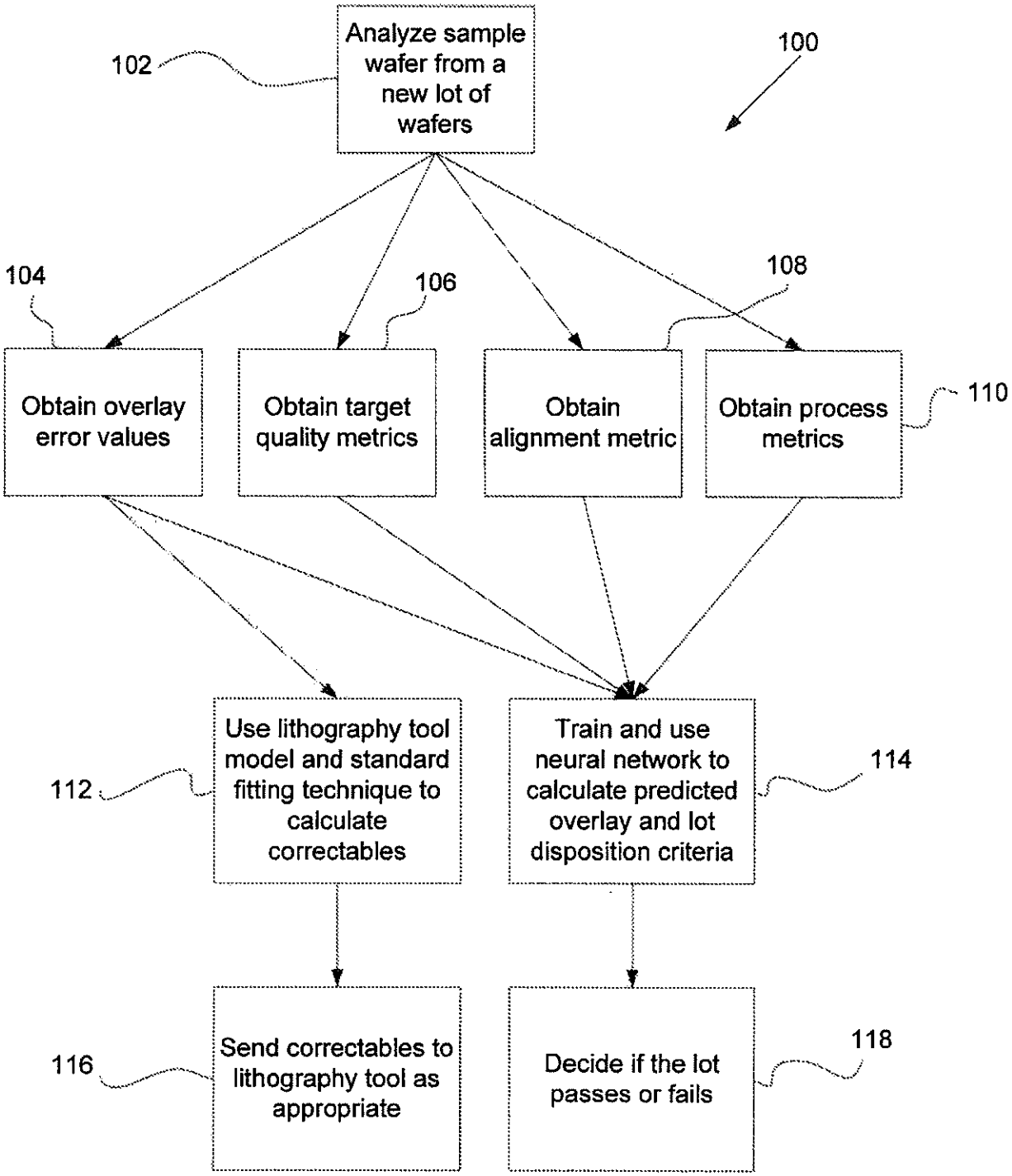

Analyze sample wafer from a new lot of wafers
102
100
104
106
108
Obtain overlay error values
Obtain target quality metrics
Obtain alignment metric
Obtain process metrics
110
Use lithography tool model and standard fitting technique to calculate correctables
112
Train and use neural network to calculate predicted overlay and lot disposition criteria
114
Send correctables to lithography tool as appropriate
116
Decide if the lot passes or fails
118

FIG. 1

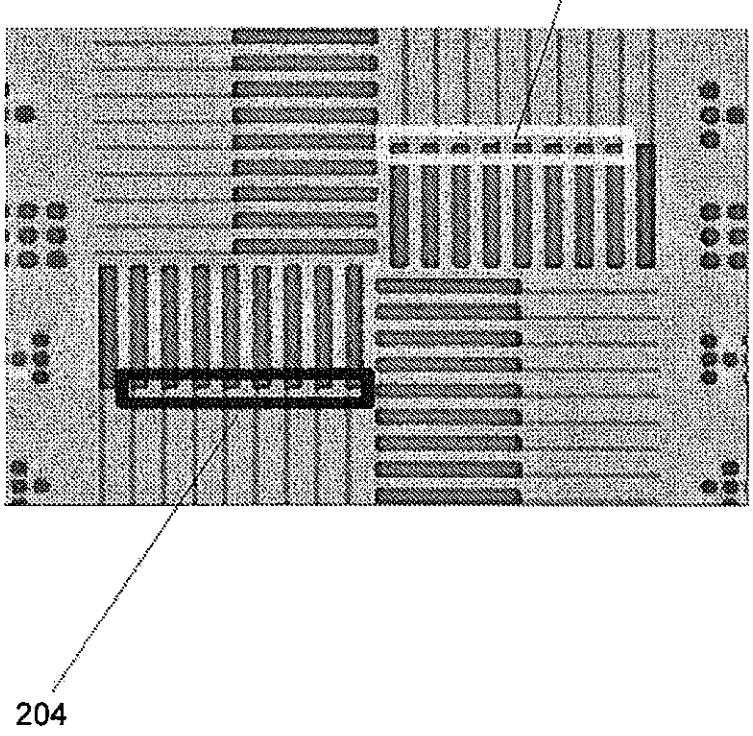


FIG. 2

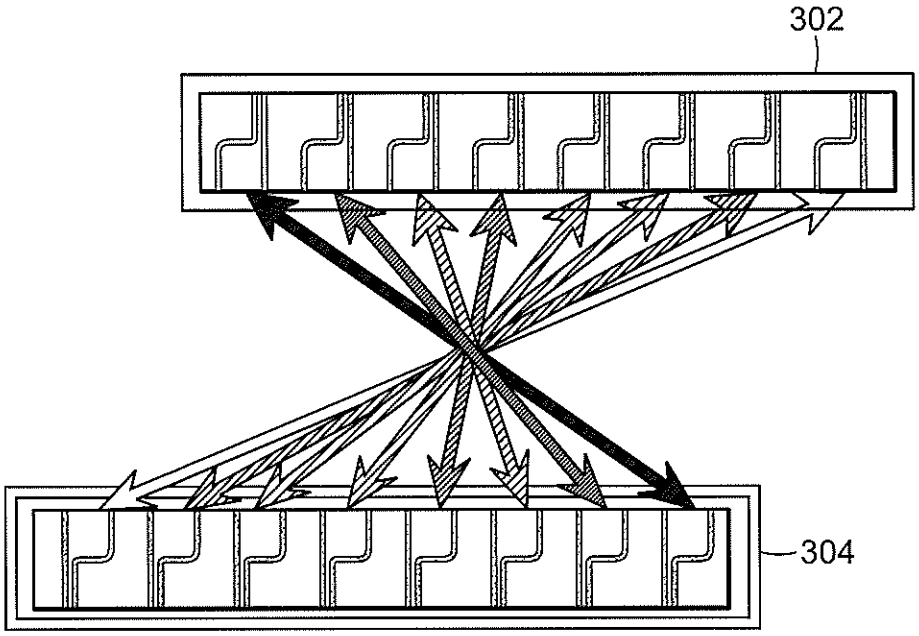


FIG. 3A

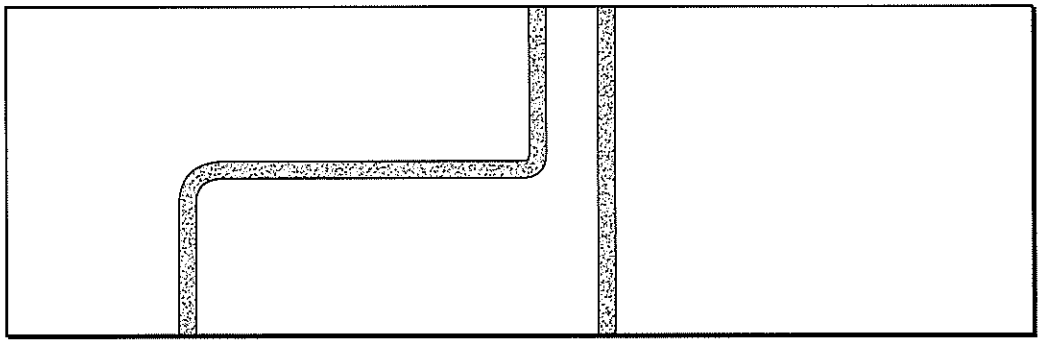


FIG. 3B

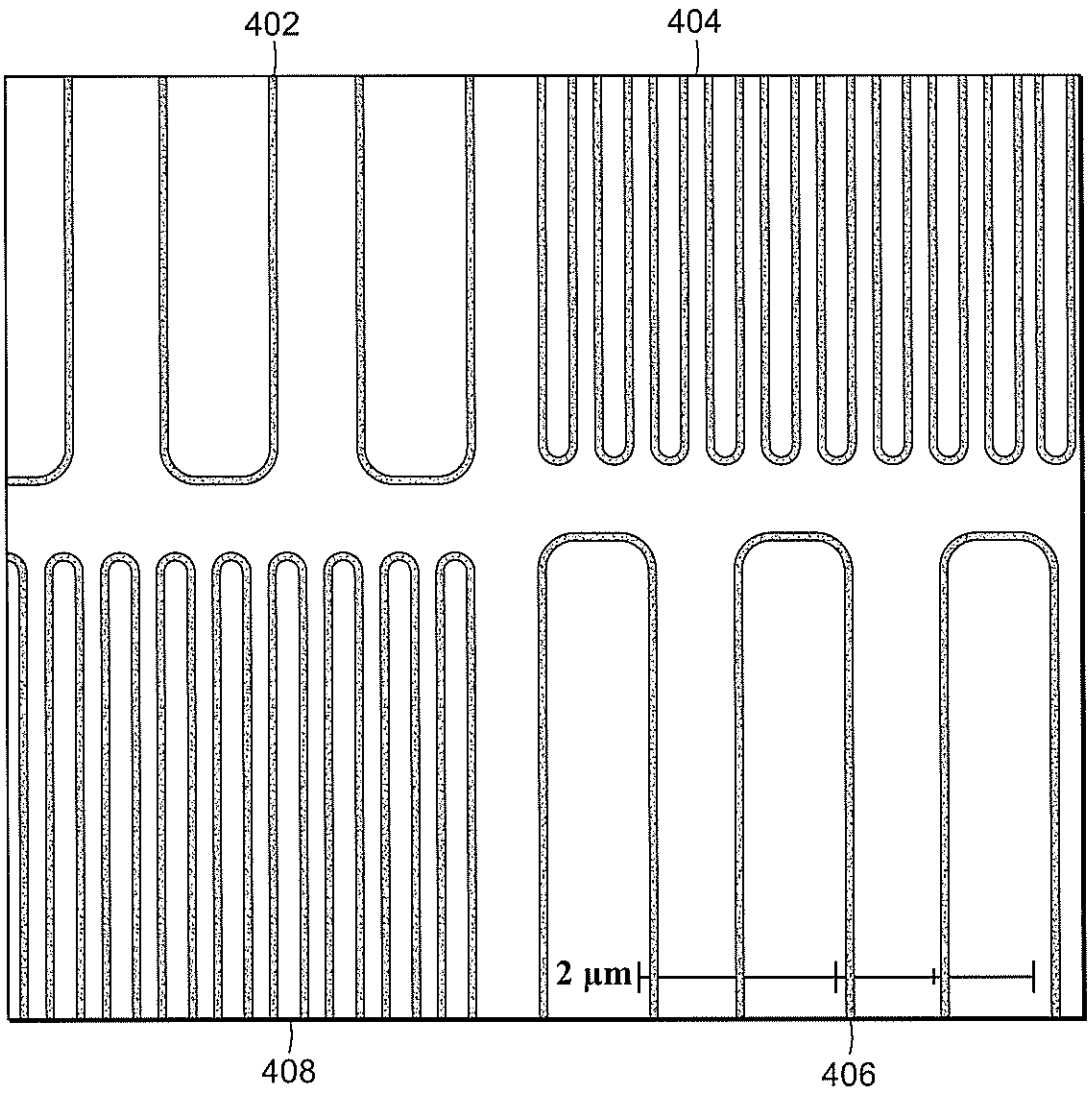


FIG. 4

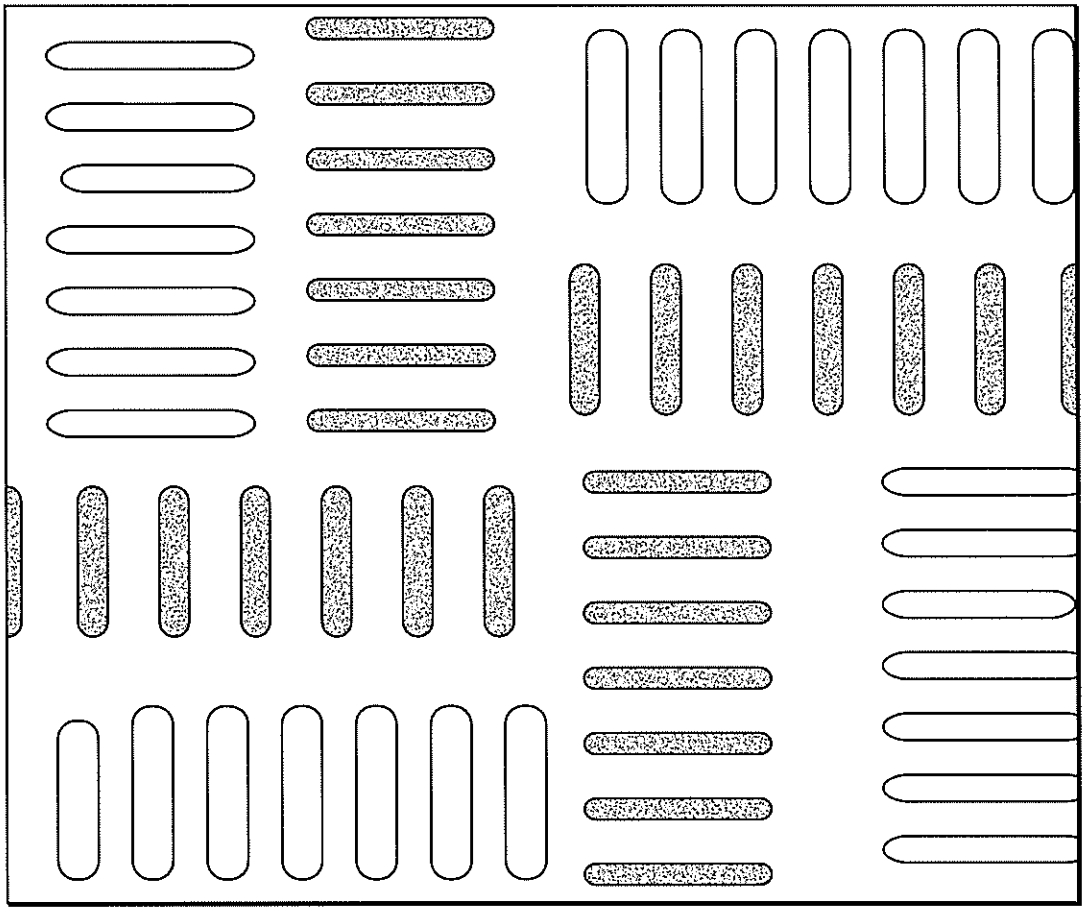


FIG. 5

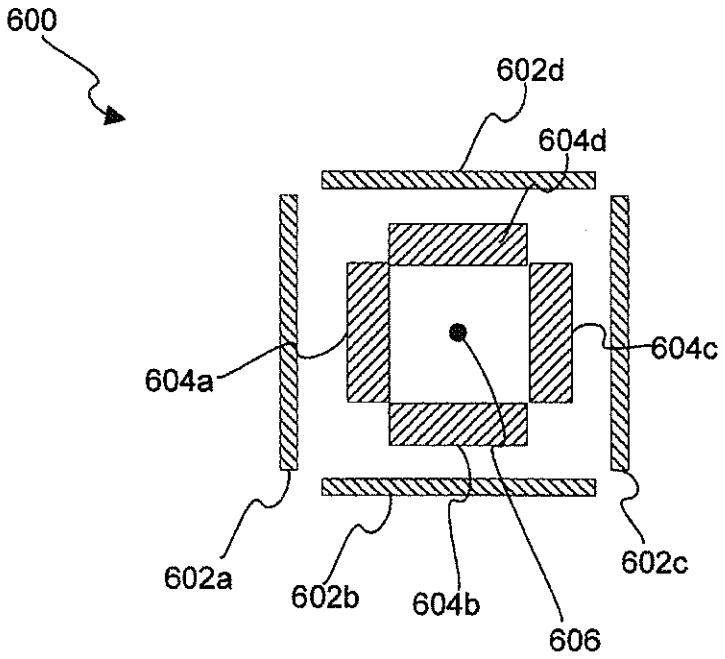


Figure 6A

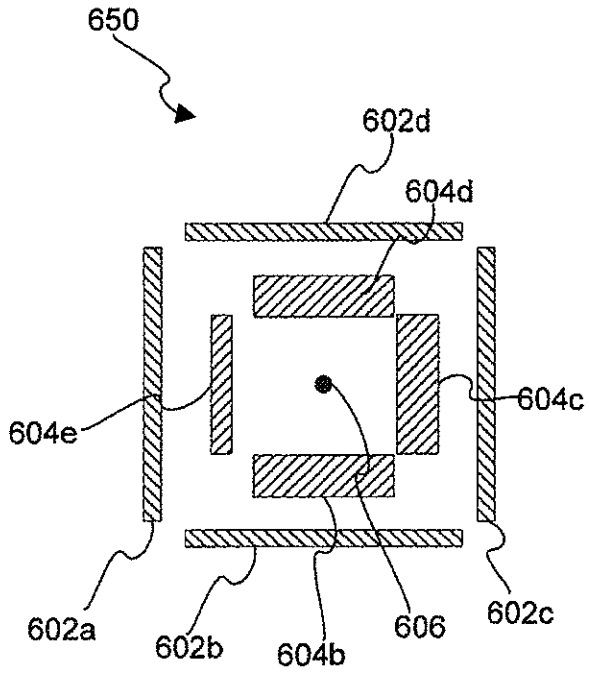


Figure 6B

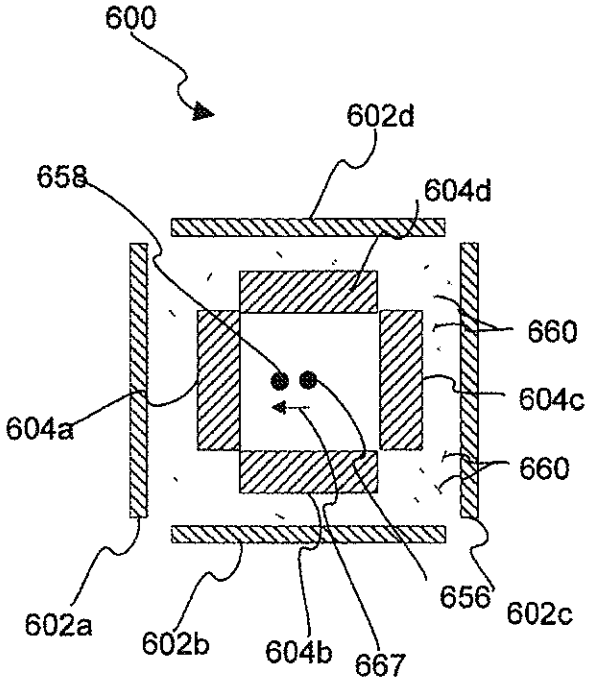


Figure 6C

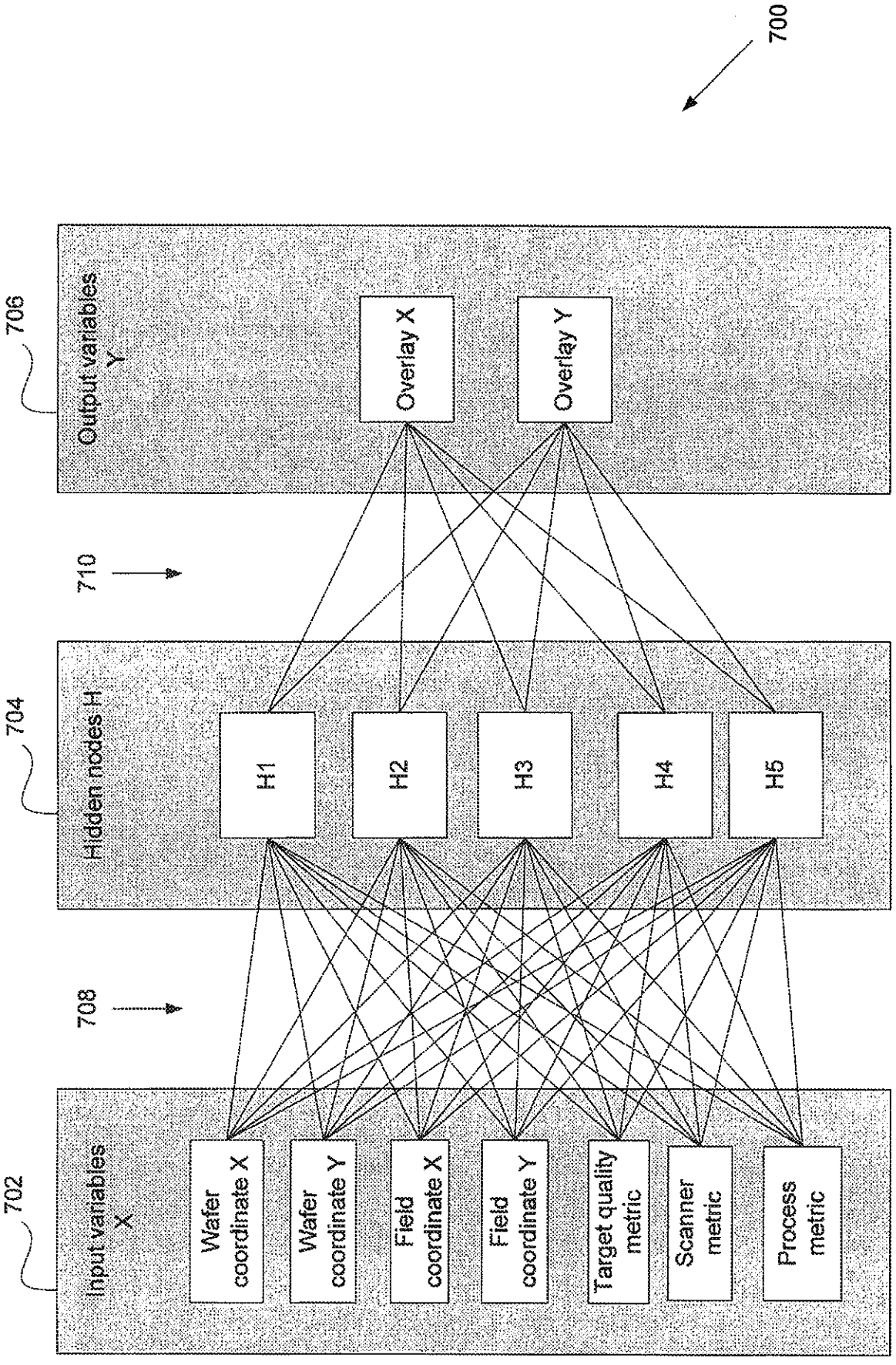

700
706
Output variables Y
Overlay X
Overlay Y
710
704
Hidden nodes H
H1
H2
H3
H4
H5
708
702
Input variables X
Wafer coordinate X
Wafer coordinate Y
Field coordinate X
Field coordinate Y
Target quality metric
Scanner metric
Process metric

FIG. 7

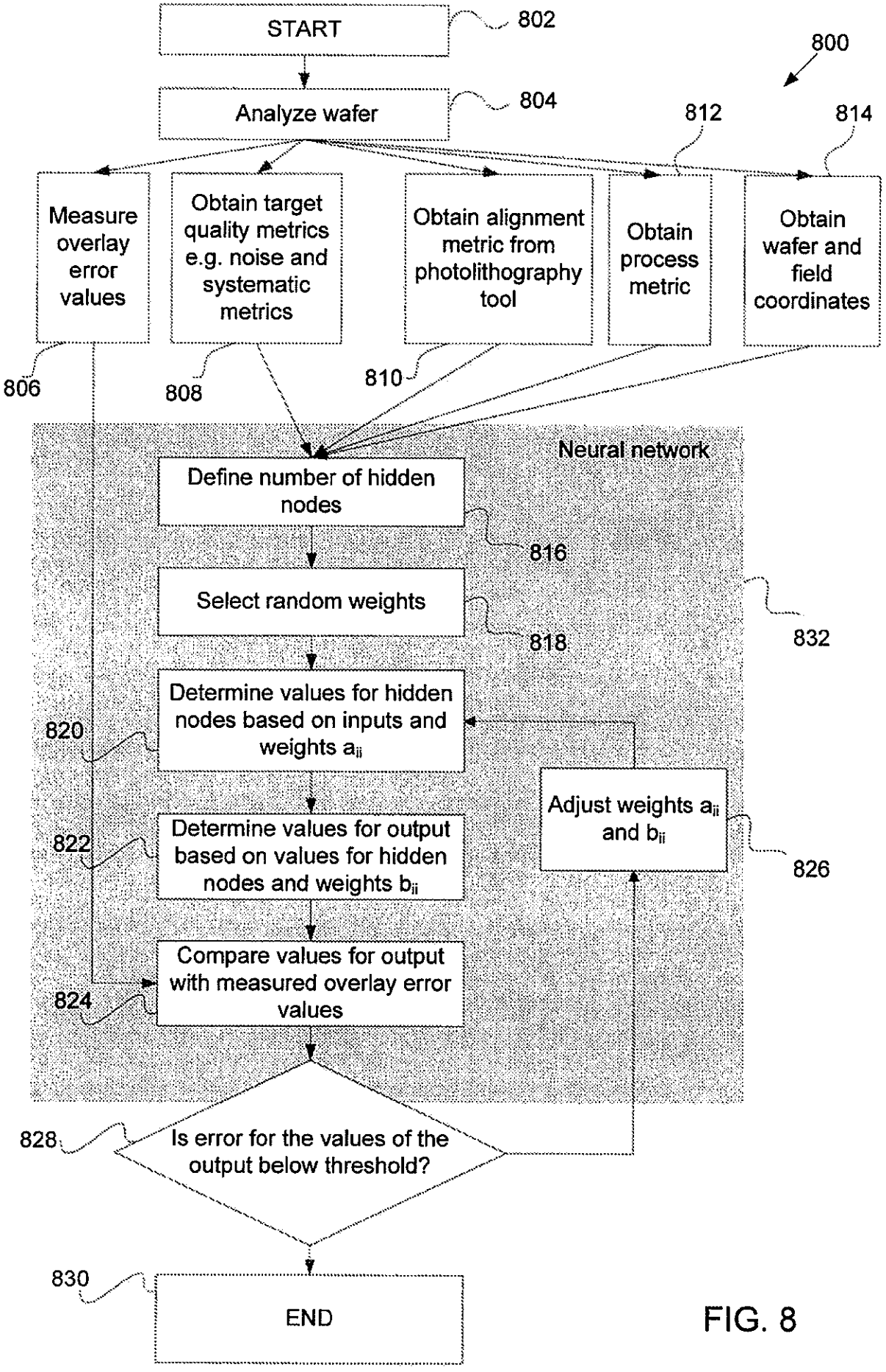

START
802
800
Analyze wafer
804
812
814
Measure overlay error values
Obtain target quality metrics e.g. noise and systematic metrics
Obtain alignment metric from photolithography tool
Obtain process metric
Obtain wafer and field coordinates
806
808
810
Neural network
Define number of hidden nodes
816
Select random weights
818
832
Determine values for hidden nodes based on inputs and weights a_{ii}
820
Adjust weights a_{ii} and b_{ii}
826
Determine values for output based on values for hidden nodes and weights b_{ii}
822
Compare values for output with measured overlay error values
824
Is error for the values of the output below threshold?
828
END
830

FIG. 8

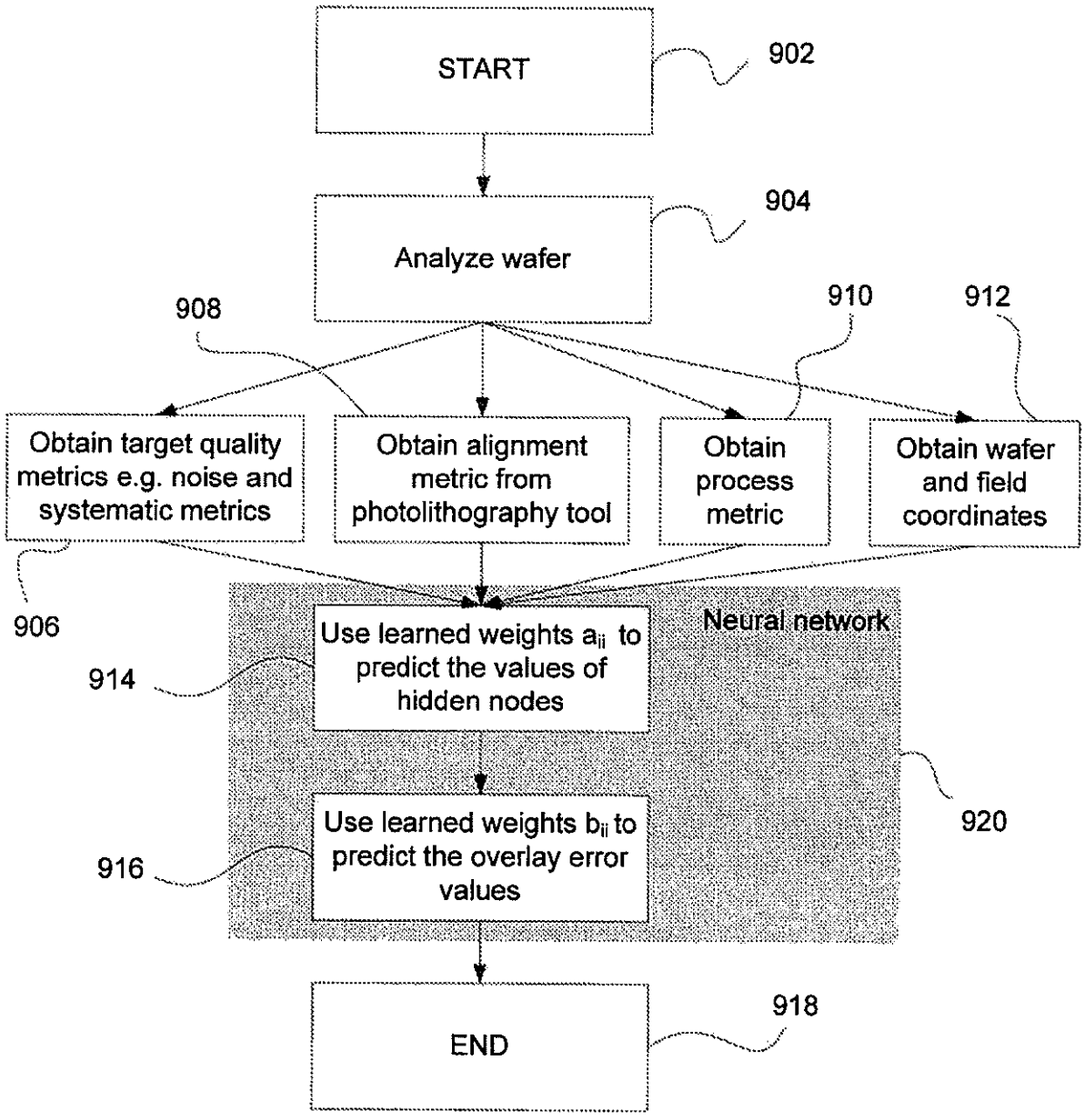

START
902
Analyze wafer
904
908
910
912
Obtain target quality metrics e.g. noise and systematic metrics
Obtain alignment metric from photolithography tool
Obtain process metric
Obtain wafer and field coordinates
906
Neural network
Use learned weights a_{ij} to predict the values of hidden nodes
914
Use learned weights b_{ij} to predict the overlay error values
916
920
END
918

FIG. 9

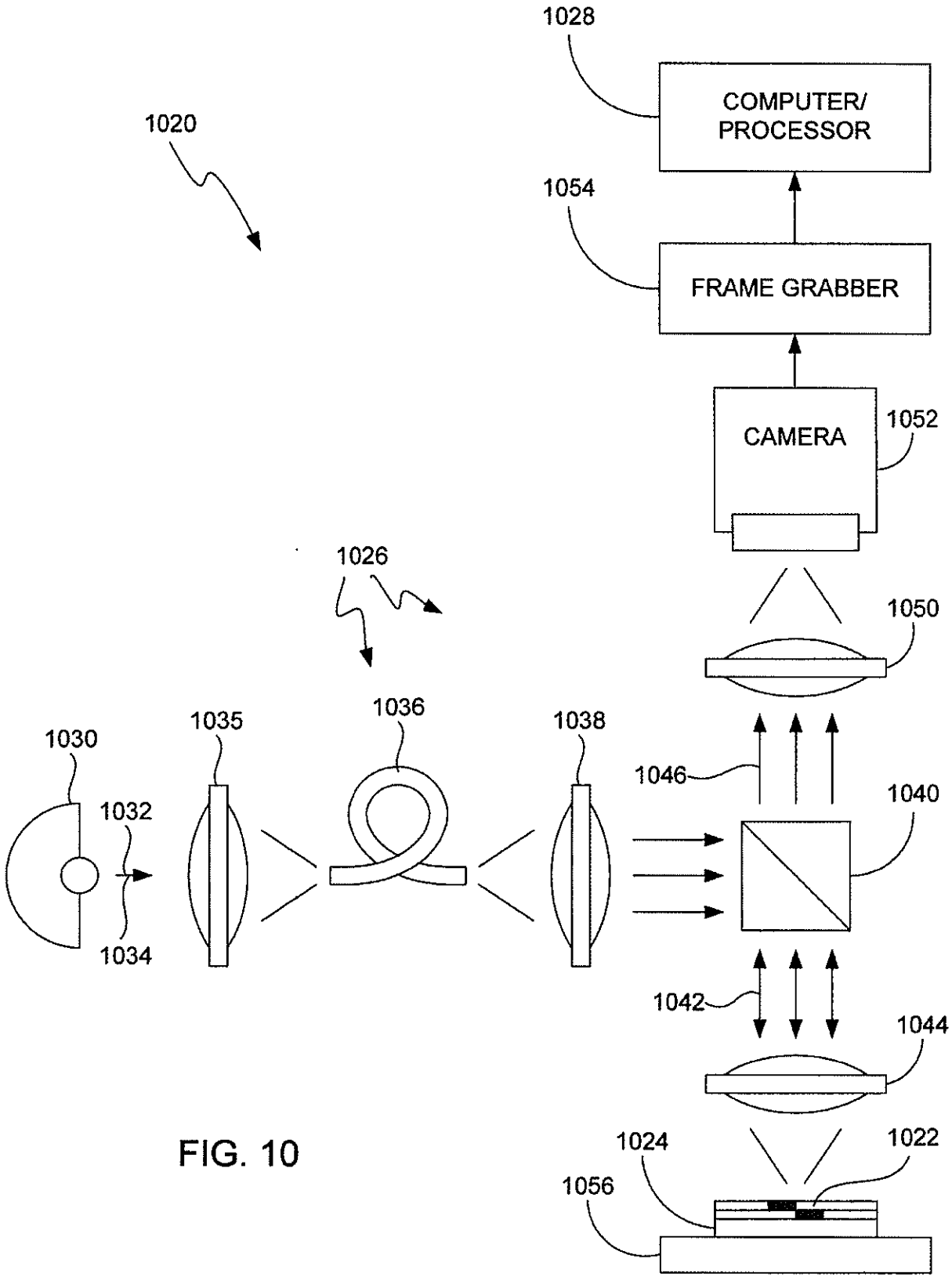

1028
COMPUTER/
PROCESSOR
1020
1054
FRAME GRABBER
CAMERA
1052
1026
1050
1030
1035
1036
1038
1046
1040
1032
1034
1042
1044
1024
1022
1056

FIG. 10