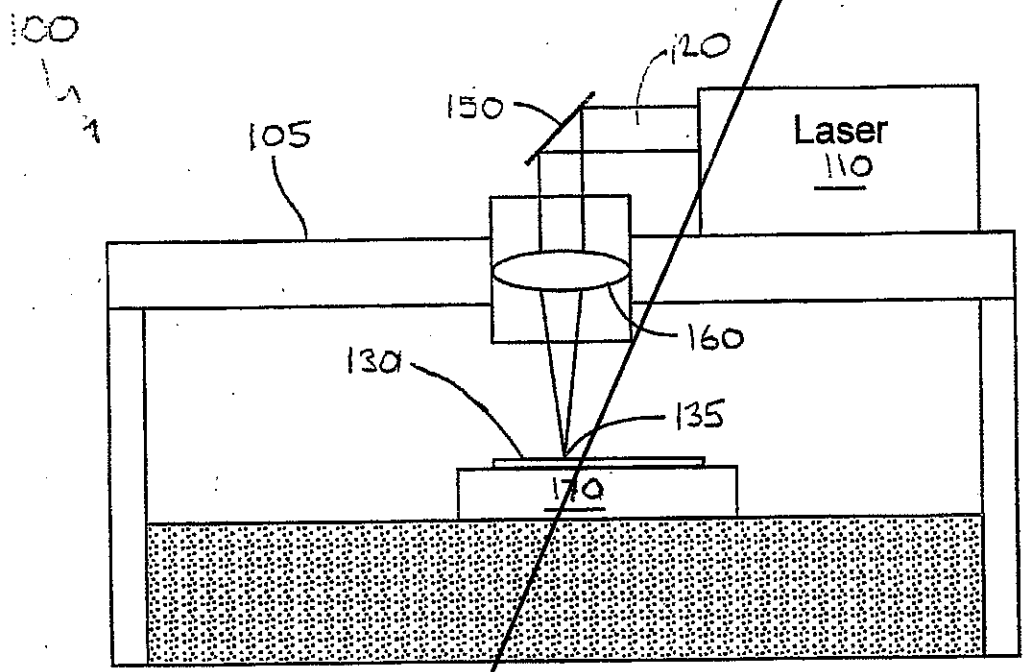

100
105
150
120
Laser
110
160
130
135
170

FIG. 1

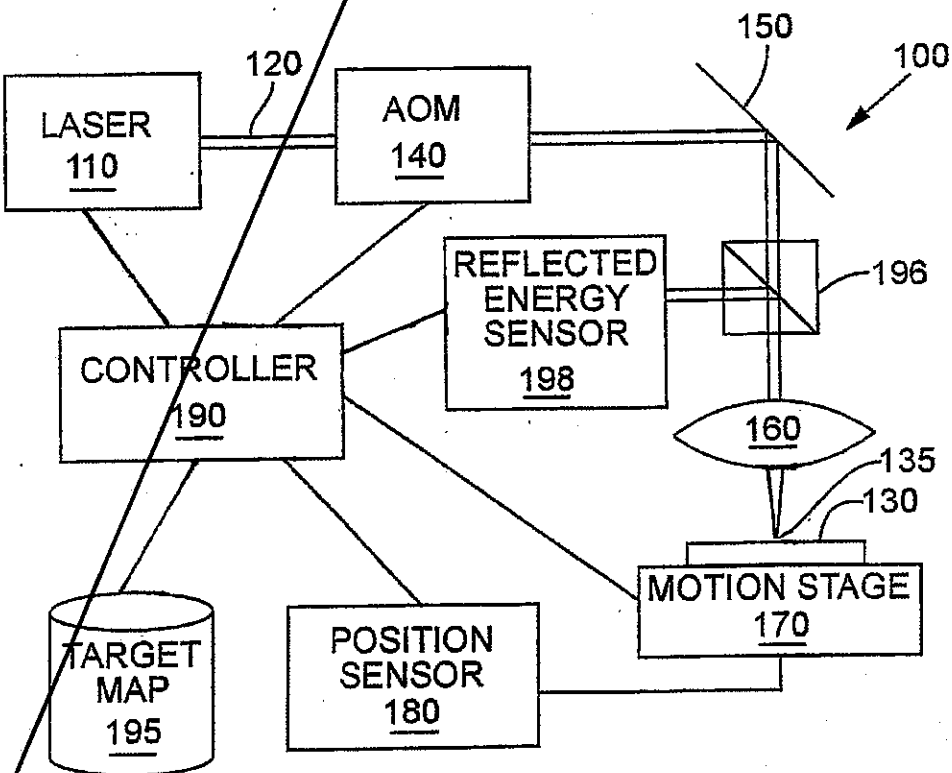

150
100
120
LASER
110
AOM
140
REFLECTED
ENERGY
SENSOR
198
196
CONTROLLER
190
160
135
130
MOTION STAGE
170
TARGET
MAP
195
POSITION
SENSOR
180

FIG. 2

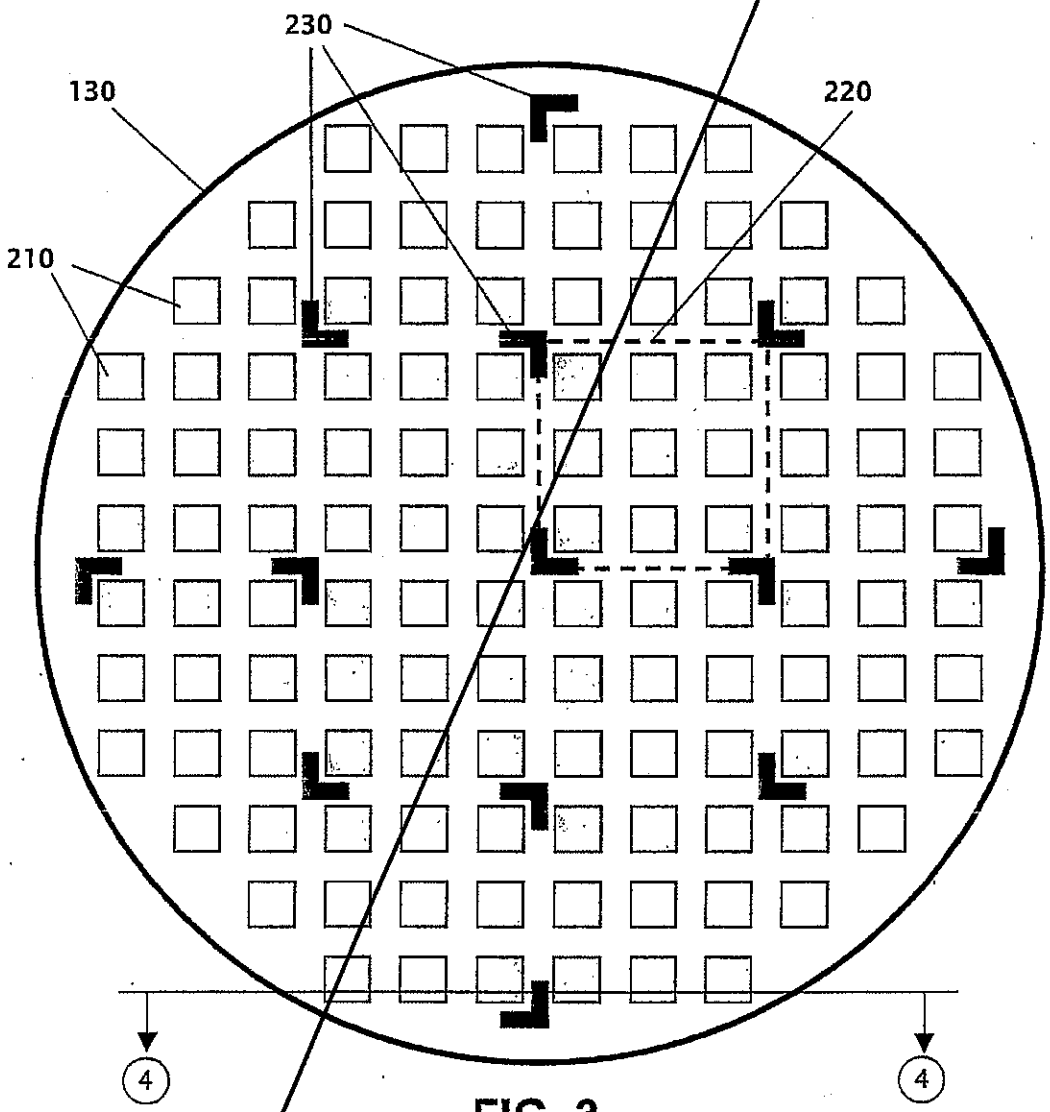


FIG. 3

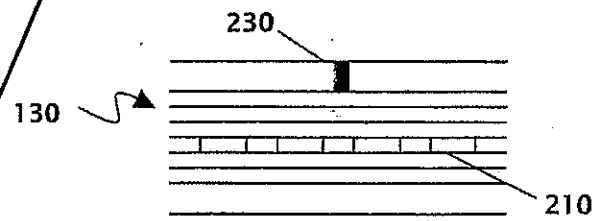


FIG. 4

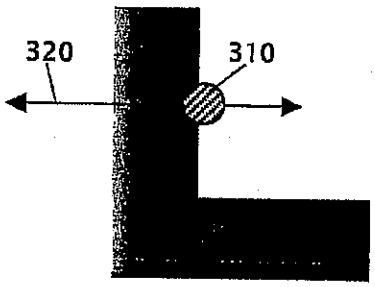


FIG. 5A

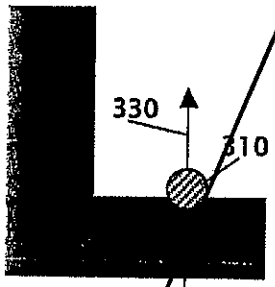


FIG. 5B



FIG. 5C

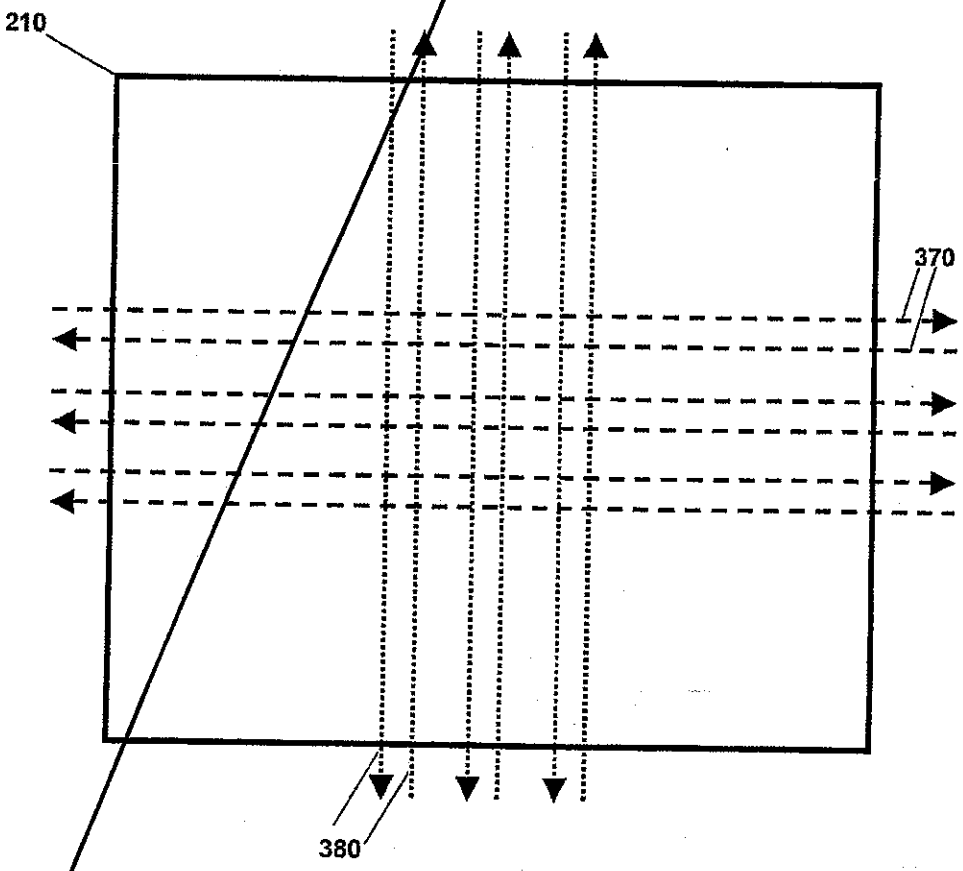


FIG. 6

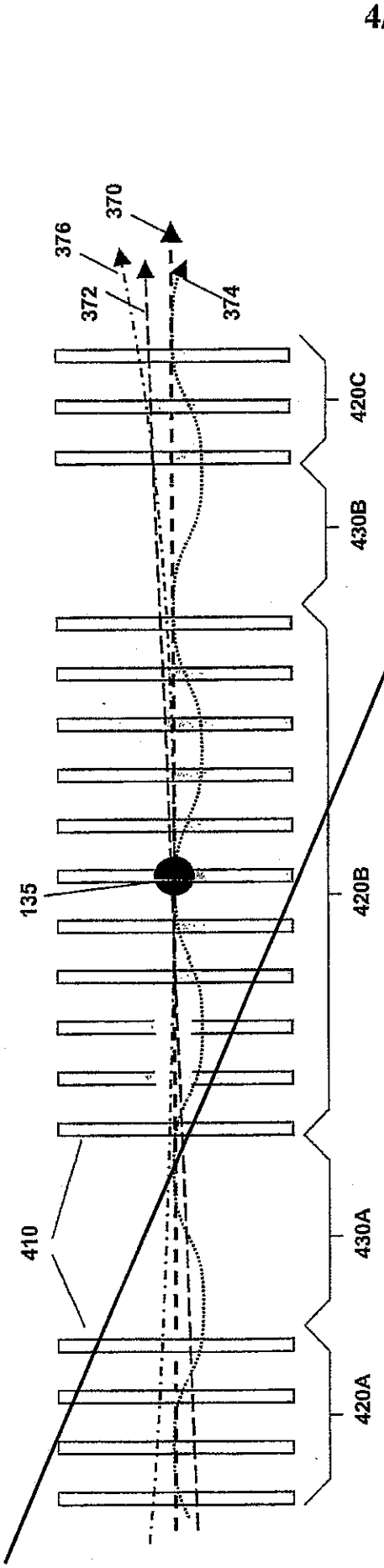

370
376
372
374
420C
430B
420B
135
410
430A
420A

FIG. 7

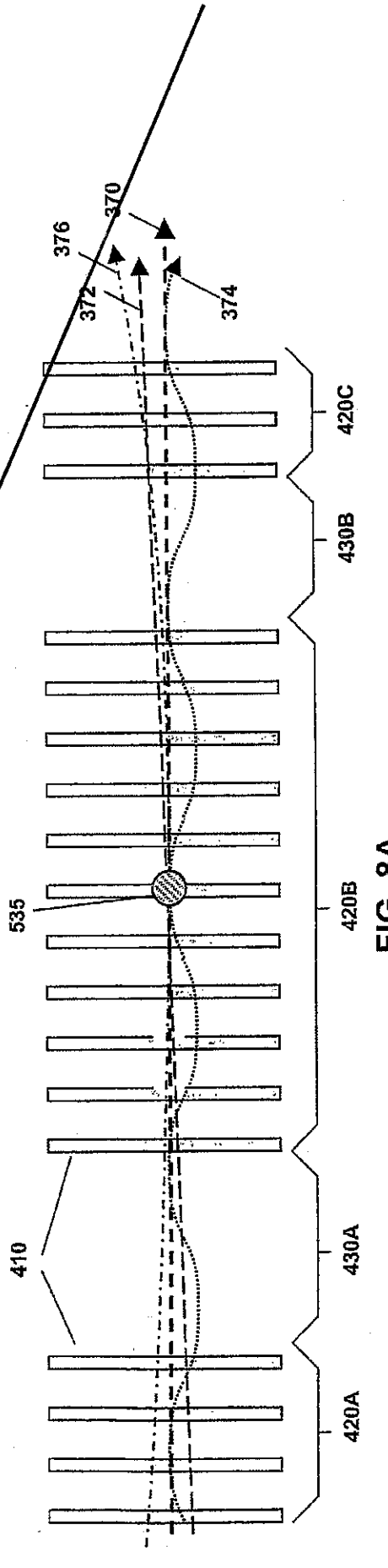

370
376
372
374
420C
430B
420B
535
410
430A
420A

FIG. 8A

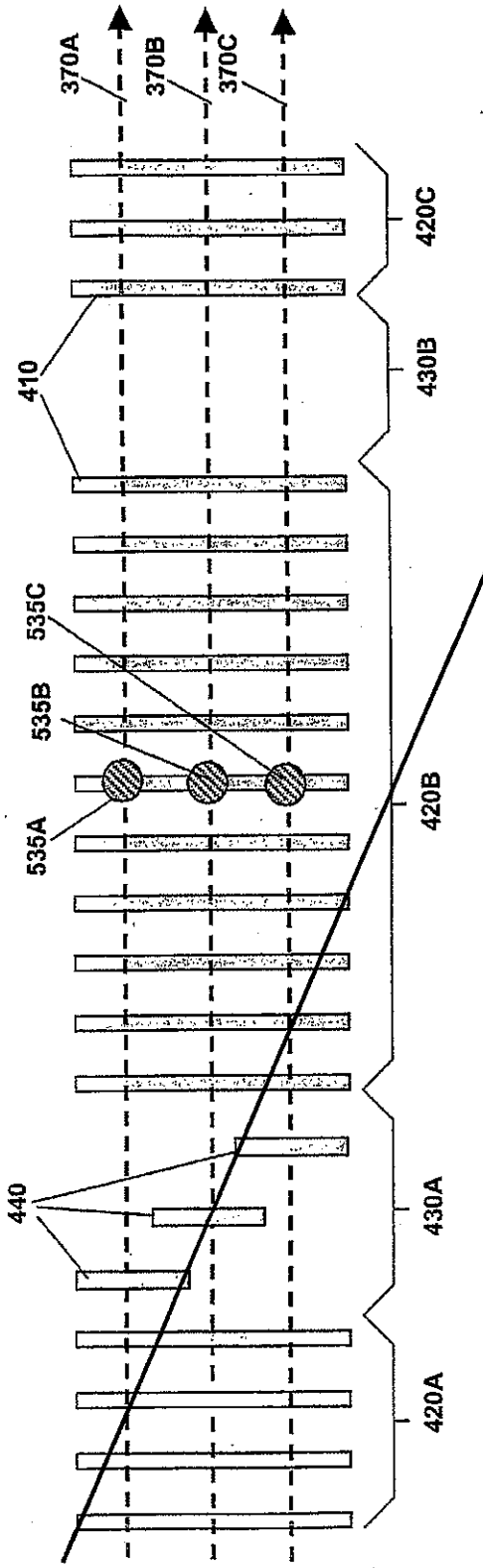

370A
370B
370C
420C
410
430B
535C
535B
535A
420B
440
430A
420A

FIG. 8B

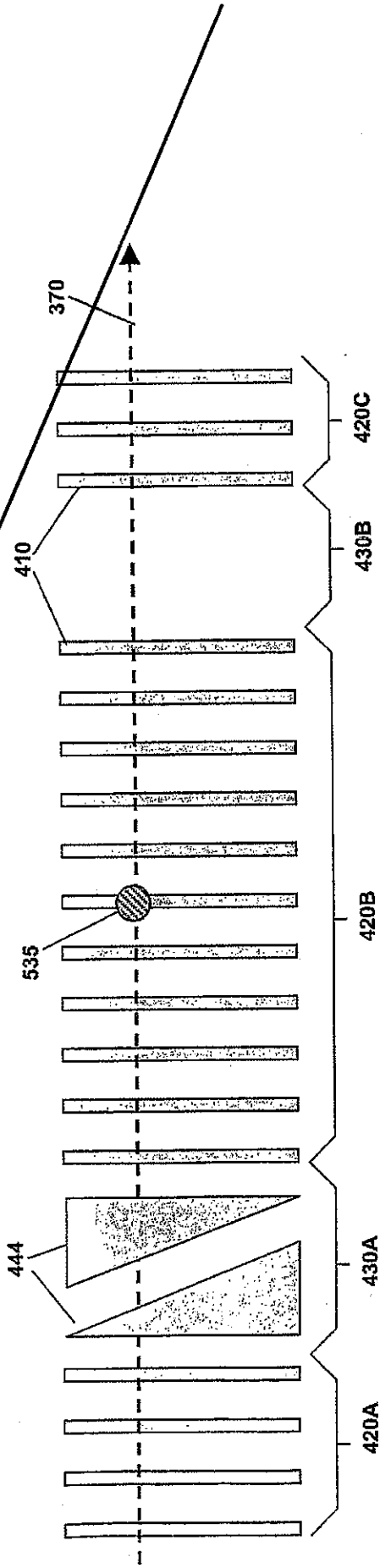

370
420C
410
430B
535
420B
444
430A
420A

FIG. 8C

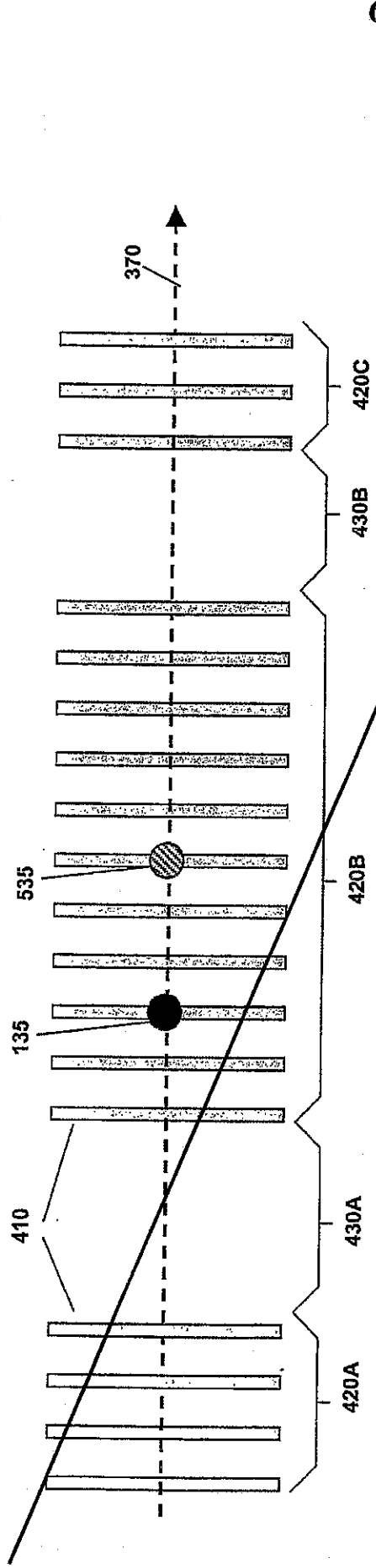

370
420C
430B
420B
535
135
410
430A
420A

FIG. 9A

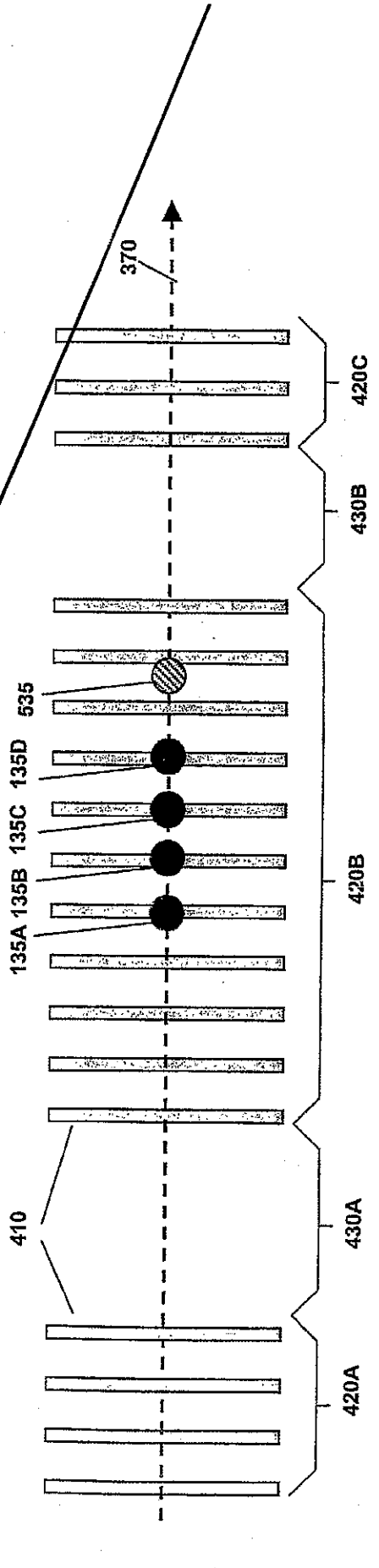

370
420C
430B
535
135D
135C
135B
135A
420B
410
430A
420A

FIG. 9B

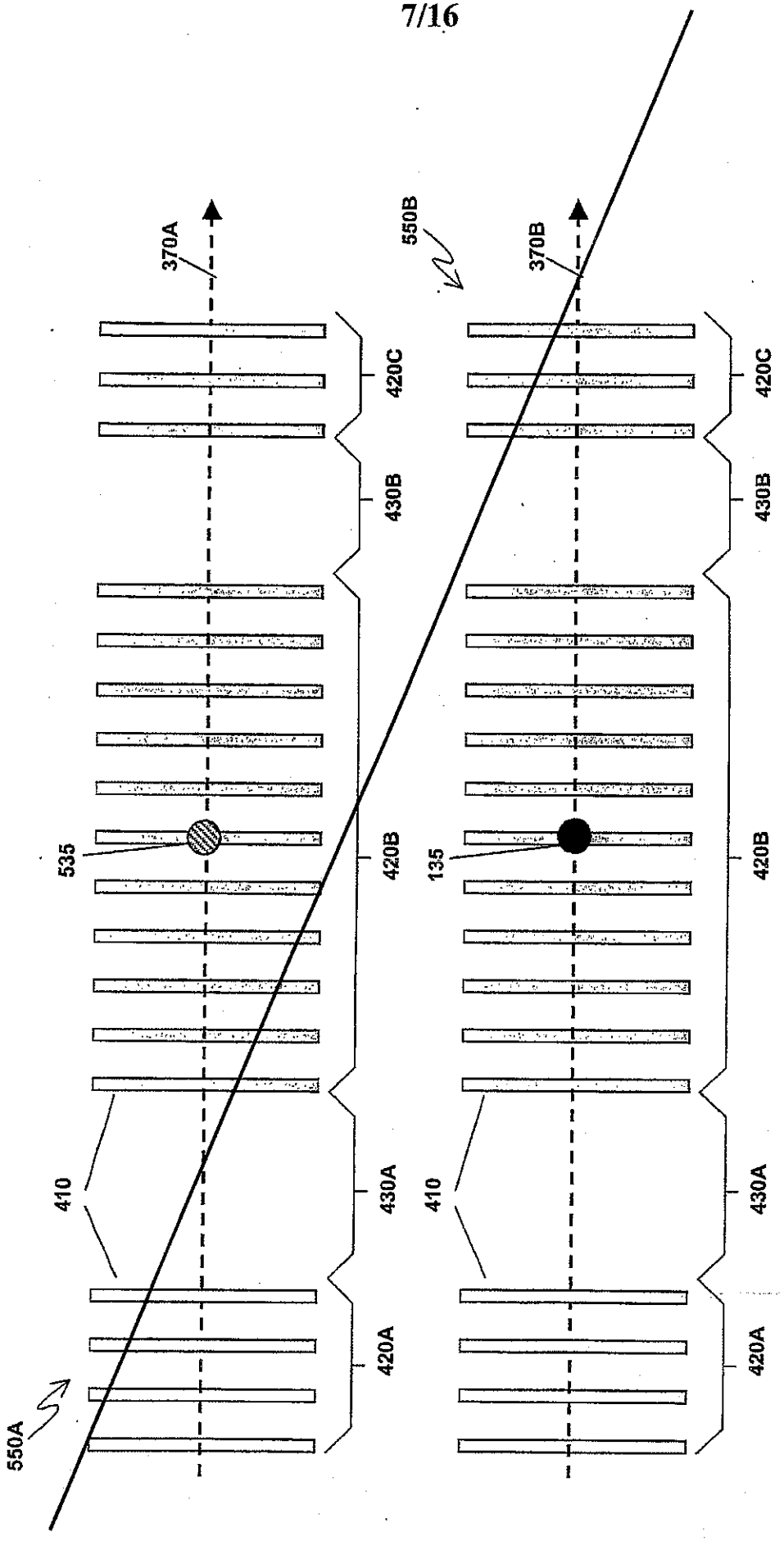


FIG. 9C

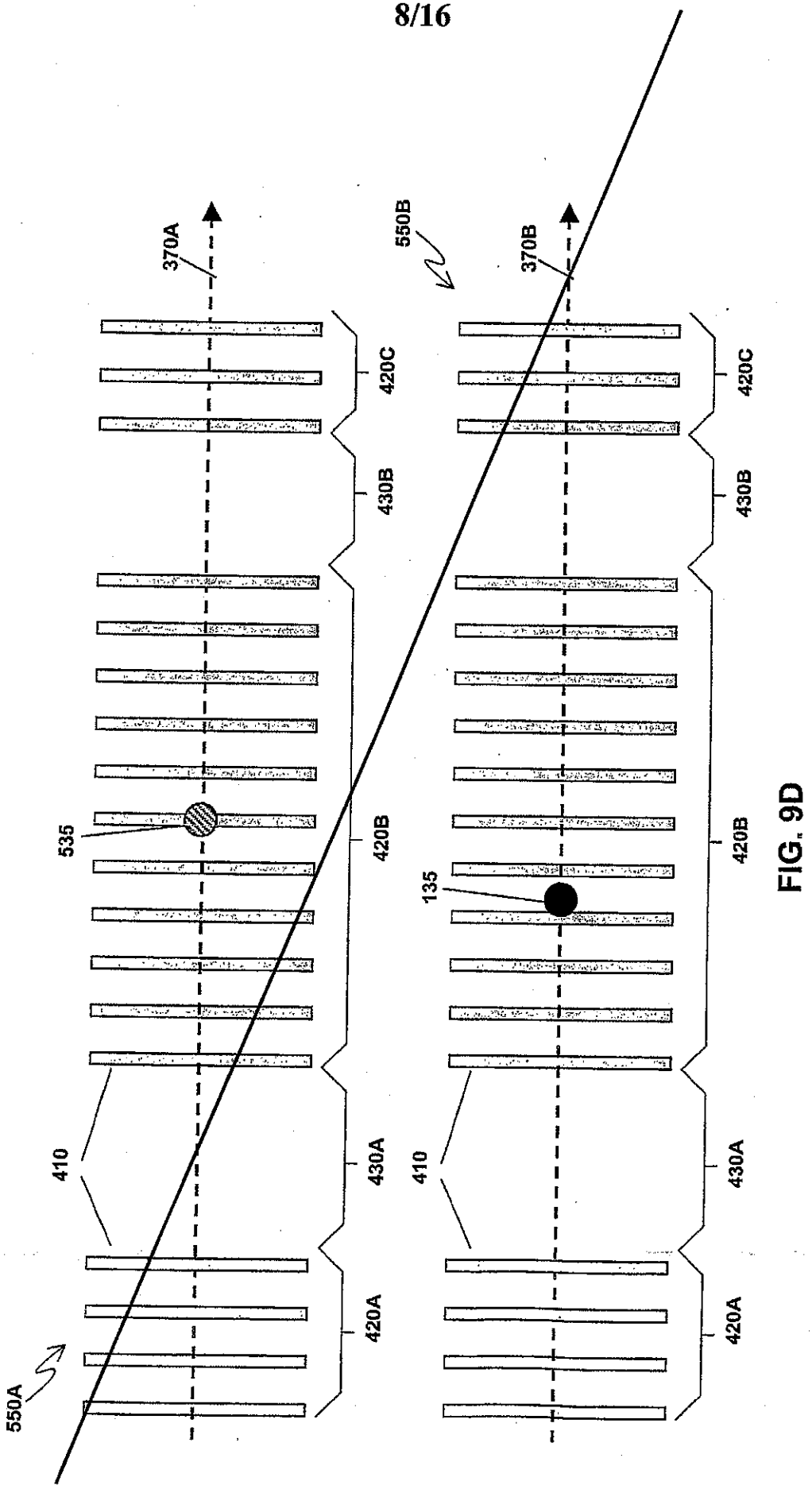


FIG. 9D

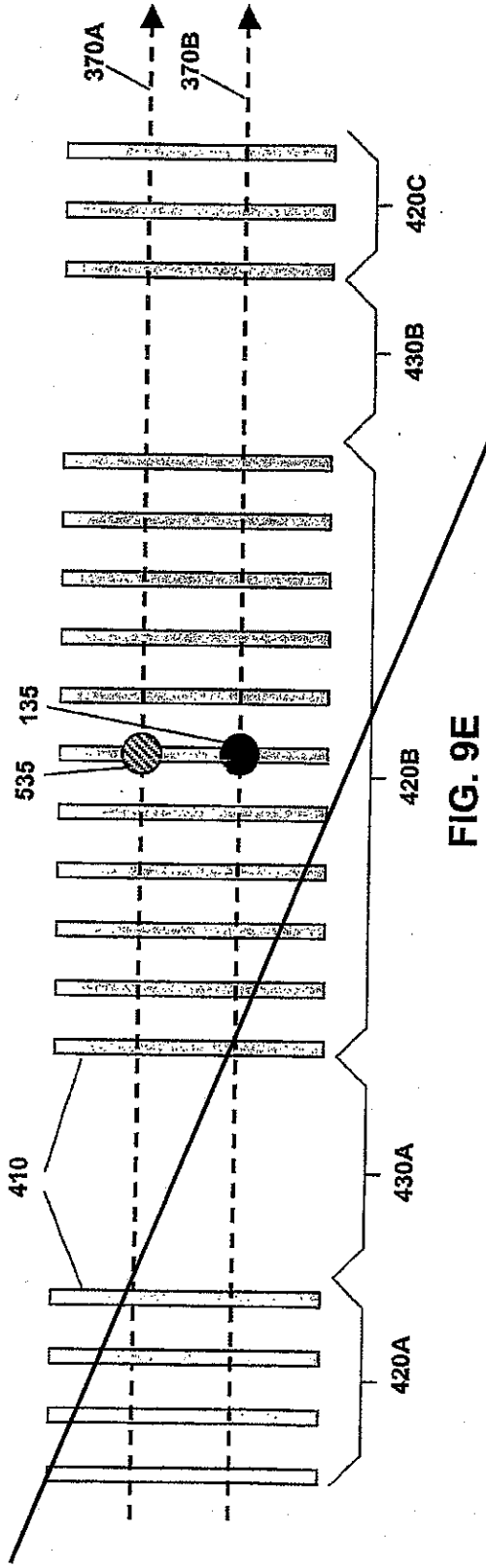

370A
370B
420C
430B
420B
135
535
430A
410
420A

FIG. 9E

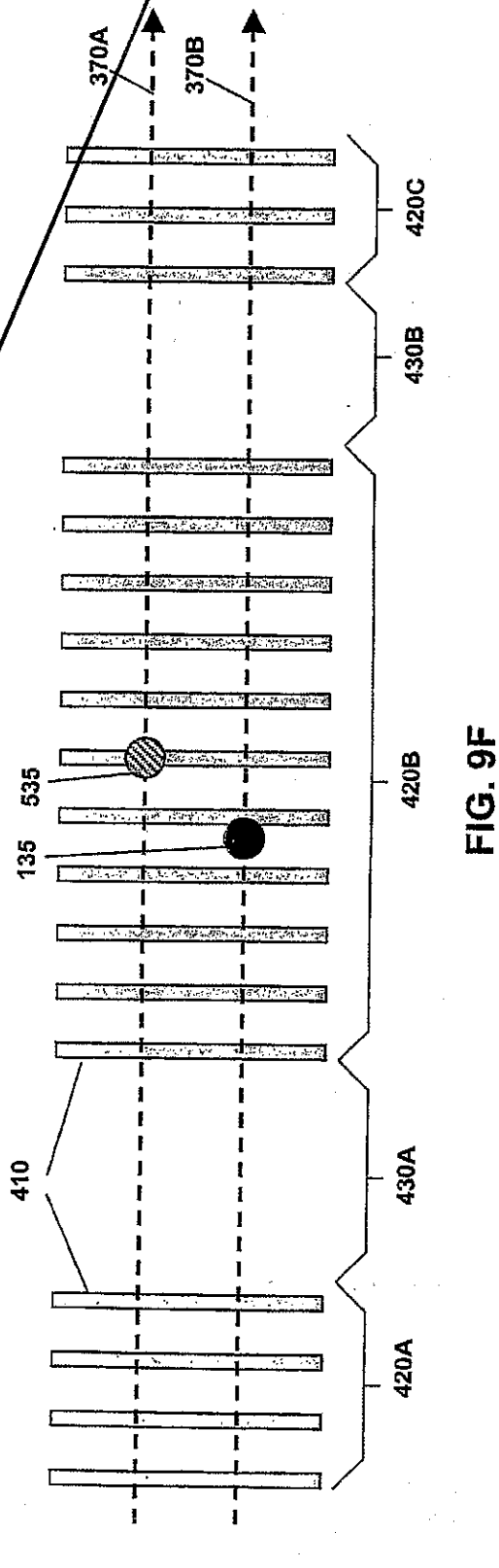

370A
370B
420C
430B
420B
535
135
430A
410
420A

FIG. 9F

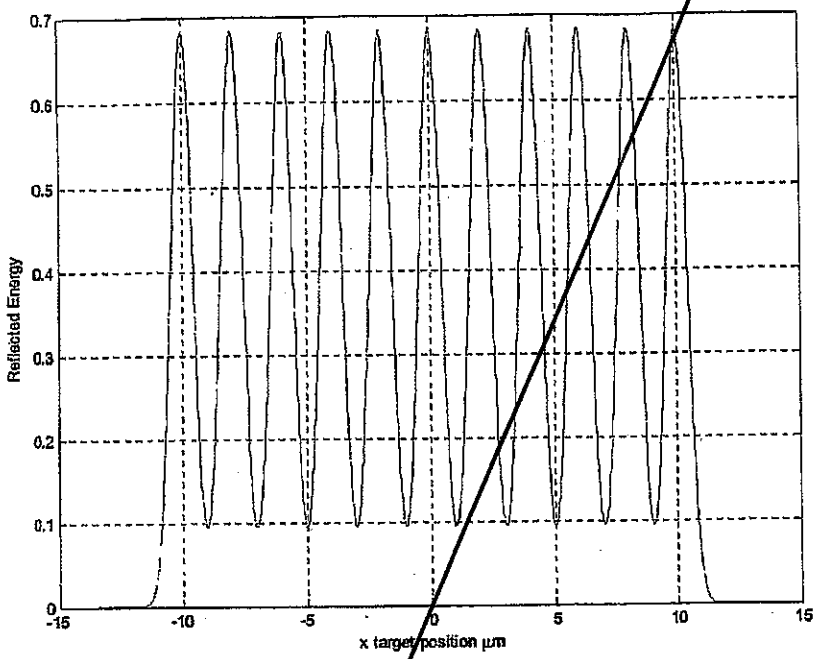

Reflected Energy
x target position µm
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-15
-10
-5
0
5
10
15

FIG. 10

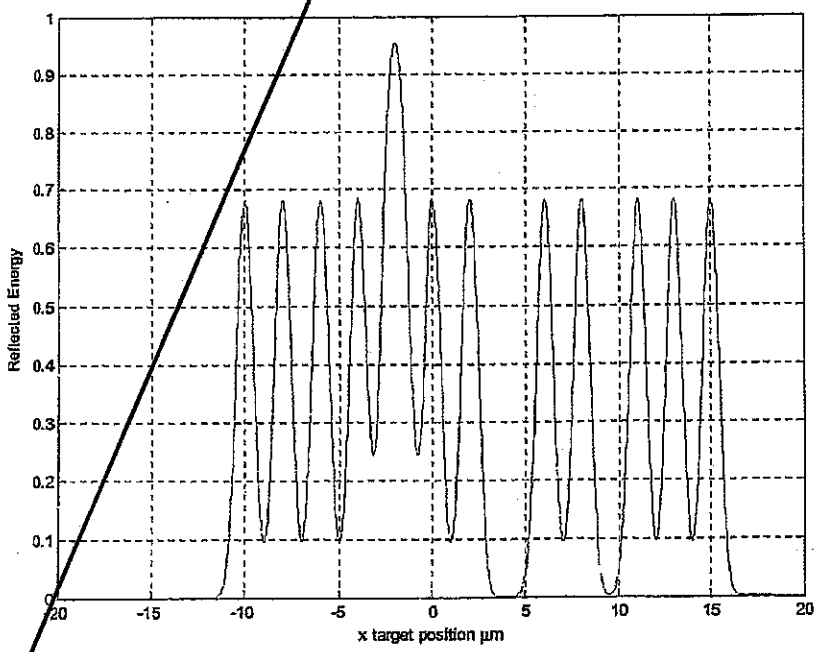

Reflected Energy
x target position µm
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-20
-15
-10
-5
0
5
10
15
20

FIG. 11

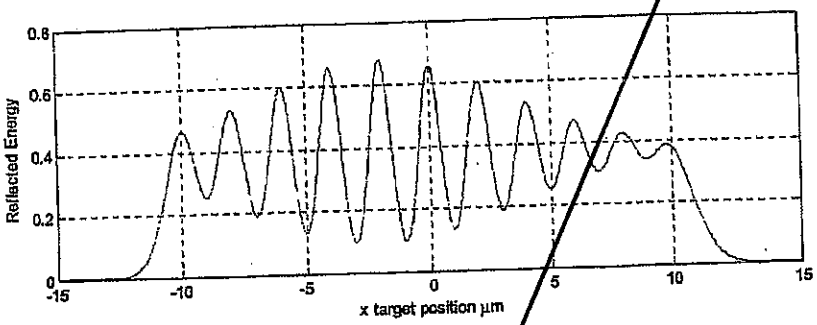


FIG. 12A

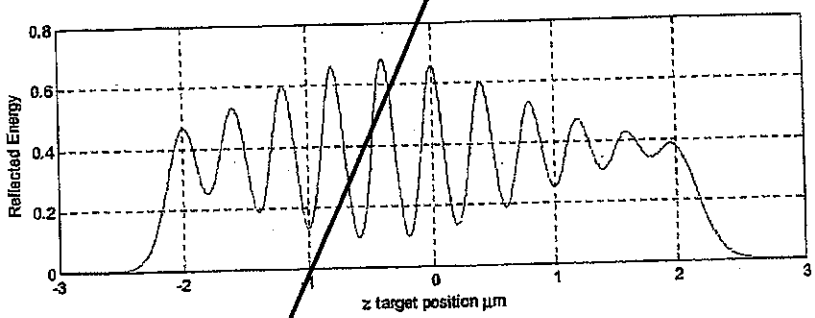


FIG. 12B

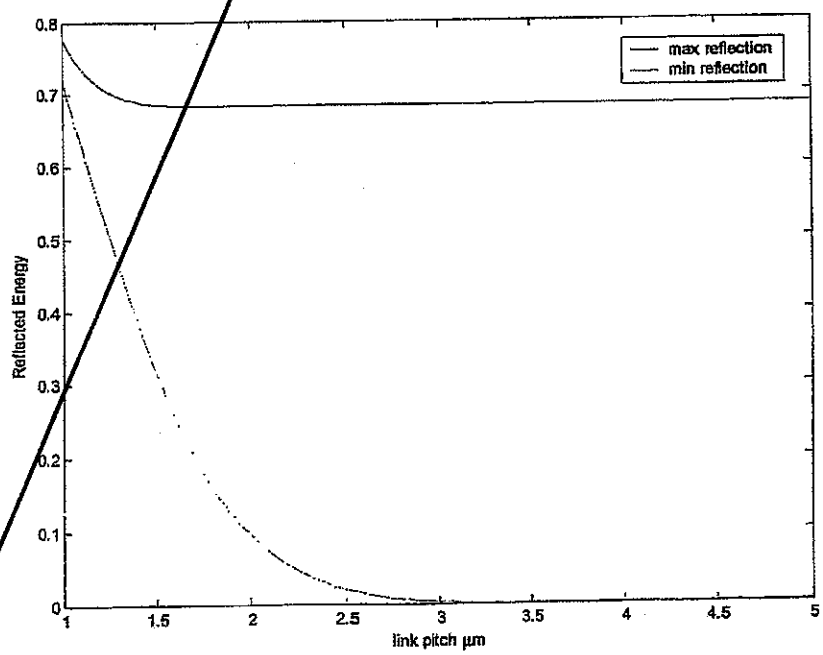


FIG. 13

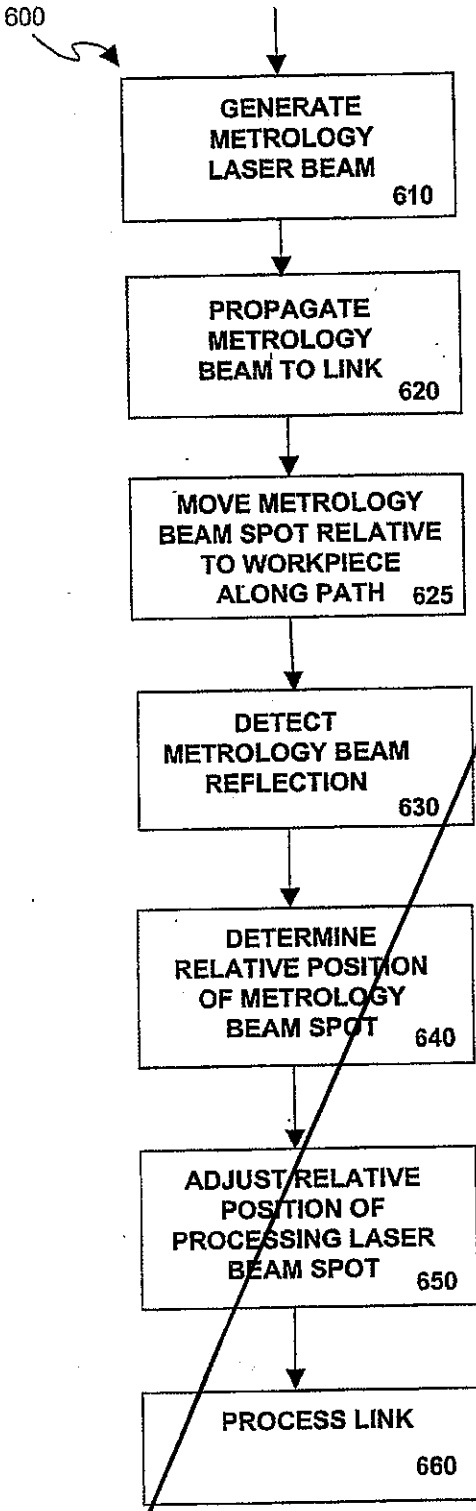


FIG. 14

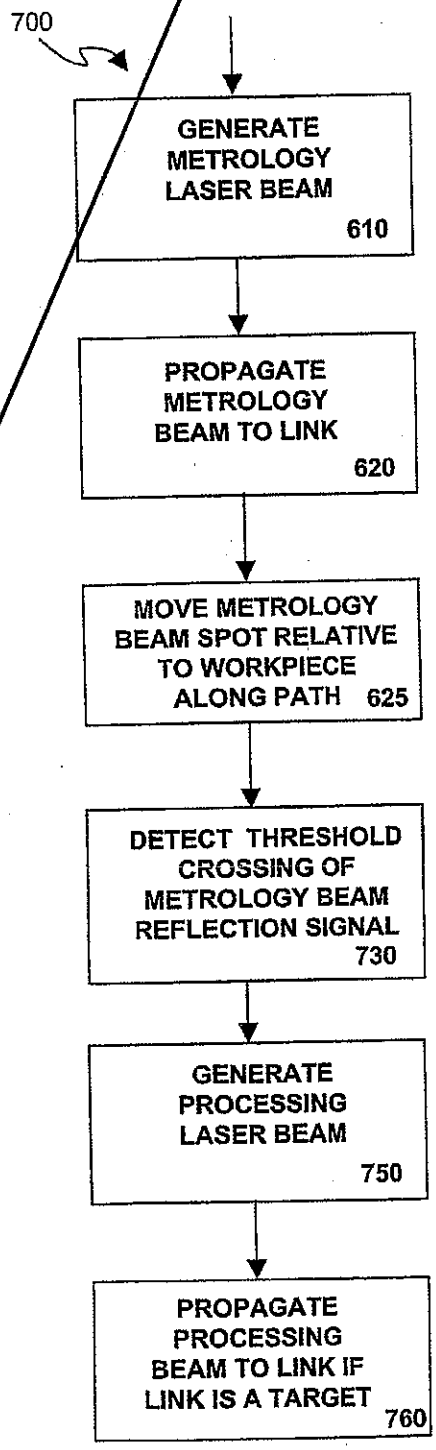


FIG. 15A

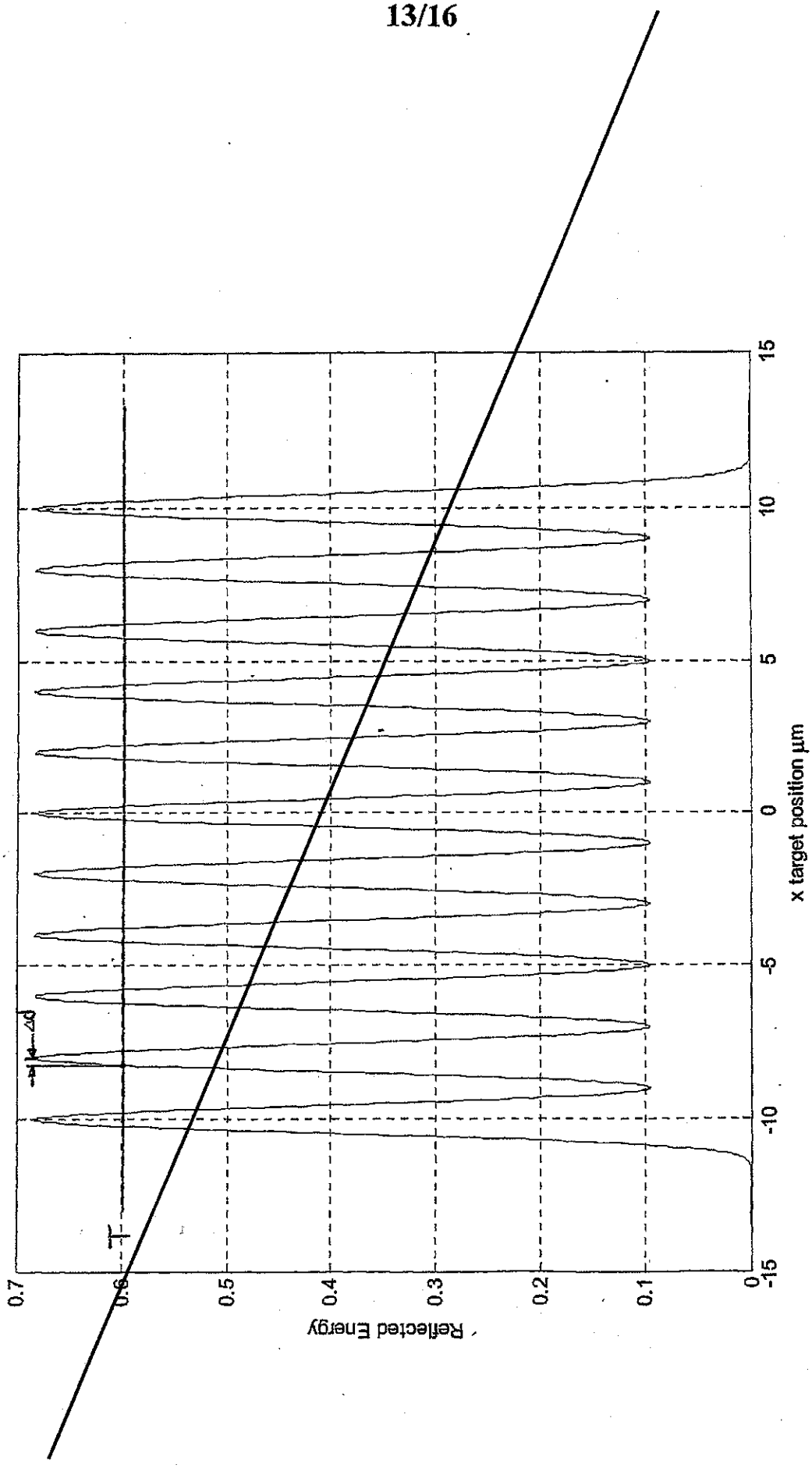

Reflected Energy
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
x target position µm
15
10
5
0
-5
-10
-15
T
Δd

FIG. 15B

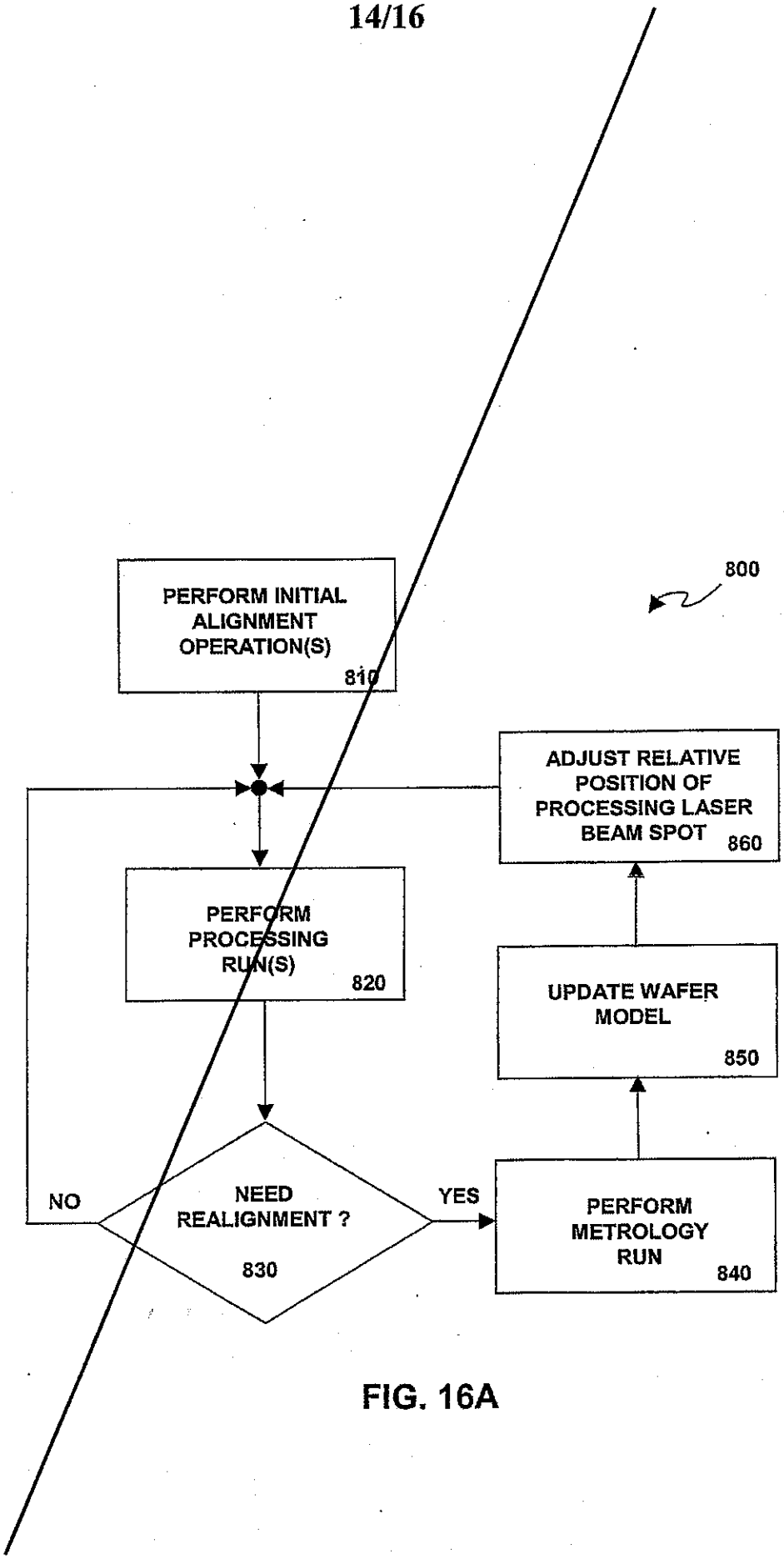

800
PERFORM INITIAL ALIGNMENT OPERATION(S)
810
ADJUST RELATIVE POSITION OF PROCESSING LASER BEAM SPOT
860
PERFORM PROCESSING RUN(S)
820
UPDATE WAFER MODEL
850
NO
NEED REALIGNMENT ?
830
YES
PERFORM METROLOGY RUN
840

FIG. 16A

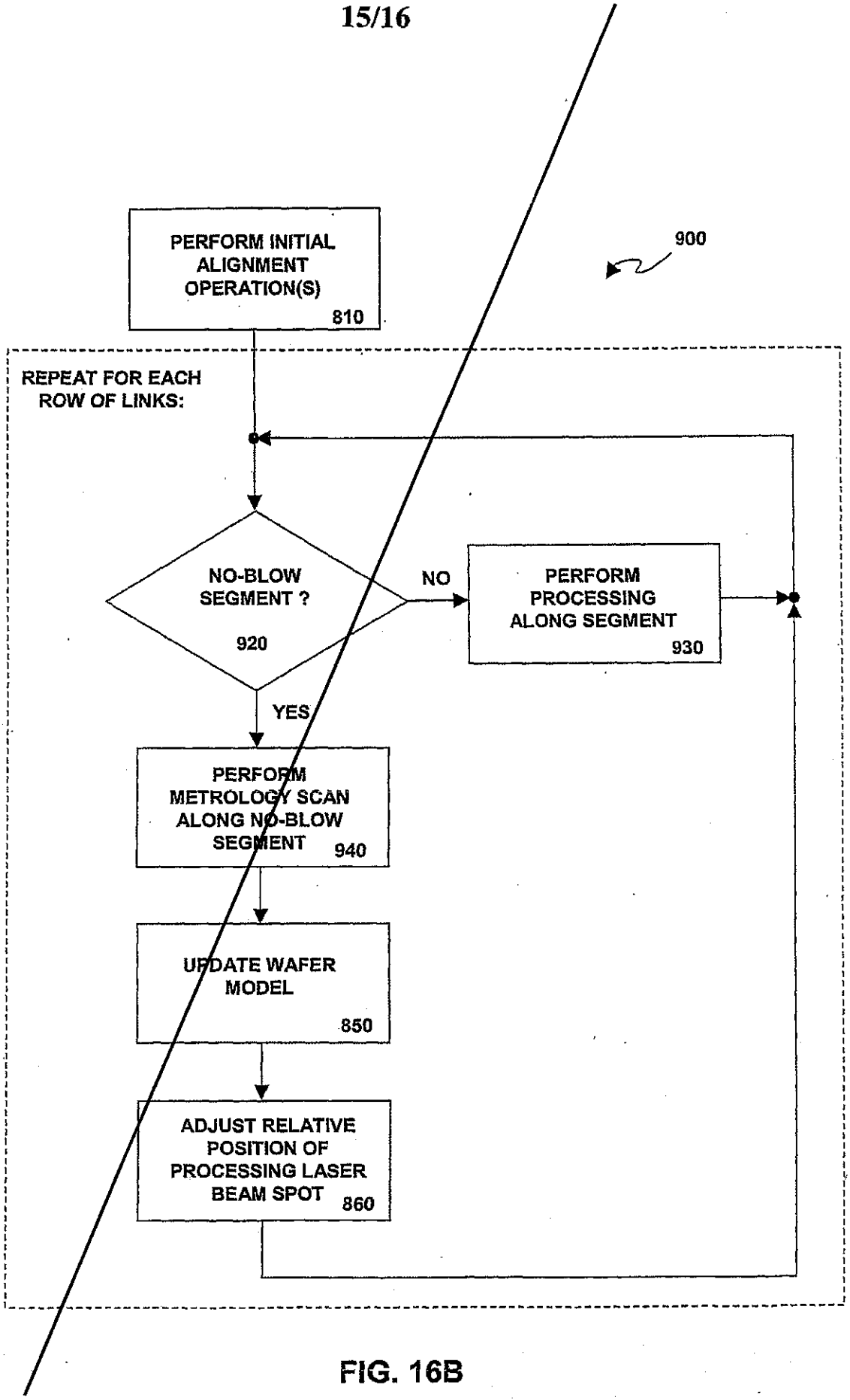

900
PERFORM INITIAL ALIGNMENT OPERATION(S)
810
REPEAT FOR EACH ROW OF LINKS:
NO-BLOW SEGMENT ?
920
NO
PERFORM PROCESSING ALONG SEGMENT
930
YES
PERFORM METROLOGY SCAN ALONG NO-BLOW SEGMENT
940
UPDATE WAFER MODEL
850
ADJUST RELATIVE POSITION OF PROCESSING LASER BEAM SPOT
860

FIG. 16B

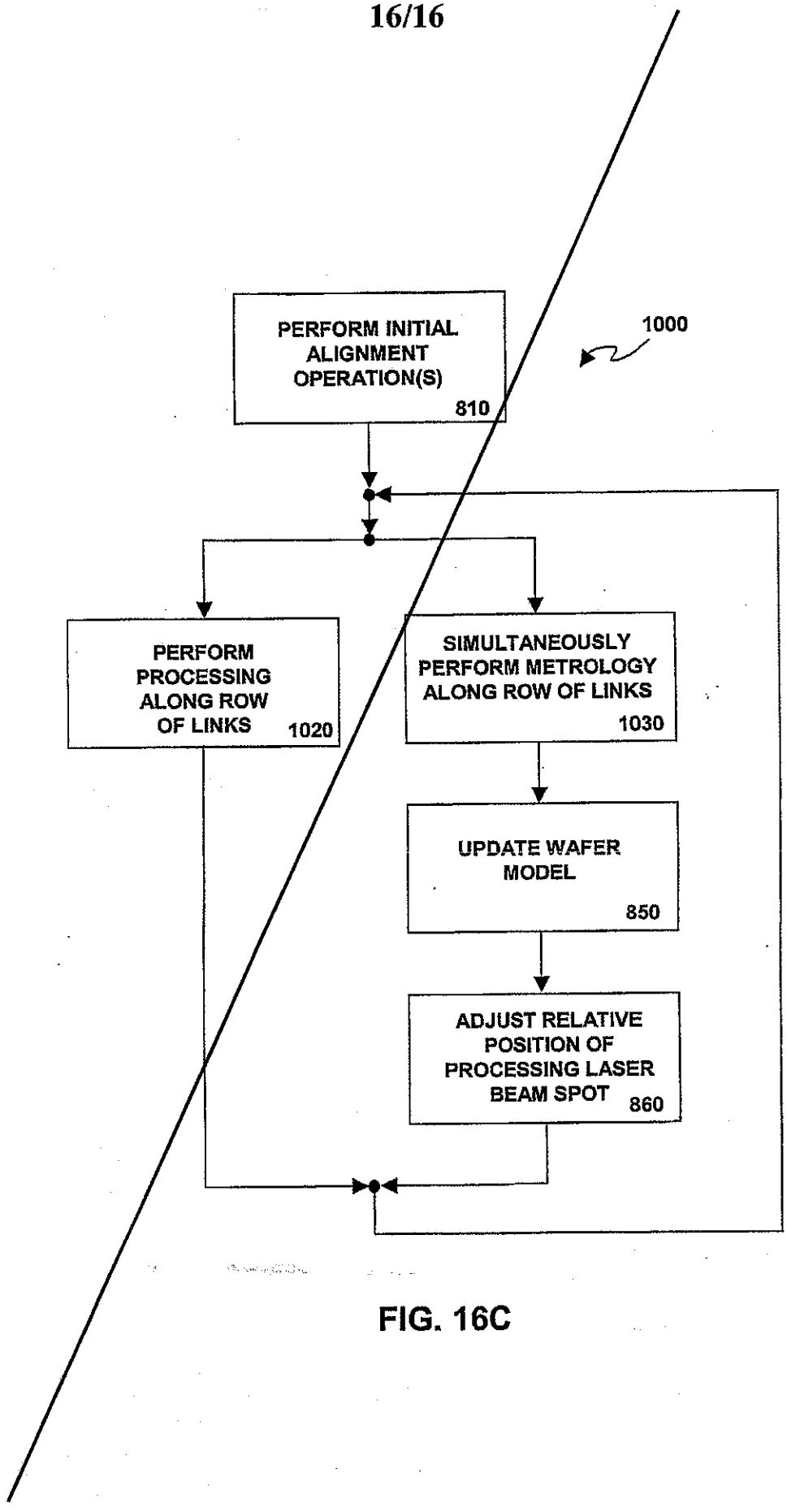

PERFORM INITIAL ALIGNMENT OPERATION(S)
810
1000
PERFORM PROCESSING ALONG ROW OF LINKS
1020
SIMULTANEOUSLY PERFORM METROLOGY ALONG ROW OF LINKS
1030
UPDATE WAFER MODEL
850
ADJUST RELATIVE POSITION OF PROCESSING LASER BEAM SPOT
860

FIG. 16C

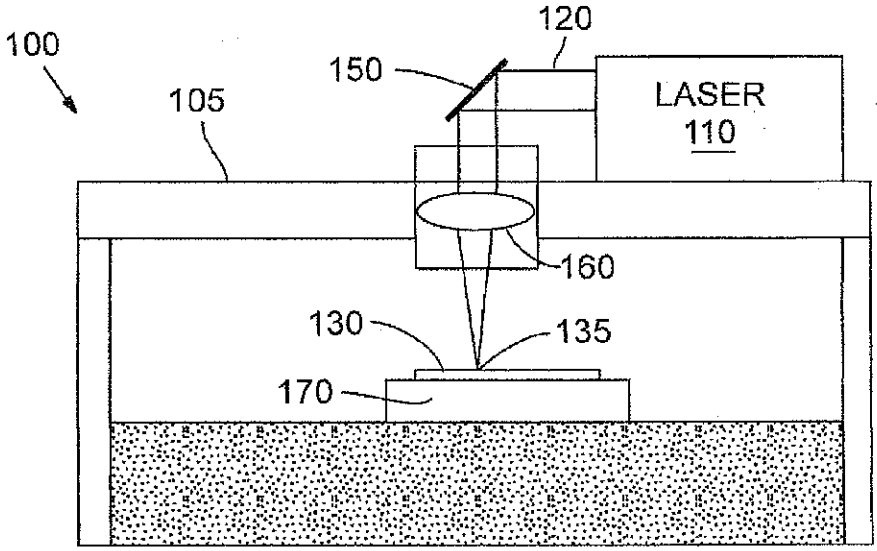

100
105
120
150
LASER
110
160
130
135
170

FIG. 1

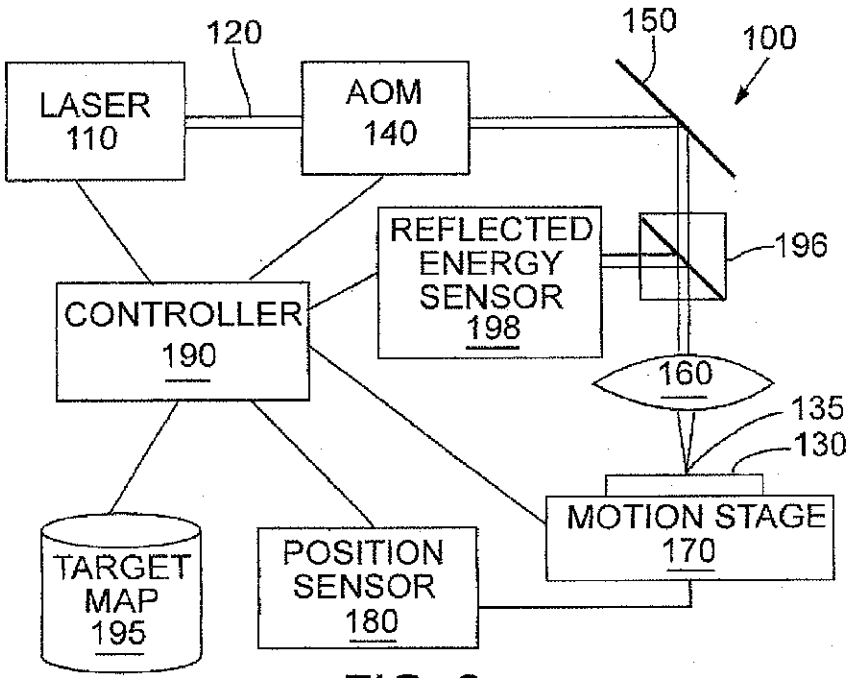

120
150
100
LASER
110
AOM
140
REFLECTED
ENERGY
SENSOR
198
196
CONTROLLER
190
160
135
130
MOTION STAGE
170
TARGET
MAP
195
POSITION
SENSOR
180

FIG. 2

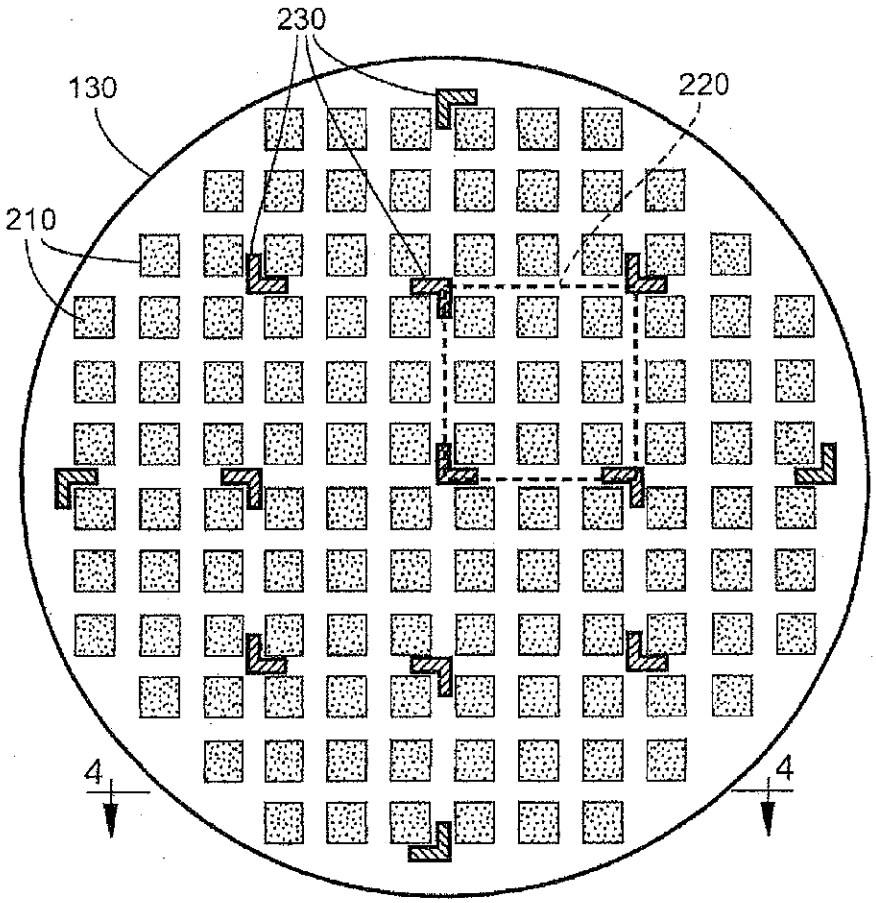


FIG. 3
(Prior Art)

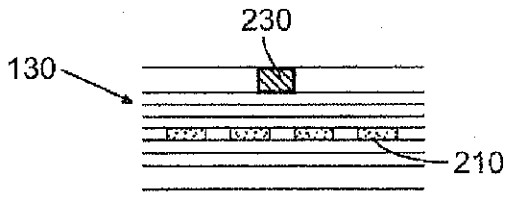


FIG. 4
(Prior Art)

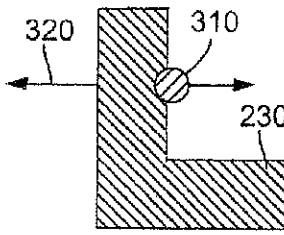


FIG. 5A
(Prior Art)

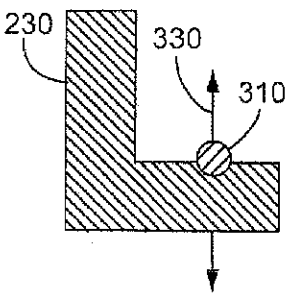


FIG. 5B
(Prior Art)

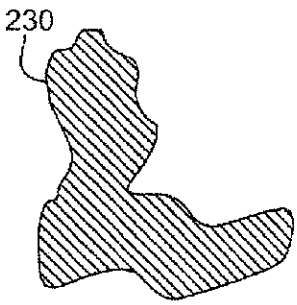


FIG. 5C
(Prior Art)

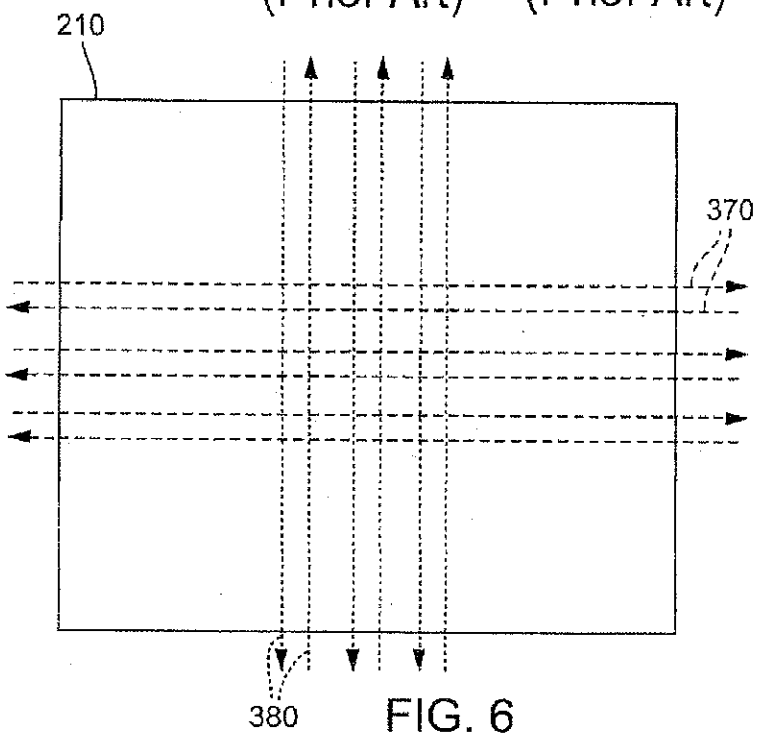


FIG. 6
(Prior Art)

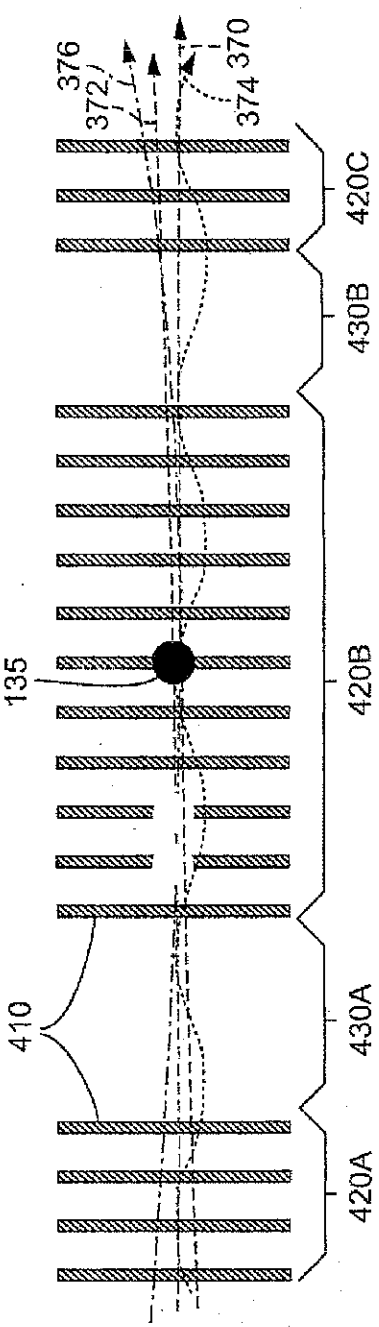

376
372
374
370
135
410
420A
430A
420B
430B
420C

FIG. 7

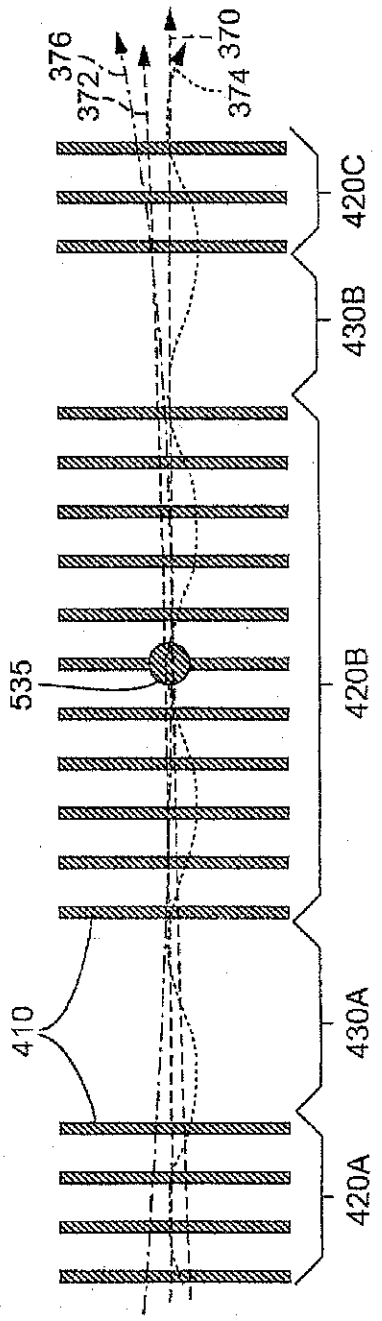

376
372
374
370
535
410
420A
430A
420B
430B
420C

FIG. 8A

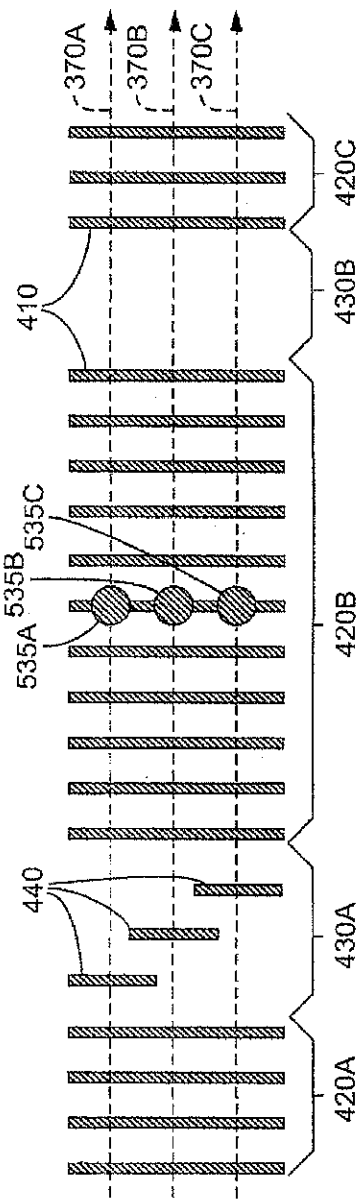

370A
370B
370C
410
535C
535B
535A
440
420A
430A
420B
430B
420C

FIG. 8B

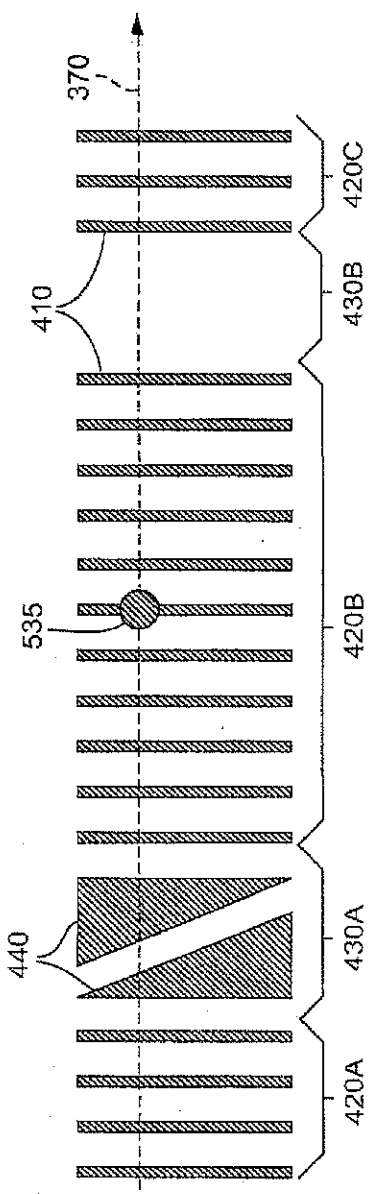

370
410
535
440
420A
430A
420B
430B
420C

FIG. 8C

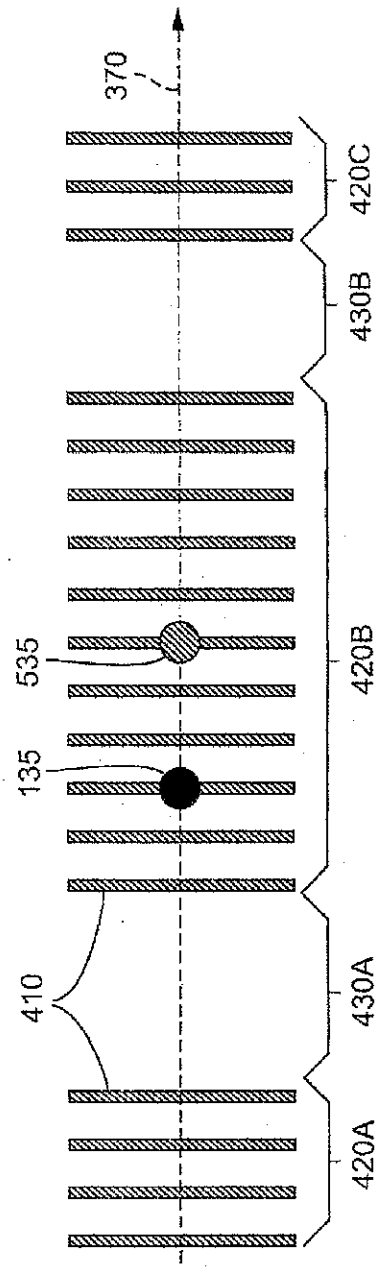

370
420C
430B
420B
535
135
410
430A
420A

FIG. 9A

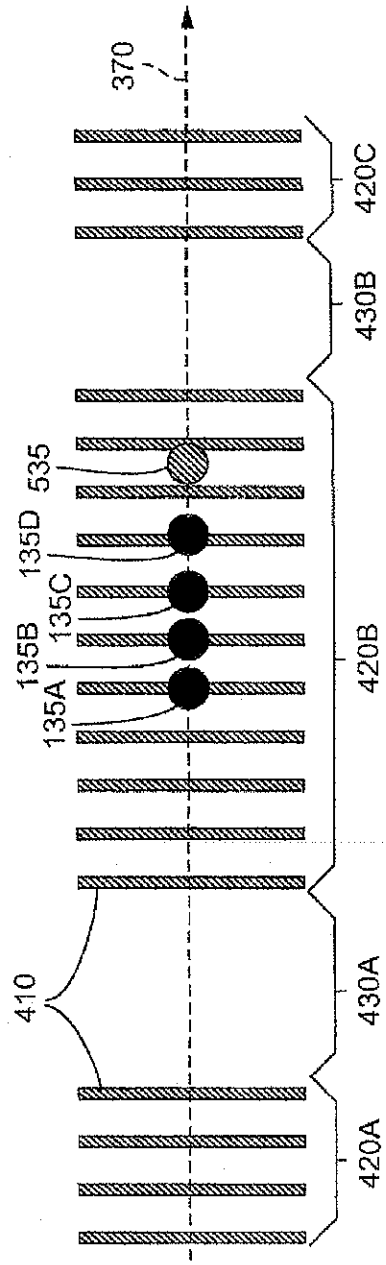

370
420C
430B
535
135D
135C
135B
135A
420B
410
430A
420A

FIG. 9B

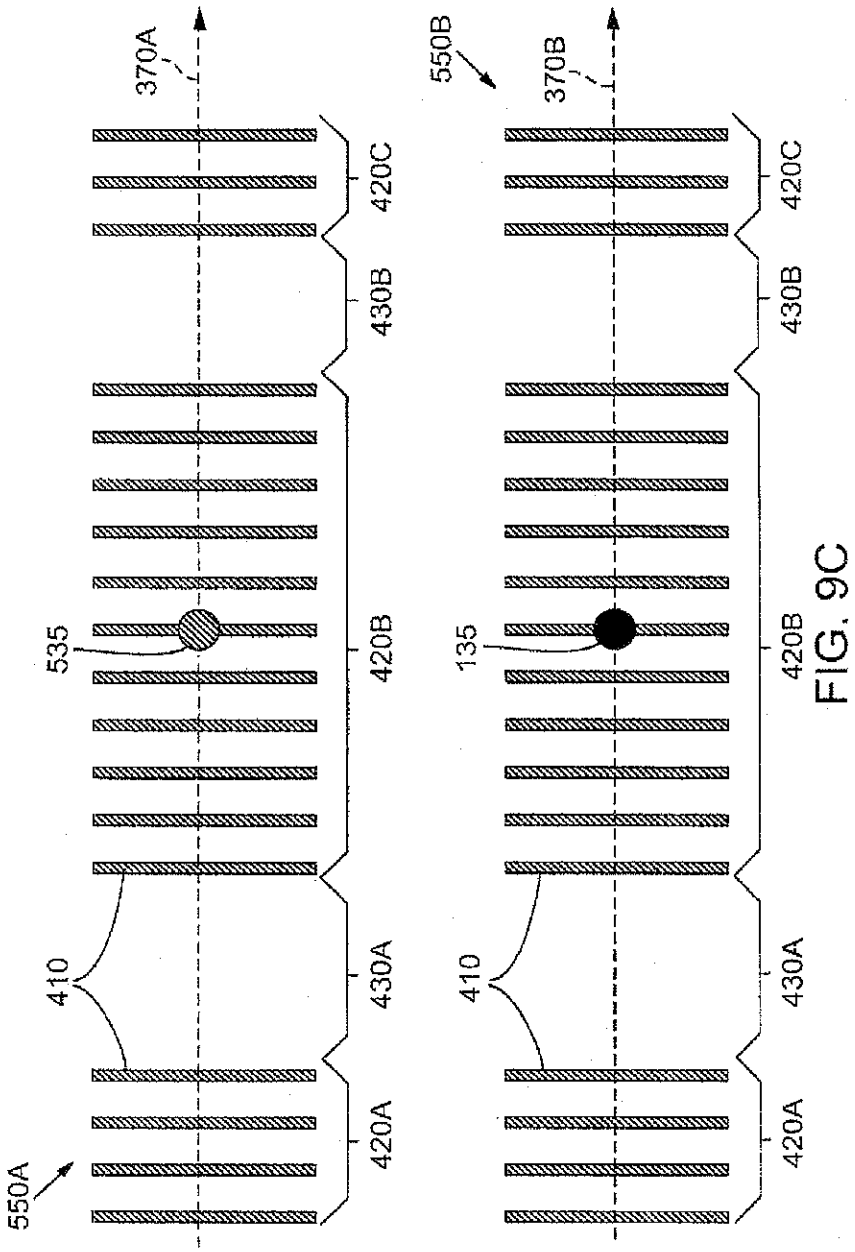

550A
370A
410
535
420A
430A
420B
430B
420C
550B
370B
135
420A
430A
420B
430B
420C

FIG. 9C

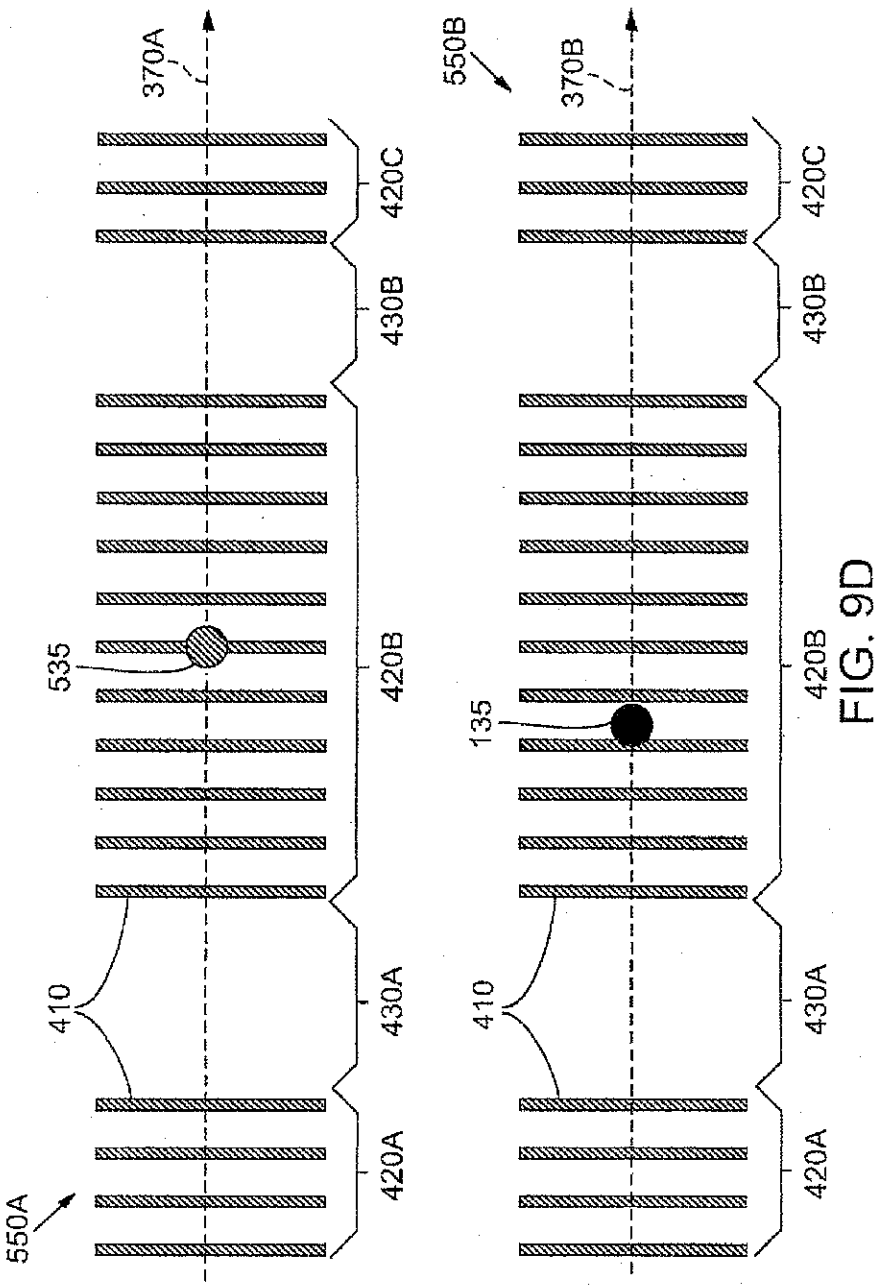

550A
370A
420C
430B
420B
535
410
430A
420A
550B
370B
420C
430B
420B
135
410
430A
420A

FIG. 9D

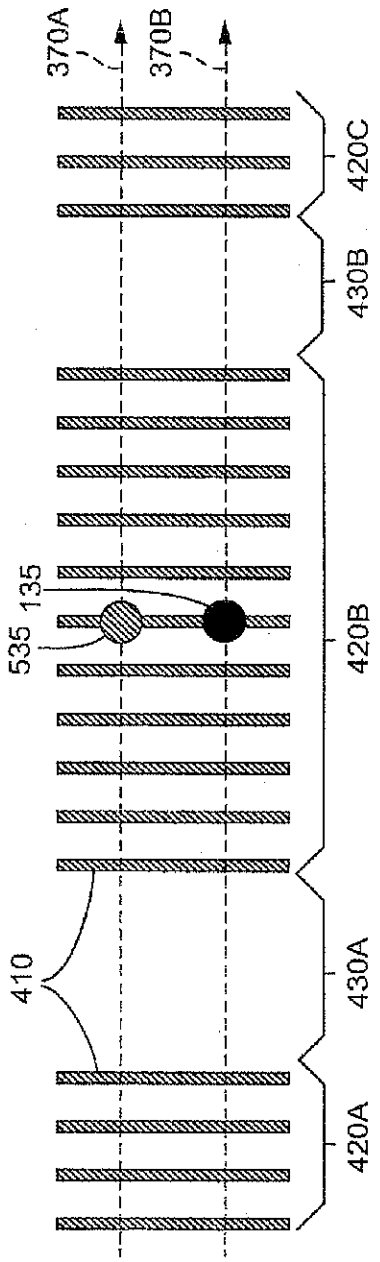

370A
370B
420C
430B
135
535
420B
410
430A
420A

FIG. 9E

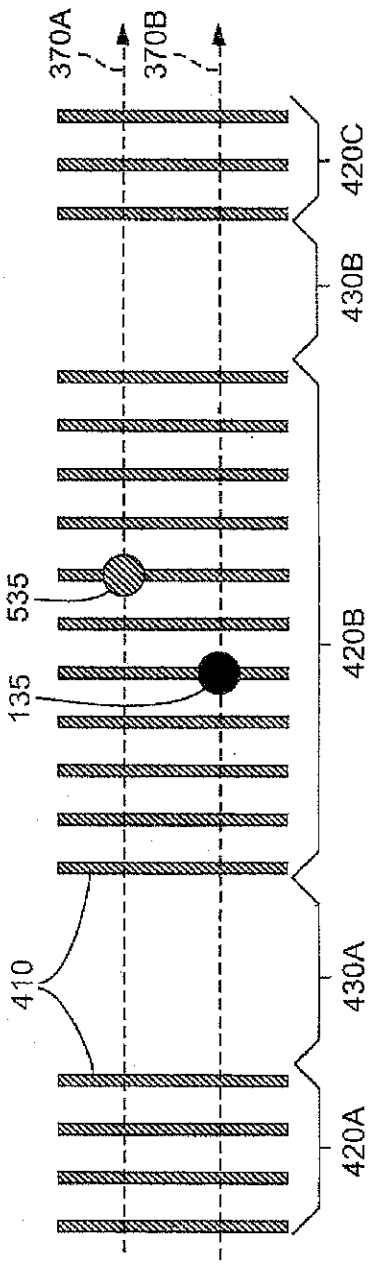

370A
370B
420C
430B
535
135
420B
410
430A
420A

FIG. 9F

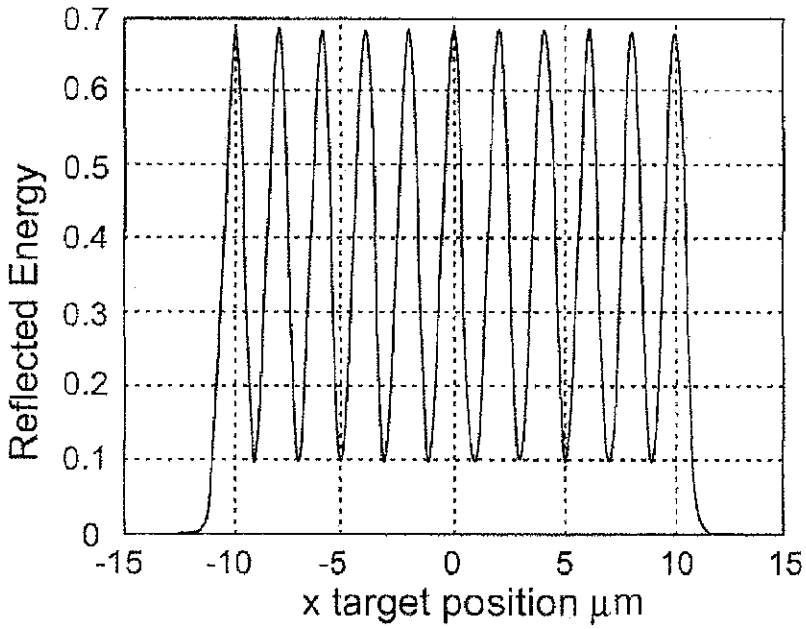

Reflected Energy
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-15
-10
-5
0
5
10
15
x target position μm

FIG. 10

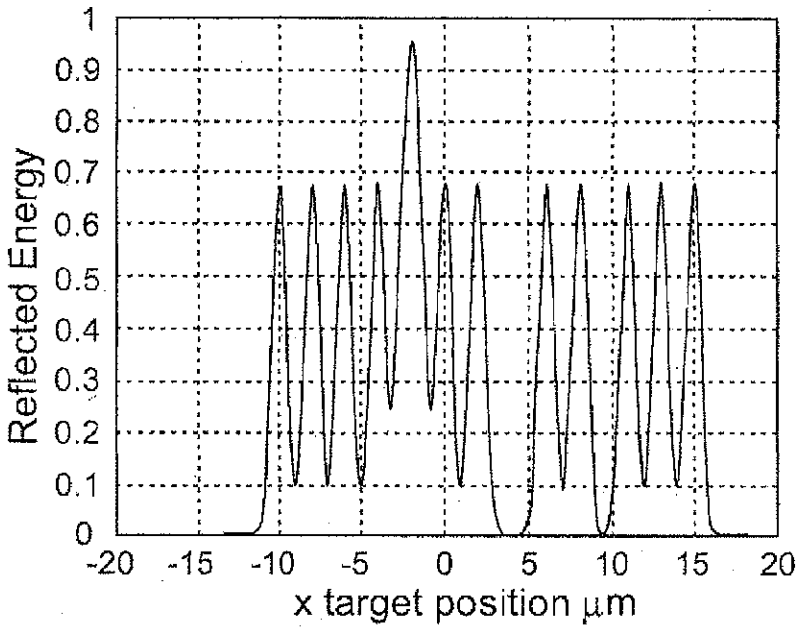

Reflected Energy
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-20
-15
-10
-5
0
5
10
15
20
x target position μm

FIG. 11

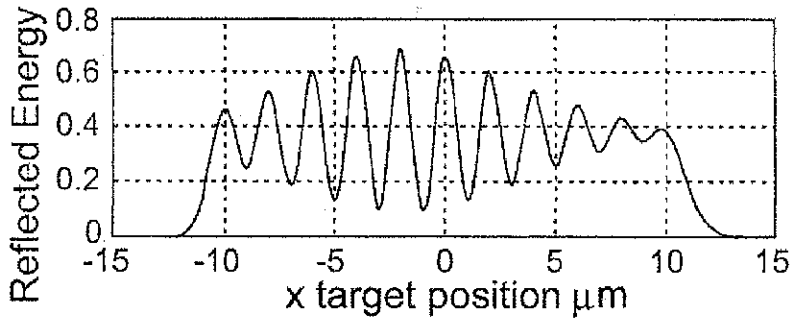


FIG. 12A

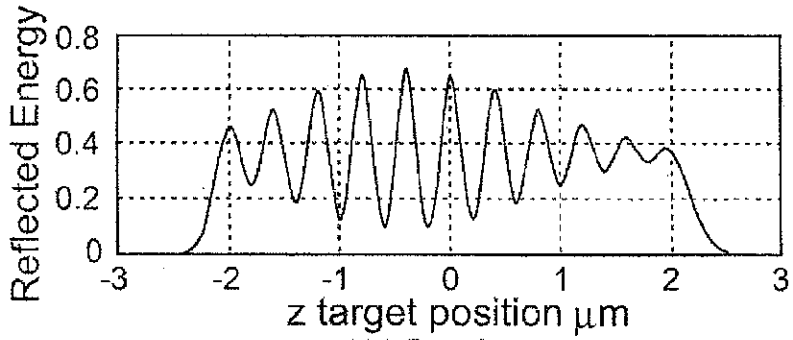


FIG. 12B

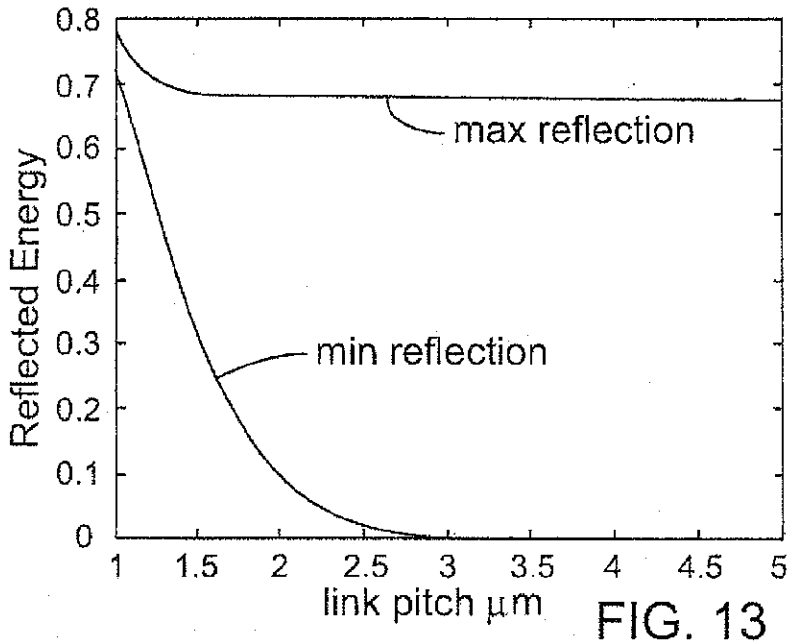


FIG. 13

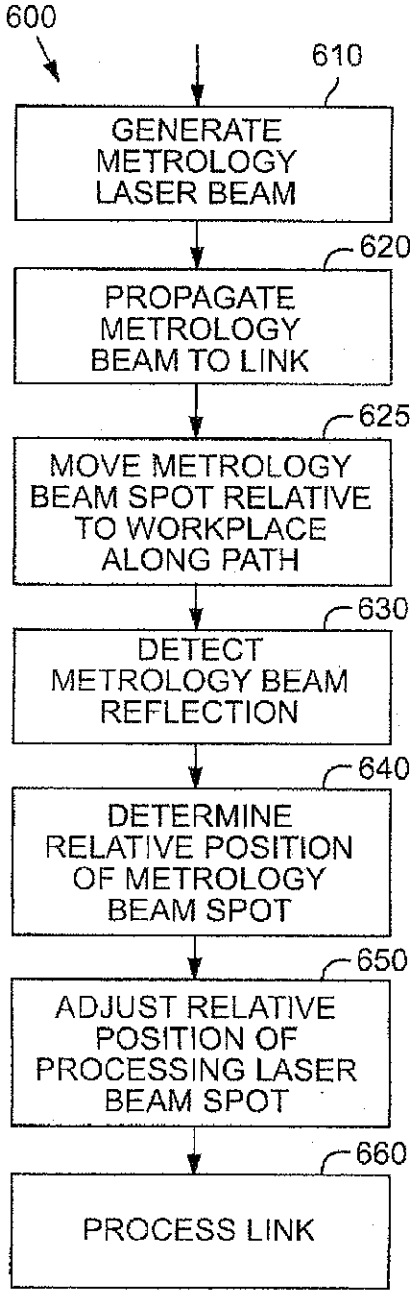


FIG. 14

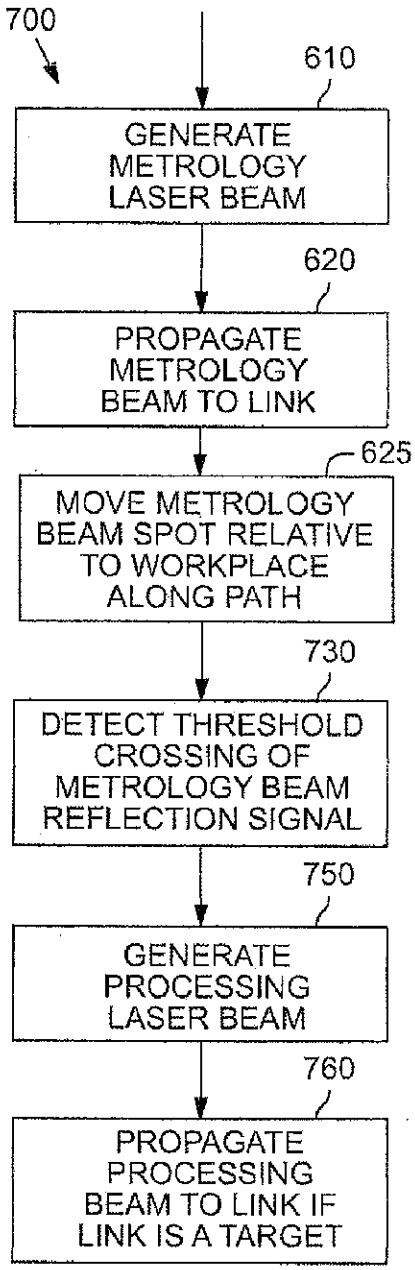


FIG. 15A

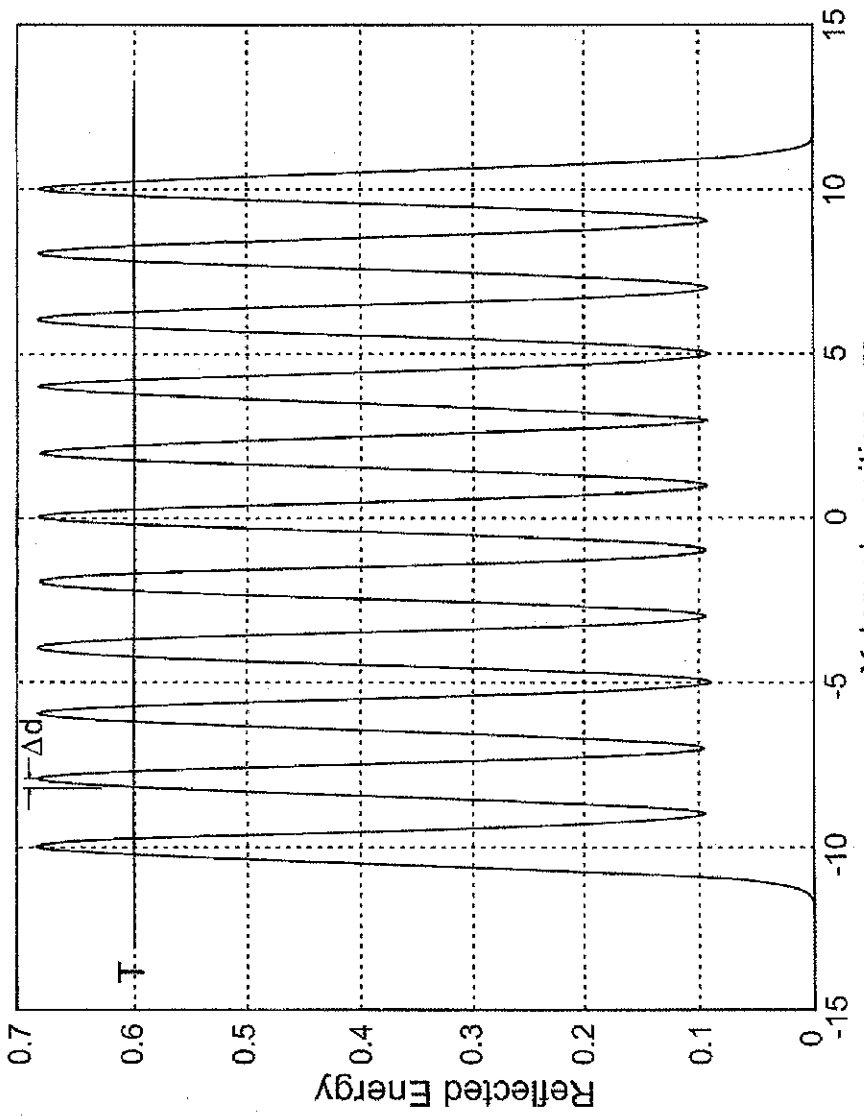

Reflected Energy
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-15
-10
-5
0
5
10
15
X target position µm
Δd
T

FIG. 15B

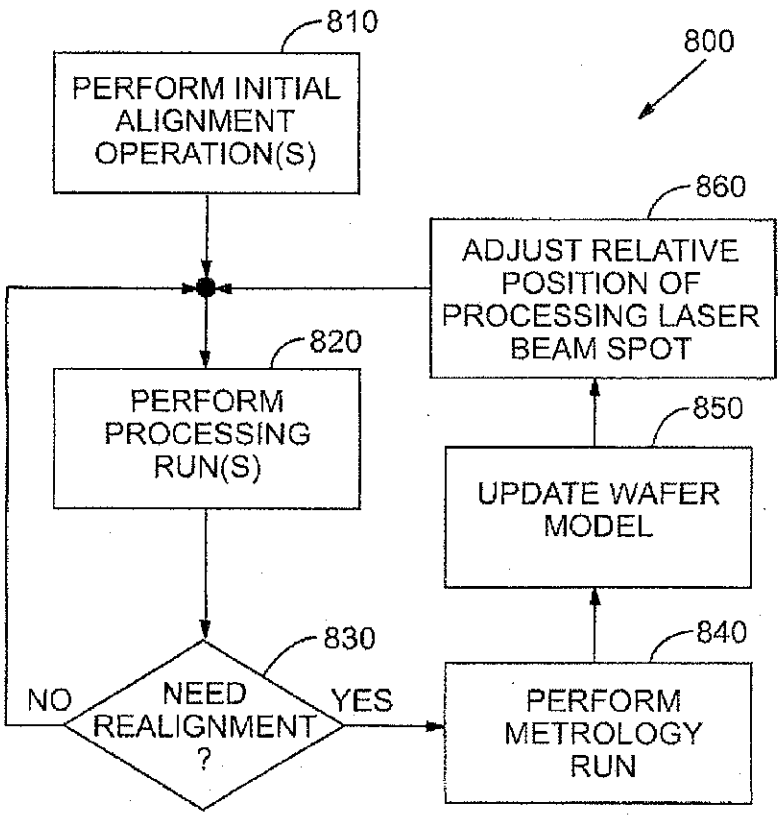

810
PERFORM INITIAL ALIGNMENT OPERATION(S)
800
860
ADJUST RELATIVE POSITION OF PROCESSING LASER BEAM SPOT
820
PERFORM PROCESSING RUN(S)
850
UPDATE WAFER MODEL
830
NO
NEED REALIGNMENT ?
YES
840
PERFORM METROLOGY RUN

FIG. 16A

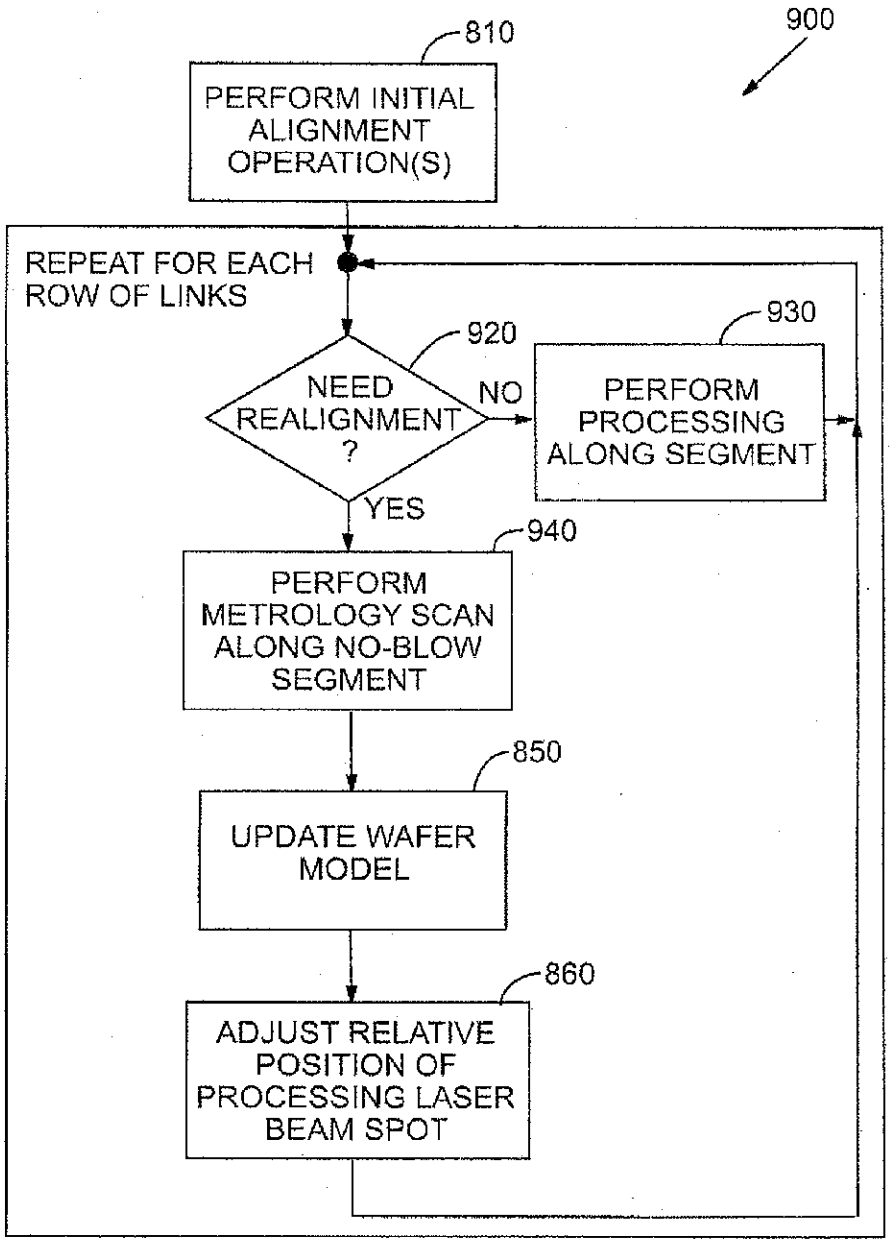

900
810
PERFORM INITIAL ALIGNMENT OPERATION(S)
REPEAT FOR EACH ROW OF LINKS
920
NEED REALIGNMENT ?
NO
930
PERFORM PROCESSING ALONG SEGMENT
YES
940
PERFORM METROLOGY SCAN ALONG NO-BLOW SEGMENT
850
UPDATE WAFER MODEL
860
ADJUST RELATIVE POSITION OF PROCESSING LASER BEAM SPOT

FIG. 16B

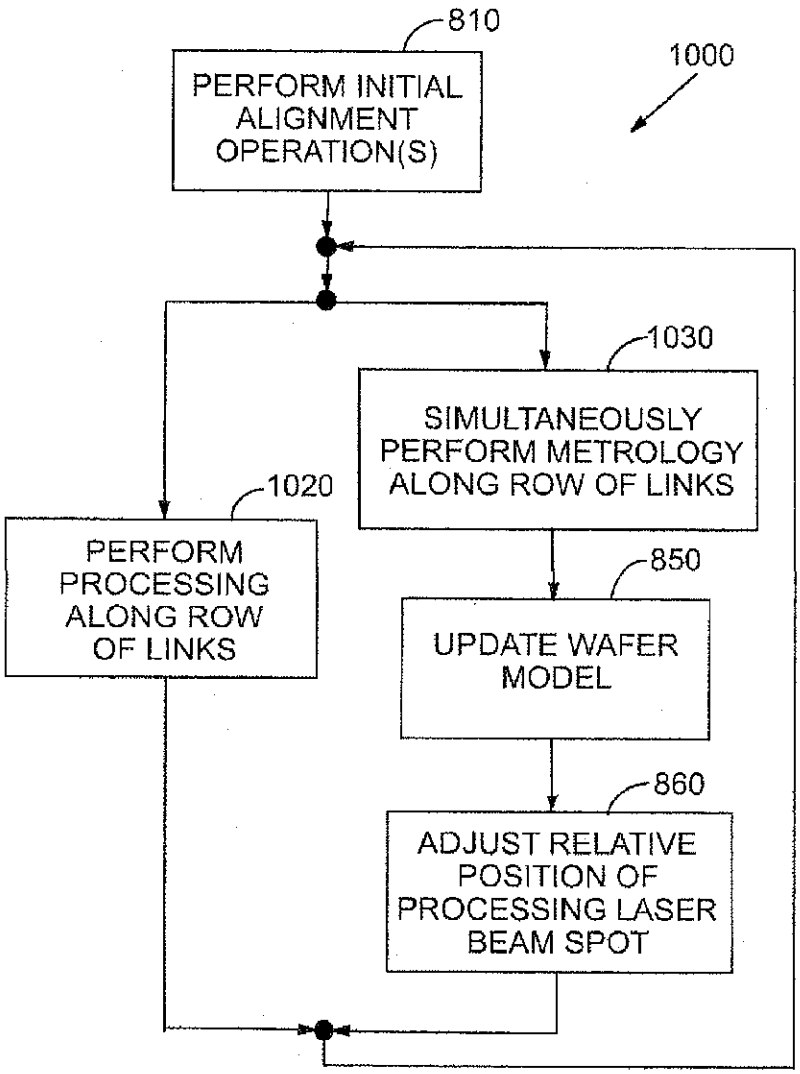

810
PERFORM INITIAL ALIGNMENT OPERATION(S)
1000
1030
SIMULTANEOUSLY PERFORM METROLOGY ALONG ROW OF LINKS
1020
PERFORM PROCESSING ALONG ROW OF LINKS
850
UPDATE WAFER MODEL
860
ADJUST RELATIVE POSITION OF PROCESSING LASER BEAM SPOT

FIG. 16C