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CARD HANDLING DEVICES AND RELATED ASSEMBLIES AND COMPONENTS

PRIORITY CLAIM

5 This application claims the benefit of the filing date of United States Patent Application Serial No. 14/959,536, filed December 4, 2015, for “CARD HANDLING DEVICES AND RELATED ASSEMBLIES AND COMPONENTS.”

TECHNICAL FIELD

10 The disclosure relates to card handling devices and related assemblies, components, and methods. In particular, embodiments of the disclosure relate to card handling devices, card buffer areas of card handling devices, substantially flat card output areas of card handling devices, and methods of shuffling cards.

BACKGROUND

15 Wagering games are often based on the outcome of randomly generated arrangements of cards. Such games are widely played in gaming establishments and, often, a single deck or multiple decks of fifty-two (52) playing cards may be used to play the game. Gaming using multiple decks of playing cards may include, for example, six to ten decks used in games such
20 as blackjack and baccarat and two decks of playing cards used in games such as double deck blackjack. Many other specialty games may use single or multiple decks of cards, with or without jokers and with or without selected cards removed.

 From the perspective of players, the time the dealer must spend in shuffling diminishes the excitement of the game. From the perspective of casinos, shuffling time
25 reduces the number of hands played and specifically reduces the number of wagers placed and resolved in a given amount of time, consequently reducing casino revenue. Casinos would like to increase the amount of revenue generated by a game without changing the game or adding more tables. One option to increase revenue is to decrease the time the dealer spends handling and shuffling playing cards. This may be accomplished by using one set of cards to administer
30 the game while shuffling a second set of cards. Other options include decreasing shuffling time.

 The desire to decrease shuffling time has led to the development of mechanical and electromechanical card shuffling devices. Such devices increase the speed of shuffling and dealing, thereby increasing actual playing time. Such devices also add to the excitement of a

game by reducing the amount of time the dealer or house has to spend in preparing to play the game.

However, working with many existing shuffler designs puts unnecessary strain on the muscles of the users (dealers). Using two complete sets of cards also increases the cost of offering the game.

Furthermore, the card output area or shoe used in conjunction with shufflers often places strain on dealers' hands and wrists by using card distribution interfaces to output cards that are oriented at a substantial acute angle relative to the table surface. To draw cards from these shoes, dealers often have to twist their wrists repeatedly at awkward and uncomfortable angles.

Moreover, shoes often are not easily adjustable to meet a dealer's card drawing preference (e.g., direction in which dealers prefer to draw a card relative to the table).

Card counting is a significant problem when using automatic card shufflers. Casinos often lose a house advantage when players are able to predict what cards remain to be dealt and the proximity of those cards being dealt. It is desirable for casinos to reduce or eliminate the ability for players to count cards. Continuous shuffling machines assist in reducing the ability to count cards, but additional ways to eliminate card counting and improve ergonomics of card delivery may be desirable.

Summary

In an aspect, there is a card handling device, comprising: a card shuffling apparatus configured to shuffle playing cards, the card shuffling apparatus defining at least a portion of a card path; and a card output portion including a card buffer area positioned at an interface of the card shuffling apparatus and the card output portion, the card buffer area configured to receive shuffled playing cards from the card shuffling apparatus via the card path and temporarily store a group of playing cards in a stacked configuration having a top and a bottom, the card output portion being configured to move to alter an orientation of the group of playing cards in the card buffer area relative to the card shuffling apparatus between a first orientation in which playing cards are inserted from the card shuffling apparatus at the top of the group of playing cards and a second orientation in which playing cards are inserted from the card shuffling apparatus at the bottom of the group of playing cards, wherein the card path between the card shuffling apparatus and the card buffer area remains fixed in both the first orientation and the second orientation.

In another aspect, there is a card handling device, comprising:
 a card shuffling apparatus configured to shuffle playing cards, the card shuffling apparatus defining at least a portion of a card path;
 a card output area in communication with the card shuffling apparatus to receive playing cards via the card path; and
 a card output portion positioned between the card shuffling apparatus and the card output area on the card path and configured to receive playing cards from the card shuffling apparatus and deliver playing cards to the card output area, the card output portion comprising:

a card buffer area positioned within the card handling device at an interface of the card shuffling apparatus and the card output portion on the card path, wherein the card buffer area is configured to (i) receive playing cards from the card shuffling apparatus along the card path, (ii) temporarily hold a group of playing cards in a stacked configuration having a top and a bottom, and (iii) move to alter an orientation of the group of playing cards between a first orientation in which playing cards from the card shuffling apparatus are inserted at the bottom of the group of playing cards and a second orientation in which playing cards from the card shuffling apparatus are inserted at the top of the group of playing cards, wherein the card path between the card shuffling apparatus and the card buffer area remains fixed in both the first orientation and the second orientation; and

a card feed system configured to remove playing cards one-at-a-time from the group of cards in the card buffer area and to deliver the playing cards one-at-a-time to the card output area via the card path, wherein the card feed system is configured to not send a playing card to the substantially flat card output area until a previously sent playing card is drawn from the card output area.

In an aspect, there is provided a method of shuffling cards, comprising:

- receiving, at a card input portion of a card handling device, playing cards;
- transporting, by a card feed system of the card handling device, the playing cards from the card input portion into a card shuffling apparatus via a card path;
- outputting, by the card shuffling apparatus, at least one playing card to a card buffer area positioned along the card path in a first orientation and configured to temporarily store a group of playing cards in a stacked configuration having a top and a bottom;
- altering, by an actuation system of the card handling device, the orientation of the card buffer area and the group of playing cards relative to the card shuffling apparatus to a second orientation, the card path between the card shuffling apparatus and the card buffer area remaining fixed in the first orientation and the second orientation; and
- outputting, by the card shuffling apparatus, at least another playing card to the card buffer area while the card buffer area is in the second orientation to alter a sequence of playing cards in the group of playing cards stored in the card buffer area.

In an aspect, there is provided a method of shuffling cards, comprising:

- removing, by a card transfer system of a card handling device, playing cards from a temporary storage area of the card handling device via a card path;
- forming, in a card buffer area of the card handling device, a group of playing cards in a stacked configuration having a top and a bottom from the playing cards removed by the card transfer system;
- adding, by the card transfer system, at least one playing card from the temporary storage area via the card path to the bottom of the group of playing cards by moving, using an actuation system of the card handling device, the card buffer area and the group of playing cards to a first orientation relative to the card path; and
- adding, by the card transfer system, at least one playing card from the temporary storage area via the card path to the top of the group of playing cards by moving, using the actuation system, the card buffer area and the group of playing cards in a second orientation relative to the card path, the card path from the card transfer system to the card buffer area remaining fixed in both the first orientation and the second orientation.

In an aspect, there is provided a card handling device for a gaming table comprising:

- a housing for mounting to a gaming table, the housing comprising a card intake area configured to receive cards to be shuffled and a card output area for a dealer to take cards

- from the card handling device for dealing a game of cards at the table, the card intake area and card output area disposed to be arranged at the top of the gaming table when the housing is mounted to a table and define a card path therebetween for providing playing cards from the card intake area to the card output area;
- 5 a card shuffling apparatus configured to receive cards from the card intake area via the card path;
- a card buffer area configured to receive and hold a group of cards from the card shuffling apparatus in a stacked configuration having a top and a bottom via the card path;
- 10 a card output portion configured to transport cards, one-at-a-time, from the card buffer area to the card output area via the card path;
- an apparatus configured to alter an orientation of the card buffer area and the group of cards relative to the card shuffling apparatus between a first orientation in which cards from the card shuffling apparatus are inserted at the bottom of the group of cards and a second
- 15 orientation in which cards are inserted at the top of the group of cards to alter the arrangement of cards in the group, wherein the card path between the card shuffling apparatus and the card buffer area remains fixed in the first orientation and the second orientation;
- a sensor configured to provide a signal in response to removal of a card from the card output area by a dealer; and
- 20 a processor configured to receive the signal from the sensor and in response thereto control the card output portion to transport another card from the card buffer area to the card output area via the card path, the processor configured to control the card shuffling apparatus to re-supply cards to the card buffer area to maintain the group of cards therein for supply to the card output area,
- 25 wherein cards are continuously supplied to the card output area.

- In an aspect, there is a card handling device for a gaming table comprising:
- 30 a housing for mounting to a gaming table, the housing comprising a card intake area configured to receive cards to be shuffled and a card output area for a dealer to take cards from the card handling device for dealing a game of cards at the table, the card intake area and card output area disposed to be arranged at the top of the gaming table when the housing is mounted to a table and define a card path therebetween for providing playing cards from the card intake area to the card output area;
- 35 a card shuffling apparatus configured to receive cards from the card intake area via the card path;
- a card buffer area configured to receive and hold a group of cards from the card shuffling apparatus in a stacked configuration having a top and a bottom via the card path;
- 40 a card output portion configured to transport cards, one-at-a-time, from the card buffer area to the card output area via the card path;
- an apparatus configured to alter an orientation of the card buffer area and the group of cards relative to the card shuffling apparatus between a first orientation in which cards from the card shuffling apparatus are inserted at the bottom of the group of cards and a second
- 45 orientation in which cards are inserted at the top of the group of cards to alter the arrangement of cards in the group, wherein the card path between the card shuffling apparatus and the card buffer area remains fixed in the first orientation and the second orientation;
- a sensor configured to provide a signal in response to removal of a card from the card output area by a dealer; and

a processor configured to receive the signal from the sensor and in response thereto control the card output portion to transport another card from the card buffer area to the card output area via the card path, the processor configured to control the card shuffling apparatus to re-supply cards to the card buffer area to maintain the group of cards therein for supply to the
5 card output area,
wherein cards are continuously supplied to the card output area.

DISCLOSURE

10 Some embodiments of the present disclosure include a card handling device having a card shuffling apparatus for shuffling playing cards and a card output portion. The card output portion may include a card buffer area positioned at an interface of the card shuffling apparatus and the card output portion. The card output portion may further be configured to move relative to the card shuffling apparatus in order to alter an orientation of the card buffer area relative to
15 the card shuffling apparatus.

Some embodiments of the present disclosure include a card handling device having a substantially flat card output area. The card handling device may include an interface portion having an at least substantially flat draw surface and a cover disposed over the interface portion. The interface portion and cover may define an outlet between the interface portion and cover.
20 The substantially flat card output area may configured to permit playing cards to be drawn from the outlet of the substantially flat card output area on the draw surface of the interface portion in a plurality of different, at least substantially horizontal directions without

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first being drawn from the outlet in a direction parallel to a center longitudinal axis of the substantially flat card output.

Some embodiments of the present disclosure include a card handling device having a card shuffling apparatus for shuffling playing cards, a card output area, and a card output
5 portion for receiving playing cards from the card shuffling apparatus and delivering playing cards to the card output area. The card output portion may include a card buffer area positioned within the card handling device at an interface of the card shuffling apparatus and the card output portion. The card buffer area may be configured to temporarily hold a group of playing cards. The card output portion may further include a card feed system
10 configured to remove playing cards one-at-a-time from the card buffer area and to deliver the playing cards one-at-a-time to the substantially flat card output area. The card feed system may be further configured to not send a playing card to the substantially flat card output area until a previously sent playing card is drawn from the substantially flat card output area.

15 Some embodiments of the present disclosure include a method of shuffling cards. The method may include inputting playing cards into a card input portion of a card handling device, transporting the playing cards from the card input portion into a card shuffling apparatus, outputting at least one playing card from the card shuffling apparatus into a card buffer area, altering an orientation of the card buffer area relative to the card shuffling
20 apparatus, and outputting at least another playing card from the card shuffling apparatus into the card buffer area while the card buffer area is in an altered orientation.

Some embodiments of the present disclosure include a method of shuffling cards. The method may include removing playing cards from a temporary storage area of a card handling device, forming a group of playing cards with the playing cards in a card buffer
25 area of the card handling device, adding at least one playing card to the bottom of the group of playing cards, and adding at least one playing card to the top of the group of playing cards.

Some embodiments of the present disclosure include a method of shuffling cards. The method may include moving playing cards into a card buffer area of a card handling device
30 in a first direction, and moving cards out of the card buffer area in a second direction, wherein the second direction defines an obtuse angle with the first direction.

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BRIEF DESCRIPTION OF THE DRAWINGS

The present disclosure may be understood more fully by reference to the following detailed description of example embodiments, which are illustrated in the appended figures.

5 FIG. 1 shows a perspective view of a card handling device, according to an embodiment of the present disclosure, with portions of housings removed to show interior components of the card handling device;

 FIG. 2 shows a side elevation view of the card handling device of FIG. 1 with additional portions of housing removed to show interior components of the card handling
10 device;

 FIG. 3 shows an enlarged side view of a card input portion of the card handling device of FIG. 1;

 FIG. 4A shows an enlarged side view of a card shuffling apparatus of the card handling device of FIG. 1;

15 FIG. 4B shows an enlarged perspective view of a packer arm portion of the card shuffling apparatus of the card handling device of FIG. 4A;

 FIG. 5A shows an enlarged side view of a card output portion of the card handling device of FIG. 1 in a first orientation;

 FIG. 5B shows an enlarged side view of a card output portion in the first orientation;
20 FIG. 5C shows an enlarged side view of the card output portion of FIG. 5A in a second orientation;

 FIG. 5D shows an enlarged side view of a card output portion in the second orientation;

 FIG. 5E shows an enlarged perspective view of a card buffer area of the card output
25 portion of FIGS. 5A-5D;

 FIG. 6 shows a perspective view of a substantially flat card output area of the card handling device of FIG. 1;

 FIG. 7 shows an enlarged side view of a card pathway of a card handling device according to an embodiment of the present disclosure;

30 FIG. 8 is a process diagram for the shuffling of playing cards according to an embodiment of the present disclosure;

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FIG. 9 shows a perspective view of a card transfer system for removing playing cards from a card shuffling apparatus of a card handling device according to an embodiment of the present disclosure; and

FIG. 10 is a schematic representation of a control system of a card handling device
5 according to an embodiment of the present disclosure.

MODE(S) FOR CARRYING OUT THE INVENTION

As used herein, any relational term, such as “first,” “second,” “over,” “beneath,” “top,” “bottom,” “underlying,” “up,” “down,” etc., is used for clarity and convenience in
10 understanding the disclosure and accompanying drawings, and does not connote or depend on any specific preference, orientation, or order, except where the context clearly indicates otherwise. For example, these terms may refer to an orientation of elements of the card handling device relative to a surface of a table on which the card handling device may be positioned, mounted, and/or operated (*e.g.*, as illustrated in the figures).

As used herein, the terms “vertical” and “horizontal” may refer to a drawing figure
15 as oriented on the drawing sheet, and are in no way limiting of orientation of an apparatus, or any portion thereof, unless it is apparent that a particular orientation of the apparatus is necessary or desirable for operation in view of gravitational forces. For example, when referring to elements illustrated in the figures, the terms “vertical” or “horizontal” may
20 refer to an orientation of elements of the card handling device relative to a table surface of a table to which the card handling device may be mounted and operated.

Some embodiments of the present disclosure may include card handling devices having “card buffer areas” (*e.g.*, area within the card handling device where playing cards can be temporarily collected). The card handling devices may include a card buffer area
25 that moves relative to a card shuffling apparatus as playing cards are inserted into the card buffer area. As a card buffer area moves, the card shuffling apparatus may insert playing cards at both a top and a bottom of (*e.g.*, beneath) a group of playing cards that is already present in the card buffer area. Some embodiments of the present disclosure may include card handling devices that have playing cards overtake the group of playing cards in the
30 card buffer area. In other words, cards may pass up other cards in the card buffer area such that the cards passing up the other cards are drawn (*e.g.* dealt) from the card handling device prior to the other cards in the card buffer area. Put another way, playing cards already in the card buffer area may have an order in which the playing cards are going to be

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dealt from the card handling device, and the card handling device may enable other playing cards to bypass (*e.g.*, jump ahead of in order) the playing cards already in the card buffer area and be dealt prior to the playing cards already in the card buffer area. For example, the card buffer area may have playing cards drawn (to be dealt) from a top a group of playing cards within the card buffer area, and the card buffer area may enable one or more cards to be positioned on top of a stack of cards in the card buffer area (*e.g.*, so that the one or more cards will be drawn before the remaining cards in the card buffer area) or in another position in the stack of cards (*e.g.*, the bottom of the stack).

Some embodiments of the present disclosure may include card handling devices that include a substantially flat card output area (*e.g.*, a substantially flat card delivery area or substantially flat card shoe). The substantially flat card output area may include an interface portion having a surface that is oriented at relatively small acute angles (*e.g.*, 5° to 20°) relative to a table surface of a table to which the card handling device may be positioned and/or mounted. The substantially flat card output area may further allow playing cards to be drawn from an outlet of the substantially flat card output area throughout a range of at least substantially horizontal directions, including directions that are perpendicular to each other.

A perspective view of a card handling device 100, according to an embodiment of the present disclosure, having portions of one or more housings of the card handling device 100 removed to show interior components of the card handling device 100, is shown in FIG. 1. The card handling device 100 may be configured to be mounted with at least a majority of the card handling device 100 beneath a level of a table surface (*e.g.*, a gaming table surface) of a table (*e.g.*, a gaming table) and to deliver shuffled playing cards to the table surface and/or receive playing cards to be shuffled from or proximate the table surface. The card handling device 100 may include a frame structure 102, a housing 104, a control system 105 in communication with a display 106, and a substantially flat card output area 108, relative to the table surface.

FIG. 2 shows a side elevation view of the card handling device 100 of FIG. 1 with additional portions of the one or more housings of the card handling device 100 removed to show interior components of the card handling device 100. The card handling device 100 may include a card input portion 202, a card shuffling apparatus 204, and a card output portion 206. The card input portion 202 may include a card intake area 208 for receiving playing cards to be shuffled. The card intake area 208 may be arranged on a same side of

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the card shuffling apparatus 204 of the card handling device 100 as the substantially flat card output area 108. Furthermore, the card intake area 208 may be oriented to be positioned above and proximate to, such as resting upon, a table surface 210 when the card handling device 100 is mounted to a table 212 and may be accessible to a dealer
5 administering a game at the table 212 to which the card handling device 100 is mounted. As a result, when the card handling device 100 is mounted to a table 212, the substantially flat card output area 108 and card intake area 208 may be oriented proximate in location to each other and to the top surface 210 of the table 212. The orientation of the card intake area 208 of the card input portion 202 and the substantially flat card output area 108 may
10 reduce an amount of the card handling device 100 that needs to be exposed above a table surface 210 of the table 212 to which the card handling device 100 is mounted. The card output portion 206 may include a card buffer area 214 proximate an interface 216 of the card output portion 206 and the card shuffling apparatus 204 of the card handling device 100.

15 In operation, the card input portion 202 may receive unshuffled playing cards from a table 212 at the card intake area 208 and may deliver the unshuffled playing cards to the card shuffling apparatus 204. The card shuffling apparatus 204 may at least partially shuffle the unshuffled playing cards and may deliver shuffled playing cards to the card buffer area 214 of the card output portion 206 of the card handling device 100. The card
20 output portion 206 may transport playing cards from the card buffer area 214 (*e.g.*, one-at-a-time) to the substantially flat card output area 108 where a dealer may manually draw the playing cards (*e.g.*, one-at-a-time) from the substantially flat card output area 108 for the distribution of cards.

An enlarged side view of the card input portion 202 of the card handling device 100
25 as shown in FIG. 2 is shown in FIG. 3. The card input portion 202 may include a first frame assembly 302, a first pivoting axis 304, a first card feed system 306, a first card imaging system 308, and a first sensor 310. The first card feed system 306 may include a first card pathway 312 (*e.g.*, pathway along which playing cards move through the card input portion 202). The first card pathway 312 may lead from the card intake area 208 of
30 the card input portion 202 to the card shuffling apparatus 204 of the card handling device 100. The first card feed system 306 may further have a set of pick-off rollers 314 that transport playing cards individually in a direction indicated by arrow 315. Additional pairs of rollers 316, 318a, 318b, 320a, and 320b may displace playing cards from the card

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intake area 208 to the card shuffling apparatus 204. For example, a stack of unshuffled playing cards may be placed in the card intake area 208, and the set of pick-off rollers 314 of the first card feed system 306 may take playing cards individually from a bottom of (e.g., beneath) the stack of unshuffled playing cards and the additional pairs of rollers 316, 318a, 318b, 320a, 320b may transport the playing cards to the card shuffling apparatus 204. In some embodiments, the card intake area 208 may be configured to receive one or more playing cards. In some embodiments, the card intake area 208 may be configured to receive one or more decks of playing cards at a time.

In some embodiments, the first card imaging system 308 may be oriented along the first card pathway 312 of the first card feed system 306. The first card feed system 306 may transport playing cards past the first card imaging system 308, and the first card imaging system 308 may capture identifying information of each playing card as each playing card moves along the first card pathway 312 before insertion into the card shuffling apparatus 204. For example, the first card imaging system 308 may include a camera or line scanning device that captures an image of each card. In some embodiments, the first card imaging system 308 may comprise one or more of the imaging devices described in U.S. Pat. No. 7,933,448 to Downs, issued Apr. 26, 2011, in U.S. Pat. No. 7,764,836 to Downs et al., issued Jul. 27, 2010, or in U.S. Pat. No. 8,800,993 B2 to Blaha et al., issued Aug. 12, 2014, the disclosure of each of which is incorporated herein in its entirety by this reference. In some embodiments, the first card imaging system 308 may not need to capture an image of an entire card, but may detect only rank and suit information, special markings on the playing cards, such as, for example, a lot number, a casino identifier, a shoe number, a shift number, a table number, bar code, glyph, any other known type of special marking, or combinations thereof. In some embodiments, the control system 105 (FIG. 1) of the card handling device 100 may receive signals from the first card imaging system 308 to determine rank and/or suit of each playing card being read or sensed by the first card imaging system 308. The control system 105 (FIG. 1) of the card handling device 100 may store at least some data related to each playing card (e.g., an inventory of the playing cards handled by the card handling device 100, a complete card set composition, etc.) in a memory portion of the control system 105 (FIG. 1). Stored data may be compared to data collected at the first card imaging system 308 or another location in the card handling device 100. For example, the first card imaging system 308 may be used in conjunction with a second card imaging system 508 (FIG. 5A) in the card output portion 206 to keep an inventory of the playing cards maintained

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in the card shuffling apparatus 204, fed from the card intake area 208 to the card shuffling apparatus 204, and fed from the card shuffling apparatus 204 to the substantially flat card output area 108. In other words, a total inventory of the cards sent through the card handling device 100 may be maintained. Interaction of the first and second card imaging systems 308, 5 508 is described in further detail in regard to FIG. 5A.

The first sensor 310 of the card input portion 202 may be oriented proximate the card intake area 208 and may be used to sense whether playing cards are present in the card intake area 208. Furthermore, the first sensor 310 may be configured to send signals to and inform the control system 105 (FIG. 1) that playing cards are present in the card intake 10 area 208. Furthermore, the control system 105 (FIG. 1) may be configured to initiate a shuffling cycle (*e.g.*, process of shuffling playing cards with the card handling device 100) when playing cards are placed in the card intake area 208 and sensed by the first sensor 310. In some embodiments, the first sensor 310 may include at least one of an optical sensor and an infrared sensor.

15 Referring to FIGS. 2 and 3 together, the first pivoting axis 304 of the card input portion 202 may comprise a first shaft 322 rotatably mounted at both ends to the frame structure 102 of the card handling device 100. The first shaft 322 of the first pivoting axis 304 may extend axially along a horizontal plane that is substantially parallel to a table surface 210 of a table 212 to which the card handling device 100 may be mounted. 20 Furthermore, the first pivoting axis 304 of the card input portion 202 may be oriented proximate the card intake area 208 of the card input portion 202 and may be positioned and spaced above a table surface 210 of a table 212 when the card handling device 100 is mounted to a table 212. In some embodiments, the card input portion 202 may be rotatable about the first pivoting axis 304 in a direction represented by arrow 305 relative to the 25 remainder of the card handling device 100. The card input portion 202 may be rotatable away from the card output portion 206 in direction 305 and card shuffling apparatus 204 of the card handling device 100, and the card output portion 206 and card shuffling apparatus 204 may be at least partially exposed when the card input portion 202 is rotated away from the card output portion 206 and card shuffling apparatus 204. For example, 30 during use, the card input portion 202 may be rotated about the first pivoting axis 304 and away from the card output portion 206 and card shuffling apparatus 204 of the card handling device 100 in order to facilitate maintenance, troubleshooting, and/or repair of the card handling device 100. In other words, in FIG. 3, the card input portion 202 may be

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rotated about the first pivoting axis 304 to expose other portions of the card handling device 100 for maintenance.

A cross-sectional side view of the card shuffling apparatus 204 of the card handling device 100 of FIG. 1 is shown in FIG. 4A. As shown in FIG. 4A, the card shuffling apparatus 204 may include a multi-compartment carousel 402 and a packer arm device 404. The multi-compartment carousel 402 of the card shuffling apparatus 204 may have a plurality of compartments 406 (*e.g.*, thirty-nine compartments 406) formed between spaced pairs of adjacent fingers 408, 410 extending from a rotatable center member 412. Each compartment 406 of the plurality of compartments 406 may be defined between two spaced pairs of adjacent fingers 408, 410 of the multi-compartment carousel 402. The fingers 408, 410 may each include a beveled edge 414, 416 that enables and guides insertion of playing cards on top of or below playing cards previously deposited in the plurality of compartments 406 by the first card feed system 306 (FIG. 3) of the card input portion 202. The beveled edges 414, 416 may include flat, angled surfaces or curved surfaces. Card edges of playing cards may contact the beveled edges 414, 416 and may be deflected and guided into the compartments 406. In some embodiments, the adjacent fingers 408, 410 may include a biased element (*e.g.*, spring 418) extending between the adjacent fingers 408, 410 for assisting in holding playing cards securely within the plurality of compartments 406 after insertion into the multi-compartment carousel 402. It is noted that in other embodiments, the multi-compartment carousel 402 may include fewer than thirty-nine (39) compartments 406 or more than thirty-nine (39) compartments 406. In some embodiments, each compartment 406 of the plurality of compartments 406 may be sized and shaped to hold between six and twenty playing cards. In some embodiments, each compartment 406 of the plurality of compartments 406 may be sized and shaped to hold between ten and sixteen playing cards. For example, each compartment 406 of the plurality of compartments 406 may be sized and shaped to hold thirteen cards.

Although, the card handling device 100 of the present disclosure is described as the card shuffling apparatus 204 including a multi-compartment carousel 402, the card shuffling apparatus 204 may include any suitable shuffling mechanism such as, for example, those disclosed in U.S. Pat. No. 5,676,372 to Sines et al. that issued Oct. 14, 1997, U.S. Pat. No. 6,254,096 to Grauzer et al. that issued Jul. 3, 2001, U.S. Pat. No. 6,651,981 to Grauzer et al. that issued Nov. 25, 2003, and U.S. Pat. No. 6,659,460 to Blaha et al. that issued Dec. 9, 2003, the disclosures of each of which are incorporated herein in their entireties by this

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reference. In some embodiments, the card shuffling apparatus 204 may have a wheel or carousel design that may be somewhat similar to the card-shuffling devices disclosed in the aforementioned and incorporated by reference U.S. Pat. No. 6,659,460 and U.S. Pat. No. 8,800,993 B2.

5 In some embodiments, the card shuffling apparatus 204 may operate, in at least one operational mode, as a continuous shuffling machine. In other words, the card shuffling apparatus 204 may be configured to continuously receive cards (*e.g.*, after each round of play) and may continuously shuffle cards and provide card to the dealer without unloading unused cards. In contrast, batch shuffling the one or more decks of cards involves unloading the entire
10 set of cards after each shuffling cycle. For example, the card shuffling apparatus 204 may shuffle the playing cards such that playing cards discarded and reinserted into the card handling device 100 from a previous round have a chance of appearing (*e.g.*, being dealt) in the next round.

 In some embodiments, the card shuffling apparatus 204 may operate, in at least one
15 operational mode as a batch shuffling machine. For example, the card shuffling apparatus 204 may be configured to shuffle a complete set or “shoe” of one or more decks of cards (*e.g.*, one, two, four, six, eight decks of cards, etc.) and then provide the cards from those decks to the dealer (*e.g.*, one card at a time) until the set of cards is depleted, or a cut card is reached.

 FIG. 4B is an enlarged perspective view of the packer arm device 404 of the card
20 shuffling apparatus 204 of FIG. 4A. Referring to FIGS. 4A and 4B together, the packer arm device 404 of the card shuffling apparatus 204 may assist in inserting playing cards into each compartment 406 of the plurality of compartments 406 of the multi-compartment carousel 402. The packer arm device 404 may include a motor 420, an elongated packer arm 422, a packer arm shaft 423, and an eccentric cam member 424. The elongated packer
25 arm 422 may include a pusher portion 426 and a pivot arm portion 428. The pusher portion 426 of the elongated packer arm 422 may have a generally L-shape having a first leg 430 and a second leg 432. The second leg 432 may extend from a first end of the first leg 430 in a direction at least generally perpendicular to a direction in which the first leg 430 extends. The pivot arm portion 428 of the elongated packer arm 422 may extend from a
30 second end of the first leg 430 in a direction at least substantially opposite to the direction in which the second leg 432 of the pusher portion 426 of the elongated packer arm 422 extends. The second end of the first leg 430 may be rotatably coupled to the packer arm shaft 423, which may be connected to the frame structure 102 of the card handling device 100. The pivot

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arm portion 428 of the elongated packer arm 422 may be coupled to the eccentric cam member 424.

The elongated packer arm 422 may rotate about the packer arm shaft 423 and the second leg 432 of the pusher portion 426 of the elongated packer arm 422 may translate
5 partially along the first card pathway 312 of the first card feed system 306 (FIG. 3) to ensure proper loading of the playing cards within the plurality of compartments 406 of the multi-compartment carousel 402. The motor 420 may rotate the eccentric cam member 424, which may, in turn, cause the elongated packer arm 422 of the packer arm device 404 to rock back and forth along an arc-shaped path.

10 In some embodiments, the packer arm device 404 may be used to provide additional force to a playing card along the first card pathway 312 as the playing card leaves the pair of rollers 320a, 320b. For example, the packer arm device 404 may be located in the card handling device 100 such that a portion of the second leg 432 of the elongate packer arm 422 of the packer arm device 404 may abut against a trailing edge of a playing card and force the
15 playing card at least substantially completely into a compartment 406 of the plurality of compartments 406 of the card shuffling apparatus 204. In some embodiments, the packer arm device 404 may be similar to the devices disclosed in the aforementioned and incorporated by the reference U.S. Pat. No. 6,659,460, U.S. Pat. No. 7,766,332, and U.S. Pat. No. 8,800,993 B2.

20 A side view of the card output portion 206 of the card handling device 100 of FIG. 1 in a first orientation is shown in FIG. 5A. An enlarged side view of the card output portion 206 in the first orientation is shown in FIG. 5B. A side view of the card output portion 206 of the card handling device 100 of FIG. 1 in a second orientation is shown in FIG. 5C. An enlarged side view of the card output portion 206 in the second orientation is
25 shown in FIG. 5D. An enlarged perspective view of the card buffer area 214 of the card output portion 206 of the card handling device 100 of FIG. 1 is shown in FIG. 5E. Referring to FIGS. 5A-5E together, the card shuffling apparatus 204 may further include a card transfer system 502, and the card output portion 206 may include the card buffer area 214, a second frame assembly 503, a second pivoting axis 504, a second card feed
30 system 506, a second card imaging system 508, and an actuation system 510.

Referring to FIGS. 4 and 5A-5E together, the card transfer system 502 of the card shuffling apparatus 204 may transfer playing cards from the plurality of compartments 406 of the multi-compartment carousel 402 to the card buffer area 214 of the card output

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portion 206 of the card handling device 100. In some embodiments, the card transfer system 502 may be configured to unload the plurality of compartments 406 in a compartment 406 by compartment 406 manner. For example, the card transfer system 502 may unload a first compartment 406 completely before unloading a second
5 compartment 406. In some embodiments, the second compartment 406 may be a compartment 406 adjacent to the first compartment 406. In other embodiments, the second compartment 406 may be a randomly selected compartment 406 and may not necessarily be a compartment 406 adjacent to the first compartment 406. In some embodiments, the card transfer system 502 may not unload the plurality of compartments 406
10 compartment 406 by compartment 406 but, rather, may unload playing cards from the plurality of compartments 406 in a randomized (*e.g.*, non-sequential) order. For example, the card transfer system 502 may unload one or more playing cards from a first compartment 406 without unloading other playing cards in the first compartment 406 and then may unload one or more playing cards from a second compartment 406 (*e.g.*, with or
15 without unloading other playing cards in the second compartment 406). In some embodiments, the card transfer system 502 may unload the playing cards one-at-a-time. In other embodiments, the card transfer system 502 may unload multiple playing cards at a time.

Referring to FIGS. 5A-5E, as discussed above, the card buffer area 214 of the card
20 output portion 206 may be positioned at the interface 216 (FIG. 2) of the card shuffling apparatus 204 and the card output portion 206 of the card handling device 100. In some embodiments, the card buffer area 214 may be positioned within the card handling device 100 such that the card buffer area 214 is inaccessible to a dealer. The card buffer area 214 of the card output portion 206 may receive playing cards from the card shuffling
25 apparatus 204 and may be able to hold a group of playing cards 512 temporarily prior to the playing cards being transferred to the substantially flat card output area 108. As discussed in further detail below, the card buffer area 214 may maintain group of playing cards 512 having a number of playing cards within the range of nine to twenty-one.

The card buffer area 214 of the card output portion 206 may include a plate 514
30 (*e.g.*, support), a spring (*e.g.*, a bias) 516, a first card guide 518, a second card guide 520, and a buffer pick-off roller 524. The plate 514 may include an upper surface 526 for supporting a group of playing cards 512 and an opposite bottom surface 527. The spring 516 may be attached to the bottom surface 527 of the plate 514, and a combination

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of the plate 514 and spring 516 may form a spring-loaded plate. For example, the spring 516 may push the plate 514 toward the buffer pick-off roller 524 and/or press the plate 514 against the group of playing cards 512. The buffer pick-off roller 524 may be oriented above the plate 514, and the card buffer area 214 may hold the group of playing cards 512 between the upper surface 526 of the plate 514 and the buffer pick-off roller 524. The first card guide 518 may be oriented above the plate 514 and proximate the buffer pick-off roller 524. The first card guide 518 may include a first portion 528 and a second portion 530. The first portion 528 of the first card guide 518 may extend from the buffer pick-off roller 524 in a direction toward the card shuffling apparatus 204, tangential to an outer circumference of the buffer pick-off roller 524, and parallel to the upper surface 526 of the plate 514 of the card buffer area 214. The second portion 530 of the first card guide 518 may extend upwards from the first portion 528 of the first card guide 518 (*e.g.*, in a direction away from the card buffer area 214) from a side of the first portion 528 facing the card shuffling apparatus 204. The second portion 530 of the first card guide 518 may extend in a first plane 532 that is oriented at an acute angle relative to the upper surface 526 of the plate 514 of the card buffer area 214. The second portion 530 of the first card guide 518 may also form a first beveled edge 534 that leads to an area between the plate 514 and the buffer pick-off roller 524 and enables and guides insertion of playing cards on the top 544 of the group of playing cards 512 already present in the card buffer area 214. The second card guide 520 may be part of the plate 514 and extend downward from the plate 514 (*e.g.*, in a direction away from the card buffer area 214) on a side of the plate 514 facing the card shuffling apparatus 204. The second card guide 520 may extend in a second plane 536 that is oriented at an acute angle relative to the upper surface 526 of the plate 514. The second card guide 520 may form a second beveled edge 538 that leads to an area between the plate 514 and buffer pick-off roller 524 and enables and guides insertion of playing cards at the bottom 542 of (*e.g.*, beneath) the group of playing cards 512 already present in the card buffer area 214. Put another way, the first card guide 518 and second card guide 520 may extend, diverge, and/or fan outward from the space between the plate 514 and buffer pick-off roller 524 and may guide playing cards transferred by the card transfer system 502 from the multi-compartment carousel 402 into the space between the plate 514 and buffer pick-off roller 524.

The card buffer area 214 may adjust in size to accommodate different amounts of playing cards. For example, as discussed above, the plate 514 of the card buffer area 214

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may be spring-loaded. As a result, the plate 514 may be able to translate generally up and down vertically relative to the card transfer system 502 of the card shuffling apparatus 204. Furthermore, the plate 514 may be able to translate relative to the buffer pick-off roller 524 such that the space between the plate 514 and the buffer pick-off roller 524 expands or contracts as the plate 514 translates. The volume of the card buffer area 214 may expand or contract responsive to playing cards being inserted into the card buffer area 214 by the card transfer system 502 or playing cards being removed from the card buffer area 214 by the buffer pick-off roller 524.

In some embodiments, the card buffer area 214 of the card output portion 206 may maintain a minimum number of playing cards in the card buffer area 214. For example, the card buffer area 214 of the card output portion 206 may maintain five to seven playing cards the card buffer area 214. In some embodiments, the card buffer area 214 of the card output portion 206 may maintain seven to nine cards in the card buffer area 214. In some embodiments, the card buffer area 214 of the card output portion 206 may maintain more than nine cards in the card buffer area 214. For example, the card buffer area 214 of the card output portion 206 may maintain nine cards in the card buffer area 214. In some embodiments, the card buffer area 214 of the card output portion 206 may have a maximum number of playing cards that fit in the card buffer area 214 of the card output portion 206. For example, the maximum number of playing cards that fit in the card buffer area 214 may be within a range of ten to fifteen playing cards. In other embodiments, the maximum number of playing cards that fit in the card buffer area 214 may be within a range of fifteen to twenty playing cards. In other embodiments, the maximum number of playing cards that fit in the card buffer area 214 may be within a range of twenty to twenty-five playing cards. In some embodiments, the maximum number of playing cards that fit in the card buffer area 214 may be twenty-two playing cards.

Referring to FIGS. 1 and 5A-5E together, in some embodiments, the control system 105 may maintain a count of a number of playing cards that are present in the card buffer area 214. For example, the control system 105 may track how many playing cards are inserted into the card buffer area 214 by the cards transfer system 502, and the control system 105 may track how many playing cards are removed from the card buffer area 214 by the second card feed system 506. By tracking movement of playing cards into and out of the card buffer area 214, the control system 105 may determine when the card buffer area 214 contains minimum number of playing cards in the card buffer area 214.

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Furthermore, the control system 105 may determine when the card buffer area 214 contains a maximum number of cards in the card buffer area 214. Upon determination that the card buffer area 214 contains the minimum number of cards in the card buffer area 214, the control system 105 may add playing cards to the card buffer area 214 by having the card transfer system 502 insert additional playing cards into the card buffer area 214. Upon determination that the card buffer area 214 contains the maximum number of cards in the card buffer area 214, the control system 105 may temporarily stop the card transfer system 502 from adding playing cards to the card buffer area 214. The function and operation of the control system 105 are described in further detail in regard to FIG. 10.

10 In some embodiments, the card output portion 206 may have at least a first orientation and a second orientation relative to card shuffling apparatus 204 of the card handling device 100, as shown in FIGS. 5A-5E, respectively. Referring to FIGS. 5A and 5B, while the card output portion 206 is in the first orientation, the card transfer system 502 of the card shuffling apparatus 204 may insert playing cards into the card buffer area 214 of the card output portion 206 at a bottom 542 of (*e.g.*, beneath) the group of playing cards 512 already present in the card buffer area 214. For example, the card transfer system 502 may remove one or more playing cards from one of the plurality of compartments 406 (FIG. 4) of the multi-compartment carousel 402 (FIG. 4) and may insert the playing card into the card buffer area 214 by sliding the playing card against the second beveled edge 538 of the second card guide 520 and the upper surface 526 of the plate 514 until the playing card is between the plate 514 and buffer pick-off roller 524 of the card buffer area 214. In other words, the card transfer system 502 may remove a playing card from one of the plurality of compartments 406 (FIG. 4) of the multi-compartment carousel 402 (FIG. 4) and may slide a leading edge of the playing card against the second beveled edge 538 of the second card guide 520 until the playing card presses up against a bottom surface of a bottommost card of the group of playing cards 512. The card transfer system 502 may continue to slide the playing card between the bottom surface of a bottommost card of the group of playing cards 512 and the upper surface of the plate 514 until the playing card is at least substantially aligned (*e.g.*, nested) with the other playing cards in the group of playing cards 512. Such an operation may result in inserting the playing card at the bottom 542 of the group of playing cards 512. Furthermore, while in the first orientation, the buffer pick-off roller 524 of the second card feed system 506 may remove playing cards from a top 544 of the group of playing cards 512 in the card buffer

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area 214 and the group of playing cards 512 may be transported to the substantially flat card output area 108 of the card handling device 100 in a same order in which the playing cards were inserted into the card buffer area 214 by the card transfer system 502.

Referring to FIGS. 5C and 5D, while the card output portion 206 is in the second orientation, the card transfer system 502 may insert playing cards into the card buffer area 214 of the card output portion 206 at a top 544 of the group of playing cards 512 already present in the card buffer area 214. For example, the card transfer system 502 may remove one or more playing cards from one of the plurality of compartments 406 (FIG. 4) of the multi-compartment carousel 402 (FIG. 4) and may insert the playing card into the card buffer area 214 by sliding the playing card against the first beveled edge 534 of the second portion 530 of the first card guide 518 and the first portion 528 of the first card guide 518 until the playing card is between the plate 514 and buffer pick-off roller 524 of the card buffer area 214. In other words, the card transfer system 502 may remove a playing card from one of the plurality of compartments 406 (FIG. 4) of the multi-compartment carousel 402 (FIG. 4) and may slide a leading edge of the playing card against the first beveled edge 534 of the second portion 530 of the first card guide 518 until the playing card presses up against a top surface of an uppermost card of the group of playing cards 512. The card transfer system 502 may continue to slide the playing card between the top surface of a upper most card of the group of playing cards 512 and the first portion 528 of the first card guide 518 until the playing card is at least substantially aligned (*e.g.*, nested) with the other playing cards in the group of playing cards 512. Such an operation may result in positioning the playing card at the top 544 of the group of playing cards 512. As a result, any playing cards inserted into the card buffer area 214 at the top 544 of the group of playing cards 512 already in the card buffer area 214 may be removed by the buffer pick-off roller 524 of the second card feed system 506 prior to playing cards that were already in the card buffer area 214. Accordingly, while in the second orientation, the card buffer area 214 of the card handling device 100 may be able to perform an overtake function where a playing card withdrawn from the multi-compartment carousel 402 (FIG. 4) may pass up (*e.g.*, overtake or pre-empt) the group of playing cards 512 that is already in the card buffer area 214. In some embodiments, only one playing card at a time will pass up the group of playing cards 512 already in the card buffer area 214. In other embodiments, multiple playing cards at a time will pre-empt the group of playing cards 512 already in the card buffer area 214.

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In some embodiments, the card output portion 206 may be configured to move between the first orientation and the second orientation in an at least substantially random or automatic (*e.g.*, without human intervention) manner. For example, the card output portion 206 may be fully controlled by the control system 105 (FIG. 1) such that a dealer
5 administering the card handling device 100 at a table 212 (FIG. 2) and/or any players playing at the table 212 (FIG. 2) are unaware of the movement of the card output portion 206 and the placement order of the cards in the card buffer area 214. In some embodiments, the control system 105 may include a random number generator and may determine when to move the card output portion 206 between the first orientation and the
10 second orientation based on the numbers generated by the random number generator. In some embodiments, a default position of the card output portion 206 may be in the first orientation. For example, the card output portion 206 may be typically oriented in the first orientation and may just move into the second orientation temporarily as determined by the control system 105.

15 Referring to FIGS. 1 and 5A-5E together, in some embodiments, the card output portion 206 may be moved back and forth between the first orientation and second orientation by the actuation system 510 of the card output portion 206. The actuation system 510 may be mounted at one end to the frame structure 102 of the card handling device 100 and at another end to the second frame assembly 503 of the card output
20 portion 206 and may be able to extend and contract. Furthermore, the actuation system 510 may be controlled by the control system 105 of the card handling device 100. When the actuation system 510 extends or retracts, the actuation system 510 may move at least substantially the entire card output portion 206 of the card handling device 100 relative to the card shuffling apparatus 204 of the card handling device 100. In some embodiments,
25 the actuation system 510 may move the card output portion 206 such that the card buffer area 214 of the card output portion 206 moves at least partially in a vertical direction relative to the card transfer system 502 of the card shuffling apparatus 204. As a result, when the actuation system 510 moves the card buffer area 214 of the card output portion 206 back and forth vertically, the card transfer system 502 of the card shuffling
30 apparatus 204 may be able to insert playing cards from the card shuffling apparatus 204 at both the top 544 and bottom 542 of the group of playing cards 512 in the card buffer area 214. In some embodiments, the actuation system 510 may include one or more of an

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electronic piston, electronic solenoid, and motor spindle. In other embodiments, the actuation system 510 may be pneumatically operated.

In some embodiments, the card output portion 206 may be rotatable about the second pivoting axis 504 relative to the card shuffling apparatus 204 of the card handling device 100. For example, the second pivoting axis 504 may include a second shaft 546 rotatably mounted at both ends to the frame structure 102 of the card handling device 100. The second shaft 546 of the second pivoting axis 504 may extend axially in a direction substantially parallel to a table surface 210 (FIG. 2) of a table 212 (FIG. 2) to which the card handling device 100 may be mounted. In some embodiments, the second pivoting axis 504 of the card output portion 206 may be oriented proximate the substantially flat card output area 108 of the card handling device 100. When the actuation system 510 moves the card output portion 206, the card output portion 206 may rotate about the second pivoting axis 504 and the card buffer area 214 of the card output portion 206 may move at least partially in a vertical direction relative to the card shuffling apparatus 204, which, as a result, allows the card transfer system 502 to insert playing cards at the top 544 and bottom 542 of the group of playing cards 512 in the card buffer area 214. As described above, allowing the card transfer system 502 to insert playing cards at the top 544 of the group of playing cards 512 in the card buffer area 214 enables playing cards to overtake the group of playing cards 512 in the card buffer area 214 as part of a playing card bypass process.

Having playing cards overtake the group of playing cards 512 in the card buffer area 214 may assist in the prevention of counting cards by players. For example, several methods of counting cards rely on knowing what rankings of playing cards in a group of playing cards 512 (*e.g.*, in a selected number of decks) remain to be dealt, have been dealt, and/or remain in the shoe before the deck or decks of cards are reshuffled as a batch or recycled through a continuous shuffler. As mentioned above, the card shuffling apparatus 204 of the card handling device 100 may be a continuous shuffling apparatus and may operate to at least partially shuffle used playing cards back into the plurality of compartments 406 of the multi-compartment carousel 402 and the card buffer area 214 of the card output portion 206 without unloading all of the cards at the end of a round of play. Furthermore, by having a playing card overtake (*e.g.*, bypass) the group of playing cards 512 in the card buffer area 214, a playing card used in a previous hand has a chance of being dealt at least almost immediately after reinsertion into the card handling

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device 100. As a result, it may be more difficult for a player to know what playing cards to expect or not to expect in a next hand. When using a card handling device that holds a group of cards in a buffer area and does not have playing cards overtake other playing cards in the shoe or card shuffling apparatus, a player can expect playing cards from a previous hand to not be dealt for at least a certain number of playing cards (*e.g.*, a minimum number of playing cards in a card buffer area 214 or playing cards already collected in a shoe). However, a player playing at a table 212 (FIG. 2) using the card handling device 100 of the present disclosure cannot assume that playing cards of the previous hand will not be dealt for a certain number of playing cards. In fact, having a playing card randomly over take the group of playing cards 512 in the card buffer area 214 may make it nearly impossible for a player to effectively count cards using known methods. Accordingly, having playing cards overtake the group of playing cards 512 in the card buffer area 214 further randomizes the order of the playing cards that are dealt from the substantially flat card output area 108 and may help to maintain a house advantage in card games where card counting is a frequent problem.

Referring again to FIGS. 5A-5E, the second card feed system 506 of the card output portion 206 may include a second card pathway 540 (*e.g.*, pathway along which playing cards move through the card output portion 206). The second card pathway 540 may lead from the card buffer area 214 of the card handling device 100 to the substantially flat card output area 108 of the card handling device 100. The buffer pick-off roller 524 of the second card feed system 506 may remove playing cards from the card buffer area 214 from a top 544 of a group of playing cards 512 collected in the card buffer area 214 of the card output portion 206. The second card feed system 506 may further have additional pairs of rollers 548, 550, 552, 554, 556, that may displace playing cards from the card buffer area 214 to the substantially flat card output area 108 of the card handling device 100. For example, as described above, the buffer pick-off roller 524 of the second card feed system 506 may remove playing cards from the top 544 of the group of playing cards 512 in the card buffer area 214 and the additional rollers 548, 550, 552, 554, 556, may transport the playing cards to the substantially flat card output area 108. In some embodiments, the second card feed system 506 of the card output portion 206 may transport playing cards to the substantially flat card output area 108 one-at-a-time. In some embodiments, the second card feed system 506 may not transport another playing card to the substantially flat card output area 108 until a playing card present in the substantially flat card output area 108

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(*e.g.*, previously sent to the substantially flat card output area 108) is taken out of the substantially flat card output area 108 (*e.g.*, dealt or otherwise removed by a dealer). In other words, until the control system 105 receives a signal indicating the absence of a playing card in the substantially flat card output area 108, another playing card may not be delivered to the substantially flat card output area 108.

Furthermore, because of the overtake function of the card handling device 100 and because the playing cards may be sent one-at-a-time to the substantially flat card output area 108, there may not be a collection of playing cards within the card handling device 100 that cannot be changed prior to sending a next playing card to the substantially flat card output area 108. As a result, randomization of the playing cards is further increased by the card handling device 100 of the current disclosure when compared with conventional card shufflers.

In some embodiments, the second card imaging system 508 may be oriented along the second card pathway 540 of the second card feed system 506. The second card feed system 506 may transport playing cards past the second card imaging system 508, and the second card imaging system 508 may capture identifying information of each playing card as each playing card moves along the second card pathway 540 before insertion in the substantially flat card output area 108. The second card imaging system 508 may be similar to the first card imaging system 308 and may comprise any of the components described above. For example, the second card imaging system 508 may include a second sensor 509, *etc.* Referring to FIGS. 3, 5A, and 5B together, as noted above, the first card imaging system 308 and the second card imaging system 508 may be used together to keep an inventory of the playing cards being sent through the card handling device 100. For example, the control system 105 (FIG. 1) may take a first inventory of the playing cards as the playing cards are inserted into the card shuffling apparatus 204, and the control system 105 (FIG. 1) may take a second inventory of the playing cards as the playing cards are inserted into substantially flat card output area 108. Furthermore, the first inventory and the second inventory may be compared and contrasted to determined behaviors of the card handling device 100, effectiveness of the card shuffling apparatus 204, and a randomness of the playing cards relative to how the playing cards entered the card shuffling apparatus 204. Moreover, the first inventory and second inventory may be used to detect tampering, cheating, or an absence of playing cards in decks handled by the card handling device 100.

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FIG. 6 is a perspective view of the substantially flat card output area 108 of the card handling device 100. The substantially flat card output area 108 (*e.g.*, substantially flat card delivery area or substantially flat card shoe) of the card handling device 100 may include an interface portion 602, a cover 604, a sensor 606, and an outlet 608. The cover 604 of the substantially flat card output area 108 may be oriented above the interface portion 602 and may cover at least a portion of the interface portion 602 of the substantially flat card output area 108. The cover 604 and the interface portion 602 of the substantially flat card output area 108 may define the outlet 608 between the cover 604 and the interface portion 602. Furthermore, the second card feed system 506 (FIG. 5A) of the card output portion 206 may be able to send playing cards one-at-a-time through the outlet 608.

The interface portion 602 of the substantially flat card output area 108 may have a lower surface 610, an opposite at least substantially flat draw surface 612, a first end 614, and a second opposite end 616. The draw surface 612 of the interface portion 602 may be able to support playing cards that are sent into the substantially flat card output area 108 from the second card feed system 506 (FIG. 5A) of the card output portion 206. The draw surface 612 of the interface portion 602 may be defined at an acute angle β relative to the lower surface 610 of the interface portion 602 (or a surface of the table surface 210 of the table 212 to which the card handling device 100 is mounted as shown in FIG. 2). In other words, the interface portion 602 of the substantially flat card output area 108 may have an at least general wedge shape. In some embodiments, the acute angle β may be within a range of 3° to 5° . In other embodiments, the acute angle β may be within a range of 5° to 10° . In other embodiments, the acute angle β may be within a range of 10° to 20° . In other embodiments, the acute angle β may be at least about 10° . The acute angle β may be selected in order to provide the dealer the greatest amount of comfort while manually removing cards. The second end 616 of the interface portion 602 of the substantially flat card output area 108 may be attached to or may be proximate to the card output portion 206 of the card handling device 100. The first end 614 of the interface portion 602 of the substantially flat card output area 108 may be oriented distal to the card output portion 206 of the card handling device 100.

When the card handling device 100 is mounted to a table 212 (FIG. 2), the lower surface 610 of the interface portion 602 of the substantially flat card output area 108 may rest on a table surface 210 (FIG. 2) of the table 212 (FIG. 2), and the draw surface 612 of the interface portion 602 may be oriented at the acute angle β relative to the table surface

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210 (FIG. 2). Having the draw surface 612 of the interface portion 602 oriented at a relatively small acute angle β relative to the surface of the table 212 (FIG. 2) may decrease an extent to which dealers are required to twist their wrists and lift their hands when drawing playing cards from the substantially flat card output area 108 when compared to
5 conventional card shoes. As a result, the substantially flat card output area 108 may increase a speed at which dealer may deal playing cards to players, which, in turn, may increase a pace at which games may be administered at a table 212 (FIG. 2). Furthermore, the substantially flat card output area 108 may, over time, decrease fatigue that dealers may experience in their wrists and/or hands when administering a game at a table 212 (FIG. 2).

10 The cover 604 of the substantially flat card output area 108 may have a base portion 618 and two laterally spaced arm portions 620, 622 extending from the base portion 618. The base portion 618 of the cover 604 may be oriented proximate the second end 616 of the interface portion 602 of the substantially flat card output area 108 and may extend above the second end 616 of the interface portion 602 of the substantially flat card
15 output area 108. The two arm portions 620, 622 of the cover 604 may extend from the base portion 618 of the cover 604 toward the first end 614 of the interface portion 602 of the substantially flat card output area 108. The two arm portions 620, 622 of the cover 604 may be separated from each other by a cutout 624 extending vertically through the cover 604. For example, the cover 604 may have an at least general U-shape when viewed from a top
20 of the cover 604 of the substantially flat card output area 108, wherein the base portion 618 forms the bottom part of the U and the two arm portions 620, 622 form the two extending arms of the U. In some embodiments, the cutout 624 in the cover 604 may have a semicircular shape. In other embodiments, the cutout 624 in the cover 604 may have a rectangular shape. The cutout 624 may serve to expose portions of the playing cards that
25 are sent to the substantially flat card output area 108 and may make the playing cards more accessible to dealers. In some embodiments, an interface of the cutout 624 of the cover 604 with the base portion 618 and two arm portions 620, 622 of the cover 604 may define a chamfered edge 626, which may make it more comfortable for a dealer to draw a playing card from the substantially flat card output area 108.

30 In some embodiments, each arm portion 620, 622 of the two arm portions 620, 622 of the cover 604 of the substantially flat card output area 108 may be at least partially separated from the draw surface 612 of the interface portion 602 of the substantially flat card output area 108 by an opening 628, 630. In other words, the two arm portions 620,

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622 may extend from the base portion 618 of the cover 604 and may overhang at least a portion of the interface portion 602 of the substantially flat card output area 108 in a cantilevered manner. The openings 628, 630 separating each arm portion 620, 622 of the two arm portions 620, 622 of the cover 604 from the draw surface 612 of the interface portion 602 may allow playing cards to pass under the two arm portions 620, 622 and through the openings 628, 630. In other words, As a result, the openings 628, 630 may permit playing cards that are sent into the substantially flat card output area 108 by the second card feed system 506 (FIG. 5A) to be drawn from the outlet 608 of the substantially flat card output area 108 in multiple, different, at least substantially horizontal directions. A range of directions comprising an included angle in which playing cards may be drawn from the outlet 608 of substantially flat card output area 108 may be characterized as a “drawable angle.” For example, playing cards may be drawn from the outlet 608 of the substantially flat card output area 108 in any direction extending within the drawable angle. The drawable angle may be within a third plane 632 extending along the draw surface 612 of the interface portion 602 of the substantially flat card output area 108 and may be centered with respect to a center longitudinal axis 634 of the substantially flat card output area 108 such that half of the drawable angle extends to each side of the center longitudinal axis 634. In some embodiments, the drawable angle may be at least 60°. In other words, a first direction in which a playing card may be drawn in the drawable angle may be offset at least 60° in the third plane 632, which may contain a majority of the draw surface 612, from a second direction in which a playing card may be drawn in the drawable angle. In some embodiments, the drawable angle may be at least 90°. In some embodiments, the drawable angle may be at least 135°. In some embodiments, the drawable angle may be 180° or greater. As a result, playing cards may be drawn from the outlet 608 of the substantially flat card output area 108 in a plurality of directions including directions that are perpendicular to or even are oriented at obtuse angles relation to each other.

Stated another way, the openings 628, 630 may permit playing cards that are sent to the substantially flat card output area 108 by the second card feed system 506 (FIG. 5A) to be drawn from the outlet 608 of the substantially flat card output area 108 in multiple at least substantially horizontal directions without first being drawn in a direction collinear to the second card pathway 540 (FIG. 5A) of the card output portion 206 or parallel to the center longitudinal axis 634 of the substantially flat card output area 108. In other words, once a playing card comes to rest in the substantially flat card output area 108 after being

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sent to the substantially flat card output area 108 by the second card pathway 540 (FIG. 5A) of the card output portion 206, any initial draw movement made by a dealer to draw the playing card from the outlet 608 of the substantially flat card output area 108 may be in in any direction extending within the drawable angle.

5 Furthermore, in some embodiments, the draw surface 612 of the interface portion 602 of the substantially flat card output area 108 may not include ridges or walls obstructing the openings 628, 630. Put another way, the draw surface 612 of the interface portion 602 may be continuously planar and may extend under the two arm portions 620, 622 and completely through the openings 628, 630. Thus, playing cards may not have to
10 pass over any ridges or walls when passing through the openings 628, 630 and being drawn from the draw surface 612 of the interface portion 602 of the substantially flat card output area 108.

 Having a substantially flat card output area 108 that allows dealers to draw playing cards from the outlet 608 of the substantially flat card output area 108 within a range of
15 directions may be advantageous over other shoes because the substantially flat card output area 108 may reduce a need to rearrange an orientation of the shoe of a card handling device 100 to meet a dealer's card drawing preference or physical limitation. Furthermore, the substantially flat card output area 108 may reduce a need to exchange shoes of a card handling device that is mounted to a table 212 (FIG. 2) in order to accommodate a dealer's
20 card drawing preference. Moreover, the substantially flat card output area 108 may increase positions at which the dealer may comfortably be situated at a table 212 (FIG. 2) while administering a game at a table 212 (FIG. 2). Thus, the substantially flat card output area 108 may enable a more universal card shoe that does not require adjustments as dealers change at a given table 212 (FIG. 2). Additionally, the substantially flat card output
25 area 108 may increase an efficiency of the dealer and may decrease down time at a table 212 (FIG. 2), such as, time needed to change out or adjust a shoe, which may, in turn, increase profitability at a table 212 (FIG. 2).

 The sensor 606 of the substantially flat card output area 108 may be oriented in the interface portion 602 of the substantially flat card output area 108 and may be in
30 communication with the control system 105 (FIG. 1). The sensor 606 may sense when a playing card is present or absent from the substantially flat card output area 108. In some embodiments, the sensor 606 may sense the movement of a playing card across the draw surface 612 of the interface portion 602 of the substantially flat card output area 108. In

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other embodiments, the sensor 606 may sense the presence or absence of a playing card. For example, the sensor 606 may include an infrared sensor. In some embodiments, during operation, when the sensor 606 of the substantially flat card output area 108 senses an absence of a playing card in the substantially flat card output area 108 or the act of a dealer
5 drawing the playing card from the substantially flat card output area 108, the control system 105 (FIG. 1) may direct the second card feed system 506 (FIG. 5A) of the card output portion 206 to remove a playing card from the card buffer area 214 (FIG. 5A) of the card output portion 206 and to send the playing card into the substantially flat card output area 108. In some embodiments, during operation, when the sensor 606 of the substantially
10 flat card output area 108 senses the presence of a playing card in the substantially flat card output area 108, the control system 105 (FIG. 1) may direct the second card feed system 506 of the card output portion 206 to stop sending playing cards to the substantially flat card output area 108. For example, as described above, the card handling device 100 may send playing cards to the substantially flat card output area 108 one-at-a-time and may
15 not send another playing card to the substantially flat card output area 108 until a previously sent playing card has been removed from the substantially flat card output area 108.

Referring to FIGS. 1, 2, and 6 together, the overall flat structure of the substantially flat card output area 108 and the orientation of the card intake area 208 of the card input
20 portion 202 (*e.g.*, proximate the substantially flat card output area 108) may permit a majority of the card handling device 100 to be mounted beneath a table surface 210 of a table 212 to which the card handling device 100 is mounted.

FIG. 7 is a partial side view of the card handling device 100 of FIG. 1. The card transfer system 502 of the card shuffling apparatus 204 may at least partially define a third
25 card pathway 702 (*e.g.*, a pathway along which playing card move through the card transfer system 502 when leaving the multi-compartment carousel 402 of the card shuffling apparatus 204 and entering the card buffer area 214). In some embodiments, the second card pathway 540 of the card output portion 206 and the third card pathway 702 of the card transfer system 502 may have an included angle ϕ defined between the second card
30 pathway 540 and the third card pathway 702. In some embodiments, the angle ϕ may be within a range of 90° and 175° . In some embodiments, the angle ϕ may be within a range of 125° and 165° . Furthermore, in some embodiments, the angle ϕ may be different when

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the card output portion 206 is oriented in the first orientation than when the card output portion 206 is oriented in the second orientation.

In other words, playing cards may first travel along the third card pathway 702 while moving through the card transfer system 502 of the card shuffling apparatus 204 and to the card buffer area 214. When drawn from the buffer area 214, the cards are then may be deflected into traveling (*e.g.*, urged to travel) along that second card pathway 540 when leaving the card buffer area 214 and traveling through the card output portion 206. Put another way, playing cards may travel in a first direction when entering into the card buffer area 214 and may traveling in a second different direction when leaving the card buffer area 214. In some embodiments, the first direction may define an obtuse angle with the second direction.

In some embodiments, the third card pathway 702 may extend in a direction of intended card movement that at least partially declines relative to the table surface 210 (FIG. 2) of the table 212 (FIG. 2), and the second card path way 540 may extend in a direction that at least partially inclines relative to the table surface 210 (FIG. 2) of the table 212 (FIG. 2). In other embodiments, the third card pathway 702 may extend in the direction of intended card movement that at least substantially horizontal, and the second card path way 540 may extend in the direction of intended card movement that at least partially inclines relative to the table surface 210 (FIG. 2) of the table 212 (FIG. 2).

FIG. 8 shows a flow diagram of a process 801 in which the card handling device 100 may shuffle playing cards. Referring to FIGS. 2, 3, 4A, and 8 together, playing cards may be loaded into the card intake area 208 of the card input portion 202 of the card handling device 100, as represented in action 800. The playing cards may be transported by the first card feed system 306 from the card intake area 208 and through the card input portion 202 along the first card pathway 312, as represented by action 802. Along the first card pathway 312, the first card imaging system 308 may capture a first image of each playing card, as represented by action 804. The playing cards may be inserted into the plurality of compartments 406 of the multi-compartment carousel 402, as represented by action 806. The playing cards may be temporarily stored within the plurality of compartments 406 of the multi-compartment carousel 402.

Referring to FIGS. 5A-5E and 8 together, the playing cards may be withdrawn from the plurality of compartments 406 of the multi-compartment carousel 402 by the card transfer system 502, as represented by action 808. The card transfer system 502 may insert

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the playing cards into the card buffer area 214 of the card output portion 206 of the card handling device 100, as represented by action 810. A group of playing cards 512 may be formed within the card buffer area 214 by inserting cards into the card buffer area 214 with the card transfer system 502, as represented by action 812.

5 In some embodiments, after a group of playing 512 cards has been positioned within the card buffer area 214, the card transfer system 502 may insert at least one playing card from the plurality of compartments 406 of the multi-compartment carousel 402 into the card buffer area 214 of the card output portion 206 at the bottom 542 of the group of playing cards 512, as represented by action 814. In some embodiments, after a group of
10 playing cards 512 has been positioned within the card buffer area 214, the card transfer system 502 may insert at least one playing card from the plurality of compartments 406 of the multi-compartment carousel 402 into the card buffer area 214 of the card output portion 206 at the top 544 of the group of playing cards 512, as represented by action 816. In some embodiments, after at least one playing card has been inserted at the top 544 or
15 bottom 542 of the group of playing cards 512, the orientation of the card output portion 206, and as a result, the orientation of the card buffer area 214 relative to the card shuffling apparatus 204 may be changed, as represented by action 815. The orientation of the card buffer area 214 may be changed (*e.g.*, back and forth, continuously, intermittently, *etc.*) to enable the card transfer system 502 to insert playing cards at both of the top 544
20 and the bottom 542 of the group of playing cards 512 formed in the card buffer area. For example, the orientation of the card output portion 206 may be changed from the first orientation to the second orientation or from the second orientation to the first orientation.

 Playing cards may be removed from the card buffer area 214 by the pick-off roller 524 from the top 544 of the group of playing card 512, as represented by action 818.
25 The playing cards may be moved through the card output portion 206 by the second card feed system 306 from the card buffer area 214 and along the second card pathway 540, as represented by action 820. Along the second card pathway 540, the second card imaging system 508 may capture a second image of each playing card, as represented by action 822. The playing cards may be delivered to the substantially flat card output area 108, where the
30 playing cards may be drawn from the substantially flat card output area 108 in multiple, different, at least substantially horizontal directions relative to the second card pathway 540, as represented by the action 824.

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FIG. 9 is an enlarged perspective view of the card transfer system 502. The card transfer system 502 may include an ejection assembly 902 for removing cards from the multi-compartment carousel 402 and a discharge feeder system 904 for inserting playing cards into the card buffer area 214. The ejection assembly 902 may include at least one
5 pusher arm 906 and at least one post 908. The at least one pusher arm 906 may be pivotally coupled to the at least one post 908 and may be configured to pivot (*e.g.*, rotate) about the at least one post 908. The at least one pusher arm 906 may extend longitudinally from the at least one post 908 in a direction at least substantially perpendicular to a direction in which the at least one post 908 extends. When the at least one pusher arm 906 pivots about the at
10 least one post 908, a distal end 910 of the at least one pusher arm 906 (*e.g.*, the end of at least one pusher arm not coupled to the at least one post 908) may translate proximate the plurality of compartments 406 of the multi-compartment carousel 402. In some embodiments, the distal end 910 of the at least one pusher arm 906 may at least partially translate along the third card pathway 702 of the card transfer system 502. During
15 translation, the distal end 910 of the at least one pusher arm 906 may be configured to catch an edge of a side (*e.g.*, lateral side) of at least one playing card located in a compartment 406 of the plurality of compartments 406 of the multi-compartment carousel 402. For example, portions of the playing cards may extend longitudinally from both sides of the plurality of compartments 406, and the distal end 910 of the at least one
20 pusher arm 906 may catch portions of the playing cards that extend from the plurality of compartments 406 when the at least one pusher arm 906 pivots about the at least one post 908. Furthermore, the at least one pusher arm 906 may be configured to push the at least one playing card from the compartment 406 and push the at least one playing card along the third card pathway 702 of the card transfer system 502 and into the discharge
25 feeder assembly 904 of the card transfer system 502.

In some embodiments, the card transfer system 502 may include an ejection assembly 902 on each lateral side of the multi-compartment carousel 402. For example, the card transfer system 502 may include a first ejection assembly on a first side of the multi-compartment carousel 402 and a second ejection assembly on a second side of the multi-compartment carousel 402. Furthermore, the first and second ejection assemblies may
30 cooperate (*e.g.*, be synchronized) to remove the at least one card from the plurality of compartments 406 of the multi-compartment carousel 402. For example, a first pusher arm of the first ejection assembly may catch a portion of the at least one playing card protruding

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from a first side of a compartment 406 and a second pusher arm of the second ejection assembly may catch a portion of the at least one playing card protruding from a second side of a compartment 406. Together, the first and second ejection assemblies may push the at least one playing card from the compartment 406 and along the third card pathway 702 of the card transfer system 502 and into the discharge feeder assembly 904 of the card transfer system 502.

The discharge feeder assembly 904 may include two discharge rollers 912, 914 configured to grip at least one playing card between the two discharge rollers 912, 914. For example, the two discharge rollers 912, 914 may be configured to grip playing cards that are pushed out of the plurality of compartments 406 of the multi-compartment carousel 402 by the ejection assembly 902 of the card transfer system. In other words, the ejection assembly 902 may push cards out of plurality of compartments 406 of the multi-compartment carousel 402 and then may push the playing cards between the two discharge rollers 912, 914.

The two discharge rollers 912, 914 may rotate relative to one another, grip the playing cards between each other, and insert the playing cards into the card buffer area 214 of the card output portion 206. In some embodiments, one of the two discharge rollers 912, 914 may freely rotate and another of the two discharge rollers 912, 914 may be coupled to a gear and belt system 916 that is operated by a discharge motor 918. The gear and belt system 916 and discharge motor 918 may rotate the another of the two discharge rollers 912, 914 and may be controlled by the control system 105. In some embodiments, both of the two discharge rollers 912, 914 may be coupled to the gear and belt system 916 and the discharge motor 918.

In some embodiments, the card transfer system 502 may be configured to move multiple playing cards at a time (*e.g.*, together or in sequence). For example, the card transfer system 502 may move at least two playing cards stacked on top of each other at a time. Furthermore, the card transfer system 502 may be able to move at least one playing card with the ejection assembly 902 while simultaneously moving at least another card with the discharge feeder assembly 904. In other embodiments, the card transfer system 502 may move a single playing card at a time.

FIG. 10 is a schematic diagram of the control system 105 that may be used in embodiments of card handling devices 100 of the present disclosure, such as that shown in FIG. 1. Referring to FIGS. 1 and 10 together, the card handling device 100 may include the

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control system 105 for control of the various components of the card handling device 100 such as those discussed above and herein. The control system 105 may receive input signals from a user (*e.g.*, through a display 106 and input device 920), to receive input signals from one or more of the various sensors described herein, and/or for selectively controlling one or more of the various previously described active components of the card handling device 100.

In some embodiments, the entire control system 105 may be physically located within the card handling device 100. In other words, the control system 105 may be integrated into or with the components of the card handling device 100 such as, for example, the card shuffling apparatus 204, the card input portion 202 (FIG. 2), the card output portion 206, and the flat card output area 108. In other embodiments, one or more components of the control system 105 may be physically located outside the card handling device 100. Such components may include, for example, a computer device (*e.g.*, a desktop computer, a laptop computer, a handheld computer, personal data assistant (PDA), network server, *etc.*). Such external components may be configured to perform functions such as, for example, image processing, bonus system management, network communication and the like.

The control system 105 may include at least one electronic signal processor 922 (*e.g.*, a microprocessor). The control system 105 also may include at least one memory device 924 for storing data to be read by the electronic signal processor 922 and/or for storing data sent to the at least one memory device 924 by the electronic signal processor 922. The control system 105 also may include one or more displays 106, one or more input devices 920, and one or more output devices 926. By way of example and not limitation, the one or more input devices 920 may include a keypad, a keyboard, a touchpad, a button, a switch, a lever, a touch screen, pressure sensitive pads, *etc.*, and the one or more output devices 926 may include a graphical display device (*e.g.*, a screen or monitor), a printer, one or more light emitting diodes (LEDs), a device for emitting an audible signal, *etc.* In some embodiments, the input device 920 and the output device 926 may be integrated into a single unitary structure (*e.g.*, the display 106).

Referring to FIGS. 1, 2, 5-7, and 10 together, the control system 105 may be configured to communicate electrically with each of the previously described sensors. For example, the control system 105 may communicate electrically with the first sensor 310 of the first card imaging system 308, the second sensor 509 of the second card imaging system 508, and the sensor 606 of the substantially flat card output area 108. Furthermore, the control system 105 may communicate electrically with additional sensors 928 that may be disposed

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along the first, second, and third card pathways 312, 540, 702. For example, additional sensors 928 may include sensors in the card intake area 208, proximate the pairs of rollers 316, 318, 320, proximate the discharge rollers 912, 914, proximate the buffer pick-off roller 524, or proximate the additional rollers 548, 550, 552, 554, 556, *etc.* In some
5 embodiments, an additional sensor 928 may be included in front of or behind each pair of rollers (*e.g.*, pair of rollers 316) along a respective card pathway for tracking movement of playing cards throughout the card handling device 100. Furthermore, in some embodiments, an additional sensor 928 may be included in the card intake area 208 to sense a presence or absence of playing cards in the card intake area 208. As discussed previously, each of the
10 above listed sensors may be in electrical communication with the control system 105. Furthermore, the control system 105 may be in electrical communication with each of the controllers (*e.g.*, motors or actuators) of each of the above listed pairs of rollers, the actuation system 510, card shuffling apparatus 204, and card transfer system 502.

 In some embodiments, the card handling device 100 may be incorporated into a table
15 game management system by connecting or otherwise providing communication between the control system 105 of the card handling device 100 and a network 930. For example, a data port (not shown) on the card handling device 100 may be used to provide electrical communication to the network 930 through a conductive wire, cable, or wireless connection. The network 930 may communicate with the electronic signal processor 922 of the control
20 system 105. In additional embodiments, the network 930 may communicate directly with one or more above-described controllers of the card handling device 100, or with both the electronic signal processor 922 of the control system 105 and the above-described controllers of the card handling device 100.

 The embodiments of the disclosure described above and illustrated in the
25 accompanying drawings do not limit the scope of the disclosure, which is encompassed by the scope of the appended claims and their legal equivalents. Any equivalent embodiments are within the scope of this disclosure. Indeed, various modifications of the disclosure, in addition to those shown and described herein, such as alternate useful combinations of the elements and/or embodiments described, will become apparent to those skilled in the art
30 from the description and are contemplated for realizing the invention in diverse forms. Such modifications and embodiments also fall within the scope of the appended claims and equivalents.

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When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

CLAIMS

What is claimed is:

1. A card handling device, comprising:
a card shuffling apparatus configured to shuffle playing cards, the card shuffling apparatus defining at least a portion of a card path; and
a card output portion including a card buffer area positioned at an interface of the card shuffling apparatus and the card output portion, the card buffer area configured to receive shuffled playing cards from the card shuffling apparatus via the card path and temporarily store a group of playing cards in a stacked configuration having a top and a bottom, the card output portion being configured to move to alter an orientation of the group of playing cards in the card buffer area relative to the card shuffling apparatus between a first orientation in which playing cards are inserted from the card shuffling apparatus at the top of the group of playing cards and a second orientation in which playing cards are inserted from the card shuffling apparatus at the bottom of the group of playing cards, wherein the card path between the card shuffling apparatus and the card buffer area remains fixed in both the first orientation and the second orientation.
2. The card handling device of claim 1, further comprising an actuation system attached to the card output portion and a frame structure of the card handling device, the actuation system configured to move the card output portion between the first orientation and the second orientation.
3. The card handling device of claim 2, wherein the actuation system comprises an electronic spindle.
4. The card handling device of claim 1, further comprising:
a card intake area configured to be positioned above a table surface of a table for receiving playing cards to be shuffled and delivering the playing cards to be shuffled to the card shuffling apparatus via the card path; and
a substantially flat card output area configured to be positioned above the table surface of the table for receiving cards from the card buffer area of the card output portion via the card path, wherein the card intake area and the substantially flat card output area are both positioned proximate one side of the card shuffling apparatus of the card handling device.
5. The card handling device of claim 1, wherein the card buffer area comprises:
a support plate having an upper surface for supporting a group of playing cards;
a pick-off roller oriented above the support plate; and
a bias attached to the support plate and configured to urge the support plate toward the pick-off roller, wherein the card buffer area is configured to hold the group of playing cards between the support plate and the pick-off roller.
6. The card handling device of claim 5, wherein the support plate of the card buffer area is translatable at least partially in a vertical direction relative to the pick-off roller of the card buffer area.
7. The card handling device of claim 1, further comprising a card input portion comprising:

a first card feed system for transporting playing cards via the card path from a card intake area to the card shuffling apparatus, the first card feed system defining a first card pathway of the card path; and

a first imaging system oriented along the first card pathway of the first card feed system and for reading playing cards being transported along the first card pathway of the first card feed system.

8. The card handling device of claim 1, wherein the card output portion further comprises: a second card feed system for transporting playing cards via the card path from the card buffer area to a substantially flat card output area of the card handling device, the second card feed system defining a second card pathway of the card path; and a second imaging system oriented along the second card pathway of the second card feed system and for reading playing cards being transported along the second card pathway of the second card feed system.

9. The card handling device of claim 1, wherein the card buffer area is configured to hold a minimum of nine playing cards and a maximum of twenty-two playing cards.

10. The card handling device of claim 1, wherein the card output portion includes a substantially flat card output area comprising: an interface portion having an at least substantially flat draw surface; and a cover disposed over the interface portion, the interface portion and cover defining an outlet between the interface portion and cover, wherein the substantially flat card output area is configured to permit playing cards to be drawn from the outlet of the substantially flat card output area on the draw surface of the interface portion in a plurality of different directions substantially within a plane defined by the draw surface without first being drawn from the outlet in a direction parallel to a center longitudinal axis of the substantially flat card output area.

11. A card handling device, comprising:
a card shuffling apparatus configured to shuffle playing cards, the card shuffling apparatus defining at least a portion of a card path;
a card output area in communication with the card shuffling apparatus to receive playing cards via the card path; and
a card output portion positioned between the card shuffling apparatus and the card output area on the card path and configured to receive playing cards from the card shuffling apparatus and deliver playing cards to the card output area, the card output portion comprising:
a card buffer area positioned within the card handling device at an interface of the card shuffling apparatus and the card output portion on the card path, wherein the card buffer area is configured to (i) receive playing cards from the card shuffling apparatus along the card path, (ii) temporarily hold a group of playing cards in a stacked configuration having a top and a bottom, and (iii) move to alter an orientation of the group of playing cards between a first orientation in which playing cards from the card shuffling apparatus are inserted at the bottom of the group of playing cards and a second orientation in which playing cards from the card shuffling apparatus are inserted at the top of the group of playing cards, wherein the card path between the card shuffling apparatus and the card buffer area remains fixed in both the first orientation and the second orientation; and
a card feed system configured to remove playing cards one-at-a-time from the group of cards in the card buffer area and to deliver the playing cards one-at-a-time to the card output area via the card path, wherein the card feed system is configured to not send a playing card to the

substantially flat card output area until a previously sent playing card is drawn from the card output area.

12. The card handling device of claim 11, wherein the card buffer area is positioned within the card handling device at a location proximal from the card output area.

13. The card handling device of claim 11, wherein the card buffer area comprises:
a support plate having an upper surface for supporting the group of playing cards;
a pick-off roller oriented above the support plate; and
a bias attached to the support plate and configured to urge the support plate toward the pick-off roller, wherein the card buffer area is configured to hold the group of playing cards between the support plate and the pick-off roller.

14. A method of shuffling cards, comprising:
receiving, at a card input portion of a card handling device, playing cards;
transporting, by a card feed system of the card handling device, the playing cards from the card input portion into a card shuffling apparatus via a card path;
outputting, by the card shuffling apparatus, at least one playing card to a card buffer area positioned along the card path in a first orientation and configured to temporarily store a group of playing cards in a stacked configuration having a top and a bottom;
altering, by an actuation system of the card handling device, the orientation of the card buffer area and the group of playing cards relative to the card shuffling apparatus to a second orientation, the card path between the card shuffling apparatus and the card buffer area remaining fixed in the first orientation and the second orientation; and
outputting, by the card shuffling apparatus, at least another playing card to the card buffer area while the card buffer area is in the second orientation to alter a sequence of playing cards in the group of playing cards stored in the card buffer area.

15. The method of claim 14, wherein the at least another playing card is output, with the card buffer area in the second orientation, to the card buffer area at a first position on top of the group of playing cards in the card buffer area.

16. The method of claim 14, wherein the at least one playing card is output, with the card buffer area in the first orientation, to the card buffer area at a second position beneath the group of playing cards in the card buffer area.

17. A method of shuffling cards, comprising:
removing, by a card transfer system of a card handling device, playing cards from a temporary storage area of the card handling device via a card path;
forming, in a card buffer area of the card handling device, a group of playing cards in a stacked configuration having a top and a bottom from the playing cards removed by the card transfer system;
adding, by the card transfer system, at least one playing card from the temporary storage area via the card path to the bottom of the group of playing cards by moving, using an actuation system of the card handling device, the card buffer area and the group of playing cards to a first orientation relative to the card path; and
adding, by the card transfer system, at least one playing card from the temporary storage area via the card path to the top of the group of playing cards by moving, using the actuation system, the card buffer area and the group of playing cards in a second orientation relative to

the card path, the card path from the card transfer system to the card buffer area remaining fixed in both the first orientation and the second orientation.

18. The method of shuffling cards of claim 17, wherein adding at least one playing card to the bottom of the group of playing cards and adding at least one playing card to the top of the group of playing cards comprises adding, by the card transfer system, the at least one playing card to the bottom of the group of playing cards and then adding, by the card transfer system, the at least one playing card to the top of the group of playing cards.

19. The method of shuffling cards of claim 18, further comprising changing, by the actuation system, an orientation of the group of playing cards and the card buffer area of the card handling device from the first orientation to the second orientation after adding the at least one playing card to the bottom of the group of playing cards and prior to adding the at least one playing card to the top of the group of playing cards.

20. The method of shuffling cards of claim 19, wherein changing an orientation of the card buffer area comprises rotating, by the actuation system, the card buffer area from the first orientation to the second orientation.

21. The method of shuffling cards of claim 20, further comprising delivering, by a card feed system of the card handling device, the at least one playing card that was added to the top of the group of playing cards to a card output area via the card path prior to removing any of the other playing cards in the group of playing cards from the card buffer area.

22. A card handling device for a gaming table comprising:

- a housing for mounting to a gaming table, the housing comprising a card intake area configured to receive cards to be shuffled and a card output area for a dealer to take cards from the card handling device for dealing a game of cards at the table, the card intake area and card output area disposed to be arranged at the top of the gaming table when the housing is mounted to a table and define a card path therebetween for providing playing cards from the card intake area to the card output area;
- a card shuffling apparatus configured to receive cards from the card intake area via the card path;
- a card buffer area configured to receive and hold a group of cards from the card shuffling apparatus in a stacked configuration having a top and a bottom via the card path;
- a card output portion configured to transport cards, one-at-a-time, from the card buffer area to the card output area via the card path;
- an apparatus configured to alter an orientation of the card buffer area and the group of cards relative to the card shuffling apparatus between a first orientation in which cards from the card shuffling apparatus are inserted at the bottom of the group of cards and a second orientation in which cards are inserted at the top of the group of cards to alter the arrangement of cards in the group, wherein the card path between the card shuffling apparatus and the card buffer area remains fixed in the first orientation and the second orientation;
- a sensor configured to provide a signal in response to removal of a card from the card output area by a dealer; and
- a processor configured to receive the signal from the sensor and in response thereto control the card output portion to transport another card from the card buffer area to the card output area via the card path, the processor configured to control the card shuffling apparatus to re-

supply cards to the card buffer area to maintain the group of cards therein for supply to the card output area,
wherein cards are continuously supplied to the card output area.

23. The device of claim 22, wherein the card output area comprises a flat draw surface and a cover defining a planar spacing therebetween for an outlet to permit cards to be pulled from the outlet in a plurality of different directions substantially within the plane of the outlet without first being drawn from the outlet.

24. The card handling device of claim 22, wherein the card buffer area comprises:
a support plate having an upper surface for supporting the group of cards;
a pick-off roller oriented above the support plate; and
a bias attached to the support plate and configured to urge the support plate toward the pick-off roller, wherein the card buffer area is configured to hold the group of cards between the support plate and the pick-off roller.

25. A card handling device, comprising:
a card intake area configured to receive playing cards to be shuffled;
a card output area configured to receive shuffled playing cards;
a card shuffling apparatus positioned between the card intake area and the card output area along a card path, the card shuffling apparatus configured to receive playing cards from the card input area via the card path and shuffle the playing cards; and
a card buffer area positioned within the card handling device between the card shuffling apparatus and the card output area along the card path, the card buffer area configured to receive playing cards from the card shuffling apparatus and store the playing cards in a stacked configuration having a top and a bottom, the card buffer area further configured to alter an orientation of the stored playing cards between a first orientation in which playing cards from the card shuffling apparatus are inserted at the bottom of the stored playing cards and a second orientation in which playing cards from the card shuffling apparatus are inserted at the top of the stored playing cards, wherein the card path between the card buffer area and the card shuffling apparatus remains fixed in both the first orientation and the second orientation.

26. The device of claim 25, further comprising at least one card imaging system oriented along the card path for reading playing cards being transported along the card path.

27. The device of claim 26, wherein the card handling device is configured to transport at least one card to the card output area of the card handling device after the at least one card has been read by the at least one card imaging device.

28. The device of claim 25, wherein the card buffer area is configured to move relative to the card shuffling apparatus.

29. The device of claim 25, further comprising a card feed system configured to remove playing cards one-at-a-time from the top of the group of cards stored in the card buffer area and to deliver the playing cards one-at-a-time to the card output area via the card path, wherein the card feed system is further configured to send a playing card to the card output area only when the card output area is free of any other playing cards.

30. The card handling device of claim 25, wherein the card buffer area comprises:
a support plate having an upper surface for supporting the stored playing cards;

a pick-off roller oriented above the support plate; and
 a bias attached to the support plate and configured to urge the support plate toward the pick-off roller, wherein the card buffer area is configured to hold the stored playing cards between the support plate and the pick-off roller.

31. A card handling device, comprising:

a card shuffling apparatus configured to shuffle playing cards, the card shuffling apparatus defining at least a portion of a card path; and

a card output portion including a card buffer area positioned at an interface of the card shuffling apparatus and the card output portion, the card buffer area configured to receive shuffled playing cards from the card shuffling apparatus via the card path, and temporarily store the received playing cards in a stacked configuration, the card output portion being configured to move to alter an orientation of the card buffer area and the stacked playing cards relative to the card shuffling apparatus and the card path between the card shuffling apparatus and the card buffer area, wherein the playing cards from the card shuffling apparatus are received at a first card position of the stacked playing cards in response to the card buffer area being positioned in a first orientation and are received at a second card position of the stacked playing cards in response to the card buffer area being positioned in a second orientation, the card buffer area comprising:

a support plate having an upper surface for supporting the stacked playing cards stored in the card buffer area;

a pick-off roller oriented above the support plate; and

a bias attached to the support plate and configured to urge the support plate toward the pick-off roller, wherein the card buffer area is configured to hold the stacked playing cards between the support plate and the pick-off roller.

32. The card handling device of claim 31, wherein the support plate of the card buffer area is translatable at least partially in a vertical direction relative to the pick-off roller of the card buffer area