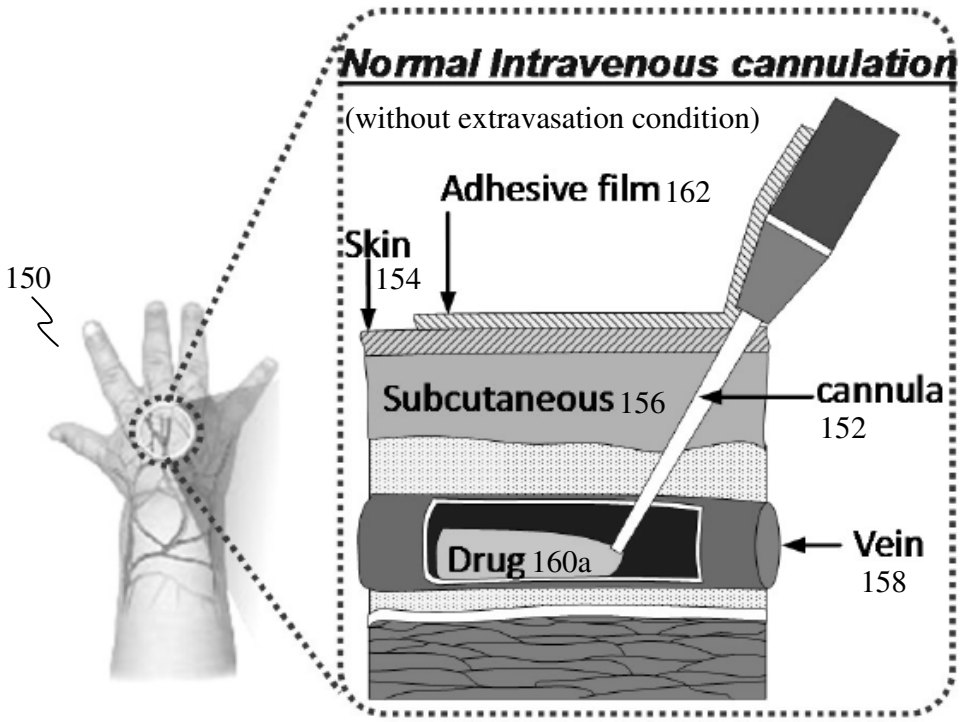

Normal Intravenous cannulation
(without extravasation condition)
Adhesive film 162
Skin
154
150
Subcutaneous 156
cannula
152
Drug 160a
Vein
158

FIG. 1A

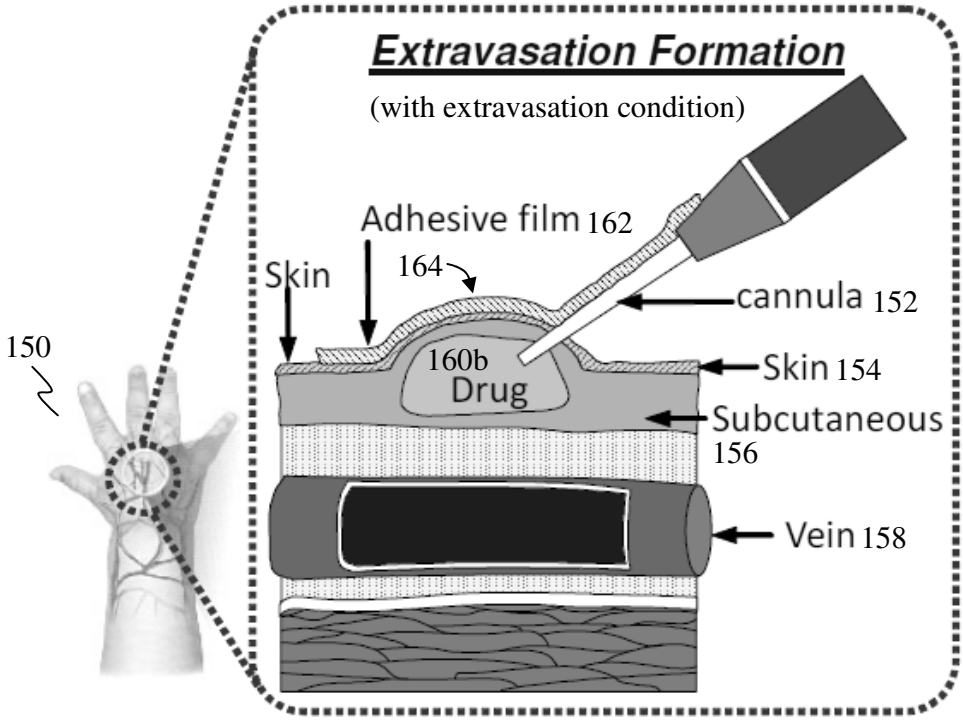

Extravasation Formation
(with extravasation condition)
Adhesive film 162
Skin
164
cannula 152
150
160b
Drug
Skin 154
Subcutaneous
156
Vein 158

FIG. 1B

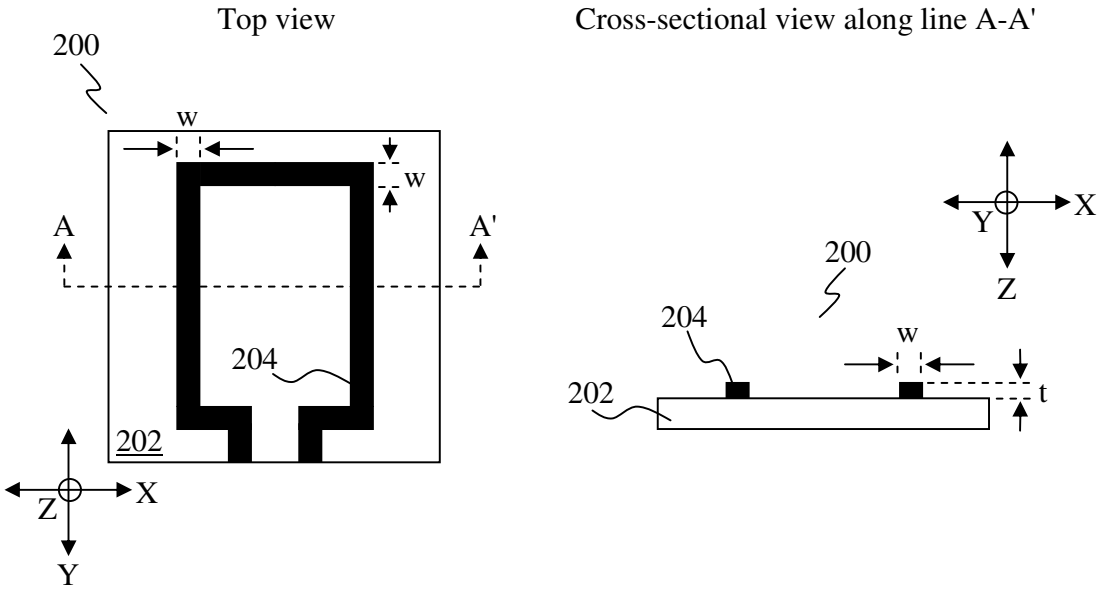

Top view
Cross-sectional view along line A-A'
200
w
w
A
A'
204
202
Z
X
Y
200
204
w
202
t
Y
X
Z

FIG. 2A

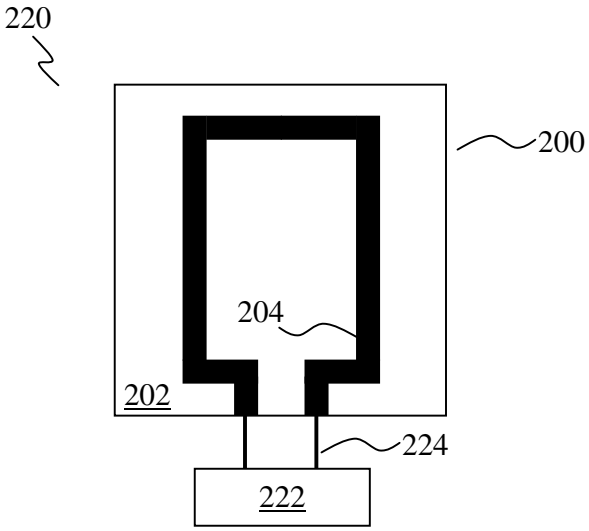

220
200
204
202
224
222

FIG. 2B

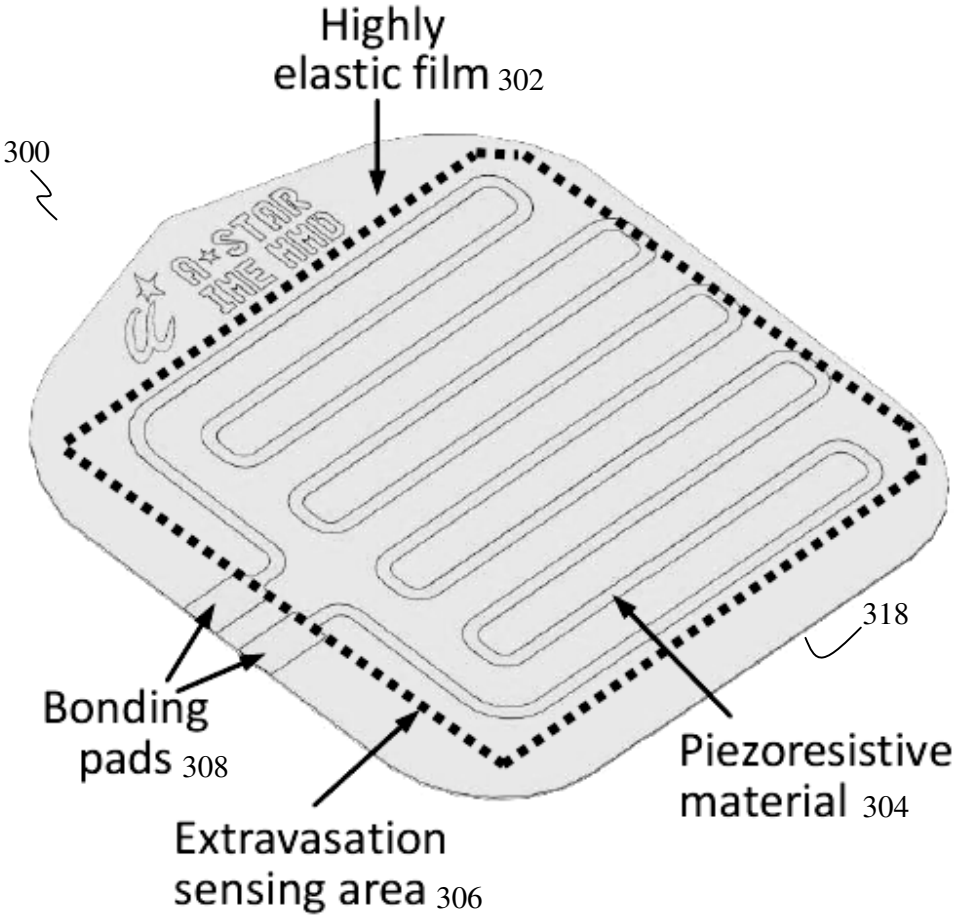

Highly
elastic film 302
300
318
Bonding
pads 308
Piezoresistive
material 304
Extravasation
sensing area 306

FIG. 3

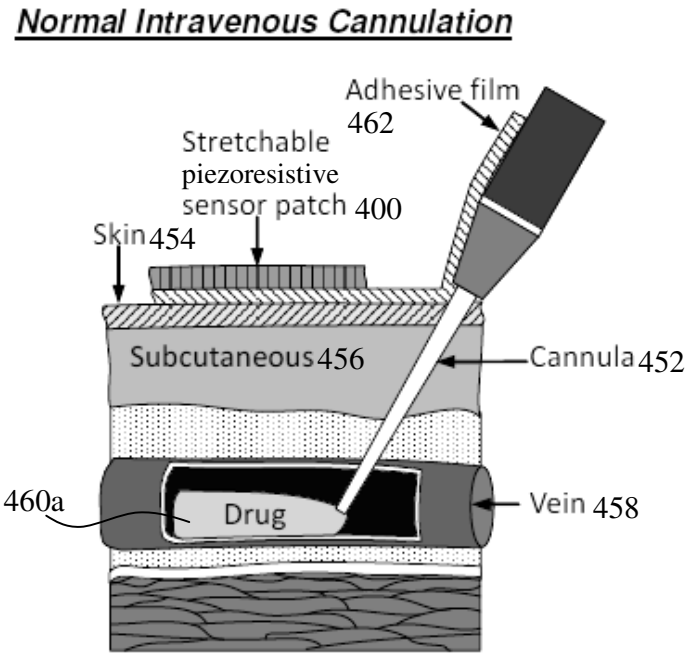

Normal Intravenous Cannulation
Adhesive film
462
Stretchable
piezoresistive
sensor patch 400
Skin 454
Subcutaneous 456
Cannula 452
460a
Drug
Vein 458

FIG. 4A

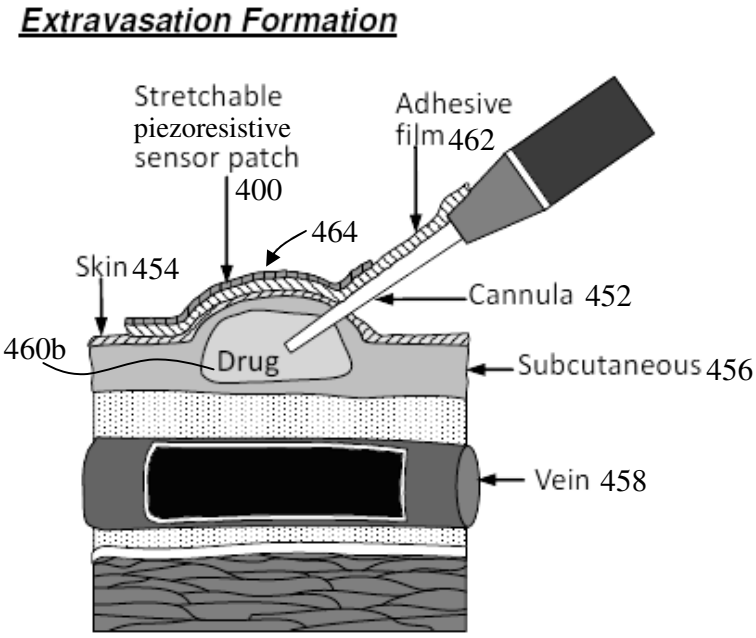

Extravasation Formation
Stretchable
piezoresistive
sensor patch
400
Adhesive
film 462
464
Skin 454
Cannula 452
460b
Drug
Subcutaneous 456
Vein 458

FIG. 4B

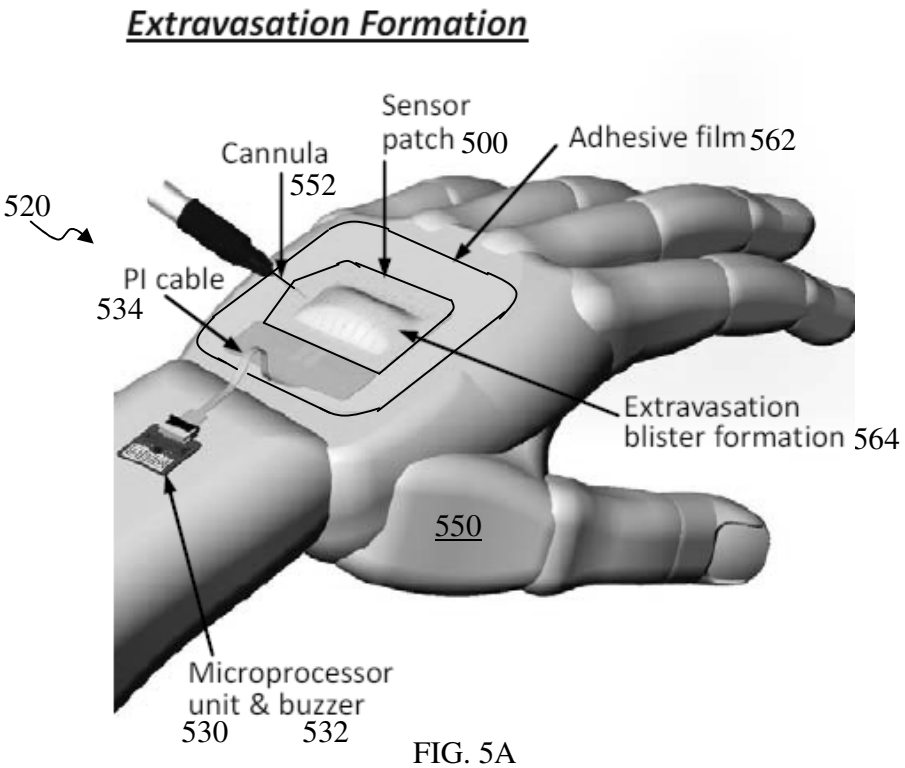

Extravasation Formation
Sensor patch 500
Adhesive film 562
Cannula 552
520
PI cable 534
Extravasation blister formation 564
550
Microprocessor unit & buzzer
530
532

FIG. 5A

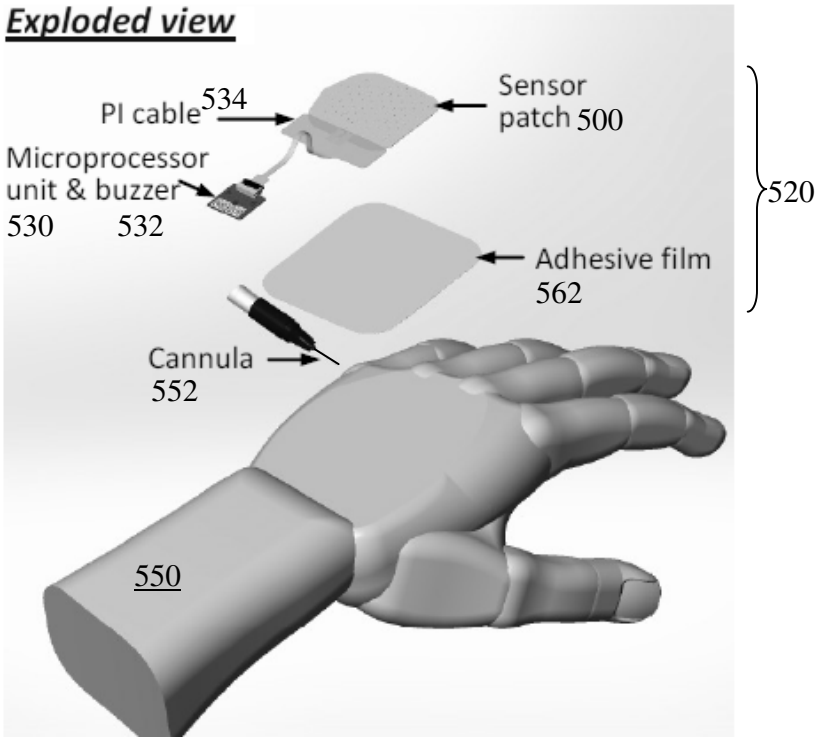

Exploded view
PI cable 534
Sensor patch 500
Microprocessor unit & buzzer
530
532
520
Adhesive film 562
Cannula 552
550

FIG. 5B

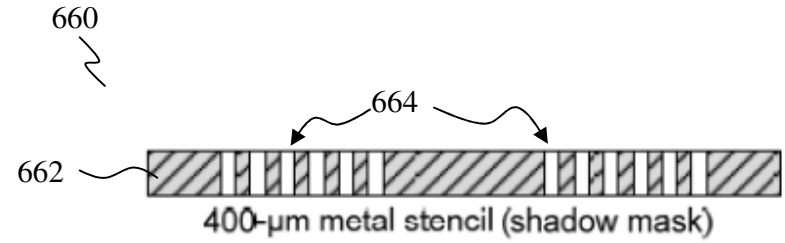


FIG. 6A



FIG. 6B

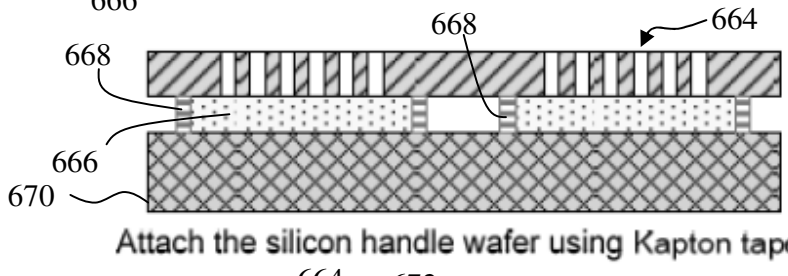


FIG. 6C

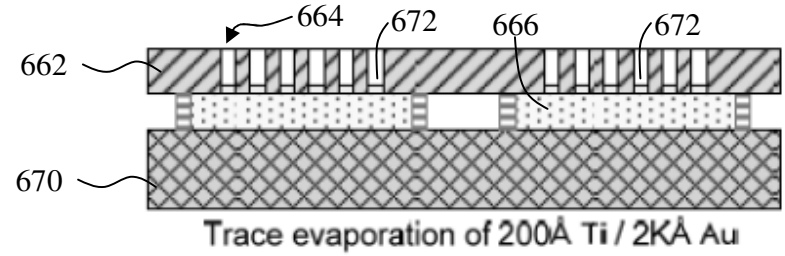


FIG. 6D

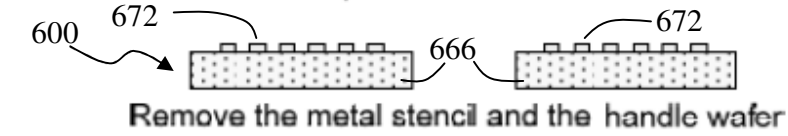
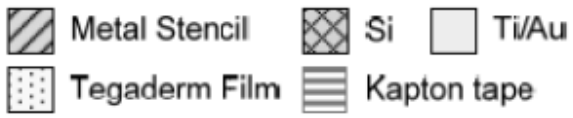


FIG. 6E



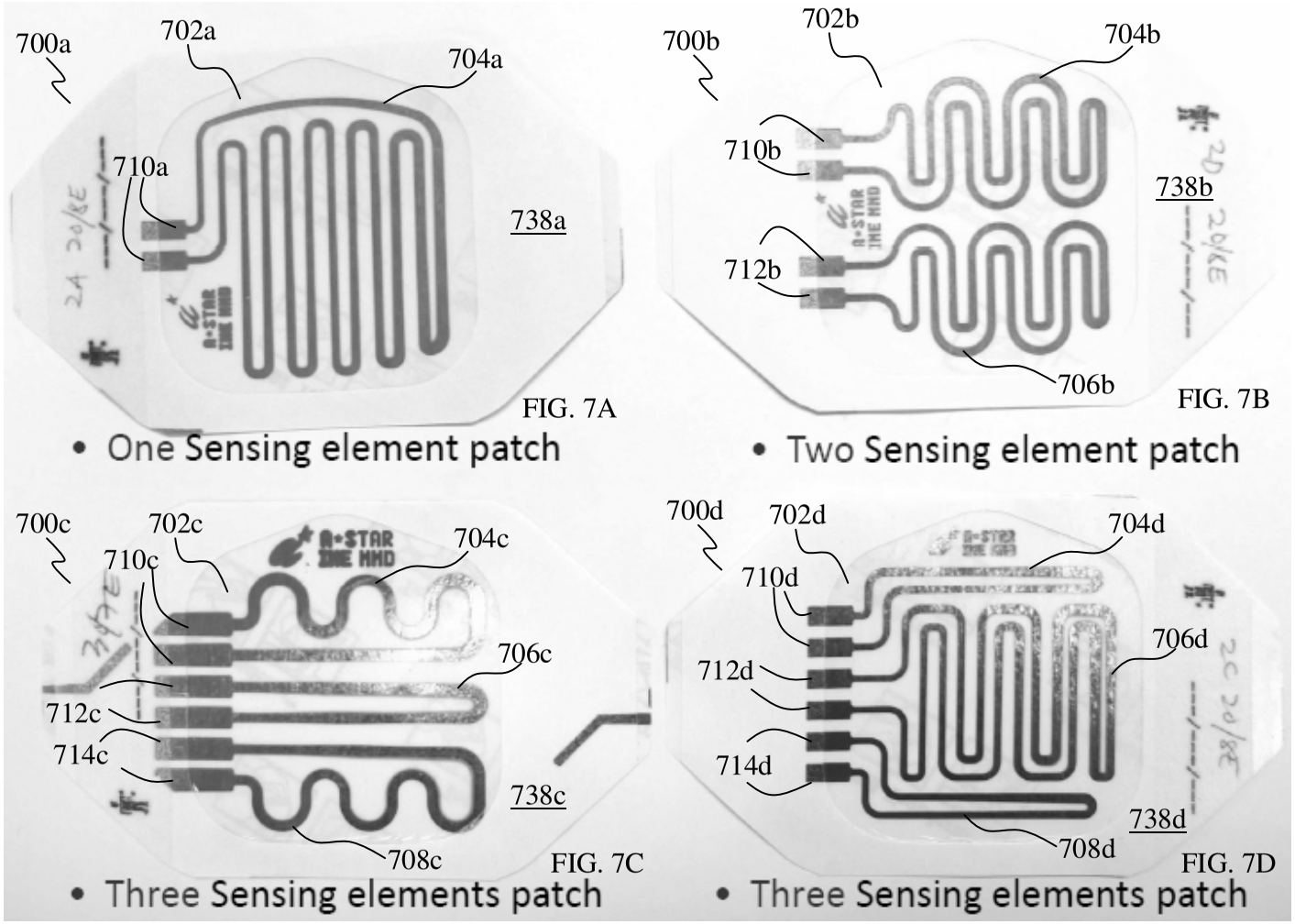


FIG. 7A

FIG. 7B

FIG. 7C

FIG. 7D

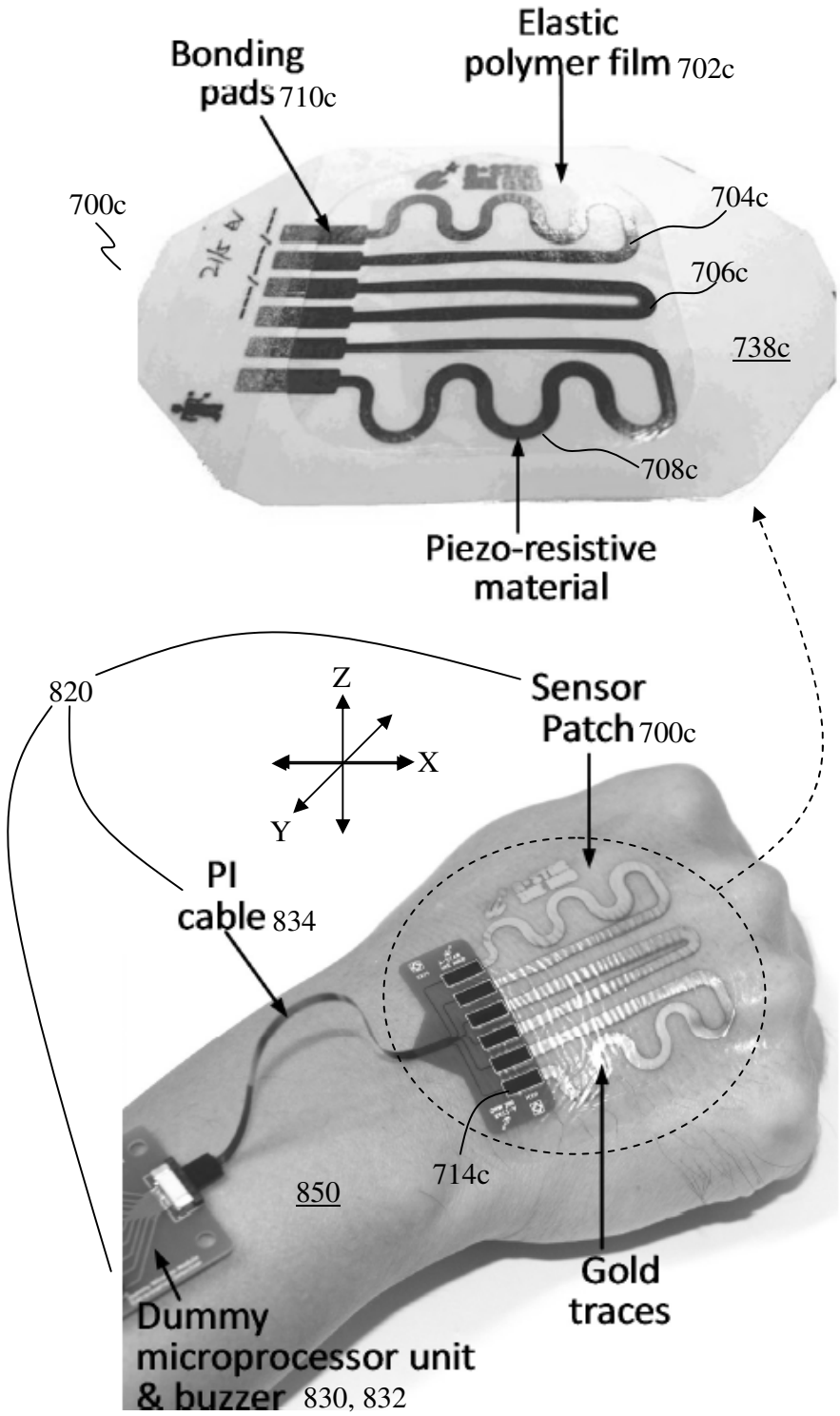

Elastic
polymer film 702c
Bonding
pads 710c
700c
704c
706c
738c
708c
Piezo-resistive
material
820
Z
X
Y
Sensor
Patch 700c
PI
cable 834
714c
850
Gold
traces
Dummy
microprocessor unit
& buzzer 830, 832

FIG. 8

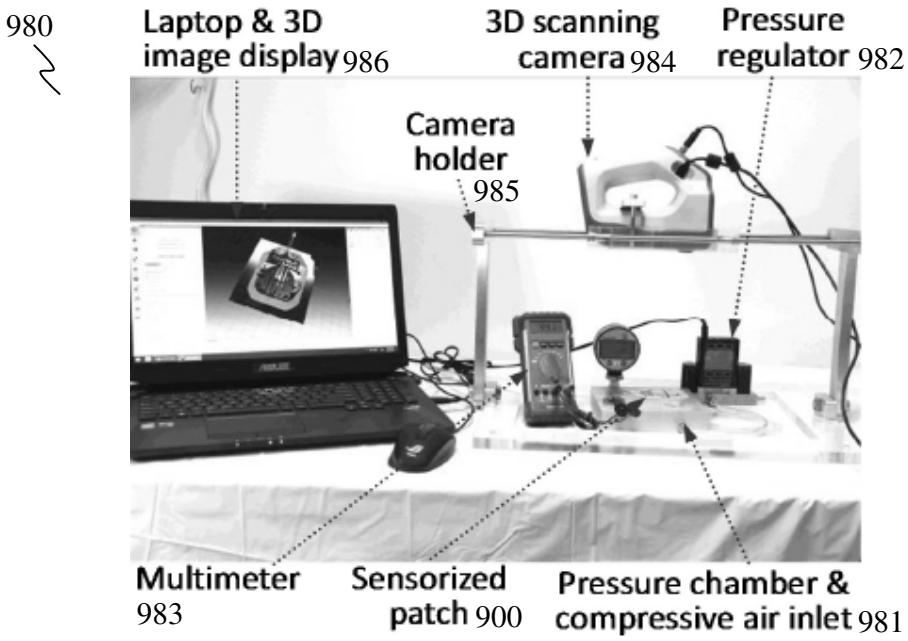

980
Laptop & 3D image display 986
3D scanning camera 984
Pressure regulator 982
Camera holder 985
Multimeter 983
Sensorized patch 900
Pressure chamber & compressive air inlet 981

FIG. 9A

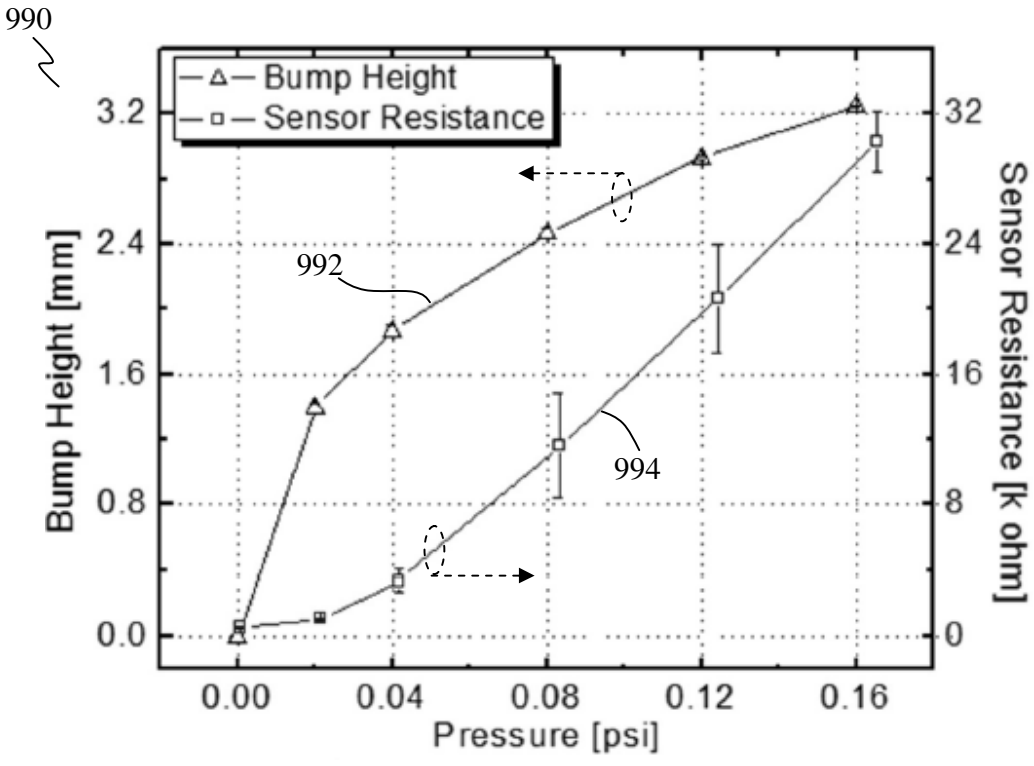

990
Bump Height
Sensor Resistance
992
994
Bump Height [mm]
Sensor Resistance [k ohm]
Pressure [psi]
0.0
0.8
1.6
2.4
3.2
0
8
16
24
32
0.00
0.04
0.08
0.12
0.16

FIG. 9B

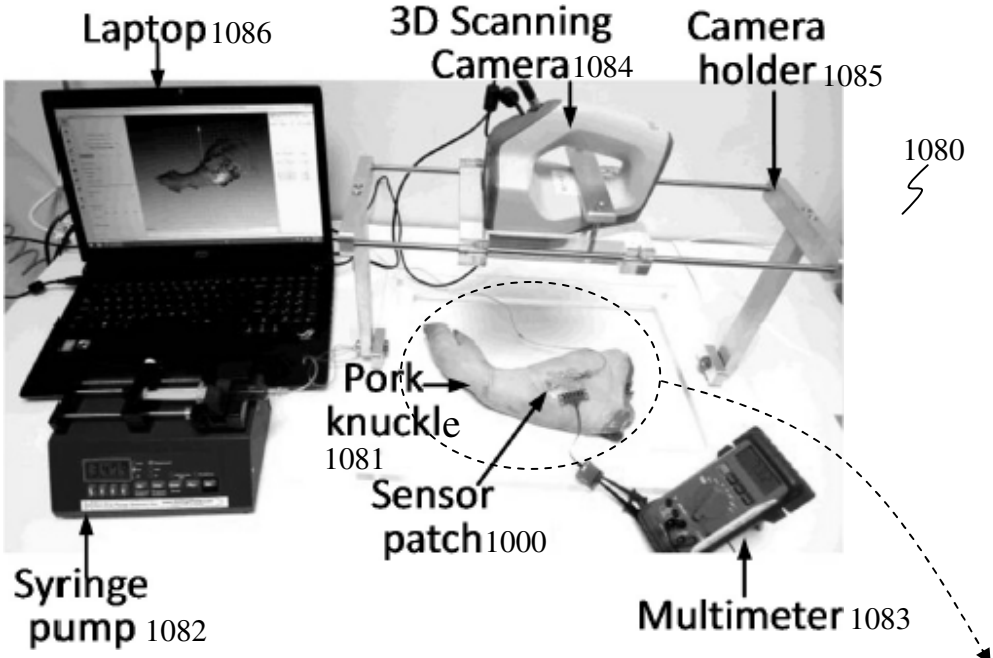
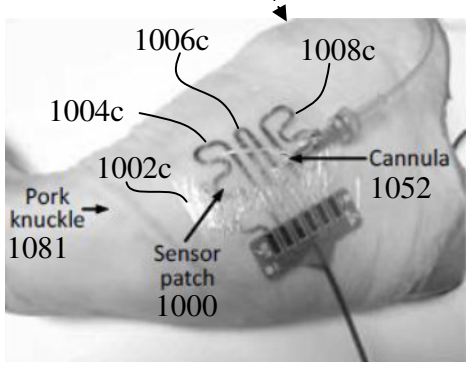


FIG. 10A



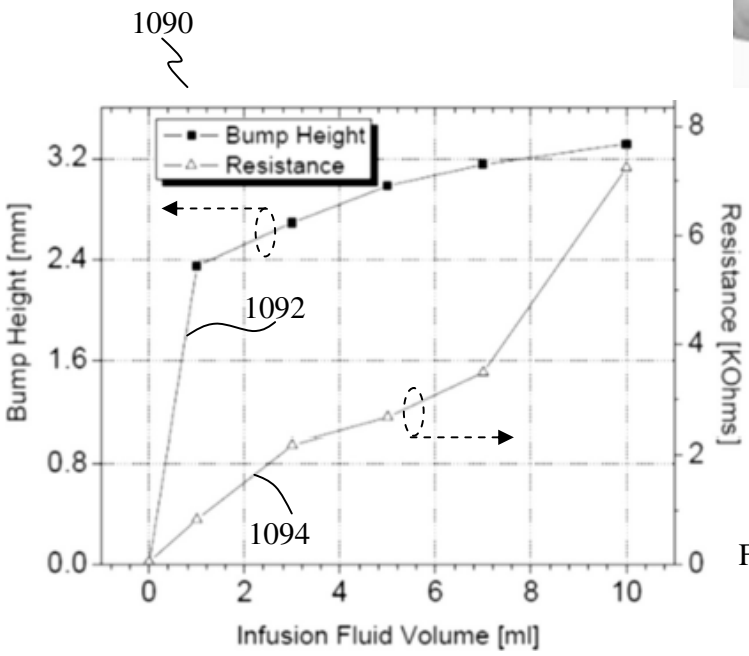


FIG. 10B