

Indian and Federal Gaming Law

IP BASICS

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IP In General

Generally, there are four recognized forms of intellectual property and one additional form of intellectual property in some states. The four generally recognized forms of intellectual property are Patents, Trademarks, Copyrights and Trade Secrets. In some states there is also a Right of Publicity that state law confers to individuals based on a person's name, likeness, voice, and signature. Patent rights and copyright rights are exclusively within the jurisdiction of federal law. Trademarks and trade secrets share concurrent jurisdiction with federal and state law; though trade secrets are primarily governed by state law.

Brief Overview

	Patents	Copyrights	Trademarks	Trade Secrets
What is protected	Inventions, methods, ideas, compositions of matter	Creative expressions	Marketplace identity	Information that is secret, valuable in part because it is secret and subject to reasonable efforts to maintain its secrecy
What is not protected	Algorithms, properties of nature, things already commercially used or invented	Ideas, facts and function	Ideas, expressions, common terms as commonly used	Information that is not commercial, information that is not secret.

	Patents	Copyrights	Trademarks	Trade Secrets
Origin of the Right	Federal law exclusively, though patent rights do not exist until a patent is issued by the federal government.	Federal law exclusively. Copyright rights and ownership vest with the author upon creation.	Federal and state law concurrently. Rights begin when marketplace identity is established, but registration can be very helpful.	State law. Rights exist upon meeting the criteria of secrecy, value related to secrecy and efforts to keep the information matter secret.

Patent Law

Utility Patents¹

Patents are federally issued monopolies for inventions that permit the patent owner to exclude others from making, using, selling, offering for sale or importing the invention disclosed in the issued patent in the United States for a limited period of time.²

Note that a patent is not a right to practice, make, use or sell an invention, but, rather, the right to exclude others from doing so.

WHAT IS A PATENT?

(a) *An exclusive right*
 (b) *in an invention*
 (c) *granted by the federal government*
 (d) *to an inventor*
 (e) *for a limited term.*

Therefore, even if one owns a patent for a particular invention, they may not have the right to practice the invention if the invention is an improvement on another protected invention.

¹ In addition to utility patents, federal law permits plant patents for new plants and design patents for new and novel ornamental designs.

² 35 U.S.C §217

The policy behind the patent system is to encourage inventors to develop new inventions by providing inventors with a limited exclusive period for commercialization of the invention. In exchange for the monopoly, inventors are required to disclose the invention and the invention becomes part of the public domain upon the expiration of the patent.

Unlike other forms of intellectual property rights, patent rights only exist upon the issuance of the letters of patent from the United States Patent and Trademark Office.

To be eligible for a utility patent, an invention must meet three criteria:

- The invention must be novel (something new)
- Useful
- Not obvious to one skilled in the art (not obvious to someone in the industry or field of practice)

While these requirements seem simple, their application (with the exception of usefulness, is the subject of most patent prosecutions and patent litigation.

Patent applications may be filed for any new and useful process, machine, manufacture or composition of matter or any new and useful improvement of any of these things.³ After filing, a patent application enters the examination process. During the examination process, a USPTO examiner will review the patent and related prior art to determine whether the invention meets the criteria for

³ 35 USC 101 et. seq.

patentability. Often, the examiner will issue rejections in whole or in part often on a claim by claim basis.

Inventors

Patent rights vest solely with the inventor(s) of the invention or their assignees. Unlike copyright, there is no federal “works made for hire” doctrine associated with patentable inventions. However, employment agreements may provide for the assignment of patentable inventions from employees to employers. In some states, like Nevada, state statutes attempt to statutorily assign invention rights to employers when an invention is made by an employee within the scope of employment.⁴ Absent an agreement, employers generally have undefined shop rights to use the invention created by employees; however, the employee remains the owner of the patented invention and the courts may have to define the limits of the shop rights enjoyed by an employer.

Novelty and Non-Obviousness

In order for an invention to be patentable it must be truly new as defined under patent laws, which provide that an invention cannot be patented if: “(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the

⁴ Nev. Rev. Stat. §600.500. Which states “Employer is sole owner of patentable invention or trade secret developed by employee. Except as otherwise provided by express written agreement, an employer is the sole owner of any patentable invention or trade secret developed by his employee during the course and scope of the employment that relates directly to work performed during the course and scope of the employment.” However, legal scholars have question whether this statute is unenforceable because it is preempted by federal law.

applicant for patent,” or “(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country more than one year prior to the application for patent in the United States . . .”

If the invention has been described in a printed publication anywhere in the world, or if it was known or used by others in this country before the date that the applicant made his/her invention, a patent cannot be obtained. If the invention has been described in a printed publication anywhere, or has been in public use or on sale in this country more than one year before the date on which an application for patent is filed in this country, a patent cannot be obtained. In this connection it is immaterial when the invention was made, or whether the printed publication or public use was by the inventor himself/herself or by someone else. If the inventor describes the invention in a printed publication or uses the invention publicly, or places it on sale, then a patent application must be filed before one year has gone by, otherwise any potential right to a patent will be lost.

Even if the subject matter sought to be patented is not exactly shown by the prior art, and involves one or more differences over the most nearly similar thing already known, a patent may still be refused if the differences would be obvious. The subject matter sought to be patented must be sufficiently different from what has been used or described before that it may be said to be non-obvious to a person having ordinary skill in the area of technology related to the invention. For example, the substitution of one color for another, or changes in size, are ordinarily not patentable.

Patent Applications

Patent applications are comprised of a written description, drawings (if necessary), and claims. The claims portion of the patent application is the legally operative section of the document. Claims are used by the USPTO to determine whether an invention is patentable and by the courts to determine if a patent has been infringed.

The written description of the patent must enable “one of ordinary skill in the art” to practice the invention.⁵ Therefore, the written description must disclose the best mode of practicing the invention.⁶ As used in the patent statutes “one of ordinary skill in the art” is someone familiar with the area of practice relevant to the invention. The written description should include known variations and alternate embodiments of the invention.

The drawings should show all claimed elements of the invention and the inter-relationship of the elements. Drawings should be clear to illustrate the invention and may include illustrations such as flow charts for method based patents.

⁵ 15 U.S.C. 112

⁶ Id.

Example Patents



US005848932A

United States Patent [19]
Adams

[11] **Patent Number:** **5,848,932**
[45] **Date of Patent:** **Dec. 15, 1998**

[54] **METHOD OF PLAYING GAME AND GAMING GAMES WITH AN ADDITIONAL PAYOUT INDICATOR**

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[21] Appl. No.: **907,764**
[22] Filed: **Aug. 8, 1997**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 311,783, Sep. 23, 1994, abandoned.
[51] **Int. Cl.**° **G07F 17/34**
[52] **U.S. Cl.** **463/20; 463/46; 273/143 R; 273/138.2; 273/142 R; 273/142 B**
[58] **Field of Search** **273/143 R, 138.2, 273/138.1, 142 R, 142 B; 463/20, 46**

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Attorney, Agent, or Firm—Galgano & Burke

[57] **ABSTRACT**

Gaming devices comprising a standard gaming unit, e.g., three reels, and a discernible additional payout indicator, e.g., a rotatable wheel. A preferred bonus payout indicator is clearly visible by the player and is actuatable when the reels of the slot machine stop on certain predetermined indicia. A preferred embodiment further comprises a payout multiplier which displays a plurality of values by which a payout may be multiplied.

69 Claims, 4 Drawing Sheets

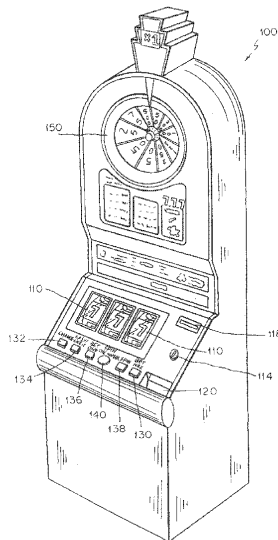


FIG. 1

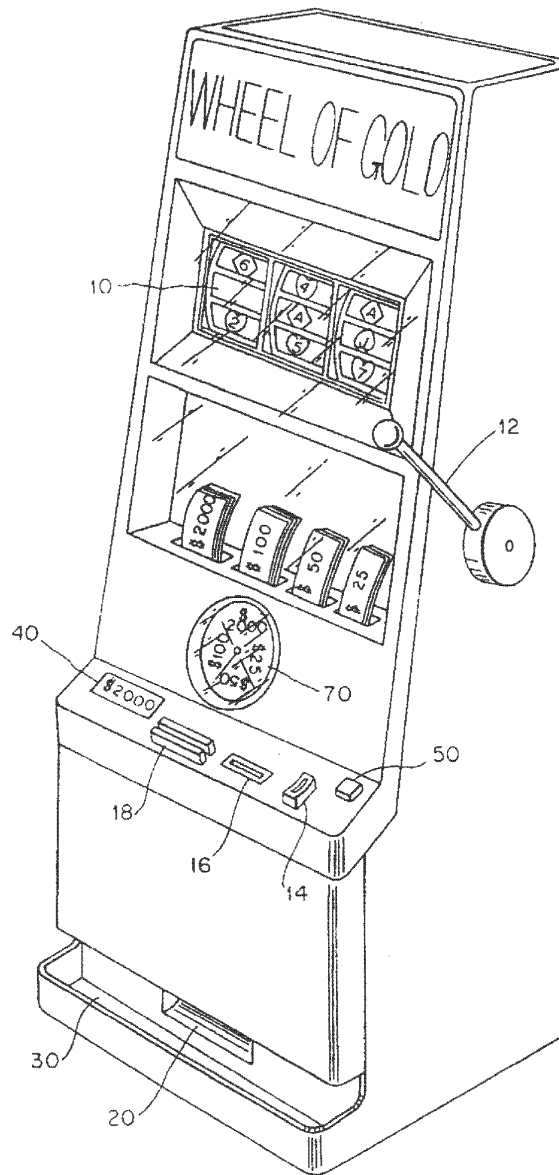


FIG. 2

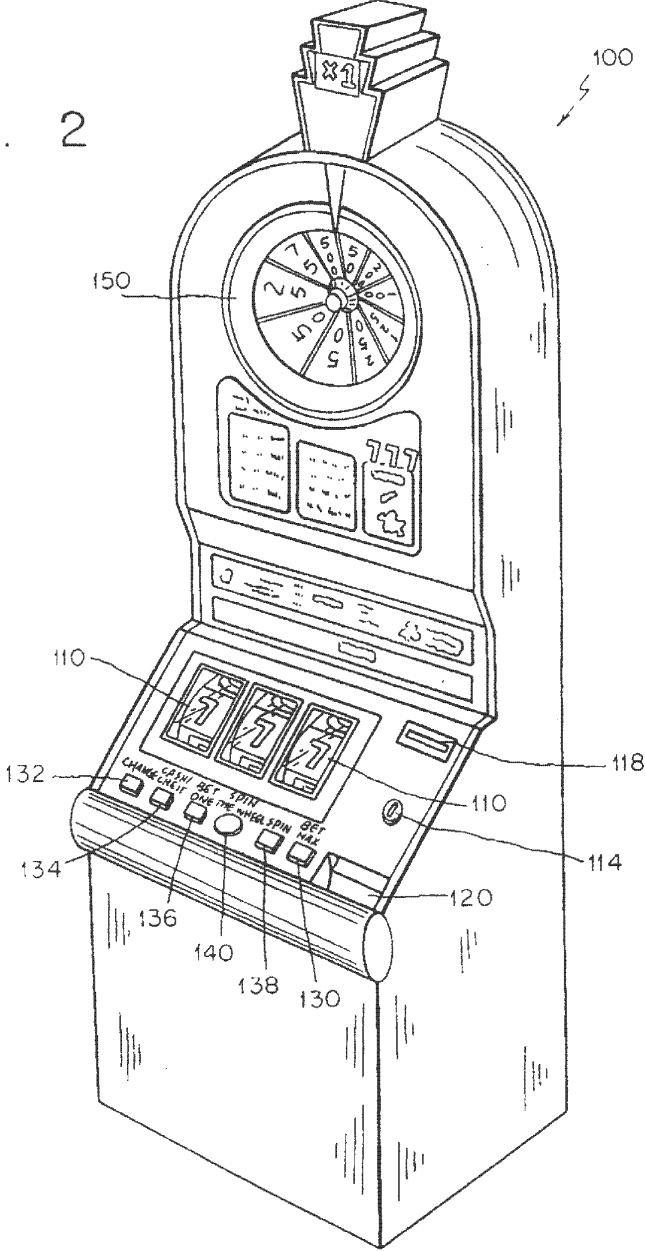


FIG. 3

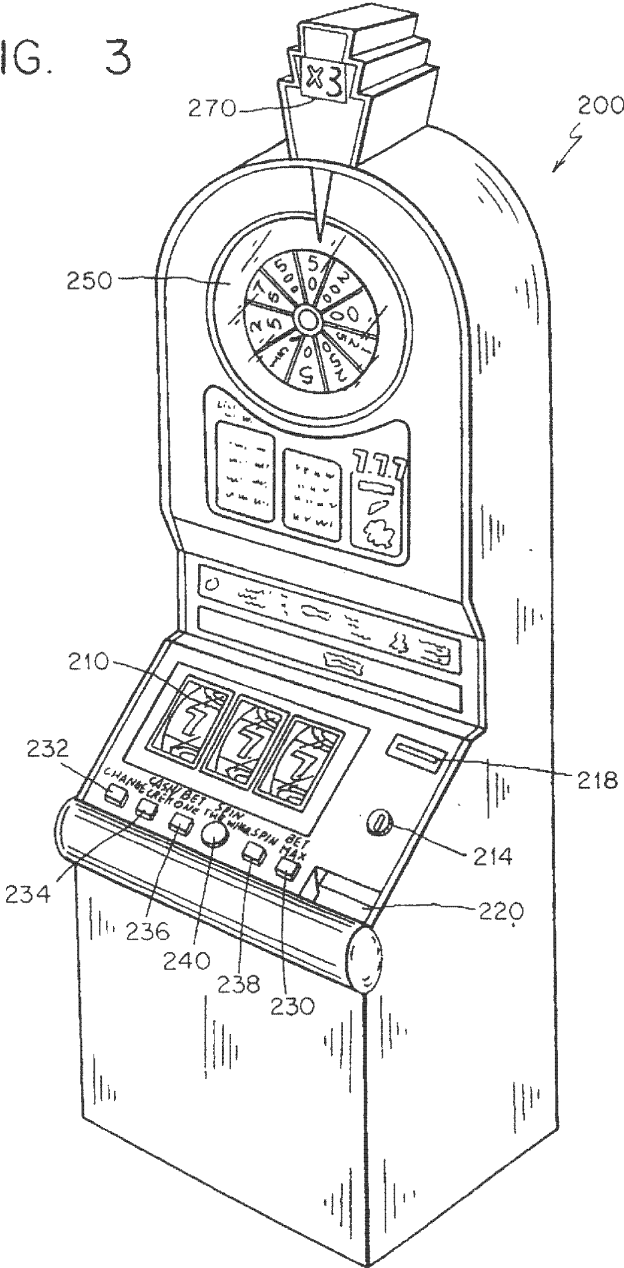
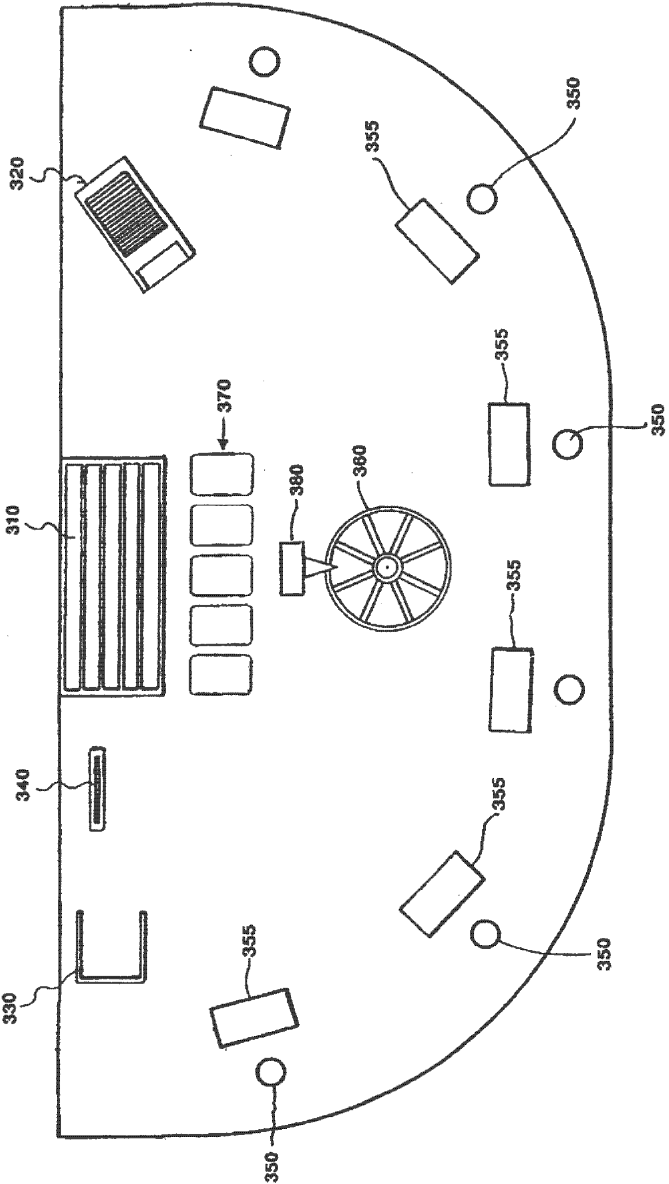


FIG. 4



METHOD OF PLAYING GAME AND GAMING GAMES WITH AN ADDITIONAL PAYOUT INDICATOR

RELATED APPLICATION DATA

This application is a continuation-in-part of U.S. patent application Ser. No. 08/311,783 filed on Sep. 23, 1994, now abandoned.

The present invention is directed to novel gaming devices and, more particularly, to gaming devices comprising at least primary and secondary events capable of providing at least one of a plurality of payouts.

BACKGROUND OF THE INVENTION

Games of chance have been enjoyed by people for years and have enjoyed widespread popularity in recent times. Many people enjoy playing a wide variety of games that they have not played before. Playing new games adds to the excitement of this recreational activity particularly when some form of "gaming" is involved. As used herein, the term "gaming" and "gaming devices" are used to indicate that some form of wagering is involved, and that players must make wagers of value, whether actual currency or some equivalent of value, e.g., token or credit.

One popular game of chance that has long been enjoyed by many players is the slot machine. Conventionally, a slot machine is configured for a player to input something of value, e.g., a standard denomination of currency or house token or other representation of currency or credit, and then to permit the player to activate the device which causes a plurality of reels to spin and ultimately stop to display a random combination of some form of indicia, for example, numbers or symbols. If this display contains one of a preselected plurality of winning combinations, the machine releases money into a payout chute or onto a credit meter for the player. For example, if a player initially wagered two coins of a national currency and that player won a high payout, that player may receive fifty coins of the same denomination in return.

Since it is desirable to offer players games which they have not played before, it would be desirable to provide a player with new games and additional opportunities to receive winning payouts.

Those familiar with games involving winning payouts, such as the popular television game show entitled "WHEEL OF FORTUNE" will realize that as players and observers watch a large wheel spin and gradually come to rest, the players experience a heightened feeling of anticipation and excitement as the wheel is slowing down to indicate a possible prize.

It would therefore also be desirable to provide a payout indicator which is discernible by a player and/or other observers.

SUMMARY OF THE INVENTION

Various embodiments of the present invention comprise methods of playing games, gaming devices and table games utilizing a primary game, e.g., rotatable reels, and at least one discernible indicia of a secondary game, preferably comprising a payout indicator. The secondary game is separate from the primary game either physically or temporally.

According to the most preferred embodiments, a bonus payout indicator is clearly visible to a player and is operable when primary reels of a primary game slot machine stop on

certain predetermined indicia. According to one preferred embodiment of the present invention, a secondary payout indicator is in the form of a rotatable bonus wheel which can be caused to spin automatically or in response to some action by a player, e.g., the player pushing a button, when the primary game indicates one of a predetermined plurality of indicia. The wheel is caused to gradually reduce speed and when the wheel stops, a pointer indicates the payout to be awarded to the player.

Another preferred embodiment of the present invention further comprises a discernible multiplier which provides the ability to change either the payout from the primary gaming unit or the secondary payout indicator, or both. As described in more detail below, it is within the scope of the present invention to provide a payout from the primary gaming unit, a payout indicated by the secondary indicator only, a payout from the primary gaming unit or the secondary indicator as changed by the multiplier, or a separate, plurality of payouts from the primary gaming unit and the secondary indicator either with or without modification by a multiplier.

According to one preferred embodiment of the present invention, the mechanical bonus payout indicator is electronically operated and is linked to a random number generator which determines where the secondary indicator actually stops.

According to another preferred embodiment of the present invention, when the primary unit stop on one of a predetermined plurality of winning indicia sets, a second event actuator is placed in an active state. According to this embodiment, a person, such as the player, must actuate the actuator in order to operate the bonus indicator.

According to another embodiment of the present invention, the bonus actuator requires operator intervention so that a player must involve a casino attendant who can activate the bonus indicator.

According to another preferred embodiment of the present invention, the bonus indicator is connected to a drive mechanism which gradually reduces the rate of spin of the bonus wheel before the bonus wheel stops.

Still other embodiments of the present invention comprise gaming devices having electronic means for displaying indicia of rotatable reels such as a video screen and/or means for displaying indicia of a secondary payout indicator, such as a video screen. The present invention also comprises methods for playing a game of chance. One preferred method comprises the steps of displaying a first randomly selected combination of indicia, said displayed indicia selected from the group consisting of slot reels, indicia of at least one reel, indicia of at least one playing card, and combinations thereof; generating at least one signal corresponding to at least one select display of first indicia; providing at least one discernible indicia of a mechanical bonus indicator, said bonus indicator indicia indicating at least one of a plurality of possible payouts, wherein said bonus indicator indicia providing means is operatively connected to said first, standard gaming unit and actuatable in response to said signal. According to one preferred embodiment, the discernible indicia of a mechanical bonus indicator gradually reduces the rate of movement of the mechanical bonus indicator for some period of time prior to actually providing the discernible indicia of a payout. According to another embodiment, a multiplier is provided to multiply at least one payout by a multiple which is most preferably indicated to a player. The multiple can preferably sequentially change as discernible indicia change. For

example, a plurality of multiples can be synchronized with a plurality of discernable indicia on the mechanical bonus indicator such that the multiple changes as the payout indicated changes.

Further embodiments of the present invention comprises a method of conducting a game of chance comprising the steps of providing a player with an opportunity to place a wager; displaying a randomly selected combination of indicia, said displayed indicia selected from the group consisting of reels, indicia of at least one and preferably a plurality of reels, indicia of at least one and preferably a plurality of playing cards, and combination thereof; generating at least one signal corresponding to at least one select display of said indicia; providing at least one discernible indicia of a mechanical bonus indicator, said bonus indicator indicia indicating at least one of a plurality of possible bonuses, wherein said bonus indicator indicia is in the form of a wheel or reel and is actuatable in response to said signal.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view one of a gaming device of one embodiment of the present invention.

FIG. 2 is another embodiment of a gaming device of the present invention.

FIG. 3 illustrates an alternative embodiment of the present invention.

FIG. 4 is an alternative embodiment of the present invention in the form of a table game.

DETAILED DESCRIPTION

The various embodiments of the present invention are designed to provide added excitement to a board/table game or gaming device in order to increase the enjoyment to players and to serve as an added attraction to potential players. One preferred embodiment of the present invention, illustrated in FIG. 1, comprises a primary gaming unit which comprises three rotatable reels 10, each of which comprise a plurality of indicia on the periphery thereof. The illustrated gaming device comprises a mechanical lever 12, coin slot 14, currency validator 16 and a credit card validator 18. In a manner which will be recognized by those skilled in the art, each reel 10 is designed to rotate and then stop in order to visually display at least one, and preferably a number of indicia. If the collection of indicia displayed by the three reels is one of a predetermined plurality of winning indicia sets, then the player can typically be provided with a winning payout either through coin chute 20 which deposits winnings into a coin trough 30 or by increasing the player's credits in a credit window 40.

According to one aspect of the present invention, when the reels 10 display at least one of a plurality of predetermined winning indicia or indicia sets then the player is provided with an opportunity for a secondary payout. According to this illustrated embodiment of the present invention, a bonus actuator button 50 is placed in an operative state when reels 10 display a bonus indicia set. A player must then depress bonus actuator 50 in order to start bonus indicator 70 spinning. In the illustrated embodiment, bonus indicator 70 is in the form of a rotatable wheel. The wheel may be a carnival-type wheel comprising pegs and a clapper or could take one or more other forms, such as a fanciful wheel typically used in a roulette game as shown in the embodiment of FIG. 2. If a preferred motor driven wheel is utilized, it is preferably linked to some random value generator in order to randomly determine where the wheel

will actually stop. In order to enhance the playing experience, sound effects corresponding to a clapper slapping against pegs of a carnival wheel are preferably provided as the wheel passes from one segment to another. The bonus indicator 70 is also preferably controlled so that the rate of spin is reduced, most preferably gradually reduced, prior to stopping in order to simulate a mechanical spinning wheel.

The facing surface of bonus indicator 70 of FIG. 1 comprises four distinct areas bearing indicia of the bonus payout to the player. In the illustrated embodiment, the bonus indicator has areas indicating bonuses of \$25.00, \$50.00, \$100.00, and \$2,000.00. When bonus indicator 70 stops, an indicator (not shown) will indicate the area on the bonus wheel corresponding to the amounts of the bonus to be provided to the player.

In a manner which will be appreciated by those skilled in the art, bonus indicator 70 can be operatively linked to a "payout" mechanism which provides a bonus payout to a player through currency chute 20 or by increasing the amount of winnings shown in credit window 40. As stated above, the payout of the bonus indicator can be in addition to a standard payout by the primary gaming unit or can be in place of the payout normally associated with the primary gaming unit.

Those familiar with gaming and game shows, will appreciate that players and observers typically experience a heightened level of anticipation and excitement as they observe one or more moving objects approaching a winning position. It is therefore most preferred for the bonus indicator of the present invention to be readily discernible, e.g., clearly visible and/or audible to the player.

According to another preferred embodiment of the present invention, a bonus indicator is connected to an electronic control unit, for example a motor, which gradually decreases the rate of movement of the bonus indicator before the bonus indicator stops. According to this embodiment of the present invention, players can be provided with a realistic sense of a totally mechanical indicator. Those skilled in the art will appreciate that such a control unit can also readily be connected to a random generator which will randomly select the winning payout according to a predetermined frequency of occurrence for each individual bonus payout, and then cause the bonus indicator to stop at the desired area. Those skilled in the art will also appreciate that other mechanisms can be utilized for gradually decreasing the rate of movement of the secondary payout indicator, e.g., a controlled braking system.

According to another embodiment of the present invention, when reels 10 display an indicia set which will provide a bonus, the bonus indicator becomes activatable but requires intervention by a house attendant, such as a casino attendant, in order to actuate the bonus indicator. According to this embodiment of the present invention, the casino is provided with greater control over the actuation of the bonus indicator and, if desired, can accompany the actuation of the bonus indicator with great fanfare. It will be appreciated that the amounts of the bonus indicated in the figures are merely for purposes of illustration and, if desired, one of the amounts on the bonus indicator can have a significantly greater value. For example, one of the areas on the bonus indicator may correspond to a new automobile, a luxury vacation or a very large sum of money.

While the illustrated embodiment of the present invention in FIG. 1 is generally in the form of a rotatable wheel, other visible, mechanical indicia can be provided, whether con-

trolled totally mechanically, electro-mechanically, or electronically without departing from the scope of the present invention.

As shown in FIG. 1, in order to provide additional levels of excitement, indicia of the possible bonuses are preferably visibly displayed within the slot machine. For example, in one illustrated embodiment, a shelf is preferably displayed comprising piles of currency equal to the amounts on the bonus indicator. While actual cash is preferred, the slot machine may also be provided with fake currency or simply indicia of actual currency or the other bonus prizes.

A preferred embodiment of the present invention is illustrated in FIG. 2 wherein a gaming device 100 comprises a primary gaming unit in the form a standard three-reel slot machine which displays reels 110. Suitable controls and currency mechanisms including a coin slot 114, bill validator 118, payout shoot 120 are provided. Furthermore, suitable player controls including CHANGE button 132, CASH/CREDIT button 134, BET ONE button 136, SPIN button 138 and BET MAX button 130 are also provided.

In addition to these standard controls the control panel of this preferred illustrated embodiment of the present invention comprises a SPIN THE WHEEL button 140 which becomes actuable when the primary gaming unit, as indicated by reels 110, has randomly selected one of a plurality of predetermined indicia sets. While the primary gaming unit shown in the lower portion of the cabinet of gaming device 100 will typically have the ability to provide a plurality of winning payouts, the SPIN THE WHEEL button 140 can become actuable when the stopped reels 110 indicate some subset of the primary unit's winning indicia, when any one of the winning reel indicia are displayed, or further in response to one or more other predetermined indicia, or a combination thereof. For example, the SPIN THE WHEEL feature, or some other secondary game, can be actuated or become activatable in response to a single indicia indicated on one of the reels or reel indicia.

When the SPIN THE WHEEL button 140 is actuated by a player, bonus wheel 150 is caused to rotate and randomly select and display one of a plurality of different areas. According to the preferred illustrated embodiment, all of the bonus areas indicate an increased winning value for the player. However, it is within the scope of the present invention to provide non-monetary prizes or losing spaces wherein no additional prize is provided and/or wherein the prize normally associated with the indicia shown on the primary gaming unit reels 110 is reduced. In the illustrated embodiment, a pointer 160 advantageously indicates the result of the bonus indicator 150.

In addition to the bonus wheel 150, this preferred illustrated embodiment of the present invention also comprises a bonus multiplier 170. The multiplier 170 preferably randomly selects a value by which the bonus indicated by bonus wheel 150 is multiplied. For example, the bonus indicator 170 can have an LED screen which cycles through multipliers of "times one", "times two" and "times three" which will indicate that the bonus is as indicated, doubled, or tripled, respectively. The multiplier 170 can be programmed to select a multiplier either totally randomly or according to some other predetermined frequency of occurrence wherein certain multipliers will occur more frequently than other multipliers. While this illustrated embodiment comprises whole number multipliers, it is also within the scope of the present invention to utilize values other than whole numbers or to include multipliers which will result in a decrease in the value shown by the bonus indicator 150. For example, a

multiplier sequence could include a "times zero" value. When bonus wheel indicator 150 is not in use, the multiplier LED window can be set to an attract mode wherein a message is displayed to players or potential players. For example, the LED display could show a message, either in complete form or can be set to sequentially display either words or individual letters, such as "SPIN - THE - WHEEL".

According to the various embodiments of the present invention, the bonus multiplier or additional payout multiplier is most preferably synchronized with the movement of the rotatable wheel or indicia of a rotatable reel, such that the multiplier value will change as each wheel segment passes the indicator. The most preferred embodiments of the present invention additionally comprise audible signals, such as the clicking of a clapper of the type found on actual spinning wheel comprising a clapper indicator and pegs which strike the clapper. The audible signals are preferably also synchronized with the segments of the wheel such that an audible signal is provided as the wheel moves from one segment to another. This advantageously provides the effect of a mechanical wheel comprising pegs moving past a mechanical clapper.

FIG. 3 illustrates a less preferred embodiment of the present invention wherein a gaming device 200 comprising similar controls as the controls illustrated in the embodiment of FIG. 2. In this illustrated embodiment, and wherein a bonus indicator 250 is in the form of an electronically generated image, such as a video screen or an LED display and provides discernible indicia, e.g., a visual video display, of a bonus wheel. For example, the video display can show a wheel of the type used in a roulette game such as the wheel 150 illustrated in FIG. 2.

The slot machine shown in FIG. 3 comprises a video display 210, such as a video screen, which displays three reels 110, each of which comprise a plurality of indicia. In addition, this slot machine comprises a video display 250, such as a second video screen, for displaying a bonus payout indicator. While separate screens are preferred, both the reels and the bonus payout indicator could be displayed on the same video screen. According to this embodiment of the present invention, the bonus payout indicator displays indicia of a wheel or a reel.

In a manner known in the art, the gaming device comprises a coin slot 214, a currency validator 218, and a coin chute 220. After placing a wager, a player determines the amount of his wager by either pressing the BET ONE button 236 or the BET MAX button 230. After the player has selected the amount of his wager, he depresses the SPIN button 238 which "spins" the reels shown in video display window 210.

Each indicia of a displayed reel 210 is designed to indicate rotation and then stop in order to visually display at least one, and preferably a number of indicia. When reels 210 display a particular indicia set or one of a predetermined plurality of indicia sets, then the additional payout mode is activated and video display 250 displaying payout indicator is placed in an operable state. In this illustrated embodiment, the displayed payout indicator 250 displays an indicia of a rotating wheel comprising a plurality of distinct areas bearing indicia of payouts to the player. Payout indicator 250, is caused to selectively indicate one of the plurality of indicia, either automatically, upon intervention of a casino or house attendant, or upon a player depressing SPIN THE WHEEL button 240 in order to start indicator 250 spinning. It will be appreciated that the amounts of the payout indicated in FIG.

2 are merely for purposes of illustration and, if desired, one of the amounts on the bonus indicator can have a greater value, e.g., a new automobile, a luxury vacation or large sum of money which may be collected subsequently, or lesser values, e.g., no payout.

The displayed reels **210** and displayed bonus indicator **250** can be operably controlled by suitable controls to gradually slow down as they come to a complete stop, displaying a selected reel indicia and a bonus indicia, respectively.

The embodiment of the present invention illustrated in FIG. **2** is considered most preferable since it is believed that players prefer to see actual slot reels and an actual bonus wheel spinning in a gaming device. Other, less preferred embodiments are also possible while providing some of the advantages of the present invention. Specifically, it is feasible to replace the spinning reels with other forms of standard gaming units, for example, a visible indicia of reels or indicia of playing cards, shown for example on a video screen. It is also possible to replace the wheel with some other discernible indicia of a mechanical bonus indicator which is operatively connected to the first standard gaming unit and which either automatically commences or is actuable in response to the result provided by the standard gaming unit. According to the present invention, both of the standard gaming unit and bonus indicator are controlled to provide random results.

From the foregoing description, it will be appreciated that embodiments of the present invention, which are specifically directed to gaming and gaming devices, comprise three different indicators. The most preferred embodiments comprise a primary (standard) gaming unit, an additional payout indicator, preferably in the form of a wheel, and a payout multiplier. While the illustrated payout multiplier of the illustrated embodiments is in the form of an electronically selected value, it is also within the scope of the present invention to have a multiplier which involves some skill on the part of a player. For example, according to an additional preferred embodiment of the present invention, a player will shoot actual projectiles, such as coins, at one or more targets in an effort to increase the value of the multiplier. In any of the embodiments of the present invention utilizing a multiplier, the multiplier can affect the value of a payout from the standard gaming unit, the additional payout indicator, or both the standard gaming unit and the payout indicator.

As stated above, the present invention also includes methods of conducting a wagering game of chance comprising the steps of providing a player with an opportunity to place a wager; displaying a randomly selected combination of indicia, said displayed indicia selected from the group consisting of reels, indicia of reels, indicia of playing cards, and combination thereof; generating at least one signal corresponding to at least one select display of said indicia; providing at least one discernible indicia of a mechanical bonus indicator, said bonus indicator indicia indicating at least one of a plurality of possible bonuses, wherein said bonus indicator indicia is in the form of a wheel or reel and is actuable in response to said signal. A further preferred method comprises the step of displaying at least one value by which a payout may be multiplied.

Another method of the present invention comprises the steps of requiring at least one player to make a wager; displaying at least one randomly selected playing card from a predetermined card indicia set; displaying and rotating a rotatable wheel comprising a plurality of indicia correspond-

ing to a plurality of prizes if said displayed playing card indicia was one of a preselected plurality of winning card indicia; and determining a winning payout with said wheel, wherein said winning payout is randomly selected.

Another embodiment of the present invention in the form of a table game is illustrated in FIG. **4** wherein a chip rack **310**, card shoe **320**, discard shoe **330**, wager slot **340**, betting areas **350**, and secondary event wheel **360** are provided. According to this embodiment of the present invention after one or more players have placed wagers in wagering areas **350**, a dealer will provide cards to the wagering players in areas **355** and then provide cards to himself in card area **370**. After the cards have been dealt, the initial bets can be resolved by comparing the players' cards to the dealer's cards. While the illustrated game is shown as five card stud poker, other games and arrangements can also be utilized without departing from the scope of the present invention. For example, a player's cards can be compared to other player's cards or a predetermined payout schedule, or other card games can be utilized including seven card draw, five card draw poker, black jack, etc.

Upon the happening of a predetermined occurrence, such as the receipt of one of a preselected plurality of card hands, one or more of the players can be given the opportunity to spin the payout indicator **360**, which is most preferably electronically operated by an actuation switch. The actuation switch can be within reach of the players for added excitement or can be actuated by the dealer. Alternatively, actuation by a player's actuator switch can require prior actuation of a dealer switch which will then render the player's switch operable. If less than all of the players are going to benefit from the results of payout indicator **360**, additional indicators can be positioned proximate the players in order to indicate which players are involved in the spin of payout indicator **360**. In a manner similar to that shown in FIG. **2**, a payout multiplier **380** is also provided. Sound effects as referenced above and means for gradually decreasing the rate of movement of the payout indicator **360** are also preferably provided.

In addition to the primary gaming unit or primary game, the secondary event, and the multiplier, another preferred aspect of the present invention which can be utilized with all previously described embodiments comprises a DOUBLE-OR-NOTHING feature wherein winning players may wager their winnings in a double-or-nothing fashion. According to this feature of the present invention, a player may be provided with the opportunity to bet on red or black after he has won a game. For this purpose, the rotatable wheels of the present invention are preferably provided with alternating red and black pie-shaped segments. According to this feature, a player can be provided with the opportunity of betting on red or black with the opportunity of doubling his winnings if he makes a correct selection. After the player makes his selection, the wheel would be rotated to determine whether the player has successfully doubled his winnings or has lost those winnings. A player may be provided with the opportunity of utilizing the double or nothing feature several times and/or up to a certain maximum to be determined by the game operator.

What is claimed is:

1. A slot machine comprising:

means for receiving a wager;

a plurality of rotatable reels, each of said reels comprising a plurality of indicia, wherein said rotatable reels are caused to rotate after a wager has been placed and subsequently stop thereby displaying a plurality of said indicia;

means for generating at least one signal corresponding to at least one of said reel displays of said indicia;

a mechanical, movable bonus payout indicator comprising a wheel for visually indicating one of a plurality of randomly selected bonus payouts to a player, said bonus payout indicator operatively connected to said signal generating means such that said bonus payout indicator will only operate if said signal generating means has generated a signal corresponding to a pre-selected bonus reel display; and

means for providing a winning payout, said payout providing means responsive to said signal generating means.

2. A slot machine according to claim 1 further comprising a bonus payout actuator operatively connected to said signal generating means and said bonus payout indicator, wherein said bonus payout actuator is switchable from an inoperable state to an operable state in response to a signal from said signal generating means.

3. A slot machine according to claim 2 wherein said bonus payout indicator will operate only if said bonus payout actuator has been actuated when in said operable state.

4. A slot machine according to claim 1 further comprising visible indications of bonus payouts.

5. A slot machine according to claim 1 wherein said bonus payout indicator comprises a rotatable disc.

6. A slot machine according to claim 1 wherein said bonus payout indicator is electronically operated.

7. A slot machine according to claim 6 further comprising means for gradually decreasing the rate of movement of said bonus payout indicator.

8. A slot machine according to claim 7 wherein said rate decreasing means comprises a motor.

9. A slot machine according to claim 1 wherein said signal generating means generates a plurality of signals corresponding to a plurality of reel displays.

10. A gaming device comprising:

a plurality of rotatable reels, each of said reels comprising a plurality of indicia, wherein said rotatable reels are caused to rotate and subsequently stop thereby displaying a plurality of said indicia;

means for generating at least one signal corresponding to at least one of a plurality of displays of said indicia;

a movable, mechanical bonus payout indicator for visually indicating one of a plurality of bonus payouts to a player, said bonus payout indicator operatively connected to said signal generating means such that said bonus payout indicator can indicate a bonus payout only if said signal generating means has generated at least one signal; and

means for providing a winning payout corresponding to a randomly selected bonus payout indicated by said mechanical bonus payout indicator.

11. A gaming device according to claim 10 further comprising a bonus payout actuator operatively connected to said signal generating means and said bonus payout indicator, wherein said bonus payout actuator is switchable from an inoperable state to an operable state in response to a signal from said signal generating means.

12. A gaming device according to claim 11 wherein said bonus payout indicator will operate only if said bonus payout actuator has been actuated when in said operable state.

13. A gaming device according to claim 10 further comprising visible indications of bonus payouts.

14. A gaming device according to claim 10 wherein said bonus payout indicator comprises a rotatable wheel.

15. A gaming device according to claim 14 further comprising means for gradually decreasing the rate of movement of said rotatable wheel.

16. A gaming device according to claim 10 wherein said bonus payout indicator is electronically operated.

17. A method of conducting a game of chance comprising the steps of:

providing a player with an opportunity to place a wager to actuate a primary gaming unit;

said primary gaming unit displaying a randomly selected primary display to a player, said display comprising an indicia set from a plurality of slot reels;

providing a secondary gaming unit having a plurality of possible bonus payouts, said second gaming unit providing a player with a randomly selected bonus payout and displaying said bonus payout with a movable mechanical bonus indicator in the form of a disc if said primary display is a preselected bonus indicia set.

18. A method of conducting a game of chance according to claim 17 wherein said step of displaying said bonus payout comprises the step of indicating said bonus payout on a bonus wheel indicator.

19. A gaming device comprising:

a first gaming unit comprising means for randomly selecting and displaying a first indicia set comprising a plurality of indicia from a plurality of possible indicia sets, wherein the possible indicia sets comprise at least one winning set, and said gaming unit indicates to a player that the player has won a prize if a winning indicia set has been selected,

a second display comprising means for randomly selecting and displaying at least one additional indicia of a bonus payout to change the prize indicated by the first gaming unit, said additional indicia selected from a plurality of possible indicia when said first indicia set is one of a preselected plurality of winning indicia sets, said additional indicia displaying means comprising indicia of a wheel element and an indicator, and wherein said indicia of a wheel element and said indicator are relatively movable.

20. A gaming device according to claim 19 further comprising means for gradually reducing the rate of relative movement of said wheel element and said indicator.

21. A gaming device according to claim 19 wherein said indicia of a movable wheel element comprises a mechanical wheel.

22. A gaming device according to claim 19 wherein said additional indicia displaying means displays a plurality of possible bonus payouts.

23. A gaming device according to claim 22 wherein said additional indicia displaying means guarantees a player an additional payout.

24. A gaming device according to claim 22 wherein said additional indicia displaying means provides a player with an opportunity for one of a plurality of additional payouts which is determined randomly.

25. A slot machine according to claim 19 further comprising means for providing a player with an opportunity to double a winning payout after said secondary indicating unit has provided a discernable indicia of a payout indicator.

26. A slot machine comprising:

means for receiving a wager;

a plurality of rotatable reels, each of said reels comprising a plurality of indicia, wherein said rotatable reels are caused to rotate after a wager has been placed and subsequently stop thereby displaying a plurality of said indicia;

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means for generating at least one signal corresponding to at least one of said reel displays of said indicia;

a mechanical, movable payout indicator comprising a wheel for visually indicating one of a plurality of randomly selected payouts to a player, said payout indicator operatively connected to said signal generating means such that said payout indicator will only operate if said signal generating means has generated a signal corresponding to a preselected reel display;

means for gradually decreasing the rate of movement of said payout indicator; and

means for providing a winning payout, said payout providing means responsive to said signal generating means.

27. A slot machine according to claim 26 wherein said rate decreasing means comprises a motor.

28. A slot machine according to claim 26 further comprising a payout actuator operatively connected to said signal generating means and said payout indicator, wherein said payout actuator is switchable from an inoperable state to an operable state in response to a signal from said signal generating means.

29. A slot machine according to claim 27 wherein said payout indicator will operate only if said payout actuator has been actuated when in said operable state.

30. A slot machine according to claim 26 further comprising visible indications of payouts.

31. A slot machine according to claim 26 wherein said payout indicator is electronically operated.

32. A slot machine according to claim 26 further comprising means for providing a player with an opportunity to double a winning payout after said secondary indicating unit has provided a discernable indicia of a payout indicator.

33. A gaming device comprising:

a primary gaming unit comprising means for displaying randomly selected indicia, said displayed indicia selected from the group consisting of at least one reel, a plurality of reels, at least one indicia of a reel, a plurality of reel indicia, at least one indicia of a playing card, a plurality of playing card indicia, and combinations thereof;

means for actuating said primary gaming unit and displaying a plurality of indicia;

means for generating at least one signal corresponding to at least one preselected display of indicia by said primary gaming unit, wherein at least one of said preselected displays comprises one winning indicia and at least one non-winning indicia;

a secondary indicating unit comprising means for providing at least one discernible indicia of a movable payout indicator, said discernible indicia indicating at least one of a plurality of randomly selected possible payouts, wherein said providing means is operatively connected to said primary gaming unit and is actuatable in response to said signal.

34. A gaming device according to claim 33 comprising means for gradually decreasing the rate of change of said discernable indicia of a payout indicator.

35. A gaming device according to claim 33 further comprising a payout multiplier.

36. A gaming device according to claim 35 wherein said payout multiplier displays a plurality of multiples by which a winning payout can be multiplied.

37. A gaming device according to claim 36 wherein said payout multiplier display is synchronized with said secondary indicating unit such that the displayed multiplier changes when different discernable indicia of a payout are indicated.

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38. A gaming device according to claim 35 wherein said payout multiplier sequentially displays a plurality of multiples by which a winning payout is multiplied.

39. A gaming device according to claim 33 further comprising means for providing a player with an opportunity to double a winning payout after said secondary indicating unit has provided a discernable indicia of a payout indicator.

40. A gaming device comprising:

a primary gaming unit comprising means for displaying randomly selected indicia, said displayed indicia selected from the group consisting of at least one reel, a plurality of reels, at least one indicia of a reel, a plurality of reel indicia, at least one indicia of a playing card, a plurality of playing card indicia, and combinations thereof;

means for actuating said primary gaming unit and displaying a plurality of indicia;

means for generating at least one signal corresponding to at least one preselected display of indicia by said primary gaming unit;

a secondary indicating unit comprising means for providing at least one discernible indicia of a movable payout indicator, said discernible indicia indicating at least one of a plurality of randomly selected possible payouts, wherein said providing means is operatively connected to said primary gaming unit and is actuatable in response to said signal; and

means for indicating a payout multiplier.

41. A gaming device according to claim 40 wherein said payout multiplier displays a plurality of multiples by which a winning payout can be multiplied.

42. A gaming device according to claim 40 wherein said payout multiplier sequentially displays a plurality of multiples by which a winning payout is multiplied.

43. A gaming device according to claim 42 wherein said payout multiplier display is synchronized with said secondary indicating unit such that the displayed multiplier changes when different discernable indicia of a payout are indicated.

44. A gaming device according to claim 40 wherein at least two of said primary gaming unit display, said discernable indicia of a payout, and said payout multiplier are randomly selected.

45. A gaming device according to claim 40 wherein said primary gaming unit display, said discernable indicia of a payout, and said payout multiplier are randomly selected.

46. A gaming device according to claim 40 further comprising means for providing a player with an opportunity to double a winning payout after said secondary indicating unit has provided a discernable indicia of a payout indicator.

47. A gaming device according to claim 40 comprising means for gradually decreasing the rate of change of said discernable indicia of a payout indicator.

48. A gaming device comprising:

a primary gaming unit comprising means for displaying randomly selected indicia, said displayed indicia selected from the group consisting of at least one reel, a plurality of reels, at least one indicia of a reel, a plurality of reel indicia, at least one indicia of a playing card, a plurality of playing card indicia, and combinations thereof;

means for actuating said primary gaming unit and displaying a plurality of indicia;

means for generating at least one signal corresponding to at least one preselected display of indicia by said primary gaming unit;

a secondary indicating unit comprising means for providing at least one discernible, indicia of a movable payout

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indicator, said discernible indicia indicating at least one of a plurality of randomly selected possible payouts, wherein said providing means is operatively connected to said primary gaming unit and is actuatable in response to said signal; and

means for gradually decreasing the rate of change of said discernible indicia of a payout indicator.

49. A gaming device according to claim 48 wherein said discernible indicia of a payout indicator is movable and said rate decreasing means reduces the rate of movement of said discernible indicia of a payout indicator.

50. A gaming device according to claim 48 wherein said discernible indicia comprises a wheel.

51. A gaming device according to claim 48 wherein said wheel is rotatable.

52. A gaming device according to claim 48 wherein said first, standard gaming unit comprises indicia of reels.

53. A gaming device according to claim 52 wherein said discernible indicia comprises at least one reel.

54. A gaming device according to claim 48 wherein said primary gaming unit comprises indicia of reels.

55. A gaming device according to claim 48 wherein said first, standard gaming unit comprises indicia of playing cards.

56. A gaming device according to claim 48 further comprising means for generating at least one discernible indicia of a payout multiplier.

57. A gaming device according to claim 56 wherein said multiplier generating means broadcasts a plurality of values by which a payout may be multiplied.

58. A gaming device according to claim 56 wherein said multiplier generating means broadcasts at least one message other than a multiplier by which a payout may be multiplied.

59. A gaming device according to claim 56 wherein said multiplier generating means is randomly controlled.

60. A gaming device according to claim 56 wherein said multiplier generating means is controlled, at least in part, by a player's skill.

61. A gaming device according to claim 48 further comprising means for receiving player input, said input receiving means is operatively connected to said providing means for actuating said providing means, and wherein said input receiving means receives said signal.

62. A gaming device according to claim 48 wherein said providing means comprises a video screen.

63. A gaming device according to claim 62 wherein said providing means comprises an audio speaker.

64. A gaming device according to claim 48 wherein said providing means comprises an audio speaker.

65. A gaming device comprising:
a first, standard gaming unit for displaying a randomly selected combination of indicia, said displayed indicia

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selected from the group consisting of reels, indicia of reels, indicia of playing cards, and combinations thereof;

means for actuating said standard gaming unit and displaying a plurality of indicia;

means for generating at least one signal corresponding to at least one select display of indicia;

a secondary gaming unit comprising a means for providing at least one discernible indicia of a movable mechanical payout indicator, said providing means indicating at least one of a plurality of randomly selected additional payouts, wherein said providing means is operatively connected to said first, standard gaming unit and actuatable in response to said signal; and

means for generating at least one discernible indicia of a payout multiplier.

66. A gaming device according to claim 65 wherein said multiplier generating means broadcasts a plurality of values by which a payout may be multiplied.

67. A gaming device according to claim 65 wherein said payout indicating means further comprises indications that a player will receive a reduced payout.

68. A gaming device according to claim 65 wherein said payout indicating means further comprises indications that a player will not receive a payout.

69. A gaming device comprising:
a primary gaming unit comprising means for displaying randomly selected indicia, said displayed indicia selected from the group consisting of at least one reel, a plurality of reels, at least one indicia of a reel, a plurality of reel indicia, at least one indicia of a playing card, a plurality of playing card indicia, and combinations thereof;

means for actuating said primary gaming unit and displaying a plurality of indicia;

means for generating at least one signal corresponding to at least one preselected display of indicia by said primary gaming unit;

a secondary indicating unit comprising means for providing at least one discernible, indicia of a movable payout indicator, said discernible indicia indicating at least one of a plurality of randomly selected payouts, wherein said providing means is operatively connected to said primary gaming unit and becomes actuatable in response to said signal; and

a switch operatively connected to said providing means by which a player can activate said providing means.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 5,848,932
DATED : December 15, 1998
INVENTOR(S) : William R. Adams

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page, item [63],

"RELATED U.S. APPLICATION DATA" to read as follows:

--Continuation-in-part of Serial No. 311,783, filed on September 23, 1994, now abandoned, and continuation-in-part of Serial No. 622,430, filed March 25, 1996, which issued as U.S. Patent No. 5,823,874 on October 20, 1998--

In Col. 1, line 9, before the period ("."), please add

--and is a continuation-in-part of Serial No. 622,430, filed on March 25, 1996, now U.S. Patent No. 5,823,874--

Signed and Sealed this
Twelfth Day of September, 2000

Attest:



Q. TODD DICKINSON

Attesting Officer

Director of Patents and Trademarks

[54] ELECTRONIC GAMING DEVICE UTILIZING A RANDOM NUMBER GENERATOR FOR SELECTING THE REEL STOP POSITIONS

Primary Examiner—Richard C. Pinkham
Assistant Examiner—Mary Ann Stoll
Attorney, Agent, or Firm—Gerald L. Moore

[76] Inventor: Inge S. Telnaes, 4435 Canyon Dr., Reno, Nev. 89509

[57] ABSTRACT

[21] Appl. No.: 352,048

A gaming machine of the type utilizing rotating reels (16) which carry on the periphery a plurality of indicia, a brake (19) to stop the reels at a selected position and a random number generator for selecting the reel stopping position. Numbers are assigned to the reel stopping positions and entered into the random number generator (41) with each number being entered one or more times to control the payout odds of each particular stopping position being selected thereby enabling any odds to be set without changing the physical characteristics of the machine.

[22] Filed: Feb. 24, 1982

[51] Int. Cl.³ A63F 5/04

[52] U.S. Cl. 273/143 R; 273/138 A

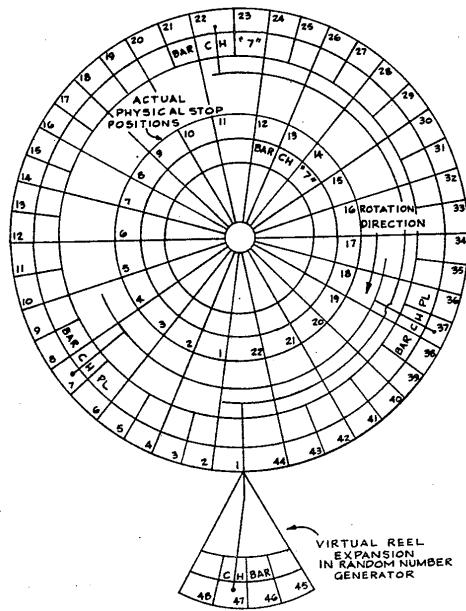
[58] Field of Search 273/138 A, 143 R, 237, 273/143 C, 143 D, 143 E; 364/717, 412, 410

[56] References Cited

U.S. PATENT DOCUMENTS

4,095,795 6/1978 Saxton et al. 273/143 R

10 Claims, 7 Drawing Figures



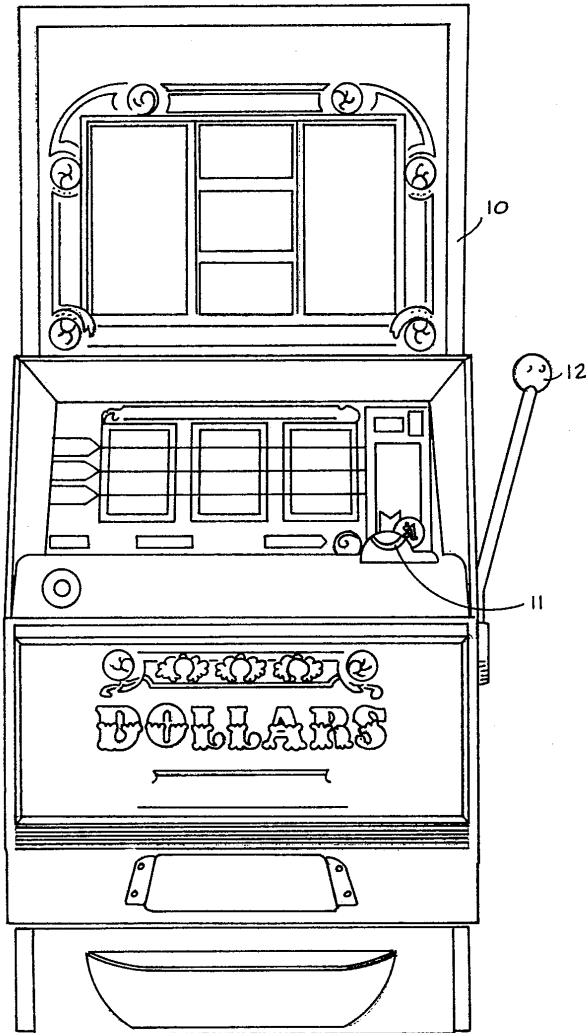


FIG 1

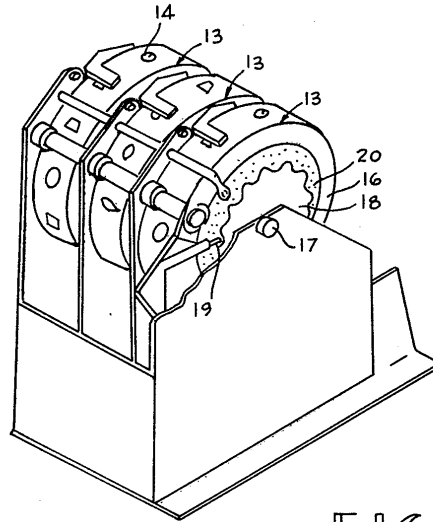


FIG 2

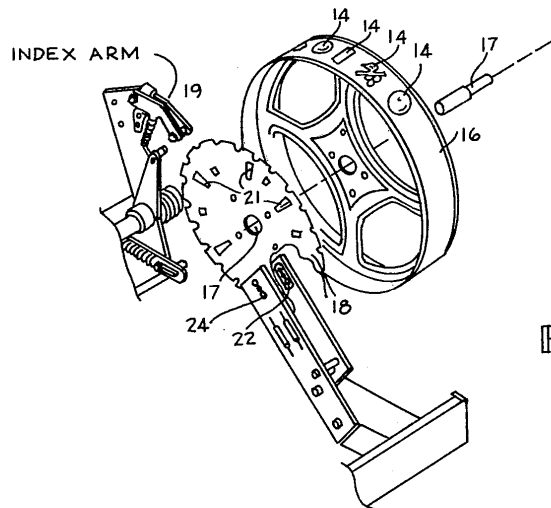


FIG 3

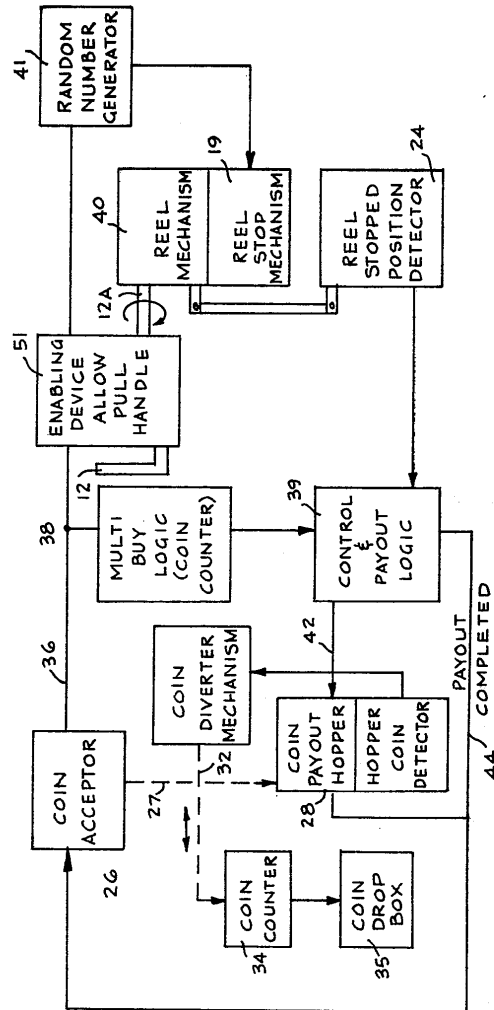


FIG 4

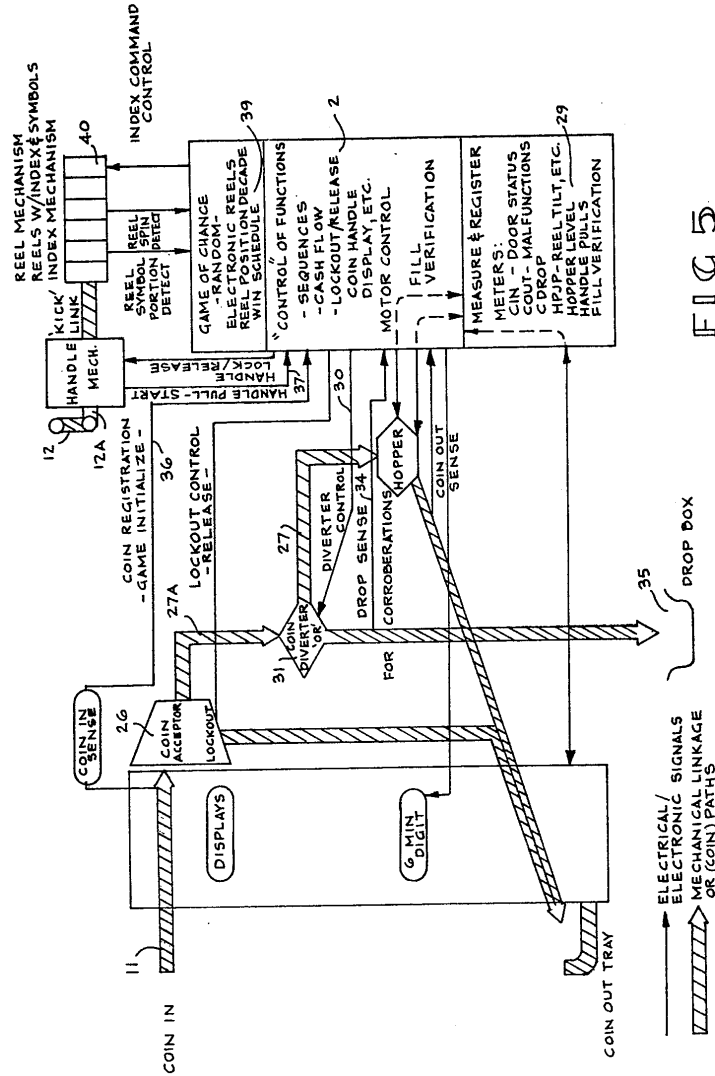


FIG 5

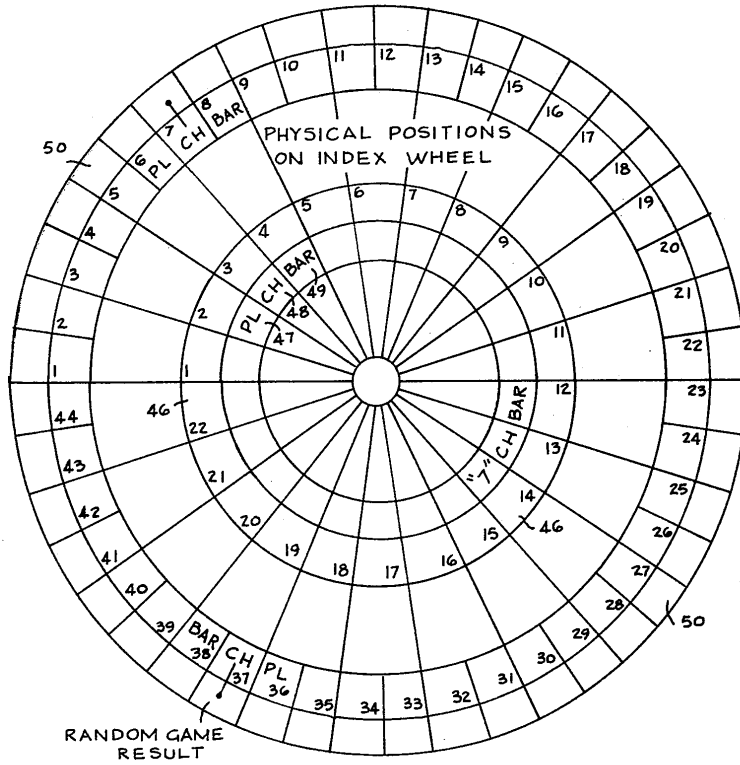
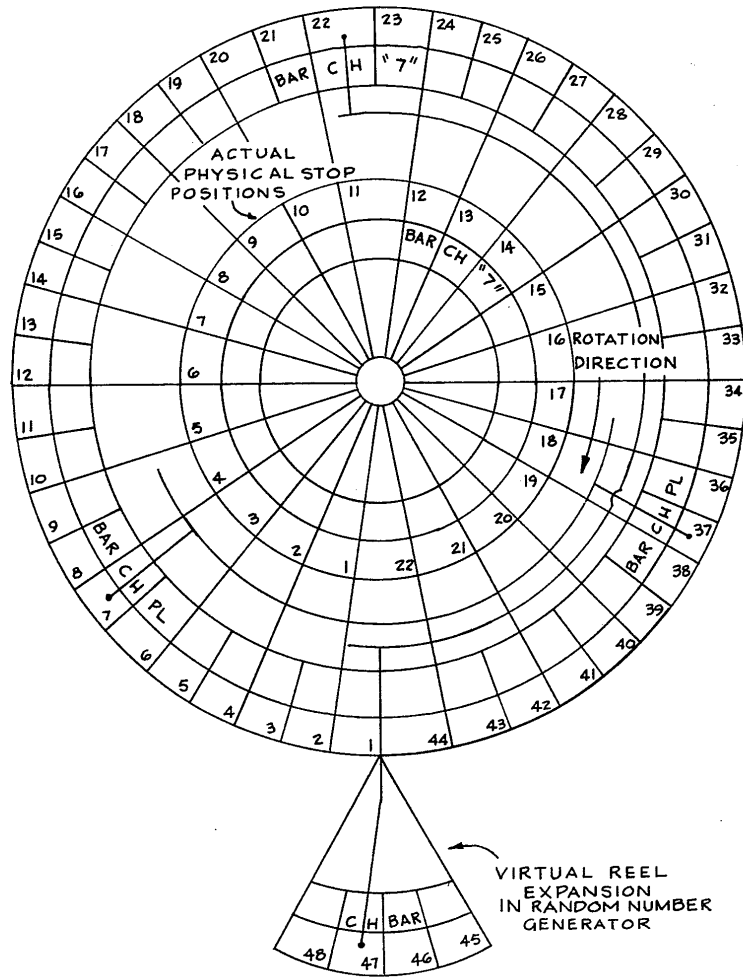


FIG 6

FIG 7



**ELECTRONIC GAMING DEVICE UTILIZING A
RANDOM NUMBER GENERATOR FOR
SELECTING THE REEL STOP POSITIONS**

FIELD OF THE INVENTION

This invention relates to gaming apparatus of the type commonly known as slot machines, wherein a plurality of reels are set into rotation and the stopping position, as indicated by indicia on the periphery of the reels, indicates the payoff to the player.

BACKGROUND OF THE INVENTION

Slot machines are gaming devices which incorporate a plurality of reels rotatable about a common axis and on which are carried at the periphery a plurality of indicia indicating the position each reel stops. Usually the reels are set into motion by pulling a lever and upon stopping, the angular positions of the reels are detected to determine the amount of payoff to the player.

In the original mechanical machines the reels were stopped by actuating a brake or a tripping arm/pin which moved into grooves (cutouts) in each reel's index wheel on a random timing basis. This method was carried over to the electromechanical machines of the 1960's and to date insofar that the basic stopping of the reels is by timewise releasing an index pin into grooves in index wheels attached to the reels with indicia displaying the game result. These varying depth grooves enabled, via physical contact closures of wipers being a part of the index arm mechanism and physical wiring to relay logic, payouts in accordance with the designed payout schedule which again was directly related to the probability of occurrence of the indicia—symbol—displayed on the reel itself. Such machines are directly susceptible to wear and tear (including erroneous electrical paths due to dirt and coin dust in particular, in the wiper contact area) as well as intentional tampering by both the player and unethical operators and their employees adversely affecting the regulations required for randomly probabilistic payoff.

Beyond the above-described slot machine devices there has followed now the electromechanical gaming devices employing a plurality of reels rotatable about a common axis and set into rotation by the pulling of a lever. However, in these newer devices an electronic random number generator of some type is energized which generates one number corresponding to each of the various positions at which the reels can be stopped. As the game is played, each reel is stopped in sequence with the other reels at a position corresponding to each subsequent number generated. The angular rotational positions of the reels are detected at all times and the brake is engaged when the reel position corresponds to the random number generated for that reel. The probability for paying off on a combination of indicia on presently used machines, as described above, is dependent on the number of reels, the number of different angular rotational positions at which the reels can be stopped, and the number of winning combinations of indicia. In other words, the lowest probability for payoff that can be offered on presently used machines are 1 to N^R where N is the number of angular rotational positions on each reel and R is the number of reels. Thus, for a three reel machine having 20 stop or index positions on each reel, the lowest probability that can be offered is $1:20^3$ or $1:8000$. For a machine to be commer-

cially viable, there is a limit on the largest amount that will be paid for any such single indicia combination.

The above reasoning explains why the slot machines which offer greatly increased payoffs are usually very large machines in terms of the number of reels and stop positions. The large machine provides the physical size to allow an increase in the number of reel stop positions as well as number of reels to increase the probability against payoff on any one position.

It should be noted that the market demands higher and higher payoffs to maintain and increase player appeal, yet the casino or operator must be assured that the probability of win and payout allows for a reasonable business profit. Generally the profit-hold objectives before taxes and operational costs that are deducted are in the range as low as 2.7% and generally up to 15%. Hence, the higher payoff for a winning indicia combination must be counterbalanced with less probability for the high win combination of indicia.

It is therefore the purpose of this invention to increase the capability of the designer to include high payoffs without increased physical size of the machine and with uniform presentation of the games of different models to the player. It should be noted that the players perceive larger machines as being less "good" in terms of winning and payout chances. That is, large physical machines and a large number of reels develop an attitude in the player which affects the play and acceptance of the machine although this does not always coincide with the true mathematical reality and probability of payout of the machine. This attitude affects the play appeal of the device and its revenue-producing capability and this player's attitude is quite important in marketability of the slot machines both to casinos and operators as well as to the "player" slot location. Also, this attitude may be more influential on whether or not the machine is played than published figures showing the payoff odds. Thus, it is important to make a machine that is perceived to present greater chances of payoff than it actually has within the legal limitations that games of chance must operate.

It is a further purpose of the present invention to provide a machine on which the probability is easily designed and on which high value payoffs can be offered on a standard three or four reel machine with correct probability that makes the high value payoffs feasible. The major benefits of such a machine besides the marketability and competitiveness to other slot machines and pure electronic or video games and gaming devices are:

(1) Prevention of tampering of the game to create illegal wins and payoffs.

Note that this feature of the invention protects both the operator and more importantly, the public or player as well as the licensing agency.

(2) Standardization in design and production by cost effectiveness of the product line across all conceivable product models and payoff probabilities and odds, i.e. payback of a win for a given coin insert.

SUMMARY OF THE INVENTION

A game apparatus having a plurality of reels mounted for rotation about an axis and which can be set into motion by the pulling of a lever. Indicia are fixed to the outer peripheries of these reels to indicate reel positions and a brake is operable to stop the reels at any randomly preselected position.

A random number generator is provided with electronic circuitry which computes the random stop position at which the reel should be stopped by the physical brake. This is done with an electronically random number selected from a group of numbers which exceeds the number of physical reel positions such that one physical reel position is represented by one or several positions on the virtual or electronically generated reel which is in affect, randomly stopped by the random number generator. In this invention the physical reels are only used as a display of the random number generated result and are not the game itself as in standard slot machines. In this manner, a standard slot machine or gaming apparatus can be made to function at payout odds, independent of the limits set by the number of physical reels and their physical stop positions, by changing the random number generator.

DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a standard electronic slot machine in which the subject invention can be applied. This machine looks identical to the present predominant electromechanical machine on the market although it is an electronic game.

FIG. 2 is a perspective view of a typical reel mechanism of a standard gaming machine.

FIG. 3 shows in exploded detail a typical reel mechanism in which the invention can be applied.

FIG. 4 is a block diagram of a prior art control system for a gaming device.

FIG. 5 shows a functional flow diagram of a gaming device in which the invention is applied.

FIG. 6 shows pictorially how the symbols on a reel displayed to the player compares to the virtual electronic indicia reel generated by the electronic random number generator.

FIG. 7 shows pictorially how the invention can be applied with flexibility in design by only expanding the virtual electronic reel.

DESCRIPTION OF THE INVENTION

Illustrated in FIG. 1 is a standard slot machine 10 which generally is played by the insertion of tokens into slots 11 and pulling a handle 12. Each such gaming device includes a plurality of reels, such as the reels shown in FIGS. 3 and 4, having indicia 14 fixed on the periphery to indicate the radial position of each reel. The reel assembly comprises a reel body 16 mounted for rotation about a shaft 17. Fixed to the reel is an index reel 18 and an index arm 19 which fits into index grooves on the index disc to serve as a brake for stopping the reel. FIG. 4 illustrates one method of sensing the angular position of the index wheel 18 and thus the reel 16.

The index wheel 18 has openings 21 through which a light source 22 passes light to the photo detector 24. The photo detector and connected sensor circuitry sense the angular position of the reel (not shown) and provide electrical pulses to a microprocessor decode logic to indicate the reel angular position.

As illustrated diagrammatically in FIGS. 1, 4, and 5, coins are inserted into the slot 11 and detected by a coin acceptor 26 (FIGS. 4 and 5). The coins pass along a conduit 27 into a coin payout hopper 28. The level of coins in the payout hopper is sensed by a detector 29 which, acting through the line 30 when the hopper 28 is full, causes the coin diverter mechanism 31 to deflect a paddle 32 and divert the coins recorded into a coin

counter 34 to come to rest in a coin drop box 35. When coins have been accepted, a signal passes through the line 36 to energize the enabling device 37 and allow the handle 12 to be pulled. If multiple coins are fed into the machine a multi-buy-logic 38 detects this fact and signals the control and payout logic 39 of the number of coins inserted.

When the handle 12 is pulled, a shaft 12A is rotated to power the reel mechanism 40. A random number generator 41 is creating random numbers and at a selected position, causes the individual index arm 19 to stop each reel of the reel mechanism in order. At that time the photocell 24 signals the control and payout logic 39 the reel position and causes a signal to be passed through the line 42 indicating payout. When payout is completed, a signal passes back through the line 44 to the control and payout logic for the playing of another game.

The above indicates a standard electromechanical gaming machine in which most or several of the functions are performed by electronic circuitry. As described before, the random number generator in past devices can select a number corresponding to a reel position. The group of numbers from which the number is selected equals the number of positions at which the reel can be stopped. Thus while the indicia on the periphery of the reel may be the same at several positions, still the numbers from which selection can be made each correspond to one position of the reel. Thus the total number of combinations at which the reels can be stopped are the number of reel positions raised to the power of the number of reels or N^3 in the subject apparatus shown with 3 reels wherein N is the number of positions at which each reel can be stopped. As stated before the manner of increasing the odds in present machines is either by adding reels or adding reel positions to the machine. Such an act involves the mechanical disassembly of the machine and the replacement of the reel position mechanisms and the random number generator.

Because the players observe directly the reel setup, increasing the number of reels and the number of reel stop positions naturally decreases the player acceptance of the gaming apparatus. Also there is a physical limit to the increasing of the physical size of the machines thereby imposing a limit to the maximum jackpots that can be offered in present day machines. In accordance with the present invention, there is provided a standard gaming apparatus which can be set up to pay off at any odds with no change in the mechanical apparatus of the machine. Thus the machine can be altered easily to pay off very high jackpots with a standardized mechanical reel mechanism with the odds being accurately predictable. Accordingly as shown in FIG. 6 in diagrammatic form, one standard type of reel will include 22 positions as illustrated by the circle 46. For example, these 22 positions can include a plum 47, a cherry 48, and a bar 49. The table entry in the random number generator for this machine is illustrated by the circle 50. Note that this circle has 44 "Virtual" or "Randomly Programmed" positions. Accordingly, the positions 7, 22, and 37 are assigned "cherry" thus changing the odds for hitting a cherry from 2 out of 22 or 0.0909 to 3 out of 44 or 0.0681. Thus by changing the number of "Virtual" positions in the read only memory without altering in any manner the standard 22 position reel, the odds on cherry can be changed dramatically. Such is possible because more positions are included in the read only

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memory than are included on the mechanical reel, a departure from past machines wherein the random number generator table has included only the reel positions.

Since the general requirements for gaming devices are that the reel be able to stop at all positions displayed and the controls be such that they can cause the reel to stop at all positions displayed, the only way that the odds can be changed is by increasing the number of symbol positions in the read only memory. In the past such odds were changed by adding physical reels or reel positions, a time-consuming act which is not necessary with the subject invention wherein the reel mechanism can be standardized for all payoff levels. It is stressed that the described invention not only offers a marketing advantage in providing for flexibility in design and the ability to give high win odds with present twenty, twenty two, or twenty five mechanical stop mechanisms with few reels (1,2,3, or 4), but also provides the manufacturer with significant economic benefits in manufacturing such as:

(1) The read only memory used for the virtual reels' stop positions are only limited by the designer's imagination in the present technology. However, the invention allows all products—slot machines—to be physically produced with the same reel size and stop position capability without any mechanical change (in design, production, etc.). This greatly simplifies tooling, service, maintenance, service training, and spare parts requirements, etc.

(2) In addition, the invention now also enables independent "Virtual" reel probability design, although the physical reels all are alike, which presents a new dimension to the game of chance design.

I claim:

1. A game apparatus, comprising:

- a reel mounted for rotation about an axis through a predetermined number of radial positions;
- means to start rotation of said reel about said axis;
- indicia fixed to said reel to indicate the angular rotational position of said reel;
- means for assigning a plurality of numbers representing said angular positions of said reel, said plurality of numbers exceeding said predetermined number of radial positions such that some rotational positions are represented by a plurality of numbers;
- means for randomly selecting one of said plurality of assigned numbers; and
- means for stopping said reel at the angular position represented by said selected number.

2. A game apparatus as defined in claim 1 including a multiplicity of reels mounted for rotation.

3. A game apparatus as defined in claim 1 wherein some angular rotational positions only have one number representing that position.

4. A game apparatus as defined in claim 1 wherein said means for randomly selecting is a random number generator.

5. A game apparatus as defined in claim 4 wherein said means to start rotation of said reel is a lever.

6. A game apparatus as defined in claim 1 including a plurality of reels and said means for stopping stops said reels in a predetermined sequence.

7. A game apparatus as defined in claim 6 wherein said means for randomly selecting one of said assigned numbers does so for each reel.

8. A game apparatus, comprising:
a plurality of reels mounted for rotation about an axis; indicia fixed to said reel peripheries to identify each of a randomly predetermined number of rotational positions through which said reels rotate;
means to stop each said reel at any selected one of said positions;

a random number generator for selecting one number from a plurality of numbers each representing one of said different angular rotational positions, said plurality of numbers exceeding the number of rotational positions of said reel such that a plurality of numbers represents some of the reel positions; and means to set said reels into rotation and to energize said random number generator.

9. The method of controlling the win odds on a game apparatus having at least one reel rotatable through a plurality of positions and stoppable at any one of said plurality of positions with the positions having differing rewards, said method comprising the steps of:

- assigning to each position at least one of a plurality of numbers;
- entering said plurality of numbers in a random number generator;
- starting said random number generator and reel and stopping said reel at the number selected by said random number generator; and
- assigning a different quantity of numbers to each position to obtain the win odds desired.

10. The method of controlling the win odds on a game apparatus wherein a plurality of indicia are displayed and the reward is based on which indicia is selected, said method comprising the steps of:

- assigning a plurality of numbers to most indicia and assigning at least one number to all indicia;
- entering said numbers into a random number generator;
- operating said random number generator to select one of said numbers;
- displaying the indicia represented by said number; and
- selecting the quantity of numbers to be assigned to each indicia responsive to the total quantity of numbers entered into said random number generator to make the win odds on each indicia a desired value.

* * * * *

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WMS GAMING, INC. v. INTERNATIONAL GAME TECHNOLOGY 1339

Cite as 184 F.3d 1339 (Fed. Cir. 1999)

of one who is the true holder of the encumbrance.”²

In the present case, it is undisputed that Republic properly recorded the mortgage and that no satisfaction of the mortgage has taken place. The debtor had actual knowledge—and the Trustee (at least) constructive knowledge—of the unsatisfied mortgage. While each subsequent assignment had a bearing on the rights of the mortgagees *inter se*, it did not affect the rights or interests of the debtor or the debtor’s estate in the manner suggested by the Trustee. Thus, it is incorrect that by virtue of Atlantic’s failure to record the assignment prior to the debtor’s filing for bankruptcy protection, the Trustee was entitled to avoid the mortgage.

For the foregoing reasons, the decision of the district court affirming the orders of the bankruptcy court is AFFIRMED.



WMS GAMING INC., Plaintiff-Appellant,

v.

INTERNATIONAL GAME TECHNOLOGY, Defendant-Appellee.

Nos. 97-1307, 98-1053.

United States Court of Appeals,
Federal Circuit.

July 20, 1999.

Rehearing Denied; Suggestion for
Rehearing In Banc Denied
Sept. 17, 1999.

Maker of slot machine brought action seeking declaratory judgment that its machine did not infringe patent held by assignee and that patent was invalid. Assignee counterclaimed for willful infringement.

2. The bankruptcy court declined to follow *In re Lakeside I Corp.*, 120 B.R. 213 (Bankr. M.D.Fla.1990) in which another bankruptcy court held that knowledge of a mortgage did not bar the exercise of a trustee’s strong-arm powers under § 544. The appellees contend that *Lakeside* is factually distinguishable from the present case, principally because the mortgage was not of record when the bank-

The United States District Court for the Northern District of Illinois, James F. Holderman, Jr., J., ruled in favor of assignee and denied maker’s motion for a new trial based on newly discovered evidence. Maker appealed. The Court of Appeals, Schall, Circuit Judge, held that: (1) district court erred in construing patent claim; (2) patent was not literally infringed; (3) patent was infringed under doctrine of equivalents; (4) patent was not invalid as obvious; (5) methodology for computing damages and quantum of damages awarded were proper; and (6) maker was not entitled to new trial.

Affirmed in part, reversed in part, vacated in part, and remanded.

1. Patents ⇌226.6

A determination as to patent infringement involves a two-step analysis: first the court must construe the claims at issue, and, next, the court must determine whether the claims, as properly construed, read on the accused device.

2. Patents ⇌324.5

Patent claim construction is an issue of law which Court of Appeals reviews de novo.

3. Patents ⇌324.55(2)

The determination as to whether patent claims, as properly construed, read on the accused device presents an issue of fact which, following a bench trial, Court of Appeals reviews for clear error.

4. Federal Courts ⇌853

A factual finding is clearly erroneous when, although there is evidence to support it, the reviewing court on the entire evidence is left with the definite and firm

impression that the finding is clearly erroneous. To the extent that *Lakeside* may stand—as the Trustee suggests—for the proposition that a trustee may rely on Fla. Stat. § 701.02 to prevail against improperly recorded assignments of a duly recorded mortgage, we endorse the decision of the bankruptcy court to steer a different course.

conviction that a mistake has been committed.

5. Patents \S 314(5), 324.5

Determining the claimed function and the corresponding structure for a claim limitation written in means-plus-function format are both matters of claim construction and therefore present issues of law that Court of Appeals reviews de novo. 35 U.S.C.A. \S 112.

6. Patents \S 176

In patent for slot machine which included limitation of a "means for assigning a plurality of numbers representing said angular positions of said reel, said plurality of numbers exceeding said predetermined number of radial positions such that some rotational positions are represented by a plurality of numbers," corresponding structure for that limitation was not microprocessor in general, but microprocessor programmed to perform algorithm disclosed in specification. 35 U.S.C.A. \S 112.

7. Patents \S 324.1

Where the parties agree to a patent claim construction that is adopted by the district court, and neither party disputes that construction on appeal, Court of Appeals declines to raise an issue sua sponte.

8. Patents \S 101(8)

In a means-plus-function claim in which the disclosed structure is a computer, or microprocessor, programmed to carry out an algorithm, the disclosed structure is not the general purpose computer, but rather the special purpose computer programmed to perform the disclosed algorithm. 35 U.S.C.A. \S 112.

9. Patents \S 176

In patent for slot machine, limitations relating to means for selecting number assigned to stop position and to means for stopping reel at stop position corresponding to selected number referred to single numbers, not combinations of numbers, absent any indication that references to "number" should be given anything other than their ordinary meaning.

10. Patents \S 226.6

To prove literal infringement, the patentee must show that the accused device contains every limitation in the asserted claims; if even one limitation is missing or not met as claimed, there is no literal infringement.

11. Patents \S 226.7

In order to establish literal infringement of a means-plus-function claim, the patentee must establish that the accused device employs structure identical or equivalent to the structure disclosed in the patent and that the accused device performs the identical function specified in the claim. 35 U.S.C.A. \S 112.

12. Patents \S 235(2)

Patented slot machine was not literally infringed by accused machine, even if accused machine had structure equivalent to patent's limitations of means for assigning a plurality of numbers and means for randomly selecting one of said plurality of assigned numbers, as function of those limitations was assigning and selecting single numbers, while accused machine assigned and selected combinations of single numbers and thus did not perform function identical to that of patent claim.

13. Patents \S 226.7, 237

The proper test for determining whether the structure in an accused device is equivalent to the structure recited in a means-plus-function claim is whether the differences between the structure in the accused device and any disclosed in the specification are insubstantial. 35 U.S.C.A. \S 112.

14. Patents \S 237

A claim that does not literally read on an accused device may nevertheless be infringed under the doctrine of equivalents if the differences between the claim and the accused device are insubstantial.

15. Patents \S 237

Patented slot machine was infringed, under doctrine of equivalents, by accused

machine because accused machine's method of assigning and selecting combinations of single numbers was only insubstantially different from patented machine's method of assigning and selecting single numbers.

16. Patents \Leftrightarrow 312(6)

In order to find willful patent infringement, the district court had to find by clear and convincing evidence in view of the totality of the circumstances that alleged infringer acted in disregard of the patent and lacked a reasonable basis for believing it had a right to do what it did.

17. Patents \Leftrightarrow 319(3)

While it is not a rule of law that patent infringement that is not literal can never be sufficiently culpable to warrant enhanced damages, avoidance of literal infringement is a fact to be considered in determining whether there has been willful infringement.

18. Patents \Leftrightarrow 226

Patent law encourages competitors to design or invent around existing patents.

19. Patents \Leftrightarrow 16(1)

The ultimate determination of whether an invention is or is not obvious is a legal conclusion based on underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) objective evidence of nonobviousness. 35 U.S.C.A. § 103(a).

20. Patents \Leftrightarrow 321.55(2)

The underlying factual determinations on which the legal conclusion that a patent is obvious is based are reviewed for clear error. 35 U.S.C.A. § 103(a).

21. Patents \Leftrightarrow 312(1.2)

Because a patent is presumed to be valid, the party asserting invalidity has the burden of showing invalidity by clear and convincing evidence. 35 U.S.C.A. § 282.

22. Patents \Leftrightarrow 312(6)

The burden on the party asserting that a patent is obvious is more easily carried when the references on which the assertion is based were not directly consid-

ered by the examiner during prosecution. 35 U.S.C.A. § 103(a).

23. Patents \Leftrightarrow 26(1)

When an obviousness determination relies on the combination of two or more prior art references, there must be some suggestion or motivation to combine the references, and the suggestion to combine may be found in explicit or implicit teachings within the references themselves, from the ordinary knowledge of those skilled in the art, or from the nature of the problem to be solved. 35 U.S.C.A. § 103(a).

24. Patents \Leftrightarrow 16.21

Patent for slot machine was not invalid on grounds of obviousness, although one prior art patent taught every aspect of claimed invention with exception of nonuniform mapping of numbers to stop positions to decrease odds of winning, where other prior art patents taught only nonuniform mapping of numbers to display symbols to simulate physical reels, not nonuniform mapping to lower the odds of winning, and there was no evidence of motivation to combine teachings of former and latter references. 35 U.S.C.A. § 103(a).

25. Patents \Leftrightarrow 31.1

The consideration of the objective evidence presented by the patentee is a necessary part of the obviousness determination, and the objective evidence of nonobviousness may be used to rebut a prima facie case of obviousness based on prior art references. 35 U.S.C.A. § 103(a).

26. Patents \Leftrightarrow 36.1(3, 5), 36.2(1)

Objective evidence that a patent is not obvious may include commercial success, long-felt but unsolved need, and licenses showing industry respect. 35 U.S.C.A. § 103(a).

27. Patents \Leftrightarrow 32

The patentee bears the burden of showing that a nexus exists between the claimed features of the invention and the

objective evidence offered to show nonobviousness. 35 U.S.C.A. § 103(a).

28. Patents ⇨318(1)

Award of damages for infringement of patent for slot machine, which included lost profits, was proper, despite infringer's claim that patent assignee was mere holding company that did not manufacture machines; infringer stipulated that assignee did manufacture machines, prior to trial, and infringer was not entitled to withdraw that stipulation as it was not prejudiced, in view of its opportunity to access consolidated records of assignee and its subsidiary that manufactured machines.

29. Patents ⇨318(3), 324.55(2)

The district court's methodology for computing patent infringement damages is discretionary and the quantum of damages awarded is a factual issue reviewed for clear error.

30. Courts ⇨96(5)

Because the denial of a motion for a new trial is a procedural issue not unique to patent law, Court of Appeals for the Federal Circuit applies the law of the regional circuit where the appeal from the district court would normally lie.

31. Patents ⇨323.3

Alleged patent infringer's posttrial discovery of slot machine that predated filing date of patent and allegedly operated in a manner similar to claimed invention did not warrant new trial, absent showing that infringer's employees were diligent in seeking out relevant prior art. Fed.Rules Civ.Proc.Rule 59, 28 U.S.C.A.

32. Federal Civil Procedure ⇨2313

Federal Courts ⇨825.1

Decisions granting or denying motions for new trials are committed to the sound discretion of the district court and may be upset only if no reasonable person could agree with the district court.

Raphael V. Lupo, McDermott, Will & Emery, of Washington, DC, argued for

* Circuit Judge Rich heard oral argument in this case, but died on June 9, 1999. The case was

plaintiff-appellant. With him on the brief was Paul Devinsky. Of counsel on the brief were Kimball R. Anderson, and Don J. Mizerk, Winston & Strawn, of Chicago, Illinois; and Arthur M. Handler, and Robert S. Goodman, Burns Handler & Burns LLP, of New York, New York. Of counsel were Donna M. Tanguay and Mark G. Davis, of McDermott, Will & Emery.

Robert G. Krupka, Kirkland & Ellis, of Chicago, Illinois, argued for defendant-appellee. With him on the brief was Barry F. Irwin. Also on the brief was Jay I. Alexander, of Washington, DC. Of counsel on the brief were Marc D. Foodman, Associate Corporate Counsel, International Game Technology, of Reno, Nevada; and Michael B. Allen, Laff, Whitesel, Conte & Saret, of Chicago, Illinois.

Before RICH,* RADER, and SCHALL, Circuit Judges.

SCHALL, Circuit Judge.

WMS Gaming Inc. (WMS) appeals the decision of the United States District Court for the Northern District of Illinois that it willfully infringed United States Patent No. 4,448,419 and that the patent is not invalid. See *WMS Gaming Inc. v. International Game Tech.*, No. 94-C-3062 (N.D.Ill. March 7, 1997) (*WMS Gaming*). WMS also appeals the order of the district court denying its motion for a new trial based on newly discovered evidence. See *WMS Gaming Inc. v. International Game Tech.*, No. 94-C-3062 (N.D.Ill. October 1, 1997). We affirm-in-part, reverse-in-part, vacate-in-part, and remand.

BACKGROUND

I.

United States Patent No. 4,448,419, entitled "Electronic Gaming Device Utilizing a Random Number Generator for Selecting the Reel Stop Positions," was issued to Inge S. Telnaes on May 15, 1984 (the

decided by the remaining judges in accordance with Fed. Cir. Rule 47.11.

Telnaes patent) and was assigned to International Game Technology (IGT) in 1988. The Telnaes patent claims a slot machine that decreases the probability of winning while maintaining the external appearance of a standard mechanical slot machine. The decreased probability of winning permits higher payoffs, which attracts players.

In general, standard mechanical slot machines include a plurality of reels with symbols around the perimeters of the reels. The symbols may include, for example, fruits, such as cherries or plums; bars, such as double-bars or triple-bars; the number “7”; and blanks. There are typically fewer unique symbols on a reel than there are reel stop positions, *i.e.*, some symbols appear at multiple positions around the reel. For example, a reel with 20 stop positions may include six cherry symbols, five double-bar symbols, three triple-bar symbols, five blank symbols, and one “7” symbol. The number of stop positions to which a symbol is fixed affects the odds of that symbol being the displayed outcome when the machine is played. In the above example, a cherry symbol is six times more likely to be displayed than a “7” symbol.

The number of reels and the number of stop positions on each reel dictate the lowest probability of winning. For example, in a three reel slot machine with 20 stop positions per reel, the lowest probability of winning is 1 in 8000 ($20 \times 20 \times 20$). Prior to the Telnaes invention, the conventional way to decrease the odds of winning was either to increase the number of reels or to increase the number of stop positions per reel. Increasing the number of stop positions per reel typically increases the size of the reels, which, in turn, typically increases the size of the slot machine. Experience has shown that players are less attracted to slot machines that have more than three reels and to larger slot machines.

1. The non-uniform mapping of numbers to stop positions is the allocation of numbers to stop positions such that some stop positions

The Telnaes patent discloses a slot machine that is capable of decreasing the probability of winning while maintaining the external appearance of a standard mechanical slot machine. Telnaes, col. 2, lines 10–27. Generally speaking, Telnaes discloses a slot machine in which the reels are electronically-controlled. *Id.*, col. 4, lines 19–21. Each time the machine is played, the control circuitry randomly determines the stop position of each reel and then stops the reels at the randomly determined positions. *Id.*, col. 3, lines 1–4. The reels only serve the function of displaying the randomly chosen result. *Id.*, col. 3, lines 10–12. To decrease the probability of certain symbols appearing, the control circuitry randomly chooses a number from a range greater than the number of stop positions. *Id.*, col. 4, line 53—col. 5, line 4. The range of numbers is non-uniformly mapped to the stop positions, *e.g.*, a memory based look-up table, that is programmed by either the manufacturer or the operator, may be used to map the range of numbers to stop positions.¹ Thus, in a slot machine with 20 stop positions per reel, the control circuitry may use a random number generator to select a number between 1 and 40. The 40 numbers are non-uniformly assigned to correspond to the 20 stop positions on a reel. For example, only one number may be assigned to the symbol “7,” while six numbers may be assigned to the “cherry” symbol. This non-uniform mapping of numbers to stop positions allows the probability of stop position combinations, and thus the probability of winning, to be adjusted without altering the configuration of the reels. *Id.*, col. 3, lines 13–16. The odds-manipulating slot machines with physical reels disclosed in the Telnaes patent are referred to as “virtual reel” slot machines.

The virtual reel slot machines claimed in the Telnaes patent have been widely accepted in the marketplace. Several competitors have licensed the patent from IGT

are allocated more numbers than other stop positions.

and have paid substantial royalties. Virtual reel slot machines comprise the vast majority of the slot machines sold throughout the world, and the percentage of casino revenues derived from slot machines has increased dramatically since the introduction of virtual reel slot machines.

II.

In 1993, WMS introduced its Model 400 slot machine, the accused device. The WMS 400 slot machine is a reel-type slot machine that manipulates the odds of winning. The WMS 400 slot machine is an embodiment of the slot machine disclosed in United States Patent No. 5,456,465, entitled "Method for Determining Payoffs in Reel-Type Slot Machines," issued to Timothy J. Durham (the Durham patent). Because the parties stipulated that the Durham patent describes the accused device, our discussion of the accused device refers to the Durham patent.

The Durham patent discloses a different approach to calculating payoffs than the Telnaes patent. In the Telnaes patent, the stop positions of the reels are determined first and then the payoff is calculated based on the stop positions. In the Durham patent, the payoff is calculated first and then stop positions that represent that payoff are chosen. Durham, col. 1, lines 40-54. As disclosed in the Durham patent, a random number generator selects two random numbers and maps those numbers to two payoff multipliers. *Id.*, col. 3, lines 9-19. The payoff amount is determined by multiplying the payoff multipliers together. *Id.*, col. 3, lines 3-37. The stop positions of the reels then are determined

by randomly selecting a group of stop positions that corresponds to the payoff amount. *Id.*, col. 4, lines 1-7.

Referring to Figures 5-8 of the Durham patent, which are reproduced below, the random number generator selects a first number (R1) from a known range, and the selected number is mapped to a first payoff multiplier (X). *Id.*, Figure 5. R1 is randomly chosen from the range of 1 to 632. If R1 is one, then payoff multiplier X is 10, if R1 is between 182 and 632, then payoff multiplier X is zero, etc. The random number generator then selects another number (R2) from a second range of numbers, and R2 is mapped to a second payoff multiplier (Y). *Id.*, Figure 6. The actual payoff amount (Z) is determined by multiplying X times Y. *Id.*, col. 3, lines 3-37. For example, if X is 10 and Y is 10, the actual payoff amount is 100. Alternatively, if X is 10 and Y is zero, the actual payoff amount is zero.

Once the actual payoff amount is determined, the WMS 400 slot machine uses the random number generator to select a group of stop positions that match the payoff amount. *Id.*, col. 4, lines 1-7. For example, eight different groups of stop positions may represent a payoff amount of 100. *Id.*, Figure 7. If the payoff amount is 100, then the random number generator selects a third number (R3) between one and eight (because as indicated in Fig. 7, there are eight possible ways of displaying a payoff of 100), and the slot machine displays a group of stop positions that corresponds to the selected number. *Id.*, Figure 8.

FIG.5

RANDOM NUMBERS	QUANTITY	MULTIPLIER "X"
1	1	10
2-31	30	2
32-181	150	1
182-632	451	0

FIG.6

RANDOM NUMBERS	QUANTITY	MULTIPLIER "Y"
1	1	100
2-23	22	10
24-259	236	5
260-396	137	1
397-632	236	0

FIG.7

PAYOFF "Z" VALUE	WAYS TO DISPLAY	SYMBOL COMBIN. DISPLAYED
1000	1	7 7 7
200	1	≡ ≡ ≡
100	8	= = =
50	27	- - -
20	180	ANY 3 BARS
10	343	ANY 3 BLANKS

FIG.8

REEL STOP POSITIONS DISPLAYING 3 DOUBLE BARS	MEMORY LOCATION
1 1 1	A
1 1 2	B
1 2 1	C
1 2 2	D
2 1 1	E
2 1 2	F
2 2 1	G
2 2 2	H

In the WMS 400 slot machine, there are 22 different ways to get a payoff amount of 100 when X is 10 and Y is 10 (R1 must be 1 and R2 must be between 2 and 23). *Id.*, Figures 5 and 6. Additionally, as just noted, there are eight groups of stop positions that represent a payoff of 100. *Id.*, Figures 7 and 8. As seen in Figure 7, a payoff amount of 100 equates to three double-bars. At the same time, as seen in Figure 8, each reel includes two stop positions with a double-bar symbol. This is because in Figure 8, a "1" identifies the first double-bar symbol on a reel, while a "2" identifies the second double-bar symbol on a reel. In other words, stop position 1 and stop position 2 on each reel display a double bar symbol. Thus, there are eight combinations of double-bars on the three reels. Accordingly, the third iteration of the random number generator selects a number (R3) between one and eight. For example, if R3 is one, the group of stop positions stored in memory location A may be displayed (1, 1, 1); if R3 is two, the group of stop positions in memory location B may be displayed (1, 1, 2), etc. *Id.*, Figure 8.

III.

On May 5, 1994, IGT sent a cease and desist letter to WMS indicating IGT's belief that the WMS 400 slot machine infringed the Telnaes patent. WMS responded on May 17, 1994, by filing an action in the district court seeking a declaratory judgment that the WMS 400 slot machine does not infringe the Telnaes patent and that the patent is invalid. IGT counterclaimed against WMS for willful infringement.

The district court bifurcated the liability and damages phases of the trial. After a three-day bench trial on liability, the court held that the Telnaes patent was not invalid and that WMS had willfully infringed the patent. Initially, the court awarded damages based on a reasonable royalty of \$50 per machine. It later vacated that award, however, and awarded IGT damages based on a combination of lost profits and a reasonable royalty. The court's final damages award, after trebling for willful infringement, exceeded \$30 million. In addition, the court permanently enjoined WMS from infringing the Telnaes patent.

At trial, WMS presented three patents to support its position that the Telnaes

patent was invalid for obviousness. After trial, WMS located an unpatented slot machine—the Merit Sweet Shawnee—that was sold several years before the application for the Telnaes patent was filed. WMS claimed that the Merit Sweet Sane operated in a manner similar to that of the claimed invention. On March 14, 1997, WMS moved for a new trial under Fed. R.Civ.P. 59 based on this newly discovered prior art. The district court responded by allowing discovery on the new evidence, and then holding a “hybrid” trial on whether to grant the motion and on the substance of the motion. After a two-day proceeding, the court denied the motion for a new trial. It did so on the grounds that WMS had not been diligent in discovering the Merit Sweet Sane and that the new evidence was not likely to change the outcome of the case.

WMS appeals the judgment of liability, the quantum of damages awarded, and the order denying a new trial. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(1) (1994).

DISCUSSION

I.

[1–4] We begin with the issue of infringement. A determination as to infringement involves a two-step analysis. First the court must construe the claims at issue. See *Vitronics Corp. v. Conception, Inc.*, 90 F.3d 1576, 1581–82, 39 USPQ2d 1573, 1576 (Fed.Cir.1996). Next, the court must determine whether the claims, as properly construed, read on the accused device. See *id.* Claim construction is an issue of law which we review *de novo*. See *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1456, 46 USPQ2d 1169, 1174 (Fed. Cir.1998) (en banc); *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979, 34 USPQ2d 1321, 1329 (Fed.Cir.1995) (en banc), *aff'd* 517 U.S. 370, 116 S.Ct. 1384, 134 L.Ed.2d 577, 38 USPQ2d 1461 (1996). The determination as to whether the claims, as properly construed, read on the accused device presents an issue of fact which, following a bench trial, we review

for clear error. See *Charles Greiner & Co. v. Mari-Med Mfg., Inc.*, 962 F.2d 1031, 1034, 22 USPQ2d 1526, 1528 (Fed.Cir.1992). “‘A finding is clearly erroneous when, although there is evidence to support it, the reviewing court on the entire evidence is left with the definite and firm conviction that a mistake has been committed.’” *In re Graves*, 69 F.3d 1147, 1151, 36 USPQ2d 1697, 1700 (Fed.Cir.1995) (quoting *United States v. United States Gypsum Co.*, 333 U.S. 364, 395, 68 S.Ct. 525, 92 L.Ed. 746 (1948)). Ms’s first contention on appeal is that the district court erred in its claim construction and that the WMS 400 slot machine does not infringe the properly construed claims.

The Telnaes patent has 10 claims, four of which, numbers 1, 8, 9, and 10, are independent. The district court found that the WMS 400 slot machine infringed claims 1, 2, 4, 5, 6, and 8, both literally and under the doctrine of equivalents, and that it infringed claims 9 and 10 under the doctrine of equivalents only. The parties’ arguments on appeal reflect an acknowledgment that determination of the issue of infringement of claim 1 controls the infringement issue as far as the remaining claims are concerned.

Claim 1 reads as follows:

1. A game apparatus, comprising:
 - a reel mounted for rotation about an axis through a predetermined number of radial positions;
 - means to start rotation of said reel about said axis;
 - indicia fixed to said reel to indicate the angular rotational position of said reel;
 - means for assigning a plurality of numbers representing said angular positions of said reel, said plurality of numbers exceeding said predetermined number of radial positions such that some rotational positions are represented by a plurality of numbers;
 - means for randomly selecting one of said plurality of assigned numbers; and

means for stopping said reel at the angular position represented by said selected number.

Telnaes, col. 5, lines 38–53.

[5] It is undisputed that the first three limitations of claim 1 read on the accused device, the WMS 400 slot machine. The parties' dispute involves the last three limitations, which are written in means-plus-function format, pursuant to 35 U.S.C. § 112, ¶ 6 (1994). Under that provision, "[a]n element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." We have stated that "for a means-plus-function limitation to read [literally] on an accused device, the accused device must employ means identical to or the equivalent of the structures, material, or acts described in the patent specification. The accused device must also perform the identical function as specified in the claims." *Valmont Indus., Inc. v. Reinke Mfg. Co.*, 983 F.2d 1039, 1042, 25 USPQ2d 1451, 1454 (Fed.Cir.1993); see also *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931, 934, 4 USPQ2d 1737, 1739 (Fed.Cir. 1987) (en banc) ("To determine whether a claim limitation is met literally, where expressed as a means for performing a stated function, the court must compare the accused structure with the disclosed structure, and must find equivalent structure as well as identity of claimed function for that structure.") (emphasis in original). Determining the claimed function and the corresponding structure for a claim limitation written in means-plus-function format are both matters of claim construction. They therefore present issues of law that we review *de novo*. See *Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus.*,

2. Although we fail to find anything in the Telnaes patent that limits the "means for assigning" limitation to a microprocessor or computer, where, as here, the parties agree to

Inc., 145 F.3d 1303, 1308, 46 USPQ2d 1752, 1755–56 (Fed.Cir.1998).

Construing the Disputed Limitations of Claim 1

As far as claim construction is concerned, our task is to identify the claimed function and the corresponding structure of each of the three disputed limitations of claim 1. We begin with the first of the three disputed limitations: "means for assigning a plurality of numbers representing said angular positions of said reel, said plurality of numbers exceeding said predetermined number of radial positions such that some rotational positions are represented by a plurality of numbers." This limitation contains the terms "angular positions," "radial positions," and "rotational positions." The district court construed each of these terms to refer to stop positions of the reel. Neither party challenges that construction.

The claimed function of the "means for assigning" limitation is "assigning a plurality of numbers representing said angular positions of said reel, said plurality of numbers exceeding said predetermined number of radial positions such that some rotational positions are represented by a plurality of numbers." In other words, the claimed function is assigning a plurality of numbers to stop positions, where the plurality of numbers exceeds the number of stop positions and some stop positions are represented by more than one number.

[6, 7] In regard to the disclosed corresponding structure of the "means for assigning" limitation, WMS and IGT stipulated—and the district court accepted the stipulation—that the Telnaes patent discloses a microprocessor, or computer, to control the operation of the slot machine, including the operation of the machine in the assignment of numbers to reel stop positions.² The algorithm that controls the assignment of numbers to stop posi-

a claim construction that is adopted by the district court, and neither party disputes that construction on appeal, we decline to raise an issue *sua sponte* that the parties have not

tions is disclosed in Figure 6 of the Telnaes patent. Figure 6 illustrates an algorithm in which a plurality of single numbers are assigned to stop positions such that: 1) the range of single numbers exceeds the number of stop positions; 2) each single number is assigned to only one stop position; 3) each stop position is assigned at least one single number; and 4) at least one stop position is assigned more than one single number. The prosecution history reinforces the teachings of Figure 6. The prosecution history indicates that each number must correspond to a stop position, but that several numbers may correspond to the same stop position. In response to an Office Action, Telnaes stated, "the applicant has disclosed a machine which utilizes a standard mechanism but on which the odds can be changed substantially infinitely. The only guidelines are that there must be a symbol for each symbol indicator in virtual memory but there can be many positions in the virtual memory for each symbol on the reel."

The district court construed the "means for assigning" limitation of claim 1 to cover "any table, formula, or algorithm for determining correspondence between the [randomly selected] numbers and rotational positions of the reel." WMS argues that this construction was overly broad. It contends that the "means for assigning" limitation should have been defined by the corresponding structure, material, or acts described in the patent specification, or their equivalents, and should have been further limited by the prosecution history. IGT responds that the court properly construed the claim.

We agree with WMS that the district court's construction of the "means for assigning" limitation was overly broad. The written description of the Telnaes patent is almost completely devoid of any structure to support this limitation of the claim.

presented. See *Seal-Flex, Inc. v. Athletic Track & Court Constr.*, 172 F.3d 836, 842, 50 USPQ2d 1225, 1228 (Fed.Cir.1999).

3. A microprocessor contains a myriad of interconnected transistors that operate as electronic switches. See Neil Randall, *Dissecting*

The district court apparently took this lack of disclosure to indicate that the limitation reads on any means for performing the recited function. However, this construction is at odds with the requirements of 35 U.S.C. § 112. See *Valmont Indus.*, 983 F.2d at 1042, 25 USPQ2d at 1454 (holding that section 112, ¶ 6, permits the use of means-plus-function language in claims, but with the proviso that the claims are limited to the structure, material, or acts disclosed in the specification and their equivalents).

The district court determined that the structure disclosed in the specification to perform the claimed function was "an algorithm executed by a computer." While this finding accurately reflected the parties' stipulation, the court erred by failing to limit the claim to the algorithm disclosed in the specification. The structure of a microprocessor programmed to carry out an algorithm is limited by the disclosed algorithm. A general purpose computer, or microprocessor, programmed to carry out an algorithm creates "a new machine, because a general purpose computer in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from program software." *In re Alappat*, 33 F.3d 1526, 1545, 31 USPQ2d 1545, 1558 (Fed.Cir.1994) (en banc); see *In re Bernhart*, 57 C.C.P.A. 737, 417 F.2d 1395, 1399-1400, 163 USPQ 611, 615-16 (CCPA 1969) ("[I]f a machine is programmed in a certain new and unobvious way, it is physically different from the machine without that program; its memory elements are differently arranged."). The instructions of the software program that carry out the algorithm electrically change the general purpose computer by creating electrical paths within the device. These electrical paths create a special purpose machine for carrying out the particular algorithm.³

the Heart of Your Computer, PC Magazine, June 9, 1998, at 254-55. The instructions of the software program cause the switches to either open or close. See *id.* The opening and closing of the interconnected switches creates electrical paths in the microprocessor

[8] In a means-plus-function claim in which the disclosed structure is a computer, or microprocessor, programmed to carry out an algorithm, the disclosed structure is not the general purpose computer, but rather the special purpose computer programmed to perform the disclosed algorithm. See *Alappat*, 33 F.3d at 1545, 31 USPQ2d at 1558.⁴ Accordingly, the structure disclosed for the “means for assigning” limitation of claim 1 of the Telnaes patent is a microprocessor programmed to perform the algorithm illustrated in Figure 6. In other words, the disclosed structure is a microprocessor programmed to assign a plurality of single numbers to stop positions such that: 1) the number of single numbers exceeds the number of stop positions; 2) each single number is assigned to only one stop position; 3) each stop position is assigned at least one single number; and 4) at least one stop position is assigned more than one single number.

We turn next to the second disputed limitation of claim 1: “means for randomly selecting one of said plurality of assigned numbers.” As the language of the claim makes clear, the function of this limitation is “randomly selecting one of said plurality of assigned numbers.” In other words, the claimed function is randomly selecting one of the numbers that was assigned to reel stop positions by the “means for assigning” limitation just discussed. The district court concluded, and the parties

that cause it to perform the desired function of the instructions that carry out the algorithm. See *id.*

4. In *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, 149 F.3d 1368, 47 USPQ2d 1596 (Fed.Cir.1998), *cert. denied*, — U.S. —, 119 S.Ct. 851, 142 L.Ed.2d 704 (1999), the patented invention related generally to a system that allowed an administrator to monitor and record financial information flow and make all calculations necessary for maintaining “a partner fund financial services configuration.” 149 F.3d at 1371, 47 USPQ2d at 1598. We pointed out that claim 1 of the patent, which was drafted in section 112, ¶ 6 format claimed “a machine, namely, a data processing system for managing a financial services configuration of a portfolio

agree, that the corresponding structure disclosed in the specification is a microprocessor programmed to perform random number generation. The random number generator randomly selects a single number from the range of numbers assigned by the “means for assigning” limitation. Telnaes, col. 3, lines 1–9. For the reasons indicated in footnote 2 above, we will not disturb the district court’s claim construction.

Finally, we consider the third disputed limitation of claim 1: “means for stopping said reel at the angular position represented by said selected number.”⁵ The claimed function is stopping the reel at the stop position that corresponds to the random number selected by the “means for randomly selecting” limitation. The disclosed structure is a brake. Neither of these points is in dispute.

[9] As just seen, the functions of the three disputed limitations of claim 1 are: 1) assigning a plurality of numbers to stop positions, where the plurality of numbers exceeds the number of stop positions and at least one stop position is represented by more than one number; 2) randomly selecting *one* of the numbers assigned to stop positions; and 3) stopping the reel at the stop position that corresponds to the selected number. Referring to the means for selecting and means for stopping limitations, WMS argues that selecting “one”

established as a partnership, which machine is made up of, at the very least, the specific structures disclosed in the written description and corresponding to the means-plus-function elements (a)-(g) recited in the claim.” *Id.* at 1372, 149 F.3d 1368, 47 USPQ2d at 1600. The structures corresponding to the means-plus-function elements recited in claim 1 in *State Street* were “a personal computer including a CPU” (element (a)), “a data disk” (element (b)), and “arithmetic logic circuit[s]” configured to perform various functions (elements (c)-(g)). *Id.* at 1371–72, 149 F.3d 1368, 47 USPQ2d at 1599.

5. The construction of this limitation is actually disputed only in the sense that it turns on the construction of the two claim limitations just discussed.

number and stopping the reel at the stop position represented by "said selected number" indicates that claim 1 is limited to assigning and selecting single numbers rather than combinations of numbers. The district court concluded, however, that: "[u]here is nothing in the claim that limits the generated numbers to be a single number." *WMS Gaming*, slip op. at 26. We agree with WMS on this point. The plain meaning of "selecting one of said . . . numbers" is selecting a single number, not a combination of numbers. See *Institutoform Techs., Inc. v. Cat Contracting, Inc.*, 99 F.3d 1098, 1105, 40 USPQ2d 1602, 1607 (Fed.Cir.1996) (determining that the claim term "a cup" suggests the use of only one cup). In addition, the last limitation of the claim refers to "said selected number." This reference to "number" in the singular sense bolsters the interpretation that "selecting one of said . . . numbers" is limited to selecting a single number. Nothing in the written description, drawings, or prosecution history indicates that the phrases "one of said . . . numbers" or "said selected number" should be given anything other than their ordinary meaning. See *York Prods., Inc. v. Central Tractor Farm & Family Ctr.*, 99 F.3d 1568, 1572, 40 USPQ2d 1619, 1622 (Fed.Cir.1996) ("Without an express intent to impart a novel meaning to claim terms, an inventor's claim terms take on their ordinary meaning."). Therefore, the term "number(s)," as used in claim 1, refers to single numbers, as opposed to combinations of numbers, and the recited function of claim 1 is limited to assigning and selecting single numbers.

Literal Infringement of Claim 1

[10, 11] Having considered claim construction, we turn to the issue of infringement of claim 1. We address literal infringement first. "To prove literal infringement, the patentee must show that the accused device contains every limitation in the asserted claims. If even one limitation is missing or not met as claimed, there is no literal infringement." *Mas-Hamilton Group v. LaGard, Inc.*,

156 F.3d 1206, 1211, 48 USPQ2d 1010, 1014-15 (Fed.Cir.1998) (citations omitted). As noted above, in order to establish literal infringement of a means-plus-function claim, the patentee must establish that the accused device employs structure identical or equivalent to the structure disclosed in the patent and that the accused device performs the identical function specified in the claim. See *Valmont Indus.*, 983 F.2d at 1042, 25 USPQ2d at 1454; *Pennwalt*, 833 F.2d at 934, 4 USPQ2d at 1739. It is undisputed that the first three limitations of claim 1 are met in the accused device, the WMS 400 slot machine. The issue, then, is whether IGT carried its burden of establishing that, as properly construed, the last three limitations of claim 1 read on the WMS 400 slot machine.

[12] As a preliminary matter, the WMS 400 slot machine does not contain structure identical to that disclosed in the Telnaes patent for the last three limitations of claim 1. The two structures are not identical because the microprocessor disclosed in the Telnaes patent is programmed differently from the microprocessor disclosed in the Durham patent. Put another way, the two disclosed machines are different, *i.e.*, not identical. As discussed above, in the Telnaes patent the structure disclosed for the "means for assigning" limitation of claim 1 is a microprocessor programmed to assign a plurality of single numbers to stop positions such that: (1) the range of single numbers exceeds the number of stop positions; (2) each single number is assigned to only one stop position; (3) each stop position is assigned at least one single number; and (4) at least one stop position is assigned more than one single number. The WMS 400 slot machine is not programmed in an identical manner. This is made clear by the descriptions, in Part I of the BACKGROUND section of this opinion, of the slot machine disclosed in the Telnaes patent and the WMS 400 slot machine. Because the structures of the two machines

are not identical, the issue of literal infringement of claim 1, as far as structural limitations are concerned, turns on whether the WMS 400 slot machine has structure equivalent to the “means for assigning a plurality of numbers” and the “means for randomly selecting one of said plurality of assigned numbers” limitations of the claim.

[13] The proper test for determining whether the structure in an accused device is equivalent to the structure recited in a section 112, ¶ 6, claim is whether the differences between the structure in the accused device and any disclosed in the specification are insubstantial. See *Chiu-minatta*, 145 F.3d at 1309, 46 USPQ2d at 1756; *Alpea Computer Corp. v. Nintendo Co.*, 102 F.3d 1214, 1222, 40 USPQ2d 1667, 1673 (Fed.Cir.1996). Because the structure recited in the Telnaes patent is limited by the disclosed algorithm, our analysis of structural equivalence necessarily discusses the disclosed algorithm, which includes functional-type elements.

As discussed above, the WMS 400 slot machine selects two random numbers (R1 and R2) and maps those numbers to two payoff multipliers (X and Y). The payoff amount (Z) is calculated by multiplying X times Y. A third random number (R3) selects a stop position for each reel based on the groups of reel stop positions that correspond to the payoff amount. In other words, the accused device assigns a combination of numbers to each stop position.

Thus, in this case the issue of equivalent structure turns on whether a machine that assigns combinations of numbers to reel stop positions, which is what the WMS 400 slot machine does, is equivalent to the structure disclosed in the Telnaes patent, which teaches a machine that assigns single numbers to reel stop positions.

Addressing the “means for assigning” limitation of claim 1, the district court found that:

one skilled in the art would consider it an insubstantial change to substitute combinations of numbers [for single numbers] . . . where necessary to conform to the algorithm selected or memo-

ry constraints. Therefore, at the very least, combinations of numbers or other sets of randomly selected elements would be equivalent to the plurality of numbers selected by the microprocessor.

WMS Gaming, slip op. at 26. As far as the “means for randomly selecting” limitation was concerned, the court found that using the random number generator algorithm several times to select a combination of numbers, as in the WMS 400 slot machine, was equivalent to selecting a single number, as in the Telnaes patent. Based upon its findings, the district court determined that the structure of the WMS 400 slot machine was equivalent to the structure disclosed for the two penultimate limitations of claim 1 of the Telnaes patent. In reaching this conclusion, the court apparently relied on the testimony of IGT’s expert, Jonathan Fry, who testified that randomly assigning and selecting combinations of single numbers is a minor difference from assigning and selecting single numbers.

On appeal, WMS argues that there are no equivalents to the disclosed structure and that the district court applied the wrong standard by focusing on equivalent results rather than equivalent structure. Discerning no clear error in the district court’s finding of equivalent structure, we reject these arguments.

In the claimed invention, each stop position on a reel is assigned one or more *single* numbers. In the accused device, each stop position on a reel is assigned one or more *combinations* of *single* numbers. For example, the first reel in the WMS 400 slot machine displays the first double-bar symbol if the payoff amount is 100 and the third iteration of the random number generator selects a number between one and four (memory positions A–D). Durham, Figure 8. Accordingly, the first reel displays the first double-bar symbol if R1 is 1, R2 is between 2 and 23, and R3 is between 1 and 4. *Id.*, Figures 5, 6, and 8. The first double-bar symbol of the first reel therefore is effectively assigned the 88

combinations of numbers comprising the set [R1, R2, R3] of [1, 2-23, 1-4].

In the WMS 400 slot machine, most combinations of numbers assigned to reel stop positions include three numbers, but some include only two numbers. As discussed above, the combination of numbers assigned to the first double-bar symbol includes R1, R2 and R3. If there is only one way to display a payoff amount, however, then the selection of R3 is not required and the combination of numbers assigned to the stop position that represents that payoff amount may only include two numbers. For example, there is only one "7" on each reel, and the group of symbols "7 7 7" is the only way to display a payoff amount of 1000. A payoff amount of 1000 corresponds only to R1 equal to one ($X = 10$) and R2 equal to one ($Y = 100$). Durham, Figures 5 and 6. Thus, the symbol "7" on each reel is assigned the combination of numbers [1,1]. Finally, the accused device includes a random number generator that randomly selects combinations of two or three numbers, as required by the "means for selecting" limitation, and a brake, as required by the "means for stopping" limitation.

In the case of both the machine disclosed in the Telnaes patent and the WMS 400 slot machine, each reel stop position is assigned a "tag" that uniquely identifies the stop position. In the case of the Telnaes patent, each "tag" is denoted by a single number selected from a plurality of numbers. In the case of the accused device, each "tag" is denoted by a combination of single numbers selected from a plurality of combinations of single numbers. Whether selecting a "tag" denoted by a single number is the structural equivalent

6. IGT asserts that the district court made an alternative finding of literal infringement based solely on the accused device's selection of the third random number (R3). To support its assertion, IGT points to the district court's infringement analysis based on a payoff of 100. We do not interpret this analysis as a determination that the selection of R3 alone infringes claim 1. In the analysis, the court refers specifically to the assignment of random numbers 1, 2, and 3, and the selection of

of selecting a "tag" denoted by a combination of single numbers is a close question. In view of the fact that there is enough credible evidence in the record, in the form of the Durham patents and the testimony from IGT's expert, Jonathan Fry, that the difference between assigning and selecting single numbers and assigning and selecting combinations of single numbers is insubstantial, we are not prepared to hold that the district court clearly erred in finding equivalent structure.

Turning now to the issue of identity of function, the functional limitations of the three disputed limitations of claim 1 do not literally read on the accused device. The two penultimate limitations of claim 1 are the "means for assigning" and the "means for selecting" limitations. We have held, as a matter of claim construction, that the function of these limitations, taken together, is assigning and selecting single numbers. Because the WMS 400 slot machine assigns and selects combinations of numbers rather than single numbers, it does not perform a function identical to that of claim 1 of the Telnaes patent. Accordingly, although it has equivalent structure, the WMS 400 slot machine does not literally infringe the claim.⁶ The district court's holding to that effect is therefore reversed.

Infringement of Claim 1 Under the Doctrine of Equivalents

[14, 15] A claim that does not literally read on an accused device may nevertheless be infringed under the doctrine of equivalents if the differences between the claim and the accused device are insubstantial. See *Hilton Davis Chem. Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512, 1521-22, 35 USPQ2d 1641, 1648 (Fed.Cir.

random numbers 1, 2, and 3. Furthermore, the analysis refers to stopping the reel at a stop position identified "by random [number] 3 in light of the value selected for random numbers 1 and 2." *WMS Gaming*, slip op. at 19. Thus, in the portion of the opinion upon which IGT relies, the district court is analyzing the infringement of the entire algorithm disclosed in the Durham patent (*i.e.*, the selection of R1, R2 and R3), not the selection of R3 alone.

1995) (en banc), *rev'd on other grounds, Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 117 S.Ct. 1040, 137 L.Ed.2d 146, 41 USPQ2d 1865 (1997). As noted above, the district court found that the WMS 400 slot machine infringed claim 1 of the Telnaes patent under the doctrine of equivalents.⁷ The court stated: “WMS Gaming’s device’s use of multiple random numbers instead of one, in a multi-step process, instead of the more direct, straightforward selection of stopping positions claimed in the [Telnaes] patent, is an insubstantial difference to a person skilled in the art.” *WMS Gaming*, slip op. at 20.

Recently, in *Chiuminatta Concrete Concepts, Inc. v. Cardinal Industries, Inc.*, we stated:

Both § 112, ¶ 6, and the doctrine of equivalents protect the substance of a patentee’s right to exclude by preventing mere colorable differences or slight improvements from escaping infringement, the former, by incorporating equivalents of disclosed structures into the literal scope of a functional claim limitation, and the latter, by holding as infringements equivalents that are beyond the literal scope of the claim. They do so by applying similar analyses of insubstantiality of the differences.

145 F.3d at 1310, 46 USPQ2d at 1758. We went on to point out in *Chiuminatta* that a “lack of equivalent structure under a means-plus-function limitation may preclude a finding of equivalence under the doctrine of equivalents.” *Id.* We stated that such would be the case unless a variant that was accused of infringement—but that did not literally infringe a means-plus-function limitation—was due to technological advances developed after the patent was granted and “constitute[d] so insubstantial a change from what [was] claimed in the patent that it should be held to be an infringement.” *Id.*

7. Although the district court improperly construed the claims, it still reached the critical issue for determining infringement under the doctrine of equivalents: whether assigning

As just seen, our holding that the WMS 400 slot machine does not literally infringe claim 1 of the Telnaes patent is not based on a finding that the accused device lacks structure equivalent to that disclosed in the patent. On the contrary, we have sustained the district court’s finding that the WMS 400 slot machine has equivalent structure. However, we have reversed the district court’s holding of literal infringement based on a lack of identity of function. Consequently, unlike *Chiuminatta*, the accused device in this case may still infringe under the doctrine of equivalents. See *Al-Site Corp. v. VSI Int’l, Inc.*, 174 F.3d 1308, 1320–21, 50 USPQ2d 1161, 1167–68 (Fed.Cir.1999) (an accused device can infringe under the doctrine of equivalents without infringing literally under 35 U.S.C. § 112, ¶ 6 because the doctrine only requires substantially the same function, not identity of function as in section 112, ¶ 6).

The question before us, then, is whether the district court clearly erred in finding that the differences between the WMS 400 slot machine and the claimed invention are insubstantial. In challenging the district court’s finding, WMS argues that the district court failed to analyze equivalency on a limitation-by-limitation basis. It also contends that the accused device functions in a different way from the claimed invention, in that it does not assign numbers to stop positions to determine a result, but rather, determines a result before stop positions are selected.

We reject WMS’s arguments. We discern no clear error in the district court’s finding of insubstantial differences between the claimed invention and the accused device. As far as the first argument is concerned, examination of the district court’s opinion makes it clear that, in the course of addressing the issue of literal infringement of claim 1 (which involved a

and selecting combinations of single numbers is insubstantially different from assigning and selecting single numbers.

determination of the substantiality of the differences between the structure of the claimed invention and the accused device and in which equivalent structure was found), the court properly conducted an element-by-element analysis. *See WMS Gaming*, slip op. at 10–12, 17–19.

WMS's second argument, that the accused device does not assign numbers to stop positions, also fails. While the WMS 400 slot machine performs the step of calculating the payoff amount before selecting the stop positions, this unclaimed extra step does not change the basic character of the device. In the WMS 400 slot machine, each stop position corresponds to at least one combination of numbers and is selected by iteratively choosing a plurality of numbers using a random number generator. Choosing two random numbers, performing mathematical operations to determine the payoff amount, and then choosing a third random number does not change the fact that each stop position is identified by a combination of numbers. The accused device therefore assigns numbers to stop positions as required by claim 1 of the Telnaes patent.

In sum, we reverse the district court's holding of literal infringement of claim 1, but affirm its holding of infringement of that claim under the doctrine of equivalents. We therefore reverse the court's holding of literal infringement of claims 2, 4, 5, 6, and 8, but affirm its holding of infringement of those claims under the doctrine of equivalents. We affirm the court's holding of infringement of claims 9 and 10 under the doctrine of equivalents.

II.

As noted above, the district court determined that WMS had willfully infringed the Telnaes patent, and therefore trebled its award of damages. The court found that WMS knew of the Telnaes patent and failed to satisfy its duty of care to avoid infringing it. *See WMS Gaming*, slip op. at 43. In arriving at its finding, the court noted that after WMS became aware of the Telnaes patent, its engineers "first developed a design that did not use Telnaes'

invention, but made up for low top payouts with a higher frequency of payouts." *Id.* at 21. The court further noted that WMS concluded that such a design could not compete with the Telnaes machine and unsuccessfully sought to obtain a license under the Telnaes patent. *See id.* According to the court, "[h]aving failed to design a competitive reel-type gaming machine without the virtual reel of the Telnaes patent or to obtain a license under the Telnaes patent, WMS chose to go forward with its infringing design in willful disregard of IGT's rights under the Telnaes . . . patent." *Id.* at 21–22.

WMS argues that the district court clearly erred in finding willful infringement. It contends that it did not act in disregard of IGT's patent rights, but rather made a good faith effort to design around the Telnaes patent. IGT responds that the district court's finding of willful infringement was not clearly erroneous. Noting that the district court heard the testimony of WMS employees and observed their demeanor, it contends that WMS clearly was aware of the Telnaes patent and its significance and that the court simply disbelieved WMS's explanations of its conduct.

[16–18] In order to find willful infringement, the district court "was required to find by clear and convincing evidence in view of the totality of the circumstances that [WMS] acted in disregard of the [Telnaes] patent and lacked a reasonable basis for believing it had a right to do what it did." *Amsted Indus., Inc. v. Buckeye Steel Castings Co.*, 24 F.3d 178, 181, 30 USPQ2d 1462, 1464 (Fed.Cir. 1994). Based on the clear error standard of review, if we were affirming the district court's finding of literal infringement of claim 1, we would not be inclined to disturb the court's finding of willful infringement. However, our holding of no literal infringement changes the picture. While "it is not a rule of law that infringement that is not literal can never be sufficiently culpable to warrant enhanced damages[,]

... avoidance of literal infringement is a factor to be considered” in determining whether there has been willful infringement. *Hoechst Celanese Corp. v. BP Chems. Ltd.*, 78 F.3d 1575, 1583, 38 USPQ2d 1126, 1133 (Fed.Cir.1996). Accordingly, we remand to the district court to reconsider the issue of willfulness in light of the finding of no literal infringement. When the district court reconsiders its finding of willful infringement, it should bear in mind that the patent law encourages competitors to design or invent around existing patents. See *Westvaco Corp. v. International Paper Co.*, 991 F.2d 735, 745, 26 USPQ2d 1353, 1361 (Fed.Cir. 1993); see also *State Indus., Inc. v. A.O. Smith Corp.*, 751 F.2d 1226, 1235–36, 224 USPQ 418, 424 (Fed.Cir.1985) (explaining that designing around existing patents promotes competition to the benefit of consumers).

III.

We turn next to the validity issue. In ruling that the Telnaes patent was not invalid, the district court rejected WMS's argument that the claims at issue were obvious in view of certain prior art.

[19–22] A claimed invention is unpatentable if the differences between it and the prior art “are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art.” 35 U.S.C. § 103(a) (1994); see *Graham v. John Deere Co.*, 383 U.S. 1, 13–14, 86 S.Ct. 684, 15 L.Ed.2d 545, 148 USPQ 459, 465 (1966). The ultimate determination of whether an invention is or is not obvious is a legal conclusion based on underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) objective evidence of nonobviousness. See *Graham*, 383 U.S. at 17–18, 86 S.Ct. 684, 15 L.Ed.2d 545, 148 USPQ at 467; *Miles Labs., Inc. v. Shandon Inc.*, 997 F.2d 870, 877, 27 USPQ2d 1123, 1128 (Fed.Cir.1993). The underlying factual determinations on which the legal

conclusion of obviousness is based are reviewed for clear error. See *Kolmes v. World Fibers Corp.*, 107 F.3d 1534, 1541, 41 USPQ2d 1829, 1833 (Fed.Cir.1997). Because a patent is presumed to be valid, see 35 U.S.C. § 282 (1994), the party asserting invalidity has the burden of showing invalidity by clear and convincing evidence. See *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 881, 45 USPQ2d 1977, 1981 (Fed.Cir. 1998). The burden on the party asserting obviousness is more easily carried when the references on which the assertion is based were not directly considered by the examiner during prosecution. See *Applied Materials, Inc. v. Advanced Semiconductor Materials Am., Inc.*, 98 F.3d 1563, 1569, 40 USPQ2d 1481, 1485 (Fed.Cir. 1996).

[23] When an obviousness determination relies on the combination of two or more references, there must be some suggestion or motivation to combine the references. See *In re Rouffet*, 149 F.3d 1350, 1355, 47 USPQ2d 1453, 1456 (Fed.Cir. 1998). The suggestion to combine may be found in explicit or implicit teachings within the references themselves, from the ordinary knowledge of those skilled in the art, or from the nature of the problem to be solved. See *id.* at 1357, 149 F.3d 1350, 47 USPQ2d at 1458. “When determining the patentability of a claimed invention which combines two known elements, ‘the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination.’” *In re Beattie*, 974 F.2d 1309, 1311–12, 24 USPQ2d 1040, 1042 (Fed.Cir.1992) (quoting *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1462, 221 USPQ 481, 488 (Fed.Cir.1984)).

[24] At trial, WMS presented three prior art patents to support its contention of obviousness: United States Patent No. 4,095,795, entitled “Amusement Apparatus and Method,” issued to James Saxton et al. on June 20, 1978 (the Saxton patent);

United States Patent No. 3,918,716, entitled "Game Apparatus for Trying Coincidence between Randomly Selected Characters," issued to Hiroshi Nonaka et al. on November 11, 1975 (the Nonaka patent); and Australian Patent No. 280649, entitled "An Improved Electrically Operated Gaming Machine," issued to Albert Cohen et al. on April 6, 1967 (the Cohen patent). The Saxton patent was considered by the examiner during prosecution, but the Nonaka patent and the Cohen patent were not.

On appeal, WMS makes the same arguments that it did in the district court. Thus, it urges that Saxton combined with either the Cohen or Nonaka renders the claimed invention obvious. WMS contends that Saxton teaches a reel-type slot machine under microprocessor control that uniformly maps numbers to stop positions. WMS further contends that Cohen and Nonaka teach or suggest the non-uniform mapping of numbers to stop positions (*i.e.*, assigning a plurality of numbers to stop positions where the plurality of numbers exceeds the number of stop positions) to decrease the odds of winning. Based on these references, WMS argues that it would have been obvious to one of ordinary skill in the art to combine the non-uniform mapping of Cohen or Nonaka with the reel-type slot machine of Saxton to arrive at the claimed invention. In addressing WMS's challenge to the district court's validity ruling, we consider the *Graham* inquiries in turn, beginning with the scope and content of the prior art.

The district court found, and the parties agree, that the Saxton patent teaches a reel-type slot machine controlled by a software program running on a microprocessor. Saxton, col. 3, lines 7-17, col. 5, lines 9-27. The software includes a random number generator algorithm that selects the stop position of each physical reel. *Id.*, col. 3, lines 38-42. In the case of each reel, the range of numbers from which the random number generator selects is equal to the number of stop positions on the reel, and exactly one number is assigned to each stop position. *Id.* Saxton teaches physical reels, mechanisms to start and

stop the reels, and an interface between physical reels and electronic control circuitry. *Id.*, col. 3, line 63—col. 5, line 8. Saxton further teaches that physical reels are interchangeable with electronic displays, such as symbol display devices. *Id.*, col. 3, lines 8-10. Saxton does not teach a range of numbers that exceeds the number of stop positions and fails to teach non-uniformly mapping these numbers to stop positions in order to manipulate the probability of winning. In Saxton, each stop position is allocated exactly one number, and therefore the numbers are uniformly mapped (*i.e.*, on a one-to-one basis) to stop positions.

The Cohen patent recites that existing gaming machines "invariably depend upon mechanical force derived from handle movements for their function," Cohen, p. 3, lines 18-19, and it notes that mechanical machines have been found to be subject to manipulation "to increase the chances of obtaining a paying combination." *Id.*, p. 3, lines 21-22. The patent then states:

It is the object of this invention to provide a gaming machine which does not utilize the mechanical force applied through its operating handle for actuation of its machinery, thereby arriving at its displayed combinations more truly through chance incidence independent of any extraneous influence.

It is also an object of the invention to provide a gaming machine which is durable in service and relatively quiet in operation.

Id., p. 3, line 28—p. 4, line 4.

Consistent with its stated objectives, the Cohen patent teaches an electro-mechanical slot machine that does not use physical reels. Rather, it employs symbol display devices to show the outcome of each actuation of the machine. *Id.*, p. 4, lines 5-30. Each symbol display device uses transparent plastic wafer elements that are illuminated on one of three windows. *Id.* Six wafer elements are used, representing the playing cards Ace, King, Queen, Jack, Ten, and Nine. *Id.* Cohen uses three electro-

mechanical random number selectors, one for each window, which are referred to as "uniselectors." *Id.*, p. 8, lines 21–26. Each unselector includes 25 contacts that are wired to the six playing card symbols. *Id.*, Figure 4. The number of contacts wired to each symbol is non-uniform, *i.e.*, some symbols are wired to more contacts than other symbols. *Id.* When the handle of the slot machine is pulled, the three uniselectors rotate until randomly set timers stop each one at one of the 25 contacts. *Id.*, p. 5, line 33—p. 6, line 6. The stopping position/contact of each unselector causes one of the card symbols to be displayed by illuminating the wafer element electrically coupled to that position/contact. *Id.*, Figure 4. A total of three such symbols are displayed in a horizontal line.

The Nonaka patent discloses a digital electronic slot machine, in which the results are displayed using three symbol display devices rather than reels. *Id.*, col. 1, lines 35–39. The abstract states that the claimed invention is "[a] game apparatus having [a] digital circuit arrangement such that some randomly selected characters are sequentially exhibited on a plurality of display sections when the player sets the apparatus in operation, as by the operation of a chip into its slot." The first of the listed objects of the invention is providing a game apparatus which eliminates the intrinsic deficiencies of the prior art mechanical machines, such as noise and wear of moving parts. Nonaka, col. 1, lines 26–32, 35–39.

Each symbol display device in Nonaka uses transparent acrylic or glass display panels that are illuminated behind windows. *Id.*, col. 9, lines 1–8. Seven display panels are used, representing the symbols "!", "*", "#", "x", "y", "z", and "?". *Id.*, Figure 6. Nonaka uses three electronic random number generators, one for each symbol display device. *Id.*, Figure 1. Each

8. Although it is not explicitly discussed, it appears that the random nature of the circuit is due to the high frequency of the oscillator relative to the tolerance of the timer. In other words, there is a slight difference in the period of the timer from one game to another.

random number generator includes 16 counter outputs that are wired to the seven display panels/symbols. *Id.*, Figure 6. The number of outputs wired to each symbol is non-uniform. *Id.* When the game is activated, each of the three random number generators randomly selects one of the outputs. *Id.*, col. 2, lines 5–11. This, in turn, results in one of the seven display symbols being illuminated by the symbol display device corresponding to the random number generator. *Id.*, col. 3, lines 42–47.

Each random number generator includes an oscillator, a counter, a timer, and a driver circuit. When the game is activated, the oscillator provides a clock signal to the counter, which begins sequentially counting through the sixteen counter outputs (when the counter reaches sixteen, it rolls-over to one and continues counting). An electronic timer disables the clock input to the counter after a set time. The output that the counter has reached when the clock stops is the randomly selected outcome.⁸ The outputs of the counter are connected to a driver circuit, which drives the display device. Each counter output is associated with an output terminal of the driver circuit. The counter output causes one of the display symbols to be displayed by activating the associated output terminal of the driver circuit, which in turn illuminates the panel associated with that output. A total of three such symbols are displayed on a horizontal line. *Id.*, col. 1, line 61—col. 2, line 11; col. 3, lines 13–59.

Turning to the second *Graham* inquiry, the parties stipulated to a level of ordinary skill in the art at the time Telnaes conceived of the claimed invention. According to the stipulation, a person possessing the stipulated level of ordinary skill would have completed at least several college-level courses in computer science or elec-

If the frequency of the oscillator is high enough, then the number of clock pulses during the period of the timer will pseudo-randomly change. Because the number of clock pulses determines the output of the counter, the output will randomly change.

trical engineering, would have been employed for several years in the field of engineering, developing and designing gaming devices, and would have had some knowledge of probability theory, random numbers, and computer programming.

The third *Graham* inquiry involves an examination of the differences between the claimed invention and the prior art. There is no dispute that Saxton teaches every aspect of the claimed invention with the exception of the non-uniform mapping of numbers to stop positions to decrease the odds of winning. Thus, the obviousness issue boils down to the question of whether Cohen or Nonaka teach this aspect of the invention, and whether there is motivation to combine Cohen or Nonaka with Saxton.

In regard to what Cohen teaches, the district court found that:

Cohen replaced the spinning physical reels with “uniselectors” for determining outcome and “wafers” or transparent elements for displaying the outcome. Each uniselector has 25 contact points corresponding to 25 outcomes and one uniselector is assigned to each display. Consequently, the lowest probability for displaying a given symbol is 1 in 25—just like the mechanical systems. Cohen enables some symbols to have a probability of 2 in 25, 3 in 25, etc. by having multiple contacts on the uniselector correspond to the same symbol just like the older mechanical reels and the later Saxton patent.

WMS Gaming, slip op. at 35. In short, the district court found that the uniselectors and the display symbols of Cohen merely simulate physical reels.

In regard to the Nonaka patent, the district court found that:

The spinning physical reels of a typical slot machine are replaced with “electronic driver circuits” for determining outcome and “wafers” for displaying the outcome. Each driver circuit has 16

9. The district court erroneously referred to the random number generators as driver circuits. The driver circuits are actually one

possible outcomes. One driver is assigned to each of the three “display [*sic.*] sections”. The lowest probability for any given symbol is 1 in 16—just like the mechanical systems. Nonaka enables some symbols to have a higher probability, e.g., of 2 in 16, 3 in 16, etc., by duplicating their occurrence in the display means—just like Saxton, Cohen, and the older mechanical reels.

WMS Gaming, slip op. at 36. In other words, the district court found that the driver circuits⁹ and the display symbols of Nonaka also simulate physical reels.

WMS challenges the district court’s findings. It argues that, like Telnaes, both Cohen and Nonaka teach the concept of decreasing the odds of winning. WMS states that both Cohen and Nonaka use random number generators and non-uniformly map numbers to display symbols. “[T]he Cohen patent,” WMS asserts, “was a ‘slot machine simulation device’ that had six possible displays. The displays did not have a one in six probability. Instead, one of the six displays had a one in 25 chance of being selected.” Similarly, WMS points to the Nonaka patent as describing “a method of electronically assigning 16 numbers to only 7 gaming symbols. Certain gaming symbols have multiple numbers assigned to them; at least one gaming symbol has only one number assigned to it.” Thus, WMS reasons that Nonaka “teaches a means of lowering the probability of winning combinations of gaming symbols by varying the quantity of numbers assigned to particular symbols.”

IGT disputes WMS’s characterization of Cohen and Nonaka. According to IGT, Cohen has no reels or reel stop positions, and consequently, “it does not teach what is claimed in Telnaes but is missing from Saxton—the assignment of a plurality of numbers to reel stop positions.” In a like vein, IGT states that “Nonaka uses driver circuits to light symbol displays, but does

component of the random number generators, as seen from the discussion above concerning the scope and content of the Nonaka patent.

not use numbers or reel stop positions.” In short, IGT contends that Cohen and Nonaka teach the mapping of numbers to symbols, which merely simulates the occurrence of multiple symbols on a physical reel.

We do not believe that the district court clearly erred in finding that Cohen and Nonaka do not teach non-uniform mapping to lower the odds of winning, but merely teach the non-uniform mapping of numbers (the outputs of the uniselectors or driver circuits) to display symbols to simulate physical reels. Based upon the record before us, we are not prepared to second-guess the district court’s conclusion that Cohen and Nonaka simulate traditional reel-type slot machines. As already seen, each reel of a typical mechanical slot machine has a plurality of stop positions, with a symbol found at each stop position. The number of unique symbols is typically less than the number of stop positions, however. For example, a physical reel with 20 stop positions may include one stop position with a “7” symbol, six stop positions with cherry symbols, five stop positions with double-bar symbols, three stop positions with triple-bar symbols, and five stop positions with blank symbols. Thus, some symbols appear multiple times on the reel. The mapping of multiple outputs to symbols, as in Cohen and Nonaka, simulates the multiple appearances of those symbols on a physical reel. For example, in the first display in Figure 6 of Nonaka, one output is mapped to the “!” symbol, one output is mapped to the “*” symbol, three outputs are mapped to the “#” symbol, seven outputs are mapped to the “x” symbol, one output is mapped to the “y” symbol, two outputs are mapped to the “z” symbol, and one output is mapped to the “?” symbol. It can fairly be said that this mapping simulates a 16 stop position reel with one “!” symbol, one “*” symbol, three “#” symbols, seven “x” symbols, one “y” symbol, two “z” symbols, and one “?” symbol.

Accepting the district court’s finding that Cohen and Nonaka merely simulate the physical reels of a standard mechanical

slot machine, we do not believe that it was clear error for the court not to read Cohen and Nonaka as teaching decreasing the odds of winning by increasing the range of numbers beyond the number of reel stop positions, as claimed in the Telnaes patent. This conclusion is reinforced by the fact that the stated objectives of Cohen and Nonaka are to overcome the deficiencies of mechanical reels, such as noise and being susceptible to wear and tampering.

Furthermore, even if Nonaka or Cohen did teach decreasing the odds of winning by non-uniformly mapping numbers to stop positions, WMS fails to point to anything in Nonaka or Cohen that indicates a motivation to combine the teachings of those references with Saxton. WMS identifies motivation in Saxton to substitute symbol display devices for physical reels, Saxton, col. 2, lines 41–44, but fails to identify, nor can we find, any motivation to combine the non-uniform mapping of Nonaka or Cohen with Saxton.

[25–27] The final underlying factual issue in the obviousness determination is objective evidence of non-obviousness, *i.e.*, secondary considerations. *See Graham*, 383 U.S. at 17–18, 86 S.Ct. 684, 15 L.Ed.2d 545, 148 USPQ at 467. The consideration of the objective evidence presented by the patentee is a necessary part of the obviousness determination. *See Rouffet*, 149 F.3d at 1355, 47 USPQ2d at 1456. The objective evidence of non-obviousness may be used to rebut a prima facie case of obviousness based on prior art references. *See In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed.Cir.1992). Objective evidence of nonobviousness may include commercial success, long-felt but unsolved need, and licenses showing industry respect. *See Rouffet*, 149 F.3d at 1355, 47 USPQ2d at 1456. The patentee bears the burden of showing that a nexus exists between the claimed features of the invention and the objective evidence offered to show non-obviousness. *See Cable Elec. Prods., Inc. v. Genmark, Inc.*, 770 F.2d 1015, 1027, 226 USPQ 881, 888 (Fed.Cir.1985).

As evidence of commercial success, IGT presented evidence that the vast majority of slot machines sold throughout the world are virtual reel slot machines. To show long-felt need, it proffered evidence that the percentage of casino revenues from slot machines has increased dramatically since the introduction of virtual reel slot machines. Additionally, IGT provided evidence that several competitors have licensed the rights to the Telnaes patent and paid millions of dollars in royalties. Based on the testimony of Mr. Raymond Pike, an officer of IGT, the district court found that:

[V]irtual reel slot machines covered by the Telnaes patent have or are made by Universal, Summit Technology, Sigma Game and Bally Gaming in the United States. Each of these companies purchased rights under the Telnaes patent by means of licenses or at one time were owners. Bally alone has paid IGT over \$2 million in royalties. Bally also acceded to a limit on the maximum payout for its machines. These licenses under the Telnaes patent are strong indicia that the patent is not obvious.

WMS Gaming, slip op. at 37–38.

As it did in the district court, to counter the objective evidence of non-obviousness, WMS argues that virtual reel slot machines were illegal in Nevada prior to 1984 and that therefore there was no motivation to develop or market these machines. IGT counters that virtual reel slot machines were not legalized until 1984 because no gambling device is legal until it is approved by the state regulatory authorities and that no gaming license for such a device was requested until 1984. WMS failed to present any evidence that any prior application for a gaming license for virtual reel slot machines had been made. This absence of prior gaming license applications, as IGT argues, appears to be more indicative that others had not conceived of the invention, rather than evidence that the licensing requirements discouraged others from conceiving or marketing virtual reel slot machines. Thus, we see no clear error in the district court's findings

with respect to objective indicia of nonobviousness.

Based upon the foregoing, we affirm the district court's conclusion that the claims of the Telnaes patent would not have been obvious in light of the prior art of record. As discussed below, the Merit Sweet Shawnee is not in the record for the purpose of determining obviousness.

IV.

We turn next to the issue of damages. The district court determined that IGT was entitled to damages in the amount of \$10,753,550. After trebling for willful infringement and after adding prejudgment interest, the court's final damages award was \$32,845,189. As discussed above, on remand, the district court will be reconsidering its finding of willful infringement in view of our holding that the WMS 400 slot machine does not literally infringe the claims at issue. If the court determines that WMS did not willfully infringe, the damages award will be reduced because there will of course be no trebling. In this section, we address a damages question that is unrelated to the issue of willful infringement.

[28] The district court initially awarded damages based on a reasonable royalty of \$50 per machine. The court did so believing that IGT had indicated that it would only seek that amount. The court vacated the damages award, however, because in reality IGT had stipulated that it would seek compensation of *at least* \$50 per machine. The revised damages award was based on lost profits and reasonable royalties. The court found that IGT had at least 75% of the market share for slot machines. The court awarded IGT lost profits of \$2413 per machine for the machines IGT would have sold but for the infringement, and a reasonable royalty of \$550 per machine for the remaining machines sold by WMS. As noted, the total damages award prior to trebling and prejudgment interest was \$10,753,550.

[29] The district court's methodology for computing damages is discretionary and the quantum of damages awarded is a factual issue reviewed for clear error. See *SmithKline Diagnostics, Inc. v. Helena Lab. Corp.*, 926 F.2d 1161, 1164, 17 USPQ2d 1922, 1925 (Fed.Cir.1991). We find no abuse of discretion in the district court's methodology for computing damages and no clear error in the quantum of damages awarded.

WMS argues that IGT is not entitled to lost profits because IGT is a holding company that does not manufacture or sell slot machines. See *Trell v. Marlee Elecs. Corp.*, 912 F.2d 1443, 1445, 16 USPQ2d 1059, 1061 (Fed.Cir.1990). WMS, however, stipulated in a pretrial order that IGT does manufacture slot machines. The district court denied WMS's motion to withdraw that stipulation because the motion was made late in the damages phase of the trial.

The district court did not abuse its discretion in denying WMS's motion to withdraw its stipulation. IGT owns a subsidiary that manufactures and sells slot machines. IGT and its subsidiary are closely tied and have consolidated records. WMS had access to those consolidated records and therefore WMS cannot assert that it was prejudiced by not being able to access the records of IGT or its subsidiary. Further, if the district court had granted WMS's motion to withdraw its stipulation, it would have been obligated to give IGT the opportunity to join the subsidiary. Cf. *Kalman v. Berlyn Corp.*, 914 F.2d 1473, 1480, 16 USPQ2d 1093, 1098-99 (Fed.Cir.1990) (holding that it was an abuse of discretion not to allow the plaintiff to amend its complaint to add a related defendant when the defendant and the related defendant were treated as one and the defendant was not prejudiced). WMS can-

not limit its liability due to a procedural error for which it was partly at fault and was not prejudiced. We have reviewed WMS's other assertions of error in awarding damages and find them unpersuasive.

V.

[30] The final matter that we must address is WMS's appeal of the district court's order denying it a new trial. Because the denial of a motion for a new trial is a procedural issue not unique to patent law, we apply the law of the regional circuit where the appeal from the district court would normally lie. See *Amstar Corp. v. Envirotech Corp.*, 823 F.2d 1538, 1550, 3 USPQ2d 1412, 1421 (Fed.Cir.1987). In this case, that is the Seventh Circuit.

[31, 32] Approximately two months after the damages phase of the trial, WMS located a slot machine—the Merit Sweet Shawnee—that predated the filing date of the Telnaes patent and allegedly operated in a manner similar to the claimed invention. Based on this newly discovered prior art, WMS moved for a new trial under Fed.R.Civ.P. 59.¹⁰ To justify a new trial, WMS was required to show, by clear and convincing evidence, *inter alia*, that the evidence at issue could not have been discovered by due diligence and that it was likely to change the result of the trial. See *United States v. McGaughey*, 977 F.2d 1067, 1075 (7th Cir.1992). Decisions granting or denying motions for new trials are committed to the sound discretion of the district court and may be upset only if no reasonable person could agree with the district court. See *id.* The district court denied WMS's motion. We are unable to say that the denial was an abuse of discretion.

10. The parties dispute whether this motion was timely filed and thus whether it was properly considered a Rule 59 or Rule 60(b)(2) motion. Under Seventh Circuit law, however, the standard for establishing grounds for relief based on newly discovered

evidence is the same under Rule 59 or Rule 60(b)(2). See *Peacock v. Board of Sch. Comm'rs of Indianapolis*, 721 F.2d 210, 213 (7th Cir.1983); see also 11 Charles Alan Wright et al., *Federal Practice and Procedure* § 2808 (2d ed.1995).

WMS presented a plethora of evidence regarding the diligence of its attorneys in discovering prior art. The district court concluded, however, that WMS failed to show the diligence of its own employees. John Nicasastro, a senior officer of WMS who located the Merit Sweet Shawnee, did not attempt to locate prior art before or during the trial. Once Mr. Nicasastro began looking for prior art, he was able to locate the newly discovered device within a month. It seems to us that an employee of WMS was in a better position than WMS's attorneys to locate the prior art because the prior art was a physical device rather than a patent or other published reference. WMS's employees had more knowledge of the characteristics of non-patented slot machines and the places to locate slot machines that were no longer being sold. Thus, we do not believe that the district court abused its discretion by finding that the due diligence standard extended to both the corporation and its attorneys. *Cf. Taylor v. Teagas Corp.*, 831 F.2d 255, 259 (11th Cir.1987) (holding that evidence was not "newly discovered" when a corporate party had possession of the evidence during trial). WMS's failure to show due diligence is sufficient grounds to affirm the denial of a new trial regardless of the persuasiveness of the new evidence, an issue upon which we express no views.

CONCLUSION

The judgment of the district court is affirmed-in-part, reversed-in-part, vacated-in-part, and remanded. We (1) reverse the holding of literal infringement; (2) affirm the holding of infringement under the doctrine of equivalents; (3) vacate the holding of willful infringement; (4) affirm the holding that the Telnaes patent is not invalid in view of the cited references; and (5) affirm the quantum of actual damages, but vacate the damages award to the extent it is based on trebling for willful infringement. The order denying a new trial is affirmed. The case is remanded to the district court for further proceedings in connection with the issue of willful infringement and for the entry of a final

damages award based on the outcome of those proceedings.

AFFIRMED-IN-PART, REVERSED-IN-PART, VACATED-IN-PART, AND REMANDED.

COSTS

Each party shall bear its own costs.



US JVC CORP., Plaintiff-Appellant,

v.

UNITED STATES, Defendant-Appellee.

No. 98-1592.

United States Court of Appeals,
Federal Circuit.

July 21, 1999.

Rehearing Denied; Suggestion for
Rehearing In Banc Declined
Oct. 6, 1999.

Importer of color television receivers sought refund of antidumping duty deposits it had paid after determination was made by Department of Commerce that no antidumping duties would be assessed, and Customs Services was instructed to liquidate receivers. After Customs Service denied request, importer filed protest, which was denied as untimely. Importer filed suit, and the Court of International Trade, Richard W. Goldberg, J., 15 F.Supp.2d 906, granted motion. Importer appealed, and the Court of Appeals, Plager, C.J., held that importer's failure to protest premature liquidation within 90 days after Customs Service posted bulletin notice of final assessments of duties rendered protest untimely, even though Customs admitted that it had improperly assessed duties during period of suspension.

Affirmed.

Copyrights

The Basics

A copyright is a form of legal protection for “original works of authorship”. Copyrights protect rights in creative and ornamental expressions for literary, dramatic, musical, artistic, boat hulls and architectural works. Copyrights do not protect ideas, facts or anything that is functional.

Copyright law provides the owner of the copyright with the exclusive right to copy, alter, prepare derivative works, distribute, publicly display, and publicly perform the works subject to the copyright law. Copyright does not prevent independent creation of similar works, provided that the original work was not used or copied in any way to create the similar work.

Ownership

Copyrights are owned initially by the author of the work. The author of a work is the person that actually puts the ideas embodied in the work into an expression in a tangible medium.

For works created by employees within the scope of their employment, the work may be deemed a work for hire and ownership rights will vest with the employer. Please note that the “work for hire” doctrine has limited applicability outside the scope of true employment and works created within the scope of employment.

Ownership of a copyright occurs upon the creation of the expression in a tangible medium. There is a misconception that copyrights only vest upon registration; however, the current copyright statutes are clear that rights exist upon creation. A copyright registration, if done in a timely manner, may entitle the owner to enhanced damages in future enforcement litigation. Also, registration is required prior to bringing an enforcement action.

Works Created Prior to January 1, 1978

In 1976, Congress passed the modern copyright statutes that went into effect on January 1, 1978. Prior to the modern copyright act, the US was considered to be a copyright outlaw by the international community. The 1976 act brought the US into compliance with international copyright treaties and fundamentally changed the way that copyright law functioned.

Prior to 1978, formal requirements for published works were required before any copyright rights could vest. Additionally, publication without meeting the formal requirements resulted in works being deemed to be in the public domain. Under the pre-1976 act (which went into effect in 1978), publication and registration were the keys to protection or loss of rights. Post 1978, rights vested upon creation and publication was no longer a central issue for most new works.

Changes in Ownership

Copyrights are freely assignable; however, any assignment must be set forth in a clear executed written agreement to be effective. The original intent of the

copyright statute was to protect authors and the rights of authors to control their works and profit from their works.

Idea/Expression Dichotomy

The idea/expression dichotomy is a constant theme in copyright law. Copyright does not protect any fact, idea, or functional expression.

For example, Client A shows you a new table game that she created that has been approved for use in Nevada. The game is called “paired up poker” and it functions by dealing 1 card down to each player, then one card down that only 2 adjoining players can see and use, then a flop as in Texas Hold'em. In support of the game, she has created and designed a new table felt and circular table that permits the limited viewing of the card that is shared by the 2 adjoining players. When she created it, she registered a copyright in the felt design and table design. New Company B is marketing a circular table for the same game with a shared card area that is functionally similar to her table felt design. She wants to sue Company B for copyright infringement because Company B's table because it can be used as a substitute for her table and felt. Unless there was direct copying of Client A's design or unless it is likely that copying can be shown, creating a functional equivalent of Client A's design does not violate Client A's copyrights.

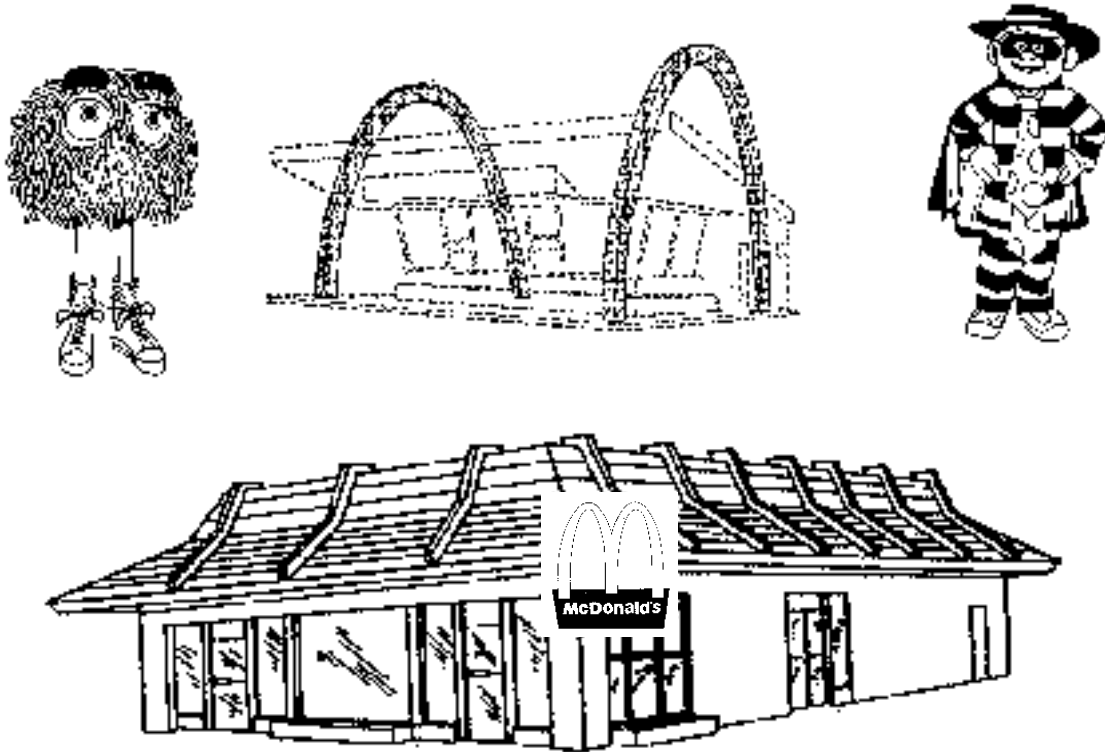
Exclusive Rights

Copyright statutes provide the owner with the exclusive right to copy, alter, distribute, and perform original works.


Trademarks

Trademark law is a body of commercial identity law. Trademarks protect the distinctive symbols experienced in the marketplace that distinguish one provider's products or services from those of another.

It is the association between a symbol⁷ and the consumer association with a particular provider of goods or services in the marketplace. For example the following are all registered marks of a particular restaurant company:



Most reader's will probably instantly recognize these marks in association with the McDonald's restaurant company.

⁷ A symbol can be a word (BELLAGIO), a design (), a sound (the Intel jingle) or even a color (pink for Owens Corning fiberglass insulation).

Trademarks are protected under statute in most states; additionally, trademarks are protected through federal statutes as well.

Origin of Rights

If one thinks about trademark law as marketplace identity law, then logically, the rights for trademarks should flow from identity or use in the marketplace. Indeed, state and federal law recognize that trademark rights flow from actual marketplace use.

Therefore, trademark rights exist even if nothing is filed with state or federal authorities. However, trademark rights are more effectively protected by such filings.

Infringement

The principal inquiry in determining one's right to use a mark or name without infringing the rights of others is whether another's mark is so similar to any previously used marks, taking into consideration the respective goods or services for which they are used, as to be likely to cause customers to be confused as to the source or sponsorship of the goods or services. This standard is usually called the "likelihood of confusion" test. The same standard applies to many aspects of trademark, trade name and unfair competition law, including infringement under the common law and under federal and state registration laws.

In analyzing the issue of likelihood of confusion, courts generally consider several factors to determine if confusion is probable, including (i) the degree of similarity between the marks, (ii) the similarity in services or products rendered by the parties, (iii) the extent to which the services are marketed through the same trade channels, (iv) the intent of the defendant in adopting and exploiting the allegedly infringing mark, (v) the amount of care and attention likely to be exercised by consumers when purchasing the services or products, (vi) the strengths and weaknesses of the marks in question, and (vii) the existence of incidents of actual confusion, taking into account the extent of each party's usage of the mark.

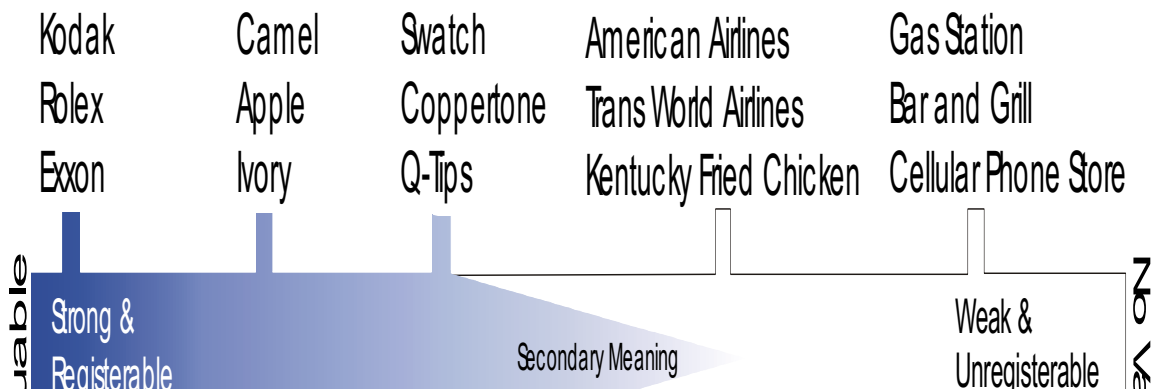
In relation to a company's right to use a mark without infringing the rights of others, the likelihood of confusion test is often applied with considerable emphasis on the extent of real competition in the marketplace. Prior unregistered uses, as well as prior registrations, can both present infringement problems.

In addition to risks associated with a likelihood of confusion, you should be aware that there exist state and federal dilution statutes protecting against use of a "famous" mark by another where the result is a lessening of the capacity of such famous mark to identify and distinguish goods or services regardless of the presence or absence of competition between the owner of the famous mark and other parties, or a likelihood of confusion, mistake or deception. The owner of a famous mark may be entitled to an injunction against another person's commercial use of the mark, if such use begins after the original mark has become famous and causes dilution of the distinctive quality of the original mark. The law regarding

dilution is relatively new and its interpretation and application are somewhat inconsistent among courts; therefore it is difficult to accurately predict the risk of diluting the mark of another.

Mark Strength and Registerability

Some marks are more unique and given a wider range of protection than others. A mark that has been used and registered by different owners for a wide variety of goods and services is considered a "weak" mark, in the sense that it is difficult to enforce rights outside of the specific field of its owner. On the other hand, an uncommon mark may be considered a "strong" mark because it is usually more broadly protectable against the users of the same or similar marks in related fields. The following graphic illustrates such a continuum of strength and registerability among marks, with the darker areas representing increased strength, value and legal competitive protectability.



A mark that is "descriptive" of the goods or services, or "descriptive" of personal names or geographic locations, on which it is used is also classified as a weak mark, and is not generally given broad, if any, protection unless its owner can

demonstrate that the mark has become distinctive of its services. In other words, the owner of a descriptive mark must show that the public recognizes its mark as identifying its services and distinguishing them from those of others. This is called "secondary meaning". Secondary meaning may be shown by evidence of substantial efforts in advertising or promoting the mark throughout a wide group of prospective customers. Such evidence may consist of the size of the business, the number of actual sales made, amounts spent in promotion and advertising, the scope of publicity given the mark, recognition by others in the field, and any similar evidence showing exposure of the mark. On the other hand, a mark that is "arbitrary" or only "suggestive" with respect to the goods or services is a stronger mark and is usually given more protection.

At the federal level, the United States Patent and Trademark Office (the "USPTO") examines mark applications and determines whether a particular mark is sufficiently distinctive for registration in relation to the goods and services in the application and whether a particular mark is sufficiently distinctive from other registrations and applications on file. The examination process generally takes at least a year, though in rare circumstances an application may proceed to registration sooner. Once federal registration is issued, the owner of the registration has a presumed legal right to the exclusive domestic use of the mark in the registration for the goods and services in the registration.

At the state level, mark applications are usually evaluated by the state's Secretary of State office. In general, so long as the mark in the application is not too similar to another registration on file, and so long as the proof of use in the state is sufficient, an application will usually mature to registration.

Corporate Names and Domain Names

Use of a corporate name, dba name, or a domain name alone may be insufficient to begin the process of building trademark rights. This is because corporate names are the way the state identifies a particular company and not necessarily how the marketplace identifies the company. For example, the state of Florida recognizes the company Doctor's Associates, Inc. under their registered corporate name. However, the marketplace probably makes no association between the name Doctor's Associates, Inc. and restaurant services. Doctor's Associates, Inc. is the company that owns SUBWAY restaurants.

Similarly, dba filings are a way for the local sheriff to find a company in the event of some official action.

Finally, domain names alone do not confer any trademark rights because they can function as a mere ULR pointing device.

While corporate names, dba names and domain names may not necessarily be trademarks, they all can be used as trademarks if a company uses the corporate name, dba name or domain name in marketing their products or services.

The Benefits of Registration

Federal registration of a trademark in the principle register provides a legal presumption that the owner of the registration has the exclusive right to use the mark set forth in the registration for the goods or services identified in the registration. This is a powerful right. In infringement actions, it essentially changes the burden of proof on the issue from being on the plaintiff to being on the defendant.