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(54) **Open-loop cashless gaming system and method using smart data mediums**

(57) An open-loop cashless gaming system and method employ a portable smart data medium and a gaming machine. The smart data medium is inherently more secure and less susceptible to fraud than other mediums of exchange. The smart data medium is embedded with a microcontroller having a memory storing first monetary data. The gaming machine includes a visual display, a credit meter, and a receptacle for receiving the smart data medium. To start playing a game of chance on the visual display, a player inserts the smart data medium into the receptacle. The first monetary data is transferred to the gaming machine and, if the monetary data is a currency amount, converted to a first number of credits that are added to the credit meter. With credits on the credit meter, the player can place wagers and play one or more cycles of the game of chance. Unless the player exhausts all of his or her credits, a second number of credits remain on the credit meter after the game of chance has been played. In response to the player activating a "collect" switch on the gaming machine, the second number of credits are converted to a currency amount (if the monetary data is a currency amount) and transferred to the memory of the smart data medium. The cashless gaming system and method are open-loop in that the credit-in and credit-out transactions are performed by the gaming machine without communicating with any remote computer linked to the machine.

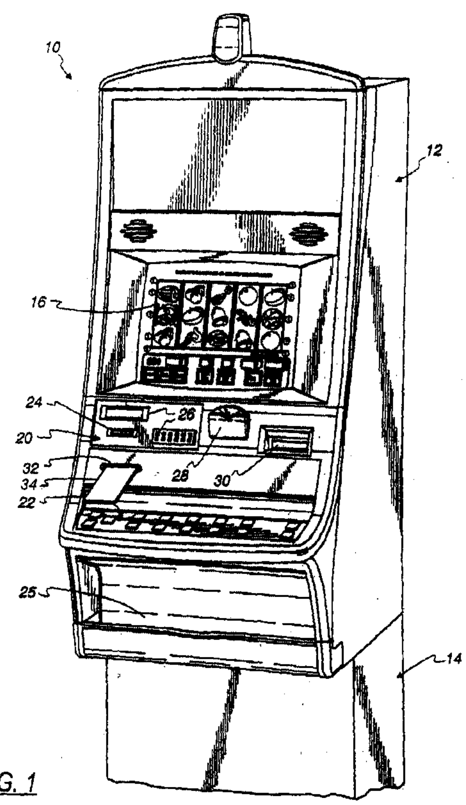

FIG. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates generally to cashless gaming and, more particularly, to an open-loop cashless gaming system and method using portable smart data mediums to provide credits for playing gaming machines without requiring communication between the machines and any remote computer system linked thereto.

BACKGROUND OF THE INVENTION

[0002] Gaming systems have used a variety of mediums for exchanging money between gaming machines and players. Some common mediums of exchange include coins, bills, and tokens. In a typical gaming environment, a player inserts coins, bills, or tokens into a gaming machine to add credits to the machine. When the player decides to leave the machine and still has credits remaining, the player presses a cash-out or collect button and receives an appropriate number of coins or tokens in a cash-out hopper. Casinos conventionally make containers, such as cups or trays, available for players to keep their money. The player can then go to another gaming machine and insert the coins or tokens therein. Coins and tokens are somewhat undesirable mediums of exchange because they can be difficult for the player to handle, take up a lot of space and have to be frequently emptied from gaming machines (thereby interrupting play of the machines), and are generally dirty and can thereby transmit diseases among players. Also, gaming establishments must spend a substantial amount of time, resources, and money to handle the coins and tokens. For example, any collected coins and tokens must be separated, counted, stored, and rolled for reuse. This process may involve dozens of people and requires expensive coin/token counting and wrapping devices.

[0003] Another medium of exchange is a credit card as proposed, for example, in U.S. Patent Nos. 6,019,283, 5,959,277, 5,952,640, 5,811,772, 5,559,312, 5,457,306, and 5,038,022 to Lucero. In the scenario proposed in the Lucero patents, a player in a gaming establishment feeds a general purpose charge card such as a VISA, MasterCard or AMERICAN EXPRESS card into a reader at a gaming machine or enters information relating to the general purpose charge card on a keyboard or other input device. The player then keys in a desired amount of playing credit and, optionally, a PIN (personal identification number) for automatic transmission to a remote financial institution (VISA or other charge card facility) either directly or through an intermediate transaction processing facility. Also transmitted are an identification of the gaming machine and the gaming operator. Upon approval of the requested playing credit, the gaming machine is enabled and thereafter a running net (balance) is kept for the player and/or each machine and/or the gaming operator by accounting for win-lose-draws. After the playing session is over, net playing credit information is automatically transmitted to the financial institution either directly or through an intermediate transaction processing facility so that the entire playing session can be a single line item on the player's regular statement from that financial institution. Although the credit card may minimize disruptions in the playing of the gaming machine because the player need not walk away from the machine to obtain more money should he or she run out, there exists a strong public policy against allowing a person gambling to have easy access to the credit limit of their credit card at the gaming machine itself. In addition, the gaming machines must be provided with interface circuitry hooked up to a communications line so that information concerning the credit transaction can be transmitted between the financial institution and the gaming machines. Such circuitry adds to the cost of manufacturing the gaming machines. Also, the transmission of credit transaction information between the financial institution and the gaming machines can be time consuming.

[0004] Another proposed medium of exchange is a magnetic strip card. In a typical scenario, a player opens a personal account stored in a central database of a gaming establishment, puts money into the personal account, and acquires a magnetic strip card that identifies the personal account After opening the account and acquiring the card, the player can use the magnetic strip card to play any gaming machine equipped with a compatible card reader and linked to the central database containing the personal account. As the player plays the gaming machine, the gaming machine communicates with the central database. The gaming machine deducts wagers from the player's personal account and adds any winnings to the personal account. Although the magnetic strip card is easy to use, it is susceptible to fraud and damage. For example, most magnetic strip cards are extremely vulnerable to magnetic fields that can erase or damage the important monetary data stored on the card. In addition, like the credit card discussed above, the gaming machines must be provided with interface circuitry hooked up to a communications line so that information concerning wagers and winnings can be transmitted between the central database and the gaming machines.

[0005] Yet another proposed medium of exchange is a bar-coded ticket, coupon, or cash-out slip. In this case, a plurality of gaming machines are linked to a remote central processing unit in a closed-loop system where each gaming machine is equipped with a bar code reader and a bar code printer. When a player has finished playing one of the gaming machines and the machine still has credits remaining on its credit meter, the printer prints a bar code on a ticket responsive to instructions from the central processing unit. The central processing unit generates the bar code to be printed on the ticket.

The bar code typically represents the monetary value of the credits remaining on the gaming machine, along with a randomly-generated identification code, to permit the central processing unit to verify the validity and unique identification of the ticket at a later time. Upon insertion of the bar-code ticket into the bar code reader of the same or a different gaming machine, the bar code reader transmits a signal to the central processing unit corresponding to the bar code, and the central processing unit compares the bar code on the ticket with those stored in its memory which contains the value of the ticket, the identification code, and its status (e.g., "redeemed" or "not redeemed"). If the ticket has not already been redeemed, then credits corresponding to the monetary value of the ticket are added to the gaming machine. Although bar-coded tickets eliminate some of the problems associated with the other mediums of exchange, the closed-loop system relies upon linking the gaming machines to a remote central processing unit and requires communication between a gaming machine and the central processing unit each time a ticket is printed out by or inserted into the machine. Many game manufacturers do not also produce such closed-loop systems with "back end" central processing units and therefore would need to either build such a system or hook up to another company's system already installed in a gaming establishment. To hook up to another company's system, however, would require the game manufacturer to install appropriate hardware and software in each gaming machine and use appropriate communications protocols for interfacing to the central processing unit. This process can cost considerable time, money, and resources and requires the cooperation of the company that makes the back end system.

[0006] A need therefore exists for a cashless gaming system that uses a medium of exchange that overcomes the aforementioned shortcomings associated with existing mediums of exchange.

SUMMARY OF THE INVENTION

[0007] An open-loop cashless gaming system and method employ a portable smart data medium and a gaming machine. The smart data medium is embedded with a microcontroller having a memory storing first monetary data. The term "monetary data" as used herein is intended to mean data that represents an amount of money. The data could, for example, be in the form of a country's circulated currency (e.g., dollars and/or cents in the United States) or game credits.

[0008] In one embodiment, the gaming machine includes a visual display, a credit meter, and a receptacle for receiving the smart data medium. To start playing a game, of chance on the visual display, a player inserts the smart data medium into the receptacle. Either automatically or in response to an amount entered by the player via a player interface, the first monetary data is transferred to the gaming machine and, if the monetary data is a currency amount, converted to a first number of credits that are added to the credit meter. With credits on the credit meter, the player can place wagers and play one or more cycles of the game of chance. Unless the player exhausts all of his or her credits, a second number of credits remain on the credit meter after the game of chance has been played. In response to the player activating a "collect" or "credit-out" switch on the gaming machine, the second number of credits are converted to a currency amount (if the monetary data is a currency amount) and transferred to the memory of the smart data medium. The cashless gaming system and method are open-loop in that the credit-in and credit-out transactions are performed by the gaming machine without communicating with any remote computer linked to the machine.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The foregoing and other advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings in which:

FIG. 1 is a front perspective view of a gaming machine embodying the present invention;
FIG. 2 is a block diagram of an open-loop cashless gaming *system,* including a smart cart and the gaming machine, in accordance with the present invention; and
FIG. 3 is a flowchart of a gaming method implemented with the open-loop cashless gaming system.

[0010] While the invention is susceptible to various modifications and alternative forms, specific embodiments have been shown by way of example in the drawings and will be described in detail herein. However, it should be understood that the invention is not intended to be limited to the particular forms disclosed. Rather, the invention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

[0011] Turning now to the drawings, FIG. 1 depicts an "upright" gaming machine 10 including a primary housing 12 supported by a secondary housing or stand 14. The machine 10 further includes a visual or mechanical display 16, a central processing unit (CPU) 18 (see FIG. 2), a player interface section 20, a mechanical button panel 22, and an optional coin tray 25. The display 16 is mounted to an upper portion of the housing 12. The player interface section 20 is arranged on the housing 12 immediately below the display 16 and between the display 16 and the button panel 22. The button panel 22 is mounted to the housing 12 below the player interface section 20. The button panel 22 includes numerous mechanical buttons that, in response to being pressed by a player, cause the CPU to perform various game functions. The coin tray 25 is mounted to the housing 12 below the button panel.22.

[0012] The display 16 can be visual or mechanical in nature. If the display is of the visual type, the display 16 may be a cathode ray tube (CRT), dot matrix, LED, LCD, electro-luminescent, or other visual display known in the art. A touch screen optionally overlays the visual display 16, If the display 16 is of the mechanical type, the display 16 may be a window with mechanical gaming components such as physical rotatable slot reels visible therethrough.

[0013] The player interface section 20 includes such features as a card reader 24 for receiving a player tracking card, a keypad and mini-display 26, an optional coin acceptor 28, an optional bill acceptor 30, and a receptacle 32 for receiving a smart data medium 34. By inserting his or her player tracking card into the card reader 24, the player logs into a casino's computer network. This allows the casino to track the player's gambling activities and award points and/or special awards to the player based on his or her degree of gambling. In one embodiment, the player tracking card reader 24 and the receptacle 32 are replaced with a single slot for receiving a smart data medium that can be used to store both monetary data and player tracking information. Such a dual purpose smart data medium would require a player to carry one less item. The keypad and mini-display 26 are used by service personnel to perform diagnostics on the gaming machine 10. The display 26 is also used as a billboard for advertising, announcing special awards, providing information to a player logged into the casino's computer network via the player tracking card reader, etc.

[0014] The illustrated gaming machine 10 can accept money in the form of coins or tokens inserted into the coin acceptor 28, bills inserted into the bill acceptor 30, or monetary data stored in a smart data medium 34 inserted into the receptacle 32. Likewise, when a player wishes to "cash-out" and collect money corresponding to the number of credits remaining on the machine's credit meter, the gaming machine 10 can dispense the money in the form of coins in the coin tray 25 and/or monetary data transferred to the smart data medium 34. For gaming establishments that prefer to be totally cashless and avoid the shortcomings associated with cash, the coin acceptor 28, the bill acceptor 30, and the coin tray 25 can be eliminated so that the gaming machine 10 is limited to transferring money to and from smart data mediums.

[0015] FIG. 2 is a block diagram of an open-loop cashless gaming system, including the smart data medium 34 and a gaming machine 10, in accordance with the present invention. In one embodiment, the smart data medium 34 is a smart card embedded with a serial access microcontroller and is based on an eight-bit CPU core 36. The smart card 34 includes the following on-chip memories with the following capacities: 128 Bytes of RAM 38, 6 Kbytes of User ROM 40, 1 Kbyte of System ROM 42, and 1088 Bytes of EEPROM 44. If the smart card is used to store player tracking information in addition to monetary data, the number of bytes of EEPROM can be increased to accommodate such information. Both the User ROM 40 and EEPROM 44 can be configured into two sectors. Access rules from any memory section or sector to any other are set up by the User's Memory Access Control Matrix (MACM) 46. This provides protection against interaction between multiple applications running on the card, or against fraudulent software execution. The CPU 36 is coupled to the MACM 46 by an internal bus 48. The EEPROM 44 preferably employs highly reliable CMOS EEPROM technology with approximately 10 year data retention and 300,000 erase/write cycles endurance. The smart data medium 34 is fully compatible with the ISO standards for smart card applications. A smart card of the aforementioned type, as well as other suitable smart cards, are commercially available from STMicroelectronics of Rousset, France and various other smart card manufacturers. Although the portable microcontroller-based smart data medium 34 is illustrated as being in the shape of a card, the smart data medium 34 can have other shapes capable of housing a microcontroller. For example, the smart data medium 34 can be in the form of a key.

[0016] An important advantage of the smart data medium 34 over some other mediums of exchange is that it is inherently more secure and therefore less susceptible to fraud. The internal bus 48 is protected from fraudulent use by security logic 49, and the MACM 46 sets up access rules from any memory section or sector. Furthermore, the CPU 36 runs security software that encrypts/decrypts data transferred between the smart data medium 34 and the gaming machine 10.

[0017] When the smart data medium 34 is inserted into the gaming machine 10, the smart data medium 34 and the gaming machine 10 communicate via respective serial I/O interfaces 50 and 52. Alternatively, the interfaces may be implemented with a Universal Serial Bus (USB), Firewire™, or any other suitable link recognized by a person skilled in the art. The serial I/O interfaces 50 and 52 preferably include mating electrical contacts, and serial interface 52 signals a central processing unit (CPU) 18 when a player has fully inserted the smart data medium 34 into the receptacle 32 (see FIG. 1) and thereby mated the contacts. The CPU 36 on the smart data medium 34 transfers the monetary data on the smart data medium 34 to the serial interface 52 of the gaming machine 10 via the serial interface 50. The CPU 18 of the gaming machine 10, in turn, reads the transferred monetary data from the serial interface 52, and adds a number of credits corresponding to the transferred monetary data to a credit meter 60. If the transferred monetary data is a currency amount such as \$25, the CPU 18 converts this currency amount to credits and then increments the credit meter by the number of credits equal to this currency amount. For example, if the minimum wager on the gaming machine 10 is $1, then a currency amount of $25 would correspond to 25 credits. This credit-in transaction is performed by the gaming machine 10 without communicating with any remote computer linked to the gaming machine 10.

[0018] The CPU 18 then executes a game program in system memory 54 and generates a game of chance on the display 16. As shown in FIG. 1, the game of chance may for example be a slot game including animated or mechanical reels with symbols displayed thereon. Alternatively, the game of chance may be poker, blackjack, keno, bingo, roulette, or any other game that is played in response to a wager and awards a payoff if the game outcome matches predetermined criteria. In the slot game, the player may select a number of pay lines to play and a number of credits to wager via push-buttons 54 or a touchscreen 56 overlaying the display 16. The credit meter 60 is decremented by the number of wagered credits. The game of chance commences in response to the player pressing a "spin" push-button or touch field or pulling a handle, causing the CPU 18 to set the animated reels in motion, randomly select a game outcome and then stop the reels to display symbols corresponding to the pre-selected game outcome. In one embodiment, certain of the game outcomes cause the CPU 18 to enter a bonus mode causing the display 16 to show a bonus game.

[0019] The system memory 54 stores control software, operational instructions and data associated with the gaming machine 10. In one embodiment, the memory 54 comprises a separate read-only memory (ROM) and battery-backed random-access memory (RAM). It will be appreciated, however, that the system memory 54 may be implemented on any of several alternative types of memory structures or may be implemented on a single memory structure. The CPU is operable in response to instructions from the CPU 16 to award a payoff of credits to the player in response to certain winning outcomes which might occur in the game of chance. The credit meter 60 is incremented by the awarded payoff of credits. The payoff amounts corresponding to certain combinations of reel symbols in the game is predetermined according to a pay table stored in system memory 54. If the game has a bonus mode, the payoff amounts corresponding to certain outcomes of the bonus game are also stored in system memory 20.

[0020] If the player no longer wishes to play the game of chance on the gaming machine, the player can press a "card return" push-button or touch field. In response to pressing the "card return" push-button or touch field, the CPU 18 converts any credits remaining on the credit meter 60 to a currency amount (if the monetary data on the smart data medium should be a currency amount) and then transfers the currency amount to the serial interface 50 of the smart data medium 34 via the serial interface 52. The CPU 36 of the smart data medium 34, in turn, reads the transferred currency amount from the serial interface 50 and stores that amount in the EEPROM 44. This credit-out transaction is performed by the gaming machine 10 without communicating with any remote computer linked to the gaming machine 10. After the currency amount has been transferred to the smart data medium 34, the smart data medium 34 is discharged from the receptacle 32 (see FIG. 1). The discharged smart data medium 34 may be re-valued at a teller machine or cashier if necessary, and used with another gaming machine in the same manner as described above.

[0021] FIG. 3 is a flowchart of a gaming method implemented with the open-loop cashless gaming system. To obtain a smart data medium 34 to be used in the gaming method, a player inserts cash into and purchases a smart data medium 34 from a teller machine or a cashier in a gaming establishment. If the smart data medium 34 is purchased directly from a teller machine, the teller machine can be designed to add specific preset amounts or any amount of money to the smart data medium. If the smart data medium 34 is purchased from a cashier, the cashier may have a similar teller machine at the cashier's station or, alternatively, may have "pre-written" smart data mediums of different values. For example, the pre-written smart data mediums could be available in $25 increments, e.g., $25, $50, $75, etc. The purchase amount is stored as monetary data in the EEPROM 44. After purchasing the smart data medium 34, the player can use any gaming machine equipped with a receptacle 32 (see FIG. 1). If the player needs to add money to the smart data medium 34, the player can return to the teller machine or the cashier and revalue the smart data medium 34.

[0022] To start playing a game of chance on the display of the gaming machine 10, the player inserts the smart data medium 34 into the receptacle at step 62. At step 64, the CPU 36 on the smart data medium 34 transfers the monetary data stored in the smart data medium's memory 44 to the machine's serial interface 52 via the smart data medium's serial interface 50. At step 66, the CPU 18 of the gaming machine 10 reads the transferred monetary data from the machine's serial interface 52 and, if the monetary data is a currency amount, converts the data into credits. At step 68, the CPU 18 checks the number of credits corresponding to the transferred monetary data. If the number of credits is zero because there was no money on the smart data medium 34, the smart data medium may be returned to the player at step 70 or the CPU may prompt the player to insert money into the machine via the bill or coin acceptor. If, however, the number of credits is greater than zero, the CPU 18 causes the display to ask the player how many credits to add to the credit meter 60 at step 72. At step 74, the player enters the number of credits via the push-buttons 56 and/or the touchscreen 58. The player's request, of course, is denied if he or she enters more credits than are available based on the monetary data from the smart data medium 34. At step 76, the credit meter 60 is incremented by the entered number of credits. The difference between the entered number of credits and the total number of credits corresponding to the monetary data originally transferred from the smart data medium 34 is returned to the smart data medium 34 as monetary data. For example, if the smart data medium 34 carries $50 and this is converted to 50 credits (assuming $1 = 1 credit) when transferred to the gaming machine 10, the player could add up to 50 credits to the credit meter 60. If the player enters 40 credits, then 40 credits are added to the credit meter 60 and 10 credits are converted to $10 and returned to the smart data medium 34,

[0023] In one embodiment, the player cannot select the number of credits to add to the credit meter. Instead, the number of credits corresponding to the monetary data on the smart data medium is automatically added to the credit meter. Therefore, in the above example, 50 credits are automatically added to the credit meter 60 in response to insertion of the smart data medium 34 into the receptacle 32.

[0024] With credits on the credit meter 60, the player can place wagers and play one or more rounds of the game of chance at step 78. In each round, the credit meter 60 is decremented by the number of wagered credits and incremented by any payoff resulting from a winning outcome (step 80). Unless the player exhausts all of his or her credits, a certain number of credits remain on the credit meter after the game of chance has been played. In response to the player activating a "collect" or "credit-out" push-button or touch field at step 82, the CPU 18 checks the number of credits remaining on the credit meter 60 at step 84. If the number of credits is zero, the smart data medium is returned to the player at step 86. If, however, the number of credits is greater than zero, the CPU 18 converts the credits remaining on the credit meter 60 to a currency amount at step 88 (if the monetary data on the smart data medium should be a currency amount) and transfers the currency amount to the smart data medium's serial interface 50 via the machine's serial interface 52 at step 90. The CPU 36 of the smart data medium 34 reads the transferred currency amount from the smart data medium's serial interface 50 and transfers that amount to the smart data medium's memory 44, The CPU 18 of the gaming machine 10 also resets the credit meter 60 to zero at step 92, The smart data medium 34 is discharged from the receptacle at step 94.

[0025] In one embodiment, in response to the player activating the "collect" or "credit-out" push-button or touch field, the CPU 18 causes the display to ask the player how many credits on the credit meter 60 to return to the smart data medium 34. The player enters the number of credits via the push-buttons 56 and/or the touchscreen 58. Only the entered number of credits is converted to a currency amount (if the monetary data on the smart data medium should be a currency amount) and transferred to the smart data medium 34, which is subsequently discharged. Any credits still remaining on the credit meter 60 following this transfer can either be used to play additional rounds of the game of chance or cashed-out in coins or tokens discharged into the coin tray 25 (see FIG. 1). For example, if the credit meter 60 includes 100 credits when the player activates the "collect" push-button or touch field, the player can enter up to 100 credits to transfer in the form of monetary data back to the smart data medium. If the player enters 70 credits, then 70 credits are converted to $70 (assuming $1 = 1 credit) and returned to the smart data medium 34 and the remaining 30 credits can be cashed out as $30 in coins or tokens.

[0026] In an alternative embodiment, the CPU 18 does not increment and decrement the credit meter 60 as the gaming machine 10 is played. Rather, the CPU 18 effectively bypasses the credit meter 60 and directly adds money to, or subtracts money from, the smart data medium 34. If the monetary data in the smart data medium's memory 44 is a currency amount, the CPU 18 performs any necessary conversions between game credits and currency amounts.

[0027] In the above-described methods, any activity in which the gaming machine reads data from the smart data medium, processes the data, and writes data to the smart data medium may be stored in a permanent memory log in the system memory 54 for verification purposes in the event of a dispute.

[0028] While the present invention has been described with reference to one or more particular embodiments, those skilled in the art will recognize that many changes may be made thereto without departing from the spirit and scope of the present invention. For example, the monetary data stored on the smart data medium 34 could be in the form of credits instead of a country's circulated currency. In this case, the monetary data would not need to be converted to credits when transferred to the gaming machine 10 and, similarly, the credits would not need to be converted back to currency when transferred to the smart data medium 34. Each of these embodiments and obvious variations thereof is contemplated as falling within the spirit and scope of the claimed invention, which is set forth in the following claims.

Claims

1. An open-loop cashless gaming system, comprising:

a smart data medium embedded with a microcontroller having a memory storing first monetary data;

a gaming machine including a visual display, a processor, and a credit meter, said processor playing a game of chance on said visual display in response to a wager, said gaming machine including a receptacle for receiving said smart

data medium;
wherein in a credit-in transaction said microcontroller transfers said first monetary data to said gaming machine, said processor adding a first number of credits corresponding to said first monetary data to said credit meter, and
wherein in a credit-out transaction said processor transfers second monetary data to said smart data medium, said microcontroller storing said second monetary data in said memory, said second monetary data corresponding to at least a portion of a second number of credits remaining on said credit meter after said processor has played said game of chance;
said credit-in and credit-out transactions being performed by said gaming machine without communicating with any remote computer linked to said gaming machine.

2. The gaming system of claim 1, wherein said microcontroller includes a first serial I/O interface and said gaming machine includes a second serial I/O interface, said first monetary data and said second monetary data being transferred between said smart data medium and said gaming machine via said first and second serial I/O interfaces.

3. The gaming system of claim 1, wherein said smart data medium and said receptacle include mating electrical contacts.

4. The gaming system of claim 1, wherein said credit-in transaction occurs automatically in response to said receptacle receiving said smart data medium.

5. The gaming system of claim 1, wherein said gaming machine includes means, operable by the player, for selecting said first monetary data, said credit-in transaction occurring in response to said receptacle receiving said smart data medium and the player operating said selection means.

6. The gaming system of claim 1, wherein said receptacle includes means, activated by the player, for discharging said smart data medium from said receptacle, said credit-out transaction occurring automatically in response to activation of said discharge means.

7. The gaming system of claim 1, wherein said gaming machine includes means, operable by the player, for selecting said at least a portion of said second number of credits, said credit-out transaction occurring in response to operation of said selection means.

8. The gaming system of claim 1, wherein said visual display includes a video display.

9. The gaming system of claim 1, wherein said visual display includes a plurality of mechanical slot reels visible through a display window.

10. The gaming system of claim 1, wherein said first monetary data is a currency amount, and wherein in said credit-in transaction said processor converts said currency amount to said first number of credits.

11. The gaming system of claim 1, wherein said second monetary data is a currency amount, and wherein in said credit-out transaction said processor converts said at least a portion of said second number of credits to said currency amount.

12. An open-loop cashless gaming system, comprising:

a microcontroller-based smart data medium having a memory storing first monetary data;
a processor-based gaming machine including a visual display, a credit meter, and a receptacle for receiving said smart data medium;
means for transferring said first monetary data to said gaming machine, and adding a first number of credits corresponding to said first monetary data to said credit meter without communicating with any remote computer linked to said gaming machine;
means for playing a game of chance on said visual display in response to a wager, a second number of credits remaining on said credit meter after said game of chance has been played; and
means for transferring second monetary data corresponding to at least a portion of said second number of credits to said memory of said smart data medium without communicating with any remote computer linked to said gaming machine.

13. The gaming system of claim 12, wherein said first monetary data is a currency amount, and further including means for converting said currency amount to said first number of credits.

14. The gaming system of claim 12, wherein said second monetary data is a currency amount, and further including means for converting said at least a portion of said second number of credits to said currency amount.

15. The gaming system of claim 12, wherein said means for transferring said first monetary data operates automatically in response to said receptacle receiving said smart data medium.

16. The gaming system of claim 12, wherein said gaming machine includes means, operable by the player, for selecting said first monetary data, said means for transferring said first monetary data operating in response to said receptacle receiving said smart data medium and the player operating said selection means.

17. The gaming system of claim 12, wherein said receptacle includes means, activated by the player, for discharging said smart data medium from said receptacle, said means for transferring said second monetary data operating automatically in response to activation of said discharge means.

18. The gaming system of claim 12, wherein said gaming machine includes means, operable by the player, for selecting said second monetary data, said means for transferring said second monetary data operating in response to operation of said selection means.

19. The gaming system of claim 12, wherein said visual display includes a video display.

20. The gaming system of claim 12, wherein said visual display includes a plurality of mechanical slot reels visible through a display window.

21. An open-loop cashless gaming system, comprising:

a smart data medium embedded with a microcontroller having a memory storing first monetary data;
a plurality of gaming machines, each of said gaming machines including a visual display, a processor, and a credit meter, said processor playing a game of chance on said visual display in response to a wager, each of said gaming machines including a receptacle for receiving said smart data medium;
wherein in a credit-in transaction on one of said machines receiving said smart data medium, said microcontroller transfers said first monetary data to said medium-receiving machine, said processor adding a first number of credits corresponding to said first monetary data to said credit meter of said medium-receiving machine; and
wherein in a credit-out transaction on said medium-receiving machine, said processor of said medium-receiving machine transfers second monetary data to said smart data medium, said microcontroller storing said second monetary data in said memory, said second monetary data corresponding to at least a portion of a second number of credits remaining on said credit meter after said processor has played said game of chance;
said credit-in and credit-out transactions being performed by said medium-receiving machine without communicating with any remote computer linked to said medium-receiving machine.

22. The gaming system of claim 21, wherein said microcontroller includes a first serial I/O interface and each of said gaming machines includes a second serial I/O interface, said first monetary data and said second monetary data being transferred between said smart data medium and said medium-receiving machine via said first and second serial I/O interfaces.

23. The gaming system of claim 21, wherein said credit-in transaction occurs automatically in response to said receptacle receiving said smart data medium.

24. The gaming system of claim 21, wherein each of said gaming machines includes means, operable by the player, for selecting said first monetary data, said credit-in transaction occurring in response to said receptacle receiving said smart data medium and the player operating said selection means.

25. The gaming system of claim 21, wherein said receptacle includes means, activated by the player, for discharging said smart data medium from said receptacle, said credit-out transaction occurring automatically in response to activation of said discharge means.

26. The gaming system of claim 21, wherein each of said gaming machines includes means, operable by the player, for selecting said second monetary data, said credit-out transaction occurring in response to operation of said selection means.

27. An open-loop cashless gaming method, comprising:

providing a smart data medium embedded with a microcontroller having a memory storing first monetary data;
providing a gaming machine including a visual display, a credit meter, and a receptacle;
receiving said smart data medium in said receptacle;
transferring said first monetary data to said gaming machine, and adding a first number of credits corresponding to said first monetary data to said credit meter without communicating with any remote computer linked to said gaming machine;
playing a game of chance on said visual display in response to a wager, a second number of credits remaining on said credit meter after said game of chance has been played; and
transferring second monetary data correspond-

ing to at least a portion of said second number of credits to said memory of said smart data medium without communicating with any remote computer linked to said gaming machine.

28. The method of claim 27, further including a second gaming machine including a second visual display, a second credit meter, and a second receptacle, and further including the steps of:

receiving said smart data medium in said second receptacle;
transferring said second monetary data to said gaming machine, and adding a third number of credits corresponding to at least a portion of said second monetary data to said second credit meter without communicating with any remote computer linked to said second gaming machine;
playing a game of chance on said second visual display in response to a wager, a fourth number of credits remaining on said second credit meter after said game of chance has been played; and
transferring third monetary data corresponding to at least a portion of said fourth number of credits to said memory of said smart data medium without communicating with any remote computer linked to said gaming machine.

29. The method of claim 27, wherein said steps of adding said first number of credits, playing said game of chance, and transferring said second monetary data are performed by a processor of said gaming machine.

30. The method of claim 27, wherein said step of transferring said first monetary data is performed by said microcontroller.

31. The method of claim 27, wherein said step of transferring said first monetary data occurs automatically in response to said step of receiving said smart data medium.

32. The method of claim 27, wherein said step of transferring said first monetary data occurs in response to said step of receiving said smart data medium and a player, selecting said first monetary data for transfer.

33. The method of claim 27, further including a step of discharging said smart data medium from said receptacle, said step of transferring said second monetary data occurring automatically in response to activation of a discharge device that discharges said smart data medium from said receptacle.

34. The method of claim 27, wherein said step of transferring said second monetary data occurs in response to a player selecting said second monetary data for transfer.

35. The method of claim 27, wherein said first monetary data is a currency amount, and wherein said step of transferring said first monetary data includes converting said currency amount to said first number of credits.

36. The method of claim 27, wherein said second monetary data is a currency amount, and wherein said step of transferring said second monetary data includes converting said at least a portion of said second number of credits to said currency amount.

37. An open-loop cashless gaming system, comprising:

a smart data medium embedded with a microcontroller having a memory storing monetary data; and
a gaming machine including a visual display and a processor, said processor playing a game of chance on said visual display in response to a wager and awarding a payoff if an outcome of said game of chance matches predetermined criteria, said gaming machine including a receptacle for receiving said smart data medium;
said microcontroller and said processor modifying said monetary data while said smart data medium is disposed within said receptacle without communicating with any remote computer linked to said gaming machine.

38. The gaming system of claim 37, wherein said microcontroller and said processor modify said monetary data in response to said wager and said payoff.

39. The gaming system of claim 38, wherein said monetary data represents a currency amount, said wager causing said currency amount to be reduced, said payoff causing said currency amount to be increased.

40. The gaming system of claim 38, wherein said monetary data represents a number of game credits, said wager causing said number of game credits to be reduced, said payoff causing said number of game credits to be increased.

41. An open-loop cashless gaming system, comprising:

a microcontroller-based smart data medium having a memory storing monetary data;
a processor-based gaming machine including

a visual display and a receptacle for receiving said smart data medium, said gaming machine playing a game of chance on said visual display in response to a wager and awarding a payoff if an outcome of said game of chance matches predetermined criteria; and
means for modifying said monetary data while said smart data medium is disposed within said receptacle without communicating with any remote computer linked to said gaming machine.

42. An open-loop cashless gaming method, comprising:

providing a smart data medium embedded with a microcontroller having a memory storing monetary data;
providing a gaming machine including a visual display and a receptacle;
receiving said smart data medium in said receptacle;
playing a game of chance on said visual display in response to a wager;
awarding a payoff if an outcome of said game of chances matches predetermined criteria; and
modifying said monetary data while said smart data medium is disposed within said receptacle without communicating with any remote computer linked to said gaming machine.

43. The gaming method of claim 42, wherein said step of modifying said monetary data includes reducing an amount represented by said monetary data in response to said wager and increasing the amount represented by said monetary data in response to said payoff.

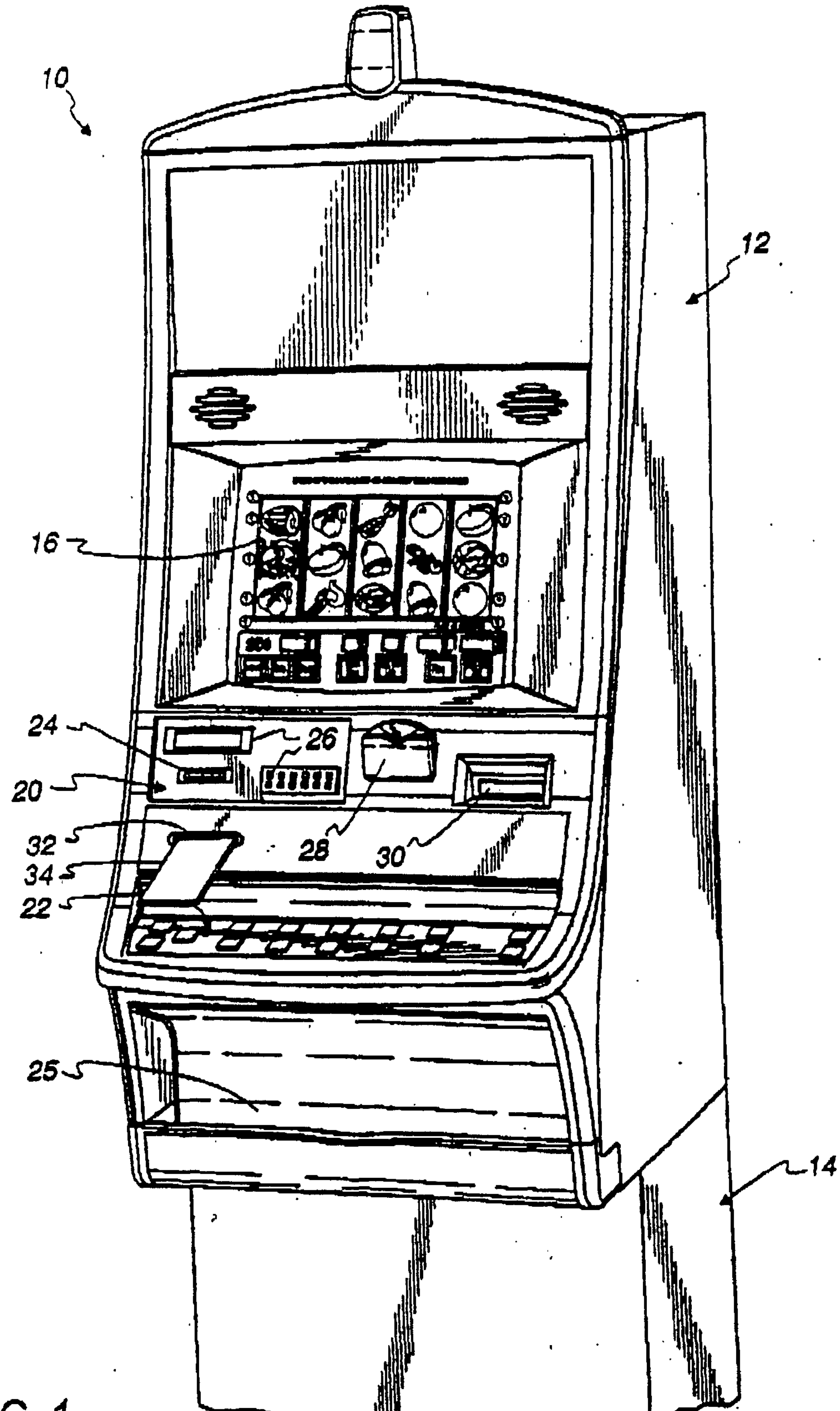

FIG. 1

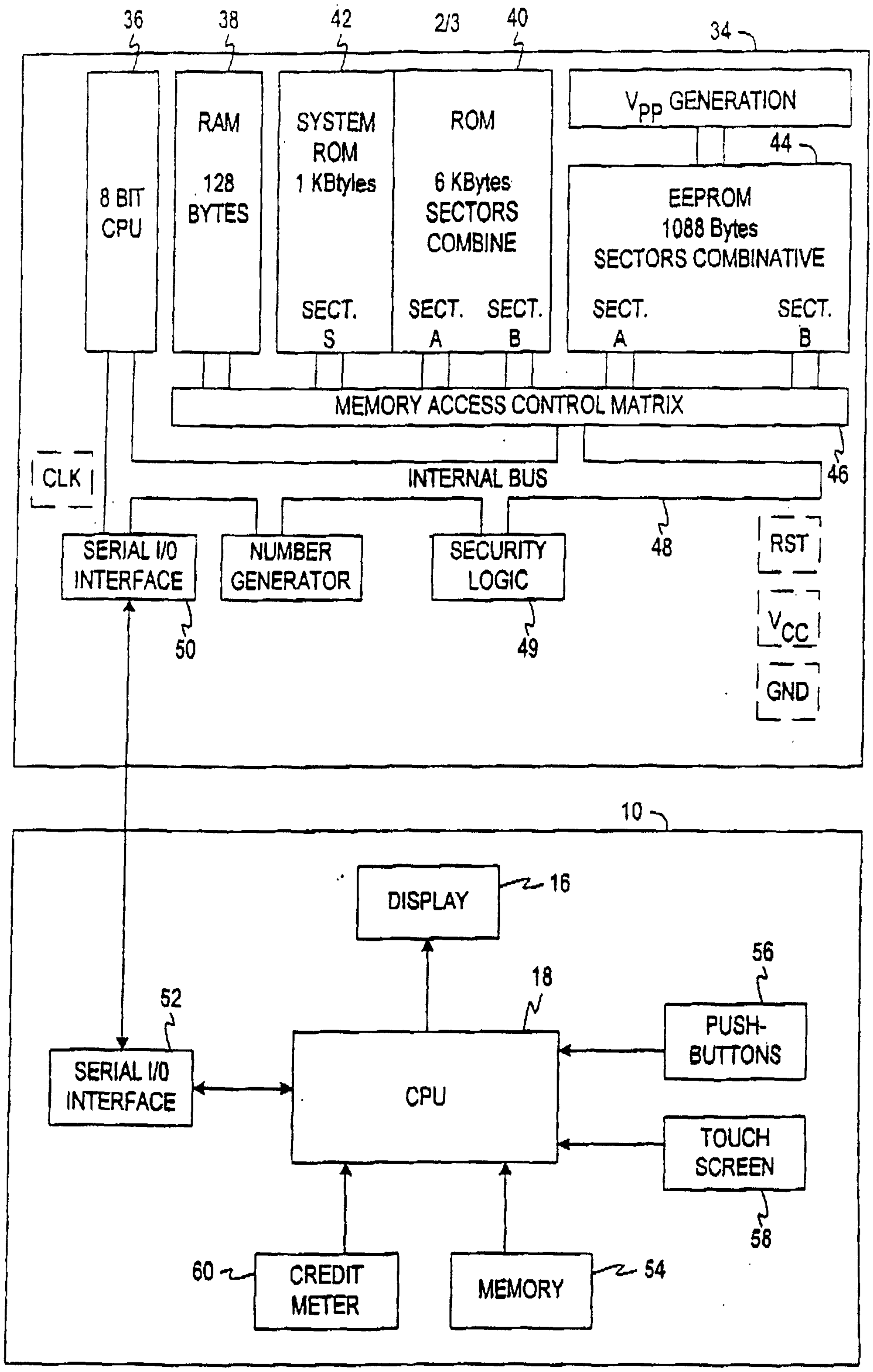
36
38
42
2/3
40
34
8 BIT CPU
RAM 128 BYTES
SYSTEM ROM 1 KBtyles
SECT. S
ROM 6 KBytes SECTORS COMBINE
SECT. A
SECT. B
VPP GENERATION
44
EEPROM 1088 Bytes SECTORS COMBINATIVE
SECT. A
SECT. B
MEMORY ACCESS CONTROL MATRIX
CLK
INTERNAL BUS
46
48
SERIAL I/0 INTERFACE
NUMBER GENERATOR
SECURITY LOGIC
RST
VCC
GND
50
49
10
DISPLAY
16
18
56
52
SERIAL I/0 INTERFACE
CPU
PUSH-BUTTONS
TOUCH SCREEN
58
60
CREDIT METER
MEMORY
54

FIG. 2

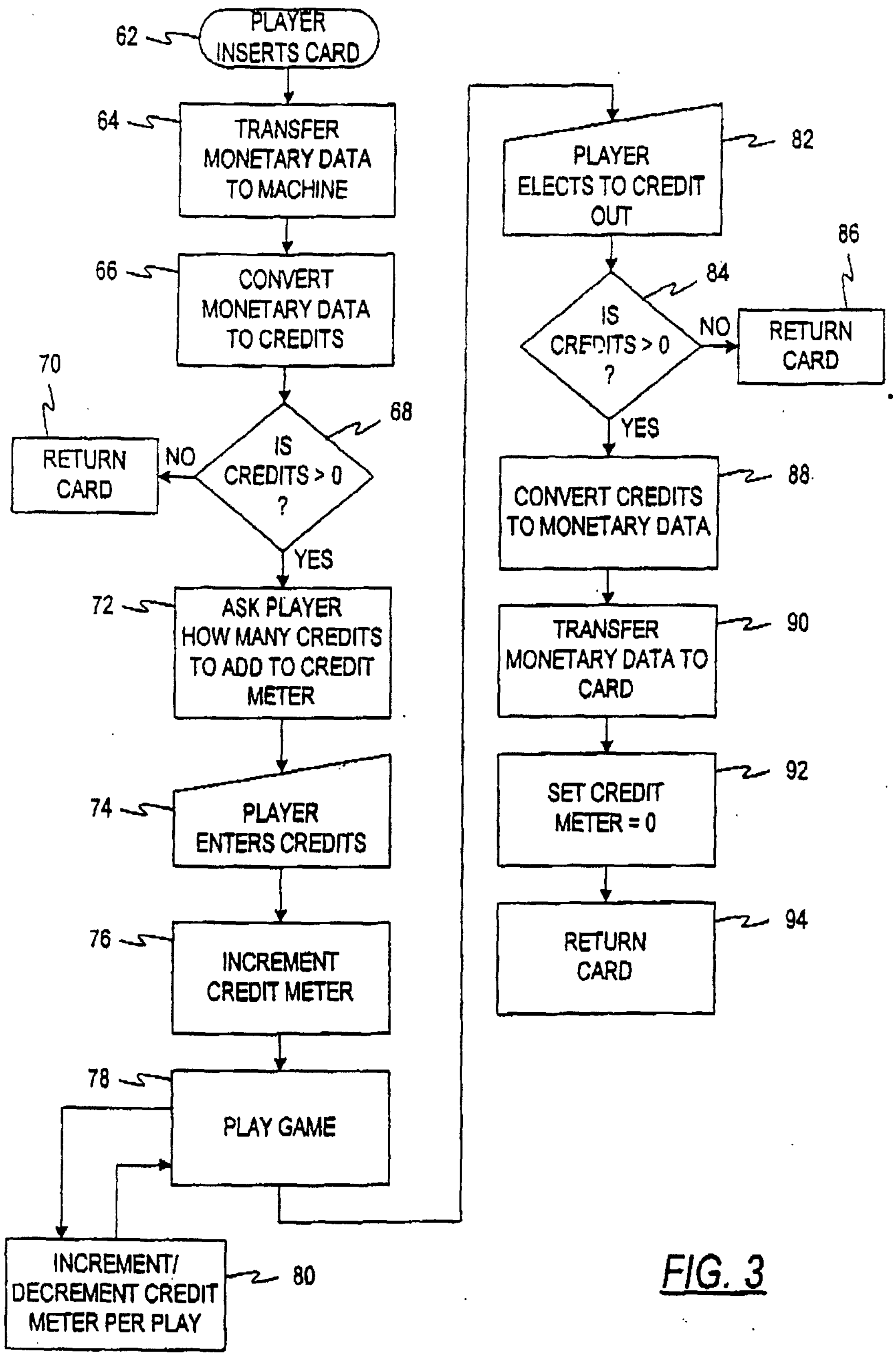
62
PLAYER INSERTS CARD
64
TRANSFER MONETARY DATA TO MACHINE
66
CONVERT MONETARY DATA TO CREDITS
68
IS CREDITS > 0 ?
NO
70
RETURN CARD
YES
72
ASK PLAYER HOW MANY CREDITS TO ADD TO CREDIT METER
74
PLAYER ENTERS CREDITS
76
INCREMENT CREDIT METER
78
PLAY GAME
80
INCREMENT/ DECREMENT CREDIT METER PER PLAY
82
PLAYER ELECTS TO CREDIT OUT
84
IS CREDITS > 0 ?
NO
86
RETURN CARD
YES
88
CONVERT CREDITS TO MONETARY DATA
90
TRANSFER MONETARY DATA TO CARD
92
SET CREDIT METER = 0
94
RETURN CARD

FIG. 3