estimate the deck penetration to increase bets if the last portion of the shoe is rich in high value cards.

Automatic card shufflers that process relatively large groups of cards, such as eight or more decks, in a single shuffling cycle suffer from having long duration shuffling cycles as compared to a single deck, hand-forming shuffler, for example. For this reason, it is common for a casino to use two complete sets of cards on games administered from a shoe. The casino typically uses a batch-type card shuffler to prepare cards for loading into the shoe while the other set of cards is in play. Even though there is typically sufficient time to perform a shuffle using two sets of cards, it is desirable for the shuffler to perform its operations as swiftly as possible so that the next set of cards is ready for use in the event that the house requires the dealer to change shoes on short notice. The dealer also may decide to change cards long before the cut card is drawn if he or she suspects players have been counting cards or cheating in other ways. If the next group of cards is not yet completely shuffled, the game may be delayed. Any delay in shuffling can cause a revenue loss for the casino, and should generally be avoided.

Modern shufflers contain many security features to assure that the set of shuffled cards is complete and adequately shuffled. For example, modern shufflers perform a count of shuffled cards to verify the set is complete. Some newer shufflers read the rank and suit of each card shuffled to verify that the card set composition is correct. If the shuffler stops shuffling for any reason, such as detecting extra or fewer cards in the set, or due to a shuffler malfunction, the game may be delayed, and revenue can be lost. Although it is desirable to stop a game that is using an invalid set of cards for security reasons, there are other reasons why a game might be delayed, such as when a shuffler malfunctions, or the shuffler aborts the shuffle because of unreadable cards. When a shuffler with card recognition is employed in a casino, it may have a card recognition system that is trained to only read card faces. If the card reader attempts to read a flipped card that exposes the card back to the reader, the card reader may fail to recognize the card. Other card reading systems may be trained to recognize a card back so that when a card is flipped and the card back is read, the system may generate a signal indicating that a card is flipped over. Flipped cards and unrecognized cards typically cause the machine to abort the entire shuffle. Any time a shuffle is aborted, the game can be delayed, causing revenue loss for the casino.

Summary

In an aspect, there is a card-handling device comprising:

a card intake configured to receive one or more playing cards;

a card output configured to provide at least one of the one or more playing cards;

a playing card-shuffling apparatus positioned along a card path through the card-handling device and configured to randomize at least some of the one or more playing cards; and

a card rotation device configured to rotate at least one of the one or more playing cards about a minor axis of the one or more playing cards to randomly alter an orientation of lateral edges of the one or more playing cards, the minor axis of the one or more playing cards extending through a thickness of the at least one of the one or more playing cards in a direction transverse to a longitudinal axis and a lateral axis thereof.

In an aspect, there is a card-handling device comprising:

a card intake configured to receive one or more playing cards;

a card output configured to provide at least one of the one or more playing cards; and

a card rotation device positioned in at least one location selected from the group consisting of a card intake, a card output, or along a card path between the card intake and the card output and configured to rotate at least one of the one or more playing cards about a minor axis of the one or more playing cards to randomly alter an orientation of one or more lateral edges of the one or more playing cards, the minor axis of the one or more playing cards extending through a thickness of the one or more playing cards in a direction transverse to a longitudinal axis and a lateral axis of the one or more playing cards.

In an aspect, there is method of deterring card edge pattern cheating, comprising:

receiving cards in a card-handling device;

transporting the cards between a card rotation device and a card-shuffling apparatus;

rotating the cards with the card rotation device from a first, initial orientation to a second orientation about a minor axis of the cards after one or more cards are received in the card rotation device to alter an orientation of lateral edges of the cards, the minor axis of the cards extending through a thickness of the cards in a direction transverse to a longitudinal axis and a lateral axis of the cards to randomize the orientation of the lateral edges of the cards;

shuffling an order of the cards in the card-shuffling apparatus; and

outputting at least one card to a card output area after the at least one card has been transported through both the card rotation device and the card-shuffling apparatus.

In an aspect, there is a method of altering an orientation of cards being shuffled in an automatic card shuffler, comprising:

providing an automatic card shuffler with a card intake, a card outlet, a card shuffling apparatus, a card path between the card intake and the card output, a card imaging system, at least one processor configured to control the card imaging system, and to operate the card shuffler, wherein the card shuffling apparatus comprises multiple compartments;

receiving a plurality of cards in the card intake, the cards arranged in a stack wherein cards are generally arranged with card faces in a face to back orientation;

automatically feeding each card individually from the stack along the card path and inserting the card into one of the multiple compartments of the card shuffling apparatus;

reading card face information of each card as the card is being fed with the card imaging system;

identifying unreadable cards, wherein unreadable cards include cards that lack card face information from the card imaging system;

inserting the unreadable cards into at least one designated compartment in the card shuffling apparatus;

randomly inserting each card not identified as unreadable into a randomly selected compartment;

unloading all cards except the cards in the at least one designed compartment into the card outlet, forming a stack of cards, wherein each card in the stack of cards is oriented in the face-to-back orientation; and

unloading the unreadable cards from the at least one designated compartment.

In an aspect, there is a card-handling device comprising:

a card intake configured to receive playing cards;

a card output configured to provide at least one of the playing cards;

a playing card-shuffling apparatus positioned along a card path through the card-handling and configured to randomize at least some of the playing cards, the playing card-shuffling apparatus comprising multiple compartments; and

a card-imaging system positioned along the card path and configured to image a surface of the playing cards;

wherein the card imaging system is configured to recognize card face information and identify one or more unreadable playing cards, wherein the one or more unreadable playing cards comprise playing cards that do not include card face information on the surface of the playing cards oriented toward the card imaging system;

wherein the playing card-shuffling apparatus is configured to receive the one or more unreadable playing cards in at least one designated compartment selected from the multiple compartments.

DISCLOSURE