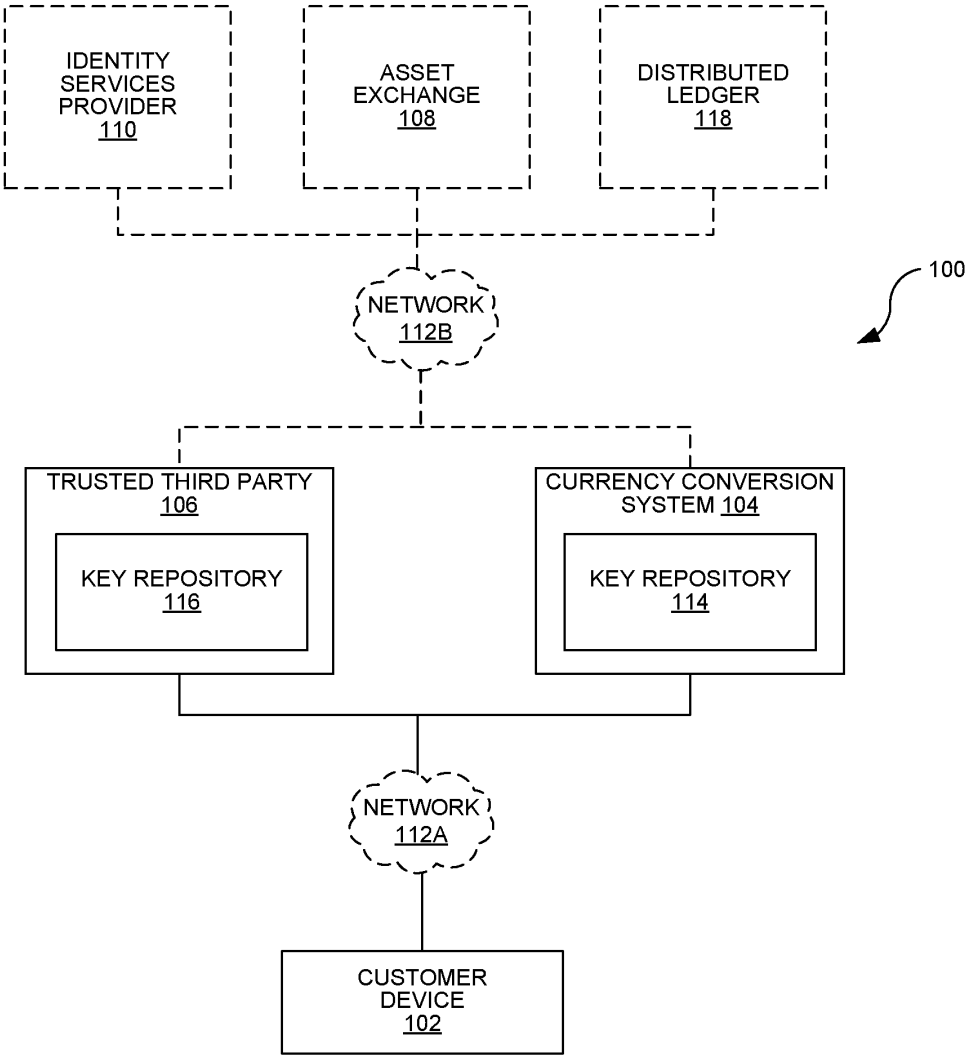
IDENTITY SERVICES PROVIDER 110
ASSET EXCHANGE 108
DISTRIBUTED LEDGER 118
NETWORK 112B
100
TRUSTED THIRD PARTY 106
KEY REPOSITORY 116
CURRENCY CONVERSION SYSTEM 104
KEY REPOSITORY 114
NETWORK 112A
CUSTOMER DEVICE 102

FIG. 1

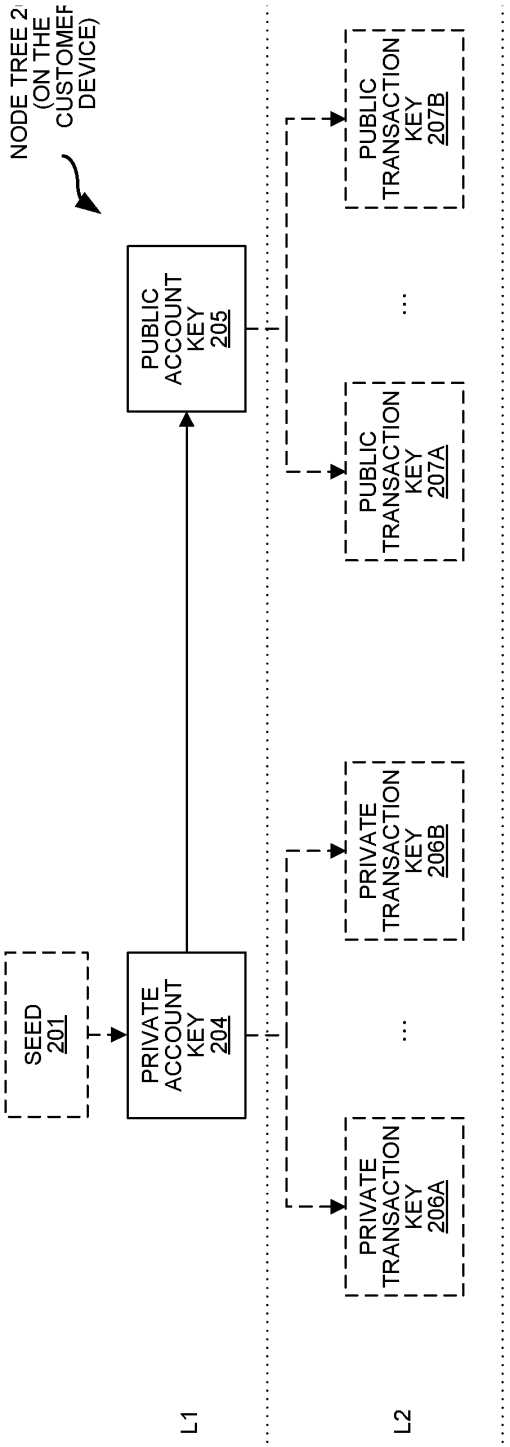
NODE TREE 2
(ON THE
CUSTOMEF
DEVICE)
SEED
201
PRIVATE
ACCOUNT
KEY
204
PUBLIC
ACCOUNT
KEY
205
PRIVATE
TRANSACTION
KEY
206A
...
PRIVATE
TRANSACTION
KEY
206B
PUBLIC
TRANSACTION
KEY
207A
...
PUBLIC
TRANSACTION
KEY
207B
L1
L2

FIG. 2A

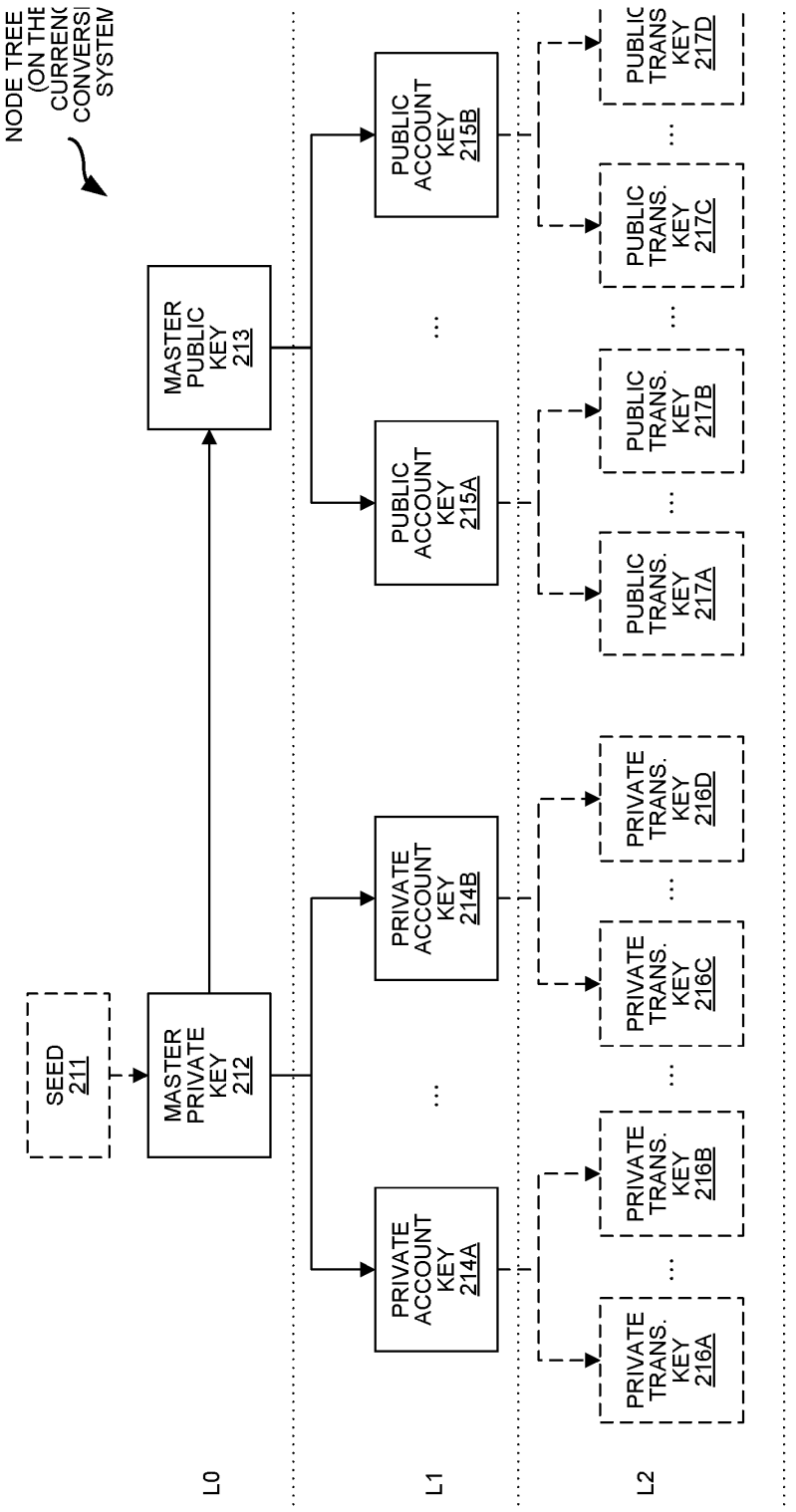
NODE TREE
(ON THE
CURRENC
CONVERSI
SYSTEM
SEED
211
MASTER
PRIVATE
KEY
212
MASTER
PUBLIC
KEY
213
PRIVATE
ACCOUNT
KEY
214A
PRIVATE
ACCOUNT
KEY
214B
PUBLIC
ACCOUNT
KEY
215A
PUBLIC
ACCOUNT
KEY
215B
PRIVATE
TRANS.
KEY
216A
PRIVATE
TRANS.
KEY
216B
PRIVATE
TRANS.
KEY
216C
PRIVATE
TRANS.
KEY
216D
PUBLIC
TRANS.
KEY
217A
PUBLIC
TRANS.
KEY
217B
PUBLIC
TRANS.
KEY
217C
PUBLIC
TRANS
KEY
217D
L0
L1
L2

FIG. 2B

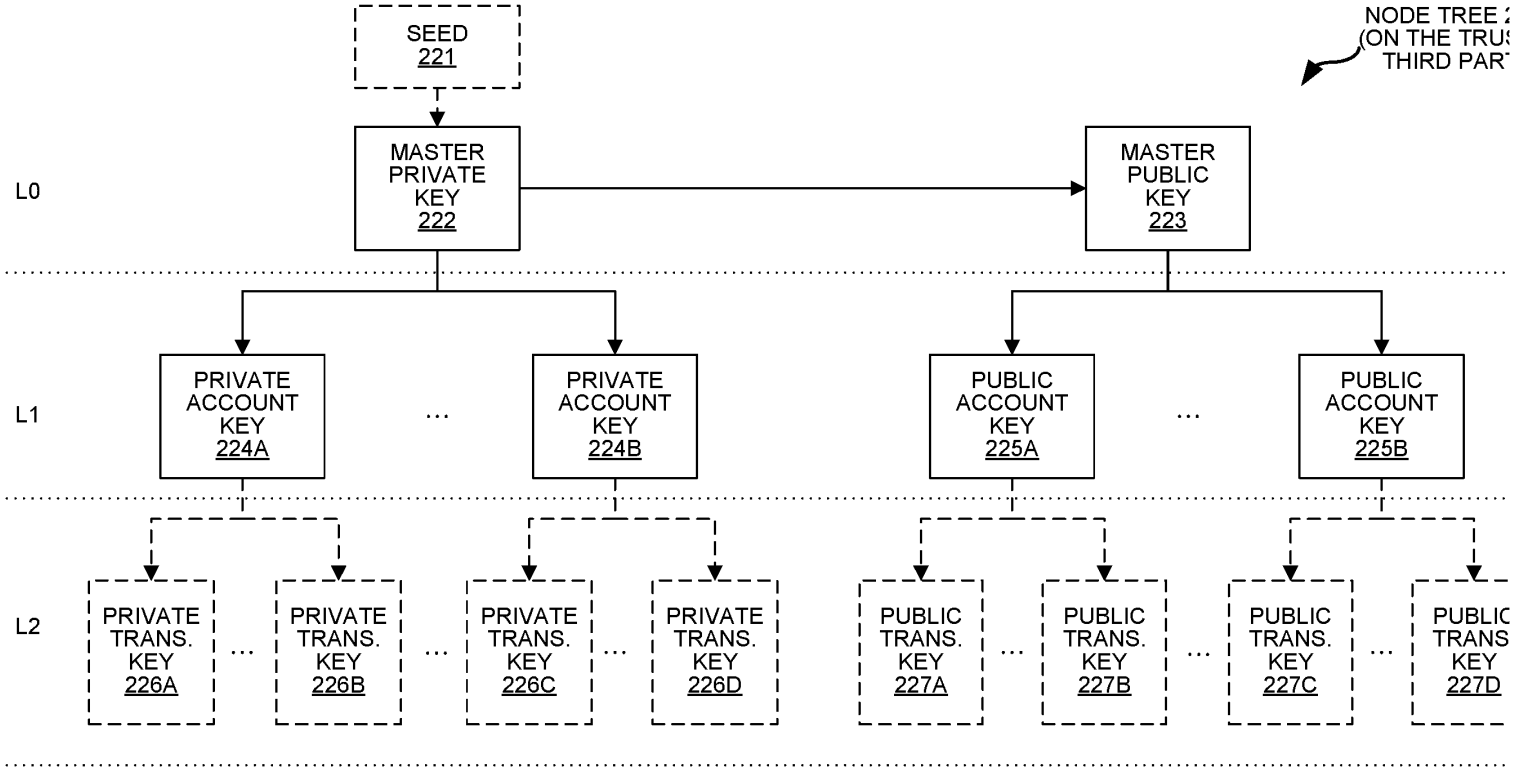
SEED
221
NODE TREE
(ON THE TRU
THIRD PAR
L0
MASTER
PRIVATE
KEY
222
MASTER
PUBLIC
KEY
223
L1
PRIVATE
ACCOUNT
KEY
224A
PRIVATE
ACCOUNT
KEY
224B
PUBLIC
ACCOUNT
KEY
225A
PUBLIC
ACCOUNT
KEY
225B
L2
PRIVATE
TRANS.
KEY
226A
PRIVATE
TRANS.
KEY
226B
PRIVATE
TRANS.
KEY
226C
PRIVATE
TRANS.
KEY
226D
PUBLIC
TRANS.
KEY
227A
PUBLIC
TRANS.
KEY
227B
PUBLIC
TRANS.
KEY
227C
PUBLIC
TRANS
KEY
227D

FIG. 2C

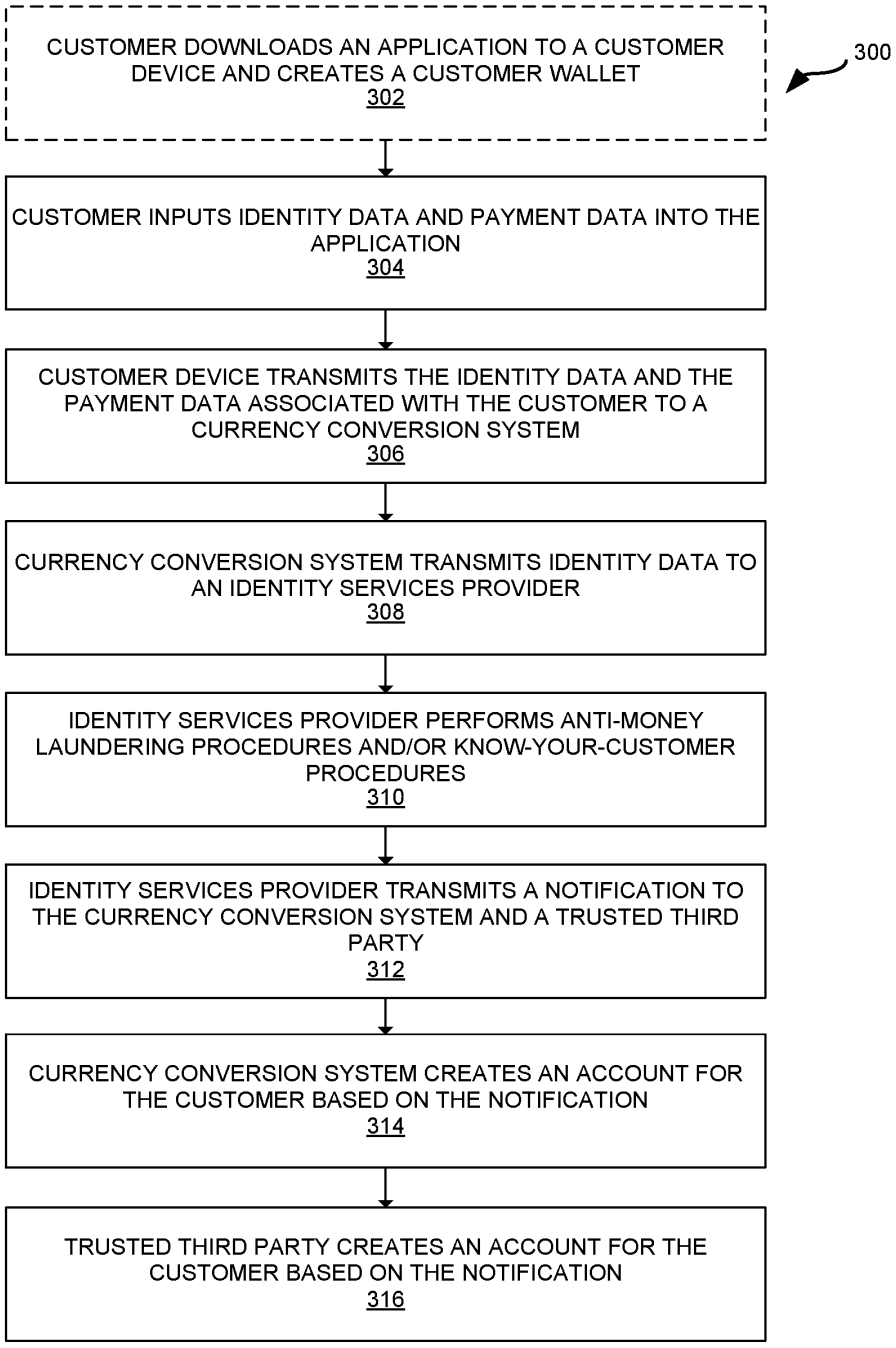
CUSTOMER DOWNLOADS AN APPLICATION TO A CUSTOMER DEVICE AND CREATES A CUSTOMER WALLET
302
300
CUSTOMER INPUTS IDENTITY DATA AND PAYMENT DATA INTO THE APPLICATION
304
CUSTOMER DEVICE TRANSMITS THE IDENTITY DATA AND THE PAYMENT DATA ASSOCIATED WITH THE CUSTOMER TO A CURRENCY CONVERSION SYSTEM
306
CURRENCY CONVERSION SYSTEM TRANSMITS IDENTITY DATA TO AN IDENTITY SERVICES PROVIDER
308
IDENTITY SERVICES PROVIDER PERFORMS ANTI-MONEY LAUNDERING PROCEDURES AND/OR KNOW-YOUR-CUSTOMER PROCEDURES
310
IDENTITY SERVICES PROVIDER TRANSMITS A NOTIFICATION TO THE CURRENCY CONVERSION SYSTEM AND A TRUSTED THIRD PARTY
312
CURRENCY CONVERSION SYSTEM CREATES AN ACCOUNT FOR THE CUSTOMER BASED ON THE NOTIFICATION
314
TRUSTED THIRD PARTY CREATES AN ACCOUNT FOR THE CUSTOMER BASED ON THE NOTIFICATION
316

FIG. 3

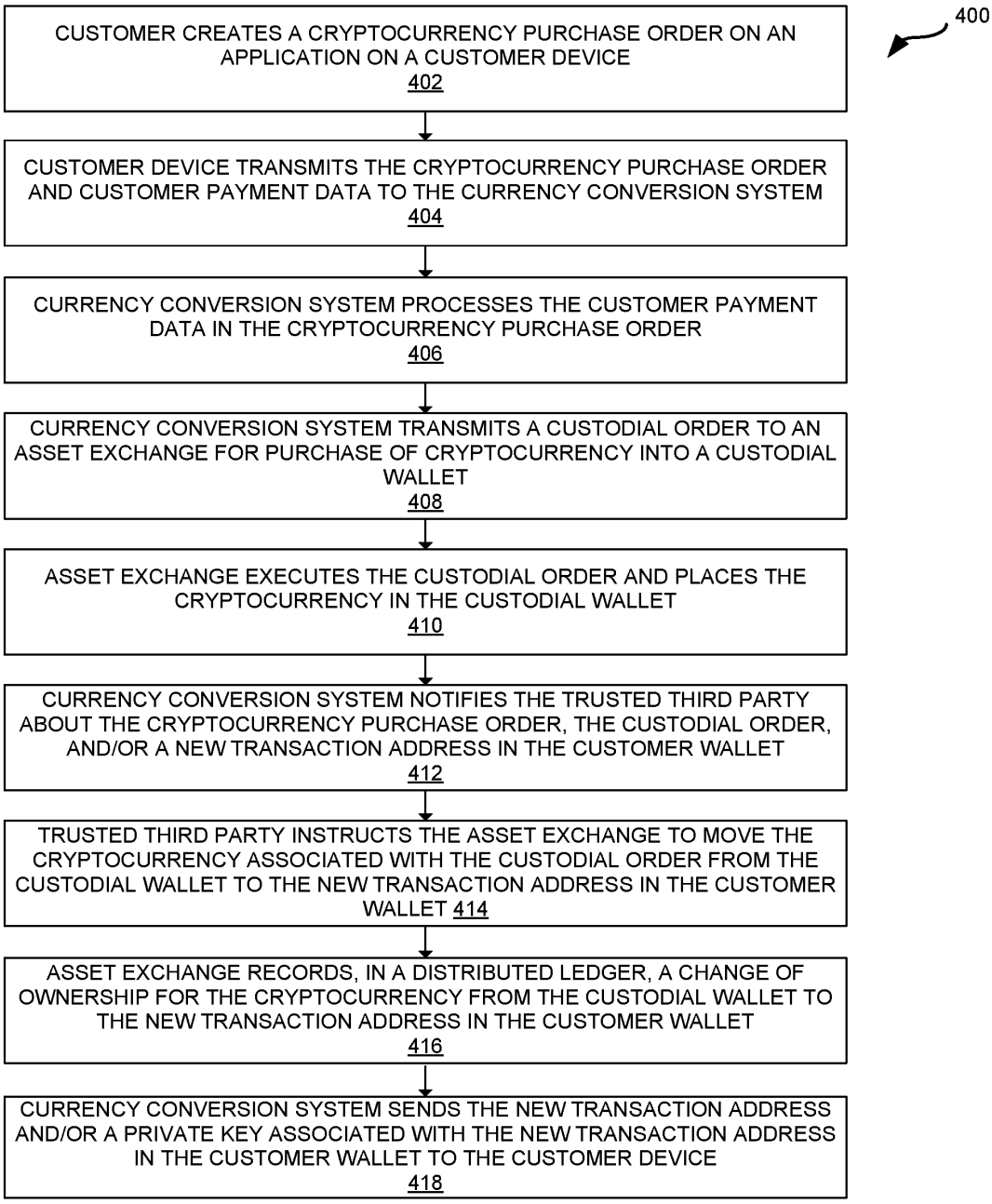
400
CUSTOMER CREATES A CRYPTOCURRENCY PURCHASE ORDER ON AN APPLICATION ON A CUSTOMER DEVICE
402
CUSTOMER DEVICE TRANSMITS THE CRYPTOCURRENCY PURCHASE ORDER AND CUSTOMER PAYMENT DATA TO THE CURRENCY CONVERSION SYSTEM
404
CURRENCY CONVERSION SYSTEM PROCESSES THE CUSTOMER PAYMENT DATA IN THE CRYPTOCURRENCY PURCHASE ORDER
406
CURRENCY CONVERSION SYSTEM TRANSMITS A CUSTODIAL ORDER TO AN ASSET EXCHANGE FOR PURCHASE OF CRYPTOCURRENCY INTO A CUSTODIAL WALLET
408
ASSET EXCHANGE EXECUTES THE CUSTODIAL ORDER AND PLACES THE CRYPTOCURRENCY IN THE CUSTODIAL WALLET
410
CURRENCY CONVERSION SYSTEM NOTIFIES THE TRUSTED THIRD PARTY ABOUT THE CRYPTOCURRENCY PURCHASE ORDER, THE CUSTODIAL ORDER, AND/OR A NEW TRANSACTION ADDRESS IN THE CUSTOMER WALLET
412
TRUSTED THIRD PARTY INSTRUCTS THE ASSET EXCHANGE TO MOVE THE CRYPTOCURRENCY ASSOCIATED WITH THE CUSTODIAL ORDER FROM THE CUSTODIAL WALLET TO THE NEW TRANSACTION ADDRESS IN THE CUSTOMER WALLET 414
ASSET EXCHANGE RECORDS, IN A DISTRIBUTED LEDGER, A CHANGE OF OWNERSHIP FOR THE CRYPTOCURRENCY FROM THE CUSTODIAL WALLET TO THE NEW TRANSACTION ADDRESS IN THE CUSTOMER WALLET
416
CURRENCY CONVERSION SYSTEM SENDS THE NEW TRANSACTION ADDRESS AND/OR A PRIVATE KEY ASSOCIATED WITH THE NEW TRANSACTION ADDRESS IN THE CUSTOMER WALLET TO THE CUSTOMER DEVICE
418

FIG. 4

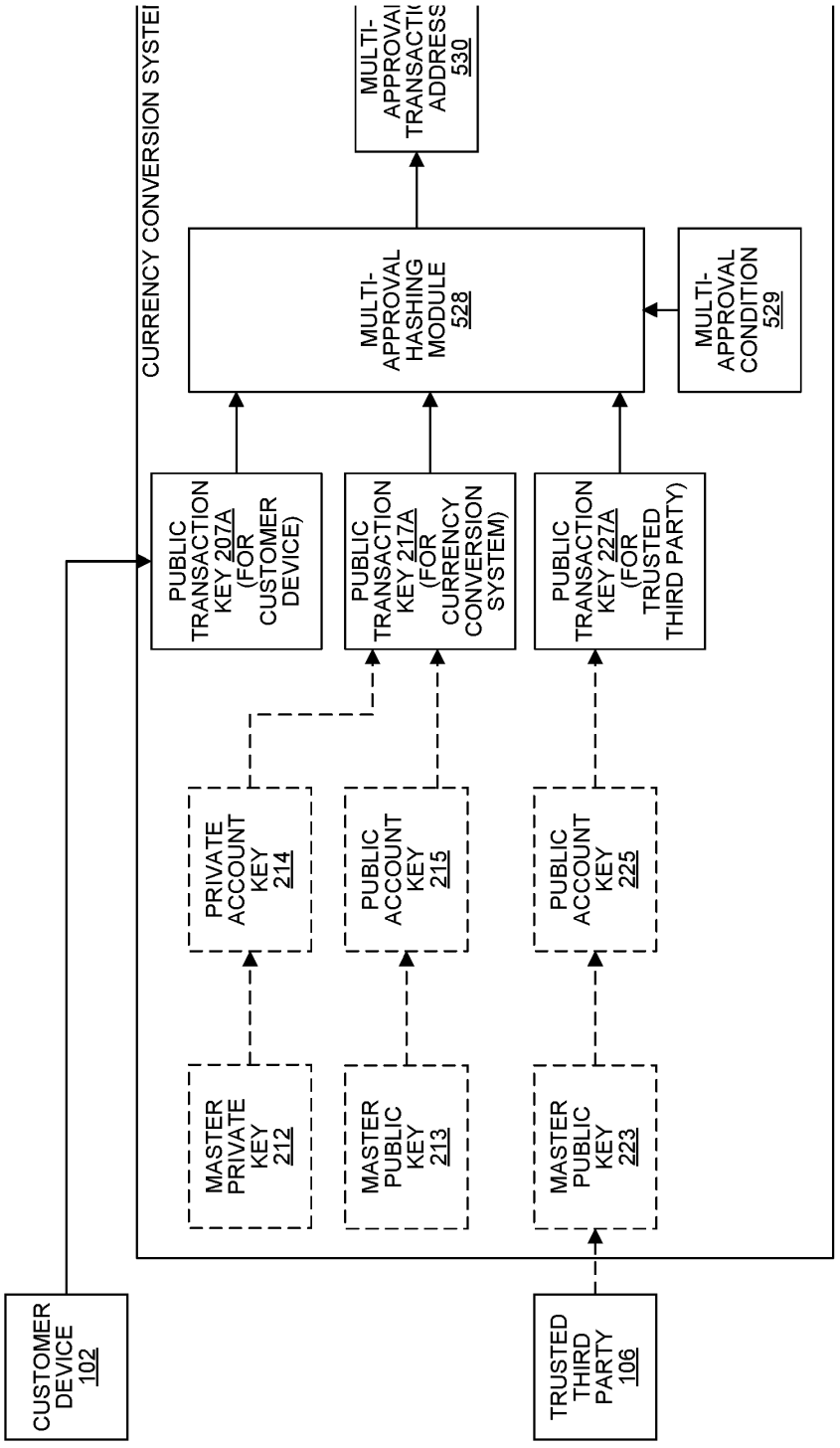
CUSTOMER DEVICE 102
TRUSTED THIRD PARTY 106
CURRENCY CONVERSION SYSTEI
MASTER PRIVATE KEY 212
MASTER PUBLIC KEY 213
MASTER PUBLIC KEY 223
PRIVATE ACCOUNT KEY 214
PUBLIC ACCOUNT KEY 215
PUBLIC ACCOUNT KEY 225
PUBLIC TRANSACTION KEY 207A (FOR CUSTOMER DEVICE)
PUBLIC TRANSACTION KEY 217A (FOR CURRENCY CONVERSION SYSTEM)
PUBLIC TRANSACTION KEY 227A (FOR TRUSTED THIRD PARTY)
MULTI-APPROVAL HASHING MODULE 528
MULTI-APPROVAL CONDITION 529
MULTI-APPROVAI TRANSACTI(ADDRESS 530

FIG. 5

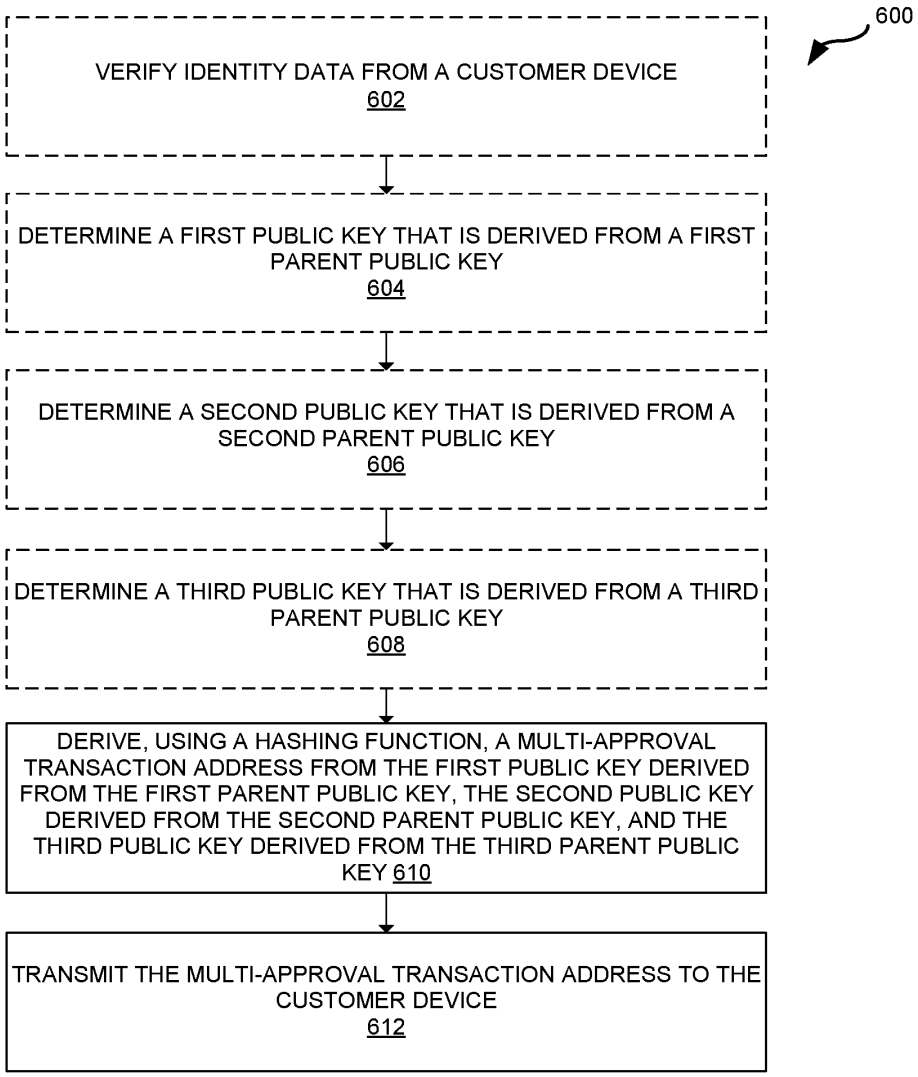
600
VERIFY IDENTITY DATA FROM A CUSTOMER DEVICE
602
DETERMINE A FIRST PUBLIC KEY THAT IS DERIVED FROM A FIRST PARENT PUBLIC KEY
604
DETERMINE A SECOND PUBLIC KEY THAT IS DERIVED FROM A SECOND PARENT PUBLIC KEY
606
DETERMINE A THIRD PUBLIC KEY THAT IS DERIVED FROM A THIRD PARENT PUBLIC KEY
608
DERIVE, USING A HASHING FUNCTION, A MULTI-APPROVAL TRANSACTION ADDRESS FROM THE FIRST PUBLIC KEY DERIVED FROM THE FIRST PARENT PUBLIC KEY, THE SECOND PUBLIC KEY DERIVED FROM THE SECOND PARENT PUBLIC KEY, AND THE THIRD PUBLIC KEY DERIVED FROM THE THIRD PARENT PUBLIC KEY 610
TRANSMIT THE MULTI-APPROVAL TRANSACTION ADDRESS TO THE CUSTOMER DEVICE
612

FIG. 6

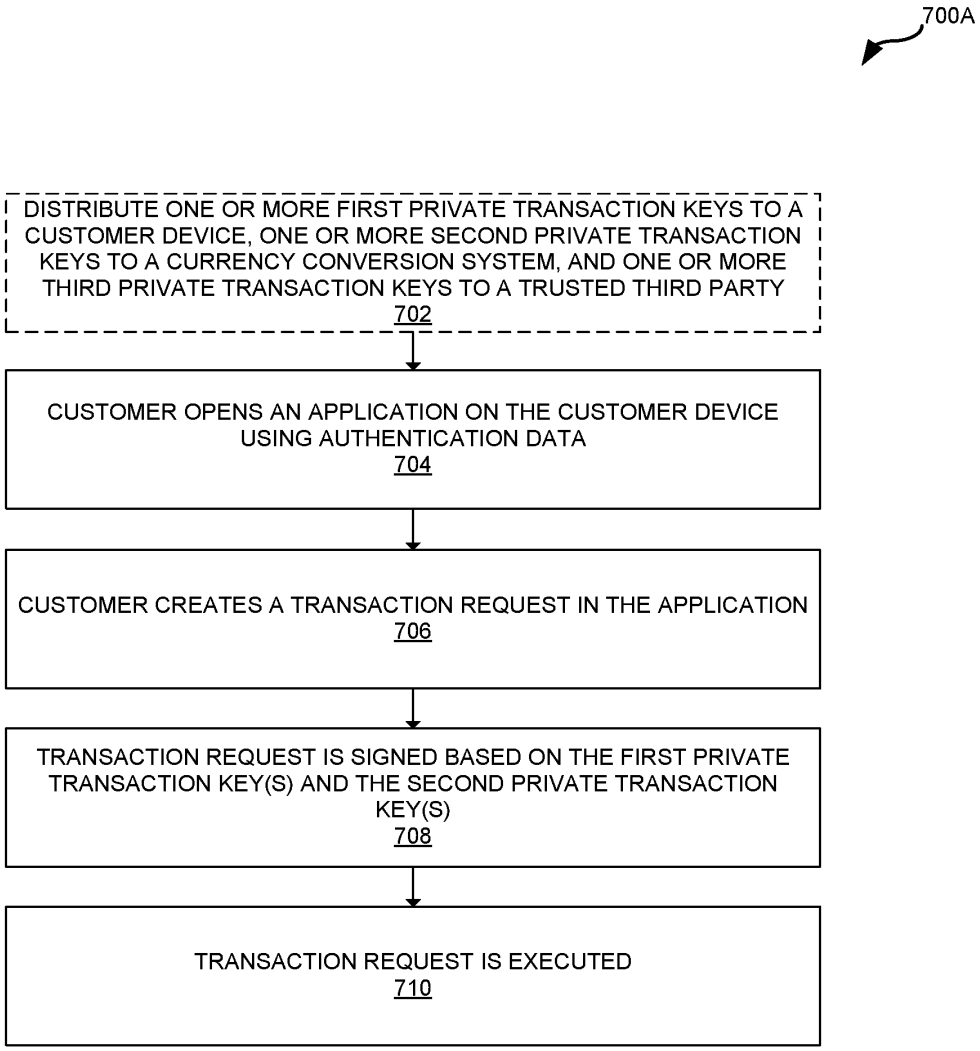
700A
DISTRIBUTE ONE OR MORE FIRST PRIVATE TRANSACTION KEYS TO A CUSTOMER DEVICE, ONE OR MORE SECOND PRIVATE TRANSACTION KEYS TO A CURRENCY CONVERSION SYSTEM, AND ONE OR MORE THIRD PRIVATE TRANSACTION KEYS TO A TRUSTED THIRD PARTY
702
CUSTOMER OPENS AN APPLICATION ON THE CUSTOMER DEVICE USING AUTHENTICATION DATA
704
CUSTOMER CREATES A TRANSACTION REQUEST IN THE APPLICATION
706
TRANSACTION REQUEST IS SIGNED BASED ON THE FIRST PRIVATE TRANSACTION KEY(S) AND THE SECOND PRIVATE TRANSACTION KEY(S)
708
TRANSACTION REQUEST IS EXECUTED
710

FIG. 7A

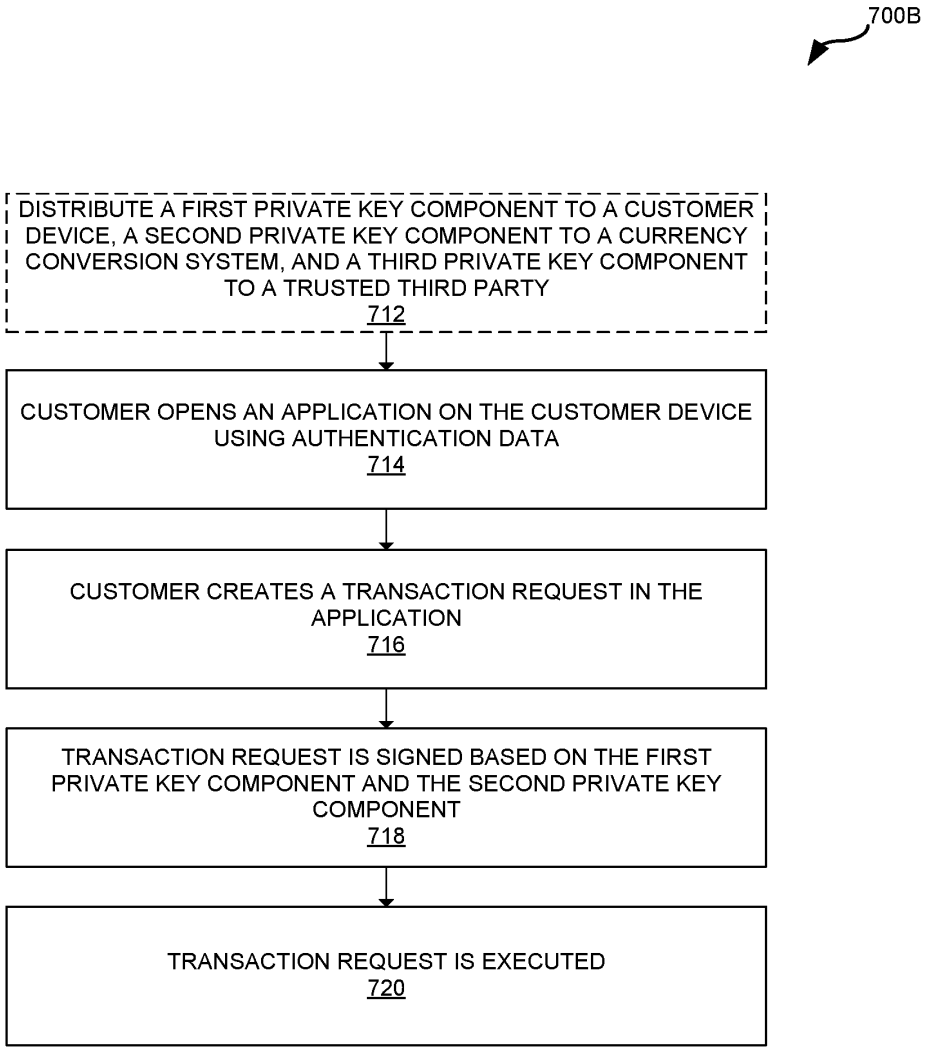
700B
DISTRIBUTE A FIRST PRIVATE KEY COMPONENT TO A CUSTOMER DEVICE, A SECOND PRIVATE KEY COMPONENT TO A CURRENCY CONVERSION SYSTEM, AND A THIRD PRIVATE KEY COMPONENT TO A TRUSTED THIRD PARTY
712
CUSTOMER OPENS AN APPLICATION ON THE CUSTOMER DEVICE USING AUTHENTICATION DATA
714
CUSTOMER CREATES A TRANSACTION REQUEST IN THE APPLICATION
716
TRANSACTION REQUEST IS SIGNED BASED ON THE FIRST PRIVATE KEY COMPONENT AND THE SECOND PRIVATE KEY COMPONENT
718
TRANSACTION REQUEST IS EXECUTED
720

FIG. 7B

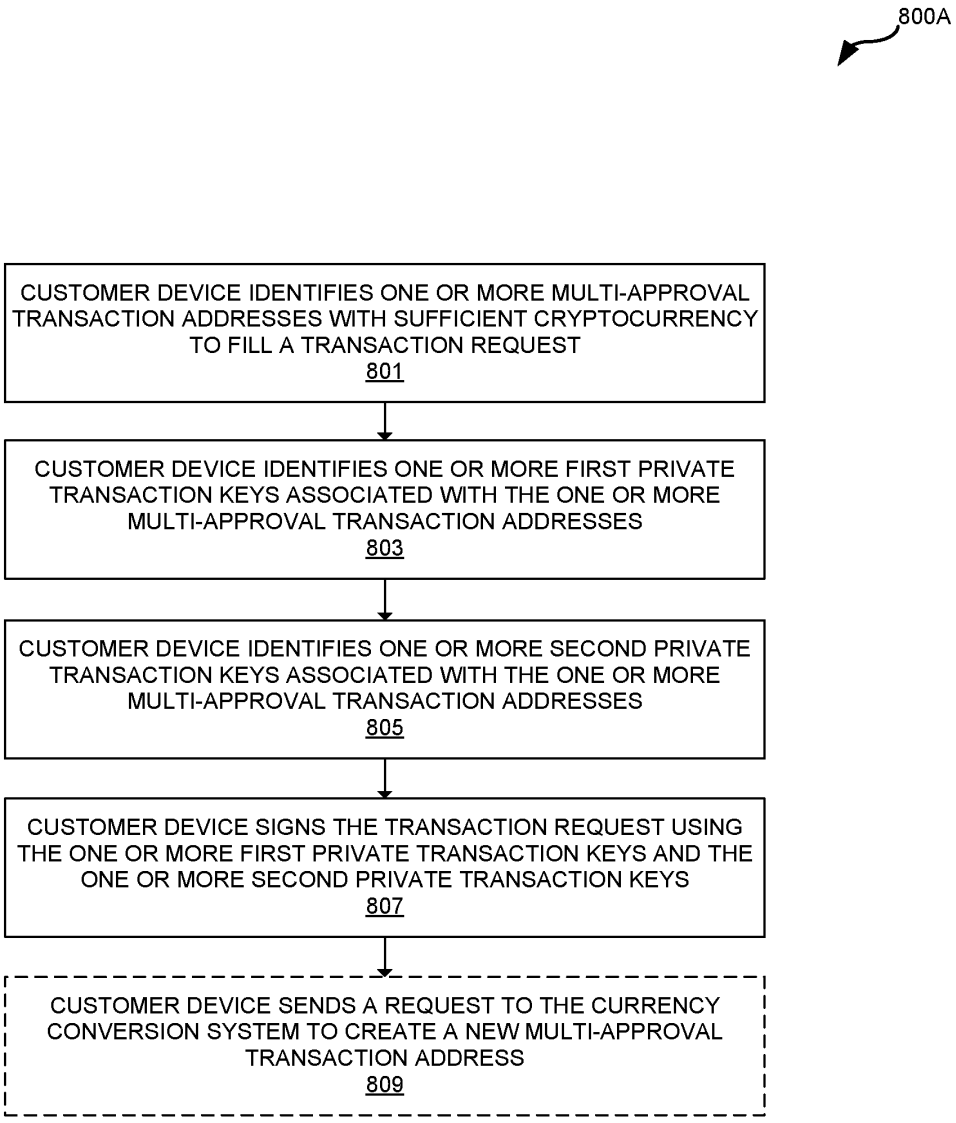
800A
CUSTOMER DEVICE IDENTIFIES ONE OR MORE MULTI-APPROVAL TRANSACTION ADDRESSES WITH SUFFICIENT CRYPTOCURRENCY TO FILL A TRANSACTION REQUEST
801
CUSTOMER DEVICE IDENTIFIES ONE OR MORE FIRST PRIVATE TRANSACTION KEYS ASSOCIATED WITH THE ONE OR MORE MULTI-APPROVAL TRANSACTION ADDRESSES
803
CUSTOMER DEVICE IDENTIFIES ONE OR MORE SECOND PRIVATE TRANSACTION KEYS ASSOCIATED WITH THE ONE OR MORE MULTI-APPROVAL TRANSACTION ADDRESSES
805
CUSTOMER DEVICE SIGNS THE TRANSACTION REQUEST USING THE ONE OR MORE FIRST PRIVATE TRANSACTION KEYS AND THE ONE OR MORE SECOND PRIVATE TRANSACTION KEYS
807
CUSTOMER DEVICE SENDS A REQUEST TO THE CURRENCY CONVERSION SYSTEM TO CREATE A NEW MULTI-APPROVAL TRANSACTION ADDRESS
809

FIG. 8A

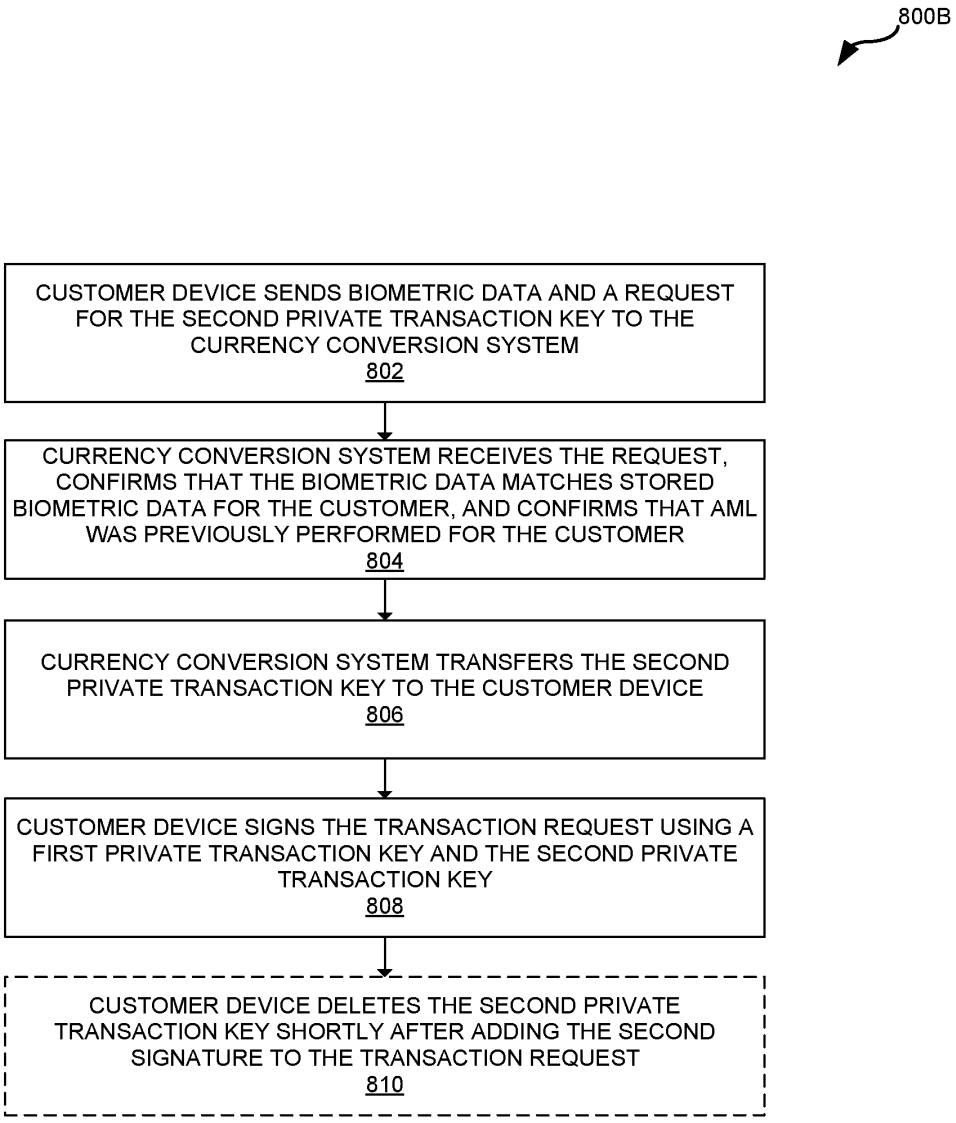
800B
CUSTOMER DEVICE SENDS BIOMETRIC DATA AND A REQUEST FOR THE SECOND PRIVATE TRANSACTION KEY TO THE CURRENCY CONVERSION SYSTEM
802
CURRENCY CONVERSION SYSTEM RECEIVES THE REQUEST, CONFIRMS THAT THE BIOMETRIC DATA MATCHES STORED BIOMETRIC DATA FOR THE CUSTOMER, AND CONFIRMS THAT AML WAS PREVIOUSLY PERFORMED FOR THE CUSTOMER
804
CURRENCY CONVERSION SYSTEM TRANSFERS THE SECOND PRIVATE TRANSACTION KEY TO THE CUSTOMER DEVICE
806
CUSTOMER DEVICE SIGNS THE TRANSACTION REQUEST USING A FIRST PRIVATE TRANSACTION KEY AND THE SECOND PRIVATE TRANSACTION KEY
808
CUSTOMER DEVICE DELETES THE SECOND PRIVATE TRANSACTION KEY SHORTLY AFTER ADDING THE SECOND SIGNATURE TO THE TRANSACTION REQUEST
810

FIG. 8B

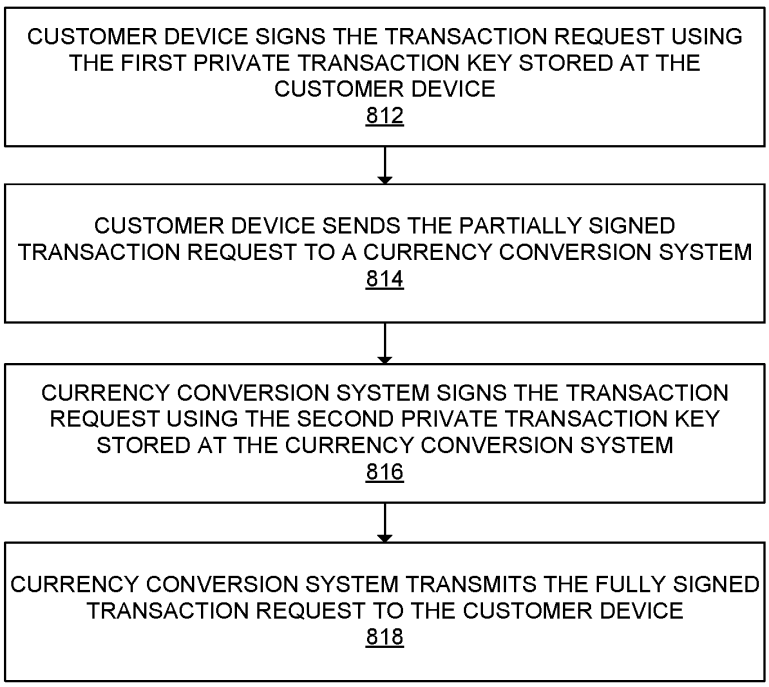
800C
CUSTOMER DEVICE SIGNS THE TRANSACTION REQUEST USING THE FIRST PRIVATE TRANSACTION KEY STORED AT THE CUSTOMER DEVICE
812
CUSTOMER DEVICE SENDS THE PARTIALLY SIGNED TRANSACTION REQUEST TO A CURRENCY CONVERSION SYSTEM
814
CURRENCY CONVERSION SYSTEM SIGNS THE TRANSACTION REQUEST USING THE SECOND PRIVATE TRANSACTION KEY STORED AT THE CURRENCY CONVERSION SYSTEM
816
CURRENCY CONVERSION SYSTEM TRANSMITS THE FULLY SIGNED TRANSACTION REQUEST TO THE CUSTOMER DEVICE
818

FIG. 8C

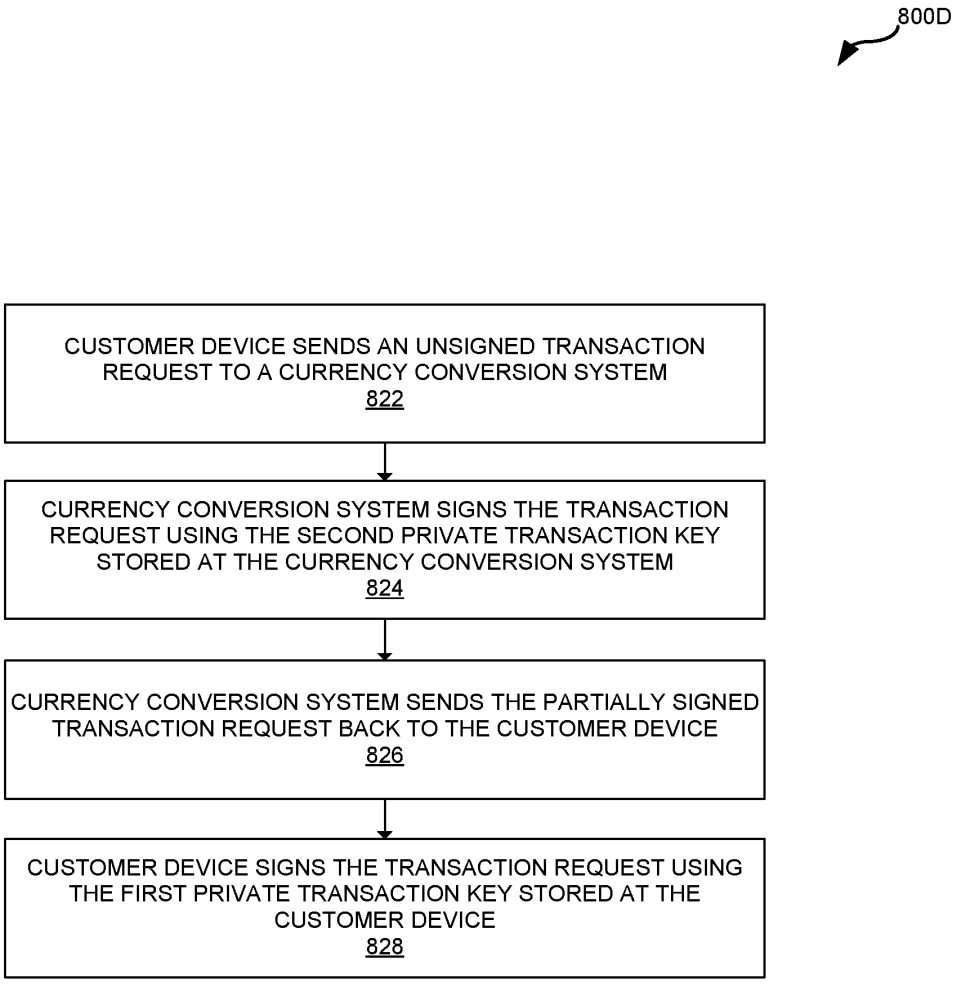
800D
CUSTOMER DEVICE SENDS AN UNSIGNED TRANSACTION REQUEST TO A CURRENCY CONVERSION SYSTEM
822
CURRENCY CONVERSION SYSTEM SIGNS THE TRANSACTION REQUEST USING THE SECOND PRIVATE TRANSACTION KEY STORED AT THE CURRENCY CONVERSION SYSTEM
824
CURRENCY CONVERSION SYSTEM SENDS THE PARTIALLY SIGNED TRANSACTION REQUEST BACK TO THE CUSTOMER DEVICE
826
CUSTOMER DEVICE SIGNS THE TRANSACTION REQUEST USING THE FIRST PRIVATE TRANSACTION KEY STORED AT THE CUSTOMER DEVICE
828

FIG. 8D

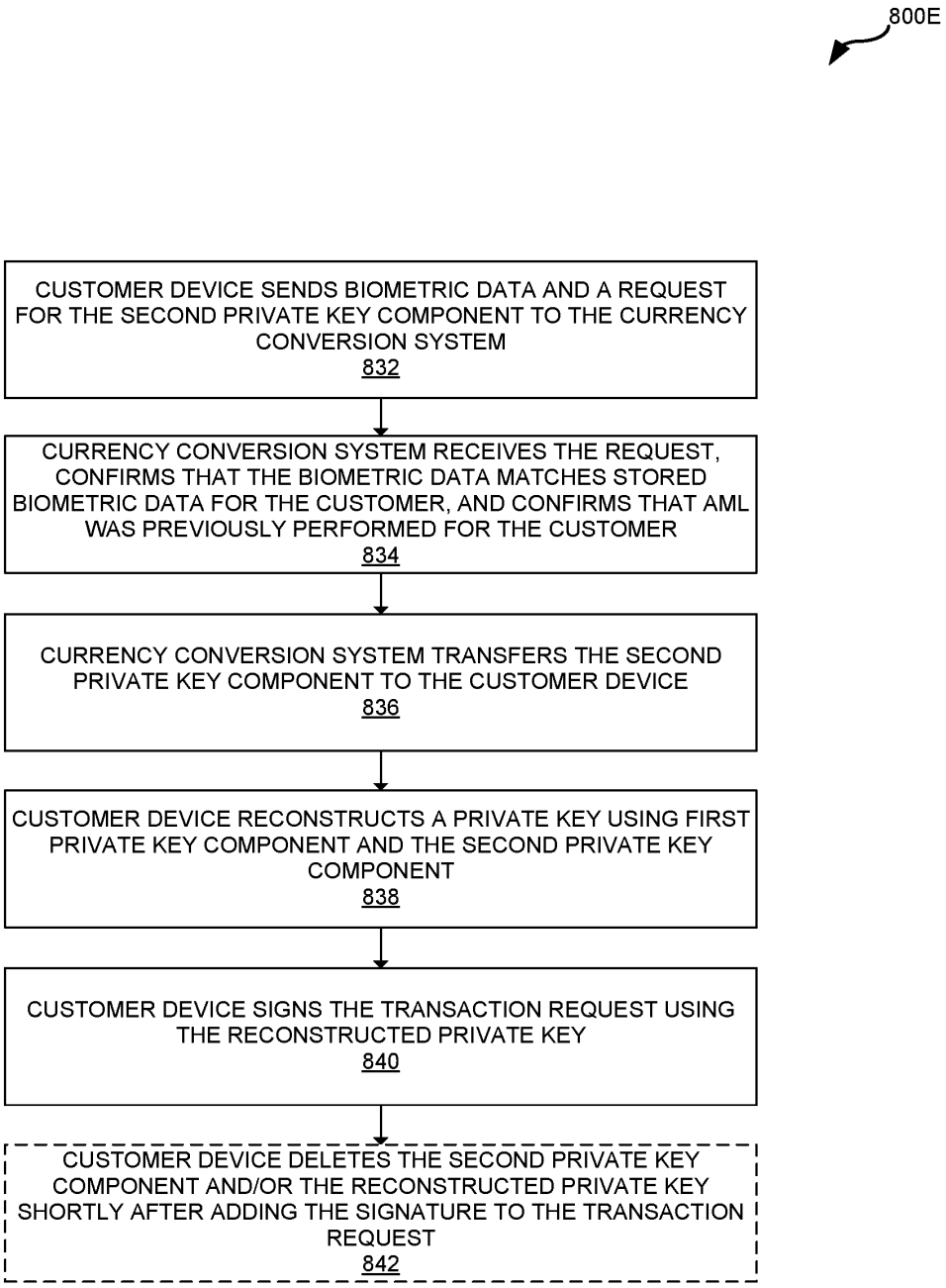
800E
CUSTOMER DEVICE SENDS BIOMETRIC DATA AND A REQUEST FOR THE SECOND PRIVATE KEY COMPONENT TO THE CURRENCY CONVERSION SYSTEM
832
CURRENCY CONVERSION SYSTEM RECEIVES THE REQUEST, CONFIRMS THAT THE BIOMETRIC DATA MATCHES STORED BIOMETRIC DATA FOR THE CUSTOMER, AND CONFIRMS THAT AML WAS PREVIOUSLY PERFORMED FOR THE CUSTOMER
834
CURRENCY CONVERSION SYSTEM TRANSFERS THE SECOND PRIVATE KEY COMPONENT TO THE CUSTOMER DEVICE
836
CUSTOMER DEVICE RECONSTRUCTS A PRIVATE KEY USING FIRST PRIVATE KEY COMPONENT AND THE SECOND PRIVATE KEY COMPONENT
838
CUSTOMER DEVICE SIGNS THE TRANSACTION REQUEST USING THE RECONSTRUCTED PRIVATE KEY
840
CUSTOMER DEVICE DELETES THE SECOND PRIVATE KEY COMPONENT AND/OR THE RECONSTRUCTED PRIVATE KEY SHORTLY AFTER ADDING THE SIGNATURE TO THE TRANSACTION REQUEST
842

FIG. 8E

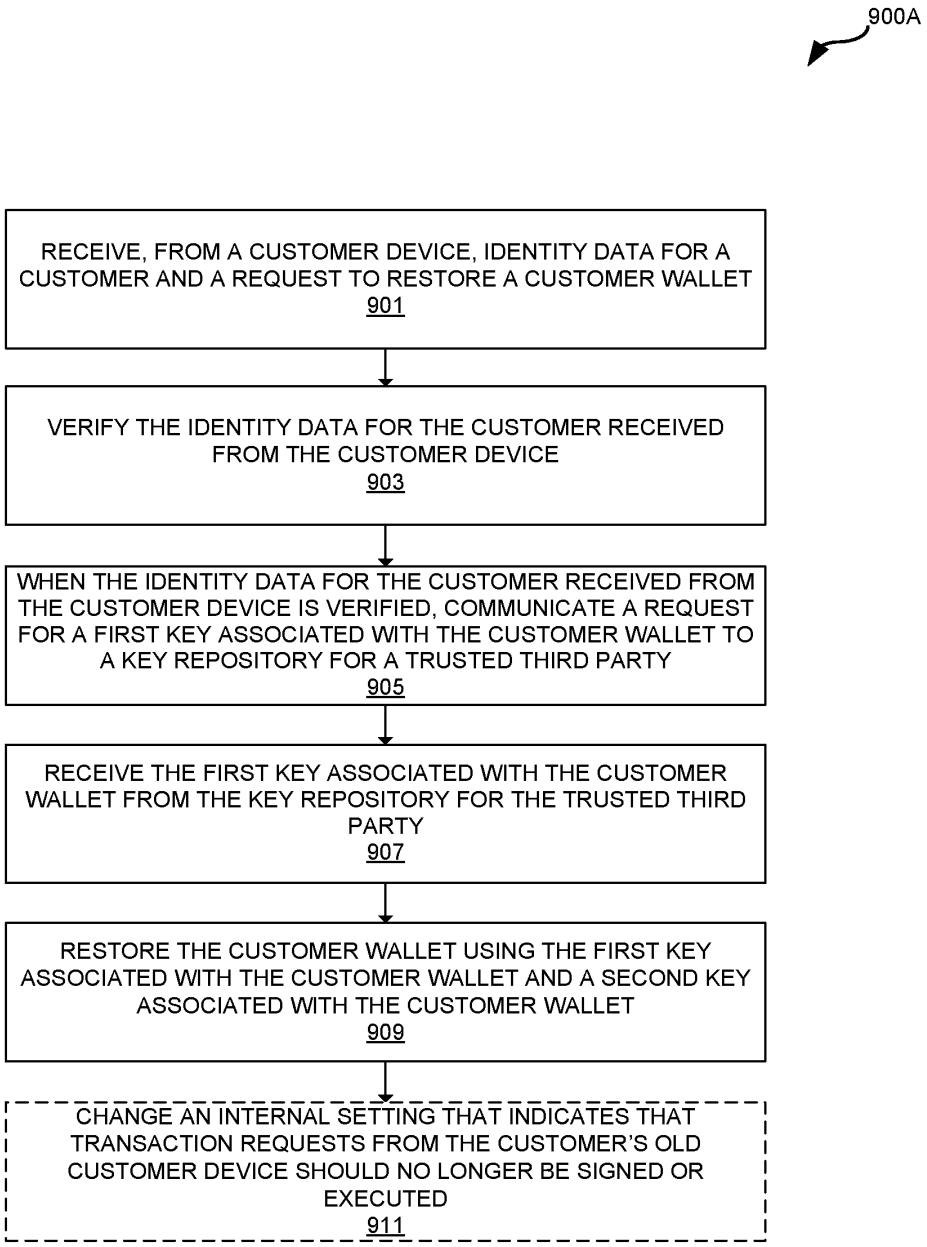
900A
RECEIVE, FROM A CUSTOMER DEVICE, IDENTITY DATA FOR A CUSTOMER AND A REQUEST TO RESTORE A CUSTOMER WALLET
901
VERIFY THE IDENTITY DATA FOR THE CUSTOMER RECEIVED FROM THE CUSTOMER DEVICE
903
WHEN THE IDENTITY DATA FOR THE CUSTOMER RECEIVED FROM THE CUSTOMER DEVICE IS VERIFIED, COMMUNICATE A REQUEST FOR A FIRST KEY ASSOCIATED WITH THE CUSTOMER WALLET TO A KEY REPOSITORY FOR A TRUSTED THIRD PARTY
905
RECEIVE THE FIRST KEY ASSOCIATED WITH THE CUSTOMER WALLET FROM THE KEY REPOSITORY FOR THE TRUSTED THIRD PARTY
907
RESTORE THE CUSTOMER WALLET USING THE FIRST KEY ASSOCIATED WITH THE CUSTOMER WALLET AND A SECOND KEY ASSOCIATED WITH THE CUSTOMER WALLET
909
CHANGE AN INTERNAL SETTING THAT INDICATES THAT TRANSACTION REQUESTS FROM THE CUSTOMER'S OLD CUSTOMER DEVICE SHOULD NO LONGER BE SIGNED OR EXECUTED
911

FIG. 9A

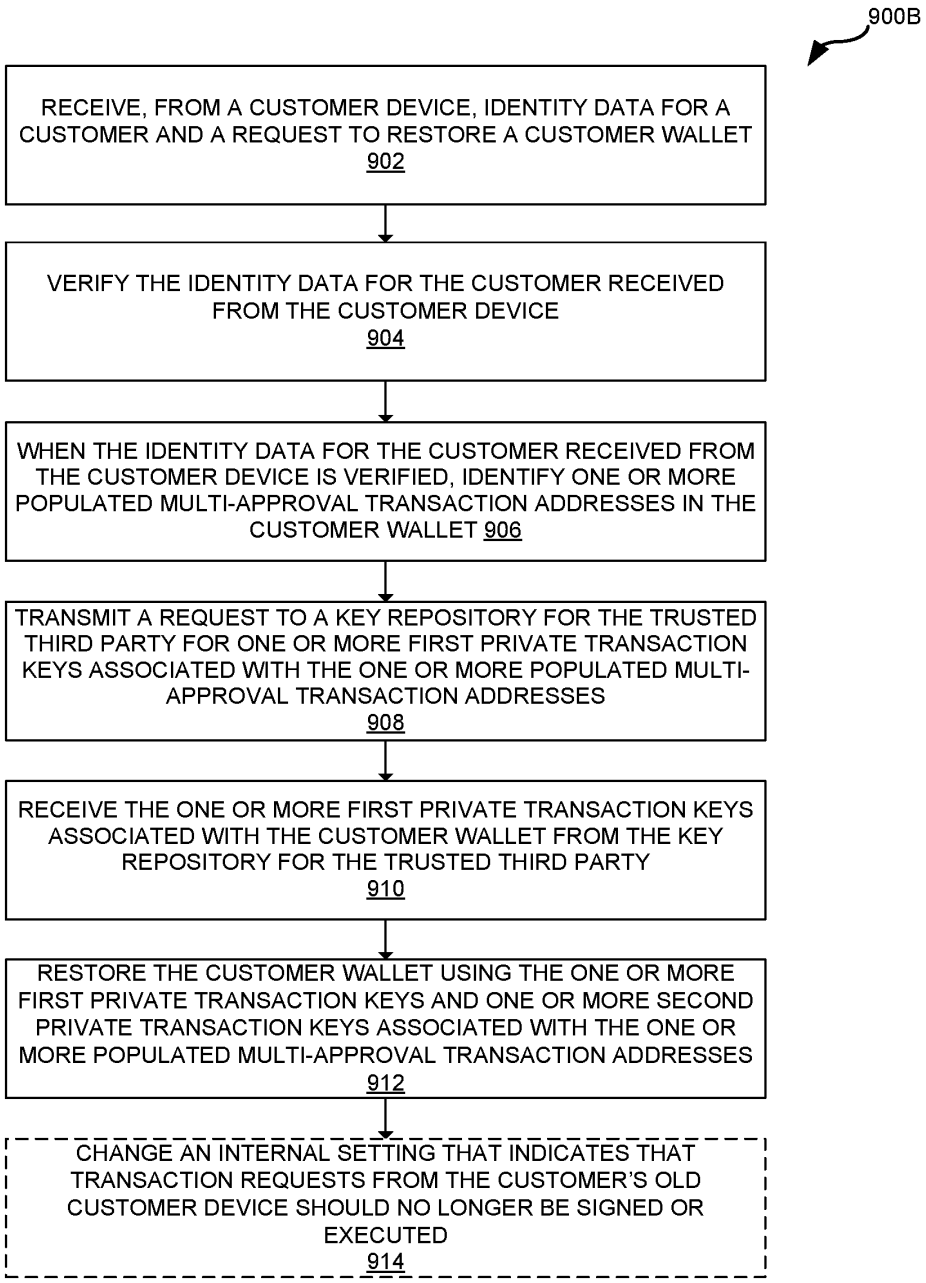
900B
RECEIVE, FROM A CUSTOMER DEVICE, IDENTITY DATA FOR A CUSTOMER AND A REQUEST TO RESTORE A CUSTOMER WALLET
902
VERIFY THE IDENTITY DATA FOR THE CUSTOMER RECEIVED FROM THE CUSTOMER DEVICE
904
WHEN THE IDENTITY DATA FOR THE CUSTOMER RECEIVED FROM THE CUSTOMER DEVICE IS VERIFIED, IDENTIFY ONE OR MORE POPULATED MULTI-APPROVAL TRANSACTION ADDRESSES IN THE CUSTOMER WALLET 906
TRANSMIT A REQUEST TO A KEY REPOSITORY FOR THE TRUSTED THIRD PARTY FOR ONE OR MORE FIRST PRIVATE TRANSACTION KEYS ASSOCIATED WITH THE ONE OR MORE POPULATED MULTI-APPROVAL TRANSACTION ADDRESSES
908
RECEIVE THE ONE OR MORE FIRST PRIVATE TRANSACTION KEYS ASSOCIATED WITH THE CUSTOMER WALLET FROM THE KEY REPOSITORY FOR THE TRUSTED THIRD PARTY
910
RESTORE THE CUSTOMER WALLET USING THE ONE OR MORE FIRST PRIVATE TRANSACTION KEYS AND ONE OR MORE SECOND PRIVATE TRANSACTION KEYS ASSOCIATED WITH THE ONE OR MORE POPULATED MULTI-APPROVAL TRANSACTION ADDRESSES
912
CHANGE AN INTERNAL SETTING THAT INDICATES THAT TRANSACTION REQUESTS FROM THE CUSTOMER'S OLD CUSTOMER DEVICE SHOULD NO LONGER BE SIGNED OR EXECUTED
914

FIG. 9B

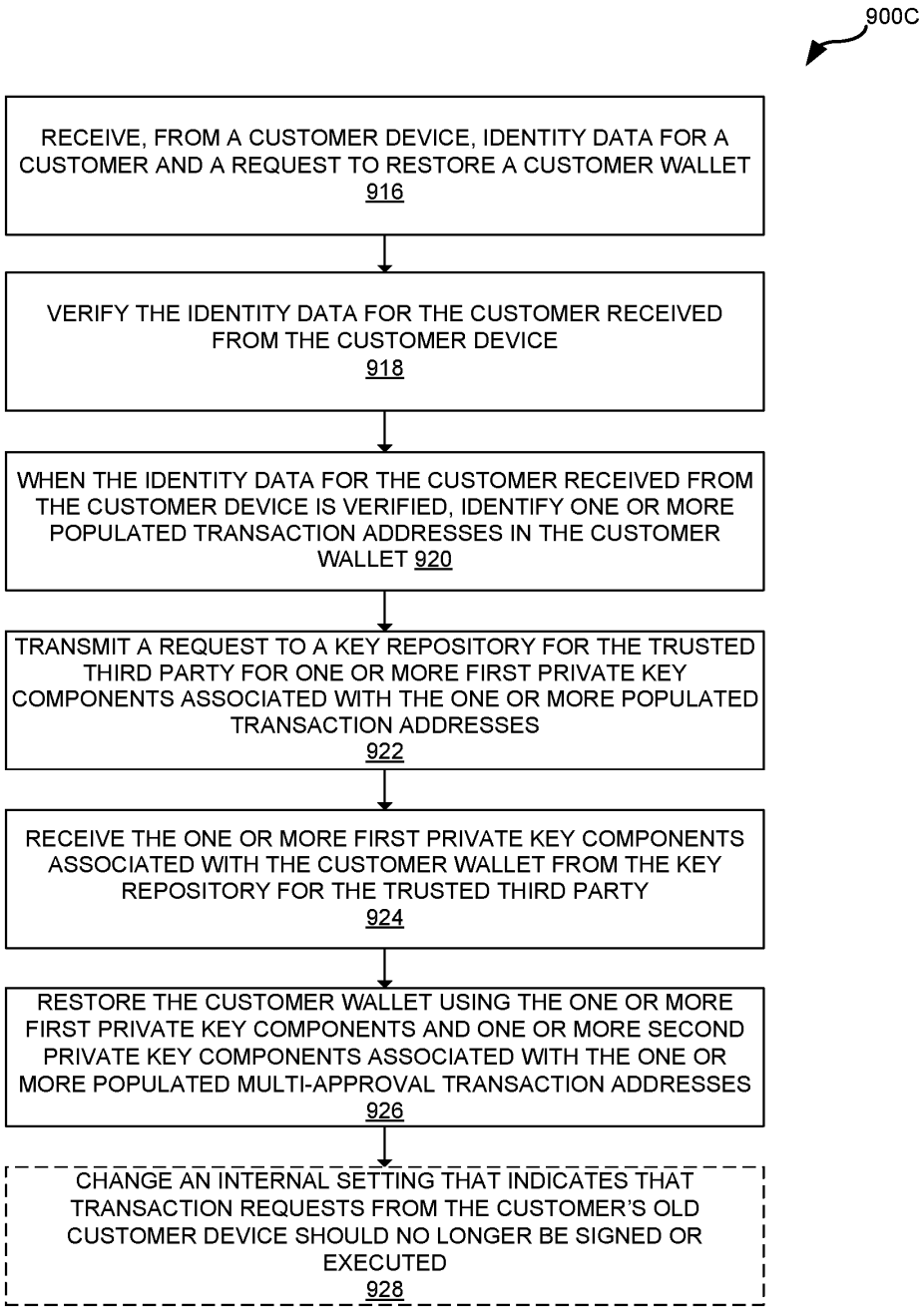
900C
RECEIVE, FROM A CUSTOMER DEVICE, IDENTITY DATA FOR A CUSTOMER AND A REQUEST TO RESTORE A CUSTOMER WALLET
916
VERIFY THE IDENTITY DATA FOR THE CUSTOMER RECEIVED FROM THE CUSTOMER DEVICE
918
WHEN THE IDENTITY DATA FOR THE CUSTOMER RECEIVED FROM THE CUSTOMER DEVICE IS VERIFIED, IDENTIFY ONE OR MORE POPULATED TRANSACTION ADDRESSES IN THE CUSTOMER WALLET 920
TRANSMIT A REQUEST TO A KEY REPOSITORY FOR THE TRUSTED THIRD PARTY FOR ONE OR MORE FIRST PRIVATE KEY COMPONENTS ASSOCIATED WITH THE ONE OR MORE POPULATED TRANSACTION ADDRESSES
922
RECEIVE THE ONE OR MORE FIRST PRIVATE KEY COMPONENTS ASSOCIATED WITH THE CUSTOMER WALLET FROM THE KEY REPOSITORY FOR THE TRUSTED THIRD PARTY
924
RESTORE THE CUSTOMER WALLET USING THE ONE OR MORE FIRST PRIVATE KEY COMPONENTS AND ONE OR MORE SECOND PRIVATE KEY COMPONENTS ASSOCIATED WITH THE ONE OR MORE POPULATED MULTI-APPROVAL TRANSACTION ADDRESSES
926
CHANGE AN INTERNAL SETTING THAT INDICATES THAT TRANSACTION REQUESTS FROM THE CUSTOMER'S OLD CUSTOMER DEVICE SHOULD NO LONGER BE SIGNED OR EXECUTED
928

FIG. 9C

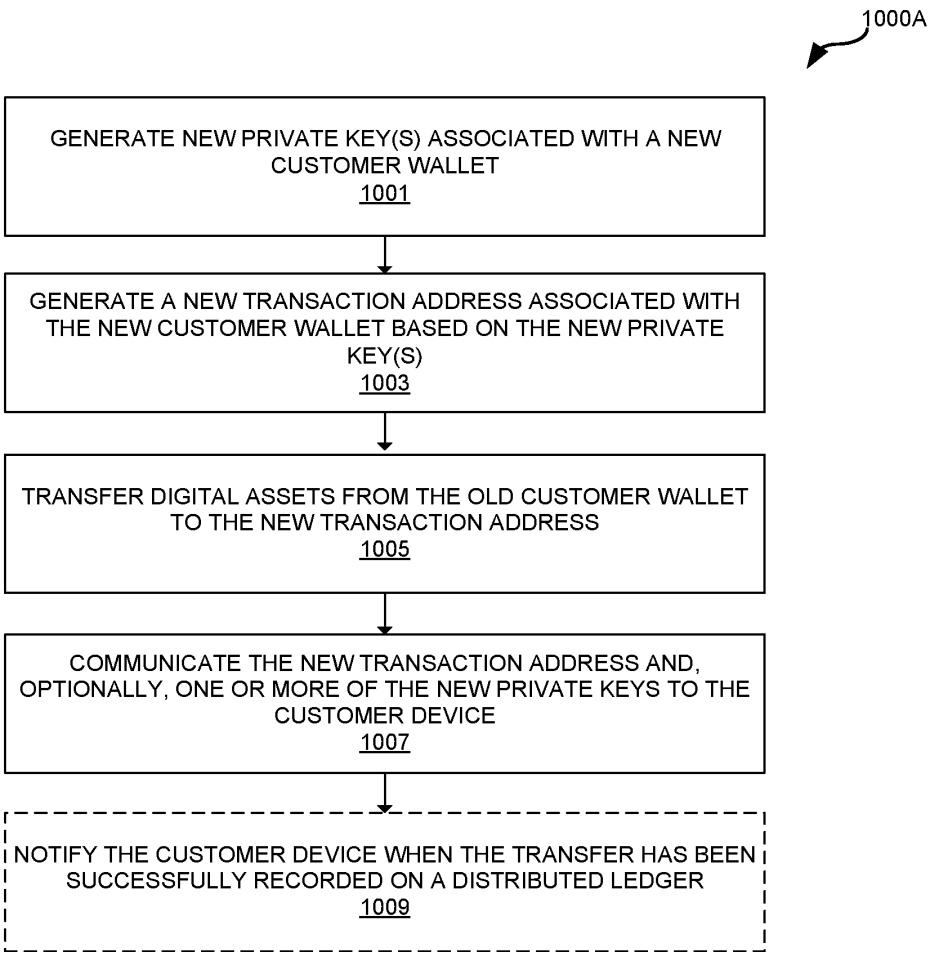
1000A
GENERATE NEW PRIVATE KEY(S) ASSOCIATED WITH A NEW CUSTOMER WALLET
1001
GENERATE A NEW TRANSACTION ADDRESS ASSOCIATED WITH THE NEW CUSTOMER WALLET BASED ON THE NEW PRIVATE KEY(S)
1003
TRANSFER DIGITAL ASSETS FROM THE OLD CUSTOMER WALLET TO THE NEW TRANSACTION ADDRESS
1005
COMMUNICATE THE NEW TRANSACTION ADDRESS AND, OPTIONALLY, ONE OR MORE OF THE NEW PRIVATE KEYS TO THE CUSTOMER DEVICE
1007
NOTIFY THE CUSTOMER DEVICE WHEN THE TRANSFER HAS BEEN SUCCESSFULLY RECORDED ON A DISTRIBUTED LEDGER
1009

FIG. 10A

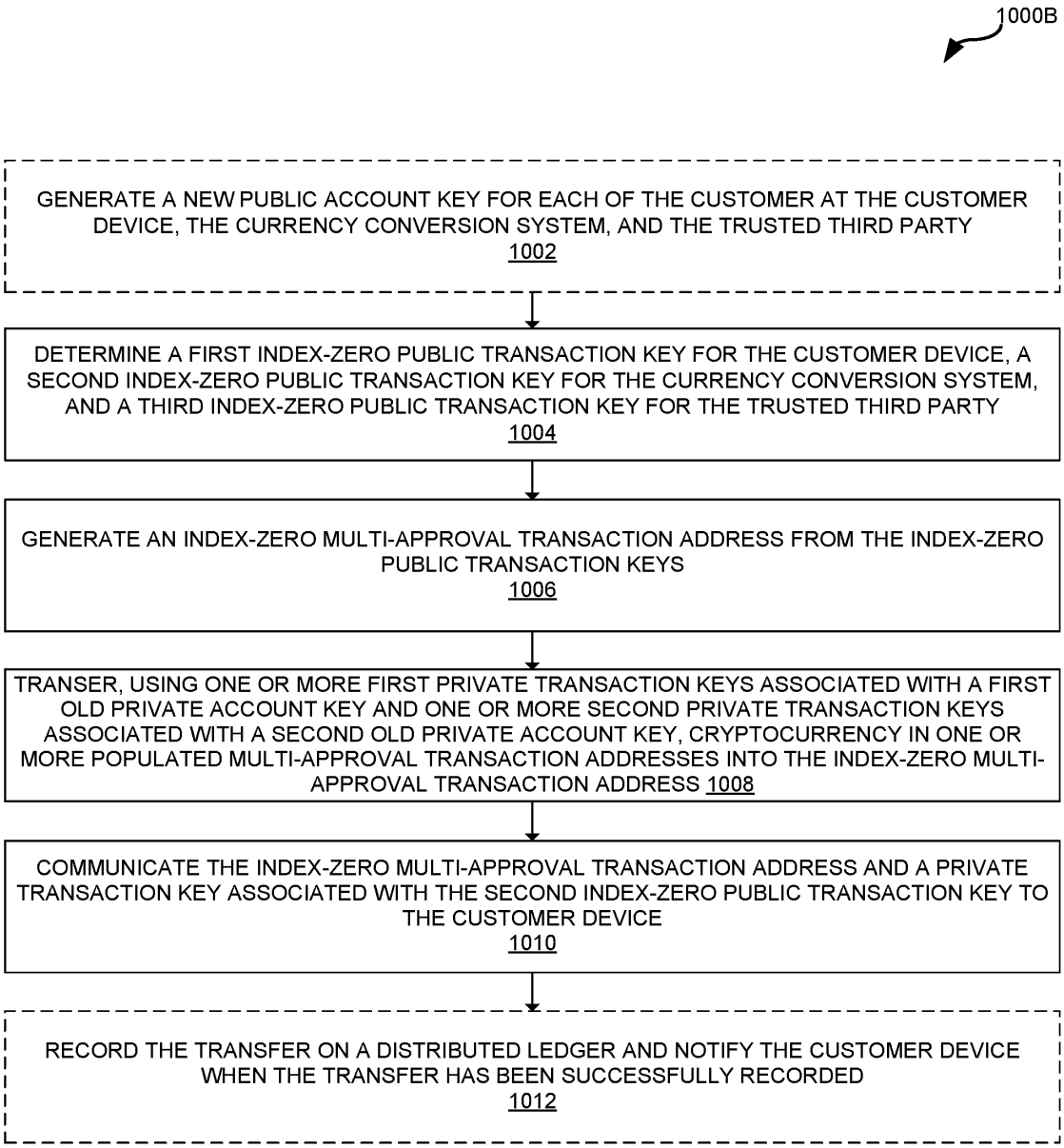
1000B
GENERATE A NEW PUBLIC ACCOUNT KEY FOR EACH OF THE CUSTOMER AT THE CUSTOMER DEVICE, THE CURRENCY CONVERSION SYSTEM, AND THE TRUSTED THIRD PARTY
1002
DETERMINE A FIRST INDEX-ZERO PUBLIC TRANSACTION KEY FOR THE CUSTOMER DEVICE, A SECOND INDEX-ZERO PUBLIC TRANSACTION KEY FOR THE CURRENCY CONVERSION SYSTEM, AND A THIRD INDEX-ZERO PUBLIC TRANSACTION KEY FOR THE TRUSTED THIRD PARTY
1004
GENERATE AN INDEX-ZERO MULTI-APPROVAL TRANSACTION ADDRESS FROM THE INDEX-ZERO PUBLIC TRANSACTION KEYS
1006
TRANSER, USING ONE OR MORE FIRST PRIVATE TRANSACTION KEYS ASSOCIATED WITH A FIRST OLD PRIVATE ACCOUNT KEY AND ONE OR MORE SECOND PRIVATE TRANSACTION KEYS ASSOCIATED WITH A SECOND OLD PRIVATE ACCOUNT KEY, CRYPTOCURRENCY IN ONE OR MORE POPULATED MULTI-APPROVAL TRANSACTION ADDRESSES INTO THE INDEX-ZERO MULTI-APPROVAL TRANSACTION ADDRESS 1008
COMMUNICATE THE INDEX-ZERO MULTI-APPROVAL TRANSACTION ADDRESS AND A PRIVATE TRANSACTION KEY ASSOCIATED WITH THE SECOND INDEX-ZERO PUBLIC TRANSACTION KEY TO THE CUSTOMER DEVICE
1010
RECORD THE TRANSFER ON A DISTRIBUTED LEDGER AND NOTIFY THE CUSTOMER DEVICE WHEN THE TRANSFER HAS BEEN SUCCESSFULLY RECORDED
1012

FIG. 10B

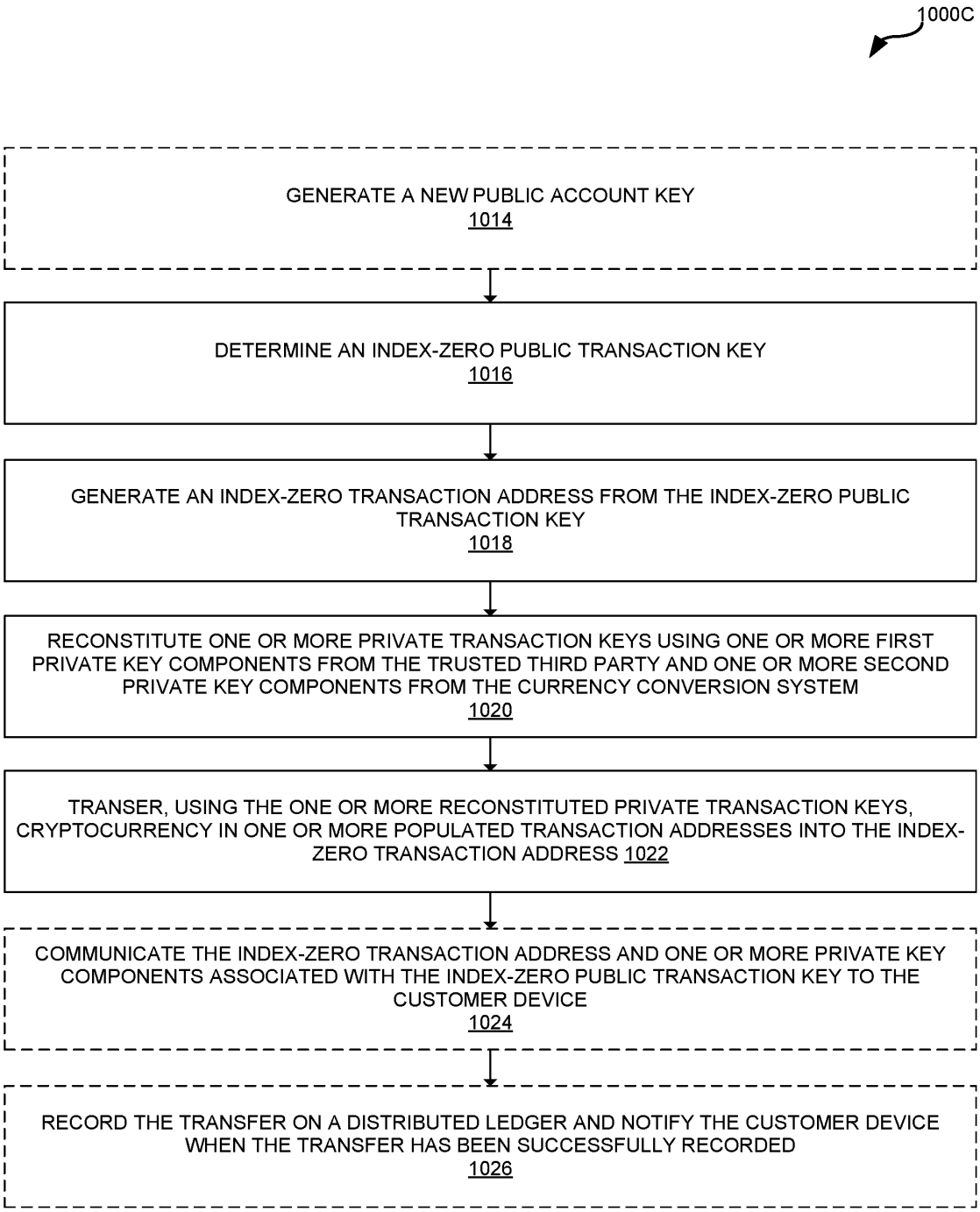
1000C
GENERATE A NEW PUBLIC ACCOUNT KEY
1014
DETERMINE AN INDEX-ZERO PUBLIC TRANSACTION KEY
1016
GENERATE AN INDEX-ZERO TRANSACTION ADDRESS FROM THE INDEX-ZERO PUBLIC TRANSACTION KEY
1018
RECONSTITUTE ONE OR MORE PRIVATE TRANSACTION KEYS USING ONE OR MORE FIRST PRIVATE KEY COMPONENTS FROM THE TRUSTED THIRD PARTY AND ONE OR MORE SECOND PRIVATE KEY COMPONENTS FROM THE CURRENCY CONVERSION SYSTEM
1020
TRANSER, USING THE ONE OR MORE RECONSTITUTED PRIVATE TRANSACTION KEYS, CRYPTOCURRENCY IN ONE OR MORE POPULATED TRANSACTION ADDRESSES INTO THE INDEX-ZERO TRANSACTION ADDRESS 1022
COMMUNICATE THE INDEX-ZERO TRANSACTION ADDRESS AND ONE OR MORE PRIVATE KEY COMPONENTS ASSOCIATED WITH THE INDEX-ZERO PUBLIC TRANSACTION KEY TO THE CUSTOMER DEVICE
1024
RECORD THE TRANSFER ON A DISTRIBUTED LEDGER AND NOTIFY THE CUSTOMER DEVICE WHEN THE TRANSFER HAS BEEN SUCCESSFULLY RECORDED
1026

FIG. 10C

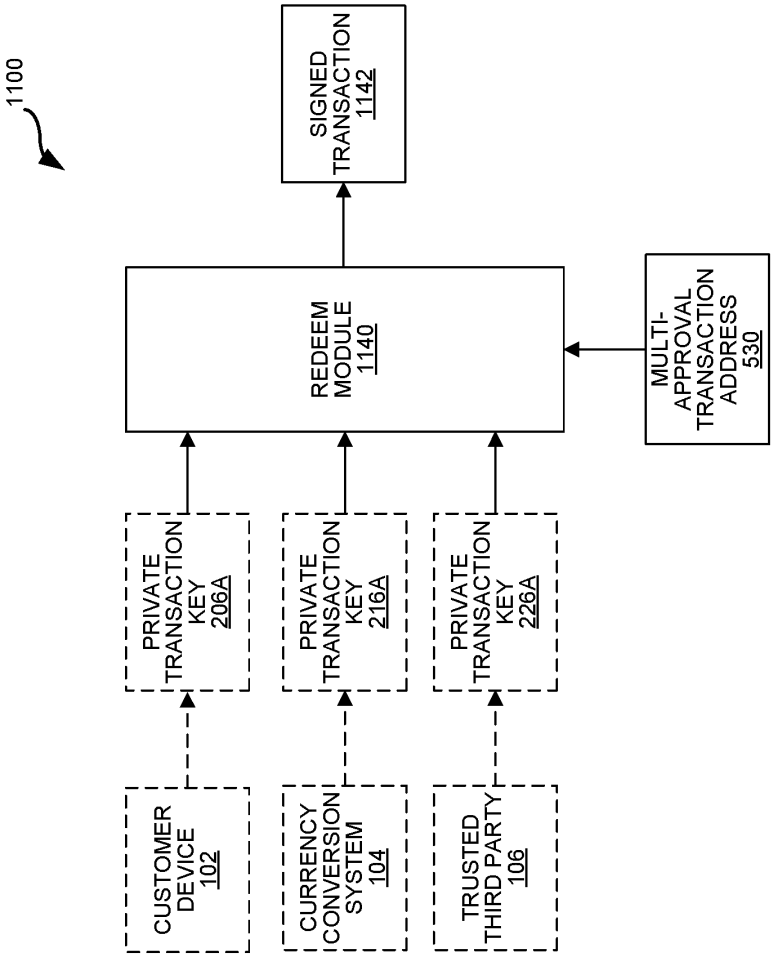
1100
SIGNED TRANSACTION 1142
REDEEM MODULE 1140
MULTI-APPROVAL TRANSACTION ADDRESS 530
PRIVATE TRANSACTION KEY 206A
PRIVATE TRANSACTION KEY 216A
PRIVATE TRANSACTION KEY 226A
CUSTOMER DEVICE 102
CURRENCY CONVERSION SYSTEM 104
TRUSTED THIRD PARTY 106

FIG. 11

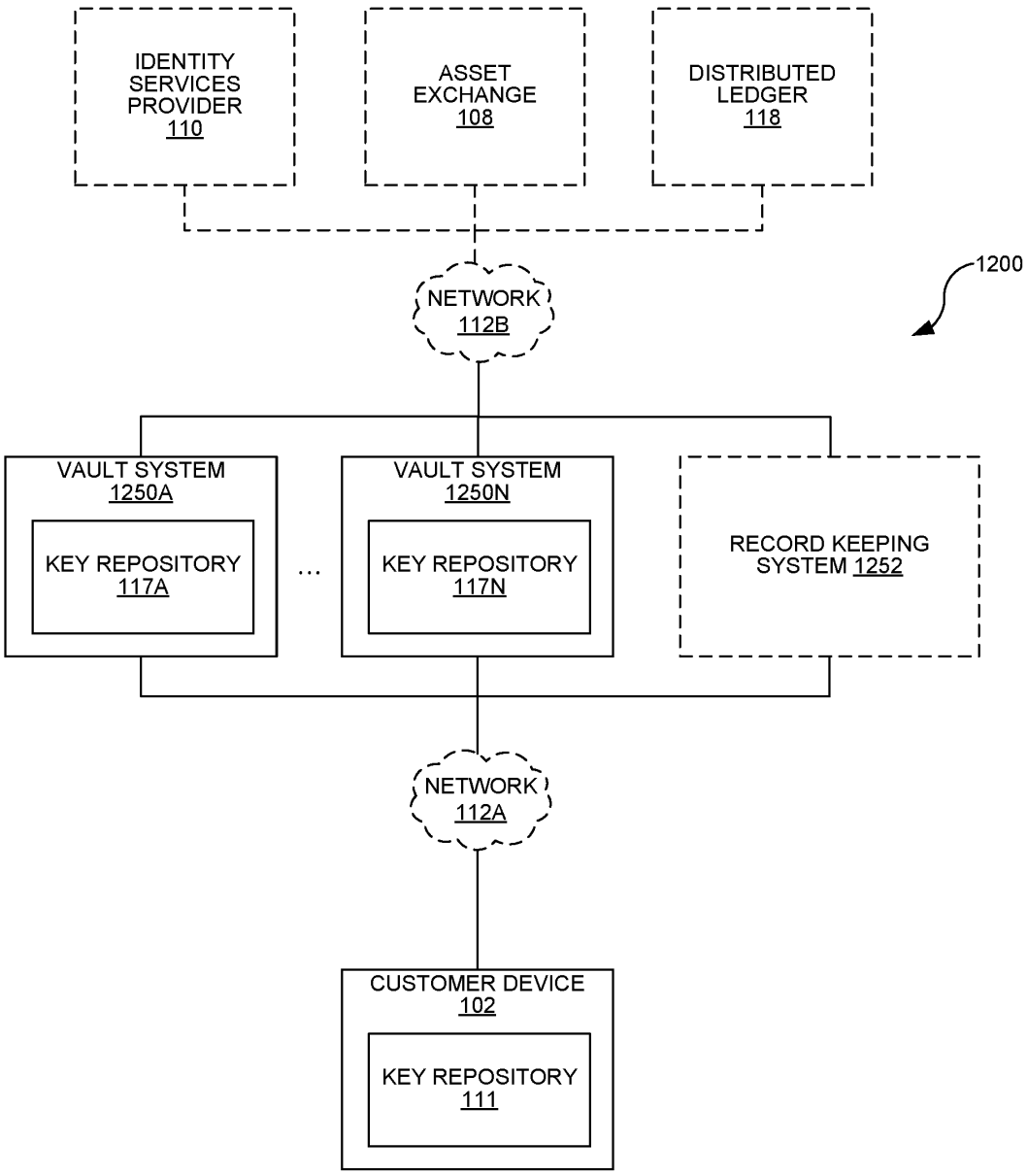
IDENTITY SERVICES PROVIDER 110
ASSET EXCHANGE 108
DISTRIBUTED LEDGER 118
1200
NETWORK 112B
VAULT SYSTEM 1250A
KEY REPOSITORY 117A
...
VAULT SYSTEM 1250N
KEY REPOSITORY 117N
RECORD KEEPING SYSTEM 1252
NETWORK 112A
CUSTOMER DEVICE 102
KEY REPOSITORY 111

FIG. 12

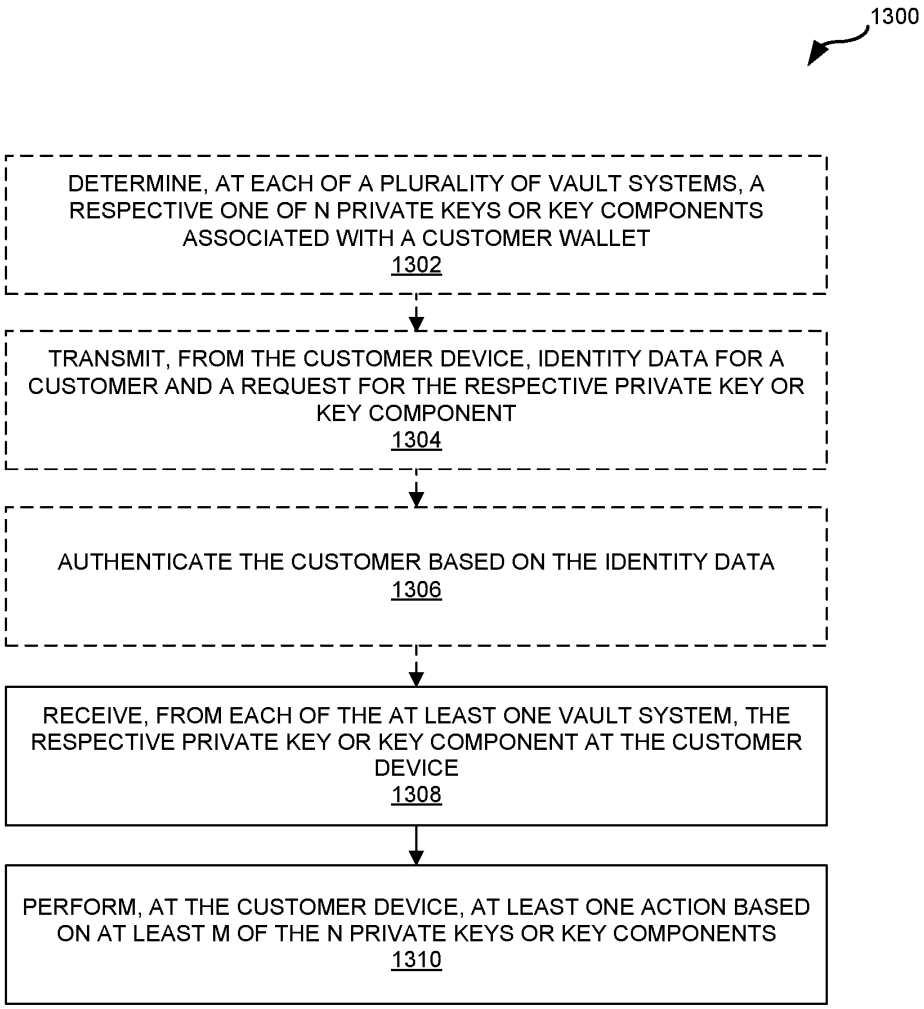
1300
DETERMINE, AT EACH OF A PLURALITY OF VAULT SYSTEMS, A RESPECTIVE ONE OF N PRIVATE KEYS OR KEY COMPONENTS ASSOCIATED WITH A CUSTOMER WALLET
1302
TRANSMIT, FROM THE CUSTOMER DEVICE, IDENTITY DATA FOR A CUSTOMER AND A REQUEST FOR THE RESPECTIVE PRIVATE KEY OR KEY COMPONENT
1304
AUTHENTICATE THE CUSTOMER BASED ON THE IDENTITY DATA
1306
RECEIVE, FROM EACH OF THE AT LEAST ONE VAULT SYSTEM, THE RESPECTIVE PRIVATE KEY OR KEY COMPONENT AT THE CUSTOMER DEVICE
1308
PERFORM, AT THE CUSTOMER DEVICE, AT LEAST ONE ACTION BASED ON AT LEAST M OF THE N PRIVATE KEYS OR KEY COMPONENTS
1310

FIG. 13

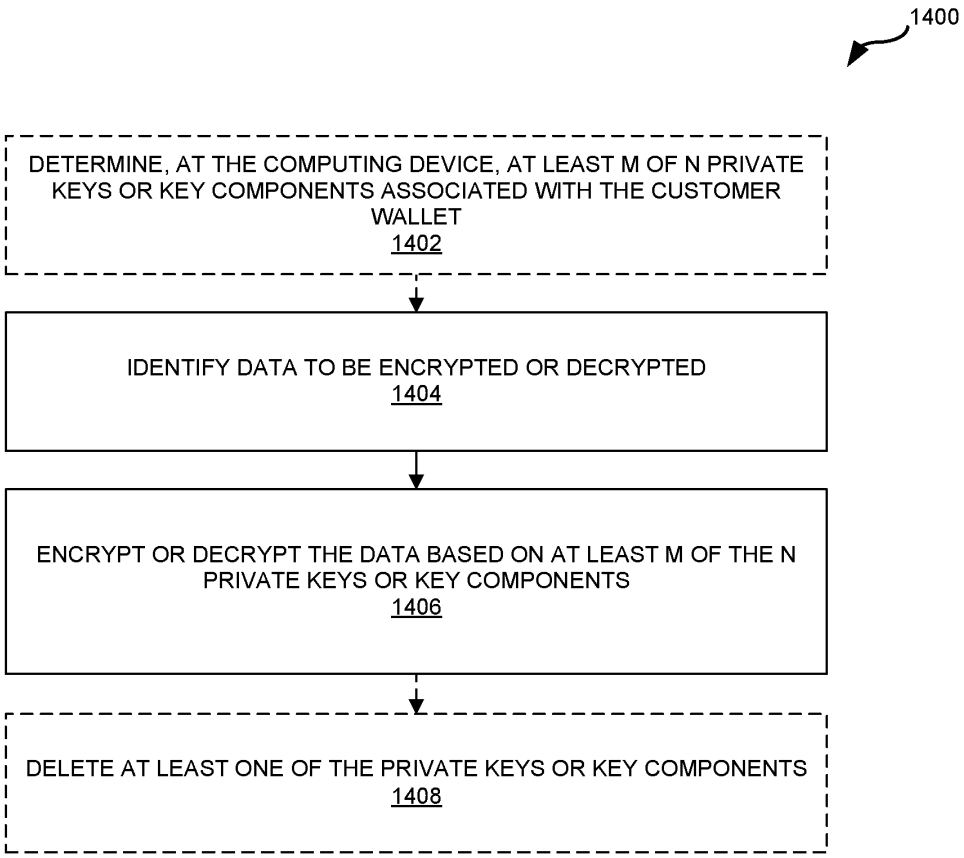
1400
DETERMINE, AT THE COMPUTING DEVICE, AT LEAST M OF N PRIVATE KEYS OR KEY COMPONENTS ASSOCIATED WITH THE CUSTOMER WALLET
1402
IDENTIFY DATA TO BE ENCRYPTED OR DECRYPTED
1404
ENCRYPT OR DECRYPT THE DATA BASED ON AT LEAST M OF THE N PRIVATE KEYS OR KEY COMPONENTS
1406
DELETE AT LEAST ONE OF THE PRIVATE KEYS OR KEY COMPONENTS
1408

FIG. 14

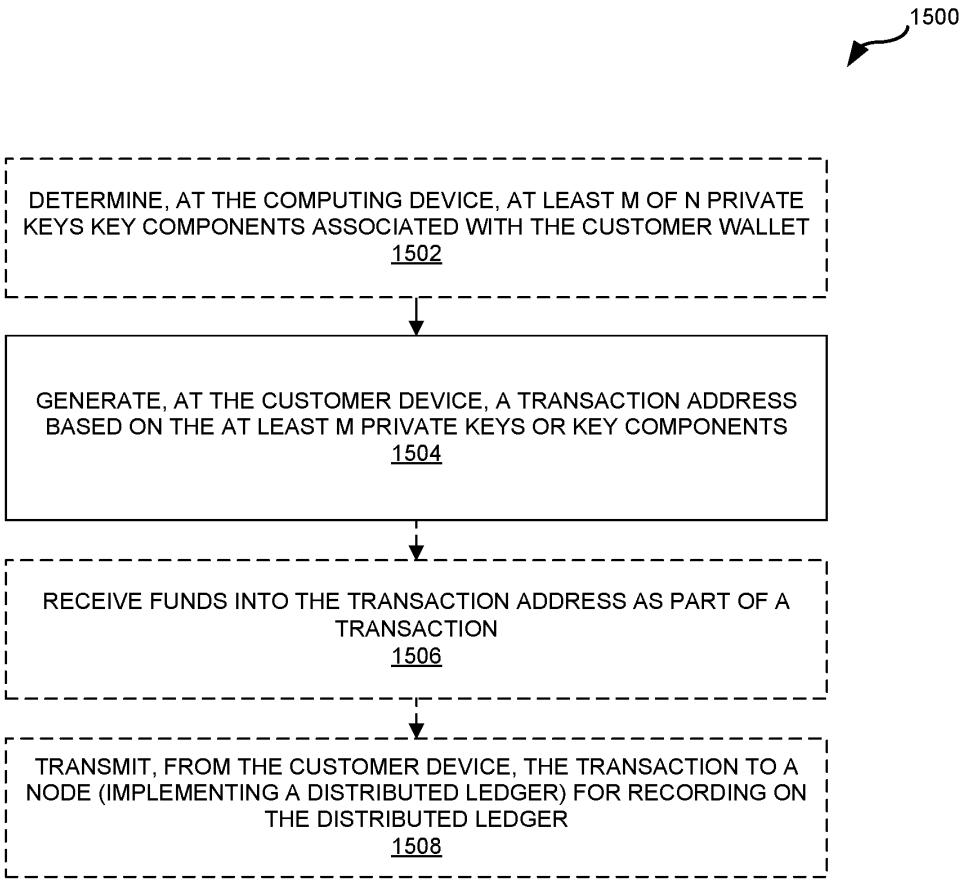
1500
DETERMINE, AT THE COMPUTING DEVICE, AT LEAST M OF N PRIVATE KEYS KEY COMPONENTS ASSOCIATED WITH THE CUSTOMER WALLET
1502
GENERATE, AT THE CUSTOMER DEVICE, A TRANSACTION ADDRESS BASED ON THE AT LEAST M PRIVATE KEYS OR KEY COMPONENTS
1504
RECEIVE FUNDS INTO THE TRANSACTION ADDRESS AS PART OF A TRANSACTION
1506
TRANSMIT, FROM THE CUSTOMER DEVICE, THE TRANSACTION TO A NODE (IMPLEMENTING A DISTRIBUTED LEDGER) FOR RECORDING ON THE DISTRIBUTED LEDGER
1508

FIG. 15

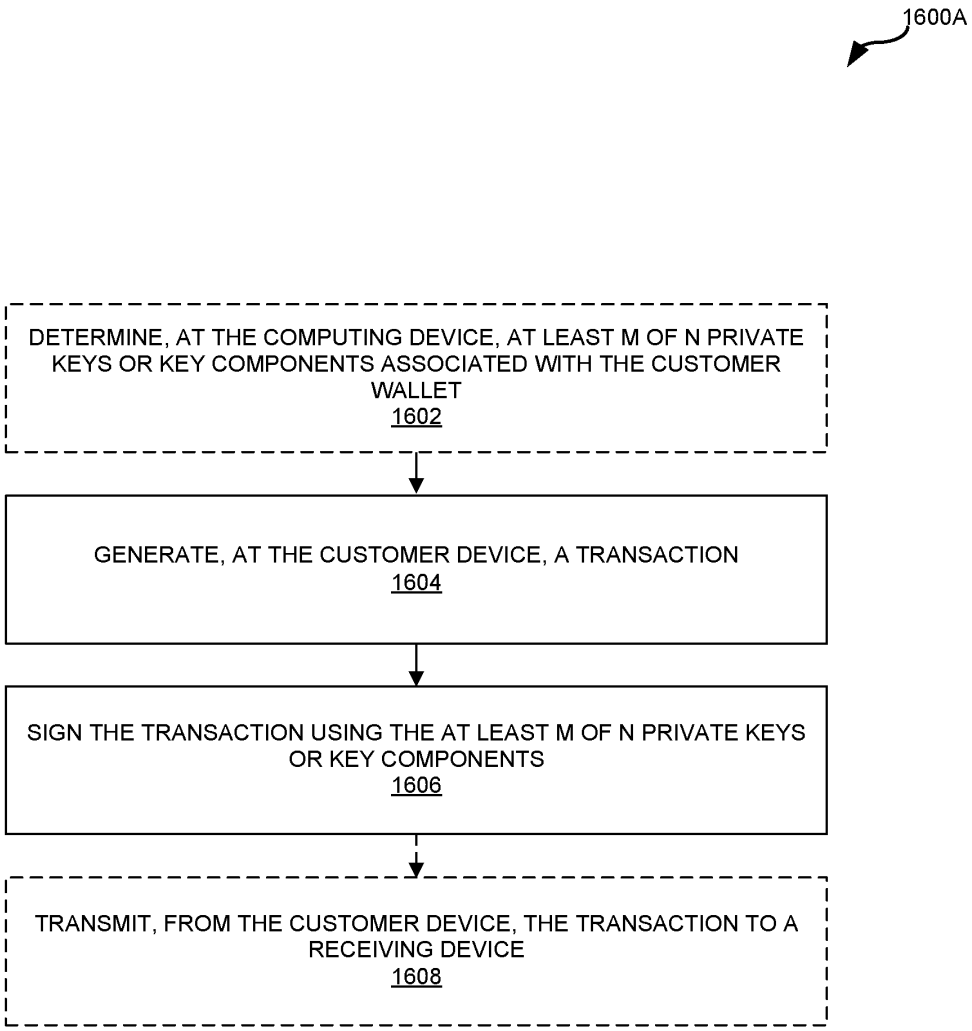
1600A
DETERMINE, AT THE COMPUTING DEVICE, AT LEAST M OF N PRIVATE KEYS OR KEY COMPONENTS ASSOCIATED WITH THE CUSTOMER WALLET
1602
GENERATE, AT THE CUSTOMER DEVICE, A TRANSACTION
1604
SIGN THE TRANSACTION USING THE AT LEAST M OF N PRIVATE KEYS OR KEY COMPONENTS
1606
TRANSMIT, FROM THE CUSTOMER DEVICE, THE TRANSACTION TO A RECEIVING DEVICE
1608

FIG. 16A

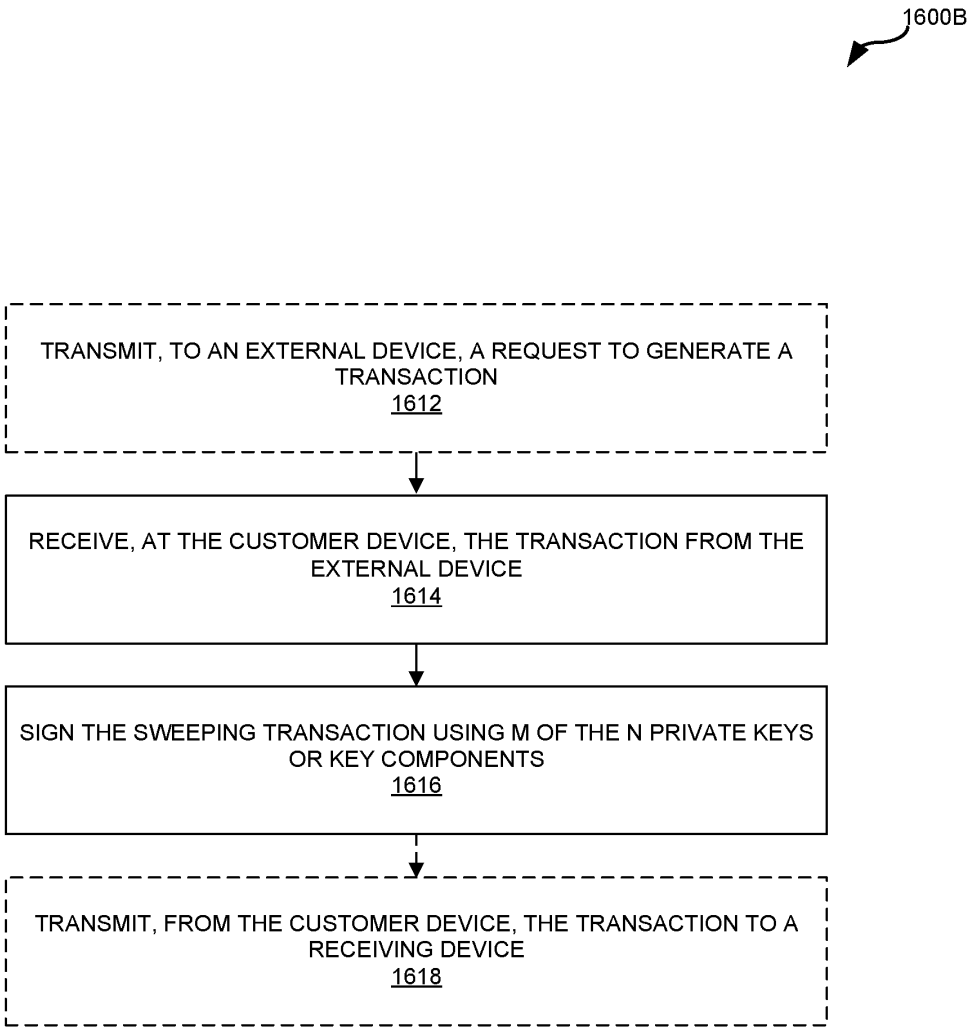
1600B
TRANSMIT, TO AN EXTERNAL DEVICE, A REQUEST TO GENERATE A TRANSACTION
1612
RECEIVE, AT THE CUSTOMER DEVICE, THE TRANSACTION FROM THE EXTERNAL DEVICE
1614
SIGN THE SWEEPING TRANSACTION USING M OF THE N PRIVATE KEYS OR KEY COMPONENTS
1616
TRANSMIT, FROM THE CUSTOMER DEVICE, THE TRANSACTION TO A RECEIVING DEVICE
1618

FIG. 16B

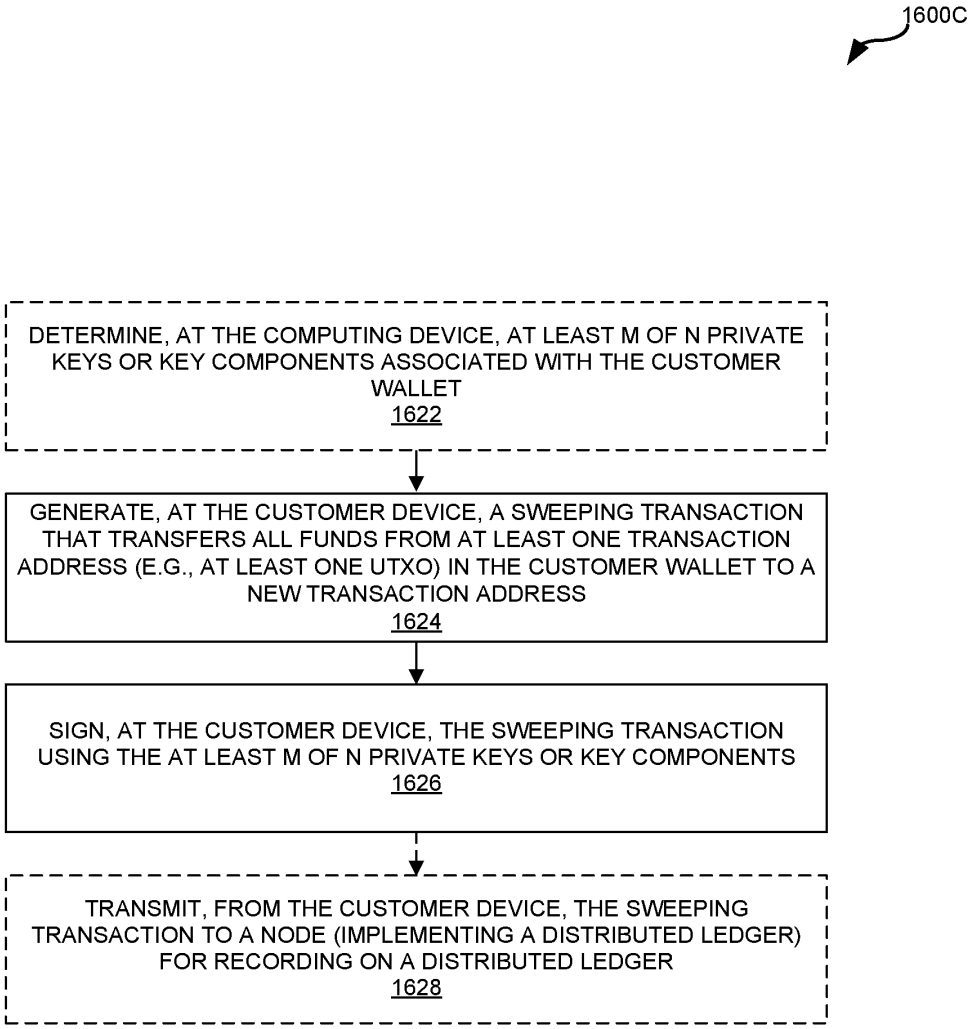
1600C
DETERMINE, AT THE COMPUTING DEVICE, AT LEAST M OF N PRIVATE KEYS OR KEY COMPONENTS ASSOCIATED WITH THE CUSTOMER WALLET
1622
GENERATE, AT THE CUSTOMER DEVICE, A SWEEPING TRANSACTION THAT TRANSFERS ALL FUNDS FROM AT LEAST ONE TRANSACTION ADDRESS (E.G., AT LEAST ONE UTXO) IN THE CUSTOMER WALLET TO A NEW TRANSACTION ADDRESS
1624
SIGN, AT THE CUSTOMER DEVICE, THE SWEEPING TRANSACTION USING THE AT LEAST M OF N PRIVATE KEYS OR KEY COMPONENTS
1626
TRANSMIT, FROM THE CUSTOMER DEVICE, THE SWEEPING TRANSACTION TO A NODE (IMPLEMENTING A DISTRIBUTED LEDGER) FOR RECORDING ON A DISTRIBUTED LEDGER
1628

FIG. 16C

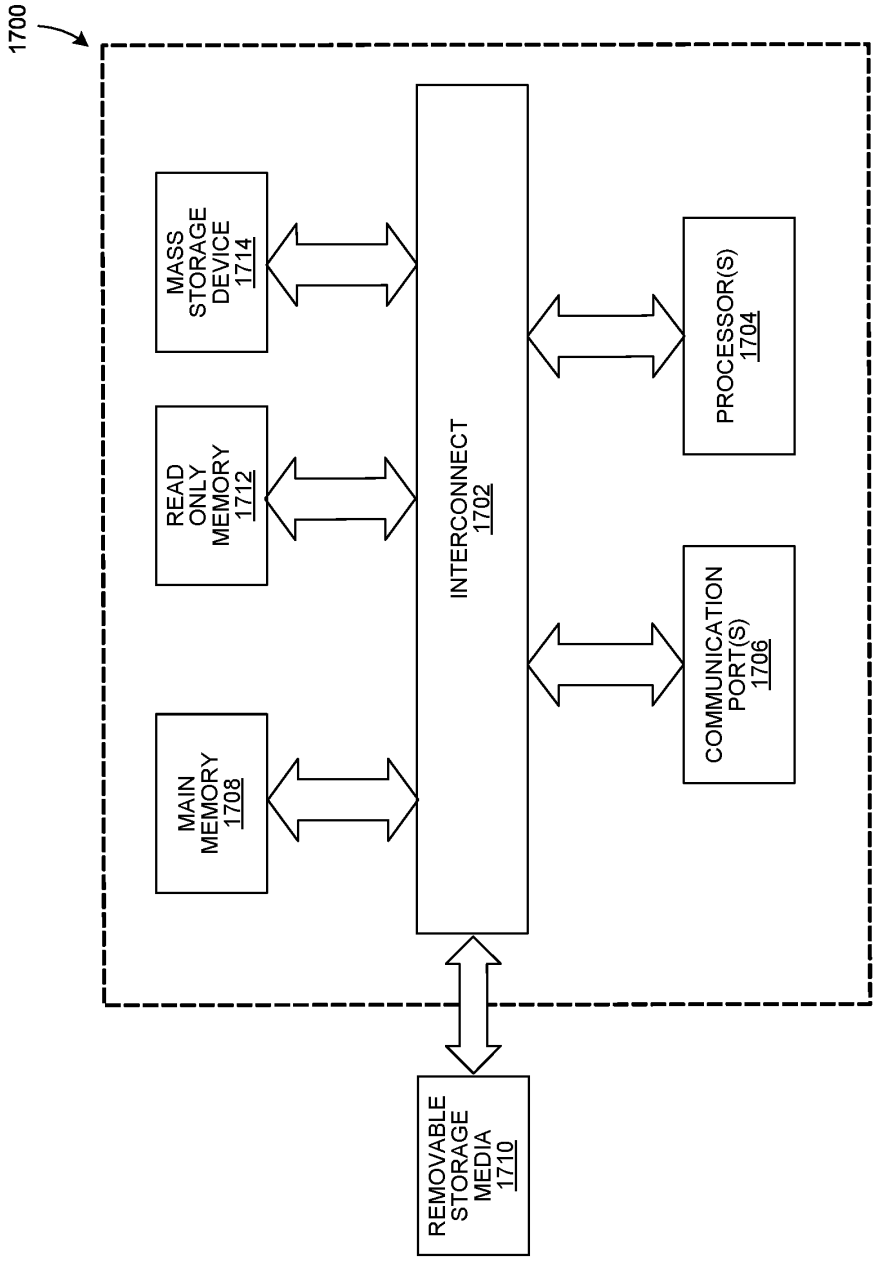
1700
MASS STORAGE DEVICE 1714
READ ONLY MEMORY 1712
MAIN MEMORY 1708
INTERCONNECT 1702
PROCESSOR(S) 1704
COMMUNICATION PORT(S) 1706
REMOVABLE STORAGE MEDIA 1710

FIG. 17

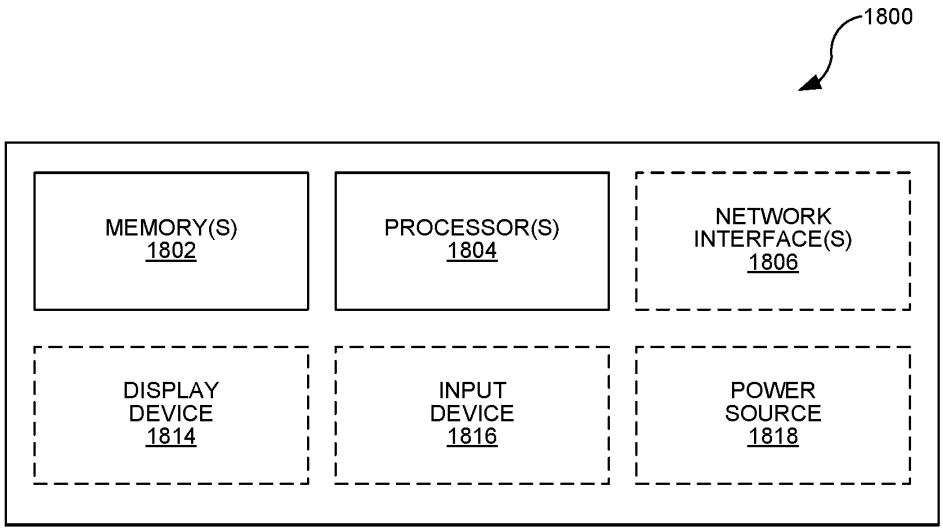
1800
MEMORY(S)
1802
PROCESSOR(S)
1804
NETWORK
INTERFACE(S)
1806
DISPLAY
DEVICE
1814
INPUT
DEVICE
1816
POWER
SOURCE
1818

FIG. 18