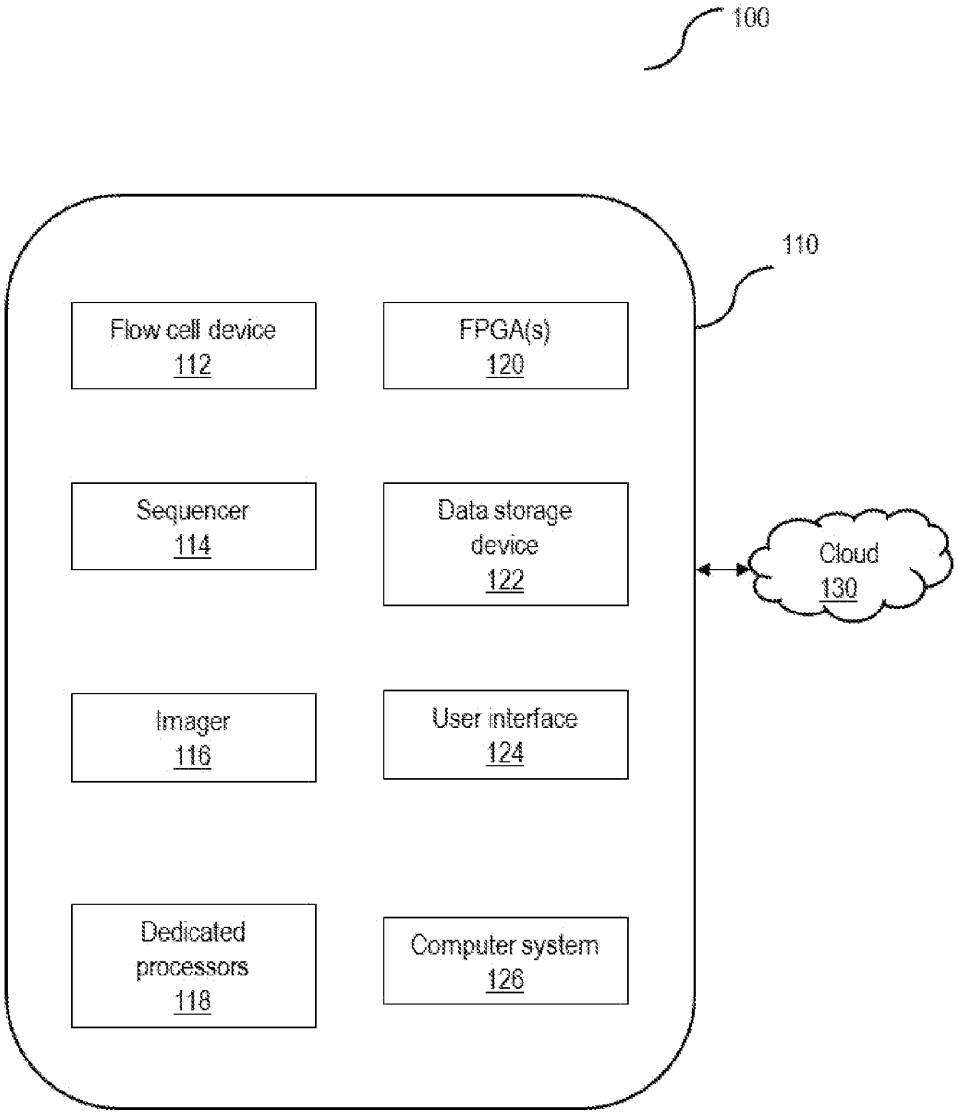

100
110
Flow cell device
112
FPGA(s)
120
Sequencer
114
Data storage
device
122
Cloud
130
Imager
116
User interface
124
Dedicated
processors
118
Computer system
126

FIG. 1

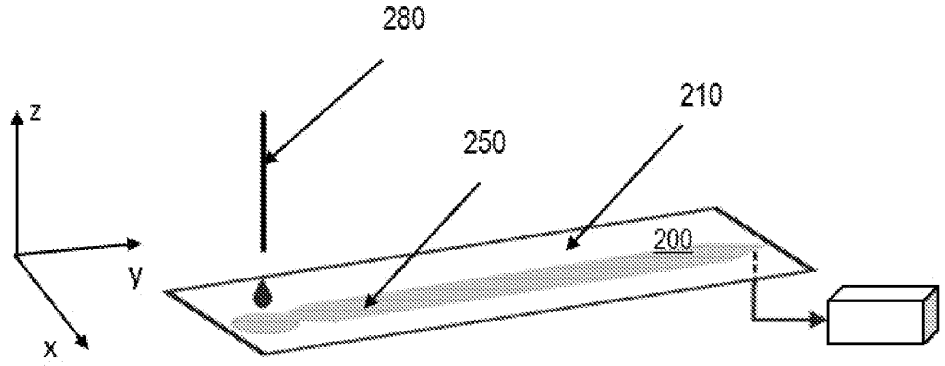

280
210
250
z
y
x
200

FIG. 2

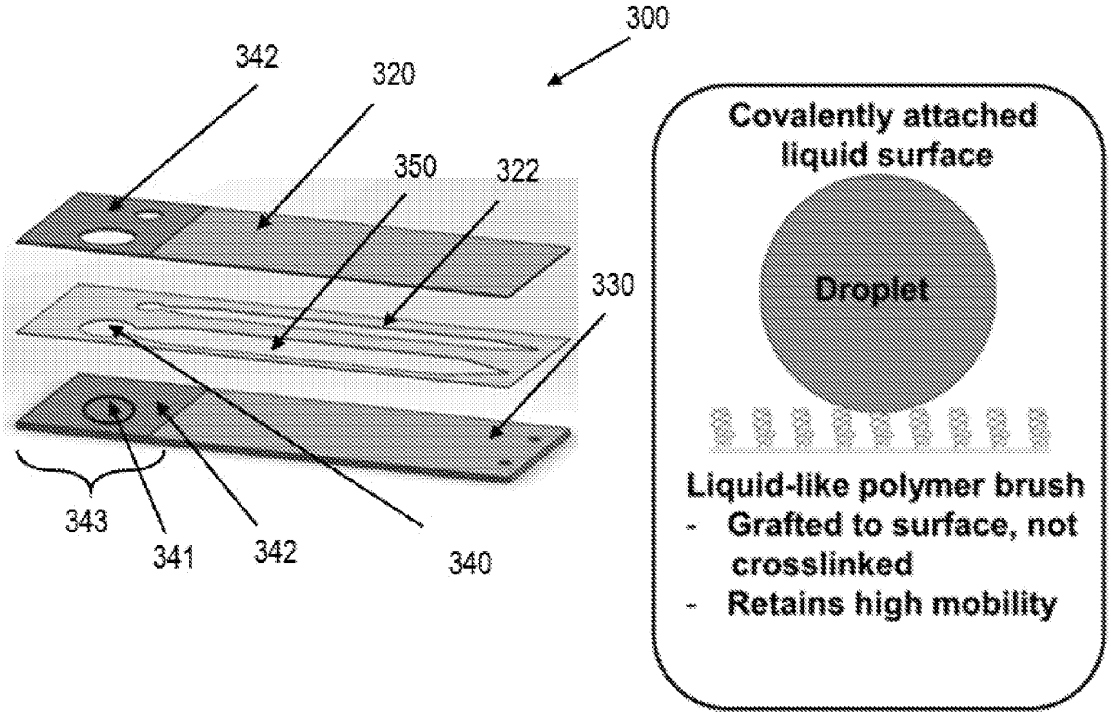
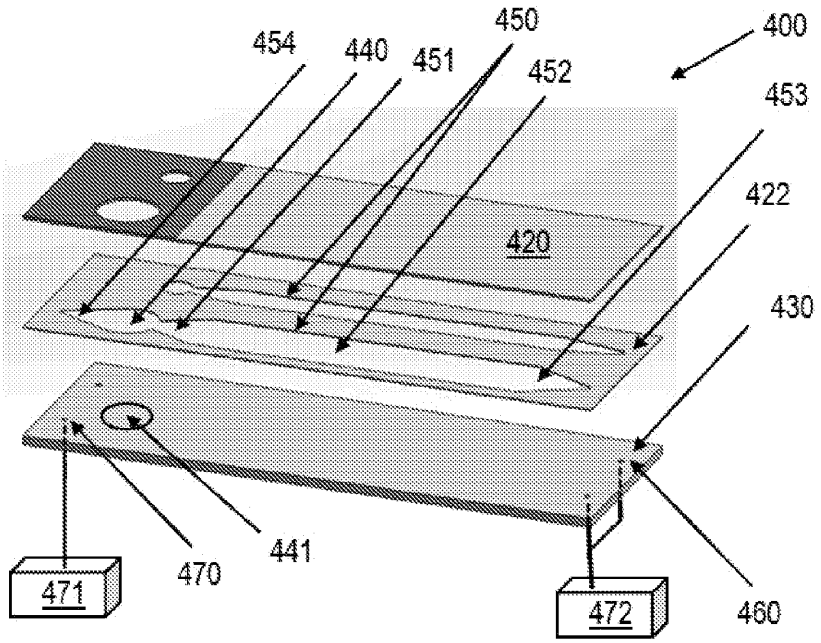

300
342
320
350
322
330
343
341
342
340
Covalently attached liquid surface
Droplet
Liquid-like polymer brush
- Grafted to surface, not crosslinked
- Retains high mobility

FIG. 3


454
440
451
450
452
400
453
422
420
430
441
470
471
472
460

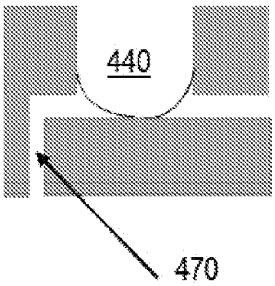

440
470

FIG. 4

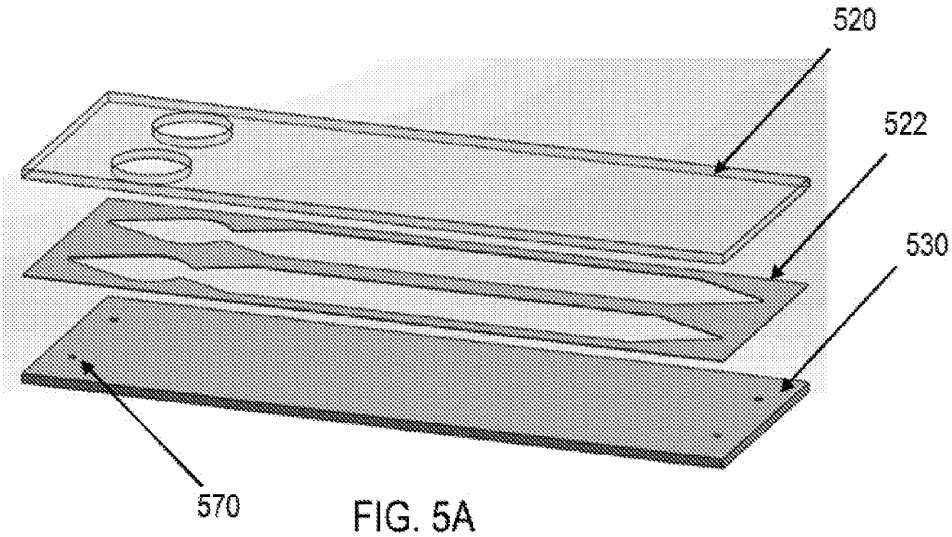

520
522
530
570

FIG. 5A

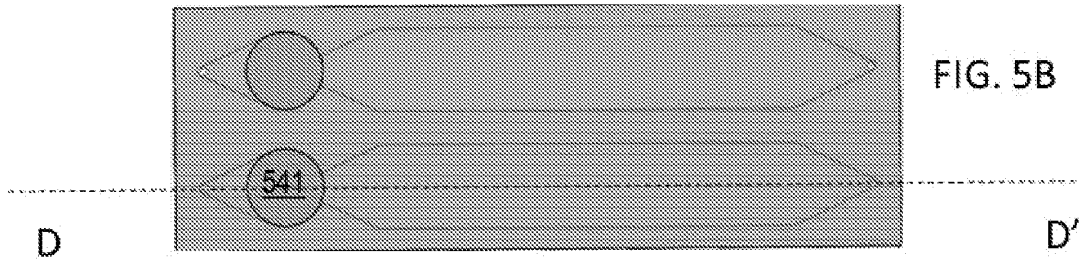


FIG. 5B

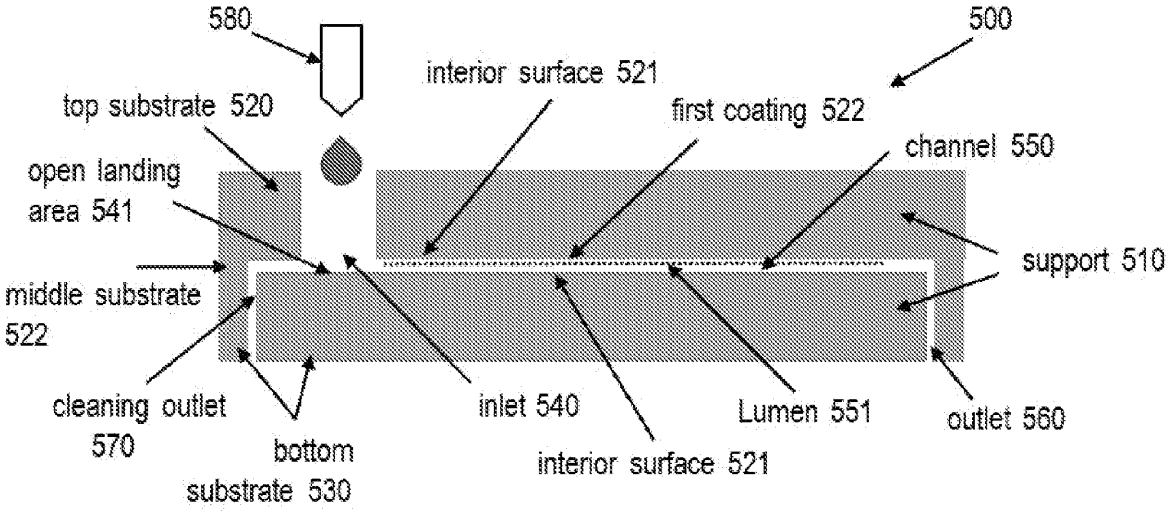


FIG. 5C

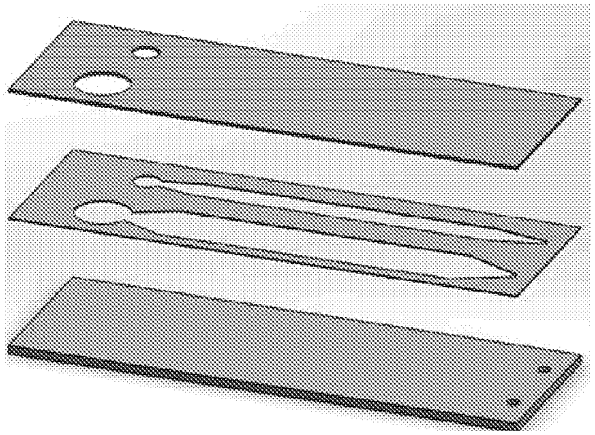


FIG. 5D

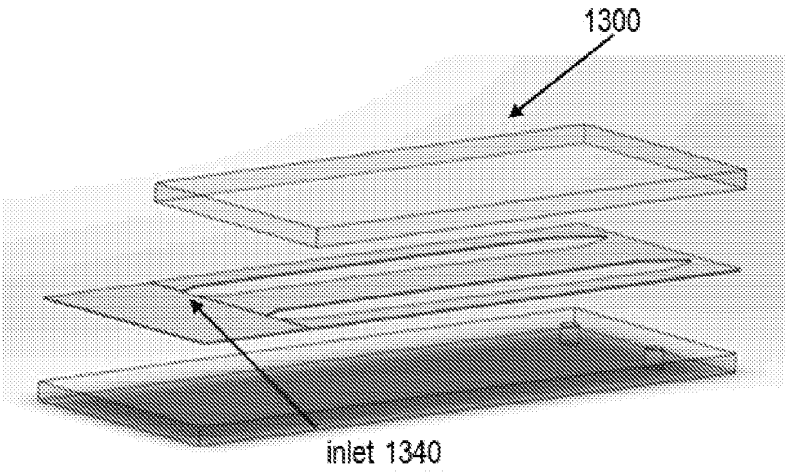


FIG. 5E

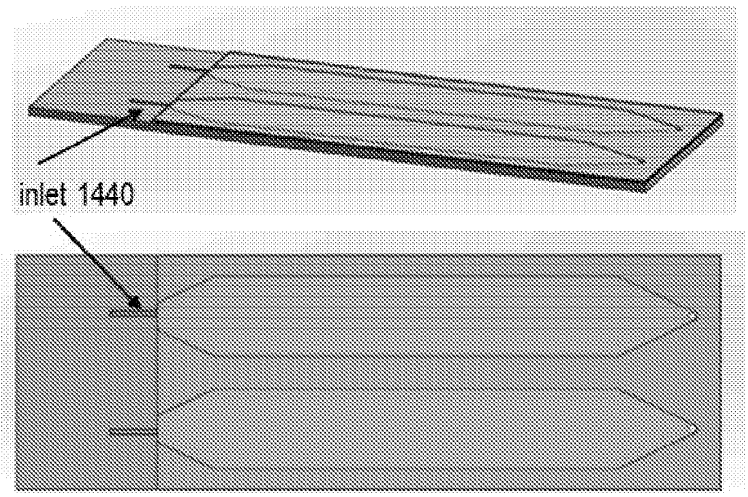


FIG. 5F

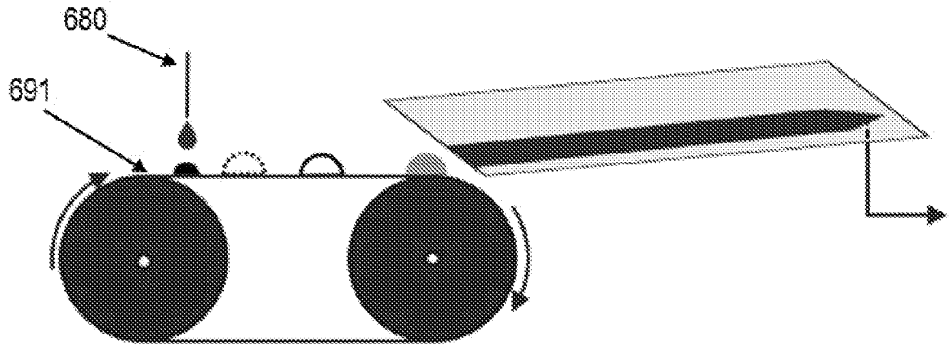


FIG. 6A

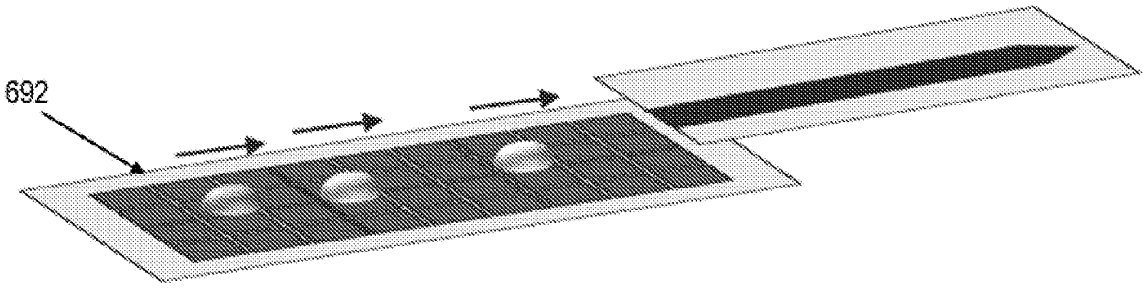


FIG. 6B

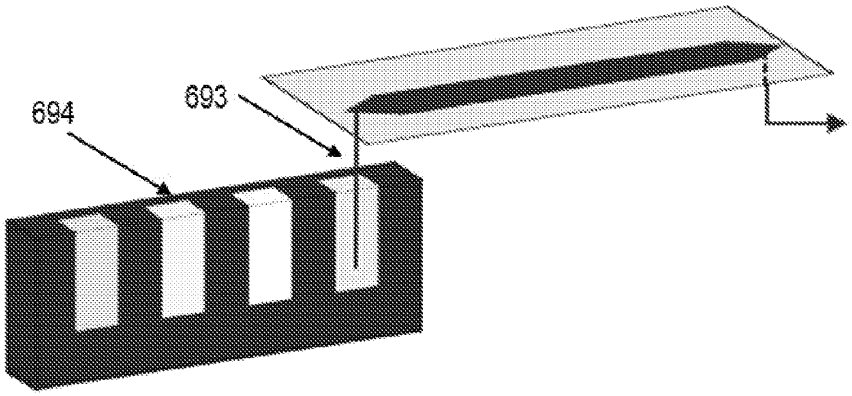


FIG. 6C

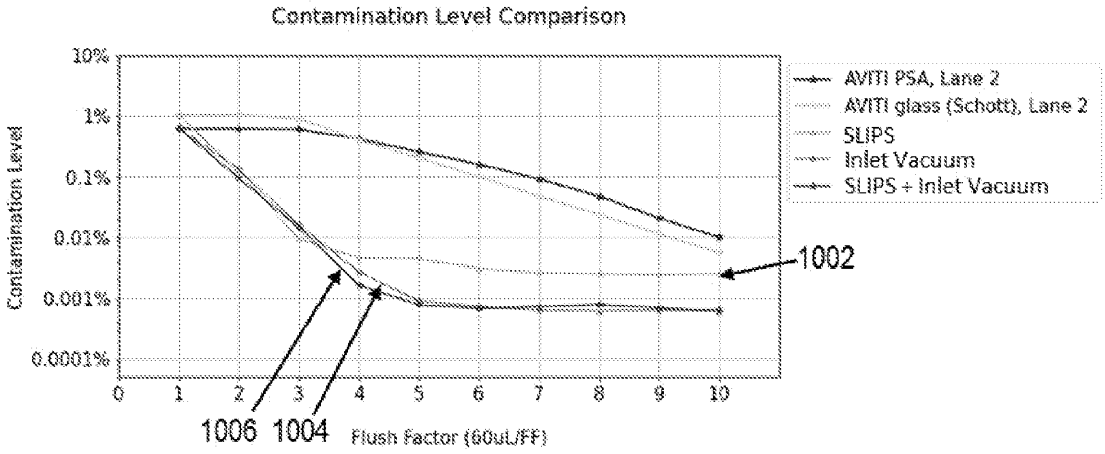


FIG. 7A

Table 1.

Steps	Reagent	Temp (C)	Flow rate (uL/s)	Incubation (s)	Baseline v6.0		COGS saving	
					volume (uL)	FF*	volume (uL)	FF*
Step	Removal	42	56.3	0	300	5	60	1
	UWB 1	52	98	0	600	10	180	1
	Step Mix	52	60	40	430	7.2	86	1.4
Cleave	Removal	51	103	0	300	5	60	1
	Cleave	51	65	30	300	5	60	1
Trap	UWB 2	42	100	0	480	8	120	2
	UWB 3 (PT 3)	42	100	0	420	7	120	2
	Trap Mix	42	50	45	300	5	60	1
	Imaging	20	30.5	0	300	5	60	1
Image								

FIG. 7B

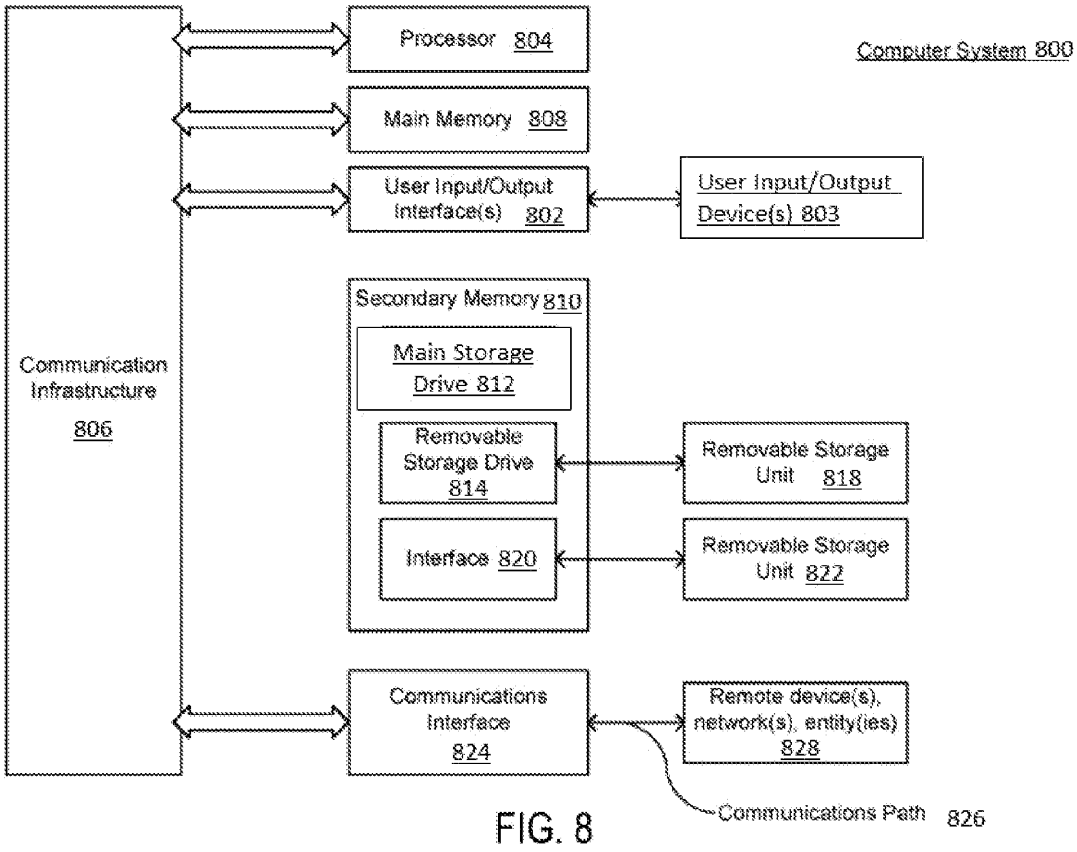

Computer System 800
Processor 804
Main Memory 808
User Input/Output Interface(s) 802
User Input/Output Device(s) 803
Secondary Memory 810
Main Storage Drive 812
Removable Storage Drive 814
Interface 820
Removable Storage Unit 818
Removable Storage Unit 822
Communication Infrastructure 806
Communications Interface 824
Remote device(s), network(s), entity(ies) 828
Communications Path 826

FIG. 8

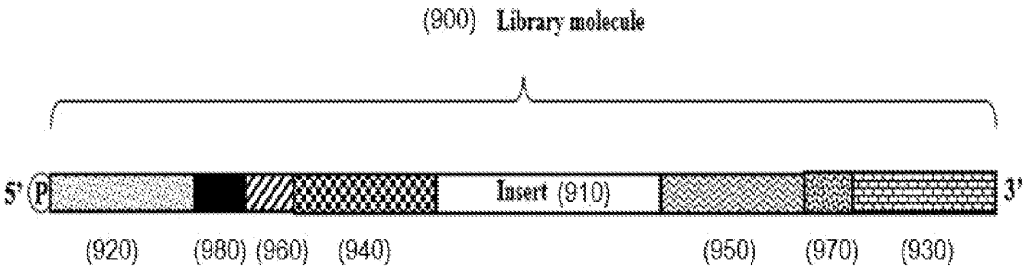

(900) Library molecule
5'
P
Insert (910)
3'
(920)
(980)
(960)
(940)
(950)
(970)
(930)

FIG. 9

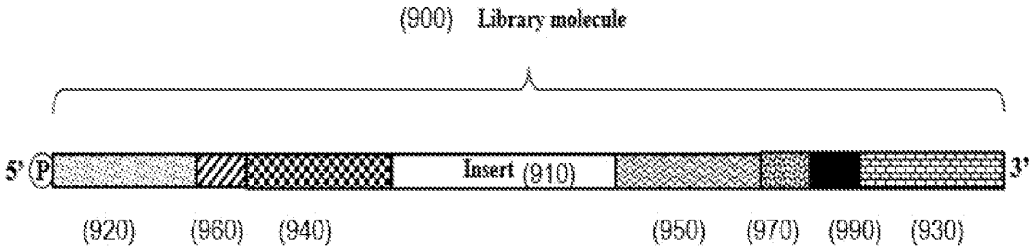

(900) Library molecule
5'
P
Insert (910)
3'
(920)
(960)
(940)
(950)
(970)
(990)
(930)

FIG. 10

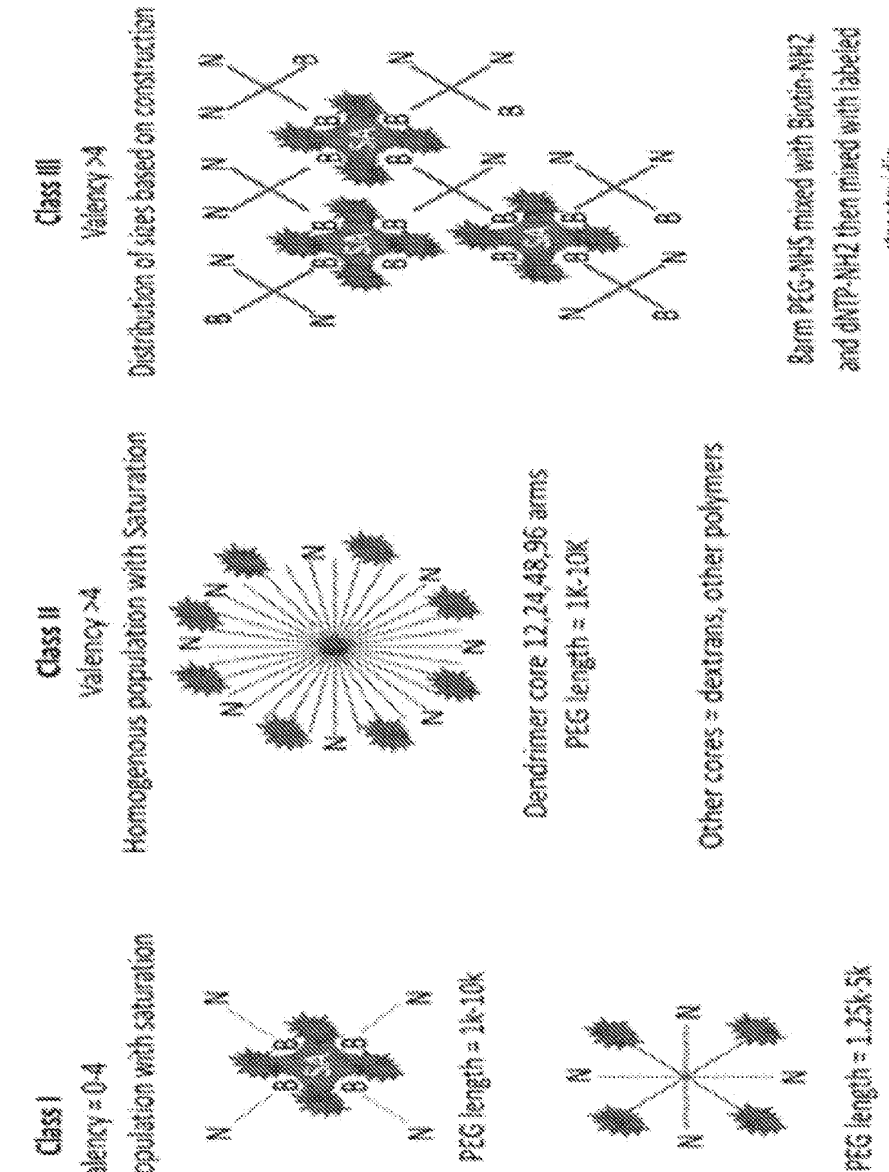

Class I
Valency = 0-4
Homogeneous population with saturation
"starburst"
PEG length = 1k-10k
"Hetter-Skelter"
PEG length = 1.25k-5k
Class II
Valency >4
Homogeneous population with Saturation
Dendrimer core 12,24,48,96 arms
PEG length = 1K-10K
Other cores = dextrans, other polymers
Class III
Valency >4
Distribution of sizes based on construction
Barn PEG-NHS mixed with Biotin-NH2
and dNTP-NH2 then mixed with labeled
streptavidin

FIG. 11

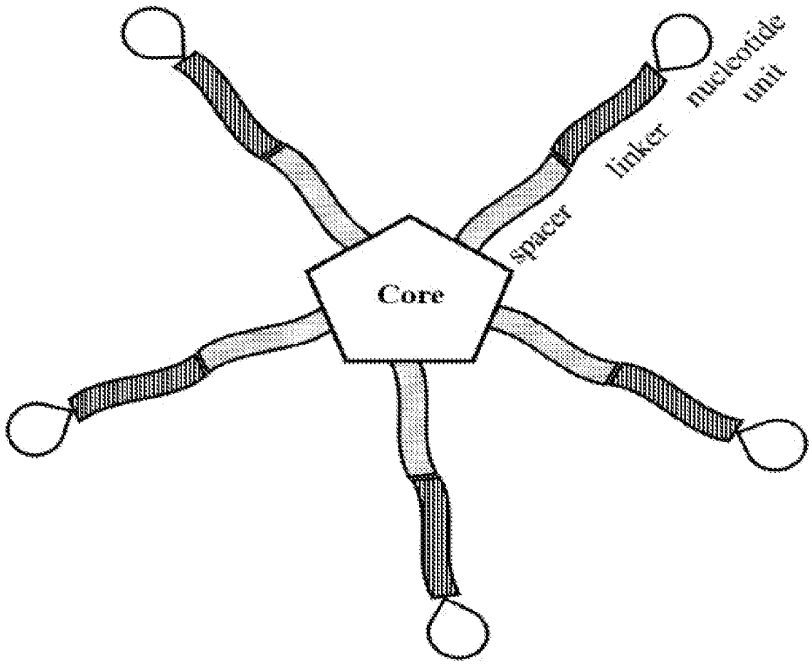

Core
spacer
linker
nucleotide unit

FIG. 12

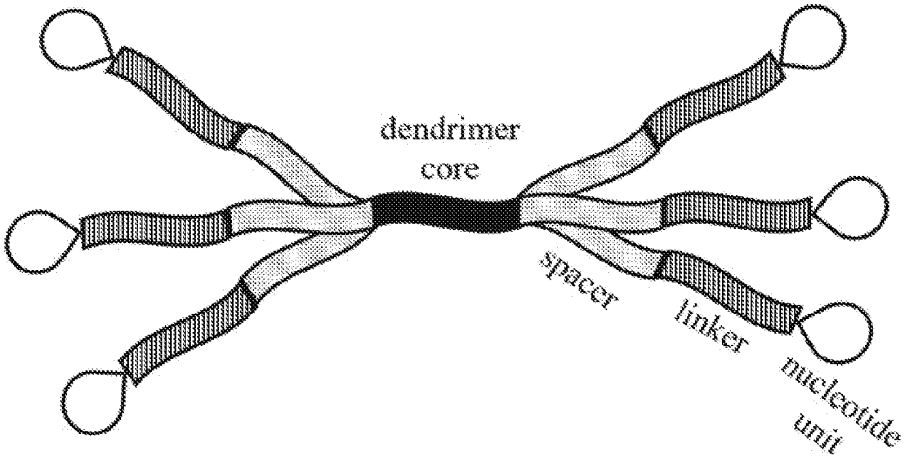

dendrimer core
spacer
linker
nucleotide unit

FIG. 13

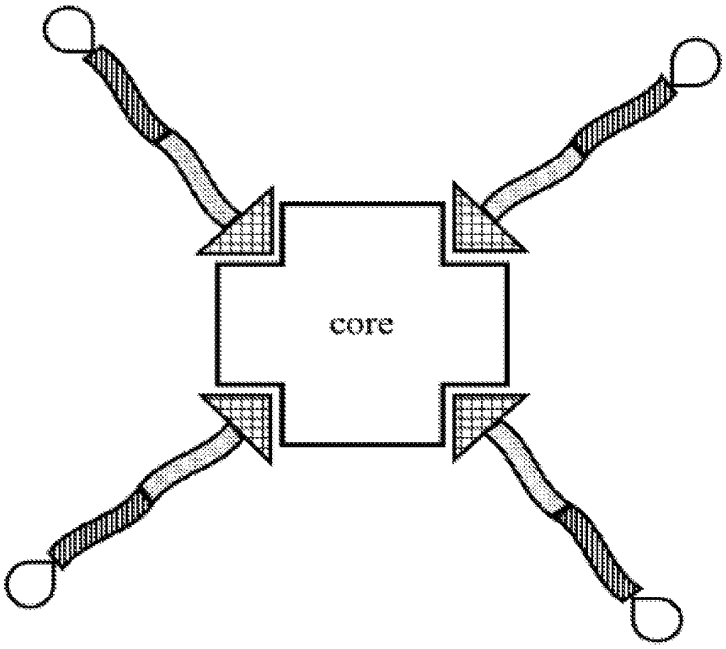

core

FIG. 14

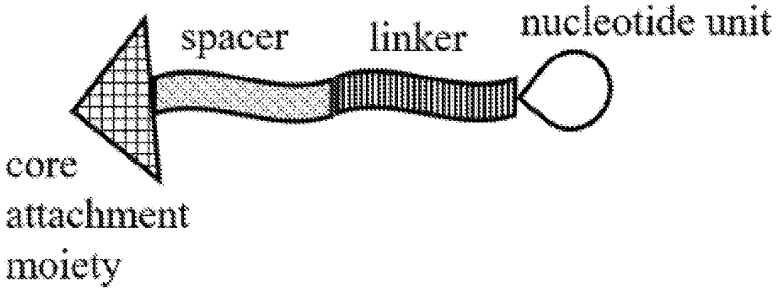
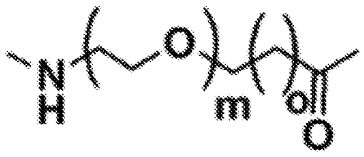

spacer
linker
nucleotide unit
core
attachment
moiety

FIG. 15

Spacer:

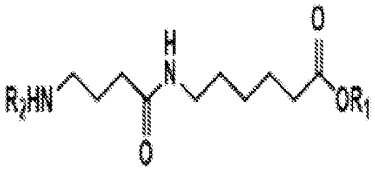


Linkers:

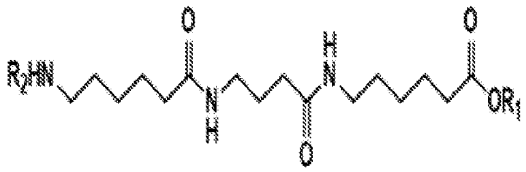
11 atom Linker:



16 atom Linker:



23 atom Linker:



N3 Linker:

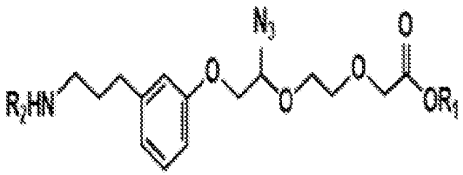
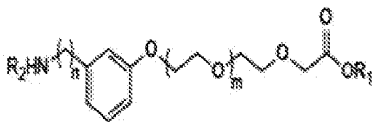
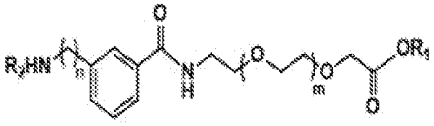


FIG. 16

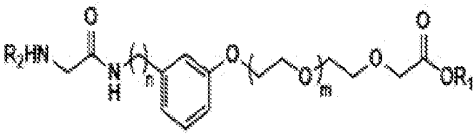
Linker 1:



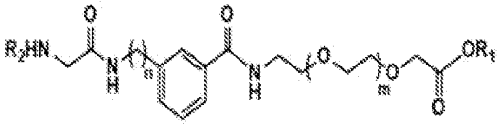
Linker 2:



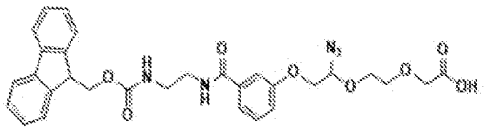
Linker 3:



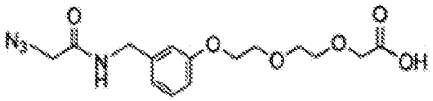
Linker 4:



Linker 5:

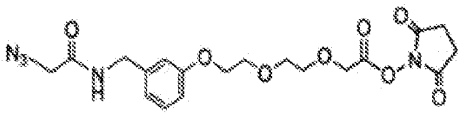


Linker 6:



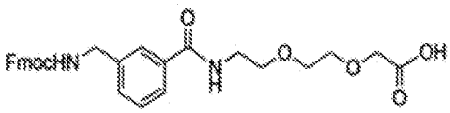
Molecular Weight: 352.35

Linker 7:



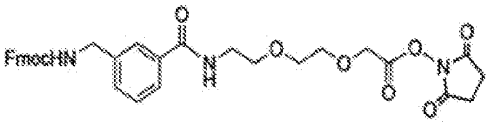
Molecular Weight: 449.42

Linker 8:



Molecular Weight: 518.57

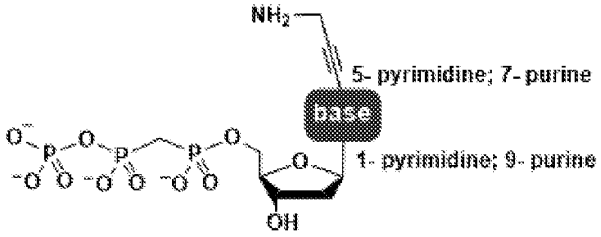
Linker 9:



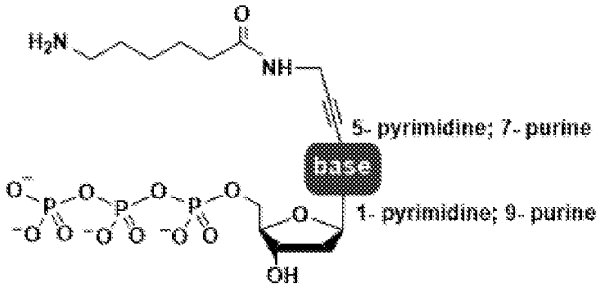
Molecular Weight: 615.64

FIG. 17

dNTP-PA-NH_2:



dNTP-PA-11 Atom Linker-NH_2:



dNTP-PA-16 Atom Linker-NH_2:

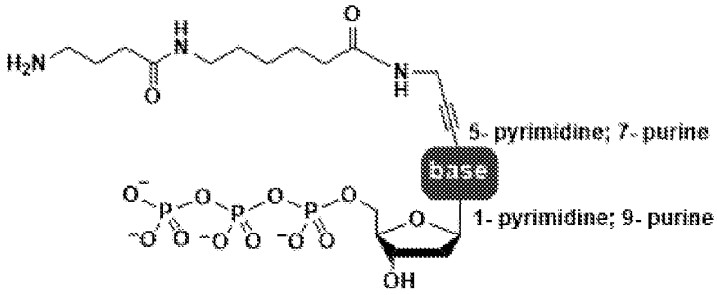
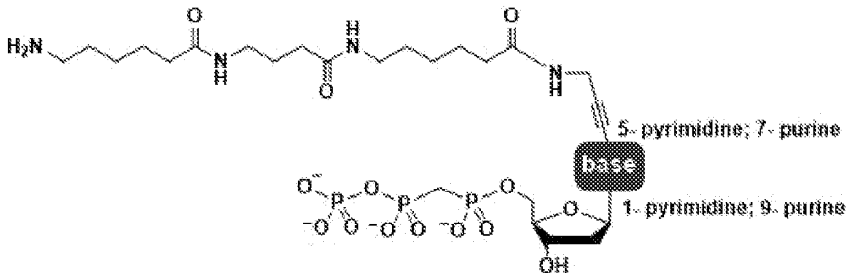
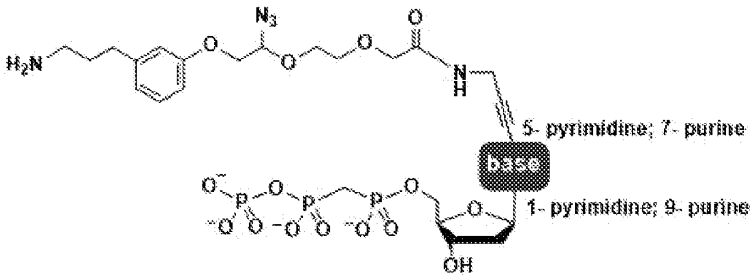


FIG. 18

dNTP-PA-23 Atom Linker-NH_2:



dNTP-PA-N3 Linker-NH_2:



dNTP-PA-Linker 1-NH_2:

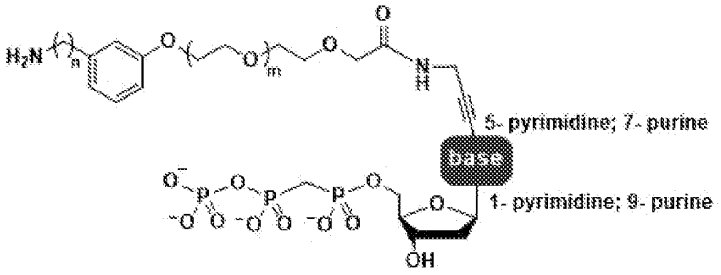
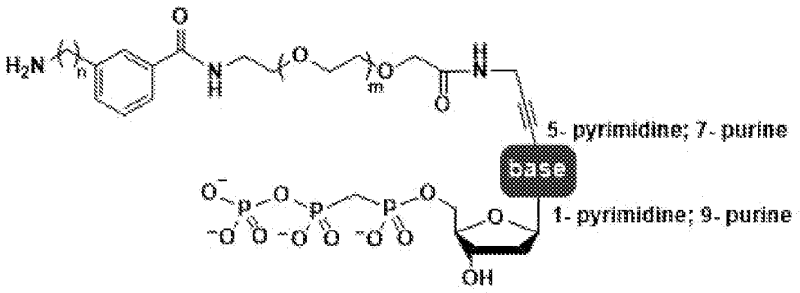


FIG. 19

dNTP-PA-Linker 2-NH_2:



dNTP-PA-Linker 3-NH_2:

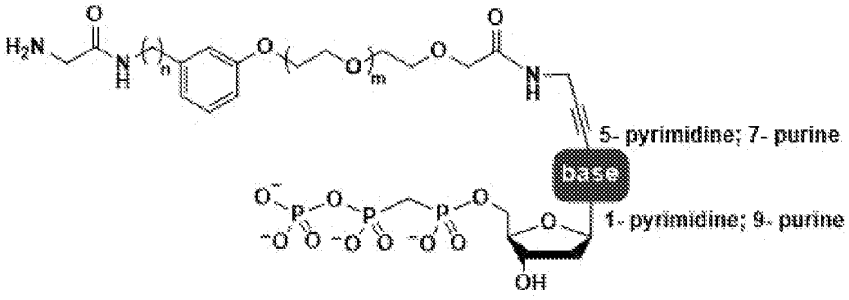
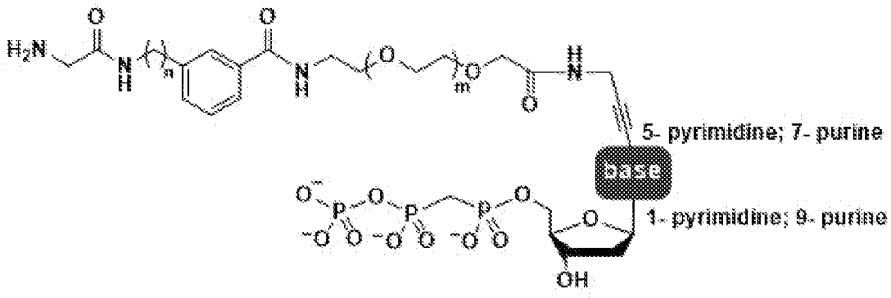


FIG. 20

dNTP-PA-Linker 4-NH_2:



dNTP-PA-N3 Linker-NH_2:

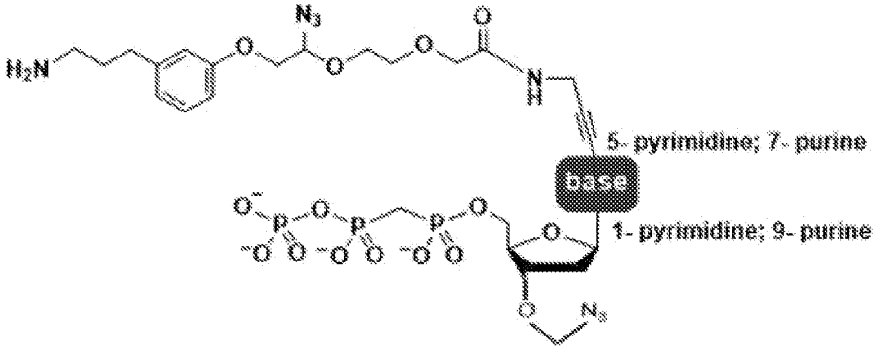


FIG. 21

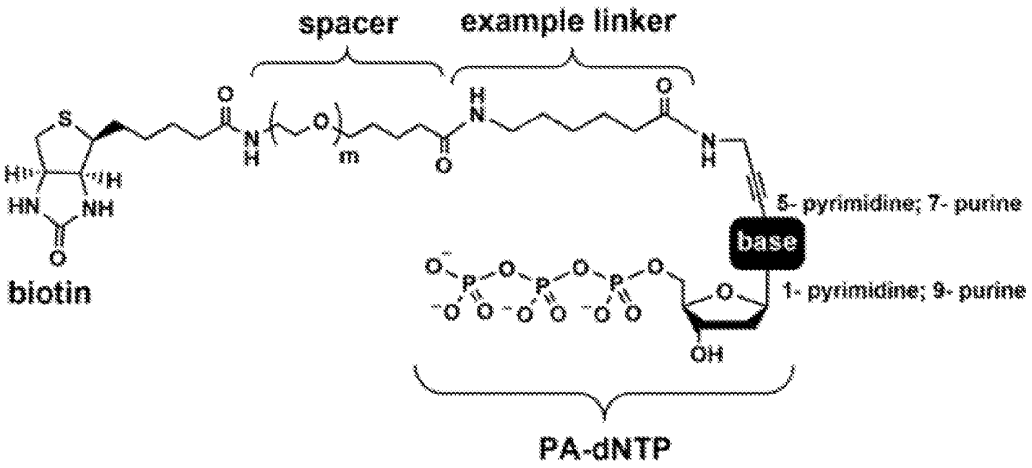

spacer
example linker
biotin
5- pyrimidine; 7- purine
base
1- pyrimidine; 9- purine
PA-dNTP

FIG. 22

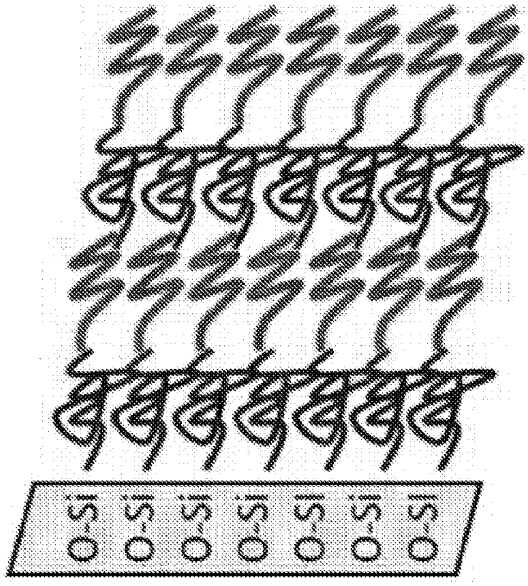


FIG. 23

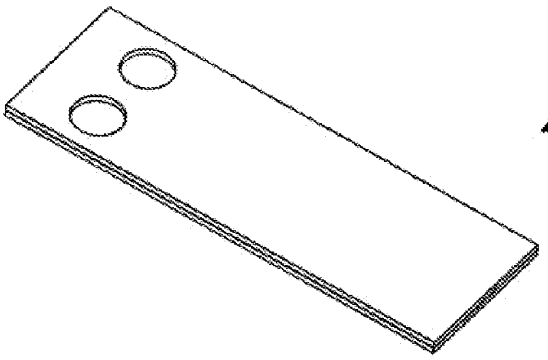


FIG. 24A

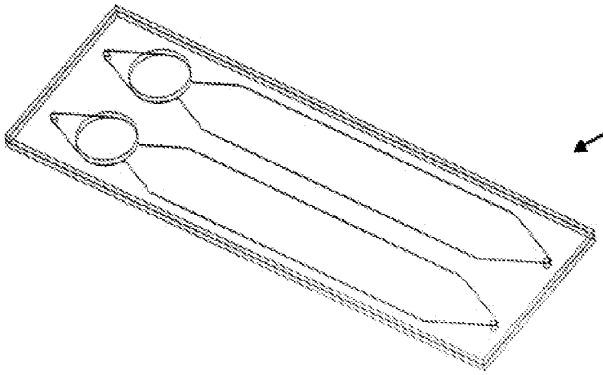


FIG. 24B



FIG. 24C

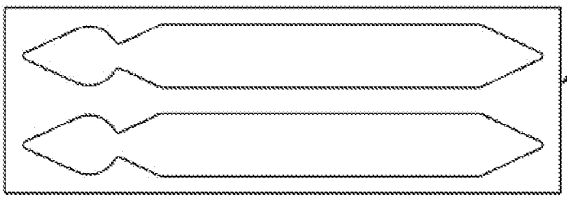


FIG. 24D

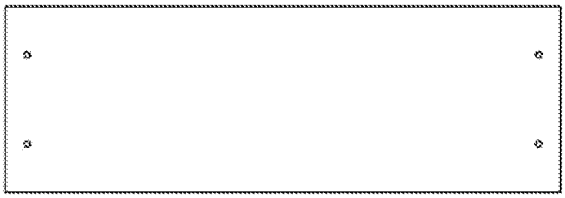


FIG. 24E

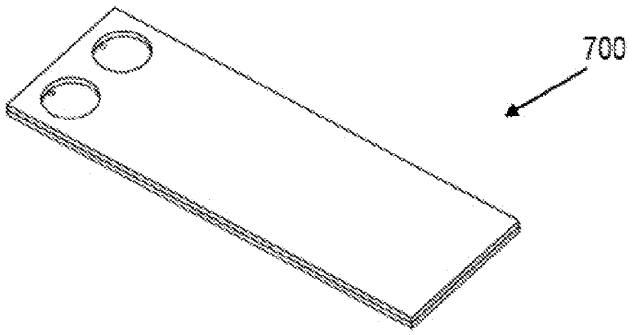


FIG. 25A

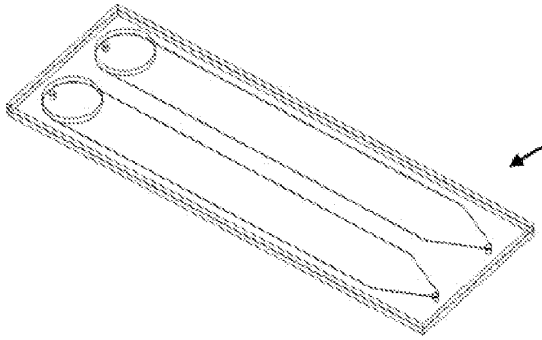


FIG. 25B

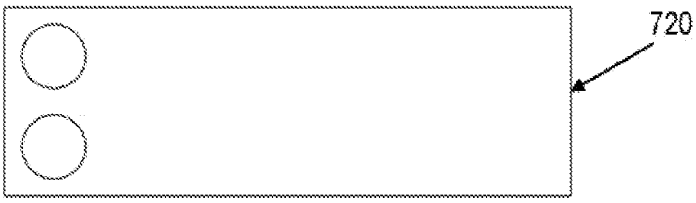


FIG. 25C

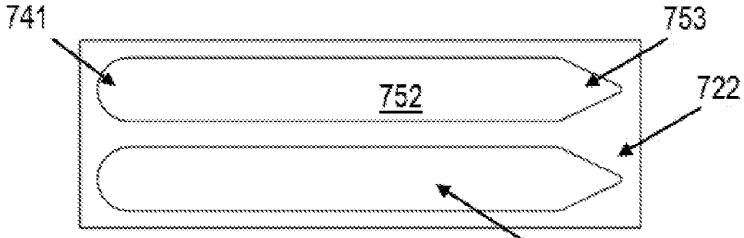


FIG. 25D

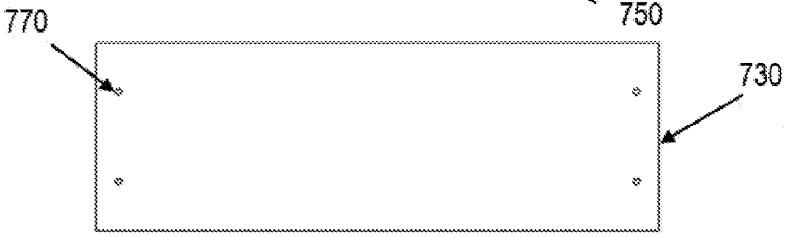


FIG. 25E

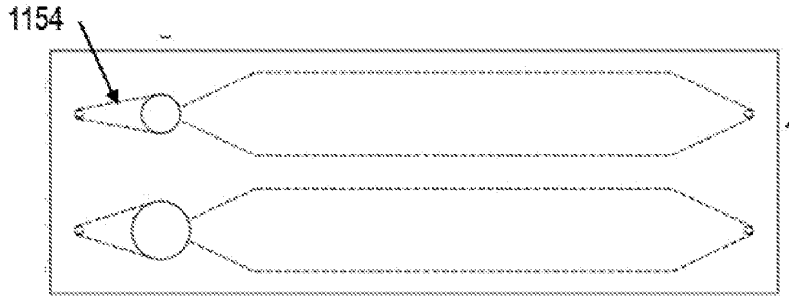


FIG. 26A

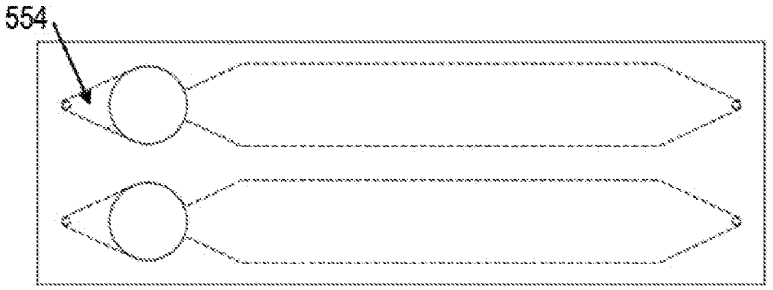


FIG. 26B



FIG. 26C

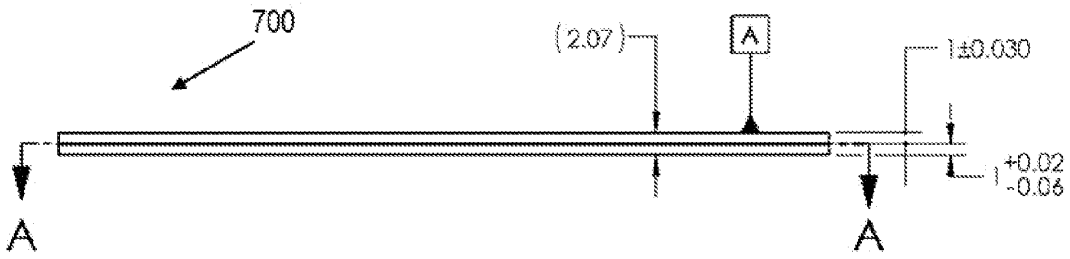
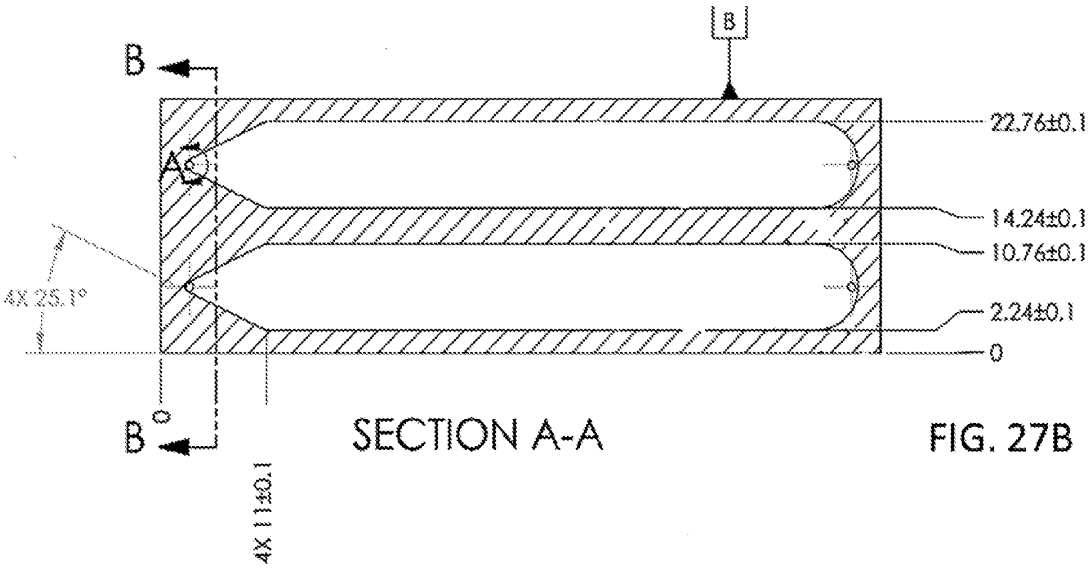


FIG. 27A



SECTION A-A

FIG. 27B

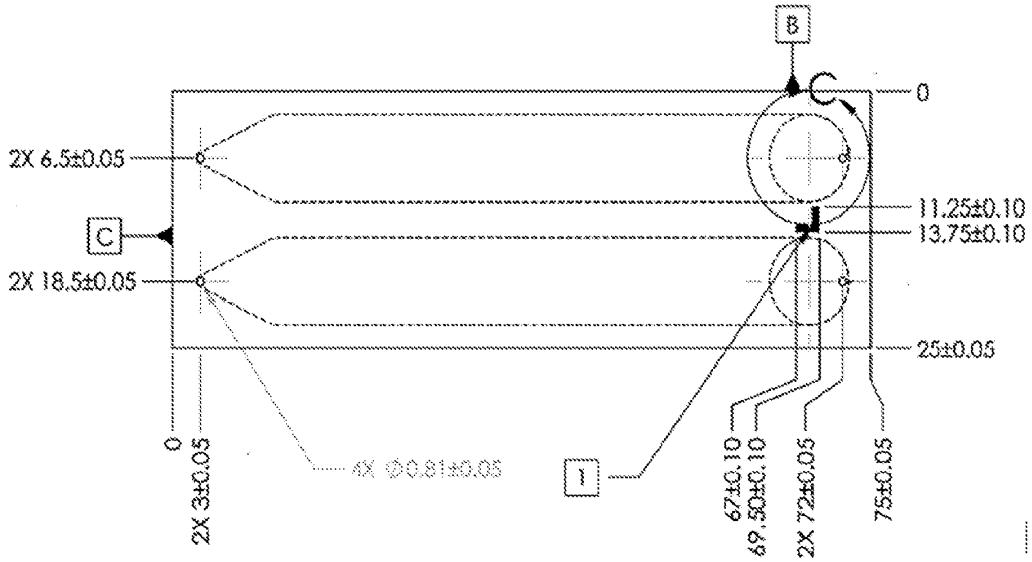
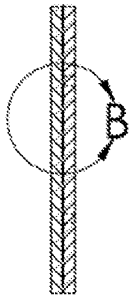
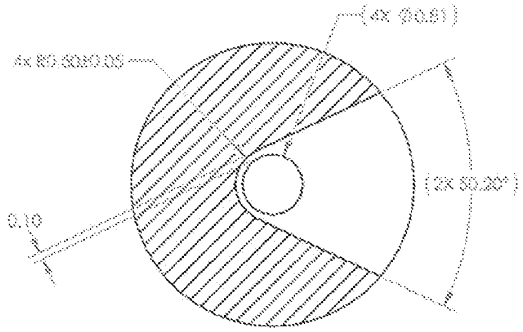


FIG. 27C



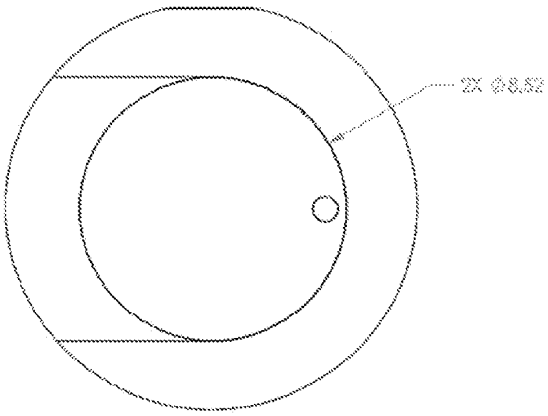
SECTION B-B

FIG. 27D



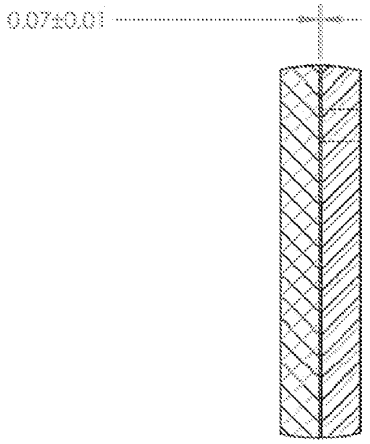
DETAIL A

FIG. 27E



DETAIL C

FIG. 27F



DETAIL B

FIG. 27G

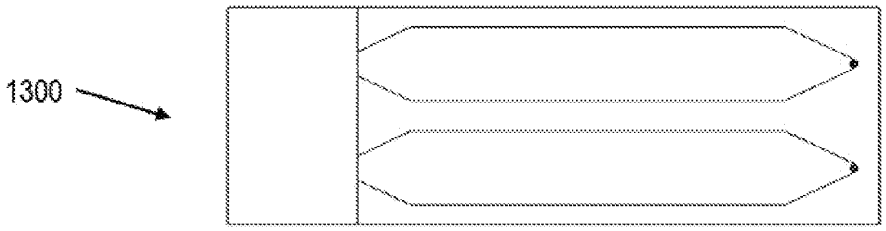


FIG. 28A

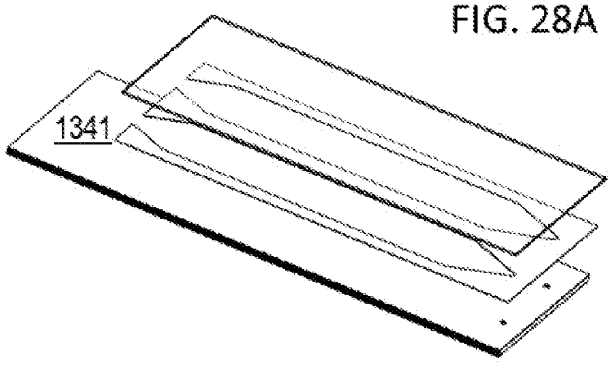


FIG. 28B

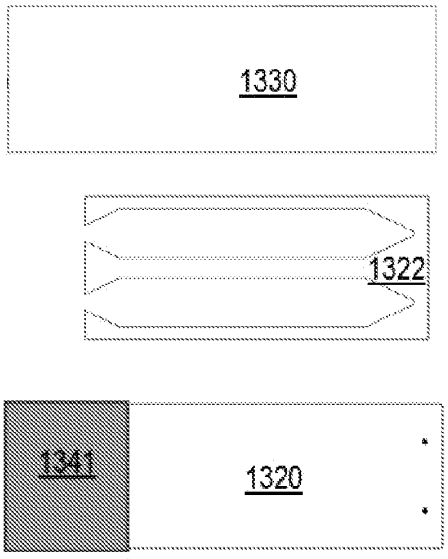


FIG. 28C

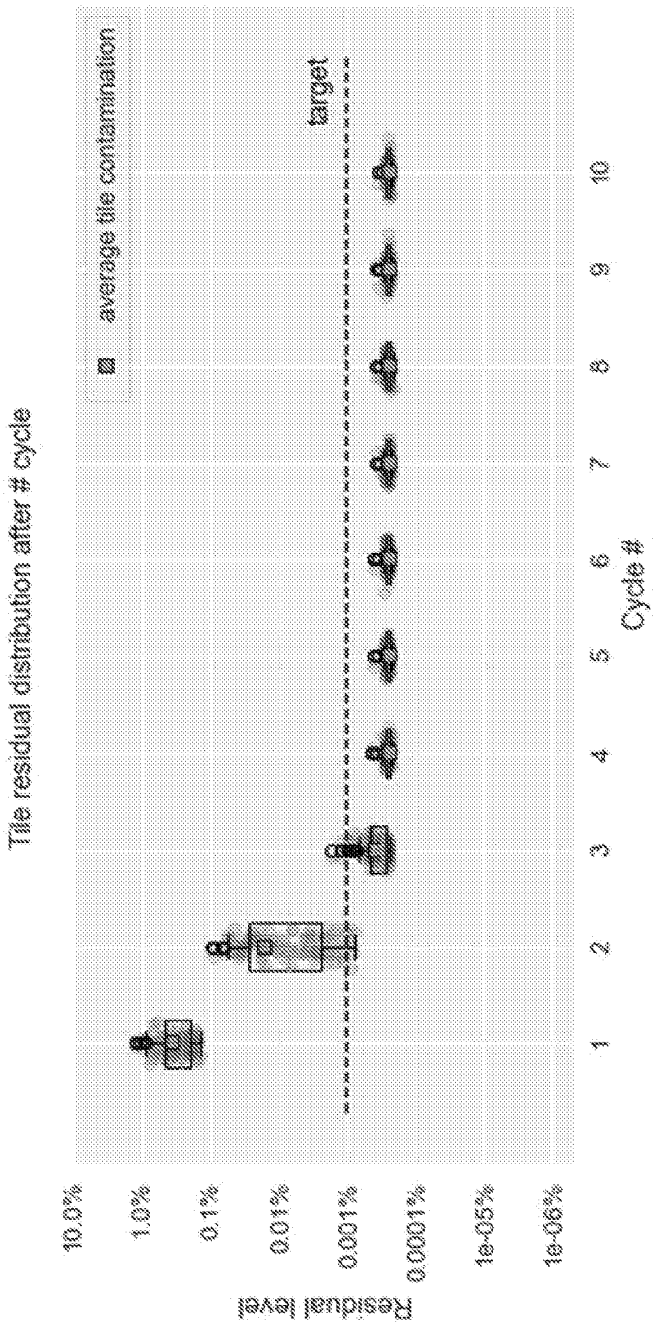

Tile residual distribution after # cycle
average tile contamination
target
Residual level
10.0%
1.0%
0.1%
0.01%
0.001%
0.0001%
1e-05%
1e-06%
Cycle #
1
2
3
4
5
6
7
8
9
10

FIG. 29

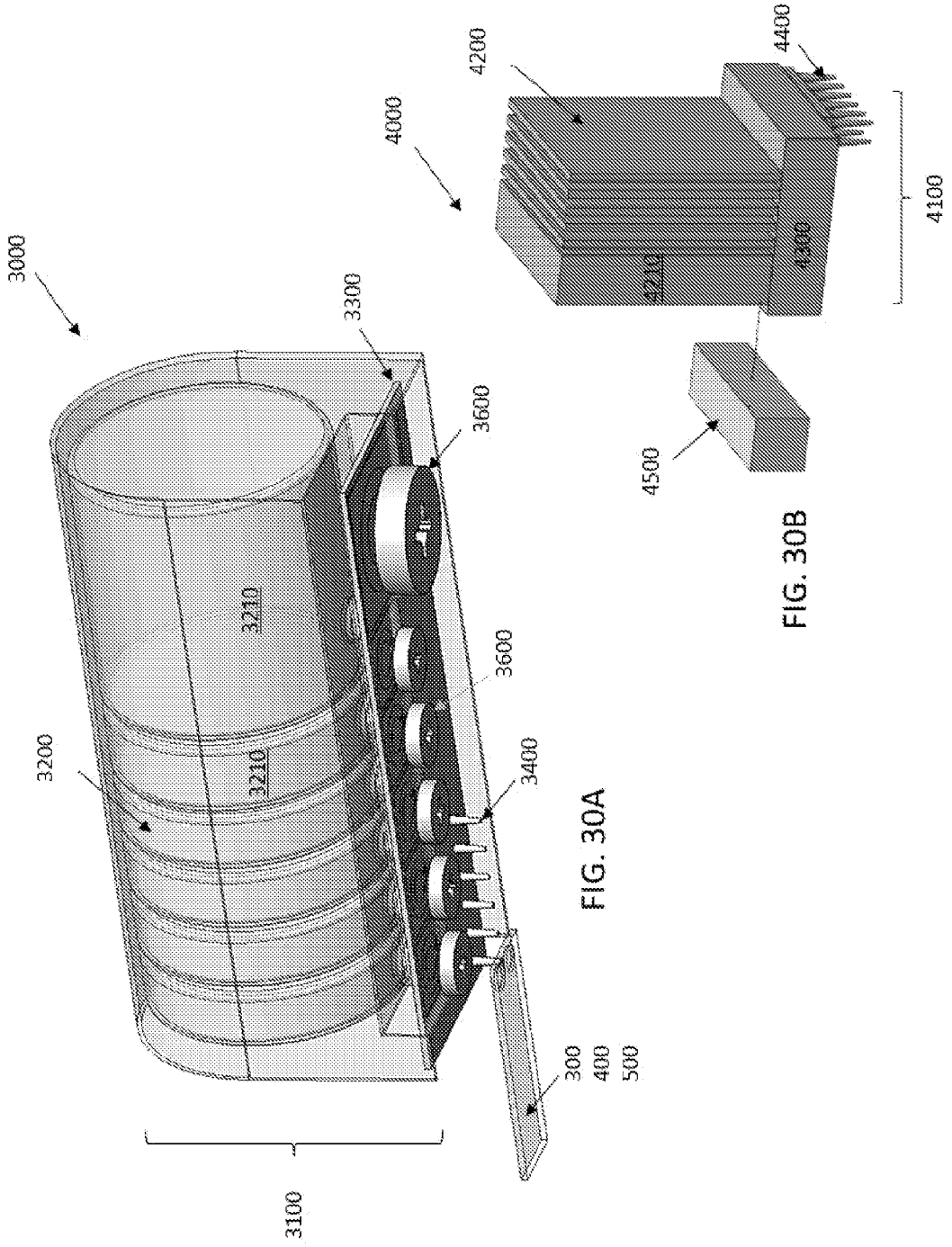


FIG. 30A

FIG. 30B

FIG. 31A

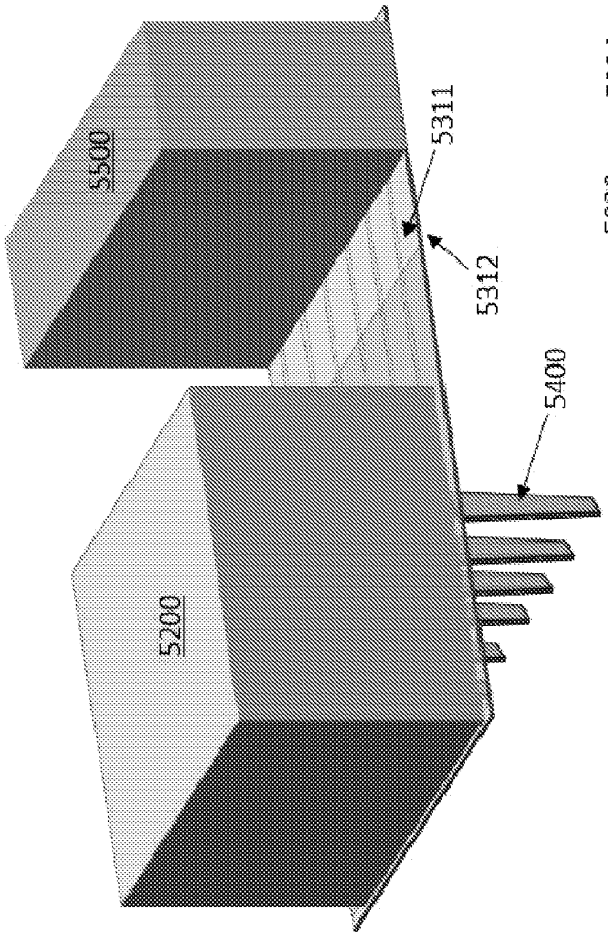
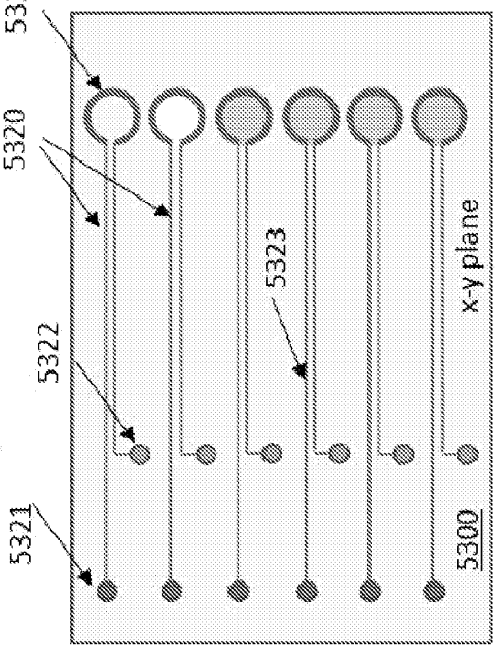


FIG. 31B



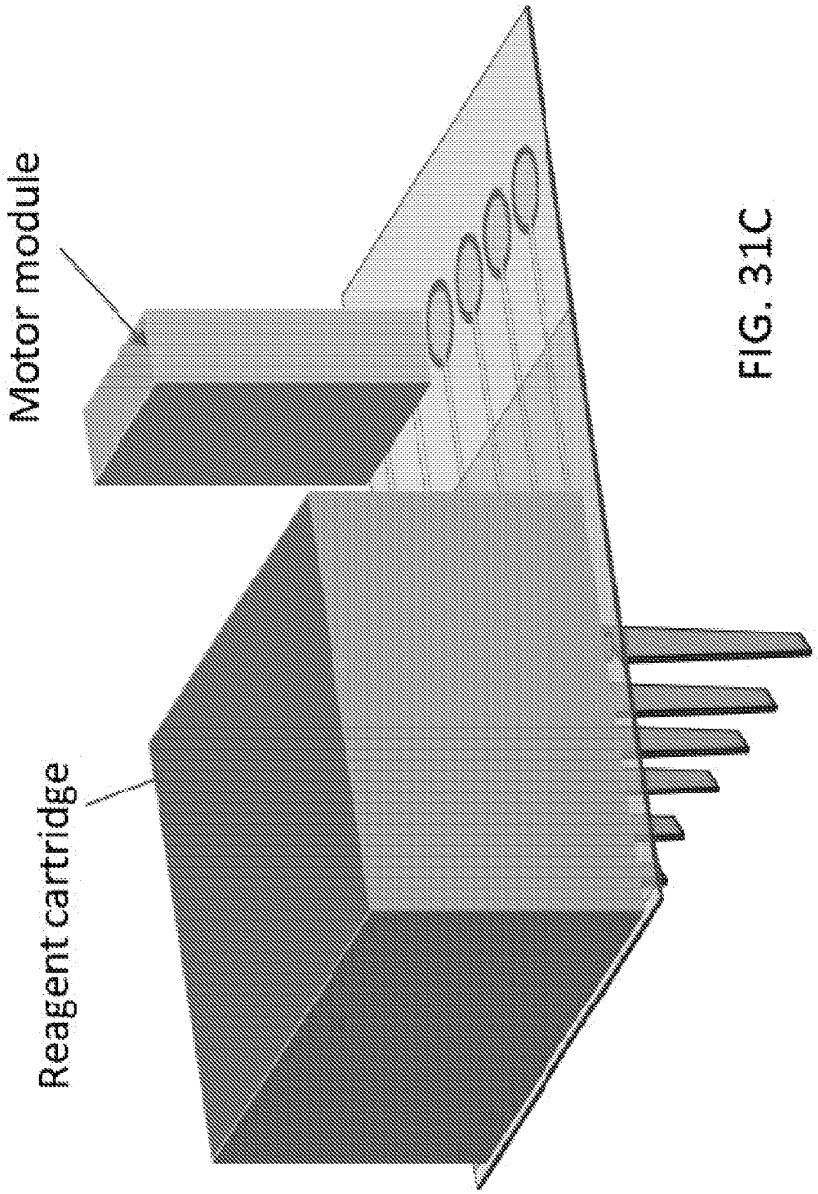


FIG. 31C

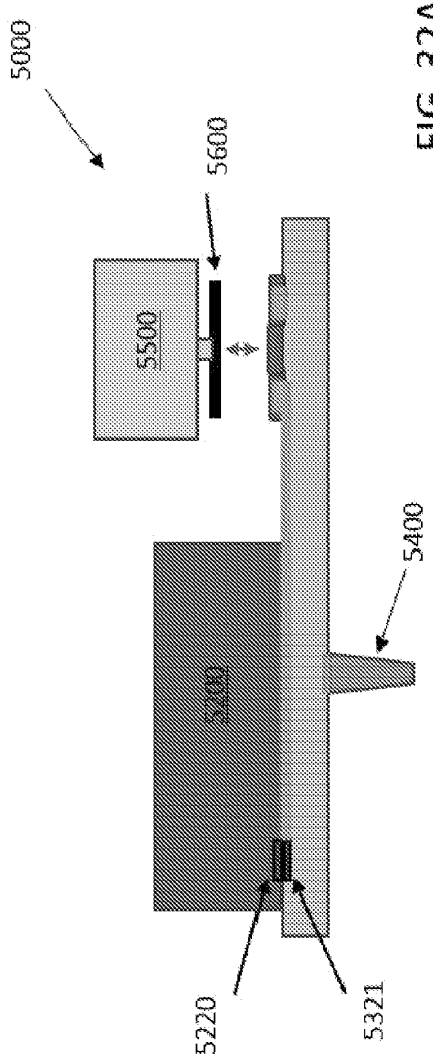


FIG. 32A

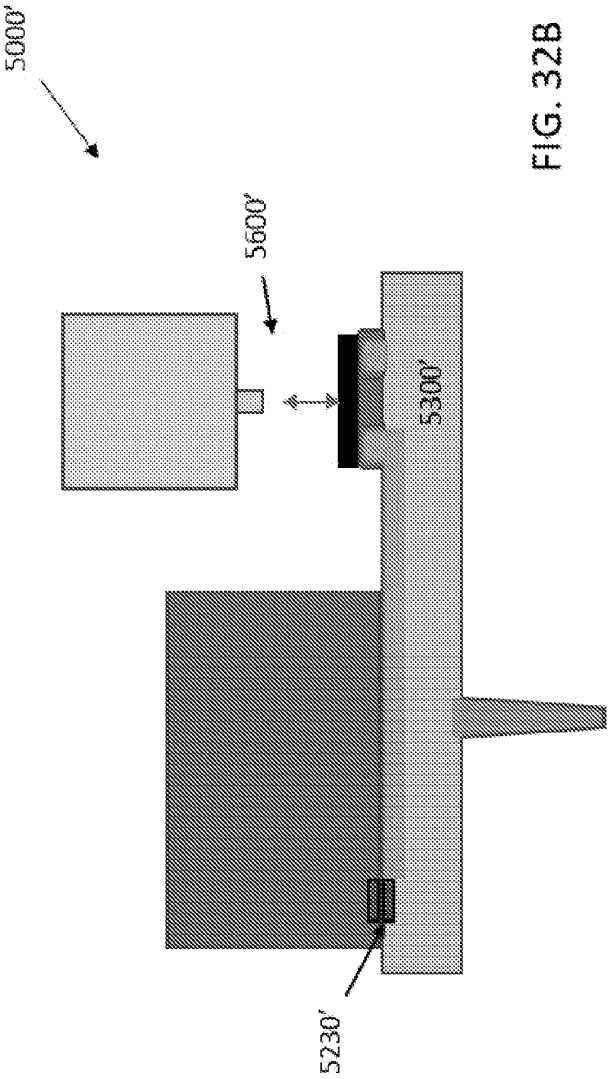


FIG. 32B

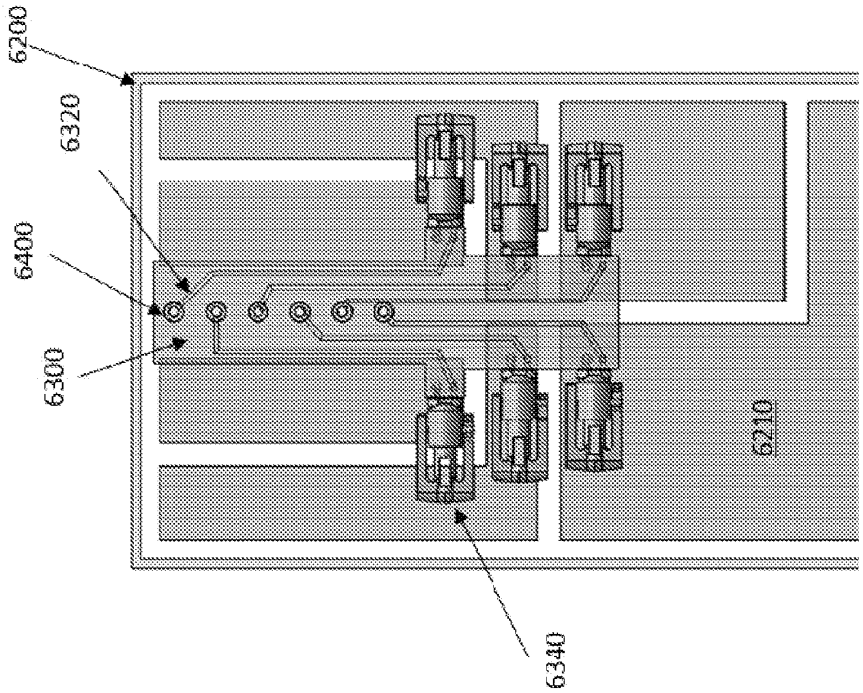


FIG. 33A

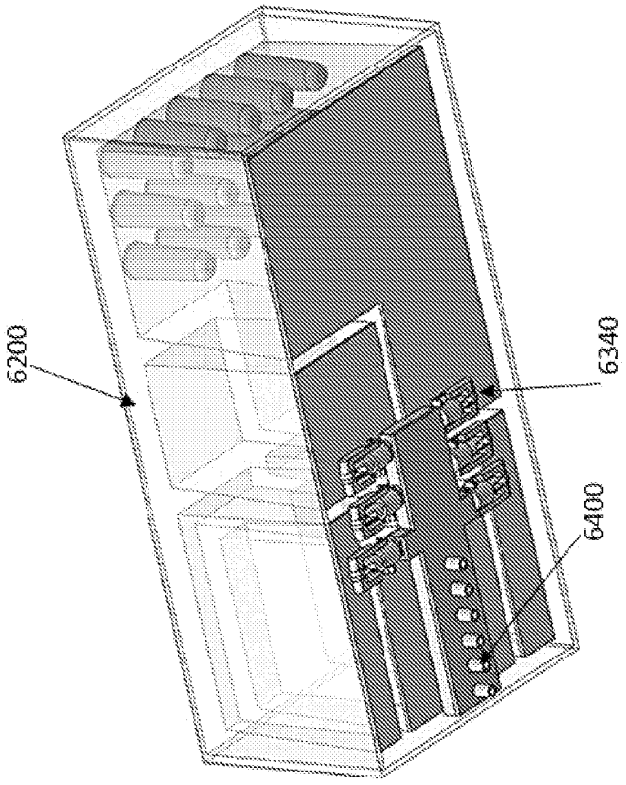


FIG. 33B

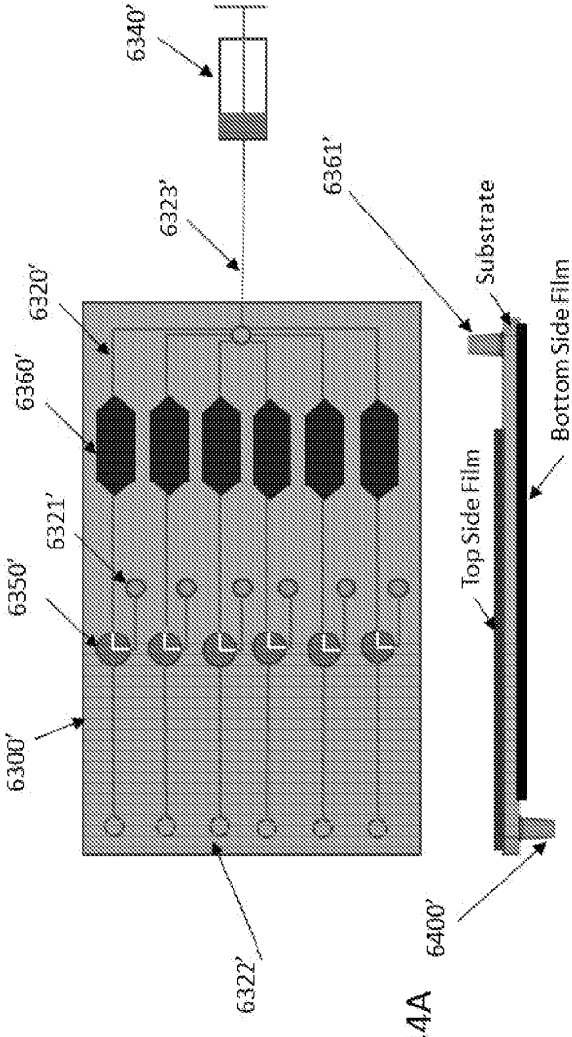


FIG. 34A

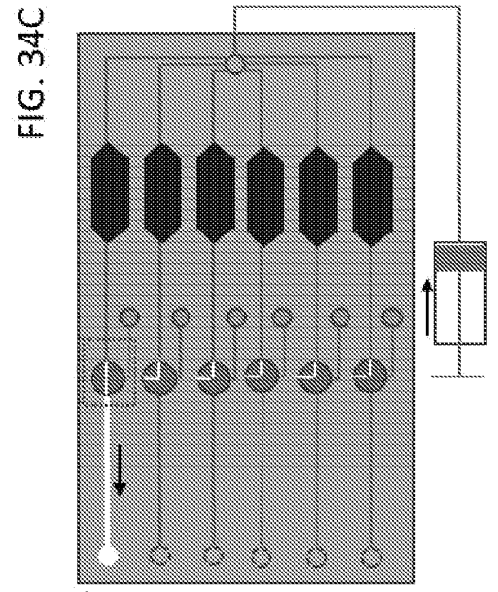


FIG. 34C

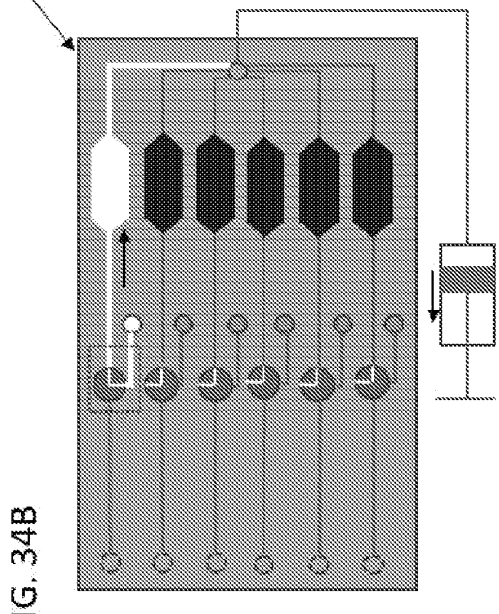


FIG. 34B

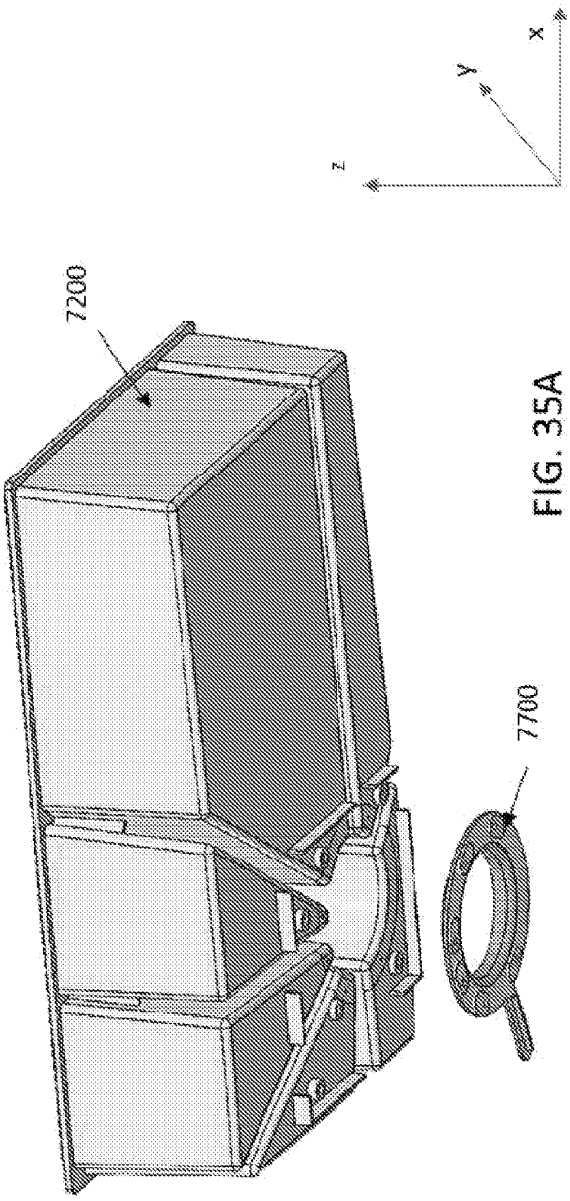


FIG. 35A

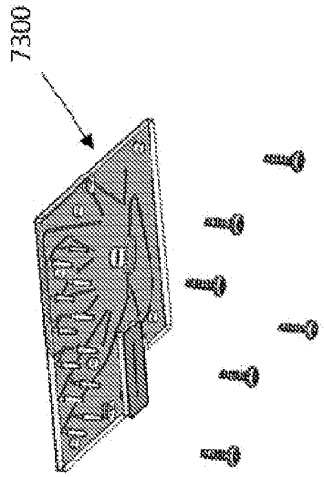
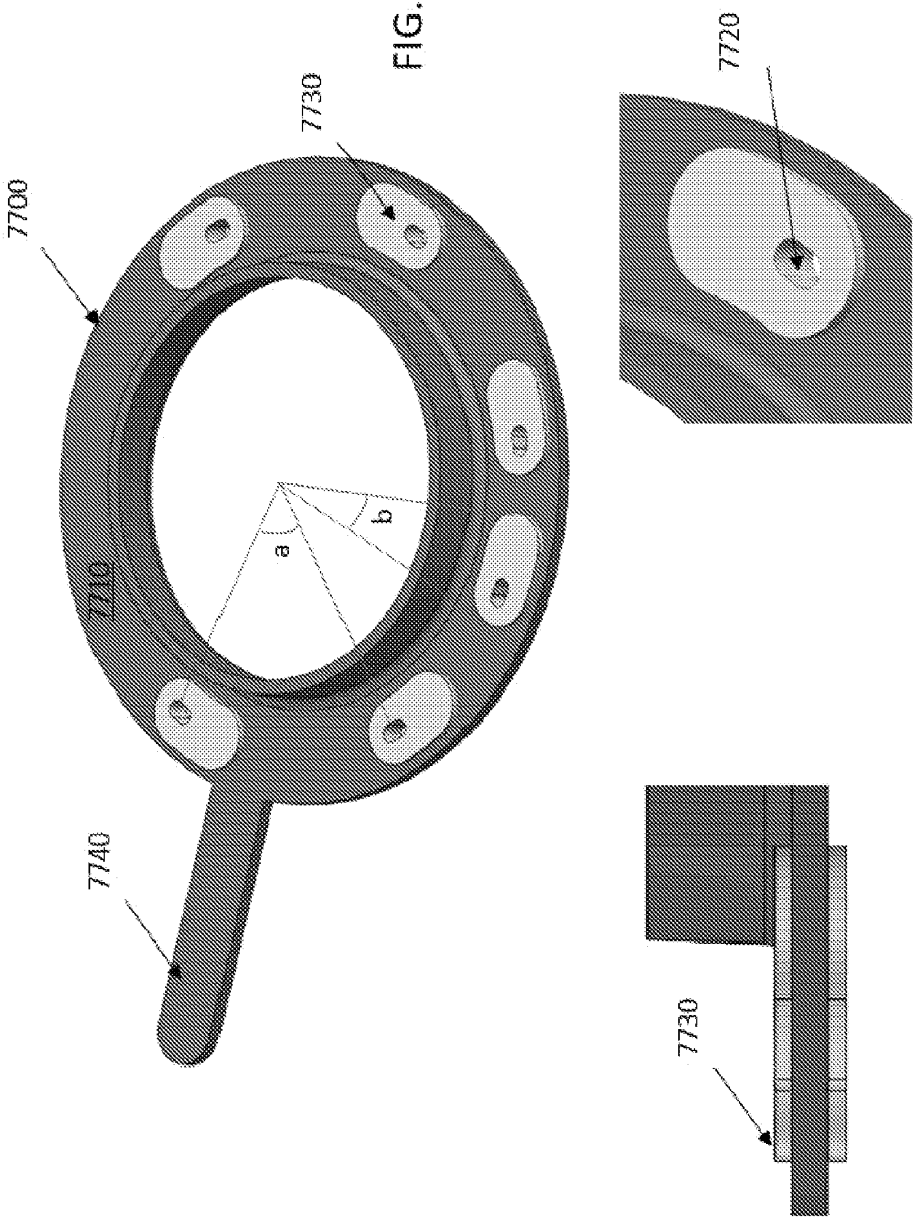


FIG. 35B

FIG. 35C



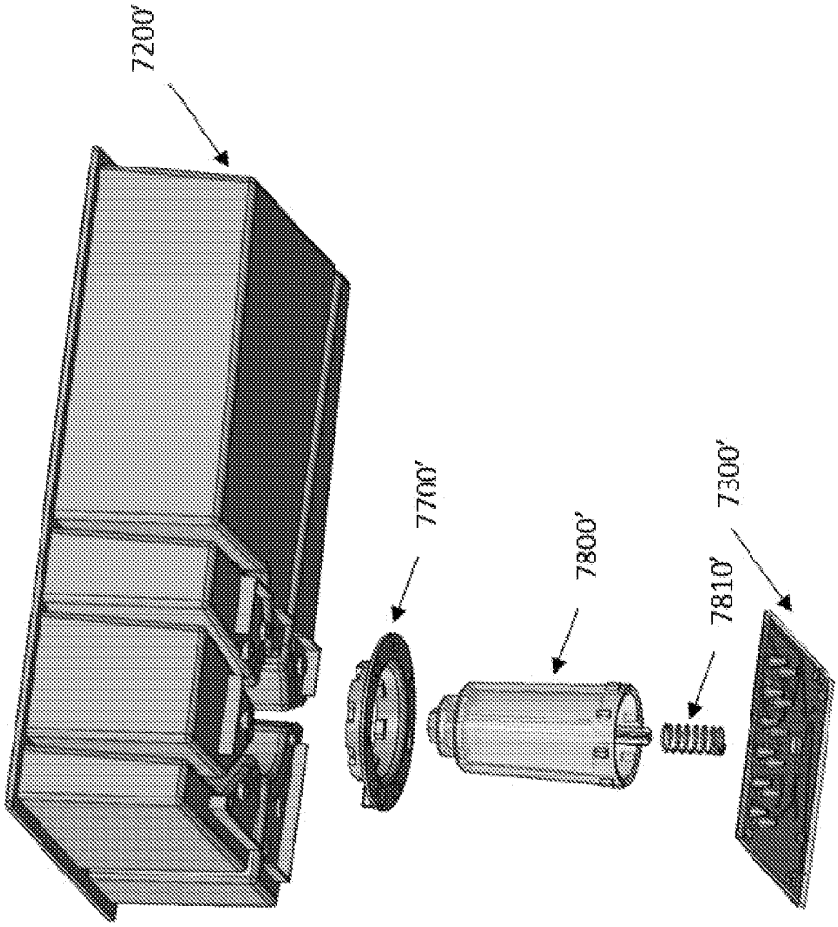


FIG. 35D

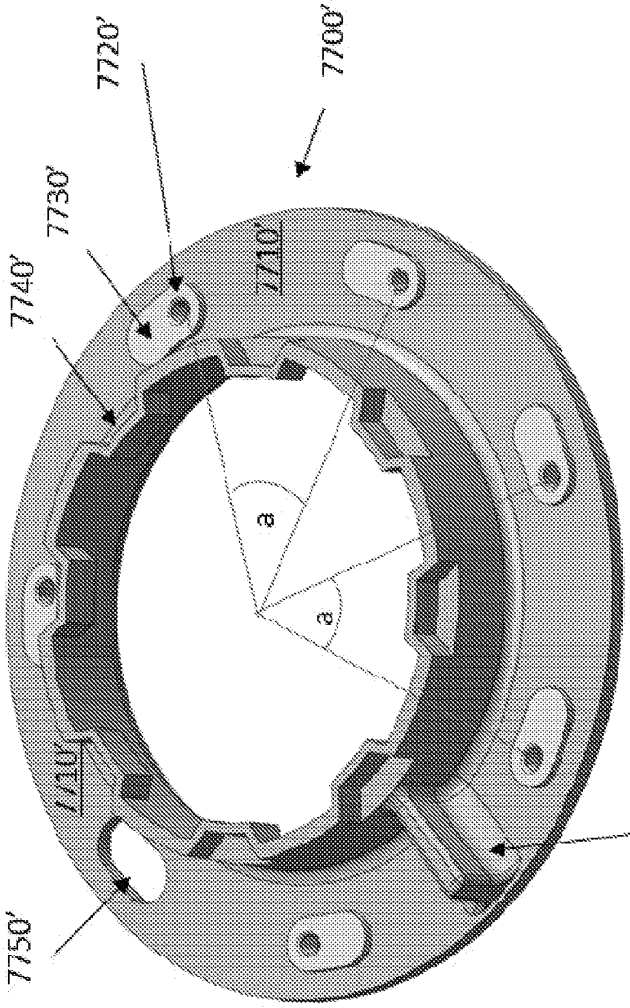


FIG. 35E

FIG. 36A

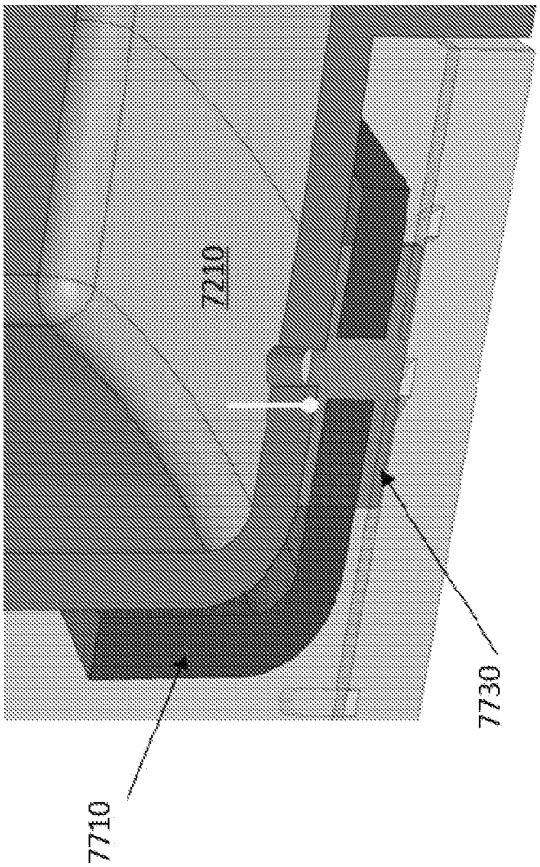


FIG. 36B

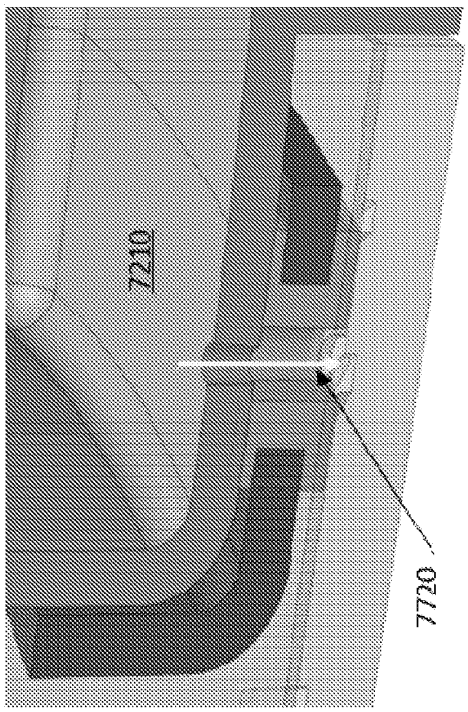
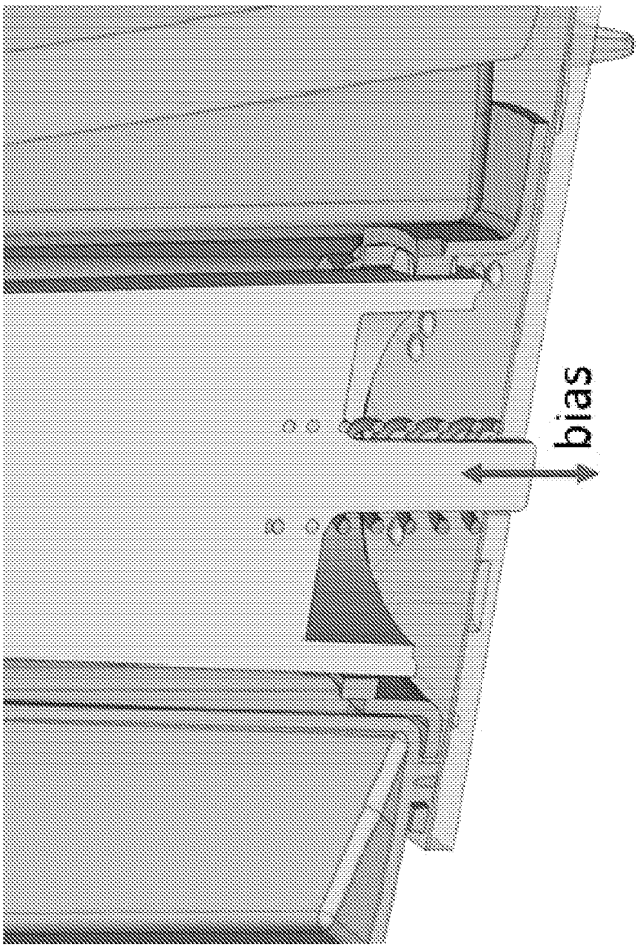


FIG. 36C



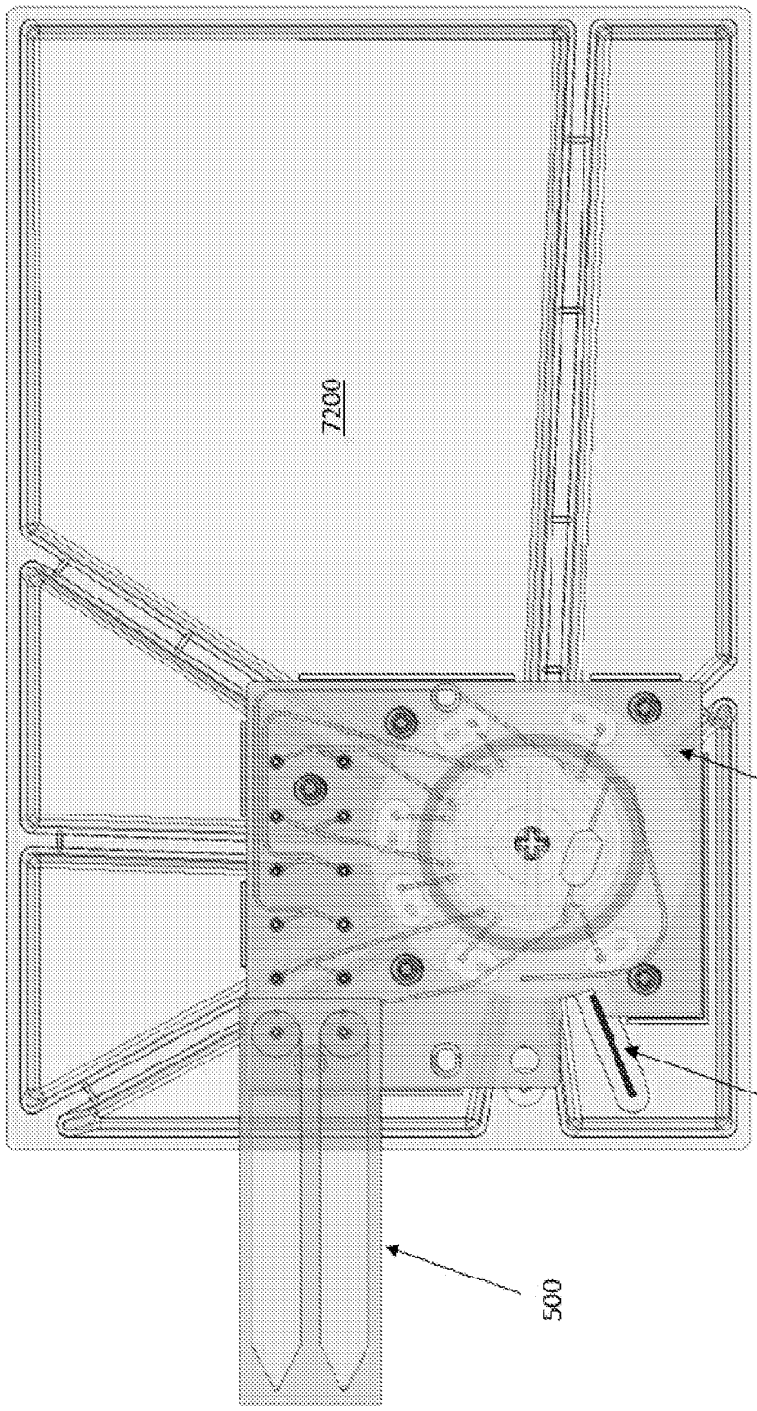
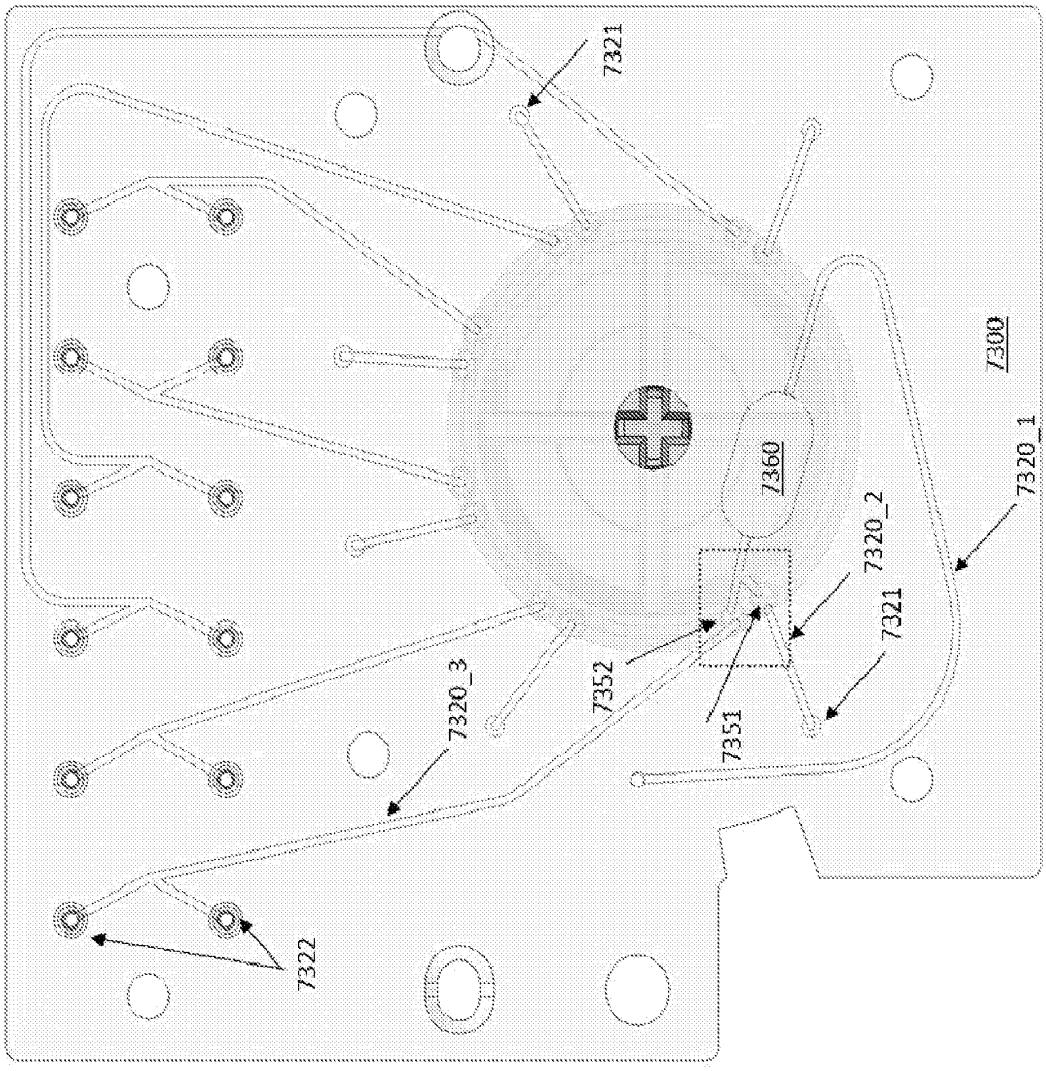


FIG. 37A


7321
7300
7360
7320_1
7320_2
7321
7352
7351
7320_3
7322

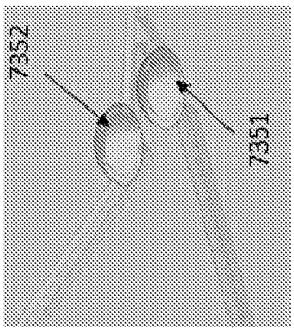

7352
7351

FIG. 37B

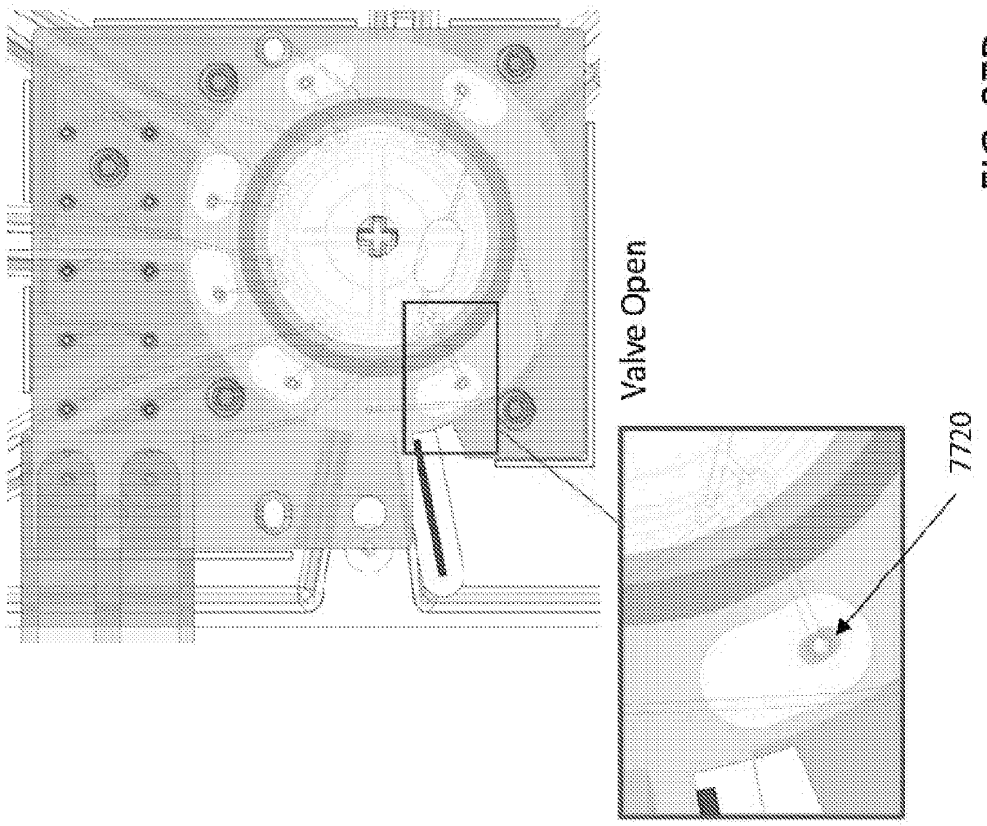


FIG. 37D

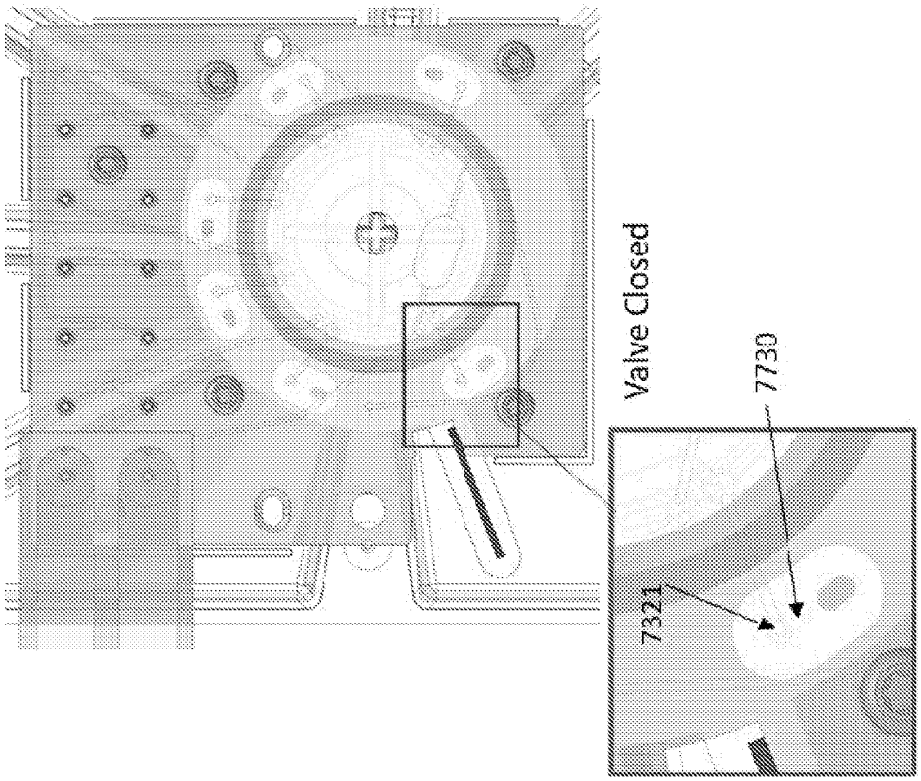


FIG. 37C

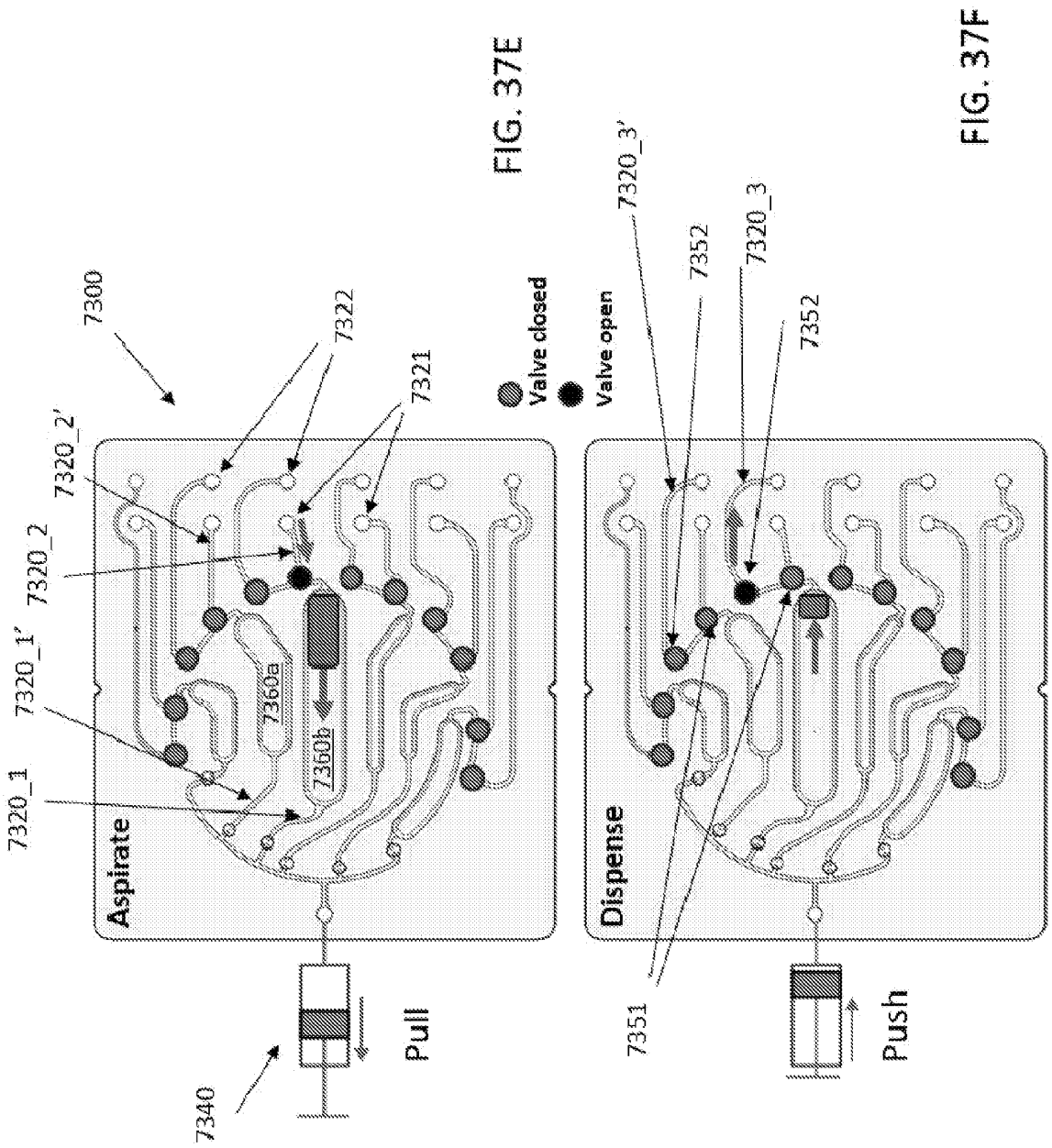


FIG. 37E

FIG. 37F

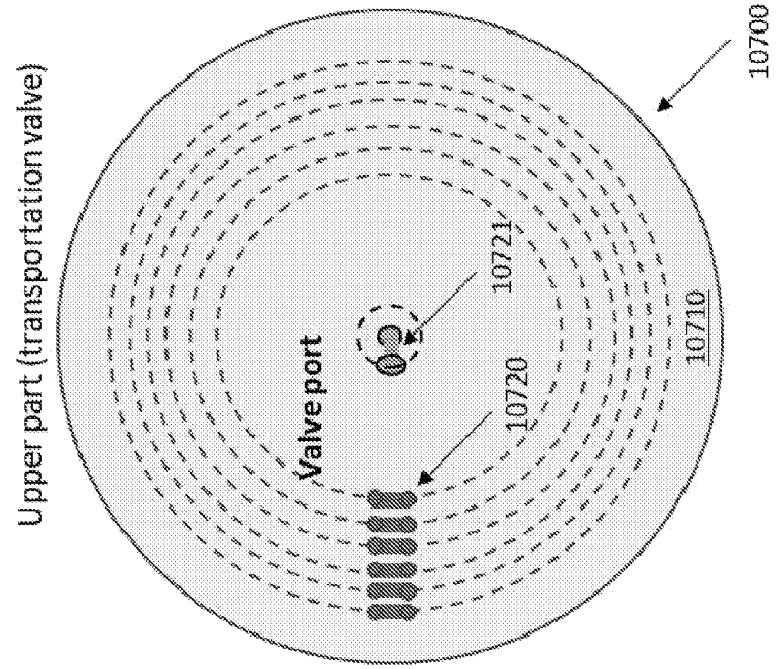


FIG. 38B

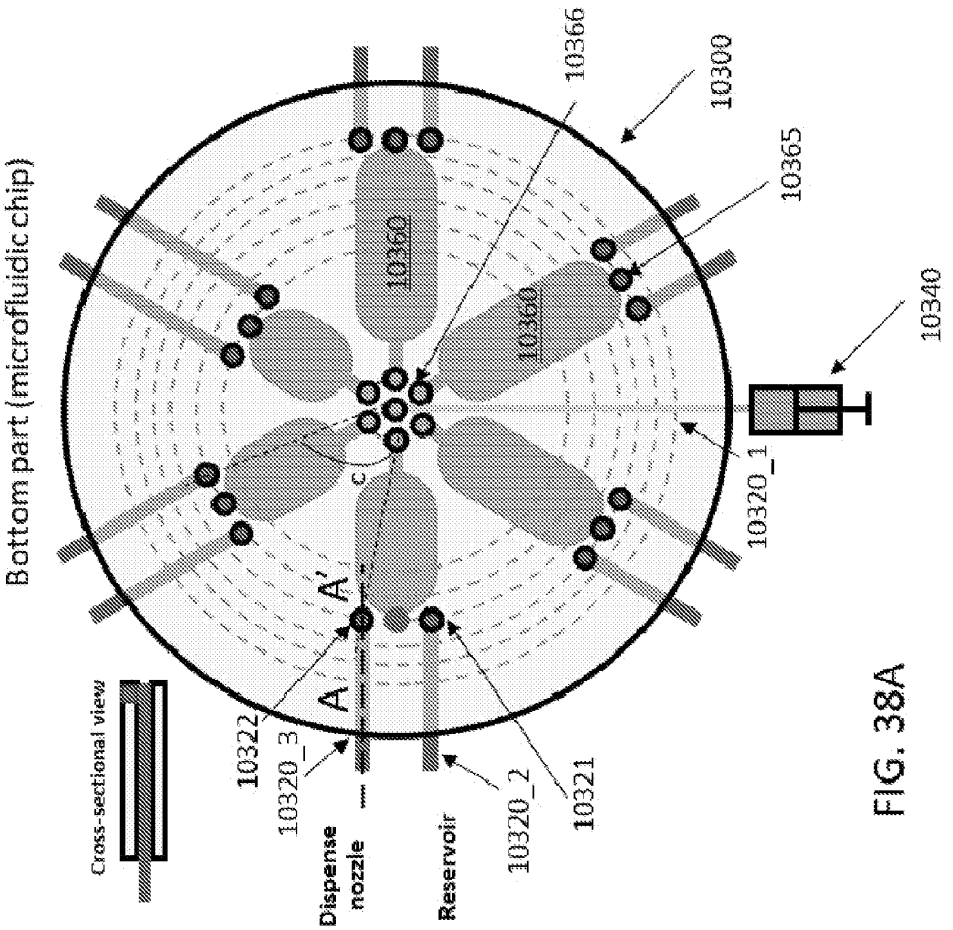


FIG. 38A

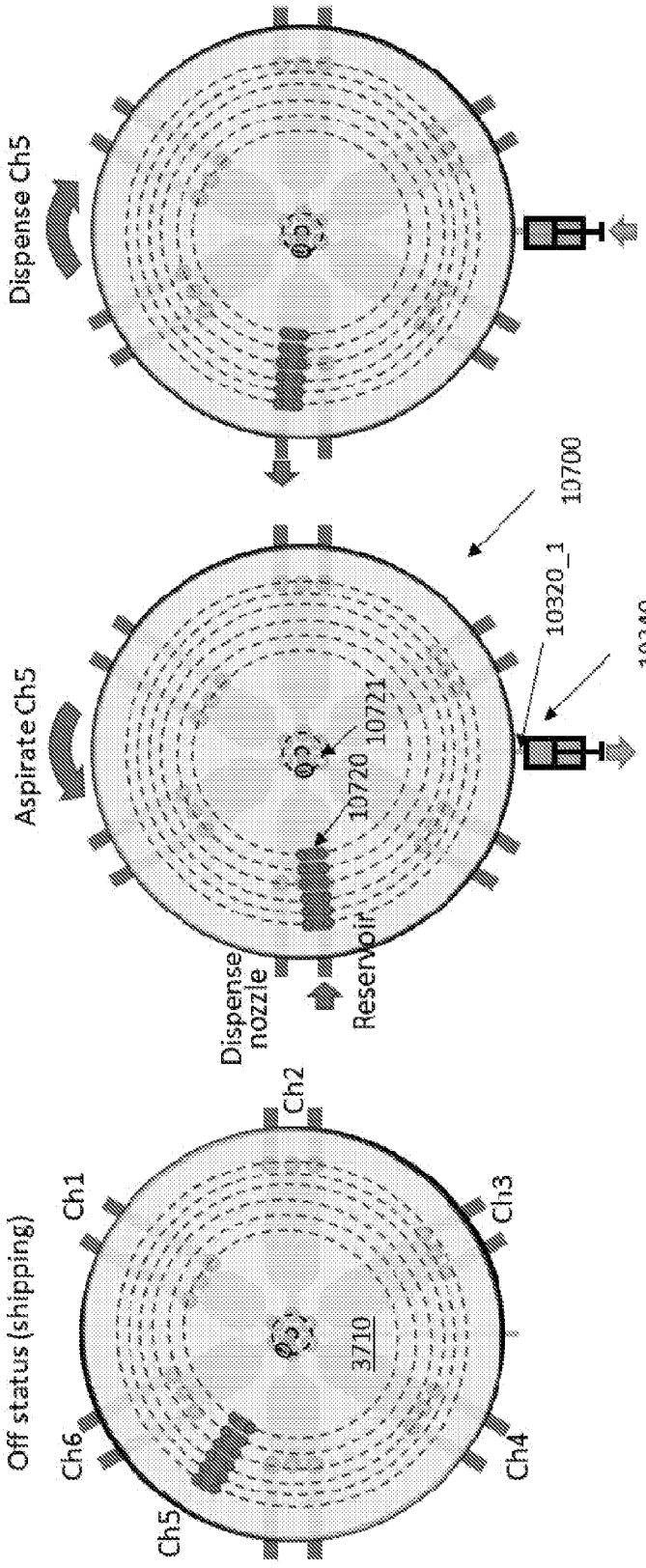


FIG. 39A

FIG. 39B

FIG. 39C

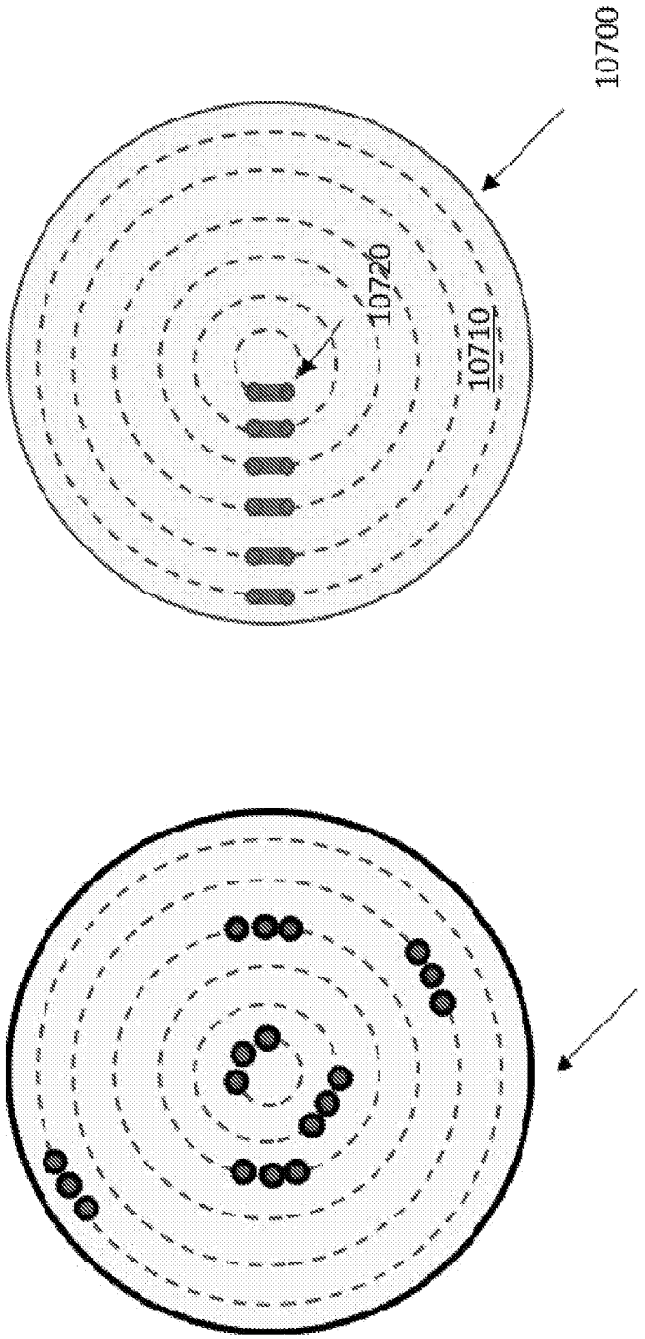


FIG. 40

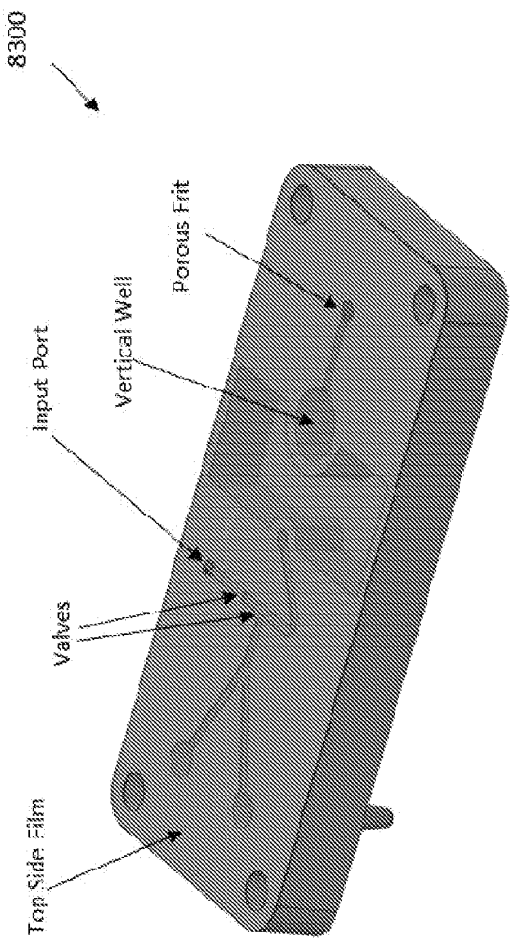


FIG. 41A

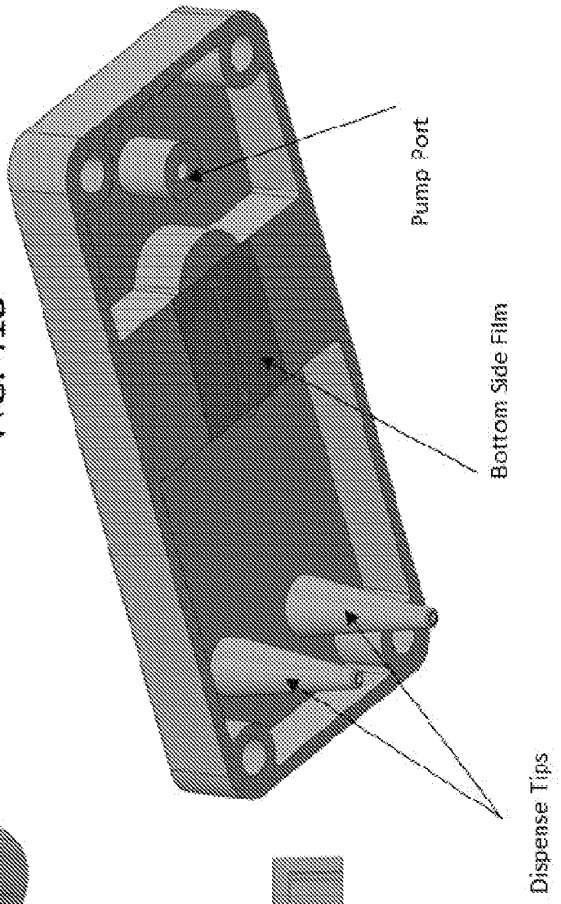


FIG. 41B

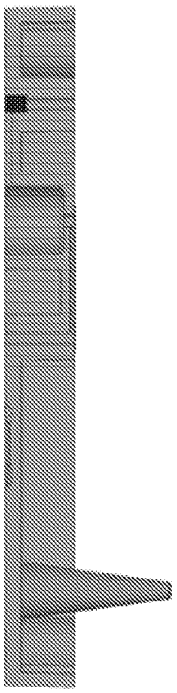


FIG. 41C

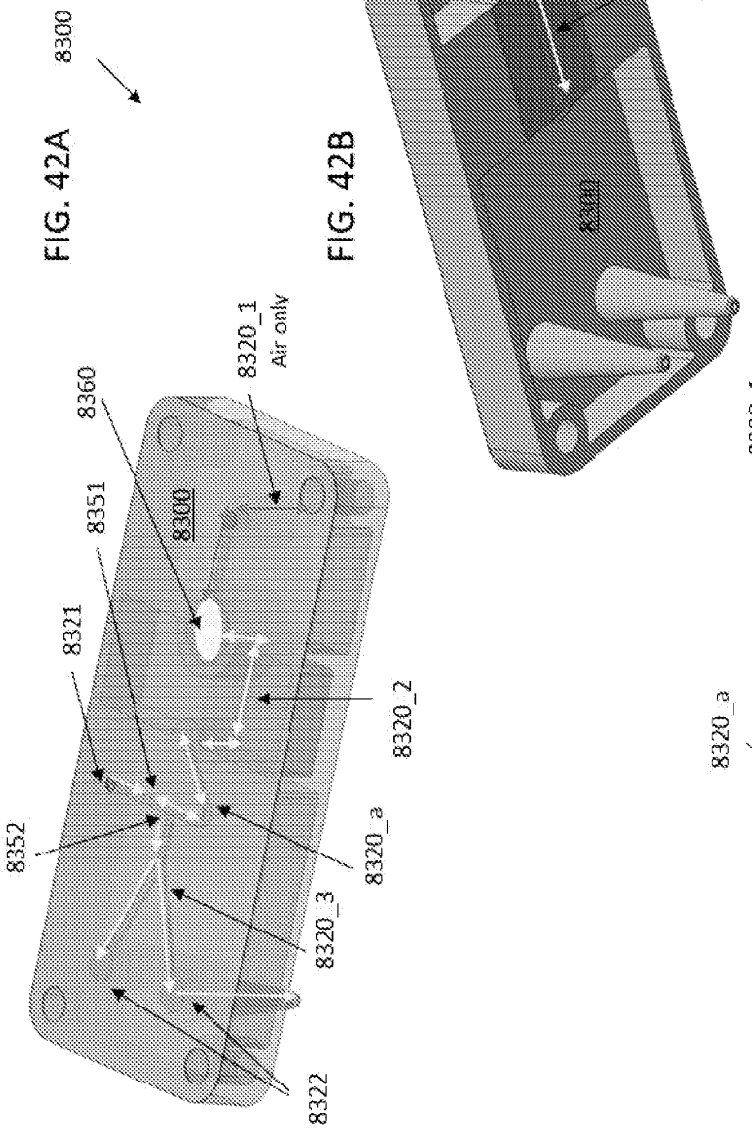


FIG. 42A

FIG. 42B

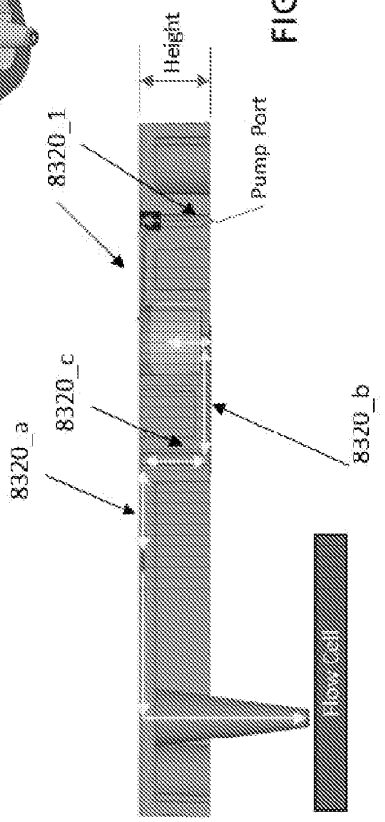


FIG. 42C

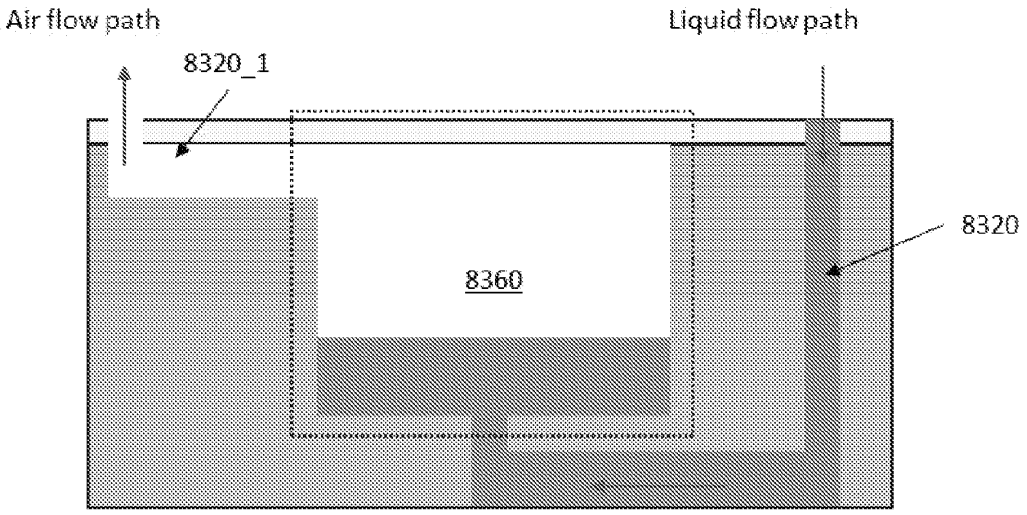


FIG. 42D

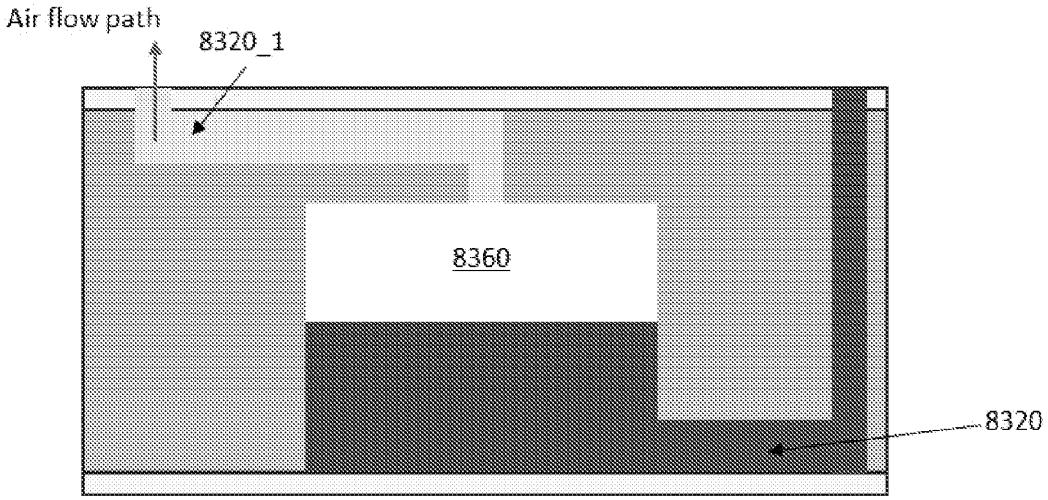


FIG. 42E

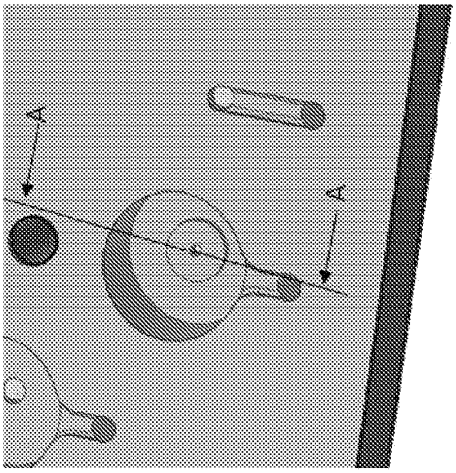


FIG. 42G

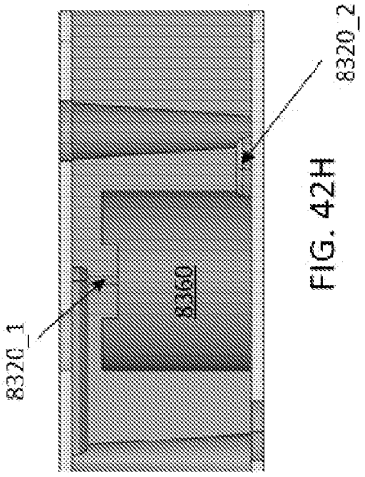


FIG. 42H

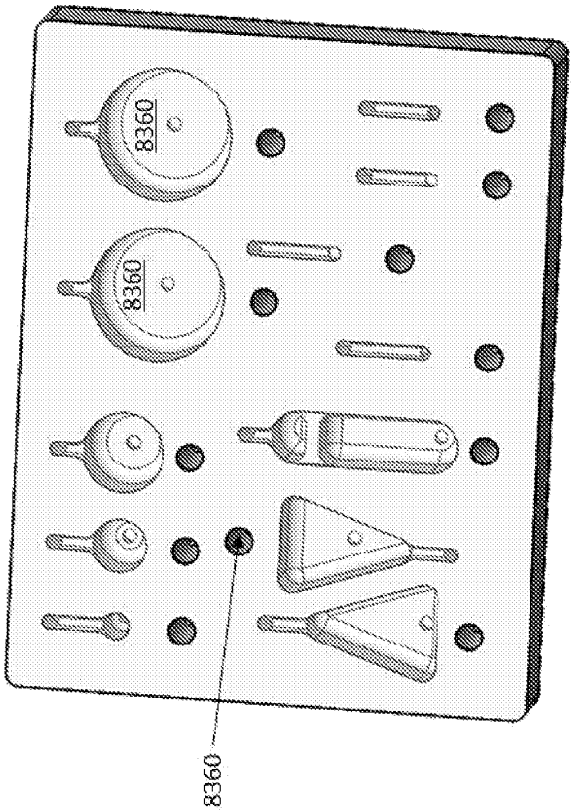


FIG. 42F

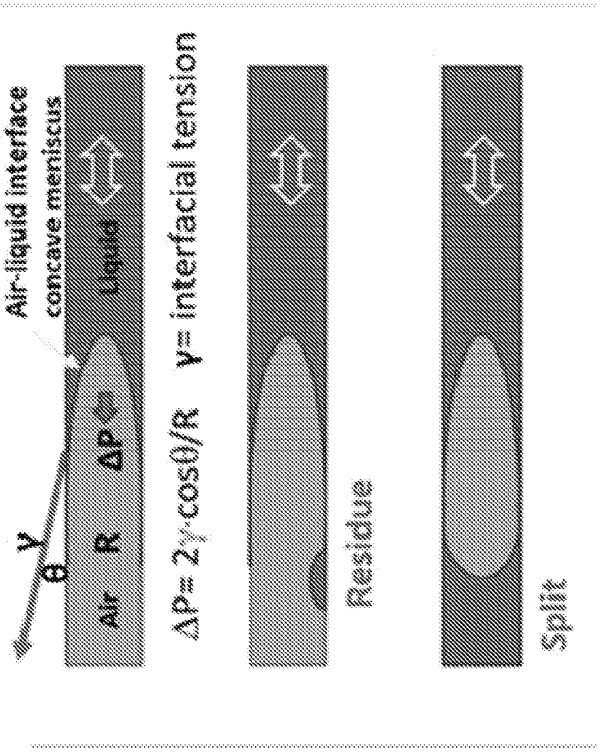


FIG. 43B

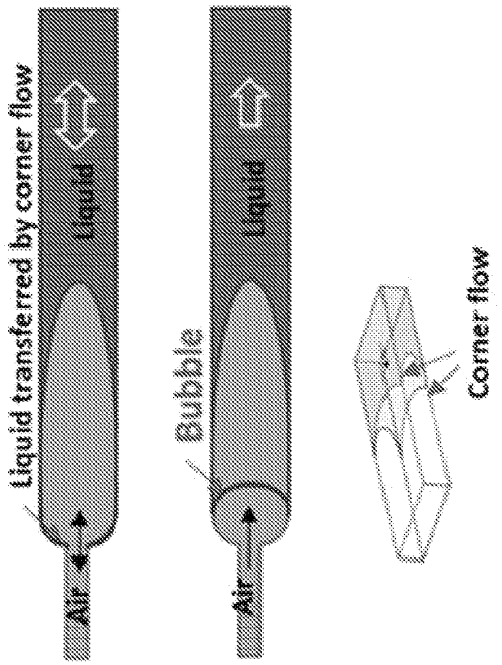


FIG. 43A

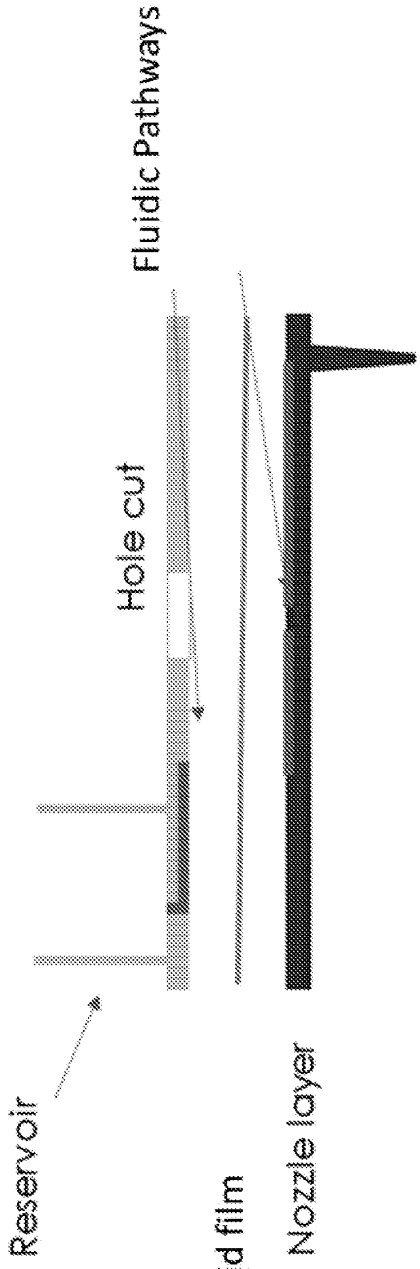


FIG. 44A

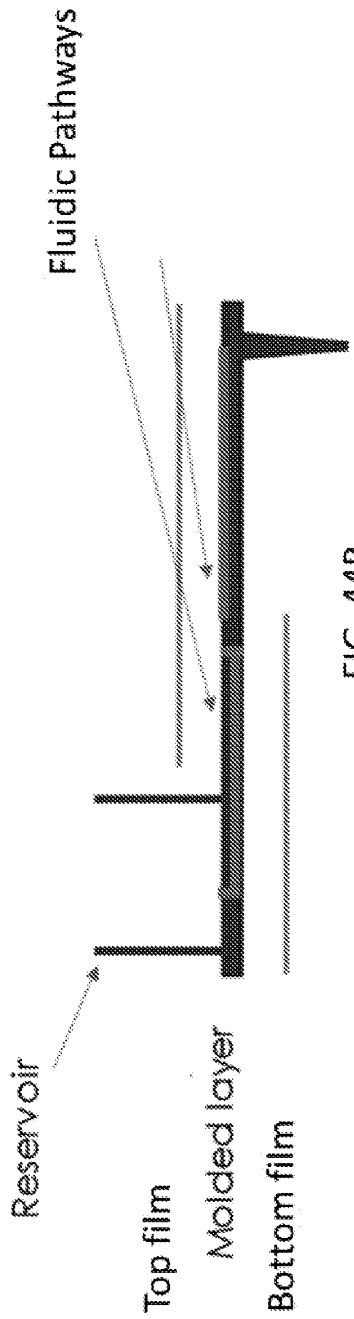


FIG. 44B

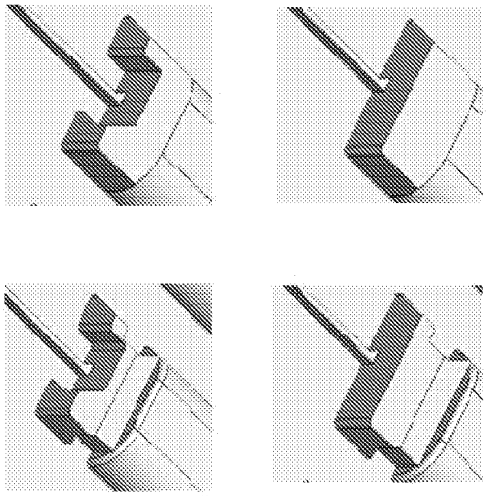


FIG. 45C

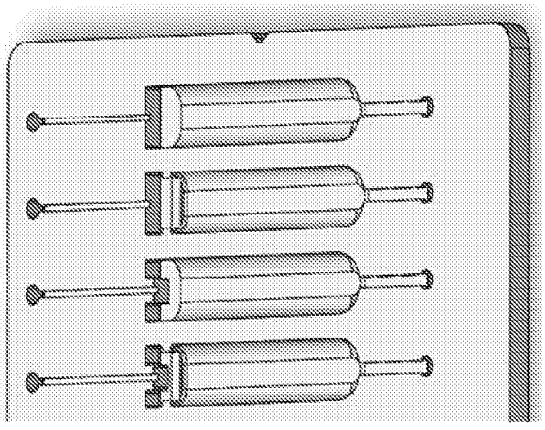


FIG. 45B

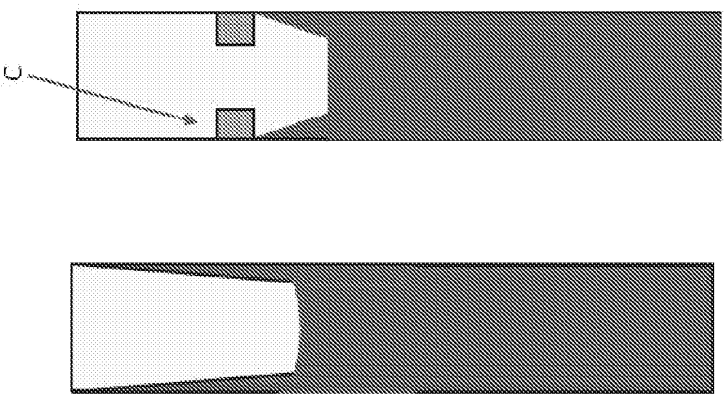


FIG. 45A

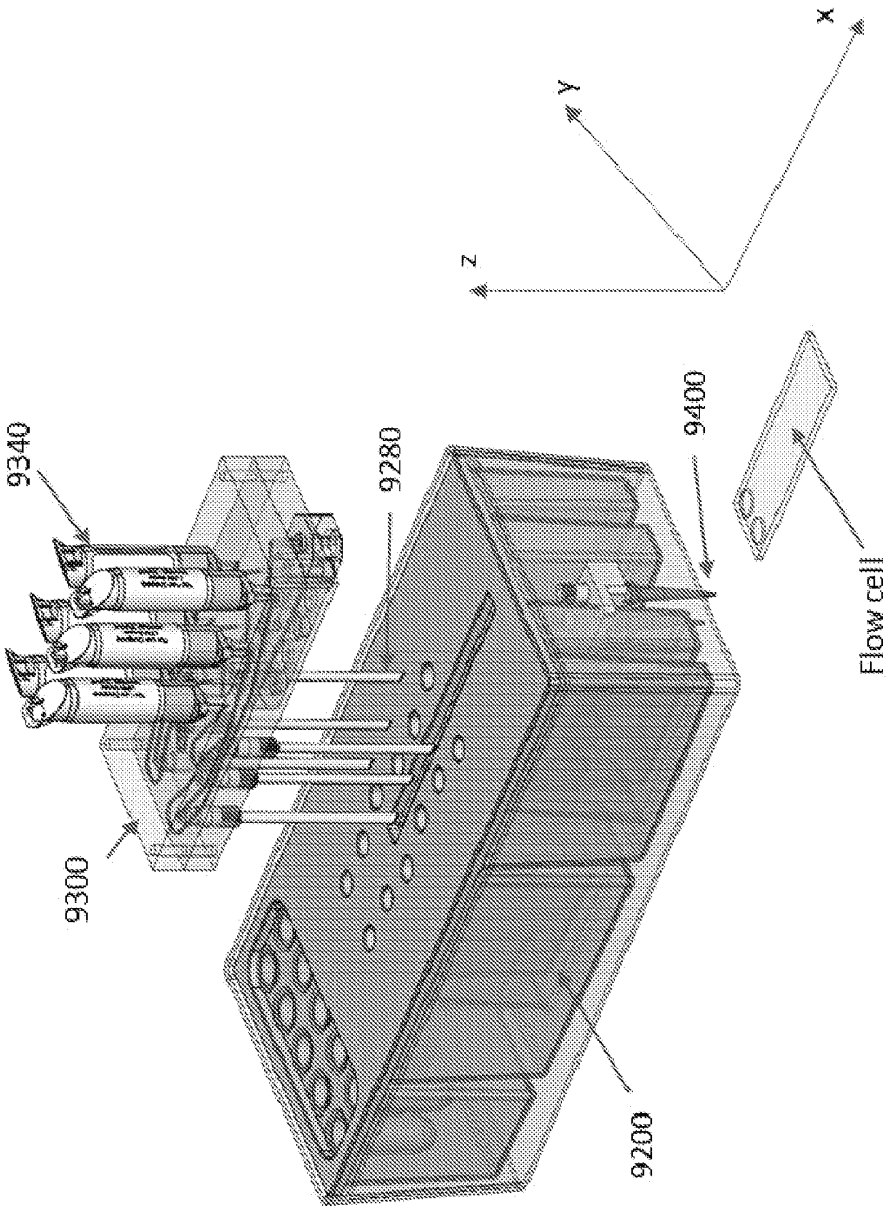


FIG. 46A

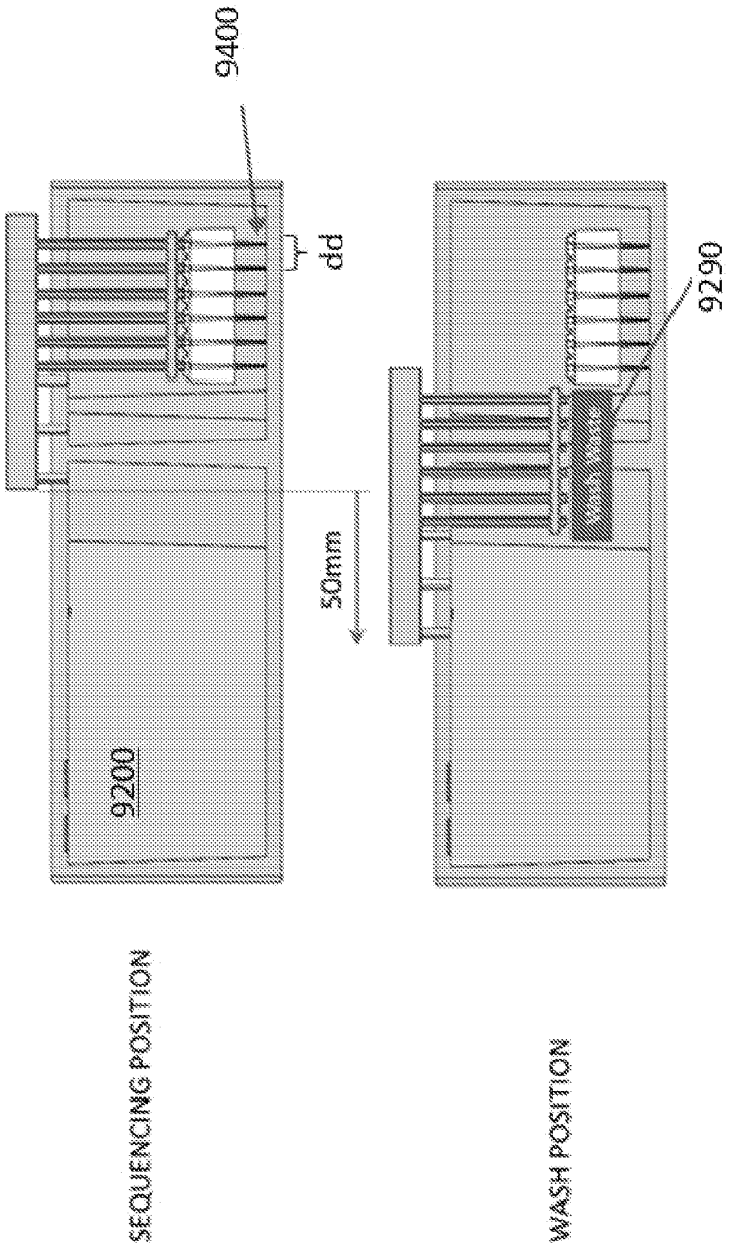


FIG. 46B

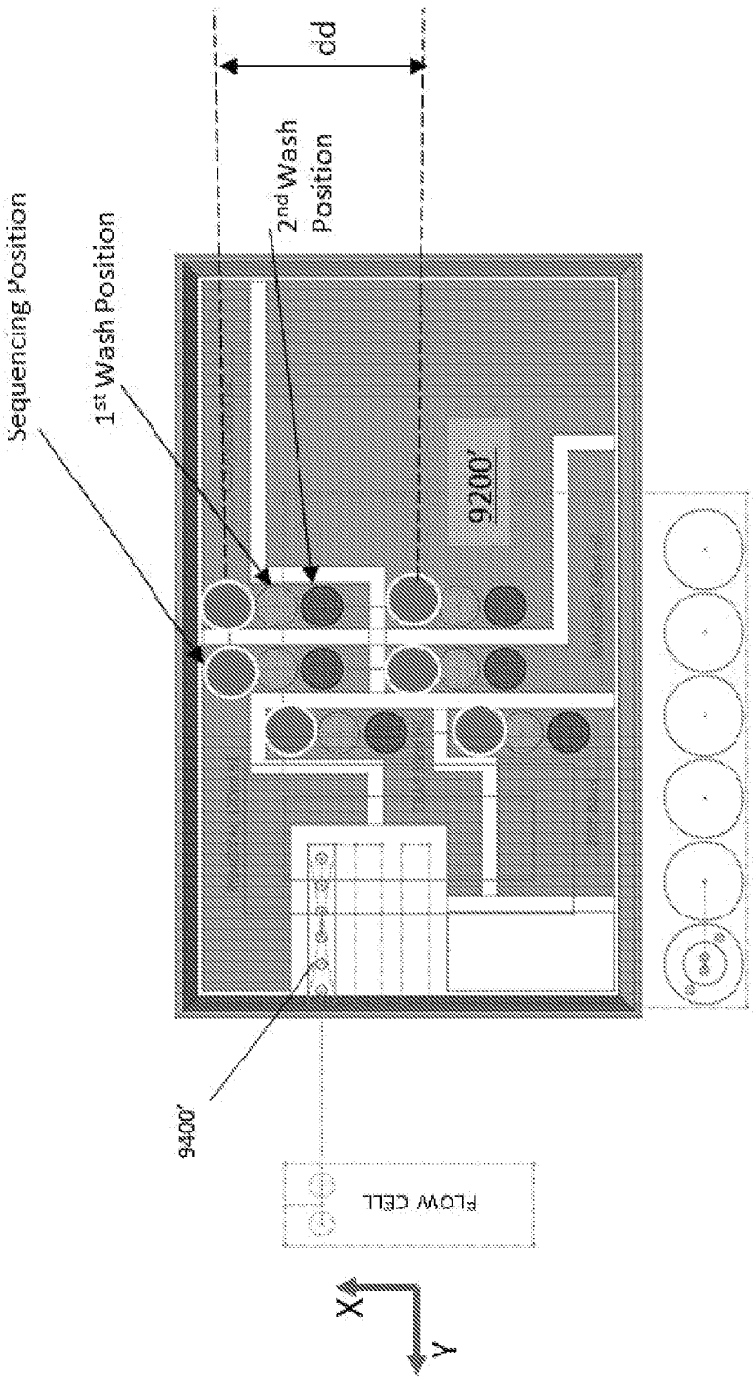

dd
2nd Wash Position
1st Wash Position
Sequencing Position
9200'
9400'
FLOW CELL
X
Y

FIG. 46C

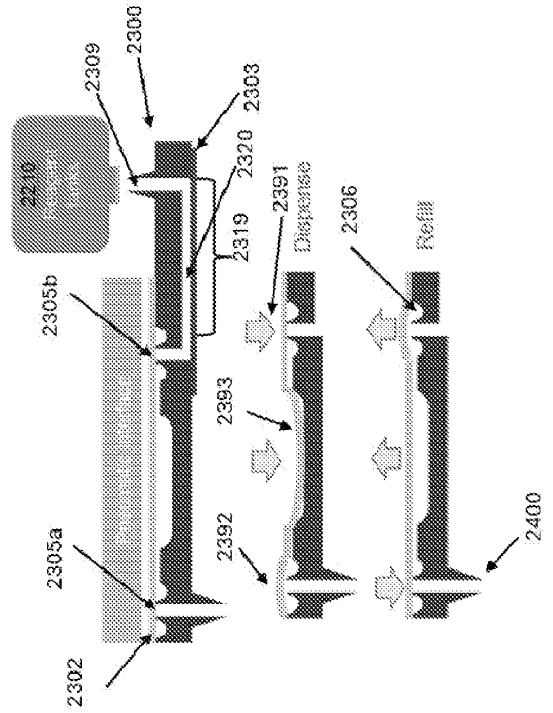


FIG. 47B

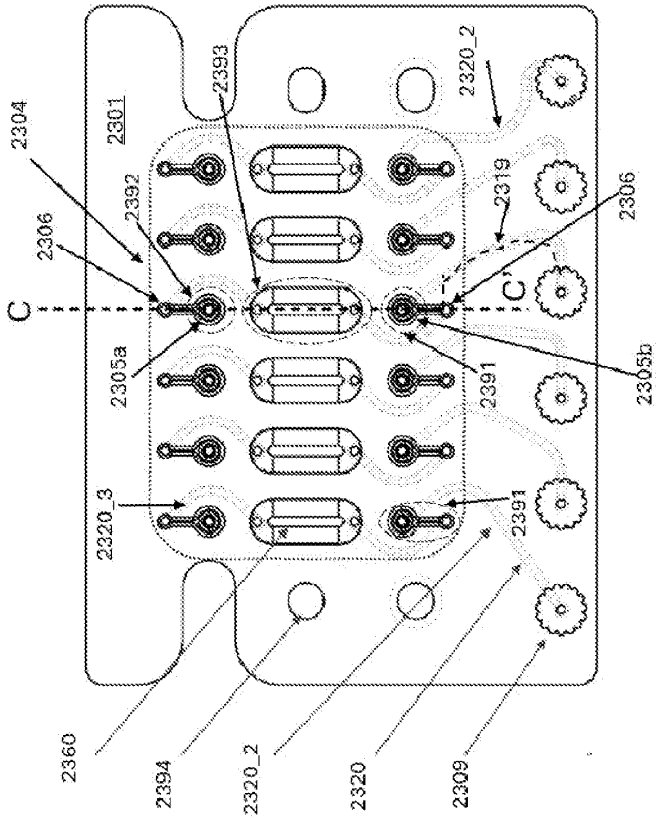


FIG. 47A

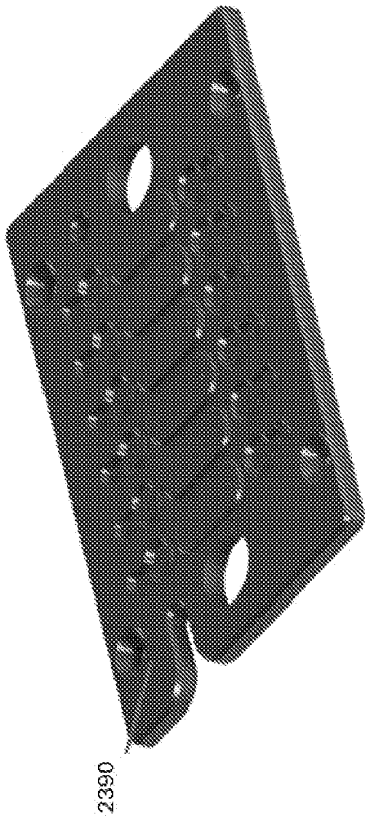


FIG. 47D

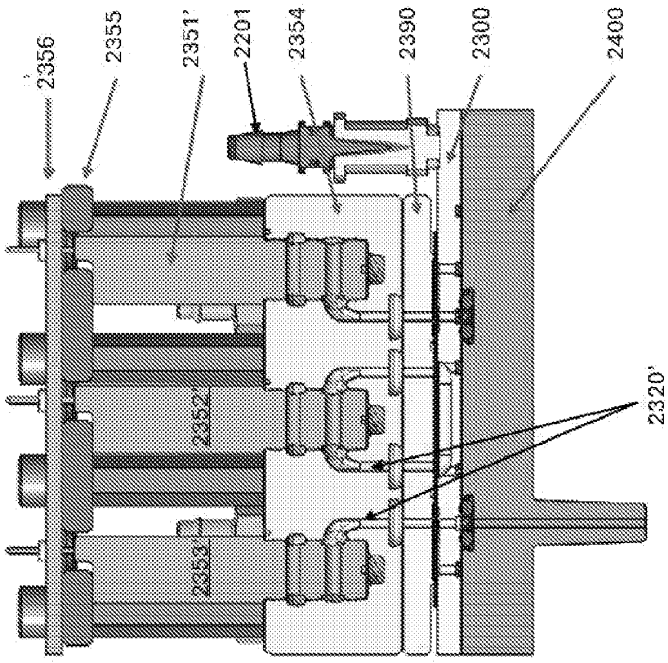


FIG. 47C