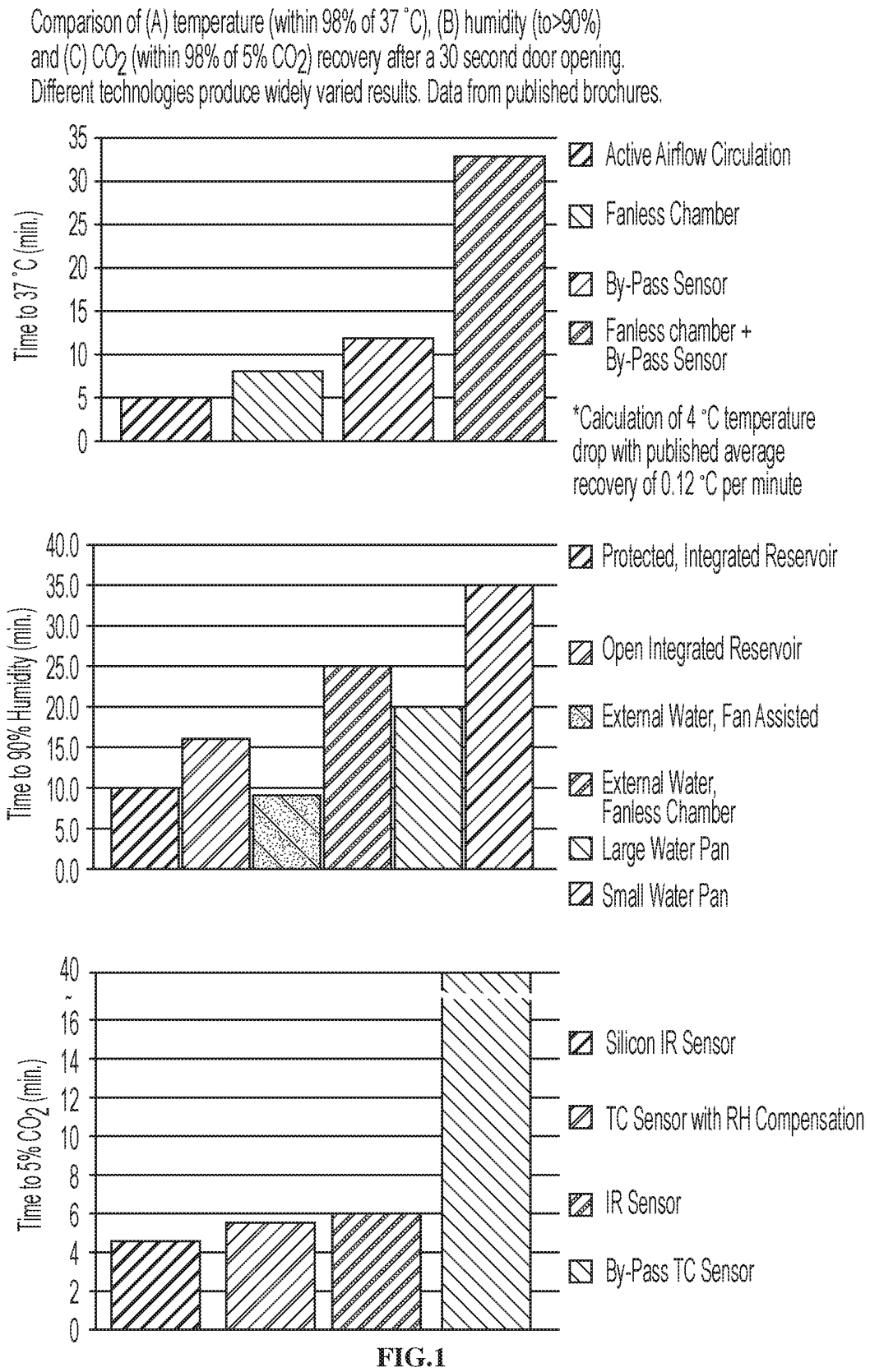

Comparison of (A) temperature (within 98% of 37 °C), (B) humidity (to>90%)
and (C) CO_2 (within 98% of 5% CO_2) recovery after a 30 second door opening.
Different technologies produce widely varied results. Data from published brochures.
Time to 37 °C (min.)
35
30
25
20
15
10
5
0
Active Airflow Circulation
Fanless Chamber
By-Pass Sensor
Fanless chamber + By-Pass Sensor
*Calculation of 4 °C temperature drop with published average recovery of 0.12 °C per minute
Time to 90% Humidity (min.)
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Protected, Integrated Reservoir
Open Integrated Reservoir
External Water, Fan Assisted
External Water, Fanless Chamber
Large Water Pan
Small Water Pan
Time to 5% CO_2 (min.)
40
16
14
12
10
8
6
4
2
0
Silicon IR Sensor
TC Sensor with RH Compensation
IR Sensor
By-Pass TC Sensor

FIG.1

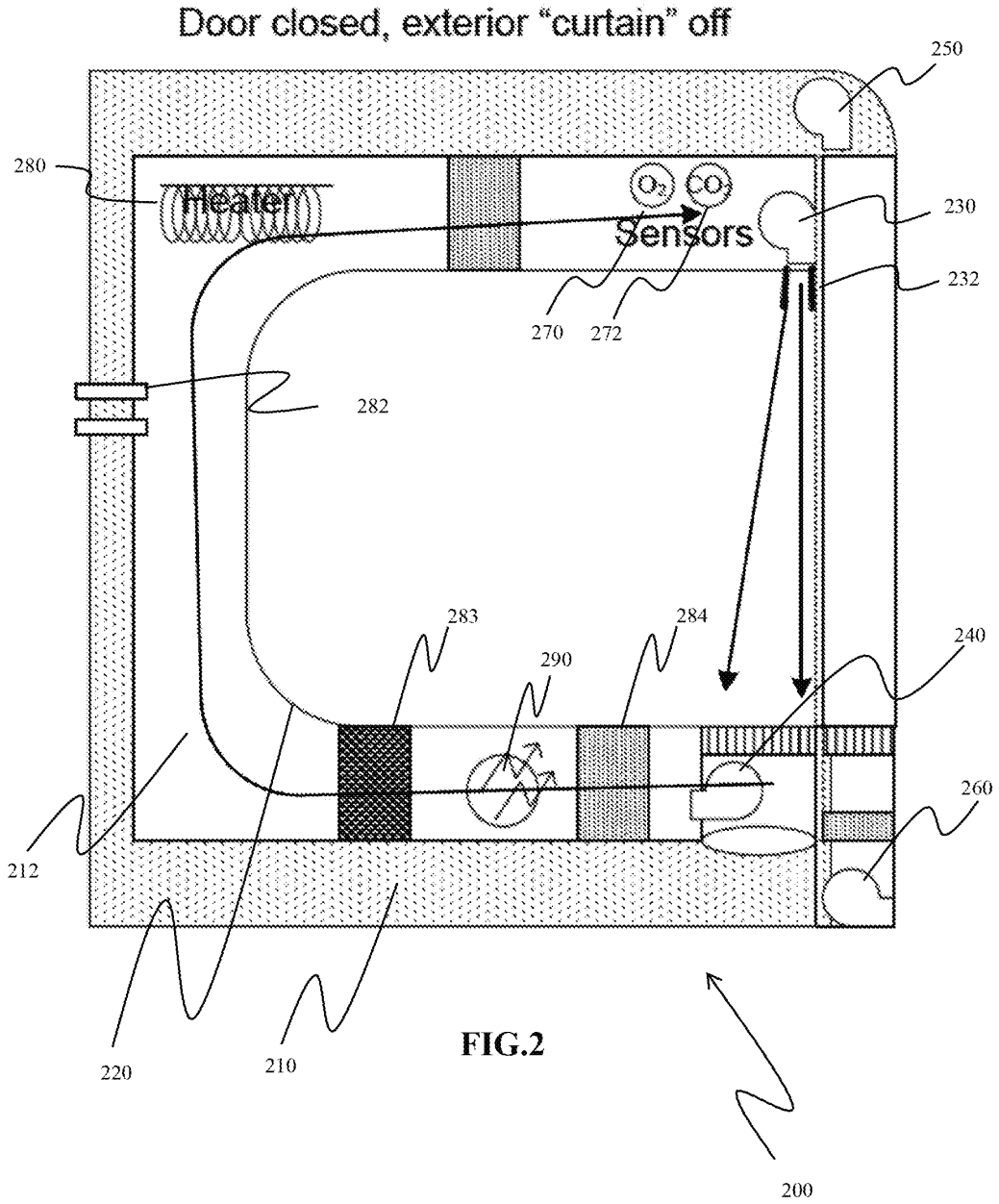

Door closed, exterior "curtain" off
250
280
Heater
Sensors
230
232
270
272
282
283
284
290
240
260
212
220
210
200

FIG.2

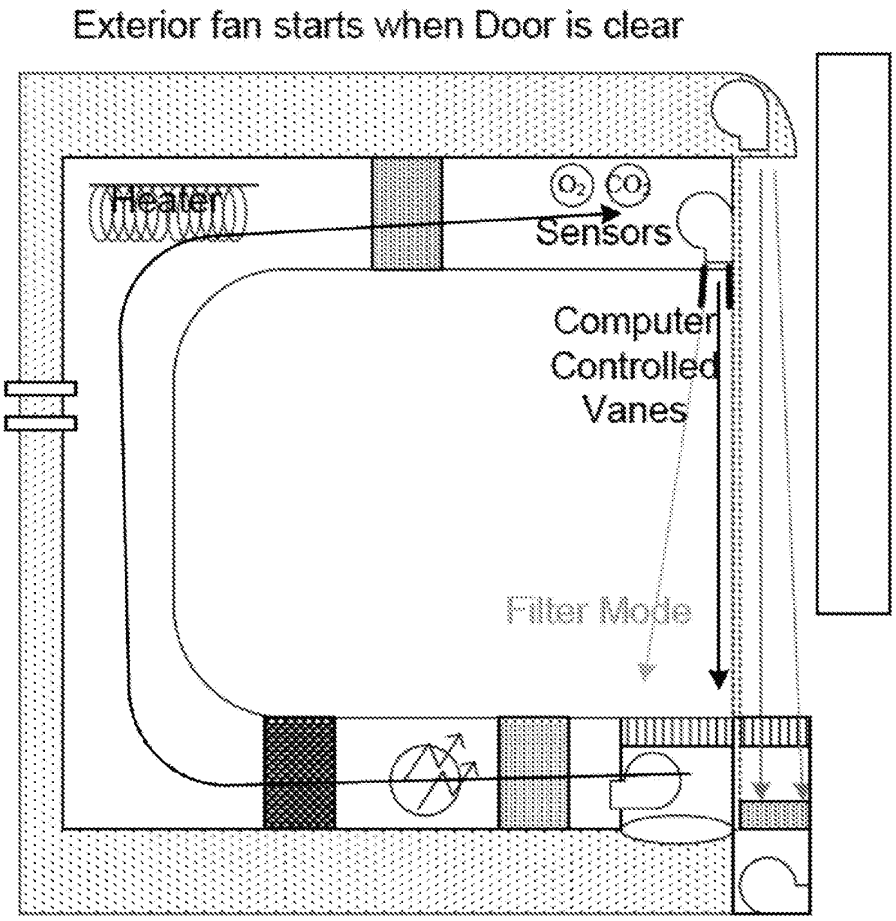

Exterior fan starts when Door is clear
Heater
O_2
CO_2
Sensors
Computer
Controlled
Vanes
Filter Mode

FIG.3

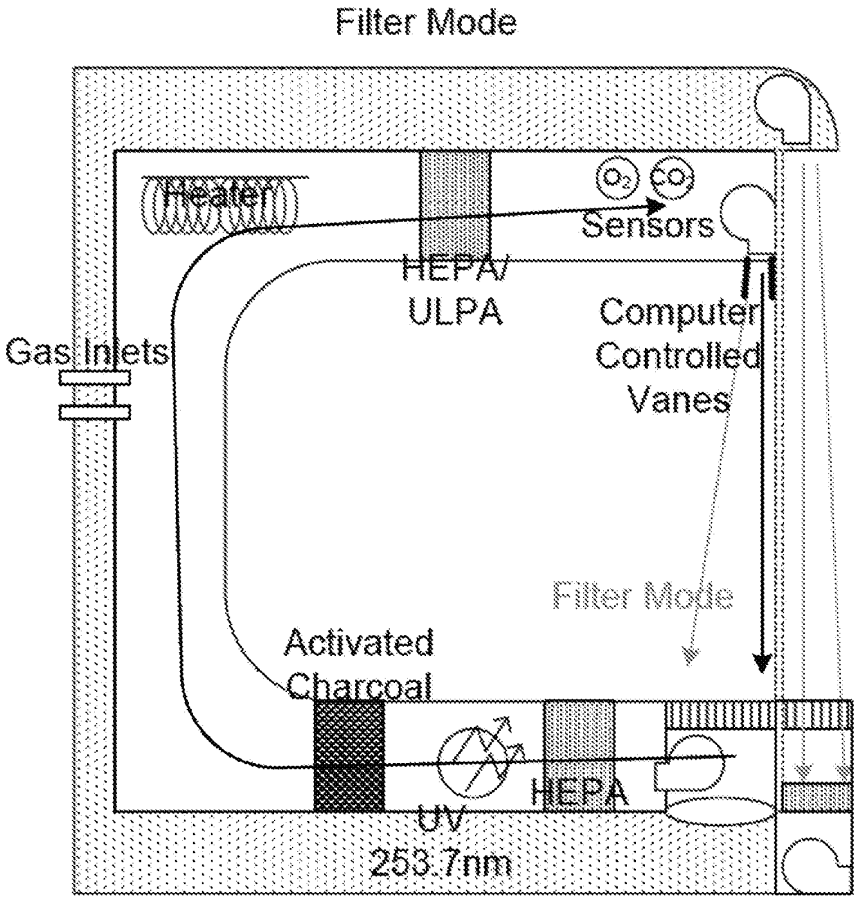

Filter Mode
Heater
Sensors
HEPA/
ULPA
Gas Inlets
Computer
Controlled
Vanes
Filter Mode
Activated
Charcoal
HEPA
UV
253.7nm

FIG.4

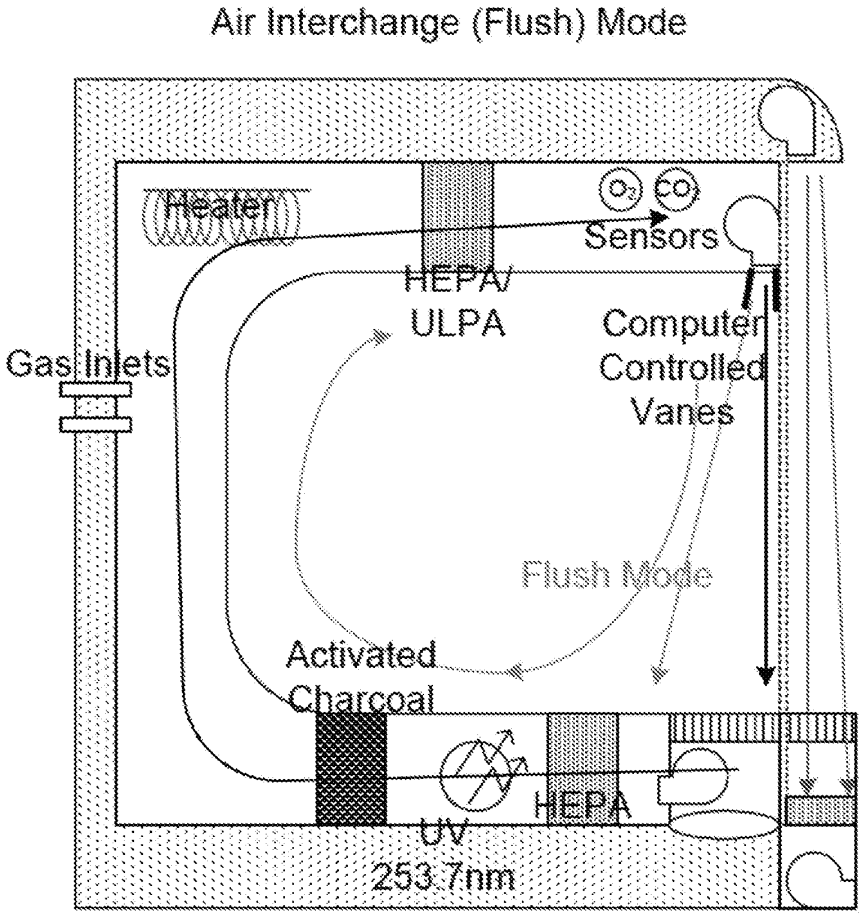

Air Interchange (Flush) Mode
Heater
Sensors
HEPA/
ULPA
Computer
Controlled
Vanes
Gas Inlets
Flush Mode
Activated
Charcoal
HEPA
UV
253.7nm

FIG.5

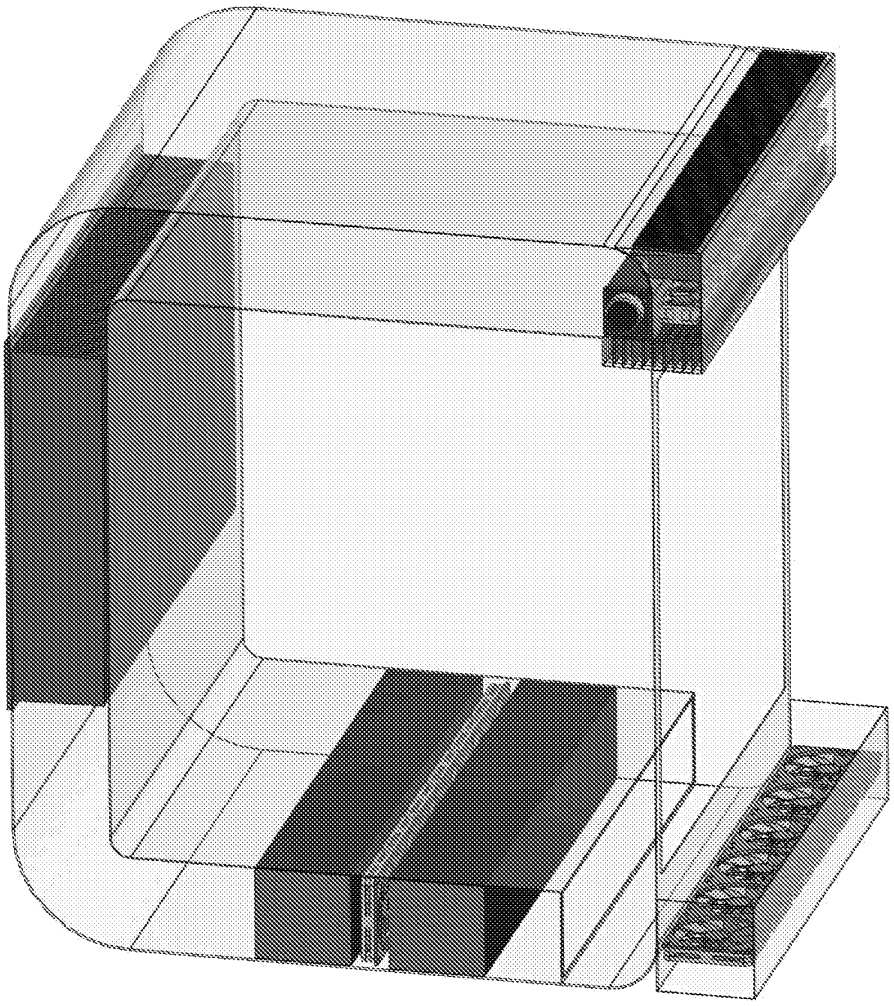


FIG.6

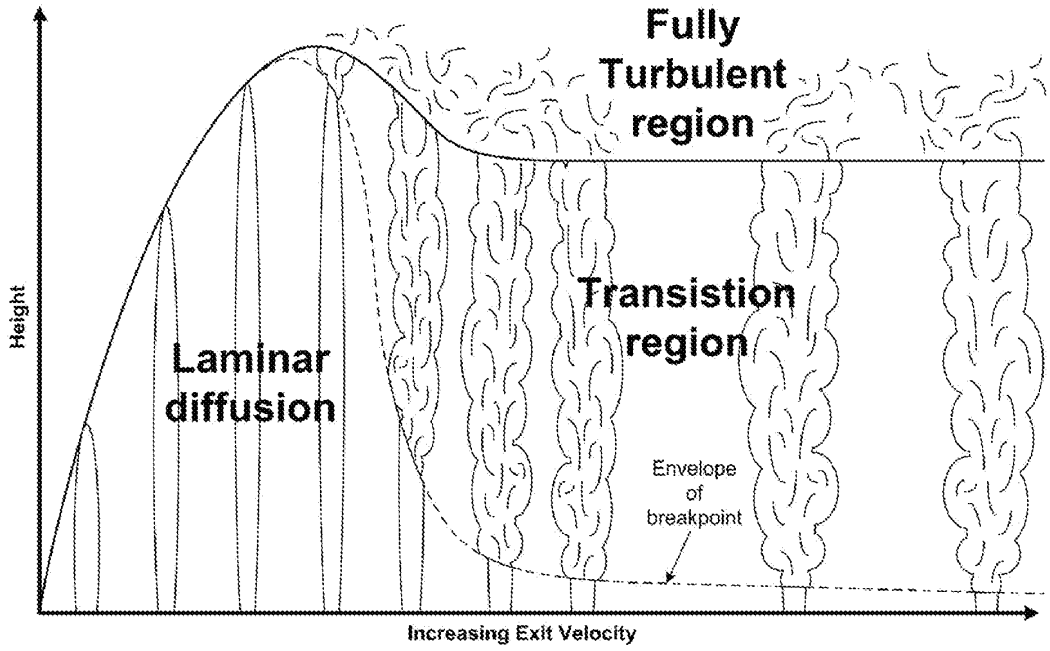

Fully
Turbulent
region
Transistion
region
Laminar
diffusion
Envelope
of
breakpoint
Height
Increasing Exit Velocity

FIG.7

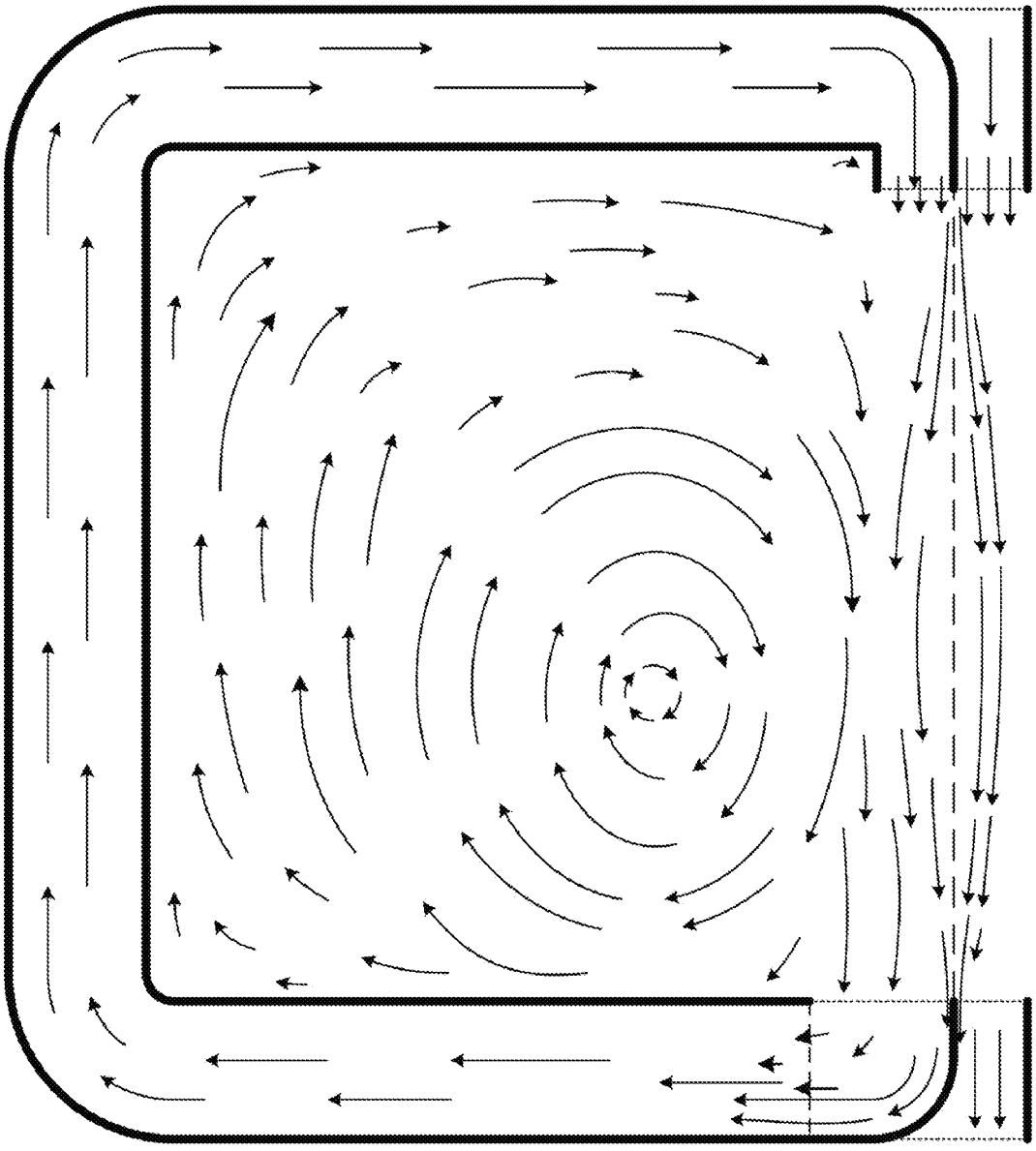


FIG.8

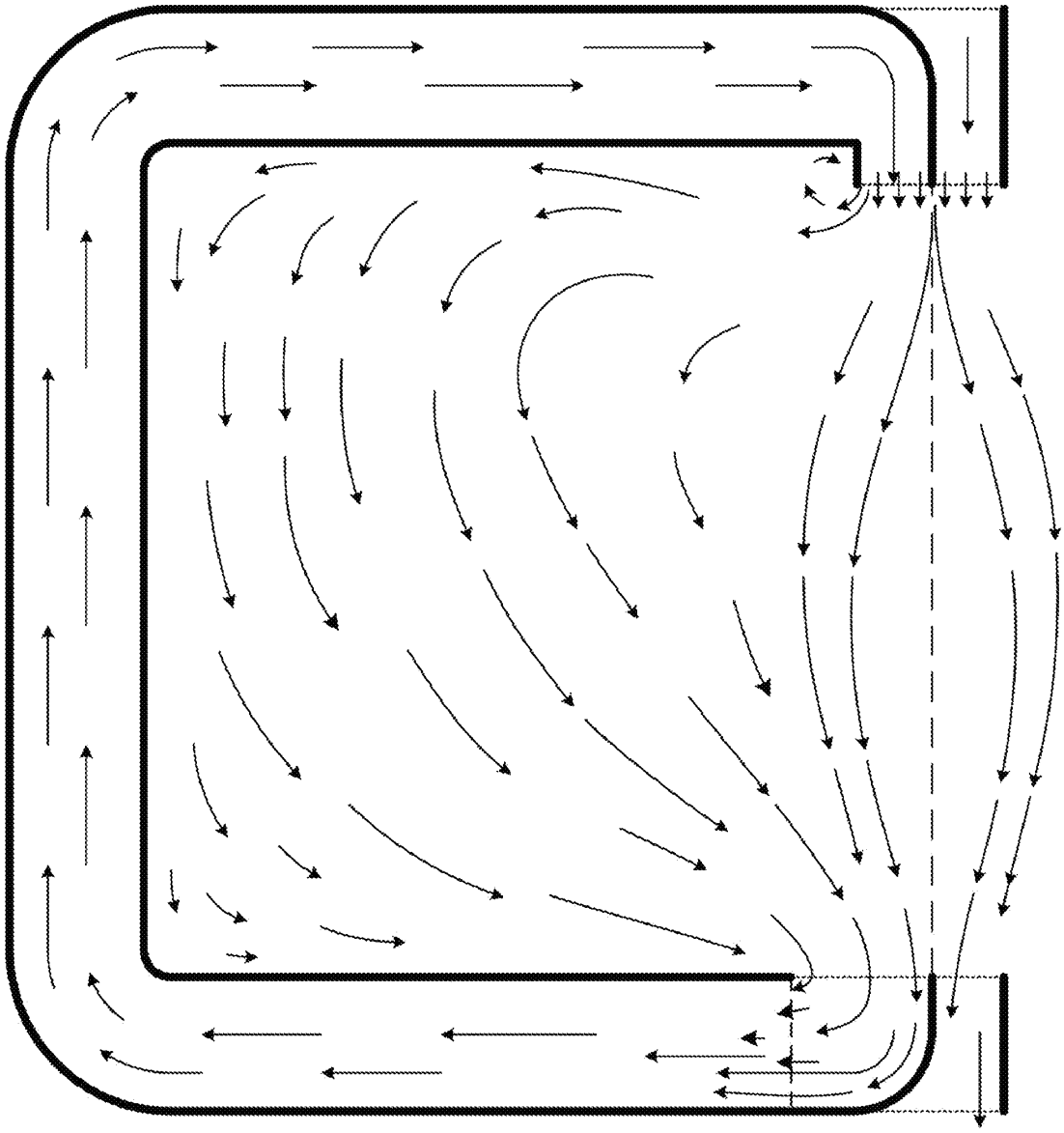


FIG.9

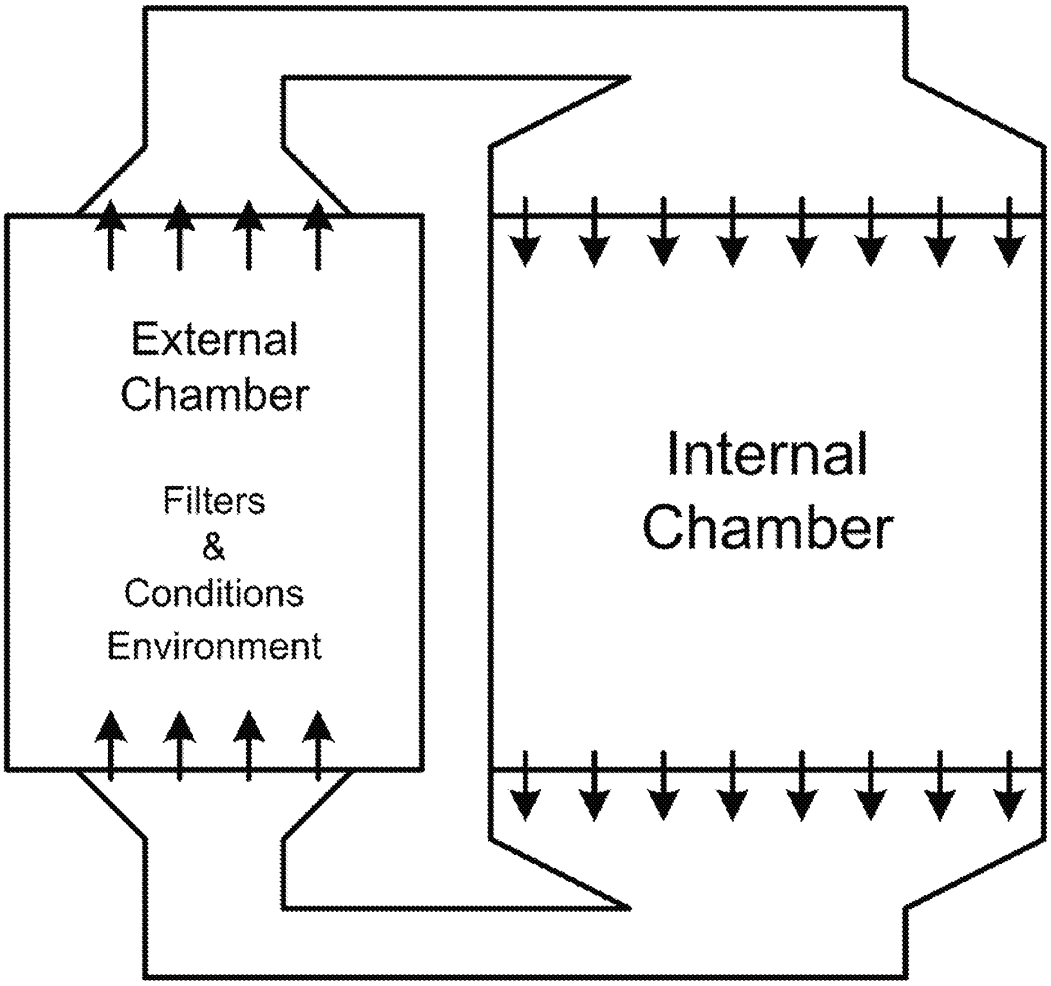

External
Chamber
Filters
&
Conditions
Environment
Internal
Chamber

FIG.10

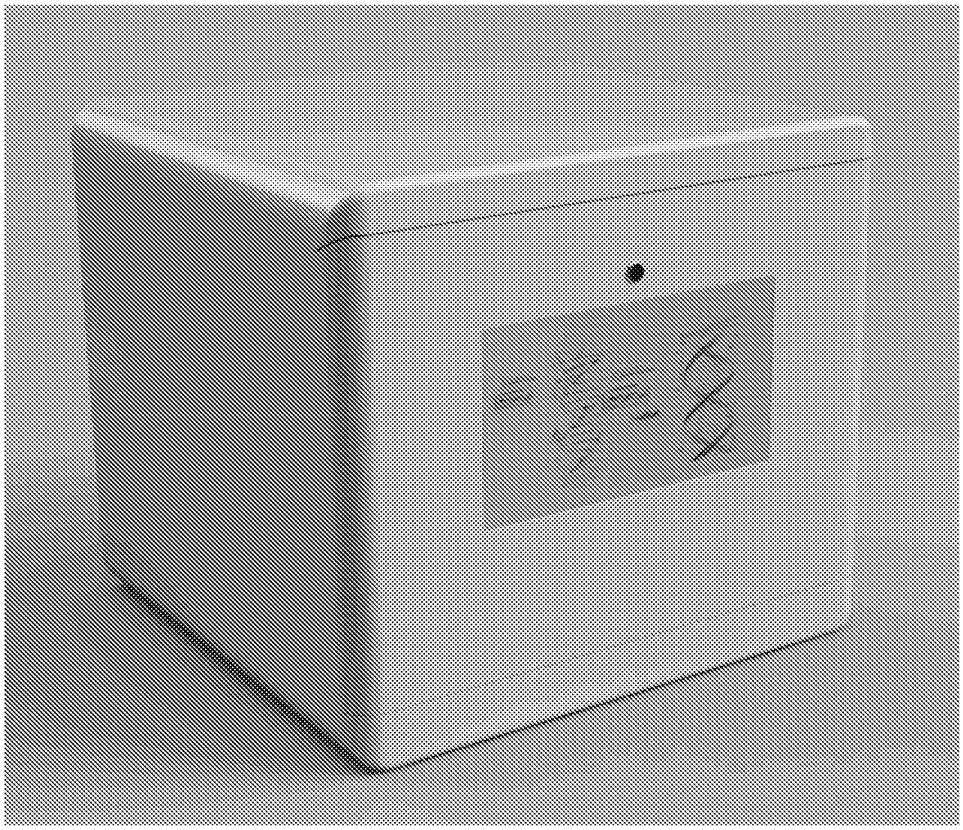


FIG.11

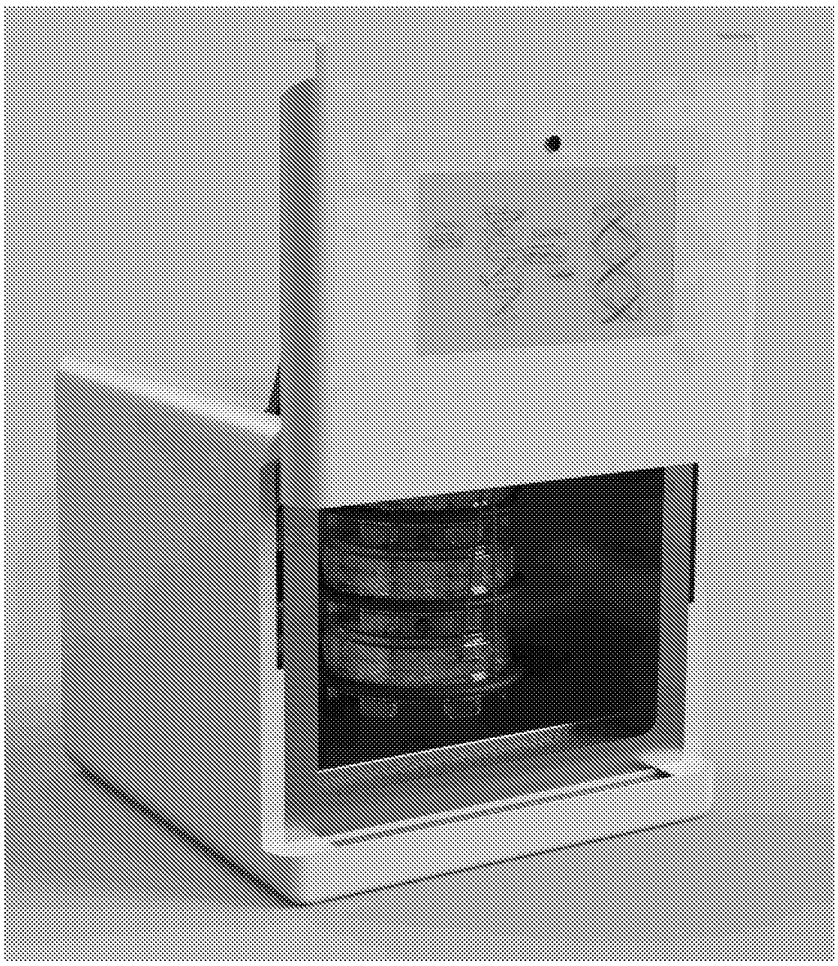


FIG.12

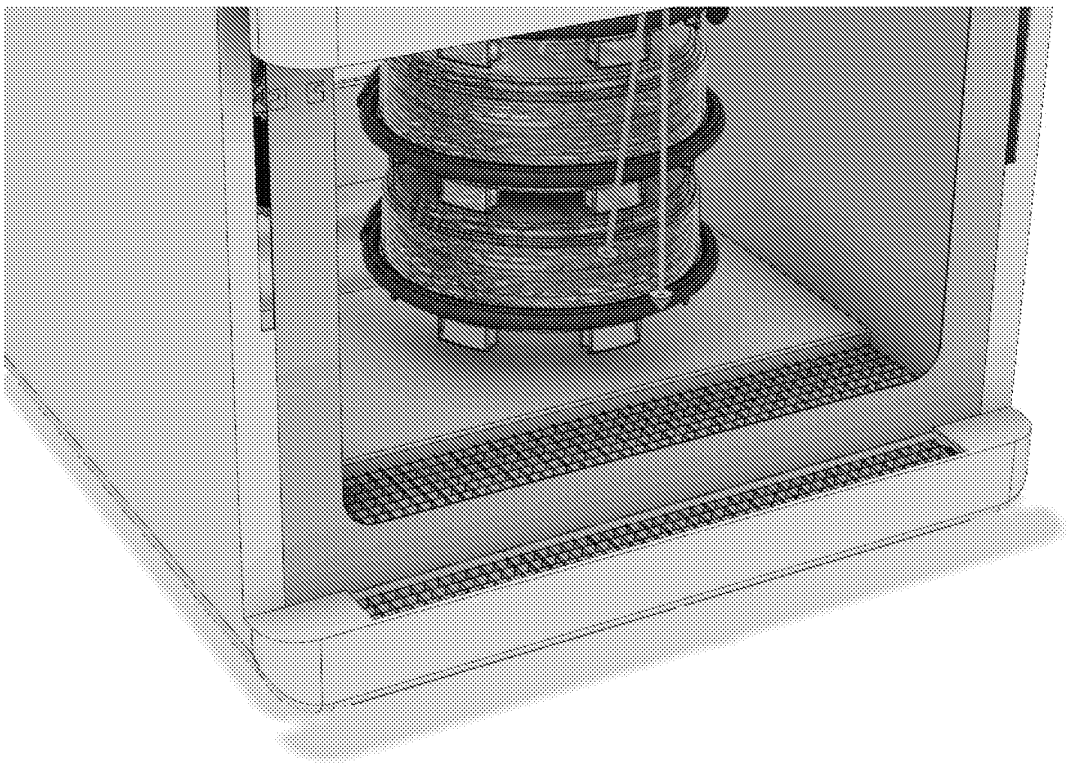


FIG.13



FIG.14



FIG.15

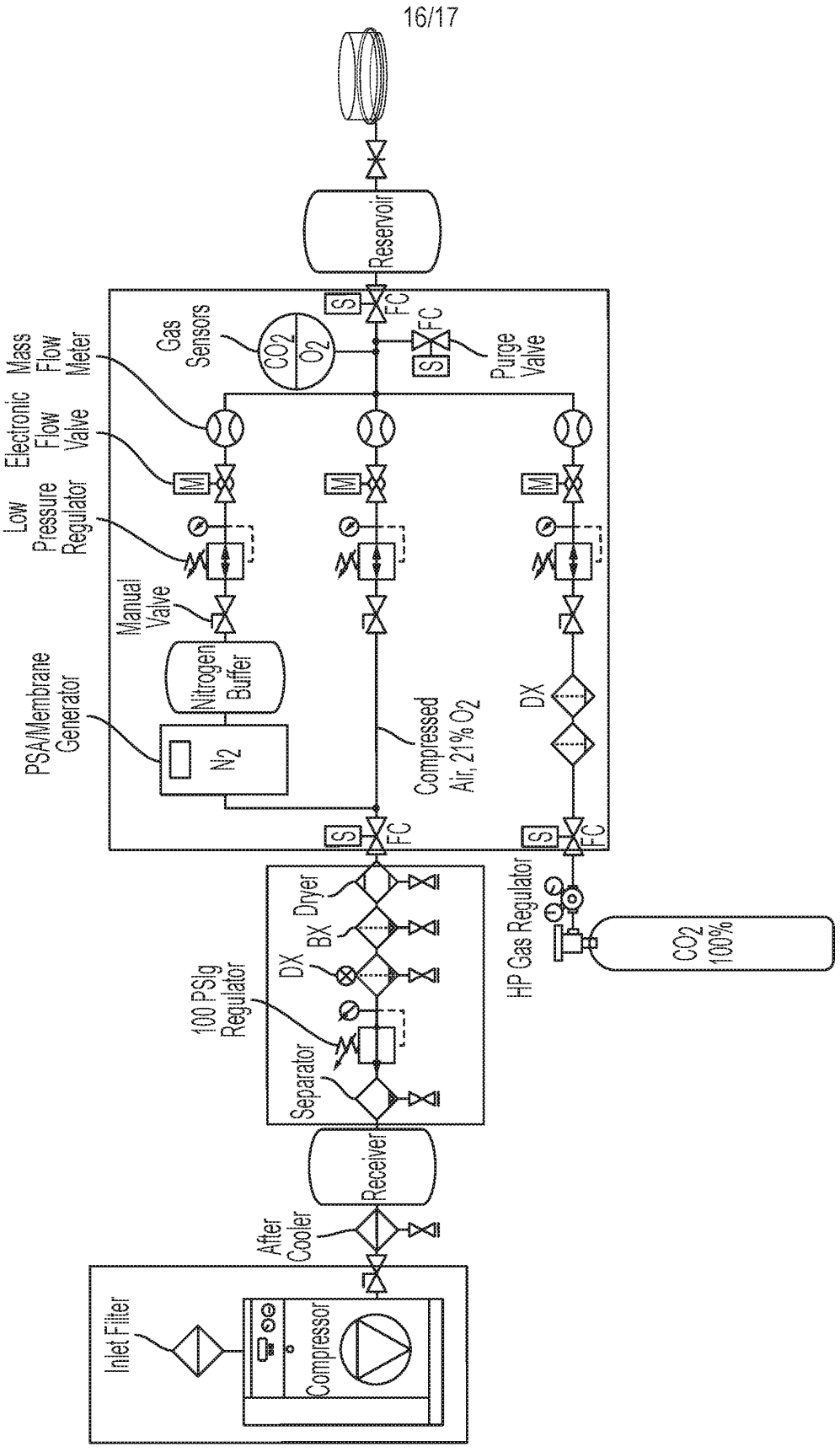

Reservoir
S
FC
Gas Sensors
CO_2
O_2
S
FC
Purge Valve
Mass Flow Meter
Electronic Flow Valve
Low Pressure Regulator
Manual Valve
Nitrogen Buffer
PSA/Membrane Generator
N_2
Compressed Air, 21% O_2
DX
S
FC
S
FC
HP Gas Regulator
CO_2 100%
Dryer
BX
DX
100 PSIg Regulator
Separator
Receiver
After Cooler
Inlet Filter
Compressor

FIG.16

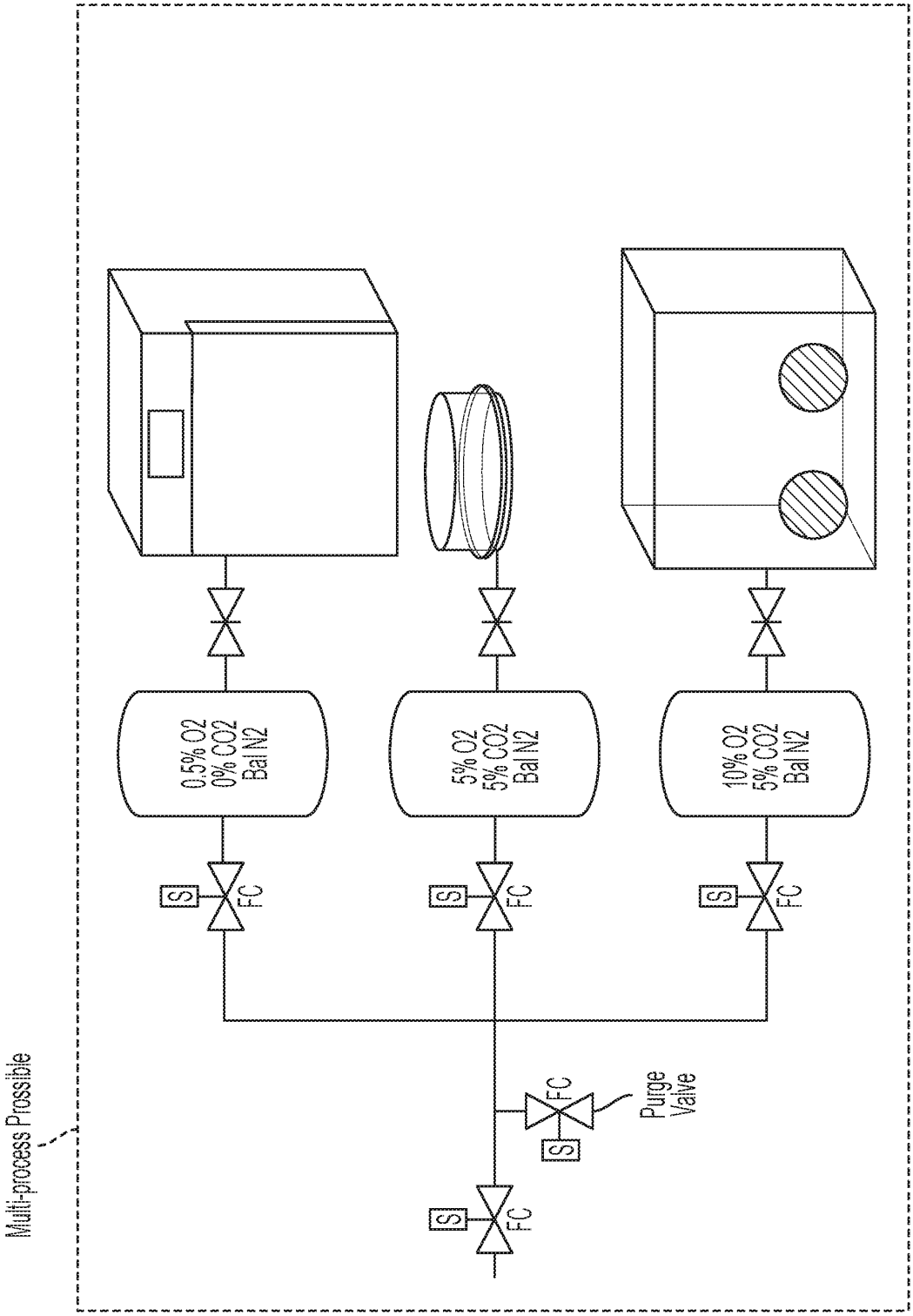

Multi-process Prossible
0.5% O2
0% CO2
Bal N2
5% O2
5% CO2
Bal N2
10% O2
5% CO2
Bal N2
S
FC
S
FC
S
FC
FC
S
Purge
Valve
S
FC

FIG.17