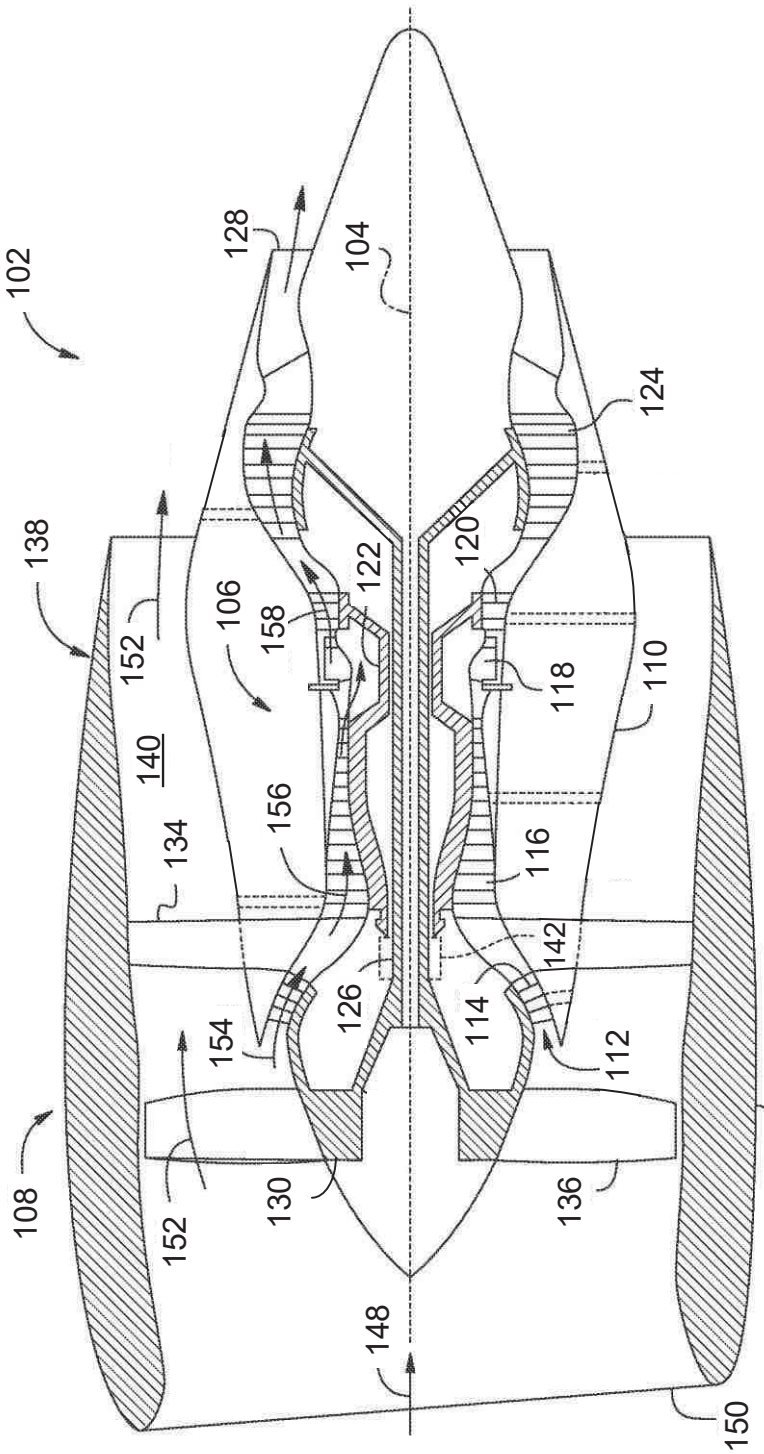

102
128
104
124
138
152
106
158
122
120
110
118
140
156
134
116
142
126
114
154
112
108
152
130
136
132
148
150

FIG. 1

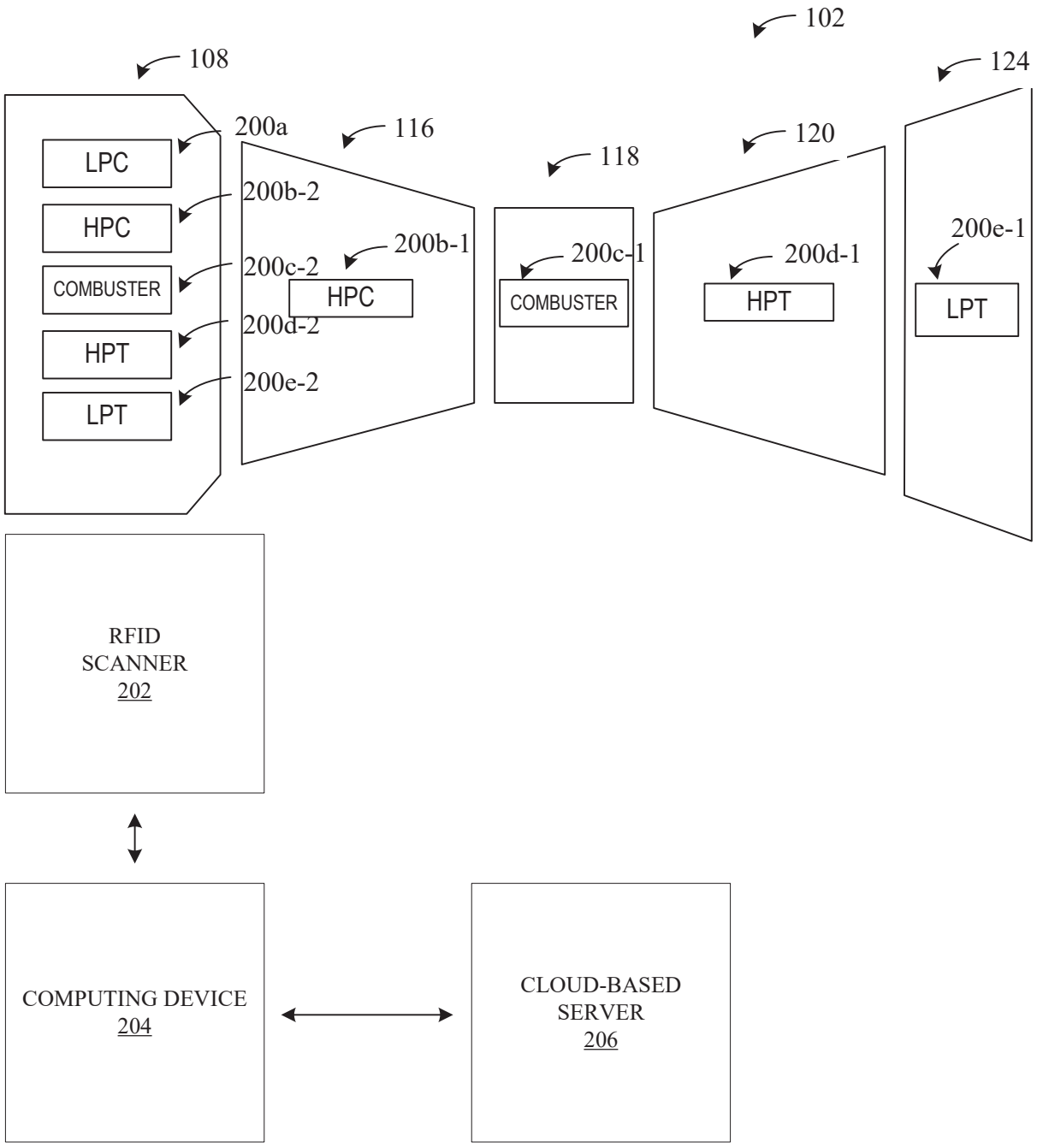
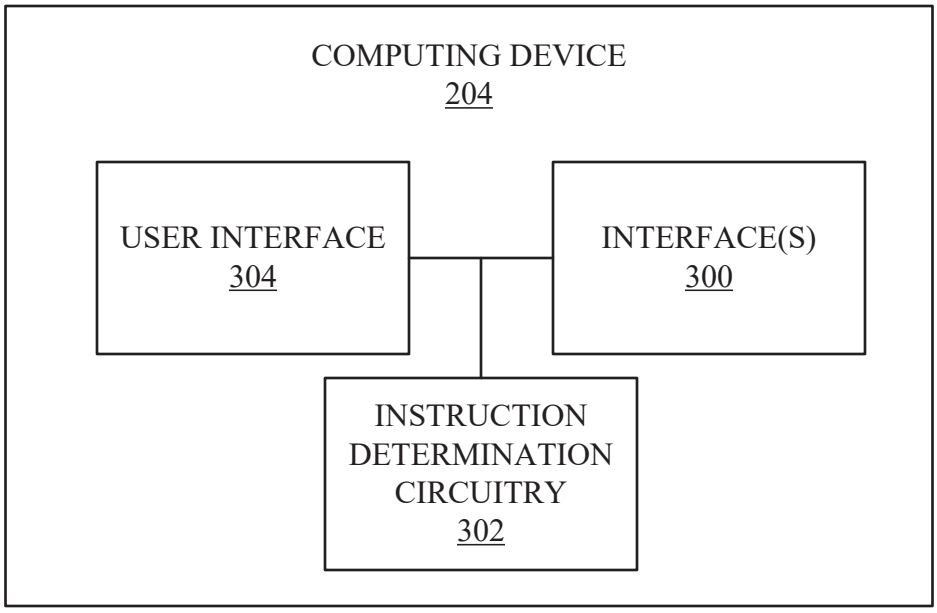

102
108
124
200a
116
118
120
LPC
HPC
COMBUSTER
HPT
LPT
200b-2
200b-1
200c-2
200d-2
200e-2
HPC
200c-1
COMBUSTER
200d-1
HPT
200e-1
LPT
RFID
SCANNER
202
COMPUTING DEVICE
204
CLOUD-BASED
SERVER
206

FIG. 2


COMPUTING DEVICE
204
USER INTERFACE
304
INTERFACE(S)
300
INSTRUCTION
DETERMINATION
CIRCUITRY
302

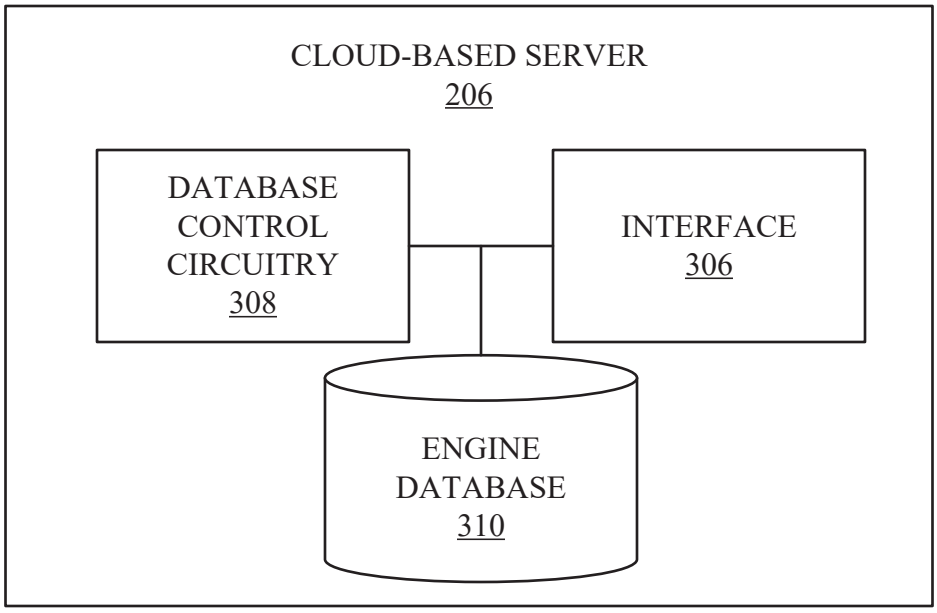

CLOUD-BASED SERVER
206
DATABASE
CONTROL
CIRCUITRY
308
INTERFACE
306
ENGINE
DATABASE
310

FIG. 3

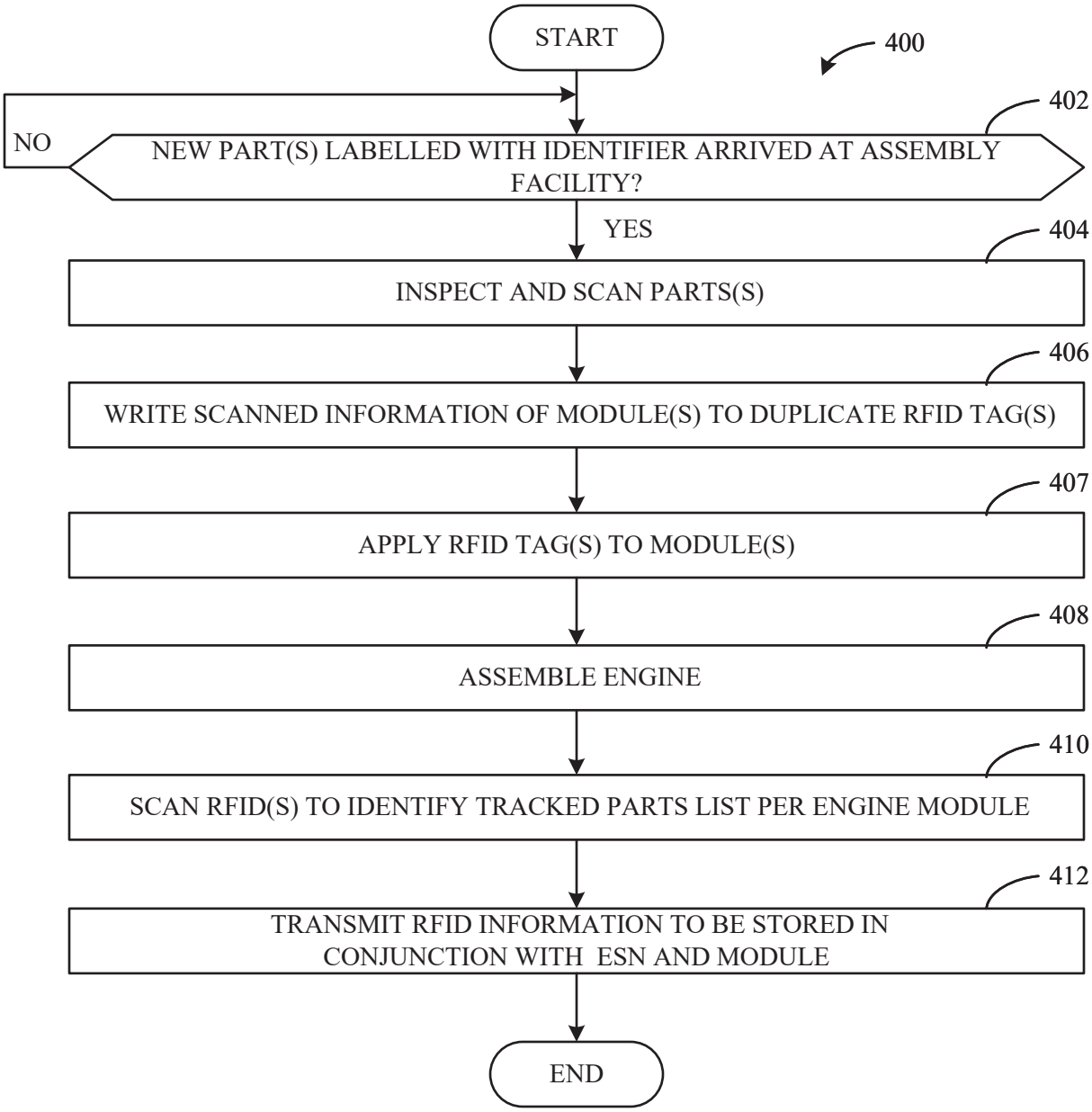

START
400
402
NO
NEW PART(S) LABELLED WITH IDENTIFIER ARRIVED AT ASSEMBLY FACILITY?
YES
404
INSPECT AND SCAN PARTS(S)
406
WRITE SCANNED INFORMATION OF MODULE(S) TO DUPLICATE RFID TAG(S)
407
APPLY RFID TAG(S) TO MODULE(S)
408
ASSEMBLE ENGINE
410
SCAN RFID(S) TO IDENTIFY TRACKED PARTS LIST PER ENGINE MODULE
412
TRANSMIT RFID INFORMATION TO BE STORED IN CONJUNCTION WITH ESN AND MODULE
END

FIG. 4

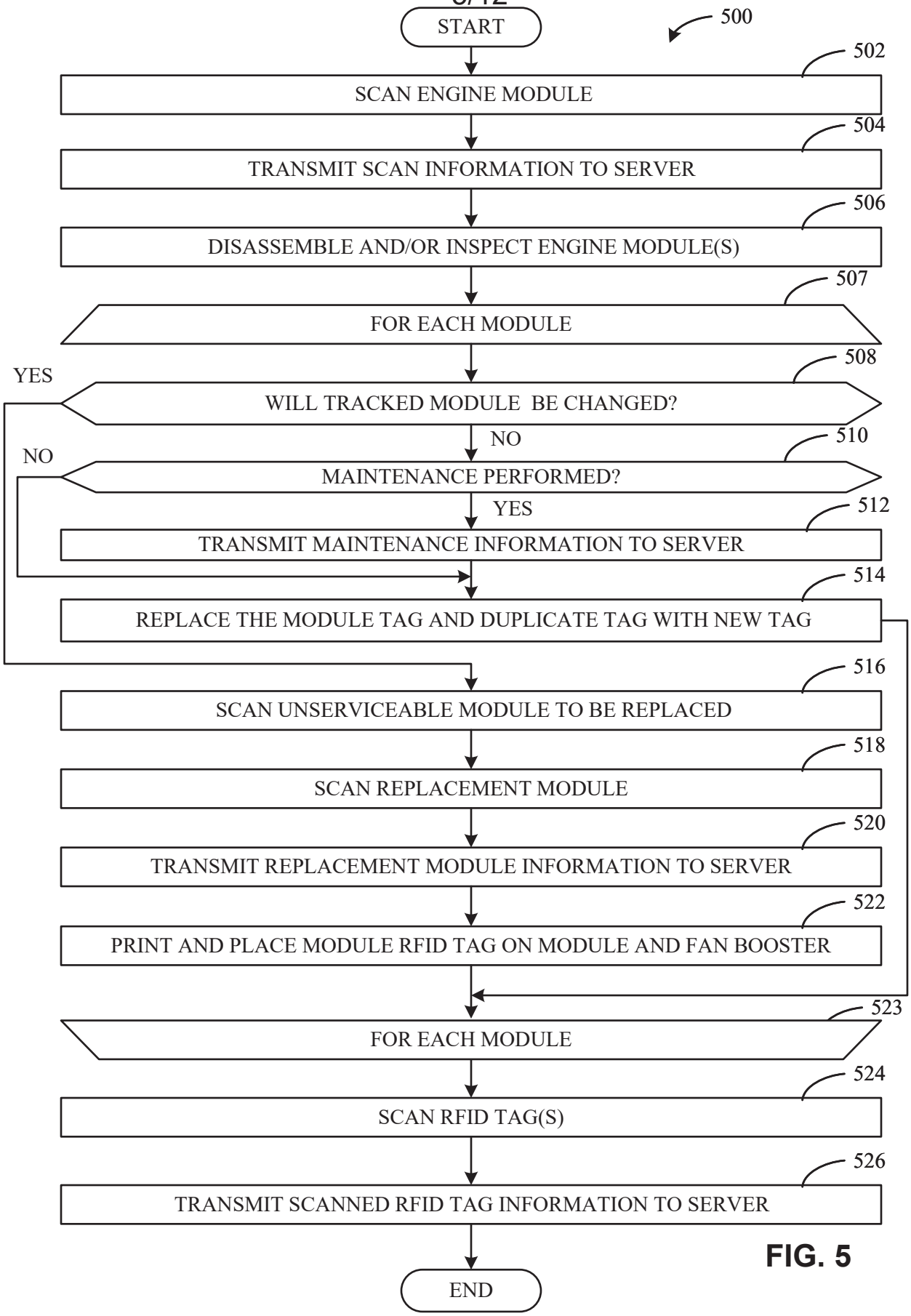

START
500
502
SCAN ENGINE MODULE
504
TRANSMIT SCAN INFORMATION TO SERVER
506
DISASSEMBLE AND/OR INSPECT ENGINE MODULE(S)
507
FOR EACH MODULE
508
YES
WILL TRACKED MODULE BE CHANGED?
NO
510
NO
MAINTENANCE PERFORMED?
YES
512
TRANSMIT MAINTENANCE INFORMATION TO SERVER
514
REPLACE THE MODULE TAG AND DUPLICATE TAG WITH NEW TAG
516
SCAN UNSERVICEABLE MODULE TO BE REPLACED
518
SCAN REPLACEMENT MODULE
520
TRANSMIT REPLACEMENT MODULE INFORMATION TO SERVER
522
PRINT AND PLACE MODULE RFID TAG ON MODULE AND FAN BOOSTER
523
FOR EACH MODULE
524
SCAN RFID TAG(S)
526
TRANSMIT SCANNED RFID TAG INFORMATION TO SERVER
END

FIG. 5

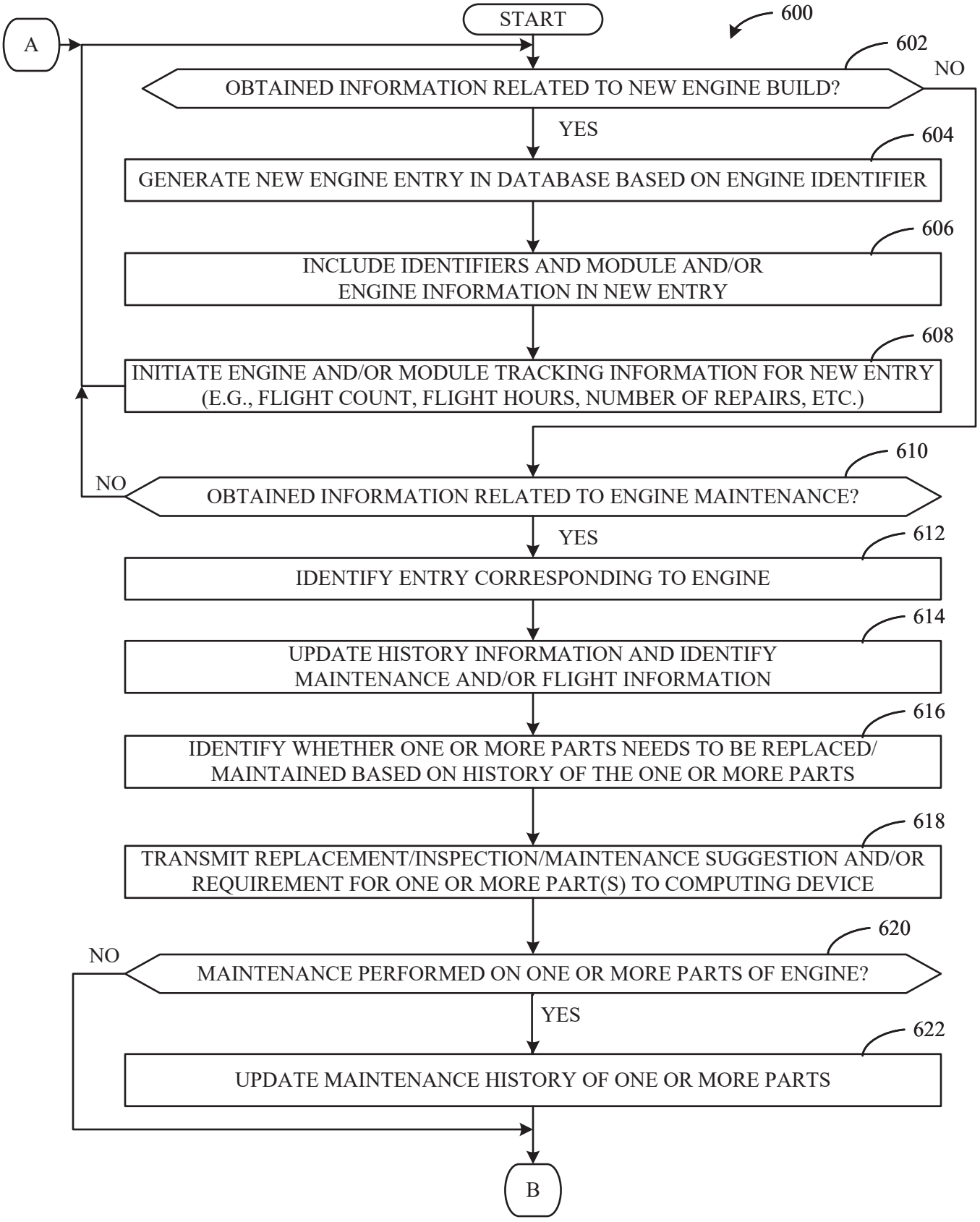

START
600
A
602
OBTAINED INFORMATION RELATED TO NEW ENGINE BUILD?
NO
YES
604
GENERATE NEW ENGINE ENTRY IN DATABASE BASED ON ENGINE IDENTIFIER
606
INCLUDE IDENTIFIERS AND MODULE AND/OR ENGINE INFORMATION IN NEW ENTRY
608
INITIATE ENGINE AND/OR MODULE TRACKING INFORMATION FOR NEW ENTRY (E.G., FLIGHT COUNT, FLIGHT HOURS, NUMBER OF REPAIRS, ETC.)
610
NO
OBTAINED INFORMATION RELATED TO ENGINE MAINTENANCE?
YES
612
IDENTIFY ENTRY CORRESPONDING TO ENGINE
614
UPDATE HISTORY INFORMATION AND IDENTIFY MAINTENANCE AND/OR FLIGHT INFORMATION
616
IDENTIFY WHETHER ONE OR MORE PARTS NEEDS TO BE REPLACED/ MAINTAINED BASED ON HISTORY OF THE ONE OR MORE PARTS
618
TRANSMIT REPLACEMENT/INSPECTION/MAINTENANCE SUGGESTION AND/OR REQUIREMENT FOR ONE OR MORE PART(S) TO COMPUTING DEVICE
620
NO
MAINTENANCE PERFORMED ON ONE OR MORE PARTS OF ENGINE?
YES
622
UPDATE MAINTENANCE HISTORY OF ONE OR MORE PARTS
B

FIG. 6A

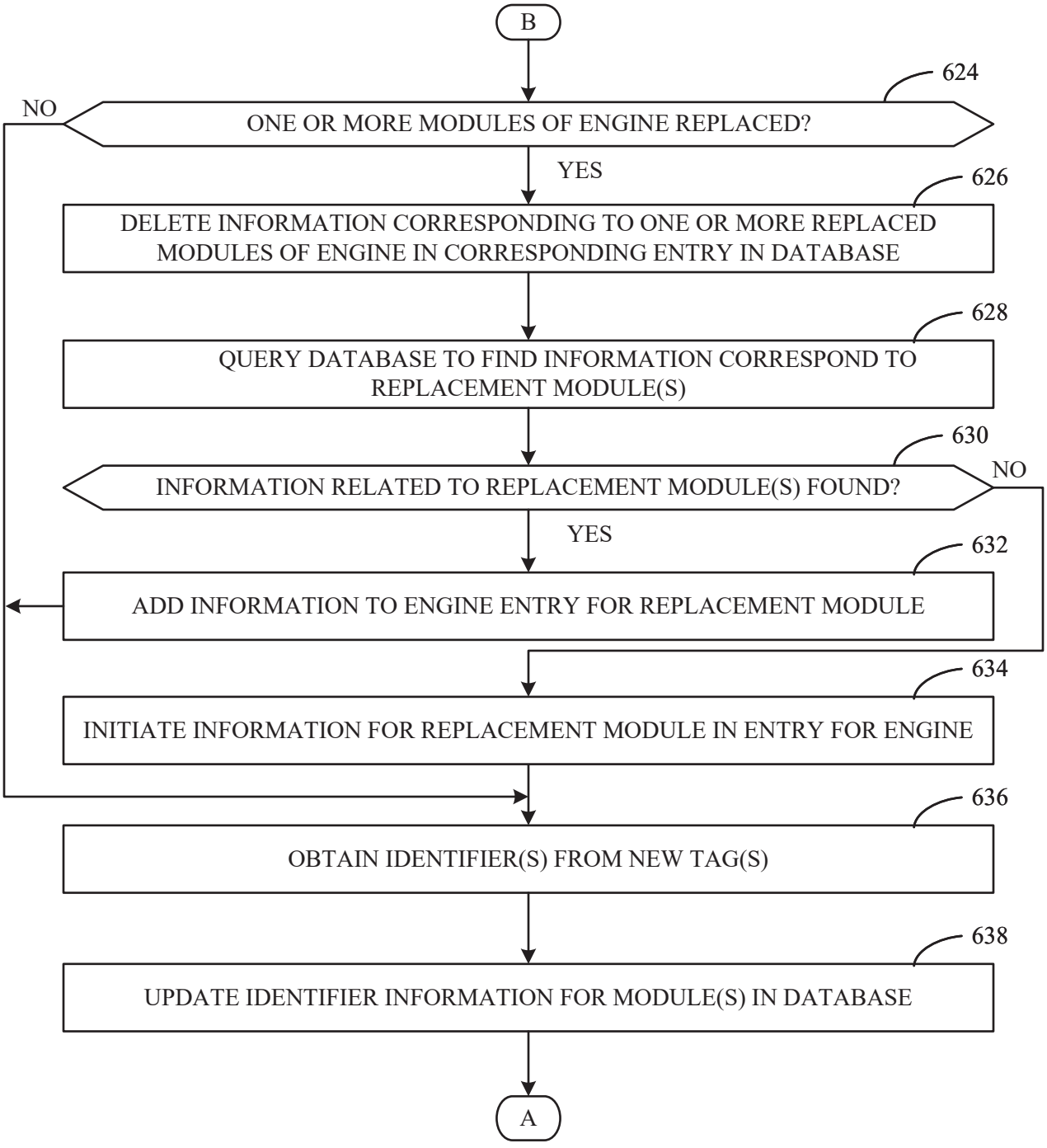

B
624
NO
ONE OR MORE MODULES OF ENGINE REPLACED?
YES
626
DELETE INFORMATION CORRESPONDING TO ONE OR MORE REPLACED MODULES OF ENGINE IN CORRESPONDING ENTRY IN DATABASE
628
QUERY DATABASE TO FIND INFORMATION CORRESPOND TO REPLACEMENT MODULE(S)
630
NO
INFORMATION RELATED TO REPLACEMENT MODULE(S) FOUND?
YES
632
ADD INFORMATION TO ENGINE ENTRY FOR REPLACEMENT MODULE
634
INITIATE INFORMATION FOR REPLACEMENT MODULE IN ENTRY FOR ENGINE
636
OBTAIN IDENTIFIER(S) FROM NEW TAG(S)
638
UPDATE IDENTIFIER INFORMATION FOR MODULE(S) IN DATABASE
A

FIG. 6B

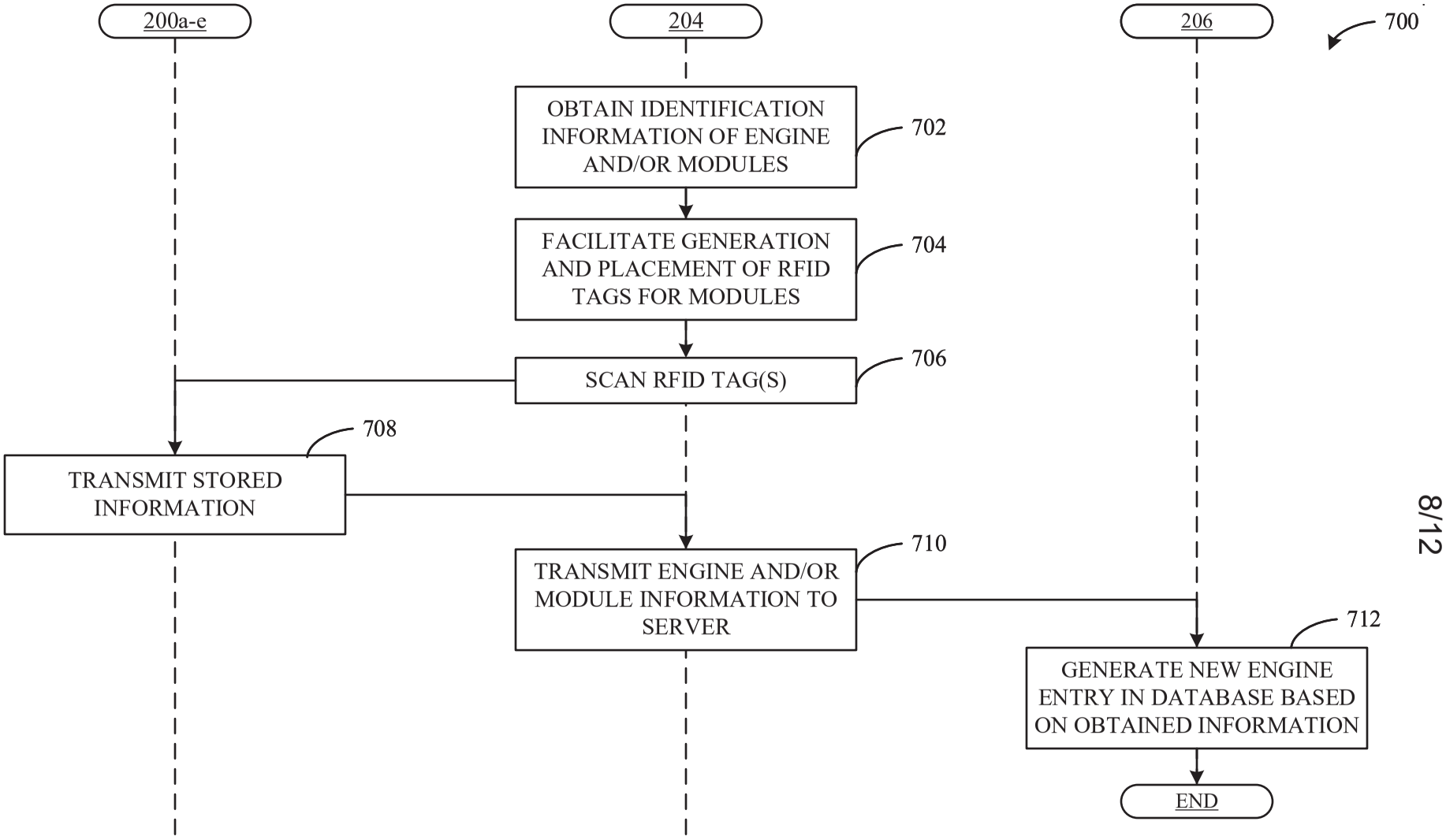

200a-e
204
206
700
OBTAIN IDENTIFICATION INFORMATION OF ENGINE AND/OR MODULES
702
FACILITATE GENERATION AND PLACEMENT OF RFID TAGS FOR MODULES
704
SCAN RFID TAG(S)
706
708
TRANSMIT STORED INFORMATION
710
TRANSMIT ENGINE AND/OR MODULE INFORMATION TO SERVER
712
GENERATE NEW ENGINE ENTRY IN DATABASE BASED ON OBTAINED INFORMATION
END

FIG. 7

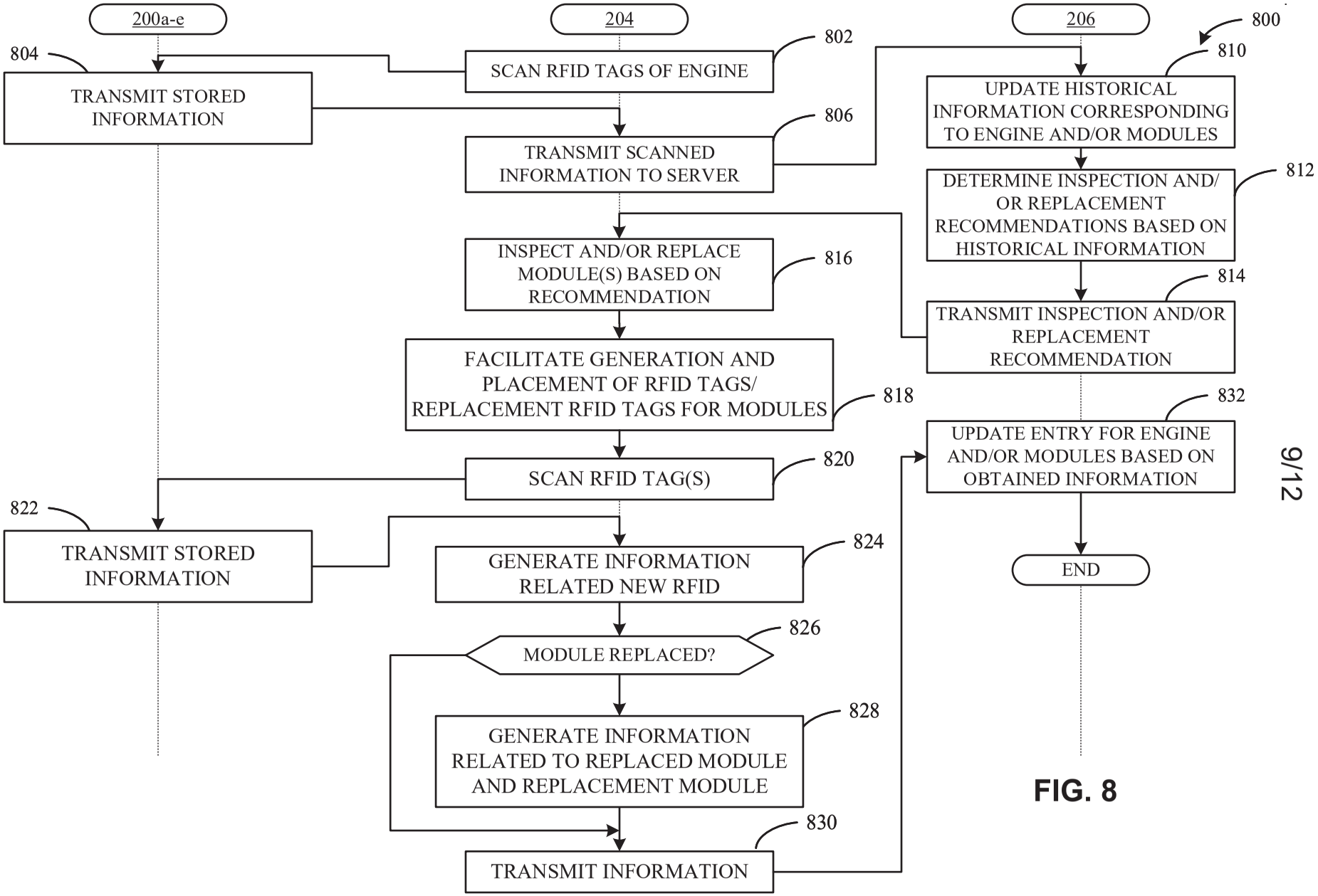

200a-e
204
206
800
804
TRANSMIT STORED INFORMATION
802
SCAN RFID TAGS OF ENGINE
806
TRANSMIT SCANNED INFORMATION TO SERVER
810
UPDATE HISTORICAL INFORMATION CORRESPONDING TO ENGINE AND/OR MODULES
812
DETERMINE INSPECTION AND/OR REPLACEMENT RECOMMENDATIONS BASED ON HISTORICAL INFORMATION
814
TRANSMIT INSPECTION AND/OR REPLACEMENT RECOMMENDATION
816
INSPECT AND/OR REPLACE MODULE(S) BASED ON RECOMMENDATION
818
FACILITATE GENERATION AND PLACEMENT OF RFID TAGS/ REPLACEMENT RFID TAGS FOR MODULES
820
SCAN RFID TAG(S)
822
TRANSMIT STORED INFORMATION
824
GENERATE INFORMATION RELATED NEW RFID
826
MODULE REPLACED?
828
GENERATE INFORMATION RELATED TO REPLACED MODULE AND REPLACEMENT MODULE
830
TRANSMIT INFORMATION
832
UPDATE ENTRY FOR ENGINE AND/OR MODULES BASED ON OBTAINED INFORMATION
END

FIG. 8

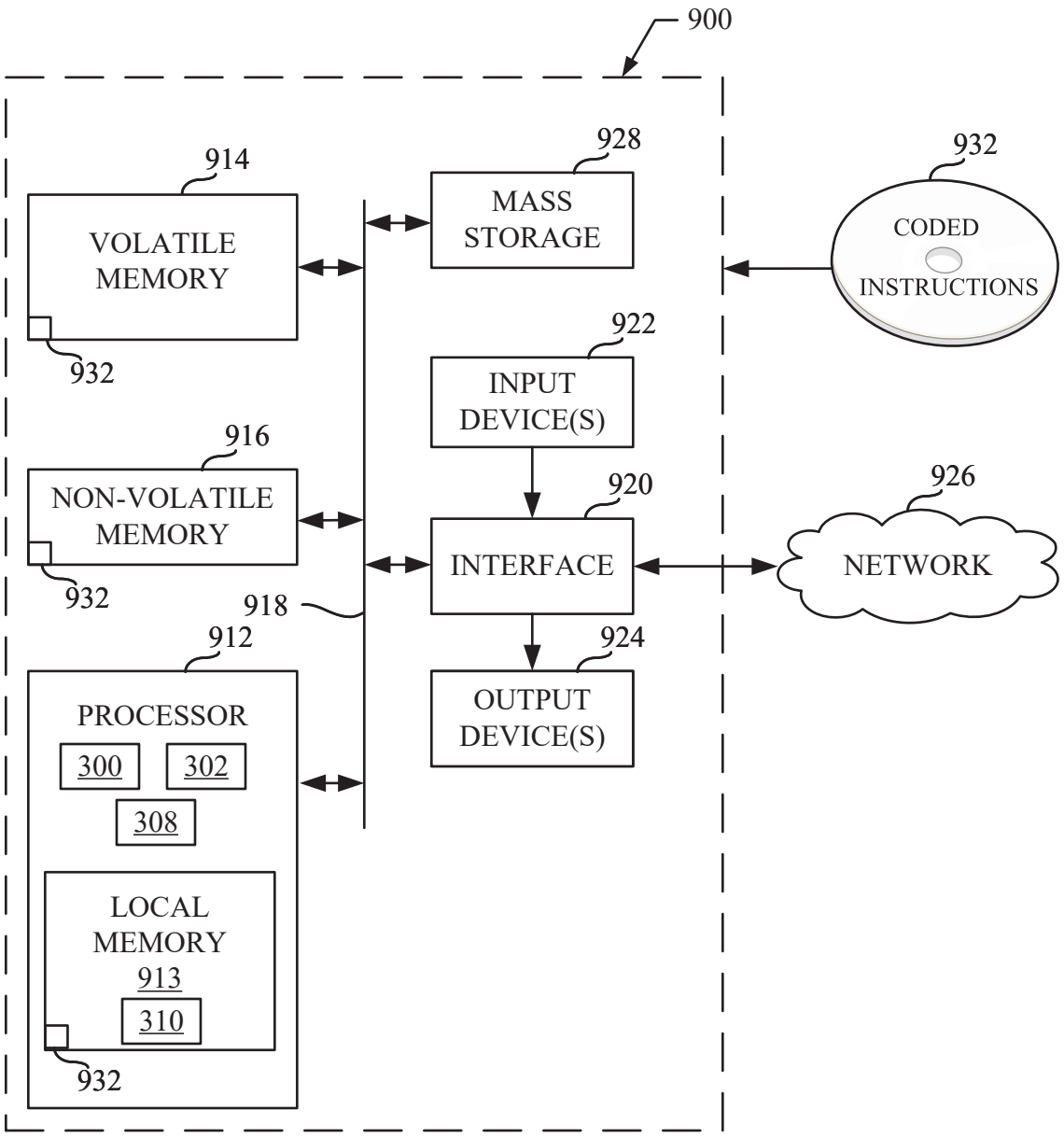

900
914
VOLATILE MEMORY
932
928
MASS STORAGE
932
CODED INSTRUCTIONS
922
INPUT DEVICE(S)
916
NON-VOLATILE MEMORY
932
920
INTERFACE
926
NETWORK
918
912
PROCESSOR
300
302
308
LOCAL MEMORY 913
310
932
924
OUTPUT DEVICE(S)

FIG. 9

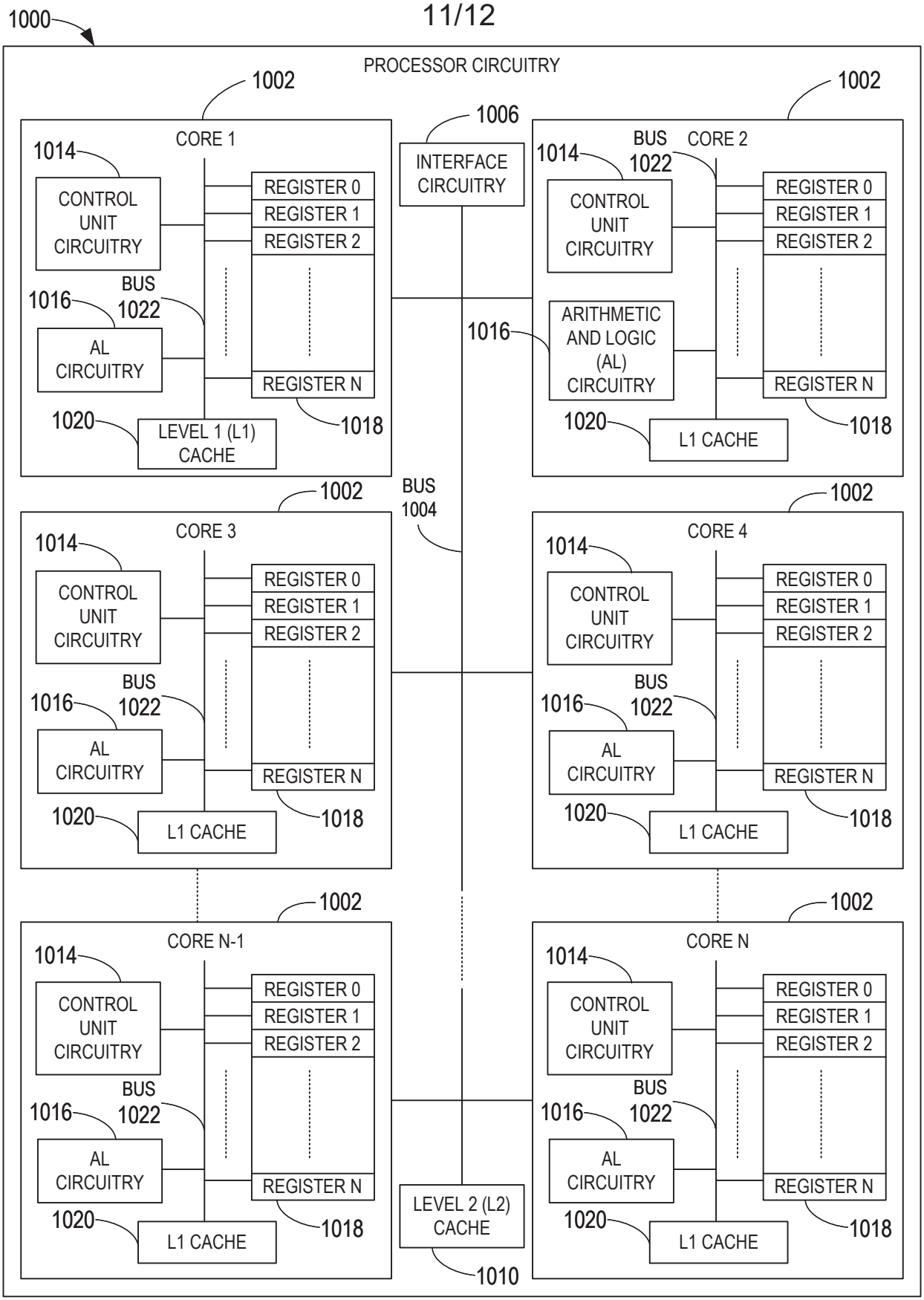

1000
PROCESSOR CIRCUITRY
1002
CORE 1
1014
CONTROL UNIT CIRCUITRY
REGISTER 0
REGISTER 1
REGISTER 2
REGISTER N
BUS 1022
1016
AL CIRCUITRY
1020
LEVEL 1 (L1) CACHE
1018
1006
INTERFACE CIRCUITRY
CORE 2
ARITHMETIC AND LOGIC (AL) CIRCUITRY
L1 CACHE
BUS 1004
CORE 3
CORE 4
CORE N-1
CORE N
LEVEL 2 (L2) CACHE
1010

FIG. 10

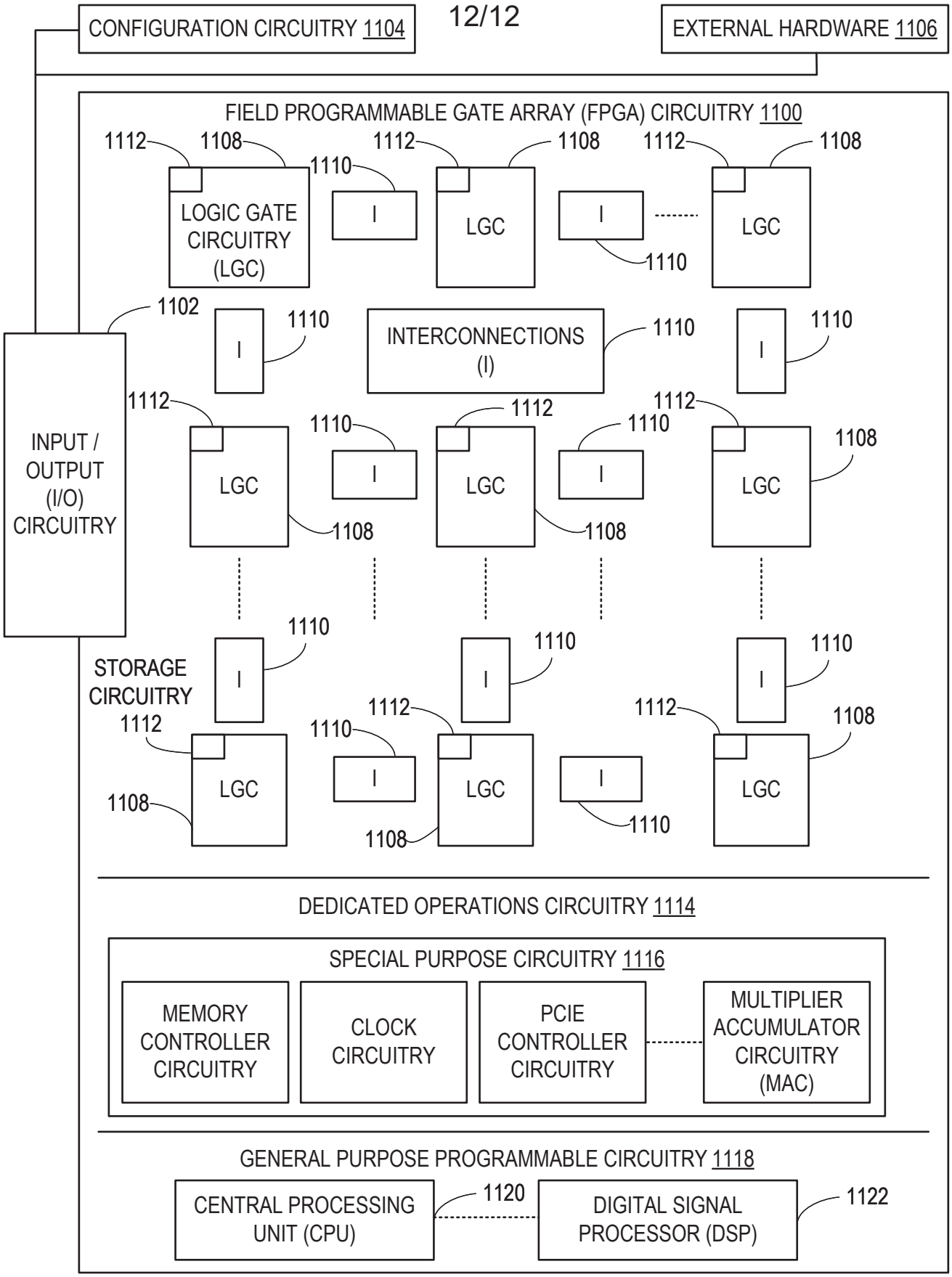

CONFIGURATION CIRCUITRY 1104
EXTERNAL HARDWARE 1106
FIELD PROGRAMMABLE GATE ARRAY (FPGA) CIRCUITRY 1100
LOGIC GATE CIRCUITRY (LGC)
LGC
I
INTERCONNECTIONS (I)
INPUT / OUTPUT (I/O) CIRCUITRY
STORAGE CIRCUITRY
1102
1108
1110
1112
DEDICATED OPERATIONS CIRCUITRY 1114
SPECIAL PURPOSE CIRCUITRY 1116
MEMORY CONTROLLER CIRCUITRY
CLOCK CIRCUITRY
PCIE CONTROLLER CIRCUITRY
MULTIPLIER ACCUMULATOR CIRCUITRY (MAC)
GENERAL PURPOSE PROGRAMMABLE CIRCUITRY 1118
CENTRAL PROCESSING UNIT (CPU)
DIGITAL SIGNAL PROCESSOR (DSP)
1120
1122

FIG. 11