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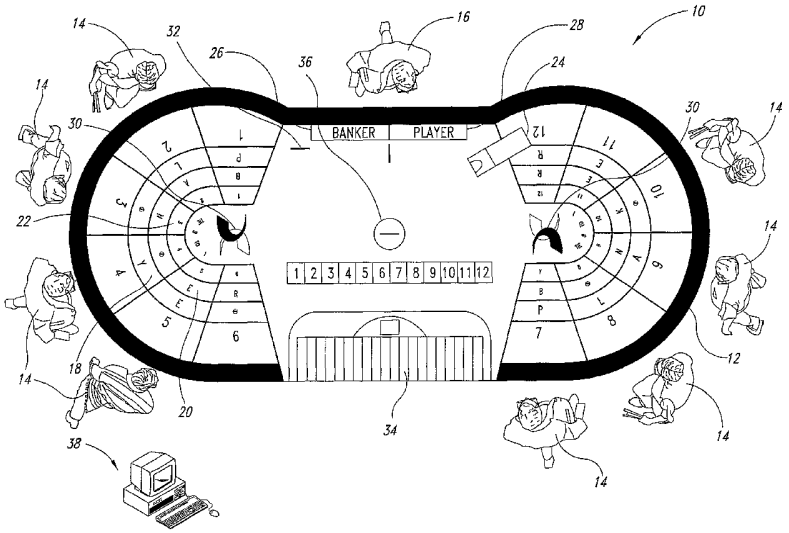
(54) **Title:** SYSTEMS, METHODS, AND DEVICES FOR MONITORING CARD GAMES, SUCH AS BACCARAT



(57) **Abstract:** Gaming systems, methods, and devices for determining or verifying the outcome of a card game, for example the card game of Baccarat. The systems, methods, and devices can be used in conjunction with the card game to enhance security by optically imaging the hands of playing cards dealt or by optically reading a set of cards to determine the outcome of each game that can be played from that set of cards. The playing cards each have at least one encoded symbol comprised of machine-readable indicia. The gaming system can include a card shoe-reader alone, a card shoe-reader in combination with at least one card hand-reader, or various other embodiments to include other devices such as a discard reader or a bet recognition device. The optically imaged playing cards can be processed within a computing system to allow the authentication of the playing cards.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

SYSTEMS, METHODS, AND DEVICES FOR MONITORING CARD GAMES, SUCH AS BACCARAT

BACKGROUND OF THE INVENTION

Field of the Invention

The present description generally relates to imaging, tracking, and verifying card sequences during card games, such as Baccarat.

Description of the Related Art

Card games are a well-known form of recreational entertainment. Games are typically played with one or more decks of cards, where each deck typically includes 52 cards of four suits (*i.e.*, hearts, diamonds, clubs, and spades), each suit including 14 cards of varying rank (*i.e.*, 2-10, Jack, Queen, King and Ace). Card games may, or may not, include wagering based on the game's outcome.

One popular card game is known as Baccarat, which is derived from European baccarat and chemin de fer. There are three variations of Baccarat, standard or Big-Baccarat, Midi-Baccarat, and Mini-Baccarat. The significant difference between the three versions is that in Big-Baccarat, each of the seated players takes a turn dealing the playing cards, in Midi-Baccarat, each of the gaming participants takes a turn dealing only the Player's hand, and in Mini-Baccarat, none of the seated players touch the playing cards – a designated casino dealer handles the playing cards.

In Baccarat, only two hands are dealt, one hand represents the Banker's hand and the other represents the Player's hand. The participants in the game are the actual individuals seated at the Baccarat table. The casino typically plays the role of the banker. The object of the game is for the participants to bet on which one of the two hands, the Player's hand or the Banker's hand, will come closest to a total of nine points or whether the hands will tie. The value of the hand is determined by the rank of the card. Thus, cards having rank Ace-10 have the value 1-10 respectively. Face cards (*i.e.*, Jack, Queen, King) each have the value 10. A hand that is worth 8 or 9 points is generally referred to as a *natural*. A hand totaling nine is more specifically referred to

as *le grand natural*, while a hand totaling eight is referred to as *le petit natural*. If the total of a hand exceeds the value of "ten," the hand is scored by dropping the tens-place integer. For instance, if a hand consists of a five and a King, which totals fifteen, the value of the hand is five after dropping the tens-place integer. In a hand with a Ten and a Queen, which totals twenty, the value of the hand is zero. Suits have no bearing on the game of Baccarat. Each hand consists of at least two cards, but no more than three. The Player's initial hand consists of the first and third cards dealt. The Banker's initial hand consists of the second and fourth cards dealt. A third card for the respective hand may or may not be drawn according to fixed rules shown below.

Rules For The Player's Hand:

Total of Player's Initial Cards:	**Based On The Total of the Player's Initial Cards, The Player Must:**
0, 1, 2, 3, 4, or 5	DRAW a third card
6 or 7	STAND
8 or 9	STAND (Natural)

Rules For The Banker's Hand:

Total of Banker's Initial Cards:	**The Player's Third Card Is:**	**Based On The Total of the Banker's Initial Cards and the Value of the Player's Third Card, The Banker Must:**
0, 1, or 2	0–9	DRAW
3	0-7 or 9	DRAW
	8	STAND
4	2-7	DRAW
	0-1, 8 or 9	STAND
5	4-7	DRAW
	0-3, 8 or 9	STAND
6	6-7	DRAW
	0-3, 8 or 9	STAND
7	0–9	STAND
8-9	0-9	STAND (Natural)

Card games are particularly popular in casinos and other gaming establishments. Players wager large sums of money while playing card games, thus, it is desirable to ensure that those playing the game are not cheating, for example by

substituting one or more cards into the deck or hand, or marking cards. Further, it is desirable to monitor the game in a relatively unobtrusive manner to allow casino customers to feel comfortable in their surroundings.

BRIEF SUMMARY OF THE INVENTION

In one aspect, a method of evaluating card games played with a number of playing cards at a gaming table comprising determining a starting sequence of the playing cards in a set of playing cards from which at least one card game will be dealt; automatically determining an identity of each of a number of playing cards forming a first hand dealt from the set of playing cards; automatically determining an identity of each of a number of playing cards forming a second hand dealt from the set of playing cards; automatically determining whether the identity of each playing card forming the first hand matches an expected identity of playing cards forming the first hand based on the starting sequence before any wagers are resolved; and automatically determining whether the identity of each playing card forming the second hand matches an expected identity of playing cards forming the second hand based on the starting sequence before any wagers are resolved.

In another aspect, a gaming system for managing a card game played with playing cards from a set of playing cards comprising a card shoe from which playing cards may be dealt in a determined order; a first card hand-reader sized to receive a portion of each of at least two playing cards forming a hand of playing cards while the at least two playing cards are positioned such that at least a first human-readable symbol carried on a face of each of the playing cards is viewably exposed to a wagering participant, and to read a machine-readable identifier carried by each of the at least two playing cards while the at least two playing cards are positioned in the first card hand-reader; and a processor communicatively coupled to receive identifying data from the first card hand reader and configured to compare an identity of each of the playing cards in the hand to an expected identity for each card in the hand based on the determined order.

In yet another aspect, a card hand-reader to read identifying data from each of a number of playing cards forming a hand comprising a frame sized to receive a

portion of up to three playing cards forming a hand while at least a first human-readable symbol on at least two of the playing cards is exposed to a game participant ; and at least one optical sensor providing a field of view encompassing an area sufficient to image a machine-readable symbol bearing portion of the up to three playing cards when the playing cards are received in the frame.

In still yet another aspect, a card identification system for evaluating an outcome of at least one card game, the card game played with a set of encoded playing cards a card shoe-reader sized to receive the set of playing cards; an optical scanner communicatively coupled to the card shoe-reader for reading the set of encoded playing cards to determine a sequence of the set of playing cards; a processor in communication with the card shoe-reader for evaluating the sequence of the set of playing cards based on a known dealing sequence and card game rules, the processor further configured to determine an outcome of each card game that can be played from the set of playing cards; and an indicator in communication with the processor for indicating the outcome of the card game.

In still yet another aspect, a method of determining an outcome of at least one card game, the card game being selectable from a set of playing cards comprising determining a card sequence of the set of playing cards from which the card game will be selected; evaluating the card sequence to determine the outcome of the at least one card game based on a set of card game rules and a dealing sequence, the outcome being determined for the at least one card game at any time before a wager is resolved, but after the card sequence is determined from the set of playing cards; and providing an indication as to which one of the hands selected from the set of playing cards comprises a winning hand or whether the hands are a tie.

In still yet another aspect, a method of determining an outcome of one card game, the card game being selectable from a set of playing cards comprising determining a card sequence of at least four cards, but less than the entire set, within the set of playing cards from which the card game will be played; evaluating the card sequence to determine the outcome of the card game based on a set of card game rules and a dealing sequence; removing at least the four cards, but not more than six cards from a card shoe-reader to assemble a first hand and a second hand, each hand having at

least two cards each; and providing an indication as to which one of the hands selected from the set of playing cards comprises a winning hand or whether the hands are a tie.

In yet another aspect, a method of determining an outcome of at least one card game, the card game being selectable from a set of playing cards comprising providing the set of playing cards to a gaming table; dealing a number of cards necessary to comprise at least two complete playing hands for the selected card game based on a set of card game rules; positioning each of the number of cards comprising the respective playing hands into at least one card hand-reader; reading a machine-readable indicia from each of the playing cards positioned within the card hand-reader; evaluating the machine-readable indicia from each of the cards to determine the outcome of the card game based on the set of rules; and verifying that the outcome of the card game as determined by the card hand-reader corresponds to the outcome of the card game upon visually totaling the cards making up the respective playing hands.

In yet another aspect, a means for determining an outcome of at least one card game, the card game being selectable from a set of playing cards comprising a support means for supporting the set of playing cards within a receptacle; a reading means for reading a machine-readable symbol from a portion of at least some of the cards within the set of playing cards; and a processing means for digitally interpreting the machine-readable symbols.

In yet another aspect, a device for successively evaluating more than one wager placed on a gaming table comprising a reflector mechanism rotatably coupled with the device, the reflector mechanism is configured to rotate from at least 0 to 360 degrees; a drive mechanism for rotationally positioning the reflector mechanism; a lens mechanism configured to receive a substantial portion of an image deflected from the reflector mechanism, the image comprised of at least a portion of at least one wagering chip; and a processor for decoding the image received by the lens mechanism.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

In the drawings, identical reference numbers identify similar elements or acts. The size and relative positions of elements in the drawings are not necessarily drawn to scale. For example, the shapes of various elements are not drawn to scale, and

some of these elements are arbitrarily enlarged and positioned to improve drawing legibility. Further, the particular shapes and the elements are not intended to convey any information regarding the actual shape of the particular elements, and have been solely selected for their ease and recognition in the drawings.

Figure 1 is a schematic diagram showing an environment in which an embodiment of the invention can operate, including participants at a gaming table with at least a card shoe-reader.

Figure 2 is a schematic diagram showing a portion of the environment of Figure 1 in which a first and second hand of playing cards have been distributed.

Figure 3 is a schematic diagram showing a portion of the environment of Figure 1 in which a winning hand has been determined.

Figure 4 is a front elevational view of a stacked set of playing cards, each of the playing cards carrying machine-readable indicia on a face of the playing cards.

Figure 5 is a top plan view of an embodiment of a card shoe .

Figure 6 is a top plan view of a one embodiment of a card shoe-reader with an indicator to announce an outcome of the game.

Figure 7 is a top front isometric view of another embodiment of a card-shoe reader, which can read a set of playing cards.

Figure 8 is an exploded top front isometric view of the card-shoe reader of Figure 7.

Figure 9 is a cutaway view of another embodiment of a card-shoe reader having a linear card-reading device integrated with the card shoe body.

Figure 10 is a front elevational view of another embodiment of a card shoe-reader having a linear card-reading device with a detachable docking assembly.

Figure 11 is a cross-sectional view of the card-shoe reader of Figure 10.

Figure 12 is a top rear isometric view of a card hand-reader schematically illustrating one hand of playing cards positioned therein.

Figure 13 is a top plan view of the card hand-reader of Figure 12.

Figure 14 is an exploded view of the card hand-reader of Figure 12.

Figure 15 is a schematic diagram of a prism assembly within the card hand-reader of Figure 12 illustrating optical paths defined by the prism assembly.

Figure 16 is a side elevational view of a bet recognition device.

Figure 17 is a top plan view of the bet recognition device of Figure 16.

Figure 18 is a cross-sectional view of the bet recognition device of Figure 16 taken along section 18-18 of Figure 17.

Figure 19 is a close-up view showing a portion of the bet recognition device of Figure 18.

Figure 20 is a schematic diagram illustrating a reflector of the bet recognition device of Figure 18 directing an image to a camera lens.

Figure 21 is a flow chart showing a method of playing a card game with a card shoe-reader capable of determining a starting sequence of a set of playing cards according to one illustrated embodiment.

Figure 22 is a flow chart showing a method of playing a card game with a card shoe-reader in combination with a card hand-reader according to another illustrated embodiment.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, certain specific details are set forth in order to provide a thorough understanding of various embodiments of the invention. However, one skilled in the art will understand that the invention may be practiced without these details. In other instances, well-known structures associated with cameras, imagers, scanners, optics, computers, computer networks, data structures, databases, and networks such as the Internet, have not been describe in detail to avoid unnecessarily obscuring the descriptions of the embodiments of the invention.

Unless the context requires otherwise, throughout the specification and claims which follow, the word "comprise" and variations thereof, such as "comprises" and "comprising" are to be construed in an open, inclusive sense, that is as "including but not limited to."

Reference throughout this specification to "one embodiment" or "an embodiment" means that a particular feature, structure or characteristic described in

connection with the embodiment is included in at least one embodiment of the present invention. Thus, the appearances of the phrases "in one embodiment" or "in an embodiment" in various places throughout this specification are not necessarily all referring to the same embodiment. Further more, the particular features, structures, or characteristics may be combined in any suitable manner in one or more embodiments.

The headings provided herein are for convenience only and do not interpret the scope or meaning of the claimed invention.

Card Gaming System Having a First Hand and a Second Hand

Figure 1 shows a gaming system 10 including a gaming table 12 at which participants 14 play a card game, for example Baccarat. A dealer 16, also referred to as a caller, can monitor the card game to insure the game runs efficiently. The gaming table 12 may include markings that identify specific regions of the table for placing wagers, for example, the gaming table 12 comprises betting regions for at least three types of wagers, a Player betting region 18, a Banker betting region 20, and a Tie betting region 22. A participant 14 may place wagers by moving one or more gaming chips into one of the betting regions 18, 20, or 22 that aligns with the participant's seating position, illustrated as positions 1-12 on the gaming table 12. One skilled in the art will appreciate that the layout of the gaming table 12 can be patterned or arranged in a variety of ways and the layout shown in Figure 1 is for illustrative purposes only. In addition, one skilled in the art will appreciate that fewer or larger numbers of participants may be seated at the gaming table 12.

A variety of devices may be used in conjunction with the gaming table 12 to augment the card game. In the illustrated embodiment, a card shoe-reader 24 can be used as a means for selecting the playing cards during the dealing process where the card shoe-reader 24 may hold, for example, up to eight decks of playing cards. The card shoe-reader 24 may also be used for reading respective machine-readable indicia from each of a number of playing cards inserted into the card shoe-reader 24, as described in detail below. Two card hand-readers 26, 28 can be used to read a first hand and second hand, respectively, dealt during the game. A bet recognition device 30 can be used to read and monitor the amount and location of the wagers (*i.e.*, type and quantity of gaming chips constituting a given wager) of each participant 14.

Further, at the conclusion of each hand, the dealer/caller 16 can access a chip tray 34 for processing the wagers made by the participants 14. In typical gaming environments 10, a bank or chip tray 34 on the gaming table 12 provides storage for holding the house's (*e.g.*, casino's) chips (not shown). The chip tray 34 allows the dealer 16 to collect or "hold" losing wagers and pay out winning wagers. Chips in the chip tray 34 are generally arranged in columns and may be organized by denomination. A deposit slot 36 may be used by the dealer 16, or another person having authority in the casino, to deposit any cash or markers received for the purchase of more gaming chips.

A magnetic stripe reader 32 can be used to read a player's comp card. Although not illustrated, a discard reader can be used to read any discarded playing cards, for example burn cards or the cards that comprised the first and second hands during the most recently played card game. It is common practice among casinos to remove several "burn cards" from a new or replacement card shoe-reader 24, prior to a first hand being dealt from that card shoe-reader 24. The number of burn cards selected is typically a matter of individual casino policy and the burn process is usually only done once when the card shoe-reader has a fresh set of playing cards.

The various devices such as the card shoe-reader 24, the card hand-readers 26, 28, the bet recognition device 30, and the magnetic stripe reader 32, can all be in combination with the gaming table 12 and each can be in communication with one another, a computing system 38, or both. In one embodiment, the dealer/caller 16 may interact with the computing system 38 via a user interface. Alternatively, the dealer/caller 16 may not have access to the computing system 38 such that the system may essentially operate behind the scenes to monitor the gaming environment.

Figure 2 shows a close-up view of the portion of the gaming table 12 where the card hand readers 26, 28 may be located. A playing card 41 may be dealt from a set of playing cards 40 (not shown) located within the card shoe-reader 24. The process of dealing can be conducted according to a dealing sequence and a set of rules for the particular card game. After a playing card 41 is removed from the card shoe-reader 24, the playing card can be inserted into at least one card hand-reader 26, 28. The first card hand-reader 26 may be configured to receive at least three playing cards

comprising the first hand 44. Likewise, a second card hand-reader 28 may be configured to receive at least three playing cards comprising a second hand 46. The first and second hands, 44, 46 must be comprised of at least two playing cards, but not more than three playing cards. Each individual playing card 41 may have a machine-readable indicia 42 encoded on at least one edge of the playing card. Alternatively, the system 10 may rely on standard playing card markings (*e.g.*, rank and/or suit symbols) and optical character recognition techniques. For purposes of clarity, the first hand 44 and the second hand 46 are shown separated (*i.e.*, not inserted) from the card hand-readers 26, 28.

Figure 3 shows the gaming system 10 at completion of a card after a first hand 44, (*e.g.*, a Banker's hand in the game of Baccarat) and a second hand 46 (*e.g.*, a Player's hand in the game of Baccarat) have been distributed from the card shoe-reader 24. Figure 3 further indicates that those participants 14, at positions 4 and 8 respectively, who placed a wager 47 on the Banker's hand were successful for that particular round of distributed playing cards.

Playing Cards Encoded With Machine-Readable Indicia

Figure 4 shows an exemplary set of playing cards 40 which may be inserted or temporarily stored in the card shoe-reader 24 as a stack. The set of cards 40 may be one or more decks of cards, or may be a lesser or greater number of cards selected from one or more decks of playing cards. (Only six playing cards are illustrated for ease and clarity of presentation.) When placed in the card shoe-reader 24 each of the playing cards 41 are shifted or staggered with respect to adjacent playing cards in the set along at least one of the two perpendicular axes 50, 52, corresponding to a long and short edge 54, 56, respectively, of the playing cards 40. (The amount of shift or stager is exaggerated in Figure 4 for clarity of presentation. In use, typically less than 1/8 inch of the edges 54, 56 of each playing card 40 will be exposed.). The shift may result from positioning the playing cards 40 on a sloped of inclined surface, as discussed more fully in U.S. Patent Application No. 10/017276, filed December 13, 2001, and entitled "METHOD, APPARATUS AND ARTICLE FOR RANDOM SEQUENCE GENERATION AND PLAYING CARD DISTRIBUTION;" and U.S. Patent Application No. 10/0360846, filed February 5, 2003, and entitled "METHOD,

APPARATUS AND ARTICLE EMPLOYING MULTIPLE MACHINE-READABLE INDICIA ON PLAYING CARDS."

As further illustrated in Figure 4, a first information carrying portion bearing a first machine-readable indicia 42 and a second information carrying portion bearing a second machine-readable indicia 48 are exposed (hereinafter the machine-readable indicia will be referenced with numeral 42, regardless of where it is placed on the playing card 41). The exposed portions are preferably proximate the edges 54, 56 of the playing card 41. The exposed portions may be an end portion along an edge of the face 58 (*i.e.*, surface bearing the rank and suit markings) or the back (*i.e.*, surface bearing a uniform marking for each playing card in the set). Placing the machine-readable indicia on the face 58 of the playing card may make it more difficult for unauthorized people to view or gain access to the information encoded in the machine-readable indicia.

The machine-readable indicia 42 can take the form of barcode, area or matrix code, or stack code symbols selected from respective symbologies to encode identifying information such as the rank and suit of the card, a unique serial number, and/or information about the set of cards 40 to which the playing card 41 belongs. For example, as shown in Figure 4, the playing cards 40 can carry barcode symbols along each of the edges 54, 56 on the faces of the playing cards. Lookup tables or an algorithm can relate a unique serial number encoded in one or both the machine-readable indicia 42 to one another, or to other identifying information, such as the rank, suit, casino, manufacturer of the card and/or card set 40. Use of a proprietary machine-readable symbology can enhance security and efficiency. Encryption can also enhance security, for example, encrypting the unique serial numbers or other information before encoding the information into the machine-readable indicia 42. The machine-readable indicia 42 can also take advantage of error correction, to discover and correct errors. Error correction techniques, for example Reed-Solomon error correction are generally known in the automatic data collection ("ADC") arts. While visibly illustrated in Figure 4, the machine-readable indicia 42 can be printed using ink that is not typically visible to humans, such as ink that is only visible in the infrared or ultraviolet portions of the electromagnetic spectrum.

The particular embodiment illustrated has a number of reading and securing advantages over other embodiments. Printing the machine-readable indicia 42 in invisible ink makes unauthorized detection and reading of the machine-readable indicia 42 difficult, and also makes the deck marking unobtrusive to participants 14 (Figure 1). Employing machine-readable indicia 42 on two perpendicular edges 54, 56, allows for redundancy and/or security not otherwise available for playing cards marked with machine-readable indicia. Repeating the machine-readable symbol 42 two or more times along any given edge 54, 56 also provides redundancy helping to ensure that the card is correctly identified within the card shoe-reader 24. Additionally, or alternatively, employing multiple machine-readable indicia 42 per card, may permit a substantially larger amount of information to be stored on any given playing card 41.

Card Shoe-Reader

Referring to Figure 5, and to Figure 1 as necessary, one embodiment of a standard card shoe 24a is illustrated. The illustrated card shoe 24a is the type without any optical reading components, thus being different from the card shoe-reader 24b discussed previously and in more detail below. The card shoe 24a is described herein to identify the components of a standard card shoe 24a. The card shoe 24a includes a housing 102 having a receptacle sized and dimensioned to receive the set of playing cards 40. The housing 102 may be coupled to a front housing 104, which includes a card access region 106. The card access region 106 can be a sufficiently sloped surface that allows the playing cards 41 to be individually removed from the card shoe 24a. The standard card shoe 24a may simply be placed on the gaming table 12.

Figure 6 illustrates another embodiment of a card shoe-reader 24b that may be configured with optical reading components, communication devices for transmitting or receiving data, digital processing equipment, or some combination thereof. The card shoe-reader 24b may have the same look and feel and many of the standard components as the card shoe 24a, discussed above. Likewise, the card shoe-reader 24b may be attachable/detachable, sufficiently affixed to the gaming table 12, or again simply be supported by the gaming table 12. One advantage of the card shoe 24a being attachable to the gaming table 12 is to ensure the stability of the card shoe 24b during the game in the event the gaming table 12 gets bumped. Another advantage is

that the card shoe 24b may be detached from the gaming table 12 and taken to a different location, such as a back room of the casino, to be reloaded with a fresh set of cards 40. The practice of reloading card shoes in a back room of the casino is fairly commonplace to avoid causing any distractions in the vicinity of the gaming environment and to not detract from the efficiency of the dealer/caller 16 (Figure 1). Alternatively, the card shoe 24a may be sufficiently affixed to the gaming table 12. In such an alternative embodiment, a new set of cards 40 could be shuffled and reloaded into the card shoe 24a at the gaming table 12.

Because the card shoe-reader 24b may be configured with the optical reading components, communication devices for transmitting or receiving data, digital processing equipment, or some combination thereof, the physical devices called on to perform those functions may be enclosed within the housing 102 (*i.e.*, making the card shoe-reader 24b a self-contained, self sufficient unit) or at least some of those physical devices may be configured with the gaming table 12, thus permitting an interface with the housing 102. The configuration of the physical devices with the gaming table 12 may take the form of these devices being embedded, recessed, attached, or supported by the gaming table 12, for example. An advantage of the card shoe-reader 24b is that it can be configured to read all of the playing cards 40 located therein as discussed in more detail below. As such, a starting sequence or dealing sequence of the set of playing cards 40 can be determined, but not necessarily disclosed, before the first card 41 is dealt from the card shoe-reader 24b. Since the rules of Baccarat dictate the play of the game, the outcome of each hand may be determined from the starting sequence before a first card 41 is dealt from the card shoe-reader 24b, before a fourth card is dealt from the card shoe-reader 24b, or even before a last card is dealt from the card shoe-reader 24b. While the outcome of all games played from the set of cards 40 in the card shoe-reader 24b may be determined before a first card 41 is dealt, the system may determine the outcome of individual games or consecutive hands 44, 46 before a first card 41 for that particular game or hand 44, 46 is dealt or even before a final card in each game or hand is dealt.

Still referring to Figure 6, an indicator 140 may be attachable to the card shoe-reader 24b. Alternatively, the indicator 140 may be remotely located from the

card shoe-reader 24, yet viewable by the participants 14 (Figure 1) at the gaming table 12. The indicator 140, if remotely located, may be in communication with the card shoe-reader 24b, the optical reading components, communication devices for transmitting or receiving data, digital processing equipment, or some combination thereof. Thus, the indicator 140, if used for the game of Baccarat for example, may include three illumination sources 142, 144, and 146. The appropriate illumination source 142, 144, and 146 (*e.g.*, incandescent, LED, LCD, etc.) may be activated after a complete game is dealt including the Banker's hand 44 and the Player's hand 46, but before wagers made by the participants 14 (Figure 1) are resolved. Since there are only three possible outcomes to the game of Baccarat, a first illumination source 142 can indicate, for example, that the Banker's hand 44 wins. A second illumination source 144 can indicate, for example, that the Player's hand 44 wins. Finally, a third illumination source 146 can indicate, for example, that the Banker's hand 44 ties with the Player's hand 46. The light sources 142, 144, and 146 can each be a discreet, recognizable color or appropriately labeled.

In an alternative embodiment, the indicator 140 may be much more elaborate. For example, the indicator 140 may be a monitor (not shown) remotely connected to the card shoe-reader 24b. The monitor may be in communication with the processor (not shown) to receive data about the playing cards 40 distributed during a particular game. For example, the monitor can be configured to produce visual representations of the cards as read within the card shoe-reader 24b. Of course, if the visual representations did not match the actual cards on the gaming table 12 (Figure 1), then there would be a discrepancy. The monitor may also "flash," simply indicate Banker, Player, or Tie, or distinguish the winning outcome in some other manner. One advantage of using a visual approach, such as using a monitor, permits the participants 14 (Figure 1) to play a more interactive role by actually doing the quick comparative check themselves.

As will be discussed in with respect to other embodiments, a reader in the card shoe-reader 24b can read (*i.e.*, scan, image, or otherwise sense) the cards 40, typically 2-8 decks, to obtain a starting sequence. One skilled in the art will appreciate

that the card shoe-reader 24b, and any of the card shoe-readers discussed herein, may be sized and configured to accept substantially more or less than 2-8 decks of cards.

The transmission of data from the card shoe-reader 24b to a processing system may be accomplished through a wireless connection (*e.g.*, RF or IR), a wired connection (*e.g.*, a detachable cable), or other communication means 110. Data indicative of the starting sequence can be transmitted through a data port 110 to an appropriate processing device or system (*e.g.*, computing system 38 from Figure 1). The data port 1 10 may be coupled and decoupled from the main body of the card shoe-reader 24 with a connector 108. The connector 108 may take the form of any number of standard input/output (I/O) connectors that are used to transmit digital or electronic data.

Figures 7-9 illustrate another embodiment of a card shoe-reader 24c. In the illustrated embodiment two primary components are depicted, a main body assembly 200 and that may be detachably coupled to a docking assembly 250. The main body assemble 200 may be comprised of a housing 202, a front housing 204, and a card access region 206, consistent with the previously discussed card shoe-reader embodiments. The one modification that may be required is that the main body assembly may have a support surface (not shown) to support the set of cards 40 within the main body assembly. The support surface, or at least a portion of the support surface, may be sufficiently transparent, clear, or capable of permitting the set of cards 40 to be read by a reader located in the docking assembly 250.

In this particular embodiment, the docking assembly 250 may include the majority, if not all, of the optical and/or electronic imaging or scanning components. Figure 8, in particular, illustrates that the main body assembly 200 may be detachable from the docking assembly 250. As noted previously, the docking assembly 250 may be configured or integrated with the gaming table such that it is substantially affixed to the gaming table 12 (Figure 1). Although no connection is truly permanent, the connection of the docking assembly 250 with the gaming table 12 can be sufficient to protect the expensive optical and/or other electrical components from being stolen, accessed, or tampered with and further protects these components from being unintentionally damaged, for example, if a casino employee accidentally dropped the

main body assembly 200 of the card shoe-reader 24c *en route* to a gaming table 12. Thus, the main body assembly 200 of the card shoe-reader 24c primarily functions as only a receptacle for the set of playing cards 40. Likewise, the docking assembly 250 may either contain circuitry for processing the scanned or imaged data or be configured to transmit such data to a remotely located processor (not shown).

The reader that may be employed with the illustrated embodiment may be a card-reading device (not shown) capable of reading at least a portion of the set of cards 40. For example, the card-reading device may take the form of optical imagers to capture optical images of the machine-readable symbols 42 portions of the playing cards 41 which are exposed when the set of playing cards 40 is positioned in the main body assembly 200 of the card shoe-reader 24c. For example, the card-reading device can take the form of one-dimensional or two-dimensional arrays of charge coupled devices ("CCD"), similar to the ones discussed *infra* for card hand-readers or bet recognition devices, and suitable optics, such as optical lenses for focusing an image on the CCD array. Such CCD arrays can capture whole images at a time, or can be electronically caused to successively sample (*e.g.*, pixel-by-pixel, row-by-row, or column-by-column) the exposed information bearing portions of the set of playing cards 40 (*i.e.*, electronically scan). Alternatively, the card-reading device can take the form of a CMOS imager capable of capturing one-dimensional or two-dimensional arrays similar to that of a CCD reader. The card-reading devices 308 discussed herein may rely on ambient light, or may include one or more light sources such as light emitting diodes ("LEDs") or incandescent lights (not shown), which may or may not be controlled via the device 308. The structure and operation of the readers 308 discussed herein are more fully described in U.S. Patent Application No. 09/790480, filed February 21, 2001, and entitled "METHOD, APPARATUS AND ARTICLE FOR EVALUATING CARD GAMES, SUCH AS BLACKJACK."

Figure 9 illustrates another embodiment of a card shoe-reader 24d having a main body assembly 300 that incorporates the optical, communication, transmission, processing, or other equipment or some combination thereof with the receptacle for housing the set of cards 40. The cutaway view of the present embodiment of the card shoe-reader 24d, for clarity illustration, depicts only one

playing card 41 having an encoded symbol 42. It should be understood that typically 8 decks of cards may be loaded within the main body assembly 300. A smooth support surface 306 supports the playing cards 40 and may be sufficiently sloped so that an edge portion of each card, containing at least one of the machine-readable symbols 42, is exposed to a card reading device 308. The layback angle of the cards, which is the angle of the cards relative to the supporting surface 306, must be sufficiently inclined in order to adequately expose the machine-readable symbols 42 on each card 41.

The card-reading device 308 can be positioned beneath the support surface 306. In order for the card-reading device 308 to adequately read the machine-readable symbols 42 on each of the respective cards, a substantial portion of the support surface 306 may be transparent, clear, or sufficiently configured to permit the cards to be read by the card reading device 308. These clear portion of the support surface 306 can take the form of glass, clear plastic, or may include coverings that are transparent in the appropriate portion of the electromagnetic spectrum (*e.g.*, white, infrared, or ultraviolet light) based on the visibility of the particular machine-readable indicia 42.

The card-reading device 308 may take the form of optical scanners to electronically capture the information bearing portions of the playing cards 41 which are exposed when the set of playing cards 40 is positioned in the main body assembly 300. For example, the card-reading device 308 can take the form of one or more laser scanners and appropriate light detector(s). The laser scanners can employ, for example, laser diodes for producing a scanning beam and one or more photodiode detectors for detecting laser light reflected from the machine-readable indicia 42 carried by each of the playing cards 41. In the illustrated embodiment, the card-reading device 308 takes the form of a linear scanner which moves in a scan direction 316. Alternatively, the linear scanner 308 may be configured to translate in a direction that is substantially orthogonal to the illustrated scan direction 316. In such an embodiment, the number of discreet sensors (*e.g.*, charge coupled devices) needed would be commensurate with the number, length, and density of the machine-readable symbols 42 on the playing cards 41.

A casino employee (not shown) or the dealer/caller 16 (Figure 1) may manually actuate the linear scanner 308 by manipulating a trigger or lever (not shown)

that positions the linear scanner 308 into a starting position. When the trigger is released, an actuator 312 provides the necessary force, such as from a spring or other biasing member, to propel the linear scanner 308 beneath the set of cards 40. In another alternative, after the linear scanner 308 is in its starting position, the actuator 312 may be triggered electronically by standard push-button, solenoid means. As one skilled in the art will appreciate, the card reading device 308 may employ alternative means for moving the linear scanner 308, for example, a hydraulic piston arrangement, or some other actuation device capable of propelling the linear scanner 308. In addition, the actuator 312 may be mechanically or electrically triggered to scan the set of cards 40.

To ensure a substantially accurate read the machine-readable symbols 42 from each of the cards in the set of cards 40, it may be desirable to have the actuator 312 propel the linear scanner 308 at a substantially constant velocity. In such an embodiment, the linear scanner 308 would have to be configured to reach the substantially constant velocity before reading a first machine-readable symbol 42. Alternatively, an encoder 309 with graduated markings may be utilized in conjunction with the card-reading device 308. Encoders are well known in the art as being used with optical scanning devices to enhance the likelihood of getting a positive read of a machine-readable symbol, for example a bar code.

Figures 10-11 illustrate another embodiment of a card shoe-reader 24e. This particular embodiment is substantially the same as the previous embodiment with the difference being that the main body assembly 400 is separable or detachable from the docking assembly 450. The illustrated docking assembly 450 may be recessed into the gaming table 12 or otherwise attached thereto. The docking assembly 450 may be configured to complementarily receive the main body assembly 400 of the card shoe-reader 24e. An external housing 452 may enclose and support at least one guide 410. The guide or guides can be a set of tracks, rails or other suitable sliding or rolling mechanism. The guides permit the card-reading device 408, which may be structurally and operationally similar to the linear scanner described in the previous embodiment, to traverse in a given scan direction. A data cable 454, or other similar data transfer medium, may be coupled to the card-reading device 408 and routed out of the housing

452 to a processor (not shown). Alternatively, the processor may be contained within the housing 452.

Data ports 454 associated with the card shoe-reader 24e couple the imaging or scanning data from the card-reading device 408 to appropriate processing circuitry. As is typical in the automatic data collection (ADC) arts, processing may include amplifying the signal from the detector, analog-to-digital conversion or "wave-shaping" of the amplified signal, and decoding the converted signal into characters represented by the symbols forming the machine-readable indicia 42. Thus, processing typically includes converting an analog signal representing variations in reflectance into digital data, and interpreting the digital data as meaningful information based on the underlying symbology (*i.e.*, a mapping of machine-readable indicia, typically defined in terms of patterns of reflectance, to human-understandable characters).

Card shoe-readers, for example readers 24b through 24e, add a higher degree of security preventing card tampering for card games, such as Baccarat, where the participants 14 (Figure 1) are permitted to deal the first hand 44 and the second hand 46. The card shoe-readers promote game security by ensuring complete card accountability and that the cards are dealt in the proper sequence from the shuffled and loaded card shoe-reader 24b through 24e. In particular, the ability for the card shoe-readers 24b, 24c, or 24e, for instance, to be detached from the docking assembly, which contains the imaging or scanning components, adds an additional level of security and protection by protecting these types of optical or electrical components from being damaged or tampered with. In addition, with respect to the self-contained type card shoe-reader 24d, if the set of cards 40 were to be read immediately after an employee loaded the reader, for example in the back room of the casino, this initial read would ensure that no cards were added or removed while the reader was transported from the loading room to the gaming table 12.

Card Hand-Readers

Figures 12-14 show a card hand-reader 500 for reading (imaging or scanning) a hand 42 of playing cards according to one illustrated embodiment. The card hand-reader 300 shown in Figure 12 may read the hand 42, process the acquired data, and compare this data with the known of sequence of cards as determined from

reading the cards within the card shoe-reader 24b-e. In essence, the card hand-reader 500 operates to verify the card sequence and game outcome that has already been determined by the card shoe-reader 24b-e. In the alternative, the card hand-reader 500 may be used in conjunction with a card shoe 24a (*i.e.*, the card shoe-reader described above, which is incapable of reading the cards contained therein). The card hand-reader 500, in this instance, verifies that the cards inserted therein are "valid" and "legitimate" playing cards 41 and that the winning hand called out by the dealer/caller 16 is actually the correct winning hand (in the event of an intentional or unintentional error, such as an arithmetic error). In either situation, the structure of the card hand-reader 500 may be used.

Still referring to Figure 12, the card hand-reader 500 may be used in a game such as Baccarat where the cards making up the hand 42 are typically displayed to all participants 14 (Figure 1) after the cards are removed from the card shoe-reader 24b-e. The card hand-reader 500 may have a lower housing 502, which can contain the majority of the optical imaging components (not shown). Similar to the docking assembly of the detachable card shoe-readers discussed above, the lower housing 502 may be recessed into the gaming table 12. For example, the card hand-reader 500 may include a support member 504, attachable to the lower housing 502, for contiguously contacting a portion of the gaming table 12.

Figure 13 illustrates a plan view of the card hand-reader 500 of Figure 12. A reader 508, such as a video or still camera or other optical sensor, with an image sensor 510 may be coupled to the lower housing 502 (Figure 12). The reader 508 may be used to read each of the cards 41 that comprise the Player's hand 46, for example. The reader 508 may take the form of CMOS or CCD sensors, such as the type taught in U.S. Patent Application No. 09/849456, filed May 4, 2001, and entitled "METHOD, APPARATUS AND ARTICLE FOR VERIFYING CARD GAMES, SUCH AS BLACKJACK." An identifier 506, for naming the particular hand, may be attached to the card hand-reader 500 to assist the gaming participants. As will be further explained below, positioning the cards 41 within the card hand-reader 500 in a staggered configuration 518 is not required, but may be done to facilitate the transmission of the image representing the machine-readable indicia 42. Alternatively, the cards may be

positioned in the card hand-reader 500 without being staggered, for example the top edges of the cards may be substantially flush with respect to a single horizontal plane.

Figure 14 illustrates an exploded view of the card hand-reader 500. As briefly discussed, the reader 508 may read the machine-readable indicia 42. A prism assembly 514 in conjunction with a reflector/mirror assembly 516 may be used to direct an optical image of the machine-readable indicia 42 to the image sensor 510. Although ambient lighting may be sufficient for the reader 508 to pick up a discernible image, an illumination source 512 may be used to direct light onto the applicable portions of the playing cards 41. For example, in the configuration shown in Figure 14, the illumination source 512 can direct light onto the edge 56 (Figure 4) of the respective cards 41. Alternatively, the reader 508 may be a linear scanner similar to the one discussed above in the context of a card shoe-reader.

Figure 15 illustrates various optical ray paths 520, 522, and 524 reflected from the respective cards. The configuration of the respective mirrors 526, regardless as to whether the cards are staggered or not as shown in Figure 13, permits the optical ray paths to focus on discreet regions of the image sensor 510, which receives each of the respective images 528, 530, 532. The images received by the image sensor 510 represent the machine-readable indicia 42 contained on at least two, but possibly each of the three cards located within the card hand-reader 500. Recall that in a game such as Baccarat, the minimum number of cards for a given hand may only be two cards, thus there would be no need to read a third card, however the card hand-reader 500 of the present embodiment is certainly capable of reading three cards, if not more if configured in such a manner. One skilled in the art will appreciate that the card hand-reader 500 may be further configured to read more than three cards.

Additionally and alternatively, although the placement of the cards 41 within the card hand-reader 500 shows the individual cards adjacently and proximately located and in the same plane with respect to each other, this configuration may be modified. For example, the cards do not necessarily have to be located within the same plane, for example the card hand-reader 500 may be curved to give it more aesthetic appeal. Further, the cards 42 may overlap as viewed by one or more of the gaming participants. As long as the human-readable symbols, which represent the rank of the

card, for example Ace, King, Queen, etc., for each of the cards 41 in the hands 44, 46 are viewably exposed to wagering participants, then the configuration of the card hand-reader 500 is adequate.

Card Discard-Reader

The card discard-reader images the burn cards placed in a discard tray and may also read them. Once the burn cards have been successfully read, the discard reader may provide an indication to the dealer/caller 16 (Figure 1) that the set of cards remaining within the card shoe-reader may be read.

Bet (Wager) Recognition Device

Figures 16-20 illustrate a bet recognition device 600 that may be incorporated into the gaming system 10 (Figure 1) to identify, track, and verify wagers placed by the participants 14. Figures 16 and 17 illustrate that the bet recognition device 600 may have a housing 602, which contains at least some of the optical reading components, a table attachment flange 604, and a lens assembly cover 606. The lens assembly cover 606 may be clear, transparent, or made of a material that does not substantially impede the transmission of one or more wavelengths of light. The lens assembly cover 606 may protect the components located therein and also be configured in a variety of ways for cosmetic or aesthetic purposes.

Figure 18 is a cross-sectional view of the bet recognition device 600 illustrating some of the other components involved in capturing data from the participant's wagering chips. A lens assembly 608 (schematically illustrated in Figure 18) may receive the image of a wager, which is discussed in more detail with reference to Figure 20 below. The image may then be transmitted through a lens array 618 toward a CCD or CMOS type camera 620. The camera 620 can have a camera lens 622 electronically coupled to a printed circuit board 624.

Figure 19 schematically illustrates one embodiment of the lens assembly 608, which can take the form of a clear or transparent circular member 610 with an embedded reflector 612 and an embedded infrared (IR) sensor 614. The circular member 610 may be rotationally coupled to a drive motor (not shown) through a shaft 617. One skilled in the art will appreciate that the rotational driving force for the

circular member 610 may be mechanical or electro-mechanical, for example a programmed magnetic drive coupler, a step motor, or other rotational driving means 617 may control the rotation of the circular member 610. The circular member 610 can rotate through 360 degrees of rotation and can be capable of imaging over a range of at least 0 to 270 degrees. One skilled in the art will appreciate that this range may be broadened or narrowed depending on the configuration of the gaming table 12, the rate of rotation of the lens assembly 608, and the location of the bet recognition device 600 on the gaming table 12, among other things. Alternatively, the circular member 610 may be programmed to pivot back and forth over a specified, but more narrow range, depending on the context of how the bet recognition device is being utilized by the casino.

Figure 20 schematically illustrates the basic operation of the bet recognition device 600 according to the present embodiment discussed above in Figures 16-19. The bet recognition device 600 may be capable of sequentially capturing images 626 (*e.g.*, a two dimensional array) of at least two stacks of chips 650 or even a single chip 652. The IR sensor 614 successively illuminates a stack of chips 650 or a single chip 652, respectively. The illuminated image 626 is received by the circular member 610 and thereby directed by the reflector 612 toward the camera lens 622. The image 626 may be pre-processed or decoded by the lens array 618, which may be embedded in an array housing 616, *enroute* to the camera lens 622.

Gaming System Operation

The general layout of a gaming system 10 is described above. The above devices, components, assemblies, etc. may be used in combination with each other or only a single item may be employed for a given gaming system 10. For example, in the game of Baccarat, the gaming system 10 may utilize a card shoe 24a or one of the embodiments of the card shoe-reader 24b-e and a card hand-reader 500; however, the card hand-reader 500 is not a necessary item if the card shoe-reader 24b-e is programmed to determine the game outcome based on the starting sequence and the rules of the game. As discussed above, card shoe-readers 24b-e can read a set of playing cards 40 to determine a starting or dealing sequence of the cards. For example, in the game of Baccarat, knowing the starting sequence in conjunction with the rules of

Baccarat permits the casino to determine the outcome of every card game that can be played from the set of cards 40 within the card shoe-reader 24b-e. Therefore, as will be further detailed below, the gaming system 10 may be comprised with either a card shoe 24a or one of the card shoe-readers 24b-e.

Figure 21 illustrates one method of playing a card game 700, for example Baccarat using one of the card shoe-readers 24b-e, but no card hand-reader 500. In step 702, a set of cards 40 can be loaded into the card shoe-reader 24b-e. As previously noted, this step may be accomplished by a casino employee in an area of the casino away from the gaming table 12 or may be accomplished at the gaming table 12. In step 704, the dealer/caller 16 (Figure 1) may burn cards from the card shoe-reader 24b-e. Typically, casinos have a standard policy to burn at least several cards from each card shoe-reader or deck of cards before game play commences from that particular reader or deck. If card are to be burned, then in step 706 the burn cards are removed from the card shoe-reader 24b-e. Next, in step 708, the card shoe-reader 24b-e may be triggered to read the set of cards 40. In step 710, the acquired data may be routed through a processor, for example, the computer 38 (Figure 1) system having appropriate decoding and decryption software, to determine the starting sequence of the set of cards 40. As an alternative, the card shoe-reader 24b-e may have a second indicator (not shown) to display, either visually or audibly, a warning in the event that the attempt to read the set of cards 40 was unsuccessful. An unsuccessful read may occur due to damaged playing cards 41, cards that are stuck together within the card shoe-reader 2bb-e, or a host of other reasons. However, most of these issues could be easily and quickly remedied once the dealer/caller 16 is aware that an issue exists.

In step 712, after a successful read, the appropriate cards for constituting a single card game are removed from the card shoe-reader 24b-e according to a predetermined dealing sequence. In step 714, the playing hands, for example the first hand 44 and second hand 46, may be visually displayed to the gaming participants 14 at which time, based on the rules of the particular game being played, a winning hand or tie hand can be visually determined. In step 716, an optional indicator 140 (Figure 6) may be actuated or displayed so that the gaming participants 14 can verify that the visually determined or announced outcome is consistent with the electronically

determined outcome from step 710. In step 718, assuming that no indicator 140 was in use, the cards played during the game comprising the first hand 44 and the second hand 46, for example, may be verified against the electronically determined outcome acquired from the card shoe-reader 24b-e. Any discrepancies could be handled according to casino protocol. In step 720, the already distributed cards may be discarded so that a new card game can be dealt.

Figure 22 illustrates another method of playing a card game 800, a card hand-reader 500 may be used in combination with a card shoe 24a or one of the other card shoe-readers 24b-e, the latter readers being capable of determining the outcome of a game based on reading the cards within the reader. For purposes of discussion, the card shoe 24a shoe-reader will be presumed, however one skilled in the art will appreciate the using any of the above components, devices, assemblies, etc. in combination with each other adds to the security, accuracy, and efficiency of the gaming system 10. In step 802, a set of cards 40 can be loaded into a card shoe 24a. In step 804, the cards for a first hand 44 and a second hand 46 may be removed from the card shoe 24a according to the gaming rules, for example the rules for Baccarat. In step 806, the cards comprising the respective hands may be placed into a single card hand-reader 500 configured to read both hands simultaneously, or individual card hand readers 500. The placement of the card into the card hand-reader can trigger the optical sensor to read the machine-readable symbol or symbols 42 on the respective cards. The machine-readable indicia 42 on the cards 41 can be optically read and decoded, thus creating an electronic record of the outcome of that particular card game. The placement of the cards into the card hand reader 500 is done such that the rank and possibly the suit (*i.e.*, the face 58; Figure 4) of the cards are viewably exposed to the wagering participants 14 (Figure 1). In Step 808, the winning or tie hand can be visually determined by at least one of the gaming participants 14. In Step 810, the visually determined winning or tie hand can be verified by comparison with the electronic output or indication from the card hand-reader 500. In Step 812, the played cards may be discarded in preparation for a new game to be dealt.

All of the above U.S. patents, U.S. patent application publications, U.S. patent applications, foreign patents, foreign patent applications and non-patent

publications referred to in this specification and/or listed in the Application Data Sheet, including but not limited to U.S. Patent Application No. 10/017276, filed December 13, 2001, and entitled "METHOD, APPARATUS AND ARTICLE FOR RANDOM SEQUENCE GENERATION AND PLAYING CARD DISTRIBUTION;" U.S. Patent Application No. 10/0360846, filed February 5, 2003, and entitled "METHOD, APPARATUS AND ARTICLE EMPLOYING MULTIPLE MACHINE-READABLE INDICIA ON PLAYING CARDS;" U.S. Patent Application No. 09/790480, filed February 21, 2001, and entitled "METHOD, APPARATUS AND ARTICLE FOR EVALUATING CARD GAMES, SUCH AS BLACKJACK;" and U.S. Patent Application No. 09/849456, filed May 4, 2001, and entitled "METHOD, APPARATUS AND ARTICLE FOR VERIFYING CARD GAMES, SUCH AS BLACKJACK" are incorporated herein by reference, in their entirety.

Although specific embodiments, and examples for, the invention are described herein for illustrative purposes, various equivalent modifications can be made without departing from the spirit and scope of the invention, as will be recognized by those skilled in the relevant art. The teachings provided herein of the invention can be applied to other systems for playing card games or developing card game systems, not necessarily the Baccarat gaming system 10 generally described above. For example, the teachings can employ networks, such as the Worldwide Web portion on the Internet, to interconnect the various described components. The various embodiments described above can be combined to provide further embodiments. For example, the illustrated methods can be combined, or performed successively. The illustrated methods can omit some acts, can add other acts, and can execute the acts in a different order than that illustrated to achieve the advantages of the invention.

These and other changes can be made to the invention in light of the above detailed description. In general, in the following claims, the terms used should not be construed to limit the invention to specific embodiments disclosed in the specification, but should be construed to include all computers, networks and card-reading and evaluation systems that operate in accordance with the claims. Accordingly, the invention is not limited by the disclosure, but instead its scope is to be determined entirely by the following claims.

CLAIMS

We claim:

1. A method of evaluating card games played with a number of playing cards at a gaming table, the method comprising:

determining a starting sequence of the playing cards in a set of playing cards from which at least one card game will be dealt;

automatically determining an identity of each of a number of playing cards forming a first hand dealt from the set of playing cards;

automatically determining an identity of each of a number of playing cards forming a second hand dealt from the set of playing cards;

automatically determining whether the identity of each playing card forming the first hand matches an expected identity of playing cards forming the first hand based on the starting sequence before any wagers are resolved; and

automatically determining whether the identity of each playing card forming the second hand matches an expected identity of playing cards forming the second hand based on the starting sequence before any wagers are resolved.

2. The method of claim 1 wherein determining a starting sequence of the playing cards in a set of playing cards from which at least one card game will be dealt comprises determining a sequence of a number of the playing cards in a card shoe before a first one of the number of playing cards is dealt.

3. The method of claim 1 wherein determining a starting sequence of the playing cards in a set of playing cards from which at least one card game will be dealt comprises determining the identity of each playing cards as the playing card is dealt from a card shoe.

4. The method of claim 1 wherein determining a starting sequence of the playing cards in a set of playing cards from which at least one card game will be dealt comprises determining an identity of each of the playing cards in the set of

playing cards before a card shoe holding the set of playing cards is placed on the gaming table.

5. The method of claim 1 wherein determining a starting sequence of the playing cards in a set of playing cards from which at least one card game will be dealt comprises determining an identity of each of the playing cards in the set of playing cards after a card shoe holding the set of playing cards is placed on the gaming table.

6. The method of claim 1 wherein determining a starting sequence of the playing cards in a set of playing cards from which at least one card game will be dealt comprises one of optically imaging and optically scanning an symbol from each of at least a number of the playing cards in the set of playing cards.

7. The method of claim 1 wherein automatically determining an identity of each of a number of playing cards forming a first hand dealt from the set of playing cards comprises reading an symbol from each of the playing cards forming the first hand when the first hand is inserted into a playing card reader located on the gaming table and wherein automatically determining an identity of each of a number of playing cards forming a second hand dealt from the set of playing cards comprises reading an symbol from each of the playing cards forming the second hand when the second hand is inserted into the playing card reader located on the gaming table.

8. The method of claim 1 wherein automatically determining an identity of each of a number of playing cards forming a first hand dealt from the set of playing cards comprises reading a machine-readable symbol from each of the playing cards forming the first hand when the first hand is inserted into a first playing card reader located on the gaming table and wherein automatically determining an identity of each of a number of playing cards forming a second hand dealt from the set of playing cards comprises reading a machine-readable symbol from each of the playing cards

forming the second hand when the second hand is inserted into a second playing card reader located on the gaming table.

9. The method of claim 1 wherein automatically determining whether the identity of each playing card forming at least one of the hands matches the expected identity of that hand based on the starting sequence before any wagers are resolved further includes making the determination before a first card is dealt.

10. The method of claim 1 wherein automatically determining whether the identity of each playing card forming at least one of the hands matches the expected identity of that hand based on the starting sequence before any wagers are resolved further includes making the determination before a fourth card is dealt.

11. The method of claim 1 wherein automatically determining whether the identity of each playing card forming at least one of the hands matches the expected identity of that hand based on the starting sequence before any wagers are resolved further includes making the determination before a last card is dealt.

12. The method of claim 1 wherein the playing card game is baccarat and automatically determining an identity of each of a number of playing cards forming a first hand dealt from the set of playing cards comprises determining the identity of at least two and less than four playing cards forming the first hand.

13. The method of claim 8 wherein reading the machine-readable symbol from each of the playing cards includes reading the machine-readable symbol from a portion of a backside of each of the cards.

14. The method of claim 8 wherein reading the machine-readable symbol from each of the playing cards includes reading the machine-readable symbol from a portion of a front side of each of the cards.

15. A gaming system for managing a card game played with playing cards from a set of playing cards, the gaming system comprising:

a card shoe from which playing cards may be dealt in a determined order;

a first card hand-reader sized to receive a portion of each of at least two playing cards forming a hand of playing cards while the at least two playing cards are positioned such that at least a first human-readable symbol carried on a face of each of the playing cards is viewably exposed to a wagering participant, and to read a machine-readable identifier carried by each of the at least two playing cards while the at least two playing cards are positioned in the first card hand-reader; and

a processor communicatively coupled to receive identifying data from the first card hand reader and configured to compare an identity of each of the playing cards in the hand to an expected identity for each card in the hand based on the determined order.

16. The gaming system of claim 15 wherein the first hand reader comprises an optical reader positioned to read the machine-readable symbol carried by each of the at least two playing cards when the portion of the at least two playing cards are received in the first hand reader while another portion of the at least two playing cards including the first human-readable symbol is positioned outside of the first hand reader and is viewably exposed to one or more game participants.

17. The gaming system of claim 15 wherein the processor is further configured to decode the machine-readable identifier.

18. The gaming system of claim 15 wherein card shoe comprises a reader to read the machine-readable identifier from each of at least a number of the playing cards in the card shoe to determine the order.

19. The gaming system of claim 15, further comprising:

a gaming table comprising a playing surface including at least a Banker wagering region, a Player wagering region, and a Tie wagering region; and

a reader to read the machine-readable identifier from each of at least a number of the playing cards in the card shoe to determine the order, the reader installed in the gaming table and complementarily detachable with the card shoe.

20. The gaming system of claim 15 wherein the first hand reader comprises an optical reader positioned and configured to simultaneously read the machine-readable symbol carried by each of the at least two playing cards when the portion of the at least two playing cards are received in the first hand reader while another portion of the at least two playing cards are positioned outside of the first hand reader to expose the first human-readable symbol to one or more game participants.

21. The gaming system of claim 15 wherein the first hand reader comprises an optical reader positioned to sequentially read the machine-readable symbol carried by each of the at least two playing cards when the portion of the at least two playing cards are received in the first hand reader while another portion of the at least two playing cards are positioned outside of the first hand reader to expose the first human-readable symbol to one or more game participants.

22. The gaming system of claim 15, further comprising:

a second card hand-reader sized to simultaneously receive a portion of each of at least two playing cards forming a hand of playing cards while the at least two playing cards are each lying flat adjacent one another to expose at least a first human-readable symbol carried on a face of each of the playing cards, and to read the machine-readable identifier carried by each of the at least two playing cards while the at least two playing cards are received in the second card hand-reader.

23. The gaming system of claim 15, further comprising:

a card discard-reader sized to receive at least two hands of playing cards collected after resolving any wagers placed on the card game.

24. The gaming system of claim 15, further comprising:

at least one bet recognition device positioned on a playing surface to acquire data from at least two wager placements.

25. A card hand-reader to read identifying data from each of a number of playing cards forming a hand, the card hand-reader comprising:

a frame sized to receive a portion of up to three playing cards forming a hand while at least a first human-readable symbol on at least two of the playing cards is exposed to a game participant ; and

at least one optical sensor providing a field of view encompassing an area sufficient to image a machine-readable symbol bearing portion of the up to three playing cards when the playing cards are received in the frame.

26. The card hand-reader of claim 25 wherein the frame sized to receive the portion of the up to three playing cards when at least two of the playing cards are in an overlapping side-by-side relationship.

27. The card hand-reader of claim 25 wherein the frame sized to receive the portion of the up to three playing cards when at least two of the playing cards are in a non-overlapping side-by-side relation.

28. The card hand-reader of claim 25, further comprising:

a first optical element positioned to reflect an image of the machine-readable symbol bearing portion of a first one of the playing cards along a first optical path toward the at least one optical sensor.

29. The card hand-reader of claim 28, further comprising:

a second optical element positioned to reflect an image of the machine-readable symbol bearing portion of a second one of the playing cards along a second optical path toward the at least one optical sensor.

30. The card hand-reader of claim 29, further comprising:

a third optical element positioned to reflect an image of the machine-readable symbol bearing portion of a third one of the playing cards along a third optical path toward the at least one optical sensor.

31. The card hand-reader of claim 25, further comprising:

a prism assembly positioned to reflect images received from the respective playing cards toward the at least one optical sensor; and

at least one reflector positioned along one of the optical paths between the prism assembly and the optical sensor.

32. The card hand-reader of claim 25 wherein the at least one optical sensor comprises three distinct optical sensor arrays, each of the optical sensor arrays positioned along a respective optical path from the machine-readable symbol bearing portions of respective ones of the three playing cards.

33. The card hand-reader claim 25 wherein the at least one optical sensor comprises a single physical optical sensor array divided into three logical optical sensor array portions, each of the logical optical sensor array portions positioned along a respective optical path from the machine-readable symbol bearing portions of respective ones of the three playing cards.

34. The card hand-reader of claim 25 wherein the optical sensor comprises an array of at least one charge-coupled (CCD) device.

35. The card hand-reader of claim 25 wherein the optical sensor comprises an array of at least one CMOS device.

36. The card hand reader of claim 25 wherein the optical sensor comprises at least one of a one-dimensional array of optical sensors and a two-dimensional array of optical sensors.

37. The card hand-reader of claim 25, further comprising:

a switch positioned to be activated by the insertion of at least one of the playing cards into the card hand-reader, the switch communicatively coupled with the optical sensor to capture an image of the machine-readable symbol bearing portions of the playing cards.

38. The card hand-reader of claim 25, further comprising:

an illumination source positioned to illuminate machine-readable symbol bearing portions of the playing cards when inserted into the frame; and

a switch positioned to be activated by the insertion of at least one of the playing cards, the switch operatively coupled to activate the illumination source.

39. A card identification system for evaluating an outcome of at least one card game, the card game played with a set of encoded playing cards, the system comprising:

a card shoe-reader sized to receive the set of playing cards;

an optical scanner communicatively coupled to the card shoe-reader for reading the set of encoded playing cards to determine a sequence of the set of playing cards;

a processor in communication with the card shoe-reader for evaluating the sequence of the set of playing cards based on a known dealing sequence and card game rules, the processor further configured to determine an outcome of each card game that can be played from the set of playing cards; and

an indicator in communication with the processor for indicating the outcome of the card game.

40. The system of claim 39 wherein the playing cards are encoded with a machine-readable indicia.

41. The system of claim 39 wherein the sequence of the set of playing cards is determined after at least one burn card has been removed from the set of playing cards.

42. The system of claim 39 wherein the indicator is connected to the card shoe-reader.

43. The system of claim 39 wherein the card game includes a Banker's hand and a Player's hand, each hand having at least two cards, but not more than three cards as determined by the card game rules.

44. The system of claim 42 wherein the indicator displays the outcome of the card game of Baccarat; the outcome being that either the Banker's hand wins, the Player's hand wins, or the Banker's hand ties with the Player's hand.

45. The system of claim 39 wherein the indicator is configured to display the outcome of the card game to at least one table participant.

46. The system of claim 39, further comprising:

at lease one card hand-reader to read identifying data from each of the cards dealt from the set of playing cards, the cards dealt from the set of playing cards forming a first hand and a second hand;

a verification means for verifying that the cards comprising the first hand and second hand are consistent with an electronically determined outcome based on data acquired from the set of playing cards within the card shoe-reader.

47. A method of determining an outcome of at least one card game, the card game being selectable from a set of playing cards, the method comprising:

determining a card sequence of the set of playing cards from which the card game will be selected;

evaluating the card sequence to determine the outcome of the at least one card game based on a set of card game rules and a dealing sequence, the outcome being determined for the at least one card game at any time before a wager is resolved, but after the card sequence is determined from the set of playing cards; and

providing an indication as to which one of the hands selected from the set of playing cards comprises a winning hand or whether the hands are a tie.

48. The method of claim 47, further comprising:

allowing a number of wagering participants to place wagers on the outcome of the card game;

removing the cards comprising the card game from the set of playing cards according to the dealing sequence and the card game rules;

determining the winning hand or push by visual verification; and

independently verifying the winning hand or tie hand with the provided indication.

49. The method of claim 47 wherein determining a card sequence of the set of playing cards from which at least one card game will be selected comprises reading the set of playing cards in a card shoe-reader after a number of burn cards are removed from the set.

50. The method of claim 47 wherein determining a starting sequence of the set of playing cards from which at least one card game will be dealt comprises reading the set of playing cards in a card shoe-reader before a number of burn cards are removed from the set.

51. The method of claim 50 wherein determining a card sequence of the set of playing cards from which at least one card game will be selected includes determining how many burn cards will be removed from the set of playing cards.

52. The method of claim 47 wherein determining a card sequence of the playing cards in a set of playing cards from which at least one card game will be selected comprises determining an identity of each of the playing cards in the set of playing cards before a card shoe-reader holding the set of playing cards is placed on the gaming table.

53. The method of claim 47 wherein determining a card sequence of the playing cards in a set of playing cards from which at least one card game will be selected comprises determining an identity of each of the playing cards in the set of playing cards after a card shoe-reader holding the set of playing cards is placed on the gaming table.

54. The method of claim 47 wherein determining a card sequence of the playing cards in a set of playing cards from which at least one card game will be selected comprises one of optically imaging and optically scanning an encoded symbol from each card comprising the set of playing cards.

55. The method of claim 47, further comprising:

a display means for displaying human-readable symbols representative of at least a face value of each of the cards comprising the card game.

56. The method of claim 47 wherein determining the card sequence of the set of playing cards from which the card game will be selected includes reading a machine-readable symbol from a portion of a backside of each of the cards.

57. The method of claim 47 wherein determining the card sequence of the set of playing cards from which the card game will be selected includes reading a machine-readable symbol from a portion of a front side of each of the cards.

58. A method of determining an outcome of one card game, the card game being selectable from a set of playing cards, the method comprising:

determining a card sequence of at least four cards, but less than the entire set, within the set of playing cards from which the card game will be played;

evaluating the card sequence to determine the outcome of the card game based on a set of card game rules and a dealing sequence;

removing at least the four cards, but not more than six cards from a card shoe-reader to assemble a first hand and a second hand, each hand having at least two cards each; and

providing an indication as to which one of the hands selected from the set of playing cards comprises a winning hand or whether the hands are a tie.

59. The method of claim 58 wherein determining a card sequence from the at least four playing cards comprises optically imaging the at least four playing cards in the card shoe-reader.

60. The method of claim 58 wherein determining a card sequence from the at least four playing cards includes determining how many burn cards will be removed from the set of playing cards.

61. The method of claim 59 wherein determining a card sequence of the at least four playing cards in a set of playing cards comprises determining an identity of each of the imaged playing cards before the card shoe-reader is placed on the gaming table.

62. The method of claim 59 wherein determining a card sequence of the at least four playing cards in a set of playing cards comprises determining an identity of each of the imaged playing cards after the card shoe-reader is placed on the gaming table.

63. A method of determining an outcome of at least one card game, the card game being selectable from a set of playing cards, the method comprising:

providing the set of playing cards to a gaming table;

dealing a number of cards necessary to comprise at least two complete playing hands for the selected card game based on a set of card game rules;

positioning each of the number of cards comprising the respective playing hands into at least one card hand-reader;

reading a machine-readable indicia from each of the playing cards positioned within the card hand-reader;

evaluating the machine-readable indicia from each of the cards to determine the outcome of the card game based on the set of rules; and

verifying that the outcome of the card game as determined by the card hand-reader corresponds to the outcome of the card game upon visually totaling the cards making up the respective playing hands.

64. The method of claim 63 wherein providing the set of playing cards to a gaming table includes optically reading the set of playing cards within a card shoe-reader.

65. The method of claim 63 wherein dealing a number of cards necessary to comprise at least two complete playing hands includes dealing a Banker's hand and a Player's hand, each hand having at least two, but not more than three cards.

66. The method of claim 63 wherein positioning each of the number of cards comprising the respective playing hands into at least one card hand-reader further includes triggering the card hand-reader to read the machine-readable indicia on the respective playing cards.

67. The method of claim 63 wherein reading a machine-readable indicia from each of the playing cards positioned within the card hand-reader includes directing an optical image of the machine-readable indicia to a camera.

68. The method of claim 63 wherein evaluating the machine-readable indicia from each of the cards to determine the outcome of the card game based on the

set of rules includes decoding the indicia to determine a rank of each of the playing cards.

69. A means for determining an outcome of at least one card game, the card game being selectable from a set of playing cards, the means comprising:

a support means for supporting the set of playing cards within a receptacle;

a reading means for reading a machine-readable symbol from a portion of at least some of the cards within the set of playing cards; and

a processing means for digitally interpreting the machine-readable symbols.

70. The means of claim 69, further comprising:

a notification means for indicating the outcome of the game.

71. The means of claim 69, further comprising:

a verification means for determining if an electrically determined outcome evaluated by the reading means is consistent with an evaluation performed by the verification means.

72. The means of claim 69 wherein the support means is a transport, sloped member configured to allow the playing cards to smoothly transition thereon.

73. The means of claim 69 wherein the reading means is a linear scanner.

74. The means of claim 69 wherein the processing means is a computer system.

75. A device for successively evaluating more than one wager placed on a gaming table, the device comprising:

a reflector rotatably coupled with the device, the reflector is configured to rotate from at least 0 to 360 degrees;

a drive for rotationally positioning the reflector;

a lens configured to receive a substantial portion of an image deflected from the reflector, the image comprised of at least a portion of at least one wagering chip; and

a processor for decoding the image received by the lens.

76. The device of claim 75, further comprising:

a sensor for illuminating the at least one wagering chip; and

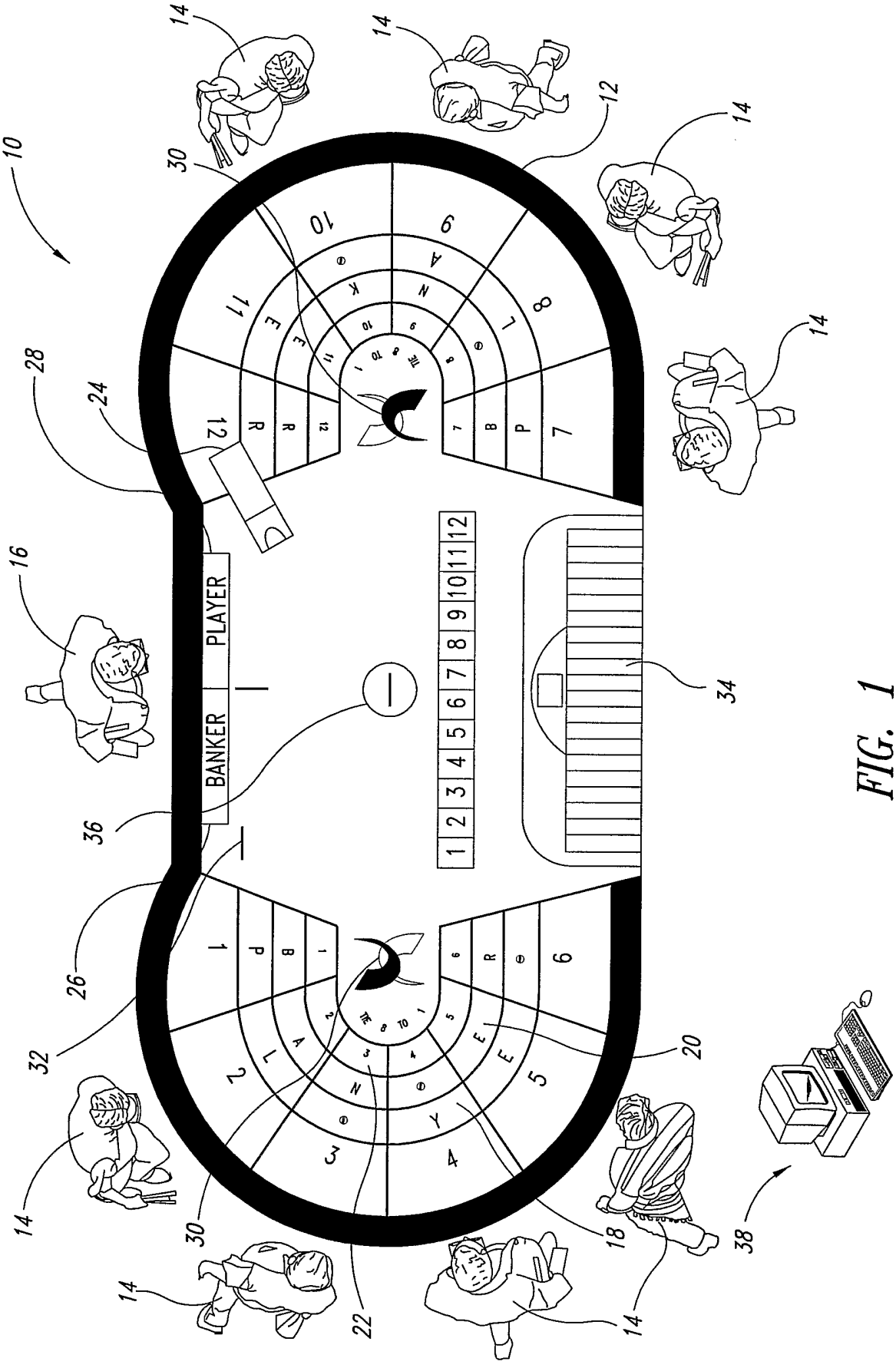
an enclosure for retaining and protecting the reflector and the sensor.

77. The device of claim 75 wherein the reflector is programmably controlled to scan any wagering chips on the gaming table over a range of 0 to 270 degrees.

78. The device of claim 75 wherein the image is a two-dimensional array comprised of encoded symbologies.

79. The device of claim 75 wherein the device is substantially recessed into the gaming table.

80. The device of claim 75 wherein the image is pre-processed by a lens array *enroute* to the processor.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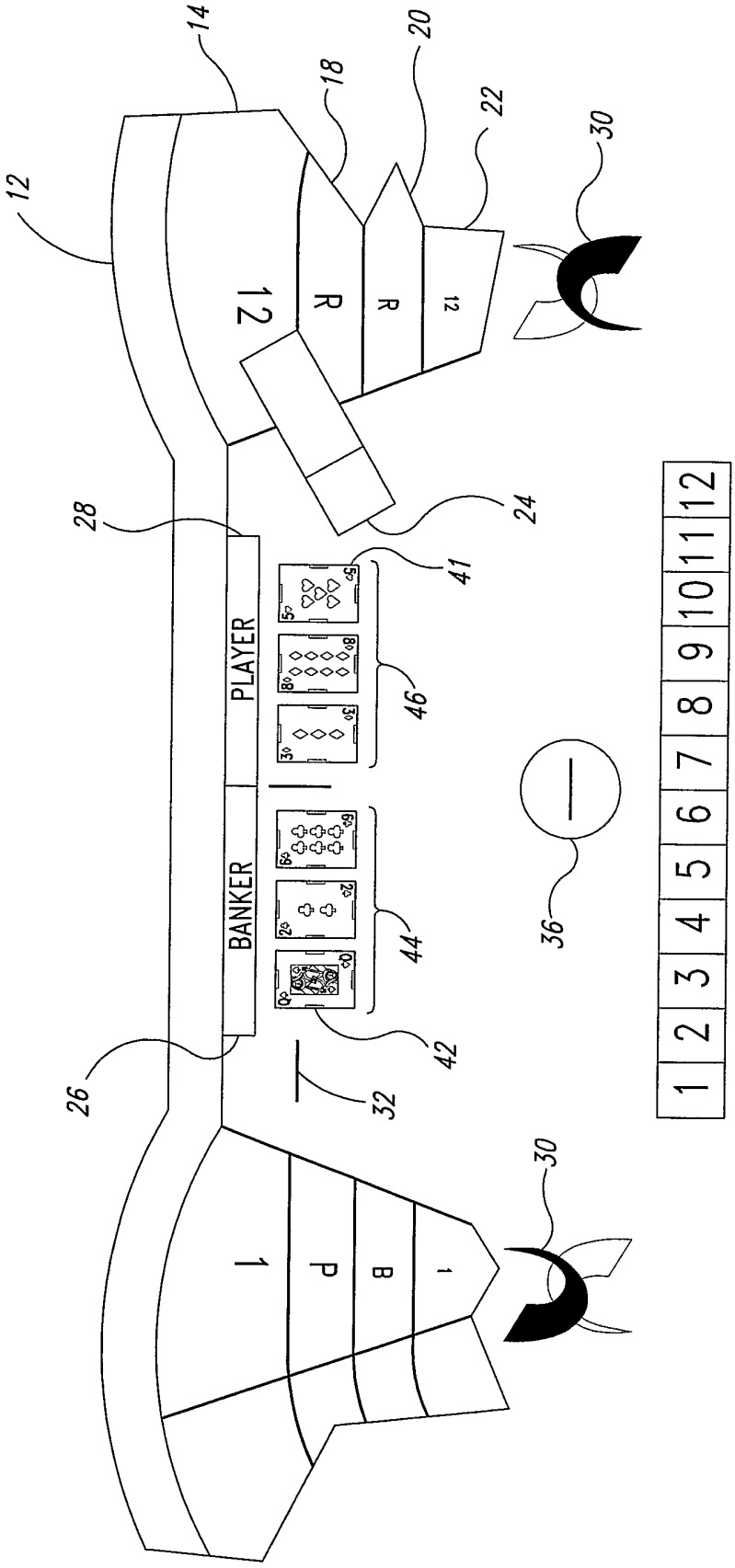
36
38
BANKER
PLAYER
1 2 3 4 5 6 7 8 9 10 11 12

FIG. 1


12
14
18
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R
R
12
28
PLAYER
BANKER
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41
46
44
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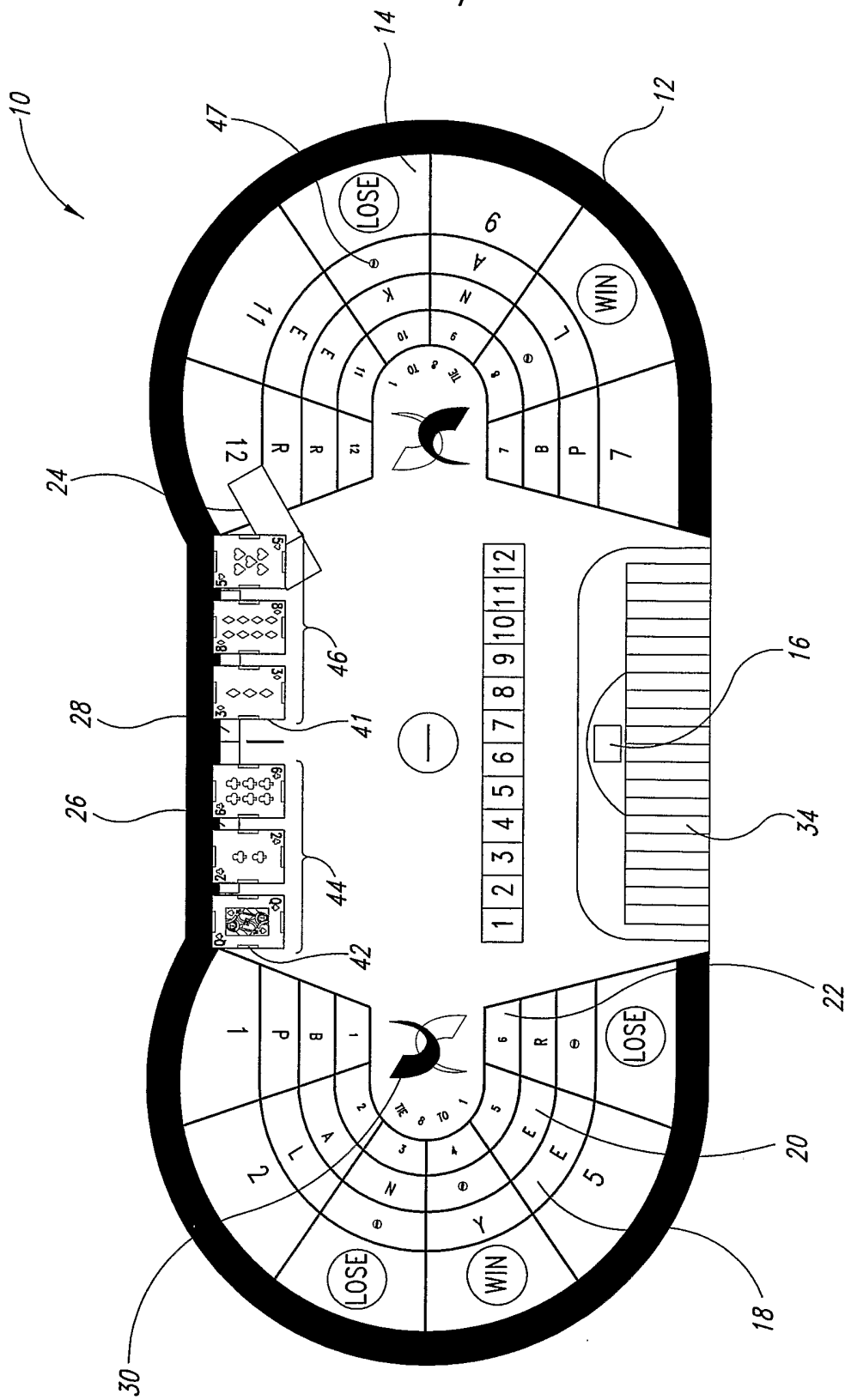
32
26
30
1
P
B
1
1 2 3 4 5 6 7 8 9 10 11 12

FIG. 2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47
LOSE
WIN
LOSE
WIN
LOSE
1 2 3 4 5 6 7 8 9 10 11 12

FIG. 3

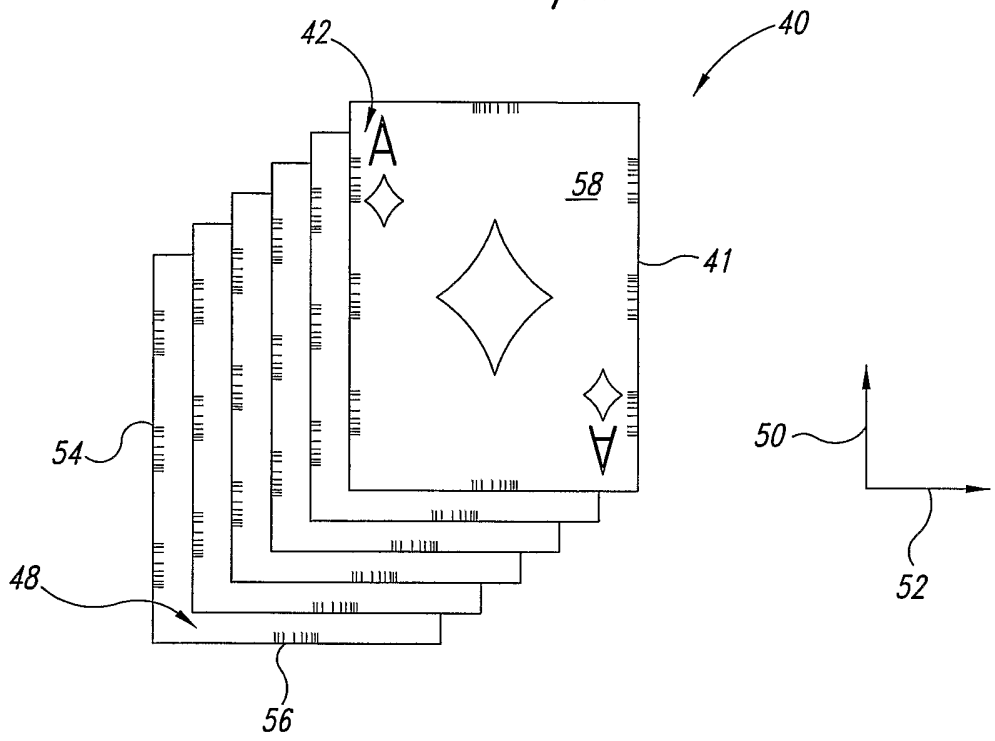

FIG. 4

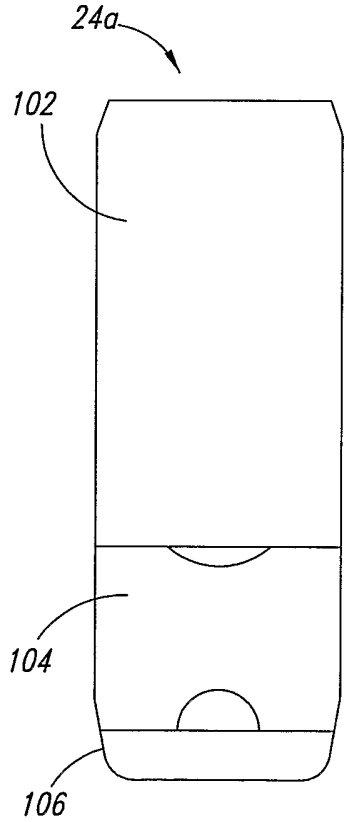

FIG. 5

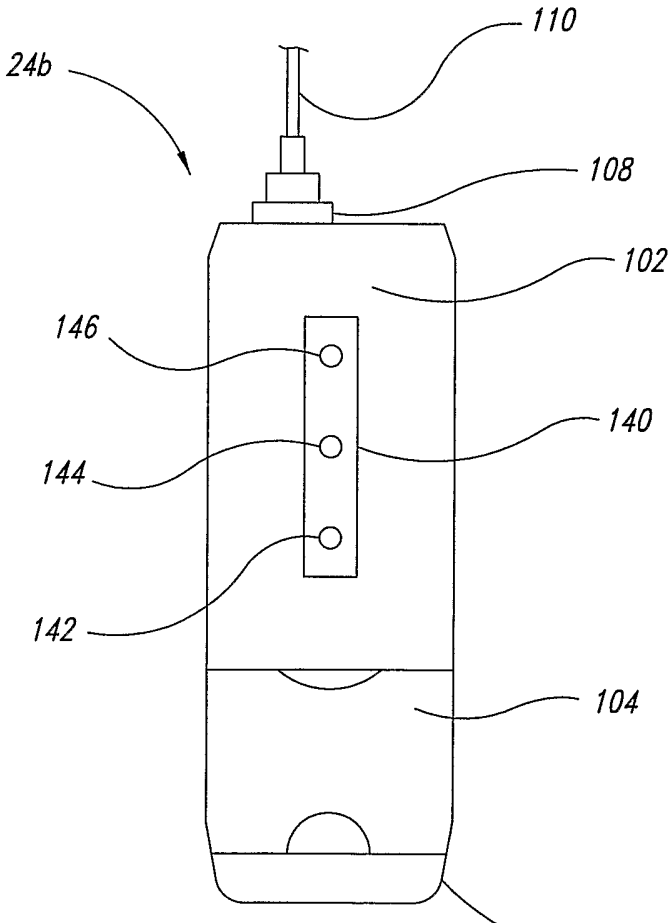

FIG. 6

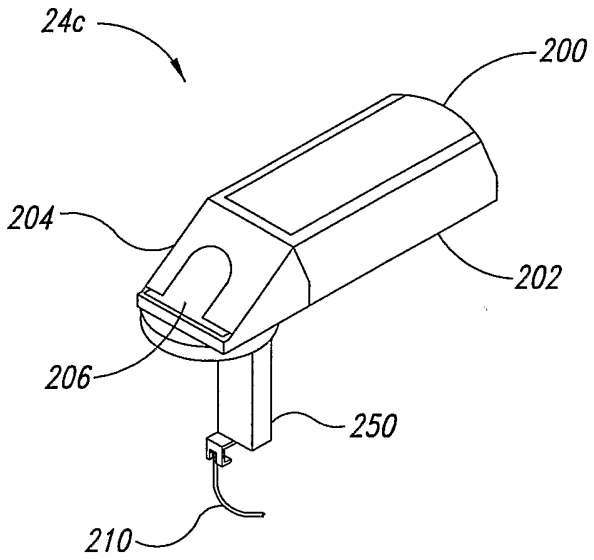

FIG. 7

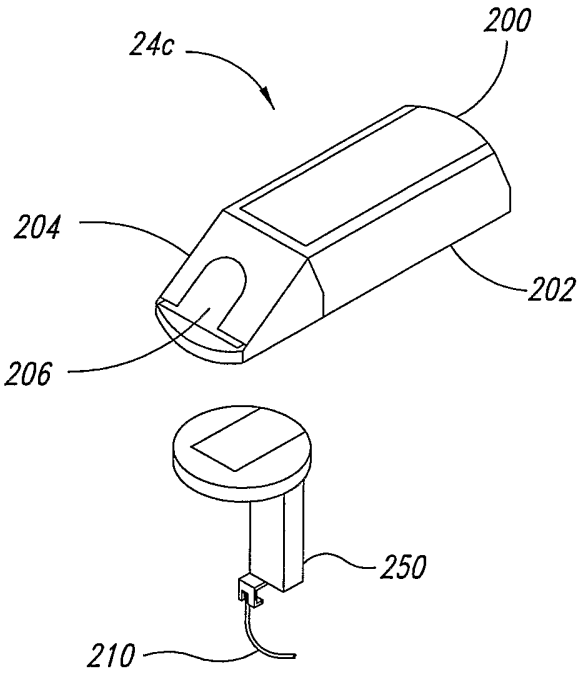

FIG. 8

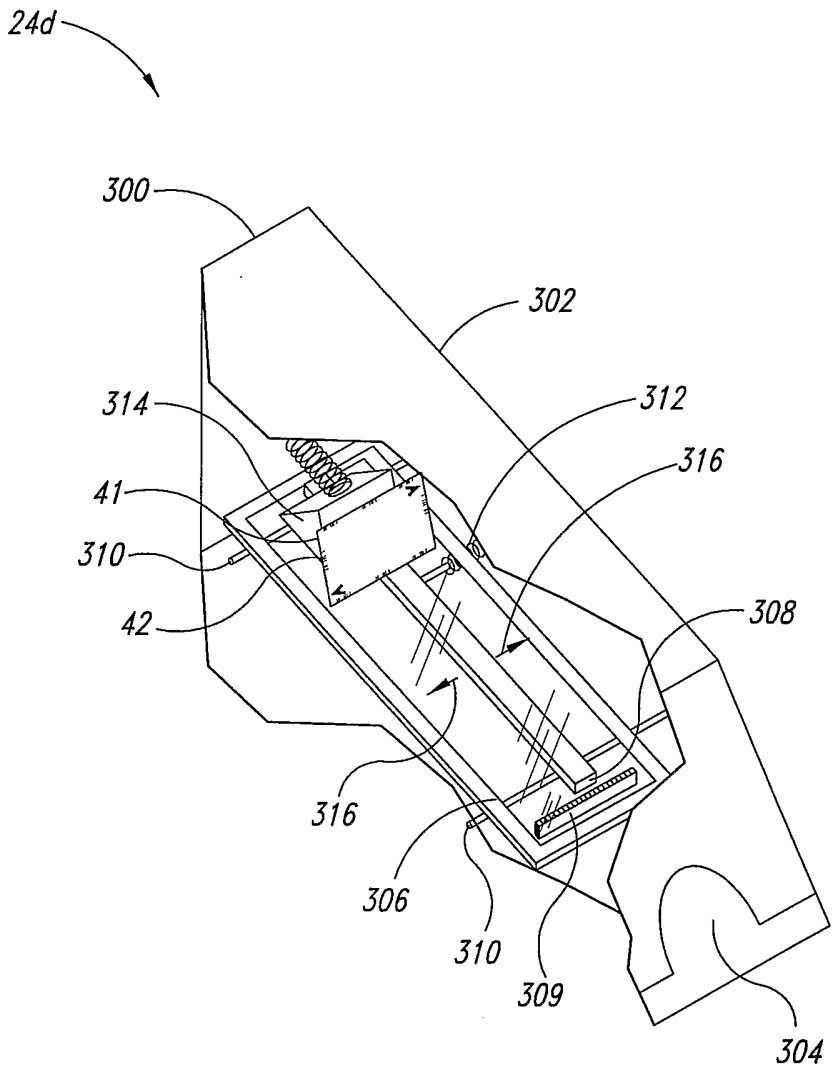

FIG. 9

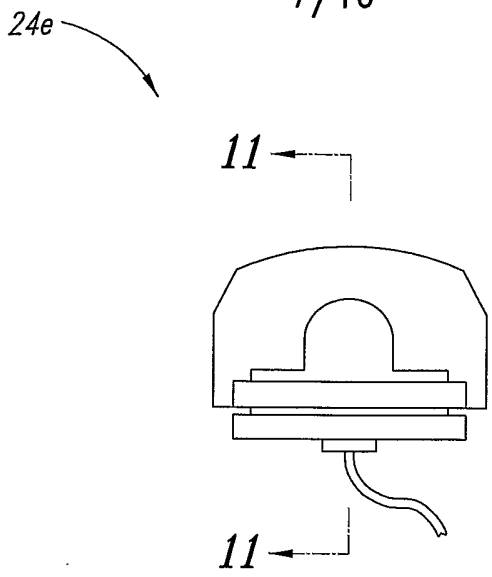

FIG. 10

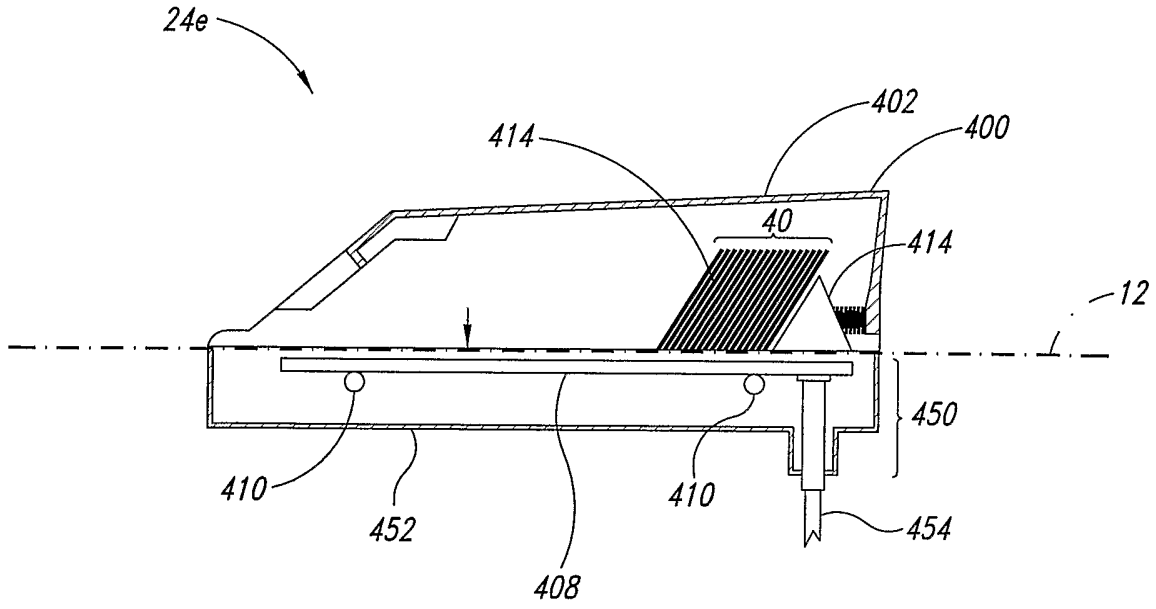

FIG. 11

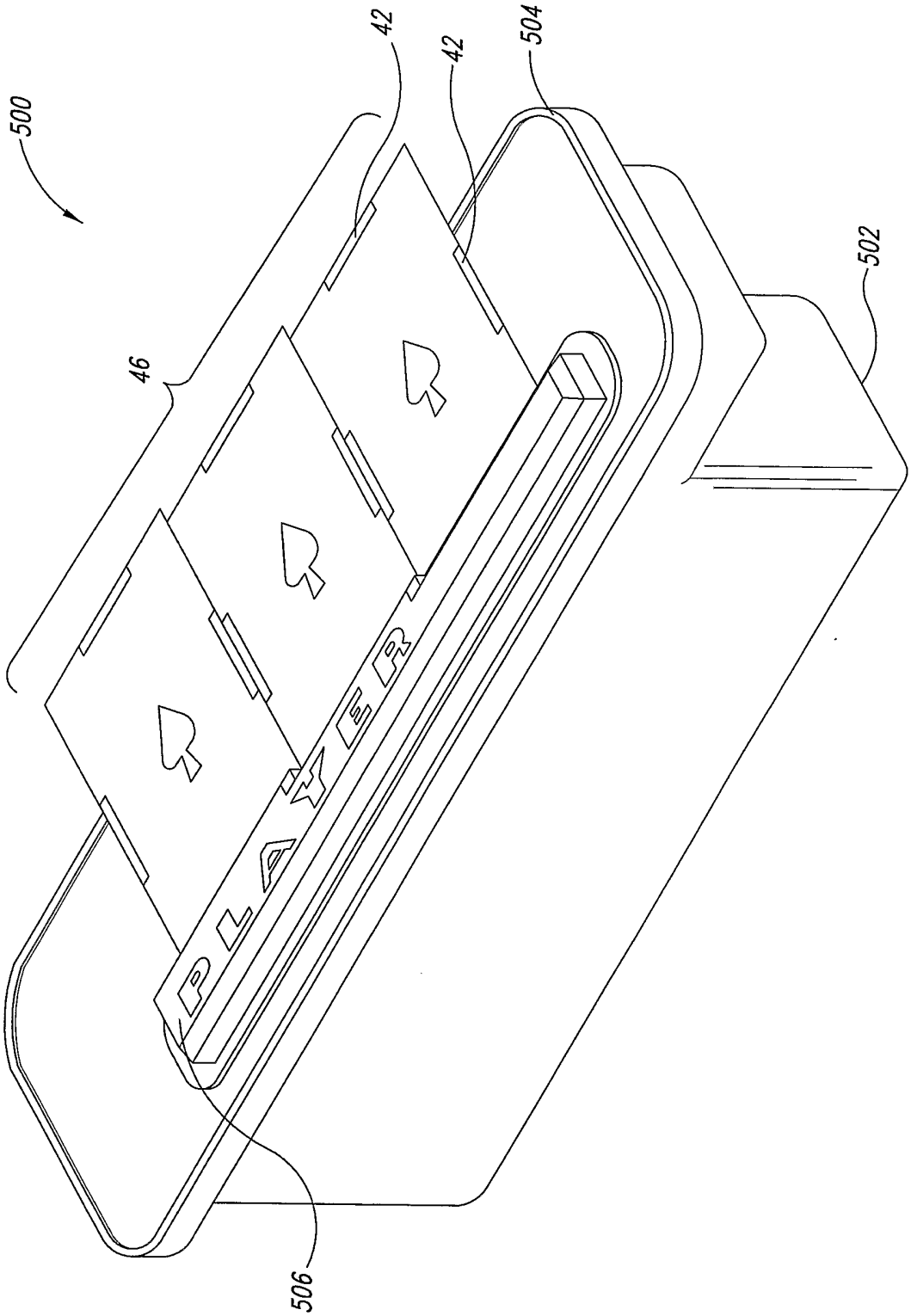

FIG. 12

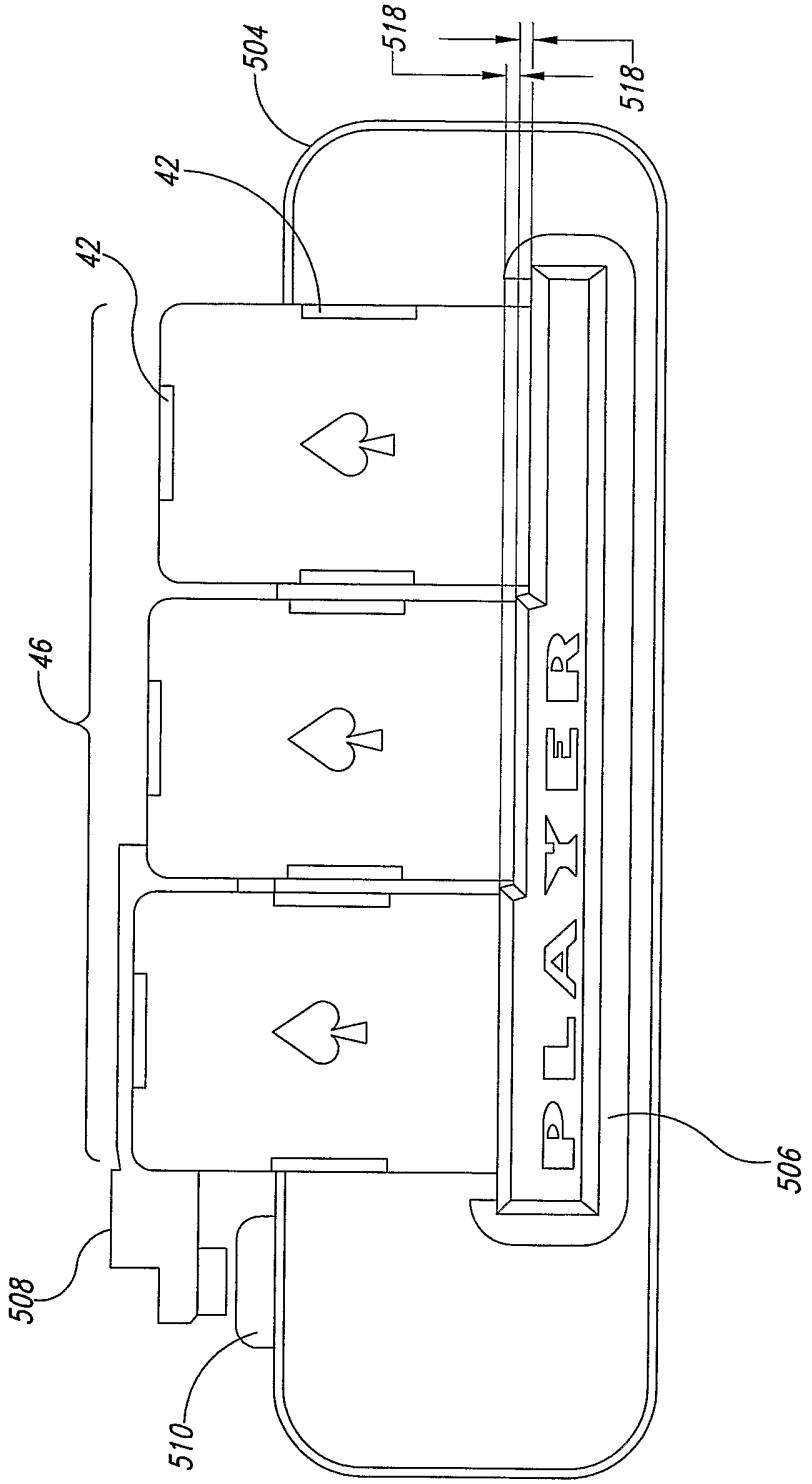

FIG. 13

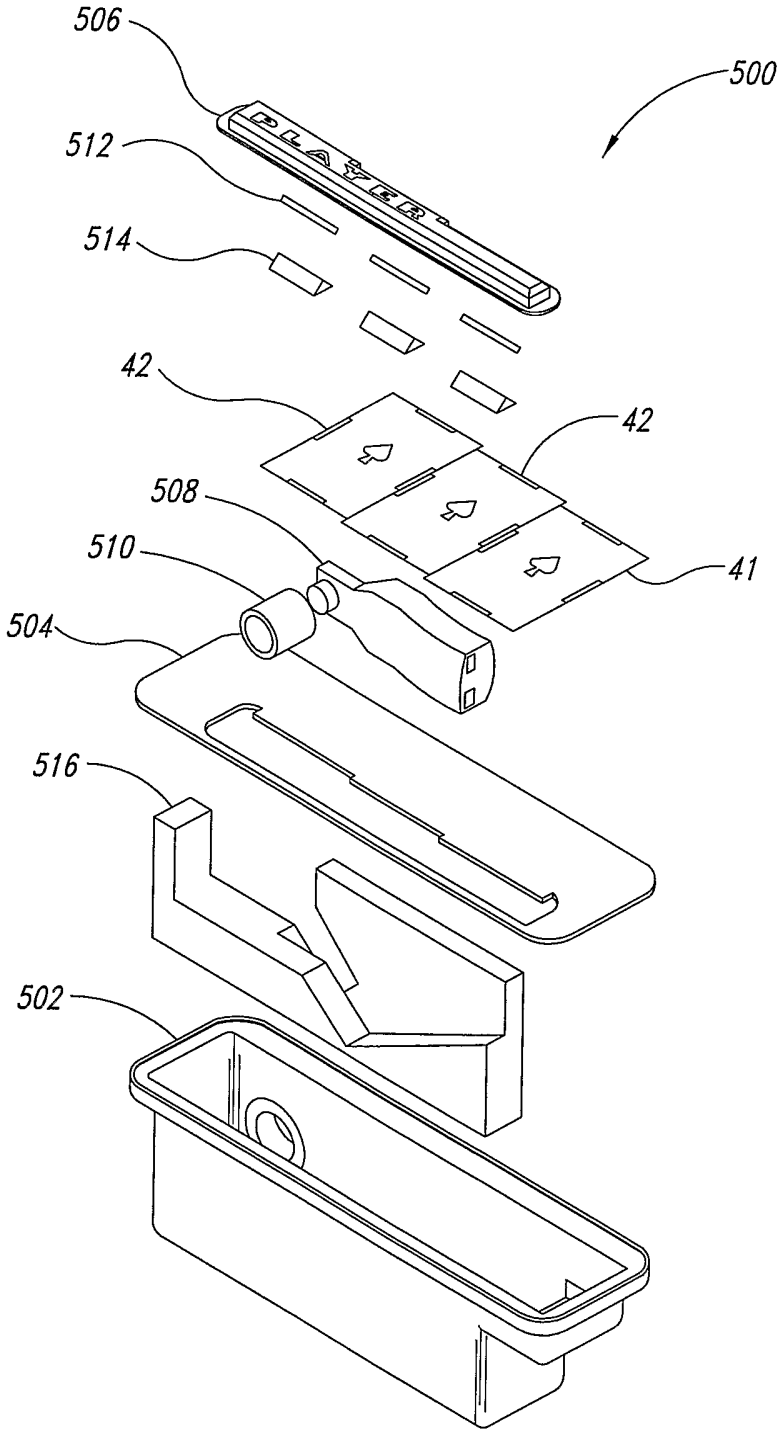

FIG. 14

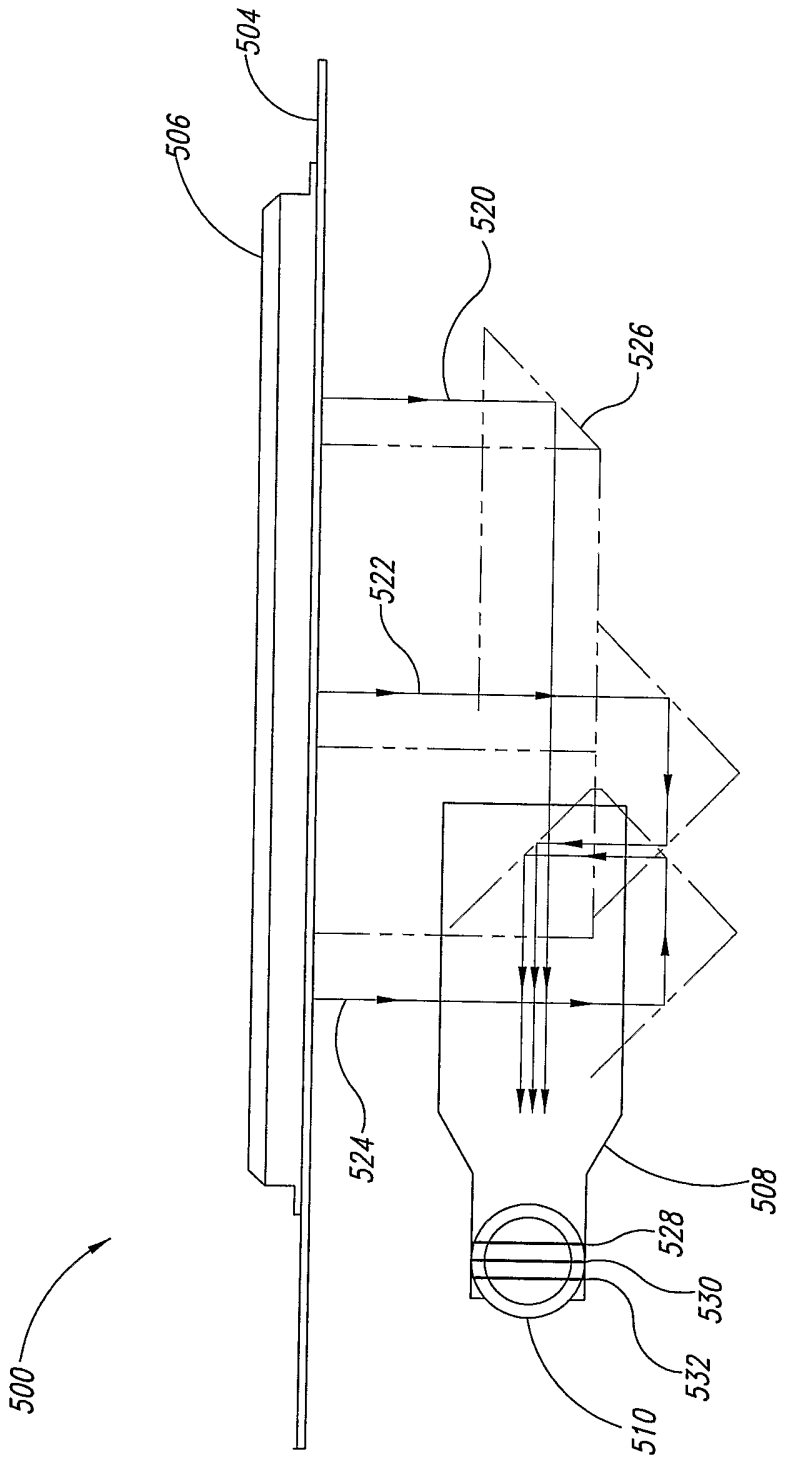

FIG. 15

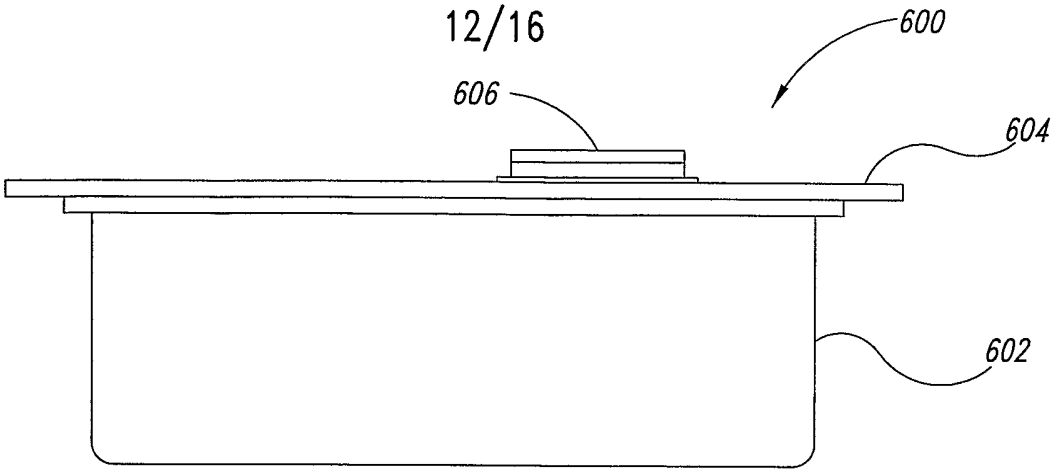

FIG. 16

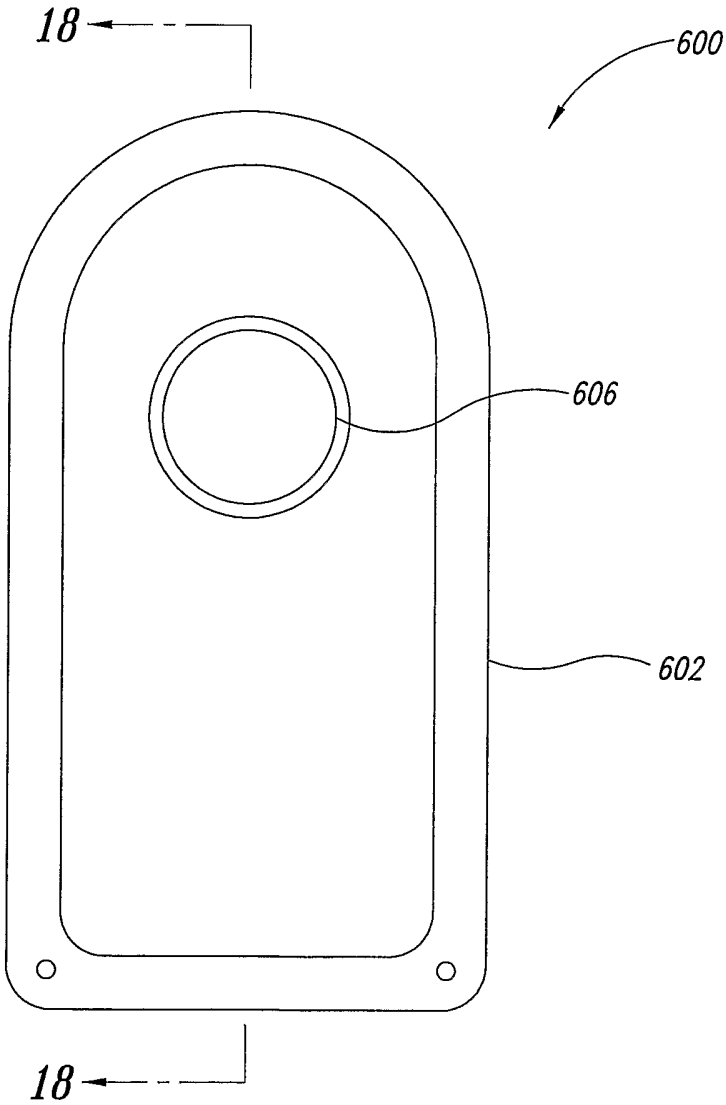

FIG. 17

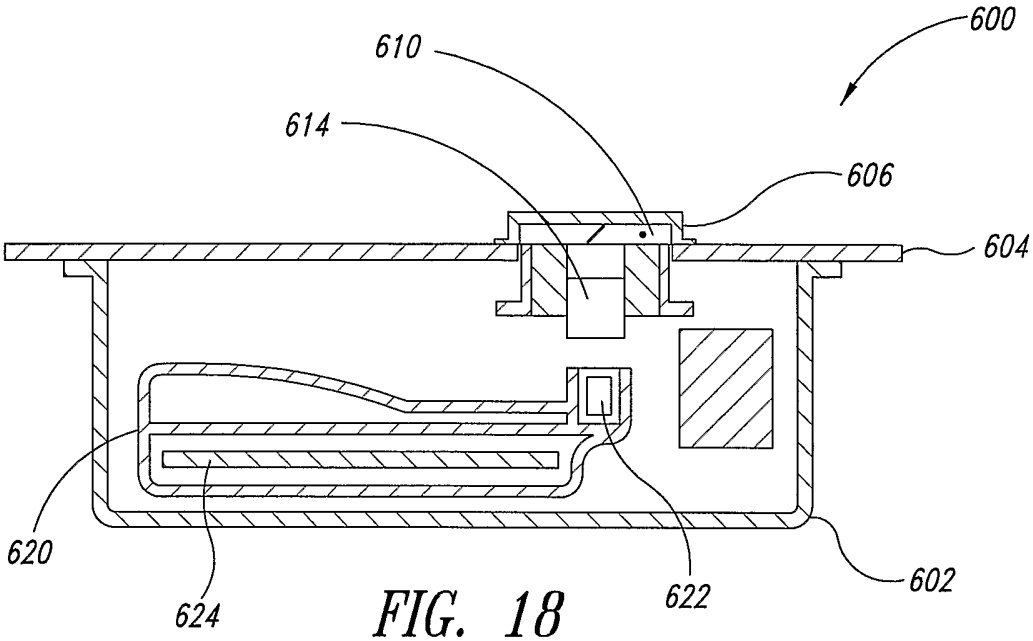
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FIG. 18

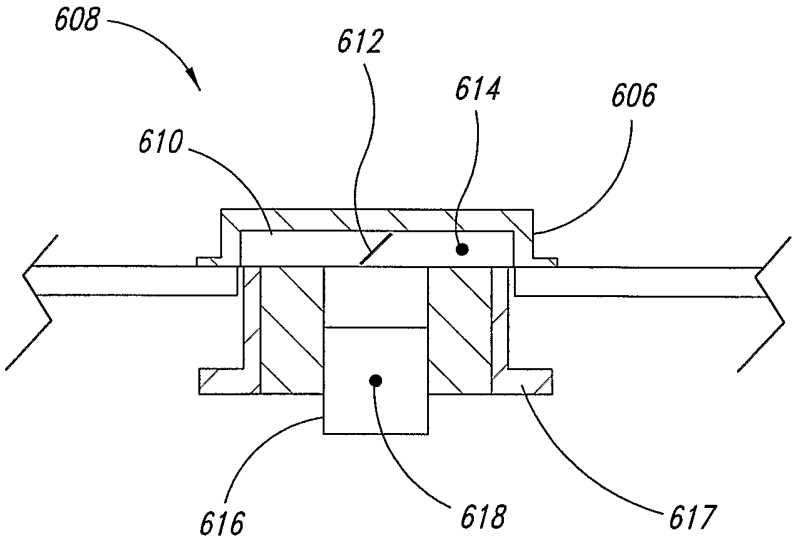
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FIG. 19

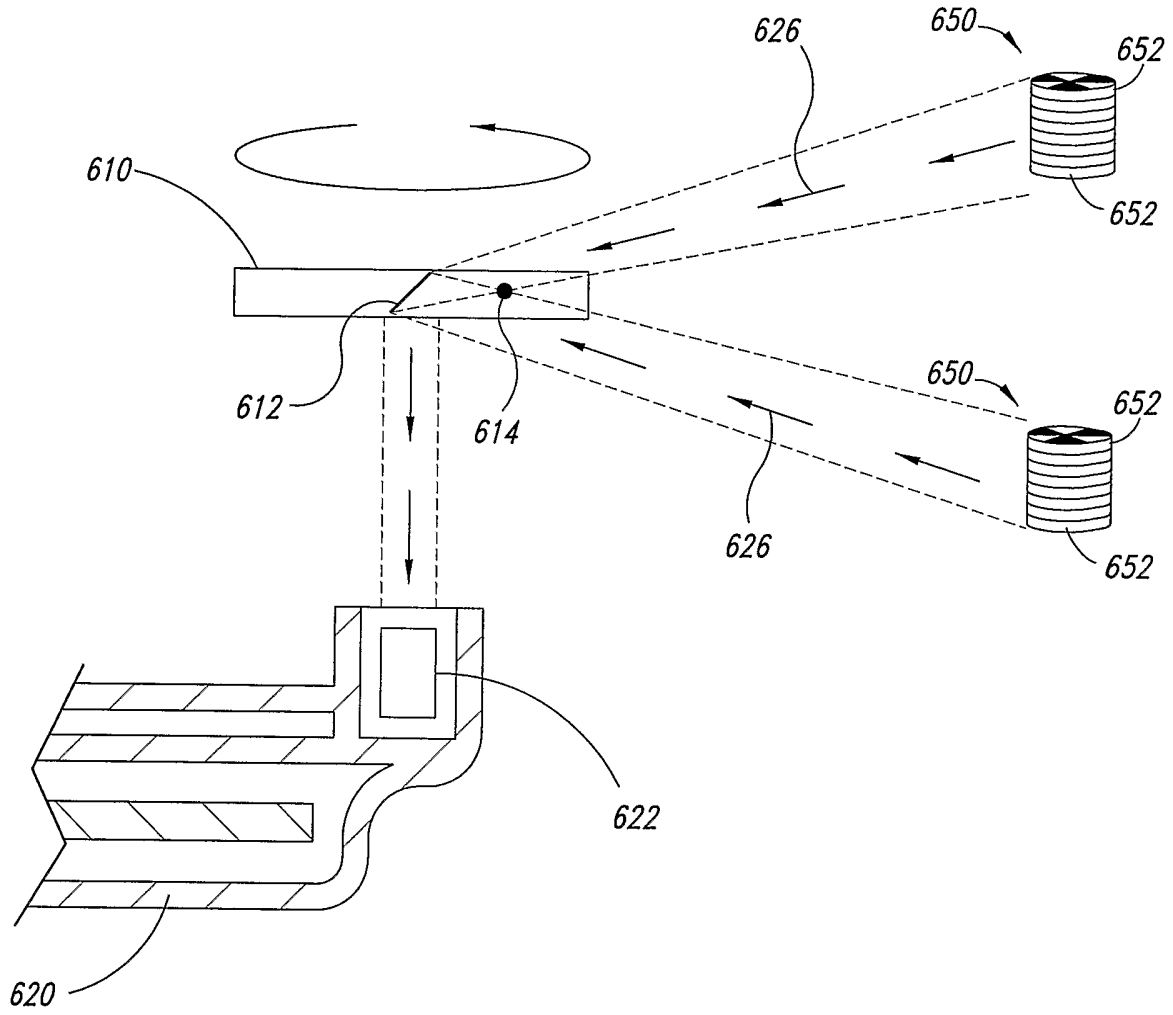

FIG. 20

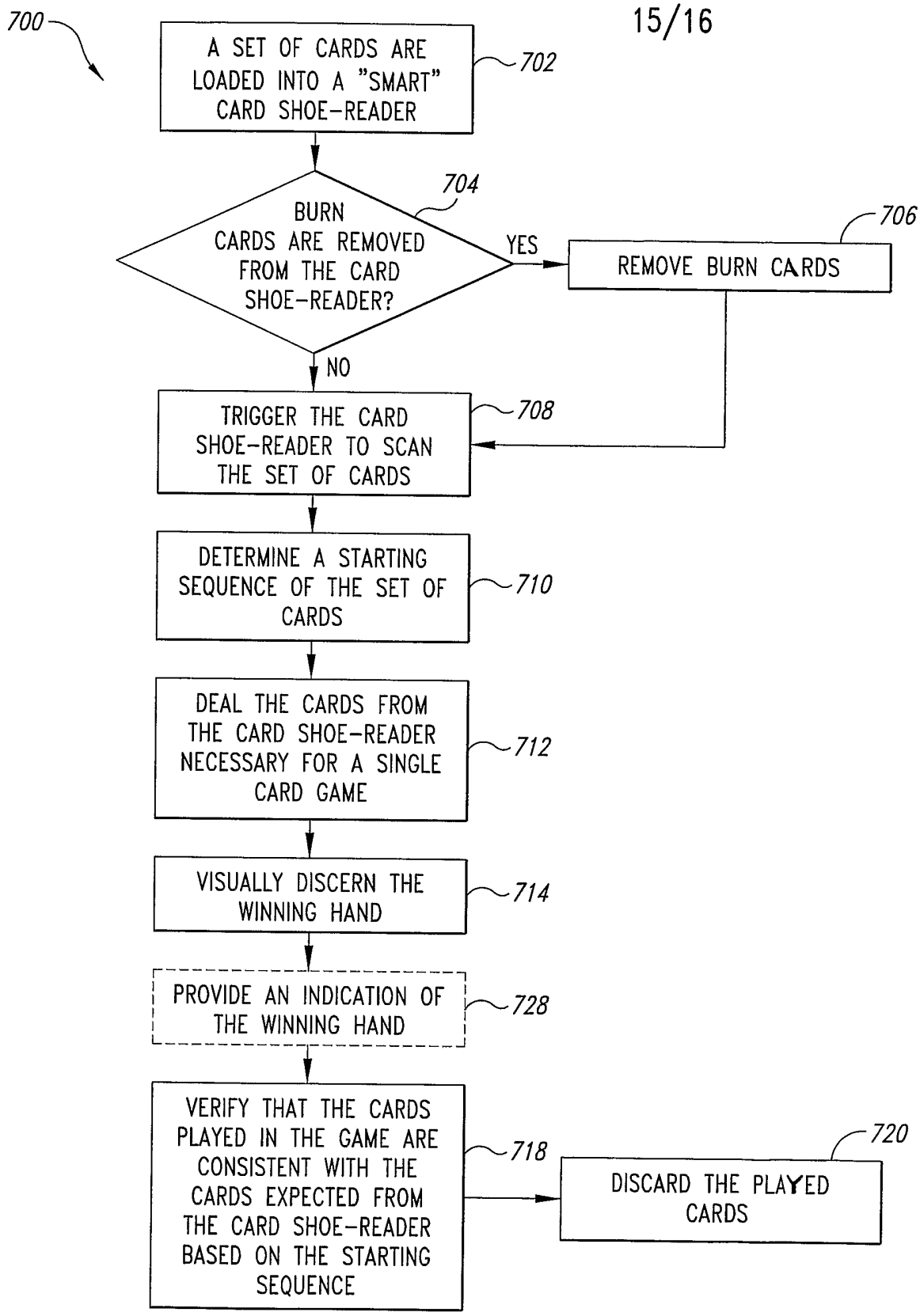
700
A SET OF CARDS ARE LOADED INTO A "SMART" CARD SHOE-READER
702
704
BURN CARDS ARE REMOVED FROM THE CARD SHOE-READER?
YES
706
REMOVE BURN CARDS
NO
TRIGGER THE CARD SHOE-READER TO SCAN THE SET OF CARDS
708
DETERMINE A STARTING SEQUENCE OF THE SET OF CARDS
710
DEAL THE CARDS FROM THE CARD SHOE-READER NECESSARY FOR A SINGLE CARD GAME
712
VISUALLY DISCERN THE WINNING HAND
714
PROVIDE AN INDICATION OF THE WINNING HAND
728
VERIFY THAT THE CARDS PLAYED IN THE GAME ARE CONSISTENT WITH THE CARDS EXPECTED FROM THE CARD SHOE-READER BASED ON THE STARTING SEQUENCE
718
720
DISCARD THE PLAYED CARDS

FIG. 21

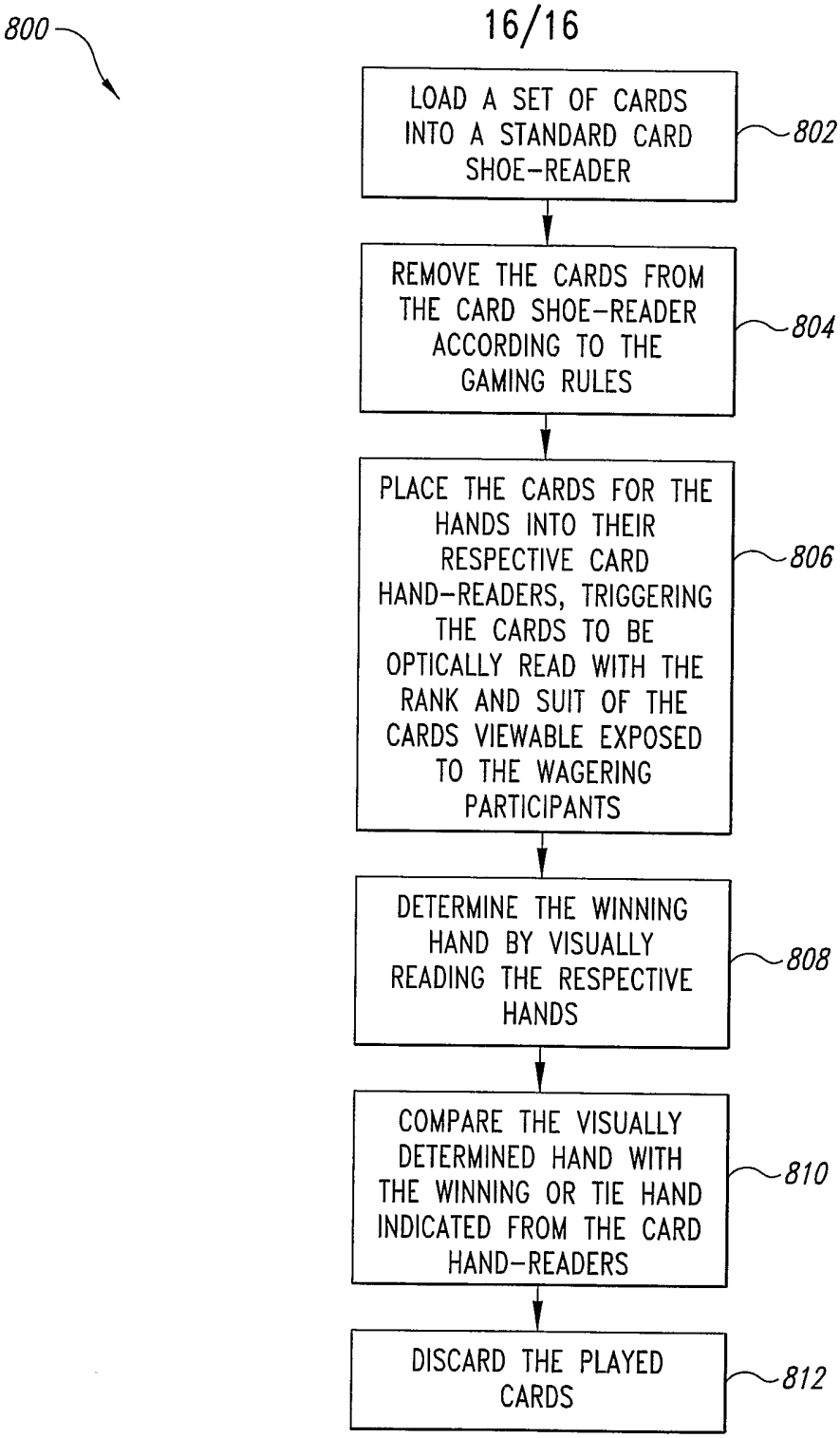
800
LOAD A SET OF CARDS INTO A STANDARD CARD SHOE-READER
802
REMOVE THE CARDS FROM THE CARD SHOE-READER ACCORDING TO THE GAMING RULES
804
PLACE THE CARDS FOR THE HANDS INTO THEIR RESPECTIVE CARD HAND-READERS, TRIGGERING THE CARDS TO BE OPTICALLY READ WITH THE RANK AND SUIT OF THE CARDS VIEWABLE EXPOSED TO THE WAGERING PARTICIPANTS
806
DETERMINE THE WINNING HAND BY VISUALLY READING THE RESPECTIVE HANDS
808
COMPARE THE VISUALLY DETERMINED HAND WITH THE WINNING OR TIE HAND INDICATED FROM THE CARD HAND-READERS
810
DISCARD THE PLAYED CARDS
812

FIG. 22