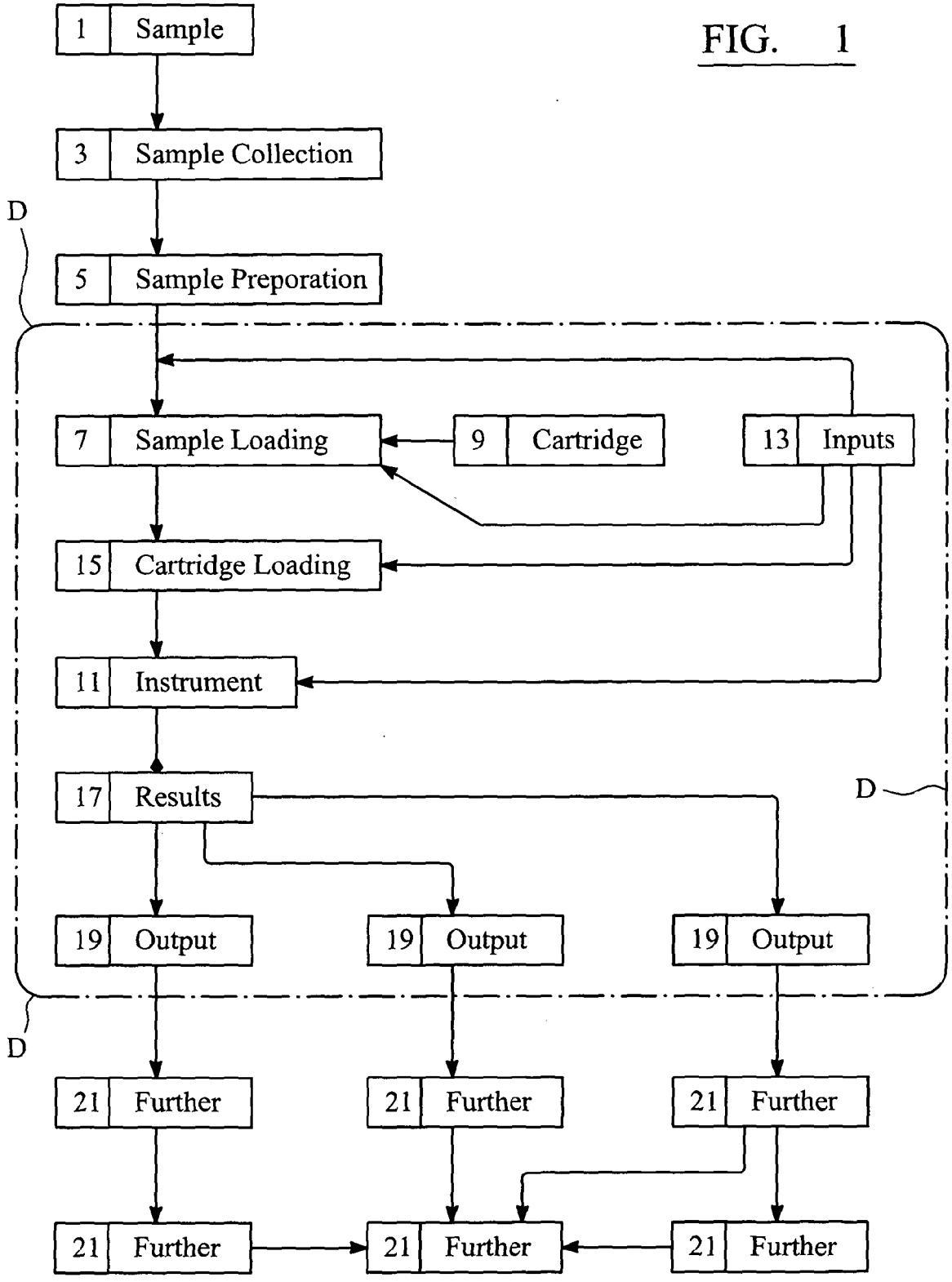
FIG. 1


1 Sample
3 Sample Collection
D
5 Sample Preporation
7 Sample Loading
9 Cartridge
13 Inputs
15 Cartridge Loading
11 Instrument
17 Results
D
19 Output
19 Output
19 Output
D
21 Further
21 Further
21 Further
21 Further
21 Further
21 Further

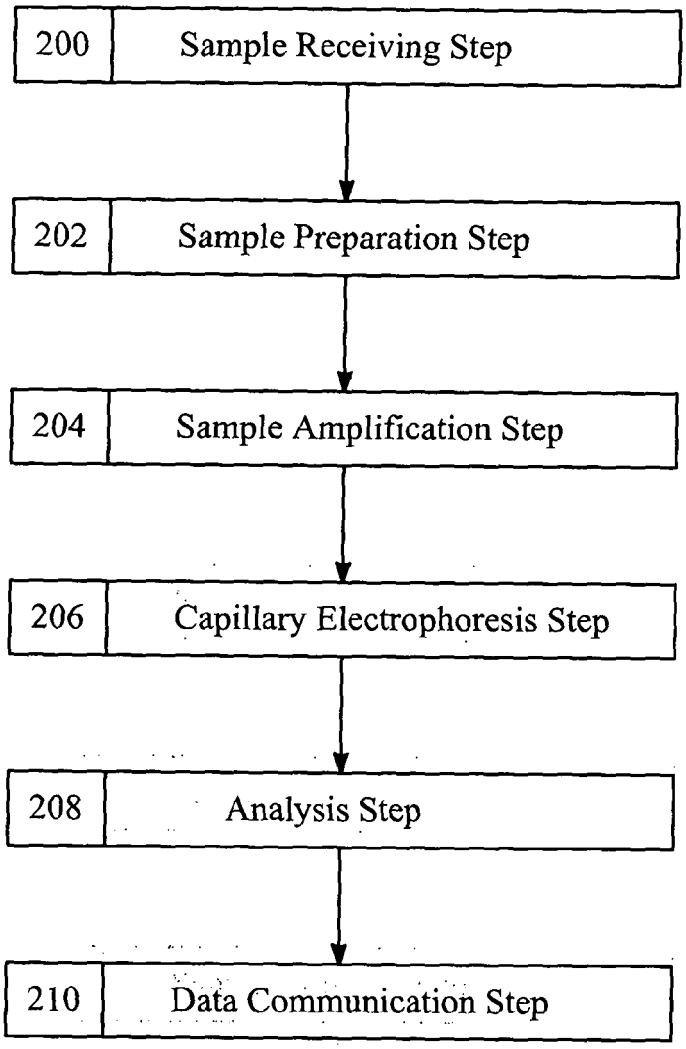

200
Sample Receiving Step
202
Sample Preparation Step
204
Sample Amplification Step
206
Capillary Electrophoresis Step
208
Analysis Step
210
Data Communication Step

FIG. 2

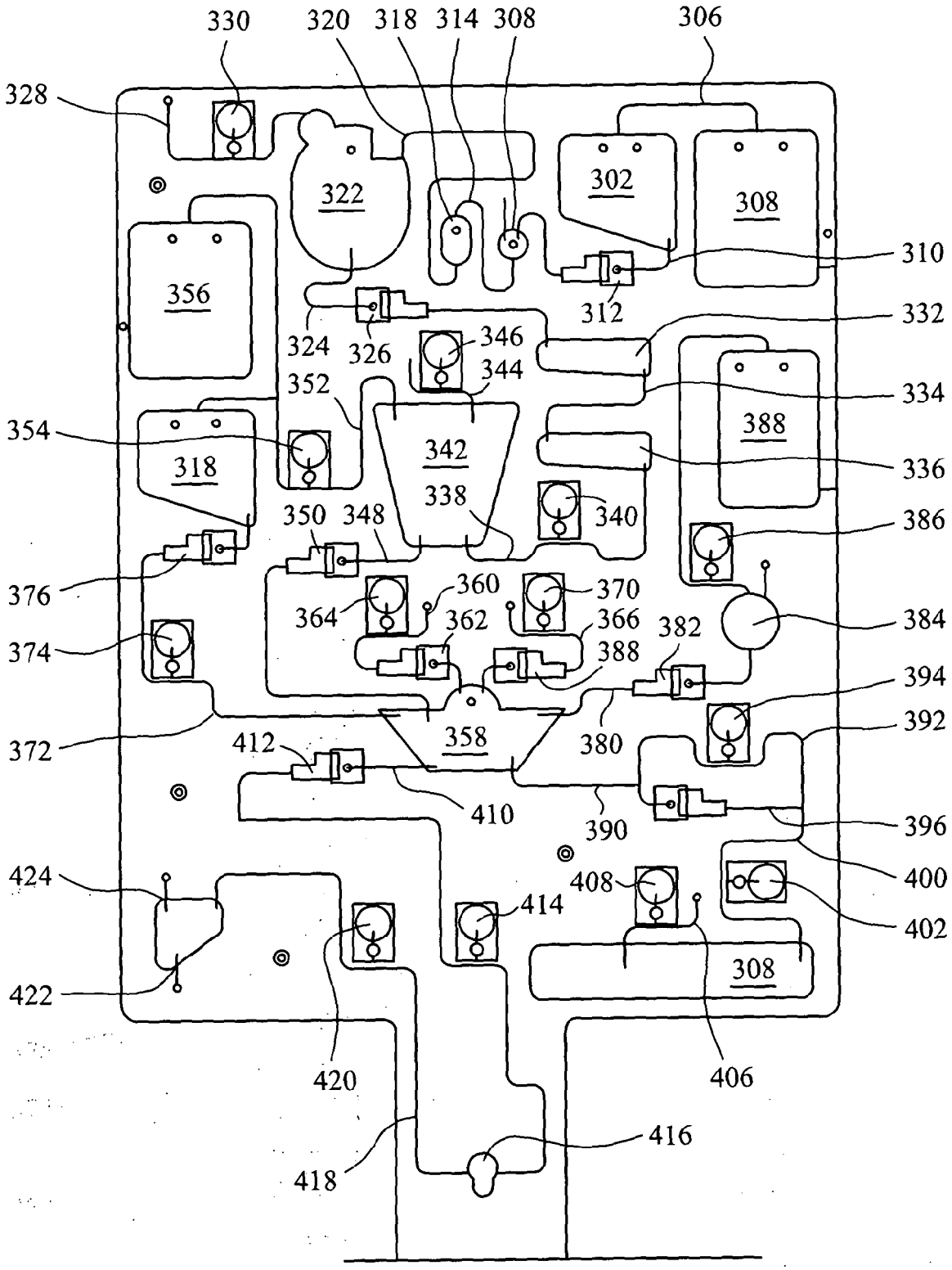

330
320
318
314
308
306
328
322
302
308
310
356
312
332
324
326
346
344
352
334
354
342
388
336
318
338
340
386
350
348
376
360
370
364
362
366
382
384
374
388
394
372
358
380
392
412
410
390
396
424
408
400
414
402
422
308
420
406
416
418

FIG. 3a

FIG. 3b

Design Specifications

Design Specification : fSS Buccal					
Functional Chambers	Volume	Depth	Tool	Vent	Note
C1 (Lysis)	300ul total	1mm			
C2 (Purification/Beads)	311ul total	0.75mm		Yes	
Expansion Chamber	67ul total	0.75mm			
C3 (Dwell)	250ul total	0.5mm		Yes	
C4 (Heating/Magnet)	250ul total	1.0mm		Yes	
Bead Storage Chamber	30ul total	1.0mm		Yes	
PCR Chamber	23ul	1.0mm			
Binding Buffer Chamber	40ul total	2.0mm		Yes	
Auxiliary Chambers					
Elution	150ul total	2.0mm		Yes	
Wash Buffer	250ul total	1.0mm		No	
Recovery	200ul	2.0mm		Yes	
EC Pump	1124ul total	2.0mm			
Waste	1000ul total	2.5mm		Yes	
Channel					
Flow Channel		0.5mm	0.5mm BEM		
Pump Channel		0.5mm	0.5mm BEM		See A.N.
PCR Entrance Channel		1.0mm	1.5mm BEM		
Paraffin Valve	Diameter				
Open Valve	1.0mm	0.5mm			
Close Valve	2.0mm	1.0mm			
Close Valve 12/13	3.0mm	1.0mm			PCR Close valves enlarged
Cartridge Specification					
Height	160mm				
Width	125mm				
Thickness	3.0mm				
Electrode Glue	UV Glue				
Alignment Pin	2.3mm				
Bonding Tape	90106				
Fabrication Note					
Tape trimmed in chambers					

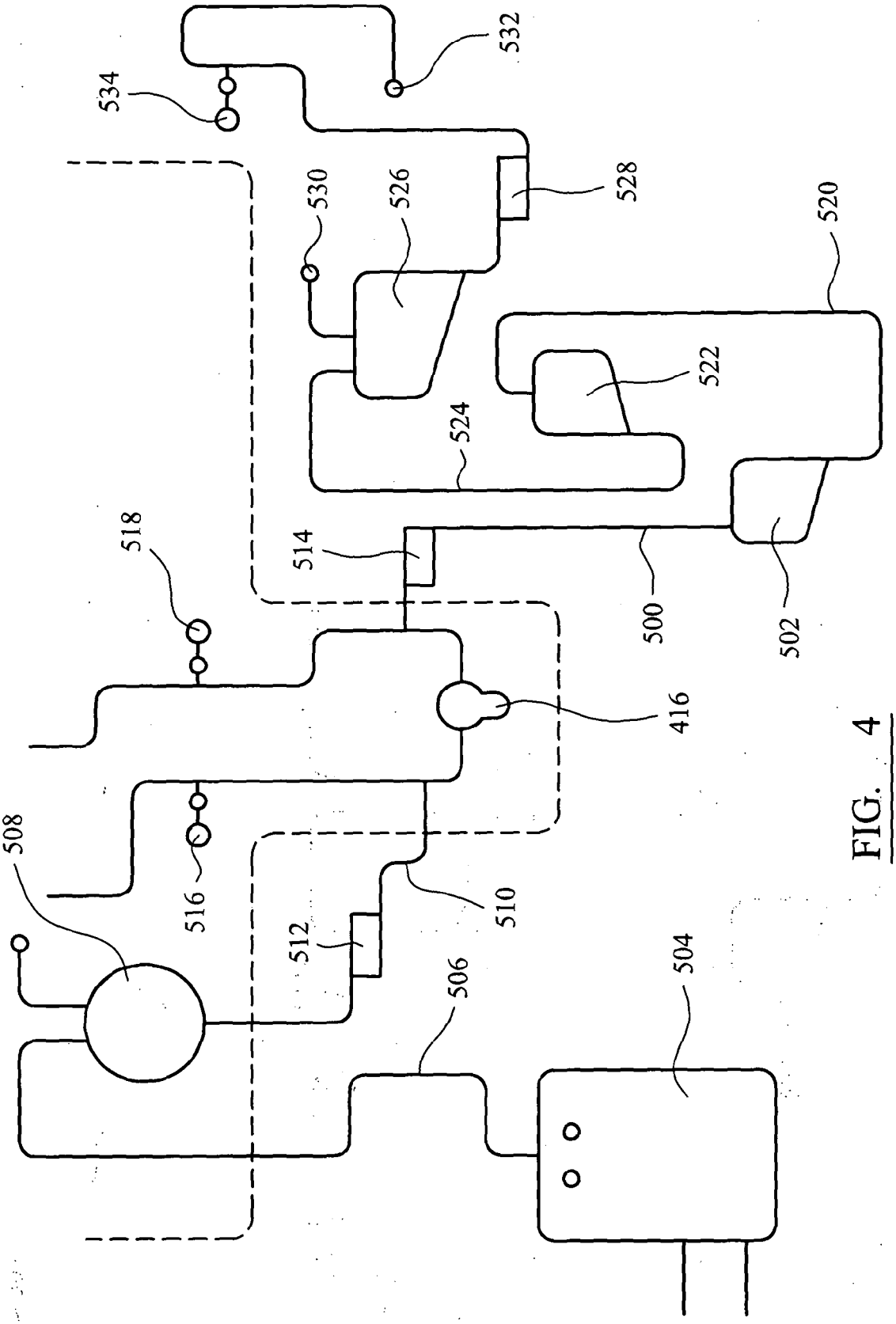

532
534
530
526
528
520
522
524
518
514
500
502
416
508
516
512
510
506
504

FIG. 4

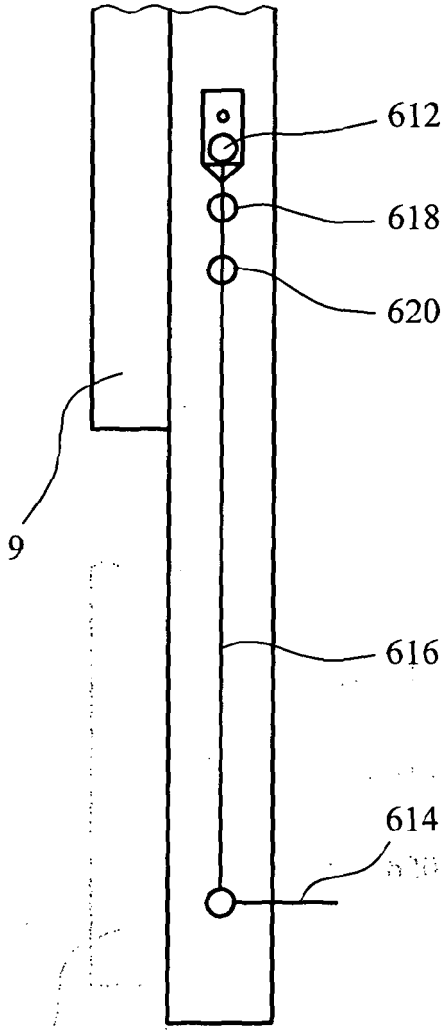

612
618
620
9
616
614

FIG. 5a

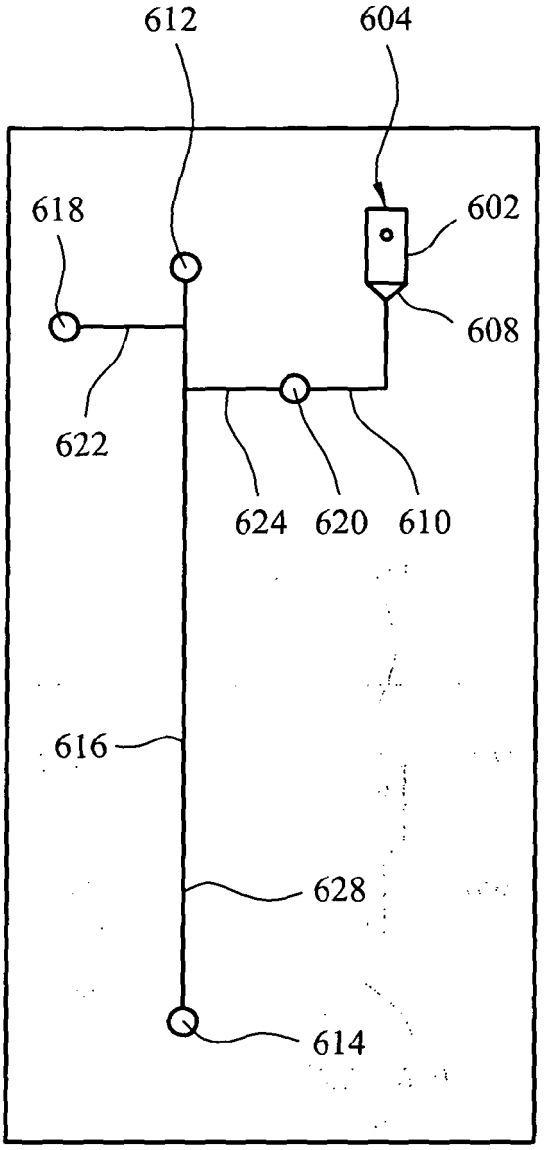

612
604
618
602
608
622
624
620
610
616
628
614

FIG. 5b

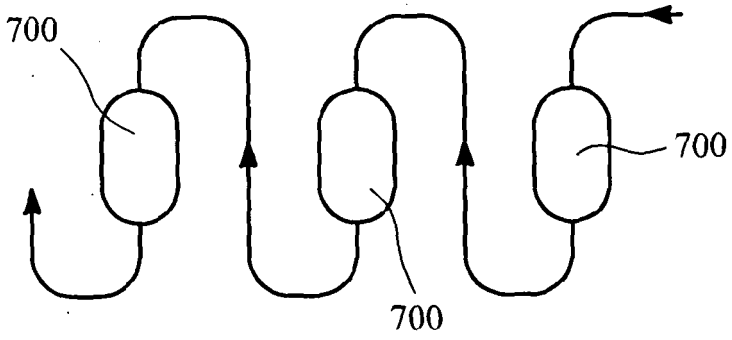


FIG. 6a

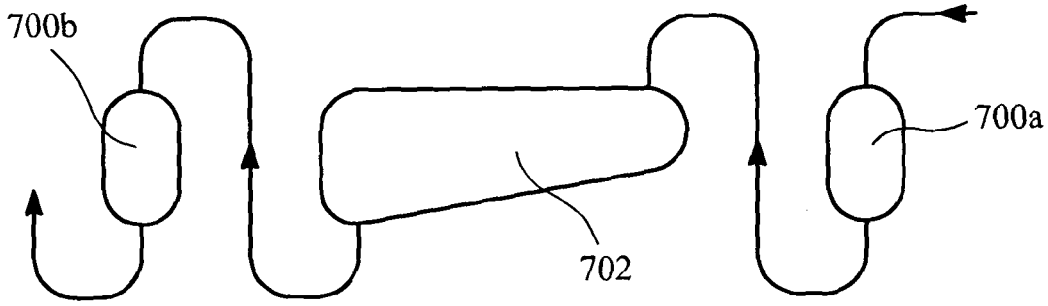


FIG. 6b

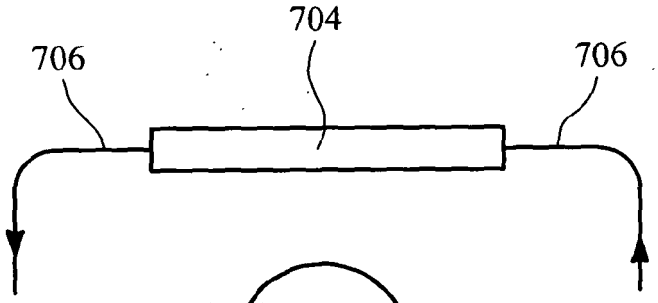


FIG. 6c

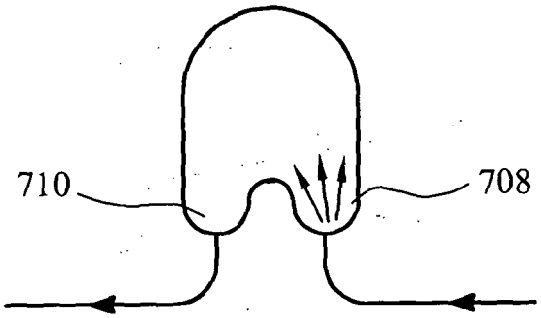


FIG. 6d

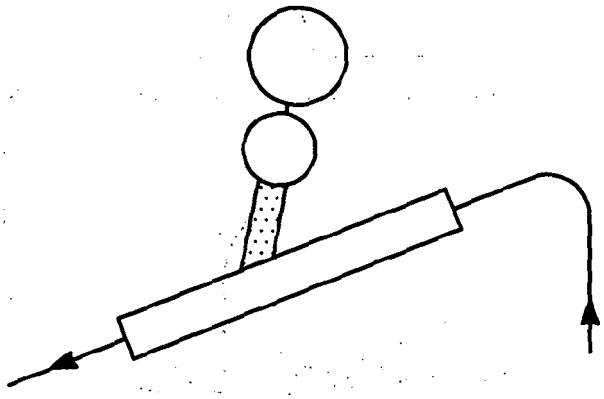


FIG. 6e

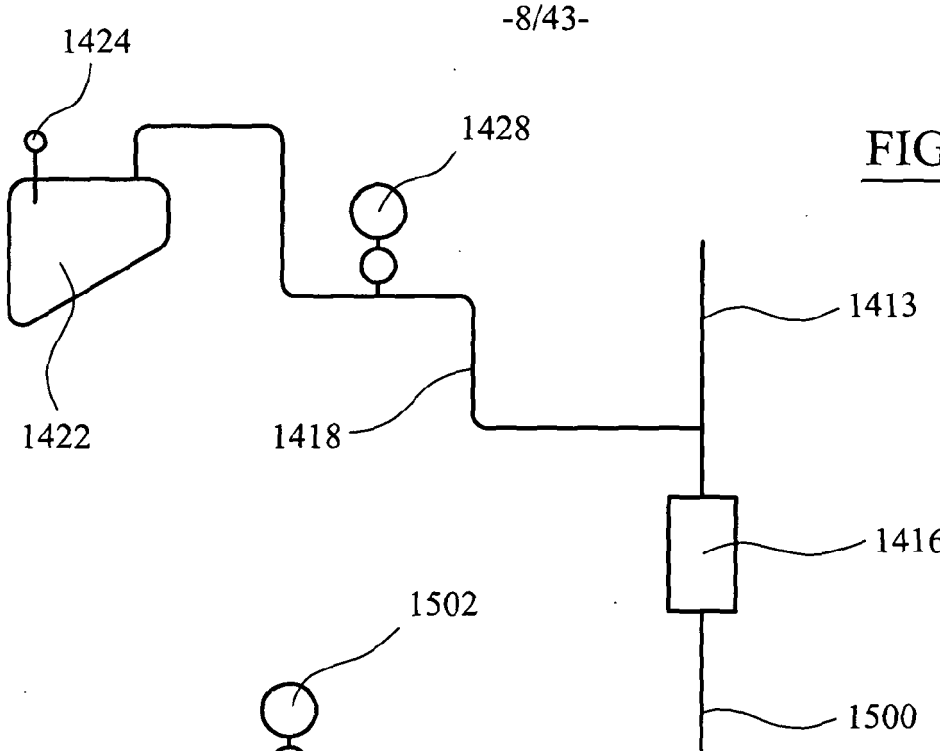

1424
1428
1422
1418
1413
1416
1502
1500
1504

FIG. 7

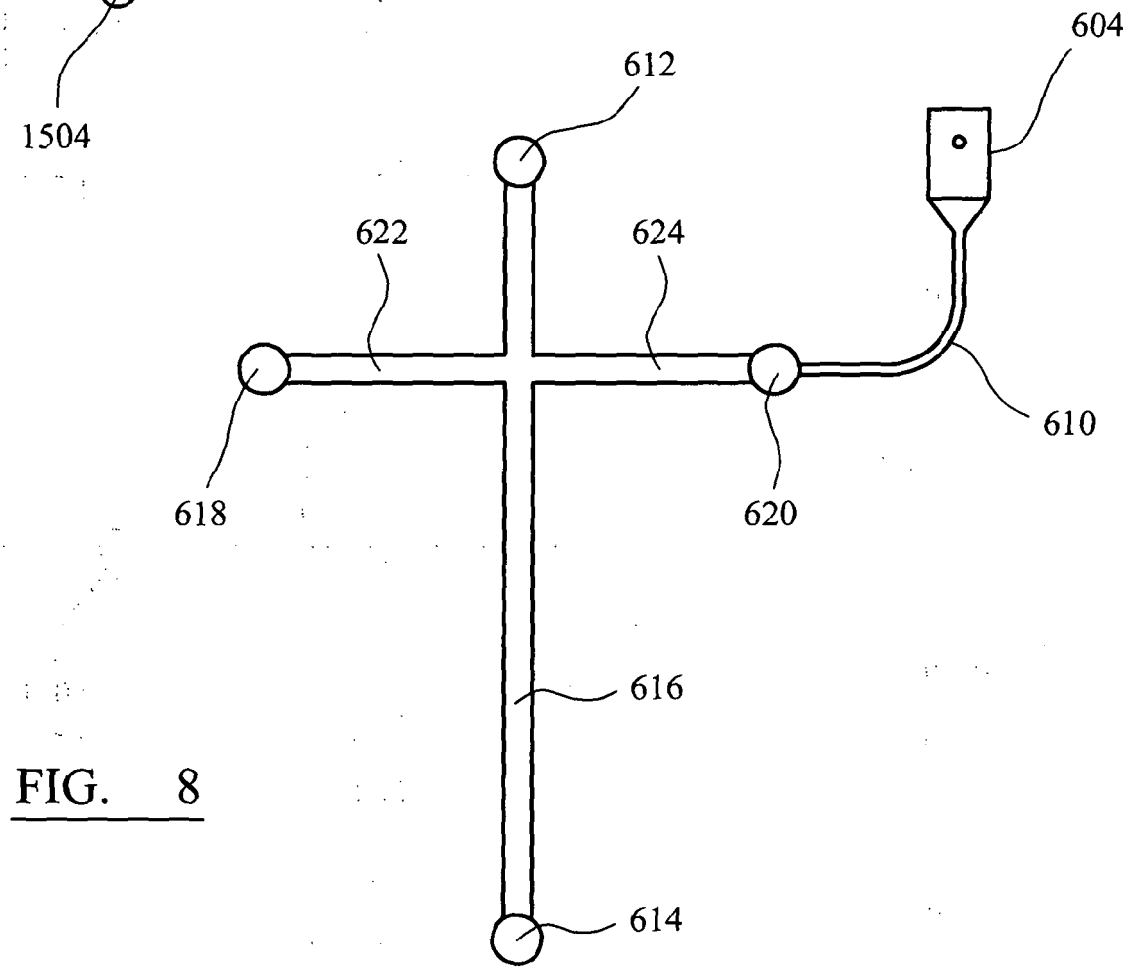

604
612
622
624
610
618
620
616
614

FIG. 8

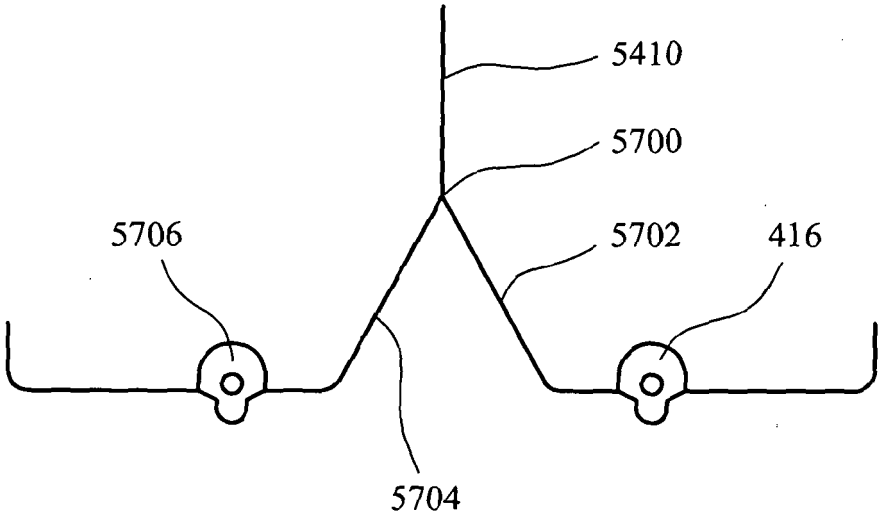

5410
5700
5706
5702
416
5704

FIG. 9

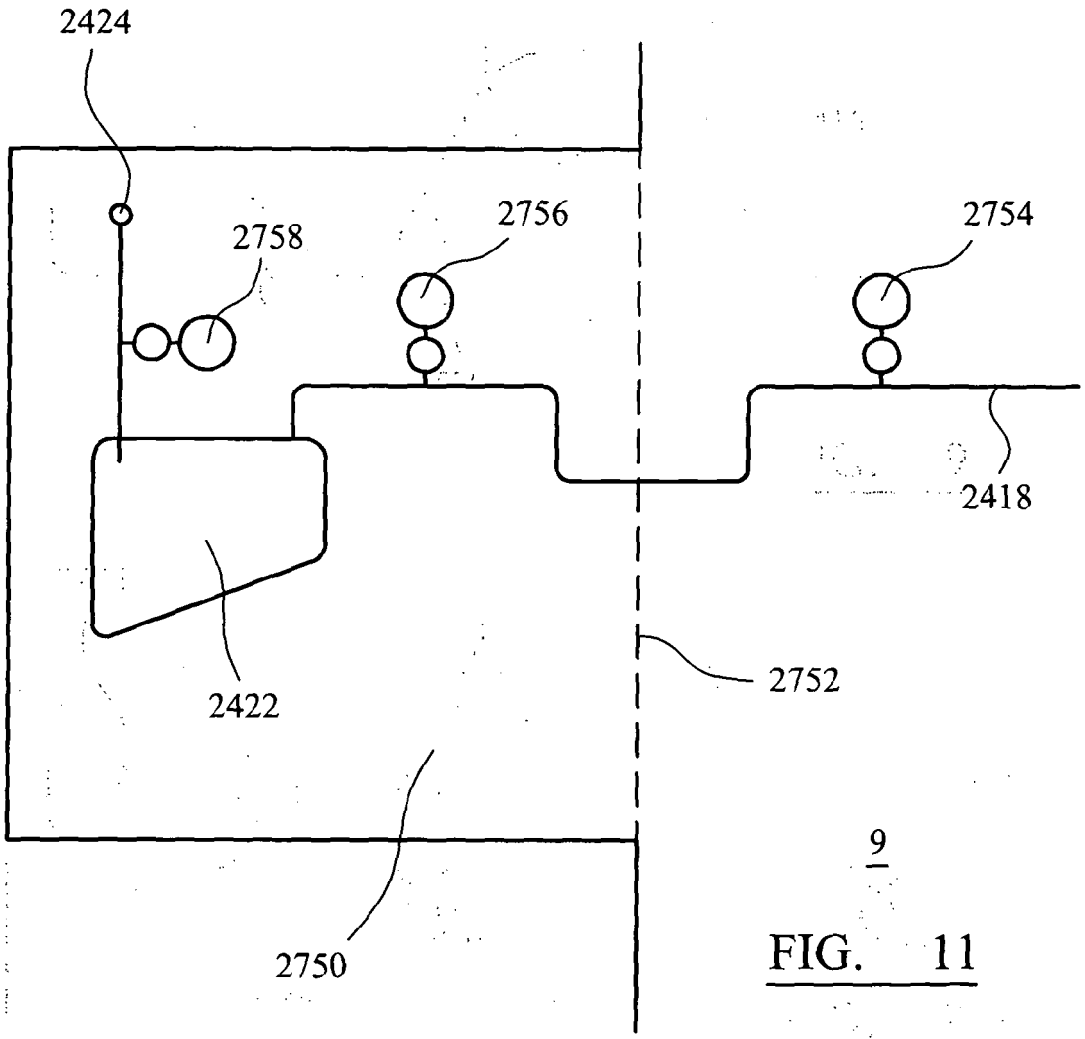

2424
2758
2756
2754
2418
2422
2752
2750
9

FIG. 11

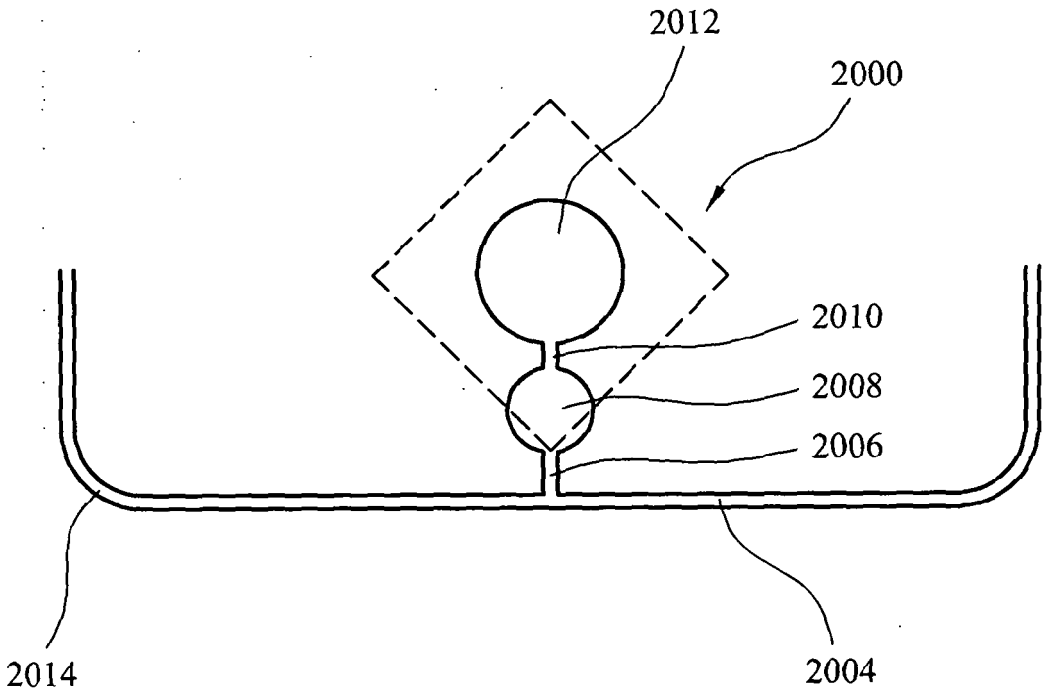


FIG. 10a

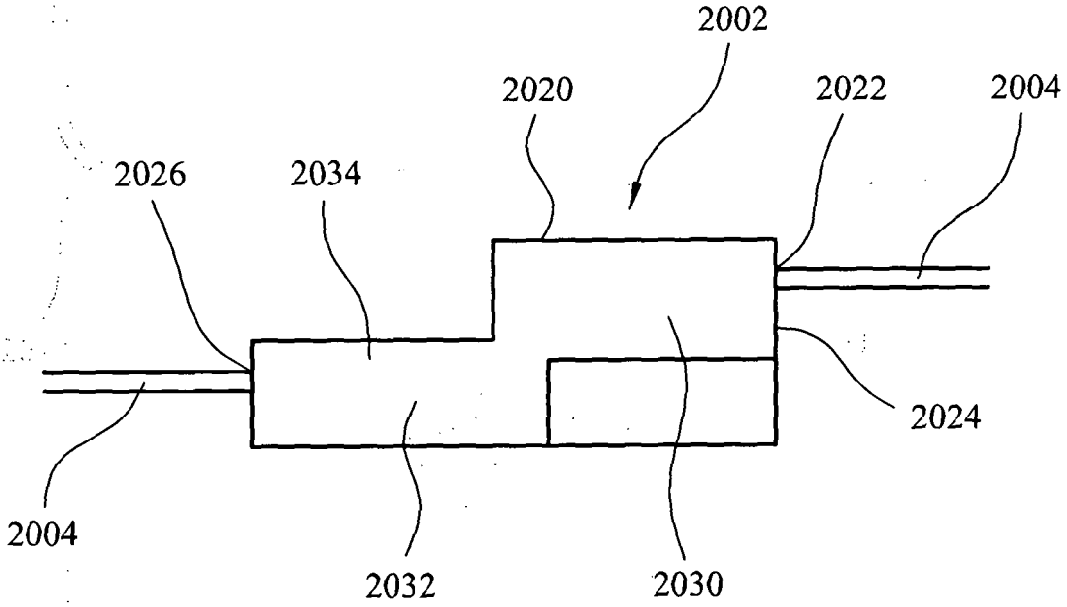


FIG. 10b

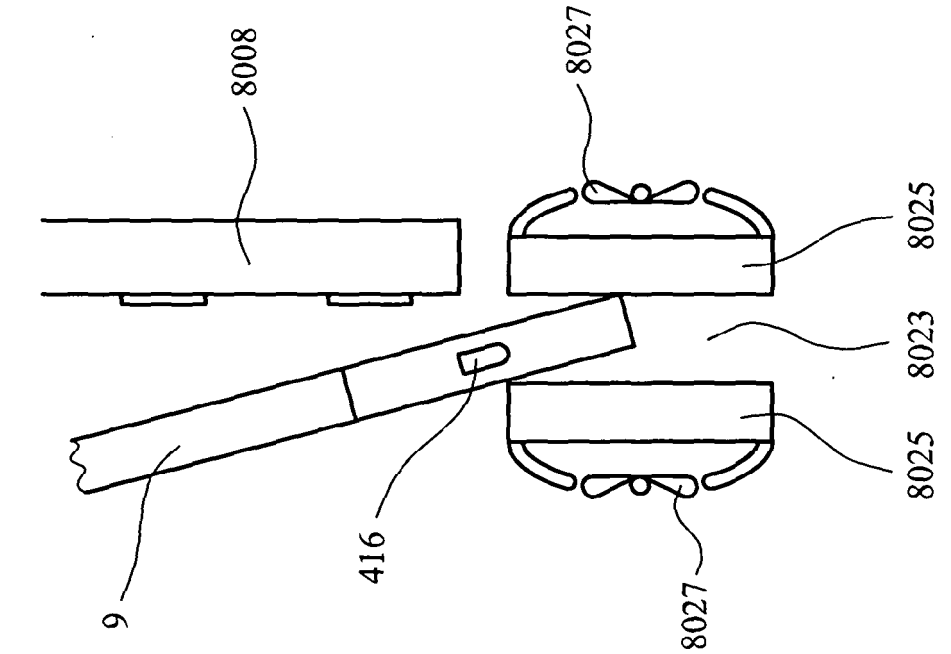

8008
8027
8025
8023
8025
416
9
8027

FIG. 13

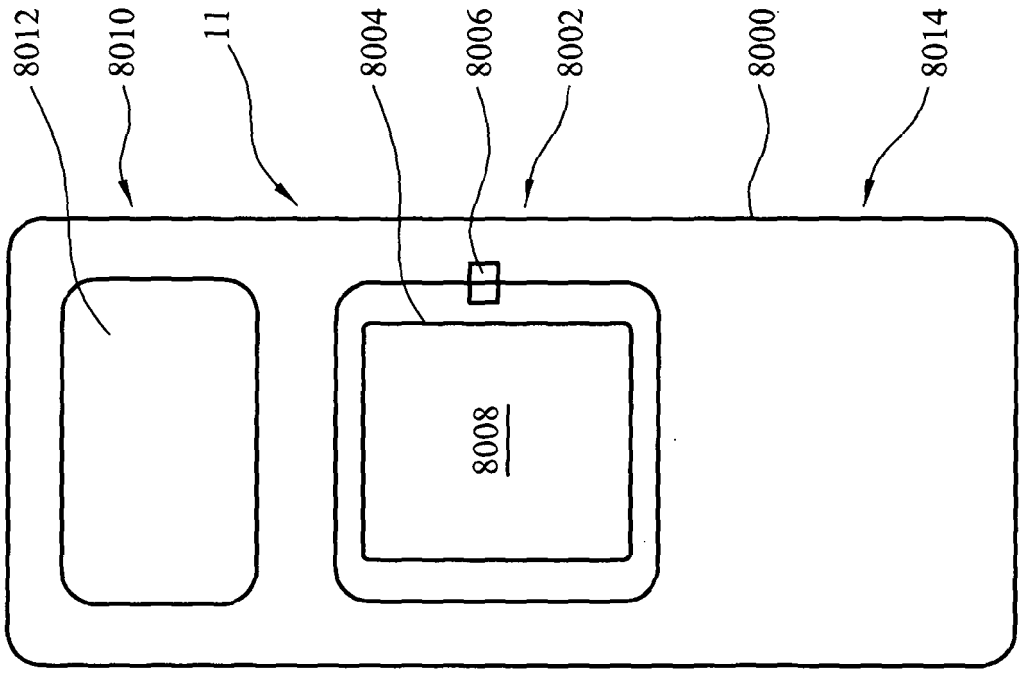
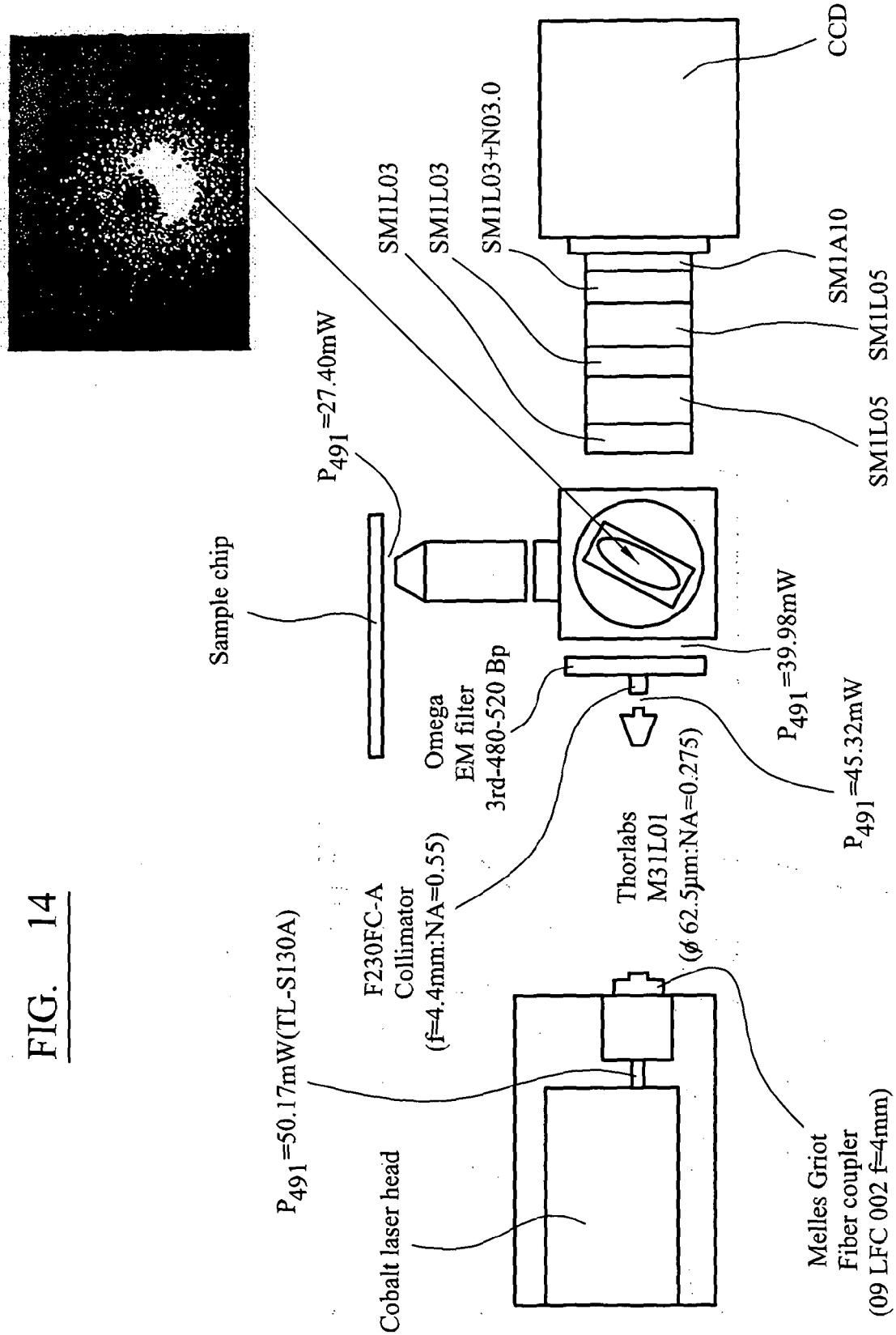

8012
8010
11
8004
8006
8002
8000
8014
8008

FIG. 12

FIG. 14


CCD
SM1L03+N03.0
SM1L03
SM1L03
SM1A10
SM1L05
SM1L05
P_{491}=27.40mW
Sample chip
Omega
EM filter
3rd-480-520 Bp
P_{491}=39.98mW
P_{491}=45.32mW
F230FC-A
Collimator
(f=4.4mm:NA=0.55)
Thorlabs
M31L01
(ϕ 62.5μm:NA=0.275)
P_{491}=50.17mW(TL-S130A)
Cobalt laser head
Melles Griot
Fiber coupler
(09 LFC 002 f=4mm)

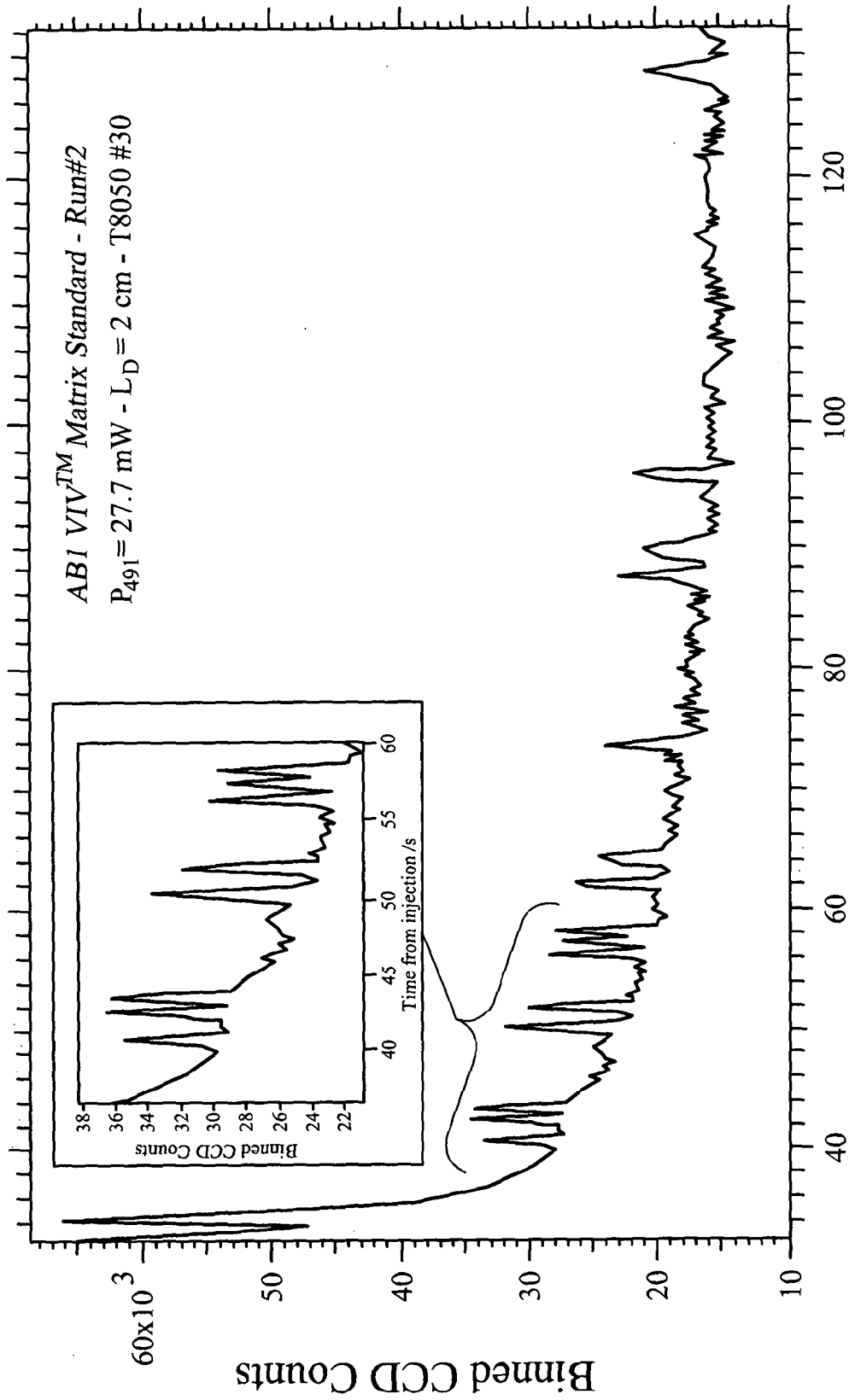

AB1 VIV™ Matrix Standard - Run#2
P491= 27.7 mW - LD= 2 cm - T8050 #30
Binned CCD Counts
60x10 3
50
40
30
20
10
40
60
80
100
120
Time from injection /s
Binned CCD Counts
38
36
34
32
30
28
26
24
22
40
45
50
55
60
Time from injection /s

FIG. 15

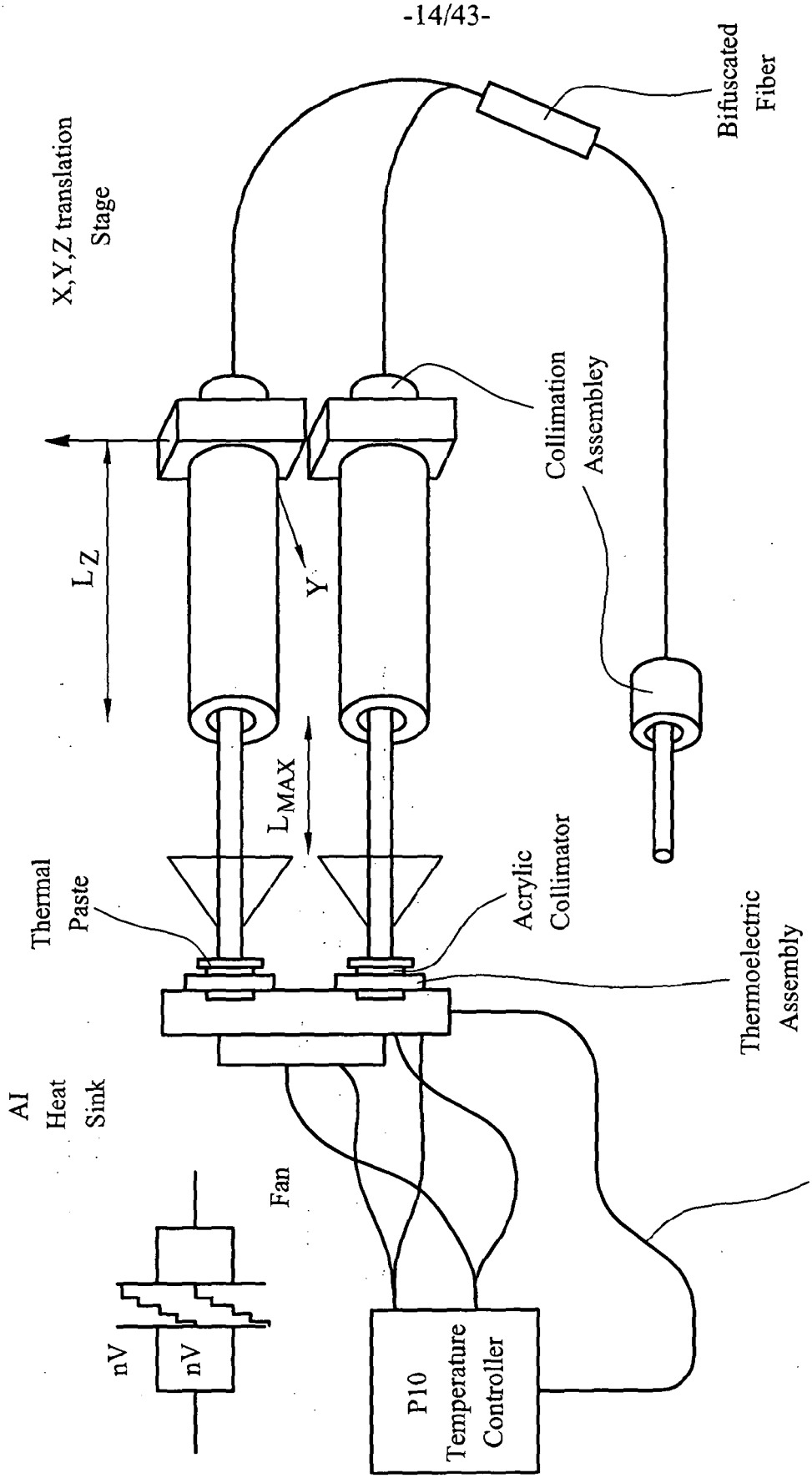

X,Y,Z translation Stage
Bifuscated Fiber
Collimation Assembley
L_Z
Y
L_{MAX}
Thermal Paste
Acrylic Collimator
Thermoelectric Assembly
Al Heat Sink
Fan
Temperature Sensor
nV
nV
P10 Temperature Controller

FIG. 16

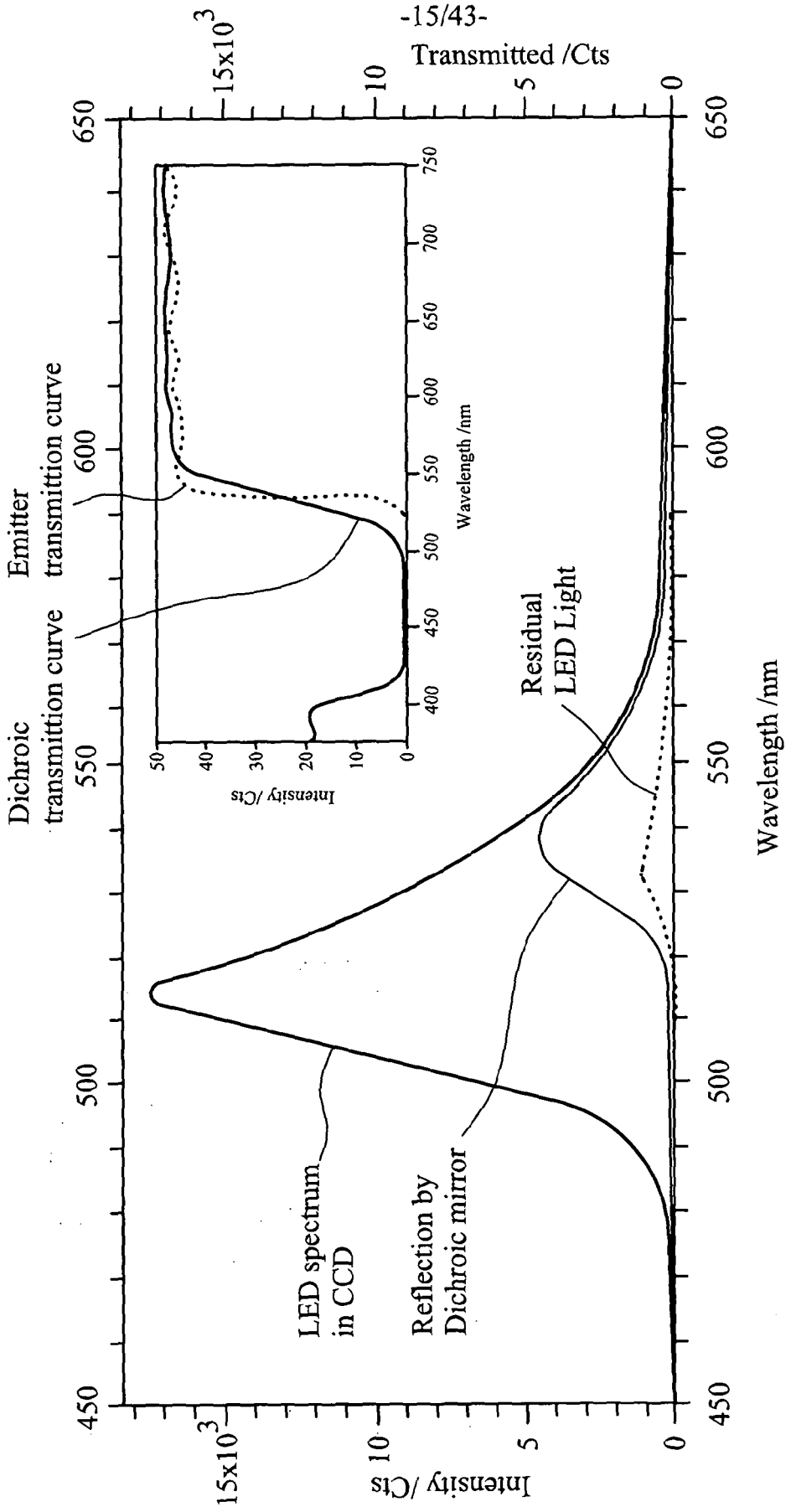

Transmitted /Cts
15x10^3
10
5
0
650
600
550
500
450
Wavelength /nm
Intensity /Cts
Emitter transmittion curve
Dichroic transmittion curve
Residual LED Light
LED spectrum in CCD
Reflection by Dichroic mirror
Wavelength /nm
Intensity /Cts

FIG. 17

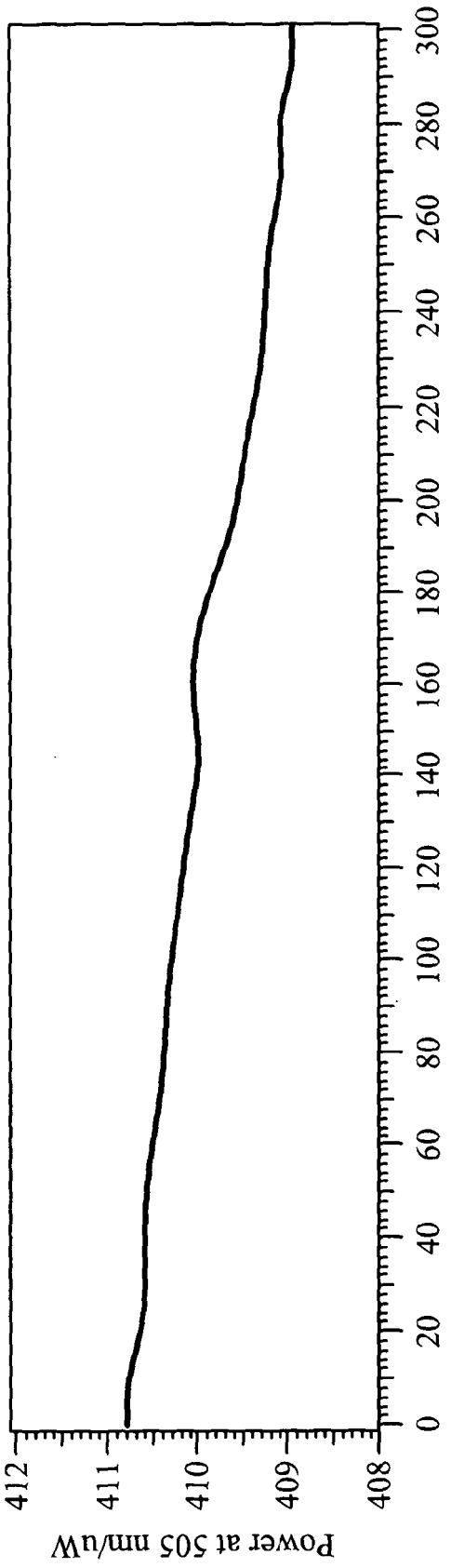

Power at 505 nm/uW
412
411
410
409
408
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
Time /m

FIG. 18

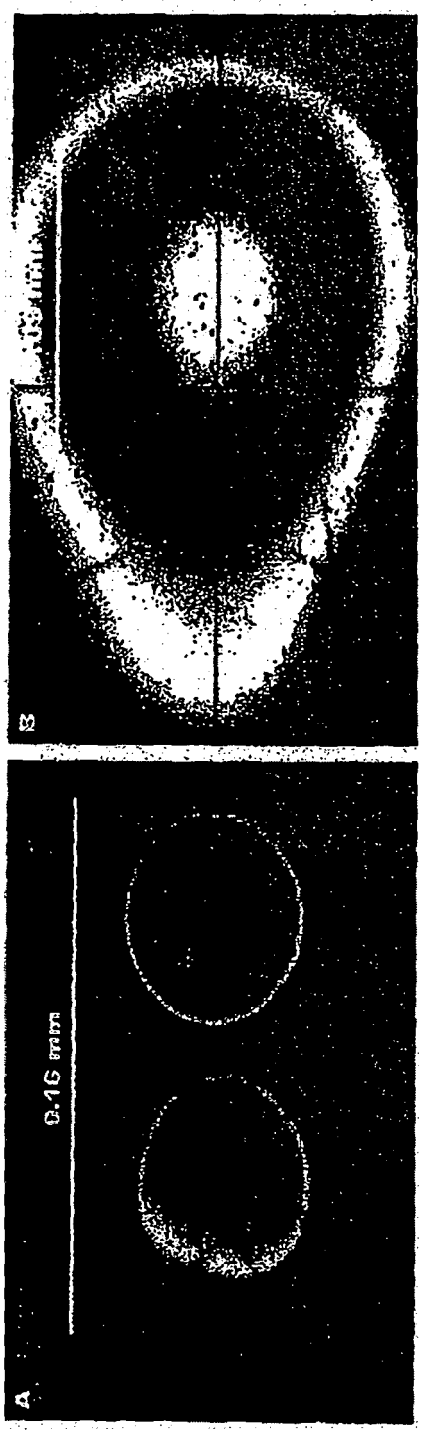

A
0.16 mm
B

FIG. 19

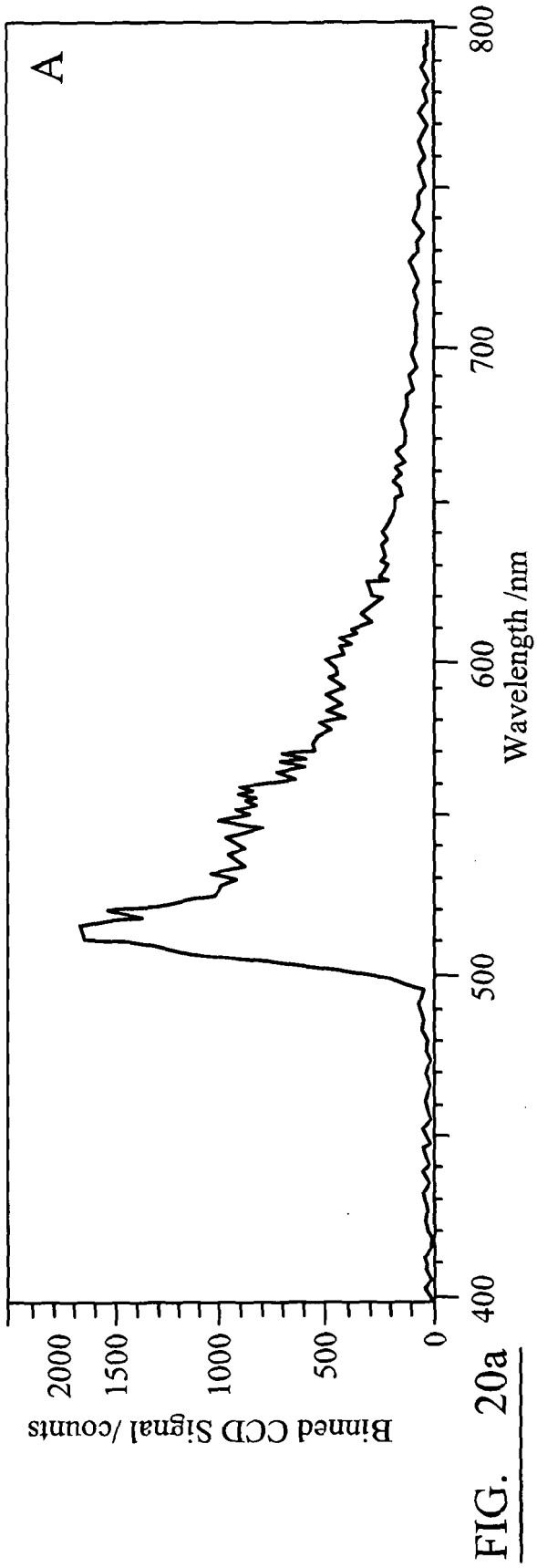


FIG. 20a

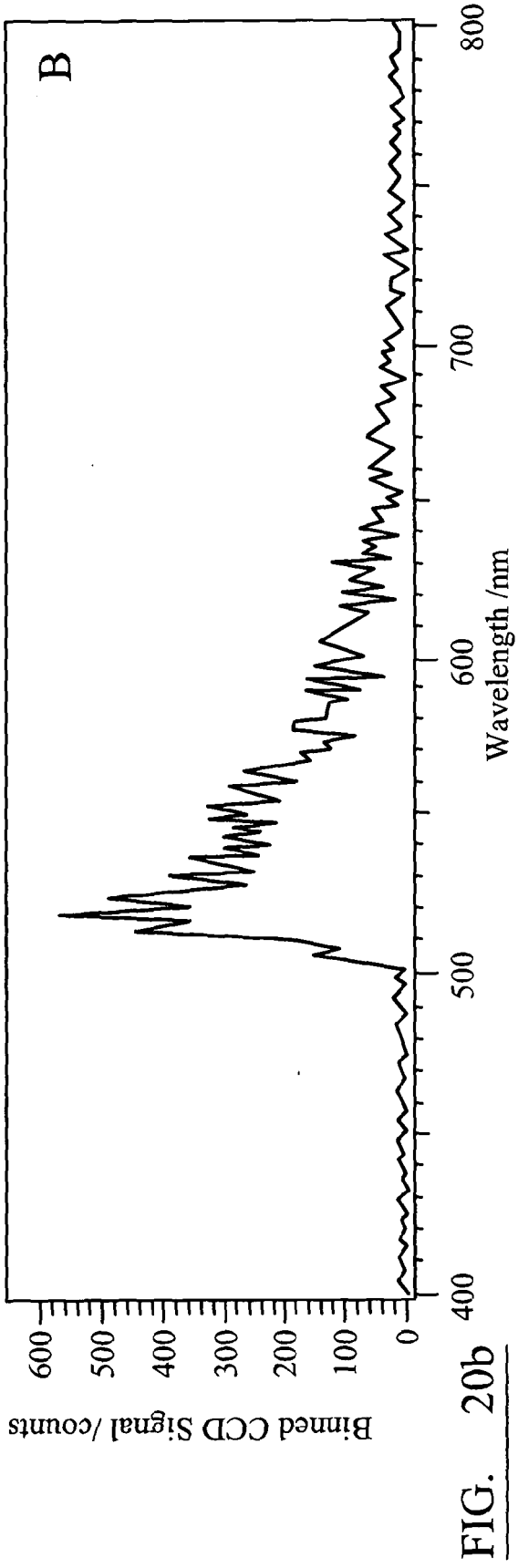


FIG. 20b

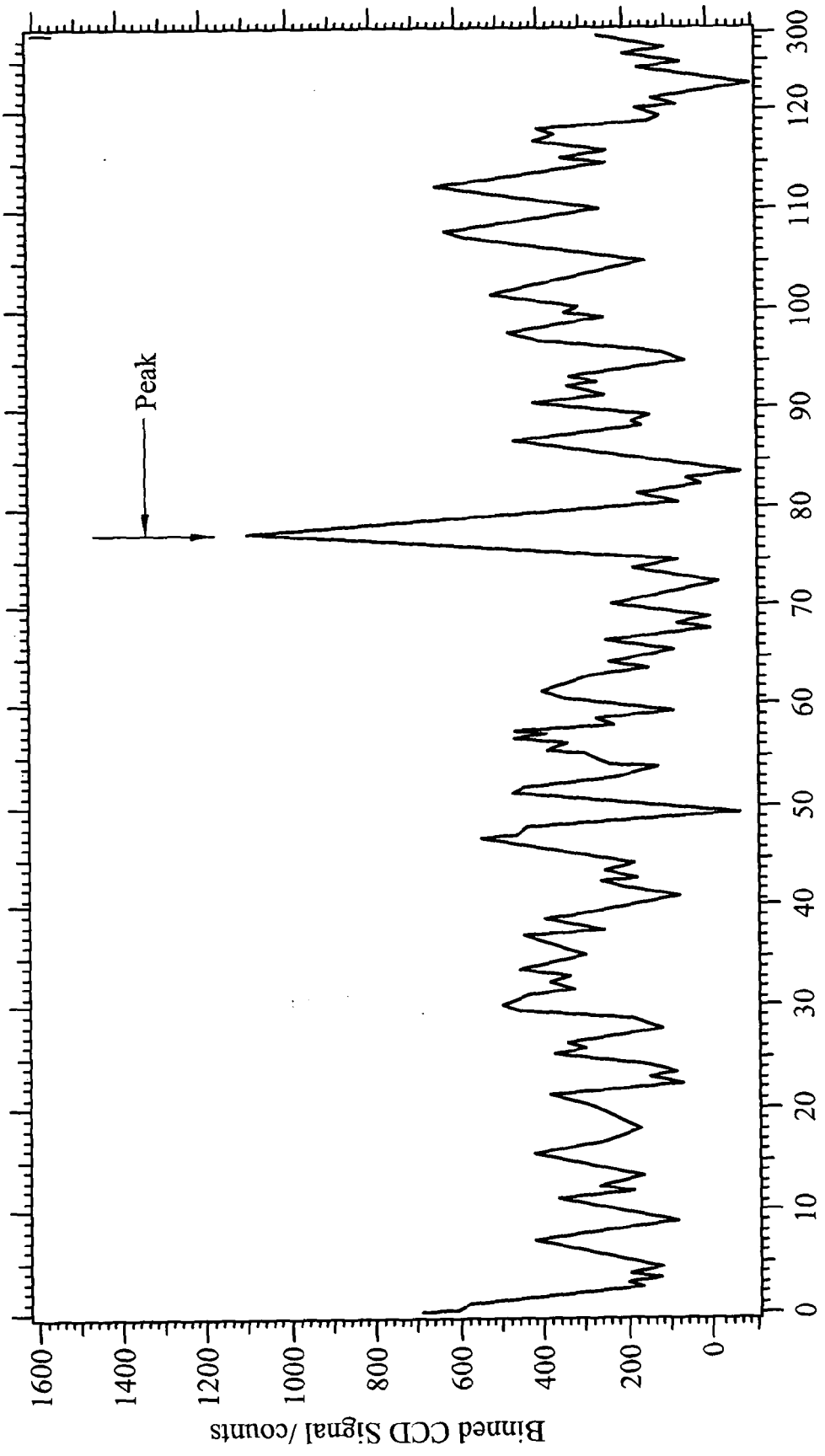

Binned CCD Signal /counts
1600
1400
1200
1000
800
600
400
200
0
Peak
0
10
20
30
40
50
60
70
80
90
100
110
120
300
Time /m

FIG. 21

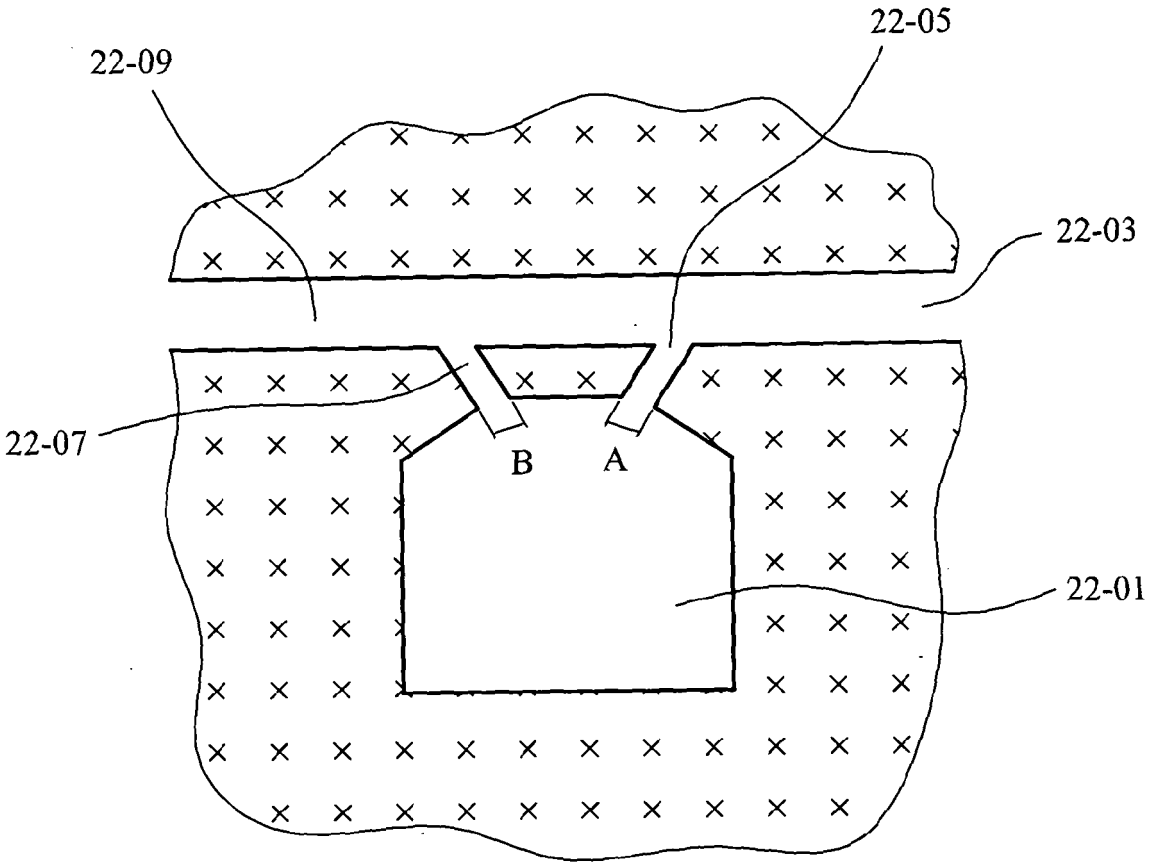


FIG. 22

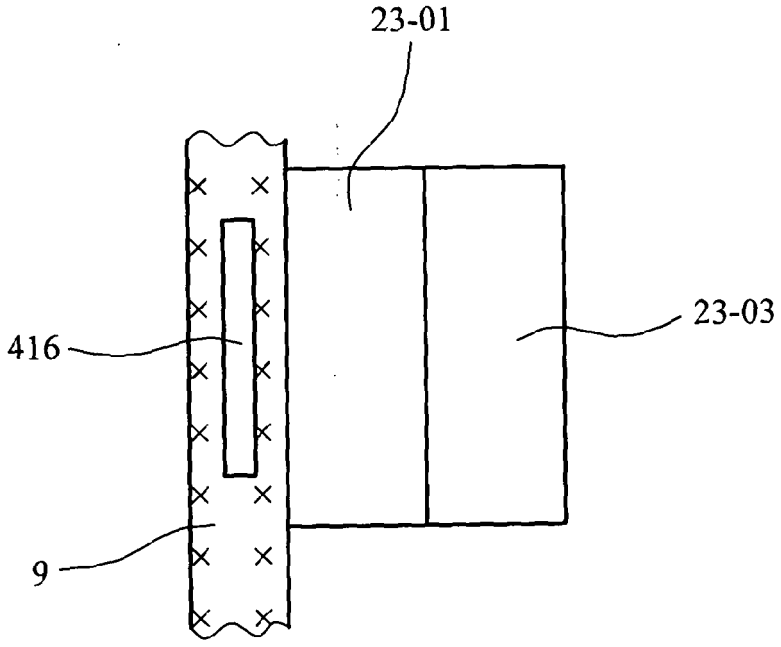


FIG. 23

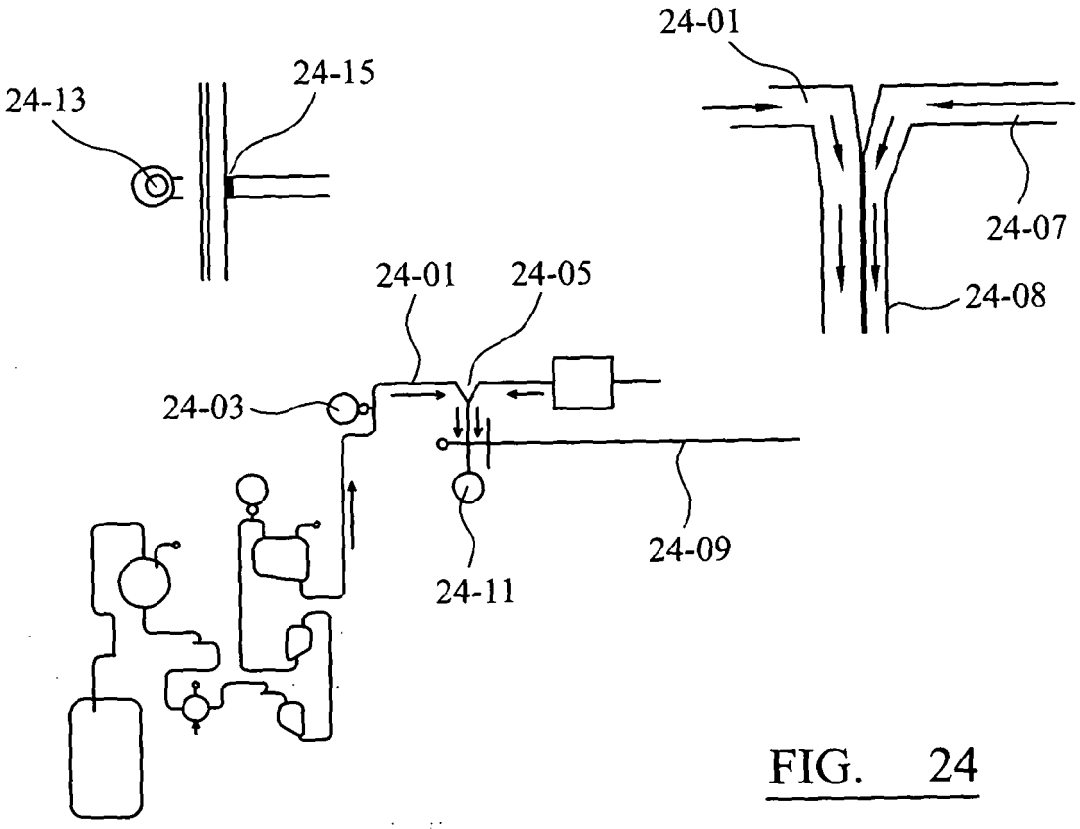

24-01
24-15
24-13
24-07
24-08
24-01
24-05
24-03
24-09
24-11

FIG. 24

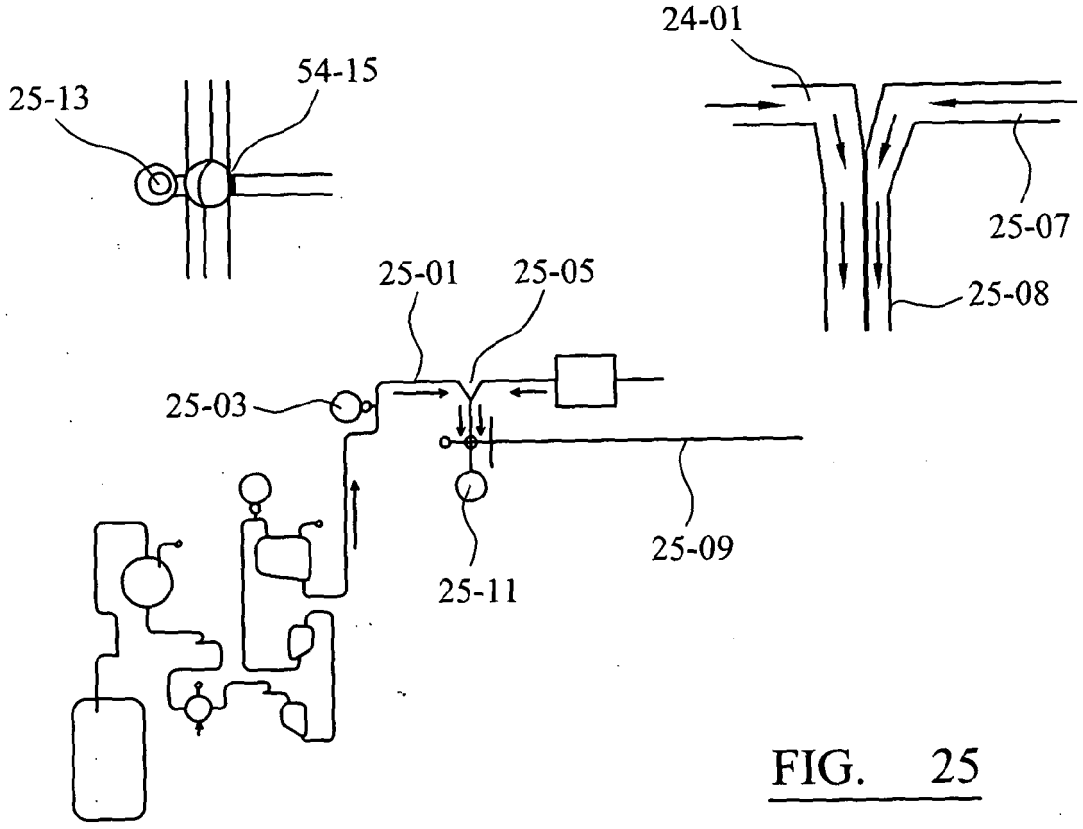

24-01
54-15
25-13
25-07
25-08
25-01
25-05
25-03
25-09
25-11

FIG. 25

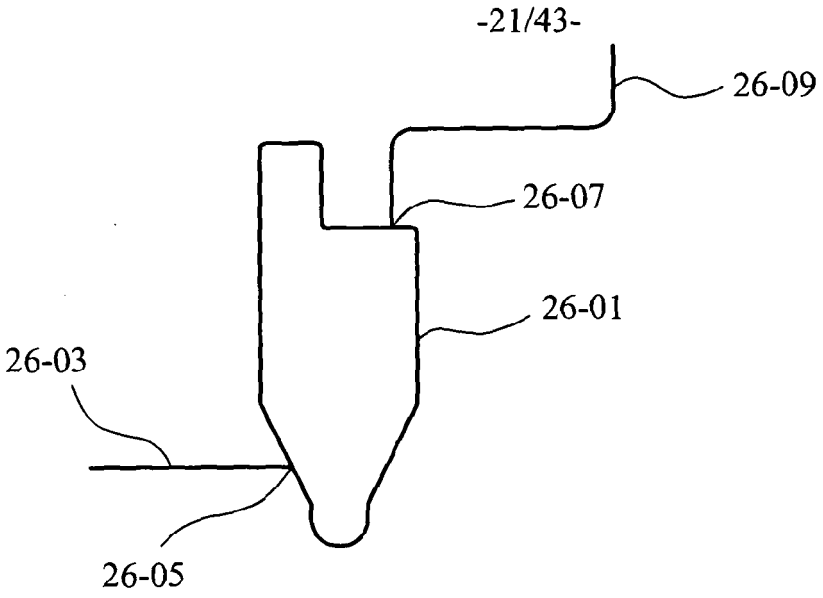

26-09
26-07
26-01
26-03
26-05

FIG. 26

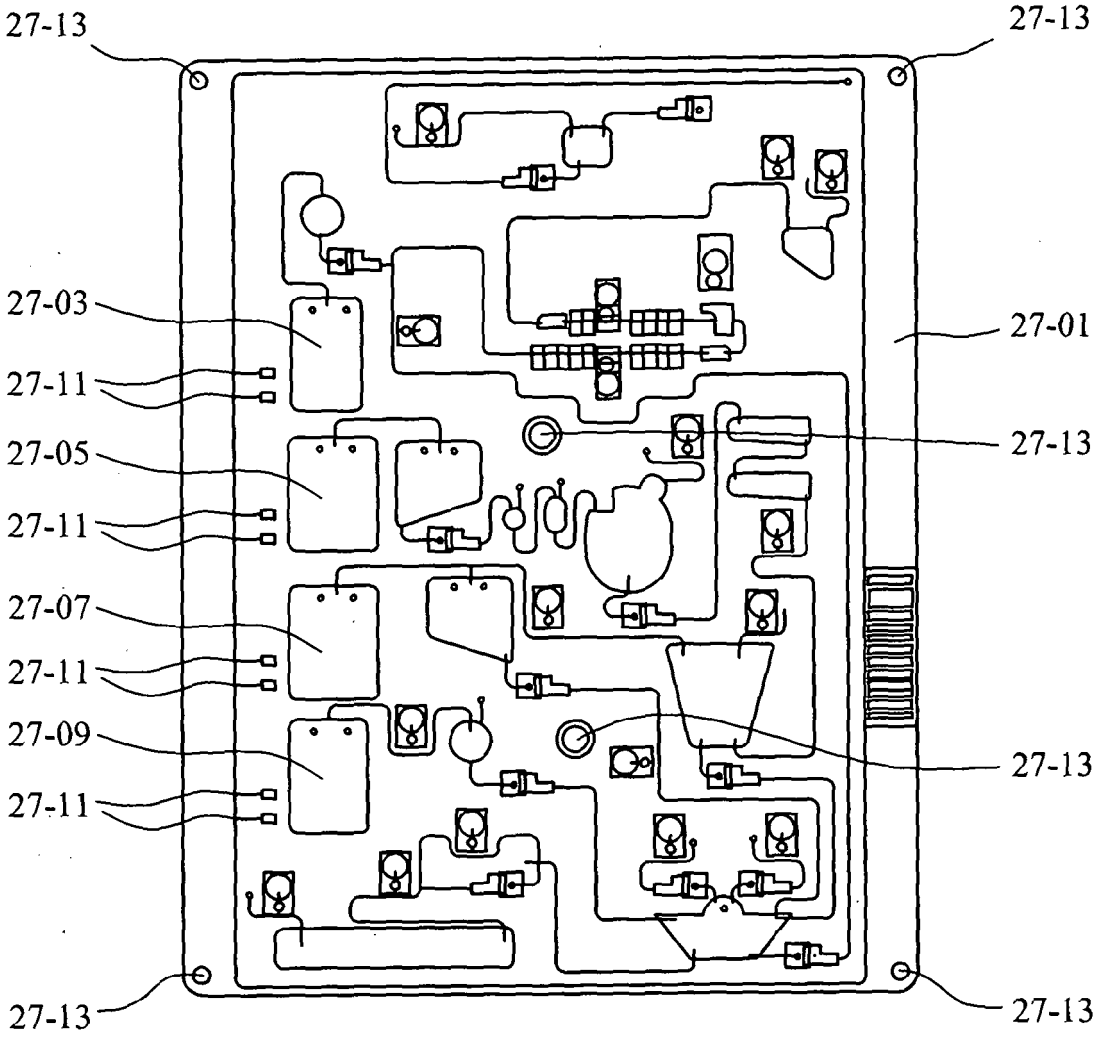

27-13
27-13
27-03
27-01
27-11
27-13
27-05
27-11
27-07
27-11
27-09
27-13
27-11
27-13
27-13

FIG. 27

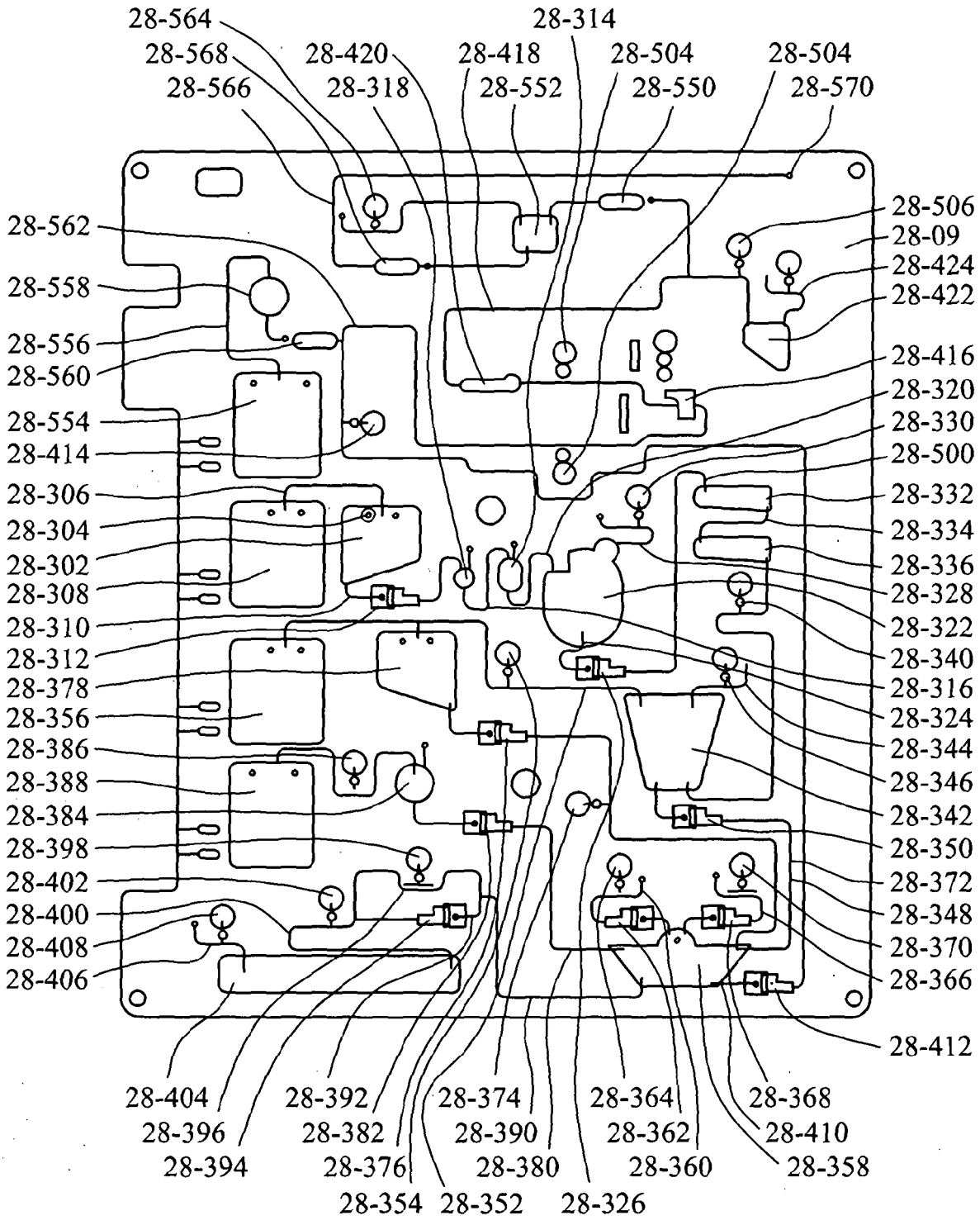

28-564
28-568
28-566
28-420
28-318
28-418
28-552
28-314
28-504
28-550
28-504
28-570
28-562
28-558
28-556
28-560
28-554
28-414
28-306
28-304
28-302
28-308
28-310
28-312
28-378
28-356
28-386
28-388
28-384
28-398
28-402
28-400
28-408
28-406
28-506
28-09
28-424
28-422
28-416
28-320
28-330
28-500
28-332
28-334
28-336
28-328
28-322
28-340
28-316
28-324
28-344
28-346
28-342
28-350
28-372
28-348
28-370
28-366
28-412
28-404
28-396
28-394
28-392
28-382
28-376
28-354
28-374
28-390
28-380
28-352
28-364
28-362
28-360
28-326
28-368
28-410
28-358

FIG. 28a

Functional Chambers	Volume	Depth	Tool	Vent	Note
C1 (Lysis)	300ul	1mm	Std Cutter	No	
C2 (Purification)	311ul	0.75mm	Std Cutter	Yes	
Expansion/Mixing Chambers	67ul	0.75mm	Std Cutter	No	
C3 (Dwell or Initial Binding))	250ul	0.5mm	Std Cutter	Yes	
C4 (PCR washing and release)	250ul	1.0mm	Std Cutter	Yes	
Bead Storage (BSC)	30ul	1.0mm	Std Cutter	No	
Binding Buffer (BBC)	40ul	2.0mm	Std Cutter	No	
Elution	150ul	2.0mm	Std Cutter	No	
Wash Buffer	250ul	2.0mm	Std Cutter	No	
Archive	200ul	2.0mm	Std Cutter	No	
Waste	1000ul	2.5mm	Std Cutter	Yes	
PCR	10ul	1.0mm	Std Cutter	No	
Formamide	105ul	1.0mm	Std Cutter	No	
Denaturing	105ul	1.0mm	Std Cutter	No	
Channel					
PCR Red		0.25mm	0.5mm BEM		Sigma-Aldrich 411663
PCR Cyan		1.0mm	1.0mm BEM		Sigma-Aldrich 411663
PCR White/Black		0.35mm	0.5mm BEM		Sasolwax H1
Magenta		0.5mm	1.0mm BEM		
EC PUMP Yellow		2.0mm	1.0mm BEM		
Paraffin Valve	Volume	Depth	Tool		
LMW OV's 1.5mm diameter	1.77ul	0.5mm	Std Cutter		
LMW OV's 3.0mm diameter	7.1ul	1.0mm	Std Cutter		
HMWV CV15	7.1ul	1.0mm	Std Cutter		
Cartridge Specification					
Substrate width - 175mm					
Substrate length - 228mm					
Substrate 3.0mm PC					
Capping Layer 0.5mm PC					
PSA 90106 cold bond assy					Adhesives Research
EC pump UV glue 1180-M					
Bar Code pocket	N/A	0.2mm	Std Cutter		May opt for fiduclai:marks instead

FIG. 28b

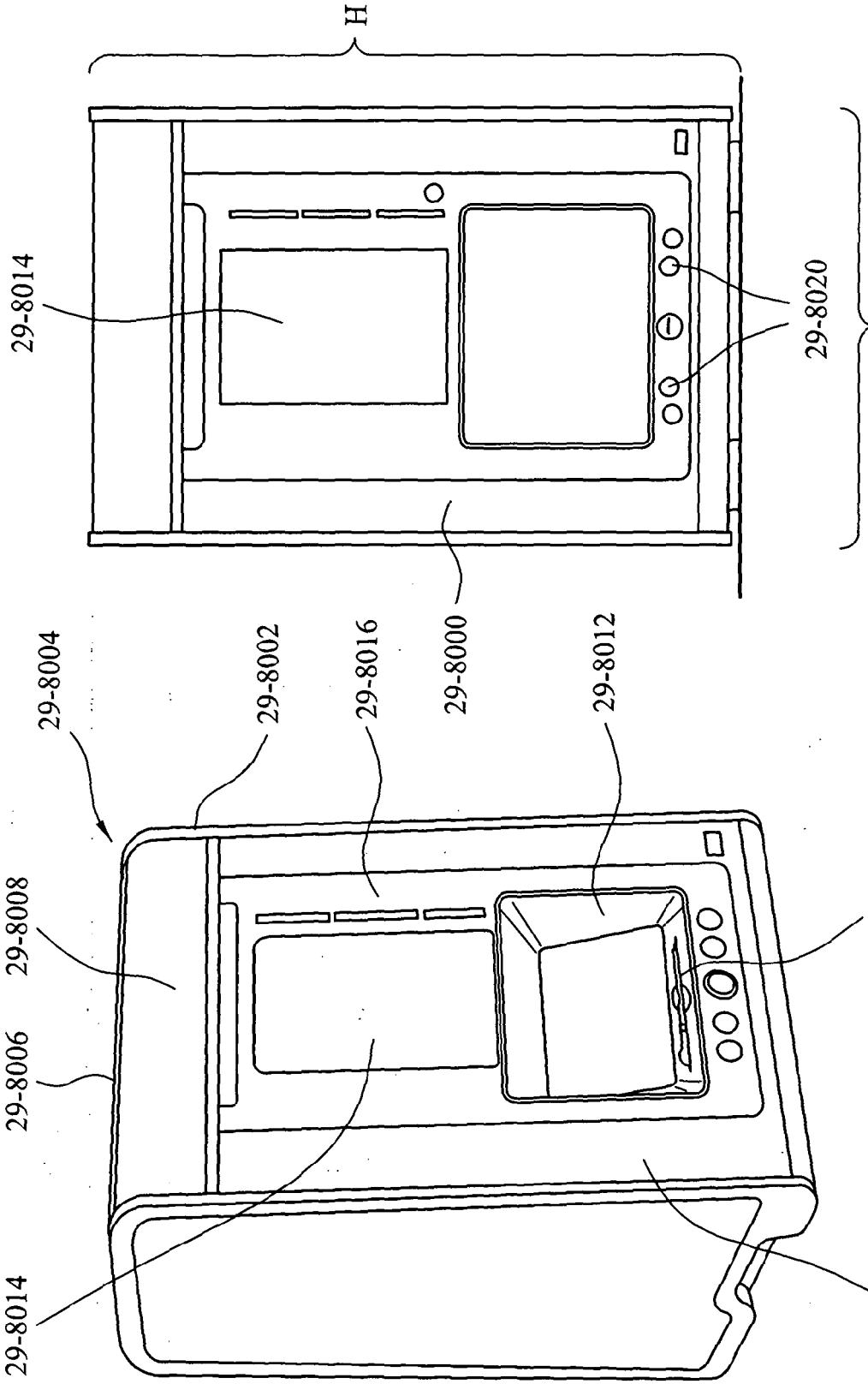


FIG. 29b

FIG. 29a

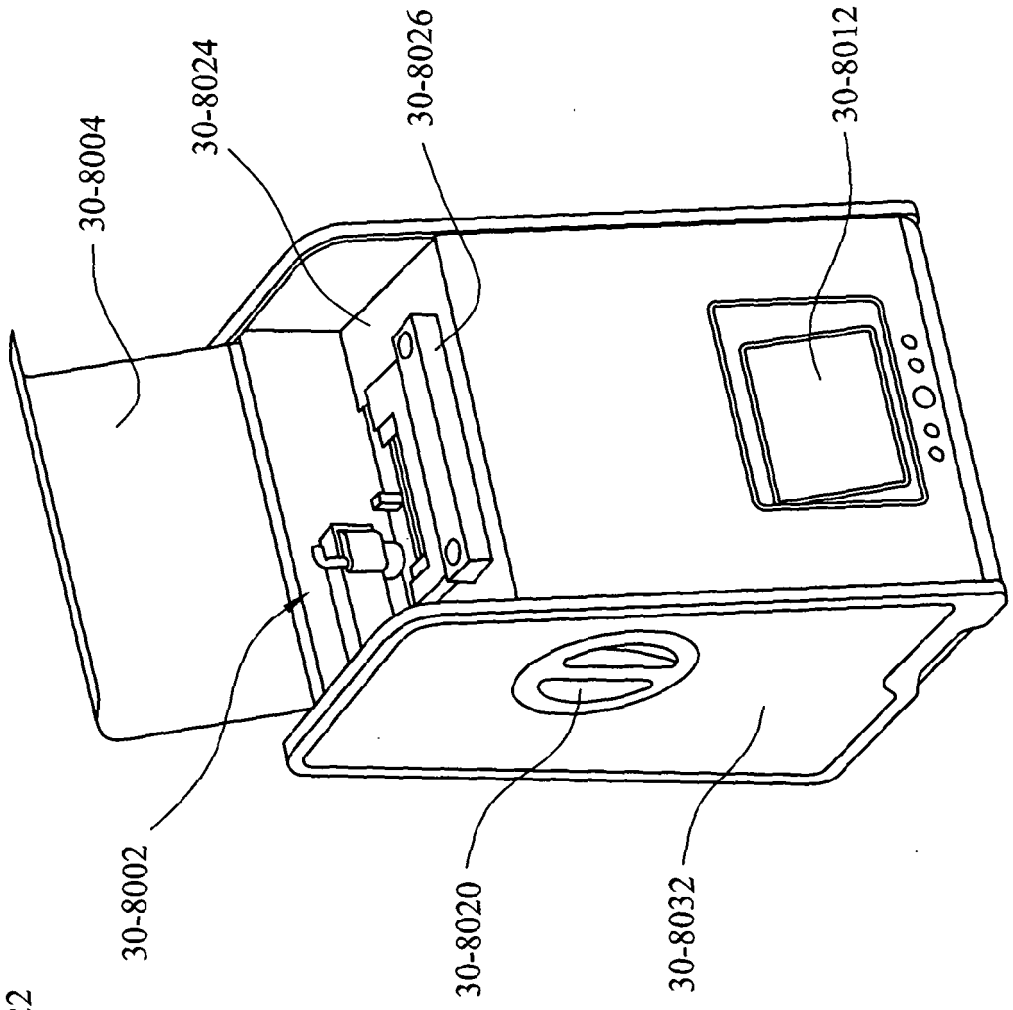


FIG. 30

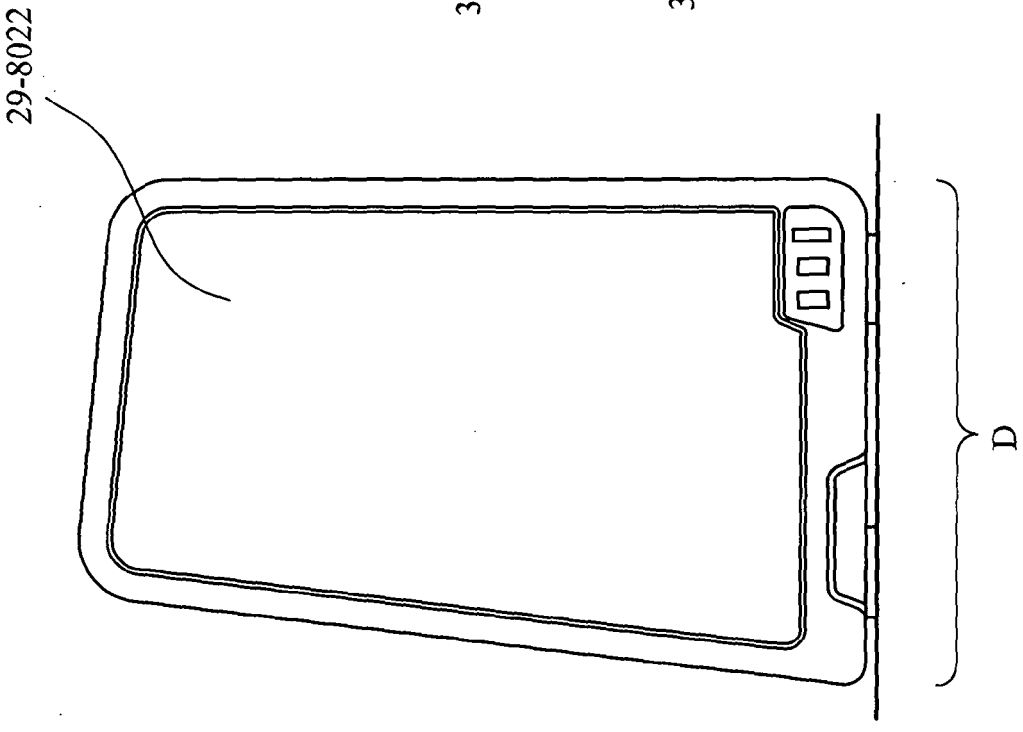


FIG. 29c

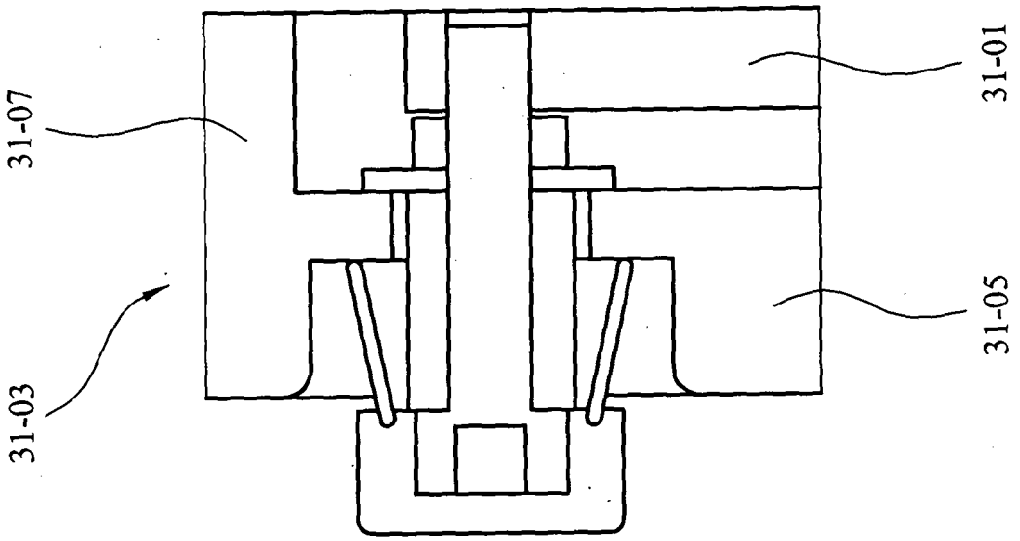


FIG. 31b

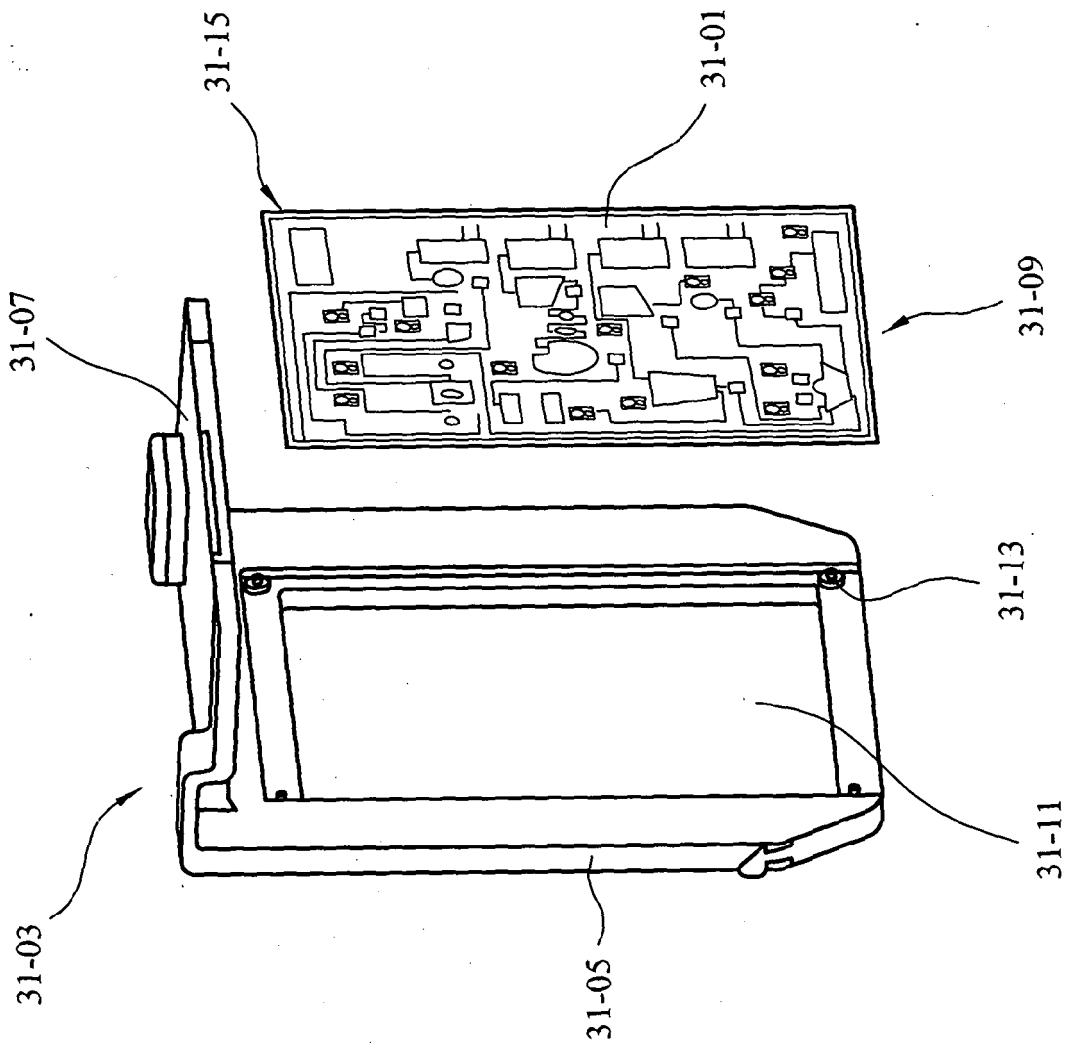


FIG. 31a

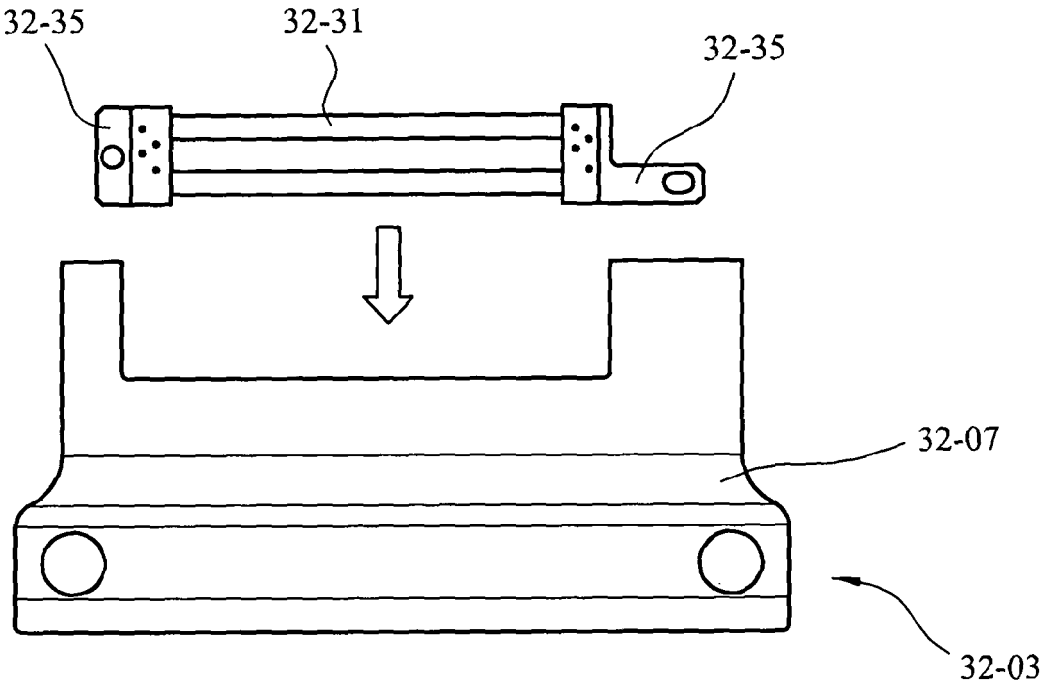


FIG. 32a

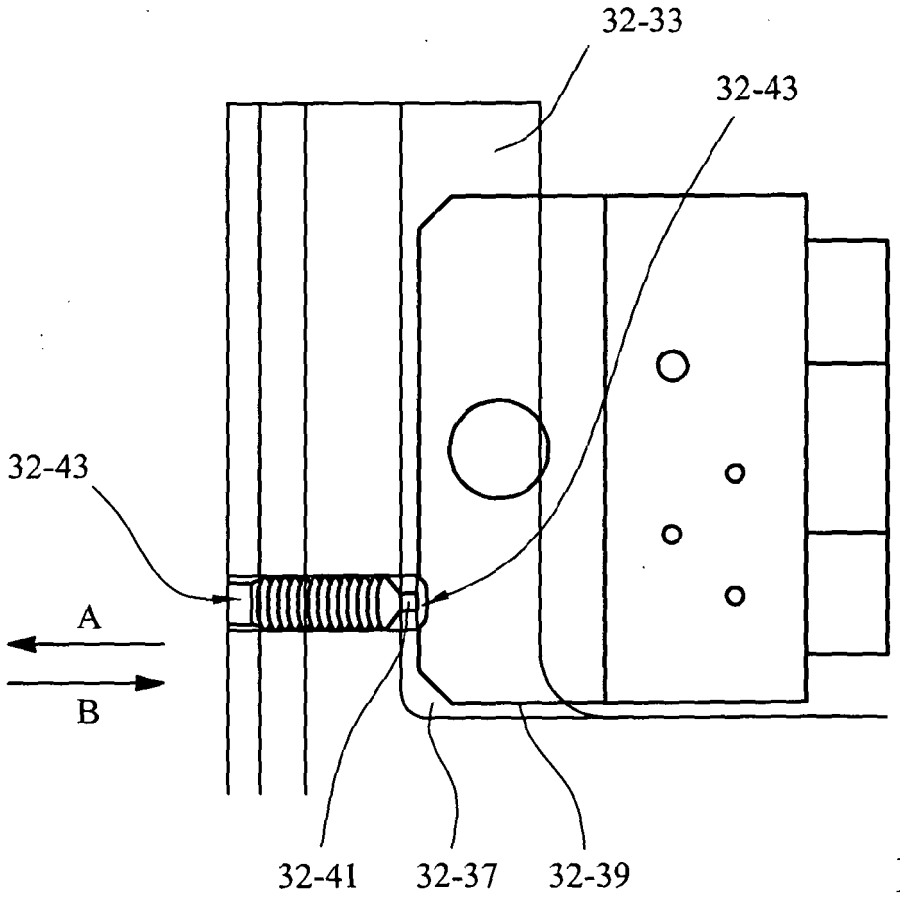


FIG. 32b

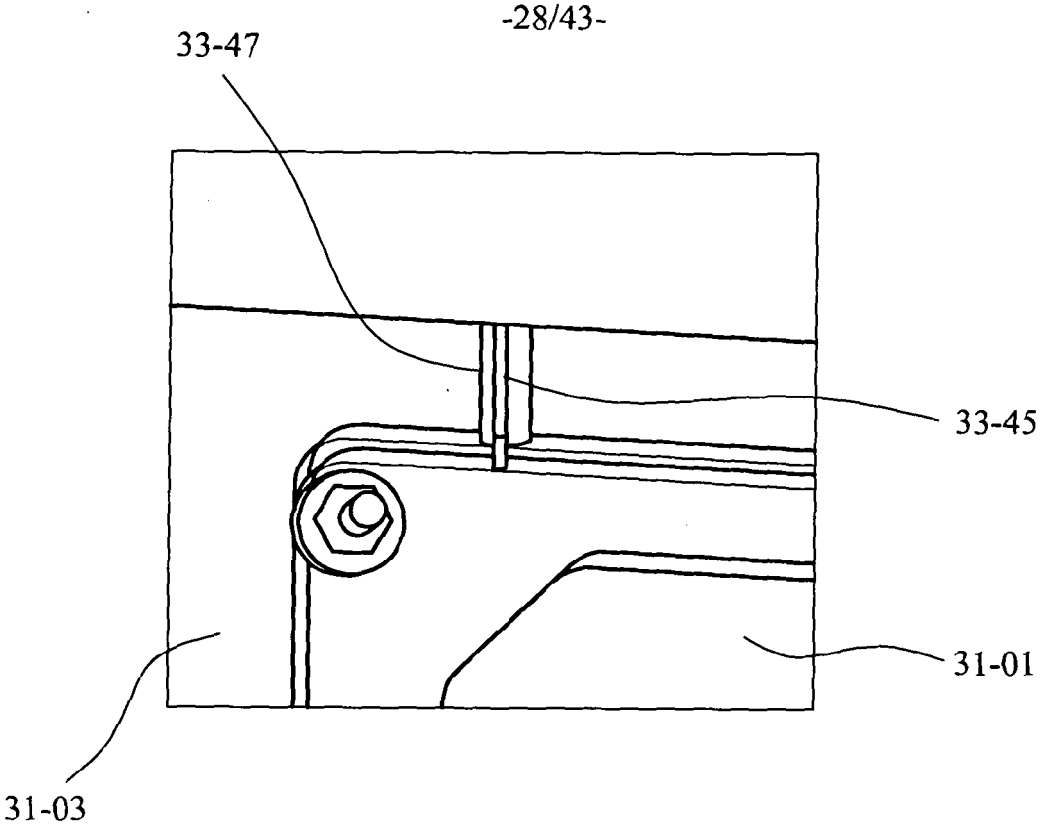


FIG. 33a

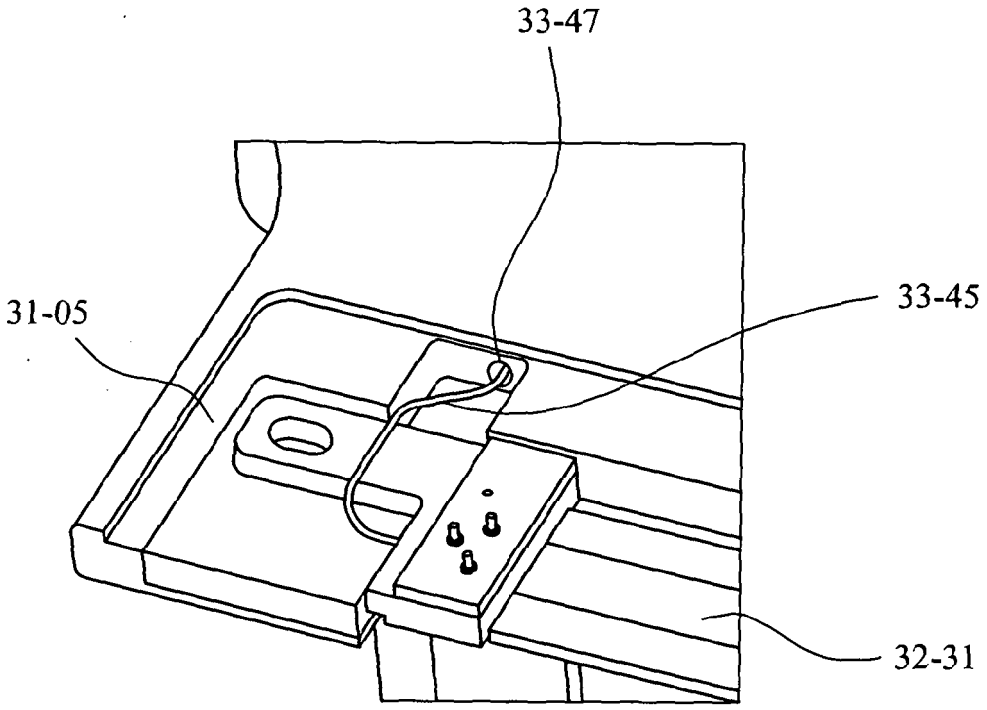


FIG. 33b

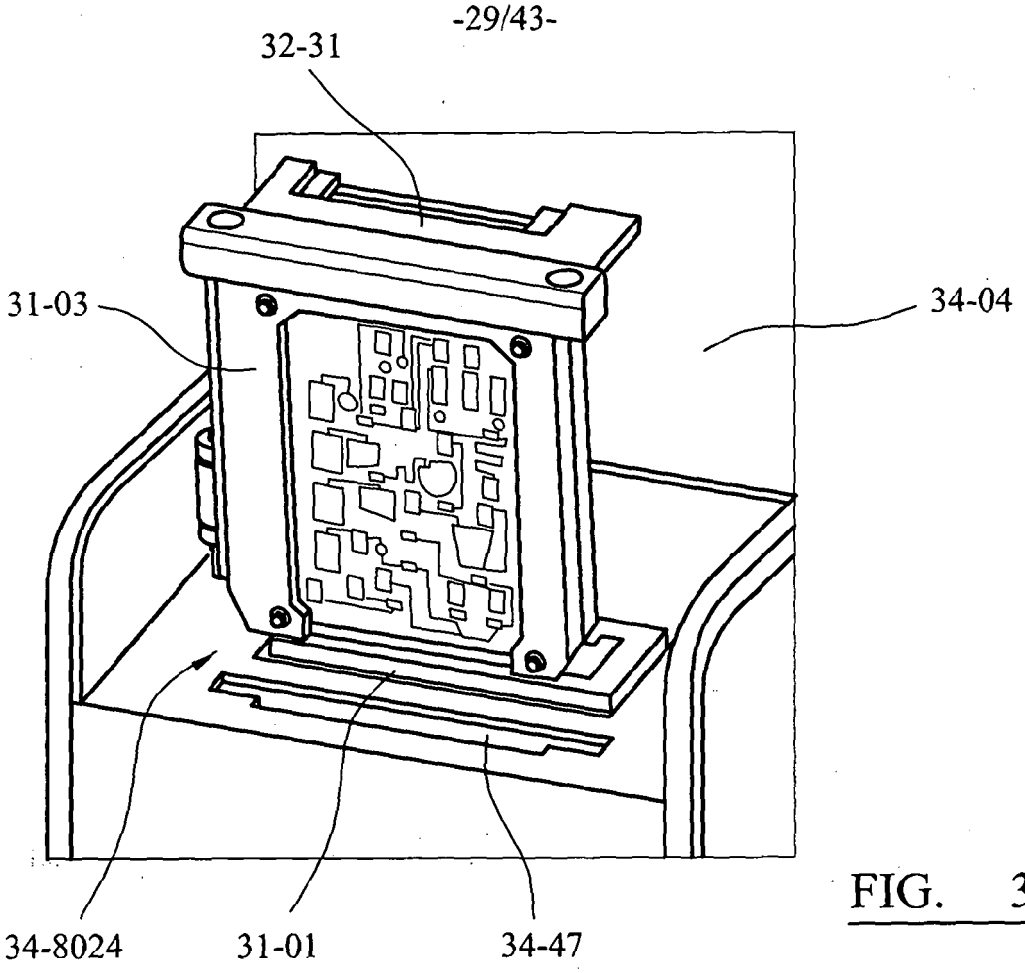


FIG. 34a

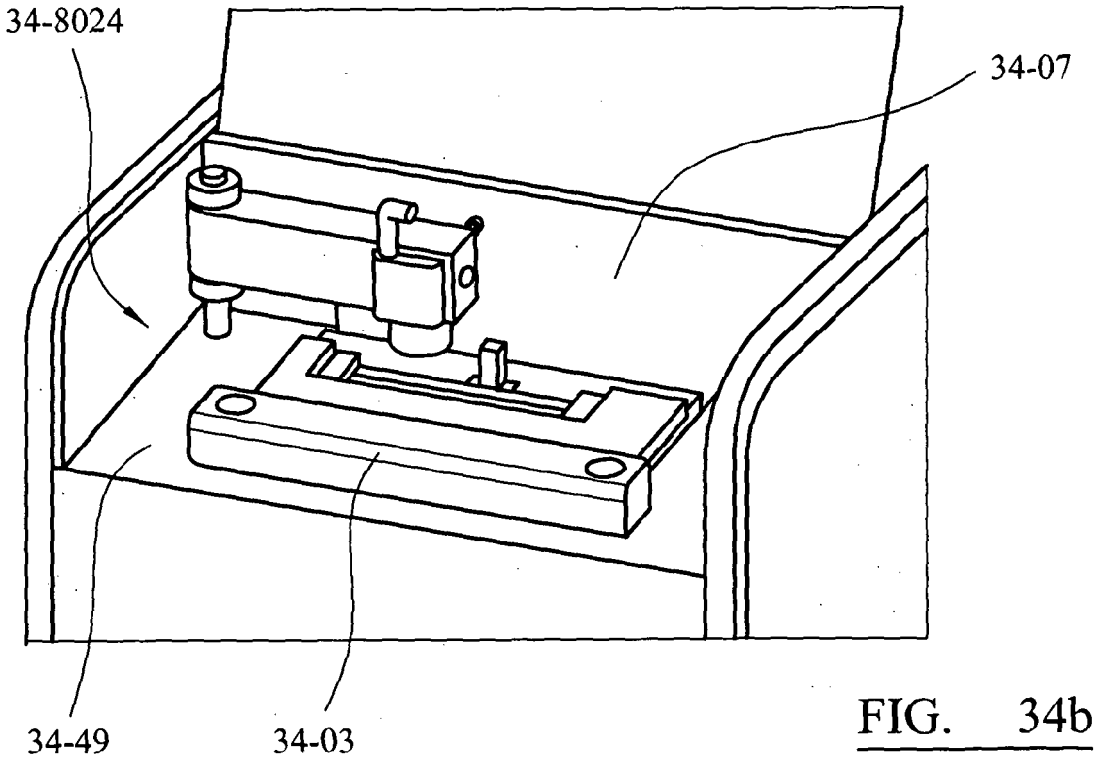


FIG. 34b

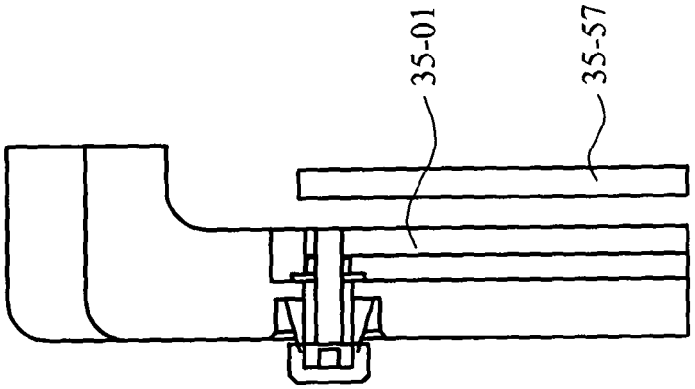


FIG. 35c

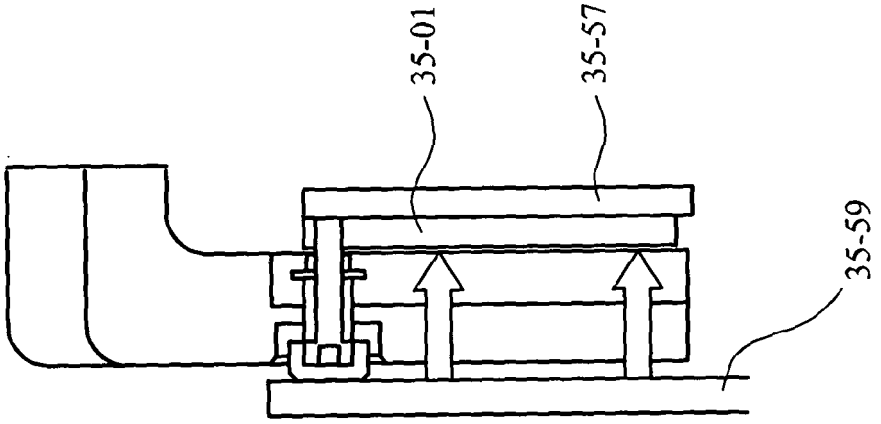


FIG. 35b

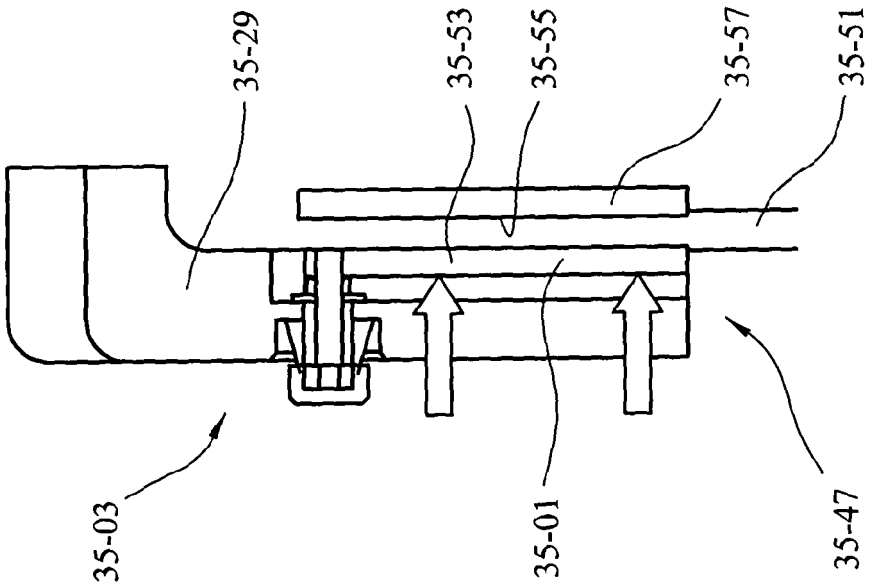


FIG. 35a

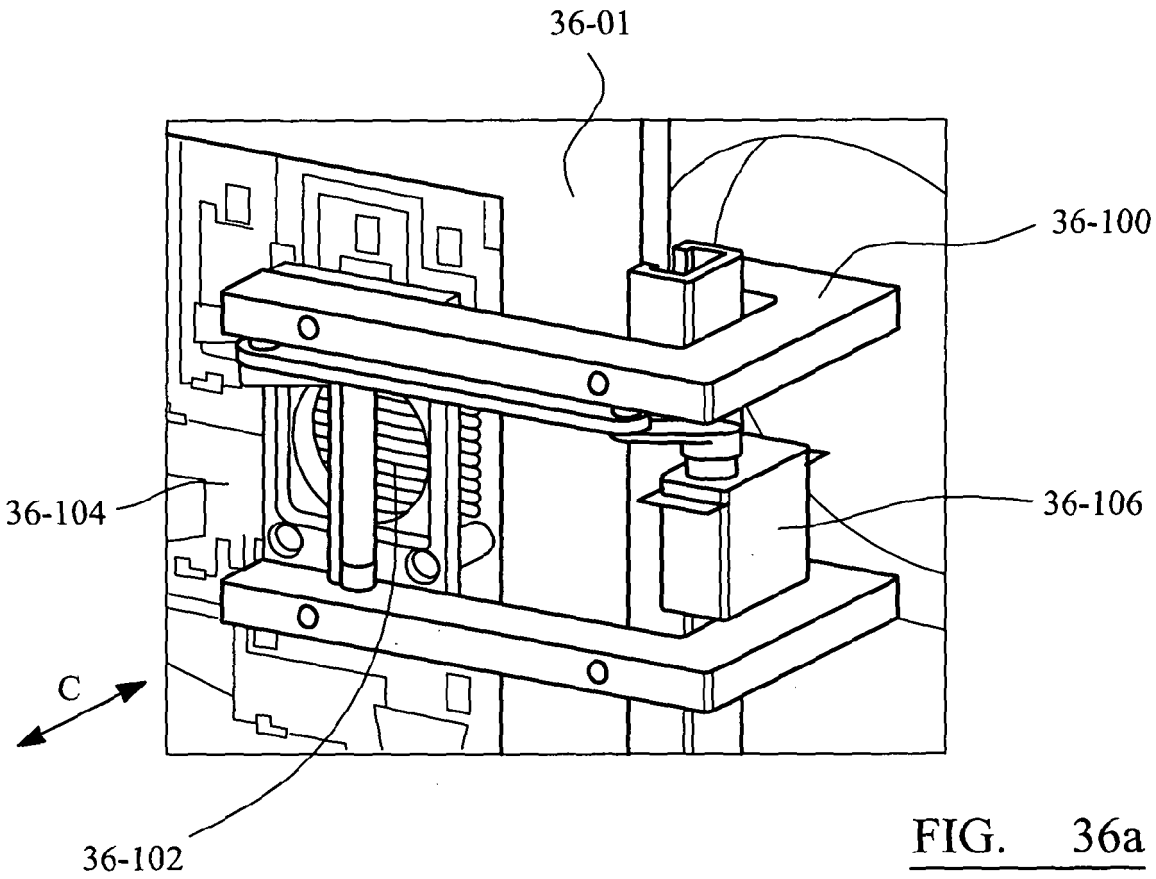


FIG. 36a

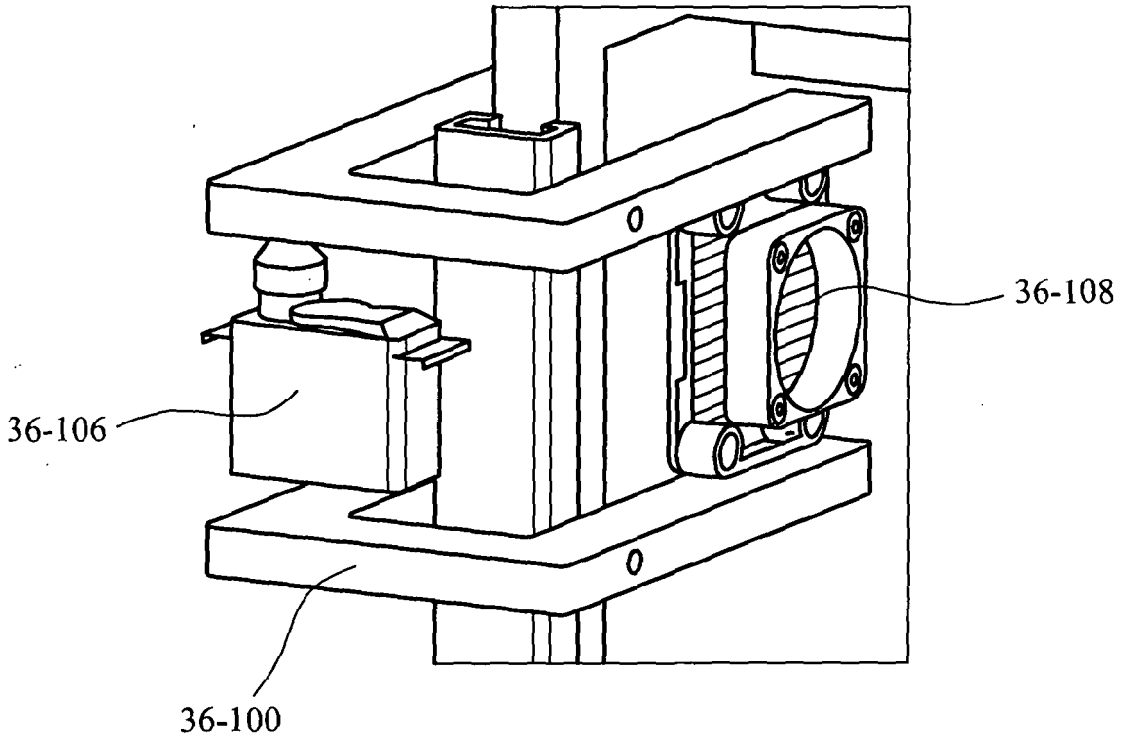


FIG. 36b

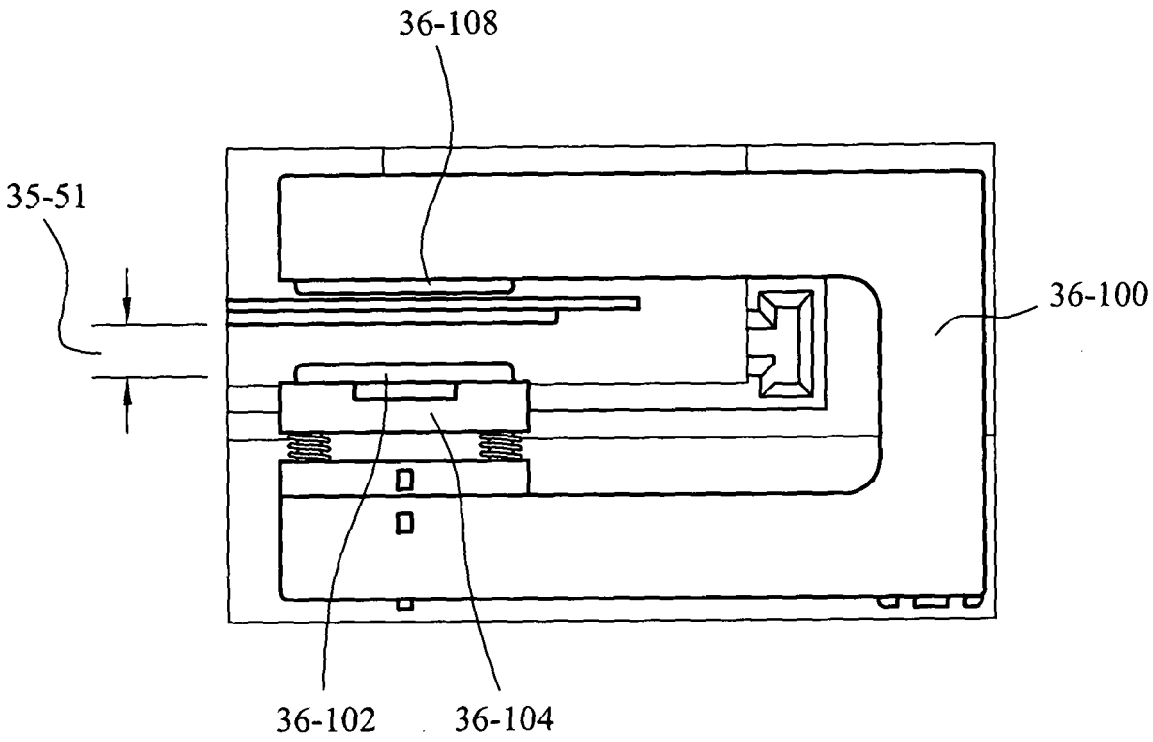


FIG. 36c

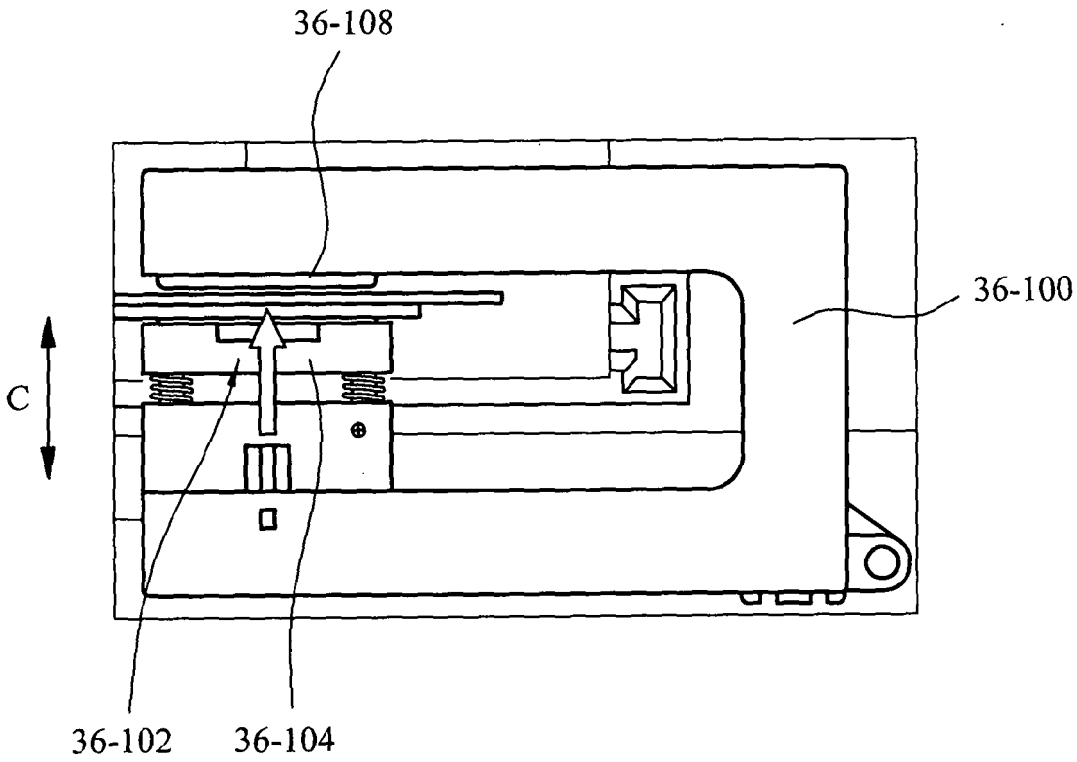


FIG. 36d

FIG. 37a

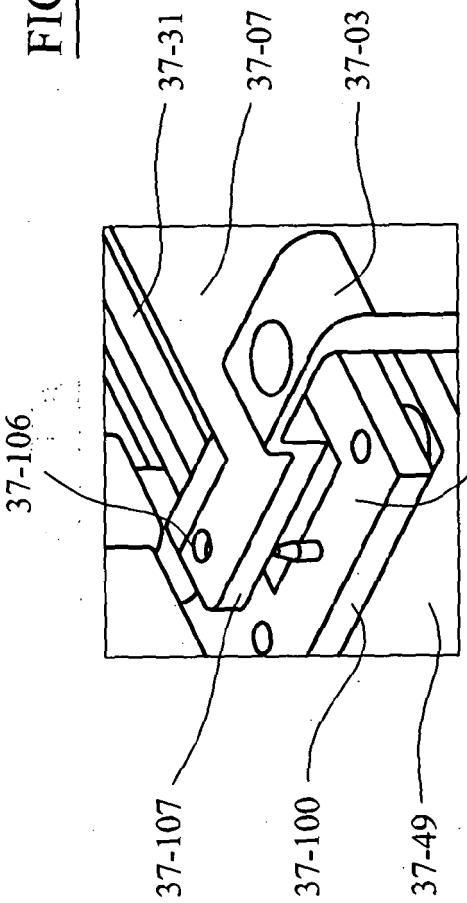
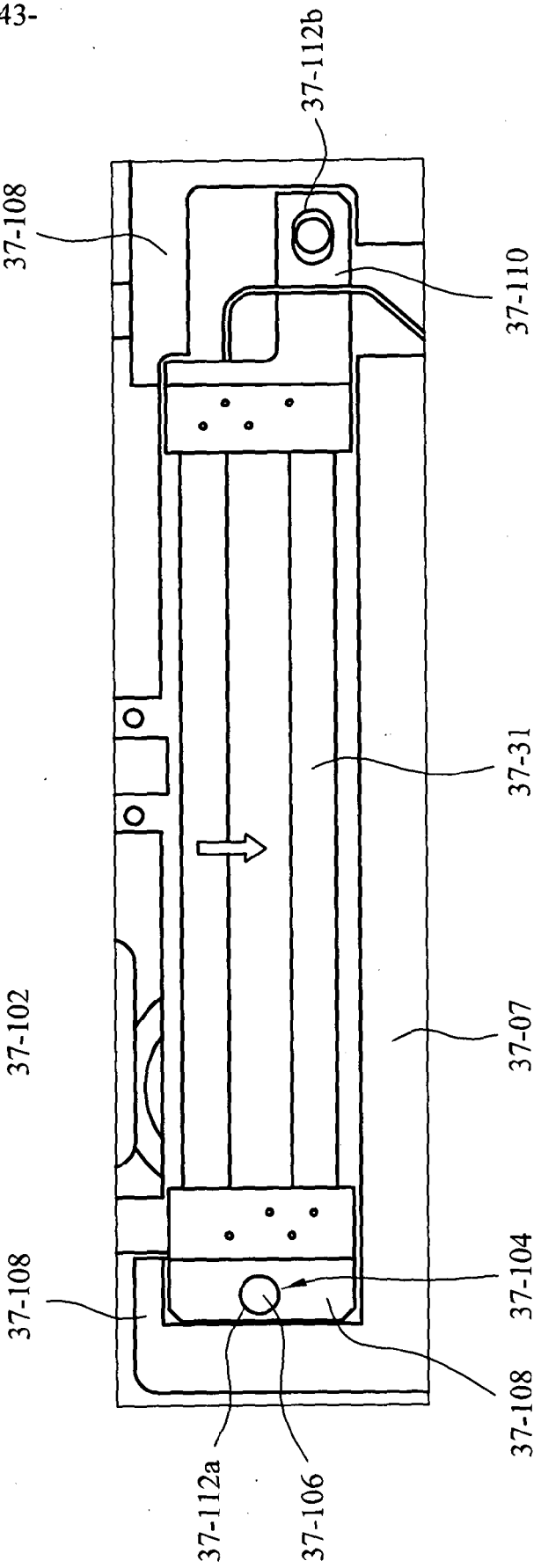


FIG. 37b



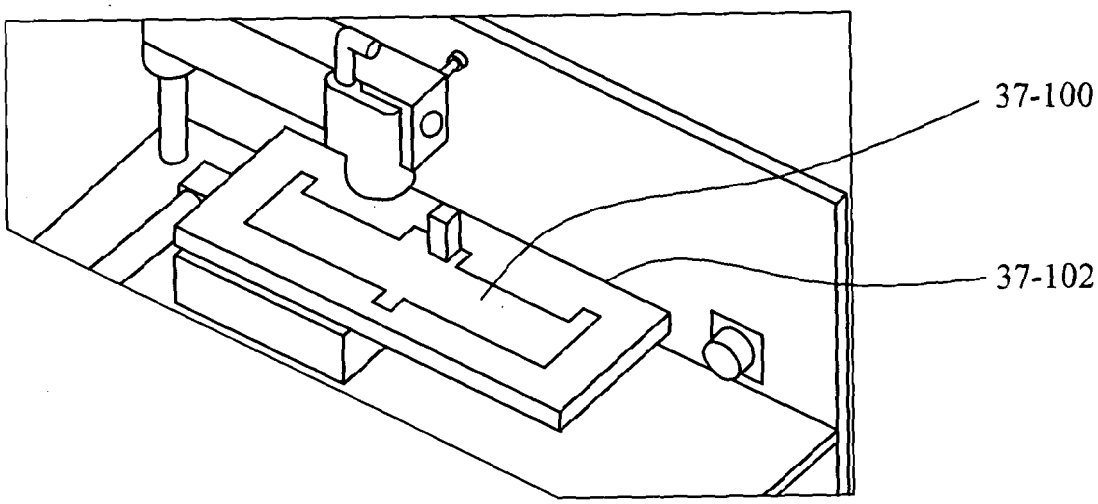
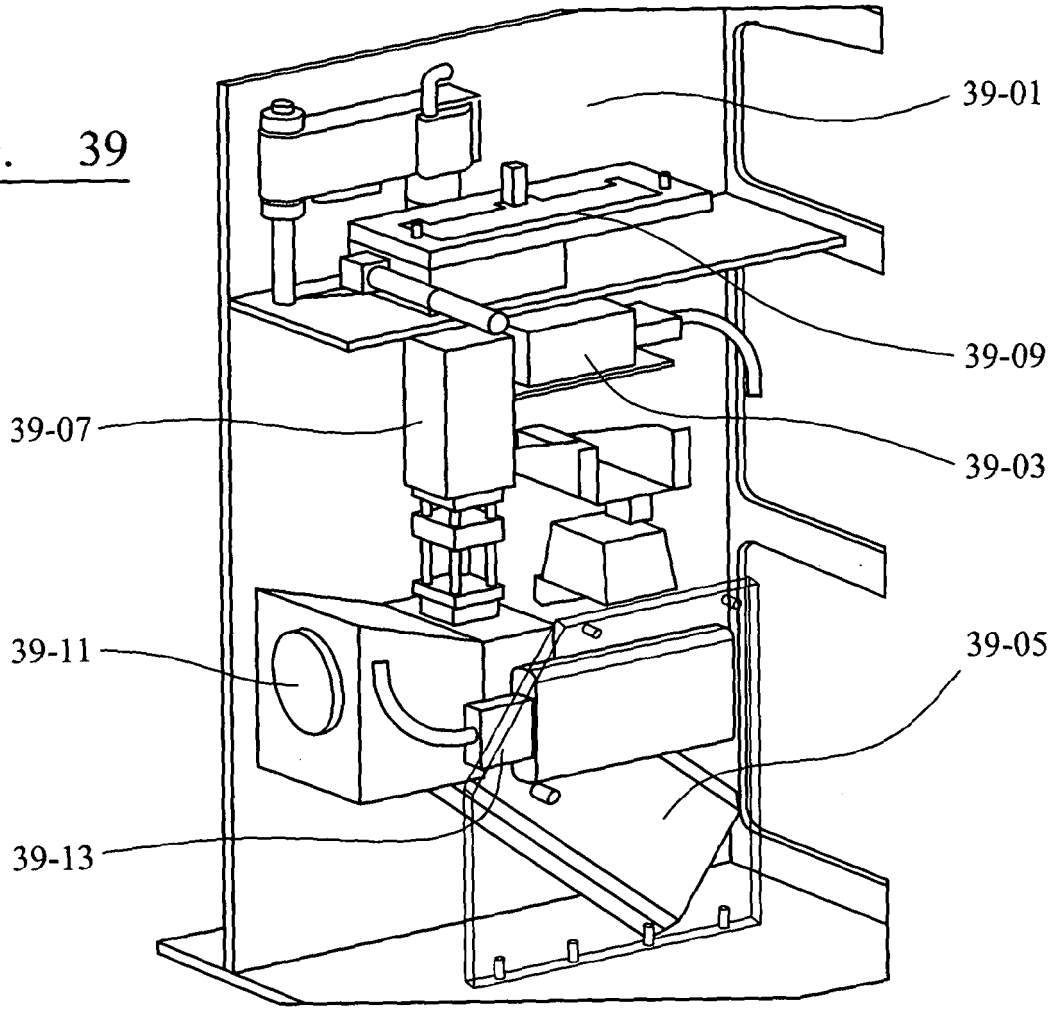


FIG. 38

FIG. 39



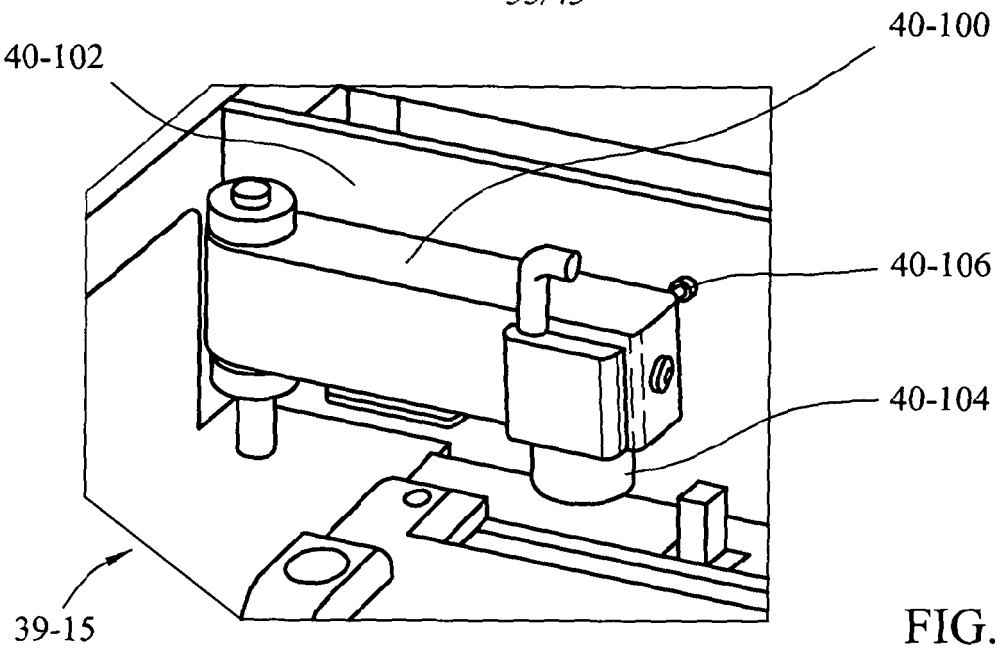


FIG. 40a

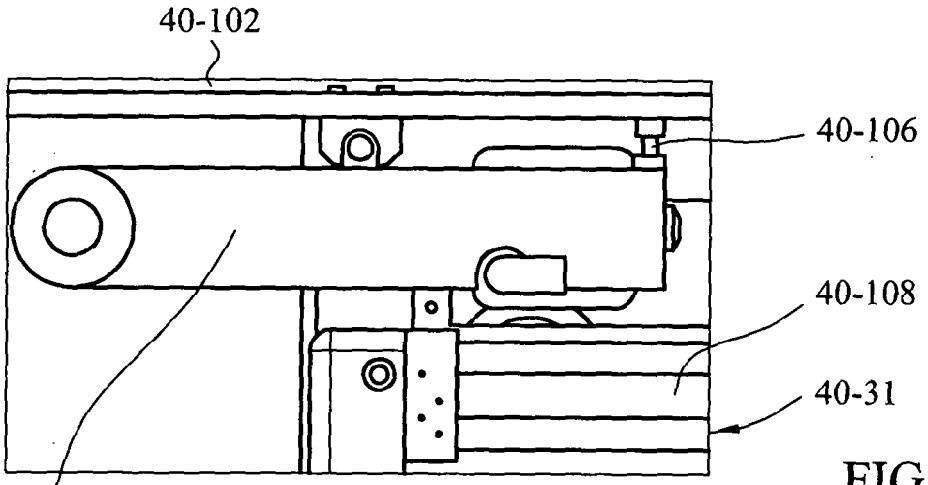


FIG. 40b

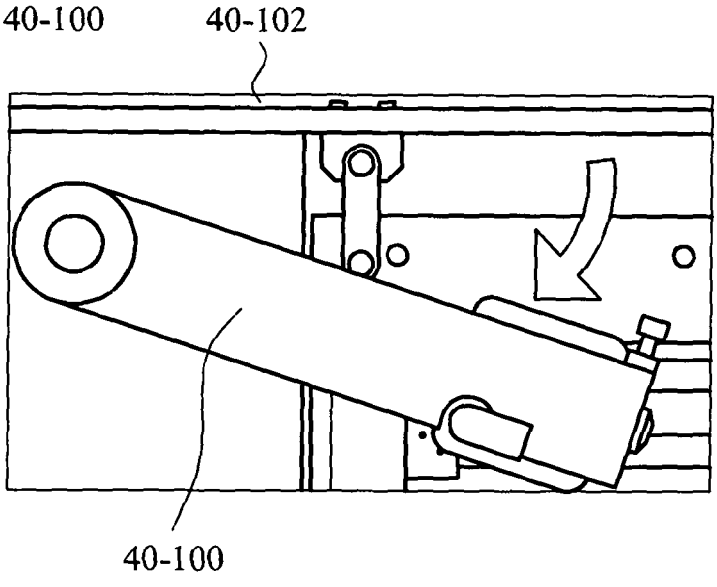


FIG. 40c

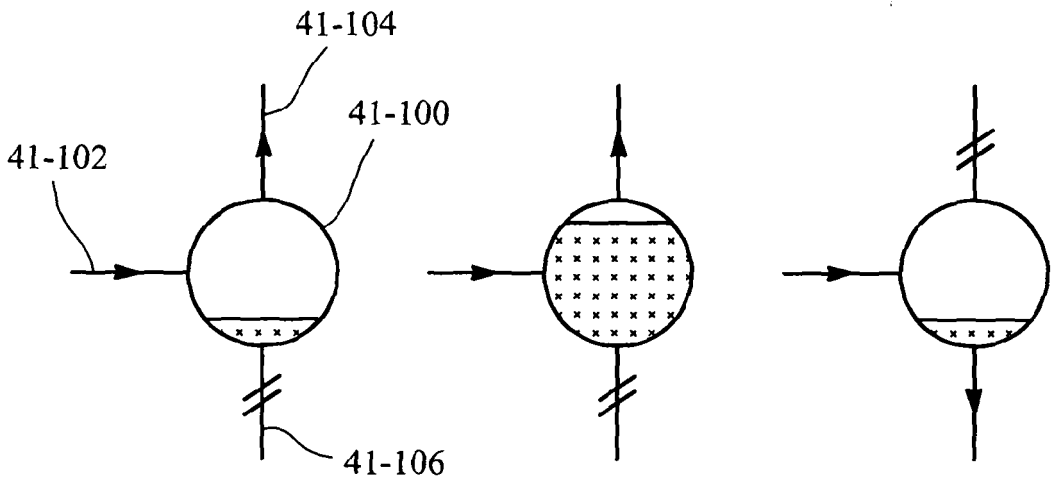


FIG. 41a

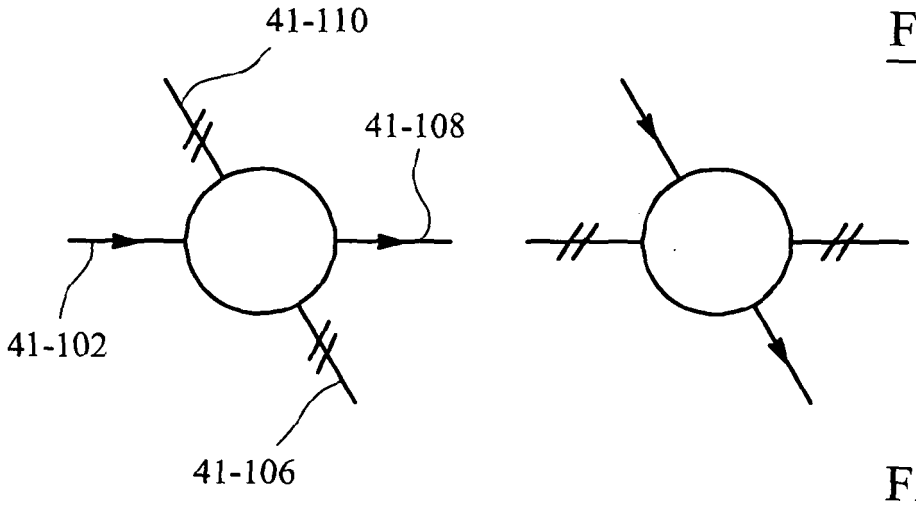


FIG. 41b

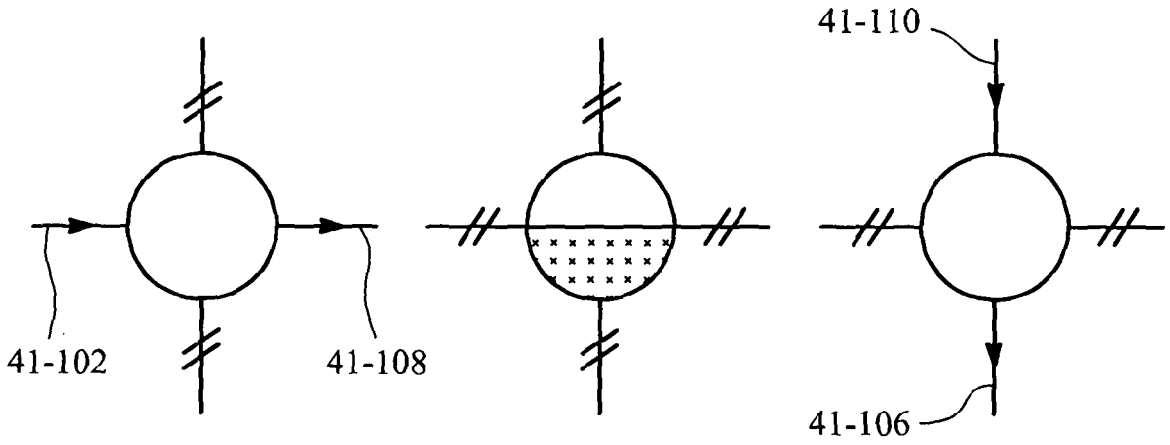


FIG. 41c

FIG. 42a

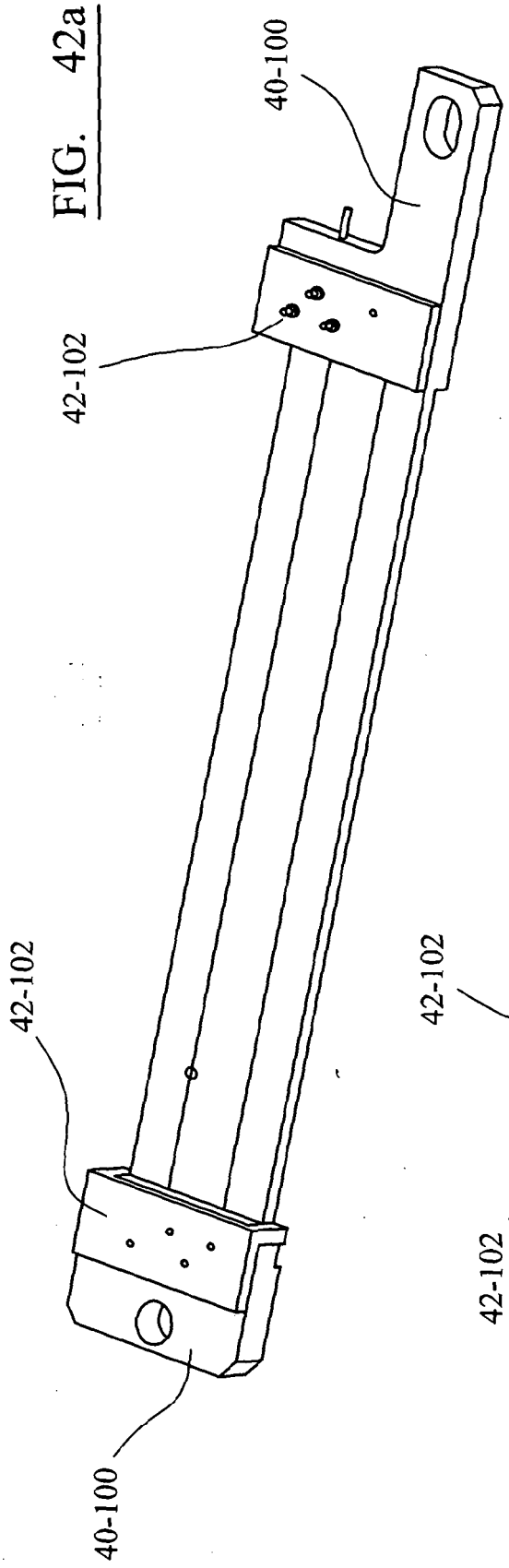
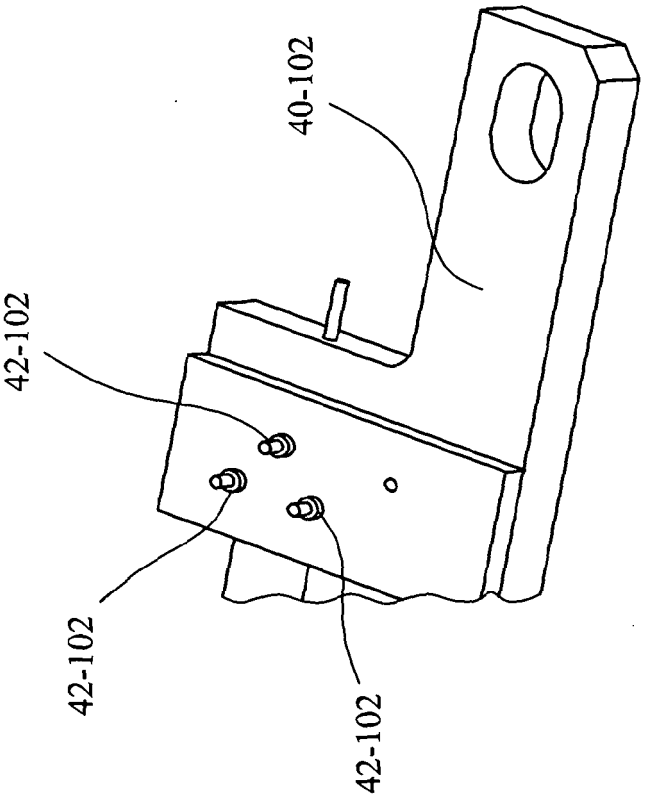


FIG. 42b



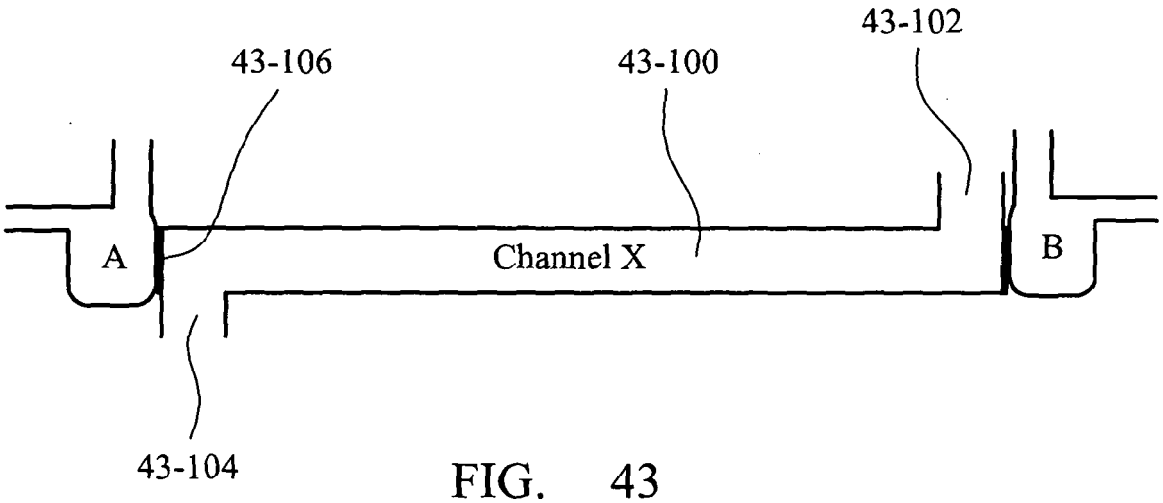


FIG. 43

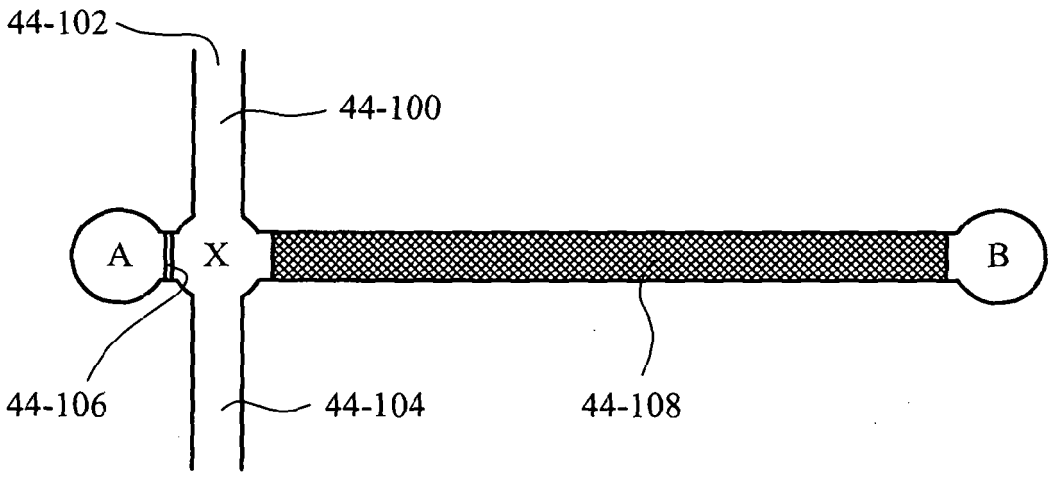


FIG. 44

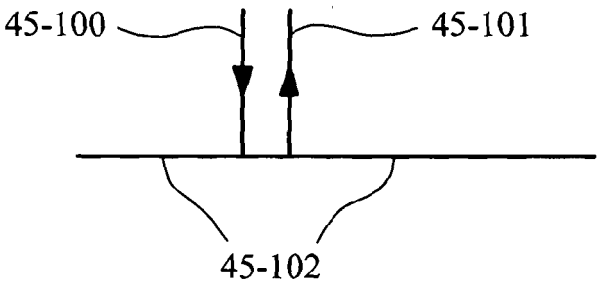


FIG. 45

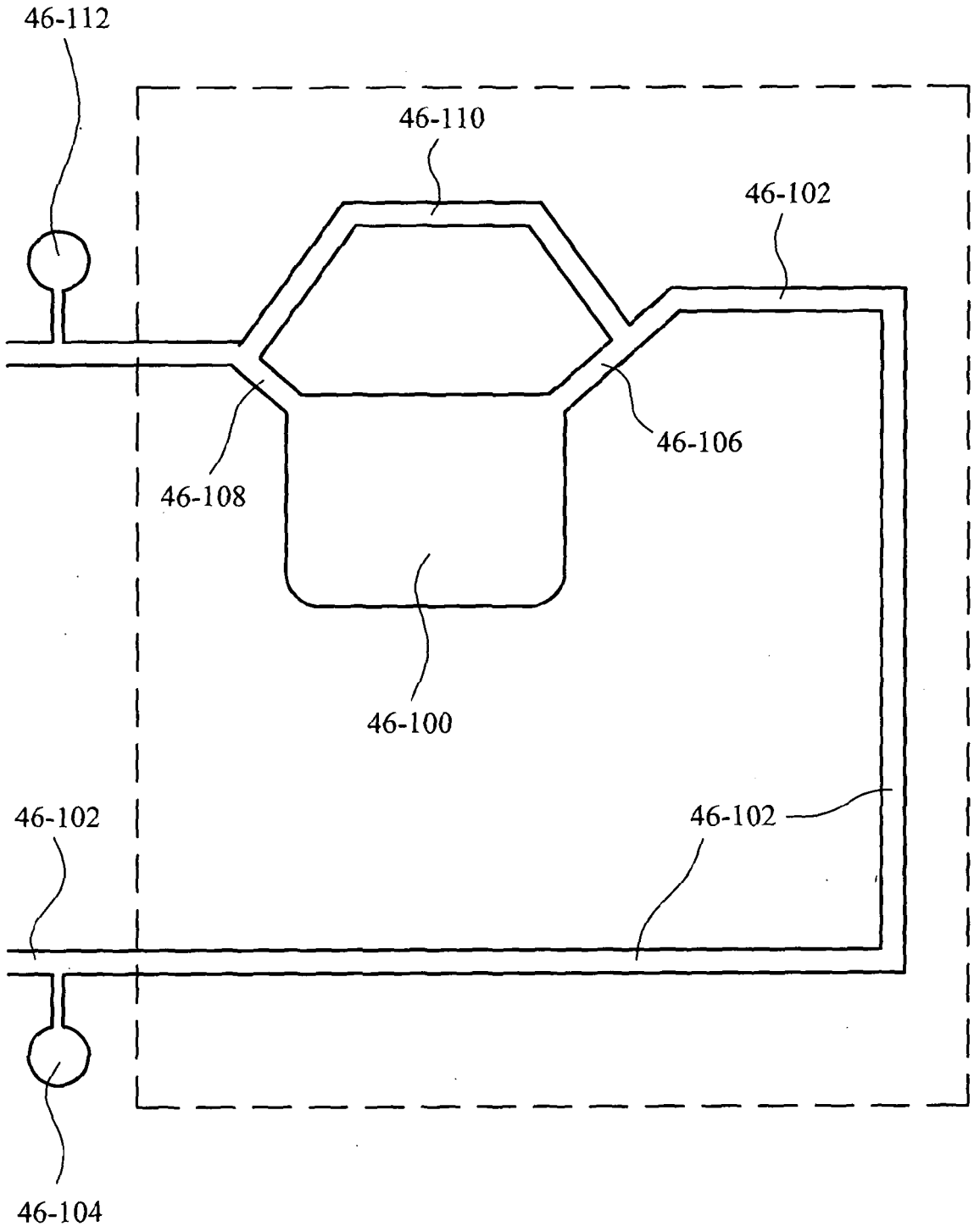


FIG. 46

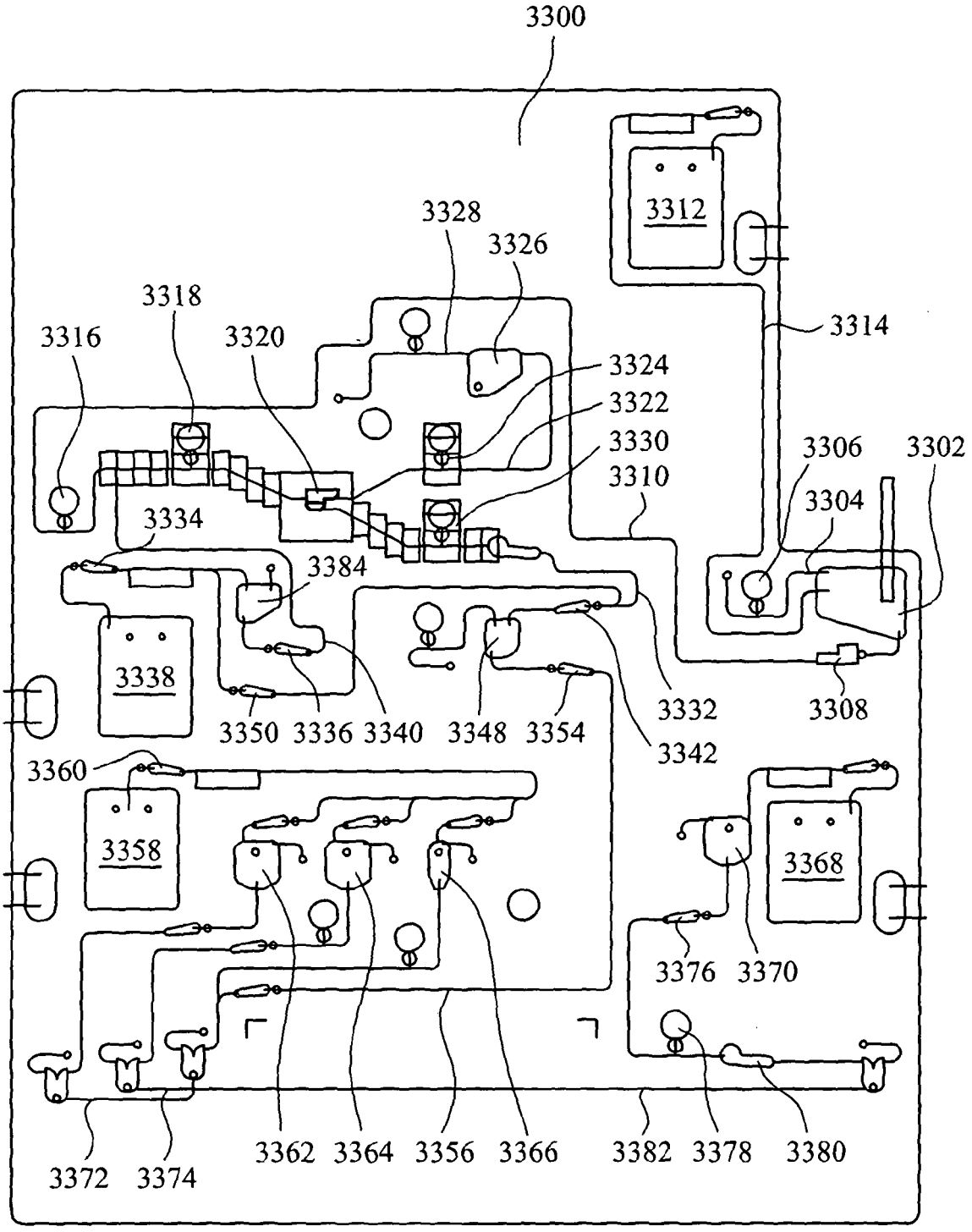
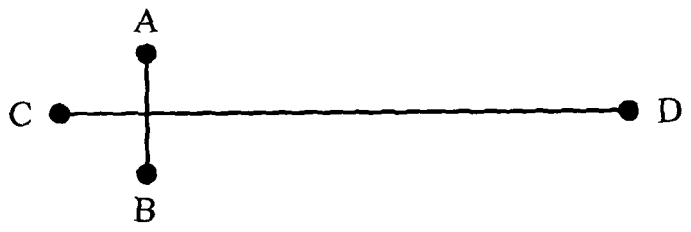
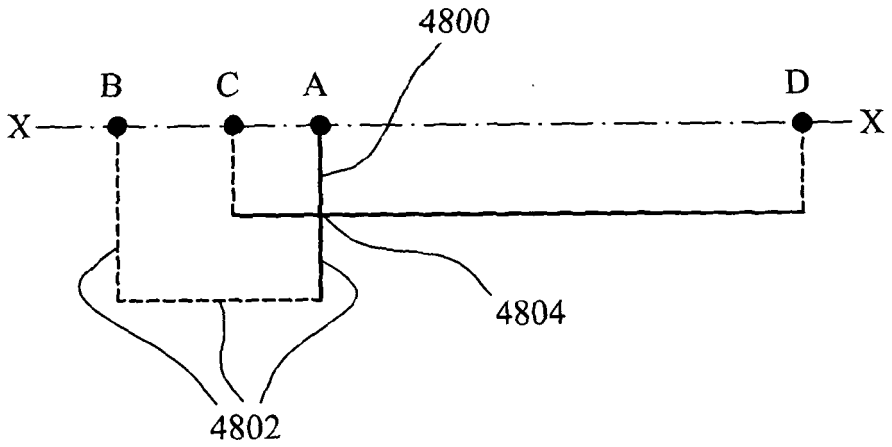

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FIG. 47



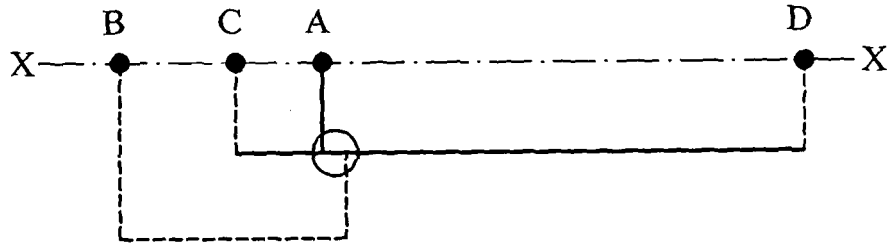
Key of ports
A: Sample inlet
B: Sample waste
C + D: Separation chamber.

FIG. 48a



Key of ports
A: Sample inlet
B: Sample waste
C + D: Separation chamber.

FIG. 48b



Key of ports
A: Sample inlet
B: Sample waste
C + D: Separation chamber.

FIG. 48c

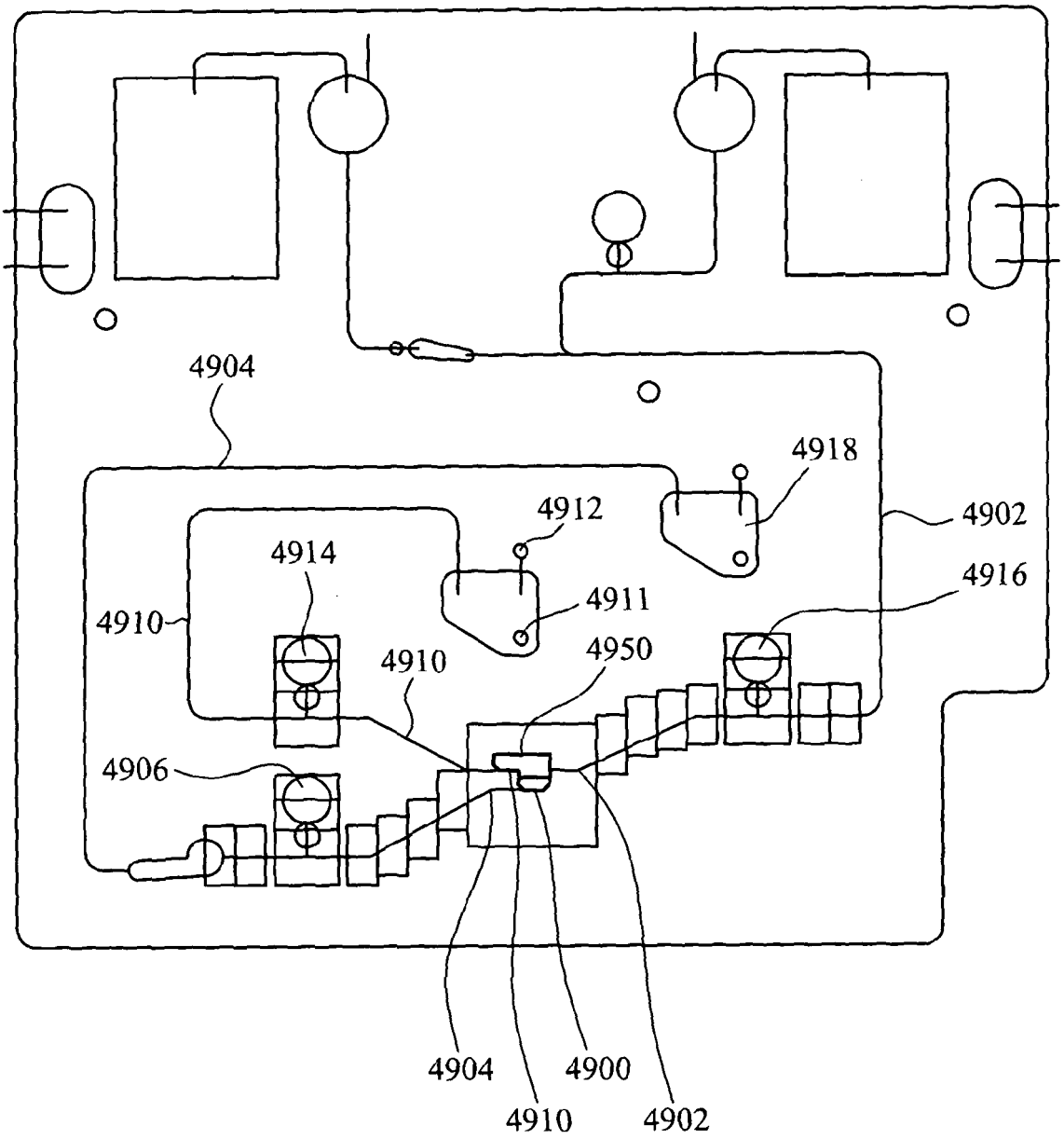

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FIG. 49

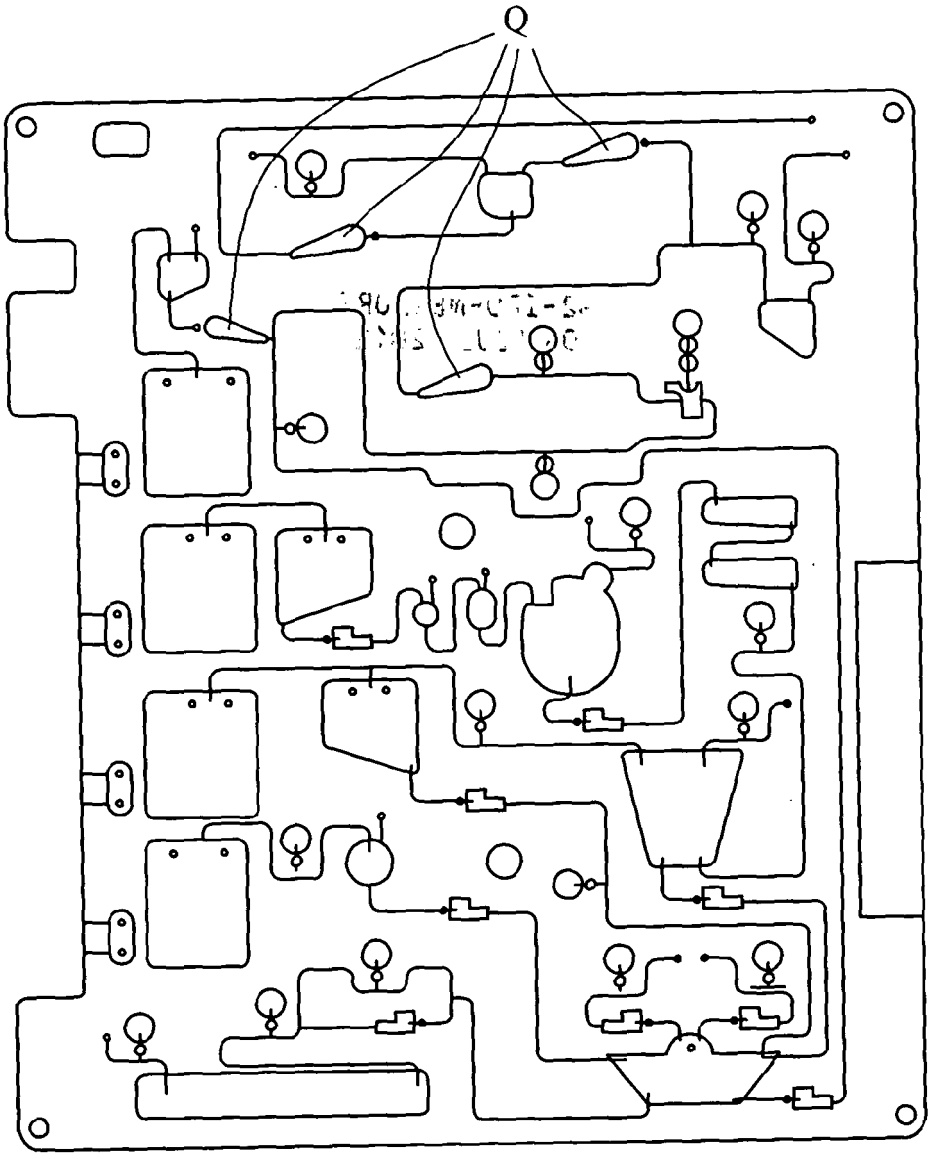


FIG. 50a

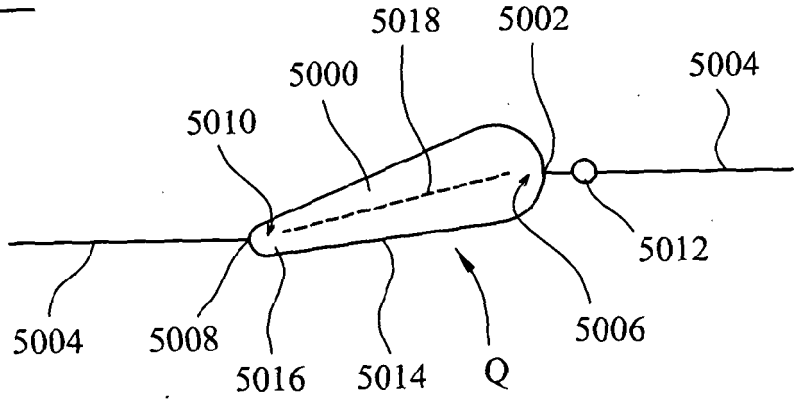


FIG. 50b