Disclosed is a game and method for a wagering game including a Sudoku-like element. A feature game playable after determination of the primary game outcome includes an award associated with placement of one or more indicia on a grid such that no two indicia are the same in at least one of a row, a column or a diagonal of the grid.
EXAMPLE OF A SUDOKU PUZZLE

FIG. 1A  (Prior Art)

FIG. 1B  (Prior Art)

EXAMPLE OF A SOLVED SUDOKU PUZZLE
图5中流程图描述了以下步骤：

1. 初始化网格
2. 游戏是否启动
3. 设计行、列或对角线是否完成
4. 特征支付
5. 是否完成九宫格
6. 获得特征支付并初始化网格

下面是流程图的详细步骤：

- 500: 初始化网格
- 510: 游戏是否启动
- 520: 设计行、列或对角线是否完成
- 530: 特征支付
- 540: 是否完成九宫格
- 550: 获得特征支付并初始化网格
SUDOKU-TYPE WAGERING GAME AND METHOD

[0001] This application claims priority from provisional application 60/761,579 filed on Jan. 23, 2006, hereby incorporated by reference in its entirety.

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BACKGROUND OF THE INVENTION

Field of the Invention

[0003] The present invention is directed to gaming games and methods and, more particularly, to games and methods that have a Sudoku-like game element.

[0004] In the prior art, various types of gaming machines have been developed with different features to captivate and maintain player interest. In general, a gaming machine allows a player to play a game in exchange for a wager. Depending on the outcome of the game, the player may be entitled to an award which is paid to the player by the gaming machine, normally in the form of currency or game credits. Gaming machines may include flashing lights, lighted displays, or sound effects to capture a player's interest in a gaming device.

[0005] Another important feature of maintaining player interest in a gaming machine includes providing the player with many opportunities to win awards, such as cash or prizes. For example, in some slot machines, the display windows show more than one adjacent symbol on each reel, thereby allowing for multiple-line betting. Some gaming machines offer a player the opportunity to win millions of dollars by providing progressive jackpots. Additionally, feature games of various types have been employed to reward players above the amounts normally awarded on a standard game pay schedule. Generally, such feature games are triggered by predetermined events such as one or more appearances of certain combinations of indicia in a primary game. In order to stimulate interest, feature games are typically set to occur at a gaming machine on a statistical cycle based upon the number of primary game plays.

[0006] A currently popular puzzle game in many countries of the world is Sudoku. Originally named Suuji Wa Dokushin Ni Kagiru, ("the numbers must be single") in Japan, the name was later abbreviated as Sudoku (Su=number, Doku=single). This type of puzzle has also been called a variety of similar names such as, for example and not by way of limitation, "Number Place" or "Nanpuru." The rules of Sudoku are described in many publications, one example of which is Master Sudoku by Carol Vorderman, copyright 2005 by Three Rivers Press. Referring to FIG. 1A, in standard Sudoku, the player is presented with a 9x9 "grid," divided into smaller 3x3 "boxes" consisting of three rows of three cells each. Some cells in the grid are prepopulated with numbers from 1 to 9. The player must fill the remaining empty cells so that each row, column and "box" contains only one instance of every number from one to nine, as shown in FIG. 1B. Printed versions of Sudoku puzzles are available in puzzle books and newspapers. Electronic versions may be played on personal computers, on the internet, on cell phones, on standalone Sudoku handheld units and the like, however, no adaptations of the puzzle for use in gaming machines is known.

[0007] Gaming establishments are continually looking for new ways to increase the popularity of their gaming machines. As players become used to the machines in a particular establishment, it is common for the patrons to become bored with the older game themes and to crave something new. Given the growing popularity of Sudoku around the world, a gaming machine with a Sudoku-like element is desirable.

SUMMARY OF THE INVENTION

[0008] In accordance with one embodiment of the present invention, a game includes an interface activatable by a player and a primary game having a set of outcomes, at least one of the set of outcomes determined after activation of the interface by the player. The primary game includes a plurality of displayed indicia. In a feature game playable after determination of the primary game outcome, placement of one or more representations of the displayed primary game indicia on a grid such that no two indicia are the same in at least one of a row, a column or a diagonal of the grid results in payment of an award associated with such placement.

[0009] In accordance with another embodiment of the invention, a method of operating a game includes the steps of accepting a wager to play the game from the player and determining at least one of a set of outcomes for a primary game, the primary game including a plurality of displayed indicia. The method further includes the steps of, upon the occurrence of a predefined primary game outcome, playing a feature game that includes placement of one or more representations of the displayed primary game indicia on a grid and paying a feature game award, the award at least partially based on the placement of the representations of the displayed primary game indicia such that no two indicia are the same in at least one of a row, a column or a diagonal of the grid.

[0010] Other features and advantages will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate by way of example, the features of the various embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIGS. 1A and 1B are prior art examples of Sudoku puzzles.

[0012] FIG. 2 is a perspective view of a gaming machine in accordance with one embodiment of the invention.

[0013] FIG. 3 is a block diagram of the physical and logical components of the gaming machine of FIG. 2.

[0014] FIGS. 4A, 4B and 4C illustrate game screens associated with a game of one embodiment of the invention.

[0015] FIG. 5 is a flow diagram depicting the steps associated with carrying out a method in accordance of one aspect of the invention.
FIG. 6 is a schematic block diagram showing a high-level view of the major hardware elements of a networked gaming system in accordance with one aspect of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Various embodiments are directed to a game and method for playing a game having a Sudoku-like element. Embodiments of the game and method are illustrated and described herein, by way of example only, and not by way of limitation. Referring now to the drawings, and more particularly to FIGS. 2-6, there are shown illustrative examples of a game and a method for playing a game in accordance with various aspects of the invention.

In accordance with one embodiment, FIG. 2 illustrates a gaming machine 200 including cabinet housing 220, primary game display 240, player-activated buttons 260, player tracking panel 236, and bill/voucher acceptor 230. Cabinet housing 220 is a self-standing unit that is generally rectangular in shape and may be manufactured with reinforced steel or other rigid materials which are resistant to tampering and vandalism. Cabinet housing 220 houses a processor, circuitry, and software (not shown) for receiving signals from the player-activated buttons 260, operating the games, and transmitting signals to the respective displays. Any shaped cabinet may be implemented with any embodiment of gaming machine 200 so long as it provides access to a player for playing a game. For example, cabinet 220 may comprise a slant-top, bar-top, or table-top style cabinet. The operation of gaming machine 200 is described more fully below.

The plurality of player-activated buttons 260 may be used for various functions such as, but not limited to, selecting a wager denomination, selecting a game to be played, selecting a wager amount per game, initiating a game, or cashing out money from gaming machine 200. Buttons 260 function as input mechanisms and may include mechanical buttons, electromechanical buttons or touch screen buttons. Optionally, a handle (not shown) may be rotated by a player to initiate a game.

In other embodiments, buttons 260 may be replaced with various other input mechanisms known in the art such as, but not limited to, a touch screen system, touch pad, track ball, mouse, switches, toggle switches, or other input means used to accept player input. For example, one input means is a universal button module as disclosed in U.S. application Ser. No. 11/106,212, entitled “Universal Button Module,” filed on Apr. 14, 2005, which is hereby incorporated by reference. Generally, the universal button module provides a dynamic button system adaptable for use with various games and capable of adjusting to gaming systems having frequent game changes. More particularly, the universal button module may be used in connection with playing a game on a gaming machine and may be used for such functions as selecting the number of credits to bet per hand.

Cabinet housing 220 may optionally include top box 250 which contains “top glass” 252 comprising advertising or payout information related to the game or games available on gaming machine 200. Player tracking panel 236 includes player tracking card reader 234 and a player tracking display (not shown). Voucher printer 238 may be integrated into player tracking panel 236 or installed elsewhere in cabinet housing 220 or top box 250.

Game display 240 presents a game of chance wherein a player receives one or more outcomes from a set of potential outcomes. For example, one such game of chance is a video slot machine game, an example of which is entitled Sudoku Slots, further described below. The Sudoku Slots game features a basic slot machine game with nine simulated spinning reels and a Sudoku feature game. It will be appreciated, however, that the game may be implemented with themes and symbology somewhat different from traditional Sudoku presentations. For example, different symbology such as Arabic numerals, Kanji characters or traditional slot machine symbols such as cherries, bars (single, double, triple), bells, sevens and stars or other indicia may be substituted for each of the numbers 1-9 found in traditional Sudoku puzzles without deviating from the scope of the invention. In other aspects of the invention, gaming machine 200 may present a video or mechanical reel slot machine, a video keno game, a lottery game, a bingo game, a Class II bingo game, a roulette game, a craps game, a blackjack game, a mechanical or video representation of a wheel game or the like. In alternative embodiments, it may further be appreciated that games of skill or games of chance involving some player skill may be implemented with gaming machine 200. It should be appreciated that not all gaming devices 200 will have all these components and may have other components in addition to, or in lieu of, those components mentioned here. Furthermore, while these components are viewed and described separately, various components may be integrated into a single unit in some embodiments.

Mechanical or video/mechanical embodiments may include game displays in cabinet housing 220 or top box 250 such as mechanical reels, wheels, or dice as required to present the game to the player. In video/mechanical or pure video embodiments, game display 240 is typically a CRT or a flat-panel display in the form of, but not limited to, liquid crystal, plasma, electroluminescent, vacuum fluorescent, field emission, or any other type of panel display known or developed in the art. Game display 240 may be mounted in either a “portrait” or “landscape” orientation and be of standard or “widescreen” dimensions (i.e., a ratio of one dimension to another of at least 16:9). For example, a widescreen display may be 32 inches wide by 18 inches tall. A widescreen display in a “portrait” orientation may be 32 inches tall by 18 inches wide. Additionally, game display 240 preferably includes a touch screen or touch glass system (not shown) and presents player interfaces such as, but not limited to, a credit meter (not shown), a win meter (not shown) and touch screen buttons (not shown). An example of a touch glass system is disclosed in U.S. Pat. No. 6,942,571, entitled “Gaming Device with Direction and Speed Control of Mechanical Reels Using Touch Screen,” which is hereby incorporated by reference.

Game display 240 may also present information such as, but not limited to, player information, advertisements and casino promotions, graphic displays, news and sports updates, or even offer an alternate game. This information may be generated through a host computer networked with gaming machine 200 on its own initiative or it may be obtained by request of the player using either one or more of the plurality of player-activated buttons 260; the
game display itself, if game display 240 comprises a touch screen or similar technology; buttons (not shown) mounted about game display 240 which may permit selections such as those found on an ATM machine, where legends on the screen are associated with respective selecting buttons; or any player input device that offers the required functionality. [0025] Cabinet housing 220 incorporates a single game display 240. However, in alternate embodiments, cabinet housing 220 or top box 250 may house one or more additional displays or components used for various purposes including additional game play screens, animated “top glass,” progressive meters or mechanical or electromechanical devices such as, but not limited to, wheels, pointers or reels (not shown). The additional displays may or may not include a touch screen or touch glass system.

[0026] In accordance with one embodiment of the present invention, FIG. 3 is a block diagram showing the interconnection of physical and logical components 300 of gaming machine 200. Currency acceptor 310 is typically connected to a conventional central processing unit (“CPU”) 305, such as an Intel Pentium microprocessor mounted on a gaming motherboard, by a serial connection such as RS-232 or USB. The gaming motherboard may be mounted with other conventional components, such as are found on conventional personal computer motherboards, and loaded with a gaming machine operating system (OS), such as an Alpha OS installed within a Bally S9000, M9000 or CineVision™ slot machine. CPU 305 executes game program 320 that causes video display screen 330 to display a game. In one embodiment, game program 320 is a game entitled Sudoku Slots.

[0027] When a player has inserted a form of currency such as, for example and without limitation, paper currency, coins or tokens, cashless tickets or vouchers, electronic funds transfers or the like into currency acceptor 310, a signal is sent to CPU 305 which, in turn, assigns an appropriate number of credits for play. The player may further control the operation of gaming machine 300, for example, to select the amount to wager via electromechanical or touchscreen buttons 350. The game starts in response to the player pushing one of buttons 350 or an alternate start mechanism such as a handle or touchscreen icon (not shown). Random number generator 340 responds to instructions from CPU 305 to provide a display of randomly selected indicia on video display screen 330. In some embodiments, random generator 340 may be physically separate from gaming machine 300; for example, it may be part of a central determination host system (not shown) which provides random game outcomes to CPU 305. Thereafter, the player may or may not interact with the game through electromechanical or touchscreen buttons 350 to change the displayed indicia. Finally, CPU 305 under control of game program 320 compares the final display of indicia to a pay table. The set of possible game outcomes may include a subset of outcomes related to the triggering of a feature game. In the event the displayed outcome is a member of this subset, CPU 305, under control of game program 320, may cause feature game play to be presented on at least one of video display screen 330 or reels 370.

[0028] In other embodiments, the Sudoku feature game is one of a set of primary games randomly selected for play. For example, one such means is disclosed in U.S. application Ser. No. 11/428,220, entitled “Multiple Primary Games Triggered by Random Number Generator,” filed on Jun. 30, 2006, which is hereby incorporated by reference. A gaming machine has at least two distinct primary games. After receiving a wager, the gaming machine determines which primary game to activate. The selected primary game is activated and a game outcome is presented to the player on at least one game display. A payout may be awarded according to the game outcome. If the selected game is the game with a guaranteed progressive award, the game is played until a progressive award has been won.

[0029] Predetermined payout amounts for certain outcomes, including feature game outcomes, are stored as part of game program 320. Such payout amounts are, in response to instructions from CPU 305, provided to the player in the form of coins, credits or currency via payout mechanism 360, which may be one or more of a credit meter, a coin hopper, a voucher printer, an electronic funds transfer protocol or any other payout means known or developed in the art.

[0030] In various embodiments of gaming machine 300, game program 320 is stored in a memory device (not shown) connected to or mounted on the gaming motherboard. By way of example, but not by limitation, such memory devices include external memory devices, hard drives, CD-ROMs, DVDs, and flash memory cards. In an alternative embodiment, the game programs are stored in a remote storage device. In one embodiment, the remote storage device is housed in a remote server. The gaming machine may access the remote storage device via a network connection, including but not limited to, a local area network connection, a TCP/IP connection, a wireless connection, or any other means for operatively networking components together. Optionally, other data including graphics, sound files and other media data for use with gaming machine 300 are stored in the same or a separate memory device (not shown). Some or all of game program 320 and its associated data may be loaded from one memory device into another, for example, from flash memory to random access memory (RAM).

[0031] Turning now to FIG. 4A, the Sudoku Slots base game is implemented on video display 400 using nine simulated spinning reels 401-409. Each of eight pay line patterns passes through one indicium on each of the three reels 401-409. It should be appreciated that the number of reels and the number of pay lines may vary without deviating from the scope of the invention. The player selects the number of played pay lines and the number of credits or coins wagered on each line using touch screen selection buttons 420. The player may also collect the balance of his credits by pressing CASH OUT button 440.

[0032] Credit meter 415 display the player’s current credit balance, while other meters 416 may display the number of lines selected for play, the number of credits or coins selected for wager on each pay line, the total bet size and the last amount paid by the payout mechanism 360 (FIG. 3). Other meters 416 containing other information may be displayed. The amount wagered on each pay line is additionally indicated by a bet tag 410 corresponding to each pay line. In the example shown, 5 credits have been wagered on each of 3 horizontal, 3 vertical and 2 diagonal pay lines. It will be appreciated that other pay line patterns may be used.

[0033] The player initiates game play by pressing SPIN button 430. Alternately, the player may simultaneously select all pay lines at the maximum number of coins or credits allowed per line by pressing MAX BET touch screen button 435. Corresponding buttons 260 on the gaming device control panel (FIG. 2) may be used instead of the
touch screen buttons to perform the actions described here without deviating from the scope of the invention. A video representation of reels 401–409 is made to spin and stop in their predetermined stop positions and then indicate whether the stop positions of the reels resulted in a winning game outcome.

[0034] Winning outcomes may be indicated on a pay table (not shown) similar to Table 1 that may be accessible through PAY TABLE help button 425. In alternate embodiments, the pay table may be presented on a second video or printed display attached to the gaming device (FIG. 2, 200) (i.e. a “pay glass”). A winning combination, for example, could be three like indicia (5, 5, 5, for example) adjacent to one another on an active pay line. For each winning combination, the game device awards the player the award in the pay table, adjusted as necessary based on the number of credits wagered on the pay line on which the win occurred. Some video representations of pay tables may factor in the amount of the player’s wager and no additional award adjustment is required.

[0035] In various embodiments, winning combinations may be evaluated across adjacent reels from left-to-right, from right-to-left or both. Additional winning combinations may be awarded when certain indicia do not necessarily accumulate adjacent on a pay line, but rather, appear anywhere on the reels (i.e., “scatter pays”). In addition, “wild” indicia may be used to complete winning combinations. Some “wild” indicia may also cause completed winning combinations to be result in pay amounts in excess of the normal winning combination by way of multiplication or addition, for example, a wild doubler symbol may be used. One or more free plays may be awarded as the result of base game or Sudoku feature game results.

[0036] In another embodiment, the reels of the base game comprise a 9-reel video or mechanical reel spinning assembly. Each reel would display indicia corresponding to the numbers 1-9 and each reel would represent one of the nine positions in a Sudoku 3×3 “box,” an arrangement of nine cells arranged in three rows of three cells each. When the game starts, each reel displays a representation of a slot machine reel spin for example, three seconds, before stopping with a particular indicium displayed to the player. A win occurs if a sequential series of numbers appears in rows, columns, or along a diagonal. Win possibilities exist for lining up identical numbers (3, 3, 3, for example) in a row, column or diagonal. Such wins provide a win of some nominal value according to a pay table, however, if a proper Sudoku “box” is achieved (i.e., each of the numbers 1-9 is displayed in the “box” only once), then a much larger award is given. The indicia on the reels may be weighted or non-weighted. The Sudoku Slots game of FIG. 4A is presented as an example of such as game but is not intended to be limiting in any way.

[0037] Players win on the base slot machine game when three of the same indicia (BAR, DOUBLE-BAR, or digit) appear on an active pay line (i.e., a pay line on which a wager has been placed). For example, BAR-BAR-BAR may pay 1 credit. Each credit wagered on the winning pay line, BAR2-BAR2-BAR2 may pay 10 credits. Each credit wagered on the winning pay line and 1-1-1, 2-2-2, 3-3-3 . . . 9-9-9 . . . may pay 5 credits for each credit wagered on the winning pay line. Note that each reel 401–409 spins independently, thus making it possible for a player to receive a properly completed Sudoku “box” in the base game, at which point a substantial of award of, for example, 1000 credits, may be paid.

[0038] The above diagram shows three single bars aligned on diagonal 490. This results in a base game pay of, for example, one credit per coin wagered on diagonal pay line 490. Prior to the player starting the next game, the numbers 2, 8, 4 and 4 that also appear on reels 406, 404, 403 and 402, respectively, are eligible to be added to the numbers staging area 480, as shown in FIG. 4B. In some embodiments, the row in the numbers staging area is incremented by one for each corresponding indicium on the reels. In other embodiments, a different increment based on the player’s wager or other factors is used.

[0039] Numbers are automatically moved from the numbers staging area 480 onto main Sudoku grid 450 according to the following rules:

[0040] Each grid row may contain only one instance of the digits 1-9.

[0041] Each grid column may contain only one instance of the digits 1-9.

[0042] Each box should contain all of the digits 1-9 without repeats.

[0043] Numbers will be placed according to the above rules and in a best attempt to complete a proper Sudoku box within the grid.

Numbers are automatically placed in grid 450 by the computer. Alternatively, the player may relocate a number placed on grid 450 by the computer to another spot on the grid using any suitable controls such as a touch screen, touch glass, buttons, mouse, joystick, trackball and the like.

[0044] To encourage game play, a new grid 450 appears once a grid has been completed (and a prize won) and is populated with as many numbers as possible from the numbers staging area 480 and play will resume. In some embodiments, grid 450 may also be initialized for play by selecting one or more numbers from the set of 1-9 at random using, for example, a random number generator, and distributing them on grid 450 according to Sudoku rules. In general, the more numbers pre-assigned to the grid, the easier it is to solve a particular puzzle. In some embodiments, the difficulty of the puzzle may be so altered by the gaming machine or system based on certain criteria, for example, but not limited to, the player wager amount, the player’s duration of play, the player’s player club status, the credit denomination selected by the player, the desired return percentage of the game.

[0045] Continuing with FIG. 4C and still before the next game begins, it can be seen that the numbers 2, 8, 4 and 4 have been removed from numbers staging area 480 and placed on grid 450 according to the above rules. In alternate embodiments of the invention, the numbers may be offered to the player for selective removal from numbers staging area 480 by the player. Other variations only allow transfer of the numbers from the numbers staging area when another triggering event has occurred in the play of the base game such as, by way of example and not limitation, expiration of a timer, completion of a certain numbers of plays, appearance of a particular indicia and the like. In still other embodiments, the player may select where on grid 450 to place the numbers removed from numbers staging area 480 or to reposition numbers previously placed on grid 450 by the computer. In another embodiment, once the player has selected a number to be moved, either from numbers staging area 480 or from another stage area, the selected number is placed on grid 450 in a column or row location, as selected by the player.
area 480 or on grid 450, the computer may disable any squares unable to receive the selected number according to Sudoku rules and may optionally indicate the disabled squares to the player by way of visually modifying their appearance. In yet another embodiment, once the player has selected a number to be moved, either from numbers staging area 480 or on grid 450, the computer may enable any squares able to receive the selected number according to Sudoku rules, disable all other squares and optionally indicate the enabled squares to the player by way of visually modifying their appearance.

[0046] As the Sudoku boxes are completed on grid 450, the player may receive additional awards. For example, and not by way of limitation, a completed Sudoku “box” on the grid may award the player 100 credits times his total wager, completion of a Sudoku “grid” row may award the player 50 credits times his total wager and so on. Completion of the entire Sudoku grid may award the player 2000 credits times his total wager.

[0047] In one embodiment, the gaming machine tracks the total wagers since the last award of a feature pay and applies it as a factor in determining the amount of the award. While the amount paid may still be based on random factors, with this method, the amount of the award is determined less by the amount wagered on the single game spin which resulted in the puzzle element solution and more by the average wager of the player since the last feature award. This has the effect of rewarding a player who may place the maximum wager or one who perseveres through an unusually unlucky streak. It also does not unduly reward a player who invests only a little by playing a minimum bet or because a puzzle is solved unusually quickly.

[0048] In one embodiment, any properly formed Sudoku sub-sequence (row, column or diagonal with no redundant numbers or indicia) on reels 401-409 is placed in its entirety directly on Sudoku grid 450. As the player plays the primary game and wins sequences in rows, columns, diagonals or complete 3x3 Sudoku box patterns, these same patterns gradually accumulate on the larger grid 450. When a 9-cell row, column or diagonal line is properly completed with no redundant numbers or indicia on the larger grid, the player may win additional prizes.

[0049] In yet another embodiment, the player may “hold” one or more of reels 401-409 in an attempt to build a complete Sudoku sequence or to try to form a particular winning pattern. The player may receive the chance to hold reels randomly or pay to buy “holds,” for example, the player might play an additional dollar and receive the opportunity to hold three reels or pay $5.00 and receive one additional hold opportunity. Furthermore, the indicia on each reel strip might include other non-Sudoku symbols such as, for example, and not by way of limitation, ‘free spins’, wild symbols, multiplier symbols and the like that provide the player with a variety of play activity.

[0050] In still further embodiments, using any suitable controls, for example, a touchscreen, trackball or a buttons, the player may be able to select and move entire regions of the large Sudoku grid 450 around to achieve better results or the gaming machine or system-based game may automatically make the moves to optimize results on the grid.

[0051] In still another embodiment, if a proper Sudoku “box” occurs on the nine reels 401-409, the values associated with each reel may be directly transferred into position on grid 450, either in the pattern originally revealed on the reels or in some other manner.

[0052] Grid 450 may be displayed on a portion of the primary game display, on a second game display, on a player tracking system display, on an overhead or on any combination thereof. One embodiment displays the grid on the main play display and the player is able to touch this area and have the game display switch focus between the primary game and the Sudoku grid by, for example, diminishing the size of the primary game and increasing the size of the Sudoku grid, by exchanging the positions of the two game displays, or by any other suitable means that enhances the view of the Sudoku grid. Still other embodiments automatically switch focus to the Sudoku grid or return focus to the primary game depending on game results and game state.

[0053] In other embodiments of the invention, the Sudoku grid may comprise a separate video display screen, a primary area of a single game screen, a secondary screen area of a single game screen, a systems-based game screen, an overhead display screen or some combination of them.

[0054] In one embodiment, when the player completes his play and leaves the machine, a subsequent player may be allowed to resume progress in the feature game at the same point. However, in another embodiment, the state of the grid is associated with the player, either through a back-end system or in some other manner that allows the player to “remove” the grid contents from the game and subsequently resume his own play with the same grid in a future playing session at the same or another gaming machine. One manner of retainer game state is described in U.S. Pat. No. 5,816,486 entitled “Method and Apparatus for Enhancing Game Play through Savenable Game Play State,” which is hereby expressly incorporated by reference in its entirety, though any other method known in the art may be used without deviating from the scope of the invention. In another embodiment, the act of the player leaving the game may clear the state of the grid and reinitialize it in a manner as described above.

[0055] A logical flow diagram generally depicting the steps associated with a method 500 for carrying out a game having a guaranteed progressive award feature, in accordance with one aspect of the invention, is presented in FIG. 5. The order of actions as shown in FIG. 5 and described below is only illustrative, and should not be considered limiting. For example, the order of the actions may be changed, additional steps may be added or some steps may be removed without deviating from the scope and spirit of the invention.

[0056] First at block 501, the Sudoku feature grid is initialized. To prevent a player from being discouraged by a
completely empty grid, a new grid may be initialized for play by selecting one or more numbers from the set of 1-9 at random using, for example, a random number generator, and distributing them on the grid according to Sudoku rules so that the puzzle is partially solved.

At block 510, the player places a wager and starts the game, whereby each reel then spins or displays a representation of a slot machine reel spin at block 520 before stopping with a particular indicium displayed to the player. A win occurs if a sequential series of numbers appears in rows, columns, or along a diagonal as described above. Win possibilities exist for lining up identical numbers (3, 3, 3, for example) in a row, column or diagonal. Such wins provide a win of some nominal value according to a pay table, however, if a proper Sudoku “box” is achieved (i.e., each of the numbers 1-9 is displayed in the “box” only once), then a much larger award is given.

Flow continues at block 530, where the indicia displayed on the reels are examined to determine whether any Sudoku symbols (the digits 1-9 or indicia otherwise representing them) appear on the reels. If not, processing resumes at block 510 with play of another iteration of the base game, otherwise, the Sudoku symbols are applied to the contents of the staging area at block 540.

At block 550, the status of the staging area is examined to see if any Sudoku symbols are available for use on the Sudoku feature grid according to the Sudoku rules. If so, symbols are removed from (or their counts reduced in) the staging area and are placed on the grid to attempt to form valid Sudoku patterns.

At block 560, the current state of the grid is examined to see if any 3x3 Sudoku boxes have been completed or if a 9-element grid row, column or diagonal has been filled-in as a result of the most recent grid update. If not, processing resumes at block 510 with play on another base game, otherwise, an award for the Sudoku pattern completion is paid to the player at block 570.

Processing continues at Block 580, where it is determined if the entire Sudoku puzzle has been solved by filling in the entire grid according to Sudoku rules. If not, processing resumes at block 510 with play of another base game, otherwise, an award for the Sudoku puzzle completion is paid to the player at block 590. The grid is reinitialized, either by drawing symbols from the staging area, by the use of a random fill method as described above, or a combination thereof.

Referring to FIG. 6, in accordance with one aspect of the invention, gaming system 600 includes server 610, gaming machines 650, and network 640 connecting gaming machines 650 to server 610. Additionally, gaming display computer 630 is shown connected to network 640. Server 610 may be selected from a variety of conventionally available servers. The type of server used is generally determined by the platform and software requirements of the gaming system. Examples of suitable servers are an IBM RS6000-based server, an IBM AS/400-based server or a Microsoft Windows-based server, but it should be appreciated that any suitable server may be used. It may also be appreciated that server 610 may be configured as a single “logical” server that comprises multiple physical servers. Gaming machines 650 operate similar to conventional peripheral networked terminals. Gaming machines 650 have a player interface such as a display, a card reader, and selection buttons through which gaming machines 650 interact with a player playing a wagering game having a guaranteed progressive award feature in accordance with various embodiments of the invention. The player interface is used for making choices such as the amount of a bet or the number of lines to bet. Gaming machines 650 also provide information to server 610 concerning activity on gaming machines 650 and provide a communication portal for players with server 610. For example, the player interface may be used for selecting different server-related menu options such as, but not limited to, transferring a specified number of credits from a player account onto the credit meter of the gaming machine, or for transferring credits from the gaming machine to a central player account.

In various embodiments, any of the gaming machines 650 may be a mechanical reel spinning slot machine, video slot machine, video poker machine, keno machine, video blackjack machine, or a gaming machine offering one or more of the above described primary games including a Sudoku element. Alternately, gaming machines 650 may provide a Sudoku element as one of a set of multiple primary games selected for play by a random number generator. Networking components (not shown) facilitate communications across network 640 between the system server 610 and game management units 620 and/or gaming display control computers 630 that control displays for carousels of gaming machines. Game management units (GMU’s) 620 connect gaming machines to networking components and may be installed in the gaming machine cabinet or external to the gaming machine. The function of the GMU is similar to the function of a network interface card connected to a desktop personal computer (PC). Some GMU’s have much greater capability and can perform such tasks as presenting and playing a game having feature games with a Sudoku element using a display 625 operatively connected to GMU 620. Displays related to games offering a Sudoku element on gaming machines 650 or GMU displays 625 may also be presented on gaming display 635 by gaming display control computer 630. In one embodiment, GMU 620 is a separate component located outside the gaming machine. Alternatively, in another embodiment, the GMU 620 is located within the gaming machine. Optionally, in an alternative embodiment, one or more gaming machines 650 connect directly to the network and are not connected to a GMU 620. A gaming system of the type described above also allows a plurality of games in accordance with the various embodiments of the invention to be linked under the control of server 610 for cooperative or competitive play in a particular area, carousel, casino or between casinos located in geographically separate areas.

One will appreciate that a gaming system may also comprise other types of components, and the above illustrations are meant only as examples and not as limitations to the types of components or games having a Sudoku element. Additionally, it may further be appreciated that each of the games could be operated on a remote host computer such that a player initiates play with the host computer over a network via the player interface and gaming machine 650 operates the respective gaming and video displays in conjunction with the game whose play is controlled by the remote computer.

The various embodiments described above are provided by way of illustration only and should not be construed to limit the claimed invention. Other system-based embodiments include a Sudoku tournament game system in...
which a common numbers staging area is fed by the results of a plurality of Sudoku games. The numbers in the common staging area are used to fill a common Sudoku grid. When the tournament puzzle is solved, each gaming machine that contributed numbers to the solution is awarded a prize which may be, but is not necessarily, ranked according to that machine's overall contribution to the solution. Another system-based embodiment includes a Sudoku progressive system which has prizes that may be won by the first player to complete certain Sudoku puzzle elements. For example, one progressive pool might be paid when a grid row is completed, one when a grid column is completed, one when a grid diagonal is completed and one when an entire puzzle is solved. In variations of this embodiment, prizes awarded for the successful completion of puzzle elements on the individual gaming machines may be supplemented or replaced by additional pools and prizes allocated and awarded for Sudoku puzzles common to all of the participating gaming machines.

[0066] Those skilled in the art will readily recognize various modifications and changes that may be made to the claimed invention without following the example embodiments and applications illustrated and described herein, and without departing from the true spirit and scope of the claimed invention, which is set forth in the following claims.

What is claimed:

1. A wagering game comprising:
an interface activatable by a player;
a primary game having a set of outcomes, at least one of the set of outcomes determined after activation of the interface by the player, the primary game further comprising a plurality of displayed indicia;
a feature game playable after determination of the primary game outcome, the feature game comprising an award associated with placement of one or more representations of the displayed primary game indicia on a grid such that no two indicia are the same in at least one of a row, a column or a diagonal of the grid.

2. The wagering game of claim 1 further comprising a staging area, the staging area retaining information about the one or more representations of the displayed primary game indicia prior to the placement of the one or more representations on the grid.

3. The wagering game of claim 1 further comprising a staging area, the staging area retaining information about the one or more representations of the displayed primary game indicia prior to the placement of the one or more representations on the grid.

4. The wagering game of claim 1 further comprising a staging area, the staging area containing the one or more representations of the displayed primary game indicia prior to the placement of the one or more representations on the grid.

5. The wagering game of claim 2 wherein the one or more representations in the staging area are restricted from placement on the grid until a predetermined event has occurred.

6. The wagering game of claim 3 wherein the predetermined event comprises elapsed time.

7. The wagering game of claim 3 wherein the predetermined event comprises a predetermined number of subsequent plays of the primary game.

8. The wagering game of claim 3 wherein the predetermined event comprises a predetermined primary game outcome.

9. The wagering game of claim 1 wherein the positions on the grid of the one or more representations of the displayed indicia are determined by the player.

10. The game of claim 1 wherein the positions on the grid of the one or more representations of the displayed indicia are determined by the game.

11. The game of claim 1 wherein the primary game comprises a slot machine game.

12. The game of claim 1 wherein the primary game comprises a poker game.

13. The game of claim 1 wherein the primary game comprises a keno game.

14. The game of claim 1 wherein the primary game comprises a blackjack game.

15. The game of claim 1 wherein the primary game comprises a bingo game.

16. The game of claim 1 wherein the primary game comprises a roulette game.

17. The game of claim 1 wherein the primary game comprises a wheel game.

18. The game of claim 1 wherein the award is a progressive award.

19. The game of claim 1 wherein the award is in part based on an average of a plurality of player wagers.

20. A method of operating a wagering game played by a player, the method comprising the steps of:
accepting a wager to play the game from the player;
determining at least one of a set of outcomes for a primary game, the primary game comprising a plurality of displayed indicia;
upon the occurrence of a predefined primary game outcome, playing a feature game, the feature game comprising placement of one or more representations of the displayed primary game indicia on a grid;
and paying a feature game award, the award at least partially based on the placement of the representations of the displayed primary game indicia such that no two indicia are the same in at least one of a row, a column or a diagonal of the grid.

21. The method of claim 20 further comprising the step of restricting play of the feature game based on the amount of the wager.

22. The method of claim 20 wherein the primary game comprises a slot machine game.

23. The method of claim 20 wherein the primary game comprises a poker game.

24. The method of claim 20 wherein the primary game comprises a keno game.

25. The method of claim 20 wherein the primary game comprises a blackjack game.

26. The method of claim 20 wherein the primary game comprises a bingo game.

27. The method of claim 20 wherein the primary game comprises a roulette game.

28. The method of claim 20 wherein the primary game comprises a wheel game.

29. The method of claim 20 wherein the feature game award is a progressive award.

30. The method of claim 20 wherein the feature game award is in part based on an average of a plurality of wagers made by the player.

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