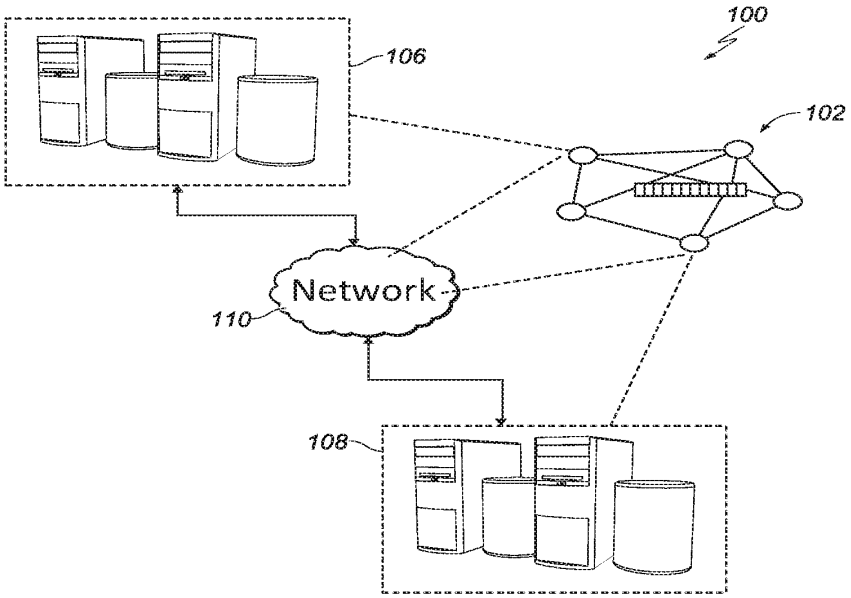
100
106
102
Network
110
108

FIG. 1

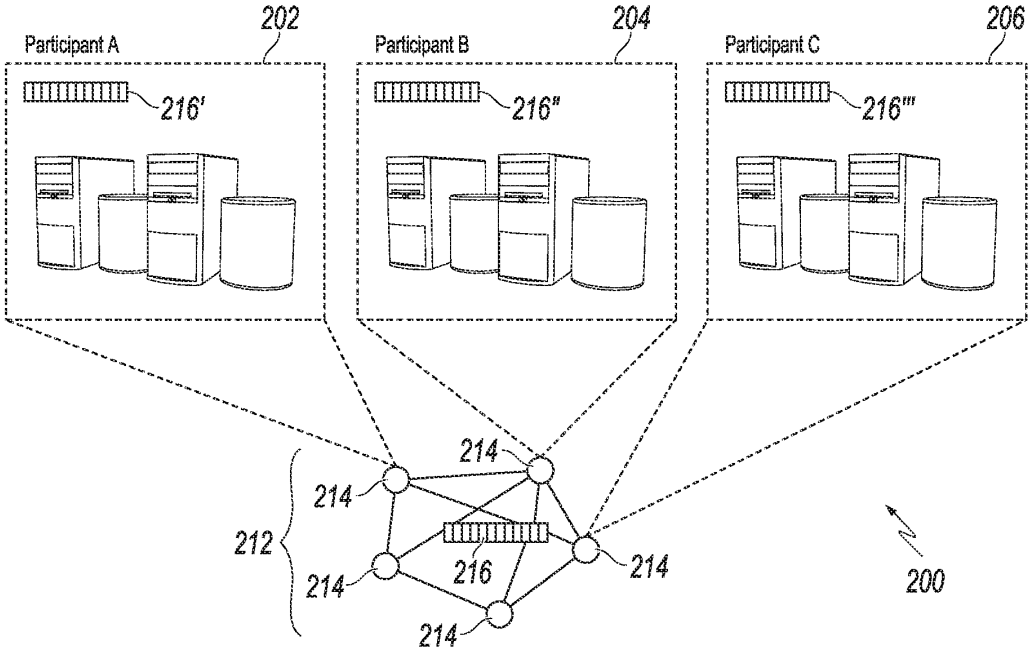
202
Participant A
216'
204
Participant B
216"
206
Participant C
216'"
214
214
212
214
216
214
214
200

FIG. 2

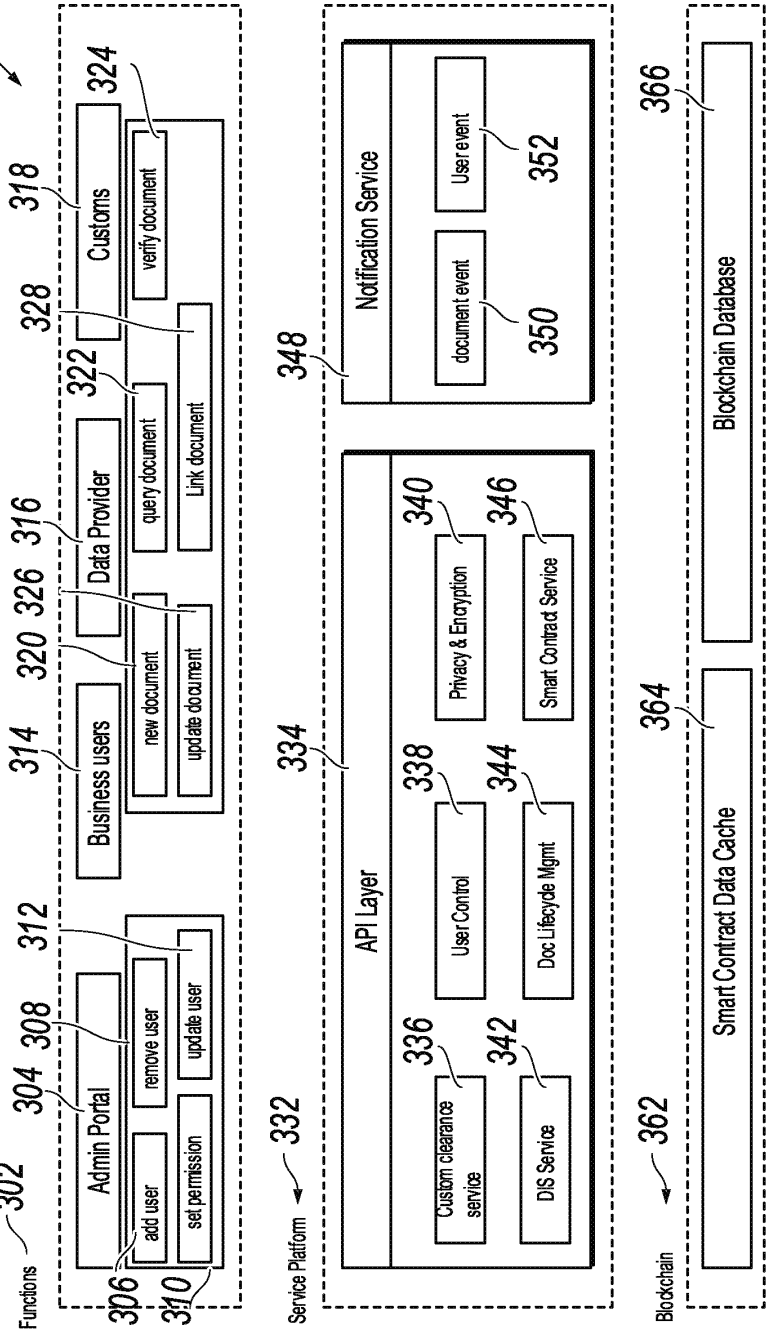
300
Functions
302
Admin Portal
304
add user
306
set permission
308
remove user
310
update user
312
Business users
314
new document
320
update document
326
Data Provider
316
query document
322
Link document
328
Customs
318
verify document
324
Service Platform
332
API Layer
334
Custom clearance service
336
DIS Service
342
User Control
338
Doc Lifecycle Mgmt
344
Privacy & Encryption
340
Smart Contract Service
346
Notification Service
348
document event
350
User event
352
Blockchain
362
Smart Contract Data Cache
364
Blockchain Database
366

FIG. 3

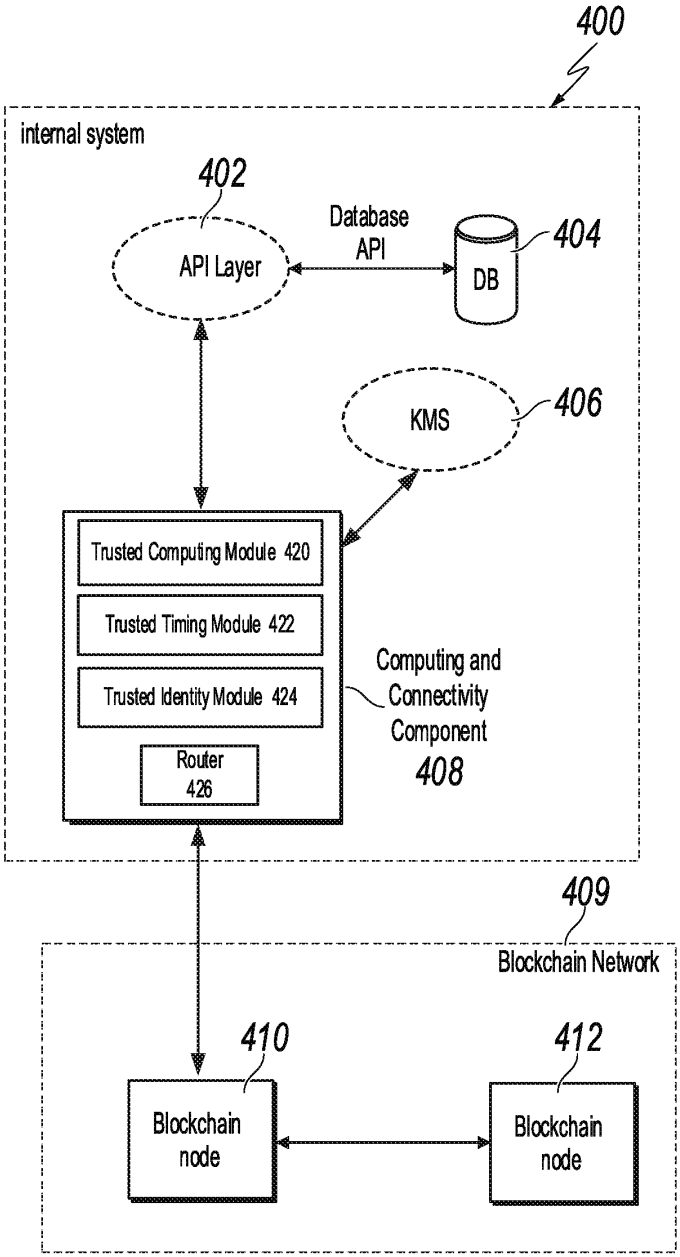
400
internal system
402
API Layer
Database API
404
DB
406
KMS
Trusted Computing Module 420
Trusted Timing Module 422
Trusted Identity Module 424
Router 426
Computing and Connectivity Component 408
409
Blockchain Network
410
Blockchain node
412
Blockchain node

FIG. 4

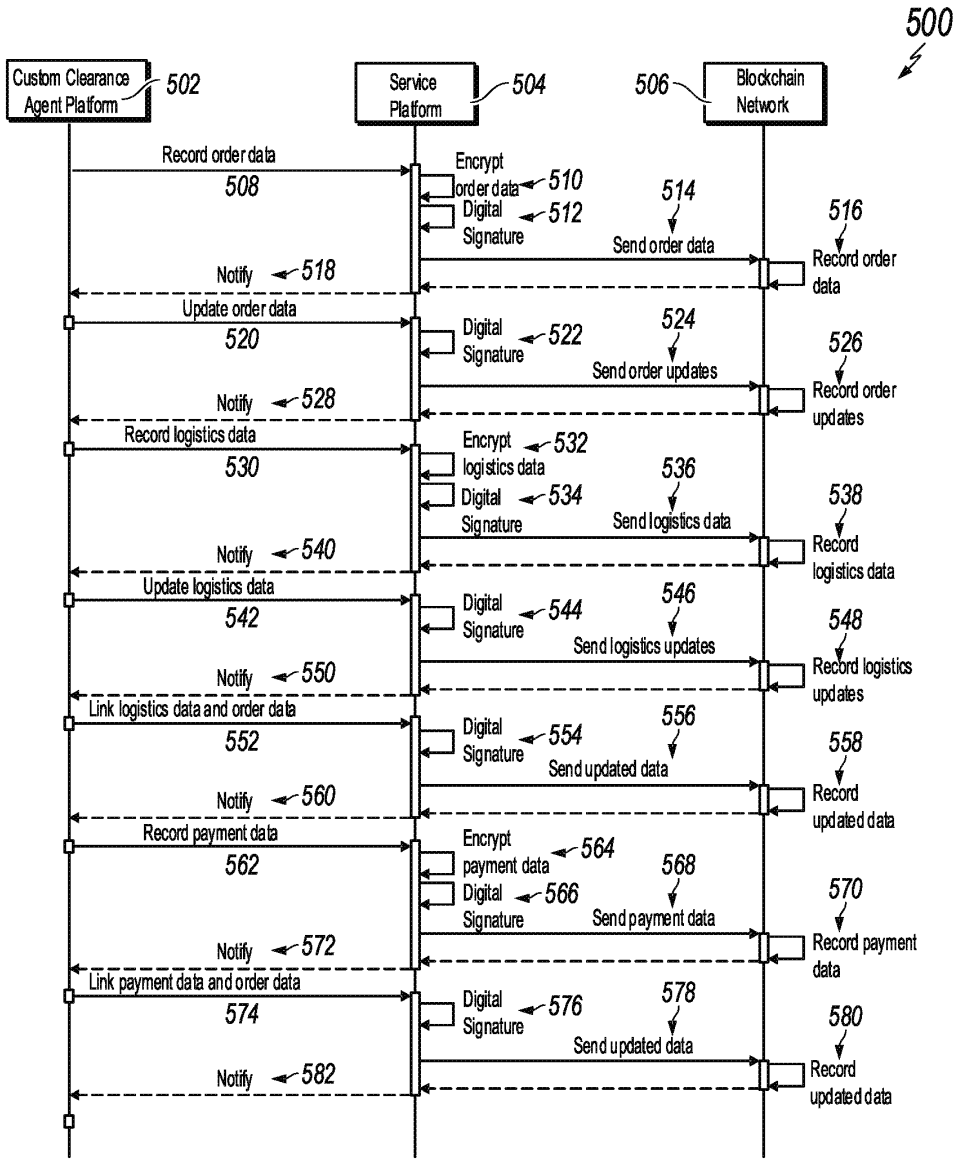
500
Custom Clearance Agent Platform
502
Service Platform
504
506
Blockchain Network
Record order data
508
Encrypt order data
510
Digital Signature
512
514
Send order data
516
Record order data
Notify
518
Update order data
520
Digital Signature
522
524
Send order updates
526
Record order updates
Notify
528
Record logistics data
530
Encrypt logistics data
532
Digital Signature
534
536
Send logistics data
538
Record logistics data
Notify
540
Update logistics data
542
Digital Signature
544
546
Send logistics updates
548
Record logistics updates
Notify
550
Link logistics data and order data
552
Digital Signature
554
556
Send updated data
558
Record updated data
Notify
560
Record payment data
562
Encrypt payment data
564
Digital Signature
566
568
Send payment data
570
Record payment data
Notify
572
Link payment data and order data
574
Digital Signature
576
578
Send updated data
580
Record updated data
Notify
582

FIG. 5

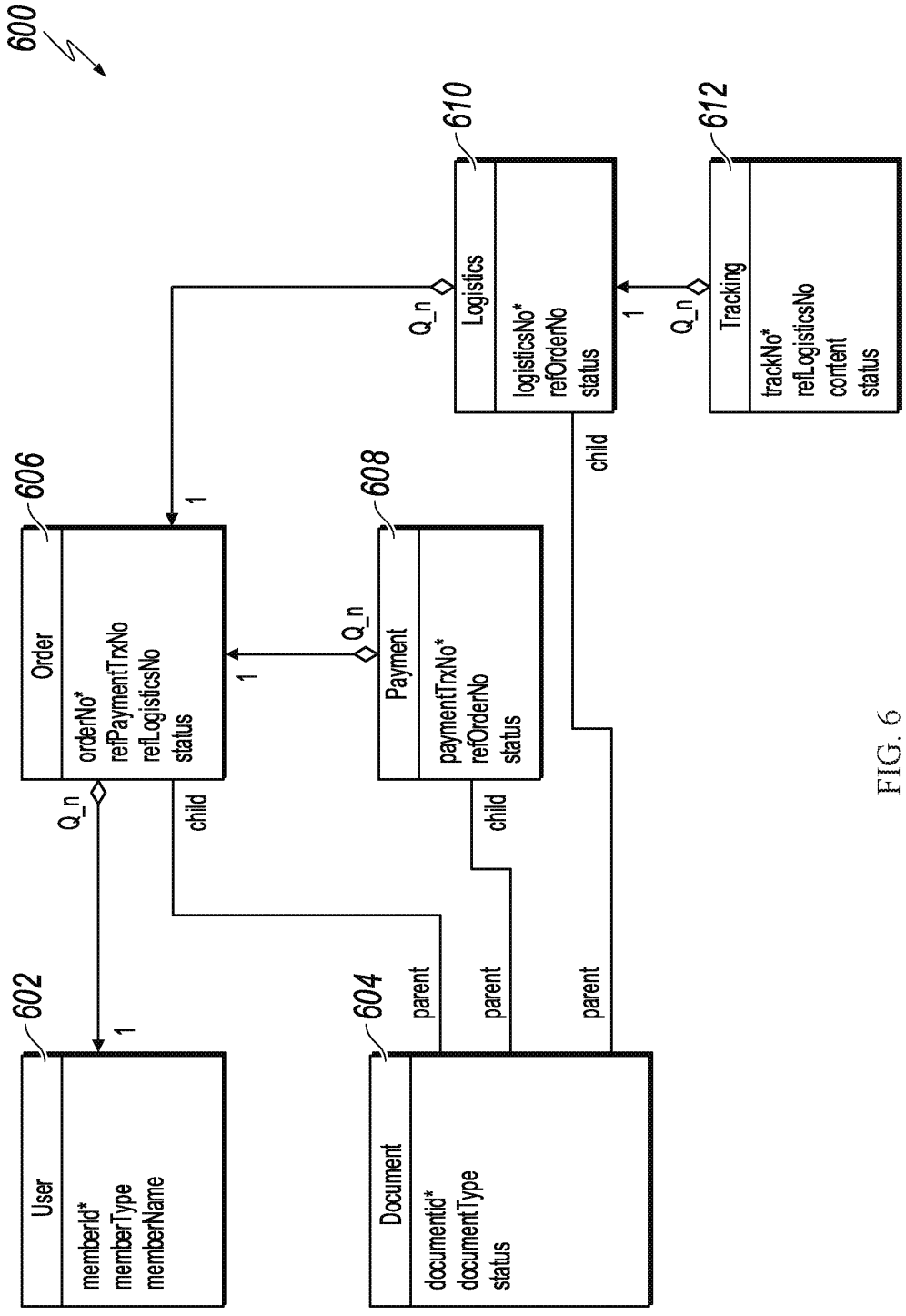
600
610
612
Logistics
logisticsNo*
refOrderNo
status
Tracking
trackNo*
refLogisticsNo
content
status
Q_n
1
child
606
608
Order
orderNo*
refPaymentTrxNo
refLogisticsNo
status
Payment
paymentTrxNo*
refOrderNo
status
parent
602
604
User
memberId*
memberType
memberName
Document
documentId*
documentType
status

FIG. 6

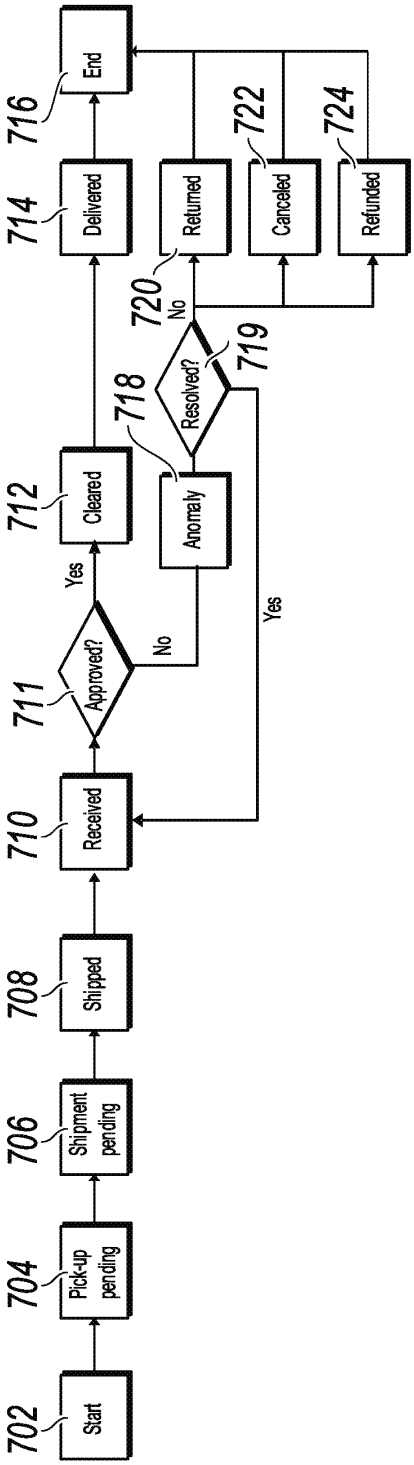
Start
Pick-up pending
Shipment pending
Shipped
Received
Approved?
Yes
No
Cleared
Anomaly
Resolved?
No
Yes
Delivered
Returned
Canceled
Refunded
End
702
704
706
708
710
711
712
718
719
720
714
722
724
716
700

FIG. 7

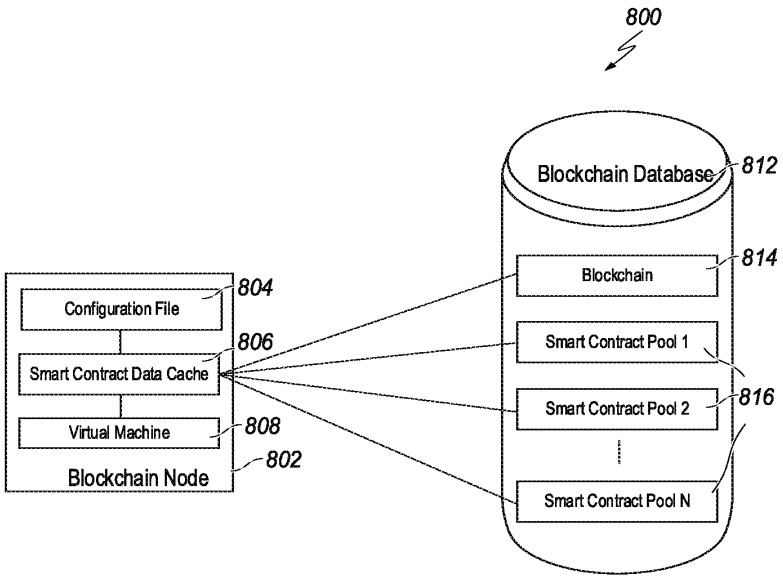
800
Blockchain Database
812
Blockchain
814
Smart Contract Pool 1
Smart Contract Pool 2
816
Smart Contract Pool N
Configuration File
804
Smart Contract Data Cache
806
Virtual Machine
808
Blockchain Node
802

FIG. 8

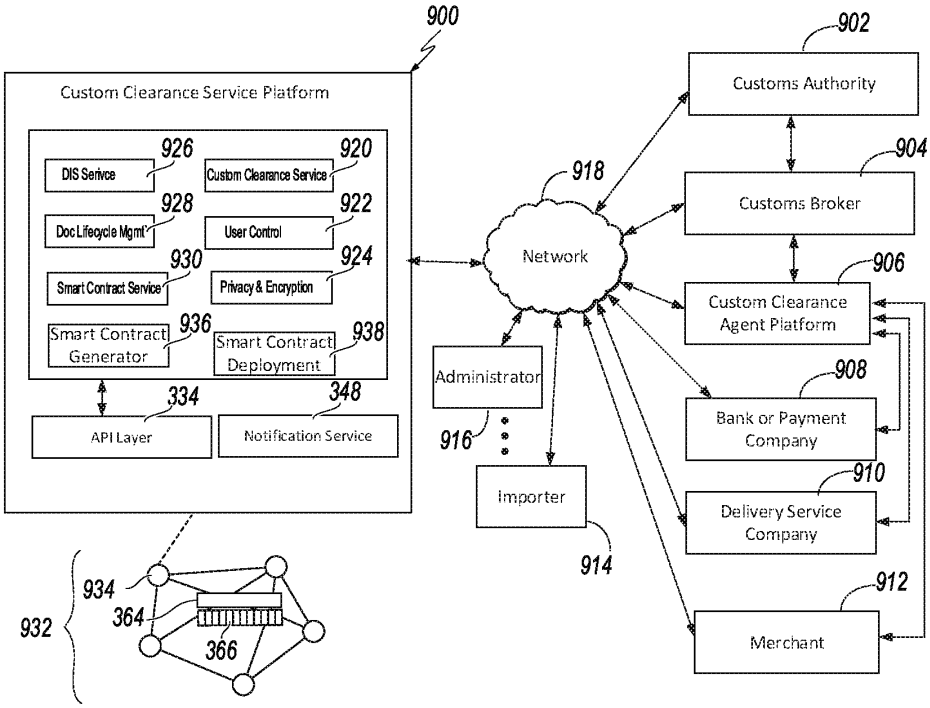
900
Custom Clearance Service Platform
DIS Serivce
926
Custom Clearance Service
920
Doc Lifecycle Mgmt
928
User Control
922
Smart Contract Service
930
Privacy & Encryption
924
Smart Contract Generator
936
Smart Contract Deployment
938
API Layer
334
Notification Service
348
932
934
364
366
Network
918
Administrator
916
Importer
914
Customs Authority
902
Customs Broker
904
Custom Clearance Agent Platform
906
Bank or Payment Company
908
Delivery Service Company
910
Merchant
912

FIG. 9

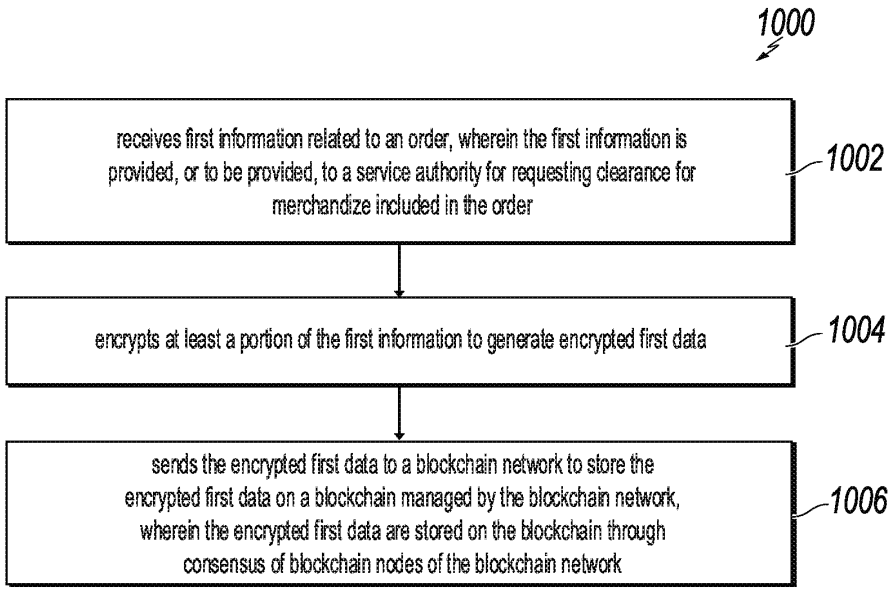
1000
receives first information related to an order, wherein the first information is provided, or to be provided, to a service authority for requesting clearance for merchandize included in the order
1002
encrypts at least a portion of the first information to generate encrypted first data
1004
sends the encrypted first data to a blockchain network to store the encrypted first data on a blockchain managed by the blockchain network, wherein the encrypted first data are stored on the blockchain through consensus of blockchain nodes of the blockchain network
1006

FIG. 10

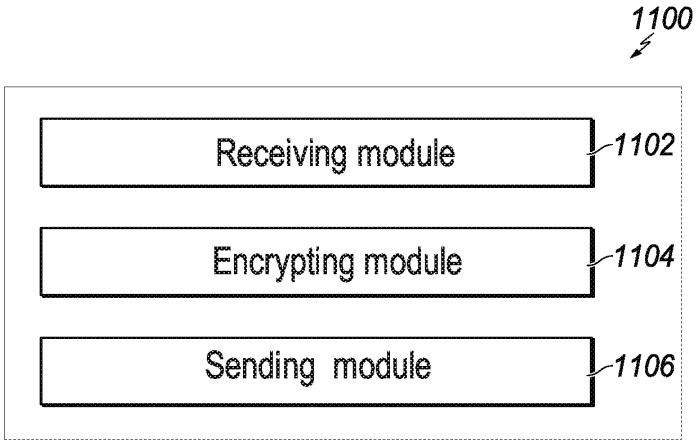
1100
Receiving module
1102
Encrypting module
1104
Sending module
1106

FIG. 11

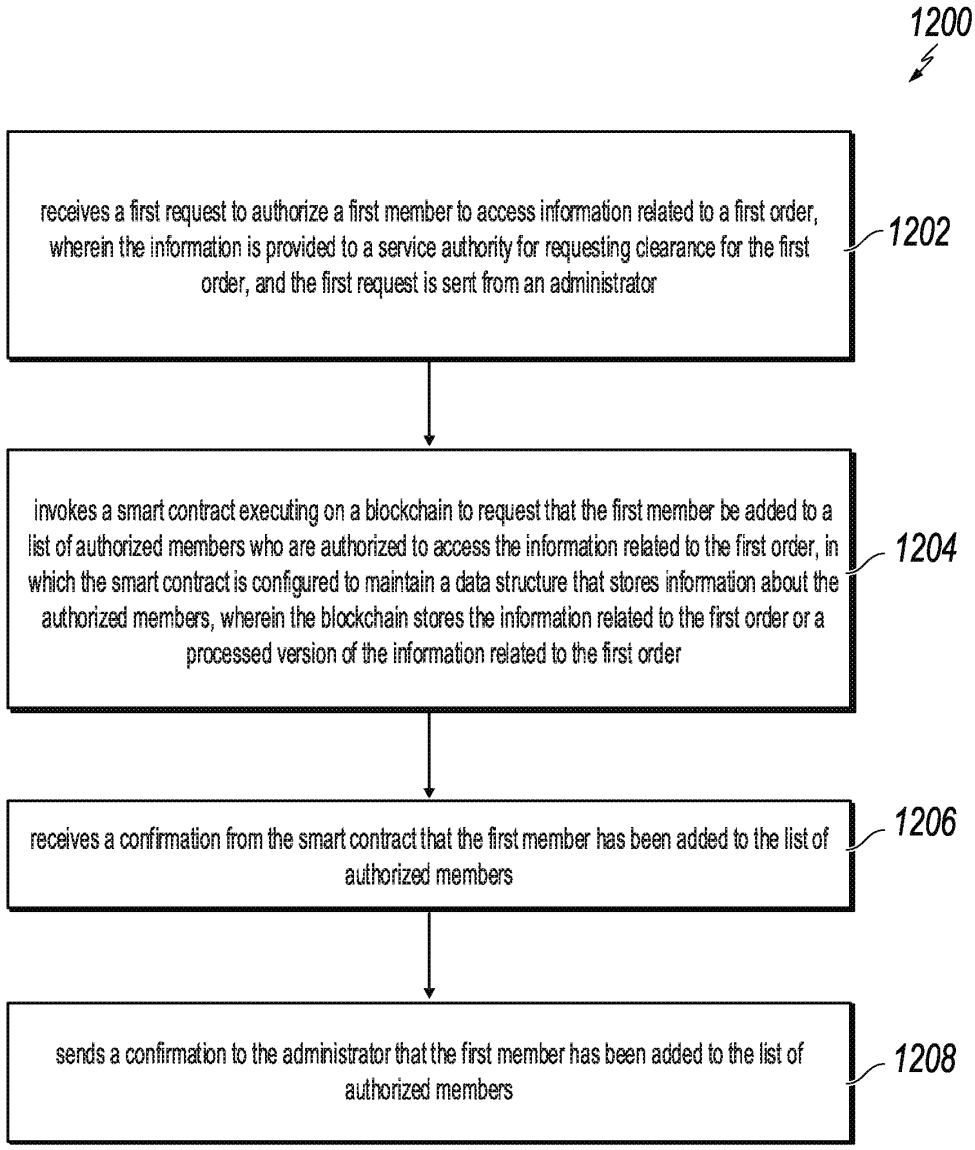
1200
receives a first request to authorize a first member to access information related to a first order, wherein the information is provided to a service authority for requesting clearance for the first order, and the first request is sent from an administrator
1202
invokes a smart contract executing on a blockchain to request that the first member be added to a list of authorized members who are authorized to access the information related to the first order, in which the smart contract is configured to maintain a data structure that stores information about the authorized members, wherein the blockchain stores the information related to the first order or a processed version of the information related to the first order
1204
receives a confirmation from the smart contract that the first member has been added to the list of authorized members
1206
sends a confirmation to the administrator that the first member has been added to the list of authorized members
1208

FIG. 12

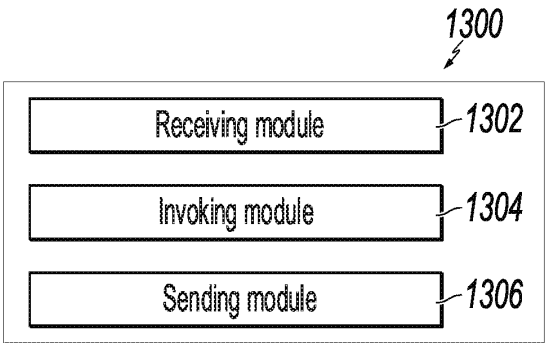
1300
Receiving module
1302
Invoking module
1304
Sending module
1306

FIG. 13

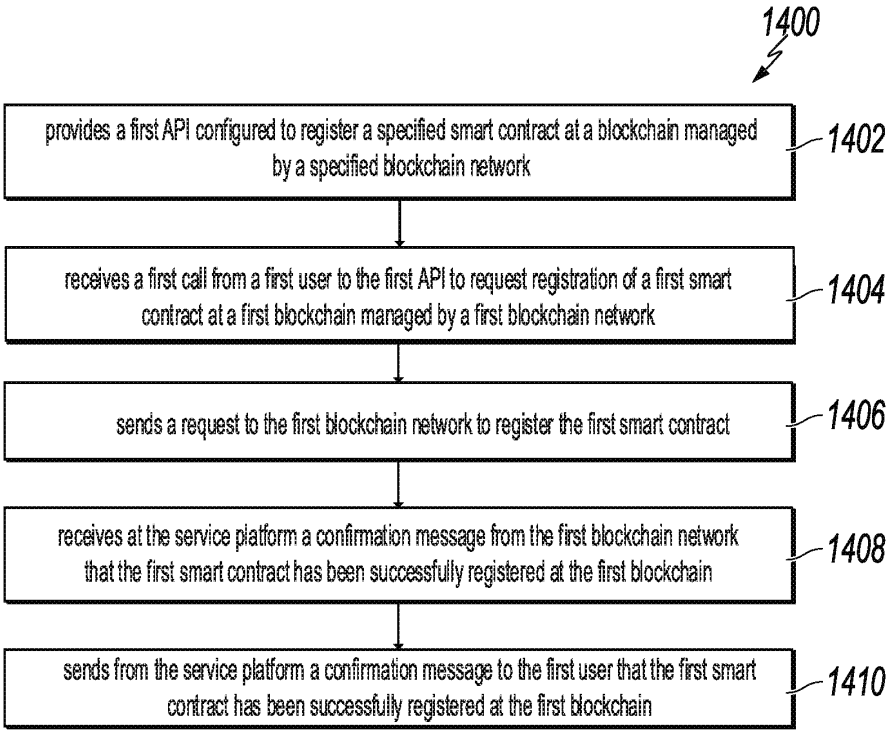
1400
provides a first API configured to register a specified smart contract at a blockchain managed by a specified blockchain network
1402
receives a first call from a first user to the first API to request registration of a first smart contract at a first blockchain managed by a first blockchain network
1404
sends a request to the first blockchain network to register the first smart contract
1406
receives at the service platform a confirmation message from the first blockchain network that the first smart contract has been successfully registered at the first blockchain
1408
sends from the service platform a confirmation message to the first user that the first smart contract has been successfully registered at the first blockchain
1410

FIG. 14

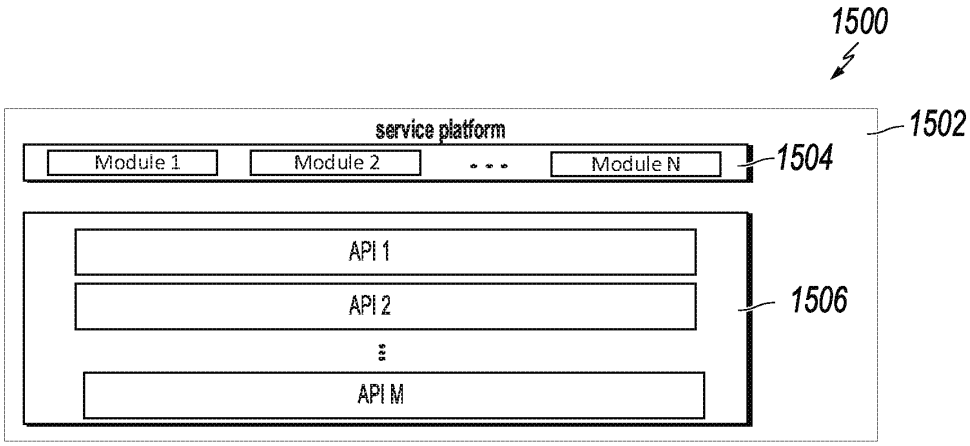
1500
service platform
Module 1
Module 2
Module N
1502
1504
API 1
API 2
API M
1506

FIG. 15

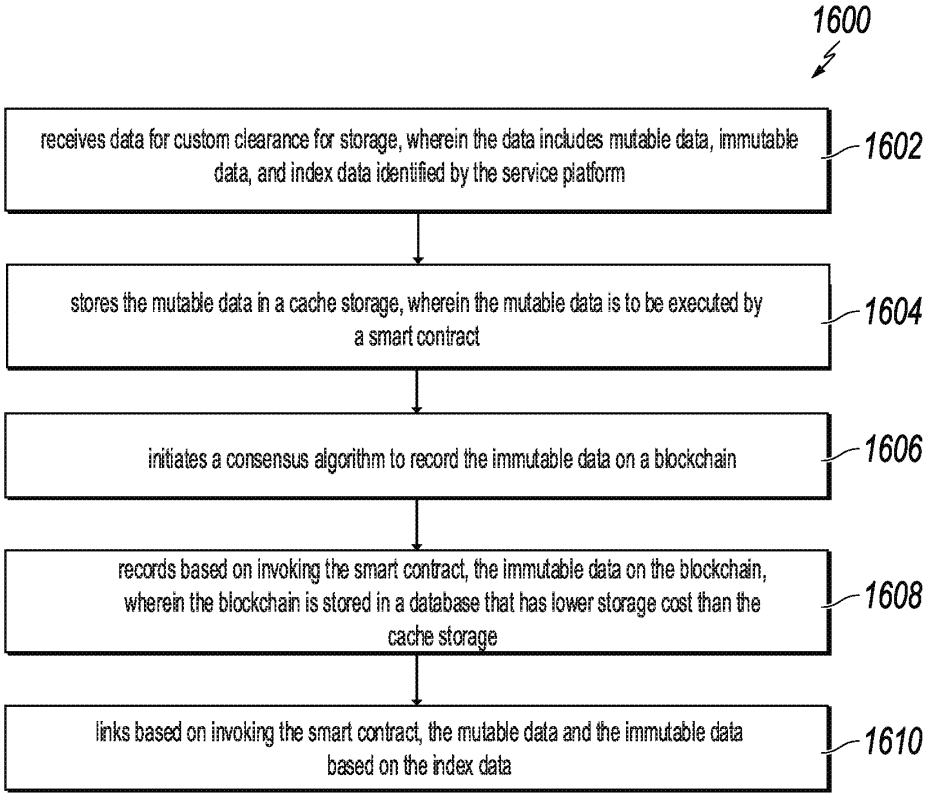
1600
receives data for custom clearance for storage, wherein the data includes mutable data, immutable data, and index data identified by the service platform
1602
stores the mutable data in a cache storage, wherein the mutable data is to be executed by a smart contract
1604
initiates a consensus algorithm to record the immutable data on a blockchain
1606
records based on invoking the smart contract, the immutable data on the blockchain, wherein the blockchain is stored in a database that has lower storage cost than the cache storage
1608
links based on invoking the smart contract, the mutable data and the immutable data based on the index data
1610

FIG. 16

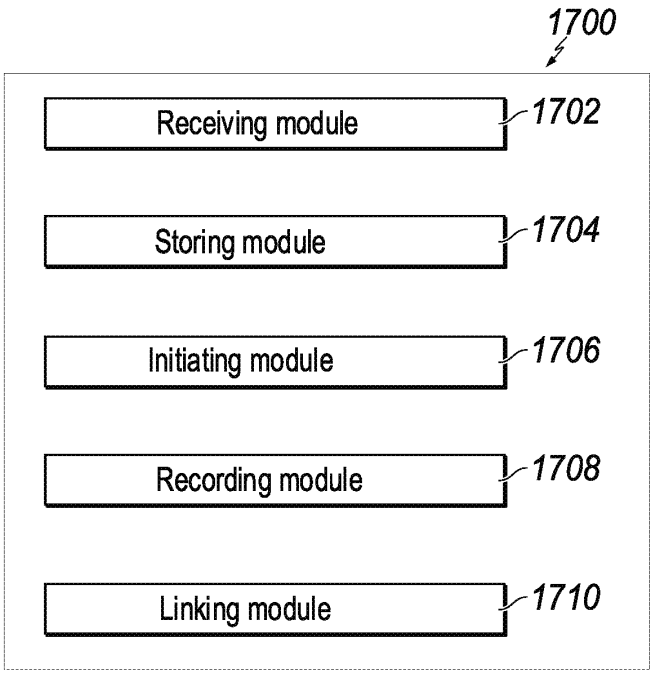
1700
Receiving module
1702
Storing module
1704
Initiating module
1706
Recording module
1708
Linking module
1710

FIG. 17

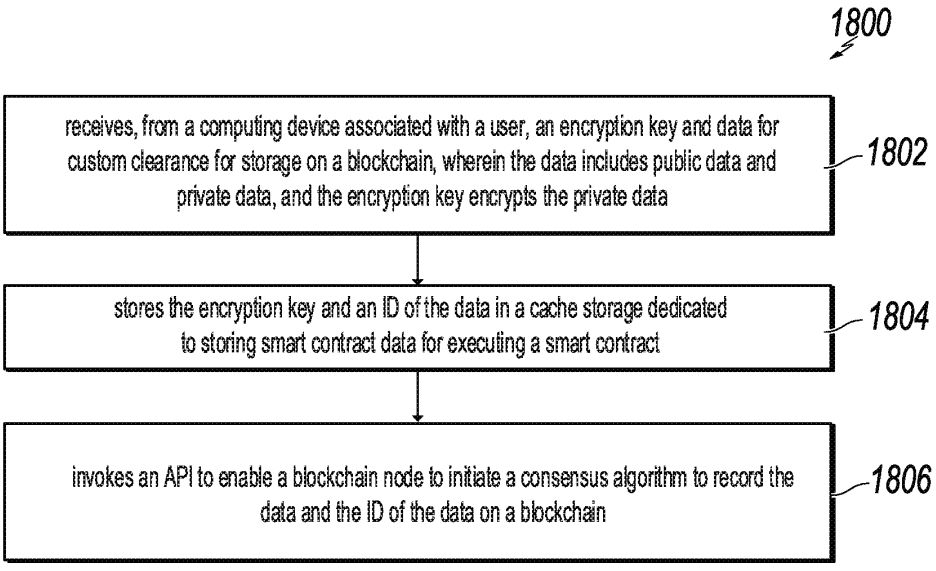
1800
receives, from a computing device associated with a user, an encryption key and data for custom clearance for storage on a blockchain, wherein the data includes public data and private data, and the encryption key encrypts the private data
1802
stores the encryption key and an ID of the data in a cache storage dedicated to storing smart contract data for executing a smart contract
1804
invokes an API to enable a blockchain node to initiate a consensus algorithm to record the data and the ID of the data on a blockchain
1806

FIG. 18

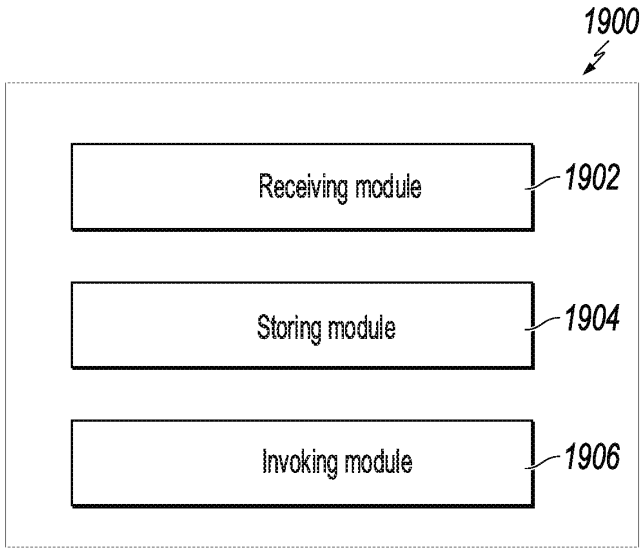
1900
Receiving module
1902
Storing module
1904
Invoking module
1906

FIG. 19

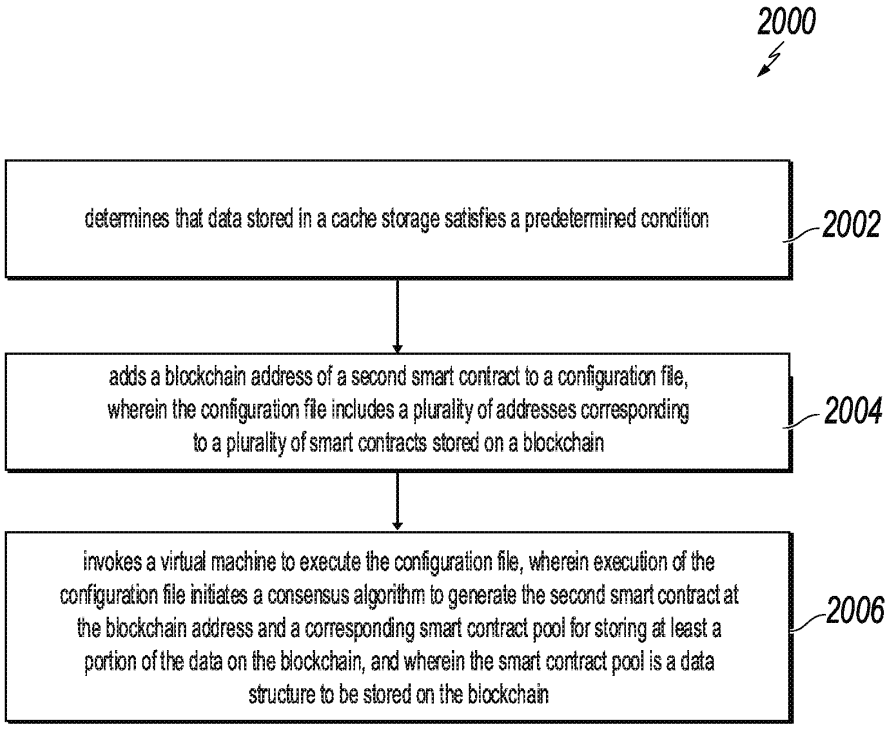
2000
determines that data stored in a cache storage satisfies a predetermined condition
2002
adds a blockchain address of a second smart contract to a configuration file, wherein the configuration file includes a plurality of addresses corresponding to a plurality of smart contracts stored on a blockchain
2004
invokes a virtual machine to execute the configuration file, wherein execution of the configuration file initiates a consensus algorithm to generate the second smart contract at the blockchain address and a corresponding smart contract pool for storing at least a portion of the data on the blockchain, and wherein the smart contract pool is a data structure to be stored on the blockchain
2006

FIG. 20

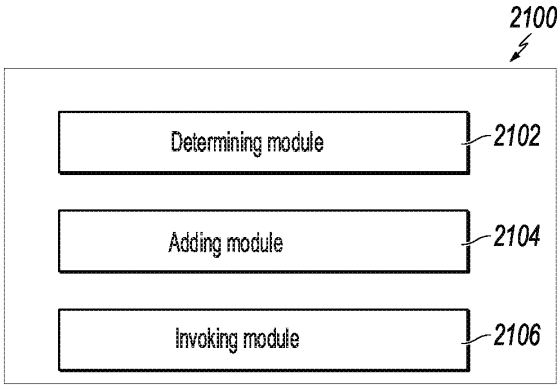
2100
Determining module
2102
Adding module
2104
Invoking module
2106

FIG. 21

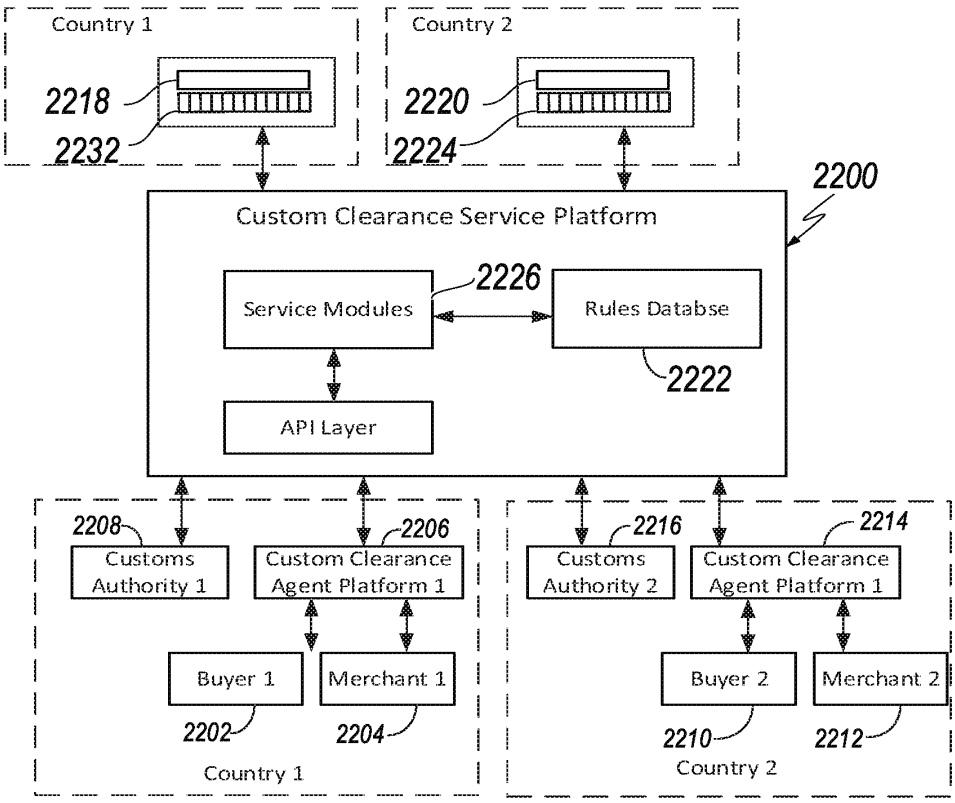
Country 1
2218
2232
Country 2
2220
2224
2200
Custom Clearance Service Platform
Service Modules
2226
Rules Databse
2222
API Layer
2208
Customs Authority 1
2206
Custom Clearance Agent Platform 1
Buyer 1
Merchant 1
2202
2204
Country 1
2216
Customs Authority 2
2214
Custom Clearance Agent Platform 1
Buyer 2
Merchant 2
2210
2212
Country 2

FIG. 22

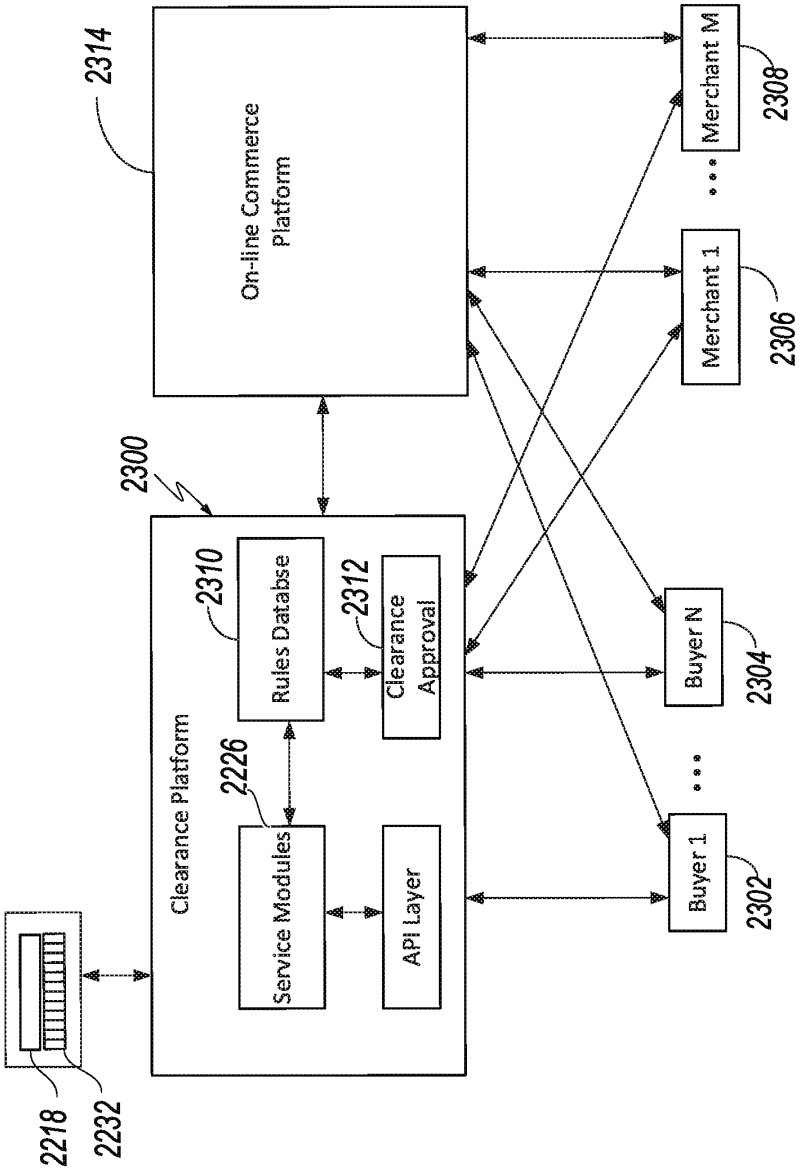
2314
On-line Commerce Platform
Merchant M
2308
Merchant 1
2306
2300
Clearance Platform
2310
Rules Database
2312
Clearance Approval
2226
Service Modules
API Layer
Buyer N
2304
Buyer 1
2302
2218
2232

FIG. 23