FIG.1

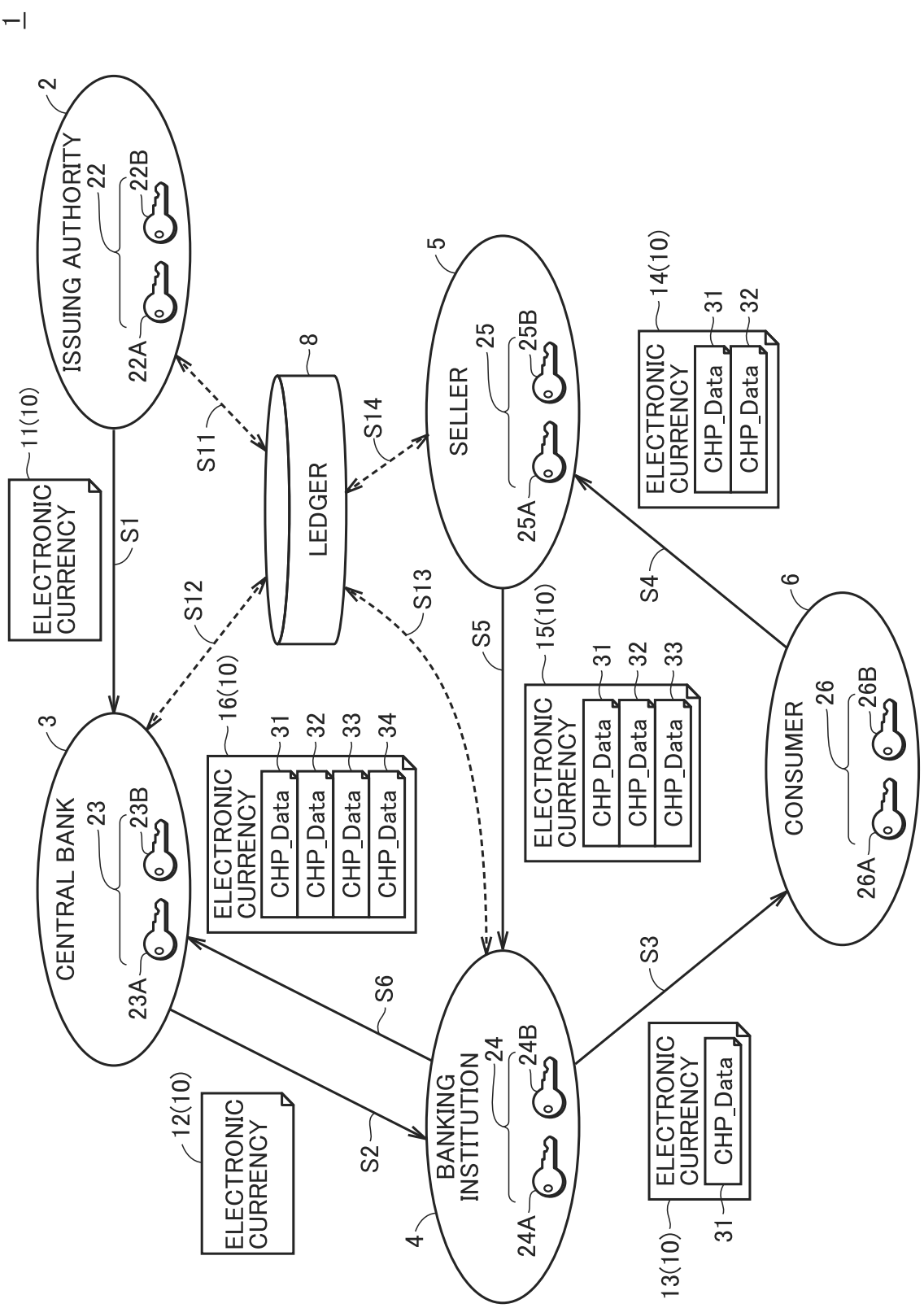

1
ISSUING AUTHORITY
2
22
22B
22A
ELECTRONIC CURRENCY
11(10)
S1
S11
LEDGER
8
S14
SELLER
5
25
25B
25A
ELECTRONIC CURRENCY
14(10)
CHP_Data
31
32
S12
S13
S4
S5
CENTRAL BANK
3
23
23B
23A
16(10)
ELECTRONIC CURRENCY
CHP_Data
31
32
33
34
15(10)
ELECTRONIC CURRENCY
CHP_Data
31
32
33
CONSUMER
6
26
26B
26A
S6
S2
S3
BANKING INSTITUTION
4
24
24B
24A
12(10)
ELECTRONIC CURRENCY
13(10)
ELECTRONIC CURRENCY
CHP_Data
31

FIG.2

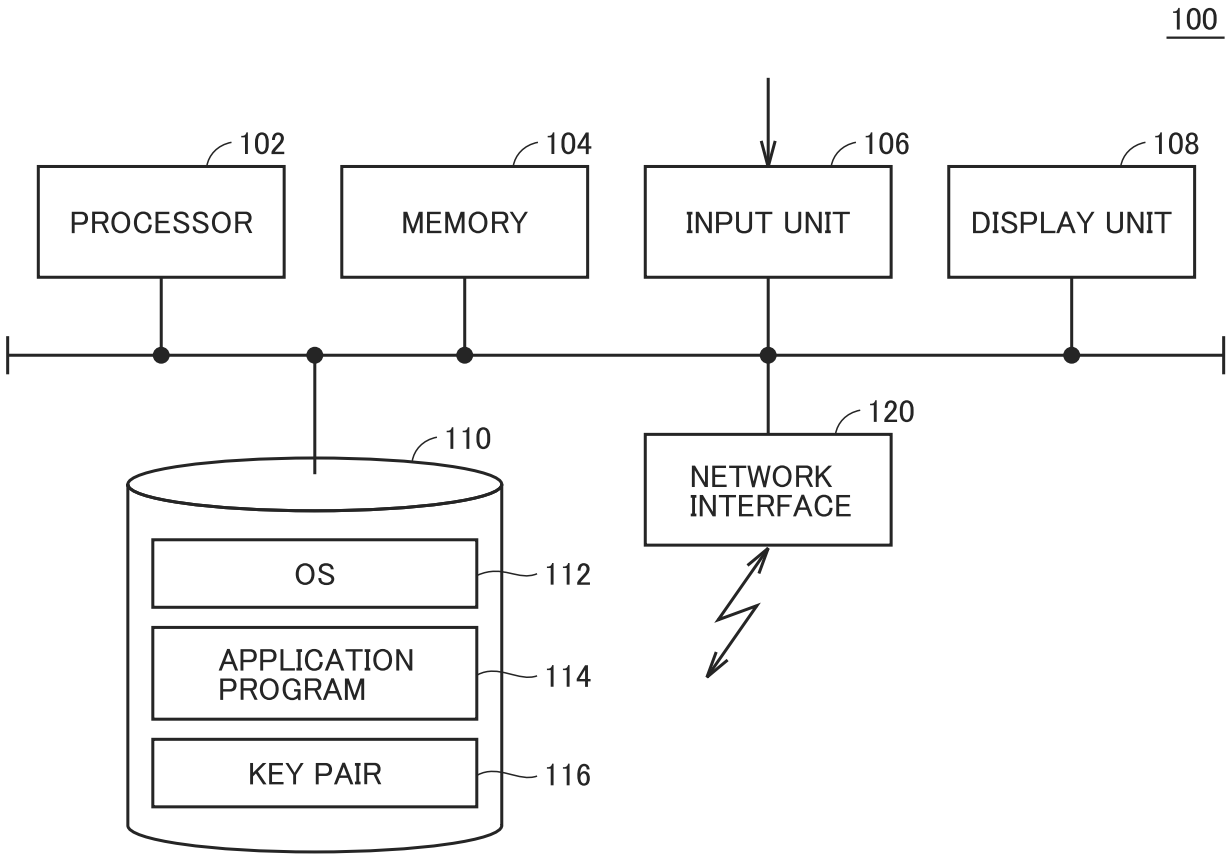

100
102
PROCESSOR
104
MEMORY
106
INPUT UNIT
108
DISPLAY UNIT
110
OS
112
APPLICATION PROGRAM
114
KEY PAIR
116
120
NETWORK INTERFACE

FIG.3

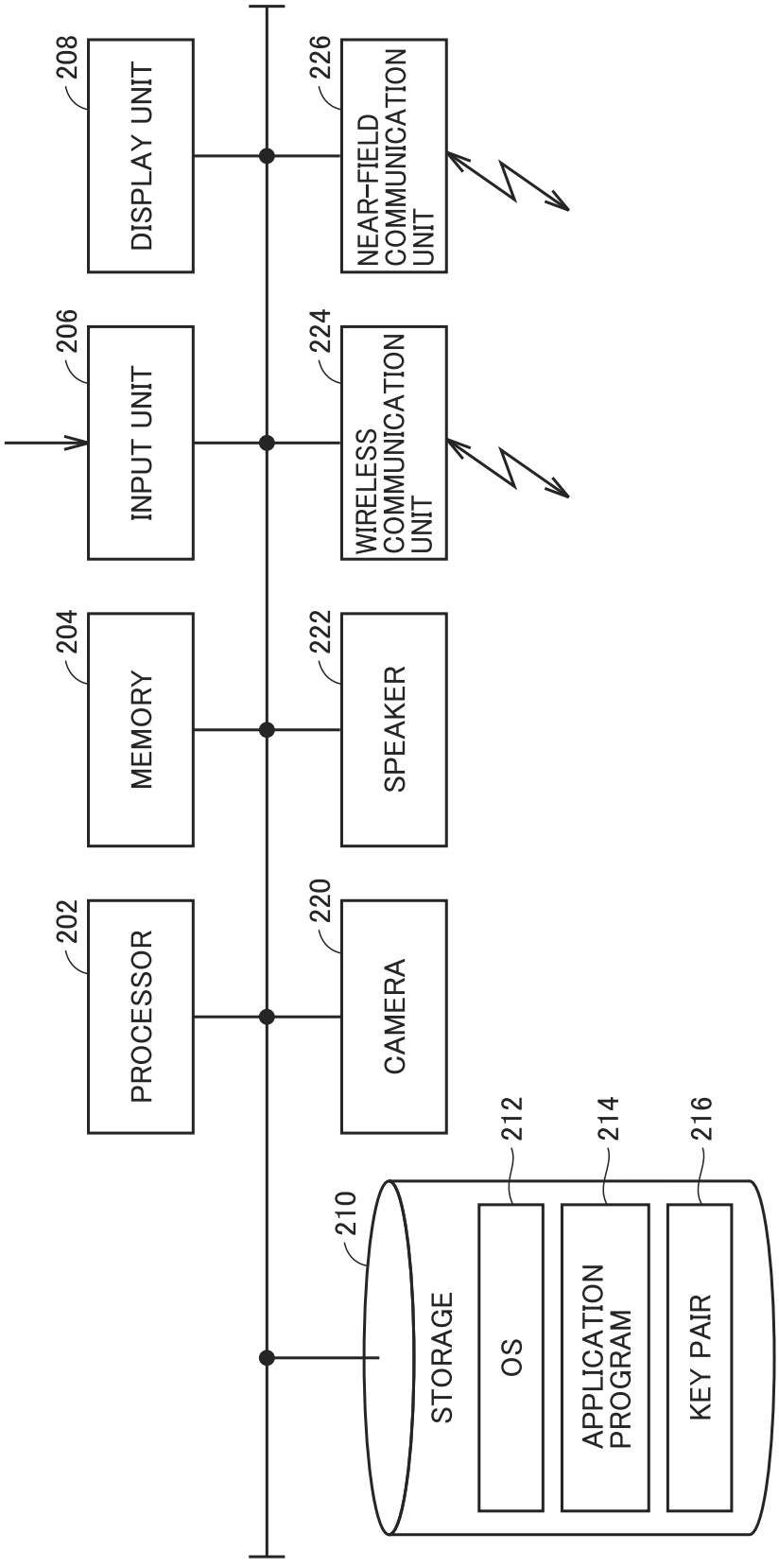

208
DISPLAY UNIT
226
NEAR-FIELD COMMUNICATION UNIT
206
INPUT UNIT
224
WIRELESS COMMUNICATION UNIT
204
MEMORY
222
SPEAKER
202
PROCESSOR
220
CAMERA
210
STORAGE
212
OS
214
APPLICATION PROGRAM
216
KEY PAIR

FIG.4

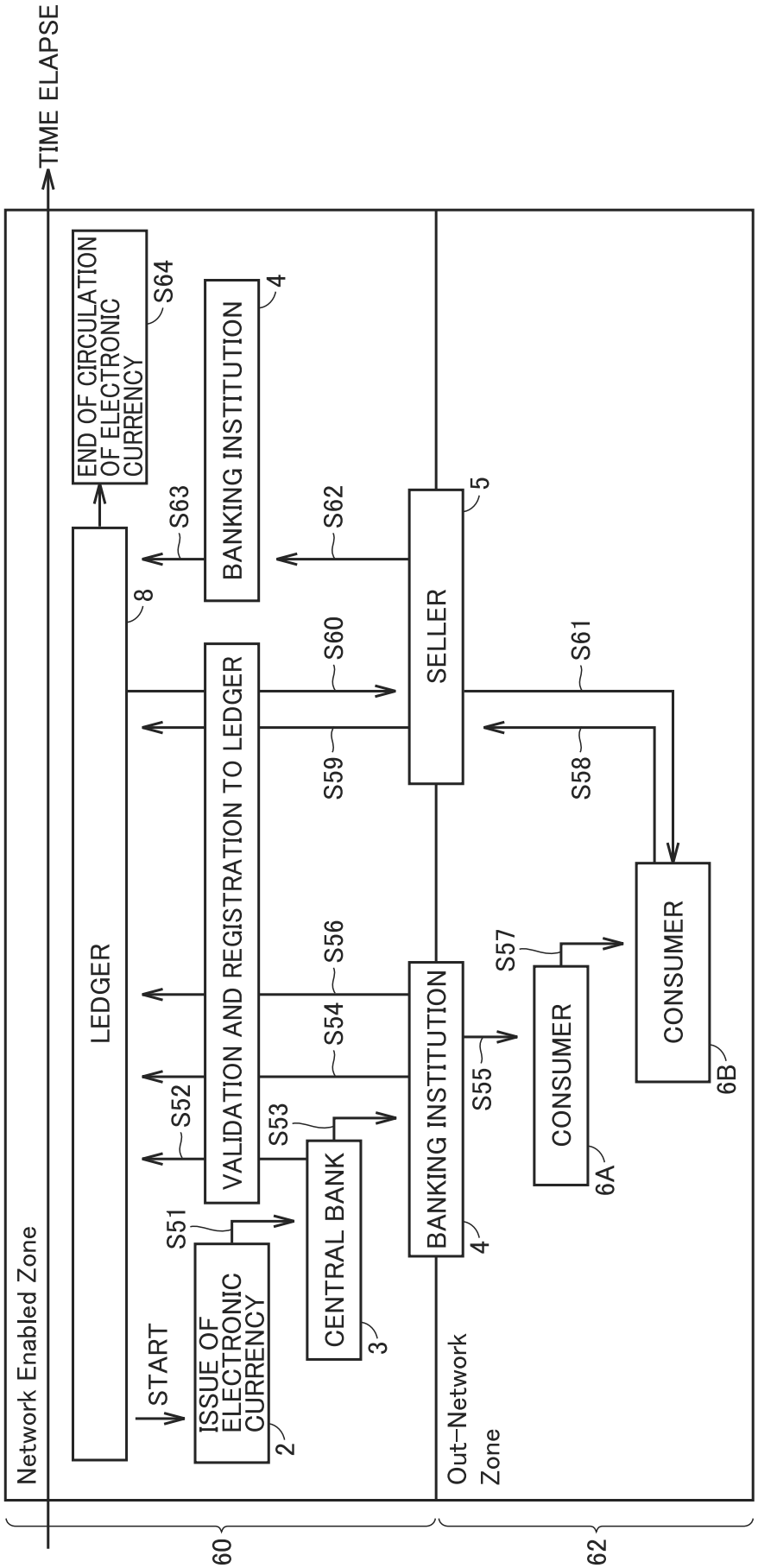

TIME ELAPSE
Network Enabled Zone
Out-Network Zone
START
ISSUE OF ELECTRONIC CURRENCY
2
CENTRAL BANK
3
BANKING INSTITUTION
4
SELLER
5
LEDGER
8
VALIDATION AND REGISTRATION TO LEDGER
BANKING INSTITUTION
4
CONSUMER
6A
CONSUMER
6B
END OF CIRCULATION OF ELECTRONIC CURRENCY
S51
S52
S53
S54
S55
S56
S57
S58
S59
S60
S61
S62
S63
S64
60
62

FIG.5

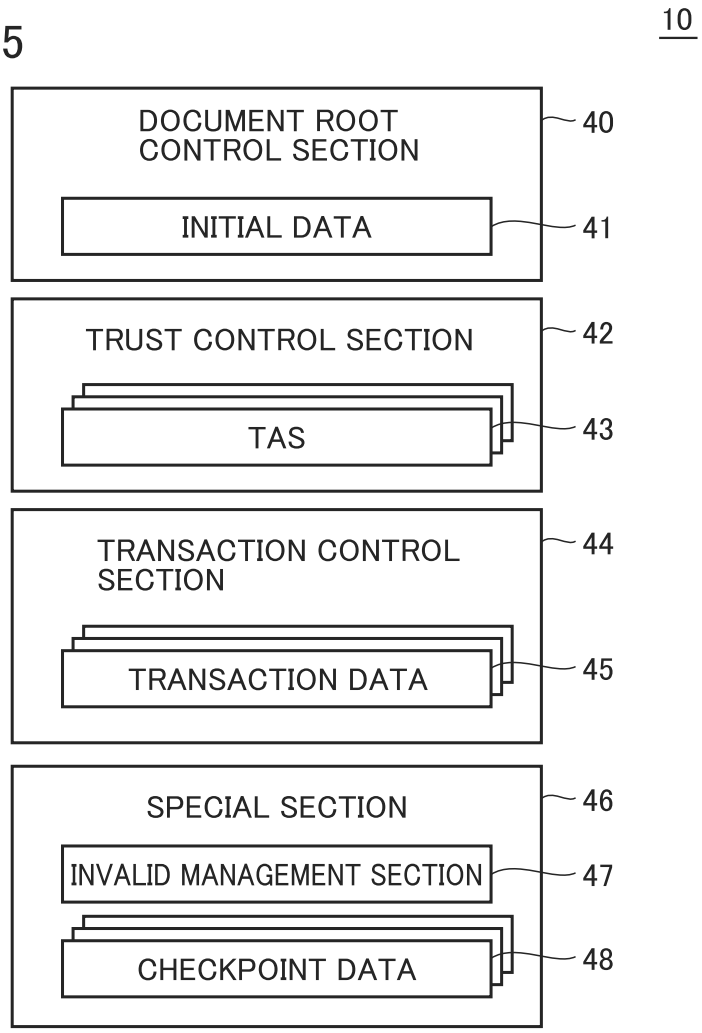

10
DOCUMENT ROOT CONTROL SECTION
40
INITIAL DATA
41
TRUST CONTROL SECTION
42
TAS
43
TRANSACTION CONTROL SECTION
44
TRANSACTION DATA
45
SPECIAL SECTION
46
INVALID MANAGEMENT SECTION
47
CHECKPOINT DATA
48

FIG.6

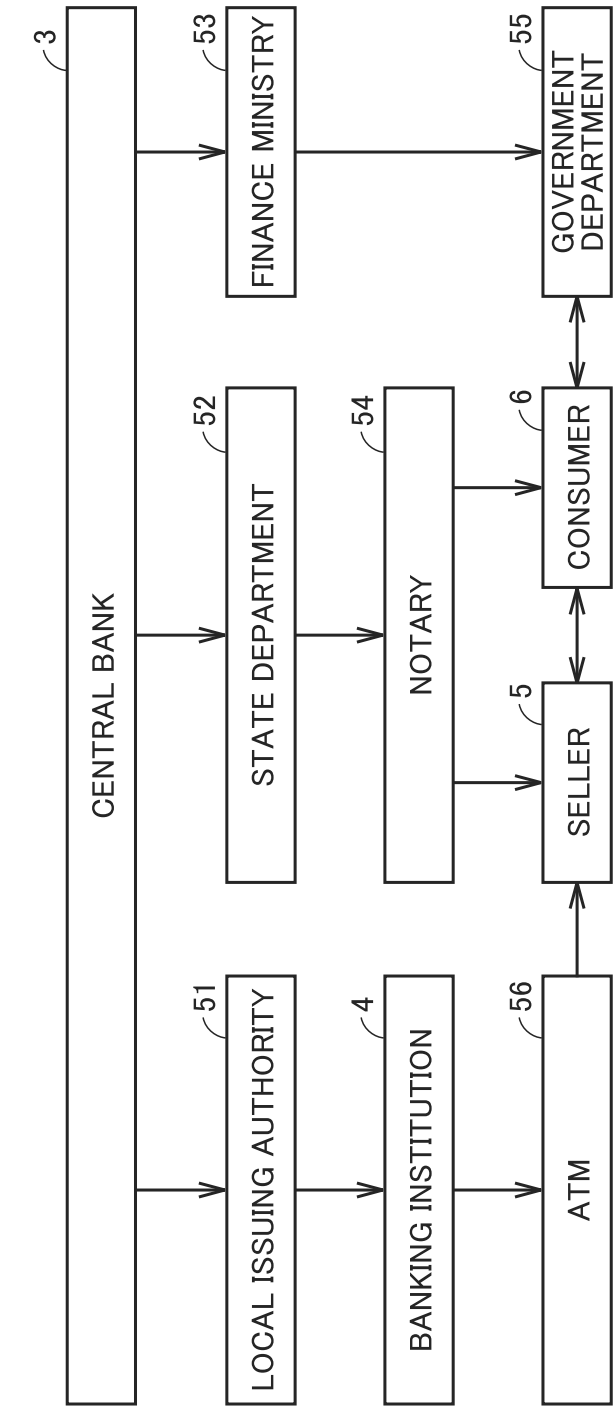

50
[ROOT]
[INTERMEDIATE L0]
[INTERMEDIATE L1]
[USER]
3
CENTRAL BANK
51
LOCAL ISSUING AUTHORITY
4
BANKING INSTITUTION
56
ATM
52
STATE DEPARTMENT
54
NOTARY
5
SELLER
53
FINANCE MINISTRY
55
GOVERNMENT DEPARTMENT
6
CONSUMER

FIG.7

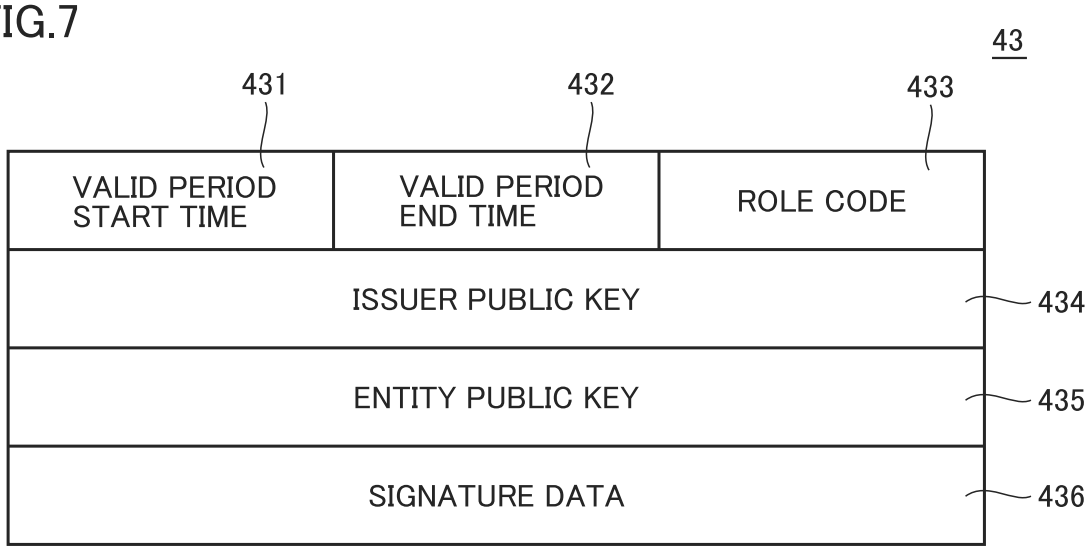

43
431
432
433
VALID PERIOD START TIME
VALID PERIOD END TIME
ROLE CODE
ISSUER PUBLIC KEY
434
ENTITY PUBLIC KEY
435
SIGNATURE DATA
436

FIG.8

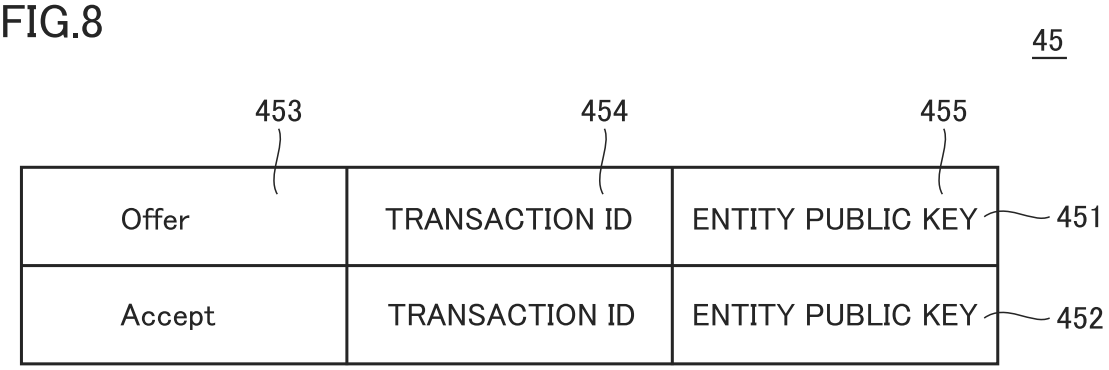

45
453
454
455
Offer
TRANSACTION ID
ENTITY PUBLIC KEY
451
Accept
TRANSACTION ID
ENTITY PUBLIC KEY
452

FIG.9

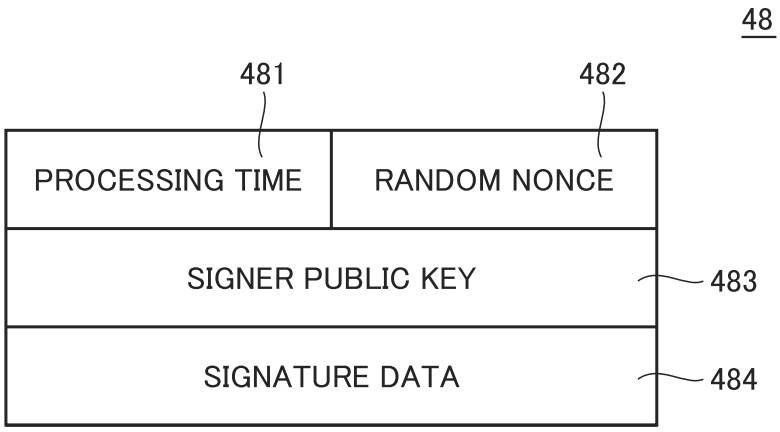

48
481
482
PROCESSING TIME
RANDOM NONCE
SIGNER PUBLIC KEY
483
SIGNATURE DATA
484

FIG.10

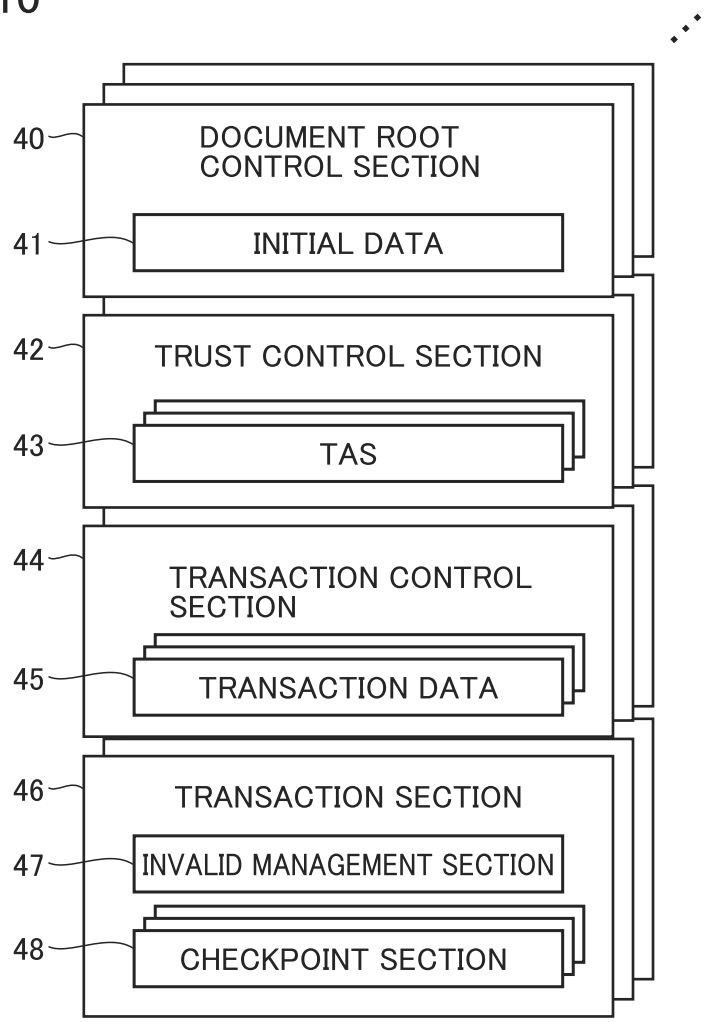

8
40
DOCUMENT ROOT CONTROL SECTION
41
INITIAL DATA
42
TRUST CONTROL SECTION
43
TAS
44
TRANSACTION CONTROL SECTION
45
TRANSACTION DATA
46
TRANSACTION SECTION
47
INVALID MANAGEMENT SECTION
48
CHECKPOINT SECTION

FIG.11

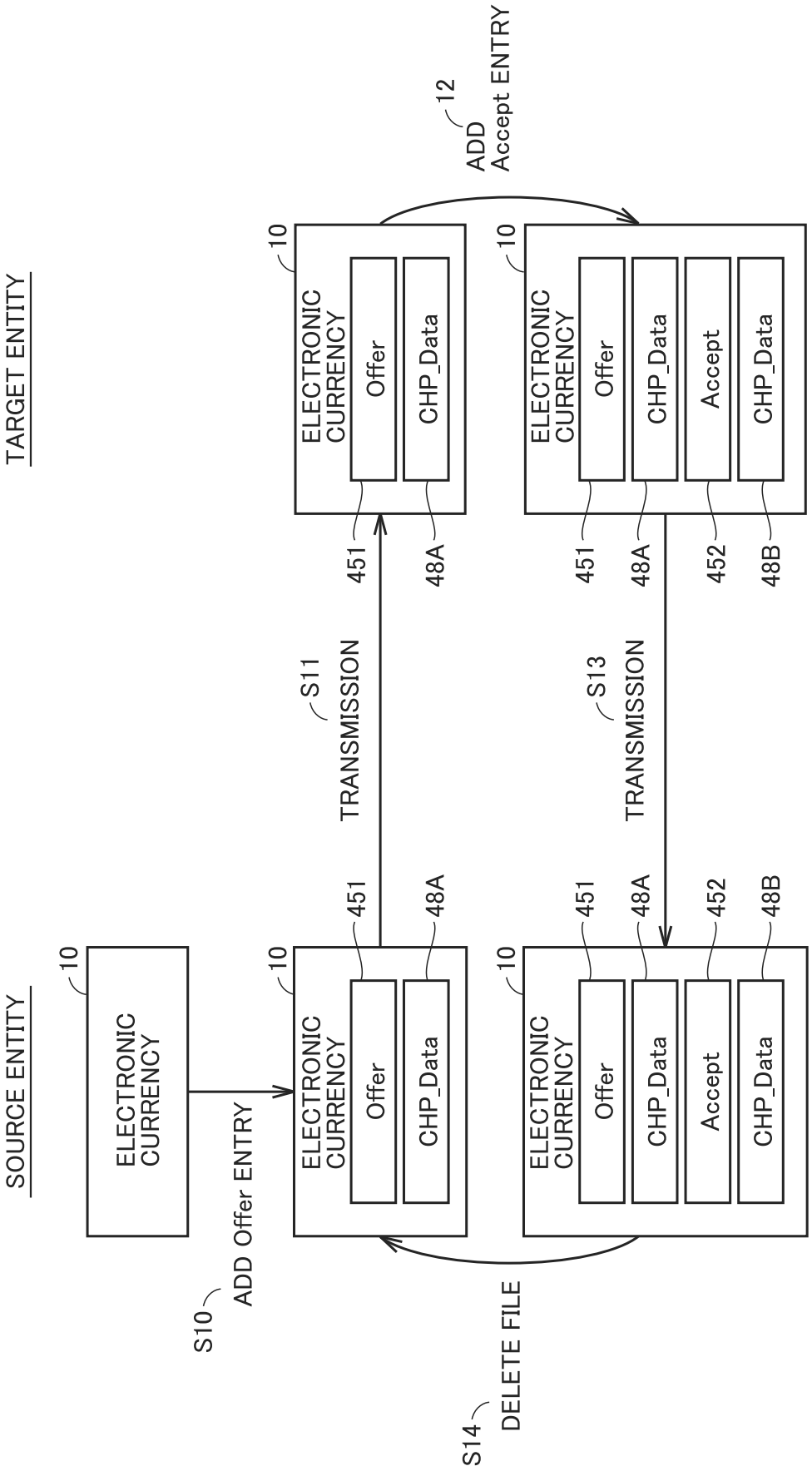

SOURCE ENTITY
TARGET ENTITY
ELECTRONIC CURRENCY
10
Offer
CHP_Data
Accept
451
48A
452
48B
S10
ADD Offer ENTRY
S11
TRANSMISSION
S13
TRANSMISSION
12
ADD Accept ENTRY
S14
DELETE FILE

FIG.12

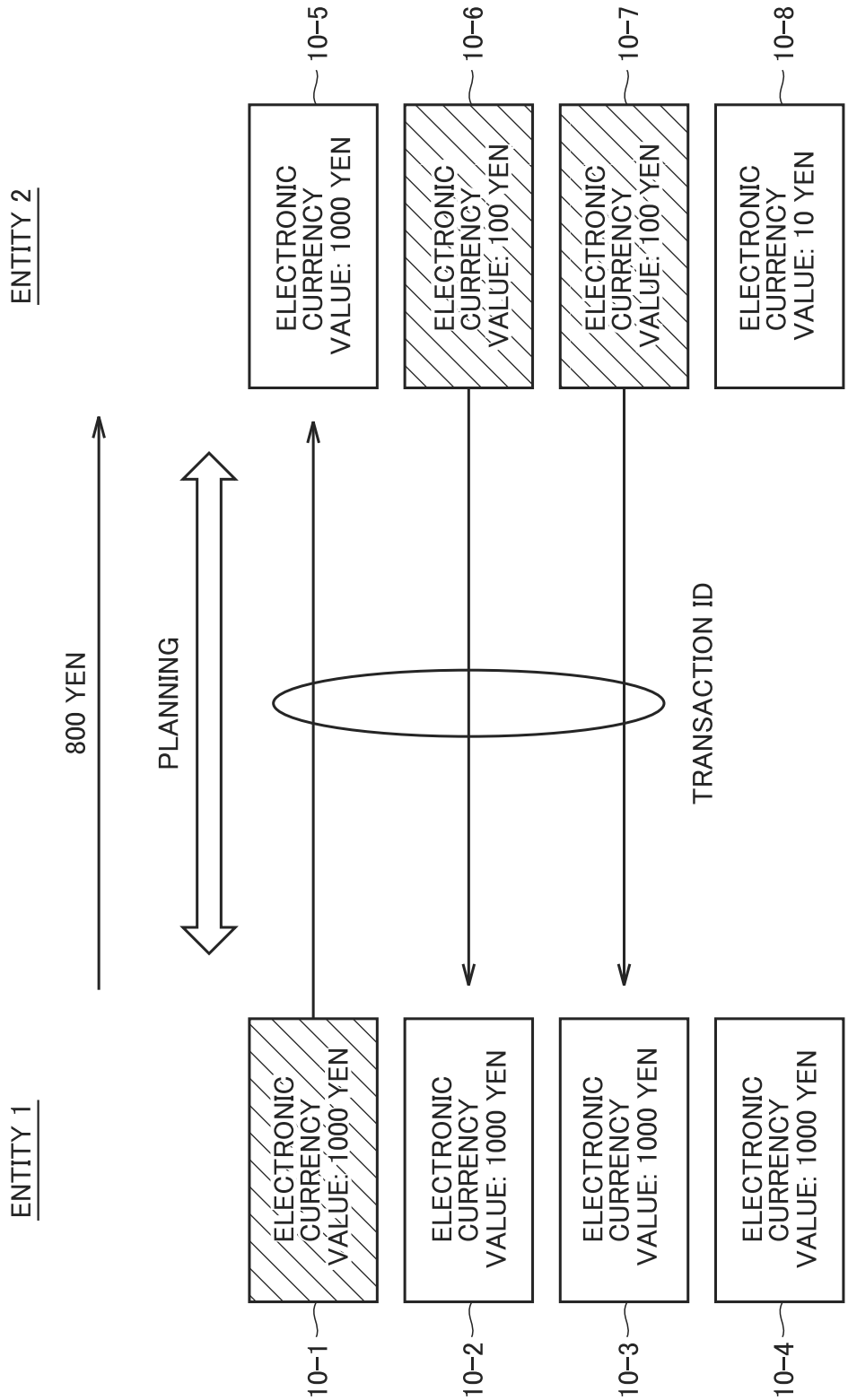

ENTITY 1
ENTITY 2
800 YEN
PLANNING
TRANSACTION ID
ELECTRONIC CURRENCY VALUE: 1000 YEN
ELECTRONIC CURRENCY VALUE: 1000 YEN
ELECTRONIC CURRENCY VALUE: 1000 YEN
ELECTRONIC CURRENCY VALUE: 1000 YEN
ELECTRONIC CURRENCY VALUE: 1000 YEN
ELECTRONIC CURRENCY VALUE: 100 YEN
ELECTRONIC CURRENCY VALUE: 100 YEN
ELECTRONIC CURRENCY VALUE: 10 YEN
10-1
10-2
10-3
10-4
10-5
10-6
10-7
10-8

FIG.13

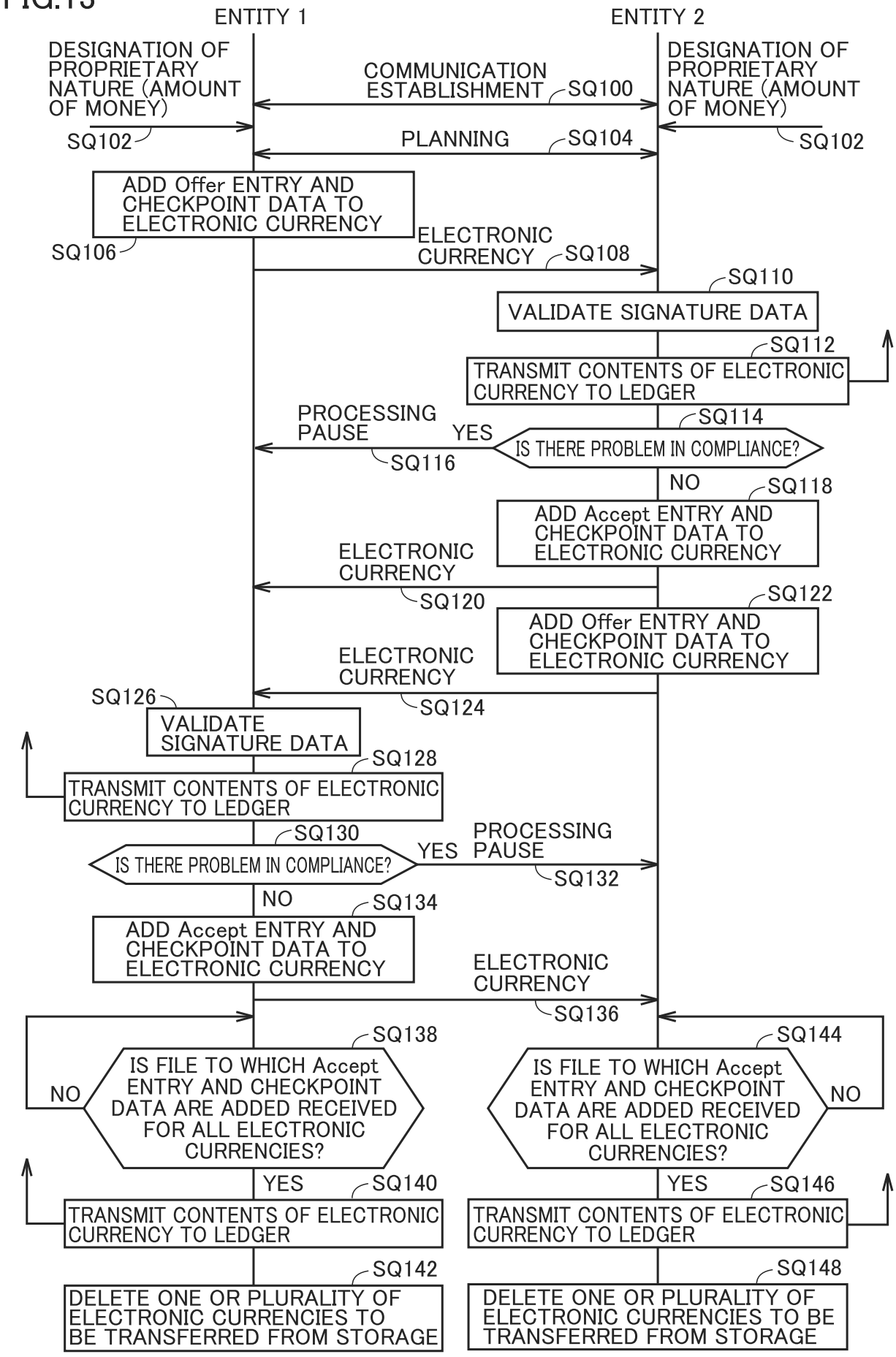

ENTITY 1
ENTITY 2
DESIGNATION OF PROPRIETARY NATURE (AMOUNT OF MONEY)
COMMUNICATION ESTABLISHMENT
SQ100
DESIGNATION OF PROPRIETARY NATURE (AMOUNT OF MONEY)
SQ102
PLANNING
SQ104
SQ102
ADD Offer ENTRY AND CHECKPOINT DATA TO ELECTRONIC CURRENCY
SQ106
ELECTRONIC CURRENCY
SQ108
SQ110
VALIDATE SIGNATURE DATA
SQ112
TRANSMIT CONTENTS OF ELECTRONIC CURRENCY TO LEDGER
PROCESSING PAUSE
YES
SQ114
IS THERE PROBLEM IN COMPLIANCE?
SQ116
NO
SQ118
ADD Accept ENTRY AND CHECKPOINT DATA TO ELECTRONIC CURRENCY
ELECTRONIC CURRENCY
SQ120
SQ122
ADD Offer ENTRY AND CHECKPOINT DATA TO ELECTRONIC CURRENCY
ELECTRONIC CURRENCY
SQ124
SQ126
VALIDATE SIGNATURE DATA
SQ128
TRANSMIT CONTENTS OF ELECTRONIC CURRENCY TO LEDGER
SQ130
IS THERE PROBLEM IN COMPLIANCE?
YES
PROCESSING PAUSE
SQ132
NO
SQ134
ADD Accept ENTRY AND CHECKPOINT DATA TO ELECTRONIC CURRENCY
ELECTRONIC CURRENCY
SQ136
SQ138
IS FILE TO WHICH Accept ENTRY AND CHECKPOINT DATA ARE ADDED RECEIVED FOR ALL ELECTRONIC CURRENCIES?
NO
SQ144
IS FILE TO WHICH Accept ENTRY AND CHECKPOINT DATA ARE ADDED RECEIVED FOR ALL ELECTRONIC CURRENCIES?
NO
YES
SQ140
TRANSMIT CONTENTS OF ELECTRONIC CURRENCY TO LEDGER
YES
SQ146
TRANSMIT CONTENTS OF ELECTRONIC CURRENCY TO LEDGER
SQ142
DELETE ONE OR PLURALITY OF ELECTRONIC CURRENCIES TO BE TRANSFERRED FROM STORAGE
SQ148
DELETE ONE OR PLURALITY OF ELECTRONIC CURRENCIES TO BE TRANSFERRED FROM STORAGE

FIG.14

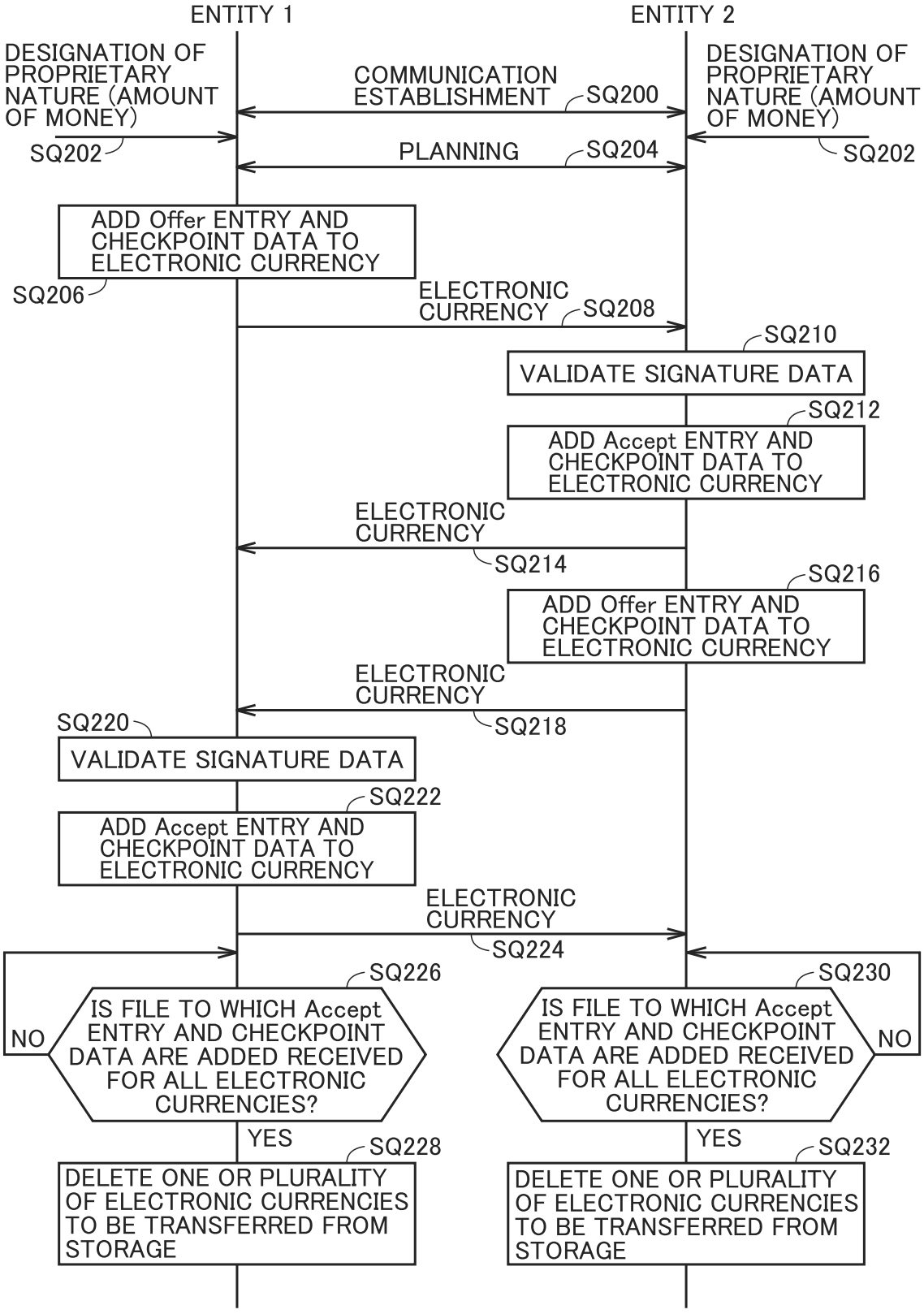

ENTITY 1
ENTITY 2
DESIGNATION OF PROPRIETARY NATURE (AMOUNT OF MONEY)
SQ202
COMMUNICATION ESTABLISHMENT
SQ200
PLANNING
SQ204
DESIGNATION OF PROPRIETARY NATURE (AMOUNT OF MONEY)
SQ202
ADD Offer ENTRY AND CHECKPOINT DATA TO ELECTRONIC CURRENCY
SQ206
ELECTRONIC CURRENCY
SQ208
SQ210
VALIDATE SIGNATURE DATA
SQ212
ADD Accept ENTRY AND CHECKPOINT DATA TO ELECTRONIC CURRENCY
ELECTRONIC CURRENCY
SQ214
SQ216
ADD Offer ENTRY AND CHECKPOINT DATA TO ELECTRONIC CURRENCY
ELECTRONIC CURRENCY
SQ218
SQ220
VALIDATE SIGNATURE DATA
SQ222
ADD Accept ENTRY AND CHECKPOINT DATA TO ELECTRONIC CURRENCY
ELECTRONIC CURRENCY
SQ224
SQ226
IS FILE TO WHICH Accept ENTRY AND CHECKPOINT DATA ARE ADDED RECEIVED FOR ALL ELECTRONIC CURRENCIES?
NO
YES
SQ228
DELETE ONE OR PLURALITY OF ELECTRONIC CURRENCIES TO BE TRANSFERRED FROM STORAGE
SQ230
IS FILE TO WHICH Accept ENTRY AND CHECKPOINT DATA ARE ADDED RECEIVED FOR ALL ELECTRONIC CURRENCIES?
NO
YES
SQ232
DELETE ONE OR PLURALITY OF ELECTRONIC CURRENCIES TO BE TRANSFERRED FROM STORAGE

FIG.15

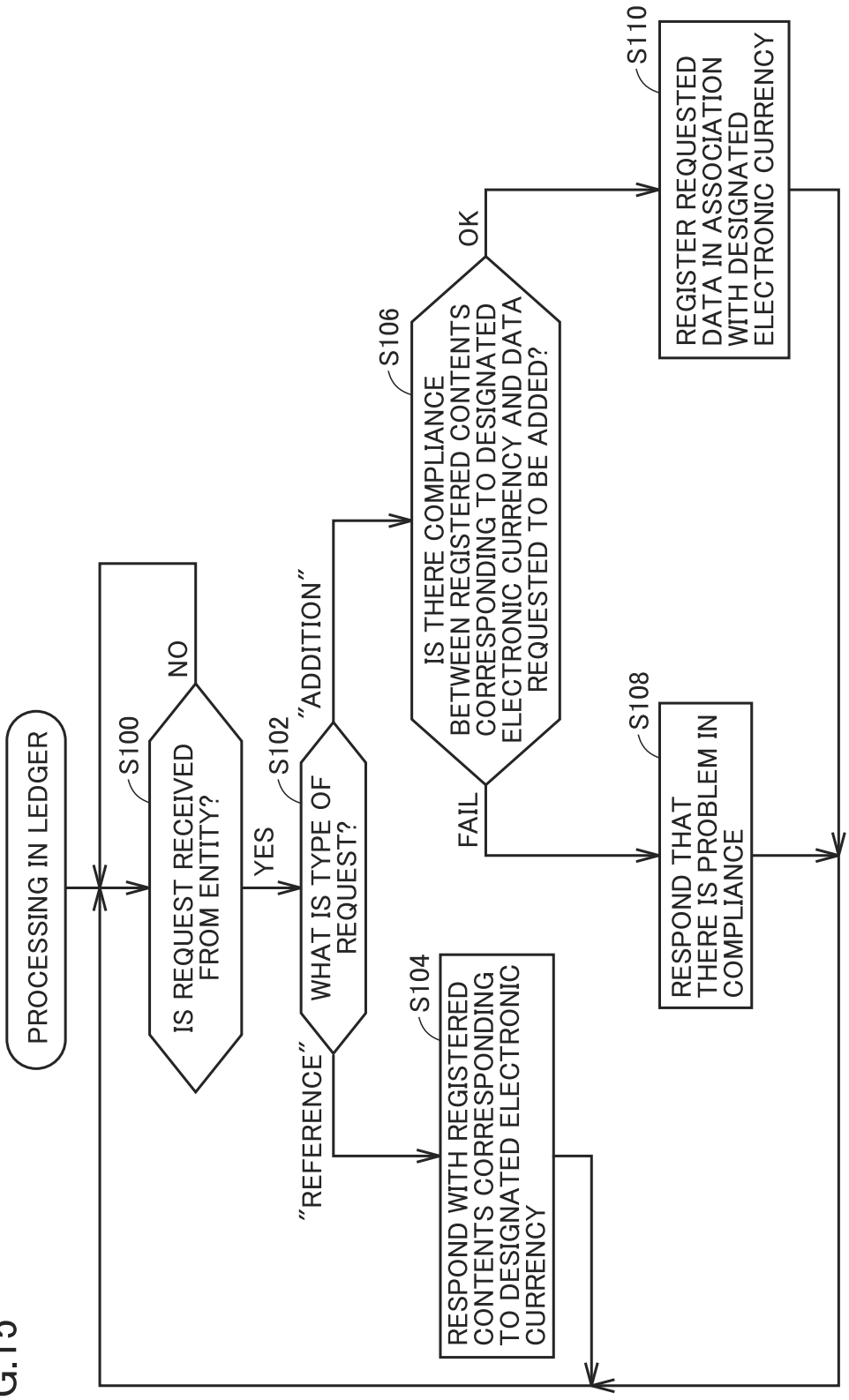
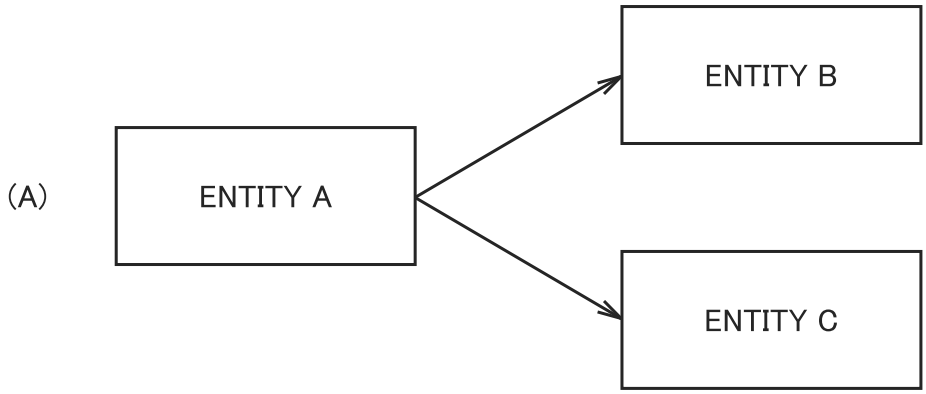
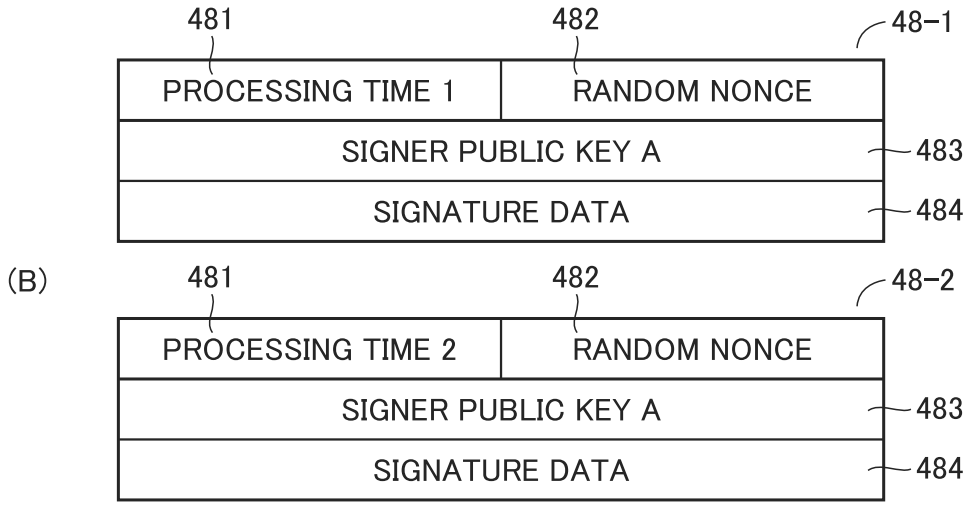

PROCESSING IN LEDGER
S100
IS REQUEST RECEIVED FROM ENTITY?
NO
YES
S102
WHAT IS TYPE OF REQUEST?
"REFERENCE"
"ADDITION"
S104
RESPOND WITH REGISTERED CONTENTS CORRESPONDING TO DESIGNATED ELECTRONIC CURRENCY
S106
IS THERE COMPLIANCE BETWEEN REGISTERED CONTENTS CORRESPONDING TO DESIGNATED ELECTRONIC CURRENCY AND DATA REQUESTED TO BE ADDED?
OK
FAIL
S108
RESPOND THAT THERE IS PROBLEM IN COMPLIANCE
S110
REGISTER REQUESTED DATA IN ASSOCIATION WITH DESIGNATED ELECTRONIC CURRENCY

FIG.16


(A)
ENTITY A
ENTITY B
ENTITY C


481
482
48-1
PROCESSING TIME 1
RANDOM NONCE
SIGNER PUBLIC KEY A
483
SIGNATURE DATA
484
(B)
481
482
48-2
PROCESSING TIME 2
RANDOM NONCE
SIGNER PUBLIC KEY A
483
SIGNATURE DATA
484