SWIVEL MOUNTED CARD HANDLING DEVICE

RELATED APPLICATIONS

The present invention is a Continuation-In-Part of pending **reissue** application Serial No. 11/299,243, filed December 9, 2005, which is a reissue of U.S. Patent 6,659,460. U.S. Patent 6,659,460 claims priority to PCT Application Serial No. PCT/AT01/00088, FILED March 26, 2001, which in turn claims priority to Austrian application Serial No. 634/2000, filed April 12, 2000, now Austrian Patent 409 222. The disclosure of the above-identified patents and applications are hereby incorporated by reference in their entireties.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present technology relates to the field of playing card handling devices such as shufflers (both batch and continuous), delivery shoes, card discard trays and the like. These card handling devices may have card-reading or imaging capability and may be in communication links with other intelligent components in a casino environment.

2. Background of the Art

In the gaming industry, especially in casino table gaming, there has been a significant move towards more automation. Playing cards are read, wagers are electronically read, player identifications are read, and the totality of the information is communicated to one or more processors, servers or computers to store and/or analyze the information for gaming and record keeping functions.

As with many technological improvements, there are often sacrifices by workers, often in the sense that functionally improved environments may not be as ergonomically satisfactory as more traditional modes of operation. The environment of playing card delivery and removal is one particular area of dissatisfaction amongst dealers in the casino table card game environment.

Originally, dealers would take one or more decks of playing cards, shuffle them manually, and deliver cards out of their hands. Dealers were able to move, bend, twist, shift forward and backwards, lift their arms and had a great degree of freedom of movement. Even though the work was repetitive, this freedom of movement relieved some of the physical stress that can build up when working long hours in a single position, with repetitive movements. Even with the initial advent of delivery shoes in the 1950's, the dealers were still able to move while they were manually shuffling cards. The delivery shoes are small and light and move easily over the gaming surface.

With the successful penetration of the casino market with automatic shufflers, primarily by Shuffle Master, Inc., the dealers are no longer required to perform repetitive shuffling tasks, but they have less freedom of movement during work. The shuffler is typically mounted in a fixed position on a table, positioned so that the structure does not interfere with play and in a position that is intended to be comfortable for a dealer of average size. The dealer inserts cards in a single stationary location, the playing cards are shuffled, the dealer removes the playing cards from a stationary card delivery tray or chute, and the dealer deals out the cards to each player position, himself and or a community position.

Shufflers, in particular, can vary significantly in height, width, depth and function on a table. Different functions include batch shufflers (which randomize a complete set of cards, which are then removed from the shuffler as a group, or in multiple sub-groups) and continuous shufflers (a number of cards always remain in a shuffler, smaller subsets are removed periodically, and spent cards are reintroduced into the shuffler and randomized into the number of cards that remain in the shuffler). Some shufflers are mounted flush with a gaming table surface, while others are fixed to a platform adjacent the table or mounted with brackets to a side of the table adjacent the dealer's position. Yet others sit on the table surface. Each of these positions requires the dealer to make repetitive moves to a single stationary position where the shuffler remains stationary. As dealers are of different heights, arm-lengths and flexibility, there is no perfect single position at which a playing card system, such as a shuffler, may be fixed.

As mentioned above, some shufflers such as the one2six® shuffler, as described in U.S. Patent 6,659,460 rest on the gaming table surface. Although this shuffler is capable of being repositioned on the table surface, its elevation with respect to the gaming surface is high as compared to more low profile shufflers.

Examples of continuous and batch shufflers that are known in the art and may be used in the practice of the present invention include, by way of non-limiting examples, those shown in U.S. Patent Nos. 7,384,044; 7,322,576; 7,261,294; 7,255,344; 7,234,698; 7,137,627; 7,059,602; 7,036,818; 6,905,121; 6,886,829; 6,719,288; 6,651,981; 6,588,751; 6,588,750; 6,568,678; 6,254,096; 6,149,154 and the like. Each of these patents are incorporated herein by reference, in their entirety. Some of these shuffling devices also have built in card reading capability.

Similarly, any delivery shoe or discard rack may be used on a gaming table, such as those disclosed, by way of non-limiting examples, in U.S. Patent Nos. 7,407,438; 7,374,170; 7,278,923; 7,264,241; 7,213,812; 7,114,718; 6,637,622; 6,402,142; 6,299,536; 6,039,650; 5,722,893; and the like, each of which is incorporated herein by reference.

SUMMARY OF THE INVENTION

Playing card delivery devices such as card shufflers, card shoes and discard racks comprise a housing and a support base. The support base is supported by a gaming table surface.

The housing includes an area that stores multiple playing cards, and an opening in the housing through which playing cards may be removed.

A structure extends below the support base, positionable in an aperture in a gaming table. The support base is movable on the gaming table surface. Movement is limited by an area defined by the size and shape of the aperture in the table.

The present invention may be characterized as a playing card delivery system. The system includes a gaming table having a top play surface with an aperture extending therethrough. A playing card delivery device with a playing card delivery shoe is elevated with respect to an elevation of a playing card reader located in the playing card delivery device. The playing card reader is insertable in the aperture.

The device is mounted so that the playing card reader is located below the game table top play surface and the playing card delivery shoe is located above the top play surface.

The present invention is a modular card handling device. The device includes a base, a shoe that is fixedly mounted to the base, and a card holding device comprising a card infeed area and a card output area. The shoe has a quick release locking mechanism that connects the shoe to the card output area of the card handling device.

The present invention may also be characterized as a card handling system having an area for holding cards, a card input area and a card output area. The card output area is configured for manual removal of one card at a time. The card output area has an opening for removal of cards that is offset from a center of the card output area.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 is a side elevational view of a playing card shuffler (with cover removed) with a removable delivery end that is one example of a playing card card handling device of the present invention.

Figure 2 is a perspective view of an exemplary playing card shuffling device fixed to a movable base.

Figure 3 is a left side elevational view of a playing card shuffler mounted on a movable base that is supported by a gaming table surface.

Figure 4 shows an expanded partial cutaway left side elevational view of a playing card delivery shoe and playing card reader assembly that may be pivotally mounted on a game table.

Figure 5 is a detailed side cut away view of the card reading shoe's sensors, camera system, and processing components with support structures removed.

Figure 6 is a perspective view of the lower surface of the removable card shoe assembly (with mounting base removed).

Figure 7 is a perspective view of the lower surface of the card shoe assembly with mounting base removed.

Figure 8 is a top perspective view of the card shoe assembly with protective housing.

Figure 9 is a perspective view of the card dispensing end of the shuffler with the card shoe assembly and base removed.

Figure 10 is a schematic diagram of the functions of the card reading module.

Figure 11 is a flow diagram representing the card imaging process.

Figure 12 is a top perspective view of the card reading shoe assembly attached to a base.

Figure 13 is a top perspective view of the card reading shoe assembly and base supporting the shoe main circuit board with upper protective housing structure removed.

Figure 14 is a bottom perspective view of the card reading shoe assembly and base illustrating one example of the exterior imaging system housing.

Figure 15 is a side elevational view of an exemplary shuffler/shoe system mounted to a base with affixed exterior housings.

Figure 16 is a rear perspective view of the shuffler/shoe assembly with shuffler exterior housing and carousel removed.

Figure 17 is a cross-sectional view of the base/shoe assembly shown in Figure 12, taken along line A– A.

Figure 18 is a schematic top plan view of an exemplary shuffler/shoe/base assembly mounted in a table aperture, illustrating range of motion of the shuffler with respect to the table.

DETAILED DESCRIPTION OF THE INVENTION

Playing card handling devices, such as shufflers, dealing shoes, discard racks and verification systems are movably mounted to a gaming table to allow for functional and ergonomic adjustment of the card handling device. Structures of the present invention provide card reading capability without increasing the height of the device on the table. The playing card handling device is attached to the gaming table in a manner that allows the dealer to rotate, swivel or move the device linearly in a defined area on the table. A relatively flat base beneath the playing card handling

device remains relatively parallel to the flat surface of a gaming table and rests on the gaming table surface as the card handling device is repositioned. The device is able to slide and pivot in directions parallel to the surface of the gaming table. At the same time, range of movement is restricted to fix the device with a predetermined surface area of the gaming table. Major movement no greater than 30 cm, for example, is restricted in any single direction along the surface of the gaming table.

Near one end of the device is the area of the device that is attached to or positioned to extend through an aperture in the table. The area of attachment is preferably a front end of the device from which playing cards may be removed as individual cards, subsets of cards (e.g., hands of cards during a round of play of a game), and complete sets of cards (e.g., a deck of cards or multiple decks of cards, or all playing cards remaining after exhaustion of a predefined amount of play of the game).

For purposes of this disclosure the term "attachment" means connected with physical means or the movement restricted by a combination of the weight of the device and the size of the aperture from which a portion of the device extends therethrough. In the second instance, the weight of the device prevents detachment of the device from the table.

If the card handling device is a discard rack, the pivot point is located near the area that receives spent cards. If the device is a shoe, the point of attachment is preferably the card delivery end of the shoe. It is preferable that the point of attachment be proximate the card imaging system when the imaging system is part of a modular addition to an existing structure. This arrangement minimizes the height of the card handling device.

At least rotation of the device within a defined area of the gaming table (i.e., an aperture) is required, and some X-Y components of movement parallel with the plane of the surface of the gaming table is optionally allowed. The rotation of the device within a defined area preferably maintains the base of the device relatively parallel to the plane of the surface of the gaming table, but some rotation or elevation of the rear of the device off of the surface of the gaming table may also be allowed or not. The rotation capability does not have to be 360 degrees, but may be limited as

designed to less than 360 degrees, including 180, 145, 120, 100, 90 or 45 degrees. A rotation of at least 10 degrees up to those limits is desired. In one form of the invention, the card handling device is a shuffler and the shuffler is positionable on a base that is supported by the gaming table surface.

The precise mechanism for attachment of the device may be varied, as the design requires as long as the swiveling function is present. It is preferred that card handling system of the present invention include a camera reading system built into the device. In one example, the card reading system is positioned at least in part below the gaming table surface, especially at a position below an area of the device over which playing cards are moved and especially removed from the device (such as the front delivery tray or shoe in the device). Non-limiting examples of mechanisms that may be used for attachment of the card handling device (with or without a separate base) to the gaming table include a male fixture (spindle, rod, bolt, post, pin or the like, and one or multiple posts may be used) on the device and a female receptor (hole, threaded hole, opening, or the like) on the gaming table surface. The male and female elements may be reversed with respect to the device and the table. Snap attachments (receptors and inserts), clips and inserts, slide engaging elements, opposed plates with locking elements, recesses and plates, and other known locking or locking and release systems may be alternatively used.

The attachment may or may not be the component that itself enables rotation (e.g., a post in a hole receptor), and is preferably a fixture carried on the table (in whole or in part) or carried on the card handling device such as a shuffler (in whole or in part). Among the preferred constructions is the use of a platform or base set slightly above, flush with or slightly recessed into the surface of the gaming table or a platform attached to the gaming table or a platform adjacent to the gaming table. By having a separate platform or panel, initial installation, replacement, repair and upgrading of the attachment system may be easily effected. The panel may be built into the table and carry one half of the attachment subcomponent or the device itself may carry the platform or panel with it so that the panel on the device can be attached to receptors on the table. The panels, whether built into the table or the device, may have male or female subcomponents built therein. If both the device component and

the table component have female receptors, a separate male-male connector may be used.

In one preferred form of the invention, the mode of attachment is a substantially circular support plate that lies over an aperture of a smaller diameter. A portion of the device, preferably the card imaging system is mounted to the support plate. The device is movable within the aperture. Preferably the diameter of the aperture is much larger than a diameter of an outer circumference of the card imaging system protective cover, allowing for a range of movement within the aperture.

The system, devices and components of the present technology may be generally described as follows. A playing card handling device that can be associated with a casino table has a housing with a support base. There is an area within the housing that can store multiple playing cards, such as sets of cards, a single deck of playing cards or multiple decks of playing cards. There is an opening in the housing through which playing cards may be removed. The base of the playing card delivery device has a connector attached to the base. The device is movable within the connector. The support base moves within a single plane, while the support base is supported by a gaming table or platform placed adjacent to or is attached to a gaming table. The preferred embodiment is to have the playing card delivery device movably mounted (pivotally and/or for linear movement) to a gaming table, but a platform may be attached to an edge of the gaming table, or a platform moved to a position adjacent the gaming table, with the playing card delivery device instead supported by the platform.

The support base is preferably in contact with a top surface on the gaming table, the single plane comprising the top surface of the gaming table. In one embodiment, the connector may be a panel that is attached to the gaming table and rotates in a plane parallel to the surface of the gaming table. In another alternative, the panel is attached to the gaming table and is seated at a level above, flush with or below the top surface of the gaming table. In other embodiments, the panel is attached to the card handling device. The device is preferably a playing card shuffler and alternately is a delivery shoe, a discard rack or a deck verification device. Both batch shufflers and continuous shufflers may be used. The shuffler preferably has a

playing card reader that sends signals indicative of at least rank (and also suit and other special markings) of a playing card, the reader located below the support base to minimize a height of the device above the surface of the gaming table. The placement of the playing card reader below the surface of the gaming table and provision of the rotating and linear movement functions reduces the overall height of the shuffler above the gaming table surface and improves ergonomics by both the reduced height and the movable positioning capability. The playing card reader preferably is fixed at an angle between about 89 and about 70 (or 60) degrees or between 85 and 70 degrees with respect to the plane of the gaming table top surface. This provides a wider angle of vision when reading the playing cards and improves reading accuracy. The playing card reader moves with the shuffler as the shuffler moves about the top surface of the gaming table.

The present invention may be characterized as a playing card delivery system. The system includes a gaming table having a top play surface with an aperture extending there through. The system also includes a playing card delivery device having a playing card delivery shoe elevated with respect to a playing card reader located in the playing card delivery device. The playing card reader is insertable into the aperture of the gaming table. The playing card delivery device is mounted so that the playing card reader is located below the game table top play surface and the playing card delivery shoe is located above the top play surface.

In one example of a playing card delivery device contemplated by the present invention includes a playing card shuffler with the playing card reader built into a front, playing card delivery end. The playing card delivery device is movable about the front end of the device while the playing card reader remains below the top play surface.

In another example of the invention, the playing card delivery device comprises a playing card delivery shoe, with the playing card reader built into a front delivery end of the shoe. The shoe is movable about the front end of the device while the playing card reader remains below the top play surface.

In one preferred form of the invention, a swivel plate is attached to a front end of the card delivery device, and the swivel plate rotates in a plane parallel to the

top play surface. When the card delivery device is a shoe, the playing card reader and the playing card shoe are fixedly attached such that the combined device defines a removable module.

Regardless of the type of playing card handling device, according to the invention, the movement of the playing card delivery device on a gaming table is limited by the geometry of the gaming table aperture and the geometry of a structure housing the playing card reader. Preferably, the playing card delivery device is movable in a plane parallel to the gaming surface and in at least one of the following directions: rotational, arc-shaped, straight line and an irregular path.

The present invention may also be defined as a modular card handling device. The device in its broadest sense includes a base, a shoe that is fixedly mounted to the base and a card holding device. The card holding device includes a card infeed area and a card output area. According to the invention, the shoe has a quick release locking mechanism that connects the shoe to the card output area of the card handling device.

In one example of the invention, the card handling device has a card imaging system. The card handling device may also include a card shuffling mechanism or removable cartridge. The card imaging system may be affixed to the card output area of the card holding device, wherein the card output area is removable from the card shuffling mechanism. In one example of the invention, a processor board is mounted in the base. The processor communicates with the card imaging system. In an example of the invention, the card output area is fixedly mounted to the base.

According to the invention, a card handling system is provided, comprising an area for holding cards to be used in a card game, a card input area, a card output area, the card output area capable of providing one card at a time for manual delivery to a card game, wherein the card output area has an opening for removal of cards that is offset from a center of the card output area. In an example of the invention, the card handling system further comprises a card imaging system, wherein the card output area has an upper plate, wherein the upper plate is larger on a first side than on a second side, wherein the card imaging system is positioned beneath the larger side. A

light source may be located beneath the larger side. The card handling system may be a shoe, a shuffler or a discard rack.

A review of the figures will further enhance an appreciation of the scope of the present technology. Figure 1 shows a left side perspective view of a non-limiting example of one embodiment of a modular shuffler design that can be used in association with the technology described herein. This shuffler is described in detail in U.S. Patent 6,659,460 (the disclosure incorporated by reference above). This patent is owned by a subsidiary of Shuffle Master, Inc. of Las Vegas, Nevada. This shuffler is shown with a removable hand-forming front end 43, but the shuffling mechanism may be used in connection with the technology of the present invention.

A shuffling storage means 2' or carousel is situated on a console formed of two legs 9 which is arranged on a base plate 1. Shuffling means is accomplished by a rotatably held drum or carousel 2. Said drum 2 is connected via spacers (not shown) with two disks 3. The flanges 2" of the drum 2 are provided with multiple compartment-like slots 69 which are provided for receiving playing cards 13. Preferably, each compartment is capable of holding one or more cards.

The disks 3 are each provided with a circular toothing 70. The shuffling storage means 2' can be driven via a pinion 4 and a toothed pulley 5 which is rigidly connected with the same, with pinion 4 and toothed pulley 5 both being jointly held rotatably in place by bars or side supports 45', and a toothed belt 6 via a second toothed pulley 7 and a motor 8. Said motor 8 is driven via a random-check generator and optionally moves the shuffling storage means 2' in mutually opposite directions, so that an oscillating movement of the shuffling storage means 2' can occur.

A storage container 10 (card input area) for the played cards 13 is provided which is part of an input apparatus assembly 106. The assembly comprises a wedge 11 which rolls by way of a support roller 12 which is arranged rotatably in the same on an inclined floor 107 of the storage container 10 against two elastic rollers 14. The two rollers 14 are held rotatably on a common shaft 28 in the side walls (not shown) of the storage container 10 and can be driven jointly with the rollers 15 via pulleys 26 (optionally a toothed belt not shown), as well as a pulley 27 via a motor 17. Two

rollers 16 touch the two rollers 15 at the circumference, so that they are co-rotated by surface friction.

Two bridges each form with the floor 107 of the storage container 10 a gap-like draw-in zone 25' which is substantially the thickness of one playing card 13 to guarantee that only one card at a time is conveyed to the shuffling storage means 2'. A sensor 24 is provided as a preferably optical sensor for recognizing the respectively moved card 13. Every card which is moved from the storage container 10 to the shuffling storage means 2' must therefore at first pass the gap-like draw-in zone 25' one after the other and then the sensor 24, with the sensor 24 being covered or triggered at first by the playing card 13 entering the sensor zone and being uncovered again after the passage of the card 13. The electronic control, preferably a microprocessor, which is provided downstream of the sensor, therefore registers the change from covered to uncovered as the playing card 13 passes, as long as the electronic control does not recognize a jam in the card path.

The electronic control adds the cards 13 inserted one by one into the randomly selected individual compartments 69 of the shuffling storage means 2' to an electronic register and subtracts the cards 13 taken from individual compartments according to their number from the electronic register with the goal of keeping a continual inventory of the playing cards 13 situated in the device. In one example of the invention, a random group of cards is formed in each compartment.

A jam in the card path is recognized when the rollers 14, 15 or 19 are blocked and thus the motors 17 and 20 show an increased power consumption. Alternatively, a jam can be recognized when the playing card 13 covers the sensor 24 for a longer period than corresponds to the conveying speed of rollers 14 and 15 (and opposed roller 16) with respect to the conveyance of a playing card 13 or when the sensor remains uncovered for a longer period although the electronic control triggers the drive of the rollers 14 and 15 and the playing cards 13 are located in the storage container 10, which fact can also be verified through a sensor (not shown) in floor 107.

The roller pair 19 and the pair of rollers 18 which touches the other pair on the circumference and which are each situated on a shaft 30 can be driven in the same manner by motor 23' as described above.

The two levers 21 are used for fully pushing the respectively moved card 13 into a compartment 69 of the shuffling storage means 2' and can be driven in an oscillating fashion via the rod 22, which is swivelably connected with one of the levers 21 by the shaft 34, through an eccentric disk 23 seated on a motor.

The output of the cards 13 from the compartments 69 to a modular, hand-forming card storage means 42, occurs by means of two swiveling arms 35 which are swivelably held in the two legs 9 and are oscillatingly drivable via lever 37 and via an eccentric disk 38 seated on a motor. Said two swiveling arms 35 each carry at their upper end an inwardly projecting rail 36 which grasps the cards 13 situated in a compartment 69 and conveys them to a nip line of two clamping rollers 40. Said clamping rollers 40 are held in the plate bars 45 and are simultaneously drivable by a motor 41.

The clamping rollers (or nip rollers) 40 convey the respectively moved group of cards 13 to the card storage means 42, as shown in Figure 1, for the shuffled cards for the purpose of a stack-wise removal of the group of cards 13, or to an alternate modular card storage means, described below (not shown) for a removal of shuffled cards 13 one at a time.

When cards 13 are removed from the compartments 69 of the shuffling storage means 2', this occurs via the withdrawing apparatus 35, 37, 38, as described above. In the present embodiment, a compartment 69 can only be emptied completely. Since the electronic control system is informed at all times about the number of cards 13 per compartment (= card value) it is thus easy to determine how many cards are taken from the shuffling storage means 2' and placed into a modular card output end.

A sensor detects actuation of the withdrawing apparatus 35, 37 that ejects all cards from a compartment as a group so that they are further carried by rollers 40 (in housing 45) through nip 901 in the housing 45a and ejected into a delivery shoe as described below. Motor 41 drives nip rollers 40.

The sum total of the cards 13 situated in the shuffling storage means 2' is thus obtained in a simple manner by the addition of the cards 13 inserted in the shuffling storage means 2' and the subtraction of the cards 13 removed therefrom.

It is understood that the method can also be applied to a card shuffler which allows the removal of individual cards 13 from the shuffling storage means 2', i.e. an entire compartment 69 is therefore not completely emptied. In this case it is not necessary that the electronic control system stores the number of cards 13 per compartment 69, because after the removal of the individual cards 13 from the shuffling storage means 2' the same can be moved past a sensor again. As a result, the electronic control system is informed at all times about the cards 13 individually supplied to and removed from the shuffling storage means 2', as a result of which the sum total of the cards 13 situated in the shuffling storage means 2' is always known. This shuffler with the tray 43 module removed is one preferred card shuffling component of the present invention. These and other features of this non-limiting example of a shuffler may be found in U.S. Patent No. 6,889,979, which is incorporated by reference herein in its entirety.

Figure 2 is a perspective view of a card delivery device of the present invention. The device includes a shuffler 999 that is positioned on a base 100. The base includes a substantially flat portion 100' that is positioned beneath the shuffler 999, a substantially flat, circular swivel plate 403 and a delivery shoe assembly 989, both affixed to the flat portion 100'. A playing card insertion area 607 is shown on the shuffling device 999. The housing encloses the mechanism shown in Figure 1 for shuffling playing cards. Section 333 defines a playing card delivery zone comprising a shoe assembly 989. The shoe assembly in this embodiment is affixed to the flat plate 100' but is removably attached to the shuffler 999, as is described in more detail below. In other embodiments, the shoe assembly is removably attached to the flat plate (not shown). In yet other embodiments, the shoe assembly 989 is removably attached to the shuffler, and the swivel plate 403 is attached to the shoe assembly 989, and there is no separate base. Shoe assembly 989 has a front cover plate 503 with a beveled finger insertion slot 505 that exposes a playing card 13 for withdrawal. Sections 503a and side wall 501 are additional portions of the front cover plate 503.

A flat draw plate 111 provides a surface across which playing card 13 is drawn and read by a playing card imaging system 200 (shown in Figure 3) located under the draw plate 111. Extension plate 130 stabilizes the cards 13 as they are individually withdrawn. The swivel plate 403 in one embodiment is securely fastened to the base 508 of the shoe assembly 989 by an attachment system. As pressure is applied by a dealer against the left side 605 (or the right side, not shown) of the shuffler, the shuffler 999 pivots by forcing the swivel plate or cover plate 403 to rotate with respect to its connection point to the table about axis 901 (shown in Figure 3). The entire plate 403 may also have more limited motion forwards and backwards for example in directions A and B with respect to the plate 403 by slides, glides pins in elongated holes and the like (not shown). When 403 is a swivel plate, it actually moves with the rotation of the card delivery device. In other embodiments, 403 is a cover plate, that is fixed on the table, does not rotate, and the connector between the card delivery device and the cover plate allows relative rotation of the card delivery device. In one embodiment, the swivel plate 403 is fixed with respect to the shuffler 999 and pivots and otherwise moves in the plane of the gaming surface, but is not mechanically attached to the table.

In alternate embodiments (not shown) the card handling device is a shoe and the shuffler 999 is replaced with a card-holding cartridge that feeds cards into the shoe 989. Suitable cartridges are fully disclosed in co-pending application Serial No. 12/228,713, filed August 15, 2008, titled Intelligent Automatic Shoe and Cartridge, and assigned to Shuffle Master, Inc. The content of this co-pending application is incorporated by reference in its entirety.

Figure 3 is a left side elevational view of a playing card shuffler 999 (including base plate 100) with a playing card imaging system 200 (for suit and/or rank) mounted below the shuffler 999. Two support posts 601 are shown supporting the shuffler 999. A pair of support posts 601a rearest the shoe 989 rests on a lower support surface 110g and a second pair of support posts 601b sits within apertures 110a in base 100 (Figure 12). At the playing card insertion area 607, a display panel 609 is provided to display card information, game status information and/or shuffler

state information. The imaging system 200 is located beneath the lower surface 602 of the shuffler 999.

The base 508 of the shoe 989 is mounted to the swivel plate 403 and the swivel plate 403 rests on the gaming table surface 900 in a rotatable manner by sliding a housing 210 (Figure 17) containing the imaging system 200 into the table aperture 405 that extends through the gaming table surface 900. The swivel plate 403 is shown resting on the gaming table surface 900. The flat draw plate 111 extends from the side wall 501 by which playing cards (not shown) pass as they are withdrawn.

The imaging system 200 preferably includes a camera (such as a CMOS camera) 103 is used as the playing card reader and is supported within angled frame support 201. The camera 103 focal plane is aimed through image window 311 (Figure 6) which exposes at least part of the face of playing cards (not shown) as they are manually slid across the flat plate 111. Adjustable elements (not shown) are used to adjust the angle of the camera 103. As the shuffler 999 pivots and or otherwise moves horizontally, the entire imaging system 200 and the entire structure beneath the game table surface 900 also moves. In one example of the invention, the movement of the device relative to the table is limited to pivotal movement about axis 901'. In other embodiments, the device is movable freely within an area defined by the size and shape of the aperture 405 in the table and the X-Y dimensions of the imaging system protective cover 210.

Figure 4 shows a partial expanded left side elevational view of a card delivery shoe 989 and associated card imaging system 200 that is removable with respect to the shuffler 999 but is fixed to the base 100. A sliding card wedge 121 is shown with the roller 123. The incline may be varied in design so as to vary the pressure placed on cards by the sliding block or card wedge 121. This sliding card wedge 121 presses against the stack of playing cards 120 so that an individual card 13 can be manually drawn out over the draw plate 111 past the front face 117 of the delivery shoe 989. Like numbers in Figures 4 and 3 refer to like elements. A spring 213 may be attached to the base of the sliding wedge 121 to assist in controlling forward and return movement. The spring 213 is elevated above the surface on which the block glides.

Front sloped face 119a contacts a leading face of the stack of cards 120 as the cards are pressed forward. A cable/wire connection 125 for transmitting data/signals from the delivery shoe 989 is shown at the rear of the delivery shoe 989. A back direction barrier 213b or stop is provided to impede the roller 123 from being too easily removed from the delivery shoe 989. An exit slot 130' is shown just in front of the draw plate 111, that allows only one playing card 13 to be pulled through the slot 130' at a time.

As the card receiving area 119 is emptied by the dealer relative to a minimum card capacity of, for example, 7-9 cards, depending on the thickness of a single card, the sliding card wedge 121 is in a "fill" position, the wedge magnet(s) 125a contacts a magnet sensor board 125b. The magnet sensor board 125b senses the number of cards in the shoe. When the shoe is empty, the shuffler's processor receives the signal generated by the magnet sensor board and subsequently begins dispensing more cards into the shoe receiving area 119. This operation relates to a mechanized delivery shoe, in which playing cards are automatically delivered into the delivery end of the delivery shoe. As the cards 13 are dispensed from the shuffler 999 component into the card receiving area 119 of the modular shoe 989, the sliding card wedge 121 is pushed back towards the shuffler 999 in direction 121a. Once the card receiving area 119 is completely filled to capacity, the sliding card wedge or block 121 is in a "home" position. At this point, the magnet sensor board is in signal transmission, and the shuffler processor instructs the shuffler 999 to stop dispensing cards into the shoe card receiving area 119. As cards are removed from the dispensing end of the shoe 989 in Figure 4, and put into play, the sliding card wedge 121 begins to slide toward the dispensing end of the shoe 989 and the sensor board 125c goes out of contact with magnets 125a.

Figure 5 is an expanded view of the card reading shoe's 989 card imaging system 200, and processing components 110 with support structures removed. A card gap 130' or exit slot is provided between the front face 117 of the shoe 989 and the card dispensing platform or draw plate 111, wherein the card gap 130' is large enough to receive only one card at a time as it exits the card receiving area 119. A camera trigger sensor emitter 113 is positioned in the upper housing of the shoe and above the

card gap 130'. A camera trigger sensor receiver 109 is positioned on the bottom of the shoe's lower housing 118 and parallel to an image window 311 (Figure 6), wherein the image window 311 is for example, a glass plate positioned and securely fixed in an aperture 312 created in the shoe ground plate 305 (Figure 6).

The camera imaging system 200 (Figure 5) is positioned below the camera trigger sensor 109 and parallel to the lower surface of the image window 311 (Figure 6). The camera imaging system 200 preferably includes at least one 2-Dimensional CMOS Camera 103, an image processing module 105, and an LED light board 107' (Figure 5). In a preferred embodiment, the card delivery shoe 989 has a main circuit board 110 with an independent processor. Once a card image is captured and processed by the shoe's imaging system 200, the card information is sent to the card delivery shoe main processor 110, and it is this processor 110 that is linked to an external network game computer and/or a processor (not shown). Preferably, there is no communication between the shoe main circuit board 110 and the shuffler main circuit board (not shown). In other embodiments, the shoe circuit board 110 communicates with the shuffler processor (not shown).

The camera trigger sensor emitter 113 preferably emits a constant signal to the camera sensor receiver 109, wherein both sensors are communicating when in an idle state. The camera sensor emitter 113 is provided with a trigger sensor emitter cover plate 115, wherein the trigger sensor emitter cover plate 115 blocks ambient light sources and/or photon noise that can interfere with image acquisition. In a preferred embodiment the imaging system 200 is offset from a centerline of the shoe 989. As shown in Figure 2, the imaging system lies below an additional portion 503a of face plate 503. This additional portion blocks the camera light source 107 from the view of the user, and additionally blocks ambient light that could interfere with imaging. By offsetting the imaging system 200, a larger sized focal area and a larger cover is obtained, improving the performance of the imaging system over known systems that position the finer insert 505 centrally on the front cover plate 503.

The LED light board 107' provides a constant available green LED light source that is angled at the image window 311 (Figure 6). As a card 13 (Figure 5) exits the card receiving area 119 and enters the imaging area, the trigger sensor

emitter 113 light source is blocked by the presence of the card 13. In addition, the trigger sensor emitter cover plate 115 ensures the imaging system has a black background necessary for acquiring an accurate card scan. At this point, the sensor emitter 113 is no longer providing a signal to the sensor receiver 109, wherein the presence of the card 13 is blocking signal transmission. The lack of a sensor emitter signal activates/notifies the card trigger sensor receiver 109 that a card is present, wherein the sensor receiver 109 sends a signal to the CMOS Camera 103. The CMOS Camera 103 immediately responds and images the card symbols, wherein the card is positioned face down above the image window with rank and/or suit visible. The lighting board 107' facilitates the image acquisition by providing the CMOS camera 103 with a constant green LED light source that shines through the image window 311 illuminating the symbols/indicia on the playing card.

Figure 6 shows a perspective view of the lower surface of the modular card shoe 989 with its shuffler attachment assembly 900a visible at one end of the shoe ground plate 305. In this Figure, the lower housing 409, as shown in Figure 7, has been removed to display the components of the shuffler attachment assembly 900a as shown in Figure 6.

The shoe ground plate 305 extends to the upper portion of the shoe 989, relative to the card dispensing end 900c of a shuffler 999 (Figure 9) and includes a ground plate structure 301. The ground plate structure 301 is designed to fit flush against the upper surface of the shuffler's shoe attachment plate 903, as shown in Figure 9. A locking pin aperture 343 (Figure 6) is cut into the ground plate structure 301. The shuffler locking pin 905 (Figure 9) fits into the locking pin aperture 343. A locking slider 303 has a slot-shaped aperture 304 that engages locking pin 905. The locking slider 303 moves in the direction of arrow 303a and the tongue 306 is recessed within the locking slider 303 is in the locked position. A spring 308 biases the locking slider 303 in the locked position. The slider 303 allows for quick release and attachment of the shoe 989 to the shuffler 900. Advantageously, no tools are needed to exchange the shoe 989 with a replacement shoe (not shown) in the event of a card imaging system 200 malfunction, or when it is desired to replace the shoe/card

imaging assembly with another type of front end, such as tray module 43 shown in Figure 1.

Figure 7 is a perspective view of the shoe 989 with swivel mounting plate 403 attached. The view represents a lower side of the assembly. In this Figure, a shoe housing 409' is installed over the locking components 303, 304, 343 and an aperture 401 is provided with a locking pin receiving area 401a. The shoe cover plate or swivel plate 403 has an aperture 405b with dimensions equal to and/or slightly greater than the dimensions of the card imaging system 200 support structure. Preferably, the imaging system 200 is inserted through the cover plate aperture 405b, wherein the cover plate or swivel plate 403 rests on the table surface. In other embodiments, the swivel plate is rotationally mounted on a lower base plate (not shown).

Figure 8 illustrates the relative positioning of the card imaging system 200 relative to the front cover plate 503a of the card shoe 503. The front cover plate 503 has an additional descending portion 503a. Beneath the additional portion 503a is housed the camera trigger sensor emitter 113 and the sensor plate 115 (Figure 5). The draw plate 111 is located beneath the additional portion 503a and surrounds the image window 311. The camera trigger sensor receiver 109 (Figure 5) is positioned on the lower surface of the flat plate 111 (Figure 8) and below the image window 311, as viewed in Figure 7.

The image window 311 according to a preferred form of the invention is offset from a center line of the shoe. It is advantageous to offset the opening because more space is then provided for the imaging system. Since the light source for the imaging system is preferably constant, it is an advantage to provide a larger area 503b covering the imaging system so that the light is not seen by the user, and so that ambient light does not interfere with imaging. Otherwise, when a card is not present, the light source would be apparent to the user.

Figure 14 provides a bottom view of the card reading shoe system, wherein the main circuit board base 100 has a lower surface 110g that is substantially flat and an exemplary cylindrical exterior housing 210 of the imaging system 200 are clearly displayed. The swivel plate 403 also has a substantially flat lower surface 403a. Referring back to Figure 8, the card path starts at area 507. A dealer manually applies

finger pressure to the card 13 at the U-shaped opening 505. As the dealer moves the card outward and over the top surface of the flat plate 111, the card passes under the additional portion 503a and over the image window 311 (Figure 7) wherein the camera trigger sensor receiver 109 (Figure 5) is activated and the camera imaging system 200 (Figure 8) captures an image of the playing card as it is removed from the flat plate 111 and put into play. The shutter speed of the camera is fast enough that variations in the rate at which cards are removed does not impact image capture and/or capture image quality. Additionally, angling of the camera towards the focal point through the image window 311 increases the field of vision of the camera and enables greater accuracy in the reading of information from the faces of the cards.

Figure 9 shows the dispensing end 900c of the shuffler 999 with the detachable shoe 989/base assembly 100 detached. The shuffler 999 has an upper surface with a rear side of shuffler 605 and a top cover 603. At the lower end of the top cover 603, the nip rollers 40a and 40b, are exposed. A card nip line 901 is shown between the nip rollers 40a and 40b, wherein the card nip line 901 allows only a formed group of one or more randomized cards to exit the shuffler 999. Although a preferred shuffler 999 has compartments configured to form groups of cards, the shuffler 999 is programmable to insert only one card into a compartment so that only card is dispensed. The shoe assembly 989 is fixedly mounted to base 100g. The shoe attachment assembly 900a includes a shoe attachment plate 903 with a locking pin 905 secured into an aperture 905a located on the attachment plate 903.

A schematic flow diagram of the camera imaging system process and associated data transfer is provided in Figure 10. The process includes a step 13' of positioning a card in the imaging area. A camera trigger sensor senses 113' the presence of the card. When the card is present, this signal is blocked. A camera sensor receiver senses the blocked state 109', triggering the operation of the imaging system. According to the process, a CMOS camera images the card 103'. The CMOS module processes the captured data and converts the data to binary code. This code is sent to an FPGA with DSP hardware to extract card rank, suit or rank and suit in step 108'.

Once the scanned image is acquired 103' by the CMOS camera, as shown in Figure 10, the CMOS (complementary metal oxide semiconductor) module reduces the black and white card data to a series of gray scale values 104', wherein the gray scale values are then assigned a binary code. This binary code is transmitted 108' to at least one FPGA/DSP (Field Programmable Gated Arrays/Digital Signal Processors) hardware component, wherein the FPGA/DSP hardware component has associated memory with stored binary codes relative to each of at least one card rank and a suit. The FPGA/DSP hardware correlates the new binary code with stored binary codes and determines the rank and suit of the card. Once the rank and suit determination has been completed by the FPGA/DSP hardware component(s), it is the FPGA/DSP that transmits 109' the rank and suit information to the shoe main circuit board 110. The card information is then transmitted 111' to an external computer or onto an external network. Preferably, the shoe main circuit board 110 (Figure 13) is linked to an operatively associated PC and/or external network, via I/O ports 110c, such as, but not limited to, a table PC/game controller with programmed game rules relative to the game in play, wherein the PC/game controller determines a game outcome based upon the card data transmitted from the shoe main circuit board 110.

Figure 12 shows the base assembly 100 . The assembly includes a first upper surface 110a that defines an upper main circuit board housing, and a second upper surface 110g. Apertures 110e accept the rear opposing support posts 601 of the shuffler 999. The front support posts 601 of the shuffler rest on the second upper surface 110g when the shuffler 999 is mounted to the base 100. The shoe assembly 989 also defines a portion of the plate assembly. In a preferred form of the invention, shoe assembly 989 is fixedly attached to the rectangular portion 104 by means of screws, bolts or other known fasteners. In another embodiment, the shoe assembly (not shown) is removably attached to the flat portion 104 of the base by means of a quick connect/disconnect fastener.

Figure 14 shows this same base assembly 100 from below. The assembly includes the mounted swivel plate 403, wherein the swivel plate 403 is fixedly attached to the flat portion 104 via screws. Figure 13 shows the same structure from above with the main circuit board housing removed, revealing main shoe circuit board

110 and I/O ports 110b and 110c. I/O Connection 110c allows the shuffler to communicate with an external computer and/or network. Internal I/O port 110b in one embodiment is a USB. port. The USB port may be used to connect the shoe processor with a removable display/user interface.

This interface/display can be used to train the card reading system to recognize different cards. For example, a library of card data, one data set corresponding to each brand of cards may be inputted into the shoe main circuit board 110 so that the card imaging system is capable of accurately reading each brand of card in the library. In alternate embodiments, I/O port 110b allows the shuffler processor 110 to communicate with the shoe processor (not shown). After the library of card values is inputted, the input/display device may be disconnected from port 110b. The main circuit board housing is replaced (Figure 12) and the shuffler 999 may then be mounted on the base.

The card shoe 989 is removably attached to the dispensing end of the shuffler by lining up the shoe locking pin aperture 343 (Figure 6) with the shuffler locking pin 905 (Figure 9) and manually sliding the shoe towards the shuffler. Once the shuffler locking pin 905 is pushed along the entire length of the shoe locking pin aperture 343, the shuffler locking pin 905 travels into the shoe locking slider 303. The shoe locking slider 303 secures the shoe to the shuffler locking pin 905 with the shoe ground plate structure 301 resting level on the upper surface of the shuffler's shoe attachment plate 903.

A cross-sectional view of the structure shown in Figure 12 taken along lines A-A is shown in Figure 17. The imaging system 200 in one embodiment is protected by an external housing 210. The external housing is preferably cylindrical and completely encloses the imaging system 200 to prevent damage and tampering.

The inner edges 405a of table top 406 aperture 405 are shown. This aperture 405 in one embodiment is circular and of a diameter 410' that is much larger than a diameter 412 of exterior housing 210. The entire structure is capable of movement relative to this aperture 405. The shuffler is capable of rotational motion, linear motion arcuate motion and combinations thereof. As shown in Figure 17, the shuffler can be moved a distance 414 or a distance 416 within the boundaries of aperture 405.

The base plate 403 is of a size and shape such that the aperture 405 is completely covered and out of the view of the players, regardless of the position of the shuffler relative to the table. In a preferred embodiment, the base plate 403 is circular or oblong in shape.

Shufflers of the present invention advantageously maintain a low profile and at the same time are adjustable on the table top to suit the size, and preferences of the dealer.

In Figure 18, the table aperture 405 is shown as circular in shape. The inner edges 405a define a range of motion of the shuffler 999 (Figure 15) with integrated card reading shoe 989 (Figure 15), hereinafter the swivel mounted shuffler 1200.

The range of motion of the shuffler 1200 is limited by the size and shape of a horizontal cross-section of the external housing 210. In this example, the housing is tubular with an enclosed lower surface. The shuffler 1200 may be pivoted, for example in angular direction 1202, or may be moved linearly, for example in directions 1204, 1206, 1208, while the exterior edges 1210 of mounting plate 403 (Figure 17) cover stationary aperture 405.

By providing a range of motion sufficient to compensate for the various sizes and preferences of dealers, the shuffler can be positioned on the table in a manner that optimizes dealer comfort, preventing repetitive motion injuries.

Dealers may wish to alter the position of the shuffler 1200 relative to the table at various intervals within a shift to relieve muscle stress and increase comfort.

A preferred structure includes a table with an aperture of a size sufficient to allow a maximum linear travel in any given direction to be about 8 inches, or more preferably about 6 inches. The motion may be linear, arcuate, angular, may have an X and Y component, and may be a combination thereof.

Since the position of the protective cover 210 is fixed relative to the swivel plate 403, the aperture 405 remains concealed, unless the shuffler 1200 (Figure 18) is removed completely from the table.

The importance of the overall height of the shuffler is significant from an ergonomic standpoint. Shufflers that provide a card insertion area at one end of the machine and a card output area at the opposite end must be low profile enough

relative to the gaming surface to allow the dealer to reach over its upper surface on a repetitive basis. Lower profile shufflers are preferable because the lifting motion is reduced. By installing a card imaging system 200 (Figure 17) below the table top, the height of the shuffler is not significantly increased. This structure allows for the addition of card recognition to an existing shuffler "engine 999" of modular design, while maintaining a desirable low profile, and while incorporating features that enable ergonomic positioning on the table.

Preferably, the dimensions of the table aperture 405 provide the imaging system 200 (which is preferably fixed with respect to the body of the shuffler 999 or delivery shoe 989) with a significant degree of unrestricted movement within the aperture, wherein the imaging system can be repositioned within the aperture easily and safely. The exterior protective cover 210 provides ample protection for the imaging system 200. The combined shuffler 999/delivery shoe 989/base 100 movement over the gaming table surface and the imaging system 200 range of motion within the table aperture 405 allows a dealer to maneuver and/or reposition a shuffler/shoe angle and or position on a gaming table surface relative to dealing a card game, wherein repositioning the shuffler/shoe provides a higher degree of comfort and ease when dealing a card game.

Figure 16 shows a rear perspective view of the shuffler/shoe assembly with the cover and carousel removed. A delivery shoe main circuit board 110 (from Figure 13) is positioned below surface 110a. It is preferred that the rear upper plate/housing 110a of the main circuit board has two apertures 110e (Figure 12), wherein the shuffler support posts 601 (Figure 3) fit securely into the apertures. The upper housing plate 110g closest to the delivery shoe is preferably lower than surface 110a. The vertical drop of the front upper housing plate 110g is approximately equal to the depth of aperture(s) 110e (Figure 13). This configuration provides a stable and level support structure for shuffler 999 while attached to the base 100.

Figure 15 shows a side elevational view of the shuffler 999 attached to the shoe assembly 989 and its base 100, wherein the shuffler 999 appears level and stable mounted to the base. Preferably, the shuffler structure 999 is manually adjusted with respect to the table by physically rotating the shuffler structure horizontally clockwise

and/or counter clockwise, wherein the shuffler structure's available range of motion is relative to the shuffler's immediate position on the table and/or the dimensions of the table aperture formed by the distance between ends of the aperture 406 (Figure 17).

In one embodiment, the shoe main circuit board 110 (Figure 13) has programmed game rules, wherein the shoe main circuit board 110 determines a game outcome based on the card rank and/or suit information transmitted by the FPGA/DSP hardware component(s) of the card imaging system. Therefore, it is the shoe main circuit board 110 that transmits a game outcome (based on dealt card information) via I/O port 110c, (Figure 13) to an operatively associated PC and/or external network. In other embodiments, game rules reside in an external game computer that communicates with the shoe 989 via port 110c. The 2-Dimensional CMOS card data acquisition and associated FPGA processing is prior art and is disclosed and fully described in the related U.S. Patent Application Serial No. 11/484,011, filed July 7, 2006. As with all references cited herein, this Patent Application is incorporated herein by reference in its entirety.

Figure 11 is a process flow diagram describing the process of imaging cards as they are randomized and move through the shoe.

In step 600, randomized groups of cards are pushed out of a compartment in the carousel 2' and into area 119 of the shoe 989. The sliding wedge 121 retracts to permit cards to move into a staging area. Prior to a first card being moved past sensing system 200, the card emitter sensor sends a signal 602 to the receiver that no card is present in the sensing position (card 13 shown in Figure 17).

When a single card is manually moved into a sensing position, the card receiver senses the presence of a card 604. Within the imaging area, data is captured 606 representative of a frame of image information. This information is acquired by the CMOS camera at time t.

Next, the CMOS module converts 608 the scanned card data into gray scale values. The gray scale data is sent to the FPGA 610 where it is converted into binary code 612.

FPGA next performs image extraction 614 to differentiate between the rank and suit images. A cross-correlation 616 is performed to identify rank and suit. Rank and suit is determined separately.

The card rank and/or suit is determined and represented by an 8 bit number. The FPGA sends this data 618 to its associated processor or to an external game controller. The final step 620 is to determine game outcome using the card information and programmed game rules.

Although specific examples and specific materials and dimensions may be stated in descriptions to better enable practice of the present technology, those descriptions are intended to be non-limiting specifics enabling generic concepts in the practice of the invention. One skilled in the art would fully appreciate and being enabled from the present disclosure to use alternatives, substitutes and equivalents in the construction of the described technology, without creating a separate and distinct invention.

WHAT IS CLAIMED:

1. A playing card delivery device comprising:

a housing;

a support base, the support base supported by a gaming table surface;

an area within the housing that can store multiple playing cards;

an opening in the housing through which playing cards may be removed;

a structure extending below the support base, positionable in an aperture in a gaming table; and

the surface support base moveable on the gaming table surface, wherein movement is limited to an area defined by the gaming table aperture.

2. The device of claim 1, and further comprising a connector connecting the device to the gaming table.

3. The device of claim 2, wherein the connector is attached to the card delivery device and comprises a plate that is attached to the device and movable in a plane parallel to the surface of the gaming table.

4. The device of claim 1, and further comprising a plate that is attached to the base, wherein the plate has a lower surface that rests on the gaming table surface.

5. The device of claim 4, wherein the plate is circular and of a diameter large enough to cover the aperture regardless of the position of the device on the table, when the structure extending below the support base is positioned in the aperture.

6. The device of claim 1, wherein the playing card delivery device is selected from the group consisting of a card shuffler, a card shoe and a discard rack.

7. The device of claim 6, wherein the device is a shuffler and the shuffler has a playing card reader that sends signals indicative of at least rank of a playing card, the reader located within the structure extending below the support base.

8. The device of claim 6, wherein the delivery device is a shoe and the shoe has a playing card reader that sends signals indicative of at least rank of a playing card, the reader located within the structure extending below the support base.

9. The device of claim 7, wherein the playing card reader is fixed at an angle between about 89 and about 70 degrees with respect to the plane of the gaming table top surface.

10. The device of claim 9, wherein the playing card reader rotates with the shuffler as the shuffler rotates over the top surface of the gaming table.

11. The device of claim 1, wherein the device is movable in a straight line, in rotation, in an irregular pattern, in an arc and in a combination thereof.

12. A gaming table and playing card delivery system comprising:

a gaming table having a top play surface with an aperture extending therethrough;

a playing card delivery device having a playing card delivery shoe elevated with respect to a playing card reader located in the playing card delivery device; and

the playing card reader being insertable into the aperture wherein the device is mounted so that the playing card reader is located below the game table top play surface and the playing card delivery shoe is located above the top play surface.

13. The system of claim 12, wherein the playing card delivery device comprises a playing card shuffler, the playing card reader built into a front, playing card delivery end of the playing card delivery device, and the playing card delivery device is movable about the front end of the device while the playing card reader remains below the top play surface.

14. The system of claim 12, wherein the playing card delivery device comprises a playing card delivery shoe, the playing card reader built into a front playing card delivery end of the playing card delivery device, and the playing card delivery device is movable about the front end of the device while the playing card reader remains below the top play surface.

15. The system of claim 13, wherein the front end of the device is attached to a swivel plate and the swivel plate rotates in a plane parallel to the top play surface.

16. The system of claim 13, wherein the playing card delivery shoe and the playing card reader define a removable module.

17. The system of claim 13, wherein movement of the playing card delivery device on a gaming table is limited by the geometry of the gaming table aperture and the geometry of a structure housing the playing card reader.

18. The system of claim 17, where the playing card delivery device is movable in a plane parallel to the gaming surface and in at least one of the following directions: rotational, arc-shaped, straight line and an irregular path.

19. A modular card handling device, comprising:

a base,

a shoe that is fixedly mounted to the base; and,

a card holding device, comprising a card infeed area and a card output area, wherein the shoe has a quick release locking mechanism that connects the shoe to the card output area of the card handling device.

20. The modular card handling device of claim 19, wherein the device is a card imaging system and further comprising a card shuffling mechanism.

21. The modular card shuffler of claim 20, wherein the card imaging system is affixed to the card output area, wherein the card output area is removable from the card shuffling mechanism.

22. The modular card shuffler of claim 21, wherein a processor board is mounted in the base and wherein the processor communicates with the card imaging system.

23. The modular card shuffler of claim 21, wherein the card output area is fixedly mounted to the base.

24. A card handling system, comprising:

an area for holding cards to be used in a card game;

a card input area; and

a card output area, the card output area capable of providing one card at a time for manual delivery to a card game, wherein the card output area has an opening for removal of cards that is offset from a center of the card output area.

25. The card handling system of claim 24, and further comprising a card imaging system, wherein the card output area has an upper plate, wherein the upper plate is larger on a first side than on a second side, wherein the card imaging system is positioned beneath the larger side.

26. The card handling system of claim 24, and further comprising a light source located beneath the larger side.

27. The card handling system of claim 24, wherein the card handling system is a shuffler.

28. The card handling system of claim 24, wherein the card handling system is a shoe.