(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
19 August 2021 (19.08.2021)

WIPO | PCT

(10) International Publication Number
WO 2021/163668 A1

(51) International Patent Classification:
G06Q 30/00 (2012.01) *H04L 9/32* (2006.01)

(21) International Application Number:
PCT/US2021/018127

(22) International Filing Date:
15 February 2021 (15.02.2021)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
62/975,845 13 February 2020 (13.02.2020) US

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

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

(54) **Title:** SYSTEMS AND METHODS FOR MARKING AND AUTHENTICATING SCARCE ITEMS

(57) **Abstract:** A system and method for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology. A unique Origination Hash is generated in accordance with specific characteristics unique to each item plus the Purchaser Identity and an Origination Secret provided by the User. A physical representation of the Origination Hash is produced and attached, embedded, or formed in a discrete location on an item. A Birth Certificate, including a HashPrint is generated from the Origination Hash and is written to the BITCOIN Blockchain to generate an immutable, time stamped record of the purchase of the specific item by the user. Access to a secure website allows for verification of user ownership, the authentication of items, the transfer of items, and an item's Status.

SYSTEMS AND METHODS FOR MARKING AND AUTHENTICATING SCARCE ITEMS

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This Application claims the benefit of U.S. Provisional Patent Application Ser. No. 62/975,845 filed February 13, 2020, and titled SYSTEMS AND METHODS FOR MARKING AND AUTHENTICATING SCARCE ITEMS, the disclosure of which is hereby incorporated by reference in its entirety into this application.

BACKGROUND OF THE INVENTION

[0002]

The present invention relates generally to anti-counterfeiting, authentication, manufacturing of rare articles, electronic communications, and association transference of unique articles between users and more specifically, it finds particular application in conjunction with electronic transactions between users and providers, particularly with respect to articles capable of authentication as to provenance and will be described with particular reference thereto.

[0003] According to the latest data available, the Organisation for Economic Co-operation and Development (OECD) estimates that trade in counterfeit and pirated products represented over 3.3% of all global trade in 2016. This is equivalent to over $500 billion annually. The study also documents that the growth of counterfeiting and pirating is accelerating at rapid pace. The OECD estimates that trade in fake goods represented about 2.5% of world trade in 2013. The risks associated with the trade in counterfeit goods are numerous and significant in an increasingly globalized and knowledge-based economy. In addition to the damage done to intellectual property rights, counterfeit goods can pose serious health and safety risks to consumers, particularly in the medical equipment, pharmaceutical, food and beverage, and garment industries. Trade in counterfeit goods steals revenues from companies and governments. It can also be a source of funds for any number of criminal enterprises.

[0004] Counterfeiters are attracted to this trade given the massive size of the markets, the high profit margins and the very low risk of detection. Despite the efforts of global organizations such as the OECD to protect trademarks, copyrights and intellectual property, there are limited tools or technologies available to assist their efforts.

[0005] Many consumers unwittingly purchase counterfeit or pirated products believing they are purchasing genuine articles. Others knowingly buy fake goods, attracted by the low price without regard for the quality or safety of the product. Internet based commerce platforms such as FACEBOOK, INSTAGRAM, EBAY, ETSY, etc. provide easy access to the markets for counterfeiters. Consumer interest in limited edition or production runs of articles of manufacture, such as shirts, shoes, collectibles, memorabilia, jewelry, etc. is increasing. In some instances, secondary markets have arisen in which these scarce items are being bought and sold. Unfortunately, a buyer is generally limited to the identity and reputation of the seller as being indicative of the authenticity of the product. The buyer generally cannot examine the article prior to purchase. Further, examination of the item by the buyer, unless the buyer is an expert, may not provide any indicia as to the authenticity of the item being purchased.

[0006] Currently, the inability of buyers, sellers, and manufacturers to provide proof of ownership or confirm the authenticity of items in the marketplace contributes to the proliferation of counterfeit and pirated items being made available to consumers. With no way to ascertain the authenticity, a presumably well-made counterfeit item would be indistinguishable from an authentic item and thus desirable for purchase by consumers.

[0007] Any discussion of the prior art throughout this specification should in no way be considered as an admission that such prior art is widely known or forms part of the general knowledge in the field. Current anti-counterfeit and authentication systems do not create scarcity, verify ownership and authenticity of unique items, nor verify provenance and other item details using cryptology and BITCOIN blockchain technology.

BRIEF SUMMARY OF THE INVENTION

[0008] Various details of the present disclosure are hereinafter summarized to provide a basic understanding. This summary is not an extensive overview of the disclosure and is neither intended to identify certain elements of the disclosure, nor to delineate the scope thereof. Rather, the primary purpose of this summary is to present some concepts of the disclosure in a simplified form prior to the more detailed description that is presented hereinafter.

[0009] In accordance with one aspect of the present disclosure, there is provided a method for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology that comprises generating, with a Hash Generator, an Origination Hash associated with a specific item, and generating a hash from the Origination Hash. The method further includes writing, with a Blockchain Writer, a Birth Certificate associated with the hash from the Origination Hash to the BITCOIN blockchain; and physically marking the specific item with the Origination Hash

[0010] In accordance with another aspect of the present disclosure there is provided a system for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology. The system includes a server computer system that comprises a processor, a Hash Generator, a Blockchain Writer, a Payment Monitor, and a memory in communication with the processor. The memory stores instructions which are executed by the processor, causing the processor to host a website accessible by a plurality of user devices via an associated computer network, and receive, via the website, user information associated with an item. The memory further stores instructions to generate, in accordance with the received user information, a unique Origination Hash via the Hash Generator, and generate, via the Hash Generator, a hash from the Origination Hash. In addition, the memory includes instructions to write, via the Blockchain Writer, a Birth Certificate associated with the hash from the Origination Hash to the BITCOIN blockchain.

[0011] In accordance with another embodiment, there is provided an article of manufacture comprising a physical Origination Hash affixed to the article.

[0012] In one embodiment, the physical Origination Hash affixed to the article is generated by an associated Hash Generator in accordance with SHA 256. In accordance with another embodiment, the article is selected from the group of an article of clothing, a pair of shoes, a collectible, a piece of jewelry, an accessory, a piece of memorabilia, or a luxury good.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The subject disclosure may take form in various components and arrangements of components, and in various steps and arrangement of steps. The drawings are only for purposes of illustrating the preferred embodiments and are not to be construed as limiting the subject disclosure.

[0014] FIGURE 1 is a functional block diagram of a system and method for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology in accordance with one aspect of the exemplary embodiment.

[0015] FIGURE 2 is a functional block diagram of a user device for use in the system and method for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology in accordance with one aspect of the exemplary embodiment.

[0016] FIGURE 3 is a functional block diagram of a manufacturer system for use in the system and method for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology in accordance with one aspect of the exemplary embodiment.

[0017] FIGURE 4 is a flowchart of an exemplary system and method for marking, validating ownership, and proving authenticity of items utilizing cryptology in accordance with one aspect of the exemplary embodiment.

[0018] FIGURE 5 is a flowchart of an exemplary system and method for verifying authenticity and tracking provenance of scarce items in accordance with one aspect of the exemplary embodiment.

[0019] FIGURE 6 is a flowchart of an exemplary method for Transferring Ownership of scarce items in accordance with one aspect of the exemplary embodiment.

[0020] FIGURE 7 is a flowchart of an exemplary method for reporting changes in Status of scarce items in accordance with one aspect of the exemplary embodiment.

[0021] FIGURE 8 is a flowchart of an exemplary method for verifying and ensuring the scarcity of items by a Sealing process in accordance with one aspect of the exemplary embodiment.

[0022] FIGURE 9 is an exemplary screenshot of an Origination Hash creation screen in accordance with one aspect of the exemplary embodiment.

[0023] FIGURE 10 an exemplary screenshot of a public authentication screen showing Retrieval Details in accordance with one aspect of the exemplary embodiment.

[0024] FIGURE 11A an exemplary screenshot of a private authentication screen showing Full Item Details in accordance with one aspect of the exemplary embodiment.

[0025] FIGURE 11B an exemplary screenshot of a screen showing Full Item Details in accordance with one aspect of the exemplary embodiment.

[0026] FIGURE 12 is an exemplary screenshot of an item Status change to In Transfer reporting screen in accordance with one aspect of the exemplary embodiment.

[0027] FIGURE 13 is an exemplary screenshot of a Transfer acceptance screen in accordance with one aspect of the exemplary embodiment.

[0028] FIGURE 14 is an exemplary screenshot of a change Status screen in accordance with one aspect of the exemplary embodiment.

[0029] FIGURE 15 is an exemplary screenshot of a revert Status screen in accordance with one aspect of the exemplary embodiment.

[0030] FIGURE 16 is an exemplary screenshot of a verification of Closing Seal screen in accordance with one aspect of the exemplary embodiment.

[0031] FIGURE 17 is an exemplary screenshot of a blockchain verification screen in accordance with one aspect of the exemplary embodiment.

[0032] FIGURE 18 is an exemplary screenshot of an Item Lost screen in accordance with one aspect of the exemplary embodiment.

[0033] FIGURE 19 is an exemplary screenshot of a Sealed Line in accordance with one aspect of the exemplary embodiment.

[0034] FIGURE 20 is an exemplary Merkel Tree Diagram of a Line in accordance with one aspect of the exemplary embodiment.

[0035] FIGURE 21 is an exemplary screenshot of a proof of ownership screen in accordance with one aspect of the exemplary embodiment.

[0036] FIGURE 22 is an exemplary screenshot of a proof of ownership after transfer screen in accordance with one aspect of the exemplary embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[0037] The exemplary embodiments are described herein with reference to preferred embodiments. Obviously, modifications and alterations will occur to others upon reading and understanding the preceding detailed description. It is intended that the exemplary embodiment be construed as including all such modifications and alterations insofar as they come within the scope of the appended claims or the equivalents thereof.

[0038] One or more implementations of the subject application will now be described with reference to the attached figures, wherein like reference numerals are used to refer to like elements throughout.

[0039] In varying embodiments disclosed herein, a system (“HashQuin”) provides a verification platform and methodology that provides luxury brands, scarce items, and consumers a mechanism to protect the value of their assets with irrefutable authentication. There are four core elements covered by the HashQuin methodology and processes. First, the system proves ownership. The fact that an individual possesses and controls an item cannot be disputed once the item is generated in the HashQuin system. Secondly, the system confirms an item’s authenticity; that fact that an item is genuine and of undisputed origin. The third element is HashQuin’s ability to verify provenance; the historical record of ownership of the item. This ensures that an item can be sold in a secondary transaction with a verifiable ledger of transactions. Finally, and very importantly, HashQuin verifies an item's scarcity. That is, an item can be proven to be of a certain lineage of a limited-edition item that cannot be reproduced. The result of securing these four attributes of an item is that counterfeits are easily identified and discredited. As used hereinafter, the terms "Item" and "item" are intended to identify a valuable/scarce item purchased or available for purchase by a user. Unless otherwise indicated, the terms may be used interchangeably to represent such an article, regardless of the type of article references, e.g., clothing, accessories, shoes, jewelry, collectibles, etc.

[0040] The HashQuin system utilizes specific definitions for terms and components. The following is illustrative of a listing of definitions corresponding to terms and components recited in varying embodiments of the systems and methods described herein, forms a part of this description, and is incorporated by reference in its entirety herein.

[0041] As used herein, the term "Origination Hash or OH" may be used as the identifying "fingerprint" of each item. The OH may be created by running the Origination Hash Item Details through an SHA 256 hashing function. The Origination Hash is the resulting output of this process and is a string of 64 characters that is unique to that item. The entire OH (or a subset of it) is physically placed/located on the inside of all HashQuin Verified Items. As will be understood in accordance with the systems and methods set forth below, the OH may be used to irrefutably tie the Item to the owner.

[0042] As used herein, the term "SHA 256" or "Secure Hash Algorithm 256" refers to the algorithm defined in FIPS 180-4, which is a mathematical equation that is utilized in various forms of encryption. As will be appreciated by those skilled in the art, SHA 256 may be used extensively to secure payments on e-commerce websites, as well as for various blockchain applications. SHA 256 is a mathematical process that always generates a 256 bit (64 character) long random sequence of letters and numbers, called a "hash" given any input. The input may be letters, numbers, words or even punctuation marks and may be of any length. SHA 256 is a one-way function meaning that the process cannot be reversed - the hash will never reveal the original input data.

[0043] As used herein, "Origination Hash Item Details" or "OHID" corresponds to the inputs used to create the Origination Hash. In accordance with one embodiment contemplated herein, the OHID may include, for example and without limitation the Line Name, Line Scarcity, Line Number, Lineage Number, Purchaser Identity and Origination Secret, as those terms are defined below.

[0044] As used herein, the term “Line” is used to designate a single category and color of clothing items, e.g., a black pullover hoodie, a pair of shoes, an article of jewelry, or other article of manufacture, i.e. a product line of goods.

[0045] The term “Line Name”, as used hereinafter, corresponds to a unique identity of a Line. That is, a first Line, e.g., a black pullover hoodie, may be given the Line Name “XXXX.” The Line Name (i.e., “XXXX”) may be one of the Origination Hash Item Details used to create the Origination Hash.

[0046] The term, “Line Scarcity”, as used herein, refers to the total number of items produced in a Line. According to one embodiment of the subject application, the number of items in each Line will be pre-determined and made known prior to its production. For example, since 210 items will be produced in the first Line, the Line Scarcity for the “XXXX” hoodie will be 210. The Sealing process and the creation of a Closing Seal for each Line ensures that the Line Scarcity remains immutable. The Line Scarcity may be one of the OHID used to create the OH .

[0047] As used herein , the term “Lineage Number” refers to the sequential number of the item within a Line. For example, the exemplary black pullover hoodie XXXX 207 will have Lineage Number 207. Lineage Number may be one of the OHID used to create the OH.

[0048] The term “Purchaser Identity” or “PI”, as used herein, refers to the name or the pseudonym created by a buyer of an item at the time of purchase. Purchaser Identity may be one of the OHID used to create the OH.

[0049] As used herein, the term “Origination Secret” or “OS” is used to refer to a password, code, biometric identifier, alphanumeric sequence, or the like, selected by the user at the time of purchase. Origination Secret may be one of the OHID used to create the OH.

[0050] The term “Full Item Details” or “FID” is used herein to refer to an exhaustive list of all the particular features of a specific item. In accordance with one embodiment of the subject disclosure, the FID may be accessible by entering the OH, PI and OS into the HashQuin website. In some embodiments, the FID may include the Status of an item.

[0051] As used hereinafter, the term “Retrieval Details” or “RD” corresponds to a list of basic details about a specific Item that may be accessible by entering at least one of the OH, the Origination Hash or the Latest OH into the HashQuin website. The Retrieval Details may be implemented as a subset of the details contained in the FID.

[0052] The term “Birth Certificate”, as used herein, corresponds to the documented credential that is visible on the blockchain generated when an item is purchased and the associated transaction is recorded on the Bitcoin blockchain. . According to one embodiment, the Birth Certificate may include the Origination Hash, the Birth Date, the Line Name and the Lineage

Number of the item. As will be appreciated by those skilled in the art, the Bitcoin blockchain comprises an immutable time stamp; wherein the “birth” of the Item may be commemorated.

[0053] As used herein, the term “Birth Date” corresponds to the time stamp information registered on the Bitcoin blockchain when an item is initially purchased. In accordance with one exemplary embodiment, the Birth Date is shown in UTC Time in ISO-8601 format. This is a 24-hour format referencing the Universal Time Coordinated standard. For example: January 14, 2020 at 1:08:32pm in New York City during Daylight Savings Time would be designated as 2020-01-14T18:08:32Z.

[0054] The term “Item History”, as utilized herein, represents the entire provenance of a specific item, listing all transfers of ownership beginning at the Birth Date. The IH may not include the OS. The IH may or may not include the PI as the current owner has the option to obfuscate this information during the Transfer process. The IH may include the item’s Origination Hash and subsequent Latest Origination Hash, if any.

[0055] The term “Hash Print” corresponds to the hash of the OH; i.e. it may be generated by running the OH though an SHA 256 hashing function. The Hash Print is included on an Item’s Birth Certificate and resides on the Bitcoin blockchain. It will be appreciated that because the Hash Print may only be determined with the input of the OH, the owner has discretion over the disclosure of an Item’s provenance and Birth Certificate. In one embodiment, the owner may maintain the OH as a secret; accordingly, in such an embodiment an Item’s Origination Hash cannot be determined. It will be appreciated, however, that the owner can reproduce the Hash Print at will.

[0056] “Status”, as used herein, refers to an Item’s present condition and may be ascertained when the OH or the Origination Hash is entered into the HashQuin website. According to one embodiment, the Status is not associated with a subjective measure of an Item’s physical condition. On HashQuin, an Item’s Status may be defined to be one of six specifically defined conditions as follows: “Exist”, “Does Not Exist”, “Compromised”, “Lost”, “Stolen”, “In Transfer”, as defined below.

[0057] The term “Exist” corresponds to the Item being present in the real-world. When the Origination Hash is entered for an Item, the Retrieve Details will be shown. When the OH is entered for an Item, the Full Item Details will be shown.

[0058] The term “Does Not Exist” corresponds to when the Item cannot be found in the database when either the OH or the Origination Hash is entered.

[0059] The term “Compromised” corresponds to when it is discovered that an item has been copied. This designation can be entered by the owner or by HashQuin administrators. Once an

Item's Status has been changed to Compromised, its Status cannot be changed by either the owner or a HashQuin administrator.

[0060] The term "Lost" corresponds to when the Item is declared missing by the last owner. If the owner later finds the Item, the owner or a HashQuin administrator is able to change the item's Status back to Exist.

[0061] The term "Stolen" corresponds to when the last owner declares the Item stolen. An Item with this Status is no longer transferable via the HashQuin platform. If the owner later recovers the Item, the owner or a HashQuin administrator is able to change the item's Status back to Exist.

[0062] The term "In Transfer" corresponds to when the Item is being transferred between parties.

[0063] As used herein, "Transferring Ownership" refers to a change in ownership of the Item within the HashQuin platform, preserving an Item's authenticity and provenance, thereby keeping intact the Item *History*. According to one embodiment, the process is accomplished jointly between the current owner ("Seller") and the prospective owner ("Buyer"). The transfer process (introduced in the definition of "Transfer" below) requires a number of steps to be executed on the HashQuin website. These include the creation of a Transfer Secret and hashes. The entire provenance of the Item is maintained via the HashQuin website, however the Buyer is the only one that can prove ownership once the Transfer is complete.

[0064] The term "Transfer Secret" or "TST", as used herein, corresponds to a secret (or password) created and shared by both the Buyer and Seller. In accordance with one embodiment, the TST may be required for use in the Transfer process in addition to the OH. Because the OH is physically visible on the item, the TST provides another layer of security in case the Item's physical delivery is intercepted.

[0065] As used herein, the term "Transfer" corresponds to the process used to assign ownership of an Item from a Seller to a Buyer. According to one embodiment contemplated herein, the Transfer is a multistage process involving the physical transfer of an Item either in-person or by mail or courier, the verification of the transfer, and the verification of the new owner through the generation of a new hash via the HashQuin website. This new hash is written to the Bitcoin Blockchain. This immutably time-stamps the Transfer of the Item. In accordance with one embodiment, HashQuin does not facilitate the physical exchange of the Item or any payments that may be involved. HashQuin only facilitates the identification and verification of the new owner in the HashQuin database. This occurs once both parties are satisfied that the payment and the Item have been successfully exchanged. By performing the Transfer utilizing the HashQuin system, the Buyer is authenticated as the new owner of the Item and the Item History, provenance, is updated and assured.

[0066] In accordance with one embodiment, the following example illustrates the Transfer of an Item and the corresponding actions that may occur during the transition of ownership from the Seller to the Buyer. The Seller provides the Buyer with a Transfer Secret and the Origination Hash of the item prior to initiating the Transfer process on the HashQuin website. The Origination Hash is provided so that the item's Retrieval Details can be viewed and accepted by the Buyer. HashQuin does not facilitate the exchange of this information between Buyer and Seller; it is accomplished on a communications platform agreed upon by the Buyer and the Seller.

[0067] On the website, the Seller must change the Status of an item to In Transfer. Once an item is designated as In Transfer, the Seller will be prompted to submit the OH, the Origination Secret, and the Transfer Secret thereby confirming ownership. The Seller will be given the option to obfuscate their Personal Identity so that this information will not be included in the Item History thereafter.

[0068] Once the Seller receives payment and the Buyer receives the item, the Transfer will be executed and the new owner will be verified on the HashQuin website as per the following process.

[0069] The Buyer will acknowledge and confirm possession of the item by entering the OH, the Transfer Secret, their own Purchaser Identity, and their own Origination Secret into the website. The Buyer will know the OH as it is physically printed on the inside of the item and is on a QR code label also located in the item. The OH, the new owner's Purchaser Identity, and the new owner's Origination Secret will be run through the SHA 256 function and the resulting hash will be the Latest Hash Print. The Latest Hash Print will be written to the Bitcoin Blockchain. The transaction will be shown in the Item History. The Buyer will now be recognized as the owner of the item and be able to provide proof of ownership.

[0070] As used herein, the term "Latest Hash Print" refers to the most recent hash of the OH, the Buyer's (the new owner) Purchaser Identity, and the Buyer's (the new owner) Origination Secret that is generated during the Transfer. According to one embodiment, the Latest Hash Print is time stamped and written to the Bitcoin blockchain as part of the Transfer process. It will be appreciated that the Latest Hash Print enables independent verification of an item's ownership and history. In such an embodiment, the Latest Hash Print is displayed in the Retrieval Details and the Item History.

[0071] The term "Hard Marker", as used herein, corresponds to a physical identifier that may be applied to each item. Hard Markers are indicators (for example, a painted spray pattern or tiny beads) of various shapes and colors applied in different locations on an Item. The type and location of an Item's Hard Marker is documented and included in the item's Full Item Details.

[0072] The term “Hard Identity” corresponds to the identification of an Item based upon the Hard Marker affixed to each Item. Each item may be physically “labeled” with one of various “Hard Markers” that will be unique to each item. Used in conjunction with the OH, the Hard Identity provides another level of security to an Item. The Hard Identity is discerned through the identification of a Hard Marker on an Item. The presence of a Hard Marker helps to verify an Item’s authenticity. It can only be confirmed by a HashQuin administrator.

[0073] As used herein, the term “Binding” corresponds to a process utilized when an “Item” is made up of two or more pieces, as in the case of a pair of shoes. Binding involves splitting the OH into pieces in order to link the parts of an item together cryptographically. In the example of a pair of shoes, the OH is split in two. The OH is a 64-character string of random letters and numbers. The first 32 characters of the OH can be applied on one shoe and the last 32 characters of the OH can be applied to the other shoe. The process links the separate parts of an item together forever and increases the security of the item’s authenticity.

[0074] The term “Sealing”, as used herein, corresponds to the process that may be used to permanently close a Line after the final item of the Line has been purchased. Every Line consists of a limited edition of items, as designated by Line Scarcity. The Sealing process ensures the Line can never be produced again, guaranteeing the Line Scarcity will never change.

[0075] The term “Closing Seal”, as used herein, corresponds to the encrypted confirmation of the closing of Line. According to one embodiment, the Closing Seal is generated by combining the Origination Hash of every Item in the Line in Lineage Number order and running it through the SHA 256 function. The resulting hash is the Closing Seal. Thereafter, it will be possible to confirm the total number and the lineage of the Items in the Line using either the OH or Hash Print of an Item in a Line. The Closing Seal is time stamped and written to the Bitcoin blockchain as part of the Sealing process. This allows for independent verification of an Item’s Lineage Number and the Line Scarcity.

[0076] As used herein, the term “Sealing Date” corresponds to the time stamp information registered on the Bitcoin blockchain when a Line’s Seal is created. The Sealing Date is shown in UTC Time in ISO-8601 format. This is a 24-hour format referencing the Universal Time Coordinated standard. For example: January 14, 2020 at 1:08:32pm in New York City during Daylight Savings Time would be designated as 2020-01-14T18:08:32Z.

[0077] Referring now to FIGURE 1, there is shown a system **100** configured for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology of scarce items in accordance with one embodiment of the subject application. As used herein, an item may include, for example and without limitation, an article of clothing, collectible, shoes, jewelry, accessory, memorabilia, luxury goods, and the like. It will be appreciated that the foregoing is intended as a non-exhaustive list of physical items capable of being marked and authenticated in accordance with the systems and methods described herein. Further, the systems and methods set forth herein, particularly on the user side, are intended to be platform-independent, i.e., access and use of the systems and methods by the user (device) may occur across different and/or multiple platforms and/or operating systems as known by those of skill in the art. It will be appreciated that the various components depicted in FIGURE 1 are for purposes of illustrating aspects of the exemplary embodiment, and that other similar components, implemented via hardware, software, or a combination thereof, are capable of being substituted therein.

[0078] As shown in FIGURE 1, the system **100** includes a HashQuin central system (generally referred to herein as “HashQuin Operations”) represented generally as the server computer system **102**, which is capable of implementing the exemplary method described below. The exemplary server computer system **102** includes a processor **124**, which performs the exemplary method by execution of processing instructions **128** that are stored in memory **126** connected to the processor **104**, as well as controlling the overall operation of the server computer system **102**. It will be appreciated that the system **100** illustrates a single server computer system **102**, however, the skilled artisan will appreciate that multiple such server computer systems **102** may be used herein to perform one or more of the operations discussed hereinafter. In accordance with other embodiments, a plurality of distinct server computer systems **102** are utilized, e.g., a third party cloud service, to implement the systems and methods set forth herein. According to one embodiment, the HashQuin Operations may include hardware as well as instructions/code on a remote cloud service (e.g., AWS) that control the processing of the system **100** as described below. In one such exemplary embodiment, operations may be written in Golang, a MariaDB database for information storage, and the like.

[0079] The instructions **128** include a HashQuin website **146** configured to host/display a website accessible by users via a computer network **101**, e.g., the Internet, LAN, VLAN, etc. In varying embodiments, the HashQuin website **146** is secured via known security protocols, utilizing Purchaser Identity (as used herein, the term “Purchaser Identity” shall be as defined in HashQuin - List of Terms) / Origination Secret combinations, as well as publicly accessible portions, or pages, providing general information to visitors regarding the services and items provided thereon. It will be appreciated that the HashQuin website **146** may be hosted by a third-party service provider (e.g., AMAZON WEB SERVICES (AWS), or similar provider), and thus may be hosted on a different device than the server **102** depicted in FIGURE 1. The website **146** may be implemented as, for example and without limitation, a Wordpress-based website, allowing users to interact with a HashQuin API **148**, and to purchase items **170** via a suitable WooCommerce plugin, as discussed in greater detail below. Accordingly, the skilled artisan will understand that the illustration of FIGURE 1 is intended as an example of one potential implementation of the subject systems and methods. In accordance with one embodiment, the website **146** may be accessed via a suitable web address, as will be understood by those skilled in the art. It will further be appreciated by the skilled artisan that the website **146** provides a suitable user interface enabling the users to interact with the various features and functions of the HashQuin system **100**. Exemplary illustrations of the interactions and screens accessible/provided by the website **146** are depicted in FIGURES 9-17, further described below.

[0080] According to one nonlimiting example embodiment, the HashQuin website **146** is a user interface (UI) that allows users to interact with various HashQuin functions. The website **146** is hosted on an ec2 instance in AWS. Once an item **170** has been purchased, users can employ the Hashquin website to retrieve a subset of details about their item, retrieve the full details about their item, transfer the ownership of an item, or change the Status of an Item **170**. HashQuin **102** has an API **148** that facilitates all of the actions taken by a user of the HashQuin website **146**. This API **148** is hosted on an ec2 instance on AWS. When a user attempts to interact with their item, for example, retrieve full item details, the HashQuin website **146** sends an API call to the HashQuin API **148**. The HashQuin API **148** then retrieves or updates data found in the HashQuin database **144**. The HashQuin API **148** then returns a response so that it can be viewed on the HashQuin website 146.

[0081] HashQuin **102** runs a Bitcoin node on an ec2 instance on AWS. This is hosted on the same ec2 instance as the Payment Monitor **158**, Blockchain Writer **159**, and Hash Generator **150**. The Blockchain Writer **159** sends an RPC call to this node, which in turn writes the information to the Bitcoin blockchain **122**. Users are able to look up their item **170** in two ways. The first method provides the Retrieval Details. By entering a valid Hash Print **155**, an API call is performed, HashQuin **102** looks up the Hash Print **155** in the database **144**, and if there is a match, it returns the Retrieval Details to the user. The second method requires the user to enter the Hash Print **155** and also the Origination Secret. An API call is performed. The database **144** is checked for the supplied hash **152** and then is checked to ensure that the Origination Secret matches the information in the database **140** for this item **170**. If there is a match, a complete set of item details is returned to the user.

[0082] Users can also use the HashQuin website **148** to change the status of an item **170** in the event that an item’s identity is compromised (duplicated or counterfeited) or if an item **170** was lost or stolen. The user enters the Hash Print **155** and the Origination Secret and HashQuin **102** checks the database **144** to confirm if there is a match. If there is a match, the item's status is updated in the database **144**. Any subsequent requests for item details will return an additional notation that the item's Status has been changed. Users can also transfer ownership of their item **170**. This process requires both the Seller and the Buyer to enter specific information. An API call is made. If the specific information supplied by the Seller specific information supplied by the Buyer, the database **144** is updated with the new owner's information. The new owner can now verify ownership using the website **146** in accordance with the methods set forth herein. It will be understood that the preceding example is one possible interaction with the various components disclosed herein, and other interactions are contemplated.

[0083] The instructions **128** further include a HashQuin Application Program Interface (API) **148** configured to enable a user to access information via the website **146** relating to items **170**, authentication, ownership, transfer of ownership, purchases, and the like. The skilled artisan will appreciate that the API **148** may be implemented in varying forms and capabilities to control the passage of information between the website **146,** the Blockchain Writer **159,** the Hash Generator **150,** the Payment Monitor **158,** and the Database **144**. In accordance with one embodiment, the API **148** returns information from the Database **144** requested by the website **146** or updates data based on inputs from the website **146**. In varying embodiments contemplated herein, the API **148** facilitates the control of the passage of information between the website **146**, the operations of the system **100**, and the BDS instance.

[0084] Included in the instructions **128** of the server **102** is a Hash Generator **150** configured to generate a unique Origination Hash **152** for an item **170** purchased by a user in accordance with the systems and methods set forth in the subject application. As illustrated in FIGURE 1, the Hash Generator **150** is configured to generate an Origination Hash **152**, a Hash Print **155**, a Closing Seal **156**, and a Latest Hash Print **157** associated with a unique item **170**. The Origination Hash **152** is generated using the Origination Hash Item Details OHID utilizing item information, user information **160**, order information **162**, and the like. It will be appreciated that the Origination Hash **152** may be a series of alphanumeric characters uniquely identifying a specific item **170** in accordance with the systems and methods set forth herein. Stated another way, the Hash Generator **150** employs a set of instructions that are executed to create an alphanumeric, cryptographic signature called a hash. Additional information regarding the generation of the Origination Hash **152**, the Hash Print **155**, Closing Seal **156** and /or Latest Hash Print **157** are discussed in greater detail below.

[0085] The instructions **128** further include a Payment Monitor **158** configured to process, monitor, and facilitate payment for the scarce item **170** acquired by the user in accordance with the systems and methods described herein. According to one embodiment, the Payment Monitor **158** is configured to monitor both BITCOIN and credit card payments. The Payment Monitor **158** may be implemented to routinely perform API calls to a suitable eCommerce component, e.g. WooCommerce or other suitable processing component/plugin as will be understood by those skilled in the art. In some embodiments, the API calls may check for items **170** for which payment has been successfully received. Further, the Payment Monitor **158** may be configured to identify new item purchases, parsing of item details, and recording of the payment information to the Database **144**.

[0086] As illustrated in FIGURE 1, the instructions **128** also include a Blockchain Writer module **159** configured to interact with the BITCOIN blockchain **122**. In particular, the Blockchain Writer **159** may utilize suitable software/hardware components, e.g., packages for btcsuite, to write the Birth Certificate **154** and the Closing Seal **156** to the BITCOIN blockchain **122**, as described in greater detail below in discussion of FIGURE 4 and FIGURE 8, respectively.

[0087] The various components of the server computer system **102** may all be connected by a data/control bus **130**. The processor **124** of the server computer system **102** is in communication with an associated Database **144** via a link **138**. A suitable communications link **138** may include, for example, the public switched telephone network, a proprietary communications network, infrared, optical, or other suitable wired or wireless data communications. The Database **144** is capable of implementation on components of the server computer system **102**, e.g., stored in local memory **126**, i.e., on hard drives, virtual drives, or the like, or on remote memory accessible to the server computer system **102**.

[0088] The associated Database **144** corresponds to any organized collections of data (e.g., account information, images, videos, item information, user information, user device information, transaction information, etc.) used for one or more purposes. Implementation of the associated Database **144** is capable of occurring on any mass storage device(s), for example, magnetic storage drives, a hard disk drive, optical storage devices, flash memory devices, or a suitable combination thereof. The associated Database **144** may be implemented as a component of the server computer system **102**, e.g., resident in memory **126**, or the like.

[0089] In one embodiment, the associated Database **144** may include data corresponding to user information **160**, order information **162**, Item History **168**, TxID **164**, Status **166** and other corresponding data, e.g., website data hosted by the server computer system **102**, URLs of item manufacturers, item listings, price information, and the like. The user information **160** may include, for example, Purchaser Identity, billing information, device **104A-104B** identification, address (billing, delivery, etc.), Origination Secrets, and the like. Such user information **160** may be collected by the server computer system **102** during user registration of a user device **104A**, **104B**, etc., during registration of the associated user, during item purchase, etc., as will be appreciated by those skilled in the art. The Database **144** may include data relating to order information, for example, instructions on the payment method, amount paid/to be paid, delivery information, billing information, authorization information, quantity, or any myriad additional information relating to the ordering and purchasing of a scarce item/ **170**.

[0090] The server computer system **102** may include one or more input/output (I/O) interface devices **132** and **134** for communicating with external devices. The I/O interface **134** may communicate, via communications link **136**, with one or more of a display device **140**, for displaying information, such estimated destinations, and a user input device **142**, such as a keyboard or touch or writable screen, for inputting text, and/or a cursor control device, such as mouse, trackball, or the like, for communicating user input information and command selections to the processor **104**. The I/O interface **132** may communicate, via communications link **118**, with external devices **104A**, **104B**, BITCOIN blockchain **122**, item manufacturer/warehouse system **110** via a computer network **101**, e.g., the Internet.

[0091] It will be appreciated that the system and method for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology **100** is capable of implementation using a distributed computing environment, such as a computer network, which is representative of any distributed communications system capable of enabling the exchange of data between two or more electronic devices. It will be further appreciated that such a computer network includes, for example and without limitation, a virtual local area network, a wide area network, a personal area network, a local area network, the Internet, an intranet, or any suitable combination thereof. Accordingly, such a computer network comprises physical layers and transport layers, as illustrated by various conventional data transport mechanisms, such as, for example and without limitation, Token-Ring, Ethernet, or other wireless or wire-based data communication mechanisms. Furthermore, while depicted in FIGURE 1 as a networked set of components, the system and method are capable of implementation on a stand-alone device adapted to perform the methods described herein.

[0092] The server computer system **102** may include one or more of a computer server, workstation, personal computer, cellular telephone, tablet computer, pager, combination thereof, or other computing device capable of executing instructions for performing the exemplary method.

[0093] According to one example embodiment, the server computer system **102** includes hardware, software, and/or any suitable combination thereof, configured to interact with an associated user, a networked device, networked storage, remote devices, or the like.

[0094] The memory **126** may represent any type of non-transitory computer readable medium such as random access memory (RAM), read only memory (ROM), magnetic disk or tape, optical disk, flash memory, or holographic memory. In one embodiment, the memory **126** comprises a combination of random access memory and read only memory. In some embodiments, the processor **104** and memory **126** may be combined in a single chip. The network interface(s) **132**, **134** allow the computer to communicate with other devices via a computer network, and may comprise a modulator/demodulator (MODEM). Memory **126** may store data processed in the method as well as the instructions for performing the exemplary method.

[0095] The digital processor **104** can be variously embodied, such as by a single core processor, a dual core processor (or more generally by a multiple core processor), a digital processor and cooperating math coprocessor, a digital controller, or the like. The digital processor **104**, in addition to controlling the operation of the server computer system **102**, executes instructions **128** stored in memory **126** for performing the method set forth hereinafter.

[0096] As shown in FIGURE 1, one or more user devices **104A** and **104B** may be in communication with the server computer system **102** via respective communication links **112** and **114**, utilizing the computer network **101**, e.g., the Internet. In one embodiment, each user device **104A** and **104B** may be implemented as a smartphone employing an operating system such as iOS, ANDROID, BLACKBERRY, WINDOWS, APPLE, CHROME, or the like. However, it is to be appreciated that the user devices **104A-104B** are representative of any personal computing devices, such as personal computers, netbook computers, laptop computers, workstation computers, personal data assistants, web-enabled cellular telephones, tablet computers, proprietary network devices, or other web-enabled electronic devices. The data communications links **112-114** between the server computer system **102** and the user devices **104A-104B** may be accomplished via any suitable channel of data communications such as wireless communications, for example Bluetooth, WiMax, 802.11a, 802.11b, 802.11g, 802.11(x), a proprietary communications network, infrared, optical, the public switched telephone network, or any suitable wireless data transmission system, or wired communications. In one embodiment, the user devices **104A-104B** may communicate with the server computer system **102** via a cellular data network.

[0097] FIGURE 2 provides an example illustration of a user device **104** representative of the user devices **104A-104B** depicted in FIGURE 1. It will be appreciated that the image presented in

FIGURE 2 is representative of any suitable personal computing device known in the art capable of providing a user with access to the Internet and/or the ability to interact with other electronic devices. Accordingly, while depicted in FIGURE 2 as a representative mobile device, any personal computing device may be utilized in accordance with the systems and methods set forth herein. The user device **104** may include a processor **202**, which executes one or more instructions or applications **216** in the performance of an exemplary method discussed below. In accordance with one embodiment, the application **216** includes a thin client interface **218** capable of accessing and displaying websites, such as the HashQuin website **146** of the subject embodiments. Suitable non-limiting examples of a thin client interface **218** include, Safari, FireFox, Edge, Dolphin, Chrome, and other such "Internet Browsers" enabling accessing, displaying, and interacting with remote server hosted pages. The skilled artisan will appreciate that such a thin client interface **218** may be adaptable to myriad communication protocols, for both the secure and public transmission and display of information.

[0098] It will further be appreciated that the application **216** may be a dedicated "App" installed on the user device **104**. In such embodiments, the application **216** is suitably platform independent, e.g., adapted for use across different platforms/operating systems, as will be understood by those skilled in the art. The user device **104** may further include a memory **204** storing the application **216** in data communication with the processor **202** via a system bus **206**. The processor **202** of the user device **200** may be in data communication with the server computer system **102** via an I/O interface **212** or I/O interface **210**. The user device **104** may further include a display **208** suitably configured to display data to an associated user, receive input from the associated user, and the like. In some embodiments, for example, when part of a mobile device or tablet, the display **208** of the user device **104** may be configured as a touch-screen display capable of receiving user instructions via user contact on the display, e.g., LCD, AMOLED, LED, RETINA, etc., types of touch-screen displays. Alternatively, when the user device **104A-104B** is implemented as a desktop or laptop computer or smart TV, the I/O interface **212** or **210** may be coupled to an input device (keyboard/mouse/touchpad/remote), as well as an output device, e.g. a display (monitor), speakers, and the like.

[0099] The memory **204** may represent any type of non-transitory computer readable medium such as random access memory (RAM), read only memory (ROM), magnetic disk or tape, optical disk, flash memory, or holographic memory. In one embodiment, the memory **204** comprises a combination of random access memory and read only memory. In some embodiments, the processor **202** and memory **204** may be combined in a single chip. The input/output interface(s) **210**, **212** allow the user device **104** to communicate with other devices via a communications network, via Universal Serial Bus or Lightning® ports, via wired or wireless connections, and may comprise a modulator/demodulator (MODEM). Memory **204** may store data processed in the method as well as the instructions for performing the exemplary method. The digital processor **202** can be variously embodied, such as by a single core processor, a dual core processor (or more generally by a multiple core processor), a digital processor and cooperating math coprocessor, a digital controller, or the like.

[00100] As shown in FIGURE 2, the user devices **104A-104B** are capable of intermittent (opportunistic) or continuous bi-directional communication with the central computer system **102** utilizing the I/O interface **212**. In one embodiment, for example when the user device **200** is implemented as a mobile device, the bi-directional communication is data communication utilizing a cellular data network, e.g., 3rd generation mobile phone standards (3G), 4th generation standards (4G, 4G LTE, WiMax), EV-DO, standalone data protocols, and the like. The user device **104A-104B** may provide user information **160** to the server computer system **102** during registration therewith, e.g. during registration via the website **146**. The server computer system **102** may then register the user associated with the user device **104A-104B**. The user device **104** depicted in FIGURE 2 further includes an image capture component **214**, e.g., camera, lens, etc., in communication with the processor **202** and memory **204** via the bus **206**. In varying embodiments, the image capture component **214** is configured to capture an image of the physical representation of an Origination Hash/QR Code **172** (e.g., QR code, Origination Hash **152**) physically affixed or embedded on the item **170**. According to such an embodiment, the image captured by the component **214** may be processed via the user device **104A-104B** to retrieve the corresponding alphanumeric symbols of the Origination Hash **152**, is sent to the server computer system **102** via the website **146** for processing thereon, or some combination there between.

[00101] As shown in FIGURE 1, the system **100** further includes an item manufacturer/warehouse **110** in communication with the server computer system **102** via the computer network **101**. The item manufacturer/warehouse **110** (hereinafter "item manufacturer **110**), as will be appreciated by the skilled artisan, is representative of a storage facility storing scarce items **170**, a manufacturer of scarce items **170**, or a combination thereof. For example, the item manufacturer **110** may function as a single entity, producing both the finished item **170** and the Origination Hash/QR Code **172**, storing previously produced items **170** and manufacturing the Origination Hash/QR Code **172** to be adhered thereto, storing the items **170** and receiving a Origination Hash/QR Code **172** from the system **102** for attachment thereto, a distribution venue, or any suitable combination thereof. According to one embodiment, the item manufacturer **110** is communicatively coupled to the computer network **101** via a suitable communications link **116**. As will be appreciated by those skilled in the art, the communications link **116** may include, for example, the public switched telephone network, a proprietary communications network, infrared, optical, or other suitable wired or wireless data communications.

[00102] In accordance with one embodiment, the item manufacturer **110** is configured to receive order information **162** from the server computer system **102** regarding a particular purchase of an item **170**. The item manufacturer **110** then processes the order information **162** and identifies the item **170** to be manufactured or retrieved. The item manufacturer **110** then produces an Origination Hash/QR Code **172** corresponding to the Origination Hash **152** associated with the order information **162**. Preferably, the Origination Hash **152** is received securely from the server computer system **102** in association with the corresponding order information **162**. The item manufacturer **110** then attaches the Origination Hash/QR Code **172** to the item **170**, and dispatches the item **170** to the purchaser or server computer system **102** location for subsequent delivery to the purchaser. It will be understood that the location of the Origination Hash/QR Code **172** on the item **170** depends upon the type of item **170**, such that the Origination Hash/QR Code **172** may be located inside a shoe, under a cuff (article of clothing), inside a seam (article of clothing), on a clasp (jewelry/watch), and the like. In varying embodiments, the Origination Hash/QR Code **172** is located in a discrete position on the item **170**, known to the owner and whomever the owner wishes to share. Alternatively, the Origination Hash/QR Code **172** may be positioned/affixed on the item **170** in a conspicuous place, providing an indication to any viewer as to the authenticity of the item **170**.

[00103] Turning now to FIGURE 3, there is shown an illustrative block diagram of a suitable manufacturer computer system **300** of the item manufacturer **110** in accordance with one embodiment of the subject application. The various components of the manufacturer computer system **300** may be connected by a data/control bus **306**. The processor **302** of the manufacturer computer system **300** is in communication with an associated Database **320** via a link **314**. A suitable communications link **314** may include, for example, the public switched telephone network, a proprietary communications network, infrared, optical, or other suitable wired or wireless data communications. The Database **320** is capable of implementation on components of the manufacturer computer system **300**, e.g., stored in local memory **304**, i.e., on hard drives, virtual drives, or the like, or on remote memory accessible to the manufacturer computer system **300**.

[00104] The associated Database **320** is representative of any organized collections of data (e.g., account information, images, videos, item information, user information, item information, transaction information, etc.) used for one or more purposes. Implementation of the associated Database **320** is capable of occurring on any mass storage device(s), for example, magnetic storage drives, a hard disk drive, optical storage devices, flash memory devices, or a suitable combination thereof. The associated Database **320** may be implemented as a component of the manufacturer computer system **300**, e.g., resident in memory **304**, or the like. In one embodiment, the associated Database **320** may include data corresponding to an Origination Hash **152**, order information **162**, item catalog, manufacturing instructions, inventory information (e.g., quantity, location, etc.), shipping information, device control information, price information, and the like.

[00105] The manufacturer computer system **300** may include one or more input/output (I/O) interface devices **324** and **326** for communicating with external devices. The I/O interface **326** may communicate, via communications link **312**, with one or more of a display device **316**, for displaying information, such estimated destinations, and a user input device **142**, such as a keyboard or touch or writable screen, for inputting text, and/or a cursor control device, such as mouse, trackball, or the like, for communicating user input information and command selections to the processor **104**. The I/O interface **132** may communicate, via communications link **322**, with external devices such as the server computer system **102**, the Origination Hash physical production device **310**, via a computer network **101**, e.g., the Internet.

[00106] It will be appreciated that the item manufacturer **110** illustrated in FIGURE 3 is capable of implementation using a distributed computing environment, such as a computer network, which is representative of any distributed communications system capable of enabling the exchange of data between two or more electronic devices. It will be further appreciated that such a computer network includes, for example and without limitation, a virtual local area network, a wide area network, a personal area network, a local area network, the Internet, an intranet, or any suitable combination thereof. Accordingly, such a computer network comprises physical layers and transport layers, as illustrated by various conventional data transport mechanisms, such as, for example and without limitation, Token-Ring, Ethernet, or other wireless or wire-based data communication mechanisms. Furthermore, while depicted in FIGURE 3 as a networked set of components, the item manufacturer **110** and is capable of implementation on a stand-alone device adapted to interact with the system **100** described herein.

[00107] The manufacturer computer system **300** may include one or more of a computer server, workstation, personal computer, cellular telephone, tablet computer, pager, combination thereof, or other computing device capable of executing instructions for performing the exemplary method.

[00108] According to one example embodiment, the server computer system **102** includes hardware, software, and/or any suitable combination thereof, configured to interact with an associated user, a networked device, networked storage, remote devices, or the like.

[00109] The memory **304** may represent any type of non-transitory computer readable medium such as random access memory (RAM), read only memory (ROM), magnetic disk or tape, optical disk, flash memory, or holographic memory. In one embodiment, the memory **304** comprises a combination of random access memory and read only memory. In some embodiments, the processor **302** and memory **304** may be combined in a single chip. The network interface(s) **324**, **326** allow the computer to communicate with other devices via a computer network, and may comprise a modulator/demodulator (MODEM). Memory **304** may store data processed in the method as well as the instructions for performing the exemplary method.

[00110] The digital processor **302** can be variously embodied, such as by a single core processor, a dual core processor (or more generally by a multiple core processor), a digital processor and cooperating math coprocessor, a digital controller, or the like. The digital processor **302**, in addition to controlling the operation of the manufacturer computer system **300**, executes instructions **306** stored in memory **304** for performing the method set forth hereinafter. In accordance with one embodiment contemplated herein, the instructions **306** include a print engine **308** configured to receive the Origination Hash **152** and operate the Origination Hash physical production device **310** to produce (e.g., print, form, mold, or otherwise manufacture) the Origination Hash/QR Code **172** to be affixed to the item **170**. The skilled artisan will appreciate that the print engine **308** comprises hardware, software and/or a combination thereof configured to control a printing device i.e., the physical production device **310** (e.g., inkjet, fabric, loom, injection molding, 3D printer, etc.) to generate a physical representation **172** of the Origination Hash **152**. Suitable examples may include, without limitation, a plastic/rubber tag, fabric tag, metal tag, or the like, depicting either the alphanumeric characters of the Origination Hash **152** or a QR code of the Origination Hash **152**.

[00111] The Origination Hash/QR Code **172** is thereafter affixed to the item **170** via any suitable means, e.g., sewn, stamped, formed directly on, glued, or otherwise attached to the item **170**. The location of the Origination Hash/QR Code **172** is dependent upon the material of the Origination Hash/QR Code **172** as well as the type of item **170** being so authenticated. In some embodiments, the Origination Hash/QR Code **172** is readily located on the item **170** and visible to even the casual observer. In other embodiments, the Origination Hash/QR Code **172** is discretely located, wherein only the owner the item **170** (interested buyer, authentication experts, etc.) is capable of locating such hash **172**.

[00112] The term "software," as used herein, is intended to encompass any collection or set of instructions executable by a computer or other digital system so as to configure the computer or other digital system to perform the task that is the intent of the software. The term "software" as used herein is intended to encompass such instructions stored in storage medium such as RAM, a hard disk, optical disk, or so forth, and is also intended to encompass so-called "firmware" that is software stored on a ROM or so forth. Such software may be organized in various ways, and may include software components organized as libraries, Internet-based programs stored on a remote server or so forth, source code, interpretive code, object code, directly executable code, and so forth. It is contemplated that the software may invoke system-level code or calls to other software residing on a server or other location to perform certain functions.

[00113] In accordance with another aspect of the present disclosure and with reference to FIGURE 4, a flowchart of an exemplary method **400** for marking and authenticating scarce items is provided. In particular, FIGURE 4 illustrates the initial purchase and creation of an item **170** in accordance with the system and method set forth herein. In some embodiments, the method **400** is implemented as a software program on a computing device. In other embodiments, the method **400** is implemented as a plug-in platform for use with other applications (third party web-based applications or mobile applications).

[00114] The exemplary method **400** of FIGURE 4 begins at **402** with the server system **102** receiving user information **160** from a user of an associated user device **104A** via the computer network **101**. In some implementations, the user information **160** includes a name, address, payment information, Purchaser Identity, Origination Secret or other identifying information associated with the user and/or user device **104A**. Preferably, this information **160** is received via interactions of the user and the website **146** accessed via the thin client interface **218** on the corresponding user device **104A**.

[00115] At **404**, the server computer system **102** receives, via the website **146**, item selection from the associated user of a particular item **170** available for authentication and purchase. Payment is received from the user device **104A** at **406** via the computer network **101** by the Payment Monitor **158** of the server computer system **102**. It will be understood that the payment received by the Payment Monitor **158** may be in the form of credit card payment (utilizing a third-party payment processor or suitable plugin component, e.g., the Stripe plugin for WooCommerce), BITCOIN payment, gift card payment, or the like. In some embodiments, when

BITCOIN is tendered as the payment method, the Payment Monitor **158** may access a self-hosted (i.e. on the server computer system **102**) instance of a BTCPay Server (an open-source project). The user is then prompted, at **408**, to input the Purchaser Identity and an Origination Secret, as illustrated in the screenshot **900** of FIGURE 9, depicting a displayed image from the website **146**.

[00116] The Hash Generator **150** then generates an Origination Hash **152** to uniquely identify the item **170** at **410**. According to one embodiment, to generate the Origination Hash **152** for unique identification of the item **170**, the Hash Generator **150** takes the Origination Hash Item Details entered by the user during purchase to generate an SHA-256 hash in accordance with the FIPS 180-4 algorithm. Concurrently at **410** with the generation of the Origination Hash **152** is the generation of a QR code, which allows users to more easily enter/lookup the OH **152** associated with a particular item **170**. At **412**, the Hash Generator **150** generates a Hash Print **155**. The Hash Print **155** is an SHA-256 hash of the Origination Hash **152** .

[00117] The Birth Certificate **154** is then written to the BITCOIN blockchain **122** at **414** by the Blockchain Writer **159** of the server computer system **102**. The skilled artisan will appreciate that the methods described hereinafter regarding writing to the blockchain **122** utilize specific programs for purposes of illustrating an example methodology to perform the writing. Accordingly, other programs and procedures may be used in addition to or in place of these example implementations. Thus, one of ordinary skill in the art will appreciate that the following description is non-limiting and intended to illustrate one possible method, and that other methods, not described, are included in the subject application. The Blockchain Writer **159** utilizes “Script”, a scripting language used within the Bitcoin protocol. In particular, it utilizes “OP_RETURN”, a script opcode that allows a transaction to contain 80 bytes of arbitrary data in a BITCOIN transaction. The Blockchain Writer **159** may also include a copy of “bitcoind”, a program utilized to allow Remote Procedure Calls (RPC) to be made. The Blockchain Writer **159** monitors the databases **144** for items **170** that have been identified as paid by the Payment Monitor **158**. The Blockchain Writer **159** checks to ensure that the Birth Certificate **154** has been generated for the item **170**, and then the item enters a FIFO queue.

[00118] An RPC connection to bitcoind is established by the Blockchain Writer **159**, which then performs a “listunspent” call to retrieve a list of Unspent Transactions (UTXOs). A UTXO is selected, and then the number of confirmations for the selected UTXO is checked. If the number of confirmations is less than 3, it moves onto the next UTXO in the list and checks the number of confirmations. If the entire list of UTXOs is exhausted without finding a UTXO with 3 or more confirmations, the item **170** remains in the queue, and the Blockchain Writer **159** continues to check the list of UTXOs until it finds a UTXO with sufficient confirmations. Once a suitable UTXO is selected, the Blockchain Writer **159** performs an “estimatesmartfee” RPC call to determine what fee must be paid for a 1 KB transaction to ensure it is confirmed within a timely fashion. The skilled artisan will appreciate that the fee referenced herein is payable to the BITCOIN blockchain **122**. The Blockchain Writer **159** then multiplies this fee by the size (bytes) of a HashQuin transaction to determine the proper fee amount.

[00119] The Blockchain Writer **159** then performs a “getrawchangeaddress” call to retrieve a change address for the transaction. In order to ensure the system **100** does not lose excess funds, the Blockchain Writer **159** subtracts the previously determined fee from the amount of BITCOIN associated with the selected UTXO. The difference is then stored as the “change” amount for this transaction in the associated Database **144**.

[00120] A safety check is then performed by the Blockchain Writer **159** to ensure that the Birth Certificate **154** is under the 80 byte maximum for OP_RETURN data. If it exceeds this amount, an error is raised and the process is aborted. The chance of this is unlikely due to other checks commonly occurring during the movement of data, (e.g., checksums, etc.) performed by the Hash Generator **150**, as will be appreciated by those skilled in the art. The Blockchain Writer **159** then begins the process of creating a raw transaction. To do so, the Blockchain Writer **159** generates an Input from the transaction ID **164** (TxID) and Vout of the stored UTXO.

[00121] Next, the Blockchain Writer **159** determines an Output from the change address, the change amount, and data associated with the Birth Certificate **154**. The Input and Output are then combined by the Blockchain Writer **159** to generate a JavaScript Object Notation (JSON) representation of the transaction. The Blockchain Writer **159** then performs a “createrawtransaction” RPC call using the JSON. Thereafter, the blockchain writer **159** performs a “signrawtransactionfromwallet” RPC call, which returns a hexadecimal representation of the signed transaction. This hexadecimal representation is then marshaled into JSON, and a “sendrawtransaction” RPC call is performed by the Blockchain Writer **159** using this JSON representation of the signed raw transaction. The result of this call is that the TxID **164** of the transaction has been written to the BITCOIN blockchain **122**. At this point, the item **170** is updated in the Database **144** with the TxID **164**, so that users can easily find the Birth Certificate **154** associated with their item **170** on the BITCOIN blockchain **122**. An example illustration of the BITCOIN blockchain **122** is shown in FIGURE 17, wherein the Birth Certificate **154** and TxID are depicted and stored thereon.

[00122] Returning to FIGURE 4, after the transaction via the Birth Certificate **154** has been written to the BITCOIN blockchain **122**, operations proceed to **416**, whereupon the item manufacturer **110** produces a physical representation **172** of the Origination Hash **152** (e.g., the

QR code **156**) and affixes the Origination Hash/QR Code **172** to the item **170**. The authentic item **170** with the Origination Hash/QR Code **172** affixed thereto is then delivered to the user at **418** in accordance with the user information **160** and order information **162** associated with the item **170**.

[00123] Referring now to FIGURE 5, there is shown a flowchart **500** of an exemplary method for verifying authenticity/provenance of scarce items **170** in accordance with one aspect of the exemplary embodiment. As shown in FIGURE 5, a user via a user device **104A** accesses the HashQuin website **146** hosted by the server computer system **102** (or third-party service) via the computer network **101** at **502**. FIGURE 10 illustrates a screenshot **1000** of the website **146** for public authentication of an item **170** in accordance with the methodology of FIGURE 5. FIGURE 11A illustrates a screenshot **1100** of the website **146** for private authentication of an item **170** in accordance with the methodology of FIGURE 5, i.e., for the owner of the item **170**. At **504**, the QR code is scanned by the image capture component **214** of the user device **104** to input the Origination Hash **152**. The skilled artisan will appreciate that the user may manually input the Origination Hash **152** or the Origination Hash **155** via suitable input mechanisms of the user device **104** to the website **146**, and the use of scanning the QR code **156** is intended to simplify entry thereof.

[00124] The Origination Hash **152** or the Hash Print **155** or the Latest Hash Print **157** is then communicated, via the network **101**, to the HashQuin API **148** of the server computer system **102** at **506**. The HashQuin API **148** then retrieves item information at **508**. It will be understood that when publicly accessing the item information with the Origination Hash or the Latest Origination Hash via the website **146**, only the Retrieval Details will be provided. Thus, upon input of a valid Hash Print **155** or Latest Hash Print **157** an API call is performed by the HashQuin API **148** to look up the Origination Hash **152** in the Database **144**, and retrieves limited information, the Retrieval Details, about the item **170**. When privately accessing the website **146**, the user is prompted to enter the Origination Hash **152**. This information is communicated via the website **146** to the HashQuin API **148**, wherein an API call is performed to the Database **144** and a complete set of details, the Full Item Details of the item **170** is retrieved from the Database **144**, as illustrated in the screenshot **1150** of FIGURE 11B..

[00125] The retrieved item information associated with the Origination Hash **152** is then returned to the requesting user device **104** at **510**. Accordingly, this information may be limited or contain the full details about the item **170**, depending upon whether public or private access was determined. Thereafter, at **512**, the Retrieval Details or the Full Item Details of the item **170** associated with the Origination Hash **152** is displayed via the website **146** operable on the thin client interface **218** of the user device **104**. FIGURE 21 illustrates a detail screen **2100** after proving ownership in accordance with one embodiment of the subject application.

[00126] Turning now to FIGURE 6, there is shown a flowchart **600** illustrating an exemplary method for Transferring Ownership of scarce items in accordance with one aspect of the exemplary embodiment. To exemplify this transfer, the current owner/Seller is described as associated with the user device **104A** and the new owner/Buyer is described subsequently as associated with the user device **104B**. The Transfer of an item **170** verified in accordance with the methodology set forth above in FIGURE 5 begins at **602**, with the current owner/Seller of the item **170** accessing the website. The current owner/Seller accesses the Status page of the website at **604**. At **606,** the current owner/Seller changes the item Status **166** to In Transfer as illustrated in FIGURE 14 as the exemplary screenshot **1400**. When the item's Status **166** is changed to In Transfer, the current owner/Seller will be prompted to provide the Hash Print **155**, the Transfer Secret and the Origination Secret at **608,** as illustrated in FIGURE 12 as the exemplary screenshot **1200.** The QR code is scanned by the image capture component **214** of the user device **104A** to input the Origination Hash **152**, or the user **104A** manually inputs the Origination Hash **152** via suitable input mechanisms of the user device **104A** to the website **146.** The Origination Hash **152** is thereafter then communicated, via the network **101**, to the HashQuin API **148** of the server computer system **102**.

[00127] At **610,** the current owner/Seller provides the new owner/Buyer with the Transfer Secret and the current owner/Seller provides the Hash Print **155** of the item to the new owner/Buyer. This is accomplished via a pre-established communications channel outside the HashQuin system **100**.

[00128] The new owner/Buyer accesses the website at **612**. The new owner/Buyer accesses the Status page of the website at **614**. The new owner/Buyer selects In Transfer at **616** as illustrated in FIGURE 12 as the exemplary screenshot **1200**. The new owner/Buyer accepts Transfer by providing the Origination Hash **152**, the Transfer Secret, inputting a new Purchaser Identity and a new Origination Secret at **618** as illustrated in FIGURE 13 as the exemplary screenshot **1300**. The QR code is scanned by the image capture component **214** of the user device **104A** to input the Origination Hash **152**, or the user **104A** manually inputs the Origination Hash **152** via suitable input mechanisms of the user device **104A** to the website **146.** The Origination Hash **152** is thereafter then communicated, via the network **101**, to the HashQuin API **148** of the server computer system

[00129] **At 620** the Origination Hash **152**, the Purchaser Identity of the new owner/Buyer and the Origination Secret of the new owner/Buyer are hashed to generate the Latest Hash Print

157. The Latest Hash Print **157** is then written to the BITCOIN blockchain **122** at **622** by the Blockchain Writer **159** of the server computer system **102**. The skilled artisan will appreciate that the methods described hereinafter regarding writing to the blockchain. Finally, at **624,** the Latest Hash Print **157** is added to the Database **144**. The Latest Hash Print **157** is included in the Retrieval Details and the Full Item Details. FIGURE 22 provides an illustration of one possible post-transfer Item details after transfer screen 2200 in accordance with one example embodiment of the subject disclosure.

[00130] Turning now to FIGURE 7, there is shown a flowchart **700** of an exemplary method for reporting a change of Status for items **170** in accordance with one aspect of the exemplary embodiment. The method shown in FIGURE 7 begins at **702**, whereupon a user via a user device **104** accesses the HashQuin website **146** hosted by the server computer system **102** (or third party service) via the computer network **101**. FIGURE 14 illustrates a screenshot **1400** of the website **146** to change the Status **166** of an item **170**. At **704**, the Origination Hash **152**, the Original Secret and the Purchaser Identification are input. The QR code is scanned by the image capture component **214** of the user device **104** to input the Origination Hash **152**. It will be appreciated to those skilled in the art that that the user may manually input the Origination Hash **152** via suitable input mechanisms of the user device **104** to the website **146**, and the use of scanning the QR code is intended to simplify entry thereof.

[00131] The Origination Hash **152** is then verified and communicated, via the network **101**, to the HashQuin API **148** of the server computer system **102** at **706**. The HashQuin API **148** then retrieves item information at **708**. The retrieved item information associated with the Origination Hash **152** is then returned to the requesting user device **104** at **710**. At **712**, request to change the Status **166** of an item **170** is then received by the HashQuin API **148** via the website **146** at the server computer system **102**. The item information in the Database **144** associated with the server computer system **102** and website **146** is then updated at **714** to indicate that the Status **166** of item **170** associated with the Origination Hash **152** is changed, i.e., Stolen, Lost, Compromised, In Transfer etc. FIGURE 18 depicts an exemplary screenshot **1800** illustrating the status of an item designated as compromised, e.g., “Lost”. Thereafter, the skilled artisan will appreciate that any subsequent purchasers of the item **170** utilizing the public access described above with respect to FIGURE 5 will be able to readily determine whether an item **170** is counterfeit, stolen, or the like.

[00132] Referring now to FIGURE 8, there is shown a flowchart **800** of an exemplary method for Sealing a Line after all items **170** in a Line have been purchased in accordance with one aspect of the exemplary embodiment. The method shown in FIGURE 8 begins with the completion of the purchases of all items **170** in a Line at **802**. The Line then goes through the Sealing process at **804**. Once the Sealing process is completed, at **806** a Closing Seal **156** is generated. The Closing Seal **156** is included with an item's Retrieval Details and Full Item Details in the Database **144** at **808**. The Closing Seal **156** and the Sealing Date are written to the BITCOIN Blockchain **122** at **810.** Exemplary screens **1600** and **1900** of FIGURES 16 and 19, respectively, illustrate varying examples of Sealed Lines in accordance with one embodiment of the subject disclosure.

[00133] In accordance with one embodiment of the subject disclosure, the Line is sealed when all of the items **170** in the lineage are created, forever tying the items in the Line together and imprinting the aforementioned Closing Seal **156** on the Bitcoin blockchain **122** which includes a time stamp and a Merkle Root (a blockchain proof of inclusion in the line) that enables any item in the line to be validated as a part of a finite set in that sealed line (scarcity). After a line is sealed, the current owner of each item **170** in the line has the ability to validate that the item is indeed part of that line. If the line uses pre-hashed creation, until the item is transferred to the first owner, the Seller may access the Merkle proof to view this validation in two ways from the "Prove Item" menu. Individual item: Click the "view" link next to Merkle Proof. This will send you to the "Merkle Proof-of-Inclusion" screen on the HashQuin website containing the following: Line name; Lineage; Seal (a hashed version of all of the HashPrints of the items in the line); HashPrint of the target item being validated; and a visual representation of the proof including the target item's HashPrint at the bottom of the tree traced back to Merkle Root at the top (the Seal hash). The option to toggle between Hexadecimal and Base 58 representations of the hashes using the buttons on the upper right hand section of the screen. Alternatively, for a Full line view, Click the "view" link next to "Line Status- Sealed". This will send the user to the Sealed line page on the HashQuin website containing the following: Line name; Items remaining (which will be 0 for sealed lines); Seal date; Seal (a hashed version of all of the HashPrints of the items in the line); Seal certificate link, immortalizing the line on the Bitcoin blockchain; and the HashPrint list of all of the items in the sealed line, each with a link to the Merkle Proof-of-Inclusion screen that proves that the item is indeed a part of the seal. FIGURE 20 illustrates an exemplary Merkle Proof-of-Inclusion screen 2000 in accordance with one embodiment of the subject application.

[00134]

[00135] Some portions of the detailed description herein are presented in terms of algorithms and symbolic representations of operations on data bits performed by conventional computer components, including a central processing unit (CPU), memory storage devices for the CPU, and connected display devices. These algorithmic descriptions and representations are the means used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art. An algorithm is generally perceived as a self-consistent sequence of steps leading to a desired result. The steps are those requiring physical manipulations of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated. It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like.

[00136] It should be understood, however, that all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise, as apparent from the discussion herein, it is appreciated that throughout the description, discussions utilizing terms such as "processing" or "computing" or "calculating" or "determining" or "displaying" or the like, refer to the action and processes of a computer system, or similar electronic computing device, that manipulates and transforms data represented as physical (electronic) quantities within the computer system's registers and memories into other data similarly represented as physical quantities within the computer system memories or registers or other such information storage, transmission or display devices.

[00137] The exemplary embodiment also relates to an apparatus for performing the operations discussed herein. This apparatus may be specially constructed for the required purposes, or it may comprise a general-purpose computer selectively activated or reconfigured by a computer program stored in the computer. Such a computer program may be stored in a computer readable storage medium, such as, but is not limited to, any type of disk including floppy disks, optical disks, CD-ROMs, and magnetic-optical disks, read-only memories (ROMs), random access memories (RAMs), EPROMs, EEPROMs, magnetic or optical cards, or any type of media suitable for storing electronic instructions, and each coupled to a computer system bus.

[00138] The algorithms and displays presented herein are not inherently related to any particular computer or other apparatus. Various general-purpose systems may be used with programs in accordance with the teachings herein, or it may prove convenient to construct more specialized apparatus to perform the methods described herein. The structure for a variety of these systems is apparent from the description above. In addition, the exemplary embodiment is not described with reference to any particular programming language. It will be appreciated that a variety of programming languages may be used to implement the teachings of the exemplary embodiment as described herein.

[00139] A machine-readable medium includes any mechanism for storing or transmitting information in a form readable by a machine (e.g., a computer). For instance, a machine-readable medium includes read only memory ("ROM"); random access memory ("RAM"); magnetic disk storage media; optical storage media; flash memory devices; and electrical, optical, acoustical or other form of propagated signals (e.g., carrier waves, infrared signals, digital signals, etc.), just to mention a few examples.

[00140] The methods illustrated throughout the specification, may be implemented in a computer program product that may be executed on a computer. The computer program product may comprise a non-transitory computer-readable recording medium on which a control program is recorded, such as a disk, hard drive, or the like. Common forms of non-transitory computer-readable media include, for example, floppy disks, flexible disks, hard disks, magnetic tape, or any other magnetic storage medium, CD-ROM, DVD, or any other optical medium, a RAM, a PROM, an EPROM, a FLASH-EPROM, or other memory chip or cartridge, or any other tangible medium from which a computer can read and use.

[00141] Alternatively, the method may be implemented in transitory media, such as a transmittable carrier wave in which the control program is embodied as a data signal using transmission media, such as acoustic or light waves, such as those generated during radio wave and infrared data communications, and the like.

[00142] It will be appreciated that variants of the above-disclosed and other features and functions, or alternatives thereof, may be combined into many other different systems or applications. Various presently unforeseen or unanticipated alternatives, modifications, variations or improvements therein may be subsequently made by those skilled in the art which are also intended to be encompassed by the following claims.

[00143] To aid the Patent Office and any readers of this application and any resulting patent in interpreting the claims appended hereto, applicants do not intend any of the appended claims or claim elements to invoke 35 U.S.C. 112(f) unless the words “means for” or “step for” are explicitly used in the particular claim.

CLAIMS:

1. A method for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology, comprising:

with a Hash Generator, generating an Origination Hash associated with a specific item;

generating a hash from the Origination Hash;

writing, with a Blockchain Writer, a Birth Certificate associated with the hash from the Origination Hash to the BITCOIN blockchain; and

physically marking the specific item with the Origination Hash.

2. The method for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology of claim 1, further comprising:

accessing a website by a first user device via a computer network;

inputting the Origination Hash via the website; and

receiving authentication information Full Item Details regarding the specific item associated with the Origination Hash.

3. The method for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology of claim 1, further comprising:

accessing a website by a first user device via a computer network;

inputting the hash from the Origination Hash via the website; and

receiving authentication information Retrieval Details regarding the specific item associated with the hash from the Origination Hash.

4. The method for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology of claim 1,

wherein the Hash Generator and the Blockchain Writer are resident on a server in data communication with an associated computer network.

5. The method for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology of claim 1, wherein physically marking the specific item further comprises affixing a Hard Marker comprising a physical identifier to the item.

6. The method for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology of claim 1, wherein the Origination Hash is implemented on the specific item as at least one of an alphanumeric sequence of numbers or a QR code.

7. The method for method for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology of claim 1, wherein the Hash Generator generates the Origination Hash in accordance with SHA-256.

8. The method for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology of claim 1, wherein the specific item is selected from the group of an article of clothing, a pair of

shoes, a collectible, a piece of jewelry, an accessory, a piece of memorabilia, or a luxury good.

9. A system for marking, validating ownership, proving authenticity, tracking provenance, and verifying scarcity of items utilizing cryptology, comprising:

a server computer system comprising:

a processor,

a Hash Generator;

a Blockchain Writer;

a Payment Monitor; and

a memory in communication with the processor, the memory storing instructions which are executed by the processor, causing the processor to:

host a website accessible by a plurality of user devices via an associated computer network;

receive, via the website, user information associated with an item;

generate, in accordance with the received user information, a unique Origination Hash via the Hash Generator;

generate, via the Hash Generator, a hash from the Origination Hash; and

write, via the Blockchain Writer, a Birth Certificate associated with the hash from the Origination Hash to the BITCOIN blockchain.

10. The system according to claim 9, wherein the Origination Hash is communicated to an associated item manufacturer via the associated computer network.

11. The system according to claim 10, wherein the associated item manufacturer is configured to:

imprint at least one of an Origination Hash or QR Code corresponding to the received Origination Hash; and attach the at least one of the Origination Hash or QR Code to the specific item corresponding thereto.

12. The system according to claim 11, wherein the associated item manufacturer is configured to attach a Hard Marker comprising a physical identifier to the item.

13. The system according to claim 12, wherein the Hard Marker comprises at least one of a painted pattern or beads.

14. The system according to claim 10, wherein the Origination Hash is generated in accordance with SHA 256.

15. The system according to claim 14, wherein the hash of the Origination Hash is generated in accordance with SHA 256.

16. The system according to claim 10, wherein the specific item is selected from the group of an article of clothing, a pair of shoes, a collectible, a piece of jewelry, an accessory, a piece of memorabilia, or a luxury good.

17. An article of manufacture manufactured in accordance with the method of claim 1.

18. An article of manufacture comprising a physical Origination Hash affixed to the article.

19. The article of claim 18, wherein the physical Origination Hash is generated by an associated Hash Generator in accordance with SHA 256.

20. The article of manufacture of claim 19, wherein the article is selected from the group of an article of clothing, a pair of shoes, a collectible, a piece of jewelry, an accessory, a piece of memorabilia, or a luxury good.

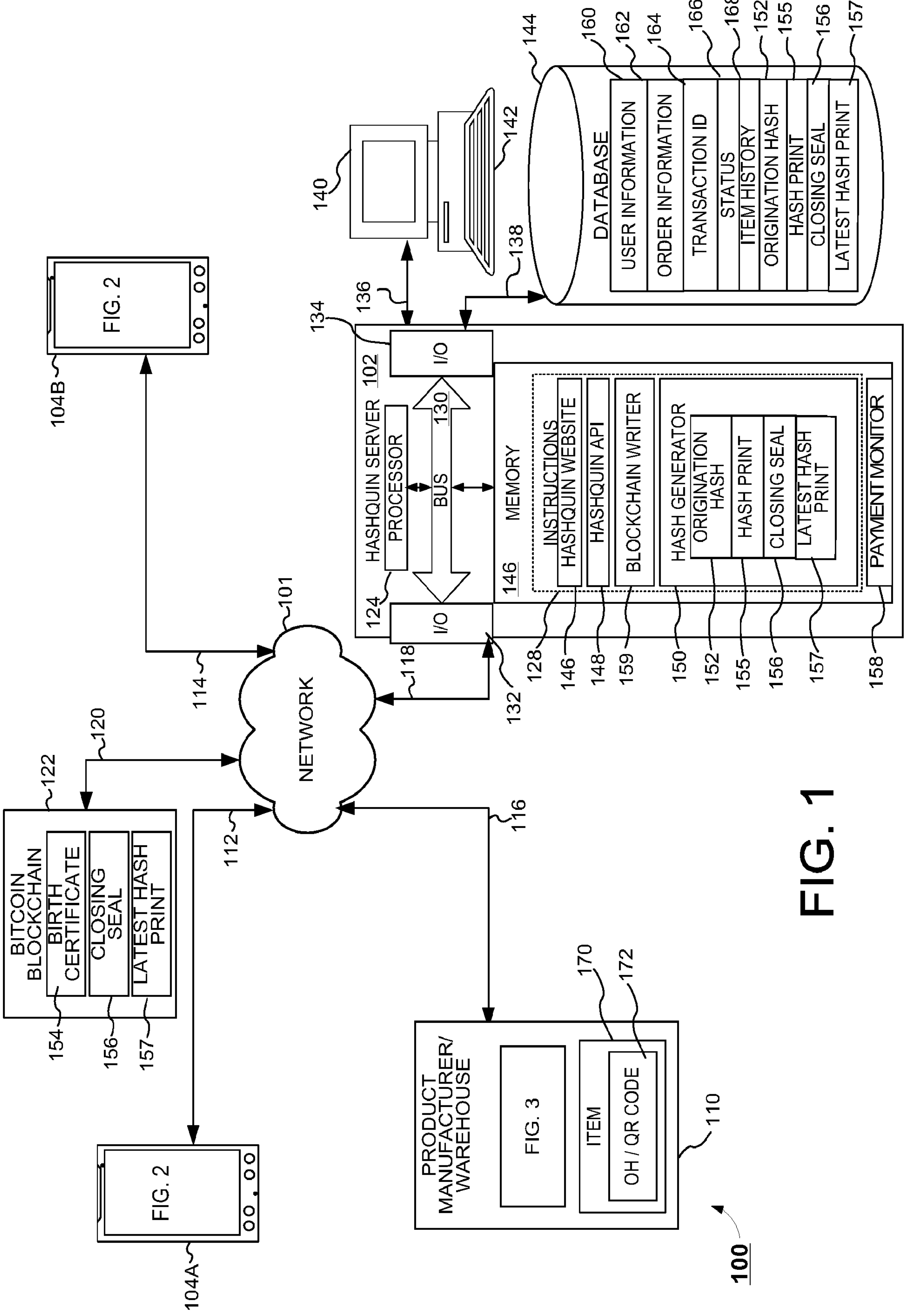

HASHQUIN SERVER 102
PROCESSOR
124
BUS
130
I/O
134
I/O
132
MEMORY
146
INSTRUCTIONS
HASHQUIN WEBSITE
HASHQUIN API
BLOCKCHAIN WRITER
HASH GENERATOR
ORIGINATION HASH
HASH PRINT
CLOSING SEAL
LATEST HASH PRINT
PAYMENT MONITOR
128
146
148
159
150
152
155
156
157
158
136
138
140
142
144
DATABASE
USER INFORMATION
ORDER INFORMATION
TRANSACTION ID
STATUS
ITEM HISTORY
ORIGINATION HASH
HASH PRINT
CLOSING SEAL
LATEST HASH PRINT
160
162
164
166
168
152
155
156
157
NETWORK
101
114
118
120
112
116
FIG. 2
104B
FIG. 2
104A
BITCOIN BLOCKCHAIN
BIRTH CERTIFICATE
CLOSING SEAL
LATEST HASH PRINT
122
154
156
157
PRODUCT MANUFACTURER/ WAREHOUSE
FIG. 3
ITEM
OH / QR CODE
170
172
110
100

FIG. 1

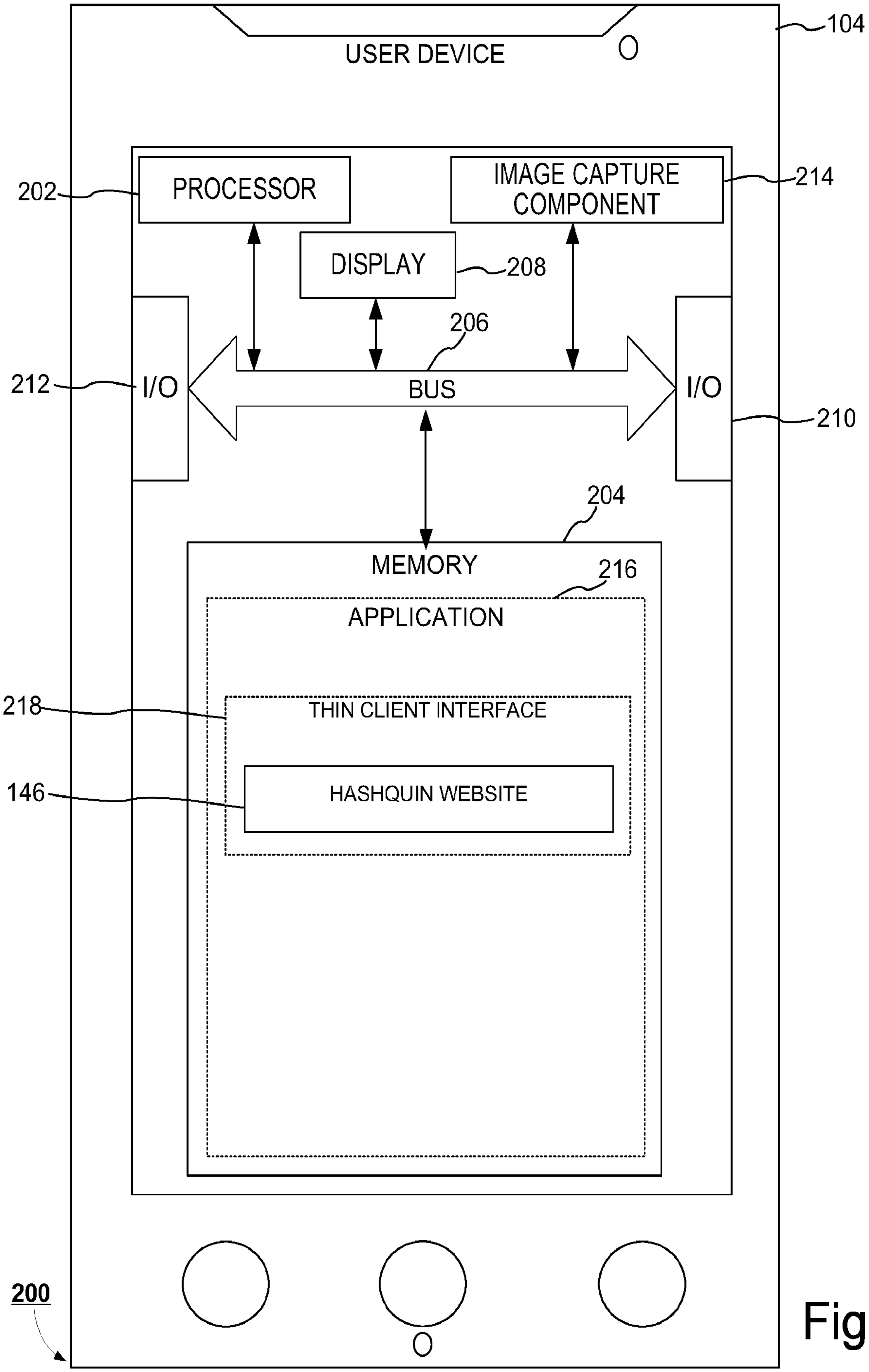

104
USER DEVICE
202
PROCESSOR
IMAGE CAPTURE COMPONENT
214
DISPLAY
208
206
212
I/O
BUS
I/O
210
204
MEMORY
216
APPLICATION
218
THIN CLIENT INTERFACE
146
HASHQUIN WEBSITE
200

Fig. 2

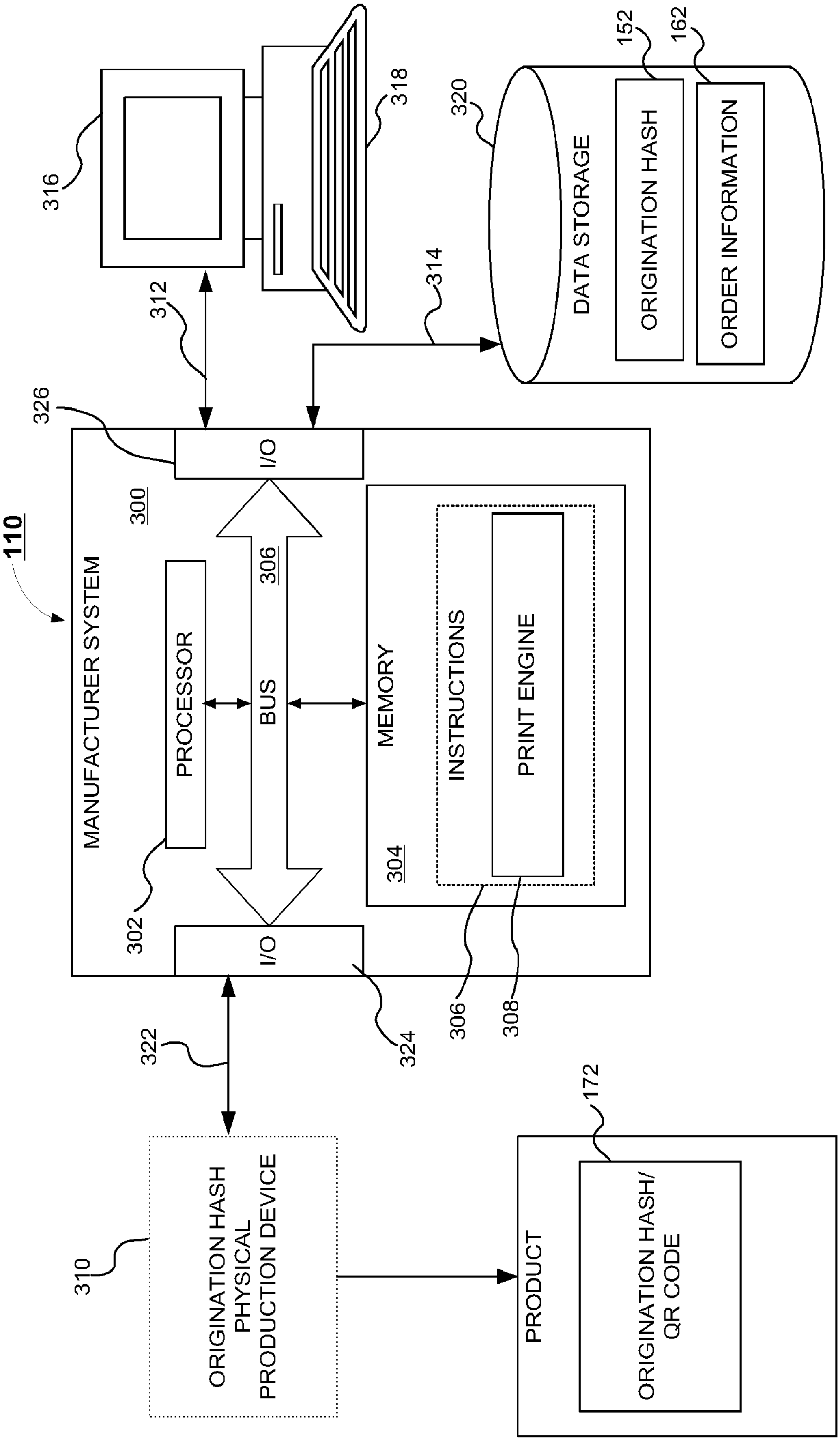

316
318
152
162
320
DATA STORAGE
ORIGINATION HASH
ORDER INFORMATION
312
314
326
I/O
110
300
MANUFACTURER SYSTEM
PROCESSOR
306
BUS
MEMORY
INSTRUCTIONS
PRINT ENGINE
304
302
I/O
324
306
308
322
172
310
ORIGINATION HASH
PHYSICAL
PRODUCTION DEVICE
PRODUCT
ORIGINATION HASH/
QR CODE

FIG. 3

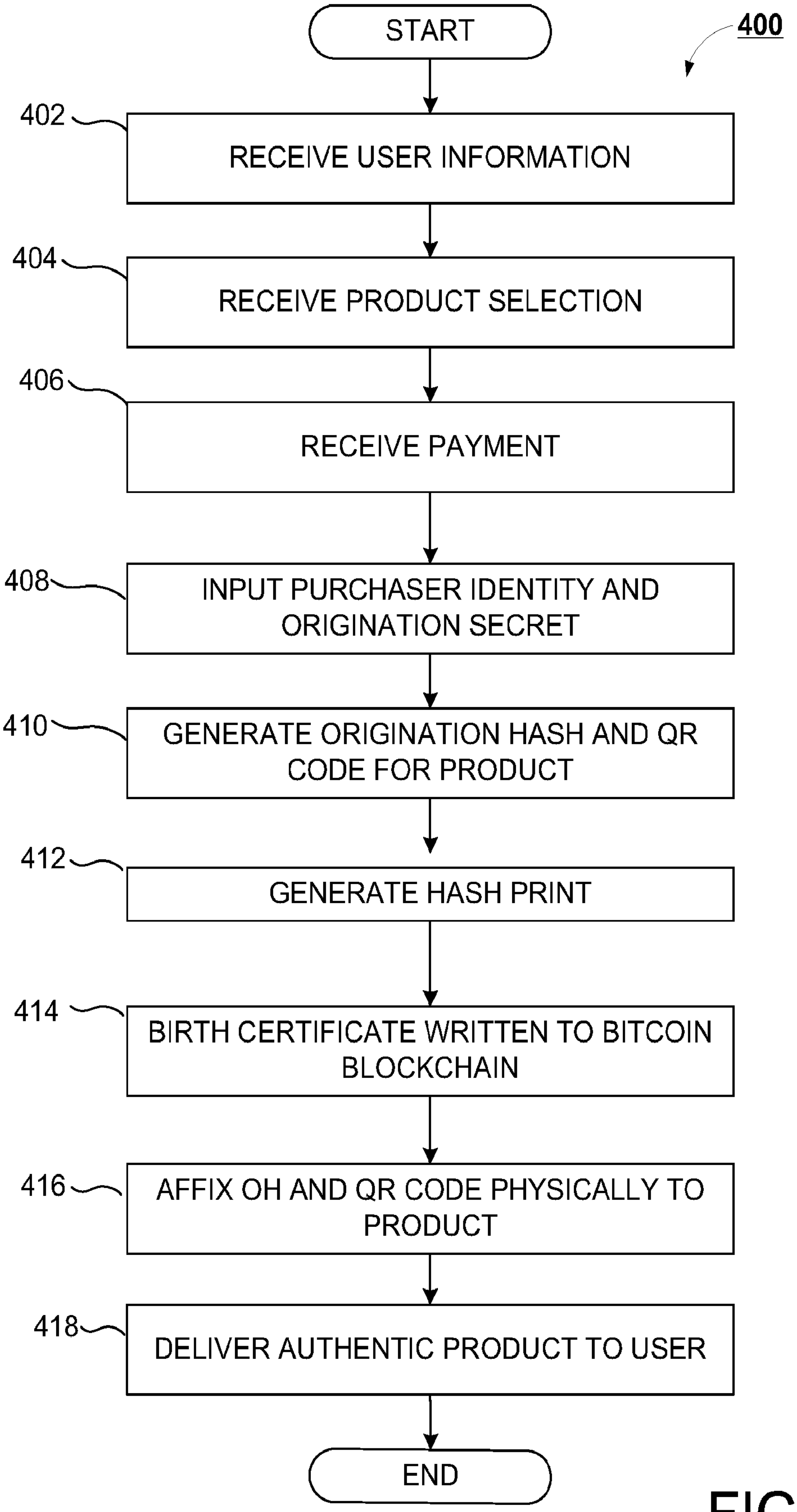

400
START
402
RECEIVE USER INFORMATION
404
RECEIVE PRODUCT SELECTION
406
RECEIVE PAYMENT
408
INPUT PURCHASER IDENTITY AND ORIGINATION SECRET
410
GENERATE ORIGINATION HASH AND QR CODE FOR PRODUCT
412
GENERATE HASH PRINT
414
BIRTH CERTIFICATE WRITTEN TO BITCOIN BLOCKCHAIN
416
AFFIX OH AND QR CODE PHYSICALLY TO PRODUCT
418
DELIVER AUTHENTIC PRODUCT TO USER
END

FIG. 4

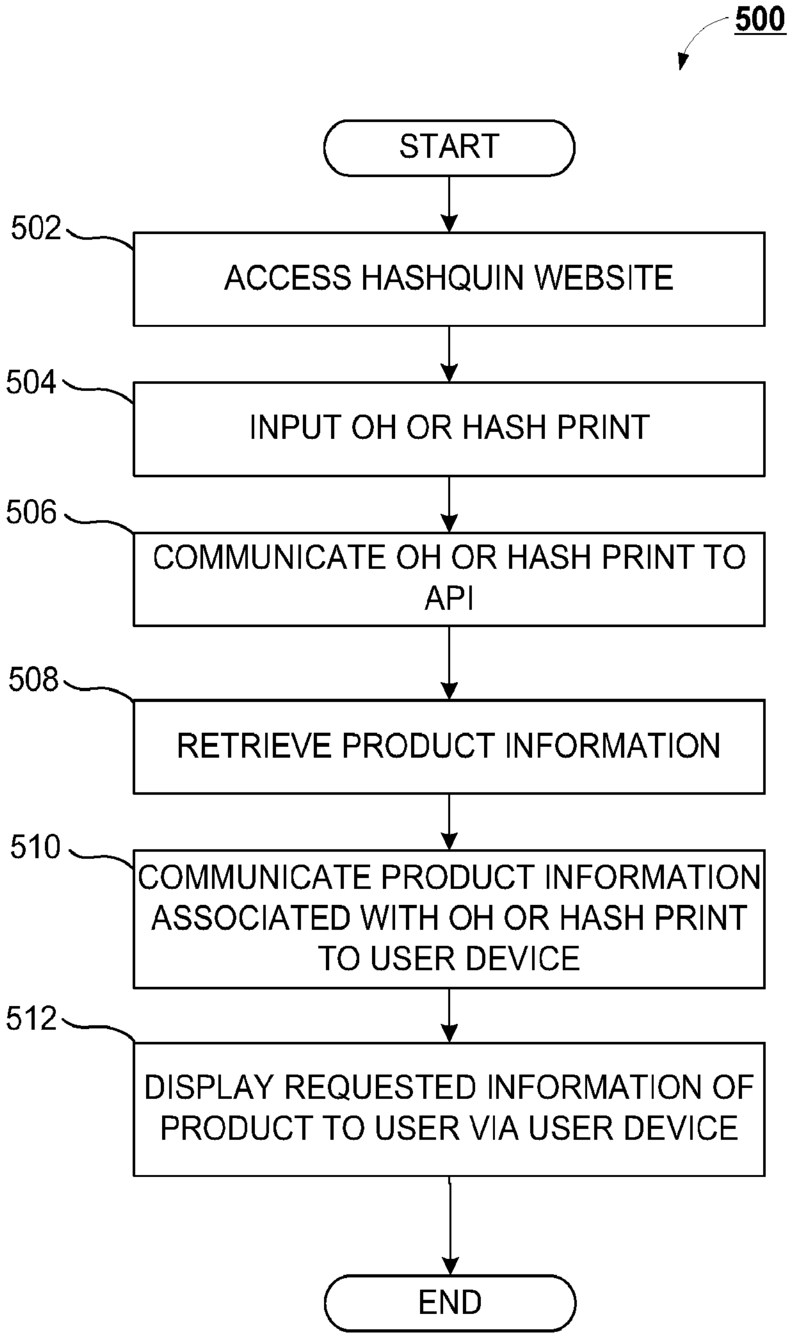

500
START
502
ACCESS HASHQUIN WEBSITE
504
INPUT OH OR HASH PRINT
506
COMMUNICATE OH OR HASH PRINT TO API
508
RETRIEVE PRODUCT INFORMATION
510
COMMUNICATE PRODUCT INFORMATION ASSOCIATED WITH OH OR HASH PRINT TO USER DEVICE
512
DISPLAY REQUESTED INFORMATION OF PRODUCT TO USER VIA USER DEVICE
END

FIG. 5

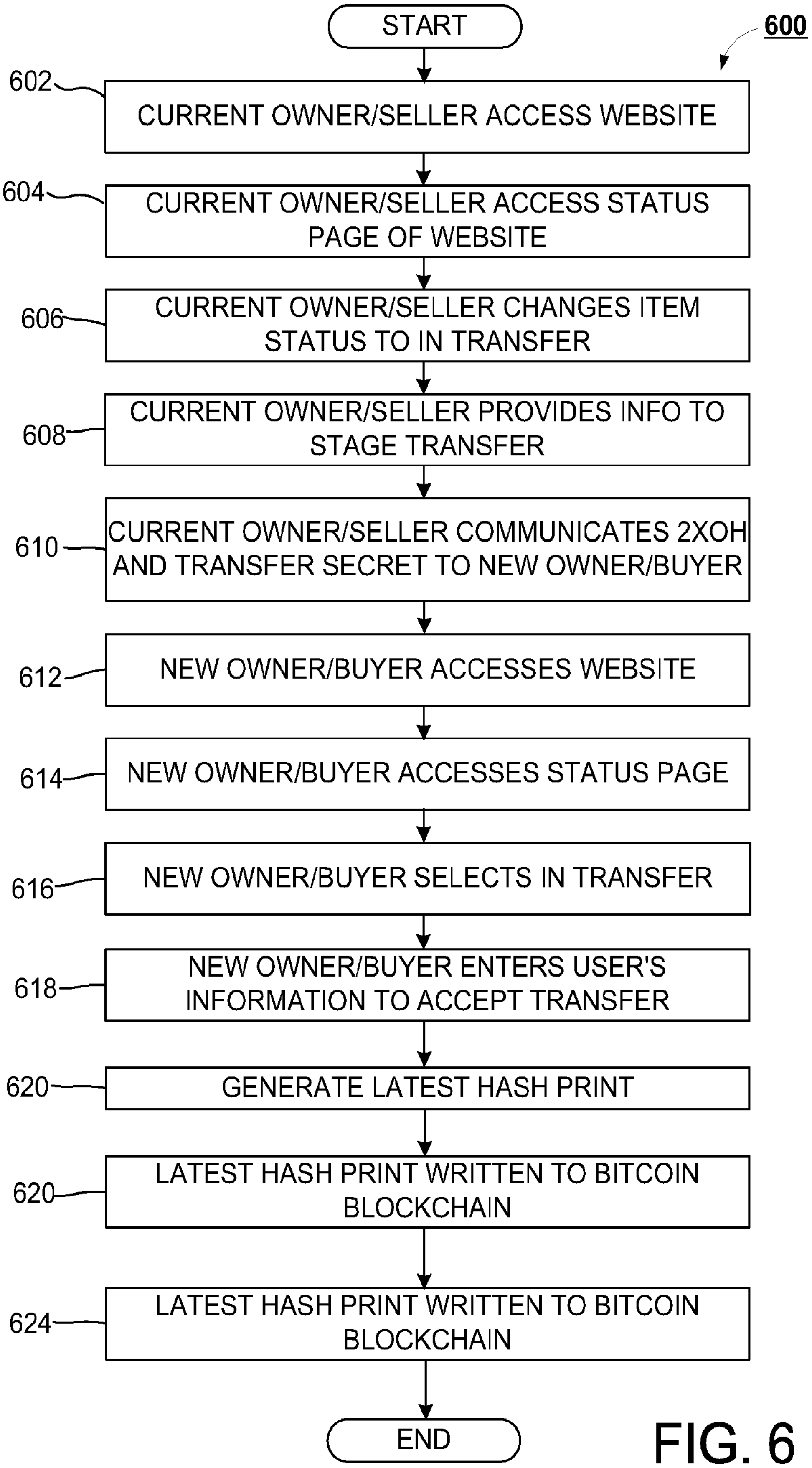

START
600
602
CURRENT OWNER/SELLER ACCESS WEBSITE
604
CURRENT OWNER/SELLER ACCESS STATUS PAGE OF WEBSITE
606
CURRENT OWNER/SELLER CHANGES ITEM STATUS TO IN TRANSFER
608
CURRENT OWNER/SELLER PROVIDES INFO TO STAGE TRANSFER
610
CURRENT OWNER/SELLER COMMUNICATES 2XOH AND TRANSFER SECRET TO NEW OWNER/BUYER
612
NEW OWNER/BUYER ACCESSES WEBSITE
614
NEW OWNER/BUYER ACCESSES STATUS PAGE
616
NEW OWNER/BUYER SELECTS IN TRANSFER
618
NEW OWNER/BUYER ENTERS USER'S INFORMATION TO ACCEPT TRANSFER
620
GENERATE LATEST HASH PRINT
620
LATEST HASH PRINT WRITTEN TO BITCOIN BLOCKCHAIN
624
LATEST HASH PRINT WRITTEN TO BITCOIN BLOCKCHAIN
END

FIG. 6

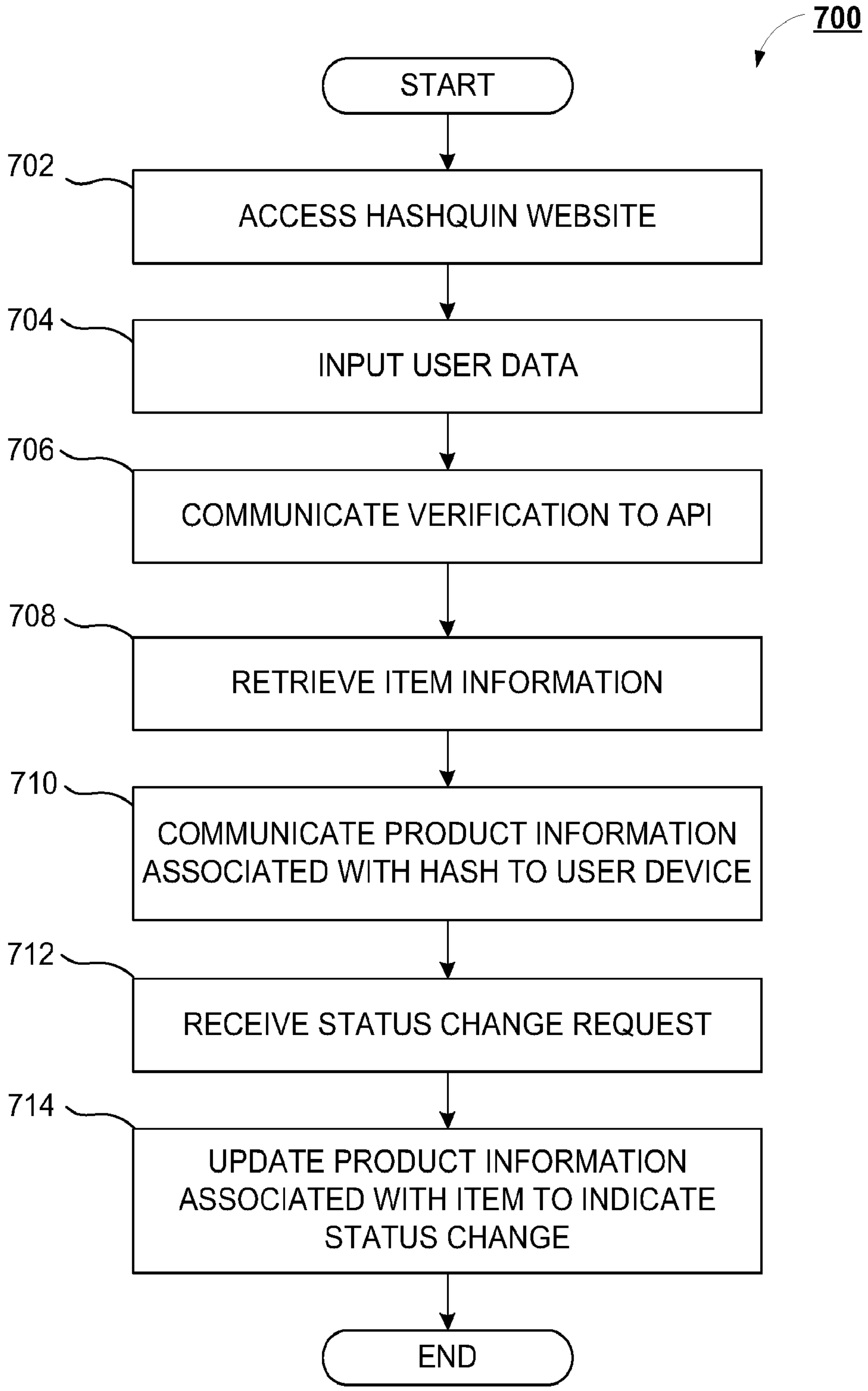

700
START
702
ACCESS HASHQUIN WEBSITE
704
INPUT USER DATA
706
COMMUNICATE VERIFICATION TO API
708
RETRIEVE ITEM INFORMATION
710
COMMUNICATE PRODUCT INFORMATION ASSOCIATED WITH HASH TO USER DEVICE
712
RECEIVE STATUS CHANGE REQUEST
714
UPDATE PRODUCT INFORMATION ASSOCIATED WITH ITEM TO INDICATE STATUS CHANGE
END

FIG. 7

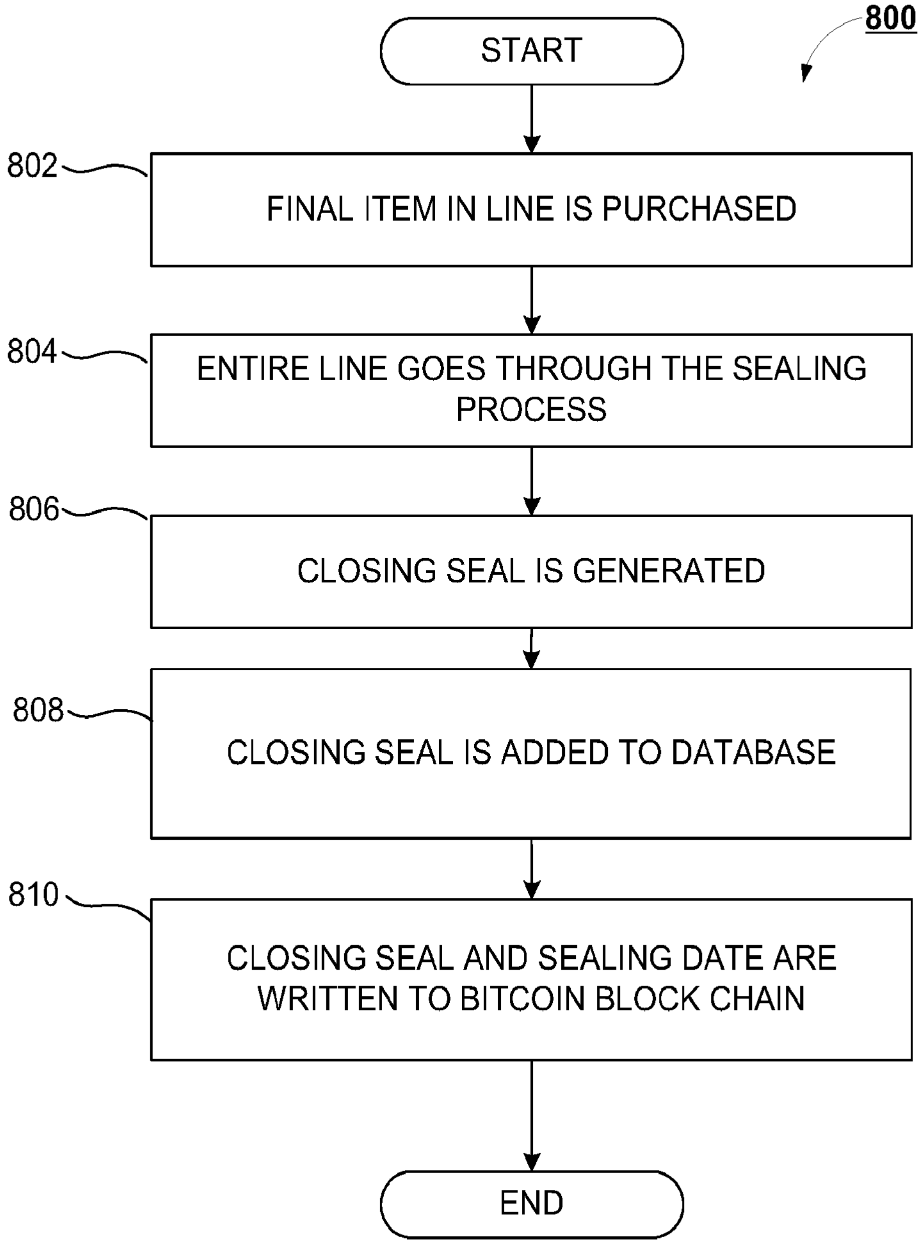
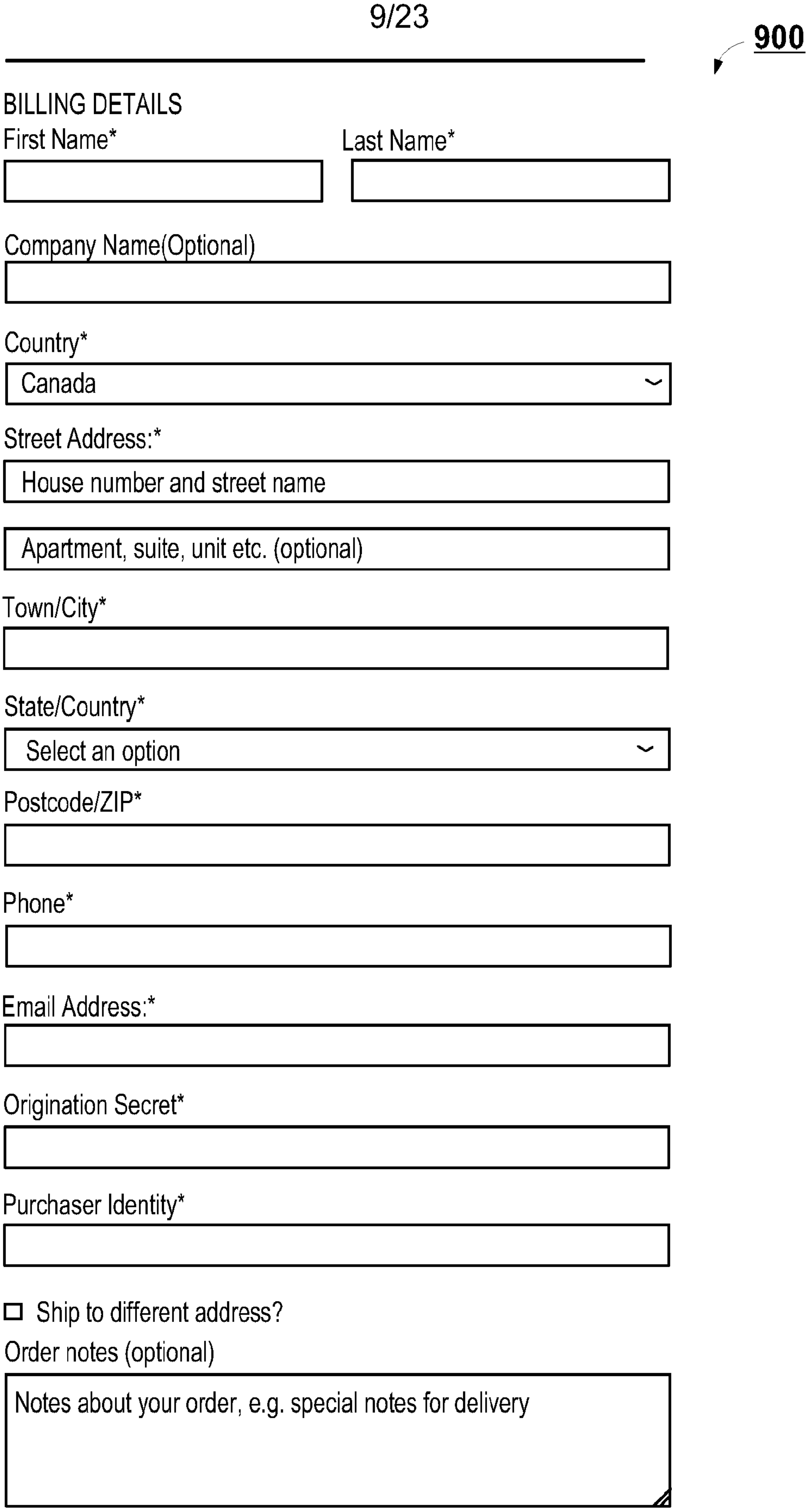

800
START
802
FINAL ITEM IN LINE IS PURCHASED
804
ENTIRE LINE GOES THROUGH THE SEALING PROCESS
806
CLOSING SEAL IS GENERATED
808
CLOSING SEAL IS ADDED TO DATABASE
810
CLOSING SEAL AND SEALING DATE ARE WRITTEN TO BITCOIN BLOCK CHAIN
END

FIG. 8



BILLING DETAILS

First Name*

Last Name*

Company Name(Optional)

Country*

Canada

Street Address:*

House number and street name

Apartment, suite, unit etc. (optional)

Town/City*

State/Country*

Select an option

Postcode/ZIP*

Phone*

Email Address:*

Origination Secret*

Purchaser Identity*

□ Ship to different address?

Order notes (optional)

Notes about your order, e.g. special notes for delivery

FIG. 9

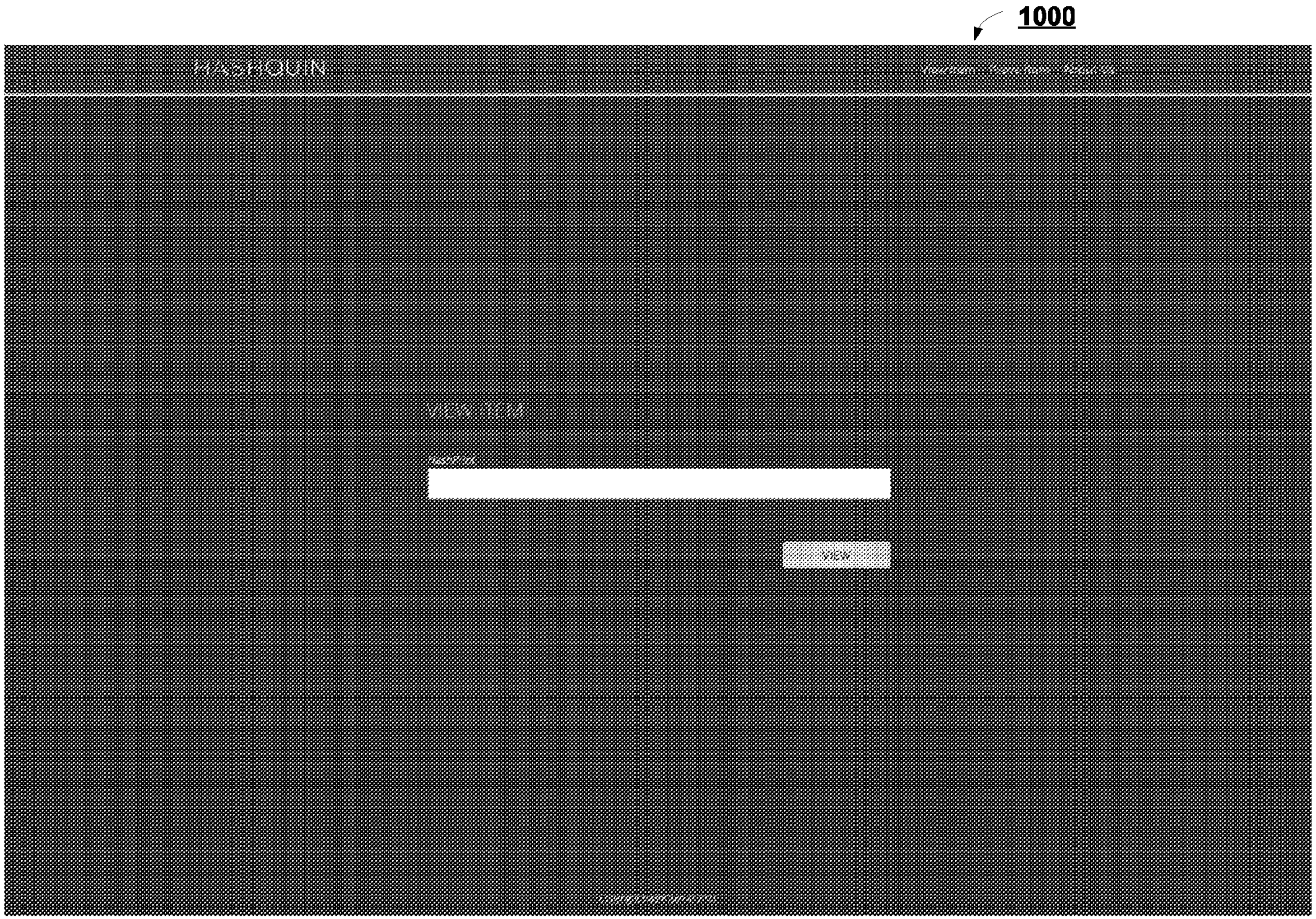


FIGURE 10

1100

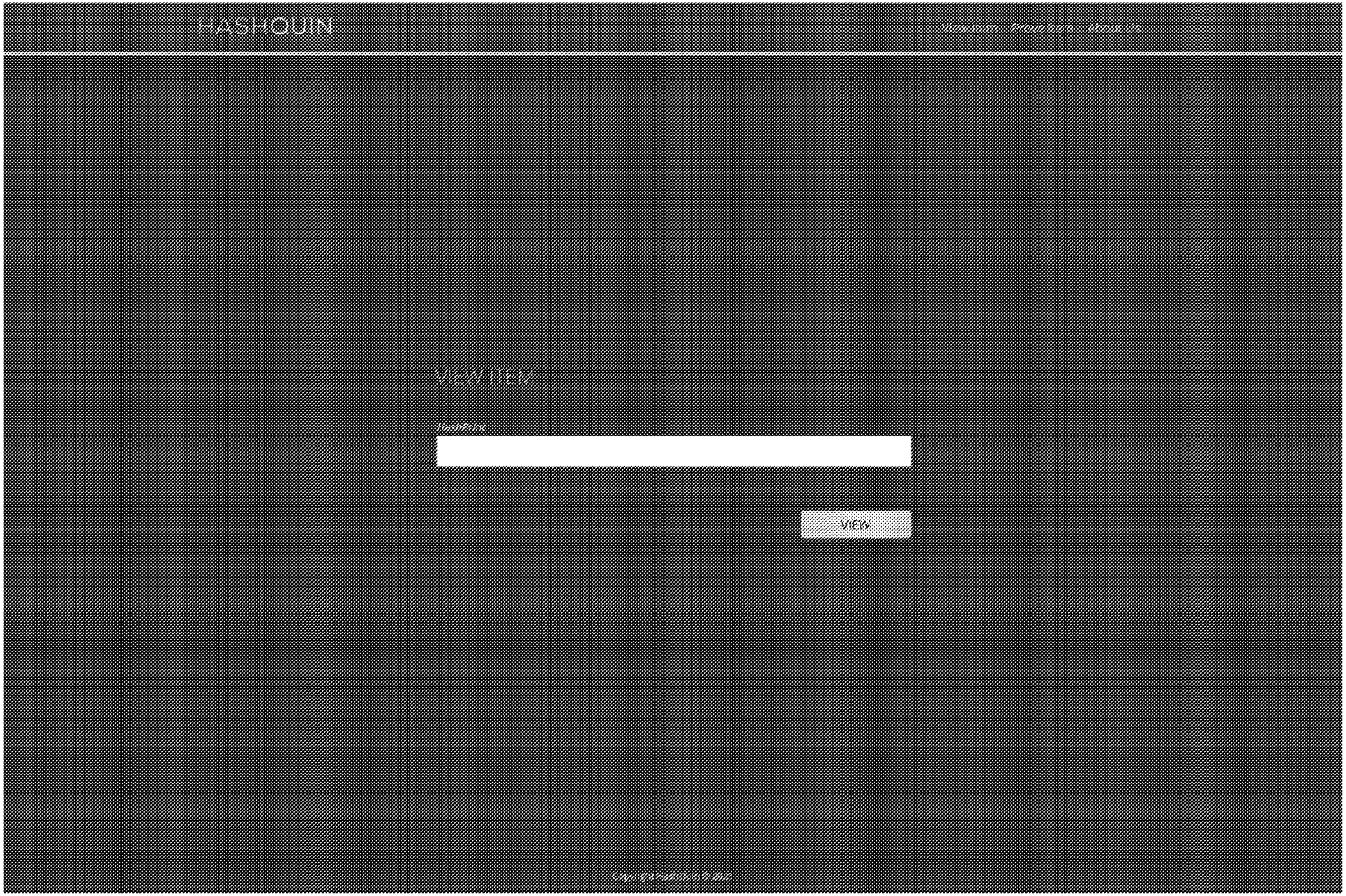
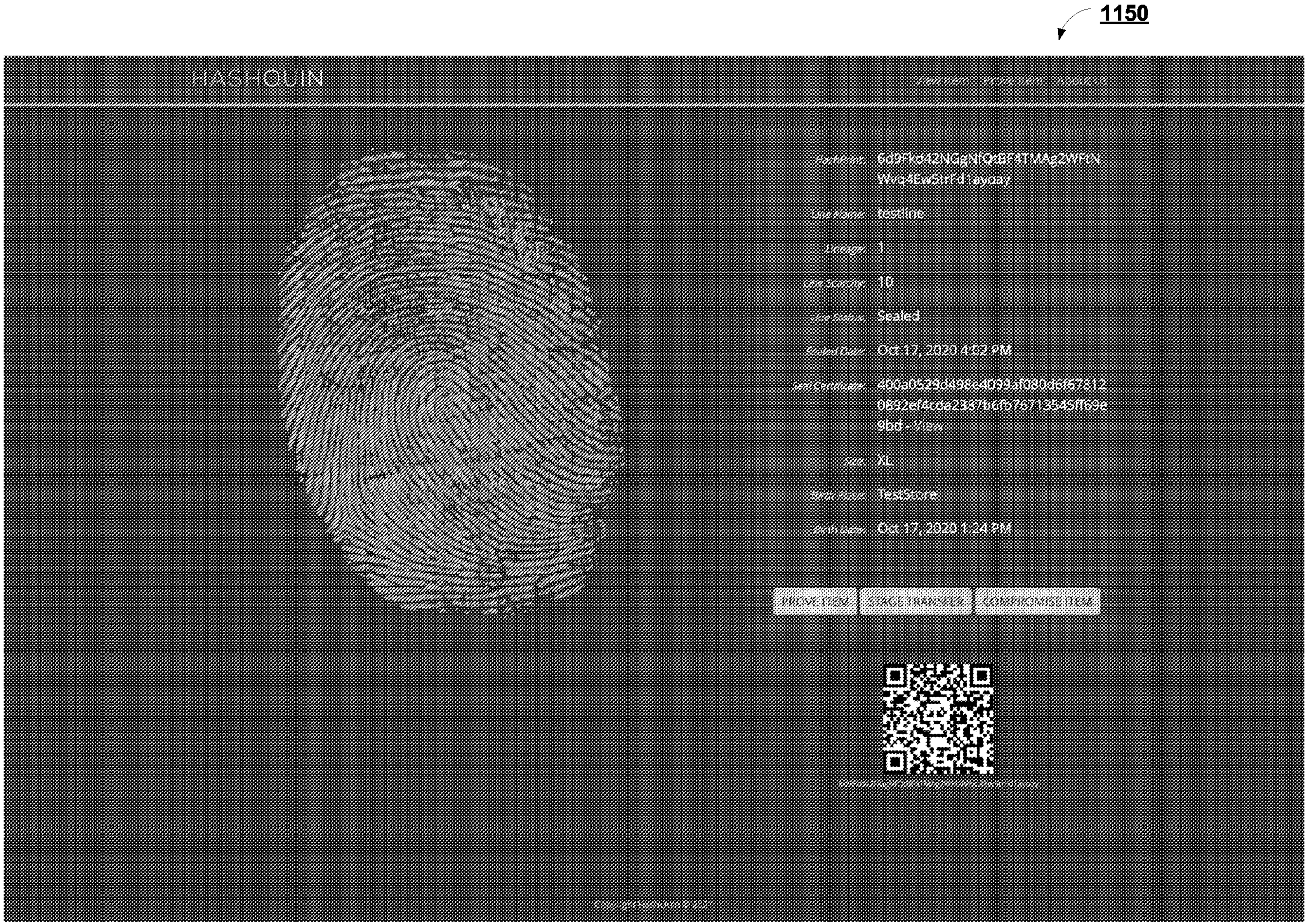


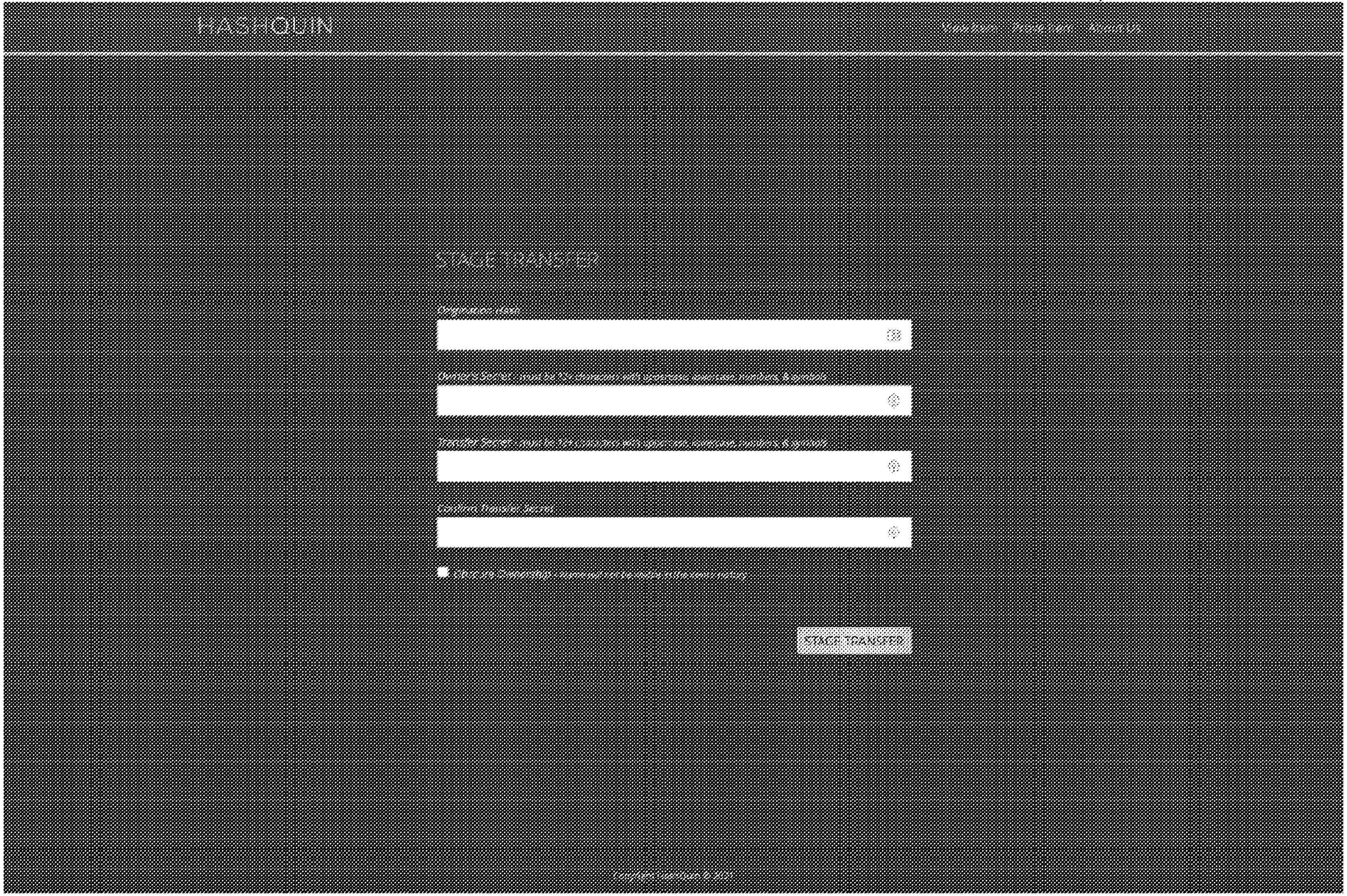
FIGURE 11A



HashPrint	6d9Fkd42NGgNfQtBF4TMAg2WFtN Wvq4Ew5trFd1ayoay
Line Name	testline
Lineage	1
Line Scarcity	10
Line Status	Sealed
Sealed Date	Oct 17, 2020 4:02 PM
Seal Certificate	400a0529d498e4039af080d6f67812 0892ef4cda2337b6f67671354Sff69e 9bd - View
Size	XL
Birth Place	TestStore
Birth Date	Oct 17, 2020 1:24 PM

FIGURE 11B

1200



STAGE TRANSFER

Origination Hash

Owner's Secret - must be 12+ characters with uppercase, lowercase, numbers, & symbols

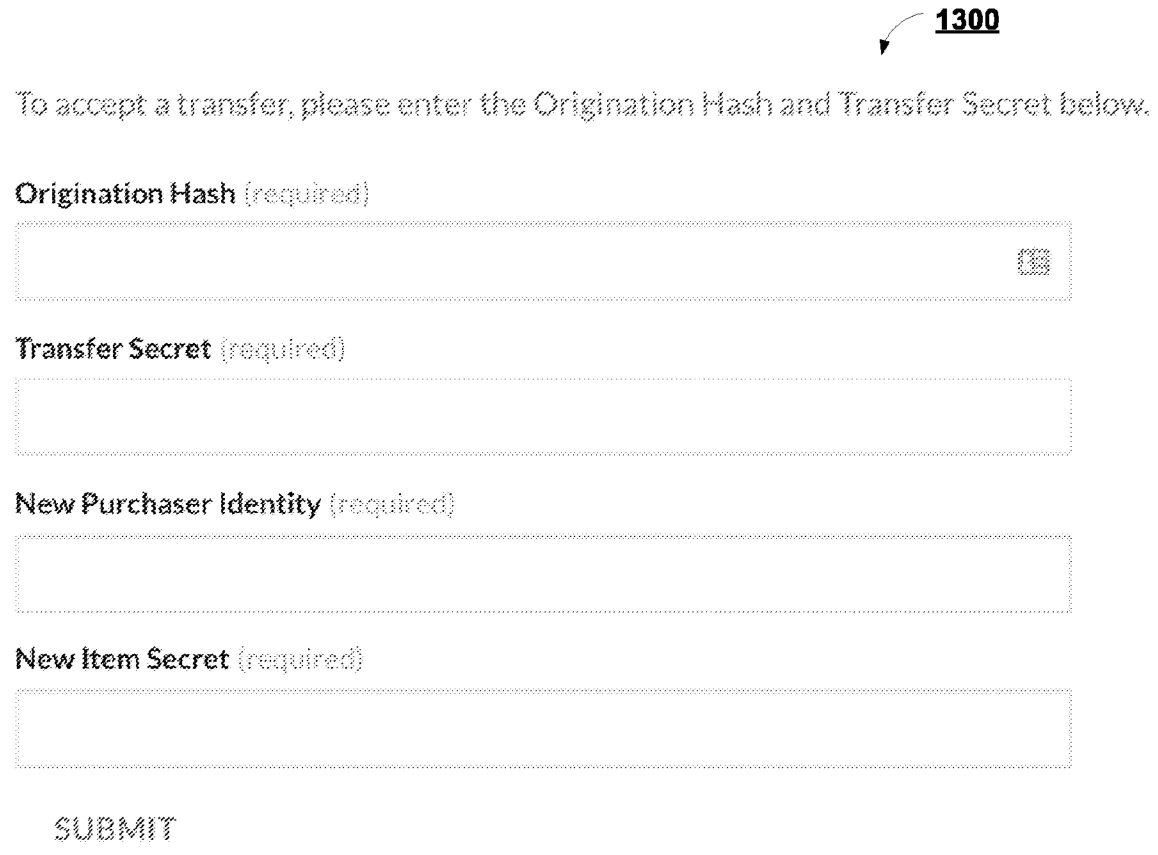
Transfer Secret - must be 12+ characters with uppercase, lowercase, numbers, & symbols

Confirm Transfer Secret

□ Check for Stewardship - [illegible]

Copyright Hashquin © 2021

FIGURE 12



To accept a transfer, please enter the Origination Hash and Transfer Secret below.

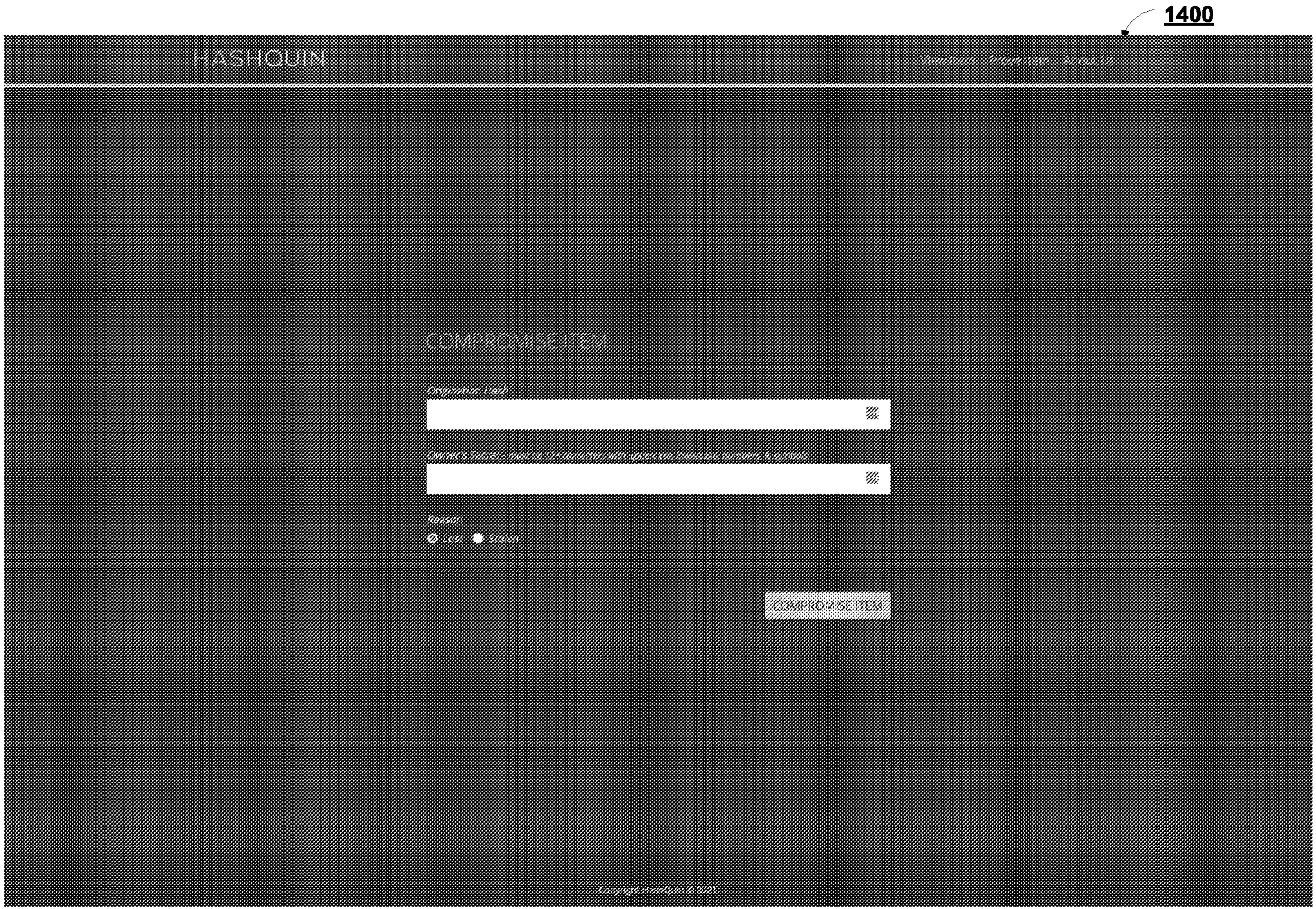
Origination Hash (required)

Transfer Secret (required)

New Purchaser Identity (required)

New Item Secret (required)

FIGURE 13



COMPROMISE ITEM

Origination Hash

Owner's Secret - must be 12+ characters with uppercase, lowercase, numbers & symbols

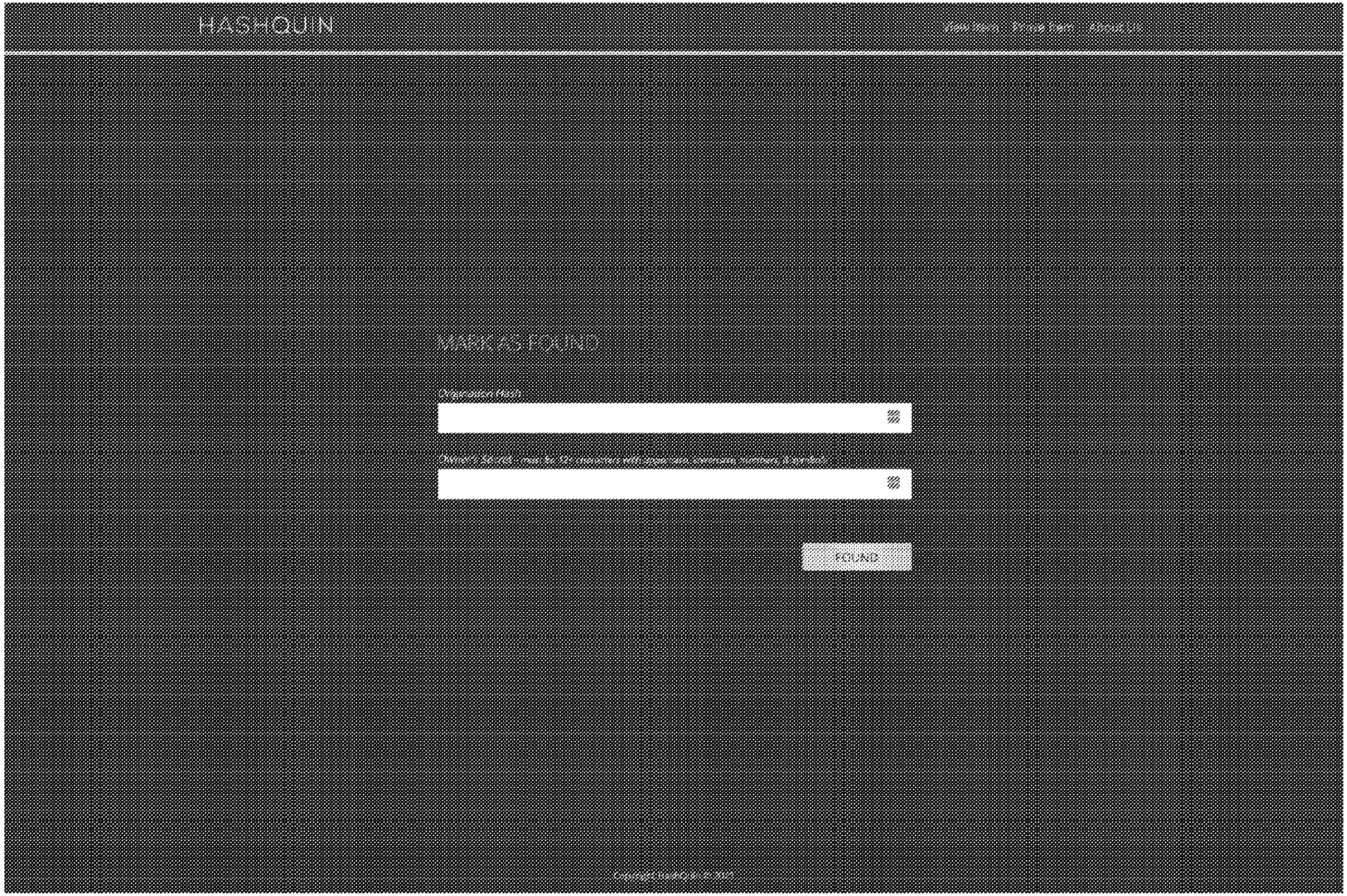
Reason

○ Lost ● Stolen

Copyright Hashquin © 2020

FIGURE 14

1500

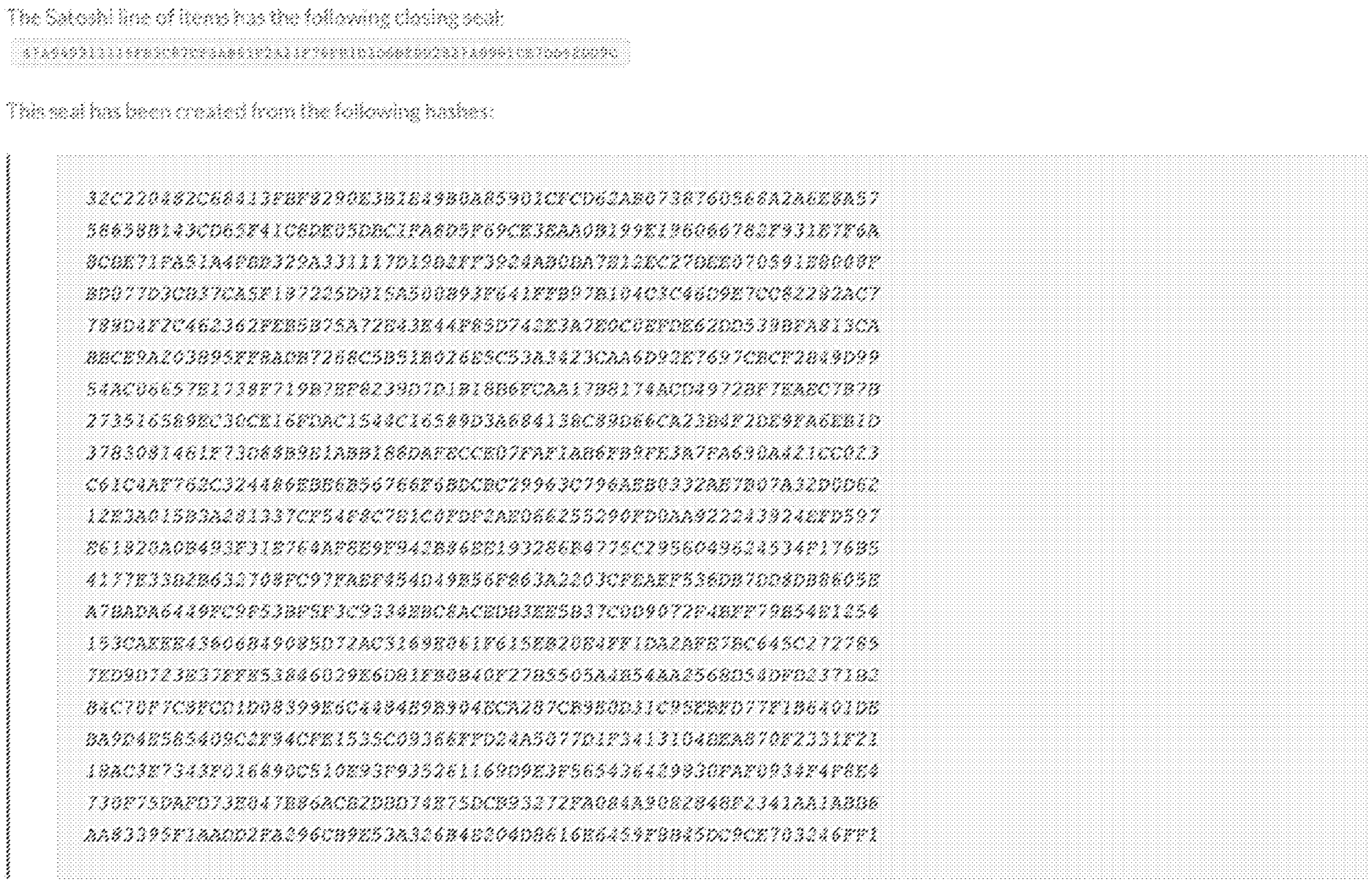


MARK AS FOUND

Organization Hash

Owner's Secret - must be 12+ characters with uppercase, lowercase, numbers, & symbols

FIGURE 15



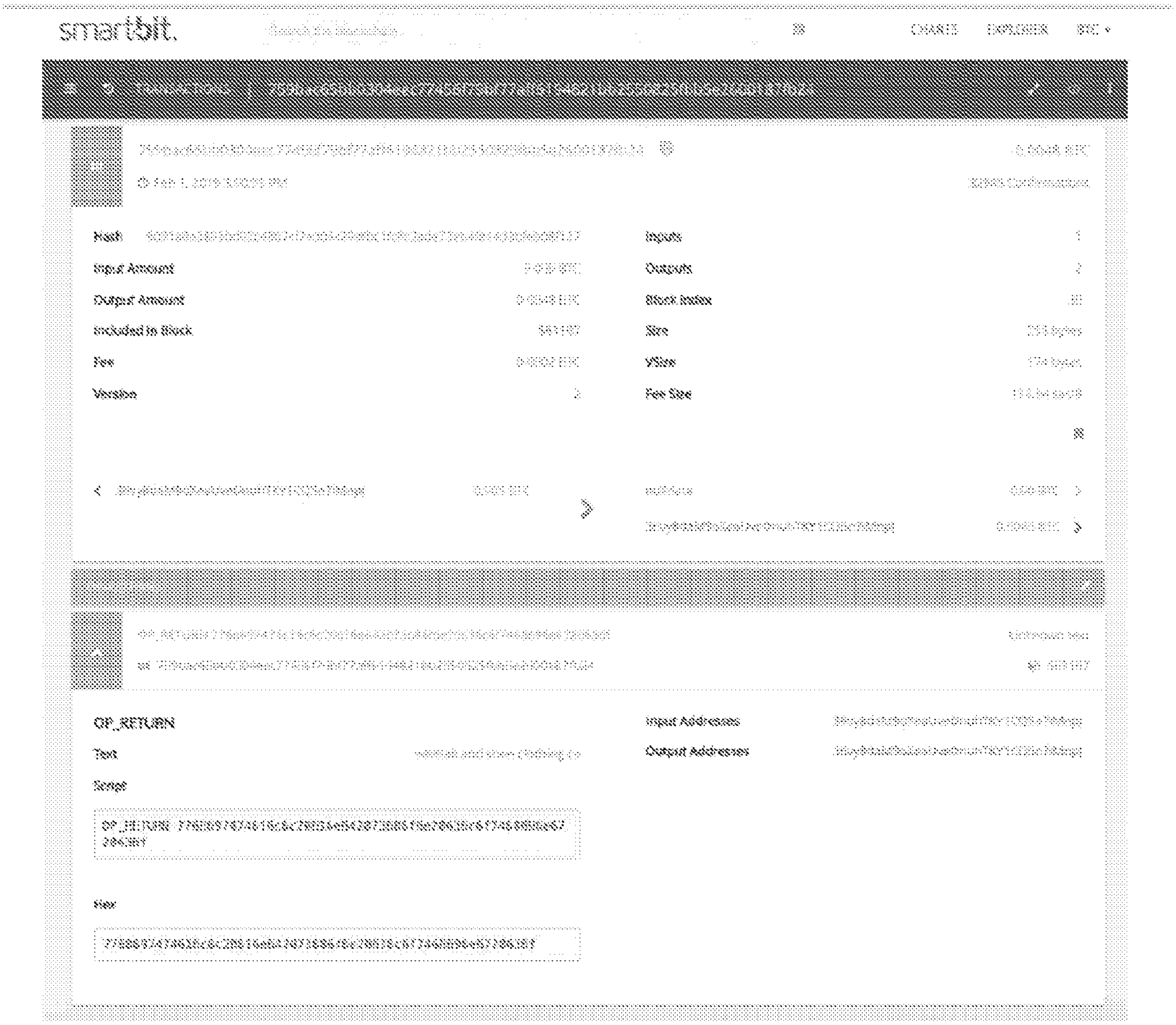
The Satoshi line of items has the following closing seal:

```
87A6493111116FB3C87CF3A881F2A21F79FB1B1D6BFD92B37A6991C870049B09C
```

This seal has been created from the following hashes:

```
32C220482C68413FBF8290E3B1E49B0A85901CFCD63AB0738760566A2A6E8A57
56638B143CD65F41C6DE05DBC1FA8D5F69CE36AA0B199E196066783F931E7F6A
8CBE71FA81A4FBB329A331117D19B2FF3924AB0DA7E12EC270EE070591E8008F
BD077D3CB37CA5F197225DD15A500B93F641FFB97B104C3C4609E7CC82292AC7
789D4F7C462362FEB5B75A72B43E44F85D742E3A7E0C0EFDE62DD539BFA813CA
BBCE9A203895FF8ADB7268C5B51B026E5C53A3423CAA6D92E7697CBCF2849D99
54AC06657E1738F719B7BF8239D7D1B18B6FCAA17B8174ACD4972BF7EABC7B7B
273516589EC30CE16FDAC1544C16589D3A684138C89D64CA23B4F2DE9FA6EB1D
3783081461F73D68B9B1ABB186DAFECCE07FAF1AB6FB9FE3A7FA690A421CC023
C61C4AF763C324486EBB6B56766F6BDCBC29963C796AEB0332AB7B07A32D0D62
12E3A015B3A281337CF54F8C7B1C0FDF2AE066255290FD0AA922243924EFD597
861820A0B493F31E764AF8E9F942B86BB193286B4775C2956049624534F176B5
4177E33D2B632708FC97FABF454D49B56F863A2203CFEAEF536DB7DD8DB8605E
A7BADA6449FC9F53BF5F3C9334EBC8ACED03EE5B37C009072F4BFF79B54E1254
153CAEEB43606B49085D72AC3169E061F615EB20B4FF1DA2AFE7BC645C272765
7ED90723E37EFE53846029E6D81EB0840F27B5505A4B54AA2568D54DF0237182
84C70F7C9FCD1D08399E6C4494B9B9046CA287CB9B0D31C95EBFD77F1B6401D6
BA9D4E585409C2F94CFB1535C09366FFD24A5077D1F34131048EA870F2331F21
18AC3E7343F016890C510E93F93526116909E3F5654364299 30FAF0934F4F8E4
730F75DAFD73E047B86ACB2DBD74E75DCB93272FA084A9082848F2341AA1AB06
AA83395F1AADD2FA296CB9E53A326B4B204D8616E6459F9B45DC9CE703246FF1
```

FIGURE 16



[illegible] -0.0048 BTC

Feb 1, 2019 [illegible] PM [illegible] Confirmations

Hash	[illegible]	Inputs	1
Input Amount	0.005 BTC	Outputs	2
Output Amount	0.0048 BTC	Block Index	[illegible]
Included in Block	[illegible]	Size	[illegible] bytes
Fee	0.0002 BTC	VSize	[illegible] bytes
Version	2	Fee Size	[illegible]

[illegible] 0.005 BTC

nulldata 0.00 BTC

[illegible] 0.0048 BTC

OP_RETURN [illegible]

[illegible]

OP_RETURN

Text	[illegible] Clothing Co	Input Addresses	[illegible]
		Output Addresses	[illegible]

Script

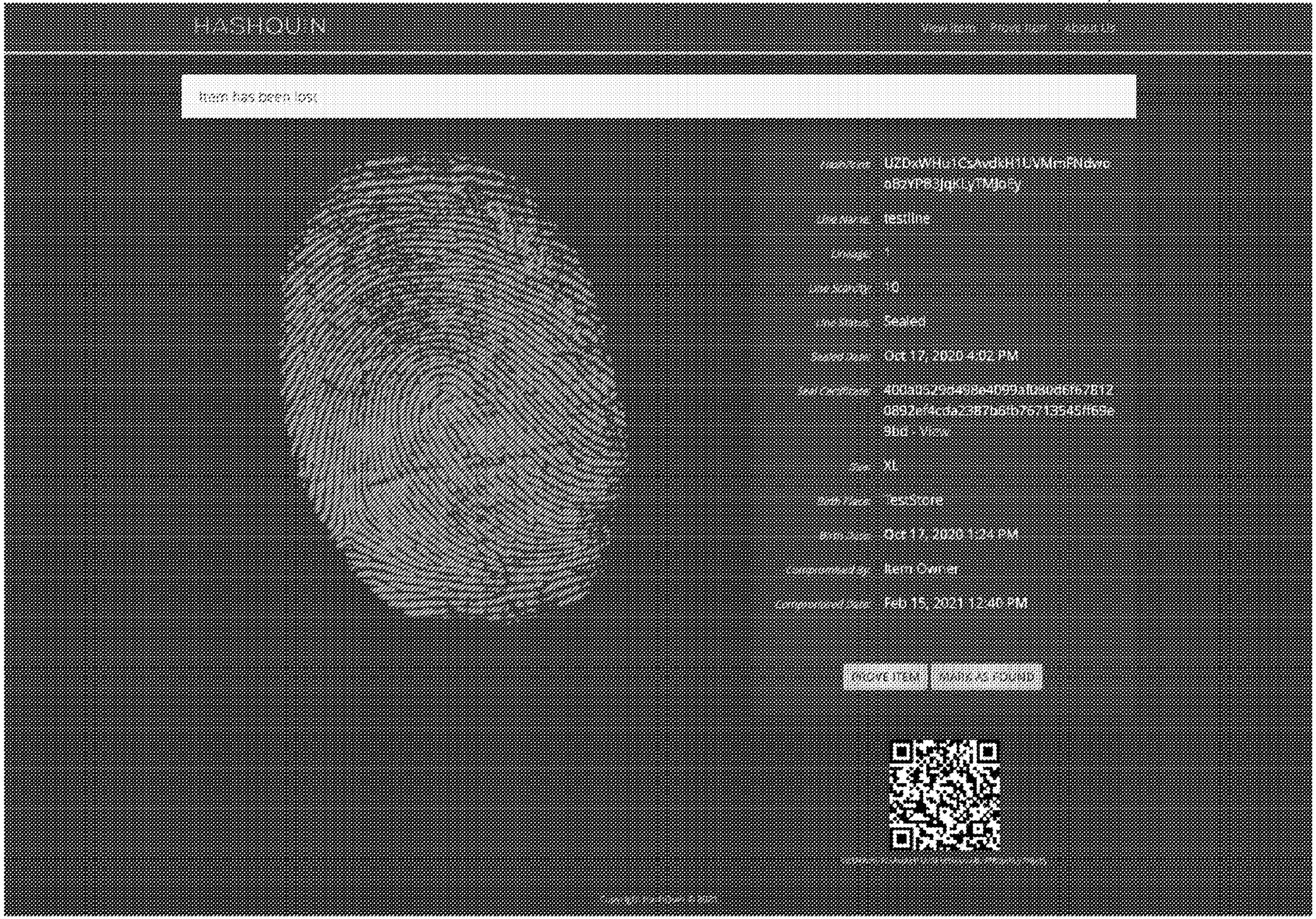
```
OP_RETURN [illegible]
```

Hex

```
[illegible]
```

FIGURE 17

1800



Item has been lost

[illegible] UZDxWHu1CsAvdkH1LVMmFNdwo aBzYP83JqKLyTMJoFy

Line Name: testline

Lineage: 1

[illegible] 10

Line Status: Sealed

Sealed Date: Oct 17, 2020 4:02 PM

Seal Certificate: 400a0529d498e4099af0a0d6f67812 0892ef4cda2387b6fb7671354ff69e 9bd - View

Size: XL

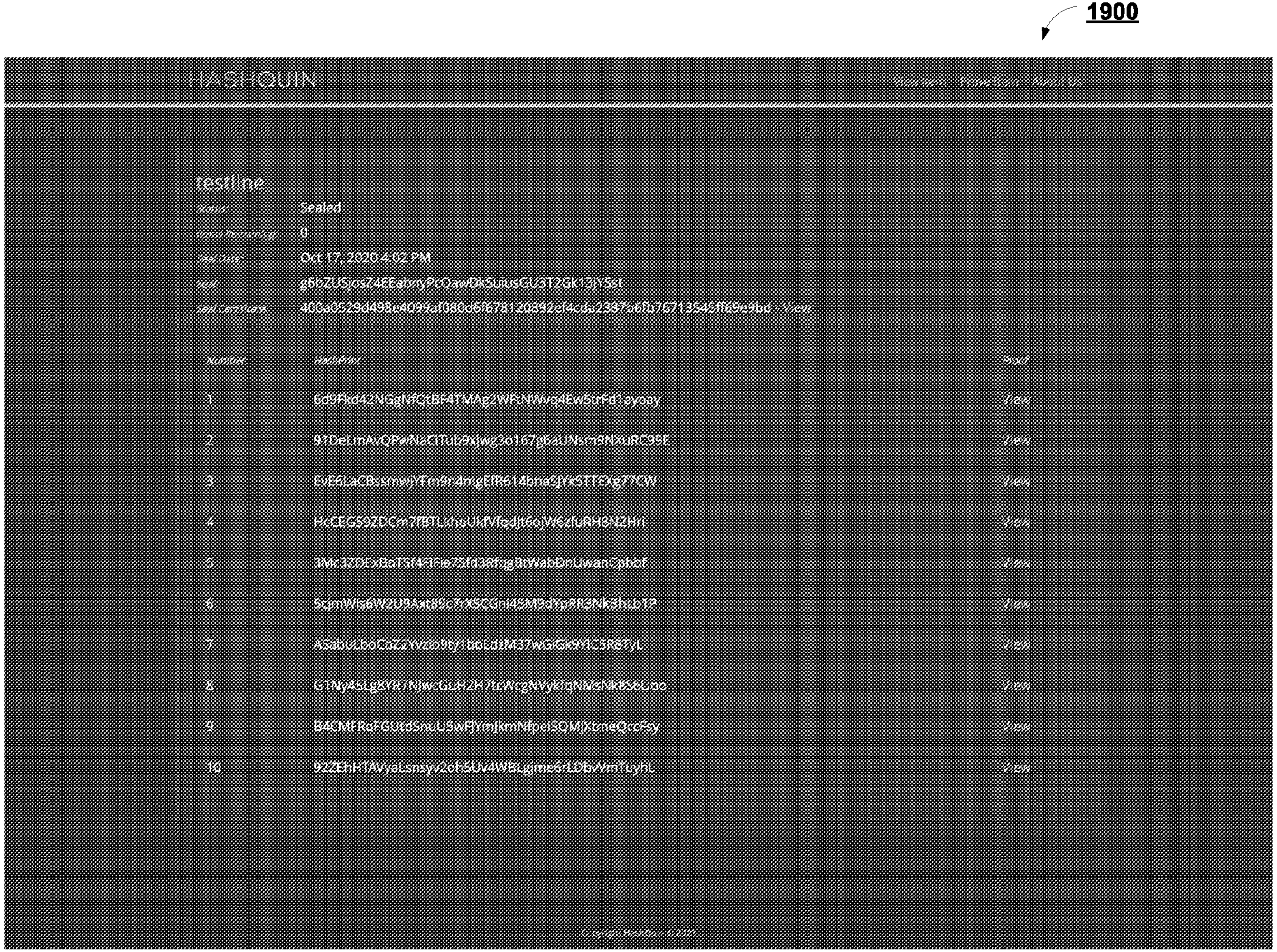
Birth Place: TestStore

Birth Date: Oct 17, 2020 1:24 PM

Compromised By: Item Owner

Compromised Date: Feb 15, 2021 12:40 PM

FIGURE 18

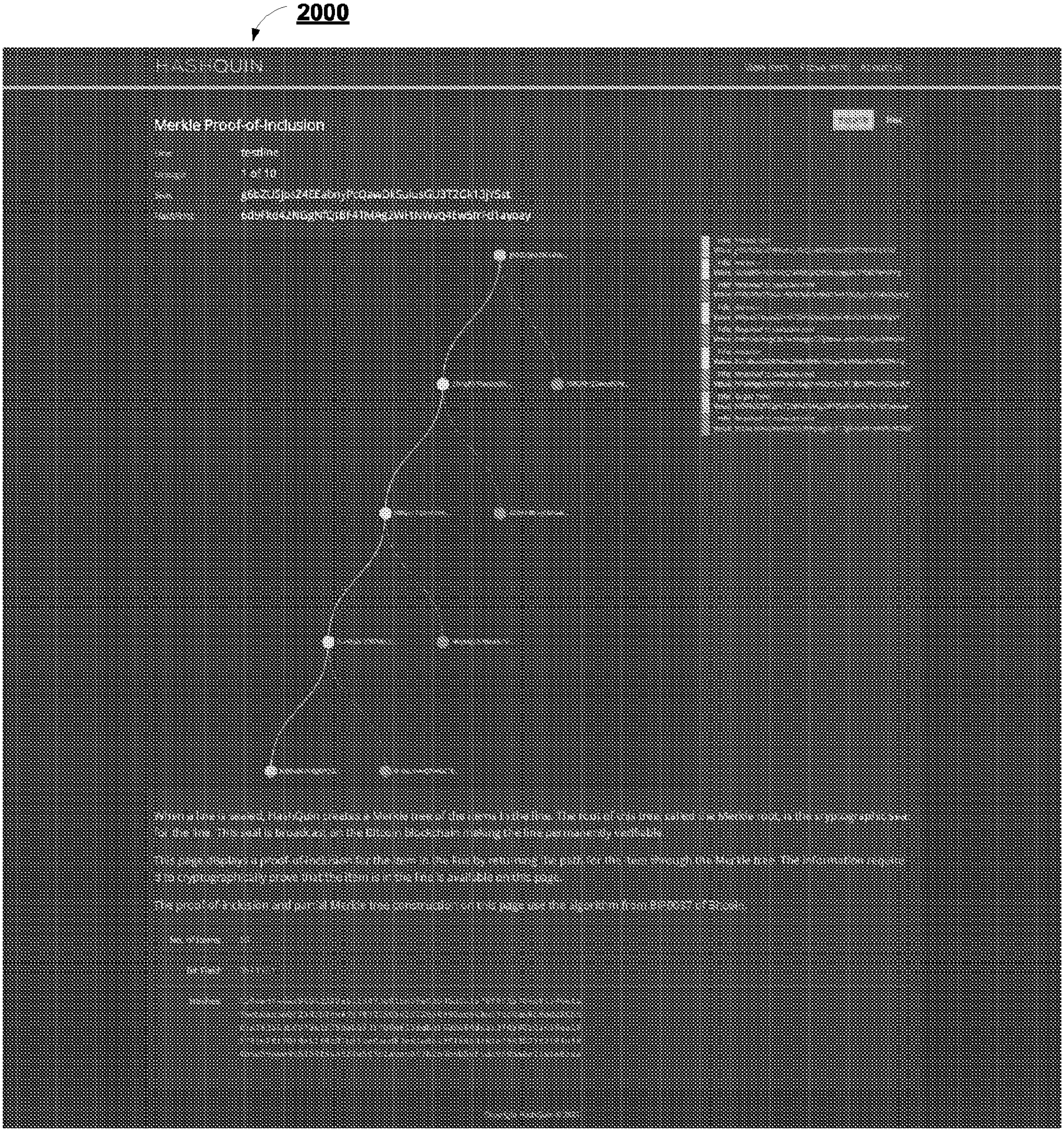


testline

Status:	Sealed
Nodes Remaining:	0
Seal Date:	Oct 17, 2020 4:02 PM
Seal:	g6bZUSjosZ4EEabmyPcQawDkSuiusGU3T2Gk13jYSst
Seal Certificate:	400a0529d498e4099af080d6f678120892ef4cda2387b6fb76713542ff69e9bd View

Number	Hash Print	Proof
1	6d9Fkd42NGgNfQtBF4TMAg2WFtNWvq4EwSurFd1ayoay	View
2	91DeLmAvQPwNaCiTub9xjwg3o167g6aUNsm9NXuRC99E	View
3	EvE6LaCBssmwjYTm9n4mgEfR614bnaSJYxSTTExg77CW	View
4	HcCEG592DCm7fBTLkhoUkfVfqdJt6ojW6zlURH8NZHri	View
5	3Mc3ZDExBaTSf4FiFie75fd38fhgBtWabDnUwanCpbbf	View
6	5cjmWis6W2U9Axt89c7rXSCGni4SM9dYpRR3Nk8hLb1P	View
7	ASabiLboCoZ2Yvzb9ty1boLdzM37wGiGk9YiC5R8TyL	View
8	G1Ny4SLg8YR7NjwcGLH2H7tcWcgNVykiqNMsNk8SeUno	View
9	B4CMFRoFGUtdSnuUSwFJYmJkmNfpeISQMjXtneQccFsy	View
10	9ZZEhHTAVyaLsnsyv2ohSUv4WBLgjme6rLDbvWmTuyhL	View

FIGURE 19



Merkle Proof-of-Inclusion

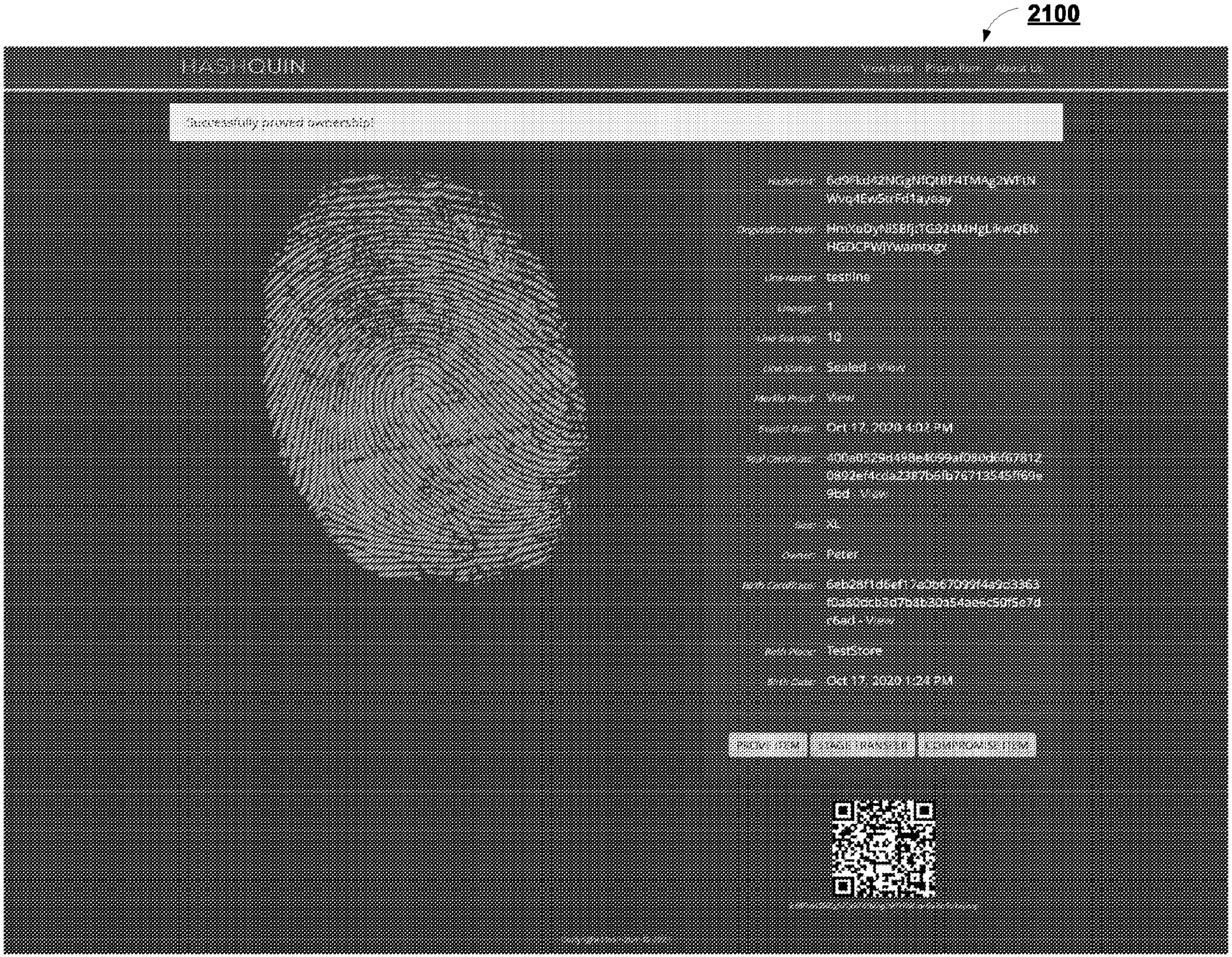
[illegible]	testline
[illegible]	1 of 10
[illegible]	g6bZUSjxs24EEabnyRoQawDKSuiusGU3T3CH3jY5at
[illegible]	[illegible]

When a line is sealed, Hashquin creates a Merkle tree of the items in the line. The root of this tree called the Merkle root, is the cryptographic seal for the line. This seal is broadcast on the Bitcoin blockchain making the line permanently verifiable.

This page displays a proof of inclusion for the item in the line by returning the path for the item through the Merkle tree. The information required to cryptographically prove that the item is in the line is available on this page.

The proof of inclusion and partial Merkle tree construction on this page use the algorithm from BIP037 of Bitcoin.

FIGURE 20



Successfully proved ownership!

6d9Fkd42NGgHiQtBF4tMAg2WFtN
Wvq4Ew5trFd1ayeay

HmXuDyNiSBfjTG924MHgLkwQEN
HGDCPWjYwamxgz

testline

1

10

Sealed - View

View

Oct 17, 2020 4:03 PM

406a0529d498e4099af080d6f67812
0892ef4cda2387b5fb76713545f69e
9bd - View

XL

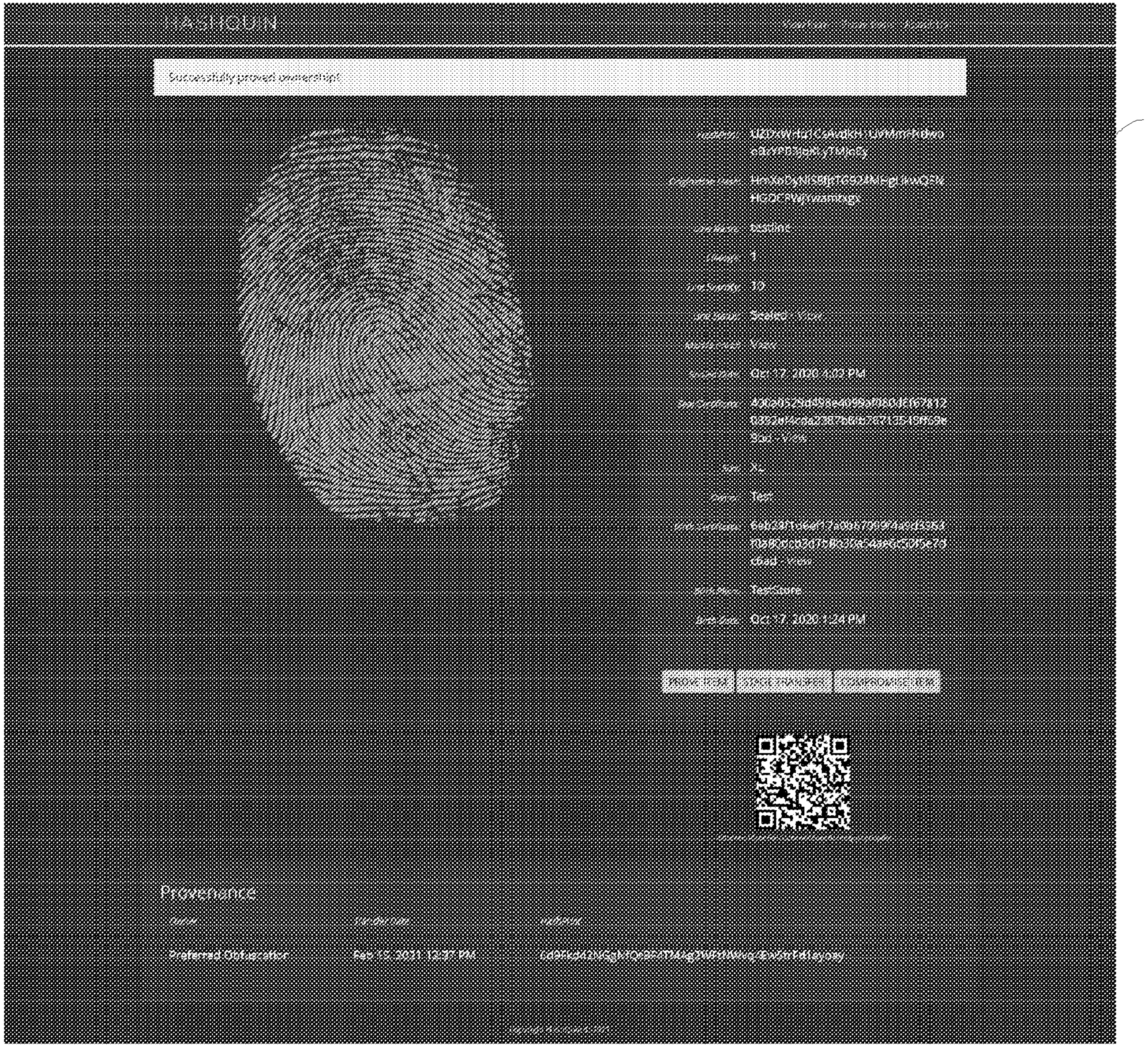
Owner: Peter

6eb28f1d6ef17a0b67099f4a9c3363
f0a80dcb3a7b8b30a54aebc50f5e7d
c6ad - View

TestStore

Oct 17, 2020 1:24 PM

FIGURE 21



Successfully proved ownership!

UZDXWHd1CsAdKH1UyMmFNdwo eaWPB3gdKyTMjeEy

HmXbDyNiS8jjTG52AMEgLkwQEN HGDCFWjYwamkgx

bstime

1

10

Sealed - View

View

Oct 17, 2020 4:03 PM

40a0529d98a4099aff80d6f67812 0892ef4c8a2387b6f67071354ff59e 9ad - View

XL

Test

6eb28f1d6ef17a0bb70697449d3583 f0a80dcb2d75f8b3ba54a6d5c0f5e79 c6ad - View

TestStore

Oct 17, 2020 1:24 PM

Provenance

Preferred Obfuscator Feb 15, 2021 12:37 PM Cd9Fkd42NGgMOr8FATM4g2WFHWxqSEw5nFd1ayowy

FIGURE 22

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2021/018127

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06Q30/00
ADD. H04L9/32

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)
G06Q H04L

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2020/021228 A1 (LEONE PHILIP [GB]) 30 January 2020 (2020-01-30) page 1 - page 15 page 18 figures 2-4 -----	1-20
X	US 10 505 726 B1 (ANDON CHRISTOPHER [US] ET AL) 10 December 2019 (2019-12-10) column 3 - column 4 column 8 column 16 - column 19 column 26 figures 2, 4 -----	1-20

□ 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

"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

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"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 25 May 2021	Date of mailing of the international search report 02/06/2021
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Pomocka, Marek

2

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2021/018127

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2020021228 A1	30-01-2020	NONE	
US 10505726 B1	10-12-2019	TW 202038162 A US 10505726 B1 US 2020186338 A1 WO 2020118297 A1	16-10-2020 10-12-2019 11-06-2020 11-06-2020