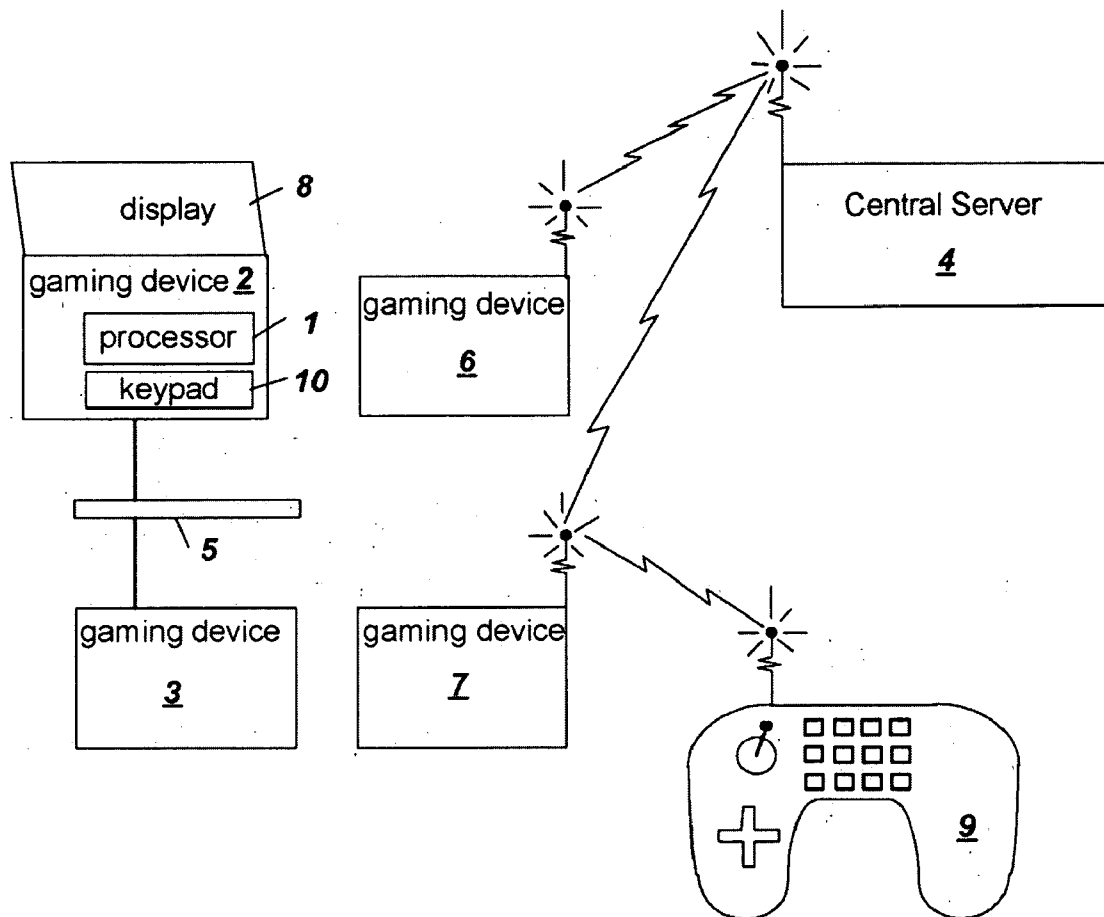




US 20090117988A1

(19) **United States**(12) **Patent Application Publication**
Mathis(10) **Pub. No.: US 2009/0117988 A1**(43) **Pub. Date: May 7, 2009**(54) **SKILL GAME PLAYABLE ON A CASINO
SPINNING REEL DISPLAY WITH AN
AWARDS TABLE HAVING A VARIABLE
PAYOUT LINE AND A METHOD OF
CALCULATING AWARDS PROVIDED
WITHOUT OPERATOR HOLD SUBTRACTED
FROM PLAYER BUY-IN****Publication Classification**(51) **Int. Cl.**
A63F 9/24 (2006.01)
(52) **U.S. Cl.** **463/20**
(57) **ABSTRACT**(76) **Inventor:** **Richard M. Mathis**, Las Vegas, NV
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SAN FRANCISCO, CA 94108 (US)(21) **Appl. No.:** **12/266,458**(22) **Filed:** **Nov. 6, 2008****Related U.S. Application Data**(60) Provisional application No. 61/001,989, filed on Nov.
6, 2007, provisional application No. 61/132,166, filed
on Jun. 16, 2008.

A skill game that is playable on a casino type display is provided that employs methods to hold a player's interest by dynamically changing an awards table as well as providing payout without subtraction from player buy-in to provide an operator hold. The awards table can include a variable pay line with values changed either before or after start of the skill game to offer the player a variety of possible payouts depending on the game results. In one example, the dynamic pay line is provided as the bottom line in the award table that provides the minimum payout otherwise not available for a combination of spinning reel symbols. To provide payout without subtraction for operator hold from the player buy-in at least one additional line is added to the awards table with a hit frequency (HF) set so that the hit frequency of all award lines totaled 1. The total award amount (AA) that is then paid for each line is then set to maintain an operator hold. With additional pay lines in the awards table that can be dynamically set, a player can choose between different award tables that can provide for preference of award size over award frequency.



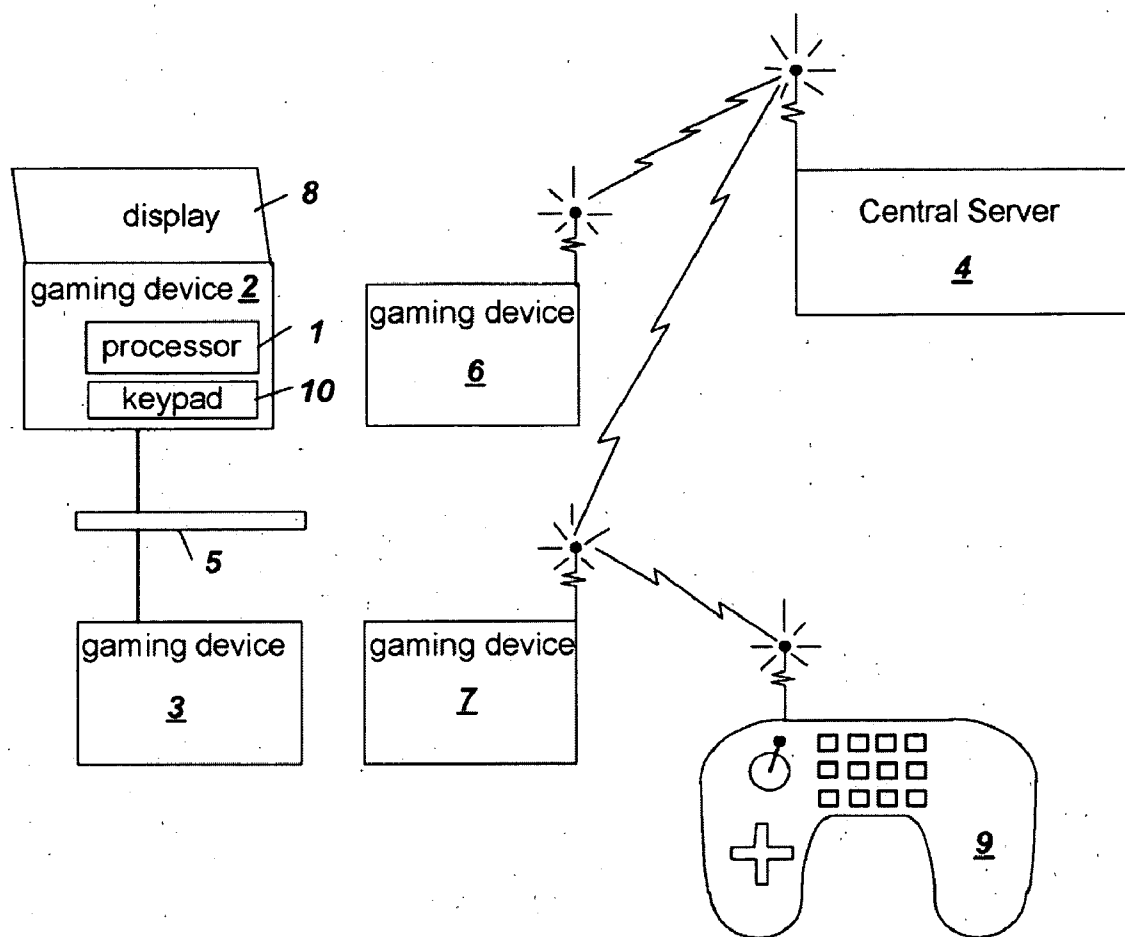


FIG. 1

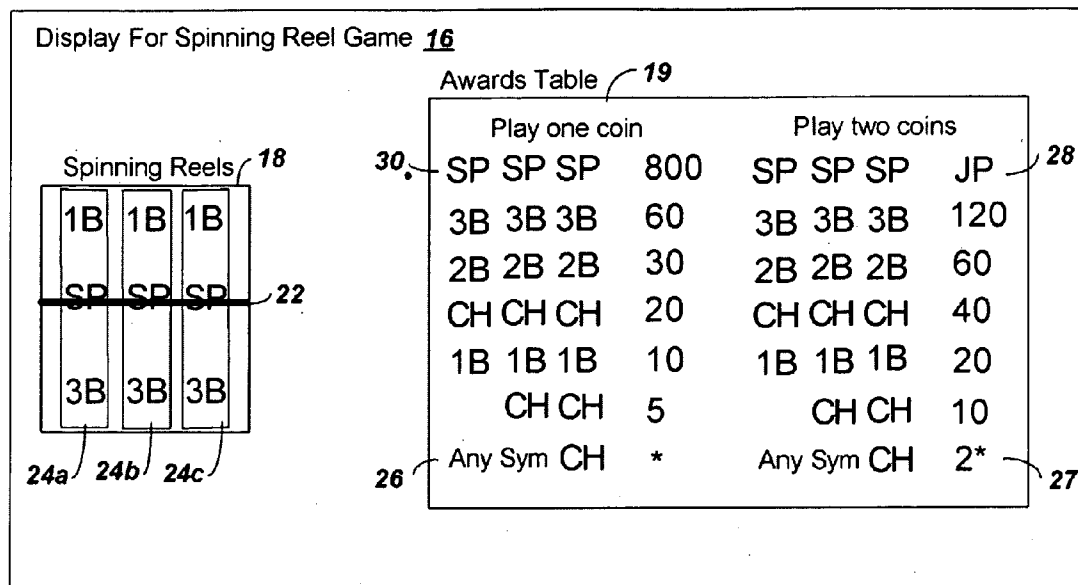


FIG. 2

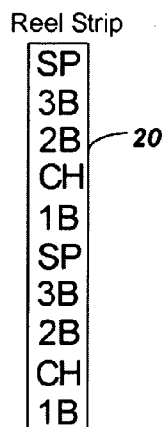


FIG. 3

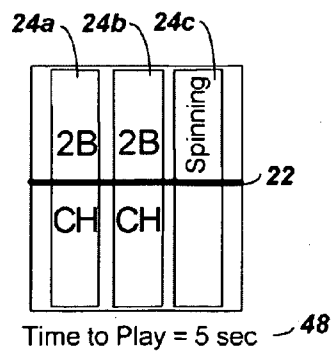


FIG. 4

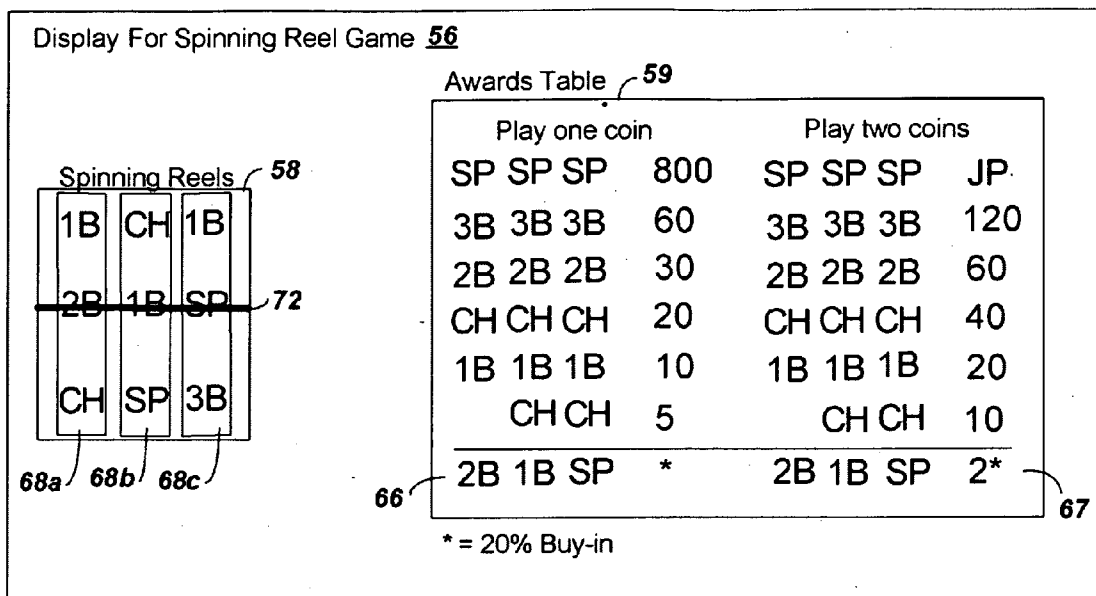


FIG. 5

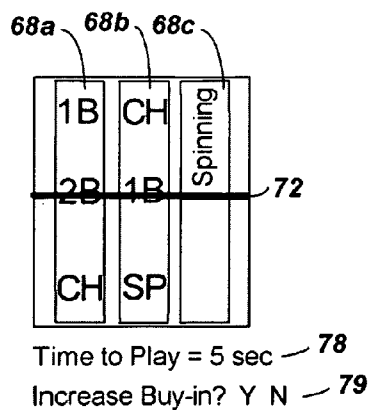


FIG. 6

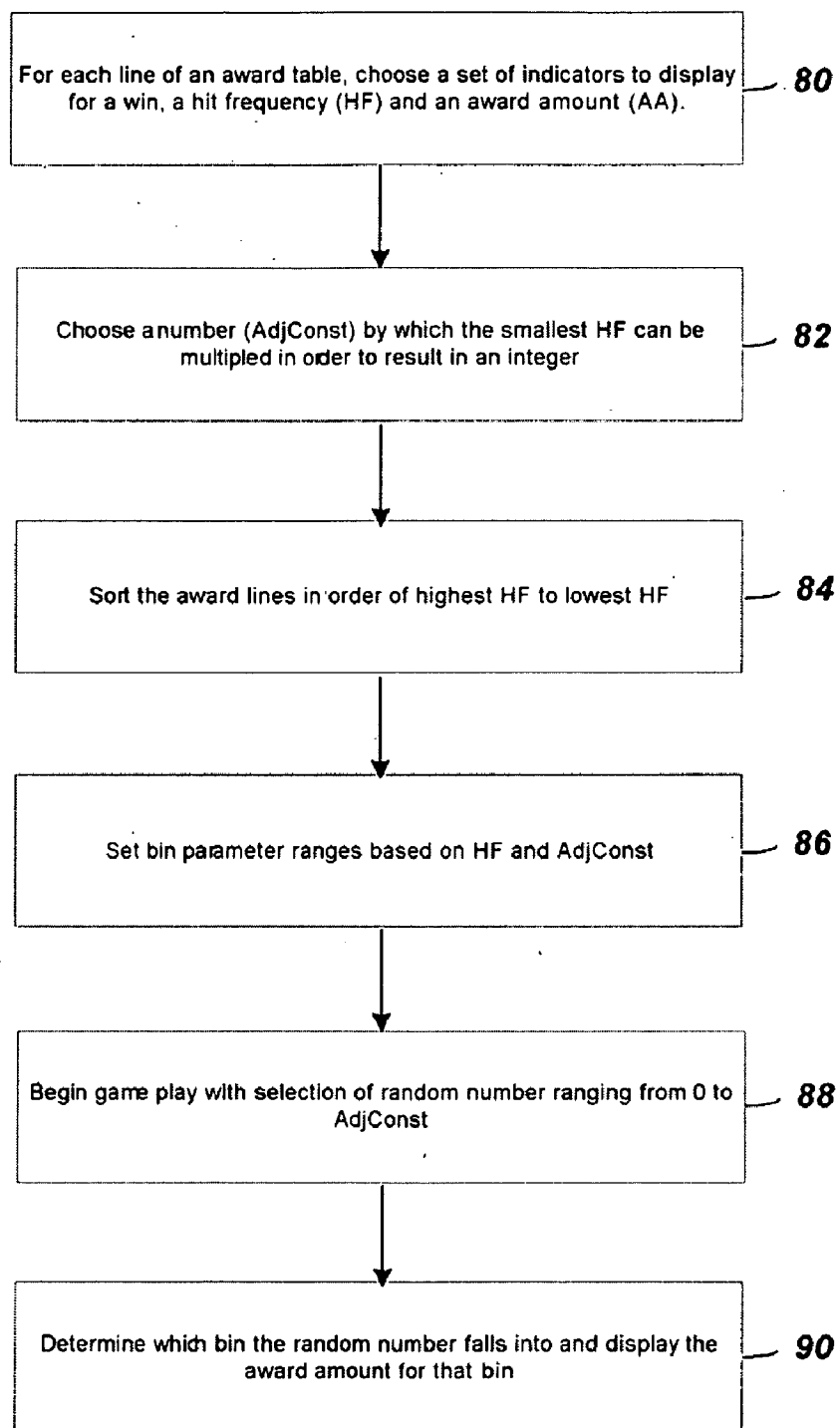
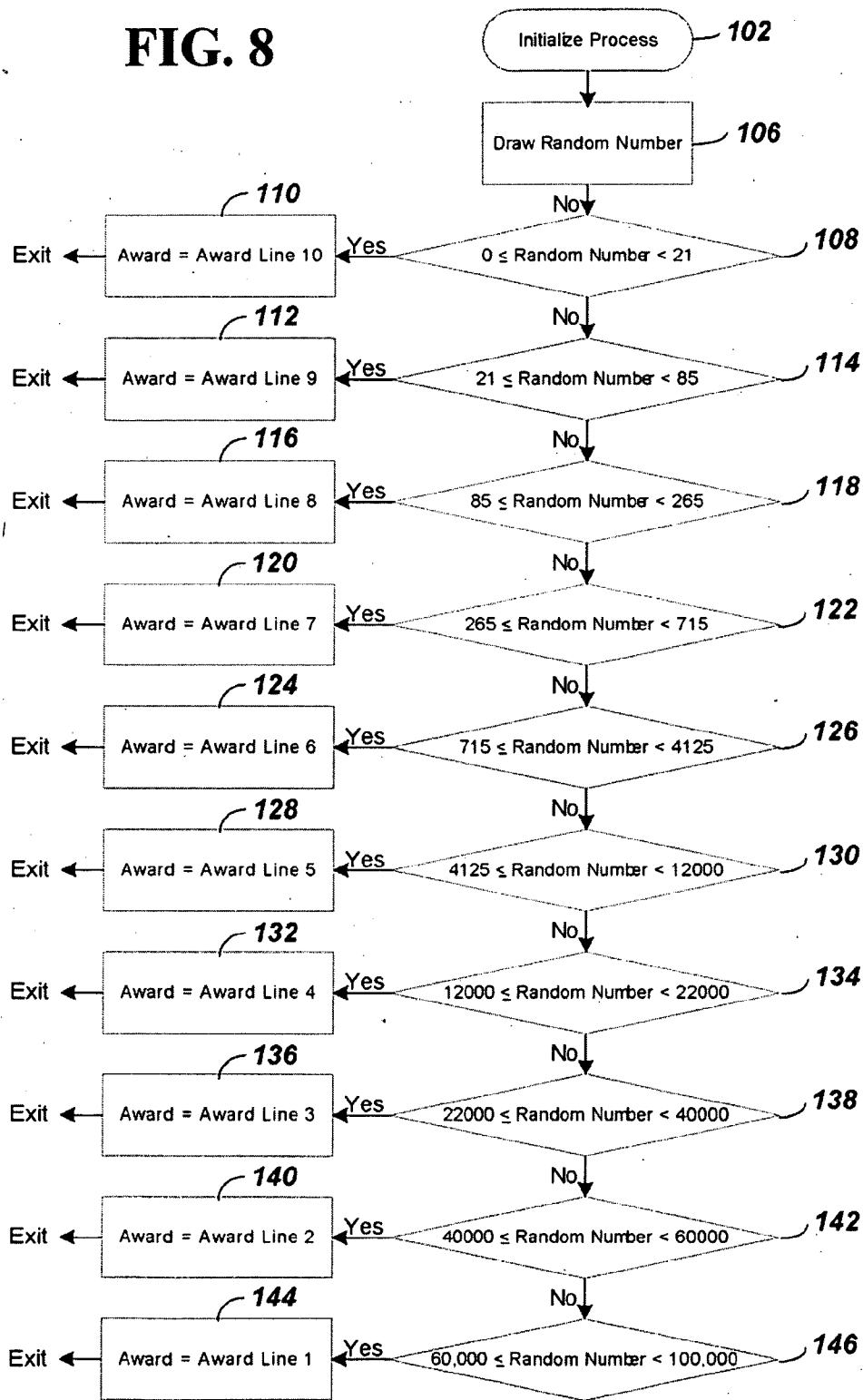
**FIG. 7**

FIG. 8



**SKILL GAME PLAYABLE ON A CASINO
SPINNING REEL DISPLAY WITH AN
AWARDS TABLE HAVING A VARIABLE
PAYOUT LINE AND A METHOD OF
CALCULATING AWARDS PROVIDED
WITHOUT OPERATOR HOLD SUBTRACTED
FROM PLAYER BUY-IN**

**CLAIM OF PRIORITY TO PROVISIONAL
APPLICATIONS**

[0001] This application claims priority under 35 U.S.C. 119(e) to the following U.S. Provisional Patent Applications: (1) Provisional Application No. 61/001,989, entitled "Skill Game with Fixed Award Table," by Richard M. Mathis, with filing date of Nov. 6, 2007, which is incorporated by reference herein in its entirety; and (2) Provisional Application No. 61/132,166, entitled "A Method of Generating Awards in Skill and Non-Skill Games," filed Jun. 16, 2008, which is incorporated by reference herein in its entirety.

**CROSS REFERENCE TO RELATED
APPLICATIONS**

[0002] This application is related to U.S. patent application Ser. No. 11/247,092 entitled "Method and Apparatus For Skill Game Play and Awards" filed Oct. 11, 2005, which is hereby incorporated by reference herein in its entirety.

[0003] This application is further related to U.S. patent application Ser. No. 12/127,660, entitled "Skill Game That Can Be Played Upon a Casino Type Display Combining Determinative, Fixed and Random Processes," filed May 27, 2008, which is hereby incorporated by reference herein in its entirety.

[0004] This application is further related to U.S. patent application Ser. No. 12/212,343, entitled "Skill Game Playable On a Casino Type Display With Game Ending Features Including Spinning Reel Up/Down Capability and a Bonus Game," filed Sep. 17, 2008, which is hereby incorporated by reference herein in its entirety.

BACKGROUND

[0005] 1. Technical Field

[0006] The present invention relates to values provided in an awards table indicating a payout upon winning a spinning reel gaming device or representation thereof that can be used in casino gaming.

[0007] 2. Related Art

[0008] Casino gaming has offered games of chance that can be played upon a machine for many years. Typically the gaming machines employ some method of randomly providing a game result to a player. The random selection can be made by a random number or character generator. In one example of a randomly provided game result, a spinning reel is stopped in a manner not reasonably controlled by an operator. In the U.S.A. a distinction has been by the Federal Government as to whether a gaming apparatus generates game random outcomes or whether player skill can influence game outcome to some degree in a determinative or non-random process. The determinative process is also referred to herein as a skill game.

[0009] Games that depend solely upon random selection for generation of game outcomes are classified as Class III, but those in which player skill can influence game outcome may be placed in another class not being subject to regulation.

The classification is a regulatory matter, but can have very significant economic ramifications. For example, Class III gaming may be relegated to casinos and Indian Tribes that have suitable compacts with state governments. Class III gaming is highly regulated and requires large economic resources in order to comply with regulations in operation and reporting. Games of skill, however, may be currently permitted on any Indian reservation whether or not an agreement exists with the state in which they are located and reporting and compliance with regulation is considerably simplified.

[0010] Skill games may be classified as non-regulated games, but award to a player must depend to some degree upon player skill. A significant risk to an operator exists if game outcome depends entirely upon player skill as a very skillful player can win every game with disastrous economic results for the operator. If game outcome is made to depend upon skill in such manner that skill level is beyond the bounds of normal human competence then the game outcome essentially becomes a process of random selection, the game is classified as Class III, and is not permitted to be legally operated in said venue. The classification assigned is important and has been the subject of many court actions.

[0011] Several gaming machines that allow skill games to be played currently exist. Most of said gaming machines that may be used in casinos depend upon a video representation of a spinning reel and require a player to stop certain symbols at a given position in order to accomplish a winning result. Stopping the spinning reel depends upon player skill to influence a game outcome, but in nearly all cases the number of symbols is huge and/or speed at which symbols are presented to a player is much greater than can be expected to be processed within even the boundaries of superhuman capabilities. If game outcome can be influenced by normal human capabilities the operator of said game is in danger of losing money. A system described in U.S. Pat. No. 7,192,342 describes a spinning reel gaming system as well as other systems with an outcome that can be influenced by normal human capabilities, while still enabling the operator to make a profit. U.S. patent application Ser. No. 12/127,660 discloses an additional system that has an outcome influenced by the player, while still maintaining operator profit. U.S. patent application Ser. No. 12/212,343 discloses a further system that provides further features that increase player excitement in a skill game such as providing a player to move a spinning reel up or down one position to improve game results and to provide a bonus game under certain conditions. It would be desirable to provide additional game features to increase player entertainment and desire to play a skill game while still maintaining an operator profit.

SUMMARY

[0012] Embodiments of the present invention provide a method for implementing a skill game that employs methods to hold a player's interest by dynamically changing the awards table as well as providing payout without subtraction from player buy-in to provide an operator hold.

[0013] In first embodiments of the invention an awards table includes a variable award line with values changed either before or after start of the skill game to offer the player a variety of possible payouts depending on the game results. In one example, the dynamic award line is provided as the bottom line in the award table that provides the minimum payout. The dynamic award line values that show what a player must achieve to win can be reset before or after the start

of each game and displayed to a player. For a spinning reel game, the amount shown on the award line will be awarded based on the game outcome as determined by final reel positions. A final combination of reel symbols that would normally be calculated to be a losing combination for the fixed pay lines can now be available as the bottom dynamic award line to still provide the minimum pay award.

[0014] In second embodiments of the invention, a method of calculating awards is provided that does not remove a portion of user buy-in for operator hold, but still maintains operator profit. Typical methods of providing an award that can be paid out after each game involve subtracting an amount from player buy-in for an operator hold fee after which a portion of buy-in is always available for player award for successful completion of a game. To accomplish this, the award hit frequency (HF) is set so that the hit frequency for all possible awards is less than 1. The second embodiment described herein, however, adds at least one award line to the awards table with a hit frequency set so that the total hit frequency of all award lines is 1. The total award amount (AA) that is then paid for all of the lines is then set to maintain a minimum operator hold.

[0015] Further embodiments allow a player to choose between sizes of available awards while keeping return to player essentially constant. The aforesaid adds to player enjoyment by allowing a player to exercise preference over size and frequency of available awards. Some players prefer many frequent small awards while others prefer infrequent large awards. This enhances a player's entertainment experience while still keeping operator profit over a large number of games played essentially constant.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Further details of the present invention are explained with the help of the attached drawings in which:

[0017] FIG. 1 illustrates components of a system of games that can be used to implement embodiments of the present invention;

[0018] FIG. 2 shows a pictorial representation of a skill game display including a set of spinning reel symbols and an award table as may be displayed to a player of said skill game;

[0019] FIG. 3 shows a reel strip with indicia displayed in the spinning reels of FIG. 2;

[0020] FIG. 4 shows a pictorial representation a skill game with an award table as shown in FIG. 1 just prior to time when a skill decision must be made by a player;

[0021] FIG. 5 shows a pictorial representation of a skill game according to embodiments of the present invention including a set of reel symbols and an award table with a dynamic pay line that may be displayed to a player of the skill game;

[0022] FIG. 6 shows a pictorial representation of a skill game with an award table having a dynamic pay line as shown in FIG. 3 just prior to time when a skill decision must be made by a player; and

[0023] FIG. 7 is a flowchart showing an embodiment of the present invention for calculating skill game award table values without operator fee subtracted from player buy-in; and

[0024] FIG. 8 shows more details of steps for playing a game as described with respect to FIG. 7.

DETAILED DESCRIPTION

[0025] FIG. 1 illustrates components of a system of games that can be used to implement embodiments of the present

invention. In general, a game used for embodiments of the present invention can be implemented in programming on a general purpose computer or processor as illustrated by processor 1 in gaming device 2. The processor can further be included in a central location, such as central server 4, that controls multiple games. The games can operate in a stand-alone fashion or be networked using the central server 4 operating a wireless network made up of gaming devices 6 and 7 or a wired network made up of games 2 and 4 connected by wired network connection 5. The game results may be displayed on an output device connected to any of the gaming devices, as illustrated by display 8, or transmitted to a remote device (not shown) for output or display. In addition, control of the gaming devices may be made using a keypad 10 directly connected to the gaming device, or by a wireless remote device as illustrated by device 9. Another applicable representation of a stand-alone game is shown in FIG. 1 of U.S. Pat. No. 7,192,346 B2.

[0026] Embodiments of the present invention can be implemented in a system as illustrated in FIG. 1. In particular, the present invention can incorporate one or more of the features of a skill game described in U.S. Pat. No. 7,192,342 as well as U.S. patent application Ser. No. 12/127,660, and/or U.S. patent application Ser. No. 12/212,343. Any of these systems can further include an award table with a dynamic award line and/or a method for calculating awards for the award table to assure operator profit without subtraction from player buy-in to provide operator hold that are described in more detail to follow. The term pay line and award line as used in this disclosure may be used interchangeably as will be realized by those skilled in the art.

I. Award Table With Dynamic Pay Line

[0027] FIG. 2 shows a representation of a spinning reel game of skill 16 displayed to a player that includes spinning reels 18 and an awards table 19. The spinning reels 18 provide three representations of rotatable reels 24a, 24b, 24c and a winline 22 under which indicia as shown on reel strip representation 20 shown in FIG. 3 must be aligned in order to indicate outcome of said skill game. Each reel 24a, 24b, and 24c has a repeating representation of a reel strip 20 shown in FIG. 3 that changes in accordance with a pattern shown on said reel strip. In the drawing shown in FIG. 3, the reel strip 20 has symbols reading from the top of the strip: SP, blank, 3B, blank, 2B, blank, CH, blank, 1B, blank, SP, blank, 3B, blank, 2B, blank, CH, blank, 1B, blank and said symbols repeat on said reels as the reels rotate.

[0028] The award table 19 is displayed to a player to indicate an award that may be won by a player after the reels 18 are stopped and depending upon symbols beneath said winline 22. As an example, a player can win 10 credits if any CH (cherry) is beneath the winline 22 on reels 24a or 24b and the player bought into the game with two credits as indicated on award table line 27 and the player stops reel 64c with a CH symbol beneath the winline before timer 48, shown in FIG. 4, decrements to zero. Said timer may be reset to a predetermined value at the beginning of each new game. Another example is if the player bought into the game with one credit and 3 SP (special) symbols are aligned under the winline when the reels 18 cease to rotate after the player successfully completes the skill portion of the game within the time limit set by the timer 48, he may win 800 credits as shown by award table line labeled 30. The player must stop the remaining rotating reel with a SP symbol beneath the winline in order to

be awarded the amount described in the previous example. With two credits played and the SP symbol of all three reels **24a**, **24b** and **24c** under the winline **22**, the payout will be the jackpot (JP) as illustrated by line **28**.

[0029] In FIG. 2 all the pay lines of the award table **19** are fixed and require that the specific symbol patterns displayed be beneath the winline **22** after two reels have stopped and require that the player stop the remaining rotating reel, in a given amount of time, with a specific symbol beneath the winline. More details of operation of a game with a display configured as shown in FIG. 2 is described in the following two paragraphs with reference to the spinning reels of FIG. 4.

[0030] First, a player chooses an amount of buy-in and indicates to the game that he desires to play by pressing a switch, choosing an icon or by some other means that signal to a microprocessor controlling the game that the game should begin. A game platform to accomplish aforesaid operation is described in U.S. Pat. No. 7,192,346. Upon the game beginning, the reels or representation thereof begin to rotate. A game outcome is chosen by means of a well-known stochastic algorithm which may be an algorithm as described in U.S. Pat. No. 5,380,008 or any other algorithm that may be determined suitable for selecting a random game outcome. The game outcome could also be chosen from a predetermined table of game outcomes commonly known as a pull-tab deck or could be predetermined by a microcomputer upon which the game is running and stored at any time prior to the game being actuated for play. Two reels come to a stop with symbols beneath the winline as determined by aforesaid game outcome algorithm. In this particular example with reference to FIG. 4, the two reels that stop can be **24a** and then **24b** to give the appearance of a well-known casino game. Timer **48** begins to decrement when only the final reel is rotating and said timer is reset to a predetermined value for play of a succeeding game.

[0031] In FIG. 4, two reels **24a** and **24b** have stopped and a final reel **24c** remains rotating. A blank is beneath the winline **22** on the two reels that are stopped, so the only option that will result in a player winning anything is to stop the remaining rotating reel on a CH within the time allowed by a timer **48**. If the player stops the final rotating reel with a CH beneath the winline within the time allotted, he is awarded a portion of his buy-in for the game. If the first two reels had stopped on any other combinations shown in the award table **19**, the player could win the amount displayed by the award table by stopping the final rotating reel in a position that results in a match of the award table pay line combination with the symbol combination beneath the winline, provided timer **48** has not decremented to zero and in accordance with the amount of the original buy-in for the game. Since game outcomes are chosen by a well-known stochastic algorithm, the operator of the game is guaranteed a profit which in worst case is a normal spinning reel game profitability for the game as determined by the stochastic algorithm determining game outcome minus percent of player buy-in returned on the lowest pay line in the award table **19**.

[0032] Turning now to FIG. 5, FIG. 5 provides a representation of a spinning reel skill game display **56** with an award table **59** having a dynamic first pay line (**66** and **67**) according to some embodiments of the present invention. Operation of the spinning reels **58** with the award table **59** of the game is similar to the operation described in (1) and (2) above. Game outcome is calculated by any well-known algorithm such as that described in U.S. Pat. No. 5,380,008 and game outcome

may be also be chosen from a pull-tab deck or predetermined in any previous game. Game outcome will thus be known and final reel positions may be calculated from game outcome. A final combination of reel symbols that would normally be calculated to be a losing combination using the awards table of FIG. 2 is shown in the dynamic first pay line (**66** and **68**) with the pay line amount **66** provided awarded with one coin played and the pay line **67** awarded with two coins pay.

[0033] Both pay lines **66** and **67** pay the minimum award in the awards table **59** with respective one and two coin combinations played. The display **56** indicates that the payout will be 20% of the buy-in for the * symbol shown in the dynamic pay line (**66** and **67**). The payout amount of 20% can in some embodiments be dynamically changed in accordance with a stochastic algorithm to assure operator profit, while maximizing the award. In some embodiments, the dynamic pay line can be set to exceed the value awarded in other award lines of the awards table **59**.

[0034] In some embodiments, the bottom line minimum pay award may change with each game and may be displayed to a player before the game is played or after the game is begun. The symbols shown on the bottom pay line may be predetermined by direct application of a stochastic algorithm for game outcome or may be drawn from a pull-tab deck along with a predetermined game outcome that has been stored upon said pull-tab deck. Although lines **66** and **67** include the first two symbols 2B and 1B, that do not correspond with the first two symbols in any of the other lines in awards table **59**, the first two symbols can match. For example, line **66** might read 3B 3B CH. As long as the combination of symbols in the bottom line does not match other lines, any combination of symbols might be displayed in the dynamic pay line.

[0035] Turning now to FIG. 6, operation of a game using an awards table with a dynamic pay line as shown in FIG. 5 will be described. Initially, a pictorial representation of a skill game spinning reels **58** and an awards table **59** is provided to a player, and the player plays either one or two coins or credits. In this example it is assumed one coin is played. Although the dynamic line (**66** and **67**) may be displayed, they can also be displayed after the game has begun. Just prior to time when a skill decision must be made by a player of said skill game, the two reels **68a** and **68b** are no longer rotating. One reel **68c** remains spinning at a sufficiently low velocity that reel symbols can be read and a particular desired symbol can be stopped beneath winline **72** by a person of average dexterity and physical ability. Presentation to player shown in FIG. 6 indicates that two reels have stopped with 2B and 1B beneath the winline and the only choice which will result in an award to a player is to stop said rotating reel with a SP symbol beneath the winline before timer **78** has decremented to zero. If the rotating reel is stopped with the SP symbol beneath the winline in the allotted time period, an award corresponding to the first pay line **66** of the award table may be paid to the player.

[0036] Inclusion of a dynamic first pay line (**66** and **67**) in the award table adds to player enjoyment since different combinations of symbols are presented to a player for minimum pay available at each game. The player may win any of the awards listed in the award table if the first two reels stop on a combination shown in the award table and he successfully stops the third reel, which is spinning at a sufficiently low velocity that reel symbols can be read and a particular desired symbol can be stopped beneath winline **72** by a person of

average dexterity and physical ability before timer 78 has decremented to zero. Since final stopped reel position of reels that are automatically stopped is determined by a stochastic game outcome determination algorithm, an operator of a game is guaranteed a profit over a large number of games played as allowed by said stochastic game outcome determination algorithm.

[0037] In some embodiments, a player may randomly be allowed to increase the amount of his buy-in while a game is playing in order to enhance player enjoyment. The display option to increase buy-in is illustrated by line 79. In some embodiments, a player may also be allowed to increase his buy-in amount as a reward for a number of games played, an amount in a bonus pool being larger than a predetermined number or other predetermined criteria which will enhance player enjoyment. If a player increases his buy-in, he may win as much as indicated by amount of said final buy-in as indicated on the award table. This will really make very little difference in games commonly known as multipliers as shown here. If a game is not a multiplier, then allowing a player to increase buy-in except at random intervals and by amounts that are carefully predetermined must be carefully calculated prior to advertising the game for play or the operator may lose revenue.

[0038] Embodiments of the present invention described previously herein for spinning reel game skill games may also be applied to card games or other well-known games or representations thereof. For example, two hands of cards could be shown and a player could be required to choose cards or arrange cards, within a predetermined time period, to complete a winning hand with a payout of the card combination shown in the award table. All the higher pay lines in the award table can be well-known winning card hands. The first dynamic line (or bottom line) in the award table which pays a minimum amount to a player could be any nonsense hand and need have no relation to any well-known card hand.

II. Payout Method Without Player Buy-In Subtraction For Operator Hold

[0039] U.S. Pat. No. 7,192,346 describes a method of calculating an award in a skill game that involves subtracting an amount from player buy-in for an operator fee. After the operator fee or hold is subtracted a portion of buy-in is always available for player award for successful completion of a game of skill. Embodiments of the present invention provide a method of award calculation that does not involve any subtraction of an amount for operator fee. The system still, however, guarantees operator profit over a large number of games, and presents an improved "feel" to a player, thus increasing player enjoyment. The system is further simpler to realize in firmware. The award table calculations may be easily done on a spreadsheet or may even be done dynamically by a program running on a gaming apparatus or skill gaming apparatus upon which games are played.

[0040] Further embodiments of the invention allow a player to choose between sizes of available awards while keeping return to player essentially constant. The aforesaid award selection adds to player enjoyment by allowing a player to exercise preference over size and frequency of available awards. Some players prefer many frequent small awards while others prefer infrequent large awards. Selection of the award frequency enhances a player's entertainment experience while still keeping operator profit over a large number of games played essentially constant.

[0041] To enable understanding of embodiments of the present invention, discussion will first be provided of a conventional award table system. The award table is for well-known spinning reel slot machine, such as that shown in FIG. 2. The spinning reel game may be either a skill game or a game of chance. Example amounts used for discussion in an award table for a single credit play are shown below:

Symbols below win line	Award Amount
Any CH	2
Any Two CH	5
Any 3 Bars	8
Bar Bar Bar	20
CH CH CH	50
SP SP SP	400

[0042] Hit frequency may be defined as the probability that a particular award will be selected as the outcome of any game and is abbreviated HF. The product of HF and award amount (AA) will give the theoretical amount paid to a player taken over a large number of games. Return to player (PC) is the summation of the product of HF and the amount of win taken over each award line of an award table.

[0043] Consider the award table amounts in the table above with the hit frequency (HF) given for each line in the award table (all calculations are for a single credit buy-in to reduce complexity):

Symbols below win line	Award Amount	HF	Return to Player (PC)
Any CH	2	0.18	0.36
Any Two CH	5	0.035	0.175
Any 3 Bars	8	0.0045	0.036
Bar Bar Bar	20	0.0018	0.036
CH CH CH	50	0.00064	0.032
SP SP SP	400	0.00021	0.084

Total Return to Player 0.723

Total HF 0.222

1 - HF = 0.778

[0044] The total return to the player 0.723 is the sum of the (PC) amounts in the table. The total HF 0.222 is the sum of the HF amounts in the table. These calculations indicate that approximately 22.2% (Total HF×100) of a large number of games played will result in an award to the player and that 77.8% ((1-HF)*100) of games played will result in a zero award. Total return of buy-in purchased to a player will be 72.3% over a large number of games. Return to player may be increased by increasing the award amount for any or all lines of the award table and/or increasing hit frequency (HF) of any or all lines of the award table.

[0045] In a method described in U.S. Pat. No. 7,192,346, a predetermined amount is subtracted from a player's buy-in for each game and set aside for operator fee. After the amount is subtracted as a fee for an operator of a skill game, a remainder of a buy-in pool is made available as a small prize for a player to attempt to win by successfully completing a game of skill. Any games that result in an award in some type as calculated above result in the player being given a chance to win said award minus the operator fee. The aforesaid method always allows a small award to be available for win by a player, but requires an additional step in implementation over

the method presented subsequently for embodiments of the present invention. Additionally, the method described in U.S. Pat. No. 7,192,346 can result in a grainy feel to a player since an operator fee is a finite amount that is always deducted from a player's buy-in.

[0046] The method of embodiments of the current invention do not set aside any predetermined amount for operator fee, but instead extend the award table calculations to guarantee an operator fee. For example, consider a first award table according to embodiments of the present invention with the hit frequency (HF) given for each line in the award table:

TABLE 1

Symbols below win line	Award Amount	HF	Return to Player (PC)	Award Line
Bin 1	0.15	0.4	0.06	1
Bin2	0.30	0.2	0.06	2
Bin3	0.35	0.1	0.035	3
Bin4	0.40	0.07785	0.03114	4
Any CH	2	0.18	0.36	5
Any Two CH	5	0.035	0.175	6
Any 3 Bars	8	0.0045	0.036	7
Bar Bar Bar	20	0.0018	0.036	8
CH CH CH	50	0.00064	0.032	9
SP SP SP	400	0.00021	0.084	10

Total Return to Player 0.90914

Total HF 1.0

$1 - 0.90914 = 0.09086 = \text{Operator Hold}$

[0047] Four new award lines (1-4) have been added to the award table with HF values set so there is never a losing game (HF=1). The lines are labeled Bin1-Bin4, and have indicators set for each Bin such as CH SP 2B, or another combination of indicators not provided in other Bins. The remaining lines and hit frequencies remain the same as the conventional award table example shown previously. The effect of adding the 4 new award lines and a constraint that total HF=1 constrains a game to having no losers. An award is available for every game. Having no losing games does not appear to allow a gaming or skill gaming apparatus to build a large amount of credit from losing games, but small payments that do not consume the players buy-in in all cases may be an attraction in a game of chance and may be an absolute necessity in a skill game. Note that in some cases for a game to be classified as a skill game, a player must always be able to win a prize for successful skillful completion of a game; each and every game played.

[0048] In the Table 1 above, Hit frequency (HF) for the fourth line is calculated by taking the difference between one and a summation of HF over all lines of the award table excluding line 4. Hit frequency may be distributed in any manner among all awards as long as the total HF=1. In fact, hit frequency could be varied dynamically from game to game as long as sum of HF=1 and return to player remains constant.

[0049] Construction of an award table as previously described may be done by setting HF for each award line and then applying a calculation to any one award line which will determine HF for said award line in such a manner that sum of HF=1. In the previous example of Table 1 HF is set by knowledge of award tables gained through experience and HF for line 4 (Bin 4) is $1 - (\text{sum of HF}[\text{line}(1 \dots 3)] + \text{line}(5 \dots 10))$. Note that although four bins are added, any number of bins can be added with the limitation of a bin like Bin 4 having a HF set so that the total HF=1. Similarly, bin award lines do not be added, but any award line may be used as a substitute

for Bin 4 in the aforesaid relation. Various relations between award lines that simply need to result in the hit frequency adding to 1 and return to player being desirable for an operator may be derived by a person skilled in the art using the basic concept presented previously.

[0050] An award table may be dynamically calculated or chosen from a set of predetermined award tables and displayed to a player. An example of a display that can be used is a video display controlled by a microprocessor. The variable display of award tables in some embodiments allows a player to adjust payment amounts on one or more award lines. The resulting selection of different award tables for different players will still keep the return to player (PC) essentially constant, but will result in awards more pleasing to a particular player.

[0051] As an example of a variable award system, providing a variation from Table 1, consider the award table 2 below:

TABLE 2

Symbols below win line	Award Amount	HF	Return to Player (PC)	Award Line
Bin 1	0.05	0.4	0.02	1
Bin2	0.05	0.2	0.01	2
Bin3	0.1	0.1	0.01	3
Bin4	0.15	0.25734	0.038600925	4
Any CH	2	0.0018	0.0036	5
Any Two CH	5	0.0034	0.017	6
Any 3 Bars	8	0.0032	0.0256	7
Bar Bar Bar	20	0.033411	0.66821	8
CH CH CH	50	0.00064	0.032	9
SP SP SP	400	0.00021	0.084	10

Total Return to Player 0.909010925

Total HF 1.0

$1 - 0.90914 = 0.090989075 = \text{Operator Hold}$

Note that any number of award lines can be included within an award table and that boundary sets for said award lines can equal or exceed the number of award lines included within said award table.

[0052] The Return to Player (PC) is within 0.01% of the previous PC in Table 1 as is the operator hold. Small awards in bins 1-4 have been reduced, though they are still allowed to satisfy a requirement that an award must be available for every successful completion of the game of skill. The large award amount in lines 5-10 have remained unchanged, but chances of winning an award displayed on lines 5, 6 and 7 have been reduced greatly. However, the player will see an expectation of an award on line 8 slightly more than 3 times every 100 games played. Previously in table 1 a player could expect an award on line 8 to appear about 1.8 times every 1000 games. The previous adjustment of award HF can be extended over an entire award table within the constraints of predetermined boundaries defined by award table limit with summation HF=1.0.

[0053] Steps can be added to allow an iterative calculation to be performed as dictated by a player. Similarly, a table of several predetermined award tables can be stored in memory and presented to a player for his selection. Since HF is determined as a number based on multiple plays, the player award table selection frequency can in some embodiments be limited to assure the HF values are reached over a number of games played. In further embodiments, steps can be included to return the display to a predetermined default award table

after no activity by a player is sensed for a predetermined period of time, indicating that a player has probably left the apparatus.

[0054] FIG. 7 is a flowchart showing an embodiment of the present invention for calculating award table values without operator fee subtracted from player buy-in and then playing games when the game is a game of skill to award a player. First, in step **80** a range of awardable values for each line in an award table, such as SP SP SP of line **10** in table 1, is chosen and a hit frequency (HF) and award amount (AA) is then chosen for that line. The process continues in step **82** wherein a number (AdjConst) is determined by which the smallest HF must be multiplied in order to result in an integer. In Table 1 above AdjConst may be 100000 since $100000 \times 0.00021 = 21$. In a next step **84** the hit frequencies are sorted in a descending order. In Table 1 above, the award lines would be sorted from smallest HF to largest as 10,9,8,7,6,4,3,5,2,1. Next in step **86**, bin parameters ranges are determined based on HF and AdjConst. The range for each bin has the constraints that allow the award lines to set the bounds of the bin based on hit frequency so that HF times AdjConst gives the upper bound for the bin and the previous bin HF*AdjConst gives the lower bound. For the first bin, the lower bound will be zero, and for the last bin, the upper bound will be AdjConst.

[0055] For example in setting bins referring to table 1, in setting the first bin **10** of table 1, the upper bound would be $0.00021 \times 100000 = 21$ and the lower bound on the bin is 0. A lower bound for a bin for line **9** of Table 1 is 21 and the upper bound is determined as $21 + (0.00064 \times 100000) = 21 + 64$. A lower bound for a bin for line **8** of Table 1 is 85 and an upper bound is $0.0018 \times 100000 = 180$ which when added to 85 yields 265. The calculation is repeated up through line **1** on the award table yielding the boundaries for each bin as:

bin1	bin2	bin3	bin4	bin5
0-21	21-85	85-265	265-715	715-4215
bin6	bin7	bin8	bin9	bin10
4215-12000	12000-22000	22000-40000	40000-60000	60000-100000

[0056] Now that the game parameters are chosen, in step **88** a game play begins with generation of a random number in the range of lower to upper bound inclusive (0-100000 in this example). The random number will be representative of a game result. In a next step **90**, a determination is made into which bin the random number generated above fits. As an example, if the random number is greater than or equal to zero and less than 21 the result of a corresponding game is line **10** of Table 1. If the random number is greater than or equal to 21 and less than 85, the result of a corresponding game is line **9** of Table 1. The process of beginning comparison of a game result to the smallest bin first progressing to the largest bin allows a very efficient method of software or firmware code development. A comparison of game result may be made to determine a bin into which a game results falls can be done in any order, but with less efficiency and ease in software or firmware code development. Finally in step **92**, the result associated with the bin identified with the random number is selected from the award table and displayed to the player. Another game can be started by returning to step **88** and generating another random number.

[0057] FIG. 8 shows more details of steps for playing a game as described with respect to FIG. 7. The bin ranges of FIG. 8 will correspond with the values of table 2 used as an example in FIG. 7. The process of FIG. 8 begins at step **102** where any required memory is initialized and then proceeds to step **106** where a random number is drawn. The random number is then initially compared with the top award line in step **108** and if the random number is greater than or equal to 0 and less than 21, the award available for a player is the award amount associated with line **10** of Table 2. If aforesaid condition is true, the program exits after flagging an award at step **110**. After initialization for another game in step **102** another random number is drawn in line **106**. If the random number drawn at **106** does not meet the predetermined conditions at **108**, the process continues on to **114** where it is compared to the ninth award line expectation at **114** and if said random number is greater than or equal to 21 and less than 85 the award available for a player is award associated with award line **9** of Table 2. If aforesaid condition is true, the program exits after flagging an award at step **112**. If the random number drawn at **106** does not meet the predetermined conditions at **114**, the process continues on to **118** where it is compared to the eighth award line expectation at **118** and if said random number is greater than or equal to 85 and less than 265 the award available for a player is award associated with award line **8** of Table 2. If aforesaid condition is true, the program exits after flagging an award at step **116**. If the random number drawn at **106** does not meet the predetermined conditions at **118**, the process continues on to **122** where it is compared to the seventh award line expectation at **122** and if said random number is greater than or equal to 265 and less than 715 the award available for a player is award associated with award line **7** of Table 2. If aforesaid condition is true, the program exits after flagging an award at step **120**. If the random number drawn at **106** does not meet the predetermined conditions at step **122**, the process continues on to **126** where it is compared to the sixth award line expectation at **126** and if said random number is greater than or equal to 715 and less than 4215 the award available for a player is award associated with award line **106** of Table 2. If aforesaid condition is true, the program exits after flagging an award at step **124**. If the random number drawn at **106** does not meet the predetermined conditions at **126**, the process continues on to step **130** where it is compared to the fourth award line expectation at **130** and if said random number is greater than or equal to 4215 and less than 12000 the award available for a player is award associated with award line **4** of Table 2. If aforesaid condition is true, the program exits after flagging an award at step **128**. If the random number drawn at **106** does not meet the predetermined conditions at **130**, the process continues on to **134** where it is compared to the third award line expectation at **134** and if said random number is greater than or equal to 12000 and less than 22000 the award available for a player is award associated with award line **3** of Table 2. If aforesaid condition is true, the program exits after flagging an award at step **132**. If the random number drawn at **106** does not meet the predetermined conditions at **134**, the process continues on to **138** where it is compared to the fifth award line expectation at **138** and if said random number is greater than or equal to 22000 and less than 40000 the award available for a player is award associated with award line **5** of Table 2. If aforesaid condition is true, the program exits after flagging an award at step **136**. If the random number drawn at **106** does not meet the predetermined conditions at **138**, the process continues on

to 142 where it is compared to the second award line expectation at 142 and if said random number is greater than or equal to 40000 and less than 60000 the award available for a player is award associated with award line 2 of Table 2. If aforesaid condition is true, the program exits after flagging an award at step 140. If the random number drawn at 106 does not meet the predetermined conditions at 142, the process continues on to 146 where it is compared to the first award line expectation at 146 and if said random number is greater than or equal to 60000 and less than 100000 the award available for a player is award associated with award line 1 of Table 2. If aforesaid condition is true, the program exits after flagging an award at step 144.

[0058] A program described with respect to FIG. 7 can be used to generate a large set of predetermined game outcomes as shown in FIG. 8. Game awards as set in step 80 of FIG. 7 may be randomly determined, or can be drawn from said set of predetermined game outcomes to determine game awards in an application that is generally described as a pull-tab or finite game.

[0059] In one embodiment of the present invention the bins allow selection of a single award to be presented to the player either before the game begins after game play starts. The award value is selected using the program of FIG. 8. In this manner, a skill game can be played by the player with one of the awards, such as those shown in FIG. 8 presented to the player to be awarded upon successful completion of the skill game. Player entertainment can be enhanced with selection by the player of one set from a group of awards tables depending on the award frequency the player desires, with the single award value presented from the selected table upon successful completion of the game.

[0060] A further embodiment of the present invention allows selection of either a single variable award line, or multiple variable award lines by a player of the game of skill. This embodiment provides at least one variable award line, such as shown in FIG. 5, with the award line selected by the player. Adjustments of the HF's can be selected so that HF=1 in some embodiments. Multiple variable lines can be included, such as four separate lines as described above. The fact that as the first four lines of the award table can approach an award of zero which would effectively take away the variable line in some embodiments can be taken care of by putting a minimum value that must always be offered to the player for completing a game of skill whenever the random number drawn results in choice of said lines.

[0061] A game generally known as a multiplier multiplies the award given on each line by the number of credits paid for buy-in before a game is played. If Table 1 is the award table for a multiplier game then an award for line 10 would be 800 credits for a two credit buy-in ($2 \times 400 = 800$). Each award in Table 1 would be multiplied by the amount of credits paid for buy-in. Since the change in award and buy-in is multiplicative and HF remains constant, return to player (PC) remains constant also. To allow a player to select a preferred hit frequency of awards in an award table where a multiplier game is employed will require that the number of credits paid for a buy-in be used in an award calculation. If a set of predetermined tables is used for award determination then values in said predetermined award tables must also be adjusted by credits paid for game buy-in. If a large set of predetermined game outcomes is calculated as in a pull-tab application, then a set of predetermined game outcomes may be made for each amount of buy-in or award amount drawn from a pull tab deck

may be multiplied by number of credits paid for buy-in and shown as an award or potential award to a player.

[0062] Another application for the method described above is in making awards of progressive jackpots. A progressive jackpot is typically granted by means of a particular award being chosen by a gaming apparatus. Credit in a progressive jackpot is typically accrued by taking a small percentage of each credit played by a player on each game which qualifies for said progressive jackpot and summing that to an accumulator for the progressive jackpot. Said small percentage of each credit is taken from the return to player on each qualifying gaming apparatus and thus really belongs to the players of the games. When a player meets predetermined qualifications and a particular award is selected by a qualifying gaming apparatus (such as maximum award) a progressive bonus amounting to a portion, or all, of the progressive jackpot is awarded to him. Generally progressive jackpot awards are tied to and associated with a gaming apparatus award and payment of a progressive jackpot depends upon selection of a particular award upon a gaming apparatus by said gaming apparatus with which the progressive jackpot is associated. As an example, if a player of a game wins a top jackpot award, he may win a progressive jackpot award in addition to or in place of said top jackpot award. Offering of a progressive jackpot award to a player of a skill game is also desirable to enhance player enjoyment so the previous discussion applies to progressive jackpots and pays associated with skill games also.

[0063] A further flexible method for awarding multiple progressive bonuses can be achieved by adding lines to the award table. An example of such a table is shown below.

TABLE 3

Symbols below win line	Award Amount	HF	Return to Player (PC)	Award Line
Bin 1	0.15	0.4	0.06	1
Bin2	0.30	0.2	0.06	2
Bin3	0.35	0.1	0.035	3
Bin4	0.40	0.07785	0.03114	4
Any CH	2	0.18	0.36	5
Any Two CH	5	0.035	0.175	6
Any 3 Bars	8	0.0045	0.036	7
Bar Bar Bar	20	0.0018	0.036	8
CH CH CH	50	0.00064	0.032	9
SP SP SP	400	0.00021	0.084	10
ProgAward1	Award1	0.00050	0	11
ProgAward2	Award2	0.00007	0	12
ProgAward3	Award3	0.00021	0	13

Total Return to Player 0.90914

Total HF 1.0

$1 - 0.90914 = 0.09086 = \text{Operator Hold}$

[0064] The added progressive bonuses are shown on the last three lines of the award table. There is no return to player (PC) assigned to them since the amount awarded is already paid for by players as previously explained. Probabilities that said progressives bonuses will be paid are a separate calculation and depend upon the frequency that the bonuses are desired to be paid. Typically the progressive bonus on line 11 would be a fairly small award since it would be paid a little more frequently than the amount on line nine of the award table. The progressive bonus on line twelve may possibly be the largest progressive bonus paid for the game shown. The progressive bonus on line thirteen has the same probability of being selected as the top pay shown on line ten, though the progressive bonus may not be paid simultaneously with a win

on line ten. In one embodiment progressive bonuses may be selected by a game, but not allowed to actually be paid until a game of skill is successfully completed. In another embodiment, the progressive bonus may be selected by the game and paid immediately as in a normal game of chance.

[0065] Although the present invention has been described above with particularity, this was merely to teach one of ordinary skill in the art how to make and use the invention. Many additional modifications will fall within the scope of the invention, as that scope is defined by the following claims.

What is claimed is:

1. A skill game comprising a game controller configured to: provide games to a player involving at least one spinning reel; display to the user an award table with pay lines containing a pattern of indicators matching individual indicators on the at least one spinning reel and an award amount for each pay line for each game; and vary the pattern of indicators for at least one of the pay lines of the award table for at least some games.
2. The skill game of claim 1, wherein the varied pattern provides the minimum award amount for the award table.
3. A method of operating a game providing an award table to a player, the method comprising: determining a hit frequency (HF) for each pay line of the award table so that the total of the hit frequencies of the pay lines of the award table equal 1; and determining an award amount (AA) for each pay line so that the total of the award amounts of the pay lines is less than one to provide an operator hold.
4. The method of claim 3, further comprising presenting one of the pay lines to the player of a skill game for an award for successful completion of the skill game.
5. The method of claim 3, further comprising determining a number of winning indicators achievable in the game and associating the winning indicators with pay lines of the award table.
6. The method of claim 3, further comprising the steps of: arranging the pay lines in order of ascending hit frequency; multiplying the hit frequencies by a range number to set range values so that the least hit frequency multiplied by the number provides a range value that is a whole number; and

determining bin ranges associated with each pay line, wherein the first bin ranges from 0 to the range value of the first pay line, wherein subsequent pay lines up to the last pay line have range values from the previous pay line range value to the current pay line range value, and wherein the last pay line ranges from its range value up to the range number.

7. The method of claim 4, further comprising:

generating a random number ranging from zero to the range number;

comparing the random number with the ranges of each bin to determine a given one of the bins containing the random number in its range; and

displaying an award value associated with the pay line of the given bin to a player.

8. The method of claim 3, wherein the hit frequency for all but a given one of the pay lines are fixed, and wherein the given one of the paylines has a hit frequency varied to enable the total hit frequency of all pay lines to be 1.

9. The method of claim 6, wherein the pay lines with fixed hit frequencies comprise four standard pay lines and three non-standard lines added to the standard pay lines along with the payline with the variable hit frequency.

10. A method of operating a game providing an award table to a player, the method comprising:

providing a first award table available for the player indicating a first set of award lines providing awards at a first frequency;

providing a second award table available for the player indicating a second set of award lines providing awards at a second frequency; and

selectively displaying one of the first award table and the second award table to the player.

11. The method of claim 10, wherein a choice of the first award table and the second award table selectively displayed is chosen by the player.

12. The method of claim 10, wherein a further selection between the first award table and the second award table is made after the player has been inactive for a predetermined period of time.

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