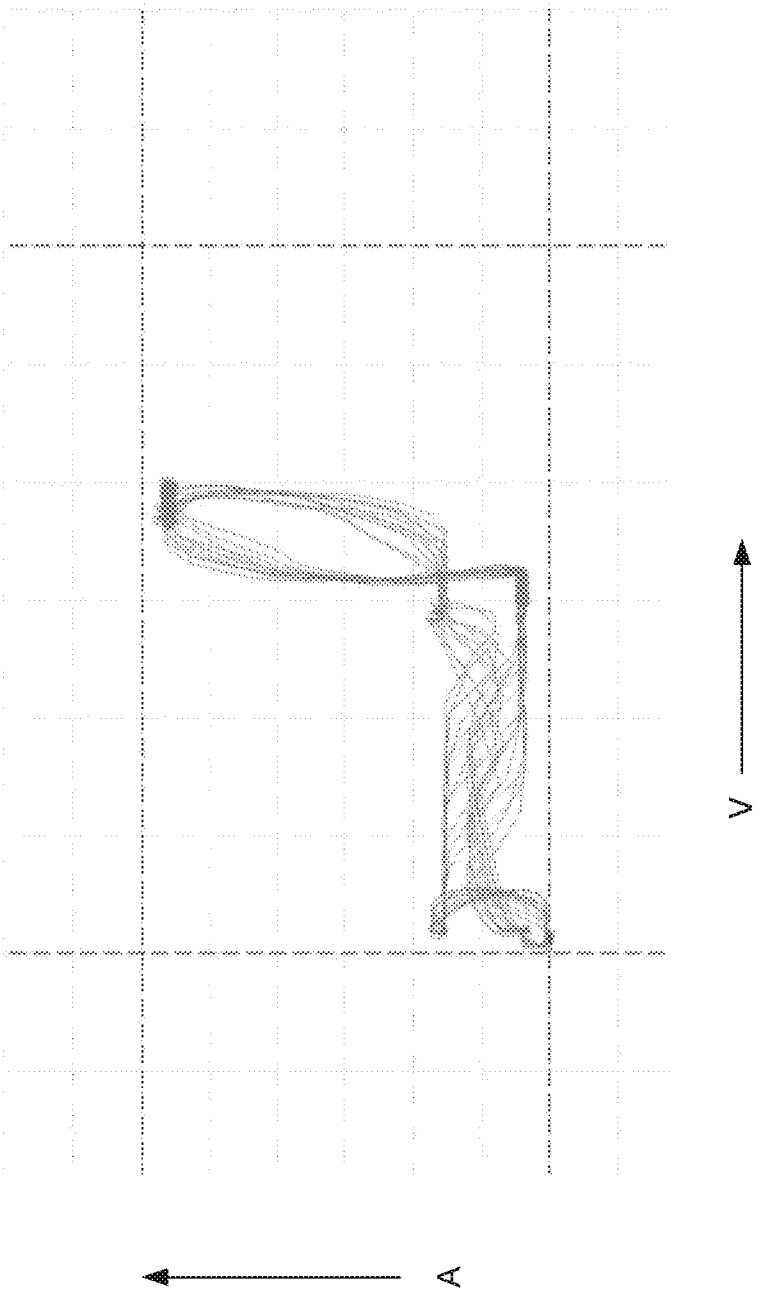


FIG. 1A

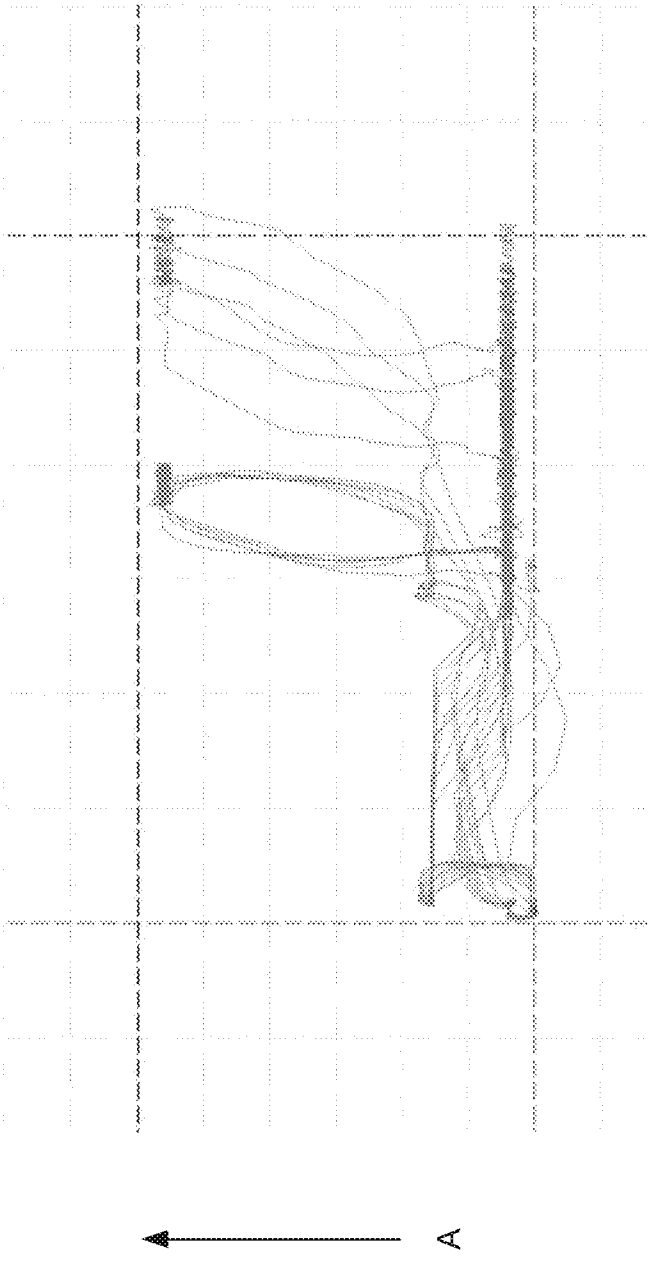


FIG. 1B

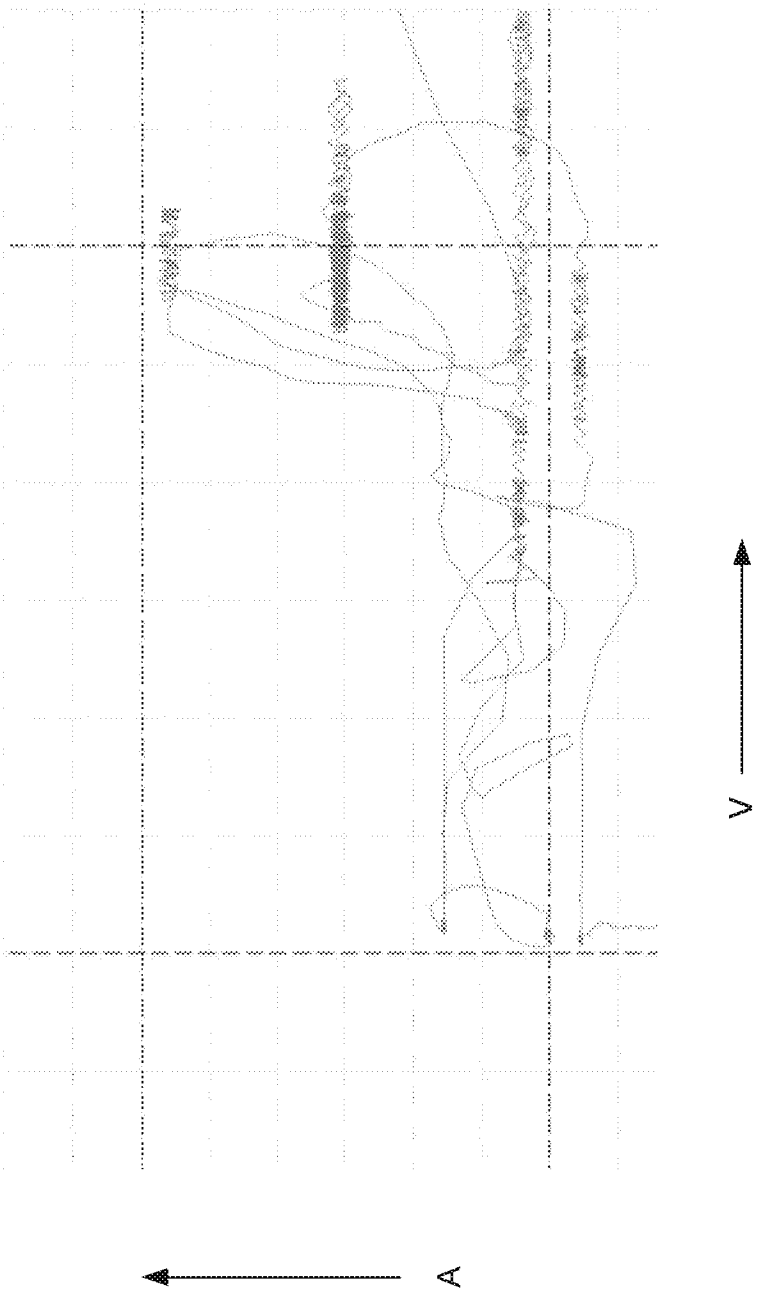


FIG. 1C

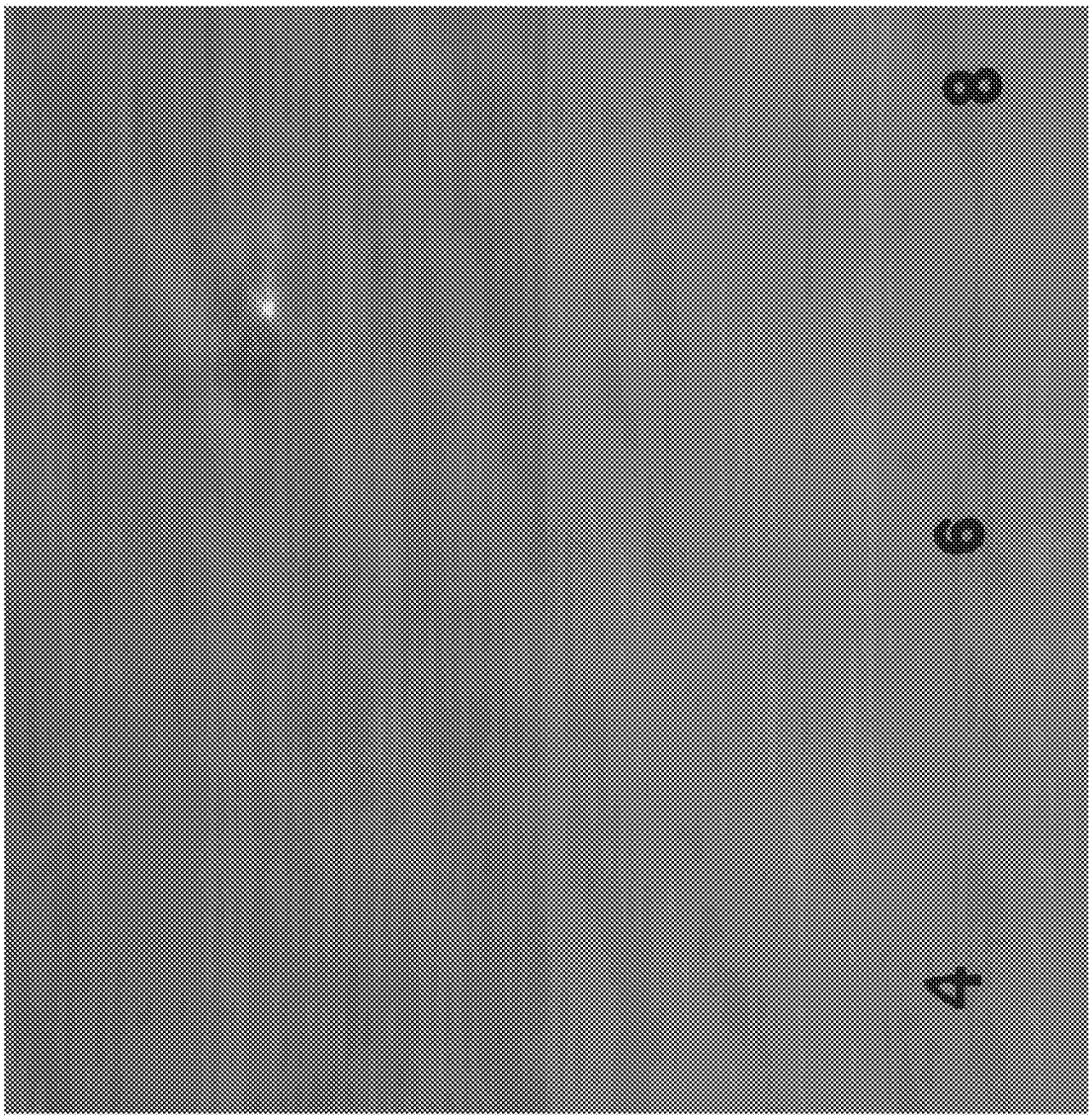


FIG. 2A

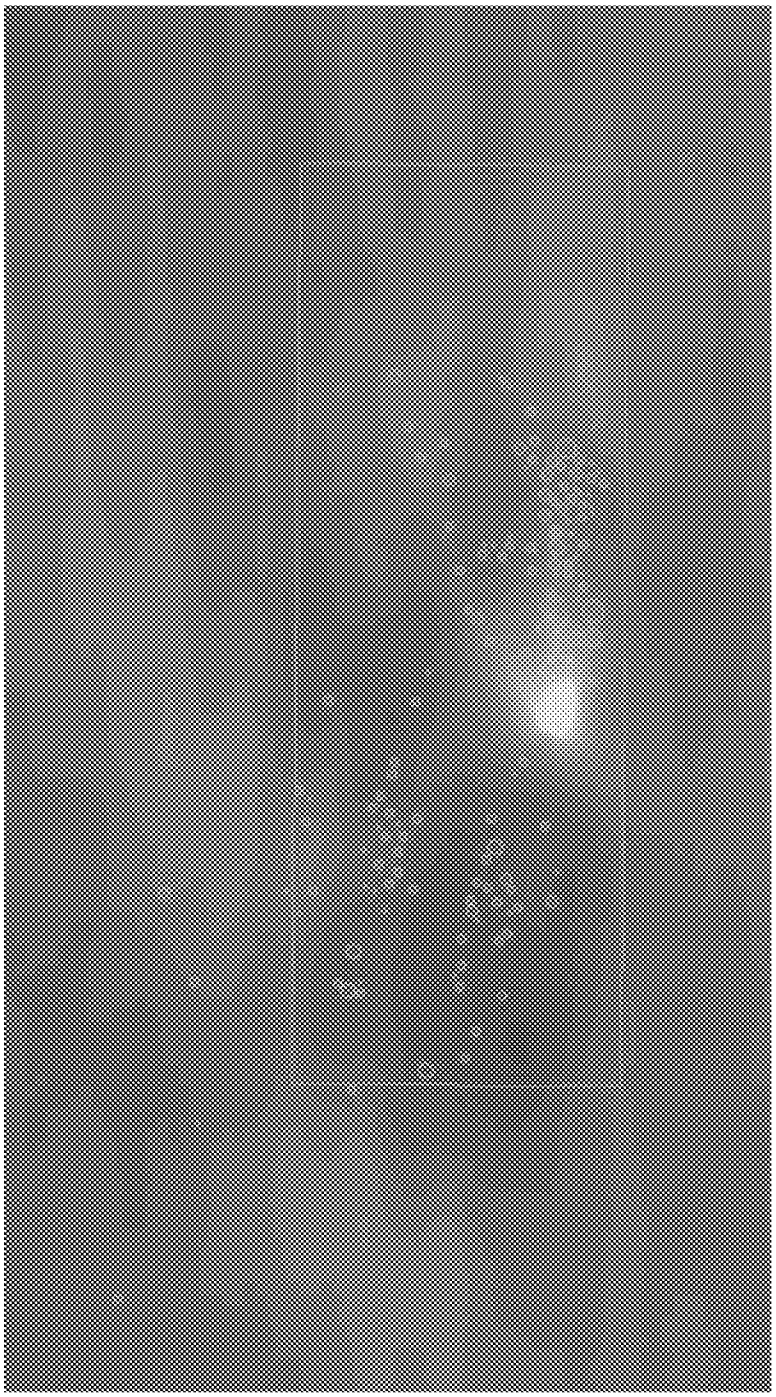


FIG. 2B

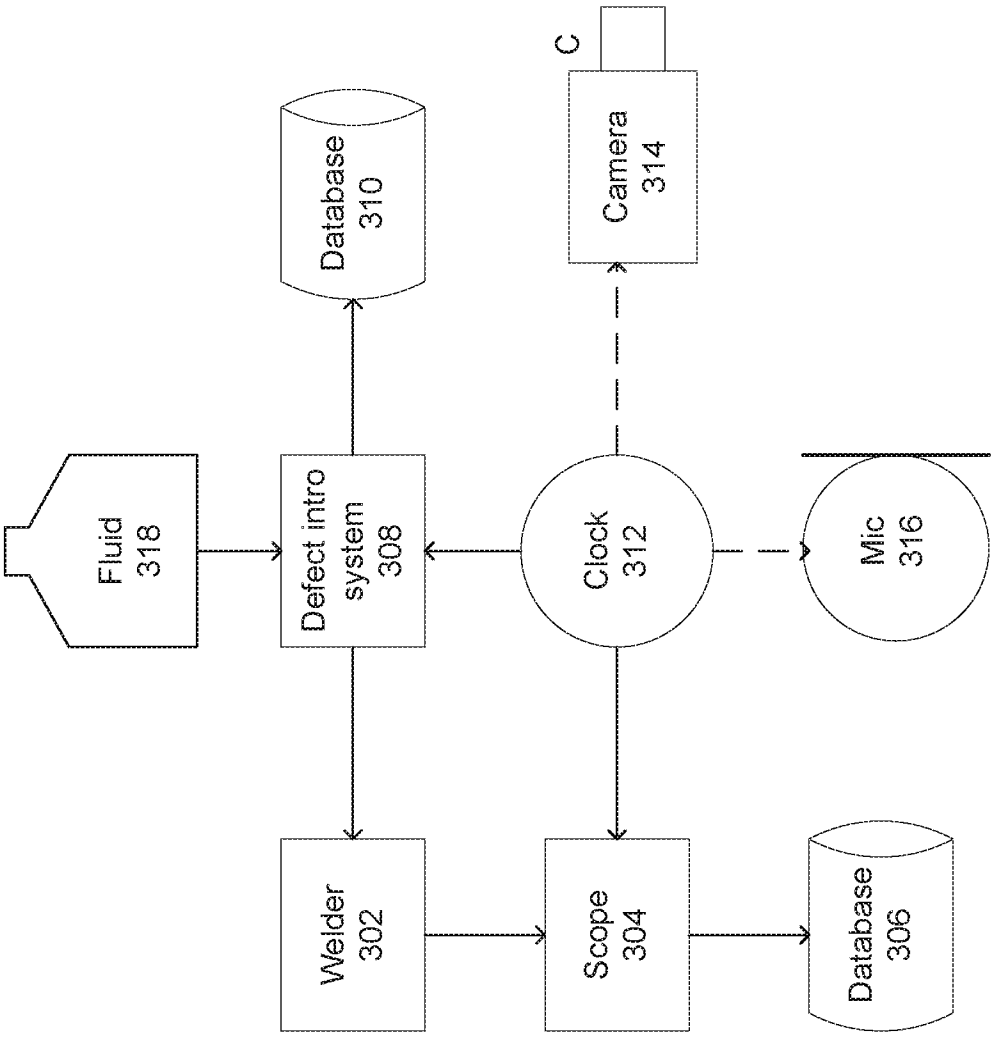

Fluid
318
Defect intro
system
308
Database
310
C
Camera
314
Clock
312
Mic
316
Welder
302
Scope
304
Database
306

FIG. 3

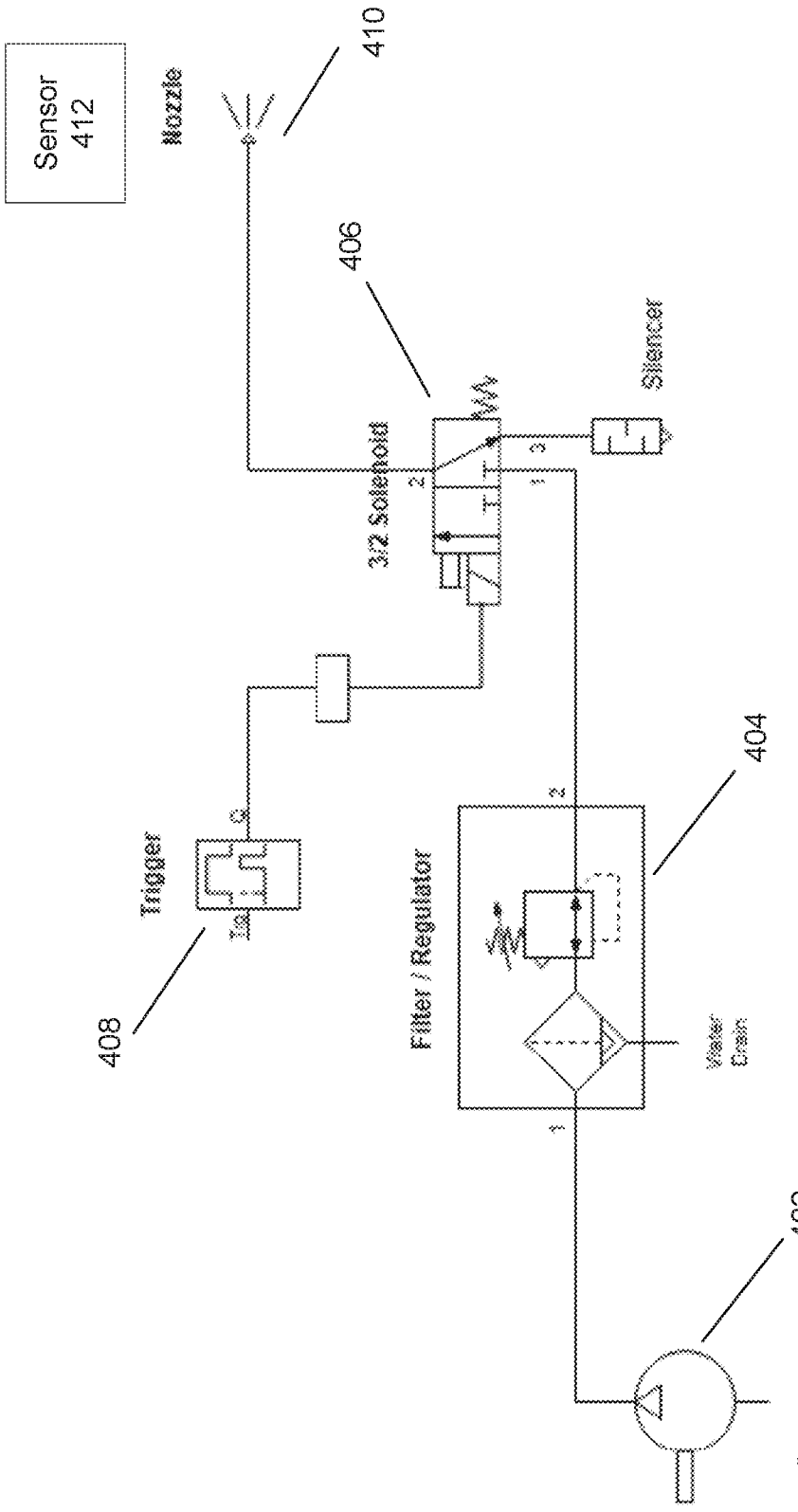
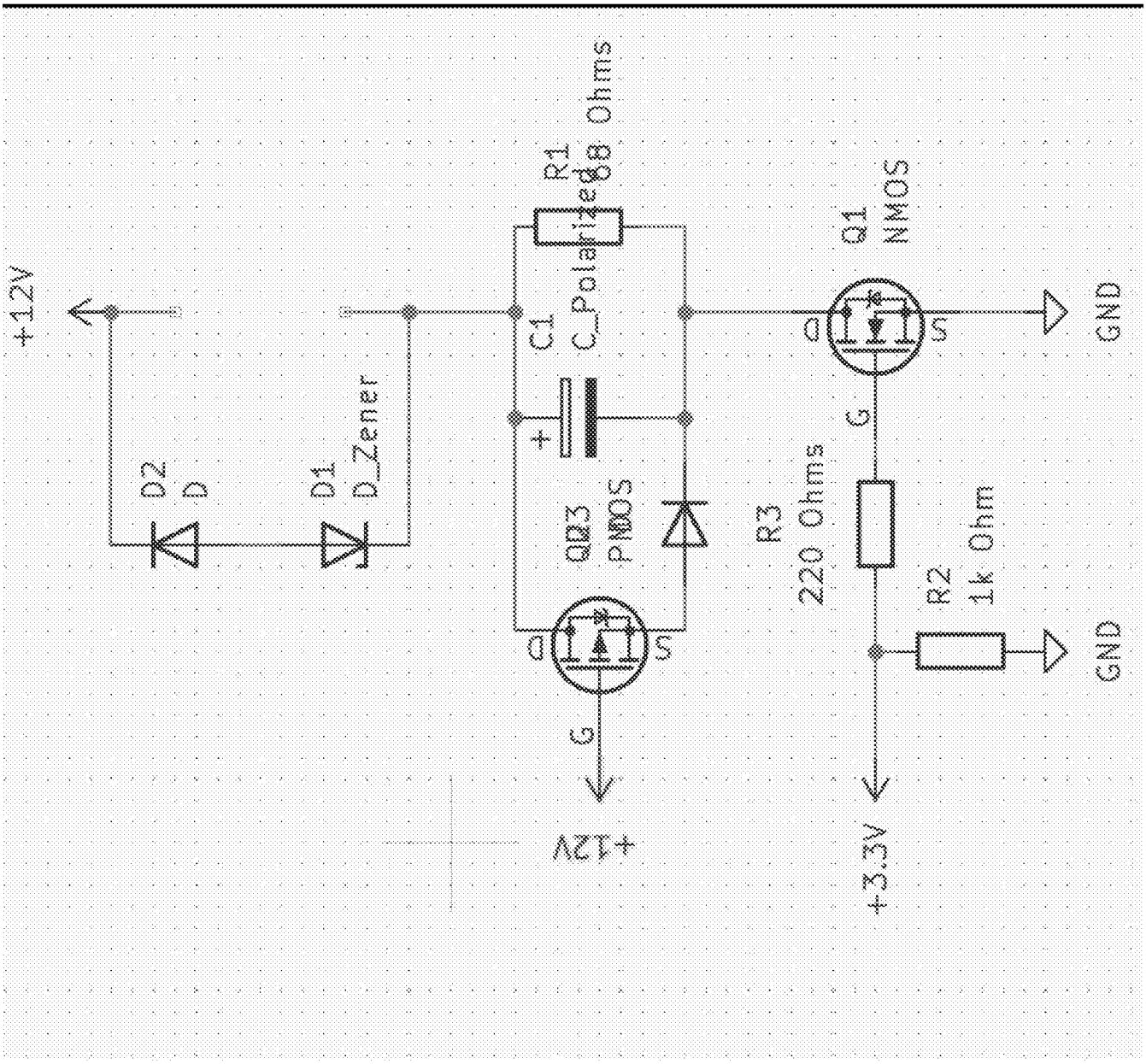

Sensor 412
Nozzle
410
406
3/2 Solenoid
Silencer
Trigger
408
Filter / Regulator
404
Water Drain
Compressor
402

FIG. 4A

FIG. 4B


+1.2V
D2
D
D1
D_Zener
R1
68 Ohms
C1
C_Polarized
Q3
PMOS
+12V
Q1
NMOS
GND
R3
220 Ohms
R2
1k Ohm
GND
+3.3V

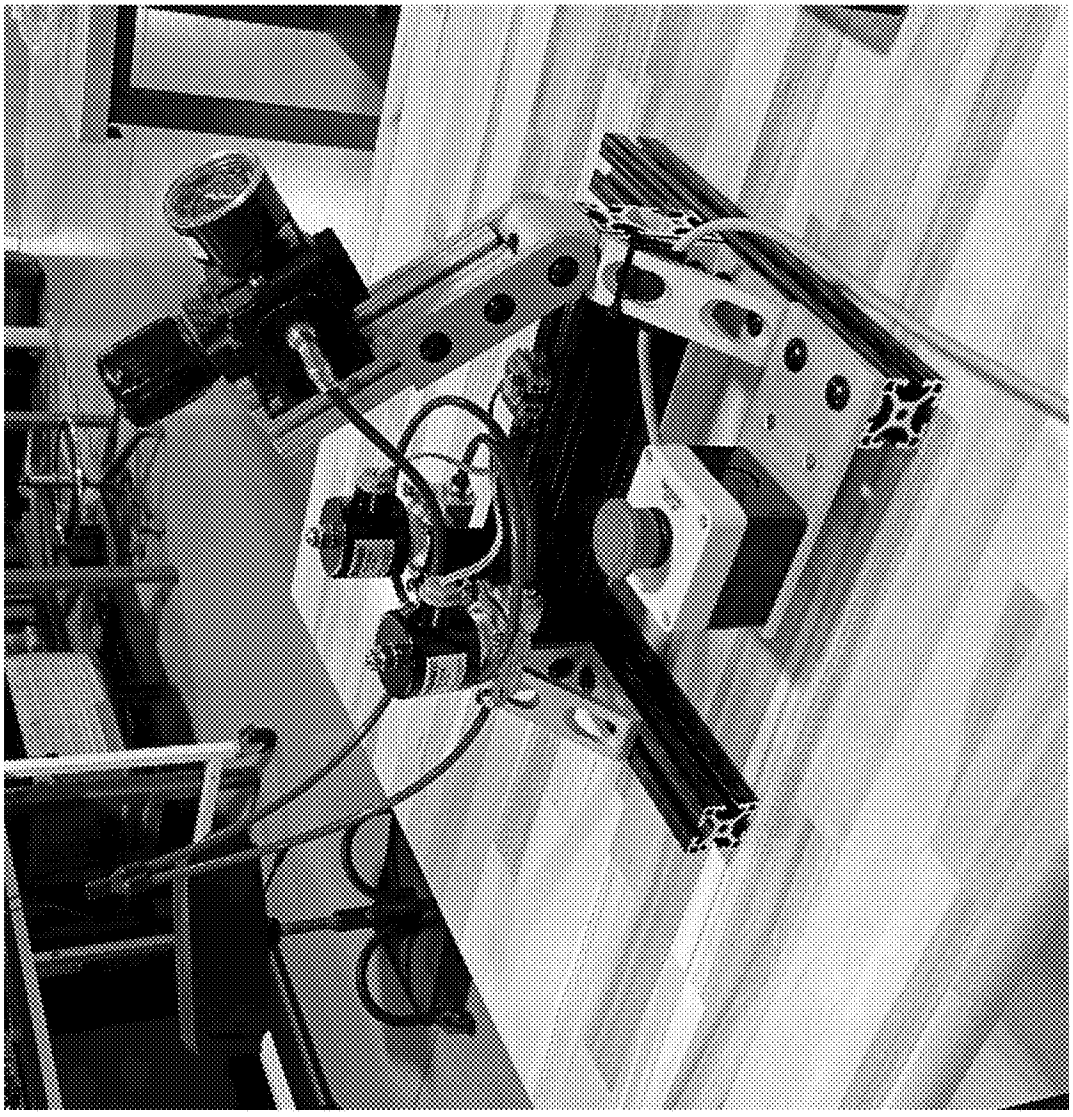


FIG. 5

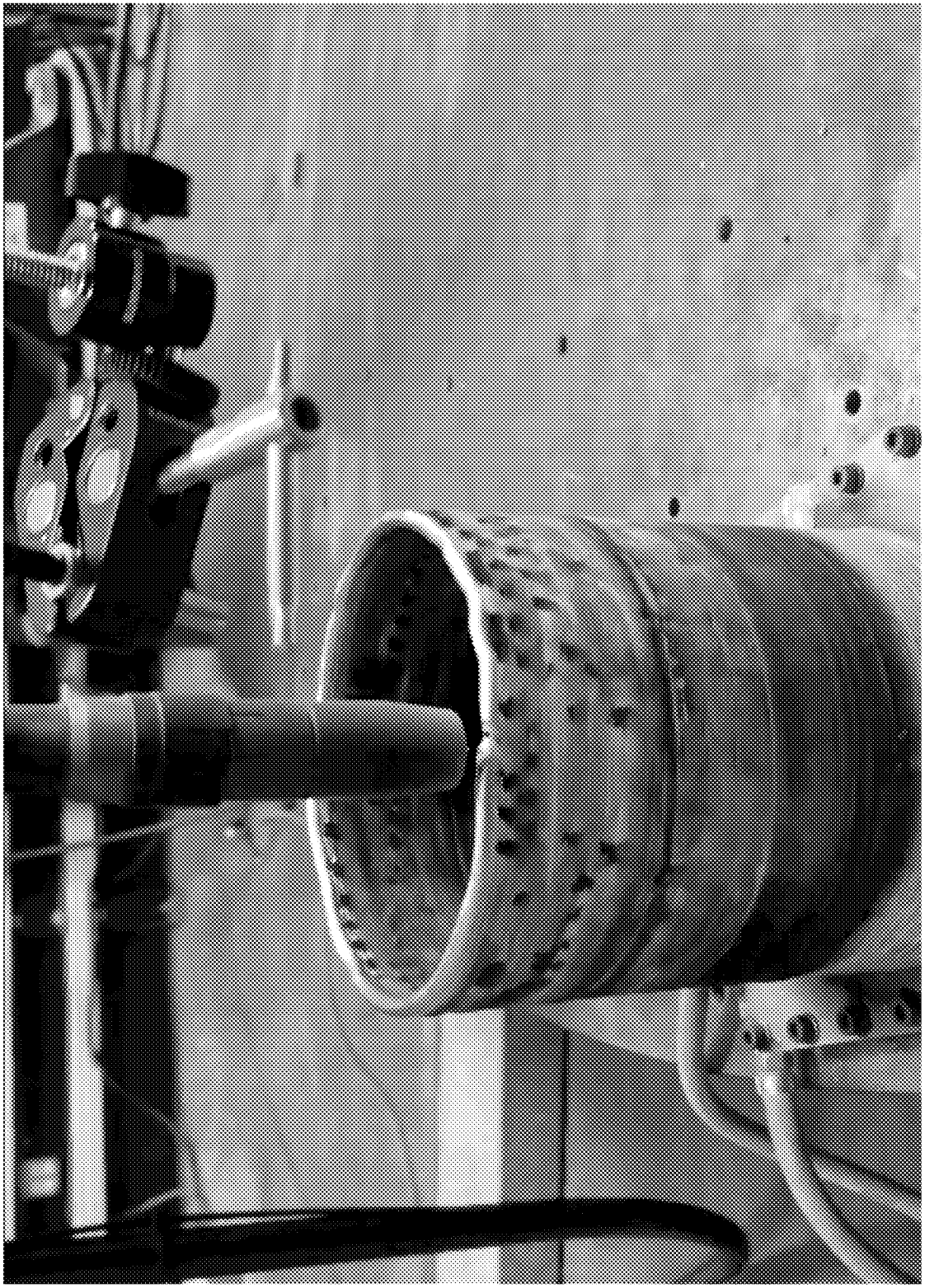


FIG. 6



FIG. 7

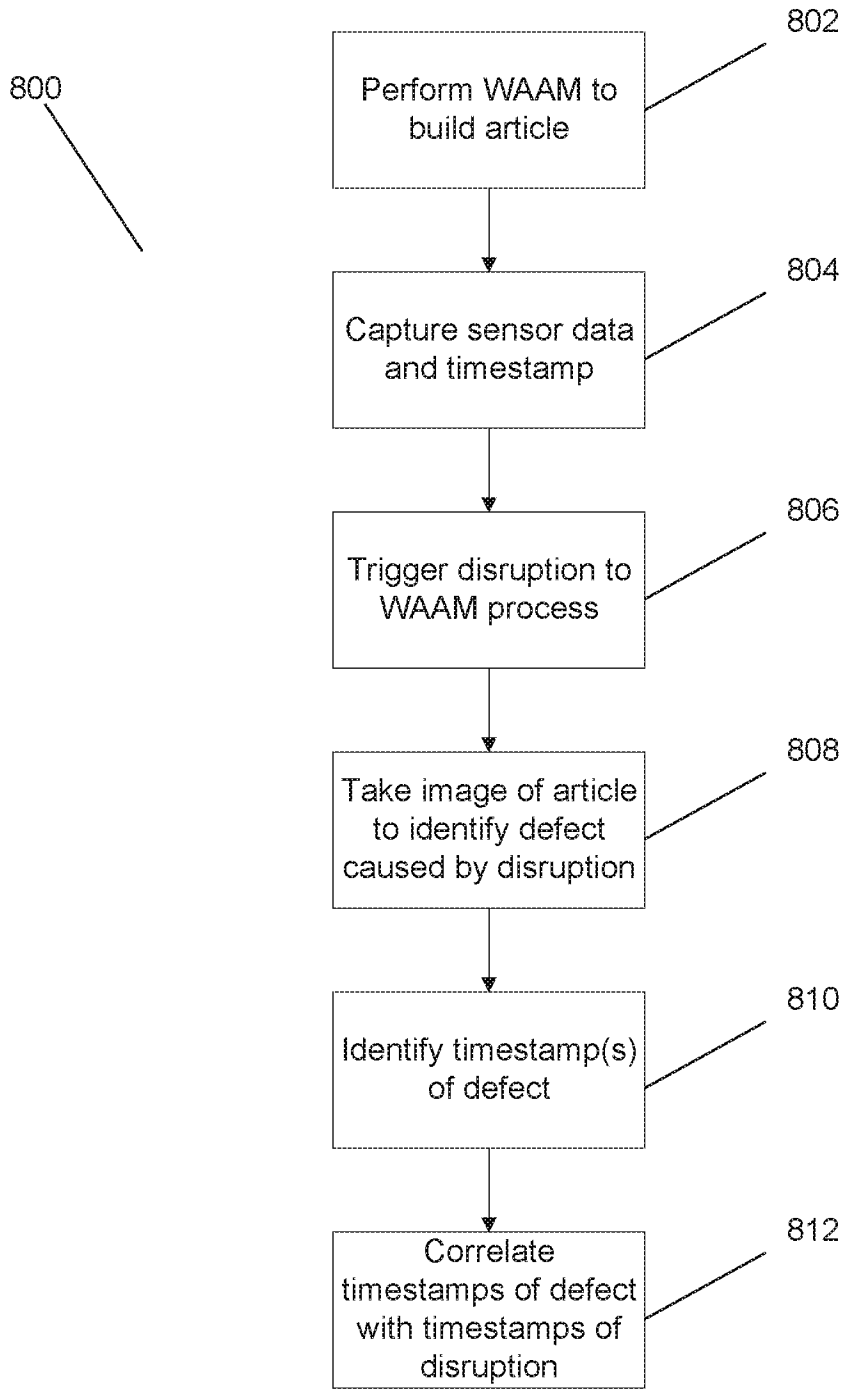

800
802
Perform WAAM to build article
804
Capture sensor data and timestamp
806
Trigger disruption to WAAM process
808
Take image of article to identify defect caused by disruption
810
Identify timestamp(s) of defect
812
Correlate timestamps of defect with timestamps of disruption

FIG. 8