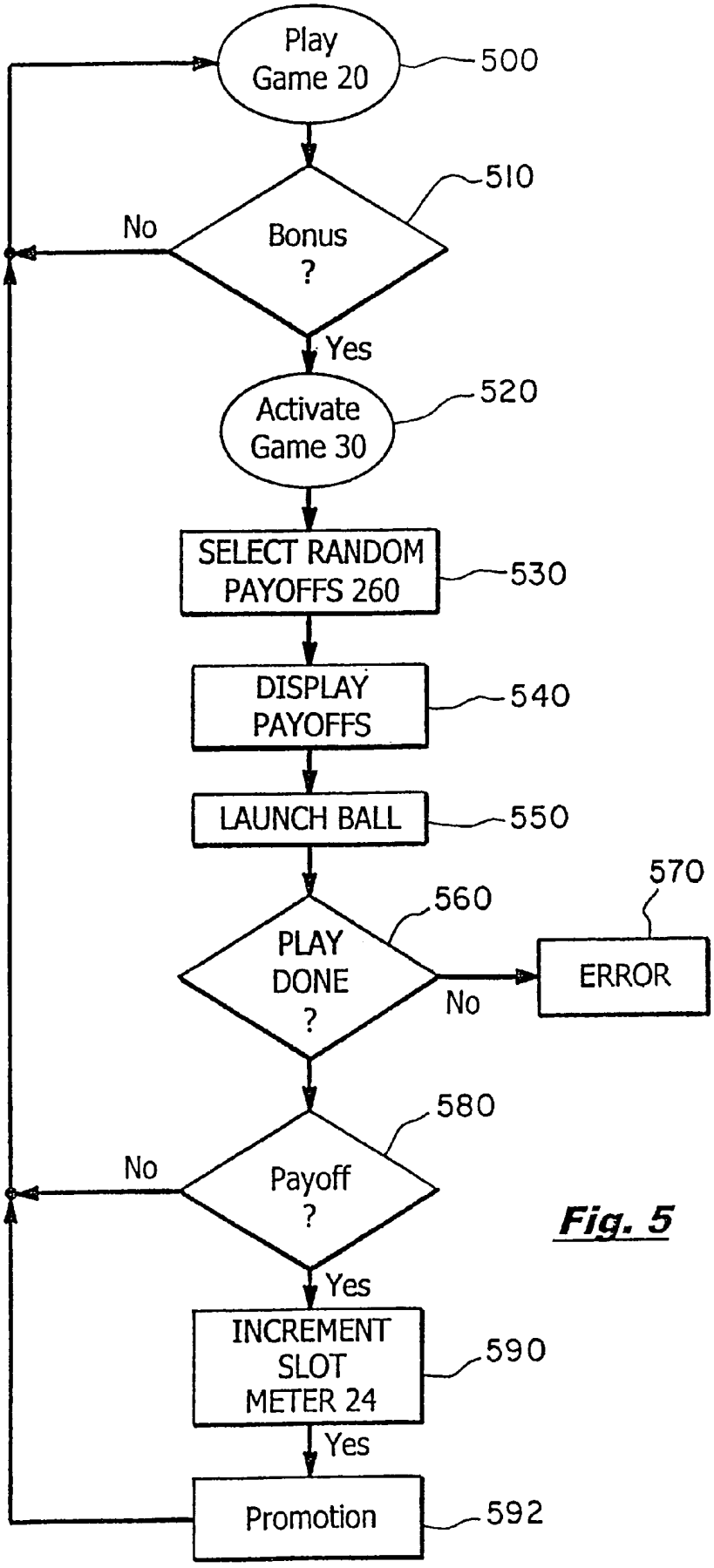

Play Game 20
500
Bonus ?
510
No
Yes
Activate Game 30
520
SELECT RANDOM PAYOFFS 260
530
DISPLAY PAYOFFS
540
LAUNCH BALL
550
PLAY DONE ?
560
570
ERROR
No
Payoff ?
580
No
Yes
INCREMENT SLOT METER 24
590
Yes
Promotion
592

Fig. 5

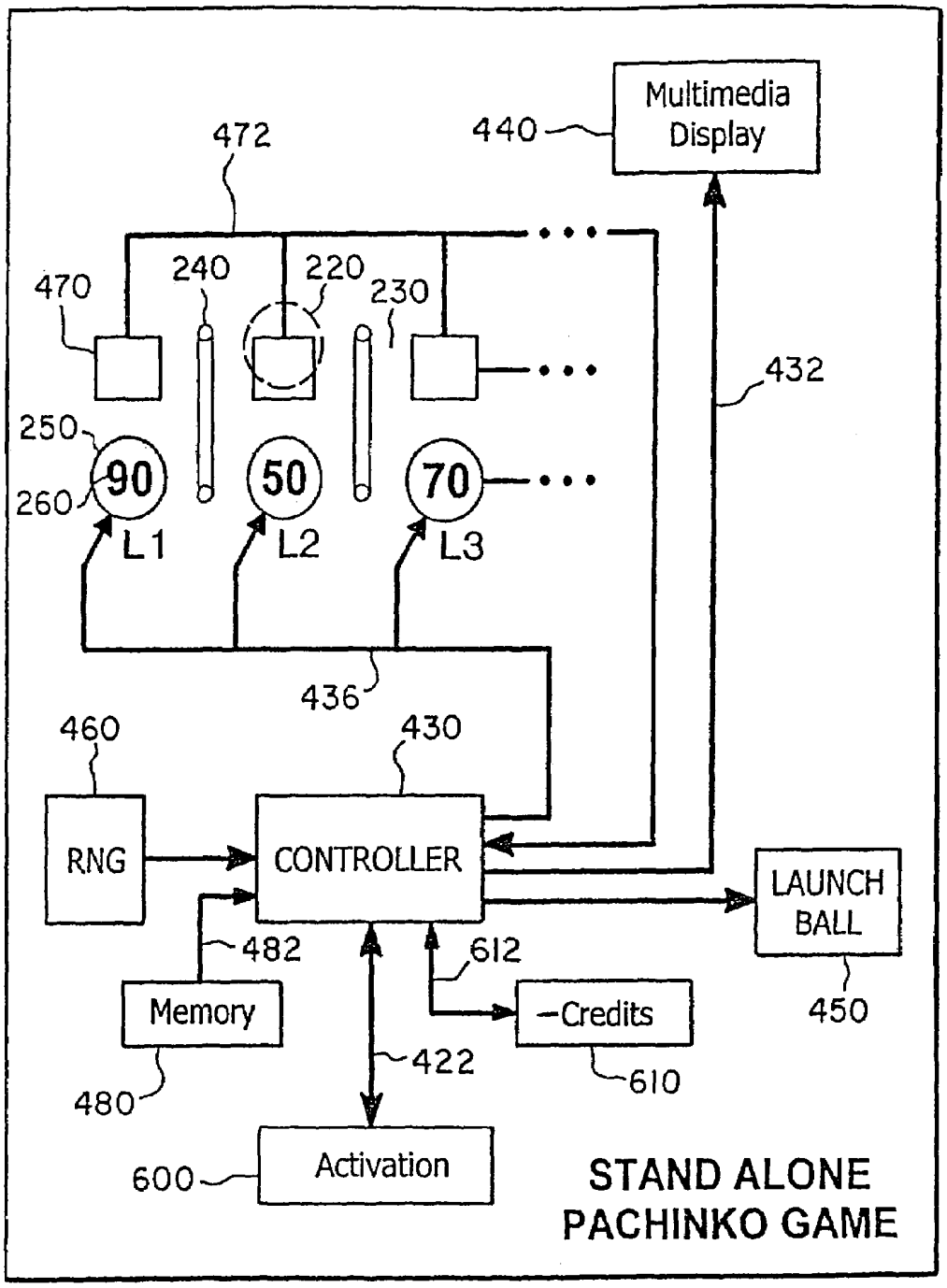

Multimedia Display
440
472
470
240
220
230
432
250
90
50
70
260
L1
L2
L3
436
460
430
RNG
CONTROLLER
LAUNCH BALL
482
612
Memory
Credits
450
422
480
610
600
Activation
STAND ALONE PACHINKO GAME

Fig. 6

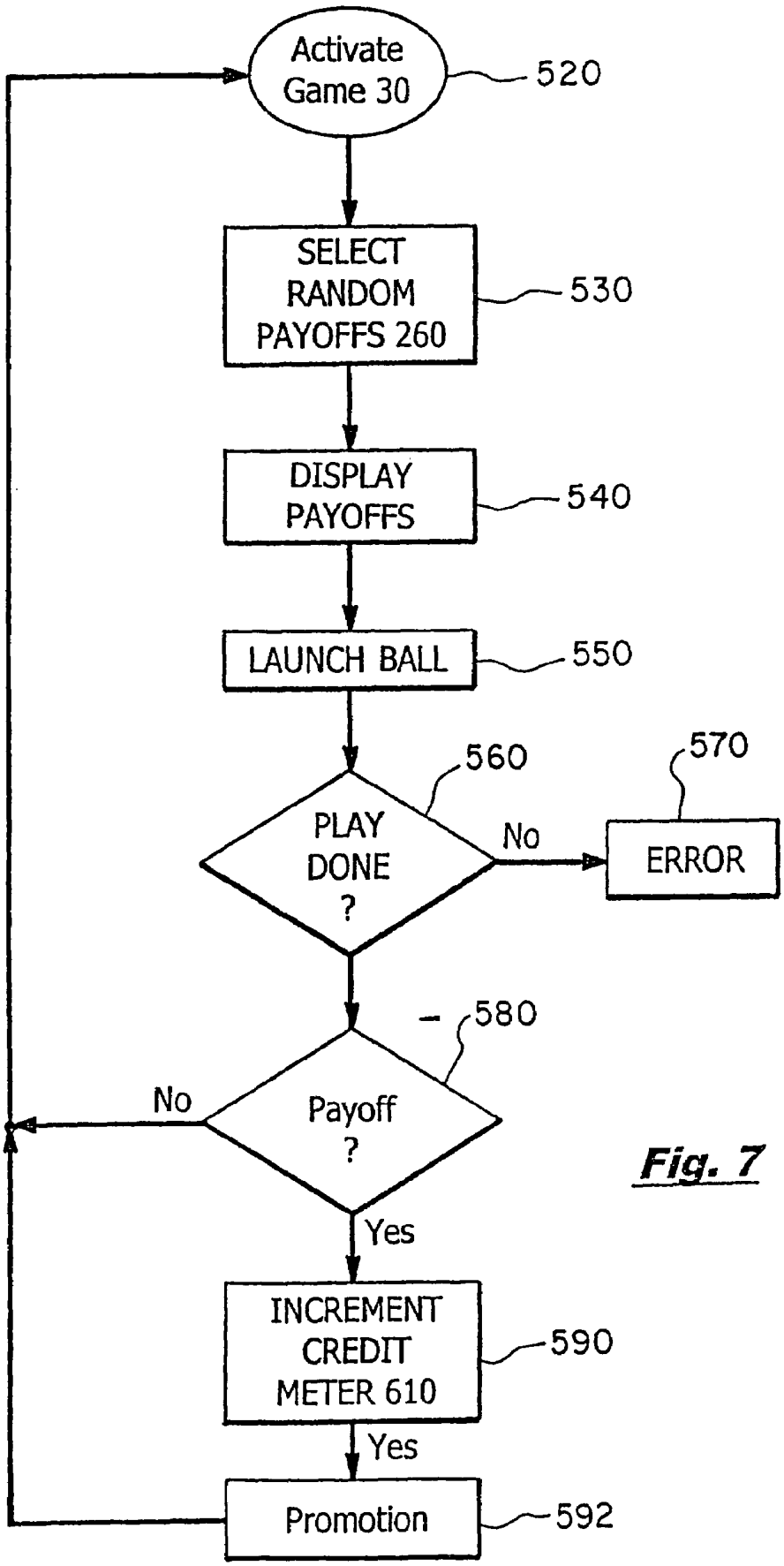

Activate Game 30
520
SELECT RANDOM PAYOFFS 260
530
DISPLAY PAYOFFS
540
LAUNCH BALL
550
560
PLAY DONE ?
No
570
ERROR
580
Payoff ?
No
Yes
INCREMENT CREDIT METER 610
590
Yes
Promotion
592

Fig. 7

METHOD FOR OPERATING MECHANICAL CASINO BONUS GAME IN THE PRESENCE OF MECHANICAL BIAS

RELATED INVENTION

This application is a continuation of U.S. patent application Ser. No. 10/161,568 filed Jun. 3, 2002 now U.S. Pat. No. 6,896,261, which is a continuation of U.S. patent application Ser. No. 09/632,357 filed Aug. 3, 2000, now U.S. Pat. No. 6,398,219 issued Jun. 4, 2002, which is a continuation of U.S. patent application Ser. No. 09/442,831 filed Nov. 17, 1999, now U.S. Pat. No. 6,139,013 issued Oct. 31, 2000, which is a continuation of U.S. patent application Ser. No. 09/098,804 filed Jun. 17, 1998, now U.S. Pat. No. 6,047,963 issued Apr. 11, 2000, which claims priority to U.S. Provisional Patent Application Ser. No. 60/081,724 filed Apr. 14, 1998 entitled "PACHINKO STAND-ALONE AND BONUSING GAME."

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to Pachinko games and, in particular, to a Pachinko stand-alone game and to a Pachinko bonus game for an underlying game such as a slot machine.

2. Statement of the Problem

Slot machine bonusing features have become popular, and examples of their success include WHEEL OF GOLD, WHEEL OF FORTUNE, JEOPARDY!, REEL 'EM IN, PIGGY BANKIN', and many others. What has been heretofore lacking is a bonus game which utilizes the excitement and dynamic qualities of Pachinko. A need exists to provide a form of Pachinko as a bonus game for an underlying game such as a slot machine.

One problem associated with Pachinko games, in general, is that wear and tear caused by repeated play causes bias to occur wherein a ball may more frequently pass through certain lanes rather than through other lanes. A need exists to provide random payoffs during the play of Pachinko whether as a bonus game for an underlying game or as a stand-alone game despite bias caused by wear and tear.

U.S. Pat. No. 5,016,879 provides a Pachinko game wherein one of a fixed set of scoring value symbols (i.e., the $100, plum and cherry symbols as shown in FIG. 4) associated with each scoring slot is selectively illuminated for the entire game. A random number generator has a plurality of numbers which are assigned to each of the value symbols so that at the insertion of a bet, the random number generator identifies which of the three possible value symbols will be active in each scoring slot for that particular game. While this solves the above-stated need to overcome bias, it limits payoff to a fixed or static number of value symbols provided at each slot. Once a set of values are allocated, the random selection merely reassigns the allocated values to new scoring slots in the next game. In order to provide a higher payoff, the '879 patent provides a "free" game. If during the "free" game the player hits a back-to-back jackpot, then a large payoff is made. For example, when the player receives three "100s," the player receives a "free" game. In the "free" game, if the player again receives three "100s," the player wins the large payoff. A need exists to provide a Pachinko game that does not provide a static number of payoff value symbols for each slot and also provides a full range of higher payoff awards without the requirement of a "free" game. A need also exists to provide displayed payoff values at each lane that change during the play of the game.

Finally, a need also exists to provide additional excitement to the conventional play of a game such as video poker, slot machines and the like by providing additional random play in the dispensing of different values when a winning combination on the game is obtained.

SUMMARY OF THE INVENTION

1. Solution to the Problem. The present invention addresses the aforesaid needs. The Pachinko bonus game of the present invention is placed near an existing slot machine such as on top of, at the rear of, side-by-side with, or located near (such as on a wall). The Pachinko bonus game is started when an initiation condition such as when a symbol or combination of symbols align on the payline of the slot machine. The payoff selection and display on a per game basis is random so that biasing caused by wear and tear is eliminated whether the Pachinko game is played as a bonus game or as a stand-alone game. The Pachinko game can be used to dispense large payoffs periodically as well as smaller payoffs for conventional winning combinations of the underlying game. Finally, the payoff values displayed at the Pachinko game can vary during the play of the game.

2. Summary. The present invention pertains to a Pachinko bonus game system for an underlying game machine (such as a slot machine) being played by a player. The underlying game machine has a credit meter. The Pachinko bonus game system provides a playing field wherein the playing field has a plurality of rows of pegs with each row of pegs staggered from each adjacent row. A ball is launched onto the playing field by a launch mechanism. The launching or propelling of the ball onto the playing field occurs when an initiate condition occurs during play of the underlying game. In the case of a slot machine, the initiate condition can be the appearance of a special symbol on the payline. A number of different initiate conditions can be utilized based upon the underlying game. A row of lanes are provided on the playing field. The ball, after traversing among the pegs on the playing field, eventually travels through one of the lanes. At each lane is displayed a bonus payoff value. The lane the ball travels through senses the presence of the ball and the value displayed for that lane is added to the credit meter. The bonus payoff values are displayed at each lane with a flush mounted display so as not to interfere with or impede the travel of the ball through the lane. The bonus payoff values are randomly changed which would eliminate any mechanical bias present in the Pachinko game. The payoff values can also change during play of the game.

The Pachinko stand-alone game operates independently of an underlying game and is conventionally activated by a player to play the game. However, the playing field, ball, launch mechanism, rows of lanes, and the payoff display are as described above for the Pachinko bonus game with the exception of the credit meters in the Pachinko stand-alone game.

And in yet another embodiment of the present invention, the Pachinko game system operates as a payoff dispenser for a conventional game.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** illustrates the Pachinko bonus game of the present invention associated with a slot machine.

FIG. **2** is a front view of the Pachinko bonus game of the present invention.

FIG. **3** is a front view of a second embodiment of the Pachinko bonus game of the present invention.

FIG. **4** is a block diagram of the interconnection showing the components of the Pachinko bonus game connected to the slot machine.

FIG. **5** is an operational flow chart for the Pachinko bonus game of the present invention.

FIG. **6** is a block diagram of the stand-alone Pachinko game of the present invention.

FIG. **7** is an operational flow chart for the stand-alone Pachinko game of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

1. Overview. In FIG. **1**, the system **10** of the present invention is shown to include an underlying game such as a conventional slot machine **20** modified according to the teachings herein and a Pachinko bonus game **30** also modified according to the teachings herein. In FIG. **1**, which represents one embodiment of the present invention, the Pachinko bonus game **30** is vertically mounted at the rear of a slanted slot machine **20**. The Pachinko bonus game is located at the slot machine **20**. The term "at" includes locating the Pachinko bonus game **30** "at the rear of," "on top of," "side-by-side with" or "near" the underlying game **20**. Furthermore, one Pachinko bonus game **30** could be used with a number of underlying games **20** such as twenty slot machines. In which case, the Pachinko bonus game would be mounted at a central location such as on a wall above the slot machines. Furthermore, the underlying game **20** can be any suitable game such as, but not limited to: slot machines, video poker, and other automated gaming machines, live-table games, and other games of chance. In the following the configuration of FIG. **1** is used to illustrate the teachings of the present invention. For example, the Pachinko bonus game could be located near the slot machine **20**, such as mounted on a wall and connected thereto by a cable.

The adjacent slot machine **20** functions conventionally when taking wagers, making payments and being played. The slot machine **20** has a conventional credit meter **24** which displays the player's current credits. Slot machines **20** are conventional and are made by a number of different manufacturers. How and in what form (i.e., coin-ins, dollar acceptors, magnetic cards, smart cards, etc.) wagers are placed at the slot machine **20** by a player is immaterial to the teachings of the present invention. What is material is that the credit meter **24** of the slot machine **20** is modified to increase when the player wins at the Pachinko bonus game **30**. In addition, should an initiation condition arise during play of the slot machines such as a special symbol **26** (or set of symbols) appearing on the payline **22** of the slot machine **20**, it automatically activates the Pachinko bonus game **30** (and deactivates the slot machine **20**) so that the player of the slot machine **20** can play the Pachinko bonus game **30**. Other means to "initiate" the Pachinko bonus game **30** are possible. The occurrence of a "winning combination" in the underlying game such as "two cherries" in a slot machine, or "twenty-one" in a blackjack game, or "three twos" in joker poker. The occurrence of the player accumulating a predetermined amount of winning such as "seventy-seven" dollars (or coins) in the underlying game. The occurrence of a symbol such as a "bonus" symbol appearing anywhere in the window or field of view in a slot machine even if it is not on the payline or receiving a card in a card game having a bonus symbol on it. The occurrence of an event such as a random signal to participate in the bonus game.

When utilized as a bonusing mechanism, the preferred Pachinko bonus game **30** embodiment utilizes one ball **220**, which is propelled up onto a playing field **200** comprising alternately spaced rows of pegs **210**. After traversing the playing field **200**, the ball **220** falls through one of a plurality of chutes or lanes **230** separated by bumpers **240**. The player receives an appropriate bonus payoff corresponding to the lane **230** the ball **220** travels through. The bonus payoff is credited to the slot game meter **24**. The bonus game **30** ends and play reverts to the slot machine **20**. The Pachinko game could also have a separate credit meter which is selectively incremented.

The underlying game could be any suitable game such as, but not limited to, a live game such as cards, roulette, etc. or a gaming machine such as slots, joker poker, Pachinko, etc. While the present invention uses a single ball, it is to be understood that more than one ball can be launched or that more than one launch could occur during play of the game.

2. Details of Pachinko Game **30**. In FIG. **2**, the Pachinko bonus game **30**, in the preferred embodiment, has eight payable lanes **230**: L**1**-L**8**. Any suitable number of lanes **230** could be used such as but not limited to 6, 10, 13, etc. The displays **250** shows the payoffs in each of the eight lanes to the player. Each payoff display **250** is a digital meter which is flush mounted in the field **200** so as not to interfere with the ball **220**. The displays **250**, in some embodiments, may be located in a separate viewing area on, the Pachinko bonus game **30** although it is preferred to have the displays **250** located at (i.e., in, above, or near) the lanes **230** so that a player may easily view the bonus payoff for that lane. The display **250** is a conventional digital display such as an LED and it may be circular, square, or any suitable shape or design. It is to be expressly understood that in certain embodiments of the present invention, the display **250** can be simply printed with fixed bonus payout values. As will be explained in the following, in the preferred embodiment the displays **250** are utilized to display individual payout values **260** for each lane **230**. Furthermore, the actual design of the field **200** for the Pachinko bonus game **30**, as is conventionally done, varies considerably from manufacturer to manufacturer. While the playing field uses pegs, any suitable deflection device such as pins, bumpers, flippers, etc. could be utilized. Hence, the present invention is not meant to be limited by the design characteristics of the Pachinko game **30**.

In the preferred embodiment, the Pachinko game **30** of FIG. **2** becomes activated when an initiation condition occurs in the underlying game **20**. For example, in FIG. **1**, the appearance of a dollar sign **26** anywhere on the payline **22** allows the player to play the Pachinko bonus game **30**. Any symbol or combination of symbols may be used to activate the Pachinko bonus game **30** such as, but not limited to, a graphic Pachinko symbol, a four-leaf clover, or the word "bonus." When the Pachinko game is activated, a light and sound campaign can be used to signal to people in the vicinity of the player's opportunity to play the Pachinko bonus game **30**. For live games such as cards, the dealer or player can activate the game. The player pushes button **28** to activate the firing mechanism **270** which launches the ball **220** forcefully upward from the bottom and along the side of the machine as shown in area **280** and onto the playing field **200**. In another design, the ball launch is automatic and occurs automatically after the initiation condition occurs. Assume in FIG. **2**, that the ball **200** is directed through lane L**6** in which case the player receives the payoff **260** displayed in display **250** of $80 (or 80 coins). The credit meter **24** of the slot machine **20** is then incremented by the value

of the payoff. The payoff could also be made in coupons, tickets, free plays, etc. In which case, the credit meter **24** would not be incremented. It is to be understood that a separate credit meter, not shown in FIG. **4**, but shown in FIG. **6**, could be utilized to keep track of the bonus payoffs.

The ball **220** is preferably three-quarters of an inch to one and one-half inch in diameter (i.e. about one inch). For example, in games **30** mounted on a wall, the ball **220** and pegs **210** would be scaled up such as having wider lanes. The pegs **210** are preferably on one and one-half to two-inch centers and each peg is preferably three-sixteenths an inch in diameter. Each row of pegs **210** is preferably staggered from the adjacent row above and below by one-half the center-to-center distance between pegs **210**. These dimensions illustrate the present invention and are not meant to limit the teachings thereof. While the present invention uses one ball **220** per bonus, it is to be understood that more than one ball **220** could be used and that more than one ball **220** could be simultaneously or successively launched. Furthermore, the present invention is not limited to balls. Any suitable play piece such as, but not limited to, a disc or token could be utilized.

It is important to prevent outside influences from affecting the operation of the Pachinko bonus game **30** such as 1) possible tilting of the Pachinko game **30** to coax the ball **220** into desirable lanes **230** and 2) possible use of magnets to coax a steel or magnetic ball. Both of these concerns are minimized in the present invention by using conventional leveling sensors and a non-magnetic ball **220**. The algorithms, methods and display techniques discussed herein also counter such outside influences. While the use of plastic is preferred, the teachings of the present invention are not limited to plastic and other non-magnetic materials may be used. Furthermore, the algorithms and methods contained herein would also apply to conventional steel balls. Hence, the teachings of the present invention are not to be limited to use of either plastic balls or leveling sensors.

3. Algorithms. Algorithms for assigning the bonus game **30** payoff values **260** to the lanes L**1**-L**8** include, but are not limited to, the following three algorithms:

Algorithm No. 1

The slot machine **20** assigns a random payoff value **260** to the bonus game **30**, either before or during play, that is independent of the outcome of the Pachinko action. After the ball **220** travels through a lane **230**, the predetermined random payoff value **260** assigned by the slot machine (or any underlying game) is displayed in display **250**. Under this algorithm, the value of bonus payoffs is not determined by the ball **220** play in the Pachinko game.

Algorithm No. 2

Bonus payoff values **260** are randomly assigned to each lane **230** as a function of time and based upon game play. The value **260** for the bonus game **30** is determined by the displayed lane value at the time the ball **220** passes through a lane **230**. This algorithm can either be free running (i.e., continuously) or start when the Pachinko bonus game **30** is activated. If free running, the cycle time for displaying a set of bonus payoffs **260** in displays **250** is preferably less than the typical Pachinko bonus game cycle time. For example, if it takes an average five seconds to play the Pachinko bonus game **30**, then the display time could be two seconds. In this example, every two seconds new payoffs **260** would be randomly displayed in displays **250**. The display time cannot be too fast since it must be viewed by a player, nor can it be too slow, if free running, since a player could take advantage of high payout values. Under the teachings of the present invention, the display time, T_D, is preferably less than the game cycle time, T_G, or $T_D \leqq T_G$.

It is to be understood that the display in each lane could change at the same time; or the display in each lane could change at staggered times. For example, the first lane at time T_0, the second lane at time T_0+T_S, the third lane at time T_0+2T_S, etc.; where T_S is a predetermined stagger time period. This creates a flickering effect which is aesthetically pleasing. In yet another embodiment, the time a value is displayed in a lane is constant (equal), but the frequency of selection is based upon the weight of the value. These variations for the display time are discussed in more detail in a later section.

Algorithm No. 3

Bonus payoff values **260** are assigned and displayed in displays **250** to each lane **230** randomly, via a weighted probability pay table, at any time after the bonus game **30** is activated and before the ball **220** travels through a lane **230**. These bonus payoff values **260** remain fixed and the lane **230** selected by the ball **220** determines the ultimate payoff amount for the bonus game. Algorithm No. 3 is the preferred embodiment for determining bonus payoff values **260** in that it allows players to see what bonus payoffs are possible, and to root for the ball **220** to settle into lanes **230** with high potential payoffs. It also gives players reassurance in knowing that no "funny business" is taking place (i.e., after launch the values **260** are fixed and known to the player, and subsequently the ball **220**—and the ball **220** alone—determines the bonus payoff **260** the player will receive).

The above three algorithms are preferred embodiments. Other algorithms could be equivalently used under the teachings of the present invention.

4. Bonus Payoff Values **260** Details Based on Algorithm No. 3. Assume the desired average bonus payoff value for the Pachinko bonus game **30** is D units. The term "units" is used to refer to any suitable bonus payoff form such as monetary value (dollars), numbers of coins (number of quarters), tickets, etc. The teachings of the present invention are not limited to the form of the bonus payoff. Two preferred methods are used to determine the payoff.

Method 1: This method assigns bonus payoff values **260** to each lane **230** such that the expected value per lane **230** remains at D units, while particular bonus payoff values fluctuate above and below D units. In this fashion, the average value per game still remains at D units, but players experience variety in game play. In Method 1, the average value per game remains equal to D units regardless of any bias which may exist or which may develop in the Pachinko bonus game **30** toward the lanes **230** and is accomplished in the following manner.

Let the number of lanes be N_L and the number of payoffs for lane be R_l. The set of payoffs and their associated weights (i.e., probabilities) for lane is $P_{l,k}$ and $w_{l,k}$, where k is an index assuming values from 1 to R_l. Let the desired average value for the game be D. Then for each lane the expected value becomes:

$$EV_l = \Sigma_k (w_{l,k} \times P_{l,k}) \equiv \text{a constant} \qquad \text{FORMULA 1}$$

where EV_l=Expected Value for lane

$P_{l,k}$=Set of rewards for lane

$w_{l,k}$=Weights per lane

Summing over the game lanes, with unknown probabilities of occurrence W_l, yields the expected value, EV, per game:

$$EV=\Sigma_l(w_l \times EV_l)=EV_l \times \Sigma w_l=EV_l \quad \text{FORMULA 2}$$

Thus EV for the game is simply that of each lane, provided this is constant (i.e., equal for each lane). Furthermore, EV is independent of the weights w_l of occurrence for each lane. Thus any bias developing through wear and tear which affects the w_l has no bearing on EV. With no multiplier (M=1), the solution is EV=D. This is an important advantage of the present invention that the bonus payoff values **260** of the game are unaffected by physical wear and tear of the associated hardware. That is, even if the Pachinko bonus game **30** becomes biased toward one or more lanes **230**, the bonus payoff value **260** of the game is unchanged. Randomness and fairness to the house and to the player is maintained. In the worst case of bias, the ball would fall through the same lane, game after game, yet the value, D, for the game is recovered.

Assume the Pachinko bonus game **30** has a value, per play, of EV=D=50 units, then the following is an example of a weighted matrix of random assignments for each lane L**1**-L**8** of FIGS. **1** and **2**:

TABLE I

	Weights/Lane								
Payoff	L1	L2	L3	L4	L5	L6	L7	L8	
10	0.15	0	0	0.7	0	0	0	0	
20	0.1	0	0	0	0	0	0	0.1	
30	0.1	0	0.25	0.1	0.2	0.4	0	0.6	
40	0.1	0	0	0	0.2	0.2	0.5	0	
50	0.1	1	0.5	0	0.2	0	0	0	
60	0.1	0	0	0	0.2	0	0.5	0	
70	0.1	0	0.25	0	0.2	0.2	0	0	
80	0.1	0	0	0	0	0.2	0	0	
90	0.15	0	0	0	0	0	0	0	
100	0	0	0	0	0	0	0	0.3	
200	0	0	0	0.2	0	0	0	0	
	50	50	50	50	50	50	50	50	EV

For example, for lane L**4**, there is a 70% chance the payoff chosen is 10 units, a 10% chance it is 30 units, and a 20% chance it is 200 units. The expected value for lane **4** is therefore 0.7×10+0.1×30+0.2×200=50 units, as required. The average bonus payoff value for each lane **230** is 50 units. However, the weights and associated possible bonus payoffs for each lane can be very different from each other. Furthermore, not all payoffs need to be possible for each lane, and vice-versa.

Several examples illustrate the operation of Table I. In the first example, assume that the controller (as will be discussed subsequently) selects the following payoff values for lanes L**1**-L**8** of FIG. **2**: {90, 50, 70, 200, 70, 80, 60, 100} which is shown in FIG. **2**. In this first example, the controller has selected the highest bonus payoff combination for each lane which is possible under this method. It is also possible, under this method and as a second example, that the lowest combination of values could be selected and displayed in lanes L**1**-L**8**: {10, 50, 30, 10, 30, 30, 40, 20}. The second example represents the lowest payoffs that can be selected for each lane. Of course, any random combination of payoffs **260** based upon the percentage weights per lane could be selected by the controller from the payoff values in Table I. It is noted that for lane L**2** in Table I, the payoff value of 50 is always selected. Under the teachings of the present invention any set of payoffs are possible such that Formula 1 is satisfied.

Further, to add even more randomness, the lanes L**1**-L**8** can be rotated from game to game (i.e., the weights for lane **1** may be applied to lane **2** in the next game, and so forth). The fixed value of 50 for lane L**3** in Table I would be the value for lane L**4** for the next game, for lane L**5** etc. Or, the mapping from Table I for each successive game to actual lanes **230** may be done in a random fashion. The fixed value of 50 for lane L**3** in Table I would be the value for a randomly selected lane such as lane L**7** for the next game.

Note, too, that this algorithm does not require that each expected payoff, on a per-game basis, is always exactly D units. This volatility is a further advantage of this approach. For a third example, the lane payoff values are randomly chosen to be: {80, 50, 50, 200, 30, 40, 60, 30} for lanes L**1** through L**8**, respectively. The probability of this occurring is 0.00012, and the expected value for the bonus game **30** is greater than 50 units. However, in the long run, the payoff will average D units.

Table I represents an illustration showing how bonus payoff values **260** are randomly selected from a weighted matrix from bonus game to bonus game. Many other values of combinations are possible which fall within the teachings of the present invention. D may be any suitable value, the number of lanes L are a design choice, whether the lanes rotate, and the actual payoff values can be tailored to the casino's requirements. A low value of D, such as D≦5, would generate little excitement in playing the Pachinko bonus game **30**, while a high value of D, such as D≧100, would generate higher excitement. Also of consideration is how frequently the bonus symbol(s) **26** stop at the payline **22**. The more frequent, then a lower D may be desirable. The lower the frequency, then a higher D may be desirable. As will be discussed later, the weighted pay tables are stored in suitable memory and a random number generator is used to select payoff values from the weighted pay tables for display **250** in each lane L**1**-L**8**.

Method 2: An alternate approach which yields the same expected value EV each game is to randomly select a set of bonus payoff values **260** whose average value is D, and then assign each element of this set randomly to a lane **230**.

For example, consider the following set of lane payoffs L**1**-L**8**: {20, 20, 30, 40, 40, 50, 100, 100} with an average value D=50. Each of these payoff values **260** are randomly mapped to a lane in a one-to-one fashion, thus ensuring a game of value D. No equipment bias affects the expected value of the game, through the random assignment of values to lanes from game to game. In choosing different sets of lane payoffs, the volatility of playing the bonus game **30** may be increased or decreased.

A modified form of Methods 1 and 2 is to tie into the temporal approach of Algorithm 2 by randomly varying the lane value **260** as a function of time, with frequency governed such that the time-averaged value is D (e.g., by Table 1 above). This can be done by, e.g., fixing the time of a reward at T_D and selecting based on weight w, or fixing the selection as the same for all and selecting the period proportionate to weight. Other manifestations are possible. Provided that the period (time between changing values) is shorter than the typical cycle time for a ball to drop through a lane, but long enough for a player to recognize the present lane value, the game should provide considerable excitement. This will be discussed later.

Under the teachings of the present invention, instead of credits, prizes or other types of awards may be provided.

5. Lane Multiplier(s) Algorithm. In addition to the algorithms described above, additional lanes are provided elsewhere on the playing field **200** in an alternate embodiment.

Such rows could be added above or below lanes L**1**-L**8**. Such rows are designated areas of the playing field **200** that change the payoff value. While rows are shown, specific areas could be utilized. Sensors **302** such as trip levers, photodiodes, etc. can sense when the ball passes through the designated area.

Consider the embodiment shown in FIG. **3** in which an additional row **300** of lanes L**9**-L**16**, positioned midway through the playing field **200**, is utilized as a multiplier (i.e., M=1×, 2×, 3×, . . .). The "×" symbol is used in the following as a "multiply sign." This row contains eight lanes also, each mapped in a random fashion to the set {1×, 1×, 1×, 1×, 1×, 2×, 2×, 3×} for lanes L**9**-L**16**. The multiplier value **260**M is displayed in flush mounted displays **250**M so that a player may easily view the multipliers assigned to that lane. Each new game results in randomly selected values for M for each lane. Then the average value of the multiplier M is 1.5×. This can be multiplied by the value of D for the lower lanes L**1**-L**8** to determine the EV for the game as a whole. To whit,

$$EV=M\times D \qquad \text{FORMULA 3}$$

Alternately, the values for the multipliers may be chosen in a fashion similar to that described in Method 1 above.

It is to be expressly understood in this embodiment, that any number of lanes in row **300** could be utilized to provide the multiplication. Furthermore, one or more of the lanes L**9**-L**16** could be a "lose" lane (i.e., OX) so that when the ball **220** falls through that lane, the player loses; in which case when the ball **220** continues to fall and travel through on lanes L**1**-L**8**, the payoff value is not recorded. Indeed, passing through a lose lane, in one embodiment, would instantly cause the displays **250** to display "zero" and there could be a multimedia display informing the player and others of the lose. The location and number of the additional lanes L**9**-L**16** is a design choice and they vary in number and can be placed anywhere in the playing field **200** above or below the pay lanes L**1**-L**8**. They do not have to be aligned in a row and can be dispersed on the field **200**. Indeed, in some designs the ball **220** may enter a first multiplier lane (e.g., 2×) and then a second multiplier lane (e.g., 3×) before entering a payoff lane (e.g., $10—in which case the player receives 2×3×$10=$60). The number of lanes, the position of the lanes, and the number of rows are simply a design choice and do not depart from the teachings of the present invention; Under the teachings contained herein at least one multiplier area (i.e., one lane) could be used.

6. Lane Addition Algorithm. The row **300** in another embodiment could be additive, subtractive, or both. For example, lanes L**9**-L**16** could be {1+, 1+, 1+, 1+, 1+, 2+, 2+, 3+} mapped in a random fashion where the average addition is A=1.5+. In another example, lanes L**9**-L**16** could be {1+, 1+, 1−, 1−, 2+, 2−, 3+, 3−} mapped in a random fashion where the average addition is A=0. Again, only one, more than one, or a number of additive lanes equaling the number of payoff lanes could be used. Under the teachings contained herein, at least one addition area (i.e., one lane) could be used.

7. Double-or-Nothing Algorithm. In another embodiment, the player may replay the Pachinko bonus game as follows.

The player is given the option to double-or-nothing the bonus payoff just received such as by re-pushing a button **28** in FIG. **1**. Should the player decide to risk the winnings from the prior Pachinko bonus game, the Pachinko lanes L**1**-L**8** would then be displayed in meters **244** with either a "Double" or "Nothing" symbol. By randomly assigning four "Double" symbols and four "Nothing" symbols to the bottom eight lanes L**1**-L**8** prior to re-propelling of the ball **220**, the chances are 50/50 for success/failure each game. As before, this will be true despite any lane bias that may be present in the equipment.

Other variations in this embodiment include triple, quadruple, etc., or nothing. For example, lanes L**1**-L**8** could have the set {0×, 0×, 0×, 0×, 0×, 2×, 2×, 4×} randomly mapped to it resulting in an average multiplier of M=1.

8. Payoff Displays. The displays **250** operate in several different techniques under the teachings of the present invention. In a first display technique, the displays **250** for all lanes simultaneously display the payoff values **260** for the entire game. In a second display technique, the displays **250** operate to flicker payoff values at different times during play of the game displayed, etc. In a third display technique, the time that a particular payoff value **260** is displayed in a lane **230** is proportional to the payoff weight so that a two hundred-dollar payoff would have a shorter display time and a ten-dollar payoff would have a faster display time.

Assume the following weighted matrix is used for a given lane **230** such as lane #**1** in FIG. **2**:

TABLE II

Payoff Value	Weights
20	0.5
30	0.3
70	0.2

The EV for the lane=20×0.5+30×0.3+70×0.2=33. This example will be used to illustrate the following three display techniques for a Pachinko game that lasts ten seconds (i.e., the average length of time it takes the ball **220** to settle in a lane **230** after it is propelled up).

The first display technique under the present invention is to associate the weights with the selection of the lane values (probability of selection proportional to weight) and keep the lane value fixed and displayed for a time equal to the entire Pachinko game. Thus, in the game, there is a 50% chance that the lane #**1** value would be 20, a 30% chance it would be 30, and a 20% chance it would be 70. Once a weighted value is randomly selected, it would remain displayed **250** at its selected value for the duration of the game (i.e., ten seconds).

A second technique is to associate the weights with the selection of the lane values (probability of selection proportional to weight), thereafter keeping the lane value fixed and displayed for a predetermined period of time, T_D such as two seconds. Assume that as the ball **220** is shot up, the lane value selection by the system of the present invention immediately begins. Then, for lane #**1** value, there is a 50% chance that the lane value would be 20, a 30% chance it would be 30, and a 20% chance it would be 70. This value (whether 20, 30, or 70) would remain associated with lane #**1** for two seconds. Thereafter, for the second lane #**1** value selected, there is again a 50% chance that the lane value would be 20, a 30% chance it would be 30, and a 20% chance it would be 70. The second randomly chosen value again remains associated with lane #**1** for two seconds, and so forth, until the ball ultimately settles in a lane. Table III shows the changing of the displayed value every two seconds for the ten second duration of the game:

TABLE III

Selected Payoff Value	Probability of Selection	Display Time Period	Total Time Elapsed
20	0.5	2 sec	2 sec
70	0.2	2 sec	4 sec
20	0.5	2 sec	6 sec
20	0.5	2 sec	8 sec
30	0.3	2 sec	10 sec

The display time period, T_D, can be the same for all lanes, or T_D may be fixed but different for each lane (e.g., lane #**1** may be varying with period two seconds while lane #**6** may be varying with a period of one second). Furthermore, if T_D is the same for all lanes, then they may all change simultaneously (i.e., lane selection begins at identical times for all lanes) or at staggered times (i.e., lane selection begins at offset times for different lanes). If T_D is chosen to be greater than the game time, this defaults to the first technique discussed above in that the lane values are fixed for the duration of a game.

The first two techniques described above have the probability of lane value selection proportional to weight, and the display time period T_D constant or equal.

A third technique is to associate the weights with the selection of the time T_D that a lane value is displayed, with probability of selection constant or equal. This represents an opposite approach to that described above but retains the expected value EV. Then, for the first lane #**1** value, there is a ⅓ chance that the lane value would be 20, a ⅓ chance it would be 30, and a ⅓ chance it would be 70. The time T_D that the lane value is displayed in display **250** in lane #**1** is proportional to the weight. Thus, taking the constant of proportionality to be, say, 4 seconds. If the lane value chosen is 20, it will remain displayed for T_D=0.5×4=2 seconds; if it is 30, it will remain so for T_D=0.3×4=1.2 seconds; if it is 70, it will remain so for T_D=0.2×4=0.8 seconds. After the display time interval T_D (whatever its value), the process repeats: for the second lane #**1** value, there is a ⅓ chance that the lane value would be 20 (with duration 2 seconds), a ⅓ chance it would be 30 (with duration 1.2 seconds), and a ⅓ chance it would be 70 (with duration 0.8 seconds), and so forth. Table IV shows the changing of the displayed value according to the third technique:

TABLE IV

Selected Payoff Value	Probability of Selection	Display Time Period	Total Time Elapsed
30	0.3333	1.2 sec	1.2 sec
20	0.3333	2 sec	3.2 sec
20	0.3333	2 sec	5.2 sec
70	0.3333	0.8 sec	6 sec
30	0.3333	1.2 sec	7.2 sec
70	0.3333	0.8 sec	8 sec
20	0.3333	2 sec	10 sec

The three techniques given above represent limiting cases. Solutions representing mixtures of these three techniques are also possible, in which a hybrid algorithm utilizes the weights both for value and time selection.

Finally, the weights assigned to payoffs need not sum to 1. If they don't sum to one, then they can be renormalized so that they do. In other words, they are mathematically equivalent. E.g., in the example above, the weights may be given as:

TABLE V

Payoff Value	Weights
20	1
30	0.6
70	0.4

The sum of these weights is 2, thus the renormalization factor is ½. In other words, multiplying each of the weights by ½ gives us an equivalent weighted matrix as before.

It is to be expressly understood that the example set forth in Table II above is only used to illustrate the three display techniques discussed above and the values chosen are not meant to limit the teachings contained herein. Any set of payoff values and any set of weights could be utilized so that displays **250** of payoff values **260** are observable by players playing the game of the present invention.

The display techniques discussed above can be incorporated individually (or as discussed mixed together) into the Pachinko bonus game or the Pachinko stand-alone game of the present invention. Finally, and as discussed elsewhere, the examples above are not to be limited to payoffs values as other payoffs could be given, or to a game time of ten seconds since any suitable game time could be used, or to a single ball **220** game as any number of balls **220** could be used (i.e., two or more balls launched or two or more separate launches), etc.

9. Stand-alone Pachinko Game. The algorithms, methods and display techniques of the present invention can also be employed if the Pachinko game is a stand-alone machine. In this case, however, some of the payoff values are net losers based on coin-in. To encourage variety in the lane payoff values, and to allow for a variety of house advantages, Method 1 coupled with either Algorithm No. 2 or Algorithm No. 3 is preferred in this case.

Consider a stand-alone five-coin Pachinko game with a desired 10% house advantage. Assume the multiplier value is fixed at M=1×. To obtain a payoff value of D=4.5, the following is an example:

TABLE VI

	Weights								
Payoff	L1	L2	L3	L4	L5	L6	L7	L8	
0	0.2	0.2	0	0.855	0.955	0.55	0	0.5	
1	0.2	0	0	0	0	0	0	0	
2	0.1	0	0	0	0	0	0	0	
3	0.1	0	0	0	0	0	0.1	0	
4	0.2	0.5	0.5	0	0	0	0.3	0	
5	0.1	0.1	0.5	0	0	0	0.6	0.1	
10	0	0.2	0	0.1	0	0.45	0	0.4	
25	0.1	0	0	0.04	0	0	0	0	
100	0	0	0	0	0.045	0	0	0	
500	0	0	0	0.005	0	0	0	0	
	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	EV

As before, the value for each lane **230** is chosen randomly by a controller and displayed in displays **250**, with weights according to Table II above. In so doing, any equipment bias in the stand-alone Pachinko game is nullified with respect to house advantage. In the example above, lane **5** will have a value of 100 coins 4.5% of the time. A 500-coin payoff in lane **4** will appear once every 200 games.

These payoffs are merely exemplary and can, of course, be modified to the particular design. Table II does demonstrate, however, the mechanism whereby large "jackpot"

values will periodically appear as possible payoffs and wherein the payoff values **260** in displays **250** are randomly changed from game to game.

These large jackpots can also arise from the use of multiple rows of lanes possibly including multipliers, additions, etc.

10. Bonus Game Hardware Configuration. FIG. **4** sets forth the details of the interconnection between the slot machine **20** and the Pachinko bonus game **30** of the present invention. The slot machine **20**, as mentioned, may be any one of a large number of different slot machines from a wide variety of manufacturers. Modern slot machines **20** typically have reels **40**A, **40**B, and **40**C which may be mechanical or electronic. However, any number of reels could be used. For example, the slot machine **20** may be played on a CRT screen. The design and operation of a slot machine **20** are well known. Under the teachings of the present invention, as shown in FIG. **1**, a special symbol or symbols **26** is added to the control software for the slot machine controller **400** and to the reels **40**A, **40**B, and **40**C. As discussed, the present invention is not limited to this one approach to "initiation" of the bonus game **30**. The controller **400** is conventionally a microprocessor-based computer. When the special symbol or symbols **26** appears on the payline **22** of reels **40**A, **40**B, and **40**C, as functionally represented by line **402**, the controller **400** pauses or deactivates the slot machine game and delivers a communication over line **404** to a communication port **410** for delivery over lines **412** to a communication port **420** in Pachinko bonus game **30**. This communication over lines **412** is an activation signal to activate the Pachinko bonus game **30**. The Pachinko game controller **430** upon receipt of the activation signal initiates over lines **432** a multimedia display **440** on or near the Pachinko bonus game **30** which may be comprised of sounds (such as words and/or music), signage (such as a digital display announcing a bonus game), or graphics (such as a moving ball). The use of a multimedia display **440** is optional under the teachings of the present invention but is preferred and may encompass any of a wide variety of multimedia presentations.

The Pachinko game controller **430**, in response to the activation signal received on lines **422** and the activation of button **28** by the player enables the launch ball mechanism **450** over line **434** to launch the ball **220** onto the field **200**. Under alternate embodiments, the launch ball mechanism may be mechanically activated by a player such as by conventionally pulling back on a pull rod which is then released to propel the ball up chute **280** and into the playing field **200**. Or, in other embodiments, a mechanical ball launcher **450** is used and if the player does not launch the ball within a predetermined time period, such as five seconds, the Pachinko game controller **430** automatically launches the ball. The Pachinko game controller **430**, in response to the activation signal over lines **422**, selects a set of payoff values **260** for delivery over lines **436** into the displays **250**. Several approaches for determining what payoff values **260** are to be displayed have been discussed above. The Pachinko game controller **430** is suitably programmed and works with a random number generator **460** which may be a separate chip or software embedded in the Pachinko game controller **430** to randomly select payoff values from a table in memory **480** over lines **482** such as set forth in Table I and to display **250** the selected values **260** according to the display technique used. For example, under the first technique, the payoff values randomly selected are displayed for the game. When displays **250** start displaying values could be at any suitable time before the ball **220** travels through a lane **230** (e.g., upon launch, a fixed time after launch, etc.) For example, under the second technique (e.g., Table III, the displays **250** display new random payoff values every display time, T_D, such as every two seconds. The timing for this is conventionally obtained in controller **430**. Finally, under the third technique (e.g., Table IV) the display T_D varies in each lane based upon the weight of the payoff. All of these display times can be programmed into the controller **430** based upon the teachings contained herein.

After the ball **220** is propelled by the launch ball mechanism **450**, the ball, after a period of time, travels through one lane **230**. In FIG. **4**, the ball **220** is shown passing through lane L**2**. Each lane **230** has a sensor **470** which senses the presence of the ball **220**. For example, for a nylon ball **220**, a suitable sensor is an infrared sensor or a diode switch flush mounted to field **200**. The sensor **470** issues a signal on lines **472** back to the Pachinko game controller **430**. In the preferred embodiment, each sensor **470** has an individual line **472** to the Pachinko game controller **430**. Hence, the Pachinko game controller **430** knows which lane the ball **220** has fallen through and, therefore, the Pachinko game controller **430** knows which payoff value (in the example of FIG. **4**, $50 or fifty coins) is to be awarded the player. The same type of hardware could be used to sense the presence of the ball **270** in a special change value area (such as area **300**) with sensors **302** also connected to controller **430**. The Pachinko game controller **430** then communicates with slot machine controller **400** through the communication ports **410** and **420** with the payout value **260** information so that the slot machine controller **400** can increment the credit meter **24** in the slot machine **20** with the payoff value **260** (for example $50).

It is to be expressly understood that a number of different designs could be implemented under the teachings of the present invention. For example, one skilled in the art could remove the random number generator **460** and the Pachinko game controller **430** as well as the communication ports **410** and **420**, and have the connections **436**, **472**, **432**, and **434** delivered directly into and under control of the slot machine controller **400**.

The field **200** may have any number of recessed lights, lighted designs, and/or sound effects commonly found in Pachinko and pinball games which are not shown and which are controlled by Pachinko game controller **430**.

11. Operation. In FIG. **5**, operation of the present invention is set forth using the Pachinko game as a bonus game. In reference to FIG. **4**, the slot machine **20** is conventionally played in stage **500**. When a bonus symbol **26** appears on payline **22** in stage **510** (or other "initiation"), the controller **410** sends an activation signal to Pachinko game controller **430**. Stage **520** is then entered. The Pachinko game controller **430**, as discussed, selects random payoffs **260** in stage **530** based upon the random number generator **460** and the payoff table stored in memory **480** and in stage **540** displays them in displays **250**. In stage **550**, the bonus game is activated with the Pachinko game controller **430** activating launch ball mechanism **450**. This corresponds to the first display technique.

It is to be expressly understood that the order of stages **530**, **540**, and **550** can vary based upon algorithm, the method, and the display technique being used as discussed above as well as other design considerations. The launch ball mechanism **450** is activated in stage **550** and play is done when the ball **220**, as shown in FIG. **4**, is sensed by one of the sensors **470**. If too much time elapses, and the ball **220** is not sensed after launch, an error stage **570** may be entered.

When the ball **220** is sensed in a lane **230** in stage **560**, then in stage **580**, the Pachinko game controller **430** determines the value of the payoff assigned for the lane, delivers that information to controller **400** which then increments the credit meter **24** in stage **590**. In stage **592**, the Pachinko game controller **430** may cause a multimedia display **440** to occur based upon the win received by the player. After which, play is resumed at the slot machine **20** in stage **500** and the process repeats.

In summary, a method for playing a Pachinko game modified according to the teachings herein is disclosed. The method of the present invention utilizes a payoff table such as a weighted payoff table to randomly select a payoff value for each of the payoff lanes. There is no limitation on the number of payoff values that can be used. The selected random payoff values are displayed one at each of the plurality of payoff lanes before or after a playing piece is delivered onto the playing field. Delivery could be launching and propelling as fully discussed above where the ball is forcefully delivered onto the playing field. Delivery could also be inserting the ball through a specific opening and letting gravity cause the ball to fall as shown in U.S. Pat. No. 5,016,879. The playing piece traverses through a plurality of deflection devices until it travels through one of the payoff lanes. The payoff which is displayed at the payoff lane the playing piece travels through is issued. Under one method of the present invention, the weighted payoff matrix can have any number of possible values, each with an associated weight. Through use of a matrix payoff table, as fully discussed above, large "jackpot" payoffs periodically occur. This occurs because the expected values are constant over a number of games.

The selection and display of the random payoff values in each of the plurality of lanes, as discussed above, can occur according to a number of different embodiments under the teachings of the present invention. The display of payoff values can start upon the occurrence of a game event such as the start of the game, reception of a wager, launching of the ball, or any event during the game.

12. Stand-alone Pachinko Game. In FIGS. **6** and **7**, the details of the stand-alone Pachinko game **30** is shown. Where possible, like numbers are utilized which refer to earlier discussed structure and functions.

In FIG. **6**, the hardware configuration for the stand-alone Pachinko game **30** is shown. This corresponds to the hardware configuration for the Pachinko bonus game shown in FIG. **6**. However, an activation circuit **600** is shown which activates the controller **430** in the manner discussed above. In all other aspects, the hardware configuration for the stand-alone Pachinko game **30** of FIG. **6** corresponds to the discussion of FIG. **4** for the Pachinko bonus game. However, the activation circuit **600** constitutes any suitable activation conventionally used for a casino game such as receiving monetary value in the form of a wager (bill acceptor, coin in, etc.) and an activation signal from the player such as a start button, pulling of a handle, touching of an icon on a screen, etc. In addition, a credit meter **610** is provided in the stand-alone Pachinko game as shown by display **610** which directly communicates with the controller **430** over lines **612**. In the event the player wins, the credits **610** are appropriately incremented. In the case a player loses, the credits **610** are appropriately decremented.

Likewise, in FIG. **7**, the functional flow chart of the stand-alone Pachinko game **30** is set forth. This corresponds substantially to FIG. **5**. Here when the payoff occurs in stage **580**, the credit meter **610** of FIG. **6** is appropriately incremented or decremented.

13. Payoff Dispensing Mechanism. In yet another alternate approach to the teachings of the present invention, Pachinko game **30** of the present invention can utilize as a payoff dispensing mechanism. Formula 1 sets forth an overall payoff value of D as the expected value, EV.

It is well known in conventional game play for an underlying casino machine **20**, that payoffs are commonly given. These payoffs are typically shown as printed charts actually on the machine. For example, in the case of the slot machine **20** and three double bars, the payoff printed on the chart may be twenty dollars. A player receiving a winning combination for the underlying casino gaming machine **20** is assured of receiving the printed payoff value. Under the teachings of the present invention, whenever a winning combination is obtained by a player at the underlying gaming machine **20**, the Pachinko game **30** automatically is activated to allow the player the opportunity to receive more or less than the printed payoff value. In other words, the Pachinko bonus game of the present invention acts as a payoff-dispensing machine. From the casino operator's point of view, under Formula 1, the casino still pays the printed payout values. However, from the viewpoint of the player, a significant and additional level of excitement and further game play is present in watching the Pachinko game operate to dispense payoff which may be more or less than the stated printed payoffs. In some embodiments of this modification of the present invention, a player may have the option to take the printed payoff value or to play automatically for the higher or lower value.

14. Fixed Payoff Embodiment. The disclosed Pachinko bonus game and/or the stand-alone Pachinko game discussed above, in this embodiment, provides fixed payoff values **260** for lanes L**1**-L**8** which could be printed at each lane or displayed in displays **250**. Hence, the payoff values remain the same from game-to-game. Of course, this embodiment is subject to mechanical bias.

The above disclosure sets forth a number of embodiments of the present invention. Those skilled in this art will however appreciate that other arrangements or embodiments, not precisely set forth, could be practiced under the teachings of the present invention and that the scope of this invention should only be limited by the scope of the following claims.

We claim:

1. A method for operating a mechanical casino bonus game to provide a constant player expected value for play of the mechanical casino bonus game in the presence of mechanical bias, the mechanical casino bonus game having a game outcome selected mechanically from a number of game outcomes, play of the mechanical casino bonus game occurring in conjunction with play of an underlying casino game, the method for operating comprising:

commencing play of the mechanical casino bonus game when a bonus game condition occurs in play of the underlying casino game;

randomly assigning a bonus payoff from a set number of bonus payoffs for each game outcome in the number of game outcomes for the aforesaid play of the mechanical casino bonus game, the set number being greater than one;

mechanically selecting one of the set number of game outcomes during play of the mechanical casino bonus game;

awarding a player the random bonus payoff assigned to the mechanically selected one game outcome;

providing the constant player expected value for the mechanical casino bonus game over all play of the mechanical casino bonus game even in the presence of mechanical bias.

2. The method of claim 1 wherein the set number of bonus payoffs is greater in number than the number of game outcomes, the assigned bonus payoffs providing a different random combination of bonus payoff values ranging in value from a highest combination of bonus payoff values to a lowest combination of bonus payoff values for each play of the mechanical casino bonus game.

3. The method of claim 1 wherein the mechanical casino bonus game is a Pachinko game, wherein a game outcome is an exit lane, and wherein commencing play comprises:

delivering a freely moving mechanical object onto a mechanical playing field having a plurality of mechanical deflection devices.

4. The method of claim 3 wherein the mechanical object is a ball.

5. The method of claim 3 wherein the mechanical object is a disc.

6. The method of claim 3 wherein the mechanical object is a token.

7. The method of claim 1 wherein randomly assigning a bonus payoff comprises:

providing a matrix of the set number of bonus payoffs and a plurality of probability weights;

randomly assigning by probability weight the bonus payoff.

8. The method of claim 7 wherein the probability weight for at least one bonus payoff in the set number for at least one game outcome in the matrix is zero.

9. The method of claim 7 wherein at least one bonus payoff in the set number has a probability weight in only one game outcome.

10. The method of claim 7 wherein the probability weight for at least one payoff in the set number of payoffs is one hundred percent in one game outcome and zero percent for all other payoffs in the set number of payoffs for the aforesaid game outcome.

11. The method of claim 7 wherein the probability weight for each game outcome is different for each payoff in the set number of payoffs than the probability weights for the remaining game outcomes.

12. The method of claim 7 wherein the probability weights for each game outcome are rotated, with each new bonus game play, from game outcome to game outcome.

13. A method for operating a mechanical casino bonus game to provide a constant player expected value for play of the mechanical casino bonus game in the presence of mechanical bias, the mechanical casino bonus game having a game outcome selected mechanically from a number of game outcomes, play of the mechanical casino bonus game occurring in conjunction with play of an underlying casino game, the method for operating comprising:

commencing play of the mechanical casino bonus game when a bonus game condition occurs in play of the underlying casino game;

randomly assigning a bonus payoff from a set number of bonus payoffs for each game outcome in the number of game outcomes for play of the mechanical casino bonus game; the assigned bonus payoffs randomly providing a different player expected payoff value for each play of the mechanical casino bonus game, the set number being greater than one;

mechanically selecting one of the set number of game outcomes during play of the mechanical casino bonus game;

awarding a player the random bonus payoff assigned to the mechanically selected game outcome;

providing the constant player expected value for the mechanical casino bonus game over all play of the mechanical casino bonus game even in the presence of mechanical bias.

14. The method of claim 13 wherein the different player expected value is not the constant player expected value.

15. The method of claim 13 wherein the set number of bonus payoffs is greater in value than the number of game outcomes.

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