

CHIP DISPENSING DEVICE AND METHOD

Field of the Invention

- 5 The invention relates to casinos and other gambling venues where chips are used in gambling transactions in place of currency. In particular, the invention relates to a system and method for converting currency into chips for the player to participate in the various gambling events.

10 Background of the Invention

As a means of security and protocol, casinos and other gambling venues use designated chips rather than currency when betting on the various games.

- 15 The chips are only legal tender for the games with the casino or gambling venue, allowing the casino or gambling venue to more easily control the distribution and reconversion back to currency. The chips themselves are high-end objects manufactured to hinder counterfeiting as well as to clearly designate the source.
- 20 Distribution of the chips to the players is typically conducted through human interaction with the player approaching a conversion window and exchanging currency for the designated quantity of chips. As with any transaction this represents an opportunity for human error or deceit. Further, it represents a bottleneck, slowing the rate of

distribution of chips and therefore slowing the revenue collected by the casino through playing of the various games.

Summary of Invention

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In a first aspect, the invention provides a chip dispensing system comprising: a currency inlet for receiving currency from a user; a processor arranged instruct a chip magazine, having a plurality of chips, to release a quantity of chips corresponding to a value of the received currency; a chip scanner for inspecting the released chips and communicating a
10 chip inspection result to the processor; the processor arranged to verify a value of the released chips based upon the chip inspection result; on verification, said processor arranged to instruct a chip dispenser to dispense said released chips to the user.

In a second aspect, the invention provides a method for chip dispensing , the method
15 comprising the steps of: receiving currency from a user; instructing a chip magazine, having a plurality of chips, and so; releasing a quantity of chips corresponding to a value of the received currency; inspecting the released chips and communicating a chip inspection result to a processor; the processor verifying a value of the released chips based upon the chip inspection result; on verification, said processor instructing a chip
20 dispenser to dispense said released chips to the user.

Accordingly, the device and method according to the present invention provides for a security of the distribution of the chips to the various players. The invention may further provide a means of logging the distribution transaction to maintain a record for

the audit of the distribution against device malfunction, or to hinder the possibility of theft or fraud.

In one embodiment, the scanning step of the chip may occur during the delivery step
5 prior to delivery of the chips to the holding zone. In a further embodiment the scanning step may occur at a specific scanning zone where an inspection camera, RFID reader or other sensor applicable to the respective chips is located.

In one embodiment, the chips may be visually distinctive such as through colour,
10 markings or numerical designation. The markings may include a QR code whereby the scanning camera includes a QR code reader.

For visually distinctive chips the scanning zone may be placed at the end of a guide by which the visually distinctive chips are guided from a random delivery movement to a
15 consistent movement across a substrate so as to facilitate an accurate and repeatable scan.

Said guide may include a channel having one dimension proximate to the thickness of a chip with the guide upstream from the channel having a progressively narrowing cross
20 section so as to progressively orient the visually distinctive chips in the required manner.

Brief Description of Drawings

Figure 1 is a flowchart of the distribution process according to one aspect of the present invention;

Figure 2 are various views of a device according to one embodiment of the present
5 invention;

Figures 3A to 3C are schematic views of a detection zone according to a further embodiment of the present invention;

10 Figure 4A is an elevation view of a collection hopper according to one embodiment of the present invention;

Figure 4B is a cross-sectional view of a collection point according to a further embodiment of the present invention;

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Figure 5 is an isometric view of a chip containment device according to one embodiment of the present invention;

Figure 6 is a front cross-sectional elevation view of a chip dispensing device according
20 to a further embodiment of the present invention;

Figure 7 is a side cross-sectional elevation view of the chip dispensing device according to Figure 6;

Figures 8A and 8B are isometric views of the chip dispensing device of Figure 6, and

Figures 9A to 9C are flow charts showing the sequential steps for the dispensing of chips according to a further embodiment of the present invention.

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Detailed Description

Figure 1 shows a possible procedure for the distribution of chips to a user. The user inserts currency 10 into chip dispensing system according to the present invention, whereupon the system scans the inserted currency 15 in order to determine the amount inserted and the individual denominations for storing the individual currency for later removal. The currency scanner sends a currency inspection result to a processor 20 to undertake a verification of the value of the currency being inserted. The currency may be cash, whereby the scanner scans the notes, with the value being determined by the denomination and number of notes inserted. The currency may also be a credit card or debit card, with the scanning including the scanning of the card and the registration of the value to be taken from the card. The currency may also include an electronic transfer.

The processor instructs 25 a chip magazine to release a number of chips corresponding to the value of the currency. In converting the currency into an equivalent value of chips, the user may nominate a preferred denominational spread of the chips, for instance to include a larger number of low value chips as compared to a smaller number of high value chips.

The processor, on identifying the correct number and denomination of chips equaling the required value, then releases the chips from a magazine 30 to a holding zone ready for dispensing the chips to the user. Intermediate the release and dispensing steps is a scanning step 32 whereby the chips are scanned and a chip inspection result 32 sent to the processor to verify 34 the correct value (including number and denomination) of chips has been delivered as verified against the determination by the processor as to the value of the currency.

Scanning may be achieved in a number of different ways depending upon the nature of the chips. Chips are often delimited by visual representation, most often colour coded by denomination and therefore scanning may be in terms of an inspection camera to determine the colour of the chip. Alternatively the chips may carry a numerical stamp providing a direct measure of the value of the chip. In a still further embodiment the chips may have an embedded RFID with the scanning involving an RFID reader to read the embedded information within the chip.

The scanned number and denomination of chips is then compared to both the inserted currency value and the converted value before verification. On verifying the correct number and the denomination of chips have been delivered 34, the chips are then dispensed 36 from the holding zone to the player. If, however, the chips are not verified 38, then they are disposed of, such as delivered to a storage bin 40 for later analysis.

Failing the verification can occur through a number of different ways, including an authentic chip placed in the wrong canister of the magazine and so can be reused later in

the correct canister. Alternatively, the chip may not be authentic, that is, counterfeit, and so be disposed of. In order to determine the correct denomination to be expected, the release of the chips by the canister may be done sequentially by denomination. That is if a currency value of \$75 is to be released as 3 x \$20 chips, 1 x \$10 chip and 1x \$5 chip, then the \$20 chips may be released first and verified, then the \$10 and finally the \$5. If one of the chips from the \$20 canister is verified as a \$200 chip, this will be delivered to the storage bin for later retrieval.

Accordingly, the security benefits of scanning the chips represent an important aspect of the invention. Where a device similar to the present invention may carry hundreds and thousands of dollars it is imperative that systems are in place to ensure that:

- (i) A hardware or software malfunction does not create a fault of delivering too many or too few chips;
- (ii) That a verifiable record is maintained for each transaction for auditing purposes or to provide evidence on receipt of a complaint from a player.

The cassette of chips may be a removable item so as to facilitate a changeover when empty. Similarly, currency received may be collected in a removable cassette for collection and removal.

The means of scanning may vary, as mentioned, depending upon the chips being used for the invention. With reference to the RFID chips, scanning may occur at various points during the delivery stage as orientation of the chips is not critical. Where the

orientation of the chips is critical or may facilitate a more accurate or reliable scan, certain features of the delivery path may facilitate said orientation.

One possible orientation to facilitate orientation is shown in Figure 2. Here a delivery
 5 path includes a chute 60 providing a progressive reorientation of the chips by following
 a path 50 of the chips. The chute 60 includes an entrance 45 whereby the chips are in
 free fall and so the orientation of the chips 55 is essentially random. As the chute 60
 narrows the orientation of the chips 65 is more closely controlled. The chute 60 then
 feeds the re-oriented chips 75 into a channel 70 whereupon the chips are co-planar and
 10 arranged in single file along a flat surface in sliding contact via a scanning zone 80. The
 scanning zone 80 includes an inspection camera 85 for scanning the chips for colour,
 markings or numerals as the chips pass through to the holding zone 90 ready for
 delivery to the player.

15 Figures 3A to 3C show various views of a detection arrangement 95 for detecting and
 confirming the correct chip has been dispensed. Here, a collector 100 funnels chips 85
 to a detection zone 130. At the detection, or inspection, zone 130 is a chip scanner, or
 sensor, 120 connected to a processor 125. Holding the chip in place is a gate 110
 preventing the chip from falling down the chute 115.

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The chip scanner 120 identifies the chip within the detection zone 105.

Figure 3B shows the consequence of the processor 125 verifying that the chip is correct whereby the gate 110 is retracted 135 to allow the chip 142 to fall 140 down the chute 115.

5 A further addition is a fall detection sensor 138 which communicates 144 to the processor whether the chip 142 has passed through the chute. Please note the fall detection system may be used in conjunction with the detection arrangement 95 or alternatively may be used separately as a standalone security measure.

10 Figure 3C shows an alternative view if in fact the control system does not permit the passage of the chip within each detection zone.

Here, a pusher 145 pushes the chip through an aperture 150 and subsequently deposits 155 the chip into a storage bin for later retrieval. Thus, the detection arrangement 95 in
15 conjunction with a processor (not shown) access a security measure to ensure that chips of the correct number and denomination are eventually delivered to a customer.

Figure 4A shows a further security measure whereby a collection area 160 comprises canisters 165 each dedicated to a particular denomination. Here, chips 170 are stacked
20 within the canisters 165 with a sensor array 175 identifying each of the chips within each of the canisters. Before eventual distribution of the chips the sensor array 175 determines that each chip coming from the dedicated canisters is of the correct denomination and so as a further security measure.

In an alternative arrangement or perhaps in conjunction with the arrangement of Figure 4A a collection point 185 incorporates a detection system 180. Here in the base 195 of the collection point 185 is a further array of sensors 200 to identify those chips distributed within the collection point. Collectively the sensor array 200 may identify
5 all the chips within the collection point 185 and communicate this data to a control system to ensure that the final distribution of chips is correct. The base 195 of the collection point may include recesses to receive the chips so as to ensure the alignment of each chip with the sensor array 200.

10 In a further embodiment, as shown in Figure 5, a chip containment device 205 includes a casing 208 enclosing a plurality of canisters 210 for containing chips 215 ready for distribution through a chute 220.

The chip containment device is separable from the main dispensing device, to allow for
15 the containment device to be opened and filled under appropriate security protocols. Once filled, it is transported to the desired location, and then installed onto the dispensing device ready to be used.

During transport, the casing 208 for the containment device 205 is locked, using a latch
20 222A, 222B. In this case, the upper latch 222A is fixed in place, with the lower latch rotatable 224 from a locked position ready to receive a lock, to an unlocked position as shown in Figure 5. The rotation of the lower latch 222B operates the security switches 225A, 225B.

The security switches 225A, 225B are spring loaded and operate to automatically release, and spring upwards 226A, B, as shown in Figure 5, on releasing the lower latch 222B.

- 5 When the canisters are fully loaded with chips, the security switches 225A, 225B are re-engaged by pushing downwards 226A, B which permits the lower latch 222B to be rotated 224 back to the locking position ready to receive a lock. This security feature prevents the chip from sliding out of the respective canisters 210, as well as preventing interference during the transfer to the dispensing device.
- 10 Figures 6, 7, 8A and 8B show a chip dispensing device according to a further embodiment of the present invention.

The chip dispensing device includes a hopper 310 into which chips fall 205 from a chip containment device such as that shown in Figure 5 but not necessarily limited thereto.

- 15 The chips 320 then fall into a channel 315 which confines the chips vertically co-planar orientation and rolling down an inclined surface 317 in single file into the inspection zone 325. Here, the further drop of the chips 330 is prevented by a retractable stop 335. Whilst in the inspection zone 330, the chips are inspected by a chip scanner 380 which may examine the chips for one or a range of criteria including colour, fiduciary marks or
- 20 denomination. In this case the chip scanner 380 will include an imaging device for recording the image or colour of the chip. The fiduciary marks may include a brand, keyword or other such mark to designate both the value and authenticity of the chip. Alternatively, the criteria may include electronic or digital features including bar code, QR code or RFID. In this case, the chip scanner may be an optical reader or RFID

reader. It will be appreciated that, as inspection and verification technologies change, so too may the inspection arrangement used whilst still falling within the broad invention.

Once inspected the retractable stop 335 allows the chip to fall into a recess 345 of a
5 rotational dispenser 340. The rotary device 340 is capable of rotating in two separate directions depending upon the outcome of the inspection. A processor (not shown) uses the information from the inspection device 380 to determine the authenticity or the denomination of the chip and then controls the rotary device 340 to rotate in the clockwise direction 350 if the chip is confirmed as authentic. On rotating in the
10 clockwise direction 350 the chip is delivered to a delivery chute 355 and then dispensed 360.

If, however, the processor identifies the chip as being counterfeit, wrong denomination or the inspection result is inconclusive, the controller rotates the rotary device 340 in the
15 counter clockwise direction 365 to a further dispensing chute 370 whereby the chip is then dispensed 375 to a holding bin for further inspection either automatically or manually.

In order to maintain the dispensing rate of the chips, the controller may rotate the rotary
20 device 340 whilst a preceding chip is being inspected in the inspection zone 325. The rotary device 340 further includes a plurality of recesses 345 such that on rotation in either direction 350, 365 the rotary device 340 immediately presents a new recess to receive a preceding chip. It follows that in the case of all the dispensed chips being authentic the rotary device 340 may constantly rotate in the clockwise direction and

deliver chips through the rotary device 340 at a very high rate. Thus, a combination of maintaining a high chip dispensing rate is not comprised by insuring the authenticity of the chips being dispensed.

5 In a further embodiment, the controller may communicate with the chip containment device 205 to deliver 305 an accurate combination of chips to the chip dispensing device 300 corresponding to the funds received from an operator. Thus, the controller may not only control the total value to be dispensed, but also the number of specific chip denomination to be dispensed. Accordingly, the controller is required to determine
10 not only the authenticity of the chips but also to ensure that the correct denomination has been dispensed. It will be appreciated that the chip containment device may be loaded by hand and therefore human error may introduce the wrong denomination within the tubes of the containment device. For instance, a \$10,000 chip placed in a \$10 tube of the containment device would clearly be disastrous, were it not for the safety
15 procedures of the present invention.

Figures 9A to 9C show the sequential steps for the dispensing of chips, including the receiving of funds, such as bills or notes, and then validating the authenticity of the bills. The process also includes the confir4mation of the value of said bills and the selection
20 of chips corresponding to that value. The process continues to both validate the correct value of chips have been selected, as well as verifying the authenticity of the chips for eventual dispensing of the chips, and storage/disposal of counterfeit chips.

CLAIMS

1. A chip dispensing system comprising:
 - a currency inlet for receiving currency from a user;
 - 5 a processor arranged instruct a chip magazine, having a plurality of chips, to release a quantity of chips corresponding to a value of the received currency;
 - a chip scanner for inspecting the released chips and communicating a chip inspection result to the processor;
 - the processor arranged to verify a value of the released chips based upon the
 - 10 chip inspection result;
 - on verification, said processor arranged to instruct a chip dispenser to dispense said released chips to the user.
2. The chip dispensing system according to claim 1, wherein the received currency
- 15 from the currency inlet includes anyone or a combination of: electronic transfer, credit card or cash.
3. The chip dispensing system according to claim 2, further including a currency
- scanner for inspecting received cash and communicating a currency inspection
- 20 result to the processor, the processor arranged to determine a value of the received cash based upon the currency inspection result.

4. The chip dispensing system according to anyone of claims 1 to 3, wherein the chip scanner is arranged to identify a visual representation on the chips.
- 5 5. The chip dispensing system according to claim 4, wherein the visual representation is any one or a combination of: colour, denomination and numeral.
6. The chip dispensing system according to anyone of claims 1 to 5, wherein the chip scanner is arranged to identify a digital or electronic feature of the chips.
- 10 7. The chip dispensing system according to claim 6, wherein the chip scanner is an RFID reader for reading an RFID embedded in said chips.
- 15 8. The chip dispensing system according to anyone of claims 1 to 7, wherein the chip dispenser includes a delivery path arranged to receive the released chips direct said chips to the chip scanner, said delivery path including a channel to guide the chips into a uniform alignment.

9. The chip dispensing system according to claim 8, wherein the channel arranged to vertically orient the chips such that said chips are co-planar and arranged one at a time within said channel.
- 5 10. The chip dispensing system according to anyone of claims 1 to 9, wherein the chips verified by the processor are delivered to a holding zone.
11. The chip dispensing system according to anyone of claims 1 to 10, wherein chips failing verification by the processor are delivered to a storage bin.
- 10 12. The chip dispensing system according to claim 11, wherein the chip dispenser includes a rotary device arranged to receive each chip within a recess of said rotary device, said processor arranged to rotate the rotary device in one direction to deliver a chip within the recess to the holding zone or rotate in an opposite
- 15 direction to deliver the chip to the storage bin.
13. A method for chip dispensing , the method comprising the steps of:
- receiving currency from a user;
- instructing a chip magazine, having a plurality of chips, and so;
- 20 releasing a quantity of chips corresponding to a value of the received currency;

inspecting the released chips and communicating a chip inspection result to a processor;

the processor verifying a value of the released chips based upon the chip inspection result;

5 on verification, said processor instructing a chip dispenser to dispense said released chips to the user.

14. The method according to claim 13, further including the steps of providing cash as the received currency;

10 inspecting the received cash and communicating a currency inspection result to the processor;

the processor determining a value of the received cash based upon the currency inspection result.