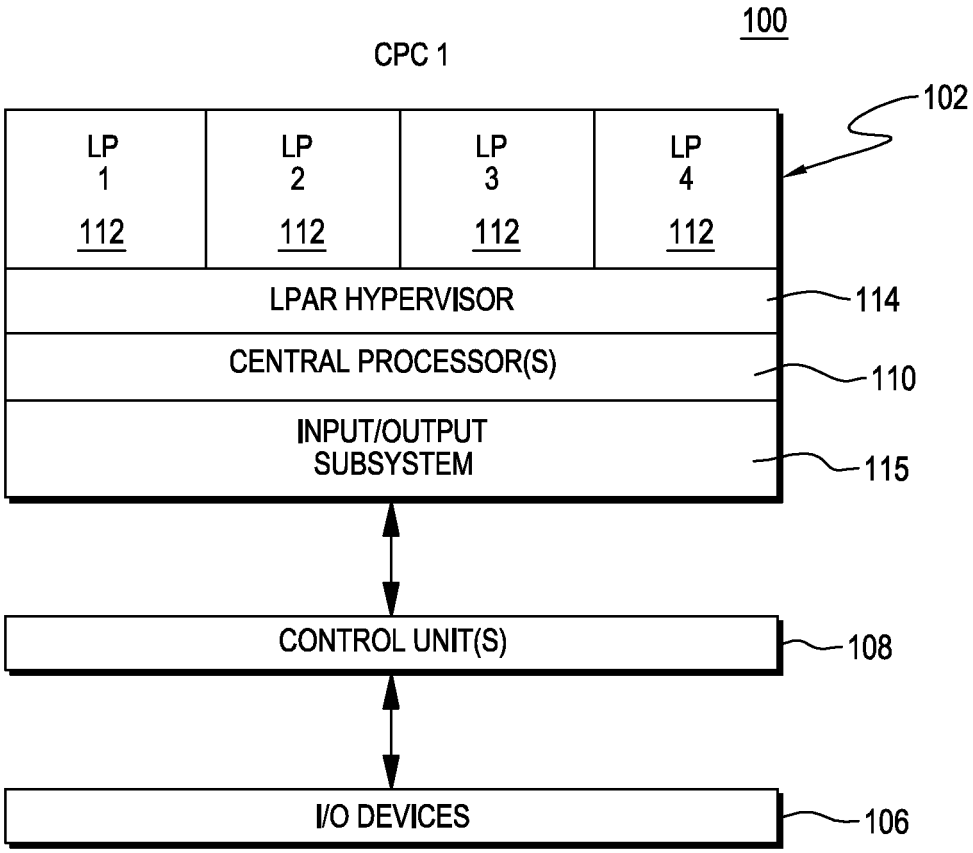
100
CPC 1
102
LP 1
112
LP 2
112
LP 3
112
LP 4
112
LPAR HYPERVISOR
114
CENTRAL PROCESSOR(S)
110
INPUT/OUTPUT SUBSYSTEM
115
CONTROL UNIT(S)
108
I/O DEVICES
106

FIG. 1

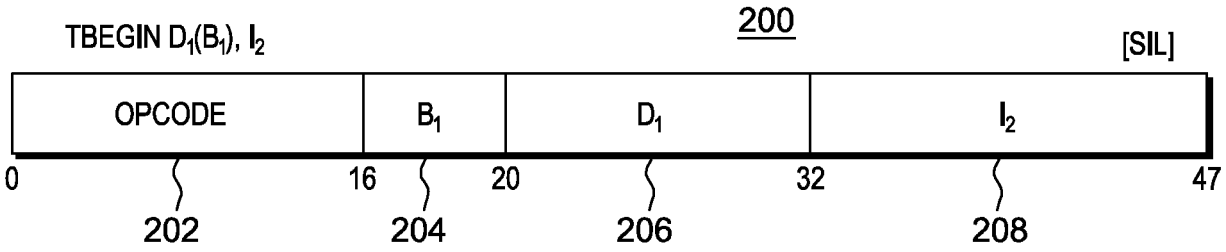

FIG. 2A

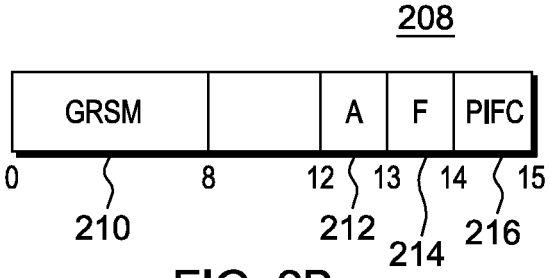

FIG. 2B

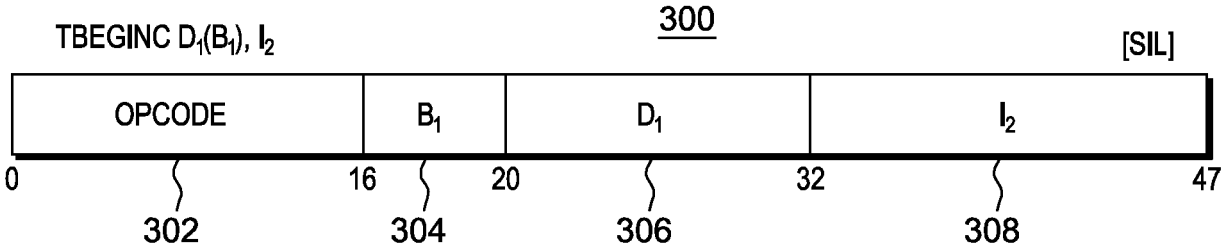

FIG. 3A

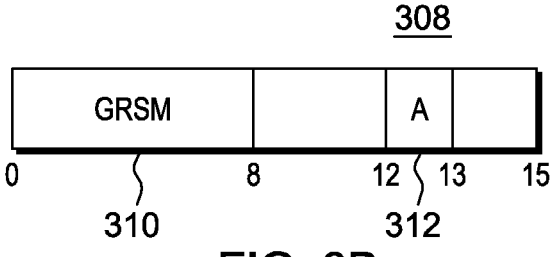

FIG. 3B

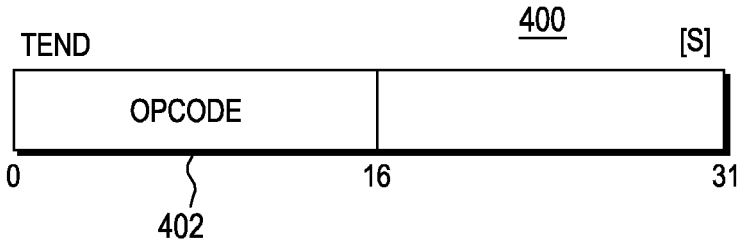
400
TEND
[S]
OPCODE
0
16
31
402

FIG. 4

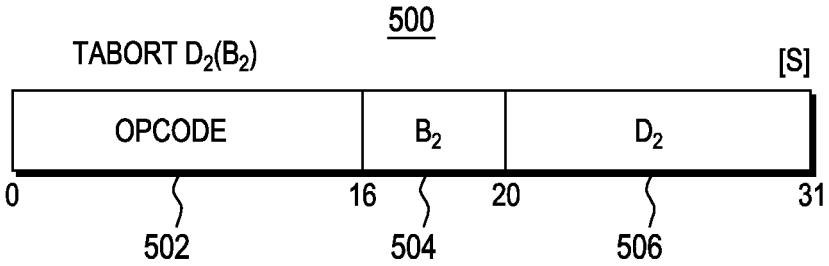
500
TABORT $D_2(B_2)$
[S]
OPCODE
B_2
D_2
0
16
20
31
502
504
506

FIG. 5

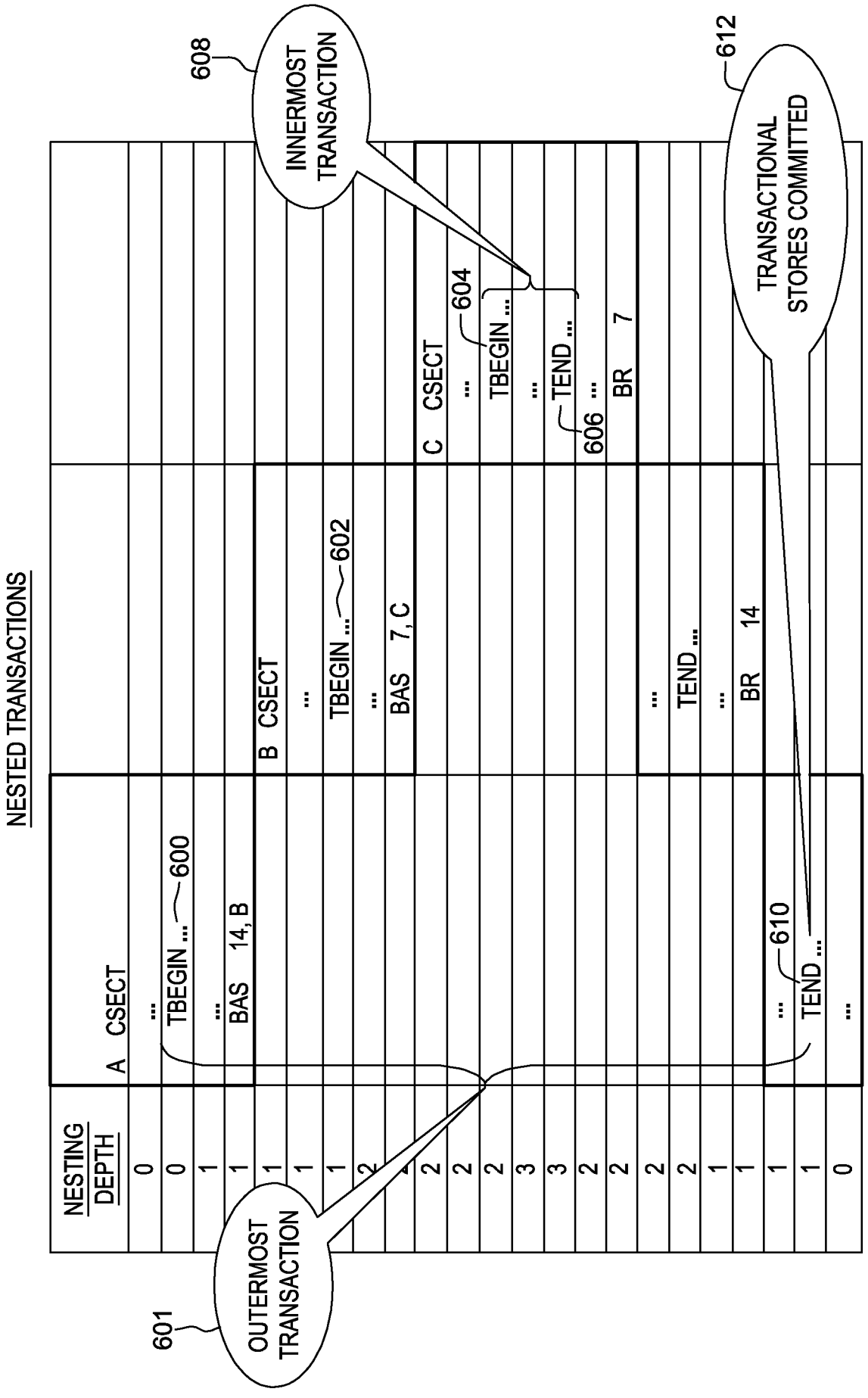
NESTED TRANSACTIONS
NESTING DEPTH
A CSECT
TBEGIN ...
600
BAS 14, B
B CSECT
TBEGIN ...
602
BAS 7, C
C CSECT
TBEGIN ...
604
TEND ...
606
BR 7
TEND ...
BR 14
TEND ...
610
601
OUTERMOST TRANSACTION
608
INNERMOST TRANSACTION
612
TRANSACTIONAL STORES COMMITTED

FIG. 6

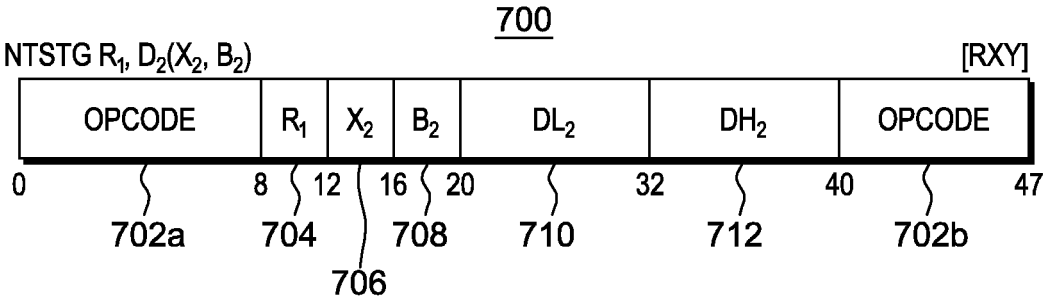
700
NTSTG R1, D2(X2, B2)
[RXY]
OPCODE
R1
X2
B2
DL2
DH2
OPCODE
0
8
12
16
20
32
40
47
702a
704
706
708
710
712
702b

FIG. 7

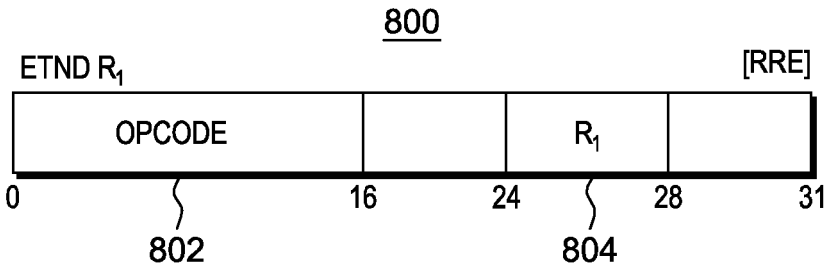
800
ETND R1
[RRE]
OPCODE
R1
0
16
24
28
31
802
804

FIG. 8

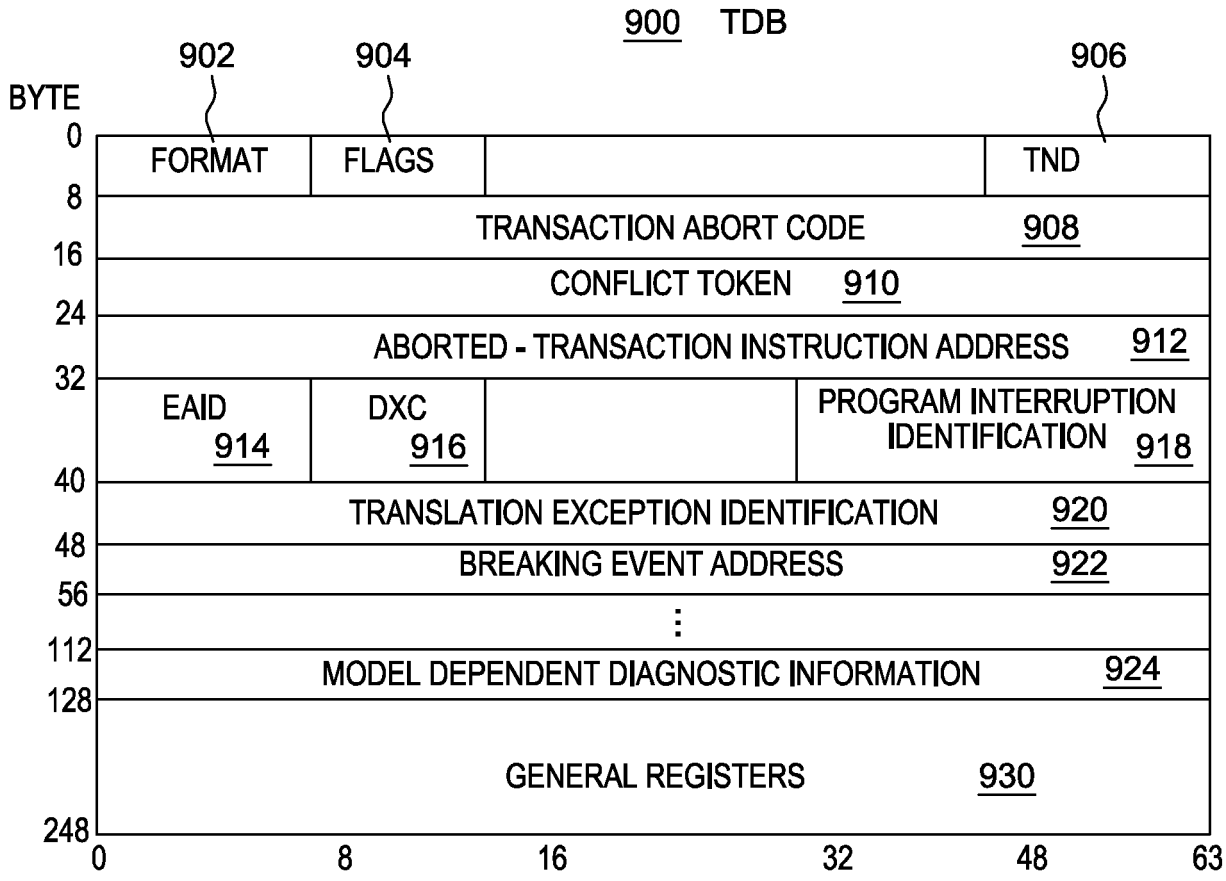
900 TDB
902
904
906
BYTE
0
8
16
24
32
40
48
56
112
128
248
FORMAT
FLAGS
TND
TRANSACTION ABORT CODE 908
CONFLICT TOKEN 910
ABORTED - TRANSACTION INSTRUCTION ADDRESS 912
EAID 914
DXC 916
PROGRAM INTERRUPTION IDENTIFICATION 918
TRANSLATION EXCEPTION IDENTIFICATION 920
BREAKING EVENT ADDRESS 922
MODEL DEPENDENT DIAGNOSTIC INFORMATION 924
GENERAL REGISTERS 930
0
8
16
32
48
63

FIG. 9

CODE	REASON FOR ABORT	CC SET
2	EXTERNAL INTERRUPTION	2
4	PROGRAM INTERRUPTION (UNFILTERED)	2 OR 3 +
5	MACHINE - CHECK INTERRUPTION	2
6	I/O INTERRUPTION	2
7	FETCH OVERFLOW	2 OR 3
8	STORE OVERFLOW	2 OR 3
9	FETCH CONFLICT	2
10	STORE CONFLICT	2
11	RESTRICTED INSTRUCTION	3
12	PROGRAM EXCEPTION CONDITION (FILTERED)	3
13	NESTING DEPTH EXCEEDED	3
14	CACHE FETCH RELATED	2 OR 3
15	CACHE STORE RELATED	2 OR 3
16	CACHE OTHER	2 OR 3
255	MISCELLANEOUS CONDITION	2 OR 3
>255	TABORT INSTRUCTION	2 OR 3
‡	CANNOT BE DETERMINED; NO TDB STORED	1

EXPLANATION:

\+ CONDITION CODE IS BASED ON INTERRUPTION CODE

‡ THIS SITUATION OCCURS WHEN A TRANSACTION ABORTS, BUT THE TDB HAS BECOME INACCESSIBLE SUBSEQUENT TO THE SUCCESSFUL EXECUTION OF THE OUTERMOST TBEGIN INSTRUCTION. NO TBEGIN SPECIFIED TDB IS STORED, AND THE CONDITION CODE IS SET TO 1.

FIG. 10

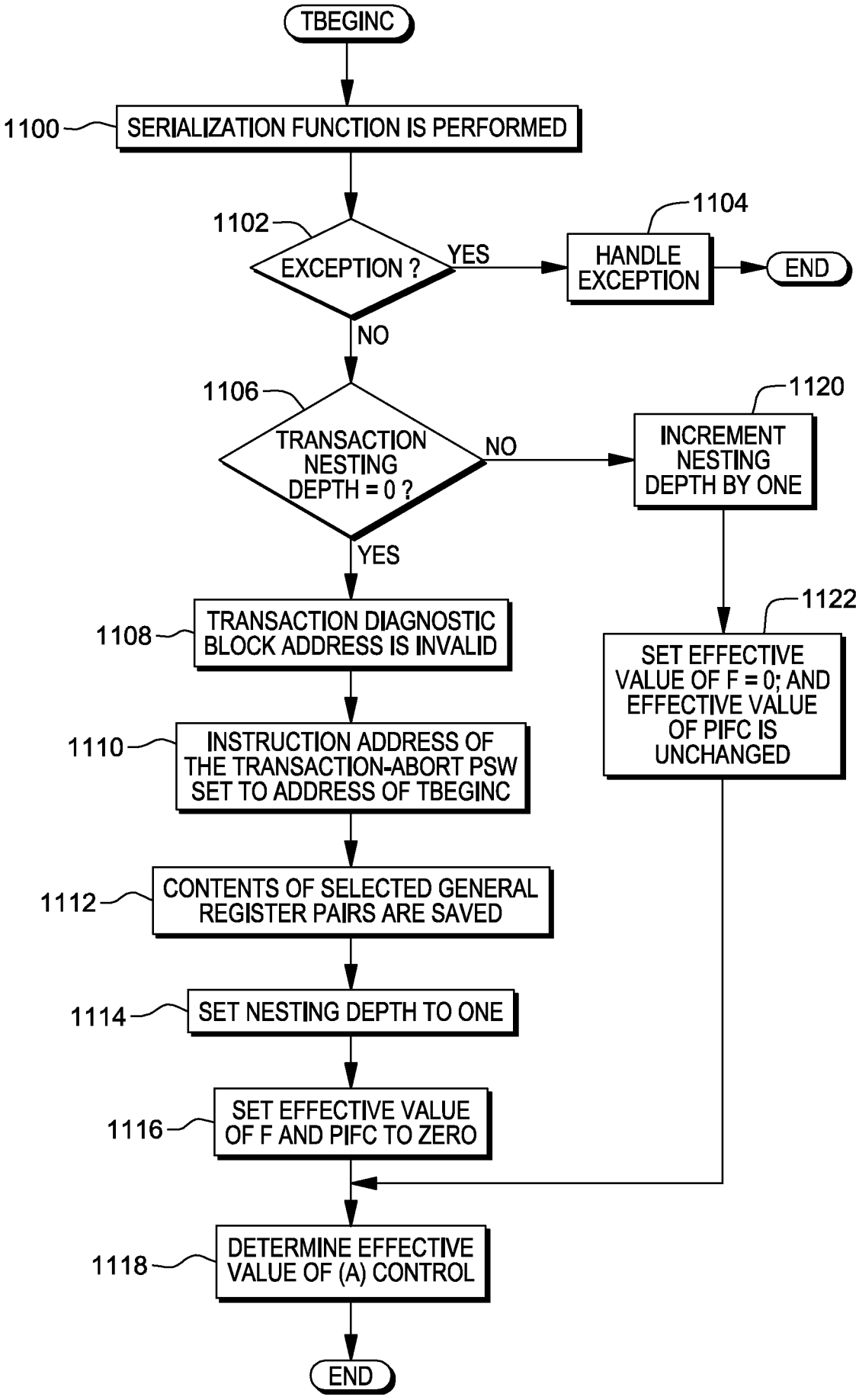
TBEGINC
1100
SERIALIZATION FUNCTION IS PERFORMED
1102
EXCEPTION ?
YES
1104
HANDLE EXCEPTION
END
NO
1106
TRANSACTION NESTING DEPTH = 0 ?
NO
1120
INCREMENT NESTING DEPTH BY ONE
YES
1108
TRANSACTION DIAGNOSTIC BLOCK ADDRESS IS INVALID
1122
SET EFFECTIVE VALUE OF F = 0; AND EFFECTIVE VALUE OF PIFC IS UNCHANGED
1110
INSTRUCTION ADDRESS OF THE TRANSACTION-ABORT PSW SET TO ADDRESS OF TBEGINC
1112
CONTENTS OF SELECTED GENERAL REGISTER PAIRS ARE SAVED
1114
SET NESTING DEPTH TO ONE
1116
SET EFFECTIVE VALUE OF F AND PIFC TO ZERO
1118
DETERMINE EFFECTIVE VALUE OF (A) CONTROL
END

FIG. 11

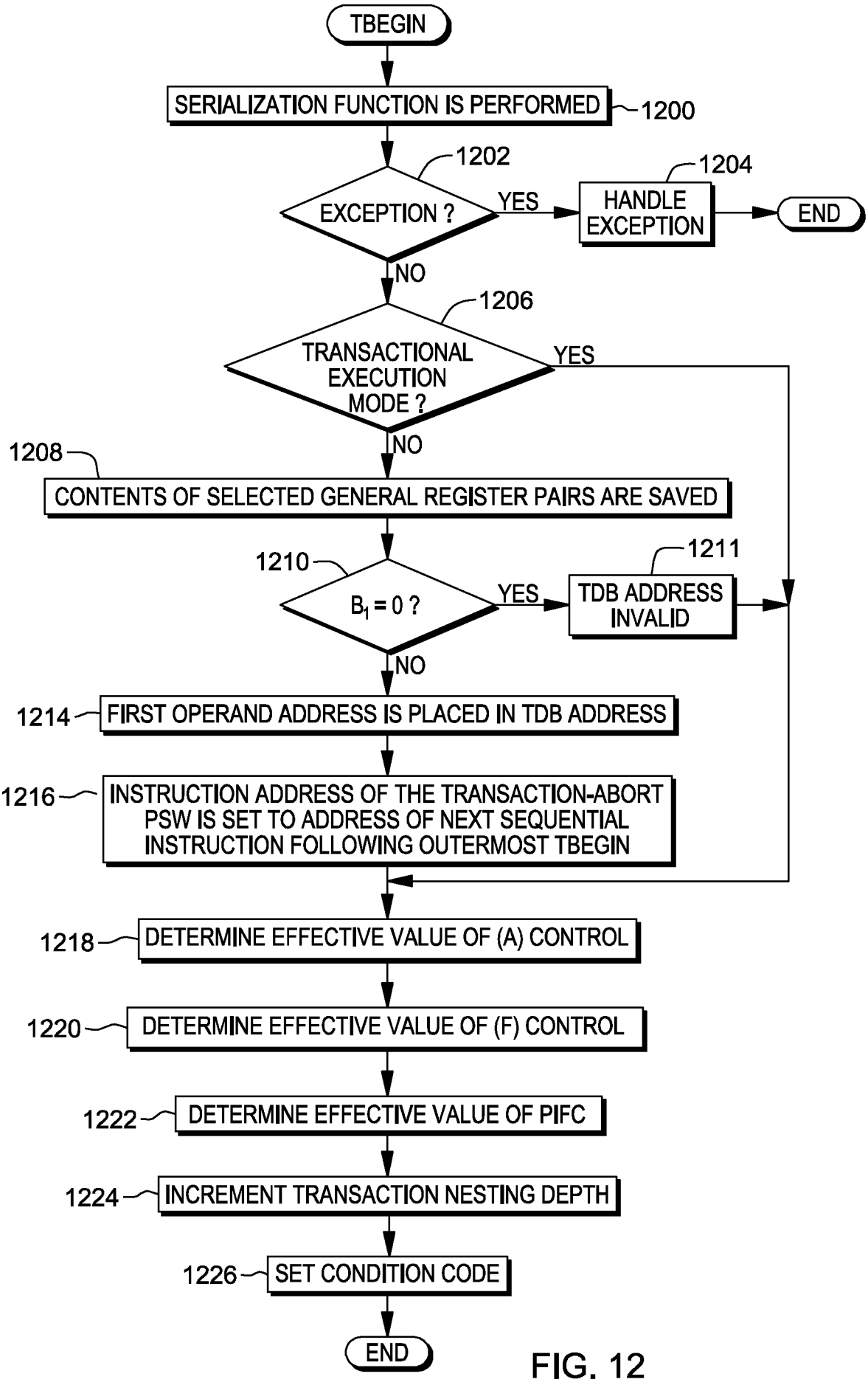
TBEGIN
SERIALIZATION FUNCTION IS PERFORMED
1200
1202
EXCEPTION ?
YES
1204
HANDLE EXCEPTION
END
NO
1206
TRANSACTIONAL EXECUTION MODE ?
YES
NO
1208
CONTENTS OF SELECTED GENERAL REGISTER PAIRS ARE SAVED
1210
$B_1 = 0$?
YES
1211
TDB ADDRESS INVALID
NO
1214
FIRST OPERAND ADDRESS IS PLACED IN TDB ADDRESS
1216
INSTRUCTION ADDRESS OF THE TRANSACTION-ABORT PSW IS SET TO ADDRESS OF NEXT SEQUENTIAL INSTRUCTION FOLLOWING OUTERMOST TBEGIN
1218
DETERMINE EFFECTIVE VALUE OF (A) CONTROL
1220
DETERMINE EFFECTIVE VALUE OF (F) CONTROL
1222
DETERMINE EFFECTIVE VALUE OF PIFC
1224
INCREMENT TRANSACTION NESTING DEPTH
1226
SET CONDITION CODE
END

FIG. 12

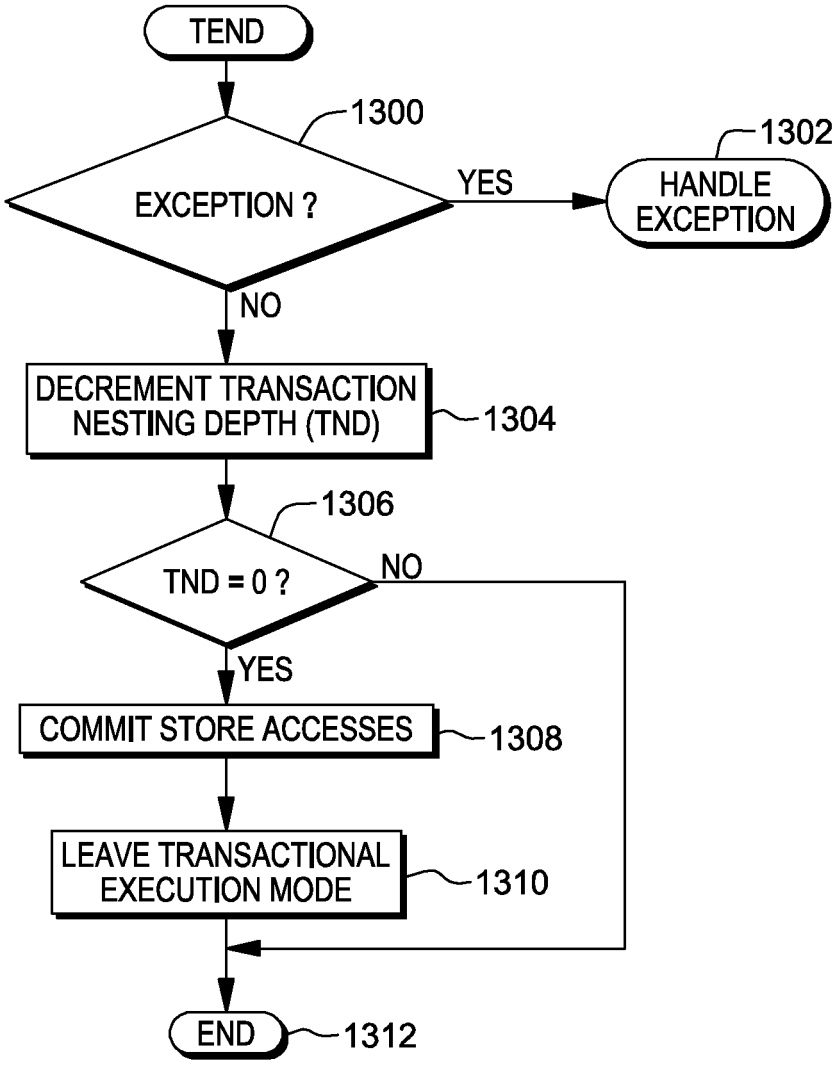
TEND
1300
EXCEPTION ?
YES
1302
HANDLE EXCEPTION
NO
DECREMENT TRANSACTION NESTING DEPTH (TND)
1304
1306
TND = 0 ?
NO
YES
COMMIT STORE ACCESSES
1308
LEAVE TRANSACTIONAL EXECUTION MODE
1310
END
1312

FIG. 13

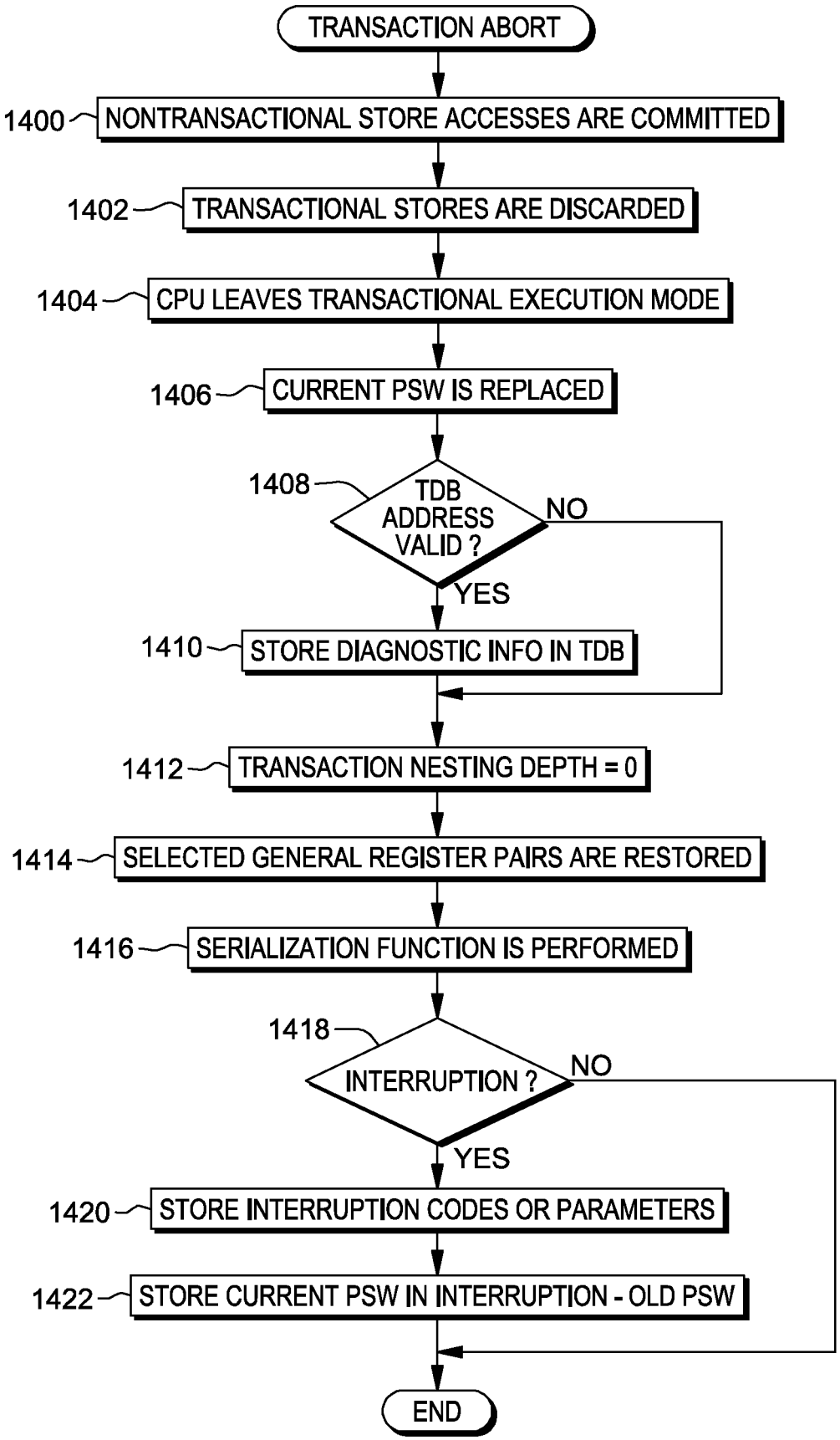
TRANSACTION ABORT
1400
NONTRANSACTIONAL STORE ACCESSES ARE COMMITTED
1402
TRANSACTIONAL STORES ARE DISCARDED
1404
CPU LEAVES TRANSACTIONAL EXECUTION MODE
1406
CURRENT PSW IS REPLACED
1408
TDB ADDRESS VALID ?
NO
YES
1410
STORE DIAGNOSTIC INFO IN TDB
1412
TRANSACTION NESTING DEPTH = 0
1414
SELECTED GENERAL REGISTER PAIRS ARE RESTORED
1416
SERIALIZATION FUNCTION IS PERFORMED
1418
INTERRUPTION ?
NO
YES
1420
STORE INTERRUPTION CODES OR PARAMETERS
1422
STORE CURRENT PSW IN INTERRUPTION - OLD PSW
END

FIG. 14

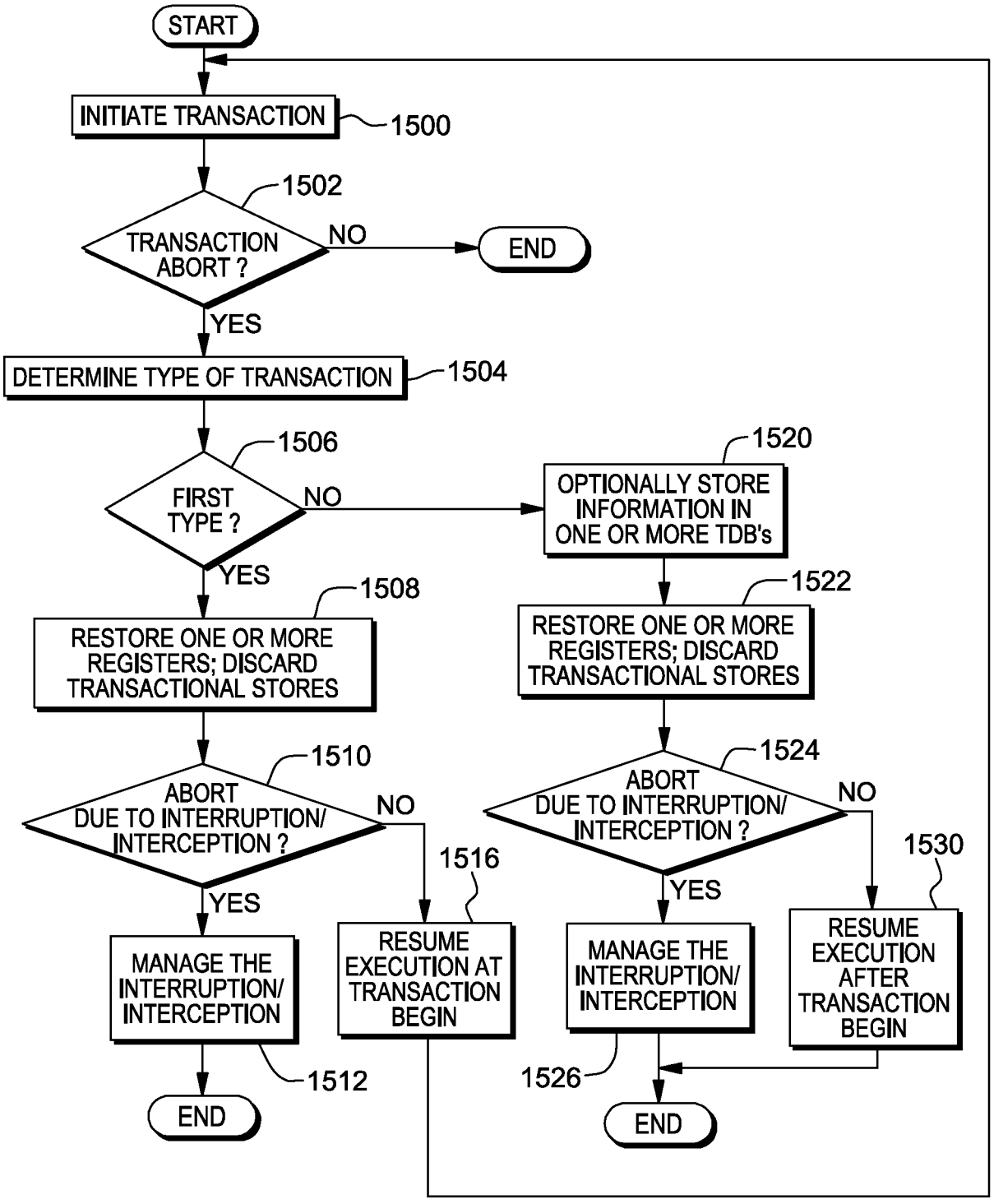
START
INITIATE TRANSACTION
1500
1502
TRANSACTION ABORT ?
NO
END
YES
DETERMINE TYPE OF TRANSACTION
1504
1506
FIRST TYPE ?
NO
YES
1508
RESTORE ONE OR MORE REGISTERS; DISCARD TRANSACTIONAL STORES
1510
ABORT DUE TO INTERRUPTION/ INTERCEPTION ?
NO
YES
MANAGE THE INTERRUPTION/ INTERCEPTION
1512
END
1516
RESUME EXECUTION AT TRANSACTION BEGIN
1520
OPTIONALLY STORE INFORMATION IN ONE OR MORE TDB's
1522
RESTORE ONE OR MORE REGISTERS; DISCARD TRANSACTIONAL STORES
1524
ABORT DUE TO INTERRUPTION/ INTERCEPTION ?
NO
YES
MANAGE THE INTERRUPTION/ INTERCEPTION
1526
END
1530
RESUME EXECUTION AFTER TRANSACTION BEGIN

FIG. 15A

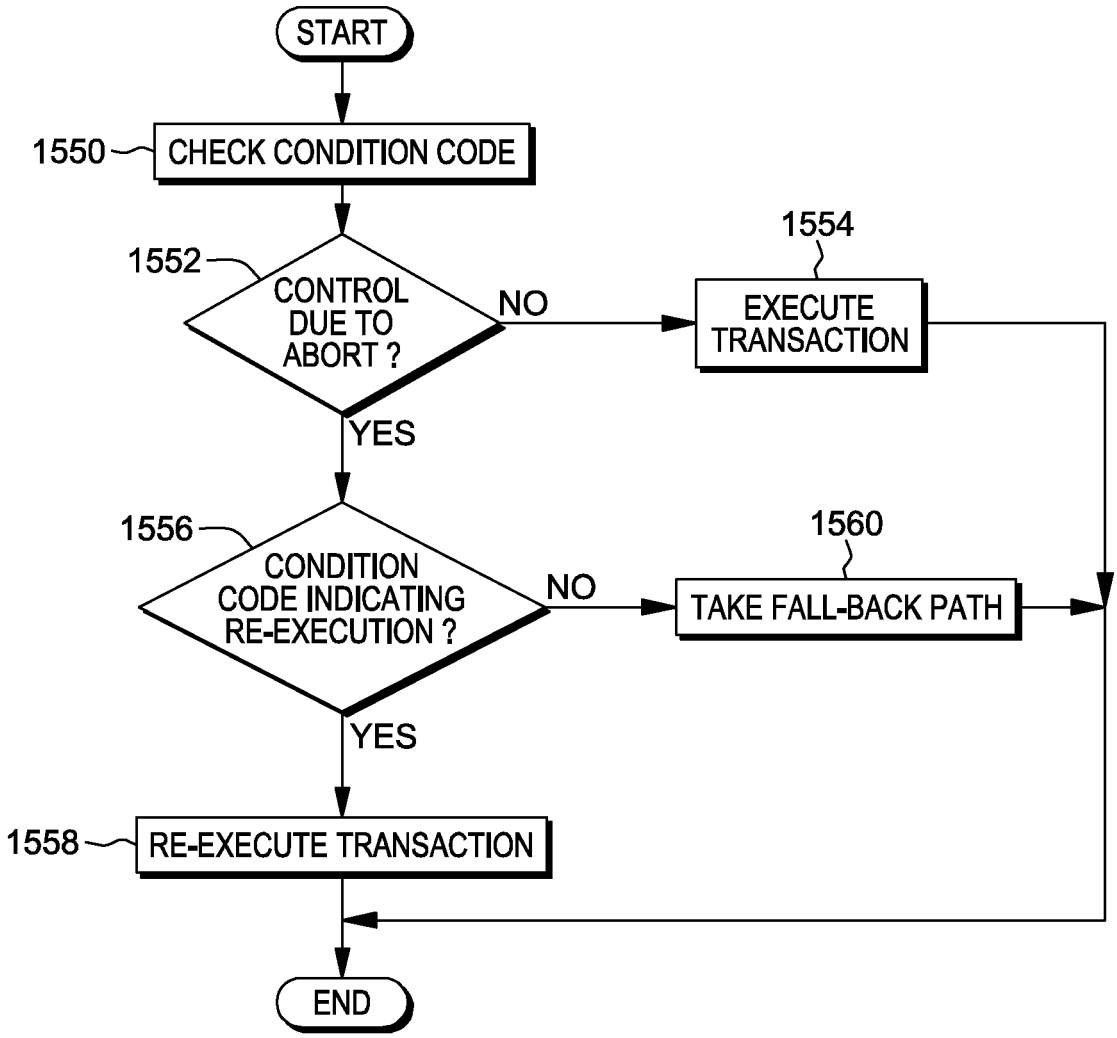
START
1550
CHECK CONDITION CODE
1552
CONTROL DUE TO ABORT ?
NO
1554
EXECUTE TRANSACTION
YES
1556
CONDITION CODE INDICATING RE-EXECUTION ?
NO
1560
TAKE FALL-BACK PATH
YES
1558
RE-EXECUTE TRANSACTION
END

FIG. 15B

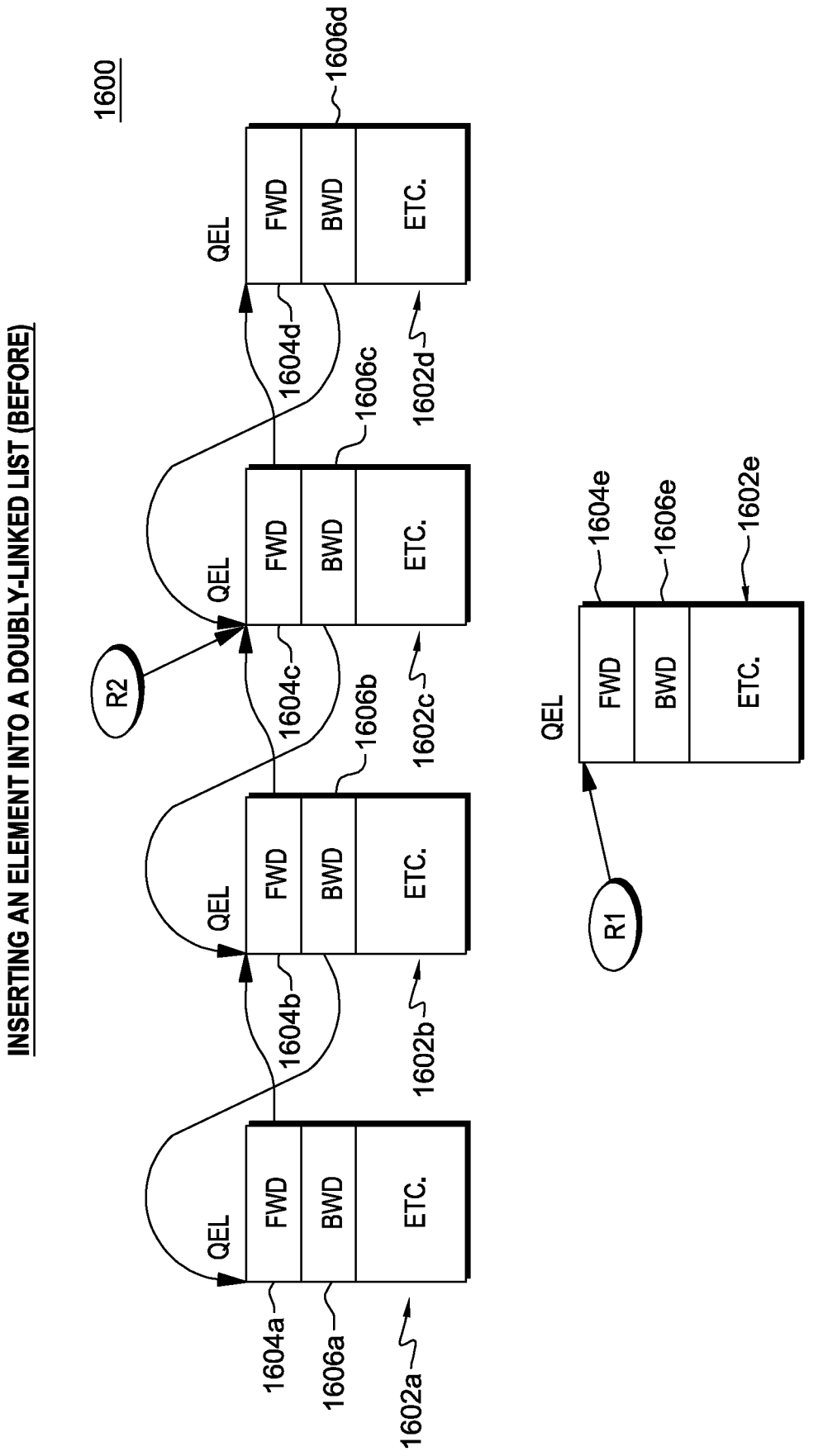
INSERTING AN ELEMENT INTO A DOUBLY-LINKED LIST (BEFORE)
1600
QEL
FWD
BWD
ETC.
1604a
1606a
1602a
1604b
1606b
1602b
1604c
1606c
1602c
1604d
1606d
1602d
R2
1604e
1606e
1602e
R1

FIG. 16A

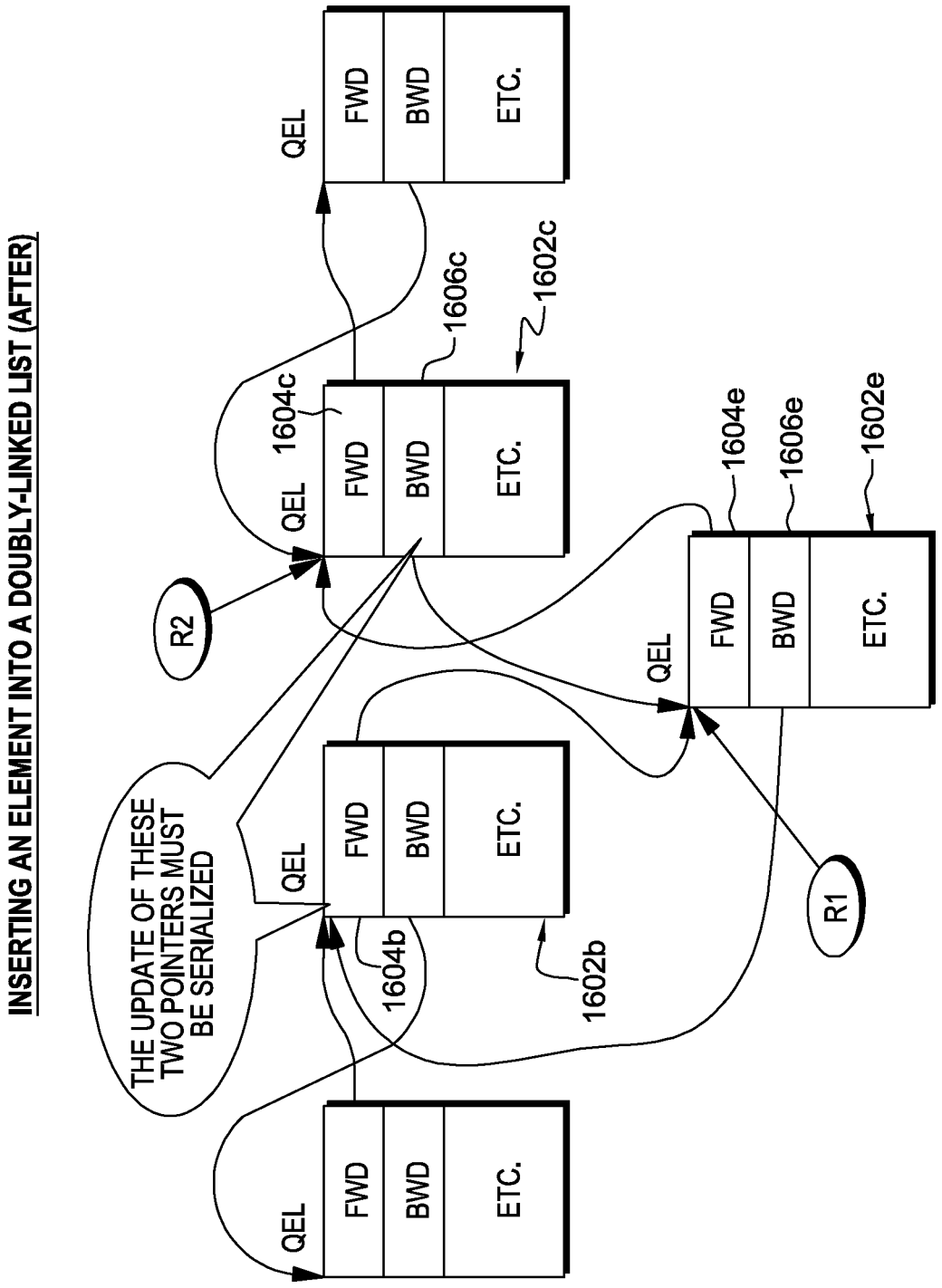
INSERTING AN ELEMENT INTO A DOUBLY-LINKED LIST (AFTER)
QEL
FWD
BWD
ETC.
1604c
1606c
1602c
R2
1604e
1606e
1602e
R1
THE UPDATE OF THESE TWO POINTERS MUST BE SERIALIZED
1604b
1602b

FIG. 16B

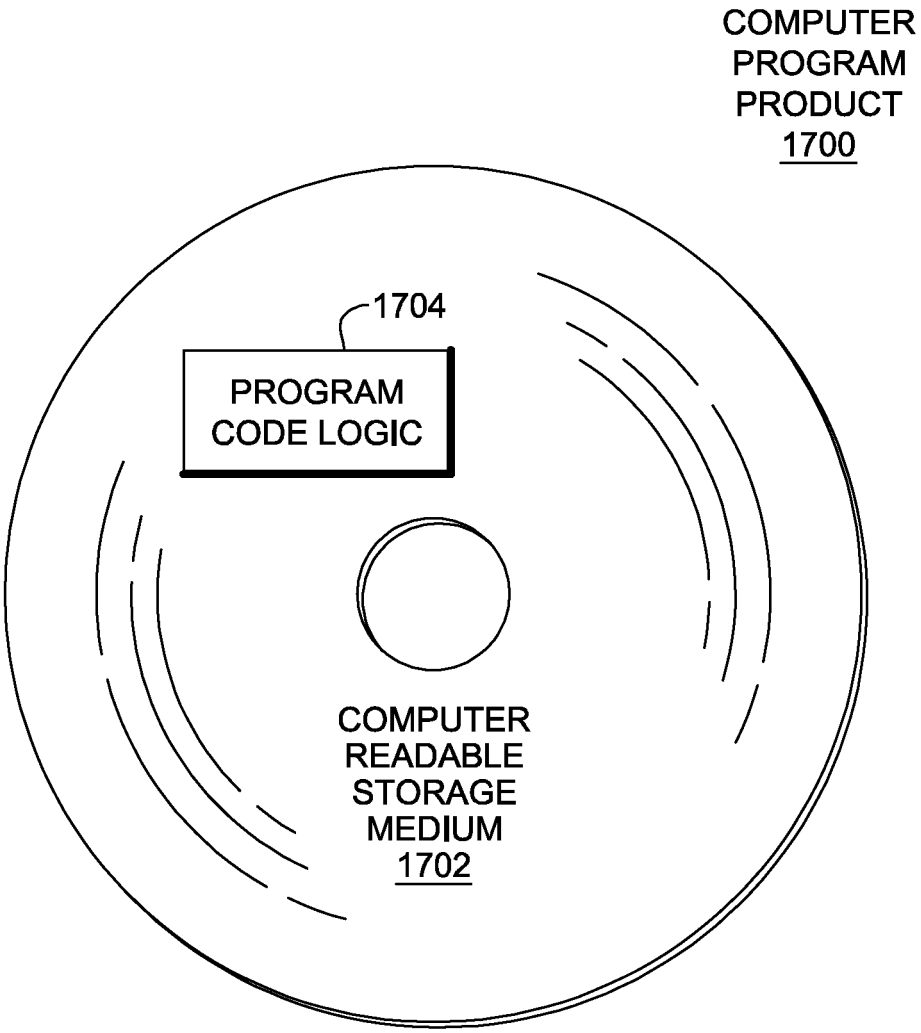
COMPUTER
PROGRAM
PRODUCT
1700
1704
PROGRAM
CODE LOGIC
COMPUTER
READABLE
STORAGE
MEDIUM
1702

FIG. 17

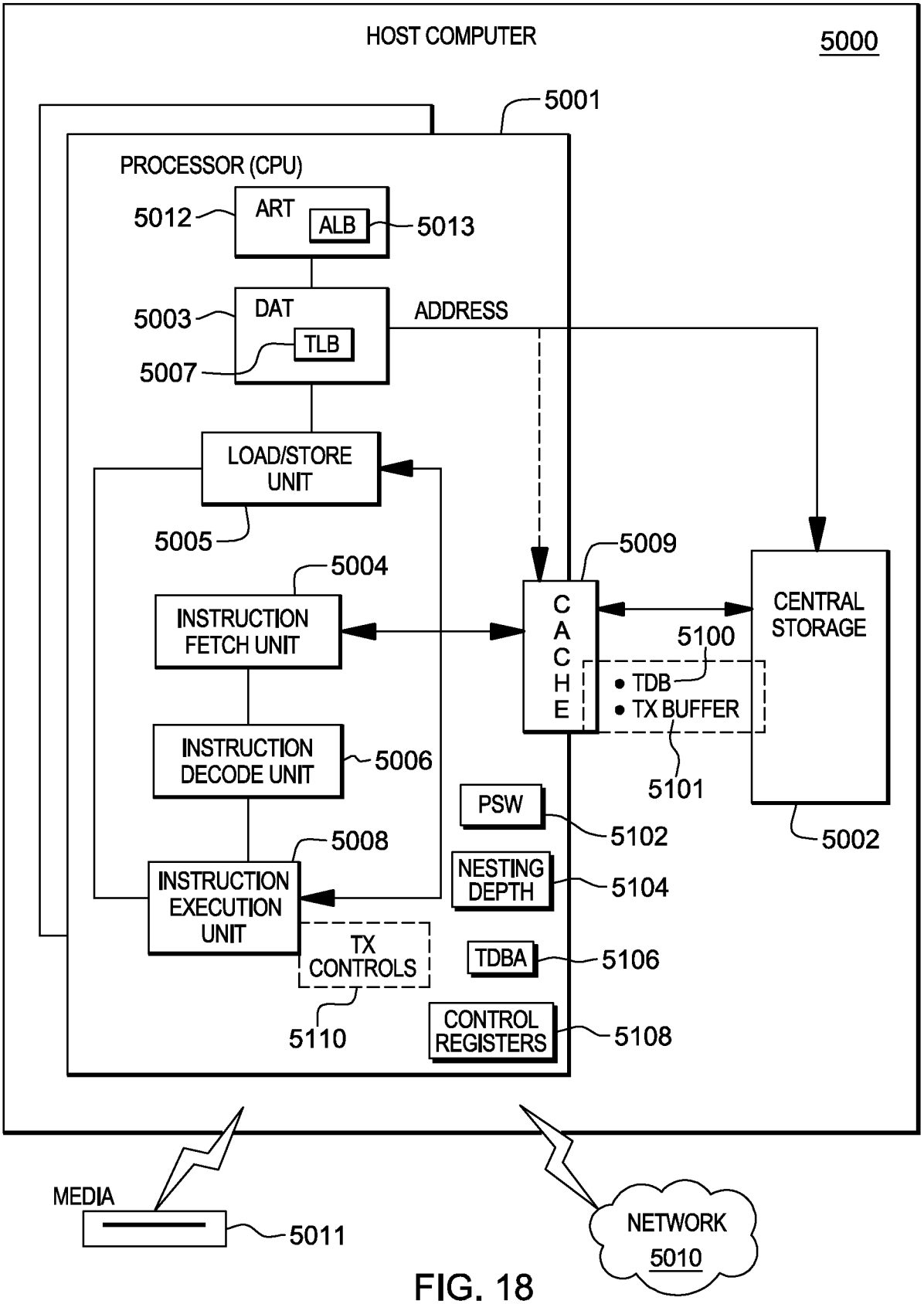
HOST COMPUTER
5000
5001
PROCESSOR (CPU)
5012
ART
ALB
5013
5003
DAT
TLB
5007
ADDRESS
LOAD/STORE UNIT
5005
5004
INSTRUCTION FETCH UNIT
INSTRUCTION DECODE UNIT
5006
5008
INSTRUCTION EXECUTION UNIT
TX CONTROLS
5110
5009
CACHE
5100
• TDB
• TX BUFFER
5101
CENTRAL STORAGE
5002
PSW
5102
NESTING DEPTH
5104
TDBA
5106
CONTROL REGISTERS
5108
MEDIA
5011
NETWORK
5010

FIG. 18

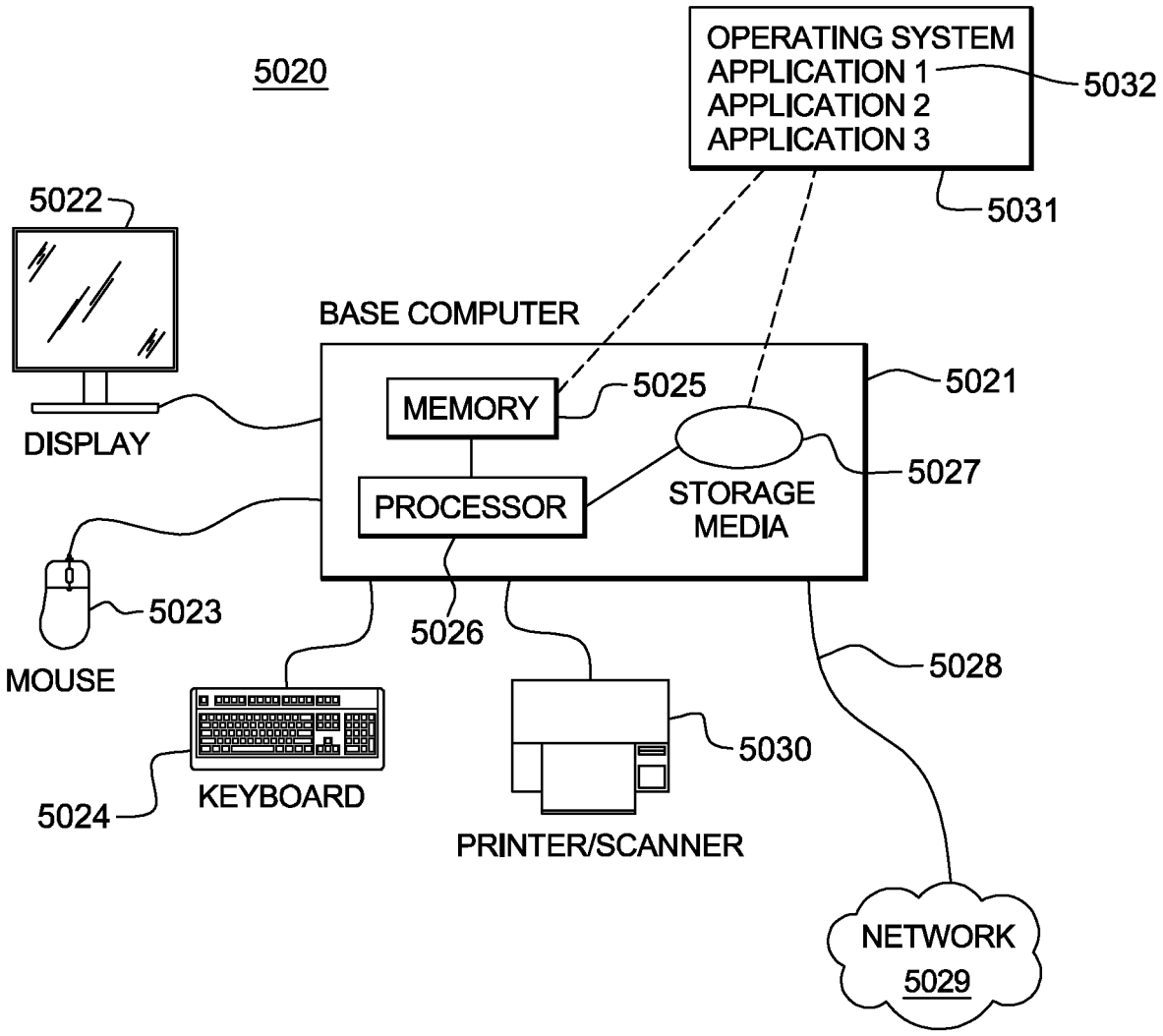
5020
OPERATING SYSTEM
APPLICATION 1
APPLICATION 2
APPLICATION 3
5032
5031
5022
BASE COMPUTER
MEMORY
5025
5021
5027
PROCESSOR
STORAGE MEDIA
DISPLAY
5023
MOUSE
5026
5028
5024
KEYBOARD
5030
PRINTER/SCANNER
NETWORK
5029

FIG. 19

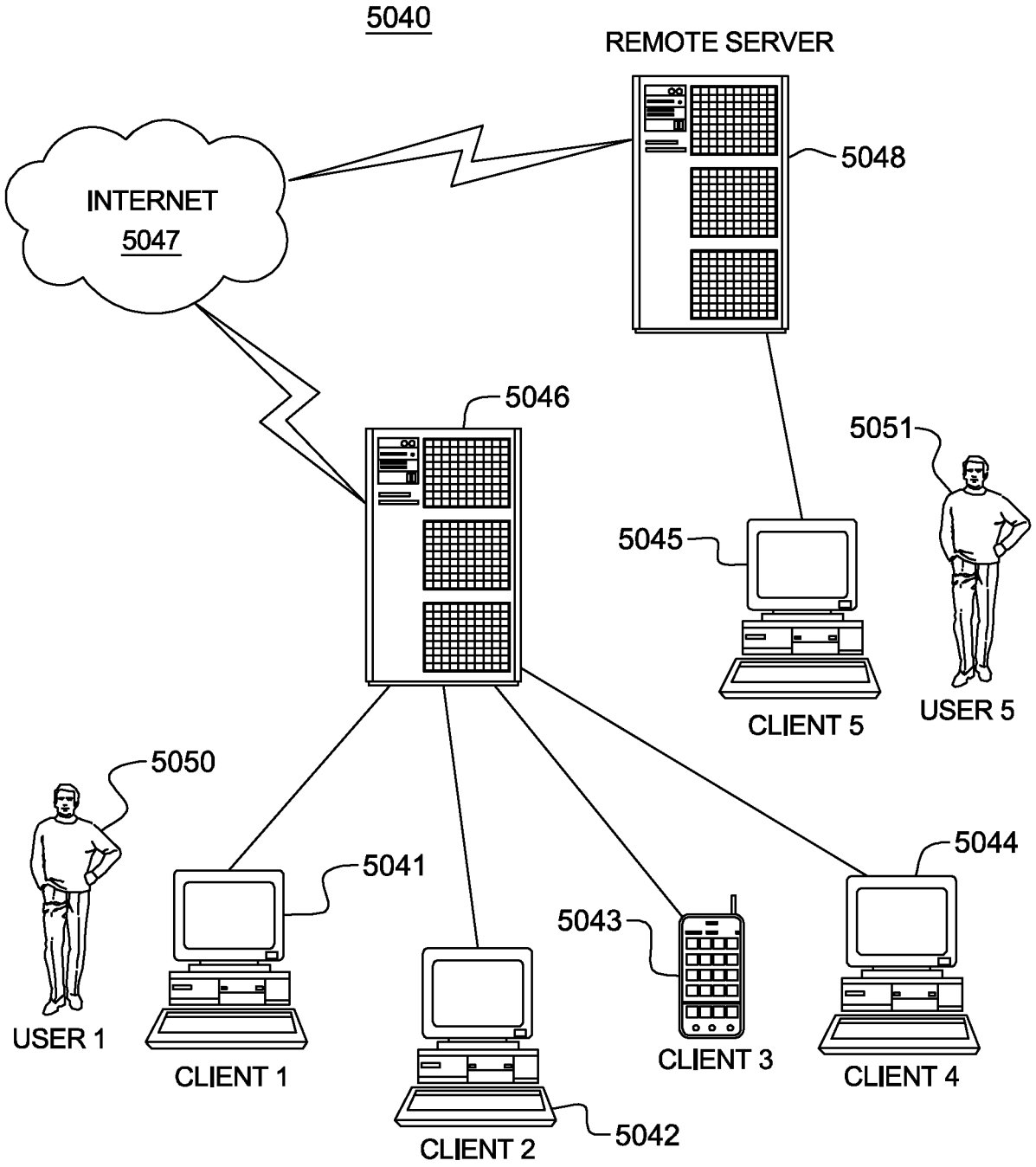
5040
REMOTE SERVER
5048
INTERNET
5047
5046
5051
5045
USER 5
CLIENT 5
5050
5044
5041
5043
USER 1
CLIENT 1
CLIENT 3
CLIENT 4
CLIENT 2
5042

FIG. 20

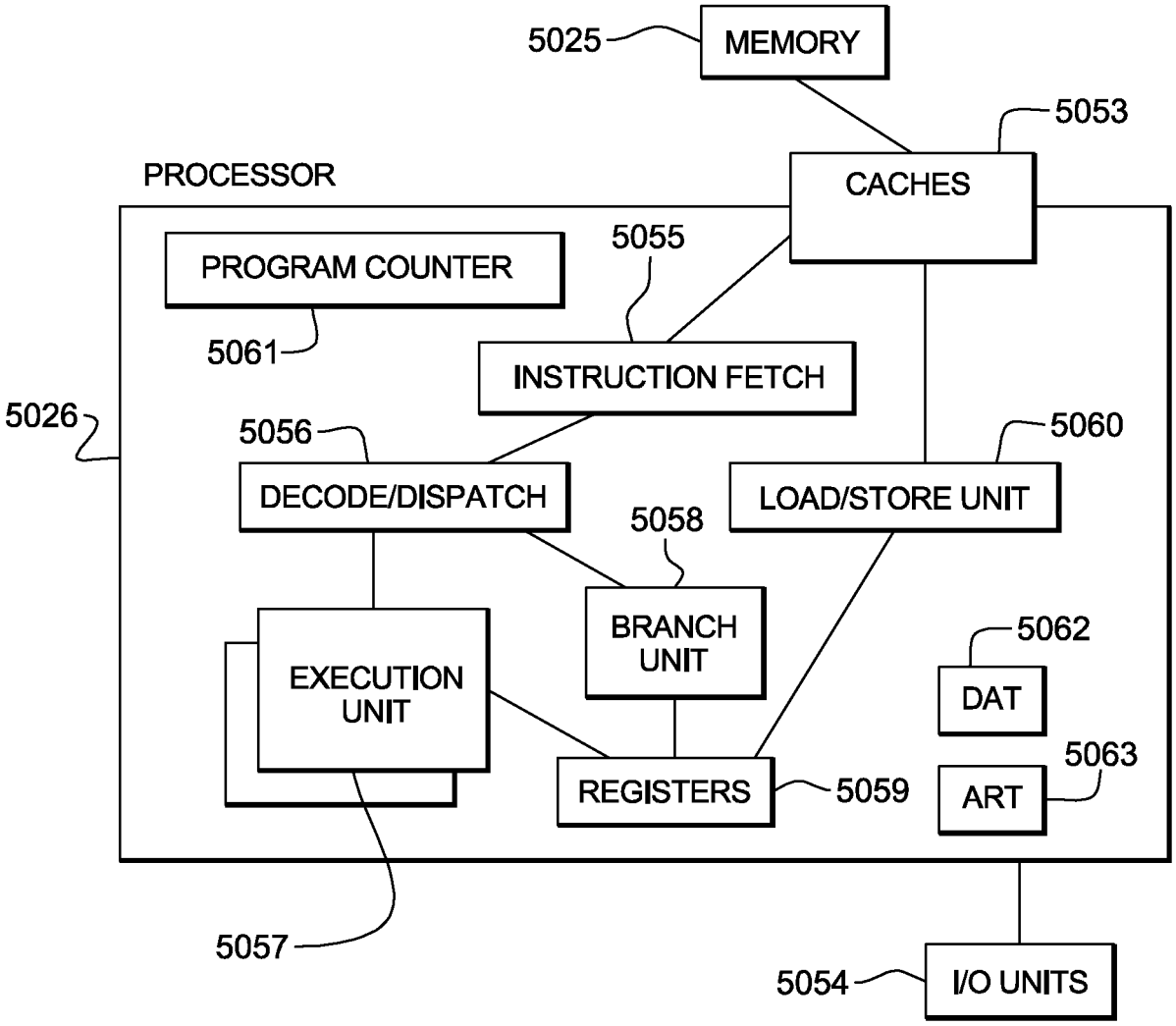
5025
MEMORY
5053
CACHES
PROCESSOR
PROGRAM COUNTER
5055
5061
INSTRUCTION FETCH
5026
5056
5060
DECODE/DISPATCH
LOAD/STORE UNIT
5058
BRANCH UNIT
5062
EXECUTION UNIT
DAT
5063
REGISTERS
5059
ART
5057
5054
I/O UNITS

FIG. 21

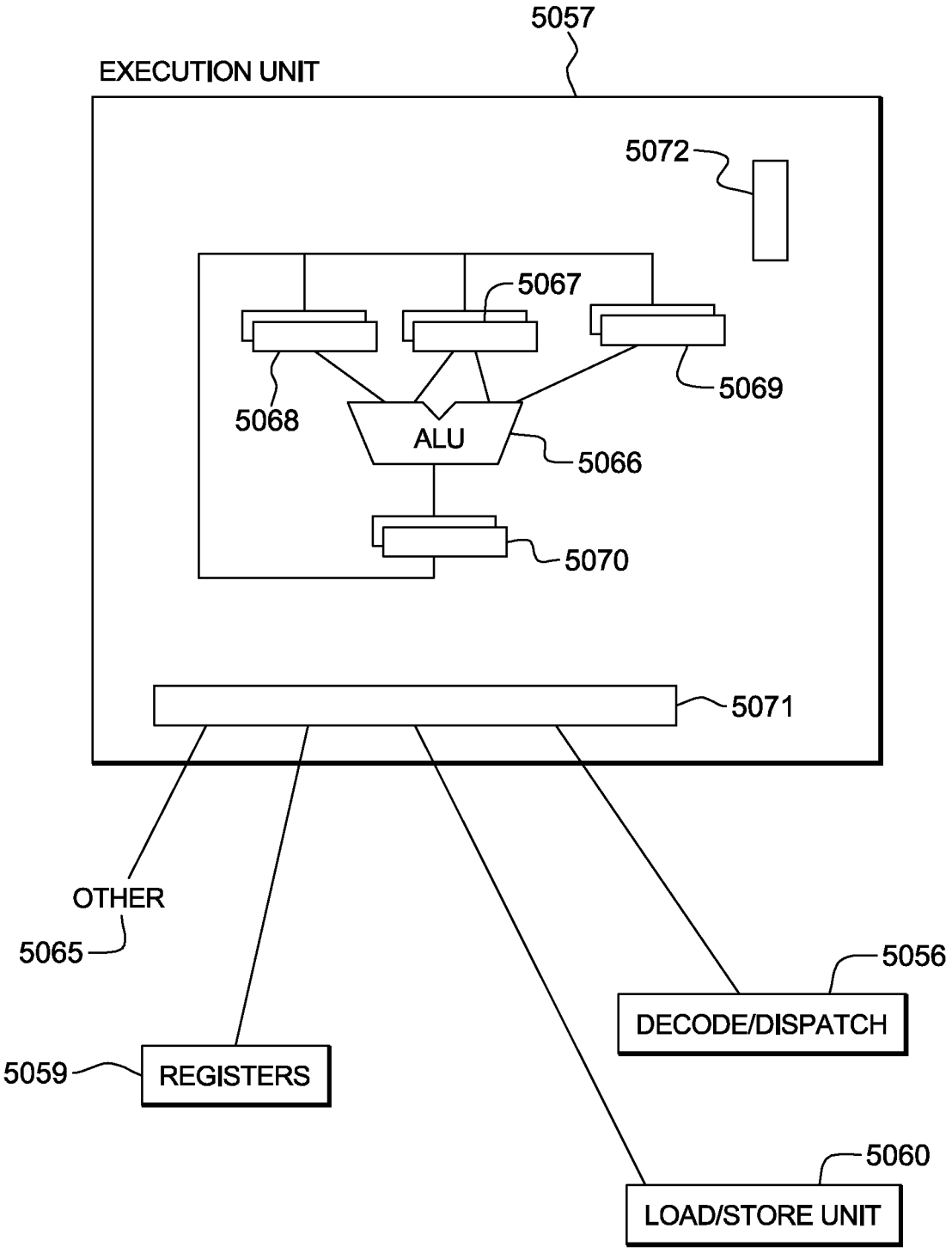
5057
EXECUTION UNIT
5072
5067
5068
5069
ALU
5066
5070
5071
OTHER
5065
5056
DECODE/DISPATCH
5059
REGISTERS
5060
LOAD/STORE UNIT

FIG. 22A

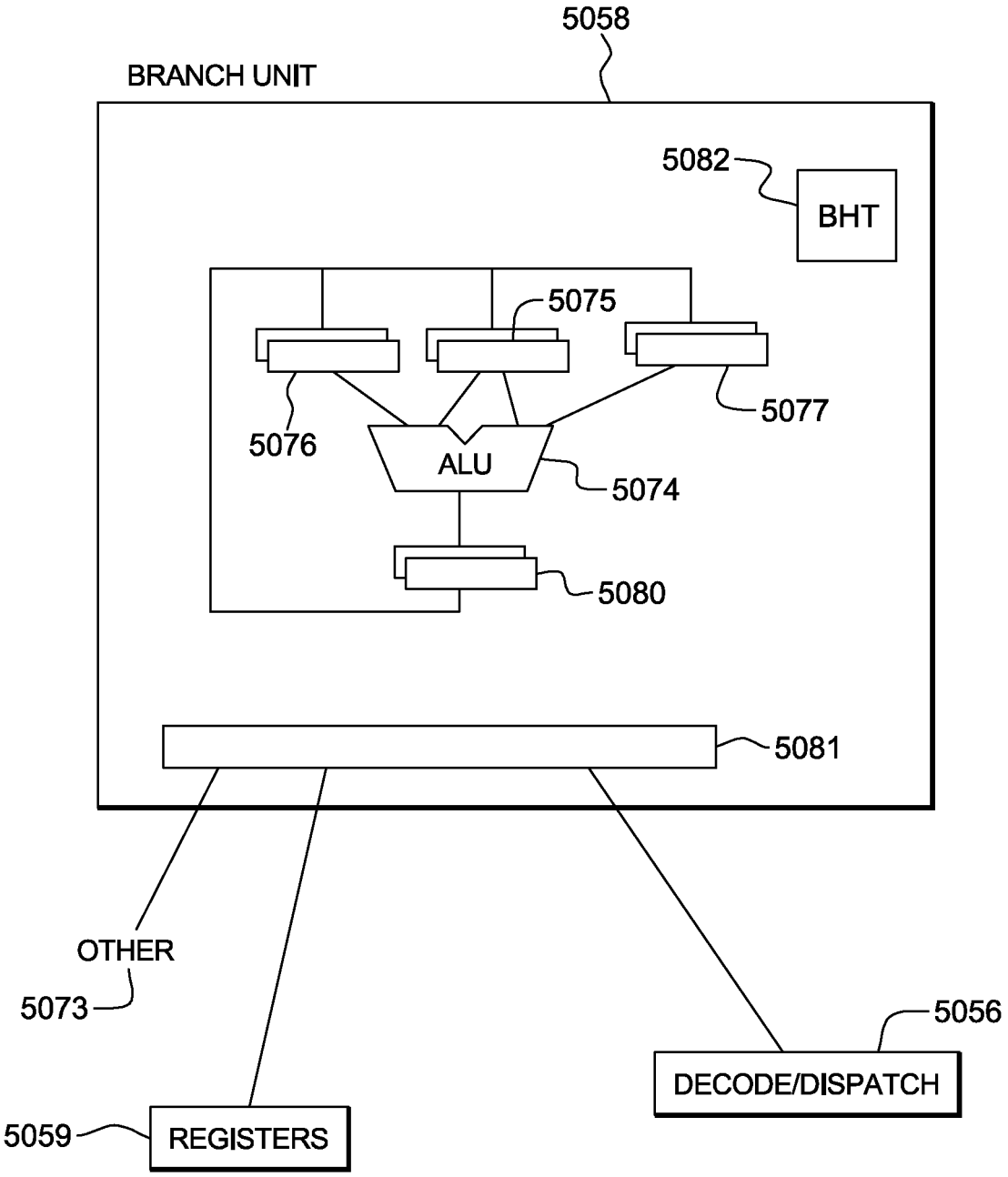
5058
BRANCH UNIT
5082
BHT
5075
5076
5077
ALU
5074
5080
5081
OTHER
5073
5056
DECODE/DISPATCH
5059
REGISTERS

FIG. 22B

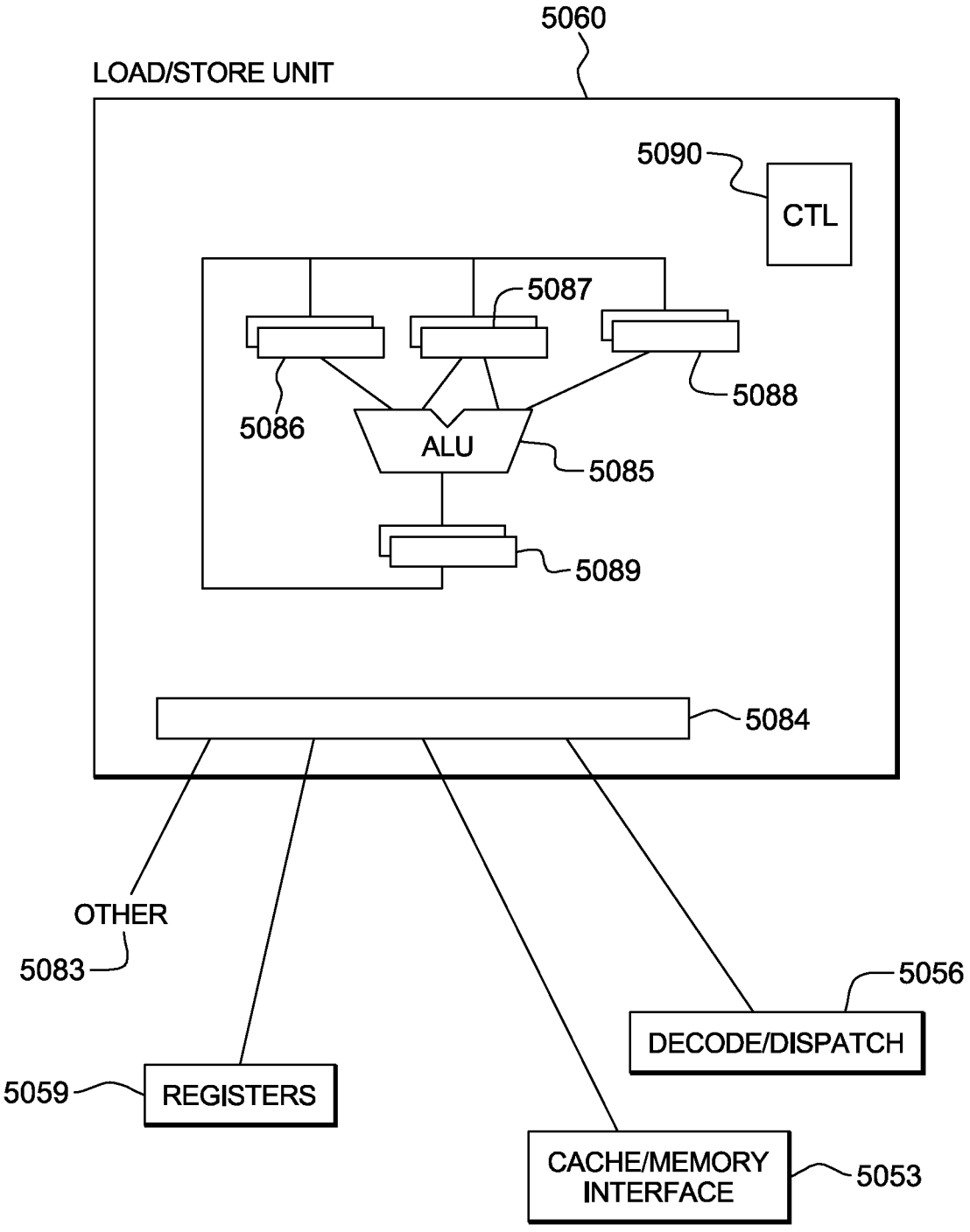
5060
LOAD/STORE UNIT
5090
CTL
5087
5086
5088
ALU
5085
5089
5084
OTHER
5083
5056
DECODE/DISPATCH
5059
REGISTERS
CACHE/MEMORY
INTERFACE
5053

FIG. 22C

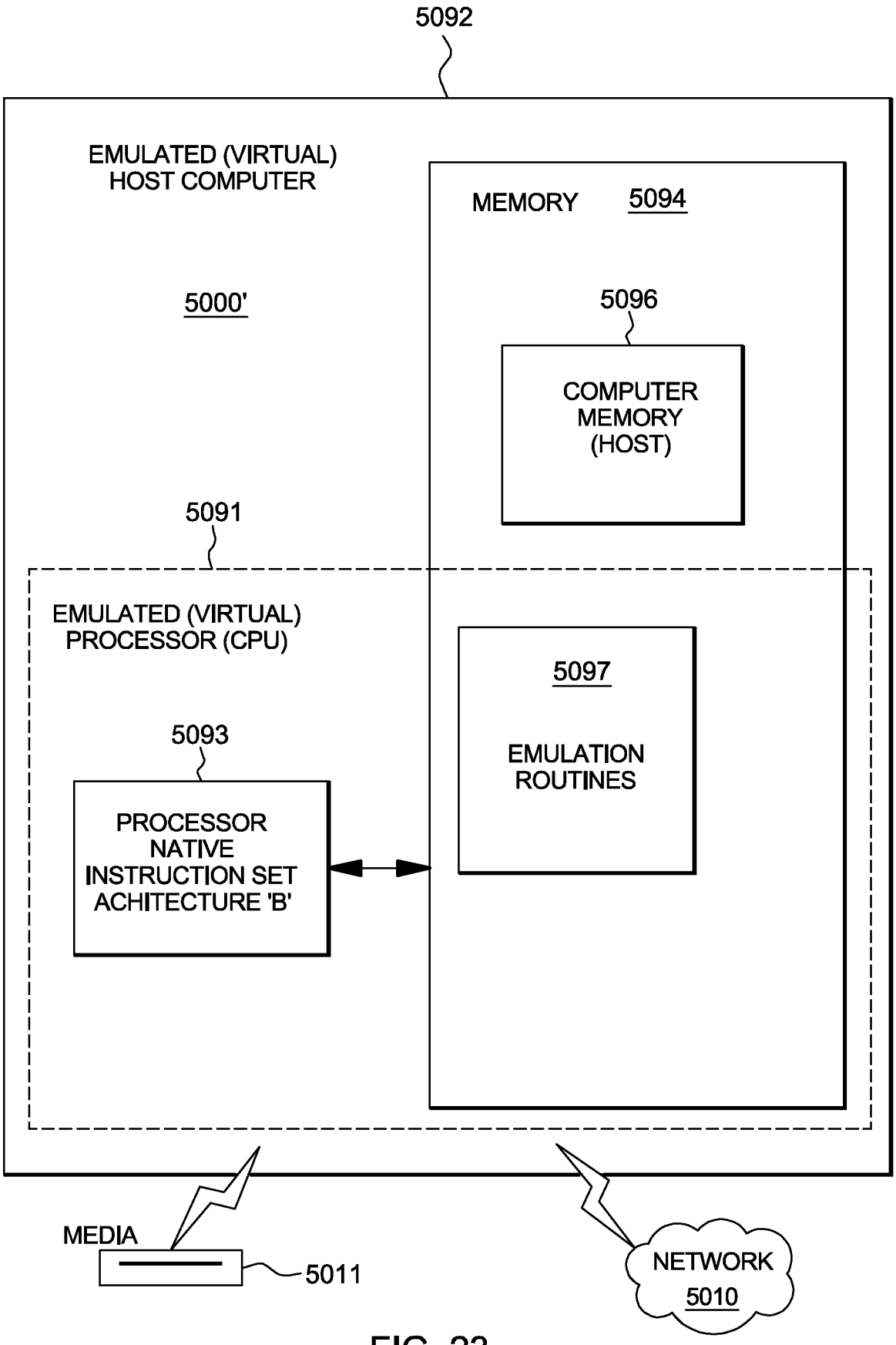
5092
EMULATED (VIRTUAL)
HOST COMPUTER
5000'
MEMORY 5094
5096
COMPUTER
MEMORY
(HOST)
5091
EMULATED (VIRTUAL)
PROCESSOR (CPU)
5097
EMULATION
ROUTINES
5093
PROCESSOR
NATIVE
INSTRUCTION SET
ACHITECTURE 'B'
MEDIA
5011
NETWORK
5010

FIG. 23