



- (51) International Patent Classification:
G06K 19/04 (2006.01) A44C 21/00 (2006.01)
G06K 19/07 (2006.01)
- (21) International Application Number:
PCT/AU2018/050418
- (22) International Filing Date:
07 May 2018 (07.05.2018)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
2017901699 08 May 2017 (08.05.2017) AU
- (72) Inventor; and
(71) Applicant: MCGOLDRICK, Lachlan [AU/AU]; Unit 11,
7 Lindsay Street, Neutral Bay, New South Wales 2089 (AU).
- (74) Agent: SHELSTON IP PTY LTD; Level 21, 60 Margaret Street, Sydney, New South Wales 2000 (AU).

- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

(54) Title: MONETARY TRANSACTION METHOD AND SYSTEM

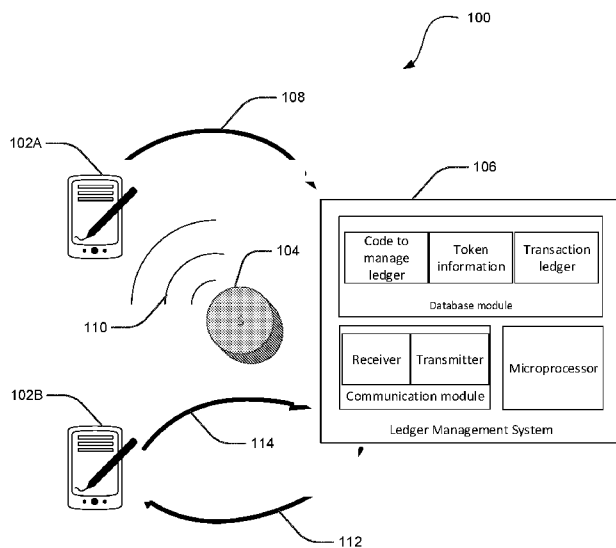


Fig. 1

(57) Abstract: A system is disclosed, consisting of hardware and software elements, which are configured to interact in a manner that provides technological infrastructure for supporting the conducting of monetary transactions. The monetary transactions (or at least a subset thereof) are conducted using physical monetary tokens, which have some inherent value. A publicly accessible database is maintained (and controlled using specially adapted computing infrastructure) to contain various information relating to the tokens, making it possible to verify the authenticity of any individual token.



Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*

MONETARY TRANSACTION METHOD AND SYSTEM

FIELD OF THE INVENTION

- [0001]** The present invention relates to monetary transaction tokens, methods and systems.
- [0002]** The invention has been developed primarily as a secure means for transferring physical monetary tokens and will be described hereinafter with reference to this application. However, it will be appreciated that the invention is not limited to this particular field of use.

BACKGROUND

- [0003]** Any discussion of the background art throughout the specification should in no way be considered as an admission that such art is widely known or forms part of common general knowledge in the field.
- [0004]** There are several systems for conducting monetary transactions such as bank transfers and physical money exchanges as well as virtual money exchange systems such as bitcoin.
- [0005]** Bank transfers and physical money exchanges lack traceability. Furthermore, the money exchanged in traditional systems lacks any inherent value.
- [0006]** Cryptographic systems, such as bitcoin, provide traceability of the exchanges, however the bitcoin tokens are virtual and have no inherent value.

SUMMARY OF THE INVENTION

- [0007]** It is an object of the present invention to overcome or ameliorate at least one of the disadvantages of the prior art, or to provide a useful alternative.
- [0008]** According to a first aspect of the invention, there is provided a physical monetary token for conducting monetary transactions, wherein the token includes: a physical body; a means for carrying a wirelessly readable identifier; and a predetermined amount of defined material disposed within the physical body; wherein tampering with the defined material disposed within the physical body causes the wirelessly readable identifier to cease being wirelessly readable.
- [0009]** According to another aspect of the invention, there is provided a physical monetary token for conducting monetary transactions, wherein the token includes: a physical body; a means for carrying a wirelessly readable identifier; and a predetermined amount of defined material disposed within the physical body; wherein tampering with the physical body causes the tampering to become evident.
- [0010]** According to a further aspect of the invention, there is provided a physical monetary

token for conducting monetary transactions, wherein the token includes: a physical body; a means for carrying a wirelessly readable identifier; a predetermined amount of defined material disposed within the physical body; and one or both of a hologram and optically variable ink disposed within the physical body.

[0011] According to a further aspect of the invention, there is provided the physical monetary token for conducting monetary transactions according to any one of the preceding claims, wherein the means for carrying the wirelessly readable identifier is a radio frequency identification (RFID) or near field communication (NFC) chip.

[0012] According to a further aspect of the invention, there is provided the physical monetary token for conducting monetary transactions according to any of the preceding claims wherein the wirelessly readable identifier includes a digital signature.

[0013] According to a further aspect of the invention, there is provided the token for conducting monetary transactions according to any of the preceding claims wherein the rigid body is made from thermosetting polymer.

[0014] According to a further aspect of the invention, there is provided the token for conducting monetary transactions according to any one of preceding claims, wherein the defined material is a precious metal.

[0015] According to a further aspect of the invention, there is provided the token for conducting monetary transactions according to any one of claims 1 to 6, wherein the defined material is a base metal.

[0016] According to a further aspect of the invention, there is provided a computer implemented method for exchanging physical monetary tokens wherein the token exchange is initiated via a transferee device, and confirmed via a transferor device, wherein each of the transferor and transferee devices have unique digital signatures which include respective public keys and private keys, the method including: providing one or more physical monetary tokens, wherein each monetary token includes: a physical body; a wirelessly readable identifier; a predetermined amount of defined material disposed within the physical body; and operating the transferee device thereby to read, from the wirelessly readable identifiers of the one or more tokens, data representative of the unique identifiers of the one or more tokens being transferred; operating the transferee device thereby to request a remotely accessible transaction ledger be altered to indicate that the exchange of tokens has occurred, wherein the request includes: providing the unique identifiers of the one or more tokens being transferred along with the transferee device's digital signature; providing data representative of the public key of the transferor device's digital signature; delivering, to the transferor device, a notification representative of the request to alter the ledger; and the operating the transferor device to selectively confirm or reject the request to alter the ledger, wherein the digital

signature of the transferor device is required to confirm or reject the request; and in the case that the transferor device confirms the request to alter the ledger, altering the ledger to record the transfer of tokens from the transferor to the transferee.

[0017] According to a further aspect of the invention, there is provided a computer implemented method for exchanging physical monetary tokens wherein the token exchange is initiated by a transferor device for transferring of tokens via a transferee device, wherein each of the transferor and transferee devices have unique digital signatures which include respective public keys and private keys, the method including: providing one or more physical monetary tokens, wherein each monetary token includes: a physical body; a wirelessly readable identifier; a predetermined amount of defined material disposed within the physical body; and inputting into the transferor device the wirelessly readable identifiers of the tokens being transferred; operating the transferor device thereby to request a transaction ledger be altered to indicate that the exchange of tokens has occurred, wherein the request includes: providing the identifiers of the tokens being transferred along with the transferor device's digital signature; providing the public key of the transferee device's digital signature notifying the transferee device of the request by the transferor device to alter the ledger; requesting the transferee device's digital signature; and in the case that the transferee device provides the digital signature, altering the ledger to record the transfer of tokens from the transferor to the transferee.

[0018] According to a further aspect of the invention, there is provided a method according to claim 9 or claim 10 wherein each of the one or more physical tokens includes a tampering means, such that tampering with the defined material disposed within the physical body causes the wirelessly readable identifier to cease being wirelessly readable.

[0019] According to a further aspect of the invention, there is provided a method according to claim 9 or claim 10 wherein each of the one or more physical tokens includes one or both of a hologram and optically variable ink disposed within the physical body.

[0020] According to a further aspect of the invention, there is provided a system for conducting monetary transactions, the system including: a plurality of tokens wherein each token is issued by an issuer and each token includes: a unique identifier; a predetermined amount of defined material; and a unique digital signature wherein the unique digital signature includes a public key; and an information repository for storing information about each token, the information including: the public key of each token's digital signature; the quantity and type of defined material in each token; the issuer of each token; and the unique identifier of each token; a transaction ledger for recording transactions of tokens between users of the system; and a transaction ledger management system configured to perform a transaction method to effect the transaction of tokens from a transferor to a transferee.

[0021] According to a further aspect of the invention, there is provided a system according to

claim 13 wherein the method includes a computer implemented method for exchanging physical monetary tokens wherein the token exchange is initiated via a transferee device, and confirmed via a transferor device, wherein each of the transferor and transferee devices have unique digital signatures which include respective public keys and private keys, the method including: providing one or more physical monetary tokens, wherein each monetary token includes: a physical body; a wirelessly readable identifier; a predetermined amount of defined material disposed within the physical body; and operating the transferee device thereby to read, from the wirelessly readable identifiers of the one or more tokens, data representative of the unique identifiers of the one or more tokens being transferred; operating the transferee device thereby to request a remotely accessible transaction ledger be altered to indicate that the exchange of tokens has occurred, wherein the request includes: providing the unique identifiers of the one or more tokens being transferred along with the transferee device's digital signature; providing data representative of the transferor device's digital signature; and altering the ledger to record the transfer of tokens from the transferor to the transferee.

[0022] According to a further aspect of the invention, there is provided a system according to claim 13 wherein the method includes a method for exchanging physical monetary tokens wherein the token exchange is initiated by a transferor device for transferring of tokens via a transferee device, wherein each of the transferor and transferee devices have unique digital signatures which include respective public keys and private keys, the method including: providing one or more physical monetary tokens, wherein each monetary token includes: a physical body; a wirelessly readable identifier; a predetermined amount of defined material disposed within the physical body; and inputting into the transferor device the wirelessly readable identifiers of the tokens being transferred; operating the transferor device thereby to request a transaction ledger be altered to indicate that the exchange of tokens has occurred, wherein the request includes: providing the identifiers of the tokens being transferred along with the transferor device's digital signature; providing the public key of the transferee device's digital signature; and altering the ledger to record the transfer of tokens from the transferor to the transferee.

[0023] According to a further aspect of the invention, there is provided the system for conducting monetary transactions according to any one of claims 13 to 15 wherein each token includes an RFID or NFC chip for transmitting the unique digital signature of the token.

[0024] According to a further aspect of the invention, there is provided the system for conducting monetary transactions according to any one of claims 13 to 15 wherein the defined material is a precious metal.

[0025] According to a further aspect of the invention, there is provided the system for conducting monetary transactions according to any one of claims 13 to 15 wherein the defined material is a valuable base metal.

- [0026]** According to a further aspect of the invention, there is provided the system for conducting monetary transactions according to claim 16 wherein the precious metal is gold.
- [0027]** According to a further aspect of the invention, there is provided the system for conducting monetary transactions according to claim 16 wherein the precious metal is a platinum group metal.
- [0028]** According to a further aspect of the invention, there is provided the system for conducting monetary transactions according to claim 16 wherein the precious metal is silver.
- [0029]** According to a further aspect of the invention, there is provided the system for conducting monetary transactions according to claim 17 wherein the precious base metal is copper.
- [0030]** According to a further aspect of the invention, there is provided the system for conducting monetary transactions according to claim 17 wherein the precious base metal is nickel.
- [0031]** According to a further aspect of the invention, there is provided a system for conducting monetary transactions according to any one of claims 13 to claim 22 wherein during an exchange of tokens from a transferor to a transferee, wherein each of the transferor and transferee have unique digital signatures which include respective public keys, the repository stores one or more of: the time of a transaction; the digital signatures of the exchanged tokens; the unique identifiers of the exchanged tokens; the public key of the digital signature of the transferee; and the digital signature of the transferor.
- [0032]** According to a further aspect of the invention, there is provided a computer implemented method for exchanging physical monetary tokens wherein the token exchange is initiated via a transferee device, and confirmed via a transferor device, wherein each of the transferor and transferee devices have unique digital signatures which include respective public keys and private keys, the method including: providing one or more physical monetary tokens, wherein each monetary token includes: a physical body; a wirelessly readable identifier; and operating the transferee device thereby to read, from the wirelessly readable identifiers of the one or more tokens, data representative of the unique identifiers of the one or more tokens being transferred; operating the transferee device thereby to request a remotely accessible transaction ledger be altered to indicate that the exchange of tokens has occurred, wherein the request includes: providing the unique identifiers of the one or more tokens being transferred along with the transferee device's digital signature; providing data representative of the public key of the transferor device's digital signature; delivering, to the transferor device, a notification representative of the request to alter the ledger; operating the transferor device to selectively confirm or reject the request to alter the ledger, wherein the digital signature of the transferor device is required to confirm or reject the request; and in the case that the

transferor device confirms the request to alter the ledger, altering the ledger to record the transfer of tokens from the transferor to the transferee.

[0033] According to a further aspect of the invention, there is provided a computer implemented method for exchanging physical monetary tokens wherein the token exchange is initiated by a transferor device for transferring of tokens via a transferee device, wherein each of the transferor and transferee devices have unique digital signatures which include respective public keys and private keys, the method including: providing one or more physical monetary tokens, wherein each monetary token includes: a physical body; a wirelessly readable identifier; and inputting into the transferor device the wirelessly readable identifiers of the tokens being transferred; operating the transferor device thereby to request a transaction ledger be altered to indicate that the exchange of tokens has occurred, wherein the request includes: providing the identifiers of the tokens being transferred along with the transferor device's digital signature; providing the public key of the transferee device's digital signature altering the ledger to record the transfer of tokens from the transferor to the transferee.

[0034] One embodiment provides a computer program product for performing a method as described herein.

[0035] One embodiment provides a non-transitory carrier medium for carrying computer executable code that, when executed on a processor, causes the processor to perform a method as described herein.

[0036] One embodiment provides a system configured for performing a method as described herein.

[0037] Reference throughout this specification to "one embodiment", "some embodiments" or "an embodiment" means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, appearances of the phrases "in one embodiment", "in some embodiments" or "in an embodiment" in various places throughout this specification are not necessarily all referring to the same embodiment, but may. Furthermore, the particular features, structures or characteristics may be combined in any suitable manner, as would be apparent to one of ordinary skill in the art from this disclosure, in one or more embodiments.

[0038] As used herein, unless otherwise specified the use of the ordinal adjectives "first", "second", "third", etc., to describe a common object, merely indicate that different instances of like objects are being referred to, and are not intended to imply that the objects so described must be in a given sequence, either temporally, spatially, in ranking, or in any other manner.

[0039] In the claims below and the description herein, any one of the terms comprising, comprised of or which comprises is an open term that means including at least the elements/features that follow, but not excluding others. Thus, the term comprising, when used

in the claims, should not be interpreted as being limitative to the means or elements or steps listed thereafter. For example, the scope of the expression a device comprising A and B should not be limited to devices consisting only of elements A and B. Any one of the terms including or which includes or that includes as used herein is also an open term that also means including at least the elements/features that follow the term, but not excluding others. Thus, including is synonymous with and means comprising.

[0040] As used herein, the term "exemplary" is used in the sense of providing examples, as opposed to indicating quality. That is, an "exemplary embodiment" is an embodiment provided as an example, as opposed to necessarily being an embodiment of exemplary quality.

[0041] The term "module" refers to a software component that is logically separable (a computer program), or a hardware component. The module of the embodiment refers to not only a module in the computer program but also a module in a hardware configuration. The discussion of the embodiment also serves as the discussion of computer programs for causing the modules to function (including a program that causes a computer to execute each step, a program that causes the computer to function as means, and a program that causes the computer to implement each function), and as the discussion of a system and a method. For convenience of explanation, the phrases "stores information," "causes information to be stored," and other phrases equivalent thereto are used. If the embodiment is a computer program, these phrases are intended to express "causes a memory device to store information" or "controls a memory device to cause the memory device to store information." The modules may correspond to the functions in a one-to-one correspondence. In a software implementation, one module may form one program or multiple modules may form one program. One module may form multiple programs. Multiple modules may be executed by a single computer. A single module may be executed by multiple computers in a distributed environment or a parallel environment. One module may include another module. In the discussion that follows, the term "connection" refers to not only a physical connection but also a logical connection (such as an exchange of data, instructions, and data reference relationship). The term "predetermined" means that something is decided in advance of a process of interest. The term "predetermined" is thus intended to refer to something that is decided in advance of a process of interest in the embodiment. Even after a process in the embodiment has started, the term "predetermined" refers to something that is decided in advance of a process of interest depending on a condition or a status of the embodiment at the present point of time or depending on a condition or status heretofore continuing down to the present point of time. If "predetermined values" are plural, the predetermined values may be different from each other, or two or more of the predetermined values (including all the values) may be equal to each other. A statement that "if A, B is to be performed" is intended to mean "that it is determined whether something is A, and that if something is determined as A, an action B is to be carried out". The statement becomes meaningless if the determination as to

whether something is A is not performed.

[0042] The term "system" and the term "device" refer to an arrangement where multiple computers, hardware configurations, and devices are interconnected via a communication network (including a one-to-one communication connection). The term "system" and the term "device" also refer to an arrangement that includes a single computer, a hardware configuration, and a device. The term "system" and the term "device" have the same definition and are interchangeable with each other. The system does not include a social system that is a social "arrangement" formulated by humans.

[0043] At each process performed by a module, or at one of the processes performed by a module, information as a process target is read from a memory device, the information is then processed, and the process results are written onto the memory device. A description related to the reading of the information from the memory device prior to the process and the writing of the processed information onto the memory device subsequent to the process may be omitted as appropriate. The memory devices may include a hard disk, a random-access memory (RAM), an external storage medium, a memory device connected via a communication network, and a ledger within a CPU (Central Processing Unit).

BRIEF DESCRIPTION OF THE DRAWINGS

[0044] Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

[0045] Figure 1 schematically illustrates a system for conducting transactions of physical monetary tokens according to one embodiment of the invention.

[0046] Figure 2 schematically illustrates an exemplary user terminal.

[0047] Figure 3 schematically illustrates an exemplary ledger management system.

[0048] Figure 4A schematically illustrates an exemplary physical monetary token.

[0049] Figure 4B schematically illustrates a profile view of the exemplary physical monetary token of Figure 4A.

[0050] Figure 5A schematically illustrates an exemplary physical monetary token.

[0051] Figure 5B schematically illustrates a profile view of the exemplary physical monetary token of Figure 5A.

[0052] Figure 6 is a schematic representation of a transaction method according to one aspect of the invention.

[0053] Figure 7 is a schematic representation of a transaction method according to one aspect of the invention.

[0054] Figure 8 is a schematic representation of a transaction method according to one aspect of the invention.

[0055] Figure 9 is a schematic representation of a transaction method according to one aspect of the invention.

DETAILED DESCRIPTION

Overview

[0056] A system is disclosed, consisting of hardware and software elements, which are configured to interact in a manner that provides technological infrastructure for supporting the conducting of monetary transactions. The monetary transactions (or at least a subset thereof) are conducted using physical monetary tokens, which have some inherent value. A publicly accessible database is maintained (and controlled using specially adapted computing infrastructure) to contain various information relating to the tokens, making it possible to verify the authenticity of any individual token.

[0057] The system uses asymmetric cryptographic techniques to identify individual users of the system as well as for identifying physical monetary tokens used for the monetary transactions. The cryptographic identification technique involves issuing a unique digital signature to each user and each token. The digital signatures include both a public key and a private key. The public keys can be disseminated widely and used to identify or specify a user or token in the system. The private key by contrast is kept secret and is known only to a user, and in the case of a token is stored on the token in such a way that it cannot be directly read. The private key can be used to confirm or authenticate a user's identity to the system, or, in the case of a token, can be used to verify the authenticity of the token.

Example Systems

[0058] Figure 1 is a conceptual modular configuration diagram of a system 100 according to one embodiment. The system 100 includes at least two users who are represented here by their respective user terminals 102A and 102B, at least one physical monetary token 104 and a ledger management system 106.

[0059] To transact a physical monetary token 104 between users 102A and 102B using the system 100, one of the users, in this case 102A, identifies the token being transferred and makes a request 108 to the ledger management system to register the transaction. In this embodiment, the token is identified by way of a transmission 110, which is received by the user terminal and provides information indicative of the tokens digital signature. The request 108 to the ledger management system includes the identity of the other user 102B involved in the transaction.

[0060] The ledger management system, after receiving the request, transmits an alert 112 to the

identified user 102B of the request 108 by user 102A. After receiving the alert 112, the identified user 102B can then selectively accept or reject the request by way of a return transmission 114.

User terminal

[0061] An exemplary user terminal 200, representative of user terminals 102A and 102B from Figure 1, is shown in greater detail in Figure 2. The terminal includes a microprocessor 202, a memory module 204, a communication module 206 and wireless reader hardware 208.

[0062] The microprocessor 202 is configured to execute commands from the user and from computer executable code stored in the memory module 204.

[0063] The memory module 204 is configured to store data related to the use of the monetary transacting system 100. Specifically, the memory module includes an application 210 for facilitating the transaction and a user interface module 212 which allows a user to interact with the application. The application provides computer executable code/instructions to the microprocessor 202 thereby to control the various hardware components of the terminal. The application also relays information between the user interface module 212 and the ledger management system 106, which includes appropriate encryption and decryption, encoding and decoding, digitally signing the message and transmitting and receiving messages to and from the ledger management 106 system respectively.

[0064] To transact a physical monetary token 104, the user interacts with the user interface module 212 which allows the user to make a request 214 to amend the transaction ledger 314. The user request 108 is received from the user interface module 200 by the application 210, which controls the wireless reader 208 to read the wirelessly readable identifier in the physical monetary token thereby identifying the token 104 being transferred. The application then combines the request from the user with the token's identity (and in some cases its digital signature) to create a transfer request. The application 210 then signs the transfer request with the user's digital signature 218 which is also stored in the memory module 204. The application 210 then controls the transmitter 220 in the communication module 206 to transmit the signed transfer request 108 to the ledger management system 106.

[0065] Upon receipt of the signed transfer request 108, the ledger management system 106 transmits an alert message 112 to the other user 102B involved in the transaction. The user terminal 102B, receives the alert 112 through the receiver 222 in the communication module 206. The application takes the received alert and provides it to the user interface module 212 which allows the user to accept or reject the request 224 to register the transaction. The user's accept or reject response 224 is input through the user interface module 212, received by the application 210 and transmitted back to the ledger management system 106 through the transmitter 220 in the communication module 206.

Ledger management system

[0066] The ledger management system 106 from Figure 1 is shown again in Figure 3. The ledger management system 106 records transactions of physical monetary tokens 104 between users of system 100. The system includes a database module 302, a communication module 304 and a microprocessor 306.

[0067] The communication module 304 includes a transmitter 308 and a receiver 310 which allows the ledger management system 106 to communicate with user terminals of system 100. Requests 108 and responses to requests 114 are received from the user terminals by the ledger management system 106 through the receiver 310 while alerts 112 are sent to the user terminals through the transmitter 308.

[0068] The microprocessor is configured to process computer executable code which is stored in the database module 302.

[0069] The database module 302, discussed in detail below, is configured to store data such as computer executable code 312 to manage the transaction ledger, the transaction ledger itself 314 as well as the information 316 about the physical monetary tokens 104 of system 100.

Database module

[0070] As previously mentioned, the monetary transaction system includes a publicly accessible database. The database records information 316 relating to the tokens 104 such as the public key of each token's digital signature, the issuer of a token, the serial number of each token and the quantity and type of material embedded in the token providing the intrinsic value. Although the database is publicly accessible, this does not necessarily mean that all aspects of the database are accessible to everyone. For example, some aspects of the database may be kept private and/or only visible to users of the system.

[0071] Additionally, the database includes the transaction ledger 314. The transaction ledger 314 records information about each transaction such as the time of the transaction, the public key of the digital signature of the transferee of the token or tokens, the digital signature of the transferor of the token or tokens and the serial numbers and digital signatures of the token or tokens being transferred. The transaction ledger does not necessarily track the transactions of all tokens, and in some embodiments may restrict tracking to high denomination tokens only. In this case, enough information will still be available in the database to establish authenticity of tokens, although the transactions and therefore ownership of the tokens would not be recorded.

[0072] The database can provide security measures which can be implemented in the system. For example, it may not be possible for a transferor to transfer a token to a transferee if the digital signature or serial number of the token being transferred is not recorded as being owned by the transferor. That is, the information in the transaction ledger would prevent a user

from transacting with tokens that do not belong to them. In some embodiments, the transaction ledger may alert other users if a user attempted to transfer a token which did not belong to them.

[0073] In some embodiments, the transaction ledger takes the form of a block chain. The blockchain may be centrally maintained, only making part of the transaction information publicly available, while the rest of the information is kept private. This centrally maintained blockchain has the advantage of maintaining the privacy of users as the number of tokens owned by a given user may be kept secret along with their transactions.

[0074] In other embodiments, an open, distributed blockchain structure is used for the transaction ledger. In this embodiment, the blockchain is maintained on a peer-to-peer network through consensus with each new block containing a hash of the previous block. Since this blockchain structure is not maintained centrally and relies on distributed consensus, it is inherently resistant to modification and therefore provides robust security for the transaction system.

[0075] It will be appreciated that other forms of transaction ledger may be used including a combination of private and public blockchains wherein a user may transfer tokens from the private blockchain to the public blockchain as required.

Tokens

[0076] As previously mentioned, at least a subset of the physical monetary tokens carry some inherent value and are each uniquely identifiable.

[0077] The tokens acquire their inherent value via the inclusion of valuable materials into the physical structure of the tokens. For example, in one embodiment tokens may include various amounts of precious metals such as gold silver or platinum or valuable base metals such as copper or nickel. Preferably, precious metals will be used in higher denomination tokens, while the base metals may be used in the lower denomination tokens. The amount and type of metal used in each token will determine the exact denomination assigned to the token. It will be appreciated that other types of material can be used to provide the inherent value to the tokens.

[0078] Identification of the tokens is made possible by a unique serial number and, as previously mentioned, a digital signature. To utilize the digital signature, the token includes some wirelessly readable identifier or means for transmitting the unique digital signature. In one embodiment, the tokens include RFID or NFC chips or antennas which are capable of digitally signing a transaction, thereby positively identifying the individual token. The serial number of each token may be displayed openly on the token and/or be transmitted by the wirelessly readable identifier. The wirelessly readable identifier can be used to verify the integrity and authenticity of the token. It will be appreciated that the wirelessly readable identifier is only a

means to identify the token and that any other means is also intended to be covered. For example, the token may have visual marks, QR codes, bar codes, some contact identification mechanism etc.

[0079] The tokens may also be constructed to include any number of anti-tampering features. In one embodiment, the valuable material is incorporated into the construction of the wirelessly readable identifier such that removal of the valuable material will cause the wirelessly readable identifier to cease functioning thereby rendering the token unable to be transacted. Another anti-tamper feature may be to integrally associate the wirelessly readable identifier with a more fragile material which will decompose when exposed to air or heat thereby destroying the wirelessly readable identifier and rendering the token valueless. Other more generic anti-tampering features such as constructing the physical body of the token from a rigid material which cannot be readily manipulated such as a chemically inert thermosetting polymer, including optically variable inks or holograms on the physical body. In some embodiments, the anti-tampering feature is such that tampering with the physical body causes the tampering to become evident.

[0080] Preferably, higher denomination tokens, which have a greater intrinsic value, will include stronger anti-tampering features. For Example, Figure 4A illustrates one embodiment of a physical monetary token 400 with comparatively low strength anti-tamper features while Figure 4B shows the same token in profile. Flecks of valuable metal 402, which provide the inherent value to the token, are spread randomly throughout the body 404 of the token which is formed from a transparent thermosetting plastic. The wirelessly readable identifier 406 is an RFID or NFC chip embedded in the body 404 of the token 400 along with a hologram 408, which is located in the body 404 of the token to prevent damage to the RFID or NFC chip.

[0081] Figure 5A illustrates another embodiment of a physical monetary token 500 with comparatively high strength anti-tamper features along with a greater amount of valuable metal 502 compared to the example of Figure 4A. Figure 5B shows the same token in profile. The body 504 of the token is again formed from a thermosetting plastic. In this embodiment, however, the hologram 506 is distributed between the pieces of valuable metal 502 and an optically variable ink 508 at least partially overlays the valuable metal 502, the hologram 506 and the RFID or NFC chip 510.

Example Methods

[0082] Example methods are described below. These methods are performed based on the operation of computing devices, such as devices configured to operate in the context of the example systems illustrated in Figure 1 and Figure 2.

[0083] The method used for exchanging the tokens will depend on who initiates a given transfer. Figure 6 illustrates the method if the transfer is initiated 602 by a transferee, who is receiving the tokens from a transferor. The transferee begins by identifying the tokens to be

transferred 604. The identification of the tokens is performed by reading a signal from the wirelessly readable identifier embedded in each of the tokens. The wirelessly readable identifier (406 or 510) can be read by any suitable device such as the user terminal 200 or any smart device running an appropriate application and including appropriate hardware.

[0084] The transferee then makes a request to have a transaction ledger altered 606 to record the transaction. As part of the request, the transferee includes the serial numbers of the tokens being transferred as well as the public key of the transferor who presently owns the tokens. The private key of the digital signature of the transferee is used to authenticate the identification of the transferee at the time of making the request.

[0085] Upon receiving the request to alter the transaction ledger, a notification is sent to the transferor 608, reporting that request has been made to alter the transaction ledger. The notification includes the identity of the tokens being transferred and requires the transferor to selectively approve the transaction 610. The private key of the digital signature of the transferor is then used to digitally sign the response thereby to authenticate and selectively approve the transaction 612. Once the transaction is approved by the transferor, the transaction ledger is altered 614 to reflect the transaction thereby concluding the token transfer 616. Alternatively, the transferor may reject the transfer, thereby preventing the transaction from occurring 618. In some embodiments, no notification is sent to the transferor. Instead, the transferor simply sees the transferee's request in the transaction ledger and in response transmits a confirmation message to the ledger thereby effecting the transfer.

[0086] In the case illustrated in Figure 7 where the transaction is initiated by the transferor 702, who is transferring a set of tokens to the transferee, a similar method is used. The transferor requests the transaction ledger be altered 704 to indicate the exchange of tokens has occurred. The transferor's identity is authenticated using the private key of the transferor's digital signature 706 when making the request. The request further includes unique identifiers of the tokens being transferred 708, such as their serial numbers and the public key of the transferee's digital signature 710. Once the request has been successfully received, notification is sent to the transferee 712 of the request to alter the ledger and requiring confirmation from the transferee 714, along with a request for the private key of the transferee's digital signature. By supplying the private key 716, the transferee is confirming the transaction thereby allowing the transaction ledger to be altered, in which case the transaction is registered in the ledger 718 and the token is transferred 720. Alternatively, the transferee may reject the transaction thereby preventing the transaction from occurring 722.

[0087] Figure 8 illustrates an alternative embodiment to the method if the transfer is initiated 802 by a transferee, who is receiving the tokens from a transferor. The transferee begins by identifying the tokens to be transferred 804. The identification of the tokens is performed by reading a signal from the wirelessly readable identifier embedded in each of the tokens. The

wirelessly readable identifier (406 or 510) can be read by any suitable device such as the user terminal 200 or any smart device running an appropriate application and including appropriate hardware.

[0088] The transferee then generates a request to have a transaction ledger altered 606 to record the transaction. The transferor then digitally signs the request 808 which is sent to the ledger management system 810. When the ledger management system receives the signed request, the transaction ledger is altered 812 to reflect and effect the transaction 814.

[0089] Figure 9 illustrates an alternative embodiment to the method if the transfer is initiated 902 by the transferor. The transferor requests the transaction ledger be altered 904 to indicate the exchange of tokens has occurred. The transferor's identity is authenticated using the transferor's digital signature 906 when making the request. The request further includes unique identifiers of the tokens being transferred 908, such as their serial numbers and the public key of the transferee's digital signature 910. Once the request has been successfully received, the transaction ledger is altered 912 and the tokens are transferred 914.

[0090] It will be appreciated that the methods described above can be carried out by any suitable means. In particular, smart devices such as smart phones and tablets executing an appropriate application could perform the method. Such smart devices may be particularly convenient if they also include a means to read the wirelessly readable identifier and include other appropriate hardware.

Registering with the System

[0091] In the monetary transaction system, certified entities may be permitted to issue tokens. The certification of the issuing entities will be controlled centrally by a certifying entity. The certifying entity will publish all information relating to certified issuing entities in a publicly accessible location, such as online. Included in the published information will be the public key of the issuing entity, enabling a user of the system to verify the digital signature of the issuing entity.

[0092] The issuing entities are able to register new users by verifying their identity and issuing them a digital signature. The issuing entity then publishes the public key of the digital signature in the database, enabling other users to see that the new user's identity has been verified. The database therefore provides some degree of confidence that a user's identity has been verified and could potentially allow a user to check whether the identity of all previous owners of a given token can be traced.

[0093] If a registered user loses the private key of their digital signature, it will be possible for the issuing entity which registered them to provide them with a new digital signature (and public key) and register all of their tokens with their new digital signature. That is, their tokens will be transferred from their old digital signature to their new one.

[0094] In some embodiments, issuing entities may have additional powers to enter various

transactions into the transaction ledger. For example, where the previous owner's digital signature is lost or unavailable (e.g. tokens passed from a deceased to an heir), an issuing entity could verify the change of ownership and update the transaction ledger without cooperation from the owner of the tokens.

[0095] Similarly it should be appreciated that in the above description of exemplary embodiments of the invention, various features of the invention are sometimes grouped together in a single embodiment, figure, or description thereof for the purpose of streamlining the disclosure and aiding in the understanding of one or more of the various inventive aspects. This method of disclosure, however, is not to be interpreted as reflecting an intention that the claimed invention requires more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive aspects lie in less than all features of a single foregoing disclosed embodiment. Thus, the claims following the Detailed Description are hereby expressly incorporated into this Detailed Description, with each claim standing on its own as a separate embodiment of this invention.

[0096] Furthermore, while some embodiments described herein include some but not other features included in other embodiments, combinations of features of different embodiments are meant to be within the scope of the invention, and form different embodiments, as would be understood by those skilled in the art. For example, in the following claims, any of the claimed embodiments can be used in any combination.

[0097] Furthermore, some of the embodiments are described herein as a method or combination of elements of a method that can be implemented by a processor of a computer system or by other means of carrying out the function. Thus, a processor with the necessary instructions for carrying out such a method or element of a method forms a means for carrying out the method or element of a method. Furthermore, an element described herein of an apparatus embodiment is an example of a means for carrying out the function performed by the element for the purpose of carrying out the invention.

[0098] In the description provided herein, numerous specific details are set forth. However, it is understood that embodiments of the invention may be practiced without these specific details. In other instances, well-known methods, structures and techniques have not been shown in detail in order not to obscure an understanding of this description.

[0099] Similarly, it is to be noticed that the term coupled, when used in the claims, should not be interpreted as being limited to direct connections only. The terms "coupled" and "connected," along with their derivatives, may be used. It should be understood that these terms are not intended as synonyms for each other. Thus, the scope of the expression a device A coupled to a device B should not be limited to devices or systems wherein an output of device A is directly connected to an input of device B. It means that there exists a path between an output of A and an input of B which may be a path including other devices or

means. "Coupled" may mean that two or more elements are either in direct physical or electrical contact, or that two or more elements are not in direct contact with each other but yet still co-operate or interact with each other.

[00100] Thus, while there has been described what are believed to be the preferred embodiments of the invention, those skilled in the art will recognize that other and further modifications may be made thereto without departing from the spirit of the invention, and it is intended to claim all such changes and modifications as falling within the scope of the invention. For example, any formulas given above are merely representative of procedures that may be used. Functionality may be added or deleted from the block diagrams and operations may be interchanged among functional blocks. Steps may be added or deleted to methods described within the scope of the present invention.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A physical monetary token for conducting monetary transactions, wherein the token includes:
 - a physical body;
 - a means for carrying a wirelessly readable identifier; and
 - a predetermined amount of defined material disposed within the physical body;wherein tampering with the defined material disposed within the physical body causes the wirelessly readable identifier to cease being wirelessly readable.
2. A physical monetary token for conducting monetary transactions, wherein the token includes:
 - a physical body;
 - a means for carrying a wirelessly readable identifier; and
 - a predetermined amount of defined material disposed within the physical body;wherein tampering with the physical body causes the tampering to become evident.
3. A physical monetary token for conducting monetary transactions, wherein the token includes:
 - a physical body;
 - a means for carrying a wirelessly readable identifier;
 - a predetermined amount of defined material disposed within the physical body; and
 - one or both of a hologram and optically variable ink disposed within the physical body.
4. The physical monetary token for conducting monetary transactions according to any one of the preceding claims, wherein the means for carrying the wirelessly readable identifier is a radio frequency identification (RFID) or or near field communication (NFC) chip.
5. The physical monetary token for conducting monetary transactions according to any of the preceding claims wherein the wirelessly readable identifier includes a digital signature.
6. The token for conducting monetary transactions according to any of the preceding claims wherein the rigid body is made from thermosetting polymer.
7. The token for conducting monetary transactions according to any one of preceding claims, wherein the defined material is a precious metal.

8. The token for conducting monetary transactions according to any one of claims 1 to 6, wherein the defined material is a base metal.

9. A computer implemented method for exchanging physical monetary tokens wherein the token exchange is initiated via a transferee device, and confirmed via a transferor device, wherein each of the transferor and transferee devices have unique digital signatures which include respective public keys and private keys, the method including:

providing one or more physical monetary tokens, wherein each monetary token includes:

a physical body;

a wirelessly readable identifier;

a predetermined amount of defined material disposed within the physical body;
and

operating the transferee device thereby to read, from the wirelessly readable identifiers of the one or more tokens, data representative of the unique identifiers of the one or more tokens being transferred;

operating the transferee device thereby to request a remotely accessible transaction ledger be altered to indicate that the exchange of tokens has occurred, wherein the request includes:

providing the unique identifiers of the one or more tokens being transferred along with the transferee device's digital signature;

providing data representative of the public key of the transferor device's digital signature;

delivering, to the transferor device, a notification representative of the request to alter the ledger; and the

operating the transferor device to selectively confirm or reject the request to alter the ledger, wherein the digital signature of the transferor device is required to confirm or reject the request; and

in the case that the transferor device confirms the request to alter the ledger, altering the ledger to record the transfer of tokens from the transferor to the transferee.

10. A computer implemented method for exchanging physical monetary tokens wherein the token exchange is initiated by a transferor device for transferring of tokens via a transferee device,

wherein each of the transferor and transferee devices have unique digital signatures which include respective public keys and private keys, the method including:

providing one or more physical monetary tokens, wherein each monetary token includes:

a physical body;

a wirelessly readable identifier;

a predetermined amount of defined material disposed within the physical body;
and

inputting into the transferor device the wirelessly readable identifiers of the tokens being transferred;

operating the transferor device thereby to request a transaction ledger be altered to indicate that the exchange of tokens has occurred, wherein the request includes:

providing the identifiers of the tokens being transferred along with the transferor device's digital signature;

providing the public key of the transferee device's digital signature

notifying the transferee device of the request by the transferor device to alter the ledger;

requesting the transferee device's digital signature; and

in the case that the transferee device provides the digital signature, altering the ledger to record the transfer of tokens from the transferor to the transferee.

11. A method according to claim 9 or claim 10 wherein each of the one or more physical tokens includes a tampering means, such that tampering with the defined material disposed within the physical body causes the wirelessly readable identifier to cease being wirelessly readable.

12. A method according to claim 9 or claim 10 wherein each of the one or more physical tokens includes one or both of a hologram and optically variable ink disposed within the physical body.

13. A system for conducting monetary transactions, the system including:

a plurality of tokens wherein each token is issued by an issuer and each token includes:

a unique identifier;

a predetermined amount of defined material; and

a unique digital signature wherein the unique digital signature includes a public key; and

an information repository for storing information about each token, the information including:

the public key of each token's digital signature;

the quantity and type of defined material in each token;

the issuer of each token; and

the unique identifier of each token;

a transaction ledger for recording transactions of tokens between users of the system; and

a transaction ledger management system configured to perform a transaction method to effect the transaction of tokens from a transferor to a transferee.

14. A system according to claim 13 wherein the method includes a computer implemented method for exchanging physical monetary tokens wherein the token exchange is initiated via a transferee device, and confirmed via a transferor device, wherein each of the transferor and transferee devices have unique digital signatures which include respective public keys and private keys, the method including:

providing one or more physical monetary tokens, wherein each monetary token includes:

a physical body;

a wirelessly readable identifier;

a predetermined amount of defined material disposed within the physical body;
and

operating the transferee device thereby to read, from the wirelessly readable identifies of the one or more tokens, data representative of the unique identifiers of the one or more tokens being transferred;

operating the transferee device thereby to request a remotely accessible transaction ledger be altered to indicate that the exchange of tokens has occurred, wherein the request includes:

providing the unique identifiers of the one or more tokens being transferred along with the transferee device's digital signature;

providing data representative of the transferor device's digital signature; and

altering the ledger to record the transfer of tokens from the transferor to the transferee.

15. A system according to claim 13 wherein the method includes a method for exchanging physical monetary tokens wherein the token exchange is initiated by a transferor device for transferring of tokens via a transferee device, wherein each of the transferor and transferee devices have unique digital signatures which include respective public keys and private keys, the method including:

providing one or more physical monetary tokens, wherein each monetary token includes:

a physical body;

a wirelessly readable identifier;

a predetermined amount of defined material disposed within the physical body;
and

inputting into the transferor device the wirelessly readable identifiers of the tokens being transferred;

operating the transferor device thereby to request a transaction ledger be altered to indicate that the exchange of tokens has occurred, wherein the request includes:

providing the identifiers of the tokens being transferred along with the transferor device's digital signature;

providing the public key of the transferee device's digital signature; and

altering the ledger to record the transfer of tokens from the transferor to the transferee.

16. The system for conducting monetary transactions according to any one of claims 13 to 15 wherein each token includes an RFID or NFC chip for transmitting the unique digital signature of the token.

17. The system for conducting monetary transactions according to any one of claims 13 to 15 wherein the defined material is a precious metal.

18. The system for conducting monetary transactions according to any one of claims 13 to 15 wherein the defined material is a valuable base metal.

19. The system for conducting monetary transactions according to claim 16 wherein the precious metal is gold.

20. The system for conducting monetary transactions according to claim 16 wherein the precious metal is a platinum group metal.
21. The system for conducting monetary transactions according to claim 16 wherein the precious metal is silver.
22. The system for conducting monetary transactions according to claim 17 wherein the precious base metal is copper.
23. The system for conducting monetary transactions according to claim 17 wherein the precious base metal is nickel.
24. A system for conducting monetary transactions according to any one of claims 13 to claim 22 wherein during an exchange of tokens from a transferor to a transferee, wherein each of the transferor and transferee have unique digital signatures which include respective public keys, the repository stores one or more of:
- the time of a transaction;
 - the digital signatures of the exchanged tokens;
 - the unique identifiers of the exchanged tokens;
 - the public key of the digital signature of the transferee; and
 - the digital signature of the transferor.
25. A computer implemented method for exchanging physical monetary tokens wherein the token exchange is initiated via a transferee device, and confirmed via a transferor device, wherein each of the transferor and transferee devices have unique digital signatures which include respective public keys and private keys, the method including:
- providing one or more physical monetary tokens, wherein each monetary token includes:
 - a physical body;
 - a wirelessly readable identifier; and
 - operating the transferee device thereby to read, from the wirelessly readable identifiers of the one or more tokens, data representative of the unique identifiers of the one or more tokens being transferred;

operating the transferee device thereby to request a remotely accessible transaction ledger be altered to indicate that the exchange of tokens has occurred, wherein the request includes:

providing the unique identifiers of the one or more tokens being transferred along with the transferee device's digital signature;

providing data representative of the public key of the transferor device's digital signature;

delivering, to the transferor device, a notification representative of the request to alter the ledger;

operating the transferor device to selectively confirm or reject the request to alter the ledger, wherein the digital signature of the transferor device is required to confirm or reject the request; and

in the case that the transferor device confirms the request to alter the ledger, altering the ledger to record the transfer of tokens from the transferor to the transferee.

26. A computer implemented method for exchanging physical monetary tokens wherein the token exchange is initiated by a transferor device for transferring of tokens via a transferee device, wherein each of the transferor and transferee devices have unique digital signatures which include respective public keys and private keys, the method including:

providing one or more physical monetary tokens, wherein each monetary token includes:

a physical body;

a wirelessly readable identifier; and

inputting into the transferor device the wirelessly readable identifiers of the tokens being transferred;

operating the transferor device thereby to request a transaction ledger be altered to indicate that the exchange of tokens has occurred, wherein the request includes:

providing the identifiers of the tokens being transferred along with the transferor device's digital signature;

providing the public key of the transferee device's digital signature

altering the ledger to record the transfer of tokens from the transferor to the transferee.

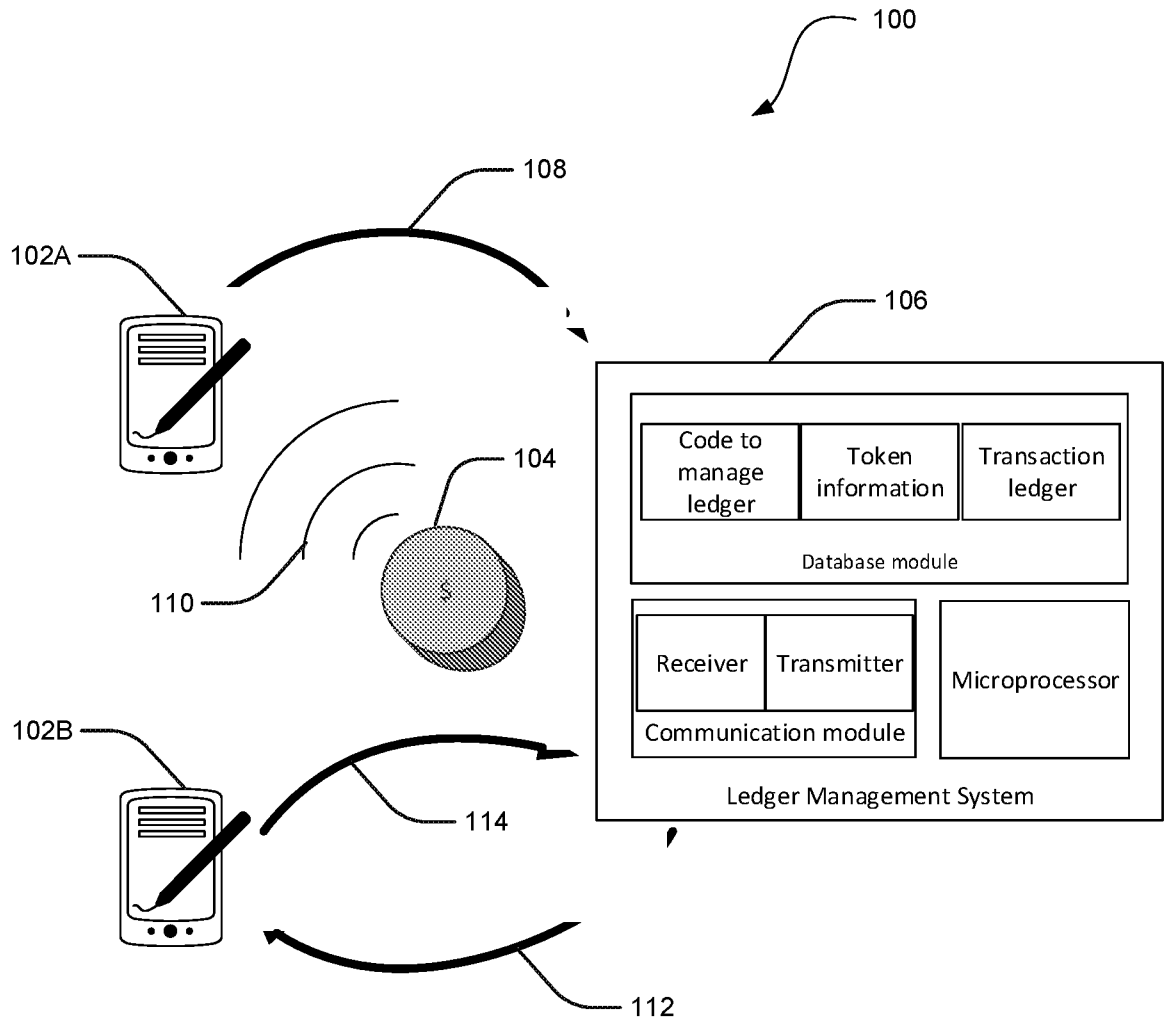


Fig. 1

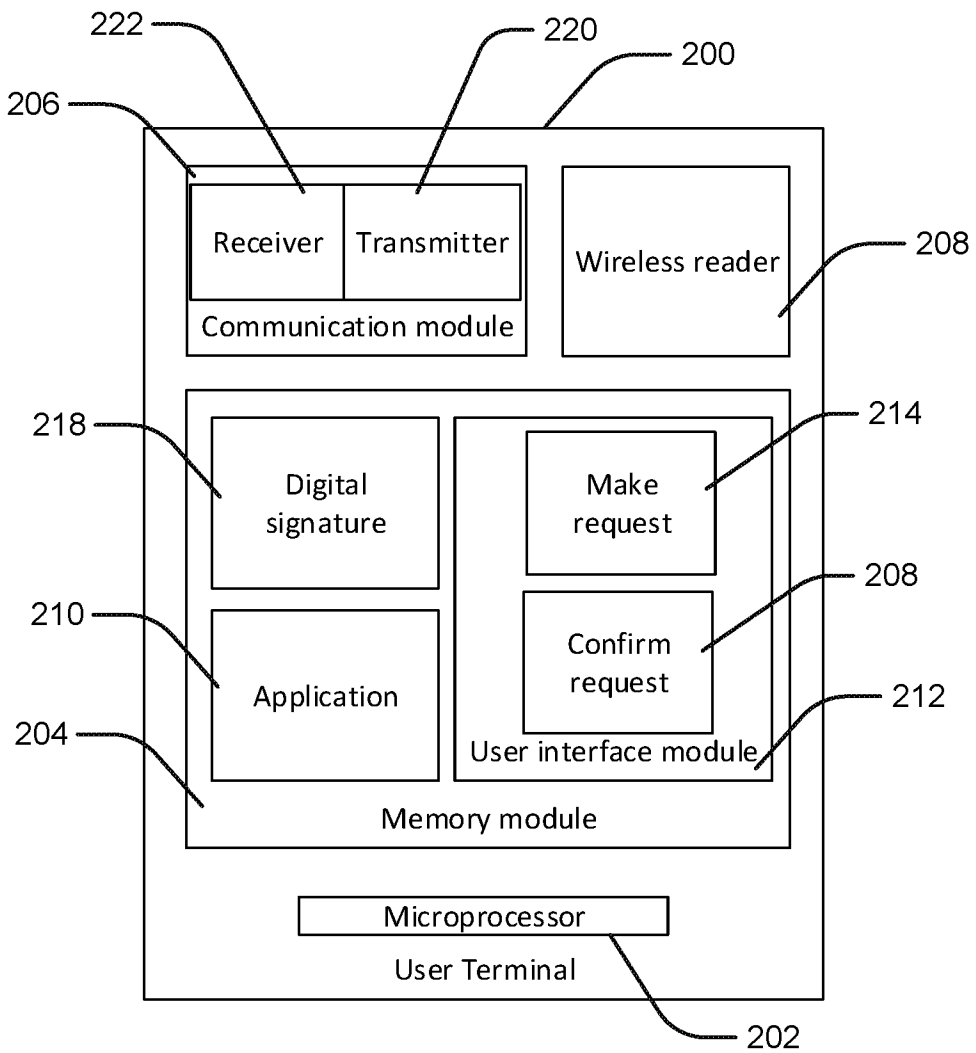


Fig. 2

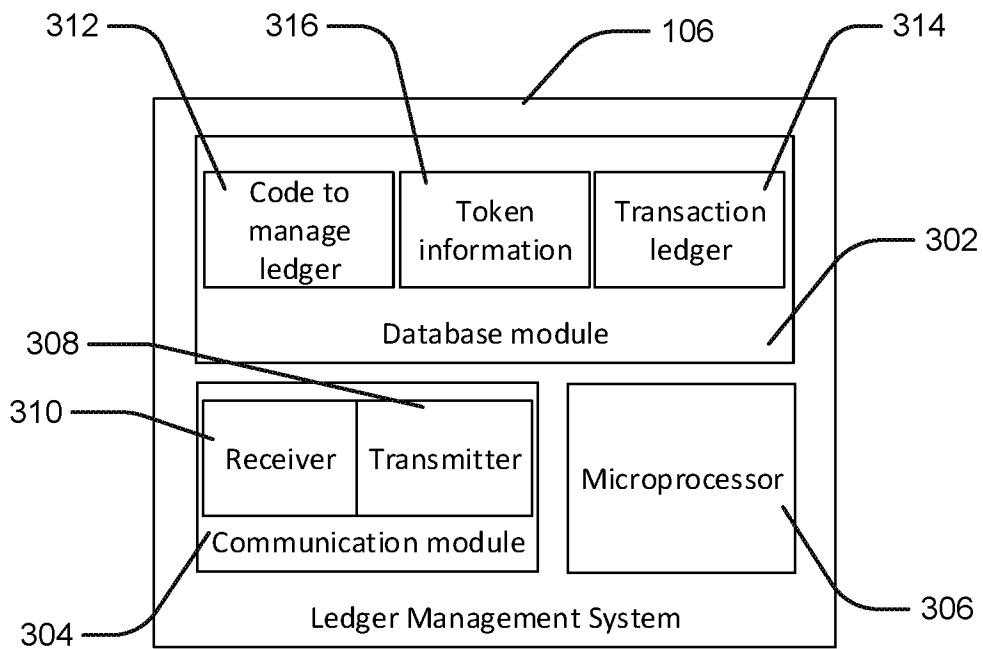


Fig. 3

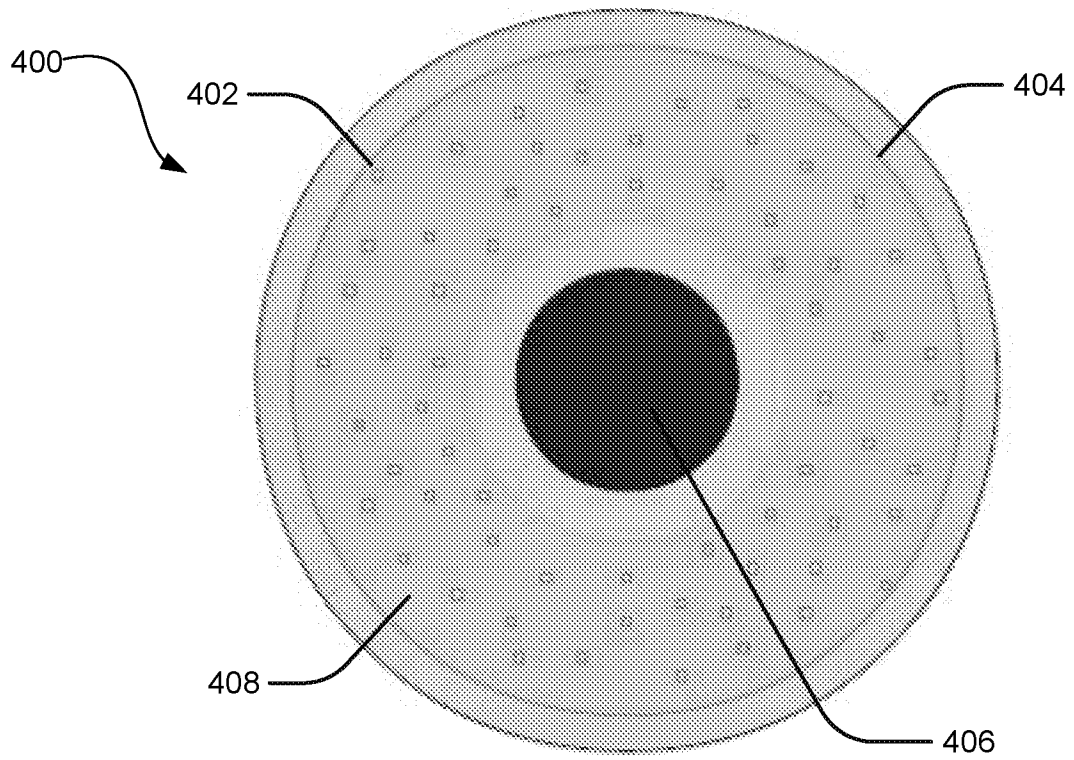


Fig. 4A

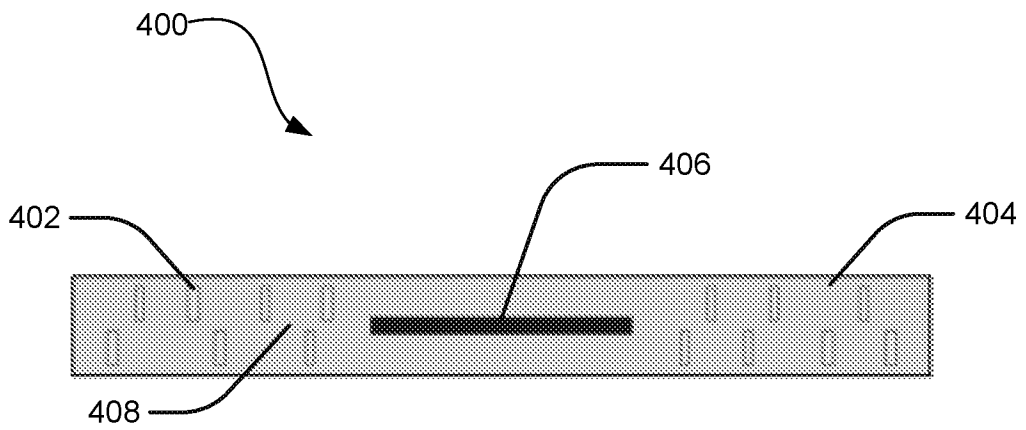


Fig. 4B

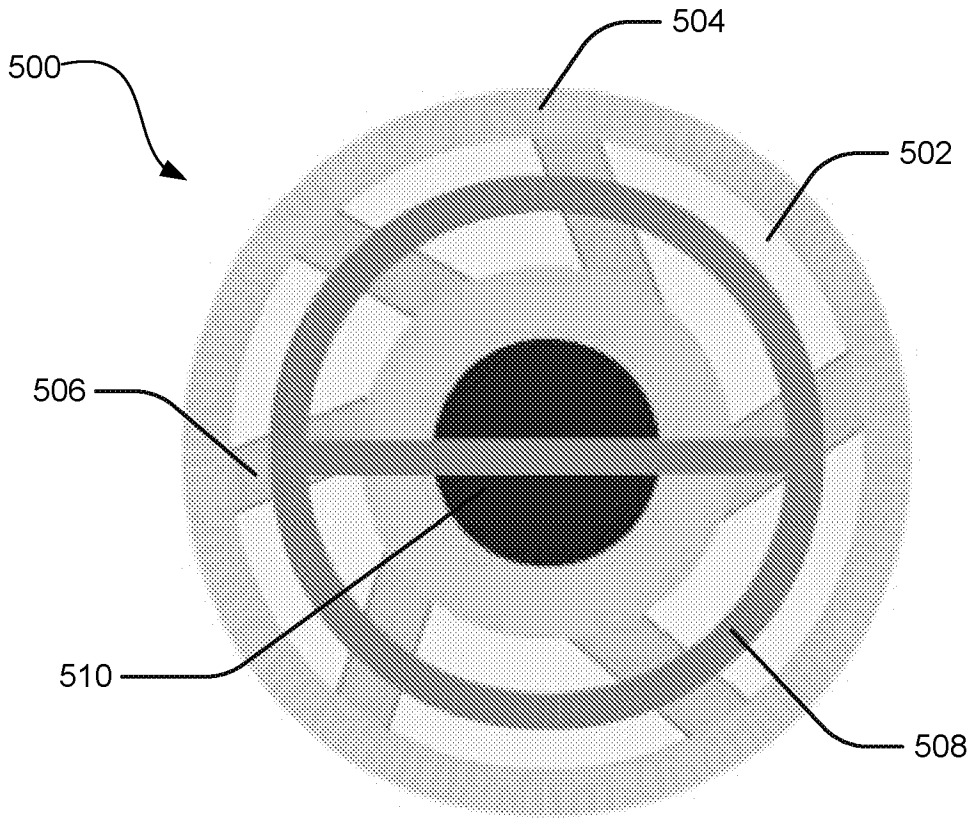


Fig. 5A

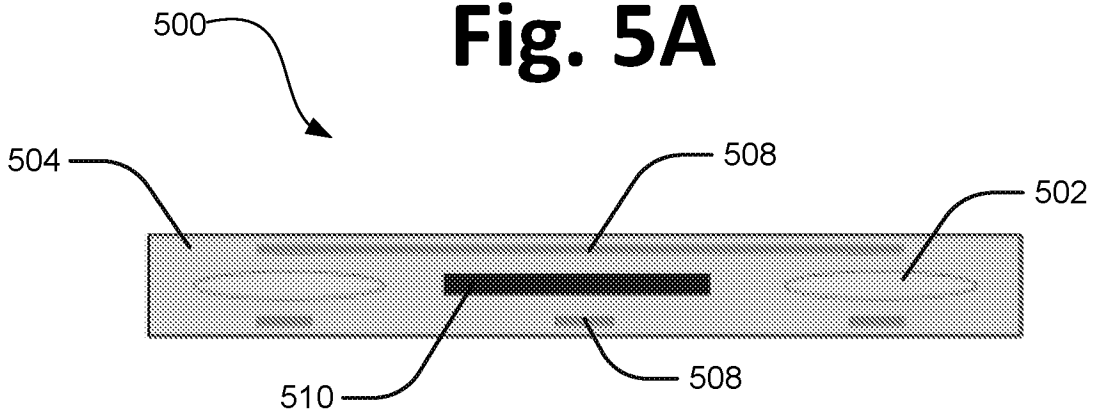


Fig. 5B

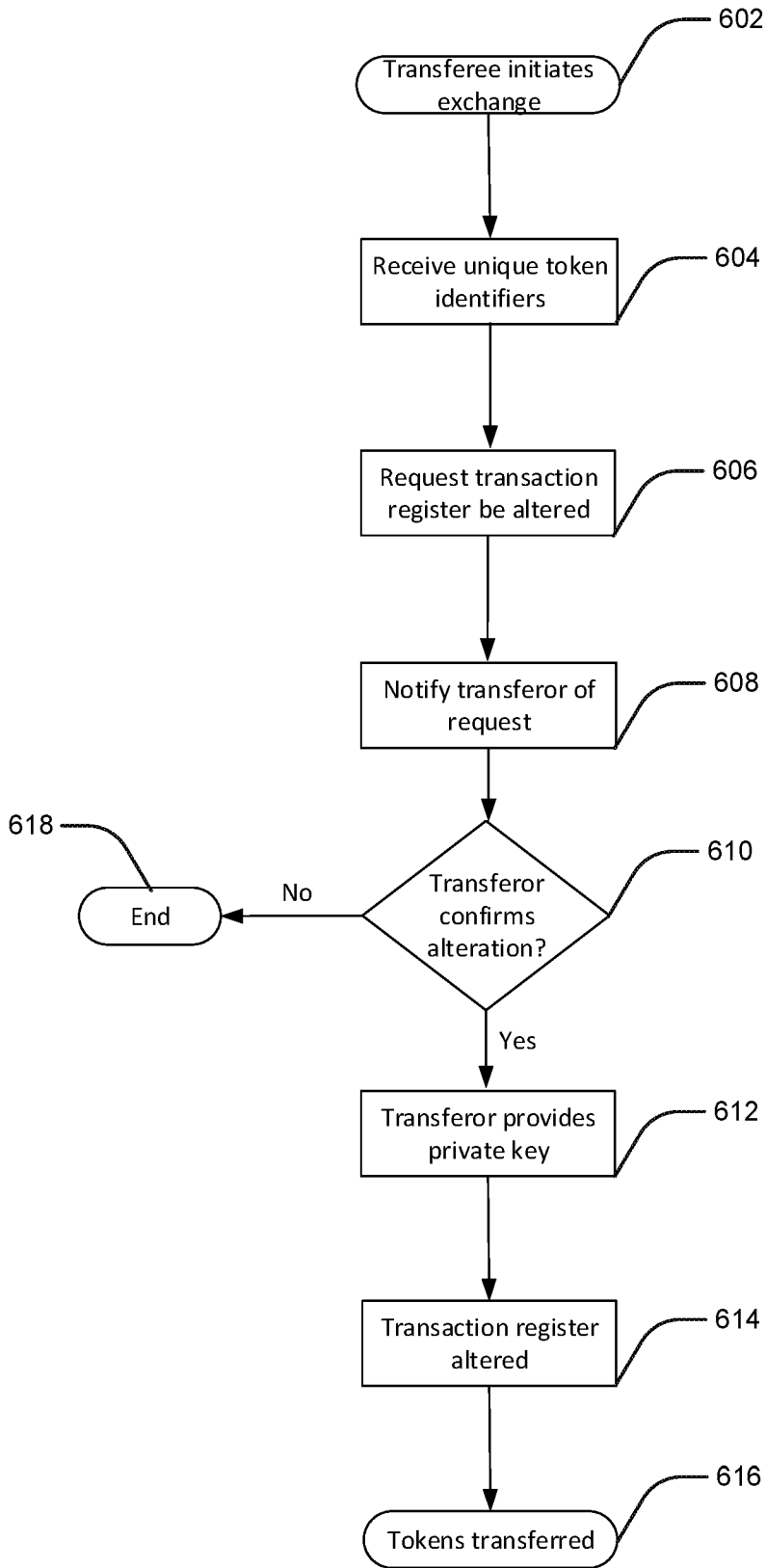


Fig. 6

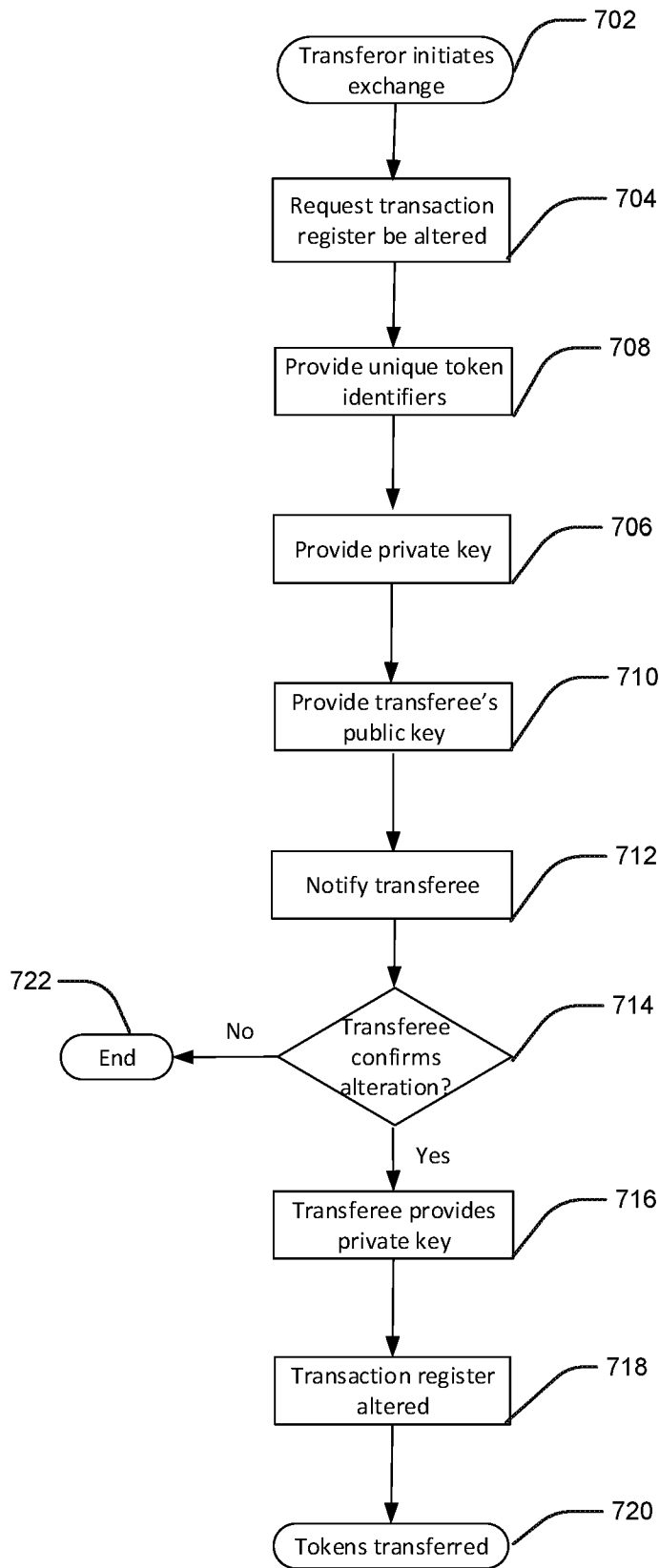


Fig. 7

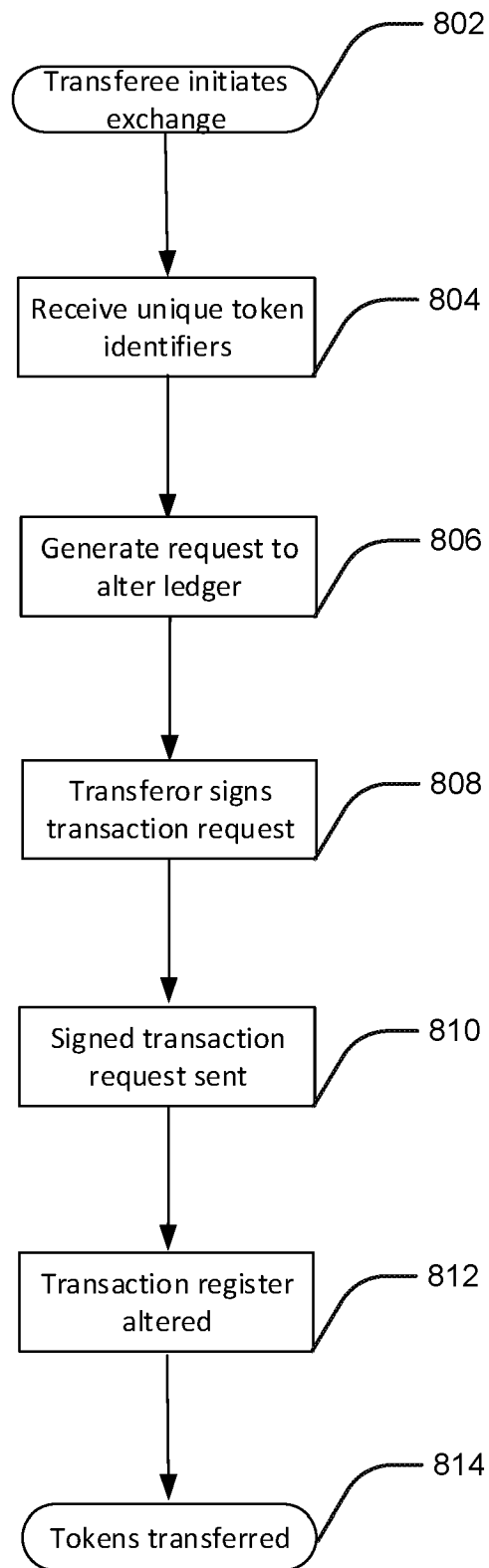


Fig. 8

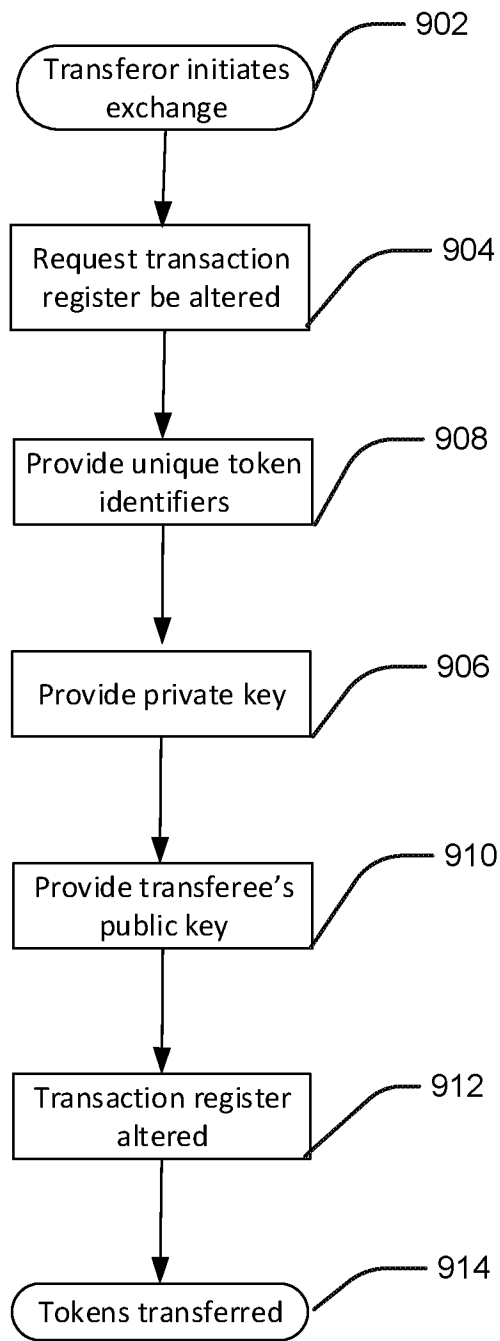


Fig. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2018/050418

A. CLASSIFICATION OF SUBJECT MATTER

G06K 19/04 (2006.01) G06K 19/07 (2006.01) A44C 21/00 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Databases: PATENW and Google Patents with the following marks and keywords including: A44C21/00, G06K19/04, G06K19/07, G07F1/06, G07D5/00, NFC, RFID, BLUETOOTH, WIRELESS, COIN, TOKEN, CURRENCY, TAMPER, HOLOGRAM, COUNTERFEIT, PRECIOUS, GOLD, SILVER, PLATINUM, NICKEL, ZINC, STEEL, IRON, MONEY, TRANSACTION, LEDGER, BLOCKCHAIN and like terms.

Applicant and inventor names searched in Espacenet, Google, Google Patents and internal databases provided by IP Australia

Applicant: MCGOLDRICK, Lachlan

Inventor: MCGOLDRICK, Lachlan

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Documents are listed in the continuation of Box C		



Further documents are listed in the continuation of Box C



See patent family annex

* Special categories of cited documents:		
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search
20 July 2018Date of mailing of the international search report
20 July 2018

Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
Email address: pct@ipaaustralia.gov.au

Authorised officer

Tim Burgess
AUSTRALIAN PATENT OFFICE
(ISO 9001 Quality Certified Service)
Telephone No. +61 2 6283 2421

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
the subject matter listed in Rule 39 on which, under Article 17(2)(a)(i), an international search is not required to be carried out, including
2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See Supplemental Box for Details

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-8

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

C (Continuation).

DOCUMENTS CONSIDERED TO BE RELEVANT

PCT/AU2018/050418

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2013/0062156 A1 (CHANDARIA) 14 March 2013 [0017], [0020], [0022], [0025]	1-8
X	US 2015/0128694 A1 (PEERLESS WORLDWIDE, LLC) 14 May 2015 [0026], [0041], [0042], [0070]	1-8
X	US 2015/0088721 A1 (GIDEON SAMID) 26 March 2015 [0032], [0036], [0041], [0050], [0057], [0075], [0100], [0101]	1-8

Supplemental Box**Continuation of: Box III**

This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

This Authority has found that there are different inventions based on the following features that separate the claims into distinct groups:

Invention 1

Claims 1 and 4-8 (in-part when appended to claim 1) are directed to a monetary token.

The feature of tampering with the defined material disposed within the physical body causes the wirelessly readable identifier to **cease being wirelessly readable** is specific to this group of claims.

Invention 2

Claims 2 and 4-8 (in-part when appended to claim 2) are directed to a monetary token.

The feature of tampering with the physical body causing the **tampering to become evident** is specific to this group of claims.

Invention 3

Claims 3 and 4-8 (in-part when appended to claim 3) are directed to a monetary token.

The feature of one or both of a **hologram and optically variable ink** disposed within the physical body is specific to this group of claims.

Invention 4

Claims 9, 25 and 11 and 12 (in-part when appended to claim 9) are directed to a computer implemented method for exchanging physical monetary tokens wherein the token exchange is initiated via a **transferee** device.

The features of:

delivering, to the transferor device, a notification representative of the request to alter the ledger; and
operating the transferor device to selectively confirm or reject the request to alter the ledger, wherein the digital signature of the transferor device is required to confirm or reject the request; and
in the case that the transferor device confirms the request to alter the ledger, altering the ledger to record the transfer of tokens from the transferor to the transferee
are specific to this group of claims.

Invention 5

Claims 10, 15, 26 and 11 and 12 (in-part when appended to claim 10) and 16-23 (in-part when appended to claim 15) are directed to a computer implemented method for exchanging physical monetary tokens wherein the token exchange is initiated by a **transferor** device.

The features of:

inputting into the transferor device the wirelessly readable identifiers of the tokens being transferred;
operating the transferor device thereby to request a transaction ledger be altered to indicate that the exchange of tokens has occurred, wherein the request includes:
providing the identifiers of the tokens being transferred along with the transferor device's digital signature;
providing the public key of the transferee device's digital signature
are specific to this group of claims.

Invention 6

Claims 13-24 are directed to a system for conducting **monetary transactions**.

The features of:

a plurality of tokens wherein each token is issued by an issuer and each token includes:
a unique identifier;
a predetermined amount of defined material; and
a unique digital signature wherein the unique digital signature includes a public key; and
an information repository for storing information about each token, the information including:
the public key of each token's digital signature;

Supplemental Box

the quantity and type of defined material in each token;
the issuer of each token; and
the unique identifier of each token
are specific to this group of claims.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art. When there is no special technical feature common to all the claimed inventions there is no unity of invention.

In the above groups of claims, the identified features may have the potential to make a contribution over the prior art but are not common to all the claimed inventions and therefore cannot provide the required technical relationship. The only feature common to all of the claimed inventions is a token having a physical body, which is further defined in a number of the independent claims as "a predetermined amount of defined material disposed within the physical body". However it is considered that this feature is generic in the art.

Therefore there is no special technical feature common to all the claimed inventions and the requirements for unity of invention are consequently not satisfied *a priori*.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU2018/050418

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	Publication Date	Publication Number	Publication Date
US 2013/0062156 A1	14 March 2013	US 2013062156 A1	14 Mar 2013
		WO 2013037057 A1	21 Mar 2013
US 2015/0128694 A1	14 May 2015	US 2015128694 A1	14 May 2015
		CA 2857951 A1	04 Oct 2012
		EP 2710365 A1	26 Mar 2014
		US 2014197242 A1	17 Jul 2014
		US 8820648 B2	02 Sep 2014
		WO 2012135346 A1	04 Oct 2012
US 2015/0088721 A1	26 March 2015	US 2015088721 A1	26 Mar 2015
		US 9471906 B2	18 Oct 2016
		US 2017039556 A1	09 Feb 2017

End of Annex

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

Form PCT/ISA/210 (Family Annex)(January 2015)