FIG. 1

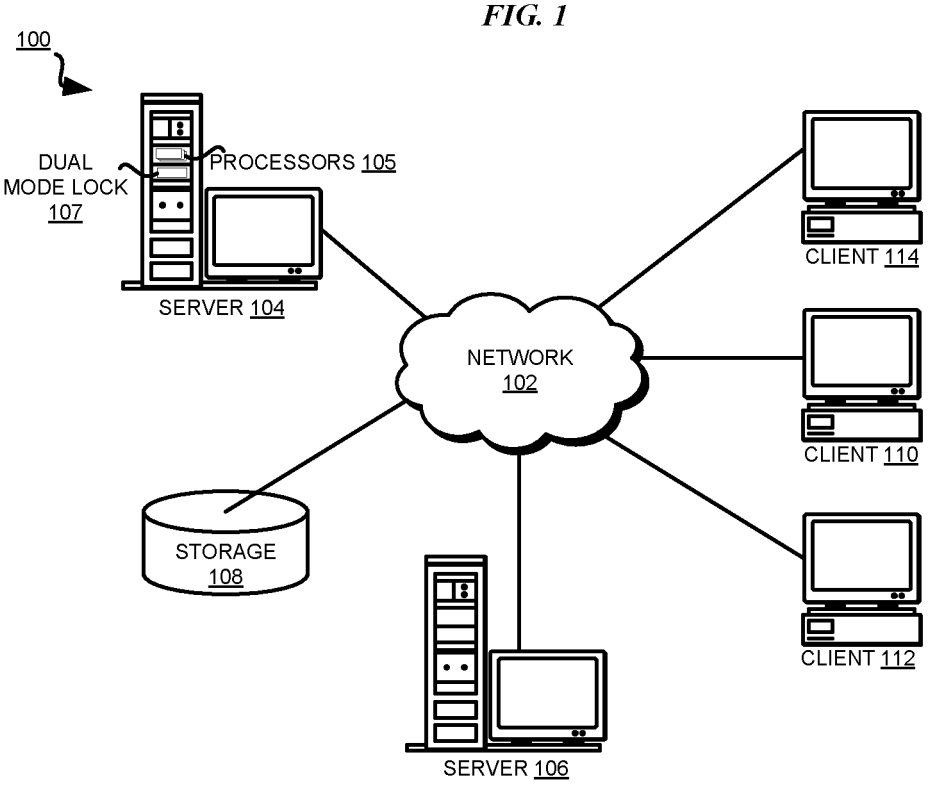

100
DUAL MODE LOCK 107
PROCESSORS 105
SERVER 104
NETWORK 102
CLIENT 114
CLIENT 110
CLIENT 112
STORAGE 108
SERVER 106

FIG. 2

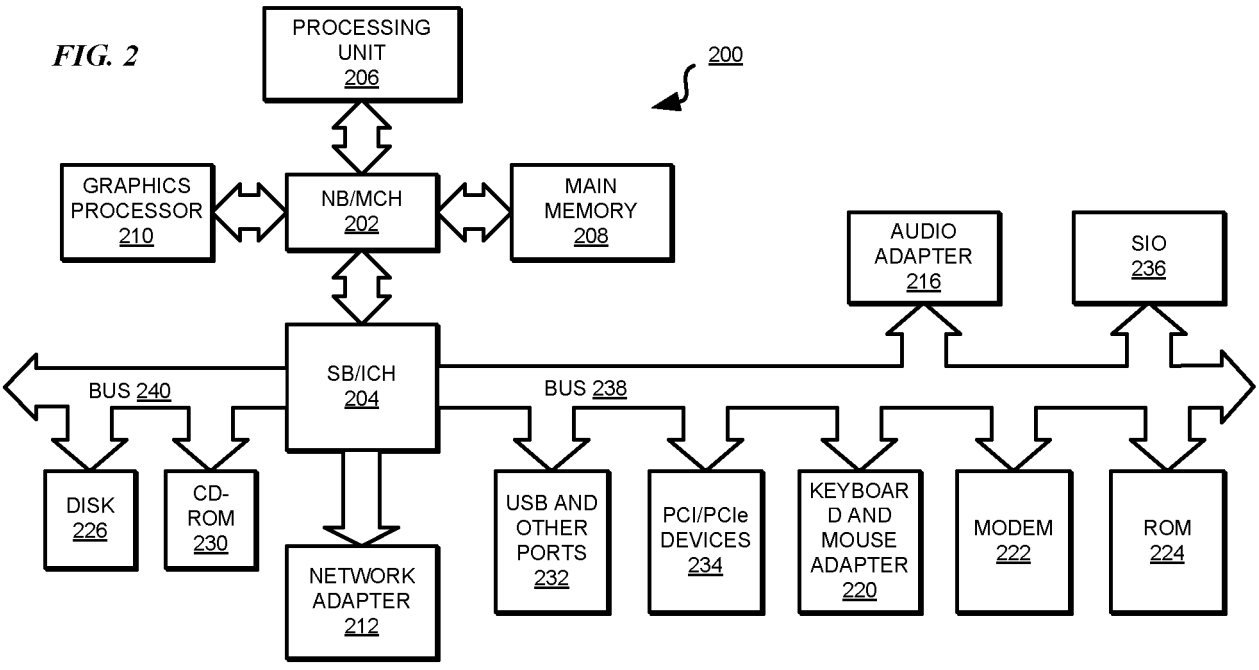

PROCESSING UNIT 206
200
GRAPHICS PROCESSOR 210
NB/MCH 202
MAIN MEMORY 208
AUDIO ADAPTER 216
SIO 236
SB/ICH 204
BUS 240
BUS 238
DISK 226
CD-ROM 230
NETWORK ADAPTER 212
USB AND OTHER PORTS 232
PCI/PCIe DEVICES 234
KEYBOARD AND MOUSE ADAPTER 220
MODEM 222
ROM 224

FIG. 3

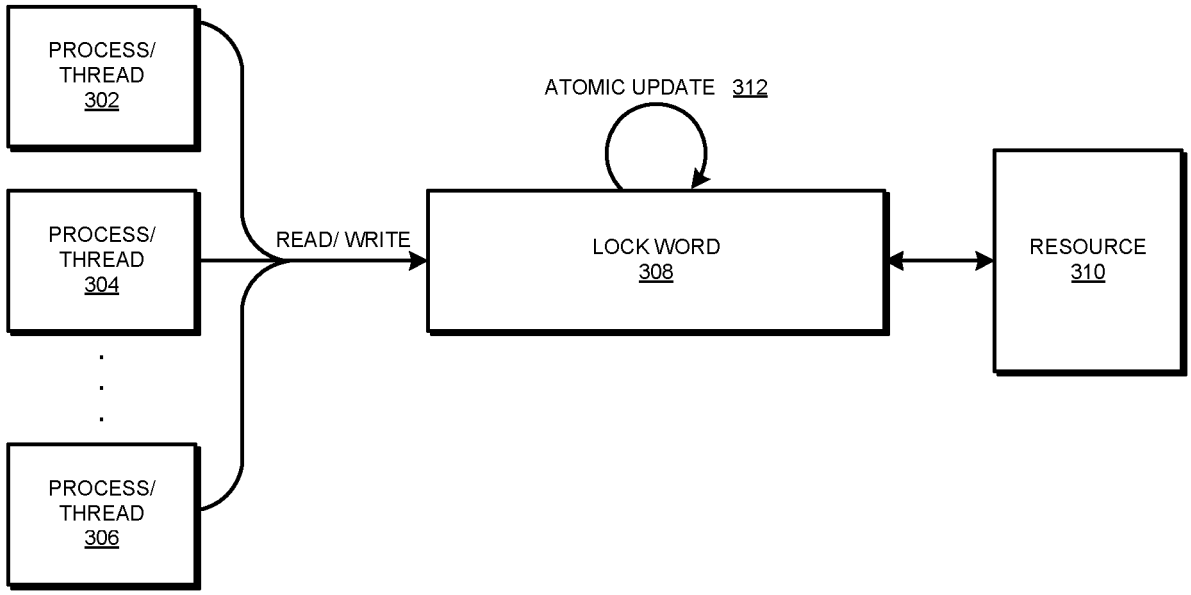

PROCESS/
THREAD
302
PROCESS/
THREAD
304
PROCESS/
THREAD
306
READ/ WRITE
ATOMIC UPDATE 312
LOCK WORD
308
RESOURCE
310

FIG. 4

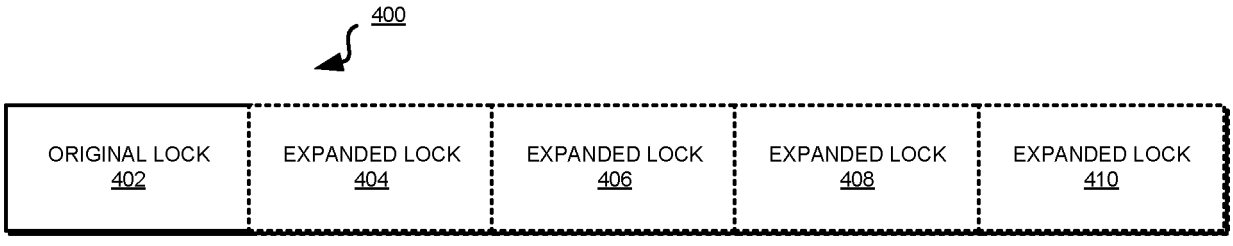

400
ORIGINAL LOCK
402
EXPANDED LOCK
404
EXPANDED LOCK
406
EXPANDED LOCK
408
EXPANDED LOCK
410

FIG. 5

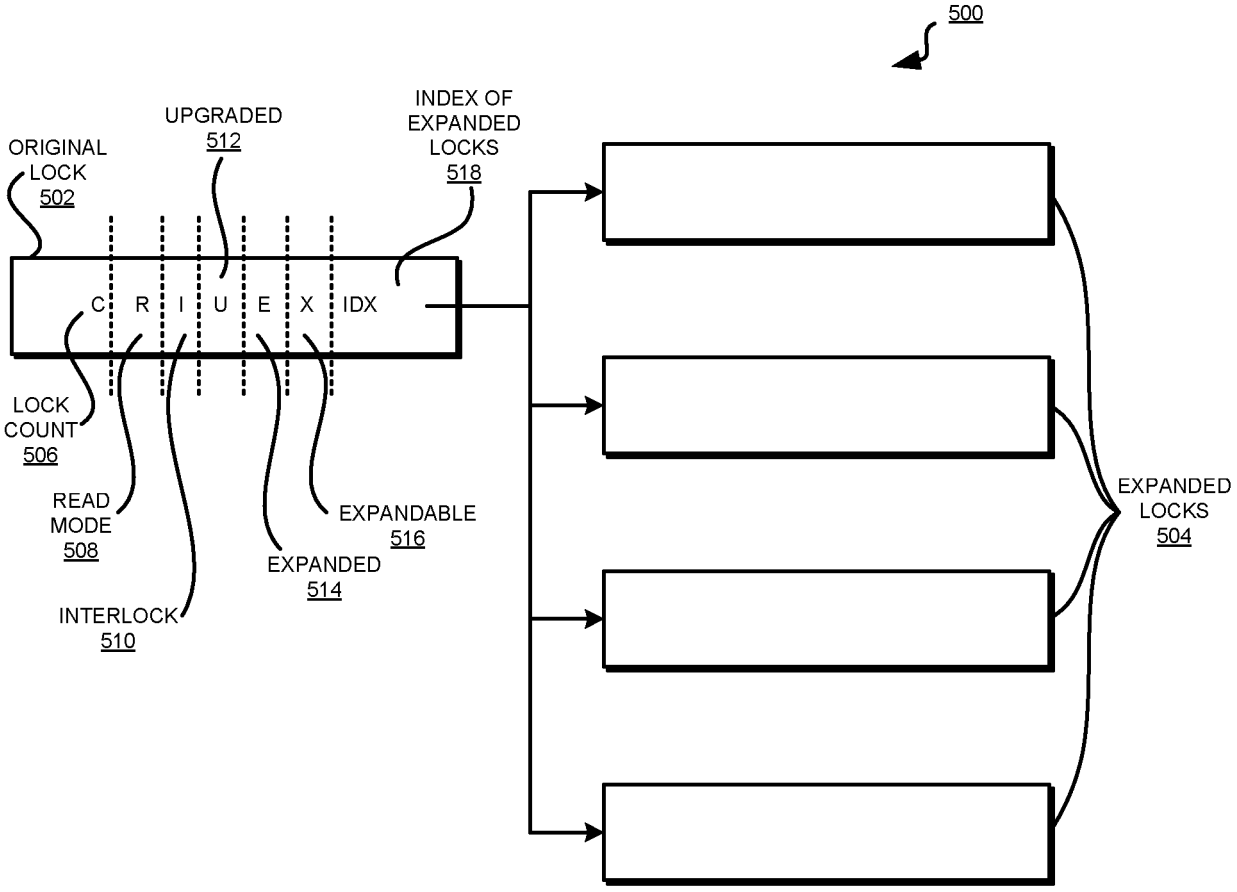

500
ORIGINAL LOCK 502
UPGRADED 512
INDEX OF EXPANDED LOCKS 518
C
R
I
U
E
X
IDX
LOCK COUNT 506
READ MODE 508
INTERLOCK 510
EXPANDED 514
EXPANDABLE 516
EXPANDED LOCKS 504

FIG. 5A

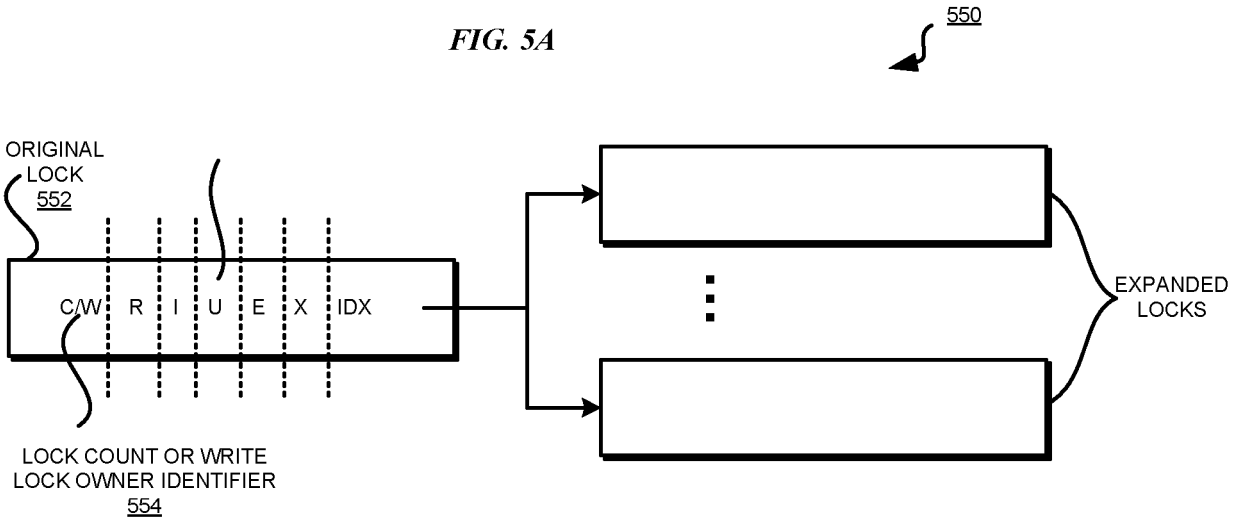

550
ORIGINAL LOCK 552
C/W
R
I
U
E
X
IDX
EXPANDED LOCKS
LOCK COUNT OR WRITE LOCK OWNER IDENTIFIER 554

FIG. 5B

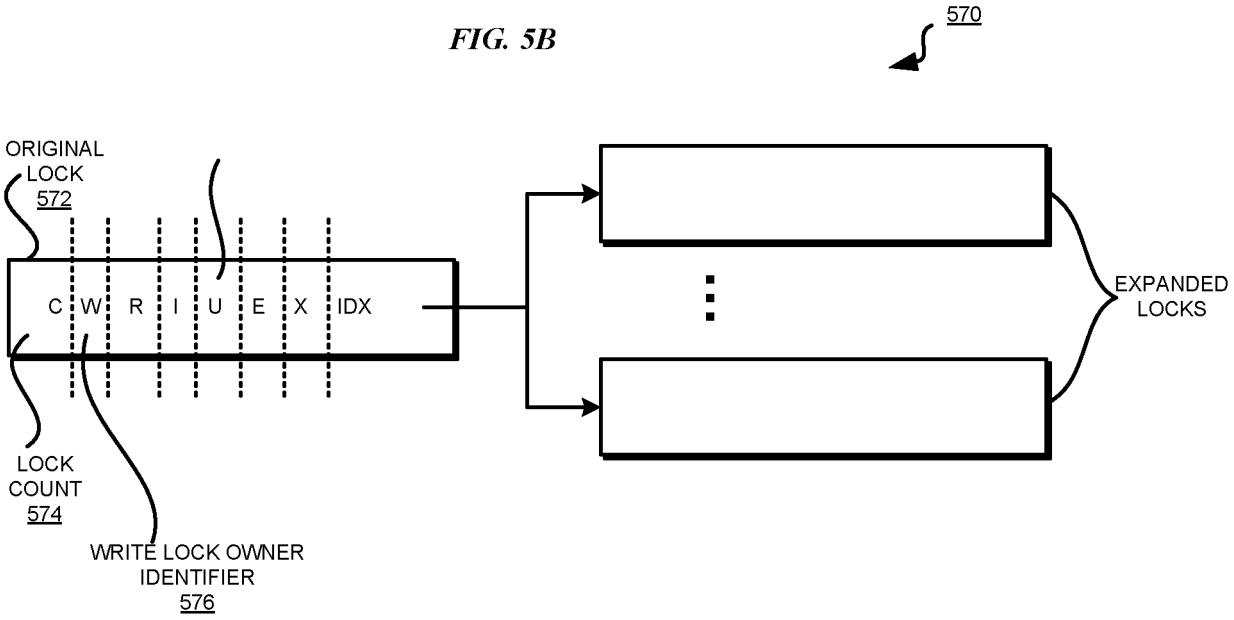

570
ORIGINAL LOCK 572
C
W
R
I
U
E
X
IDX
EXPANDED LOCKS
LOCK COUNT 574
WRITE LOCK OWNER IDENTIFIER 576

FIG. 6

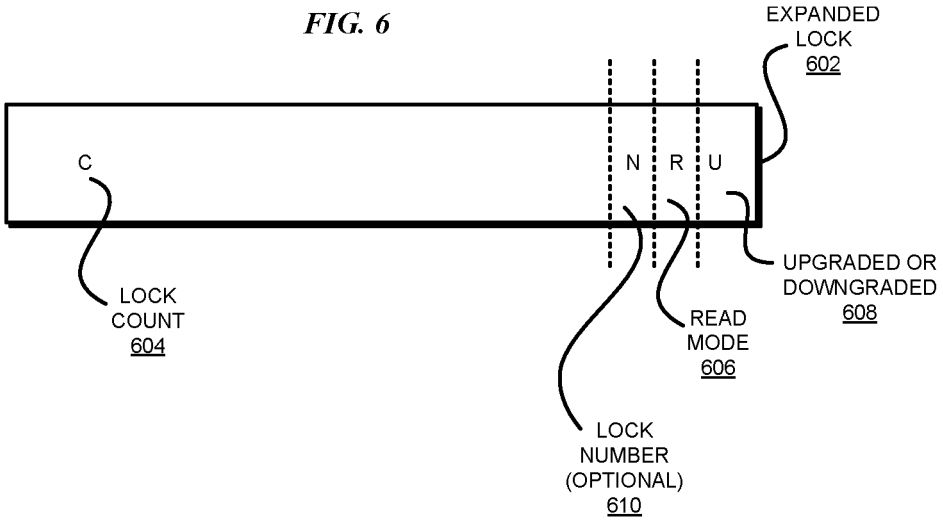

EXPANDED LOCK 602
C
N
R
U
LOCK COUNT 604
READ MODE 606
UPGRADED OR DOWNGRADED 608
LOCK NUMBER (OPTIONAL) 610

FIG. 7

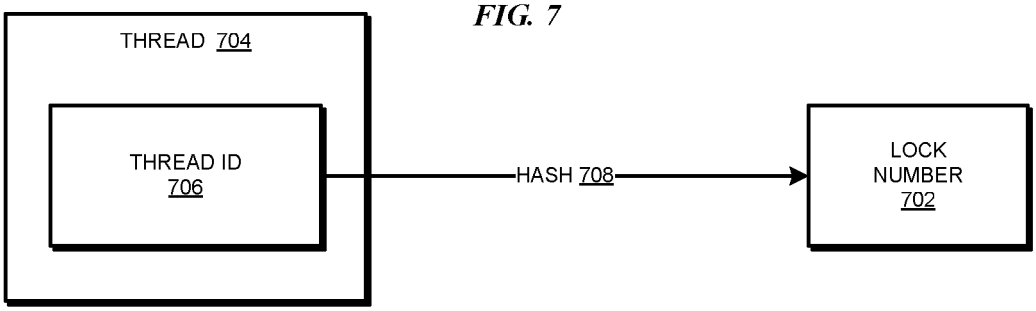

THREAD 704
THREAD ID 706
HASH 708
LOCK NUMBER 702

FIG. 8

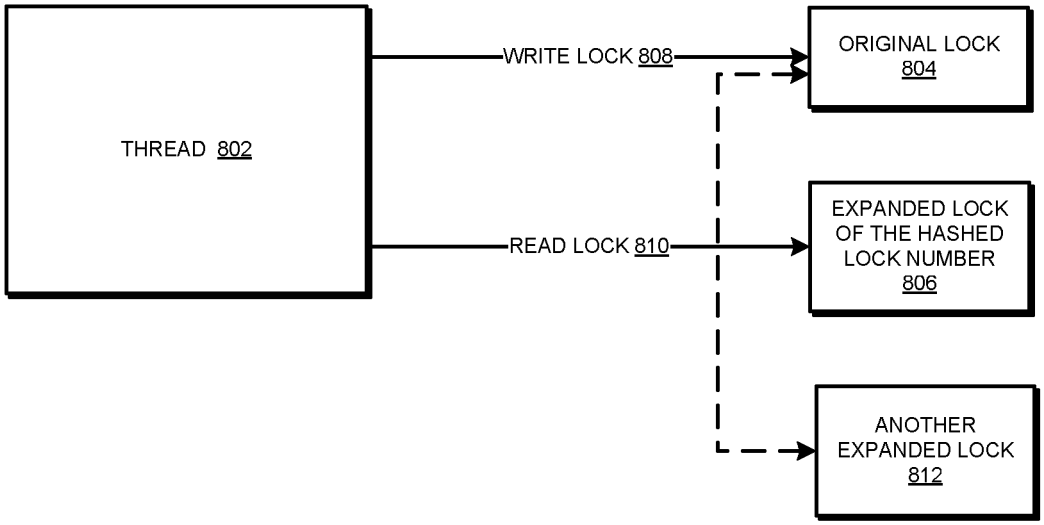

THREAD 802
WRITE LOCK 808
READ LOCK 810
ORIGINAL LOCK 804
EXPANDED LOCK OF THE HASHED LOCK NUMBER 806
ANOTHER EXPANDED LOCK 812

FIG. 9

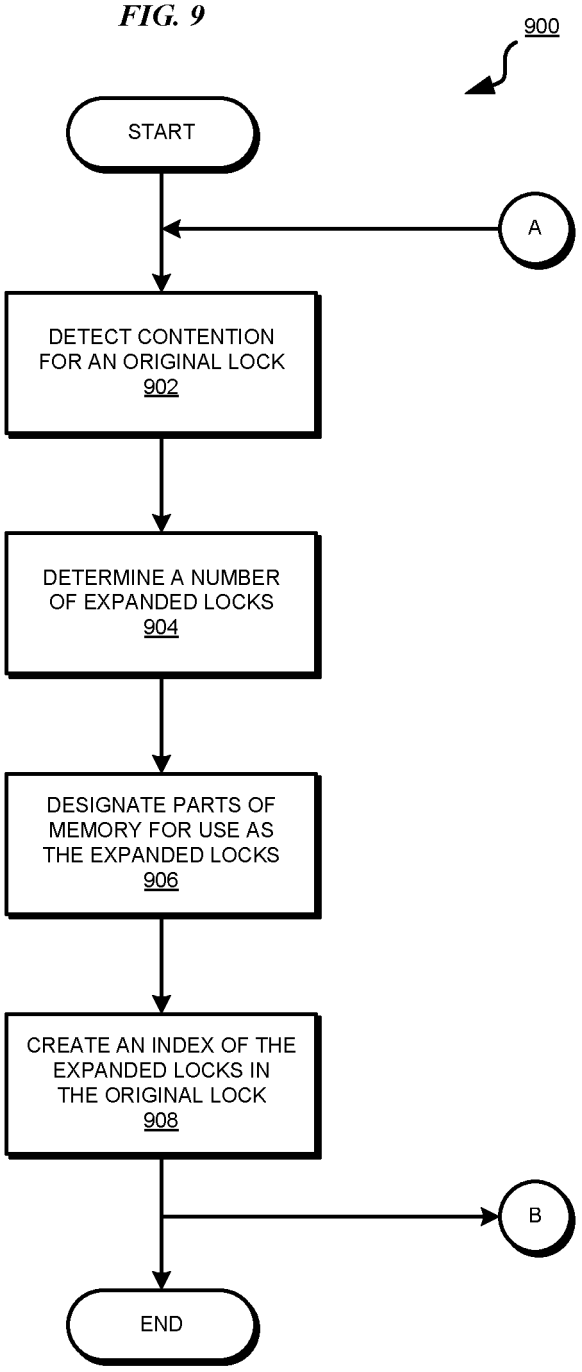

900
START
A
DETECT CONTENTION FOR AN ORIGINAL LOCK
902
DETERMINE A NUMBER OF EXPANDED LOCKS
904
DESIGNATE PARTS OF MEMORY FOR USE AS THE EXPANDED LOCKS
906
CREATE AN INDEX OF THE EXPANDED LOCKS IN THE ORIGINAL LOCK
908
B
END

FIG. 10

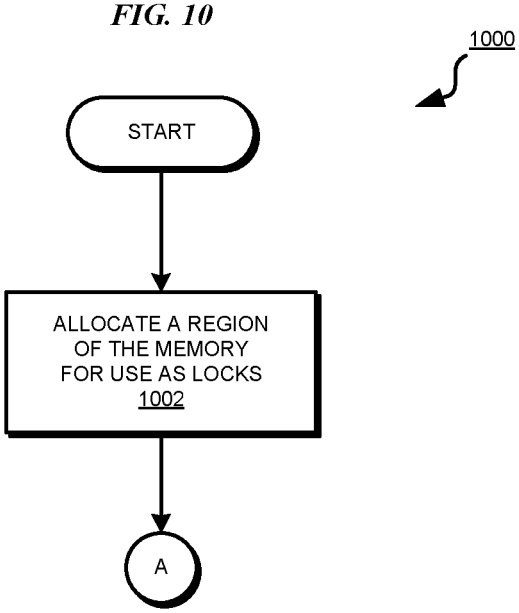

1000
START
ALLOCATE A REGION OF THE MEMORY FOR USE AS LOCKS
1002
A

FIG. 11

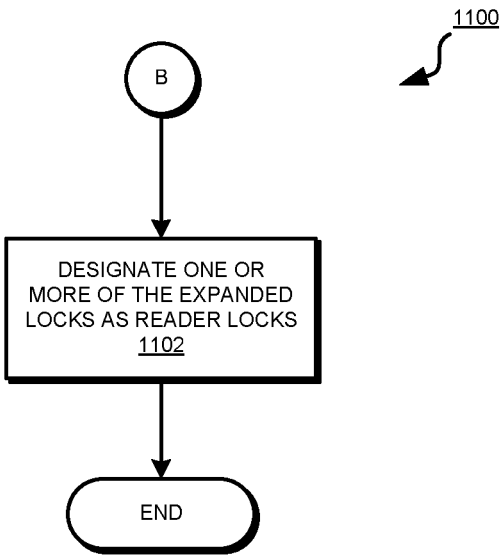
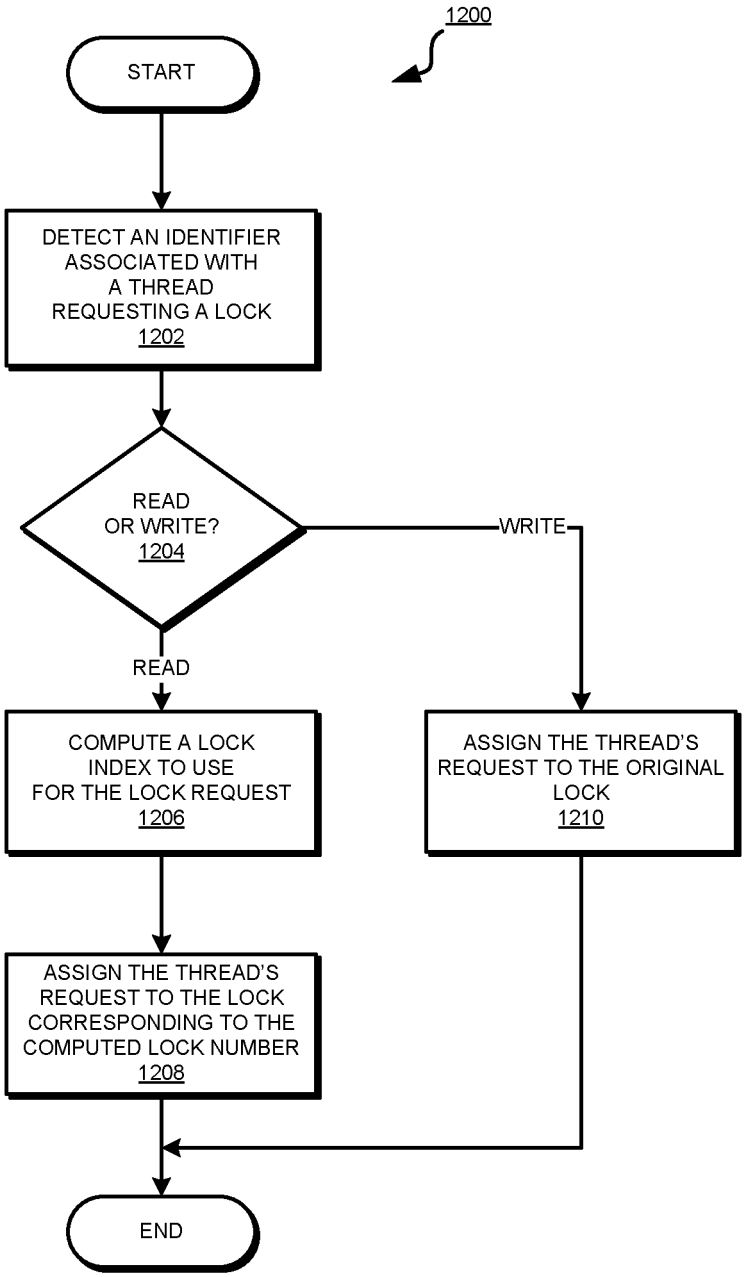

1100
B
DESIGNATE ONE OR MORE OF THE EXPANDED LOCKS AS READER LOCKS
1102
END

FIG. 12


1200
START
DETECT AN IDENTIFIER ASSOCIATED WITH A THREAD REQUESTING A LOCK
1202
READ OR WRITE?
1204
WRITE
READ
COMPUTE A LOCK INDEX TO USE FOR THE LOCK REQUEST
1206
ASSIGN THE THREAD'S REQUEST TO THE ORIGINAL LOCK
1210
ASSIGN THE THREAD'S REQUEST TO THE LOCK CORRESPONDING TO THE COMPUTED LOCK NUMBER
1208
END