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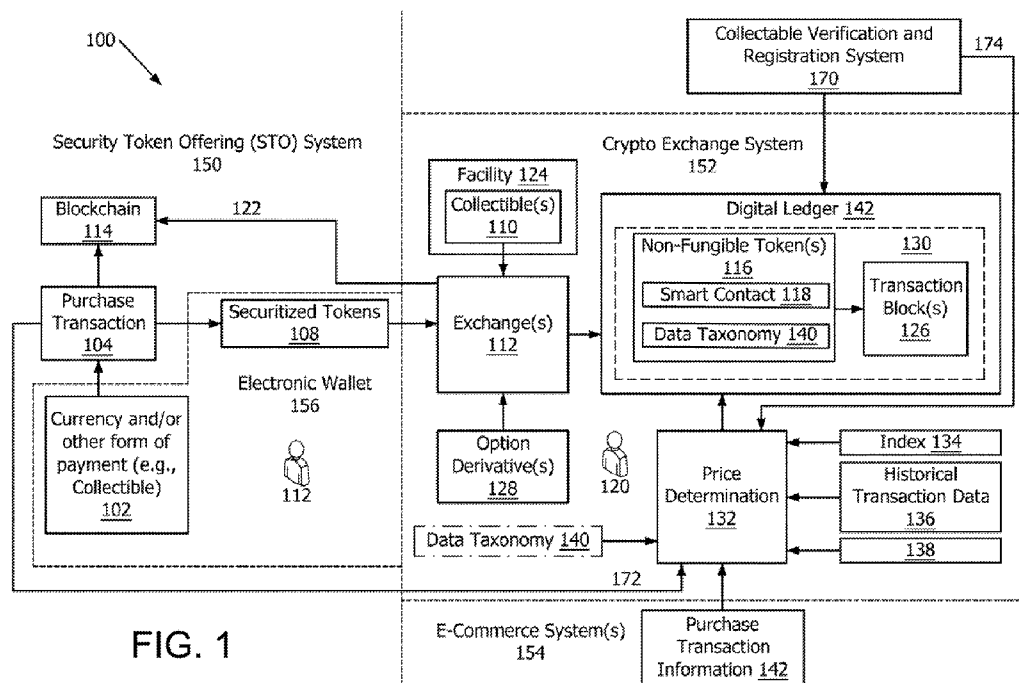


FIG. 1

(57) Abstract: Systems and methods for providing an online exchange system. The methods comprise: performing, by a computing device of the online exchange system, a first transaction in which an ownership of a collectible is exchanged for an electronic financial instrument backed by at least one asset having a tangible value; generating, by the computing device, a non-fungible token on a first digital ledger for verifying ownership of the collectible; and communicating information from the computing device to a system which generated the electronic financial instrument such that a block is added to a second digital ledger that indicates a change of ownership of the electronic financial instrument occurred during the first transaction.

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SYSTEMS AND METHODS FOR VERIFYING TRANSACTION AUTHENTICITY USING SECURITIZED TOKEN-BASED SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority to and the benefit of U.S. Provisional Patent Application No. 63/369,527 which was filed on July 27, 2022. The content of this Provisional Patent Application is incorporated herein in its entirety.

BACKGROUND

[0002] Many e-commerce websites and app-based online platforms allow individual users to buy and sell physical items. On some such sites, the items may be unique items such as original artwork, sports memorabilia, limited edition shows or other wearable items, autographed items, or other collectibles. Proving authenticity of the collectibles and eliminating fraud is a serious concern in such marketplaces. Users must rely on printed certificates of authenticity, which themselves may be fraudulently created. Technical solutions for proving authenticity of physical collectibles are lacking.

[0003] In addition, on online auction marketplaces, sellers can sometimes use so-called “straw men” or bots to submit fake bids in an attempt to prompt higher bids from real customers. Technical solutions for determining whether a bidder in an online auction is a legitimate bidder or a fake one also are lacking. This further erodes trust in online collectible marketplaces.

[0004] A blockchain is a digital ledger for recording transaction information in a way that is difficult to change. Blockchains are often used to record and track transactions relating to assets in a business network. The digital ledger comprises a plurality of blocks that are linked together using cryptography. Each block contains a cryptographic hash of the previous block, a timestamp and transaction data.

[0005] A non-fungible token, commonly known as an NFT, is a unique, non-interchangeable, digital object that is stored on a blockchain. NFTs can be sold or otherwise traded, and they include digital terms (known as a smart contract) governing their transfer. NFTs

are often associated with (and sometimes include) digital objects such as photos, digital artwork, or video or music files. More recently, NFTs have also been linked to physical assets, such as real estate or luxury products, to maintain a record of a chain of title record for the assets. However, current systems that use NFTs to verify ownership of a physical item are very difficult to use, as they typically require users to convert between multiple token types across multiple platforms to acquire an asset. They also lack any means to verify delivery of a physical asset to the buyer.

[0006] This document describes methods and systems that are directed to addressing at least some of the issues described above, and/or other issues.

SUMMARY

[0007] The present disclosure concerns methods for providing an online exchange system. The methods comprise: performing, by a computing device of the online exchange system, a first transaction in which an ownership of a collectible is exchanged for an electronic financial instrument (e.g., a securitized token) backed by at least one asset having a tangible value (e.g., at least one unit of equity ownership in a corporation); generating, by the computing device, a non-fungible token on a first digital ledger for verifying ownership of the collectible; and communicating information from the computing device to a system (e.g., a security token offering system) which generated the electronic financial instrument such that a block is added to a second digital ledger that indicates a change of ownership of the electronic financial instrument occurred during the first transaction. The first and second digital ledgers may be the same digital ledger or different digital ledgers. A fractional share of ownership in the collectible may optionally have been exchanged for the electronic financial instrument during the first transaction.

[0008] The methods may also comprise: offering, by the online exchange system, an ability to exchange currency for an option contract granting a right to buy the collectible at a set price on or before a certain date; completing, by the computing device, a second transaction in which the currency is exchanged for the option contract; and/or performing operations by the computing device to modify the first digital ledger to include information specifying details of

the second transaction. Terms of the option contract may be set in accordance with a policy defined in the non-fungible token.

[0009] Additionally or alternatively, the methods further comprise: offering, by the online exchange system, an ability to borrow or loan the collectible in exchange for currency in accordance with a policy defined in the non-fungible token; performing operations by the computing device to complete a third transaction for borrowing or loaning the collectible and modifying the first digital ledger to include information specifying details of the third transaction; continuously varying a price of the collectible based on an index, historical transaction data, and purchase transaction data received from other online exchange systems; tracking changes in physical custody of the collectible and encoding tracking updates into the first digital ledger so as to be tied to transaction history of the non-fungible token; and/or authenticating an identity of an individual prior to allowing the individual access to the online exchange system. The non-fungible token may be configured to verify ownership of one or more securitized tokens in addition to the ownership of the collectible.

[0010] The methods may additionally or alternatively comprise: generating and presenting a single graphical user interface simultaneously displaying streaming quotes for auctioned collectibles, non-functional tokens and derivatives; organizing assets of a plurality of different platforms in accordance with a data taxonomy that is defined by at least one of an asset class, a year of creation of a collectible, a company that made the collectible, a unique identifier for the collectible, a collectible type, a rating or verification agency classification, a fractionalization exchange offering indicator, an origin auction house identifier, and a listing expiration date; and/or using artificial intelligence or machine learning algorithm(s) to: (i) automatedly identify patterns or trends relating to collectibles amongst individuals based on electronic content accessible on a network; (ii) discover insights, predict trends and/or make forecasts in the collectible industry based on unstructured data flowing through the online exchange system; (iii) make recommendations for the exchange of collectibles based on the patterns or trends relating to collectibles and/or historical transaction data; or (iv) provide a chatbot configured to simulate conversation with individuals for facilitating trading.

[0011] The present disclosure also concerns a system comprising a processor; and a non-transitory computer-readable storage medium comprising programming instructions that are configured to cause the processor to implement a method for providing an online exchange system. The programming instructions comprise instructions to: perform a first transaction in which an ownership of a collectible is exchanged for an electronic financial instrument backed by at least one asset having a tangible value; generate a non-fungible token on a first digital ledger for verifying ownership of the collectible; and communicate information from the computing device to a system which generated the electronic financial instrument such that a block is added to a second digital ledger that indicates a change of ownership of the electronic financial instrument occurred during the first transaction.

[0012] The first and second digital ledgers may be the same digital ledger or different digital ledgers. The electronic financial instrument may comprise a securitized token. The system may comprise a security token offering system. The asset may comprise at least one unit of equity ownership in a corporation. A fractional share of ownership in the collectible may have been exchanged for the electronic financial instrument during the first transaction.

[0013] The programming instructions may also comprise instructions to: offer an ability to exchange currency for an option contract granting a right to buy the collectible at a set price on or before a certain date; complete a second transaction in which the currency is exchanged for the option contract; and/or modify the first digital ledger to include information specifying details of the second transaction. The terms of the option contract may be set in accordance with a policy defined in the non-fungible token.

[0014] Additionally or alternatively, the programming instructions further comprise instructions to: offer an ability to borrow or loan the collectible in exchange for currency in accordance with a policy defined in the non-fungible token; complete a third transaction for borrowing or loaning the collectible and modifying the first digital ledger to include information specifying details of the third transaction; and/or continuously vary a price of the collectible based on an index, historical transaction data, and purchase transaction data received from other online exchange systems.

[0015] Additionally or alternatively, the programming instructions further comprise instructions to: track changes in physical custody of the collectible and encode tracking updates into the first digital ledger so as to be tied to transaction history of the non-fungible token; and/or authenticate an identity of an individual prior to allowing the individual access to the online exchange system. The non-fungible token may be configured to verify ownership of one or more securitized tokens in addition to the ownership of the collectible.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The present solution will be described with reference to the following drawing figures, in which like numerals represent like items throughout the figures.

[0017] FIG. 1 provides an illustration of an illustrative system implementing the present solution.

[0018] FIG. 2 shows a screen shot of an e-commerce webpage auctioning a collectible.

[0019] FIG. 3 provides an illustration of another illustrative system implementing the present solution.

[0020] FIGS. 4A and 4B each provides an illustration of chain.

[0021] FIG. 5 provides an illustration of a computing device.

[0022] FIGS. 6A-6B (collectively referred to as "FIG. 6") provides an illustration of another system implementing the present solution.

[0023] FIGS. 7A-7B (collectively referred to as "FIG. 7") provides an illustration that is useful for understanding differences between the present solution and conventional Security Token Offering (STO) offering processes.

[0024] FIGS. 8A-8B (collectively referred to as "FIG. 8") provides an illustration that is useful for understanding how a smart contract process of the present solution differs from conventional smart contract processes.

[0025] FIGS. 9A-9B (collectively referred to as “FIG. 9”) provides an illustration that is useful for understanding differences between an auction process of the present solution and conventional auction processes.

[0026] FIGS. 10A-10B (collectively referred to as “FIG. 10”) provides an illustration that is useful for understanding a data taxonomy.

[0027] FIG. 11 provides an illustration of a ticker Graphical User Interface (GUI).

[0028] FIG. 12 provides an illustration showing how a user can drill down on specific item listings and indexes using the ticker GUI of FIG. 11.

[0029] FIG. 13 provides an illustration showing a data taxonomy that allows for market data to be viewed at multiple levels simultaneously.

[0030] FIGS. 14-16 provide illustrations of displayed information.

[0031] FIGS. 17A-17B (collectively referred to as “FIG. 17”) provides an illustration that is useful for understanding differences between a collectible lending process of the present solution and conventional securities lending processes.

[0032] FIG. 18 provides a flow diagram of an illustrative method for providing an online exchange system.

DETAILED DESCRIPTION

[0033] It will be readily understood that the components of the embodiments as generally described herein and illustrated in the appended figures could be arranged and designed in a wide variety of different configurations. Thus, the following more detailed description of various embodiments, as represented in the figures, is not intended to limit the scope of the present disclosure, but is merely representative of various embodiments. While the various aspects of the embodiments are presented in drawings, the drawings are not necessarily drawn to scale unless specifically indicated.

[0034] The present solution may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the present solution is, therefore, indicated by the appended claims rather than by this detailed description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

[0035] Reference throughout this specification to features, advantages, or similar language does not imply that all of the features and advantages that may be realized with the present solution should be or are in any single embodiment of the present solution. Rather, language referring to the features and advantages is understood to mean that a specific feature, advantage, or characteristic described in connection with an embodiment is included in at least one embodiment of the present solution. Thus, discussions of the features and advantages, and similar language, throughout the specification may, but do not necessarily, refer to the same embodiment.

[0036] Furthermore, the described features, advantages and characteristics of the present solution may be combined in any suitable manner in one or more embodiments. One skilled in the relevant art will recognize, in light of the description herein, that the present solution can be practiced without one or more of the specific features or advantages of a particular embodiment. In other instances, additional features and advantages may be recognized in certain embodiments that may not be present in all embodiments of the present solution.

[0037] Reference throughout this specification to “one embodiment”, “an embodiment”, or similar language means that a particular feature, structure, or characteristic described in connection with the indicated embodiment is included in at least one embodiment of the present solution. Thus, the phrases “in one embodiment”, “in an embodiment”, and similar language throughout this specification may, but do not necessarily, all refer to the same embodiment.

[0038] As used in this document, the singular form “a”, “an”, and “the” include plural references unless the context clearly dictates otherwise. Unless defined otherwise, all technical and scientific terms used herein have the same meanings as commonly understood by one of

ordinary skill in the art. As used in this document, the term “comprising” means “including, but not limited to”.

[0039] A futures market is an auction market where participants buy and sell commodities and/or securities for delivery on specified future date(s) in accordance with futures contract terms. The United States Securities and Exchange Commission (“SEC”) and the Commodity Futures Trading Commission (“CFTC”) jointly regulate the trading of futures on single securities and narrow-based security indexes (i.e., security futures products), that have features of both futures and securities. A futures contract is a derivative that is intended to lock in future delivery of a commodity or security at a price set as of the contract execution date. The futures contract is intended to protect the seller’s profit regardless of price changes in the market since (s)he locked in the purchase price for the commodity at the time of contract execution. An option contract is a derivative where a fee is paid for the right, but not the obligation, to buy and sell the underlying asset(s) at its current price on or before an expiration date. Consequently, the option contract may expire without any securities and/or commodities being bought or sold. Some of these futures and/or derivatives markets may be traded over-the-counter (“OTC”) through an electronic communications network (“ECN”) or by way of an “open outcry” trading floor/pit model. Again, some derivatives are traded on exchanges that may be regulated by the SEC or CFTC.

[0040] The present disclosure concerns implementing systems and methods for providing an online exchange system for collectible(s), securitized token(s), NFT(s) and/or derivatives. The methods comprise: performing, by a computing device of the online exchange system, a first transaction in which an ownership of a collectible is exchanged for an electronic financial instrument backed by at least one asset having a tangible value; generating, by the computing device, an NFT on a first digital ledger for verifying ownership of the collectible; and communicating information from the computing device to a system which generated the electronic financial instrument such that a block is added to a second digital ledger that indicates a change of ownership of the electronic financial instrument occurred during the first transaction. The first and second digital ledgers can be the same digital ledger or different digital ledgers.

[0041] A price of the collectible may be variable based on an index, historical transaction data, and purchase transaction data received from other online exchange systems. Changes to the price can occur in real time or near real time as transactions are completed via the other online exchange systems. The electronic financial instrument can include, but is not limited to, a securitized token. In this case, the system that generated the securitized token comprises a security token offering system. The security token offering system may be part of the online exchange system or an external system to the online exchange system. The asset can include, but is not limited to, unit(s) of equity ownership in a corporation (for example, corporate share(s)) and/or collectible(s). All or a fractional share of ownership in the collectible may be exchanged for the electronic financial instrument during the first transaction.

[0042] In some scenarios, the online exchange system offers option derivatives providing an ability to exchange currency for an option contract granting a right to buy the collectible at a set price on or before a certain date. The terms of the option contract may be set in accordance with a policy defined in the NFT. A second transaction may be completed in which the currency is exchanged for the option contract. The first digital ledger may be modified to include information specifying details of the second transaction.

[0043] In those or other scenarios, the online exchange system offers an option which provides an ability to borrow or loan the collectible in exchange for currency. The terms of the option may be set in accordance with a policy defined in the NFT. A third transaction may be completed for borrowing or loaning the collectible. The first digital ledger may be modified to include information specifying details of the third transaction.

[0044] The online exchange system may track changes in physical custody of the collectible. For example, the collectible may be shipped by a third-party shipping company from a facility of the online exchange system to a facility of the owner. The third-party shipping company may communicate shipment tracking information to the online exchange system. Upon receipt of the shipment tracking information, the online exchange system performs operation to encode tracking updates into the first digital ledger so as to be tied to transaction history of the non-fungible token.

[0045] Referring now to FIG. 1, there is provided a block diagram **100** that is useful for understanding a novel process in which collectibles **110** are exchanged for securitized tokens **108** and/or other forms of currency. The novel process is implemented by an STO system **150**, a crypto exchange system **152** and a Collectible Verification and Registration (CVR) system **170**. These systems **150**, **152**, **170** can collectively comprise a single combined system operated by a given business entity or multiple systems respectively operated by different business entities.

[0046] A securitized token is a financial instrument that has a monetary value and is intended for trading on crypto exchange platforms. The securitized tokens are backed by one or more assets that have a tangible value. The asset(s) can include, but is(are) not limited to, collectible(s) and/or other units of equity ownership in a corporation (for example, corporate share(s), stock and bonds tied to a real company). The securitized tokens can be generated by an STO system **150** in a blockchain environment.

[0047] The securitized tokens **108** can be purchased by individual(s) **112** using currency **102** and/or other forms of payment. Details of the purchase transaction **104** are recorded in a blockchain **114**. Blockchain **114** may comprise a publicly shared ledger. Currency **102** can include any known or to be known currency (for example, dollars, other fiat currency, or cryptocurrency such as Bitcoin or Ethereum, etc.). The other forms of payment can include, but are not limited to, physical goods (such as collectible(s)). Currency **102** can be stored in electronic wallet(s) **156** of the individual(s) **112**. The securitized tokens **104** are then stored in the electronic wallet(s) **156** of the individual(s) **112**.

[0048] The identities of the individuals **112** may be validated and/or authenticated prior to their access to the STO platform and/or the crypto exchange platform(s). The validation and/or authentication can be achieved using any known or to be known validation/authentication technique. For example, the individual's identity can be validated/authenticated in accordance with a Know Your Customer (KYC) authentication technique and/or an Anti-Money Laundering (AML) authentication technique. The present solution is not limited to the particulars of this example.

[0049] The securitized tokens **108** can then be used to purchase or otherwise be exchanged for collectible(s) **110** on a crypto exchange system **152**. Collectibles **110** can include, but are not limited to, physical goods (for example, baseball cards, sneaker, etc.) and/or digital good(s) (for example, digital artwork). In the physical good scenario, the collectibles can be stored in a facility **124** of the crypto exchange system **152**.

[0050] The CVR system **170** verifies the authenticity of the collectible(s), the ownership of the collectible(s) and/or location(s) of the collectible(s). When such verification is successful, the CVR system **170** registers the collectible(s) with the crypto exchange system **152** prior to allowing any transactions to occur therewith. A unique identifier may be assigned to each collectible during the registration process. A transaction block **126** may be added to a digital ledger **142** that includes information indicating results of the verification and the unique identifier generated for the collectible.

[0051] When an exchange **112** for a collectible and/or a securitized token occurs, one or more NFTs **116** are created on the digital ledger **142** for verifying ownership of the associated collectible and/or securitized token(s). The digital ledger **142** may be stored in a centralized and/or decentralized manner. Digital ledger **142** may be a publicly shared ledger. The digital ledger **142** may comprise blockchain **114** or be a digital ledger different from blockchain **114**. Information about the exchange may also be provided from the crypto exchange system **152** to the STO system **150** as shown by arrow **122**. A transaction block may be added to the blockchain **114** that includes transaction information associated with the securitized tokens **108** (for example, a change of ownership of the securitized tokens).

[0052] Each NFT **116** comprises a unique identification code and metadata that distinguishes it from other NFTs. The NFT **116** also comprises terms of the exchange **112** for the collectible **110** and/or securitized token(s). For example, the NFT can include information specifying a percentage of ownership that the individual has in the collectible. The individual may have full ownership (for example, 100%) or partial (or fractional share of) ownership (for example, 1% - $N\%$, where $N < 100$). The present solution is not limited to the particulars of this example. The NFT **116** may also comprise a smart contract (or code) **118** defining a main policy for access to

and use of the collectible(s) and/or securitized token(s) by individual **112** and/or other individual(s) **120** (for example, a borrower of a collectible). For example, the smart contract (or code) can specify parameters for possible derivative(s) associated with the collectible(s) and/or future action(s) associated with the collectible(s) (for example, lending). The present solution is not limited in this regard.

[0053] The digital ledger(s) **114**, **142** and NFTs **108** facilitate subsequent transactions **110** relating to the collectible **106** and/or securitize token(s). Information about these transactions can be stored in the digital ledger(s) **114**, **142** so as to be associated with the NFTs **116**. For example, transaction block(s) **126** can be added to a blockchain. The present solution is not limited to the particulars of this example. The transactions can include, but are not limited to, a change of ownership of securitized token(s), a change of ownership of collectible(s), a change of possession of collectible(s) (for example, borrowing, loaning, removal from the facility **124**, or a shipping from the facility **124** to a buyer's facility), NFT trades, fractional NFT trades, and/or transactions relating to derivatives of NFTs and/or option derivatives **128** (for example, transactions in which fees are paid for the right to buy collectible(s) at its(their) current price(s) on or before an expiration date). The transactions can occur twenty-four hours all seven days of the week without physical transfer of the collectible.

[0054] The digital ledger **142** can include, but is not limited to, a chain-based ledger. The chain-based ledger can include, but is not limited to, a blockchain **130** in which transactions made between two parties are recorded chronologically in a chain of blocks **130**. Each block contains a cryptographic hash of the previous block, a timestamp, and/or transaction data. In this way, the blocks cannot be altered retroactively without the alteration of all subsequent blocks and the consensus of the network.

[0055] The price of each collectible **110** is variable over time. The price of each collectible is first set to an initial price determined in block **132** based on information in an index **134**, historical transaction data **136** for collectibles of the same or similar type, and/or other information **138**. The initial price may then be dynamically and selectively modified in block **132** based on real-time e-commerce website purchase transaction information **142** received from

e-commerce system(s) **154**. For example, if the collectible comprises a baseball card, then the initial price for the collectible is determined based on sale prices (for example, \$3,500) for baseball cards of the same or similar quality and/or baseball cards associated with baseball players of the same or similar ranking. A similar baseball card was recently purchased during an online auction for \$5,000 as shown in FIG. 2. Consequently, the price of the collectible is changed from the initial price to a second different price (for example, decreased from \$3,500 to \$2,500 or increased from \$3,500 to \$5,000) in accordance with the recent sale of the similar baseball card. The present solution is not limited to the particulars of this example. Other information can be used to set initial prices for collectibles **106** and/or vary the prices of collectibles **106**, such as changes in index information **134** for collectibles of the same or similar type, specifics of securitized token purchase transactions performed in block **104** as shown by arrow **172**, and/or results of operations performed by the CVR system **170** as shown by arrow **174**. Price changes may also be recorded in transaction block(s) **126** of the digital ledger **112** so as to be associated with the respective NFTs **108**, and/or communicated from the crypto exchange system **152** to the STO system **150** as shown by arrow **122**.

[0056] In some scenarios, each NFT **116** can include information specifying a data taxonomy for pricing the respective collectible. The data taxonomy defines which data is to be used for pricing purposes. The data taxonomy can be the same as or different for the collectibles. The data taxonomy **140** could alternatively or additionally be stored in a datastore. The data taxonomy **140** is a system for categorizing data such that it is organized in a hierarchical tree from largest groupings to individual items. The data taxonomy **140** is managed by a node of the network and is modifiable as assets are removed from and added to the system.

[0057] Machine learning applications may be employed in system **100** to facilitate an exchange. The machine learning applications implement Artificial Intelligence (AI) that provides an electronic device with the ability to automatically learn and improve data analytics from experience without being explicitly programmed. The machine learning applications employ one or more machine learning algorithms that learn various information from accessed data (e.g., via pattern recognition and prediction making). Machine learning algorithms are well

known in the art, and therefore will not be described herein in detail. Any known or to be known machine learning algorithm can be used herein without limitation. For example, in some scenarios, the machine learning application employs a supervised learning algorithm, an unsupervised learning algorithm, and/or a semi-supervised algorithm. Techniques for training machine learning algorithms are well known. Any known technique for training a machine learning algorithm can be used here.

[0058] The machine learning applications can be employed in, for example, blocks **104**, **112**, **124**, **132**, **142** and/or **170**. Thus, the machine learning functions can be used by the STO system **150**, the crypto exchange system **152**, the e-commerce system **152** and/or the collectible verification and registration system **170**.

[0059] The machine learning algorithms may be trained to act as research tool(s). The research tool(s) can be trained to recognize words in plaintext, identify items in images or other graphics, and/or identify patterns or trends relating to collectibles amongst individuals (e.g., auctioneers, collectors and/or general public). The research tool(s) is(are) configured to: automatically scan electronic content (e.g., news, social media posts, etc.) accessible on a network (e.g., Intranet and/or Internet) to identify different collectibles that are being discussed online and trending or popular amongst individuals (e.g., auctioneers, collectors and/or general public); output the identities of the trending or popular collectible(s) and other information associated therewith (e.g., current price, collectible type, manufacturer, current owner, being offered for sale, seller identity, collectible authenticity, etc.); and/or output information for other collectible(s) that are similar to one or more of the trending or popular collectible(s).

[0060] The research tool may cause the listed information to be presented to a user in a single Graphical User Interface (GUI). This GUI improves the underlying functionality of the system since it would present information from a plurality of sources and/or software applications in a consolidated format. In effect, a user would not need to launch a plurality of different software applications and/or access a plurality of different webpages to view data in a plurality of GUIs or windows respectively associated with the different software applications and webpages.

[0061] The machine learning algorithms may also be trained to act as a marketing tool for automations and recommendations; and/or analyze unstructured data flowing through the platform to discover insights in the collectible industry, predict trends in the collectible industry, and/or make forecasts in the collectible industry. The research tool and/or marketing tool may be configured to forecast what collectible(s) will become popular or trendy in a given time period (e.g., week(s), month(s), year(s), etc.), and make recommendations for the exchange of the same (e.g., recommend that a collectible is offered for sale now or wait a given period of time before offering the collectible for sale, and/or a recommendation to purchase a collectible of a given type within a period of time). The following information may be input into the marketing tool: outputs from the research tool; current e-commerce information for collectibles (e.g., price(s), change(s) in price(s), how long collectible(s) have been on sale, etc.); purchase transaction data; and/or historical transaction data **136**.

[0062] The machine learning algorithms may be trained to act as a chatbot to facilitate quote finder and trading. The chatbot is configured to simulate conversation with human users of system **100** to, for example, complete exchanges for collectible(s) and/or option derivative(s).

[0063] FIG. 3 provides an illustration of a system implementing the above-described novel process for exchanges relating to collectibles, NFTs and option derivatives. System **300** comprises client computing device(s) **302**, sever(s) **306** and datastore(s) **308**. The client computing device(s) **302** can include, but is(are) not limited to, personal computer(s), desktop computer(s), laptop computer(s), smart device(s), tablet(s) and/or personal digital assistant(s). The client computing device(s) **302** is(are) communicatively coupled to the server(s) **306** via a network **304** (e.g., the Internet or Intranet). The datastore(s) **308** can comprise a centralized storage system and/or a distributed storage system.

[0064] The server(s) **306** is(are) generally configured to facilitate creation of securitized token(s) **326** for individual(s) **316**, creation of NFTs **314** for individual(s) **316**, control of access to and use of the collectible(s) **310** associated with the NFTs **318** by client computing device(s) **302** and/or individual(s) **318**, and facilitate transactions relating to the securitized token(s) **326**, NFTs **314** and/or collectible(s) **310**. The collectible(s) **310** include, but are not limited to,

physical goods and/or digital goods. The digital goods can include, but are not limited to, videos, images, song recording, digital artwork, electronic documents, electronic books, electronic text-based postings (e.g., tweets), etc. Transactions relating to the collectible(s) **310** and/or securitized token(s) **326** are facilitated by digital ledger(s) **312** and the NFTs **314**. The transactions can include, but are not limited to, a change of ownership of securitized token(s), a change of ownership of all or a fractional share of collectible(s), a lending/borrowing/loaning of collectible(s), a shipping of collectible(s), and/or option derivatives associated with the collectible(s).

[0065] The digital ledger(s) **312** may be implemented as chain-based ledger(s) and stored in datastore(s) **308**. The chain-based ledger(s) can include, but is(are) not limited to, blockchain(s). The term “blockchain”, as used herein, refers to a digital ledger in which transactions made between two parties are recorded chronologically, efficiently and in a verifiable and permanent way. The digital ledger defines a cryptographically secure chain of blocks. Each record in the digital ledger comprises a block. Each block contains a cryptographic hash of the previous block, a timestamp, and/or transaction data. In this way, the blocks cannot be altered retroactively without the alteration of all subsequent blocks and the consensus of the network.

[0066] An illustrative blockchain **400** is shown in FIG. 4A. Blockchain **400** provides a digital ledger in which transactions are performed in relation to collectible(s) and/or securitized token(s) are recorded chronologically, efficiently and in a verifiable and permanent way. Blockchain **400** comprises a cryptographically secure chain of blocks. The blocks include a root block **402** and a plurality of leaf blocks **404₁**, **404₂**, **404₃**, . . . , **404_N** (collectively referred to as “**404**”), where **N** is an integer greater than zero.

[0067] The root block **402** comprises a timestamp **410** and an NFT **420**. The timestamp **410** may include a time of a respective transaction between a client device and a server for creating the NFT and/or root block **402**. The NFT **420** is associated with individual(s), collectible(s) and/or securitized token(s). The NFT **420** includes a smart contract (or code) **422** defining a policy for access to and use of collectible(s) by the individual(s) or other individual(s). For example, the policy may be that: securitized token(s) may be sold at price(s) determined in

accordance with given data taxonomy(ies); collectible(s) may be sold at price(s) determined in accordance with given data taxonomy(ies); percentage of payment(s) for subsequent sale(s) of the collectible(s) is to be paid to previous owner(s) of the collectible(s); collectible(s) may be lent/borrowed/loaned for pre-defined price(s) or variable price(s) determined in accordance with a given data taxonomy; and/or option derivative(s) may be created in which a given fee is paid for the right to buy and sell the collectible(s) at its(their) current price(s) on or before a given expiration date. The present solution is not limited to the particulars of this example.

[0068] Each leaf block **404₁**, **404₂**, **404₃**, . . . , **404_N** provides a record of a transaction relating to collectible(s) and/or securitized token(s) associated with a given NFT **420**. In this regard, each leaf block comprises a timestamp **412**, a hash **430** for the previous block and transaction data **440**. The timestamp **412** may include a time of the block's creation. Any known or to be known hash algorithm can be used herein without limitation to generate hashes **430** of the leaf blocks. The transaction data **440** may include, but is not limited to, securitized token identifier(s), collectible identifier(s), individual identifier(s), user permission(s), user authorization duration(s) (for example, a book can be borrowed or loaned for 3 days), instructions how to access or use resource(s), and/or specifics of transactions made by individual(s) associated with given collectible(s) and/or securitized token identifier(s).

[0069] The last leaf block **404_N** in the chain **400** only includes a timestamp and a hash of the previous block (e.g., block **404_{N-1}**). It does not originally include transaction data. Transaction data may be added to the block **404_N** by a server when a new transaction is performed between a client device and the server. When this modification to transaction block **404_N** occurs, a new transaction block **404_{N+1}** (not shown in FIG. 4A) is created which includes the hash of transaction block **404_N**.

[0070] Another illustrative chain **450** is shown in FIG. **4B**. Chain **450** comprises a root block **452** and a plurality of branches of leaf nodes **472**, **474**, **476**, **478**, **480**. The root block **452** comprises a timestamp **460** and a ledger **456** and a data taxonomy schema **458**. The ledger **456** defines exchanges between the branches **462**, **464**, **466**, **468**, **470**. For example, the ledger states that a user's identification must be verified prior obtaining any securitized tokens, a payment

transaction must be completed prior to distribution of any securitized tokens to an individual, and/or shipment must be verified prior to receiving an item. That data taxonomy schema defines the structure of hierarchical trees for arranging in a datastore and/or accessing data stored in the datastore.

[0071] The branches include an authentication branch **462**, a securitized token branch **464**, an NFT transaction branch **466**, an NFT derivatives branch **468**, and a shipment verification branch **470**. Each of the branches **462**, . . . , **470** can have a similar architecture as chain **400** described above in relation to FIG. 4A. The authentication branch **462** comprises a sub-chain of leaf nodes **472** each including information relating to an authentication process for a given individual. The authentication information can include, but is not limited to, a timestamp for an authentication process, a user identifier, and results of the authentication process (for example, user identification was or was not authenticated or otherwise verified). The securitized token branch **464** comprises a sub-chain of leaf nodes **474** each including information relating to a securitized token process. The securitized token information can include, but is not limited to, a timestamp of a securitized token process, a user identifier identifying the individual that purchased the securitized token, and transaction details for the securitized token purchase. The NFT transaction branch **466** comprises a sub-chain of leaf nodes **476** each including information relating to a transaction associated with a given NFT and/or collectible associated with the NFT. The NFT derivatives branch **468** comprises a sub-chain of leaf nodes **478** each including information relating to a transaction associated with a given NFT derivative. The shipment verification branch **470** comprises a sub-chain of leaf nodes **480** each including information relating to a shipment of a given collectible from a source location to a destination location.

[0072] During a transaction process, the client device **302** executes a Web browser **322** and performs operations to log into a crypto exchange system (e.g., crypto exchange system **152** of FIG. 1). The client device **302** then communicates a request for a list of collectibles **310** that are being auctioned or otherwise offered for sale (for example, via option derivatives). The user **318** may select one or more first collectibles in the list and initiate a transaction relating thereto. Payment for the first collectible(s) **310** is facilitated by an electronic wallet **324**. Securitize

token(s) **326** can be used to make payment for the first collectible(s) **310** and/or other securitized token(s). Transaction data **316** is added to the digital ledger **312** when the transaction is completed. Additionally, an NFT **314** is created which is associated with the first collectible(s) and/or securitized token(s). The NFT **314** provides a means to verify ownership the collectible(s) and/or securitized token(s).

[0073] If the collectible(s) is(are) physical good(s), then the NFT **314** may be redeemed for access to the collectible(s). Once the NFT is redeemed, the collectible(s) may be shipped from a storage facility (for example, facility **124** of FIG. 1) to a destination location (for example, a home of the individual who purchased or borrowed the collectible(s)). Shipment information is added to the digital ledger **312**. This allows for recoding and tracking of chain of custody for the collectible(s).

[0074] During a subsequent transaction process, another client device executes a web browser and performs operations for logging into the crypto exchange system. This transaction can include purchasing the collectible(s) from individual **318** using any form of currency, loaning the collectible(s) from individual **318**, trading NFT(s) associated with second collectible(s) and/or securitized token(s) for the NFT associated with the first collectible(s) and/or securitized token(s), and/or entering into option contract(s) associated with the collectible(s) and/or securitized token(s).

[0075] Referring now to FIG. 5, there is provided an illustration of an architecture for a computing device **500**. STO system **150**, crypto exchange system **152** and/or e-commerce system **154** of FIG. 1 may be implemented by one or more computing device(s) **500**. Client computing device(s) **302** and/or server(s) **306** of FIG. 3 is(are) the same as or similar to computing device **500**. As such, the discussion of computing device **500** is sufficient for understanding these components of systems **100**, **300**.

[0076] In some scenarios, the present solution is used in a client-server architecture. Accordingly, the computing device architecture shown in FIG. 5 is sufficient for understanding the particulars of client computing devices and servers.

[0077] Computing device **500** may include more or less components than those shown in FIG. 5. However, the components shown are sufficient to disclose an illustrative solution implementing the present solution. The hardware architecture of FIG. 5 represents one implementation of a representative computing device configured to provide an improved item return process, as described herein. As such, the computing device **500** of FIG. 5 implements at least a portion of the method(s) described herein.

[0078] Some or all components of the computing device **500** can be implemented as hardware, software and/or a combination of hardware and software. The hardware includes, but is not limited to, one or more electronic circuits. The electronic circuits can include, but are not limited to, passive components (e.g., resistors and capacitors) and/or active components (e.g., amplifiers and/or microprocessors). The passive and/or active components can be adapted to, arranged to and/or programmed to perform one or more of the methodologies, procedures, or functions described herein.

[0079] As shown in FIG. 5, the computing device **500** comprises a user interface **502**, a Central Processing Unit (CPU) **506**, a system bus **510**, a memory **512** connected to and accessible by other portions of computing device **500** through system bus **510**, a system interface **560**, and hardware entities **514** connected to system bus **510**. The user interface can include input devices and output devices, which facilitate user-software interactions for controlling operations of the computing device **500**. The input devices include, but are not limited, a physical and/or touch keyboard **550**. The input devices can be connected to the computing device **500** via a wired or wireless connection (e.g., a Bluetooth® connection). The output devices include, but are not limited to, a speaker **552**, a display **554**, and/or light emitting diodes **556**. System interface **560** is configured to facilitate wired or wireless communications to and from external devices (e.g., network nodes such as access points, etc.).

[0080] At least some of the hardware entities **514** perform actions involving access to and use of memory **512**, which can be a Random Access Memory (RAM), a solid-state or disk driver and/or a Compact Disc Read Only Memory (CD-ROM). Hardware entities **514** can include a disk drive unit **516** comprising a computer-readable storage medium **518** on which is stored one

or more sets of instructions **520** (e.g., software code) configured to implement one or more of the methodologies, procedures, or functions described herein. The instructions **420** can also reside, completely or at least partially, within the memory **512** and/or within the CPU **506** during execution thereof by the computing device **500**. The memory **512** and the CPU **506** also can constitute machine-readable media. The term "machine-readable media", as used here, refers to a single medium or multiple media (e.g., a centralized or distributed database, and/or associated caches and servers) that store the one or more sets of instructions **520**. The term "machine-readable media", as used here, also refers to any medium that is capable of storing, encoding or carrying a set of instructions **520** for execution by the computing device **500** and that cause the computing device **500** to perform any one or more of the methodologies of the present disclosure.

[0081] Computing device **500** implements chain-based technology. In this regard, computing device **500** runs one or more software applications **522** for facilitating: the completion of transactions or exchanges relating to collectible(s) (for example, collectible(s) **110** of FIG. 1 and/or **310** of FIG. 3); the creation of securitized tokens (for example, securitized tokens **108** of FIG. 1 and/or **326** of FIG. 3); the use of securitized tokens to complete transactions or exchanges; the creation of NFTs (for example, NFTs **116** of FIG. 1 and/or **314** of FIG. 3); the trading of NFTs; the creation of option derivatives; the completion of transactions involving the option derivatives; and/or the creation of digital ledger(s) (for example, digital ledgers **114**, **142** of FIG. 1, **312** of FIG. 3, chain **400** of FIG. 4A, and/or chain **450** of FIG. 4B). Other operations and/or functions of software applications **522** are evident from other portions of this document. The present solution is not limited to the particulars of this example.

[0082] Referring now to FIG. 6, there is provided a more detailed illustration of a system **600** implementing the present solution. System **600** is configured to facilitate creation of an exchange on top of a securitized token which is backed in-turn by a dependent series of assets that eventually resolve to a physical collectible. Such an exchange may, for example, be of the type that is registered pursuant to the Securities Exchange Act of 1964 and the rules promulgated thereunder by the SEC.

[0083] In a traditional futures market backed by physical assets, physical assets (such as cattle or wheat) are offered on a standardized terms structure of rolling calendarized contracts, with derivative options offered on top of these same contracts. Each asset is exercisable until eventual physical delivery of the asset. Each asset can be purchased with fiat currency as well.

[0084] Unlike the traditional futures market, in system **600**, all currency must first be converted into securitized token(s), whose value is backed through the offering of corporate shares as well as the collectibles on which the rest of the system derivatives are traded on top of. These collectibles are securitized and tokenized into NFTs or other digital assets that verify the ownership of the collectible(s). The ownership and transfer of the collectible(s) and/or NFTs are tracked on a shared ledger. Exchanges are only made possible through a network consensus approving each transaction.

[0085] As the NFTs are immutable and may be linked to delivery of physical collectible(s), and since the NFTs are backed by the securitized token(s) which in turn has backing by corporate shares and collectibles, when transactions are processed through proof of stake, they can always be exercised for physical cards guaranteed by the network.

[0086] Fractional NFTs and option derivatives are then able to be traded and exercised for the NFTs, thereby offering liquidity even when auctions of rare collectibles happen rarely. This liquidity comes from the fact the NFTs, fractional NFTs, and option derivatives are able to be traded 24/7 in real time without physical transfer of the collectible(s). Thus, pricing is established for future auctions without collectibles having to change hands physically nor auctions actually having to complete before price changes are seen.

[0087] The entities of system **600** work together to codify legal obligations with smart contracts that are then in turn sent to an STO offering platform. As shown, a Special Purpose Vehicle (SPV), which the illustration describes as a “Tokenized Security Project SPV”, may be utilized to encapsulate transactions of funds and principal/interests to/from the STO offering platform. SPV exchanges regulate shares of the STO offering platform through regulatory exemption (Reg A+, Reg D, Reg S) for ERC20 and/or native tokens (which are fungible). An originator originates STO assets (including both collectibles & corporate shares) which are held

and managed by this entity and exchanged for currency with the SPV and the STO offering platform.

[0088] The components of system **600** have the following responsibilities: enforcing compliance with policies (stored on the blockchain as a part of the publicly available shared ledger); KYC and AML for all investors and traders who would want to access the network and perform transactions of any kind (stored on the blockchain as a part of the publicly available shared ledger); legal obligations related to offering digital asset custody to investors; maintaining of immutable transaction history; maintaining a dynamic cap table (stored on the blockchain as a part of the publicly available shared ledger); automating settlement; and/or automatically and tracking transfers of the STO offering platform.

[0089] FIG. 7 provides an illustration that is useful for understanding differences of the present solution **702** implemented by system **600** from current STO offering processes **700**. In the current STO offering processes **700**, the value of the originator's assets is not tied to a third party. In contrast, the originator's assets are offered by the present solution **702** through auctions and exchange-related trading managed by exchange offering derivatives on NFTs. Thus, unlike the conventional scheme **700**, the present solution **702** involves continuously and dynamically adjusting prices for securitized token assets based on exchange activities (for example, auctions, exercises of option derivatives, etc.). Novelty, this means the originator in system **600** must dynamically re-price the value of held assets and report them to the SPV based upon exchange activity.

[0090] FIG. 8 provides an illustration that is useful for understanding how a smart contract process **802** of system **600** differs from conventional smart contract processes **800**. The current process **800** by which NFTs are transacted are notably different than in system **600**. In the commonly accepted NFT smart contract exchange process, primarily digital assets are submitted to a NFT exchange for minting (creation) and then through consensus transactions allow these NFTs to be bought and sold for non-linked cryptocurrencies (such as Bitcoin). This is not the case in process **802**. Instead, in process **802**, NFTs are immutably linked to valid transactions

performed for the project securitized token in third party collectible auction houses, and thus these auctions are required to mint the NFTs traded within the system.

[0091] Shipment of the item through third party shipping providers is tracked through network consensus tied to the NFT as well, establishing that all physical custody is immutably stored on the network. As third-party shipping providers provide digital tracking, these tracking updates can be encoded into the ledger and attached to the NFT's history, thus linking custody and transit to each item.

[0092] A Hyper Text Markup Language (HTML)/Cascading Style Sheet (CSS)/Java Script (JS) and Application Programming Interface (API) widget and Software Development Kit (SDK) may be licensed to third party auction houses to allow for collectibles to be bid upon and purchased through the securitized token of the network. Through a contractual relationship with the auction house, the collectible is then transferred to the originator/originator licensed escrow service which provides identity verification services on the buyer, seller, and the collectible to ensure that the collectible is as stated in the auction. This includes verification with external third-party ratings/certification/verification agencies APIs whose ratings are encoded within the NFT as a part of the minting process.

[0093] FIG. 9 provides an illustration that is useful for understanding differences between an auction process **902** of the system **600** and a conventional auction process **900**. The conventional auction process **900** does not involve storage of shipment verification, collectible verification, or buyer/seller due diligence on a shared ledger. Thus, these processes are not publicly available for review and their entire responsibility falls on an auction house. In the present systems, the collectible verification system (**170** on FIG. 1) represents authentic collectibles as registered entities in the shared ledger, thus enabling verification of the collectibles in future transactions.

[0094] These processes are now publicly available and only able to be established through consensus by the network in system **600** via auction process **902**. This means that, until proof of shipment, verification and item verification are processed transparently, the network transactions are not able to be processed and tokens are not able to be released from escrow.

[0095] The nature of the present solution being backed by rare collectibles dictates that, instead of assets resolving to interoperable units (for example, a barrel of oil), the base component is always tied eventually to a unique auction listing (for example, a specific physical baseball card). Dependently then, a data system taxonomy exists to standardize these unique listings into indexable groupings. These groupings allow price indexes to be generated across multiple unique listings. Where, up until the end of the data taxonomy, further description can be omitted, and an index of the collectibles is generated as a unique derivative. For example, leaving off all aspects of data taxonomy past Type would be a tradeable index of all collectibles having the same identifier. The present solution is not limited to the particulars of this example.

[0096] In some scenarios, a data taxonomy is defined by a plurality of information. The data taxonomy generally organizes different platform assets into a self-describing symbology making it easy to standardize categorization of all collectible types and their sub-assets. This standardization makes it possible to compare asset prices and differentiated components of them in a transparent way. This information defining the data taxonomy includes, but is not limited to, an asset class (for example, cards, memorabilia, video home system tapes, cassettes, games, art, ticket stubs, action figures, etc.), a year of creation, a company (for example, which made collectible), a unique identifier, a type (for example, custom attributes such as rookie, holographic, etc.) which define the collectible more specifically than a unique identifier, a rating/verification agency classification, a fractionalization exchange offering indicator, an origin auction house identifier, and/or a listing expiration date. An illustration is provided in FIG. 10 that is useful for understanding an example data taxonomy **1001** with data elements such as those described above. The data taxonomy **1001** may be implemented as a plurality of tables. For example, as shown in FIG. 10A, a first table can be provided for item ending auction months and associated codes. A second table can be provided for auction houses and associated codes. A third table can be provided for asset classes and associated codes. In addition, FIG. 10 shows a data string **1002** that represents a particular collectible. The data string includes data elements such as an asset class code, an item code (i.e., a unique identifier for the item”), an edition code (representing a group of collectibles that include the specific collectible item), a minimum fractional amount of an associated derivative, option or NFT that purchasers may acquire, a seller code that may identify

the seller and/or a location when or where the sale will occur (such as at an auction), and/or other data such as a margin amount that is paid to the seller and/or the owner of the underlying collectible. Other data elements may be included.

[0097] Through the indexing derivative system described above, a quote can be generated at any level of the data taxonomy. These quotes can be displayed through a ticker, streaming chart, historical chart, order book, depth of market chart, and/or heatmap displaying the data taxonomy at any level of specificity. An illustrative ticker GUI **1100** is shown in FIG. 11. The ticker GUI **1100** allows a user to see streaming quotes for auction collectibles, NFTs and/or derivatives in one place. This ability to see liquid price updates provides a source of accurate price information even on scarce collectibles with low auction volume. Ticker interface **1100** shows quotes **1102**, **1104** for two specific NFT-backed auction listings, an index **1106** on the NFTs that back the specific collectible across all ratings/verifications, and a quote **1108** showing how a fractional NFT of the same index could receive its own price. A user can interact with the ticker interface **1100** to drill down on specific item listings and indexes as shown in FIG. 12. This drill down feature allows metadata on the market data and item to be displayed together in real time or near real time. The present solution is not limited to the metadata shown in FIG. 12. The metadata may include, but is not limited to, an auction price change for a collectible, a fractional option on auction price change, and/or an index price change.

[0098] The data taxonomy also allows for market data to be viewed at multiple levels simultaneously, in real time, as shown in FIG. 13. Underlying auctions at different expirations can be aggregated, and derivative NFTs, fractional NFTs and options can thus all have pricing, volume and open interest tied to each other. As the data taxonomy is further specified, the indexing becomes narrower, until landing on the specific collectible item. These integrated components of increasing liquidity can serve as a point to execute orders on-top of the interface. The information also provides an assessment of an expected value of the underlying physical collectible, as the total of all interests purchased in the registered digital assets associated with the collectible can serve as an indicator of a likely selling price of the collectible itself.

[0099] Triggering order entry at each level of liquidity and indexing shows a different order entry capability, adapting to the nature of the underlying instrument. For instance, as shown in FIGS. 14-15, the system enables viewing data on a full NFT relating to the collectible **1401**, fractional NFTs relating to the collectible **1402**, and/or other instruments such as options and derivatives of the NFTs. Clicking on the price or other displayed information associated with collectible-backed NFT **1501** allows for bidding directly onto the NFT listing, whereas clicking on information relating to the fractional NFT **1502** would initiate a trade on the fractional NFT. If clicking on the option at a given price-level, an option order entry panel can also be utilized as shown in FIG. 16. Notice how the options contracts are tied uniquely both to the expiration schedule of NFT auctions as well as differing price levels.

[00100] FIG. 17 provides an illustration that is useful for understanding differences between a collectible lending process **1702** of system **600** and a conventional securities lending process **1700**. Margin and short interest are offered in system **600** to back shorting and derivatives trading. To back these transactions, users can offer their collectibles to system **600** through a lending program. The lending origination system backing the collectibles lending program differs from traditional securities lending in that instead of a lending agent producing dividends and other entitlements, it is settlement of the collectible from NFT and options trading through the crypto exchange that generates exchange fees for the collectible owner. In essence, this means that the collectibles owner is staking the network's securitized token, NFTs and derivatives on top of these NFTs with a physical collectible. As they are providing asset verification for the network consensus, they are rewarded with additional securitized tokens for their efforts to support the network.

[00101] Referring now to FIG. 18, there is provided a flow diagram of an illustrative method **1800** for providing an online exchange system (for example, system **100** of FIG. 1, crypto exchange system **152** of FIG. 1, system **300** of FIG. 3 and/or system **600** of FIG. 6). The online exchange system is generally configured to facilitate exchanges relating to collectible(s) (for example, collectible(s) **110** of FIG. 1 and/or **310** of FIG. 3).

[00102] Method **1800** begins with **1802** and continues with **1804** where a computing device (for example, server(s) **306** of FIG. 1 and/or computing device **500** of FIG. 5) performs operations to authenticate an identity of an individual prior to allowing the individual access to the online exchange system. Any known or to be known authentication technique can be used here.

[00103] In **1806**, the computing device performs a first transaction in which all or a fractional share of an ownership of a collectible is exchanged for an electronic financial instrument backed by asset(s) having tangible value(s). The electronic financial instrument can include, but is not limited to, a securitized token (for example, securitized token **108** of FIG. 1 or **326** of FIG. 3). In this case, the external system comprises a security token offering system (for example, STO system **150** of FIG. 1). The asset(s) can include, but is(are) not limited to, unit(s) of equity ownership in a corporation (for example, corporate share(s)) and/or collectible(s).

[00104] In **1808**, the computing device generates NFT(s) (for example, NFT **116** of FIG. 1 or **314** of FIG. 3) on a digital ledger (for example, **142** of FIG. 1 or **312** of FIG. 3) for verifying ownership of the collectible, the electronic financial instrument and/or securitized token(s). The computing device may optionally communicate information to an external system (for example, STO system **150** of FIG. 1) which generated the electronic financial instrument. This communication causes a block is be added to another digital ledger (for example, digital ledger **114** of FIG. 1) that indicates a change of ownership of the electronic financial instrument occurred during the first transaction.

[00105] The price or value of the collectible may be varied in **1812**. The price/value variation can be based on an index (for example, index **134** of FIG. 1, historical transaction data (for example, data **136** of FIG. 1) and/or purchase transaction data (for example, data **142** of FIG. 1) received from other online exchange system(s) (for example, e-commerce system **154** of FIG. 1). Changes to the price can occur in real time or near real time as transactions are completed via the other online exchange systems.

[00106] In **1814**, the online exchange system offers an option derivative providing an ability to exchange currency for an option contract granting a right to buy the collectible at a set price

on or before a certain date. The terms of the option contract may be set in accordance with a policy defined in the NFT. A second transaction is completed in **1816** whereby the currency is exchanged for the option contract. The digital ledger is modified in **1818** to include information specifying details of the second transaction.

[00107] In **1820**, the online exchange system offers an ability to borrow or loan the collectible in exchange for currency. The terms of the option may be set in accordance with a policy defined in the NFT. A third transaction is completed in **1822** for borrowing or loaning the collectible. The digital ledger may be modified in **1824** to include information specifying details of the third transaction.

[00108] In **1826**, the online exchange system performs operations to track changes in physical custody of the collectible. Tracking updates are encoded into the digital ledger so as to be tied to transaction history of the NFT associated with the collectible, as shown by **1828**. Subsequently, **1830** is performed where method **1800** ends or other processing is performed (e.g., return to **1802**).

[00109] Method **1800** is not limited to the operations described above. Method **1800** may additionally or alternatively comprise: generating and presenting a single graphical user interface simultaneously displaying streaming quotes for auctioned collectibles, non-functional tokens and derivatives; organizing assets of a plurality of different platforms in accordance with a data taxonomy that is defined by at least one of an asset class, a year of creation of a collectible, a company that made the collectible, a unique identifier for the collectible, a collectible type, a rating or verification agency classification, a fractionalization exchange offering indicator, an origin auction house identifier, and a listing expiration date; and/or using artificial intelligence or machine learning algorithm(s) to: (i) automatedly identify patterns or trends relating to collectibles amongst individuals based on electronic content accessible on a network; (ii) discover insights, predict trends and/or make forecasts in the collectible industry based on unstructured data flowing through the online exchange system; (iii) make recommendations for the exchange of collectibles based on the patterns or trends relating to collectibles and/or historical transaction data; or (iv) provide a chatbot configured to simulate conversation with

individuals for facilitating trading. These additional or alternative operations could, for example, be performed in block **1830**.

[00110] Although the present solution has been illustrated and described with respect to one or more implementations, equivalent alterations and modifications will occur to others skilled in the art upon the reading and understanding of this specification and the annexed drawings. In addition, while a particular feature of the present solution may have been disclosed with respect to only one of several implementations, such feature may be combined with one or more other features of the other implementations as may be desired and advantageous for any given or particular application. Thus, the breadth and scope of the present solution should not be limited by any of the above-described embodiments. Rather, the scope of the present solution should be defined in accordance with the following claims and their equivalents.

CLAIMS

What is claimed is:

1. A method for providing an online exchange system, comprising:
performing, by a computing device of the online exchange system, a first transaction in which an ownership of a collectible is exchanged for an electronic financial instrument backed by at least one asset having a tangible value;
generating, by the computing device, a non-fungible token on a first digital ledger for verifying ownership of the collectible; and
communicating information from the computing device to a system which generated the electronic financial instrument such that a block is added to a second digital ledger that indicates a change of ownership of the electronic financial instrument occurred during the first transaction.
2. The method according to claim 1, wherein the first and second digital ledgers are the same digital ledger.
3. The method according to claim 1, wherein the first and second digital ledgers are different digital ledgers.
4. The method according to claim 1, wherein the electronic financial instrument comprises a securitized token and the system comprises a security token offering system.
5. The method according to claim 1, wherein the at least one asset comprises at least one unit of equity ownership in a corporation.
6. The method according to claim 1, wherein a fractional share of ownership in the collectible was exchanged for the electronic financial instrument during the first transaction.

7. The method according to claim 1, further comprising offering, by the online exchange system, an ability to exchange currency for an option contract granting a right to buy the collectible at a set price on or before a certain date.
8. The method according to claim 7, wherein the terms of the option contract being set in accordance with a policy defined in the non-fungible token.
9. The method according to claim 7, further comprising completing, by the computing device, a second transaction in which the currency is exchanged for the option contract.
10. The method according to claim 9, further comprising performing operations by the computing device to modify the first digital ledger to include information specifying details of the second transaction.
11. The method according to claim 1, further comprising offering, by the online exchange system, an ability to borrow or loan the collectible in exchange for currency in accordance with a policy defined in the non-fungible token.
12. The method according to claim 11, further comprising performing operations by the computing device to complete a third transaction for borrowing or loaning the collectible and modifying the first digital ledger to include information specifying details of the third transaction.
13. The method according to claim 1, further comprising continuously varying a price of the collectible based on an index, historical transaction data, and purchase transaction data received from other online exchange systems.

14. The method according to claim 1, further comprising tracking changes in physical custody of the collectible and encoding tracking updates into the first digital ledger so as to be tied to transaction history of the non-fungible token.
15. The method according to claim 1, further comprising authenticating an identity of an individual prior to allowing the individual access to the online exchange system.
16. The method according to claim 1, wherein the non-fungible token is configured to verify ownership of one or more securitized tokens in addition to the ownership of the collectible.
17. The method according to claim 1, further comprising generating and presenting a single graphical user interface simultaneously displaying streaming quotes for auctioned collectibles, non-functional tokens and derivatives.
18. The method according to claim 1, further comprising organizing assets of a plurality of different platforms in accordance with a data taxonomy that is defined by at least one of an asset class, a year of creation of a collectible, a company that made the collectible, a unique identifier for the collectible, a collectible type, a rating or verification agency classification, a fractionalization exchange offering indicator, an origin auction house identifier, and a listing expiration date.
19. The method according to claim 1, further comprising using artificial intelligence or a machine learning algorithm to: (i) automatedly identify patterns or trends relating to collectibles amongst individuals based on electronic content accessible on a network; (ii) discover insights, predict trends and/or make forecasts in the collectible industry based on unstructured data flowing through the online exchange system; (iii) make recommendations for the exchange of collectibles based on the patterns or trends relating to collectibles and/or historical transaction data; or (iv) provide a chatbot configured to simulate conversation with individuals for facilitating trading.

20. A system, comprising:
a processor;
a non-transitory computer-readable storage medium comprising programming instructions that are configured to cause the processor to implement a method for providing an online exchange system, wherein the programming instructions comprise instructions to:
perform a first transaction in which an ownership of a collectible is exchanged for an electronic financial instrument backed by at least one asset having a tangible value;
generate a non-fungible token on a first digital ledger for verifying ownership of the collectible; and
communicate information from the computing device to a system which generated the electronic financial instrument such that a block is added to a second digital ledger that indicates a change of ownership of the electronic financial instrument occurred during the first transaction.
21. The system according to claim 20, wherein the first and second digital ledgers are the same digital ledger.
22. The system according to claim 20, wherein the first and second digital ledgers are different digital ledgers.
23. The system according to claim 20, wherein the electronic financial instrument comprise a securitized token and the system comprises a security token offering system.
24. The system according to claim 20, wherein the at least one asset comprises at least one unit of equity ownership in a corporation.
25. The system according to claim 20, wherein a fractional share of ownership in the collectible was exchanged for the electronic financial instrument during the first transaction.

26. The system according to claim 20, wherein the programming instructions further comprise instructions to offer an ability to exchange currency for an option contract granting a right to buy the collectible at a set price on or before a certain date.

27. The system according to claim 26, wherein the terms of the option contract being set in accordance with a policy defined in the non-fungible token.

28. The system according to claim 26, wherein the programming instructions further comprise instructions to complete a second transaction in which the currency is exchanged for the option contract.

29. The system according to claim 28, wherein the programming instructions further comprise instructions to modify the first digital ledger to include information specifying details of the second transaction.

30. The system according to claim 20, wherein the programming instructions further comprise instructions to offer an ability to borrow or loan the collectible in exchange for currency in accordance with a policy defined in the non-fungible token.

31. The system according to claim 30, wherein the programming instructions further comprise instructions to complete a third transaction for borrowing or loaning the collectible and modifying the first digital ledger to include information specifying details of the third transaction.

32. The system according to claim 20, wherein the programming instructions further comprise instructions to continuously vary a price of the collectible based on an index, historical transaction data, and purchase transaction data received from other online exchange systems.

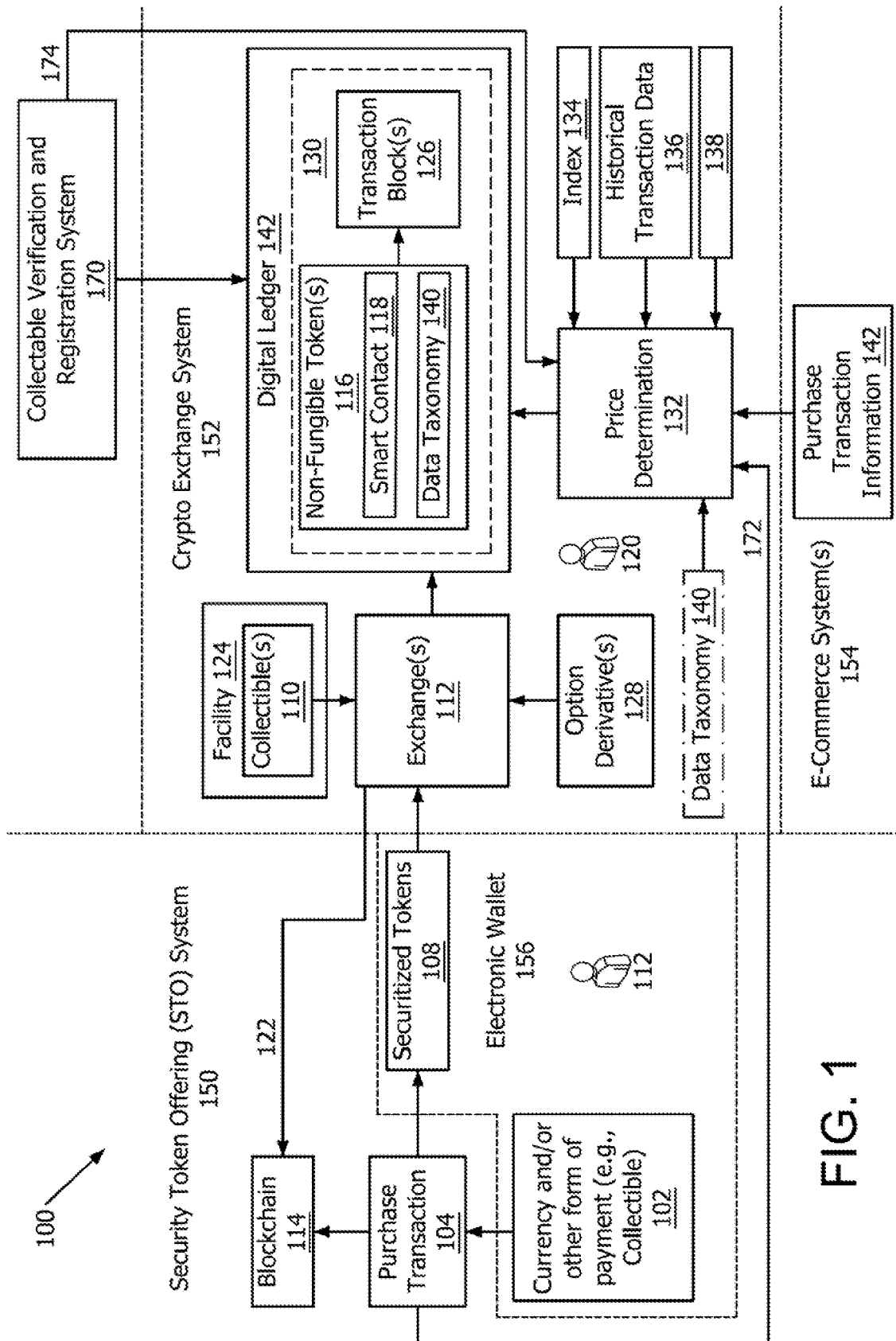
33. The system according to claim 20, wherein the programming instructions further comprise instructions to track changes in physical custody of the collectible and encode tracking updates into the first digital ledger so as to be tied to transaction history of the non-fungible token.

34. The system according to claim 20, wherein the programming instructions further comprise instructions to authenticate an identity of an individual prior to allowing the individual access to the online exchange system.

35. The system according to claim 20, wherein the non-fungible token is configured to verify ownership of one or more securitized tokens in addition to the ownership of the collectible.

36. The system according to claim 20, wherein the programming instructions further comprise instructions to generate and present a single graphical user interface simultaneously displaying streaming quotes for auctioned collectibles, non-functional tokens and derivatives.

37. The system according to claim 20, wherein the programming instructions further comprise instructions to organize assets of a plurality of different platforms in accordance with a data taxonomy that is defined by at least one of an asset class, a year of creation of a collectible, a company that made the collectible, a unique identifier for the collectible, a collectible type, a rating or verification agency classification, a fractionalization exchange offering indicator, an origin auction house identifier, and a listing expiration date.



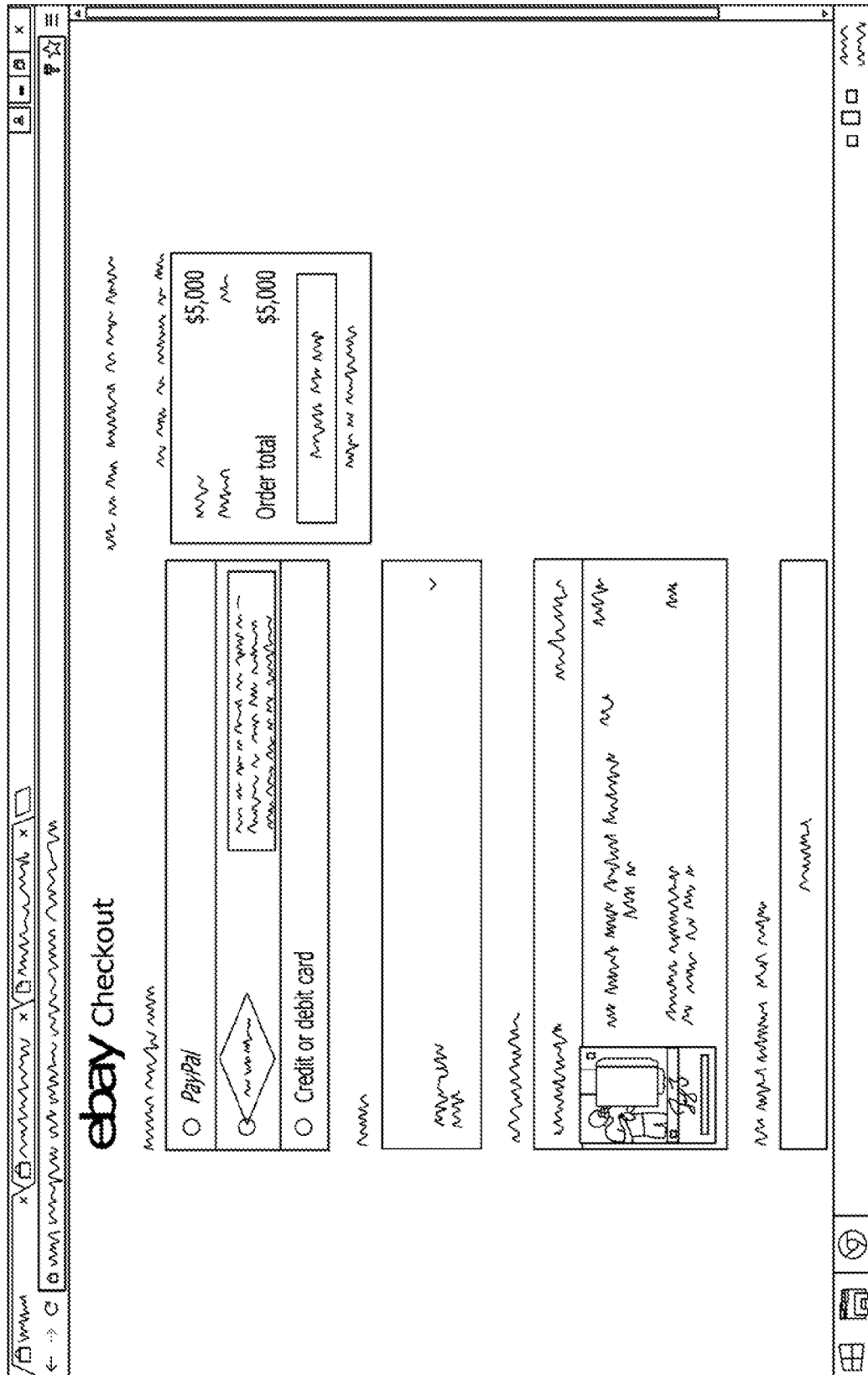


FIG. 2

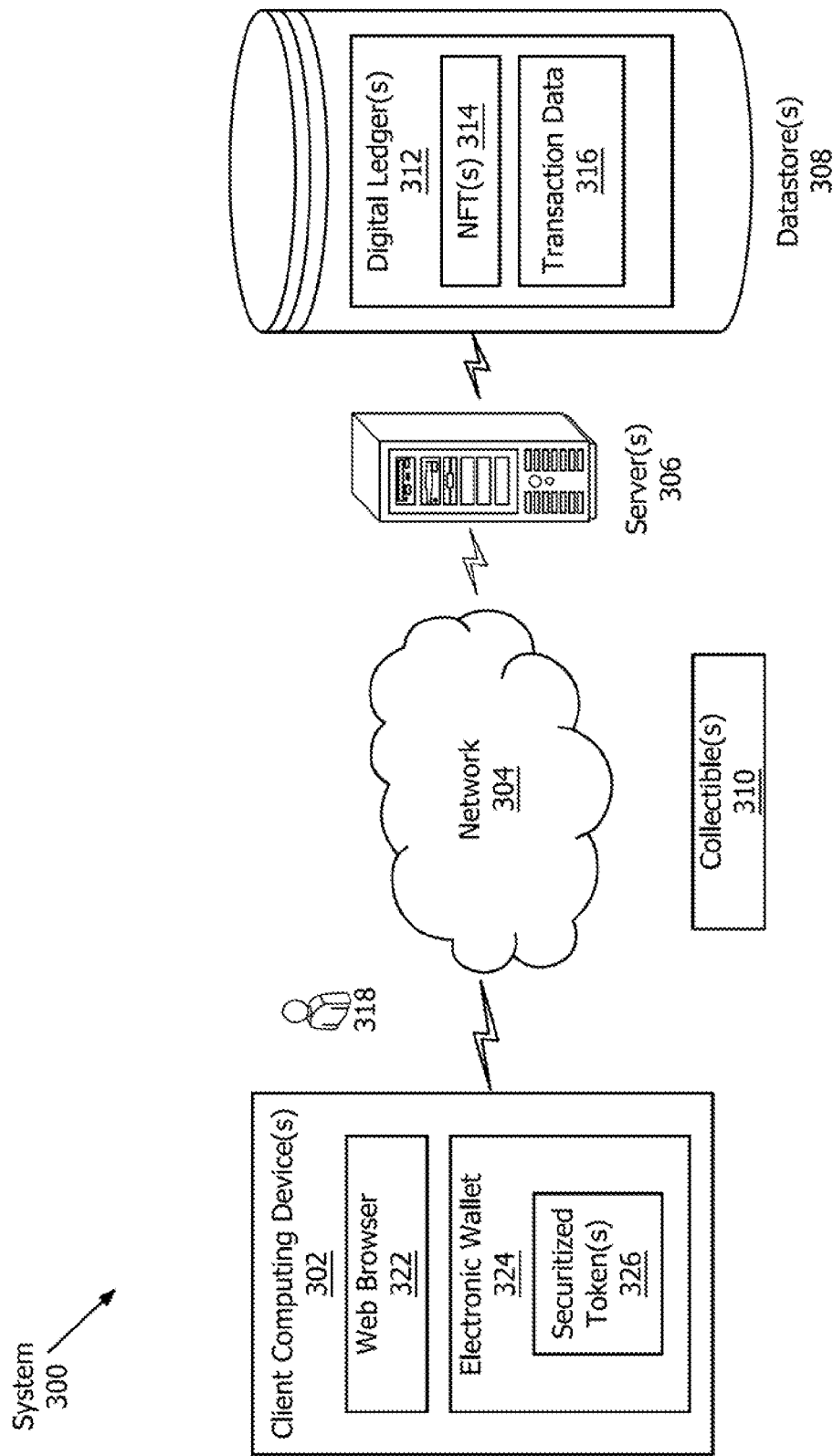


FIG. 3

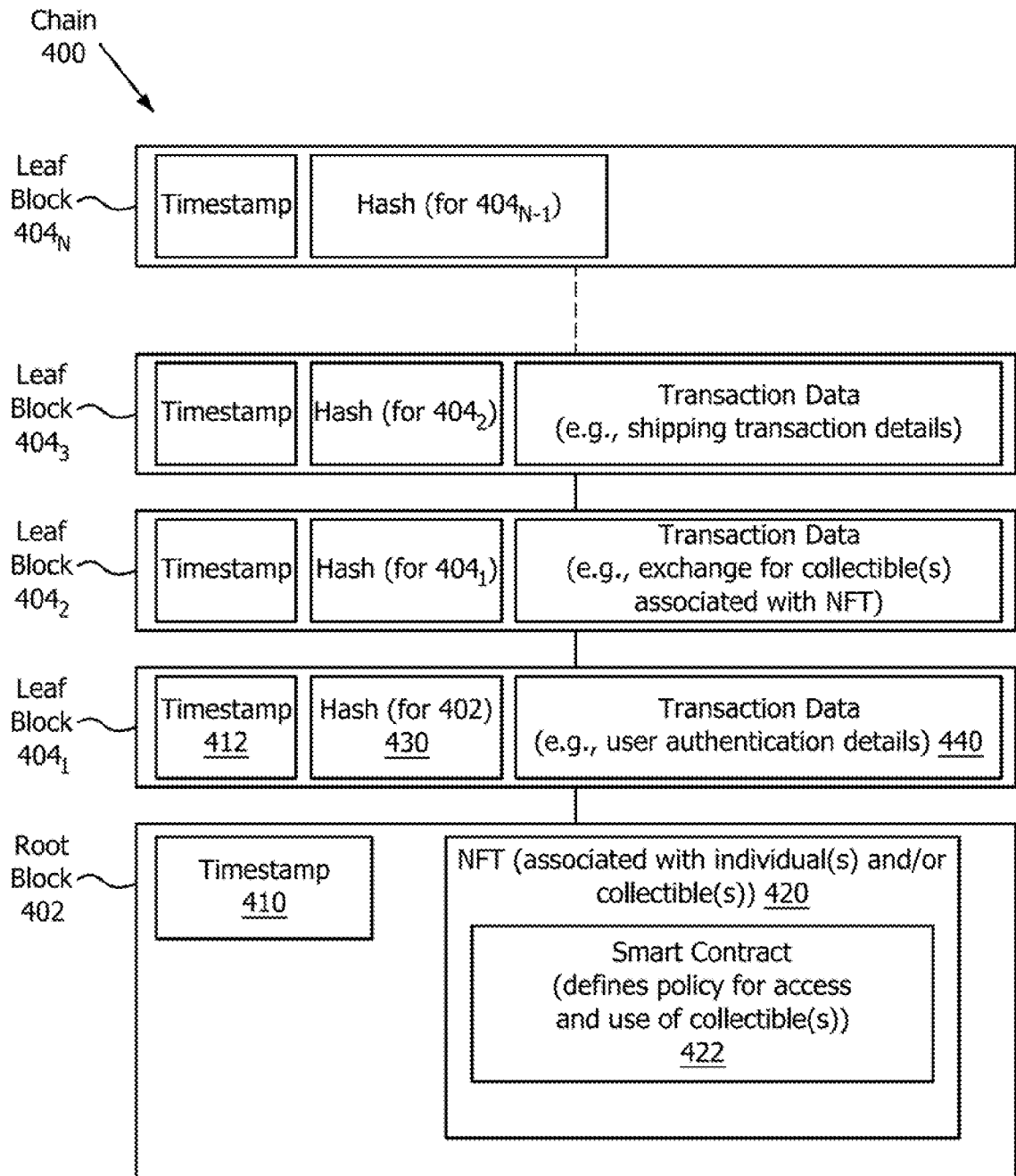


FIG. 4A

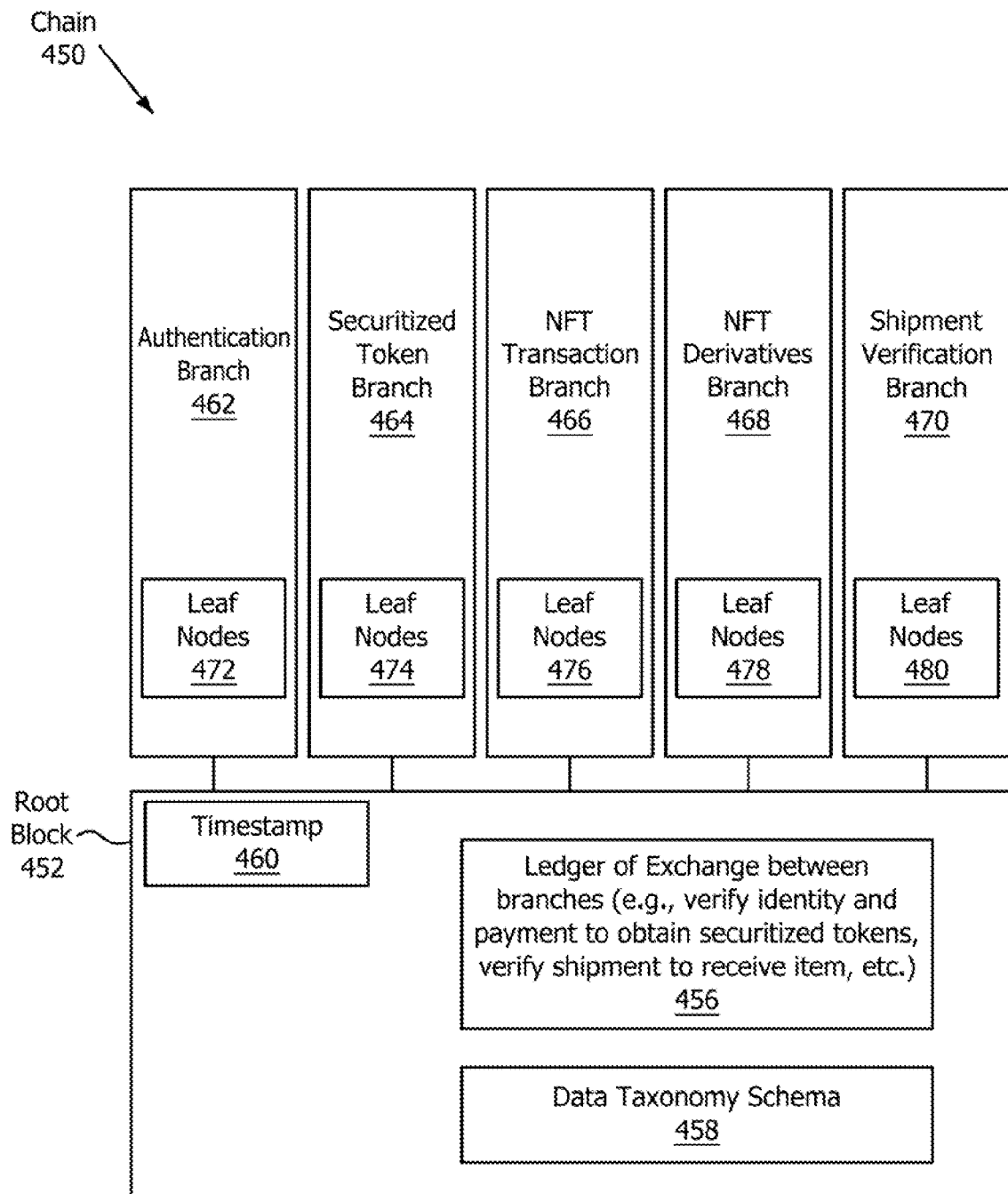


FIG. 4B

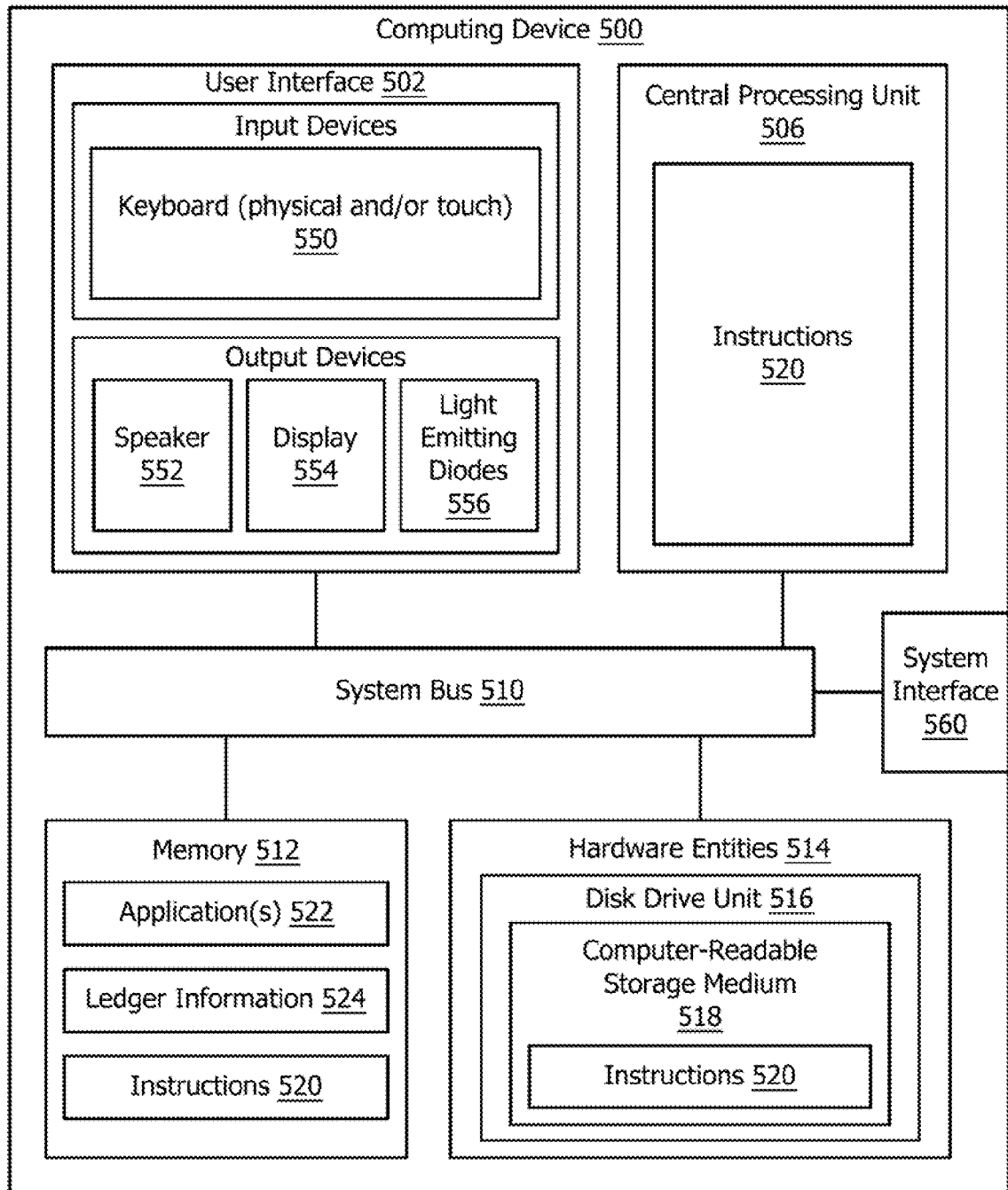


FIG. 5

FIG. 6A

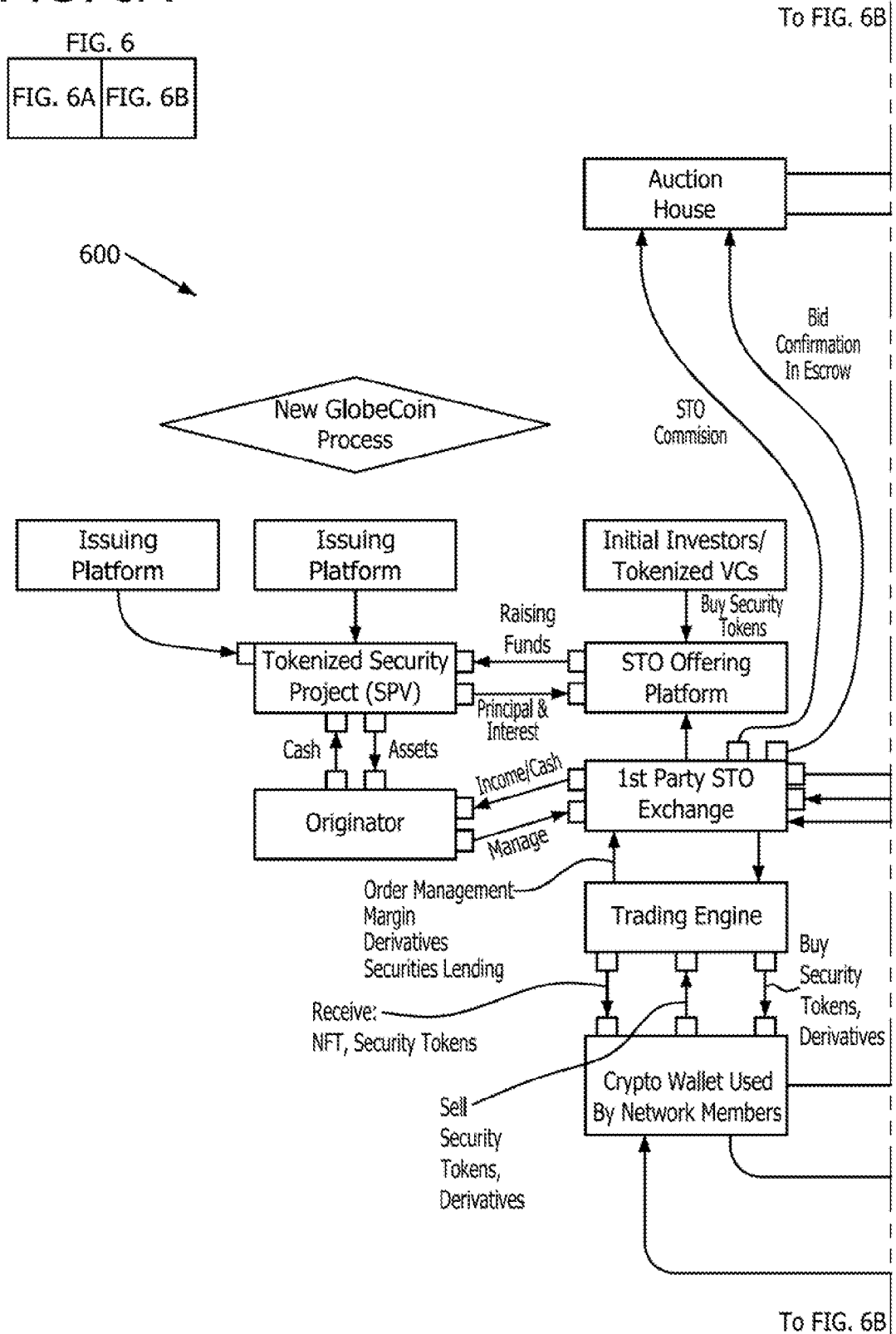


FIG. 6B

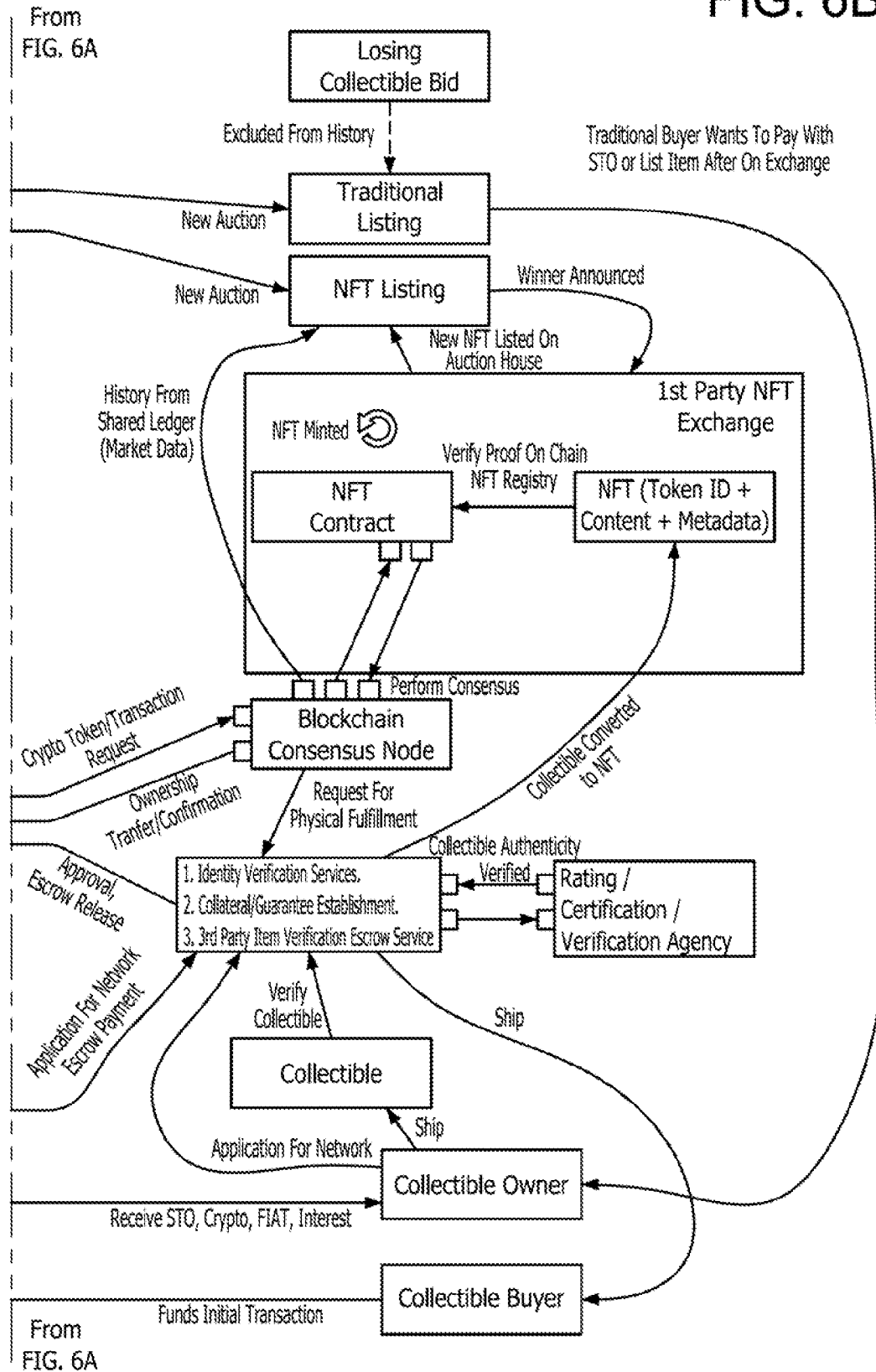
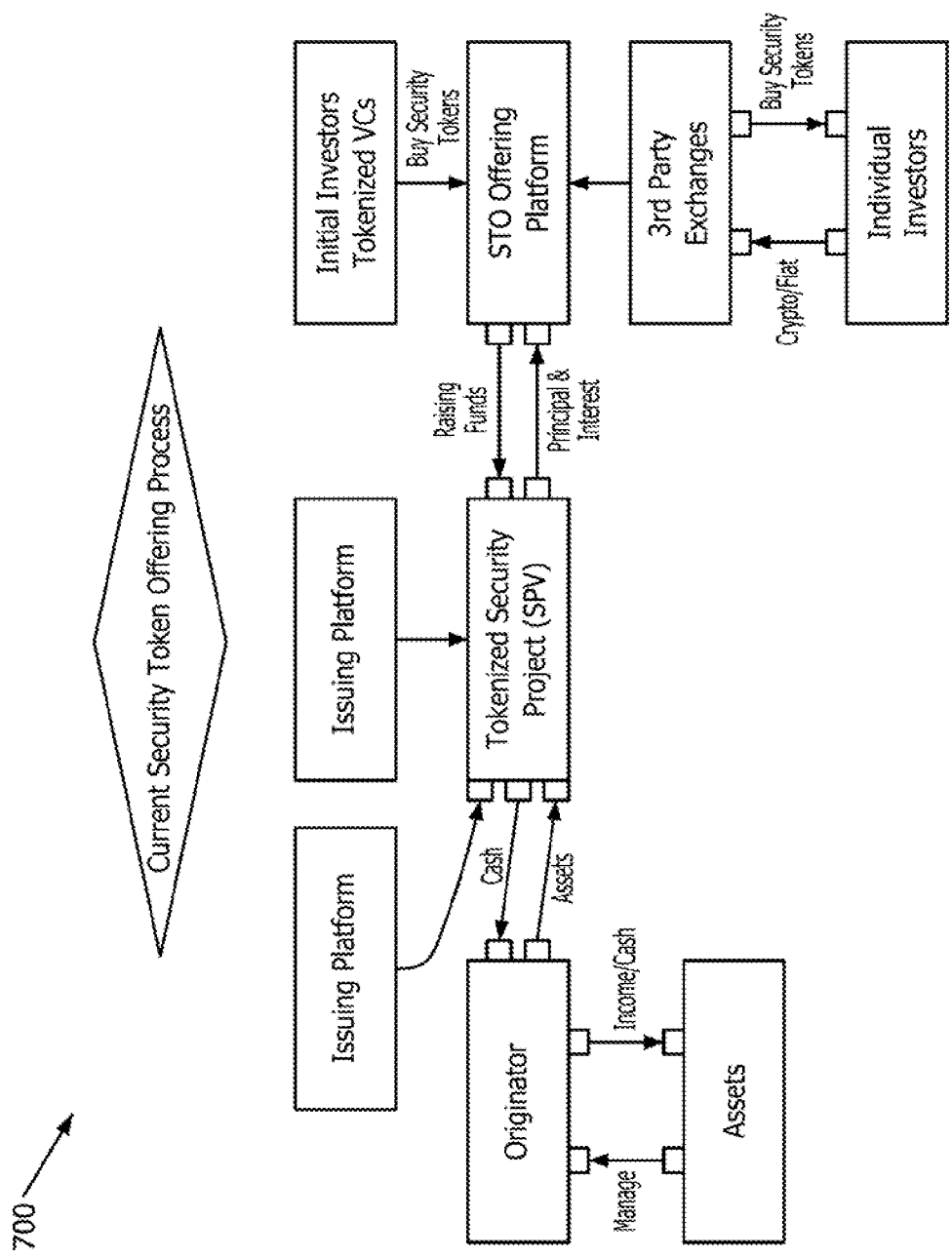


FIG. 7A

FIG. 7

FIG. 7A
FIG. 7B



From
FIG. 7A

702

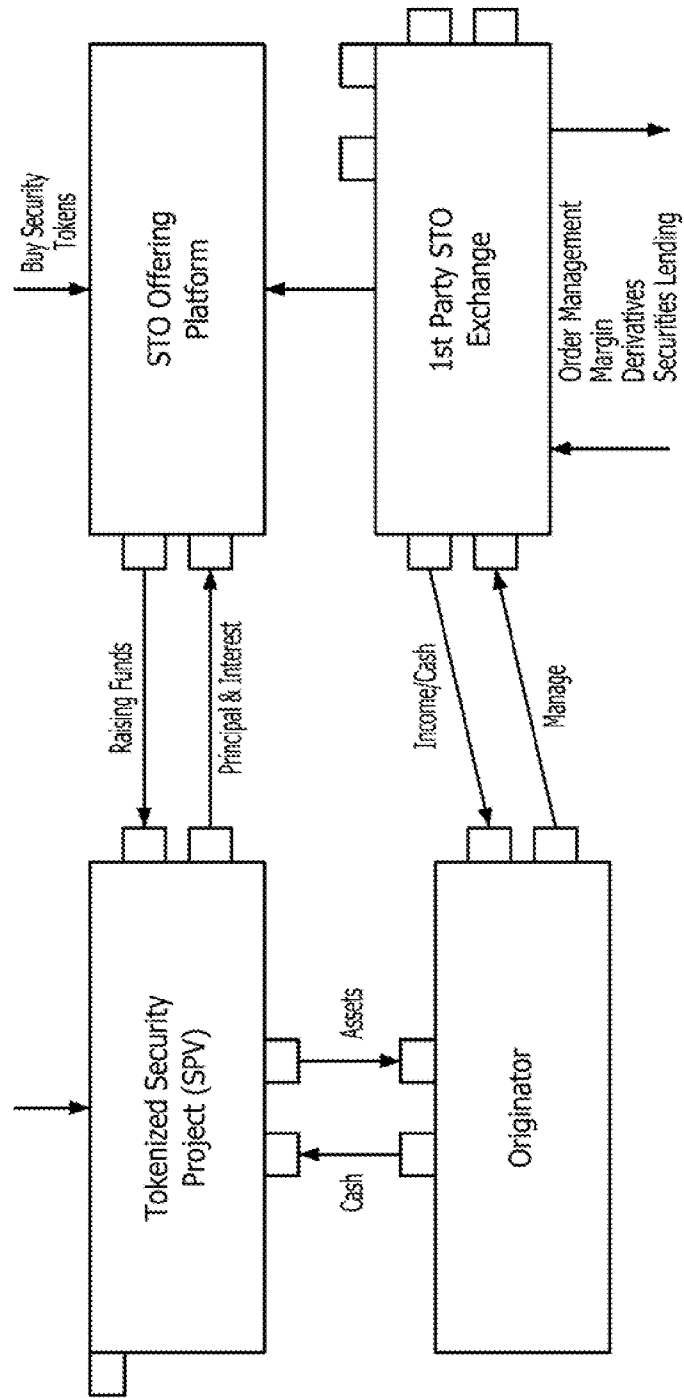
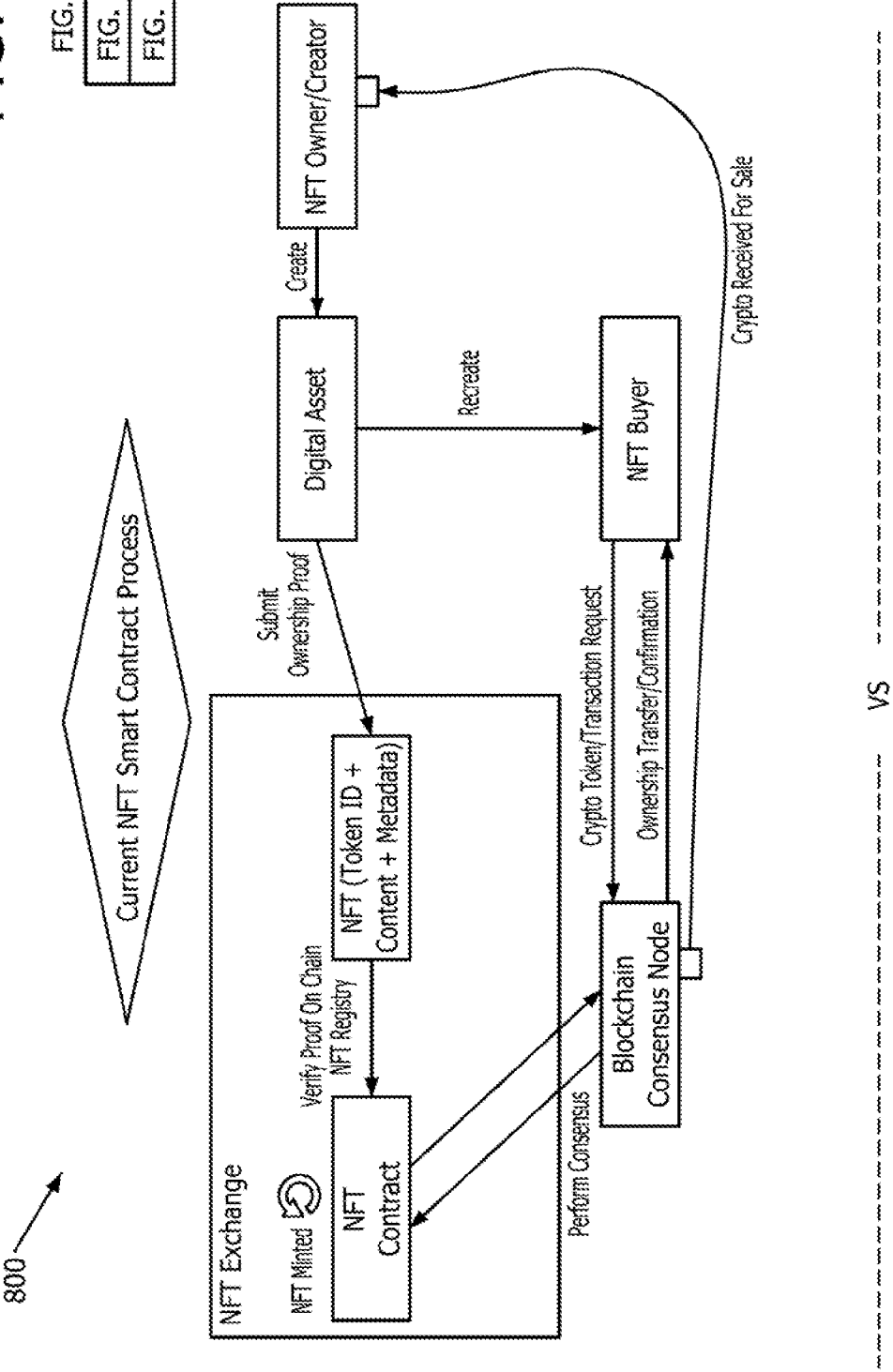
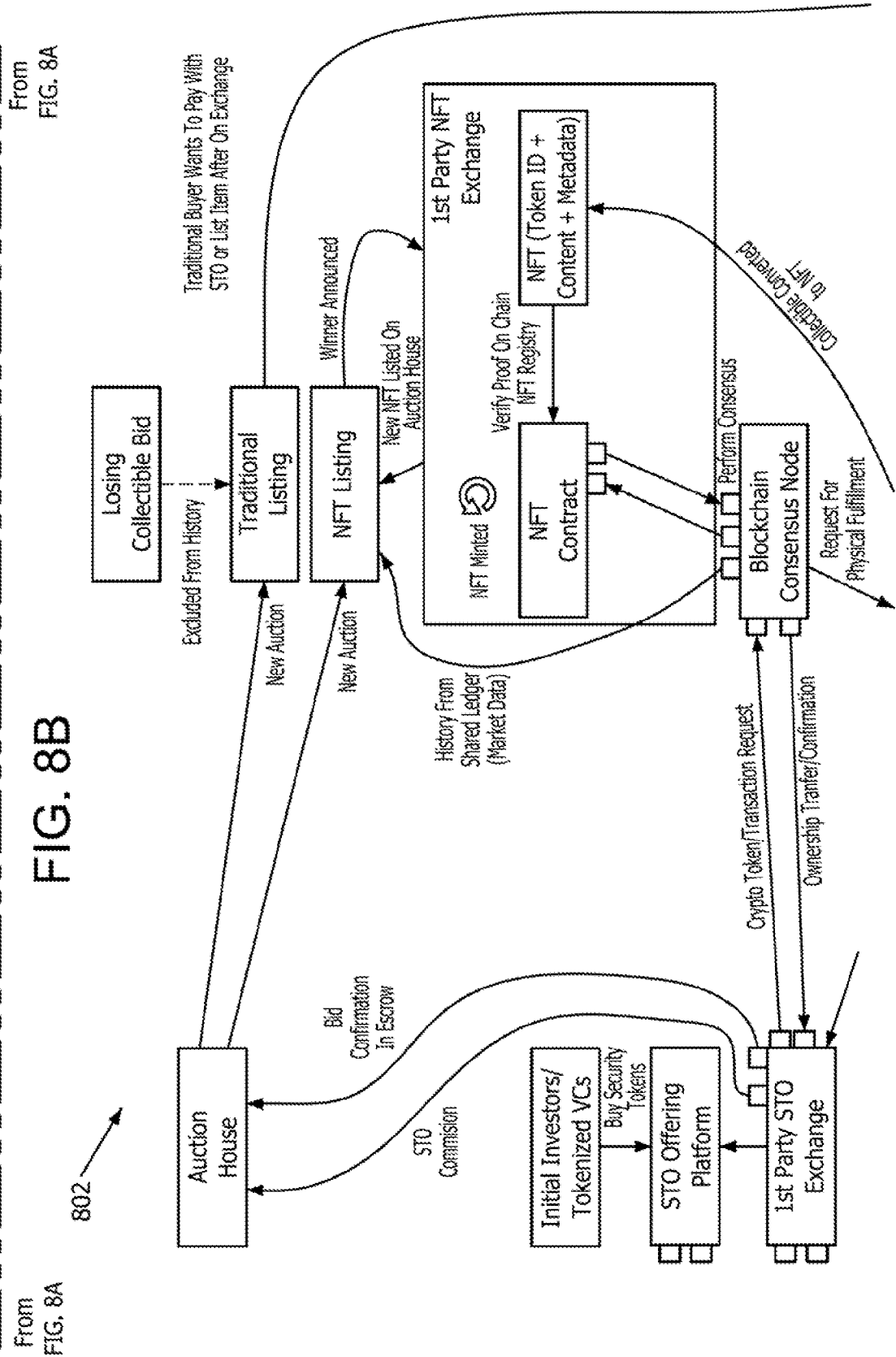


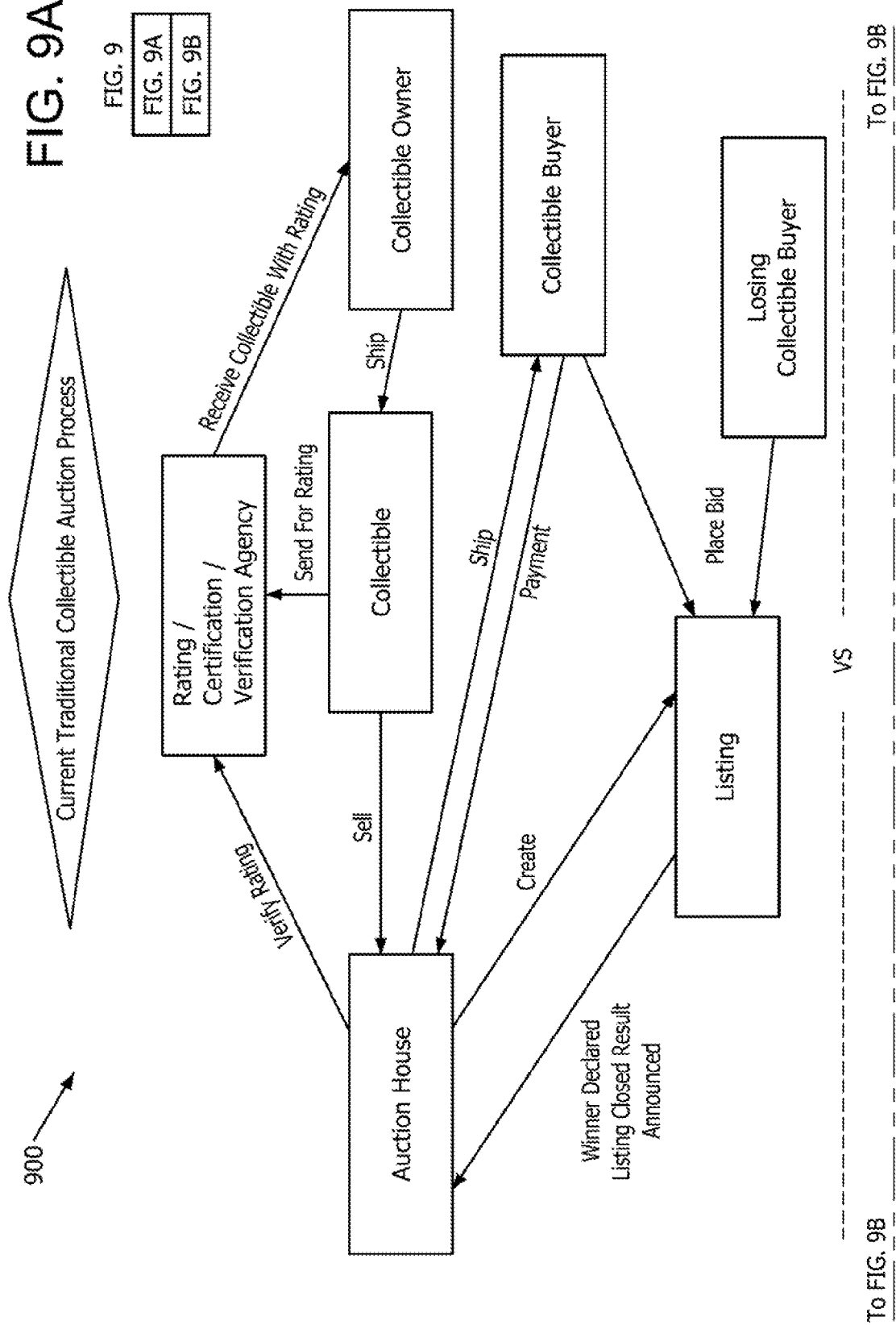
FIG. 7B

FIG. 8A



To FIG. 8B





From
FIG. 9A

From
FIG. 9A

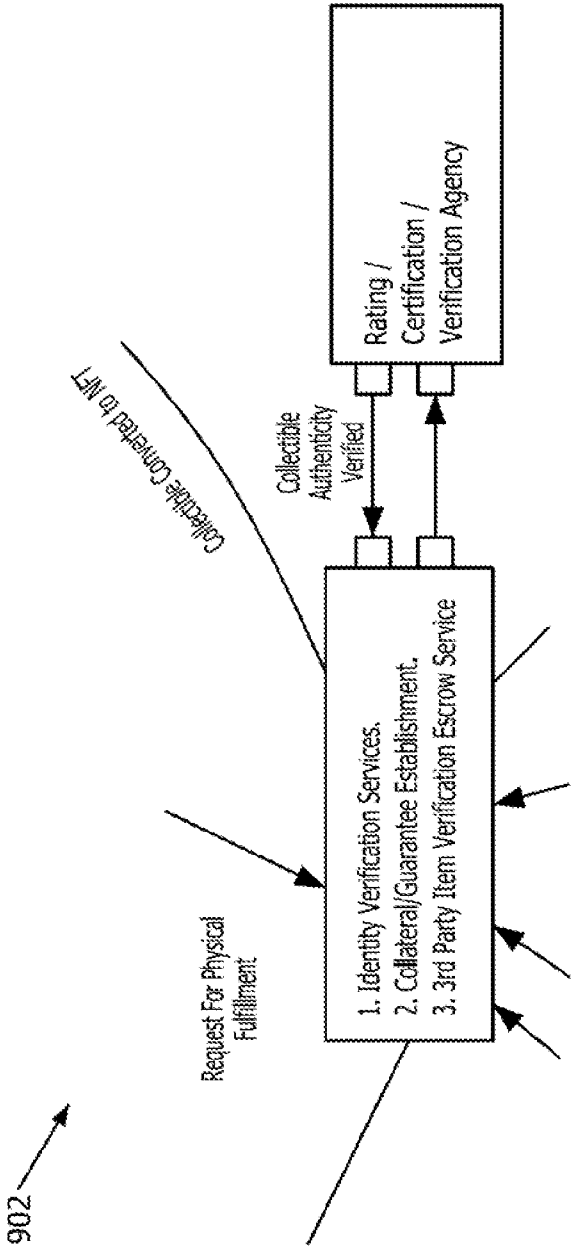


FIG. 9B

1001 

Item Ending Auction Month
January - F
February - G
March - H
April - J
May - K
June - M
July - N
August - Q
September - U
October - V
November - X
December - Z

Auction Houses	Auction Houses Abbreviations
Goldin Auctions	G
Heritage Auctions	H
Ebay	E
Sothebys	S
Fractional Option On Auction	F

Asset Classes	Abbreviated Asset Classes
Cards	C
VHS	V
Video Games	VG
Sealed Wax	SW

FIG. 10A

1001 →

Year	Company	First	Last	Number	Type	Grading Company	Grade	Signed
2020	Panini National Treasures	Joe	Burrow	156	Rookie Patch Autograph	Beckett Grading Services	9.5	Signed
Abbreviated Year	Abbreviated Company	First	Last	Number	Abbreviated Type	Grading Company Abbreviated	Grade	Signed Abbreviated
Year	PNT	J	Burrow	156	RPA	BGS	9.5	Signed

1002 →

Asset Class	Abbreviated Card Code	Edition Code	Min Fraction	Maintenance Margin	Auction Code
-------------	-----------------------	--------------	--------------	--------------------	--------------

C 020PNT156 RPA-BGS9.5S .10 10% G-F1222

Year

Company

Card #

Type

Ratings

Agency

Grading

Company

Rating

Signed

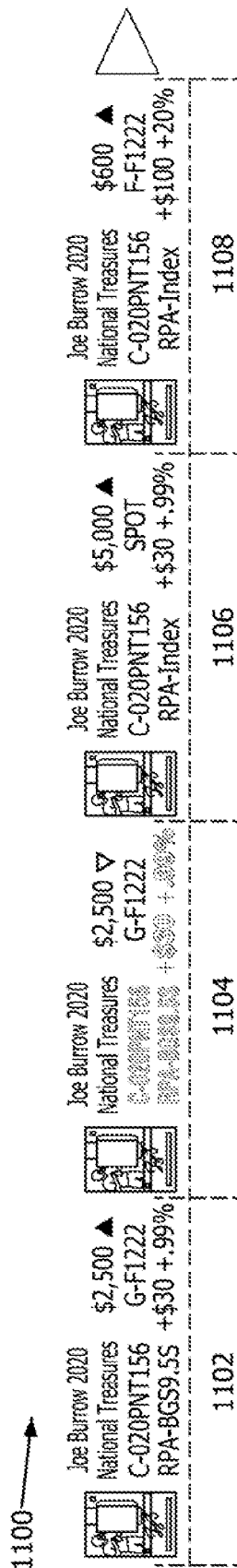
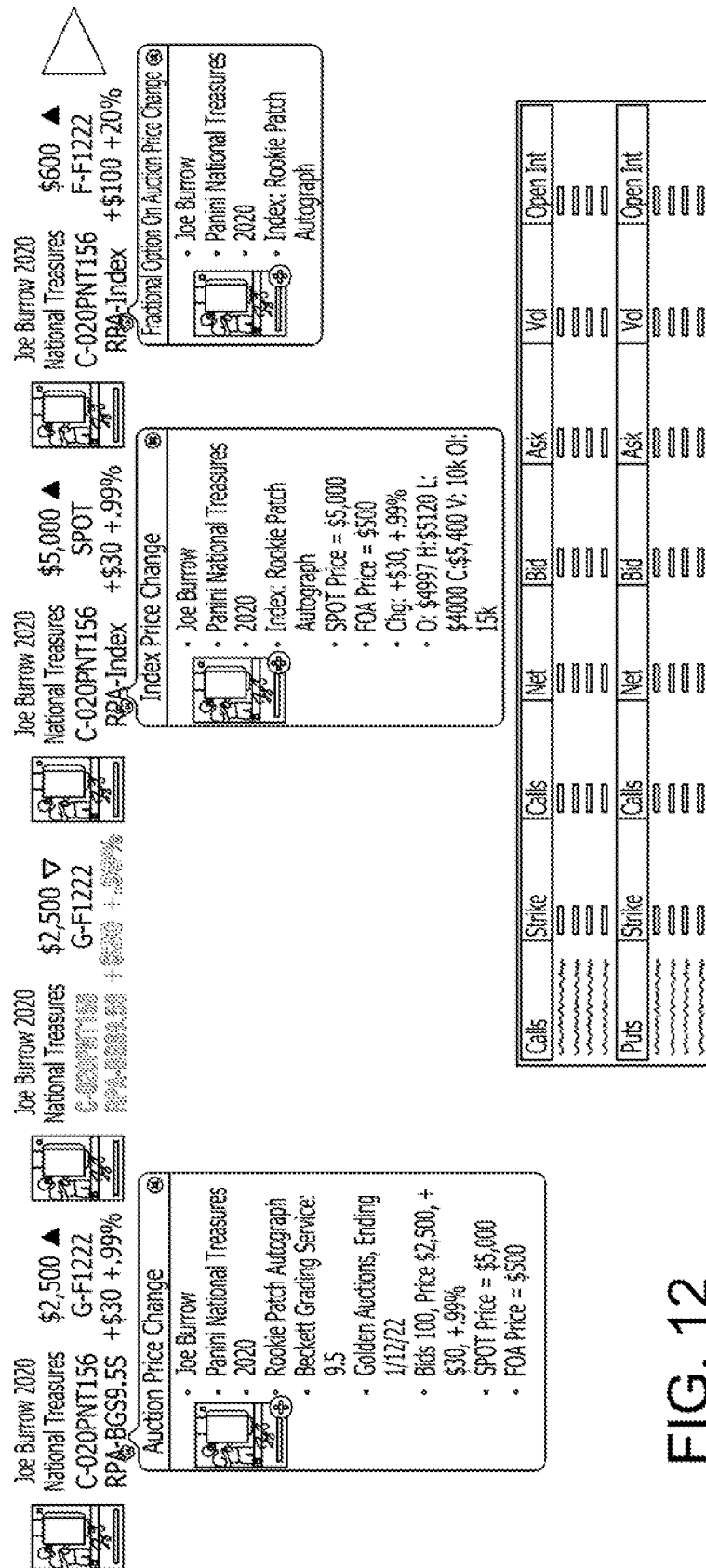
Auction

House

Exp

date

FIG. 10B



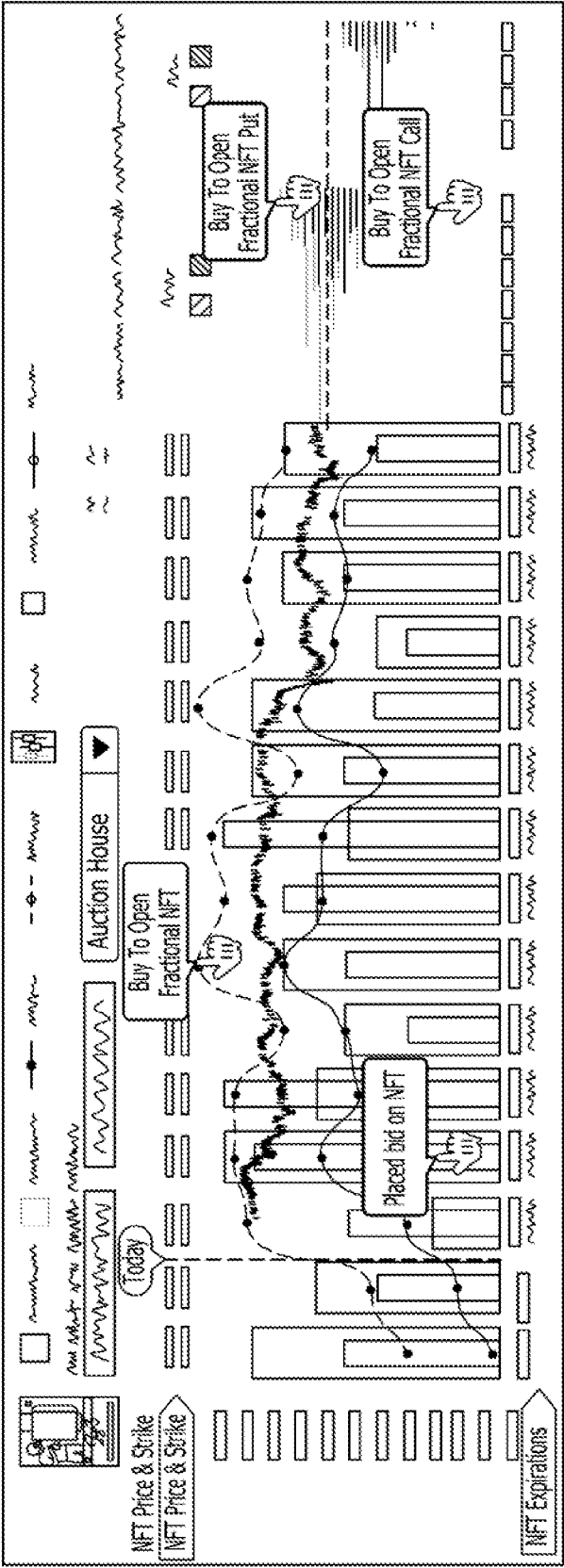


FIG. 13

1401

Order Entry Collectible NFT

Asset Class	Abbreviated Card Code	Edition Code	Min Fraction	Maintenance Margin	Auction Code
C	020PNT156	RPA-BGS9.5S	.10	10%	F-F1222

Current Bid \$2,500

Current Spot \$5,000

goldin

1402

Order Entry Fractional NFT

Asset Class	Abbreviated Card Code	Edition Code	Min Fraction	Maintenance Margin	Auction Code
C	020PNT156	RPA-BGS9.5S	.10	10%	\$600 ▲ F-F1222 +\$100 +20%

Quantity and price selection

Account selection

Order type selection

Restriction (TIF) selection

Staged order handling

Order actions

Free-form text field entry

Order reset

Live inside market data entry

Buy **Sell**

FIG. 14

Order Entry NFT Option

Asset Class	Abbreviated Card Code	Edition Code	Min Fraction	Maintenance Margin	Auction Code
-------------	-----------------------	--------------	--------------	--------------------	--------------

C

Cards

020PNT156

2020 Panini National Treasure

RPA-BGS9.5S .10

Rookie Patch Autograph Service

\$600 ▲

F-F1222

+ \$100 + 20%

Fractional 1/12/22

Click a market data cell for a Call or Put options contract to open a floating order entry widget...

		Call				Put				Basis				Delta				Gamma				Vega				Theta				Rho			
Contract	Quantity	Price	Bid	Ask	Price	Bid	Ask	Price	Bid	Ask	Price	Bid	Ask	Price	Bid	Ask	Price	Bid	Ask	Price	Bid	Ask	Price	Bid	Ask	Price	Bid	Ask					
12.4	12.4	12.4	12.2	60.0	283	40.7																											
12.1	12.1	12.1	12.1	57.6	11	37.5																											
11.9	11.9	11.9	12.0	55.1	11	34.2																											
11.7	11.7	11.7	11.8	52.5	838	31.0																											
11.5	11.5	11.5	11.7	49.8	845	28.0																											
11.3	11.3	11.3	11.6	47.0	76	25.2																											
11.1	11.1	11.1	11.5	44.1	779	25.2																											

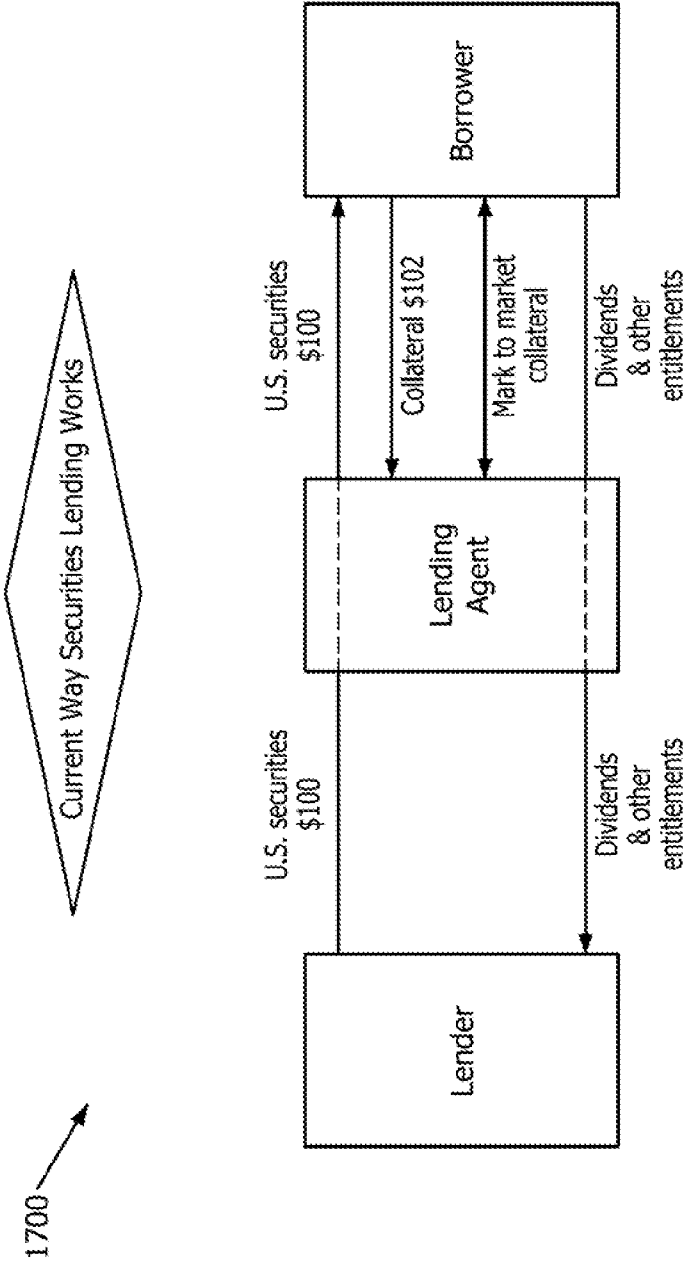
Order Entry	
<p>Contract: 12.4</p> <p>Quantity: 100</p> <p>Order Type: Limit</p> <p>Price: 63.00</p> <p>Day Order: ☒</p>	<p>Symbol: A.111</p> <p>Limit Price: 63.00</p> <p>Day Order: ☒</p> <p>Stop Order: ☐</p>

<p>Buy/Sell: Buy</p> <p>Price: 63.38</p> <p>Quantity: 72.2</p> <p>Commission: -23.31</p> <p>Total: 106.14</p>	<p>Sell Price: 63.75</p> <p>Quantity: 4</p> <p>Commission: 0.39</p> <p>Total: 23.31</p>
--	---

6
G
L

FIG. 17A

FIG. 17	
FIG. 17A	FIG. 17B

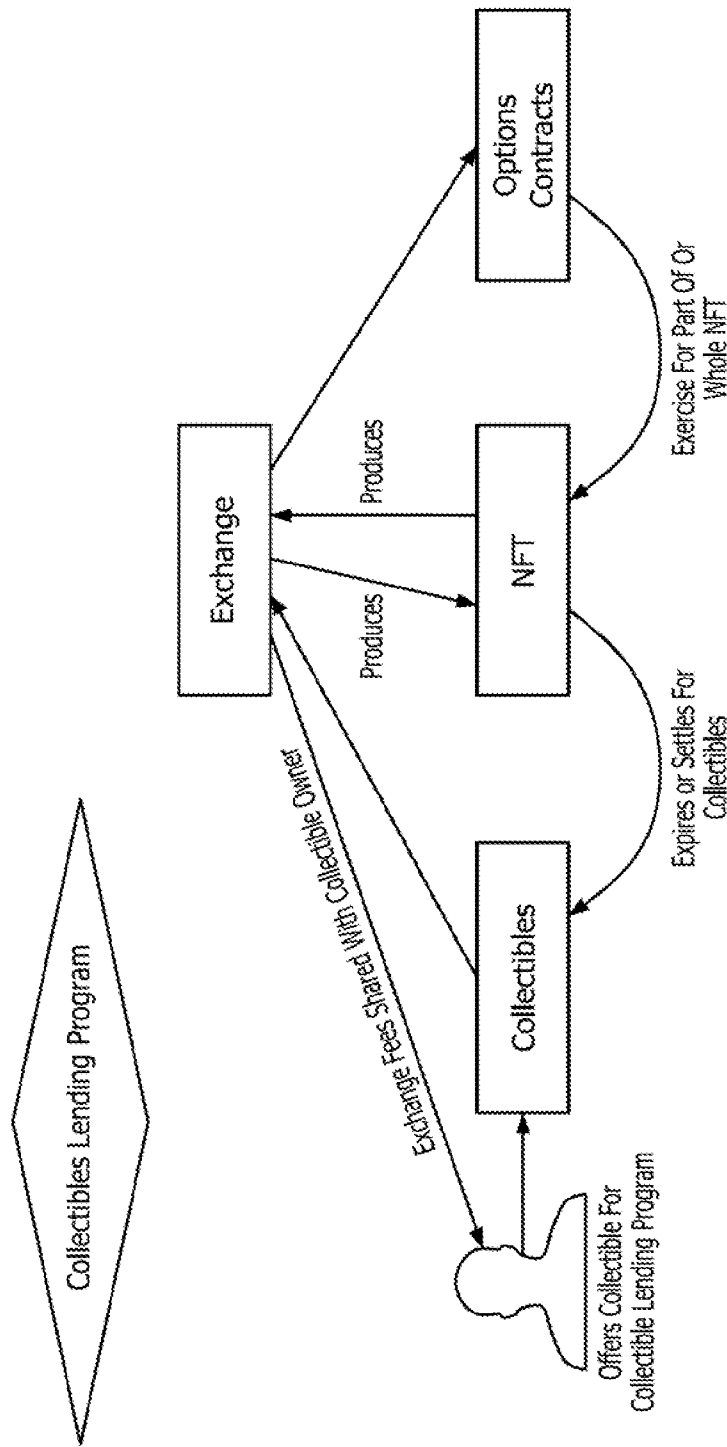


VS

To FIG. 17B

To FIG. 17B

From
FIG. 17A



From
FIG. 17A

FIG. 17B

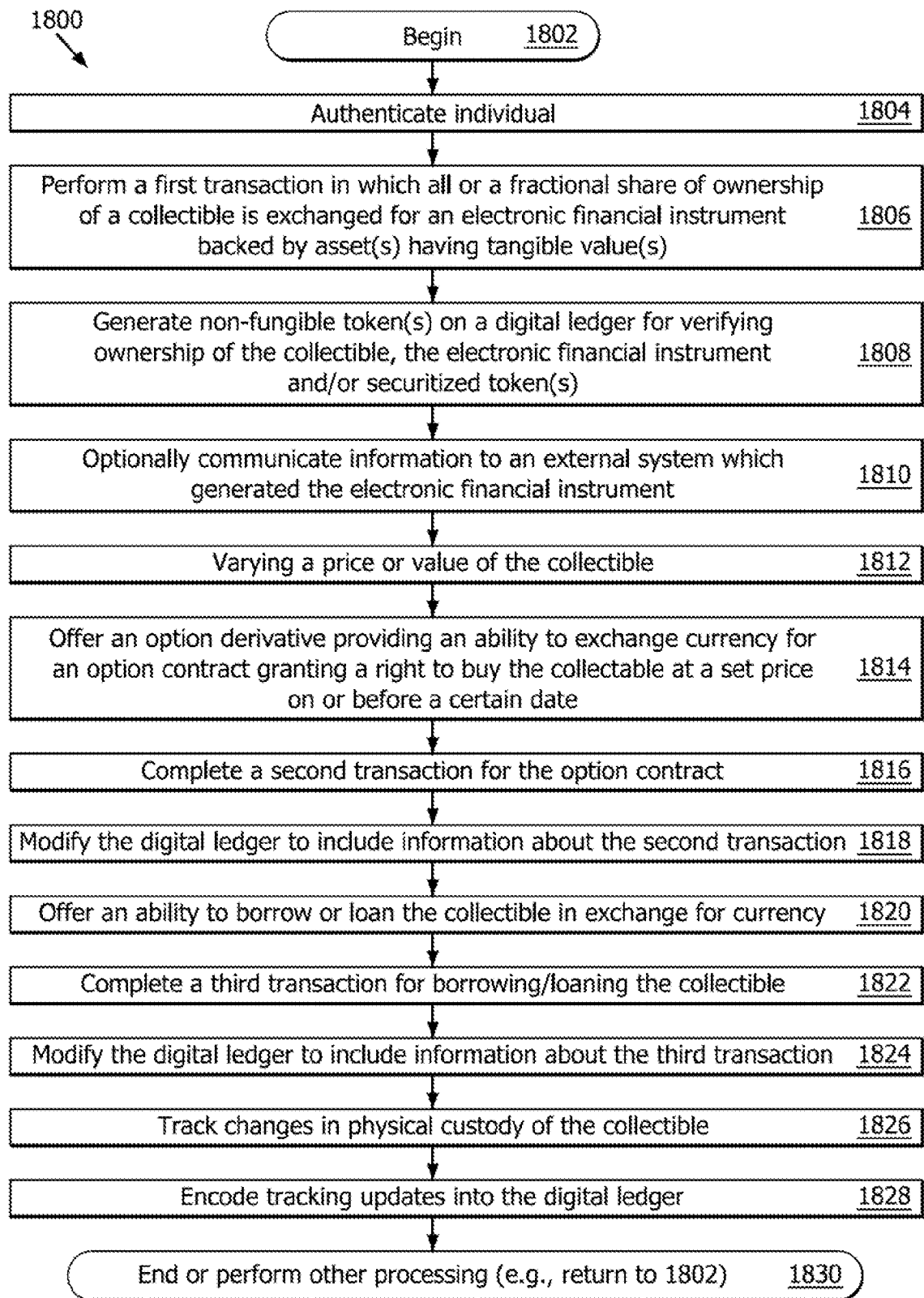


FIG. 18

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US23/28713

A. CLASSIFICATION OF SUBJECT MATTER

IPC - INV. G06Q 20/06; G06Q 20/36; H04L 9/32 (2023.01)

ADD. H04L 9/06 (2023.01)

CPC - INV. G06Q 20/06; G06Q 20/36; H04L 9/32

ADD. H04L 9/06

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)

See Search History document

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

See Search History document

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

See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2021/0133700 A1 (FORTE LAB INC) 06 May 2021; paragraph; [0004]; [0007]; [0032]; [0003]; [0010]; [0050]; [0051]; [0038]; [0009];	1-37
Y	US 11,075,891 B1 (THETA LAB INC) 27 July 2021; column 8, lines 8-11; column 3, lines 7-10; column 4, lines 23-26; column 8, lines 12; column 24, lines 5-8;	1-37
Y	US 2022/0122062 A1 (MAYBLUMN ET AL) 21 April 2022; paragraph; [0324]; [0160]; [0279]; [0316]; [0462]; [0277]; [0161]; [0360]; [0051]; [0012];	5-6, 10-14, 18-19, 24-33, 29-33, 18
Y	US 10,445,727 B1 (JPMORGAN CHASE BANK, N. A) 15 October 2019; column 14, lines 1-3; column 14, lines 17-20; column 14, lines 40-45	7-9, 26-28

☐ 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

"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"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)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"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

"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

"&" document member of the same patent family

Date of the actual completion of the international search

31 October 2023 (31.10.2023)

Date of mailing of the international search report

NOV 21 2023

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Authorized officer

Shane Thomas

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