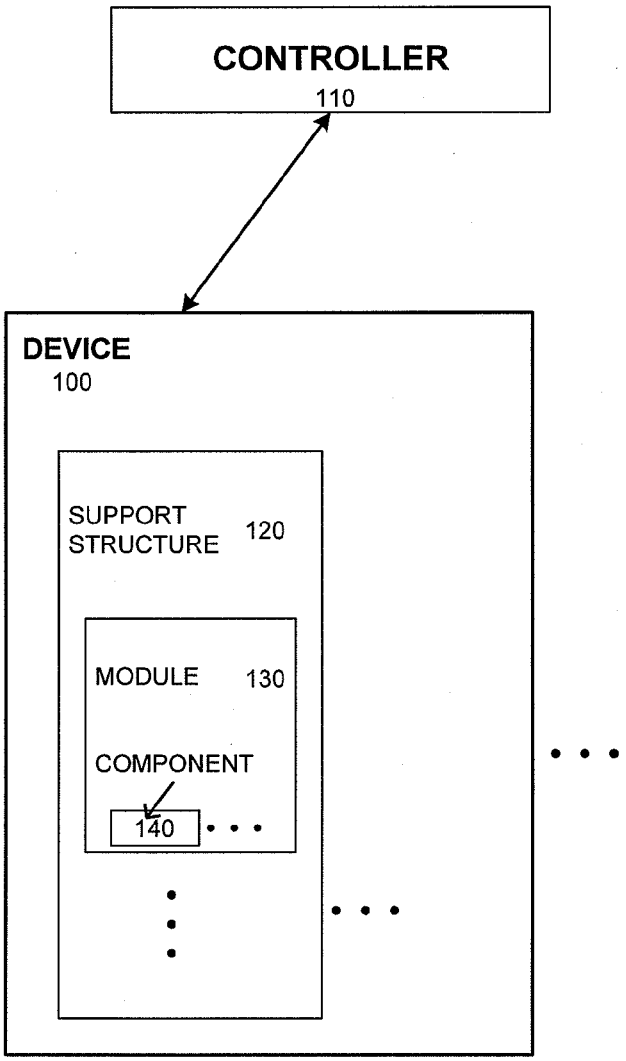

CONTROLLER
110
DEVICE
100
SUPPORT STRUCTURE
120
MODULE
130
COMPONENT
140

FIG. 1

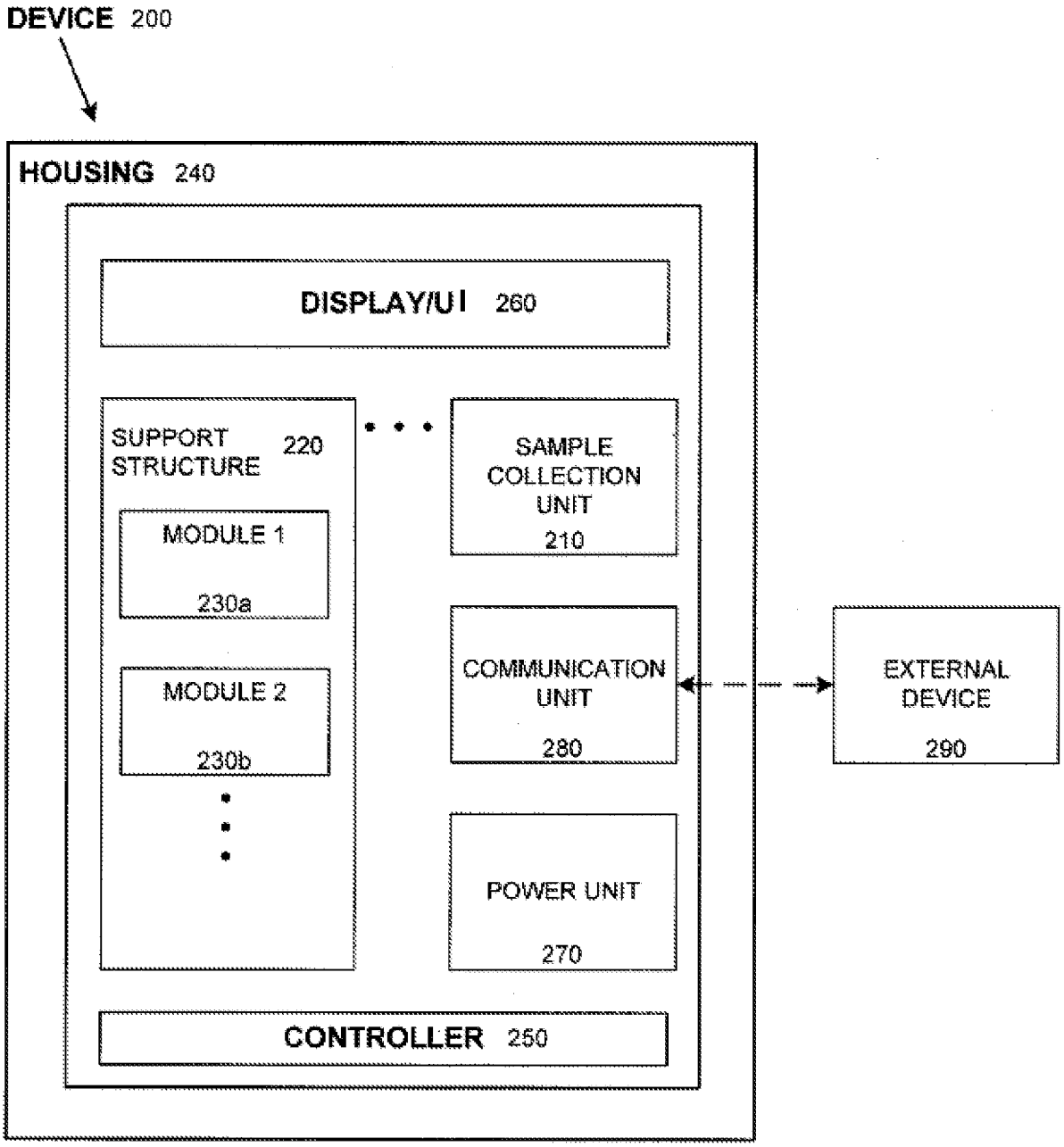

DEVICE 200
HOUSING 240
DISPLAY/UI 260
SUPPORT STRUCTURE 220
MODULE 1 230a
MODULE 2 230b
SAMPLE COLLECTION UNIT 210
COMMUNICATION UNIT 280
EXTERNAL DEVICE 290
POWER UNIT 270
CONTROLLER 250

FIG. 2

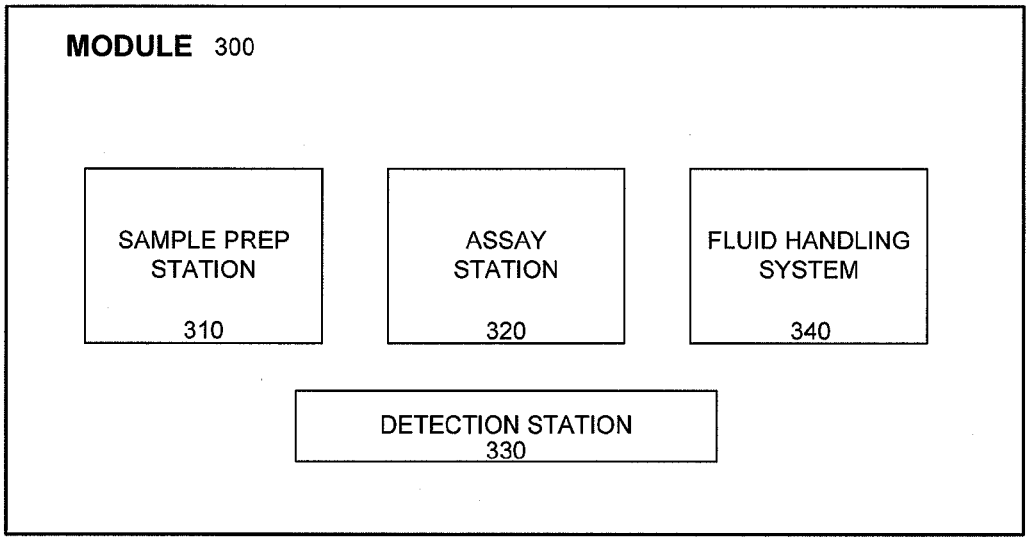

MODULE 300
SAMPLE PREP STATION 310
ASSAY STATION 320
FLUID HANDLING SYSTEM 340
DETECTION STATION 330

FIG. 3

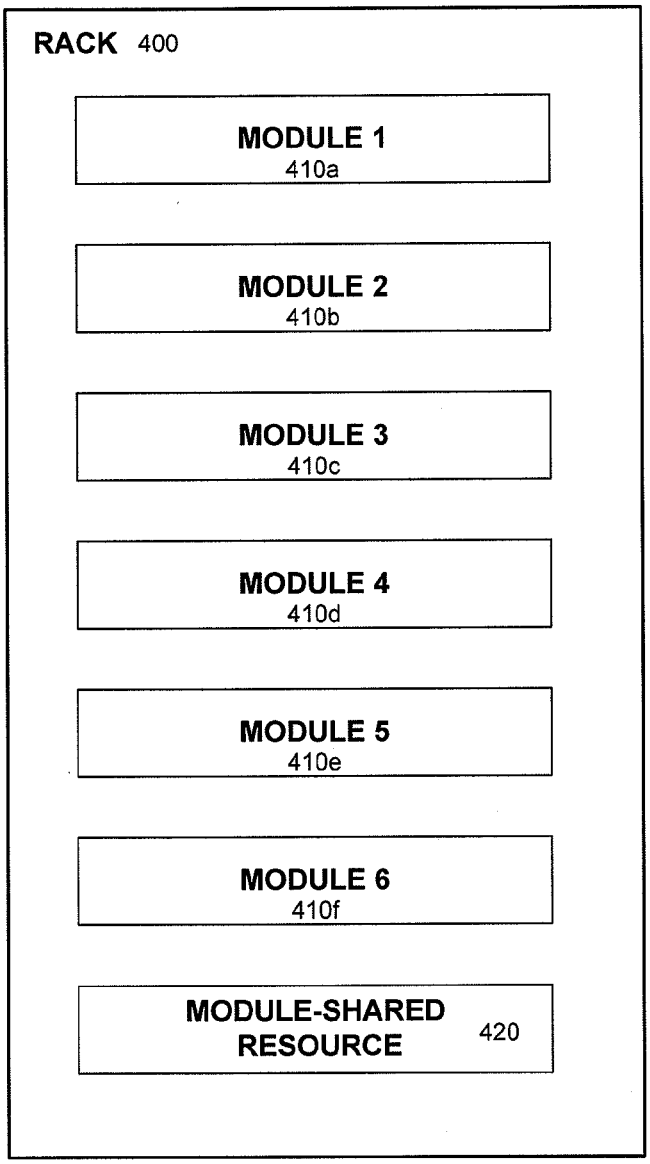

RACK 400
MODULE 1
410a
MODULE 2
410b
MODULE 3
410c
MODULE 4
410d
MODULE 5
410e
MODULE 6
410f
MODULE-SHARED RESOURCE
420

FIG. 4

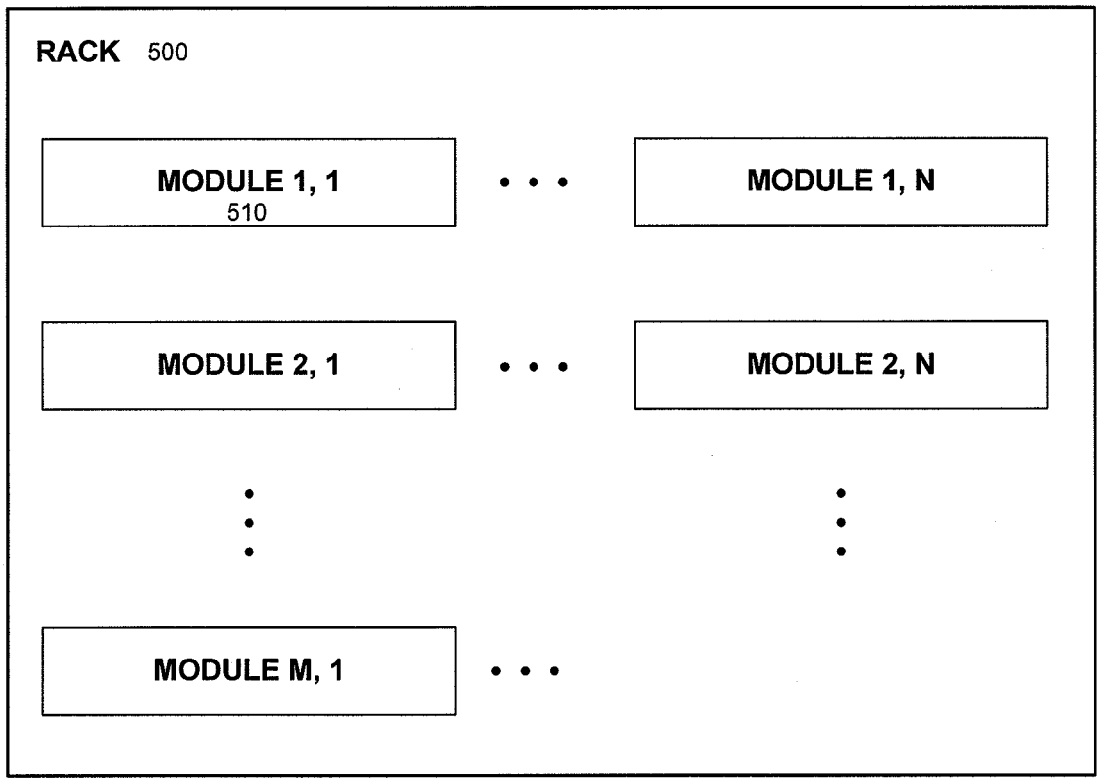
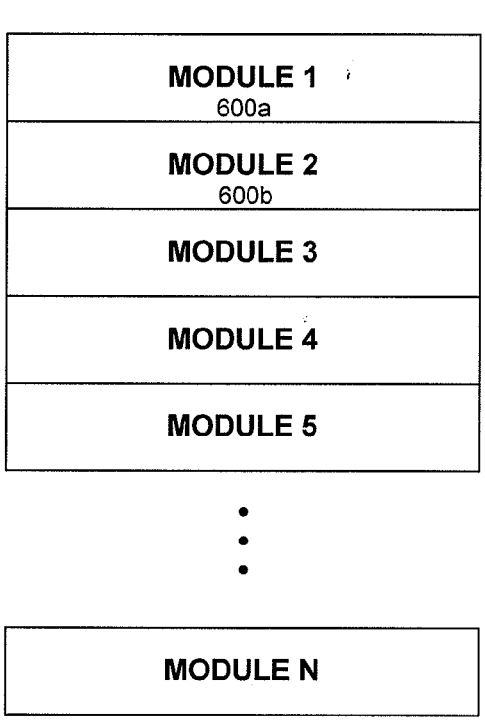

RACK 500
MODULE 1, 1
510
MODULE 1, N
MODULE 2, 1
MODULE 2, N
MODULE M, 1

FIG. 5



vertical stack
no-rack config

FIG. 6

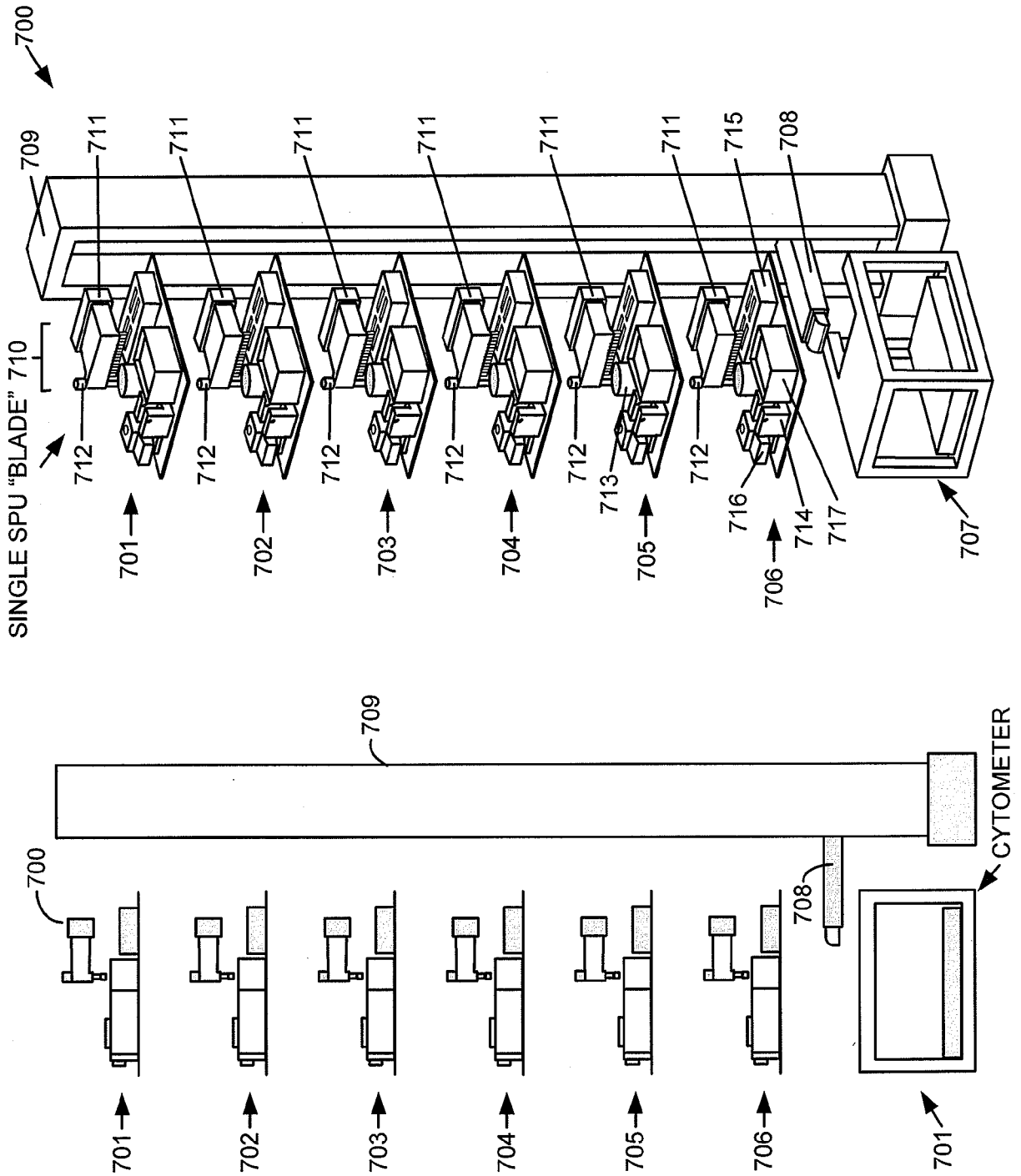

700
709
711
711
711
711
711
711
715
708
SINGLE SPU "BLADE" 710
712
712
712
712
712
712
713
716
714
717
707
701
702
703
704
705
706
709
CYTOMETER
700
708
701
702
703
704
705
706
701

FIG. 7

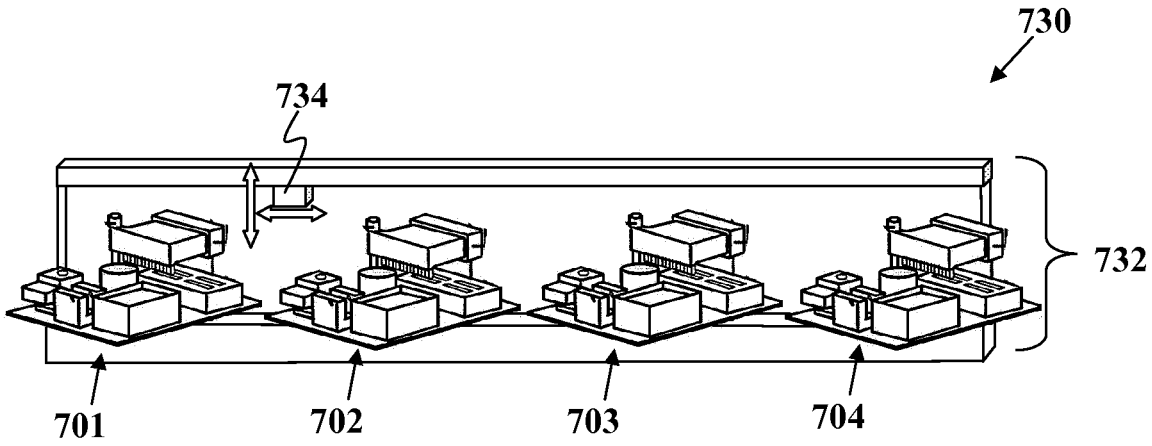

730
734
732
701
702
703
704

FIG. 7A

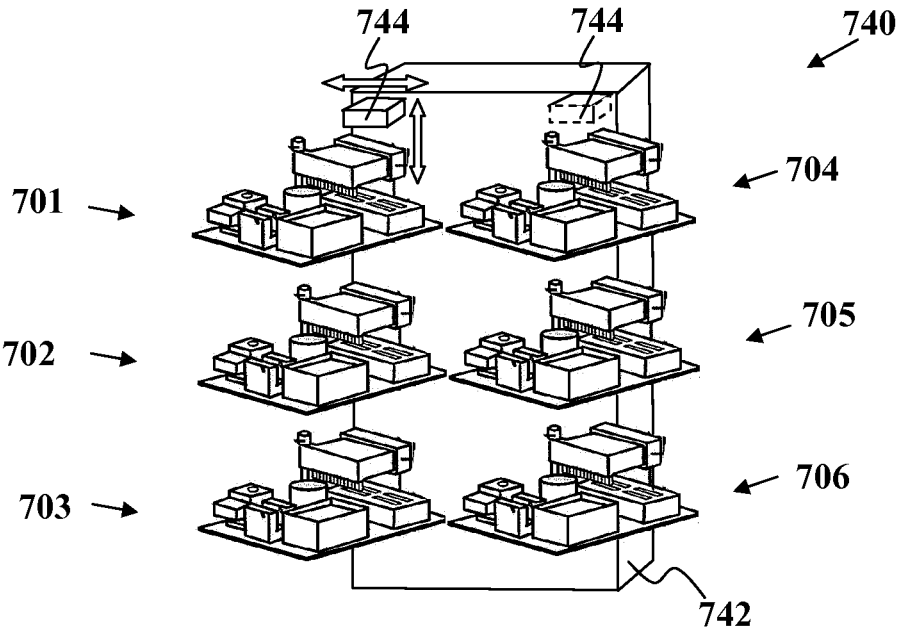

744
744
740
704
701
705
702
706
703
742

FIG. 7B

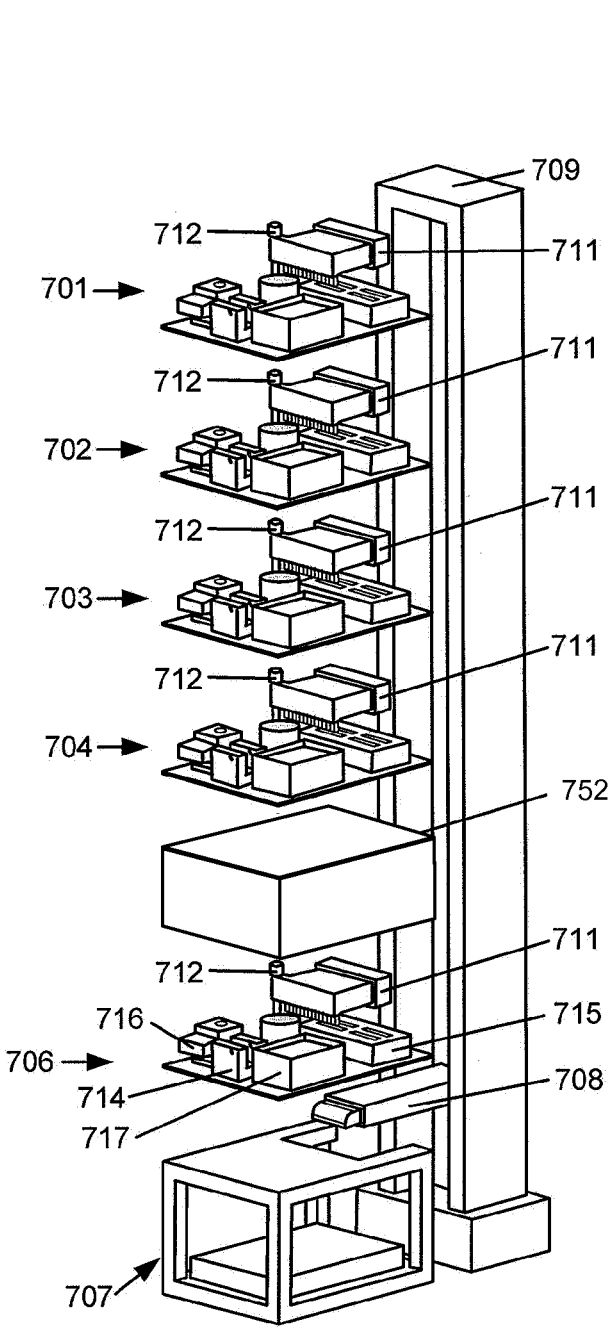
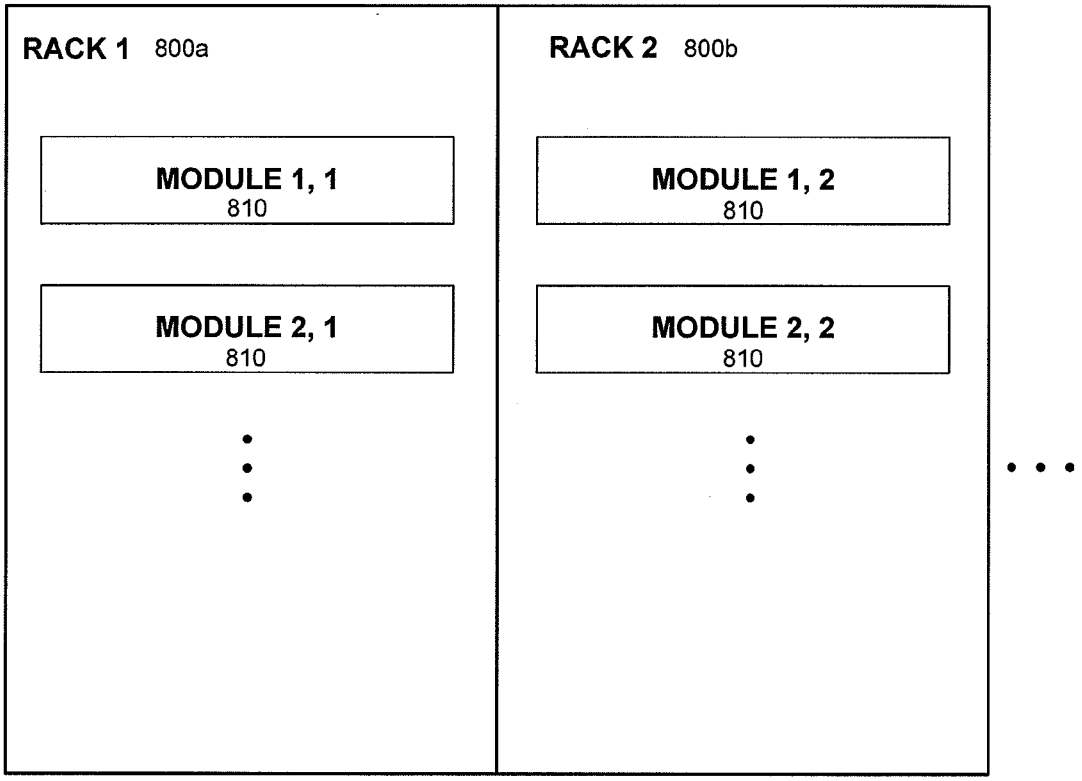

750
709
712
711
701
711
712
702
711
712
703
711
712
704
752
711
712
716
715
706
708
714
717
707

FIG. 7C



multi-rack

FIG 8

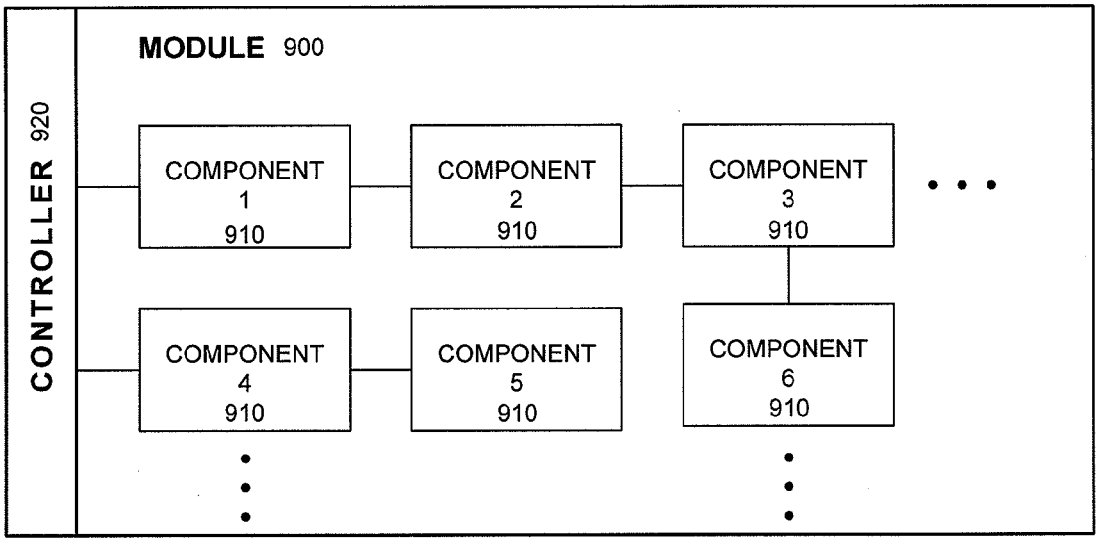

MODULE 900
CONTROLLER 920
COMPONENT 1 910
COMPONENT 2 910
COMPONENT 3 910
COMPONENT 4 910
COMPONENT 5 910
COMPONENT 6 910

FIG. 9

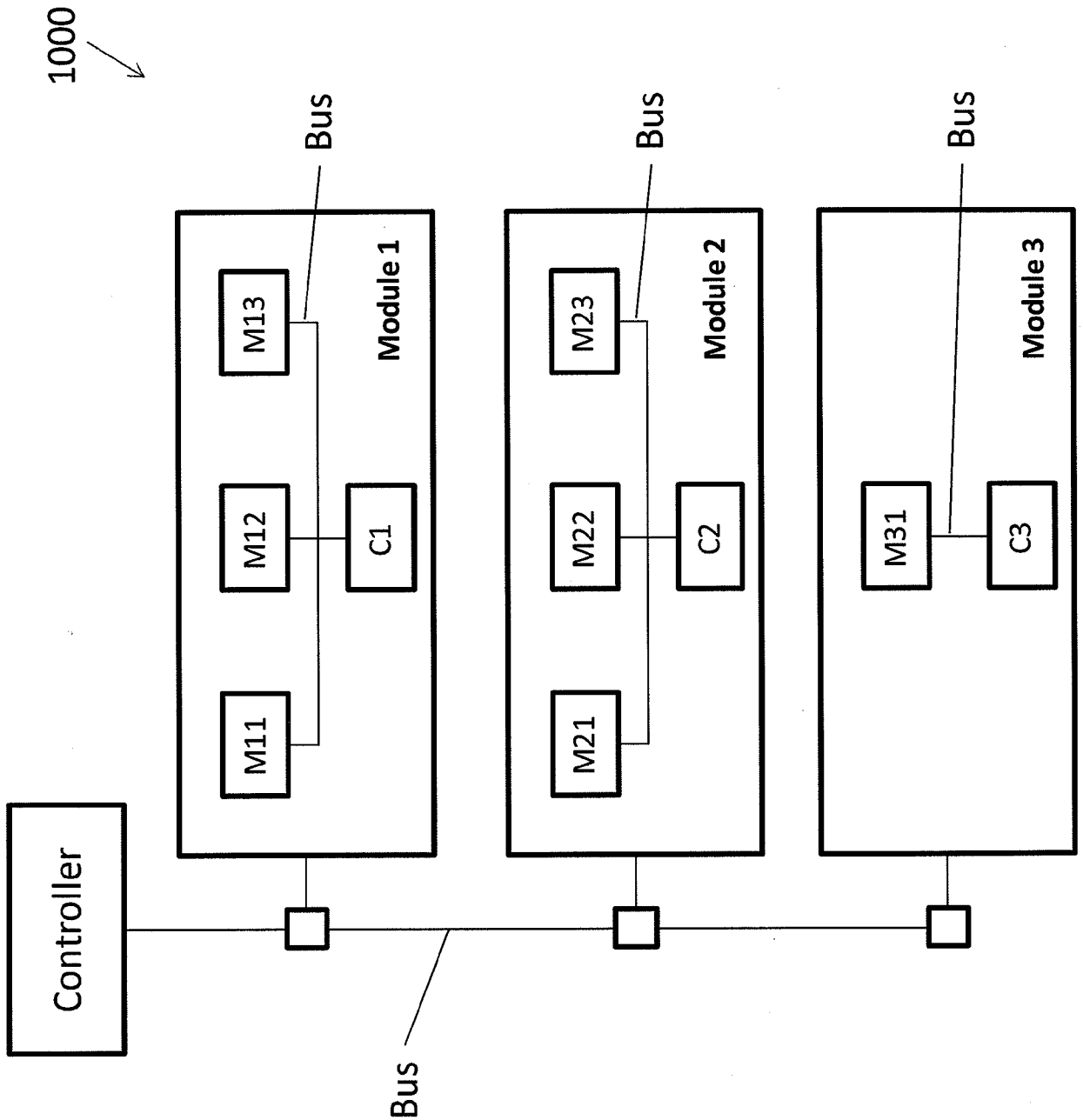

1000
Bus
Bus
Bus
Module 1
Module 2
Module 3
M13
M12
M11
C1
M23
M22
M21
C2
M31
C3
Controller
Bus

FIG. 10

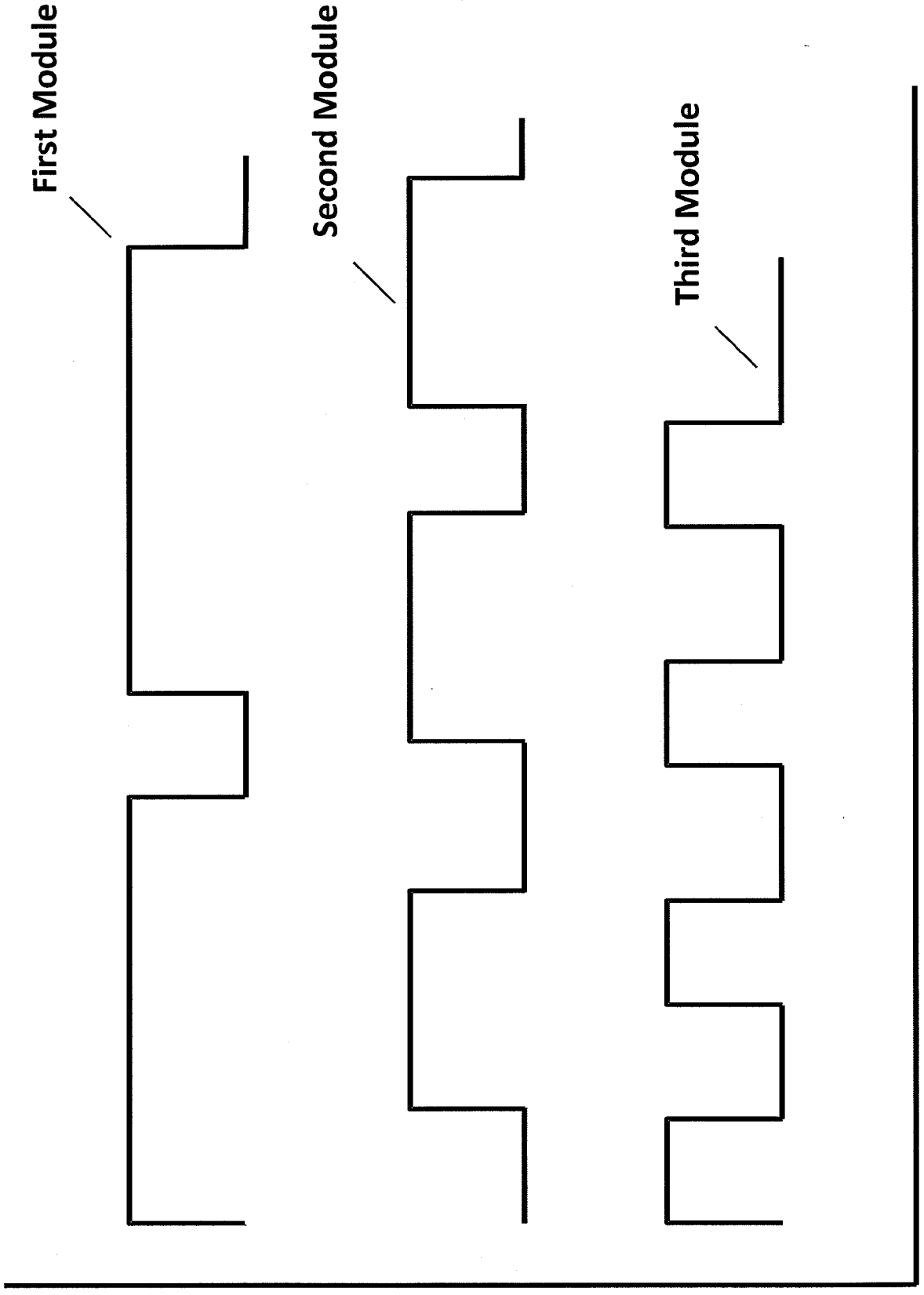


FIG. 11

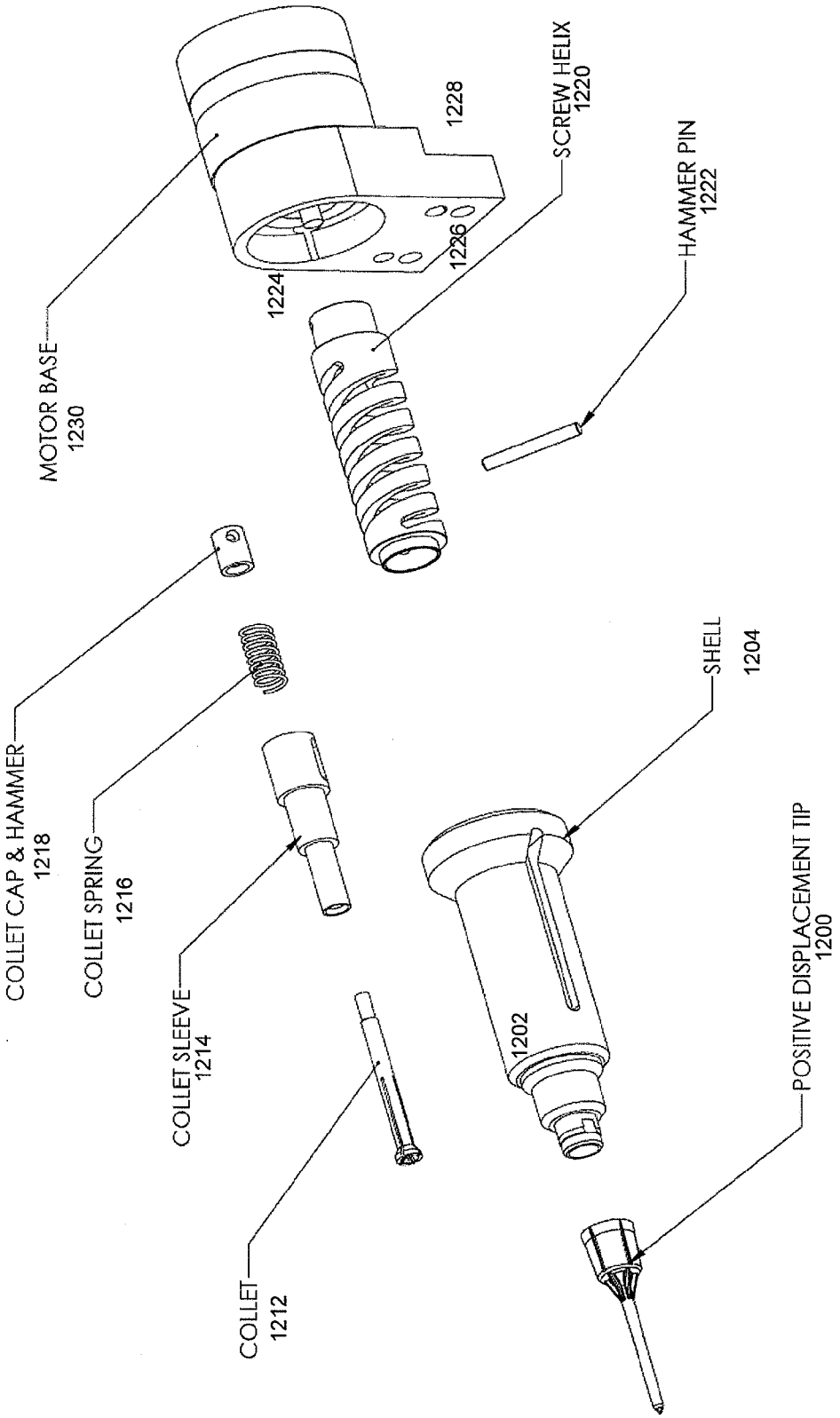

MOTOR BASE
1230
1228
1224
1226
SCREW HELIX
1220
HAMMER PIN
1222
COLLET CAP & HAMMER
1218
COLLET SPRING
1216
COLLET SLEEVE
1214
COLLET
1212
SHELL
1204
1202
POSITIVE DISPLACEMENT TIP
1200

FIG. 12

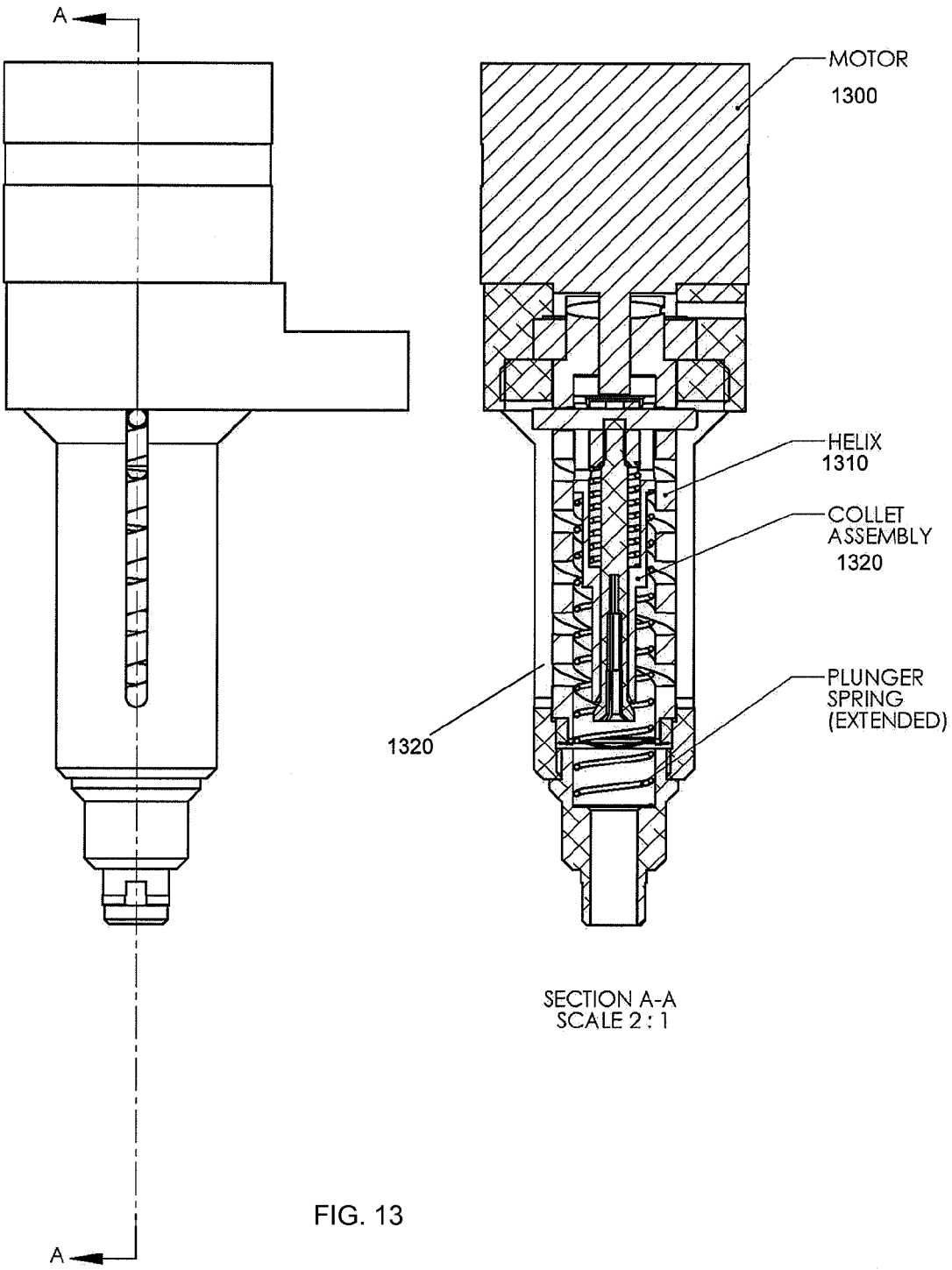

A
MOTOR
1300
HELIX
1310
COLLET
ASSEMBLY
1320
PLUNGER
SPRING
(EXTENDED)
1320
SECTION A-A
SCALE 2 : 1
A

FIG. 13

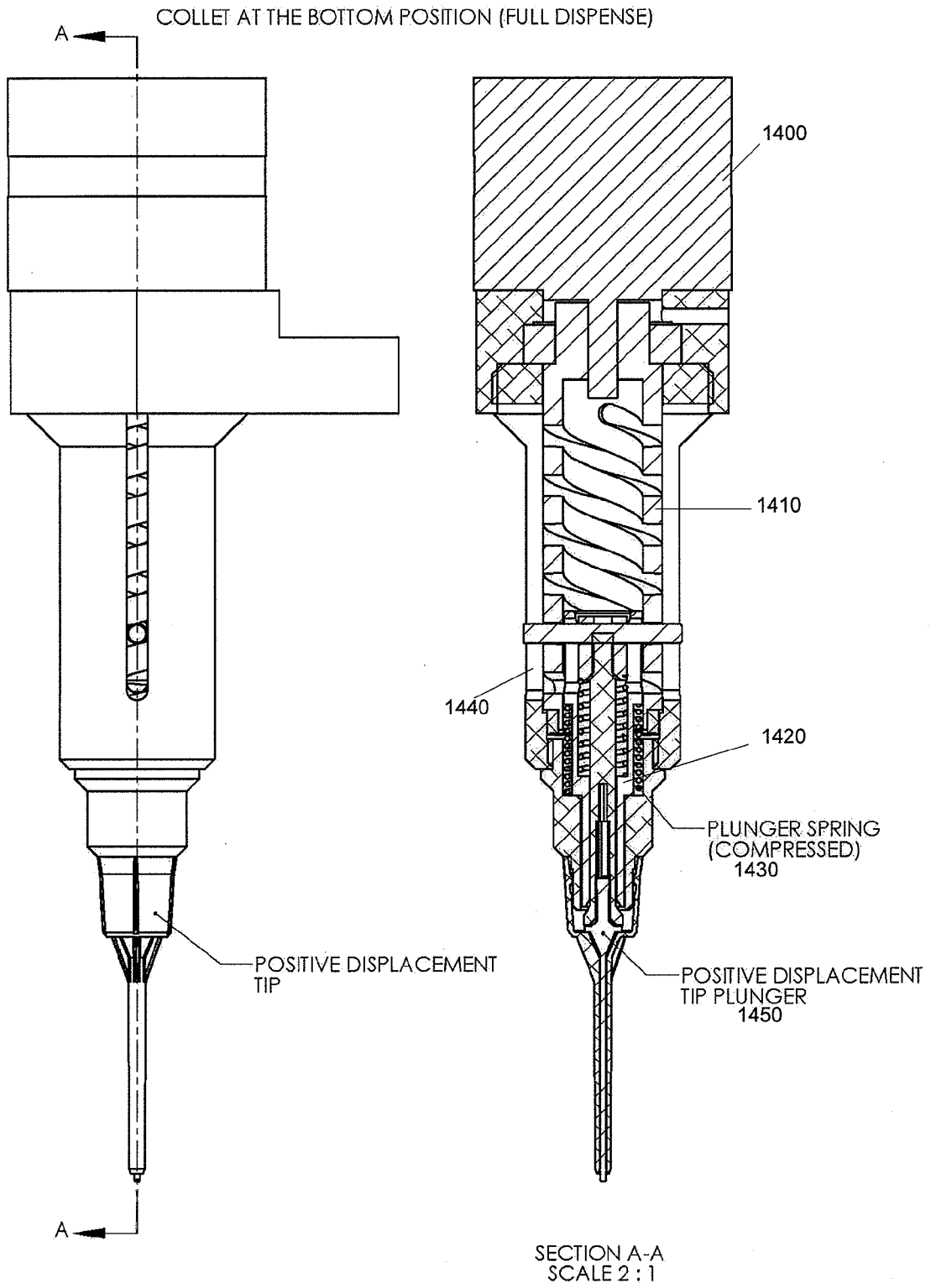

COLLET AT THE BOTTOM POSITION (FULL DISPENSE)
A
A
1400
1410
1440
1420
PLUNGER SPRING
(COMPRESSED)
1430
POSITIVE DISPLACEMENT
TIP
POSITIVE DISPLACEMENT
TIP PLUNGER
1450
SECTION A-A
SCALE 2 : 1

FIG. 14

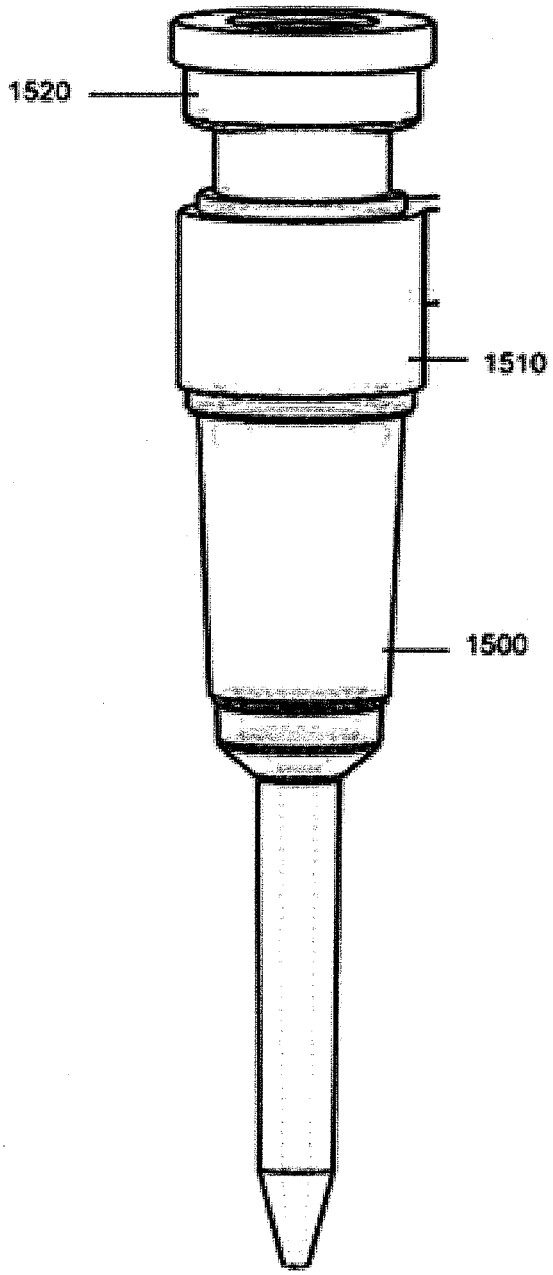


FIG. 15

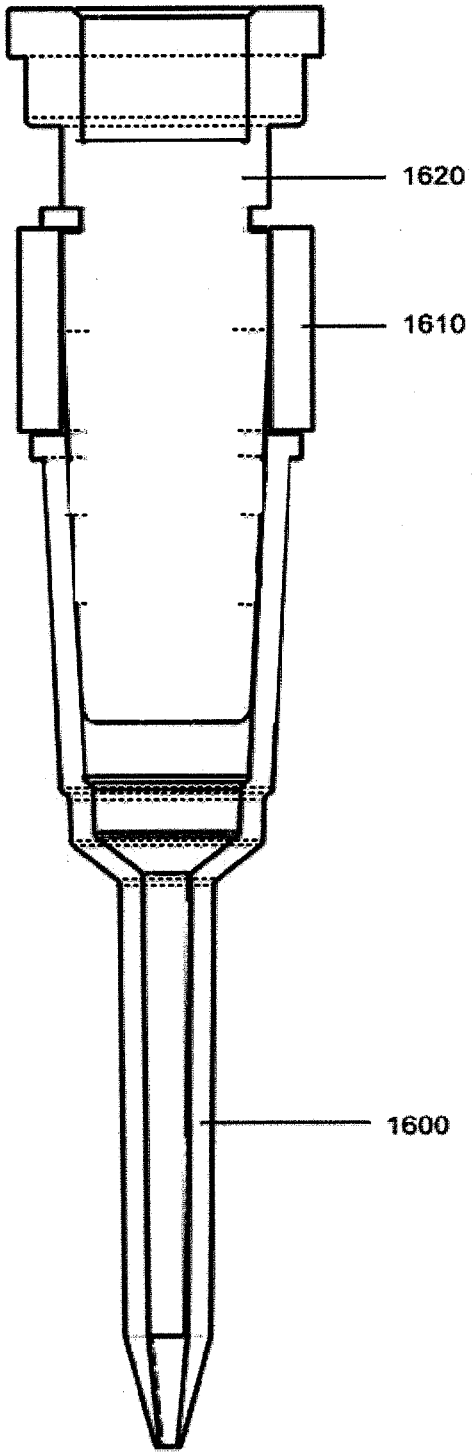


FIG. 16

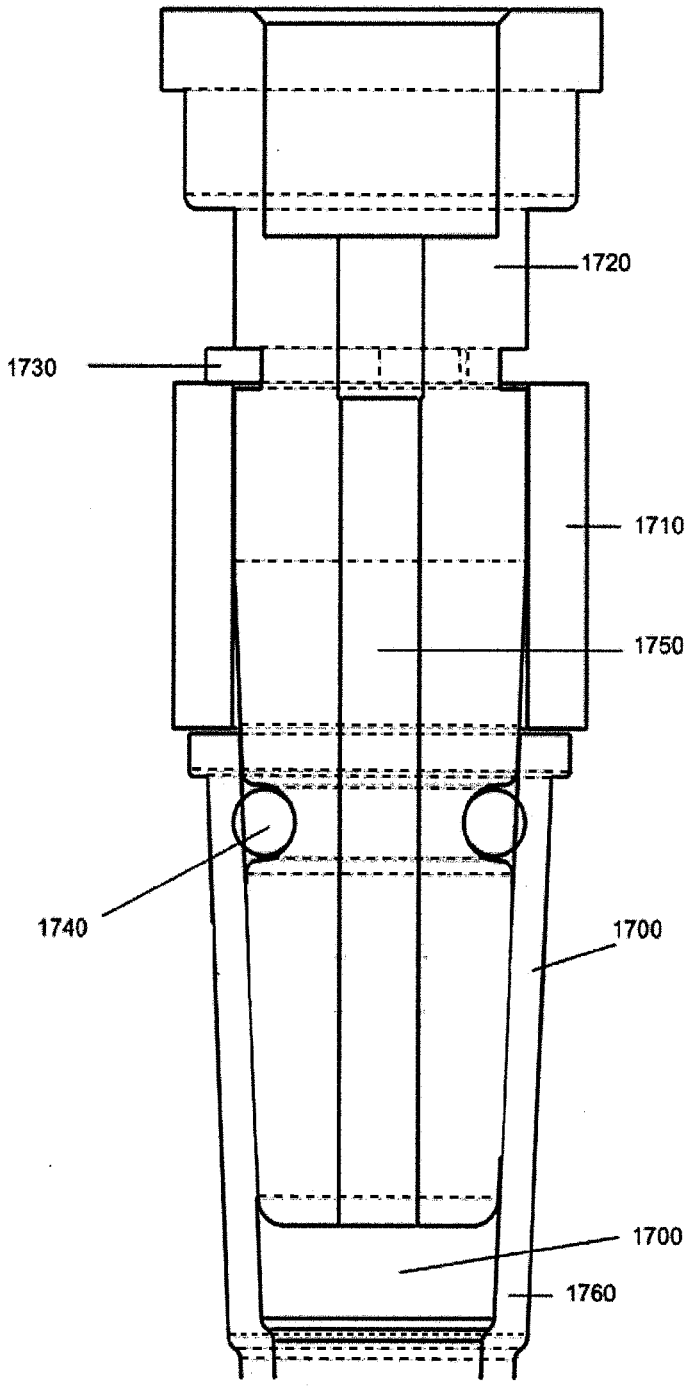


FIG. 17

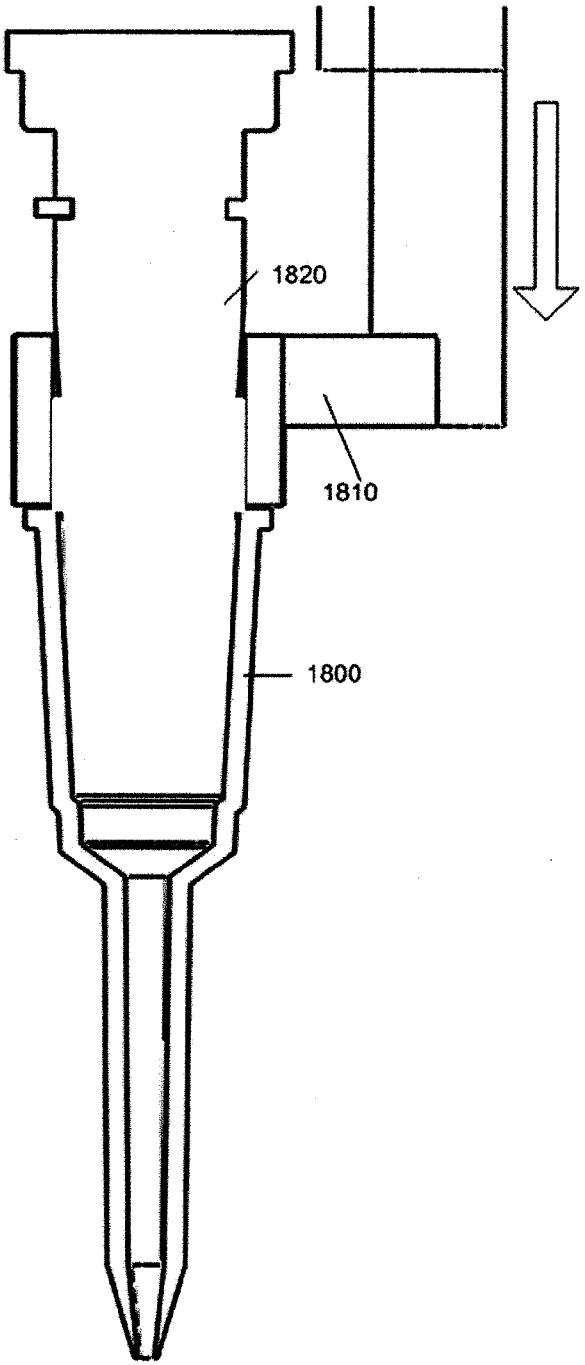


FIG. 18

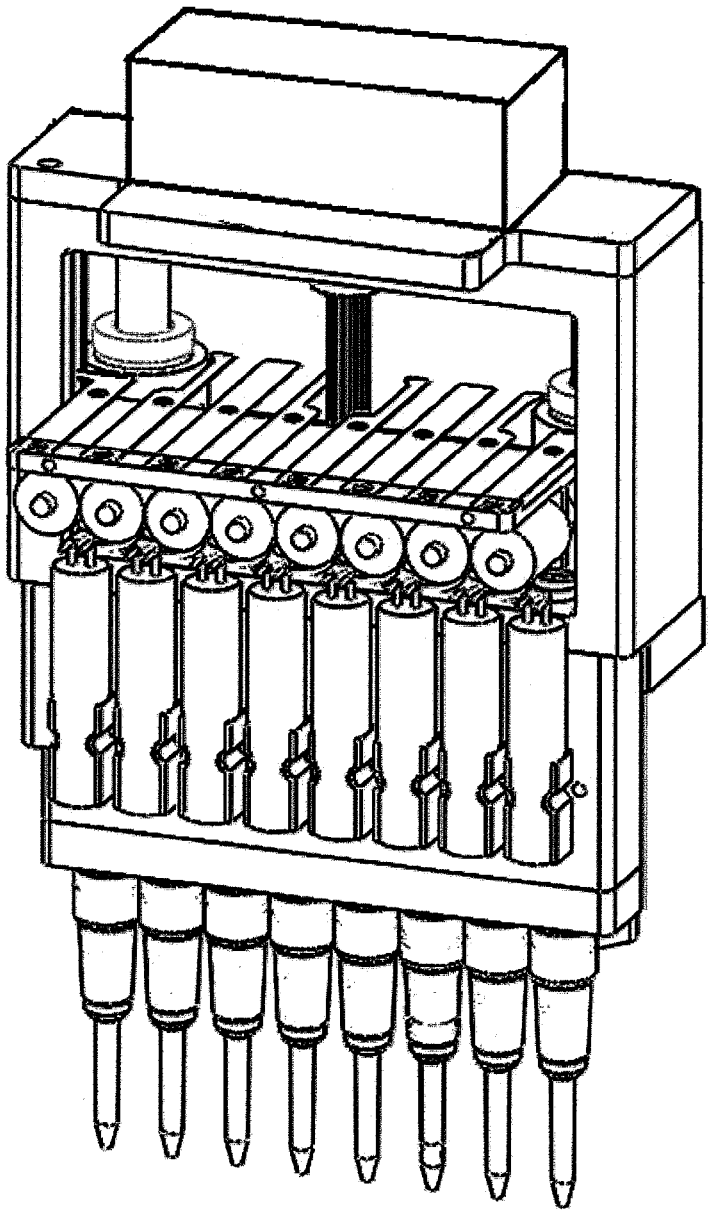


FIG. 19A

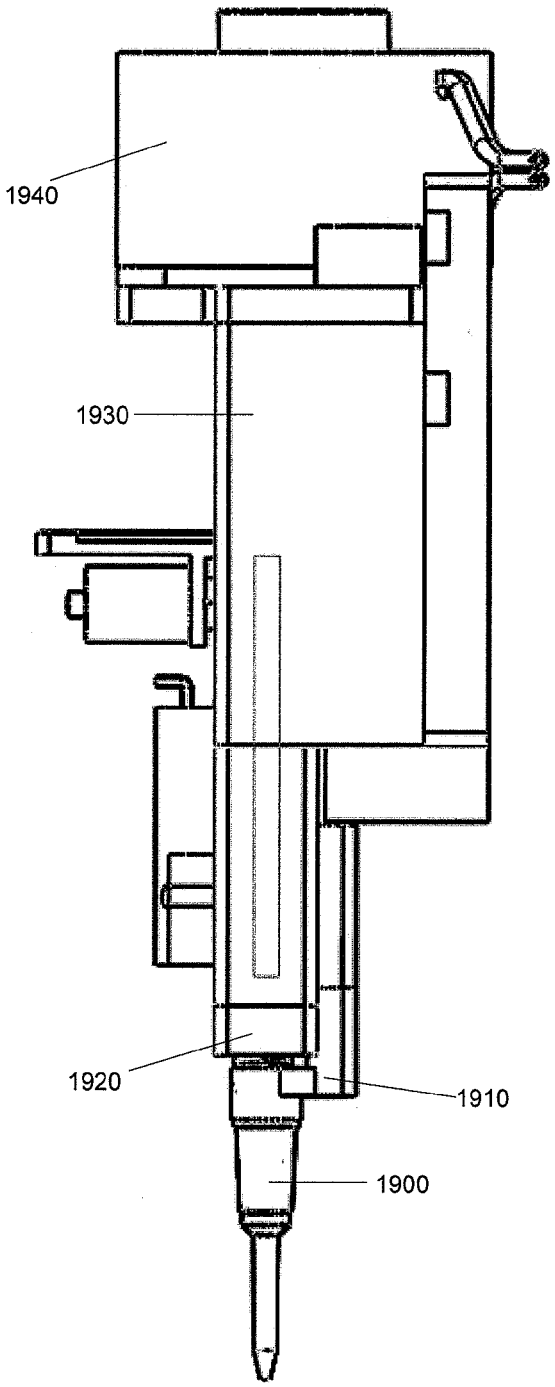


FIG. 19B

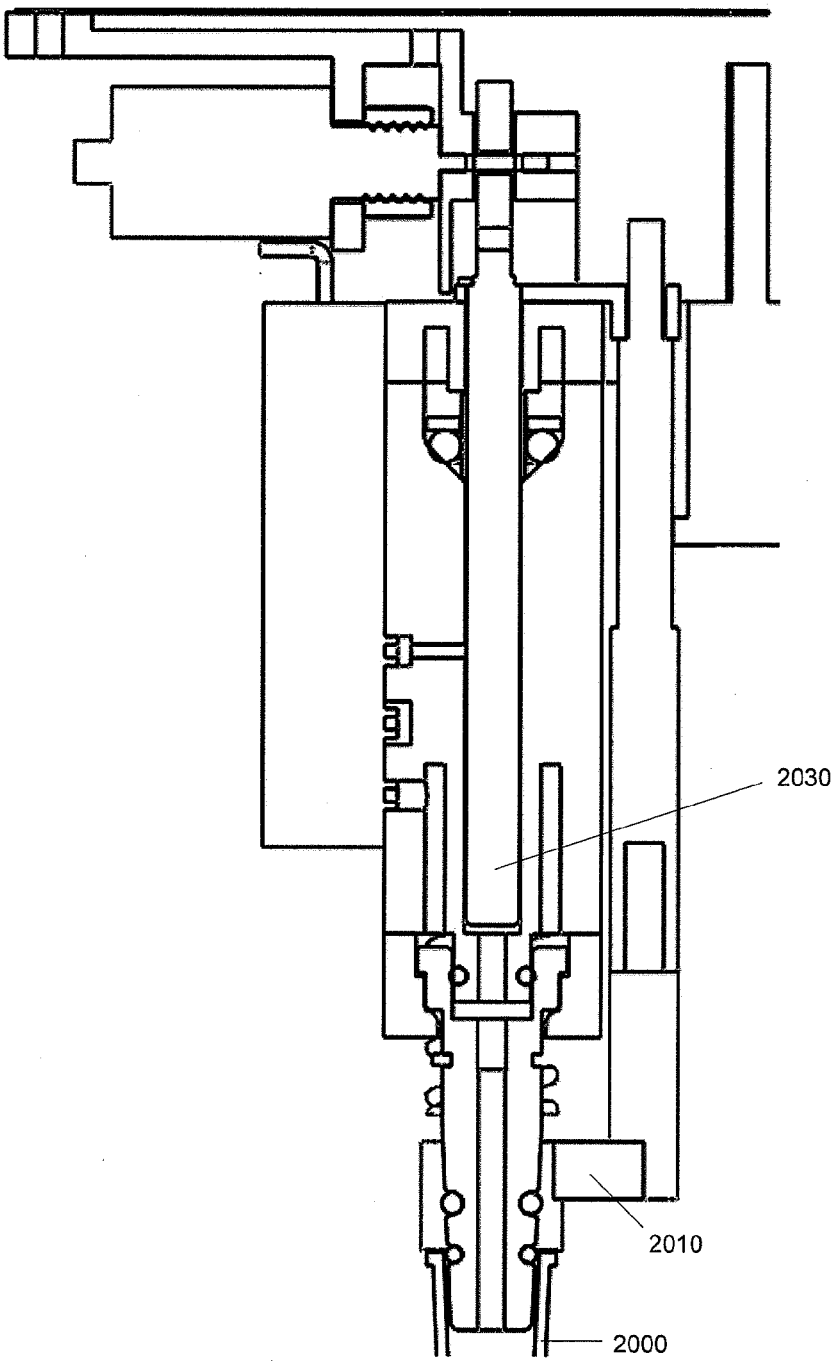


FIG. 20A

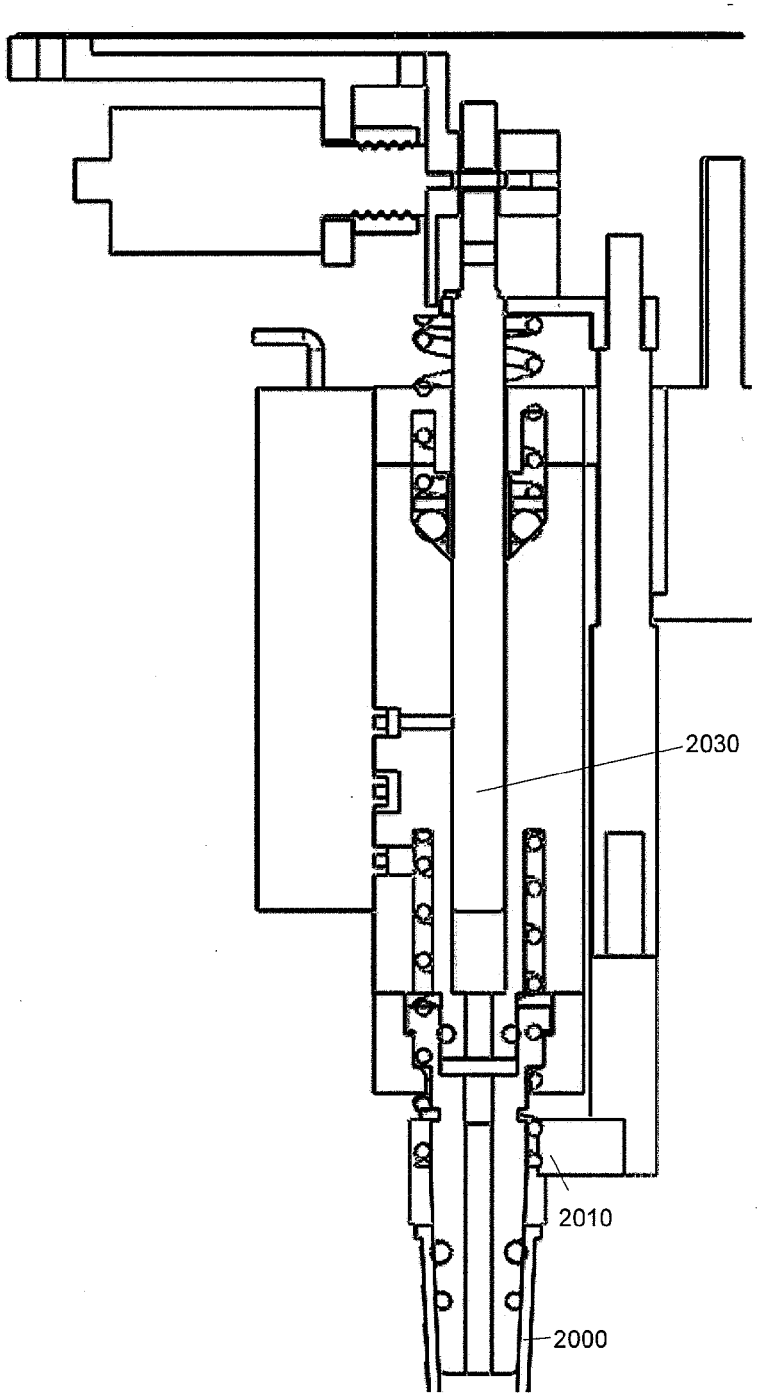


FIG. 20B

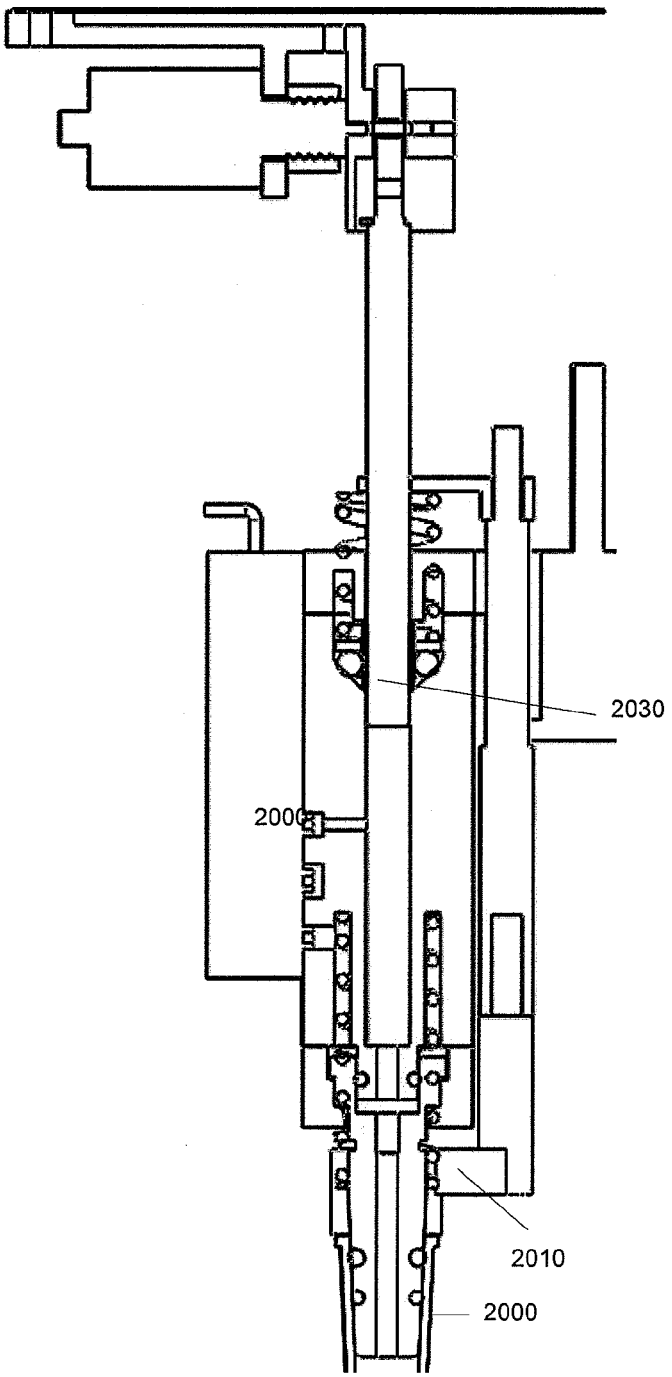
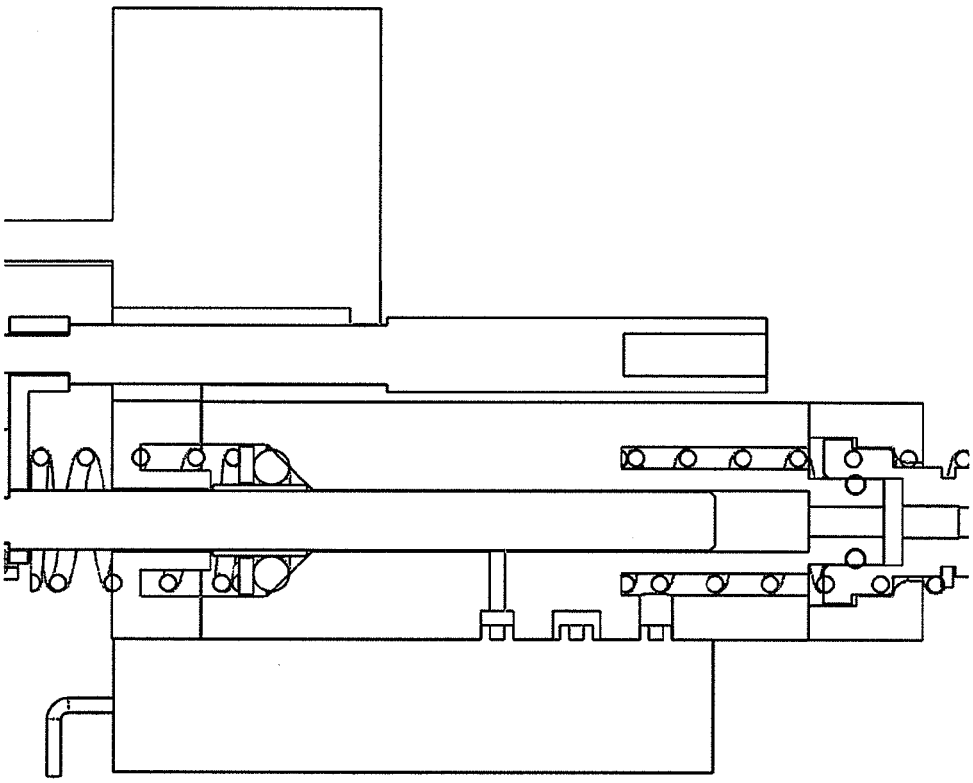


FIG. 20C



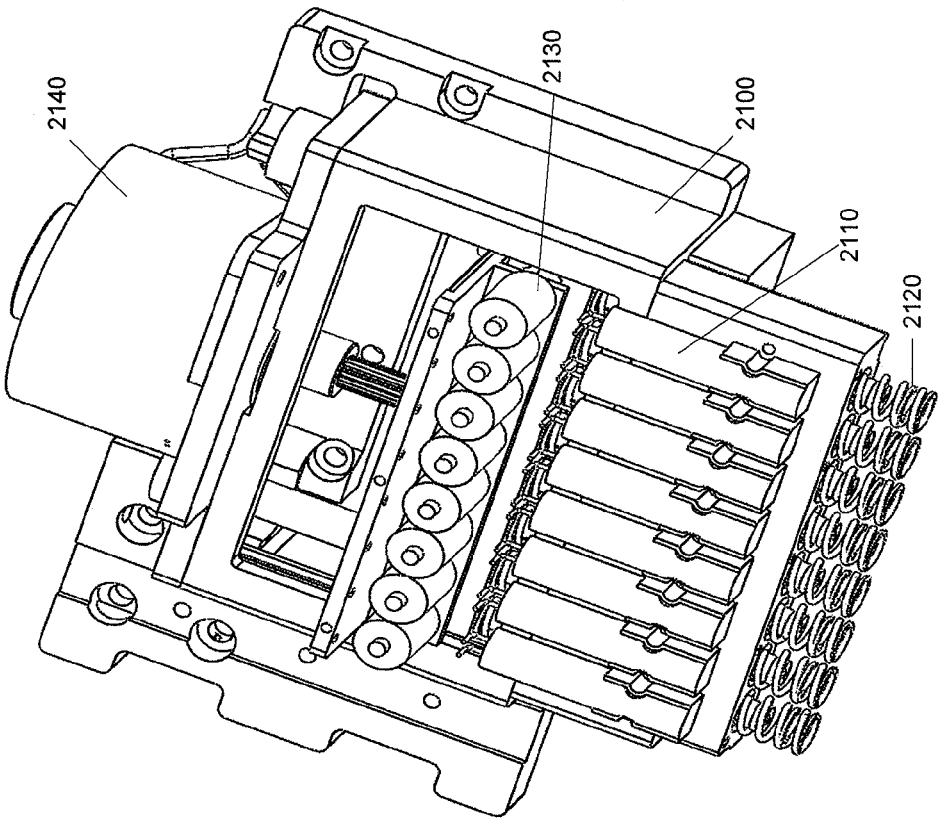
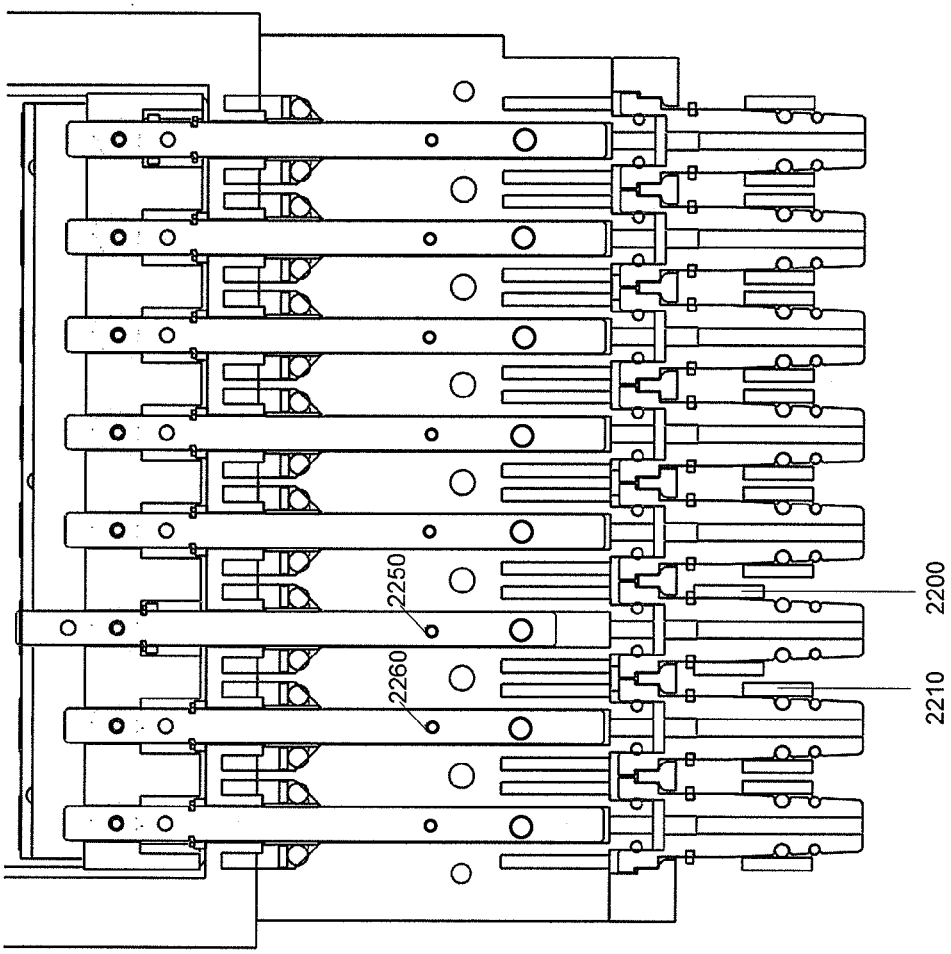


FIG. 21



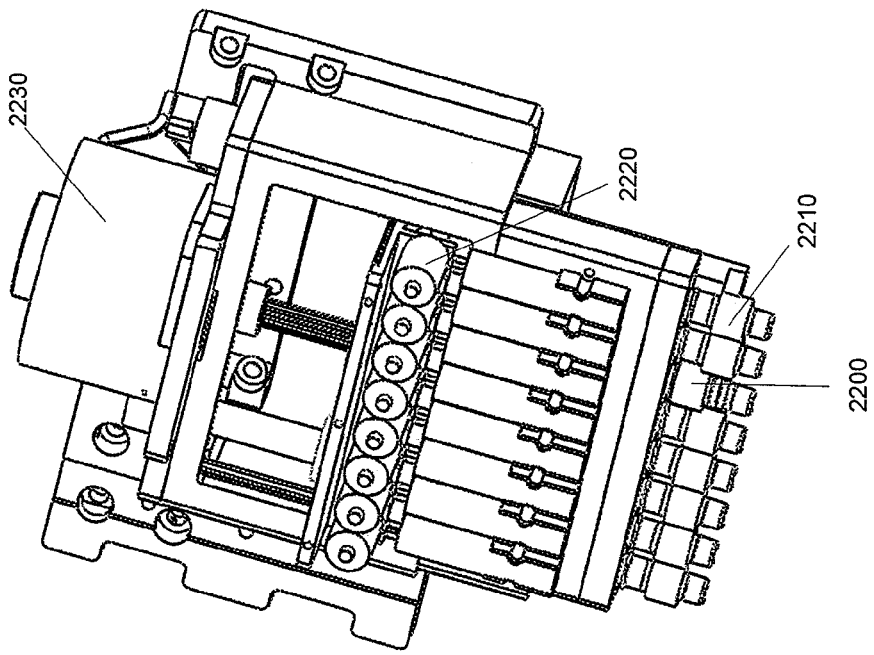


FIG. 22

28/151

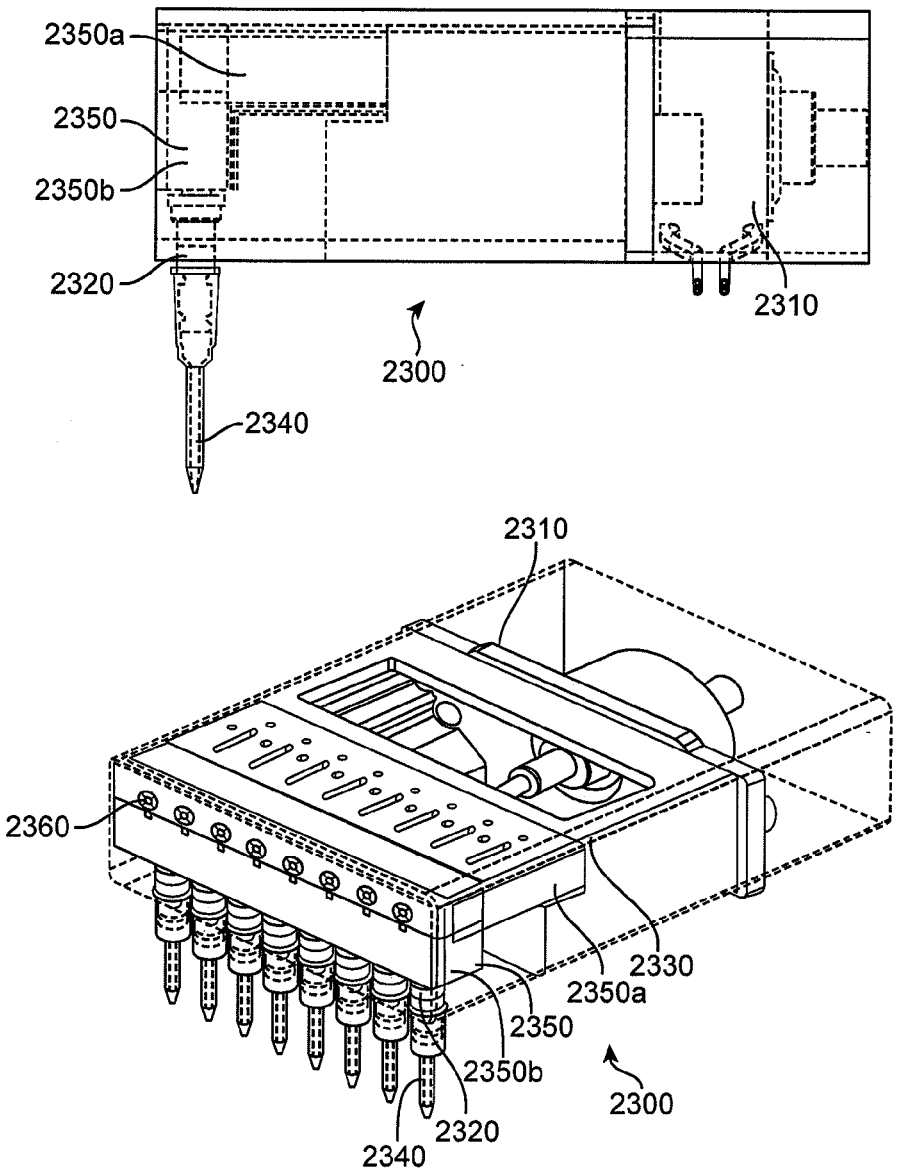
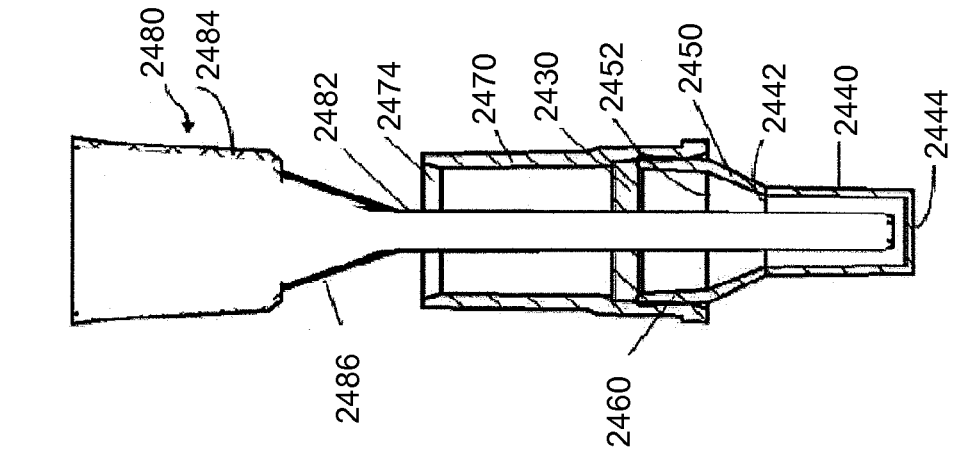

2350a
2350
2350b
2320
2340
2300
2310
2310
2360
2330
2350a
2350
2350b
2320
2340
2300

FIG. 23


2480
2484
2482
2474
2470
2430
2452
2450
2442
2440
2444
2486
2460

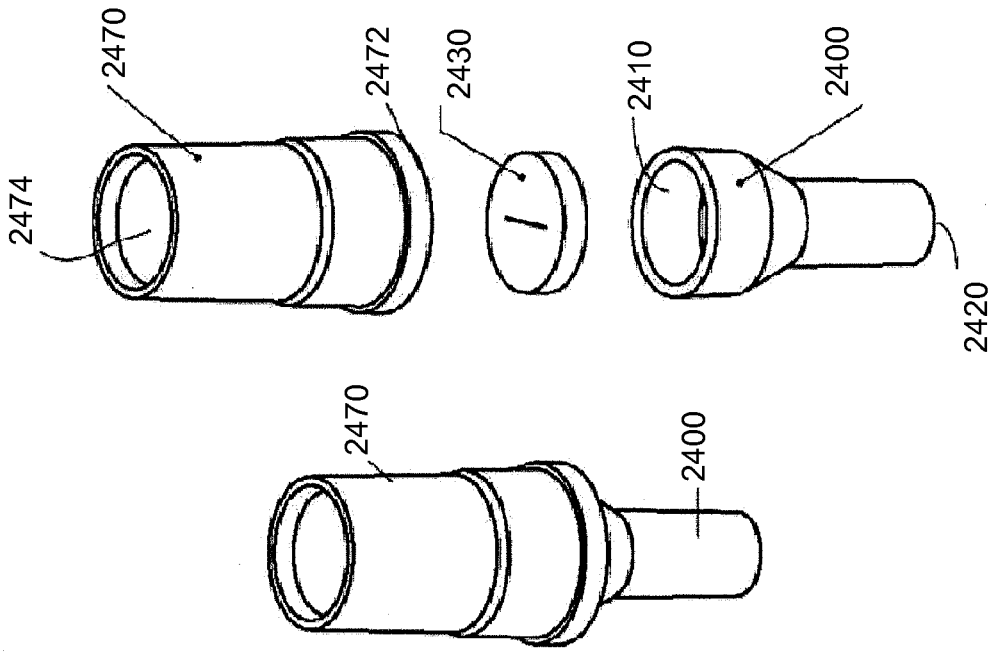

2470
2472
2430
2410
2400
2474
2420
2470
2400

FIG. 24

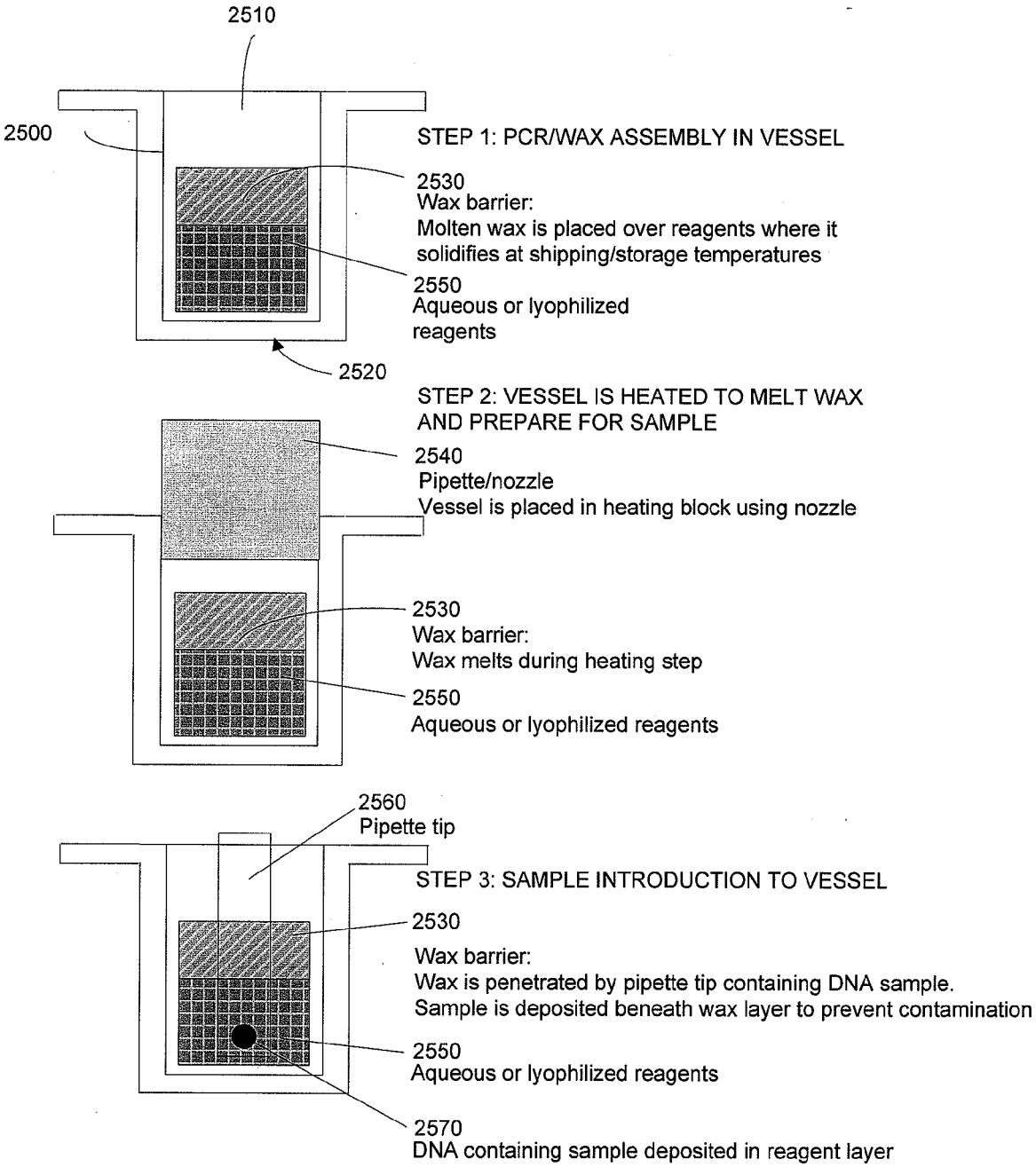
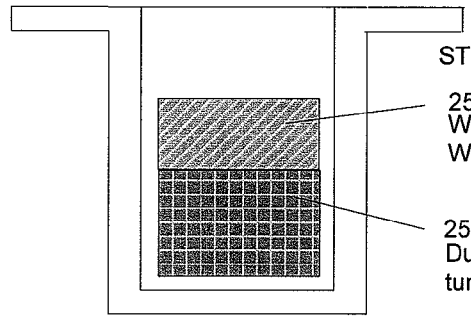

2510
2500
STEP 1: PCR/WAX ASSEMBLY IN VESSEL
2530
Wax barrier:
Molten wax is placed over reagents where it solidifies at shipping/storage temperatures
2550
Aqueous or lyophilized reagents
2520
STEP 2: VESSEL IS HEATED TO MELT WAX AND PREPARE FOR SAMPLE
2540
Pipette/nozzle
Vessel is placed in heating block using nozzle
2530
Wax barrier:
Wax melts during heating step
2550
Aqueous or lyophilized reagents
2560
Pipette tip
STEP 3: SAMPLE INTRODUCTION TO VESSEL
2530
Wax barrier:
Wax is penetrated by pipette tip containing DNA sample.
Sample is deposited beneath wax layer to prevent contamination
2550
Aqueous or lyophilized reagents
2570
DNA containing sample deposited in reagent layer

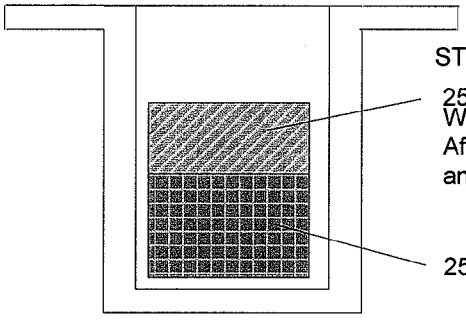
FIG. 25



STEP 4: AMPLIFICATION

2530
Wax barrier:
Wax remains a molten barrier during amplification

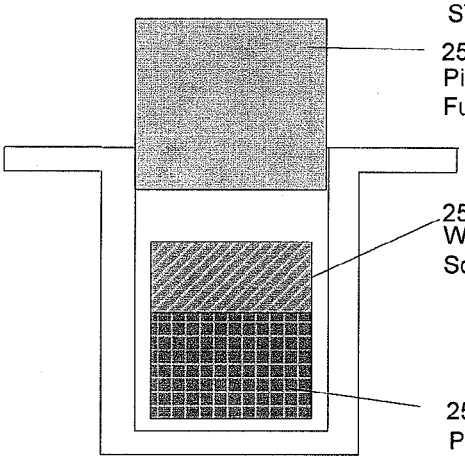
2550
During assay, amplification takes place under wax layer, turbidity readings indicate level of product



STEP 5: POST AMPLIFICATION WAX SOLIDIFICATION

2530
Wax barrier:
After assay readings are taken, the vessel is cooled and the wax resolidifies and provides a containment barrier for the DNA generated by the PCR

2550



STEP 6: REMOVAL OF LAMP VESSEL

2540
Pipette/nozzle
Fully contained used LAMP vessel is removed

2530
Wax barrier:
Solidified wax barrier

2550
PCR product contained, ready for disposal

FIG. 25 Con't

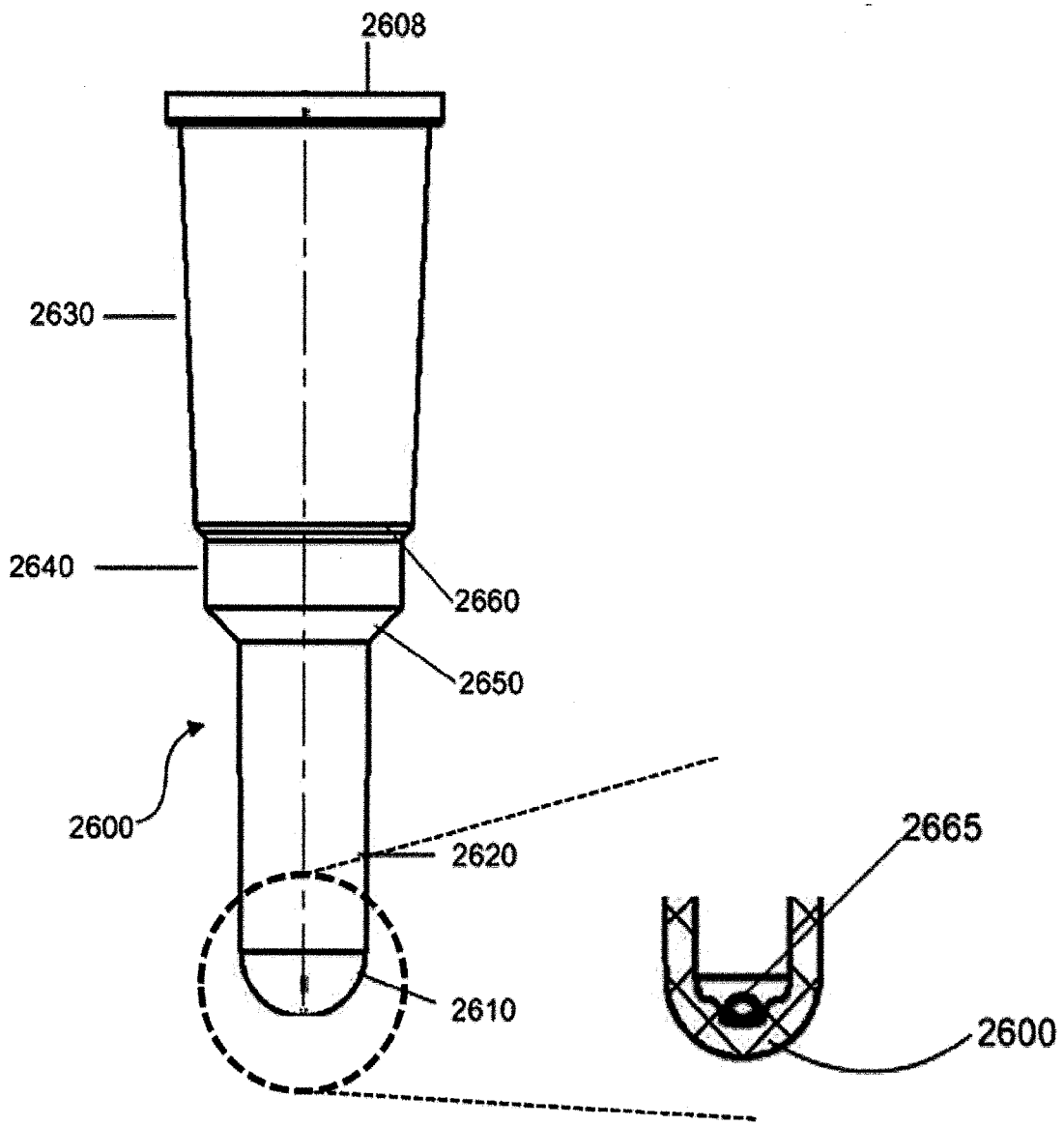


FIG. 26A

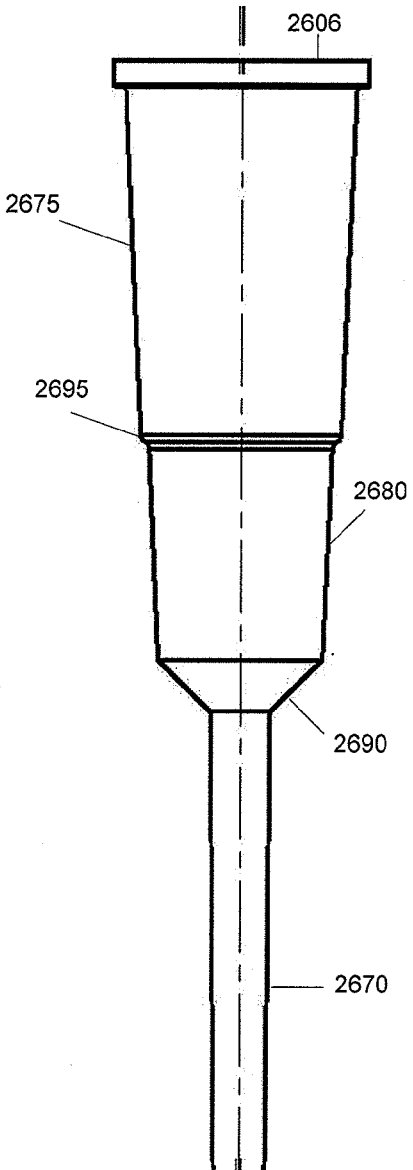


FIG. 26B

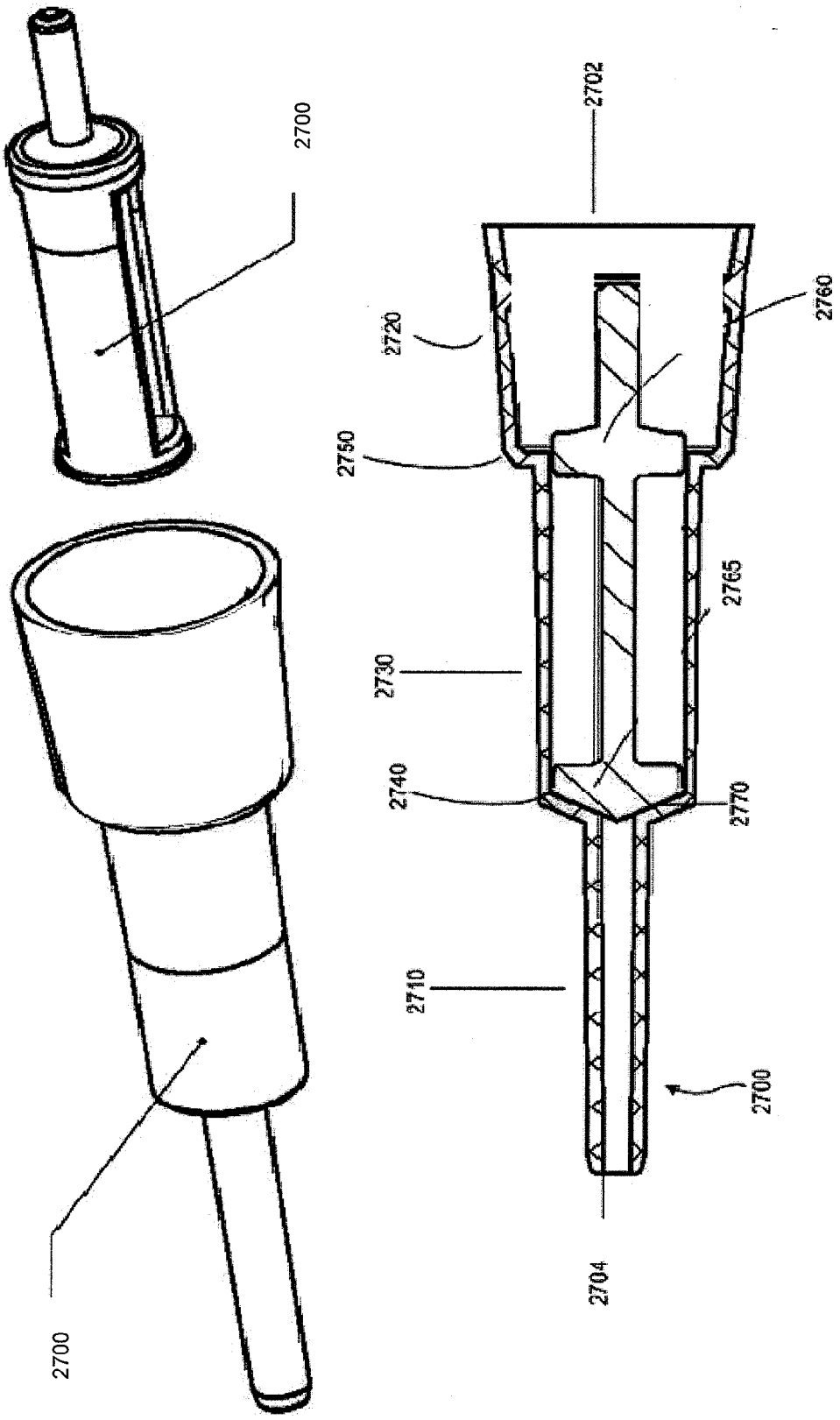

2700
2700
2702
2720
2760
2750
2765
2730
2740
2770
2710
2700
2704

FIG. 27

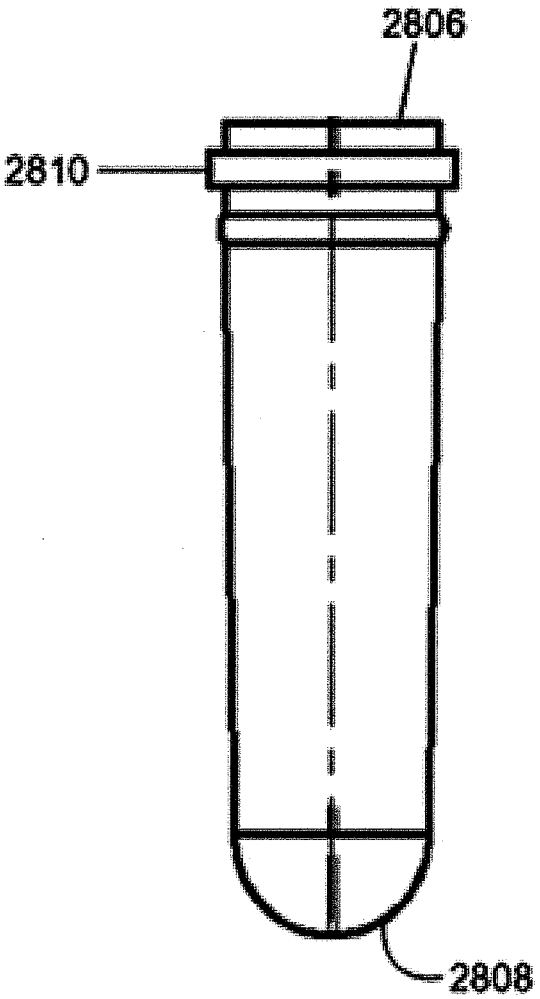


FIG. 28

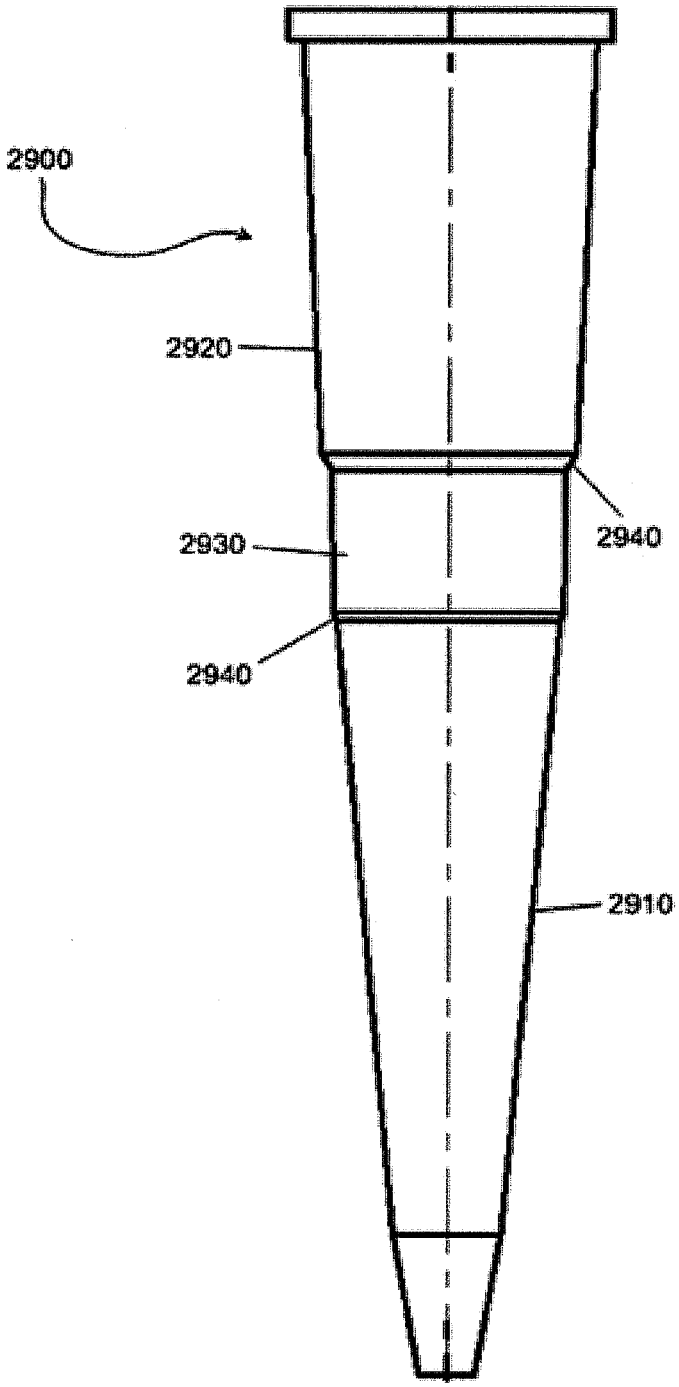


FIG. 29

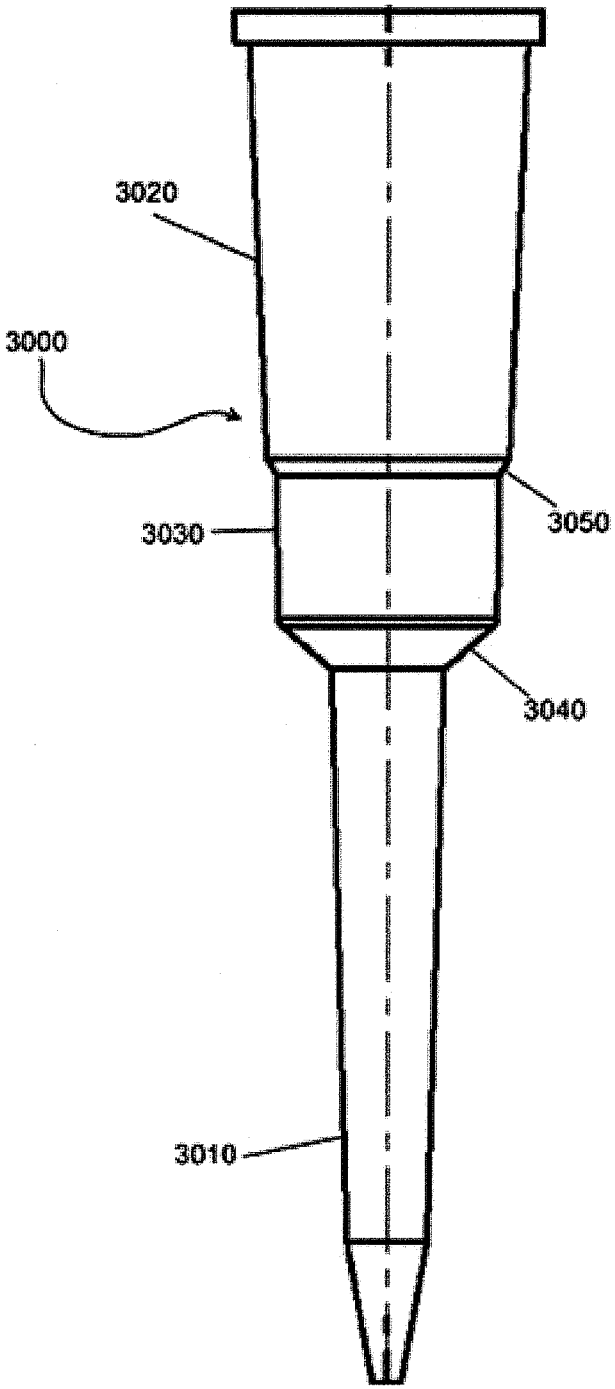


FIG. 30

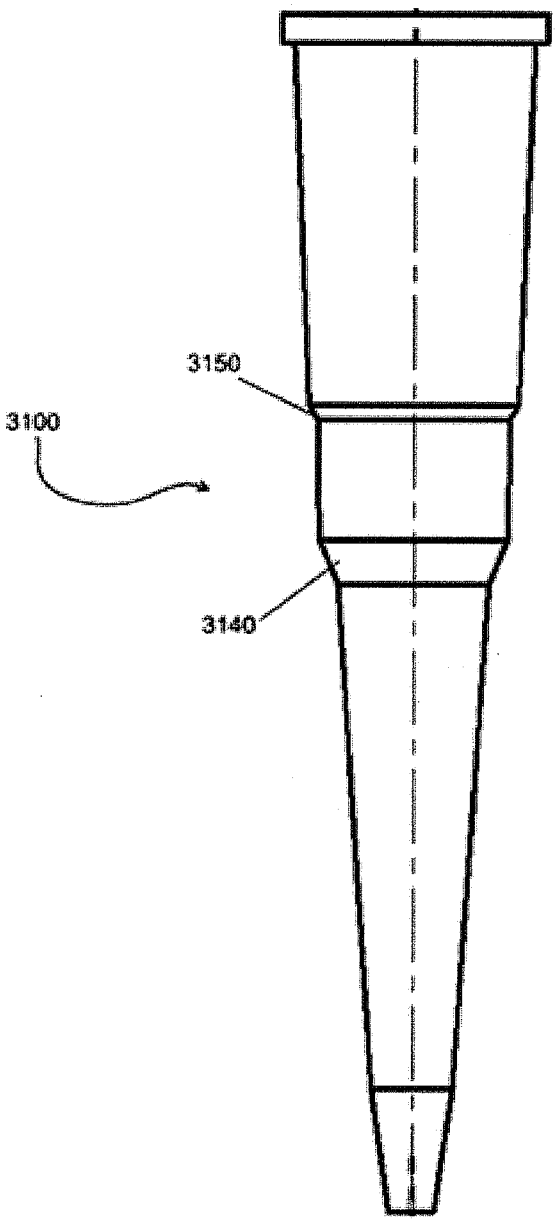


FIG. 31

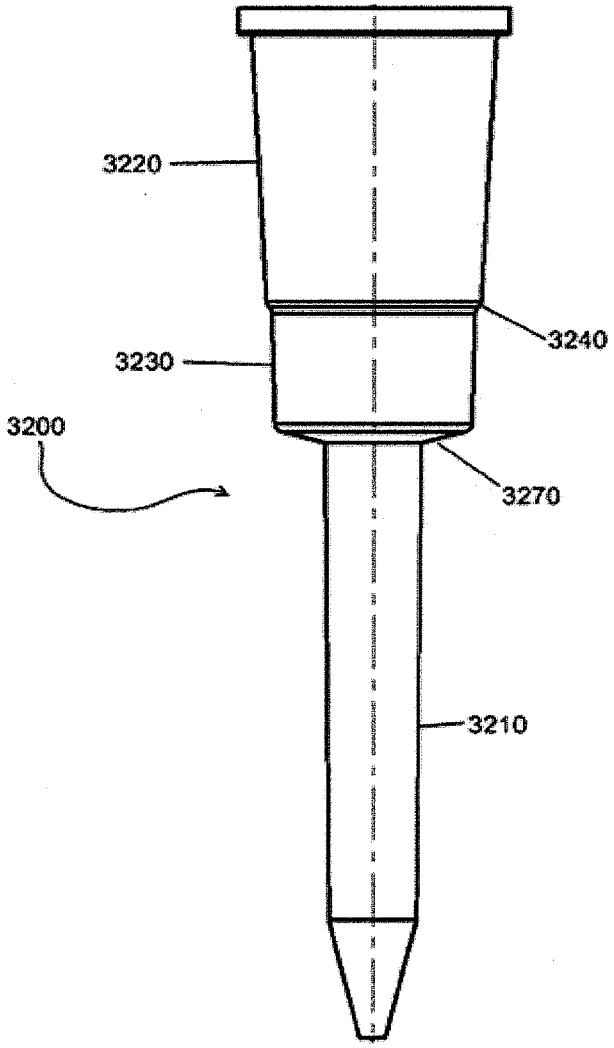


FIG. 32

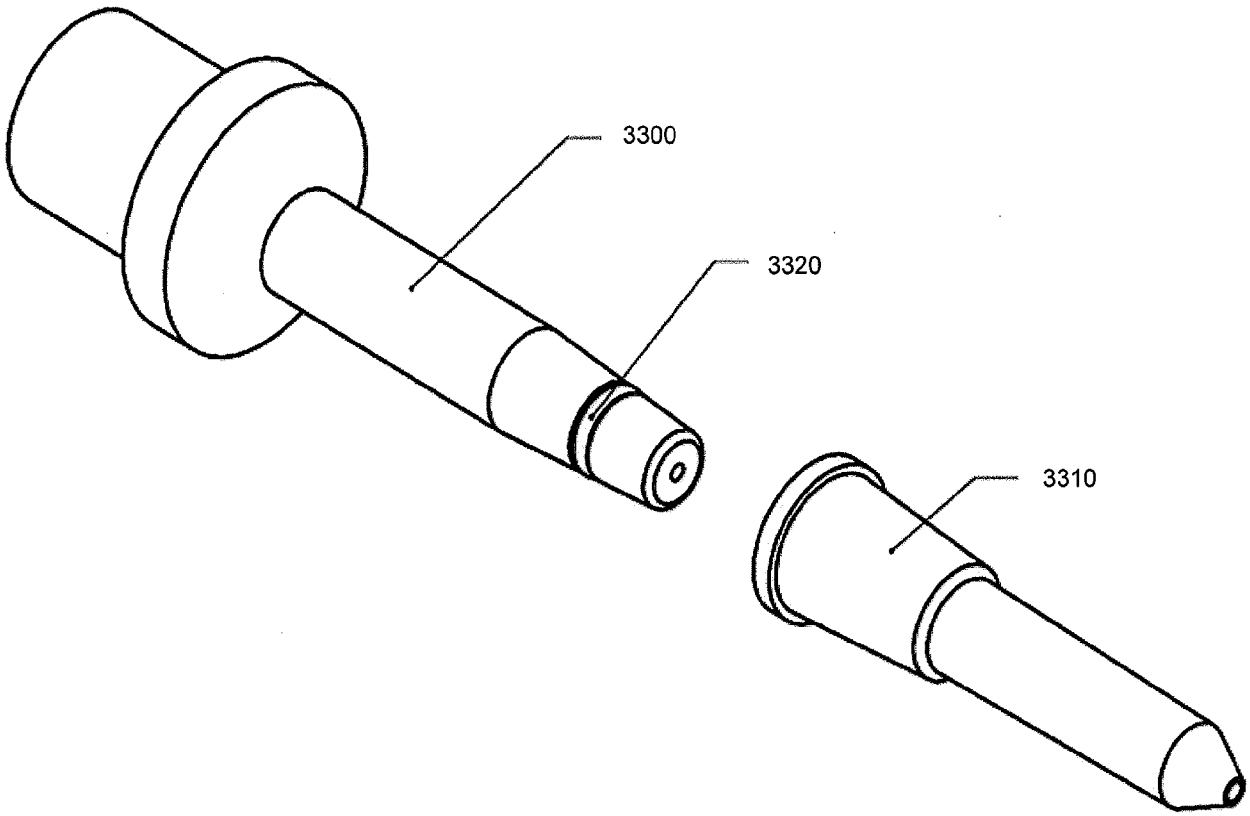


FIG. 33

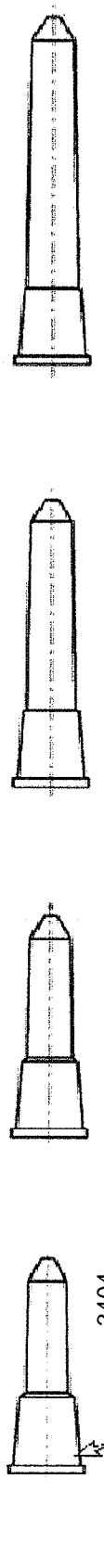


FIG. 34

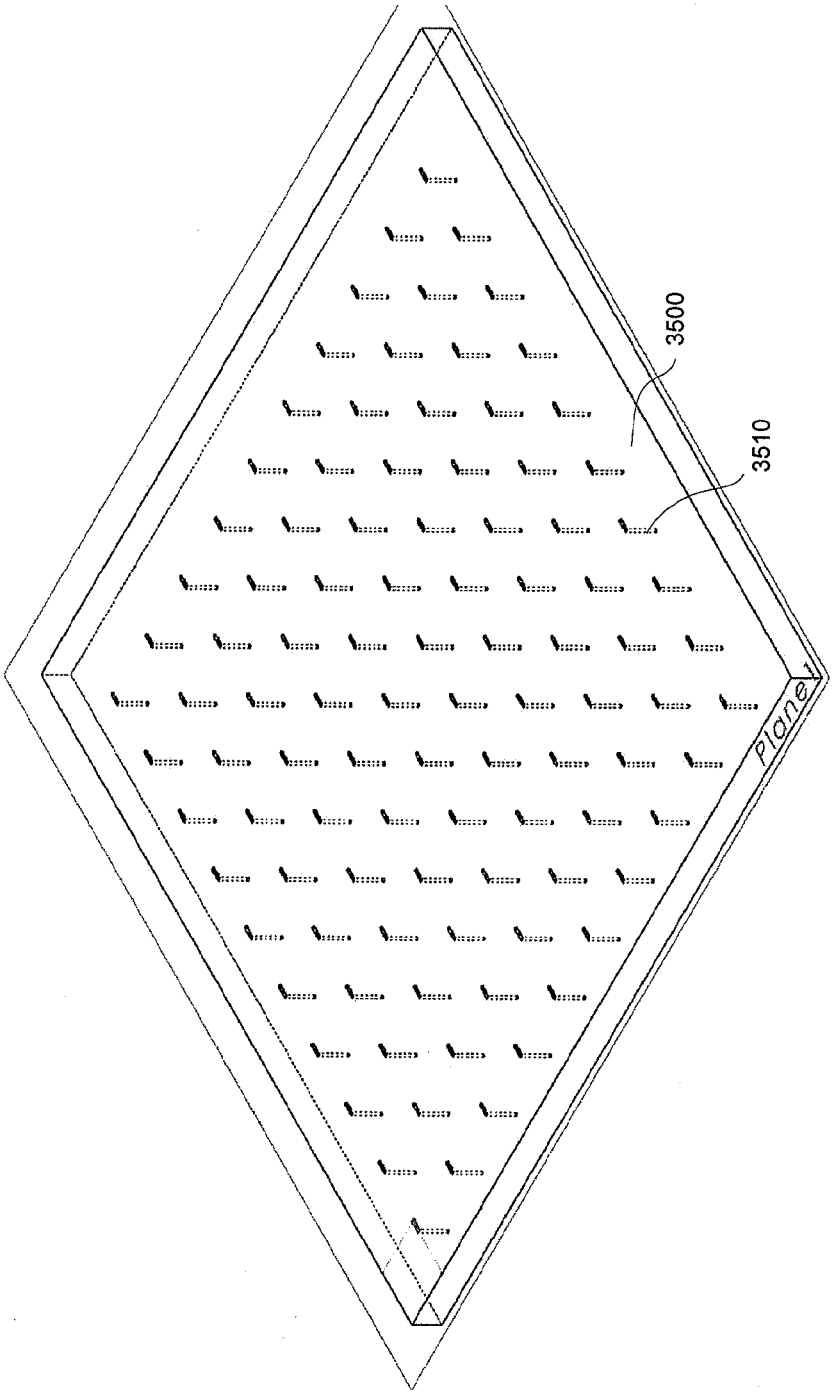


FIG. 35

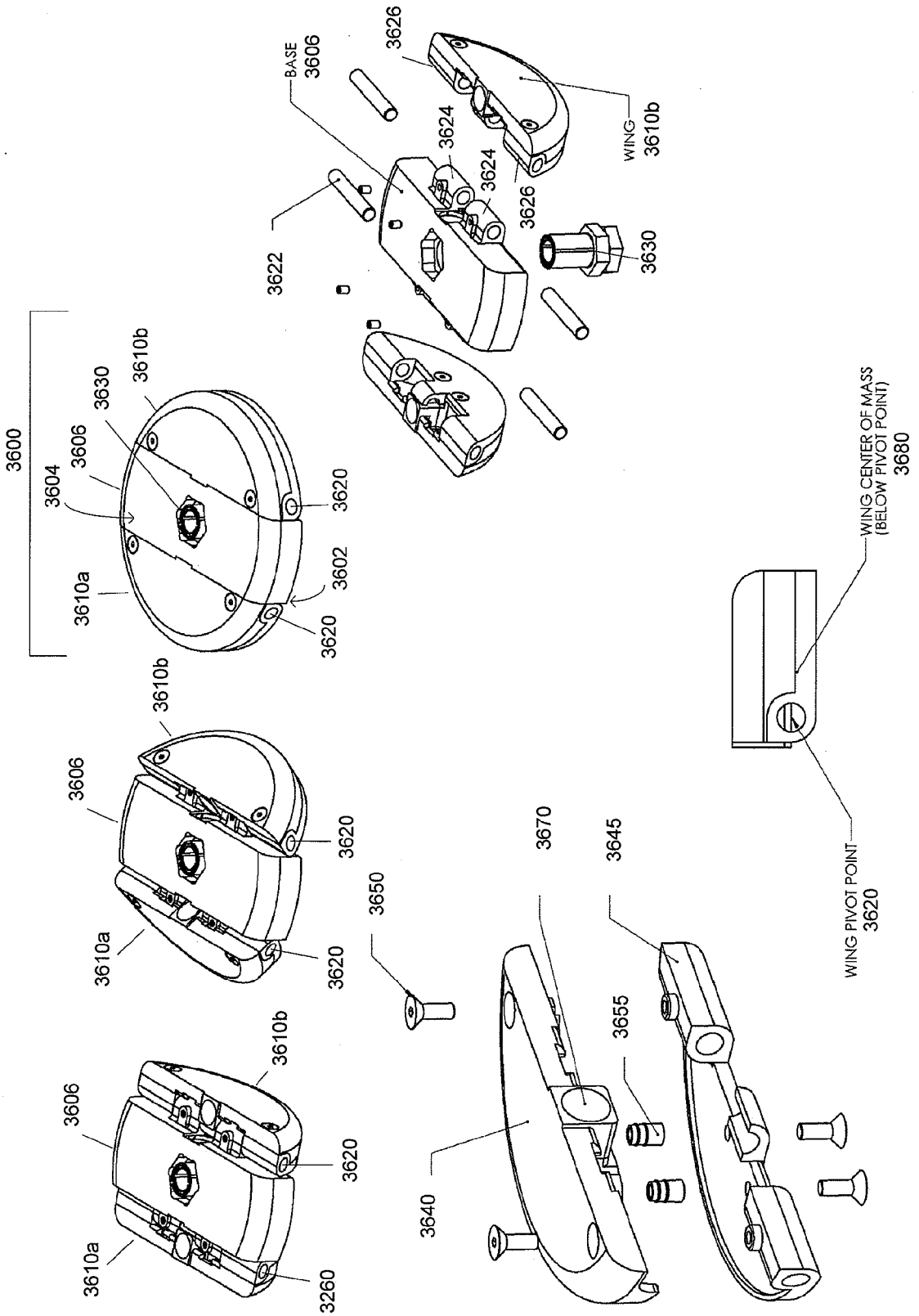

3600
3604
3606
3610b
3630
3620
3602
3610a
3620
3610b
3606
3620
3610a
3620
3610b
3606
3620
3610a
3260
BASE
3606
3626
3624
3624
3626
3622
3630
WING
3610b
3650
3670
3645
3655
3640
WING CENTER OF MASS
(BELOW PIVOT POINT)
3680
WING PIVOT POINT
3620

FIG. 36

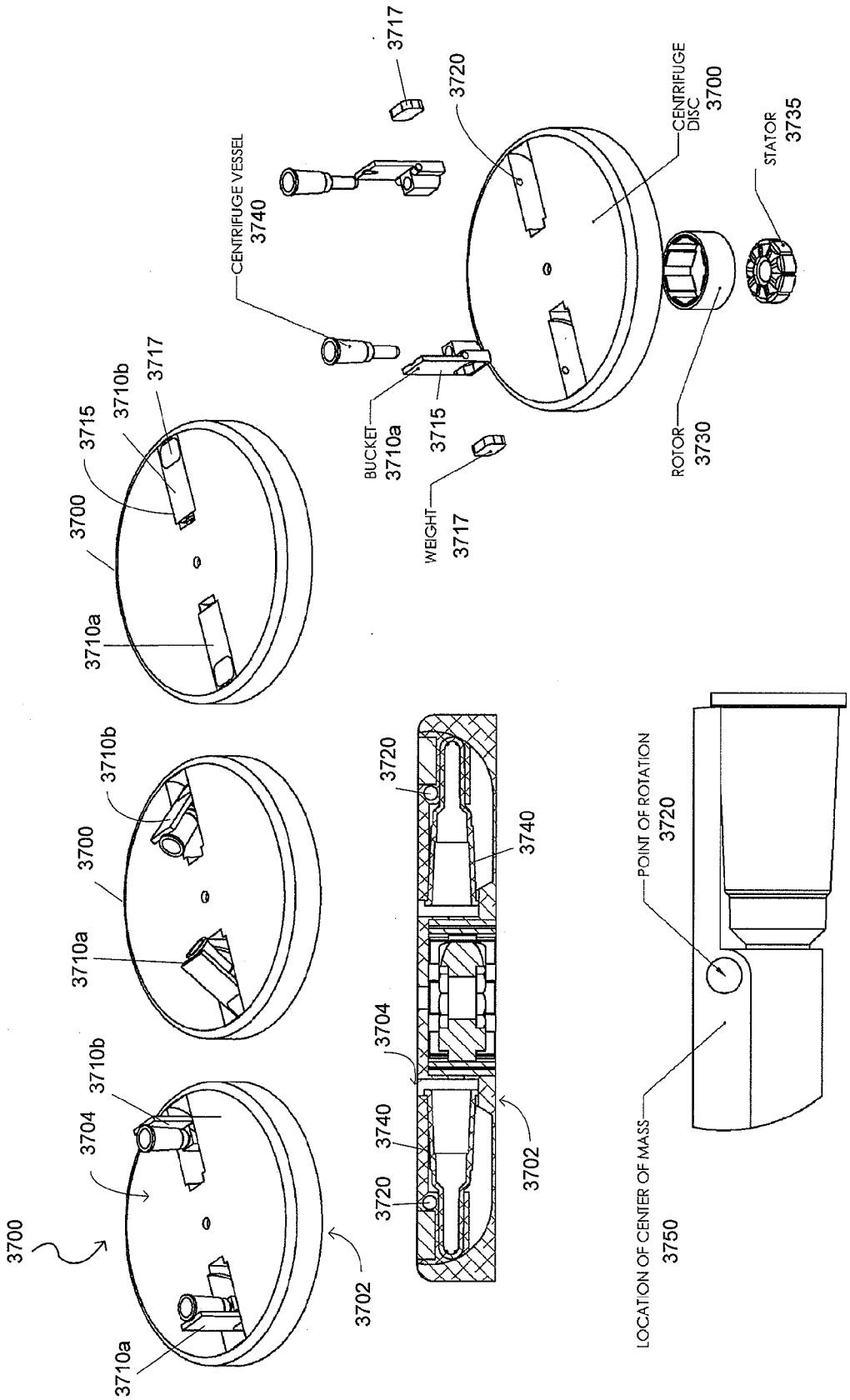

3717
3720
CENTRIFUGE DISC 3700
STATOR 3735
CENTRIFUGE VESSEL 3740
BUCKET 3710a
3715
WEIGHT 3717
ROTOR 3730
3700
3710b
3715
3717
3710a
3720
3740
3704
3702
POINT OF ROTATION 3720
LOCATION OF CENTER OF MASS 3750

FIG. 37

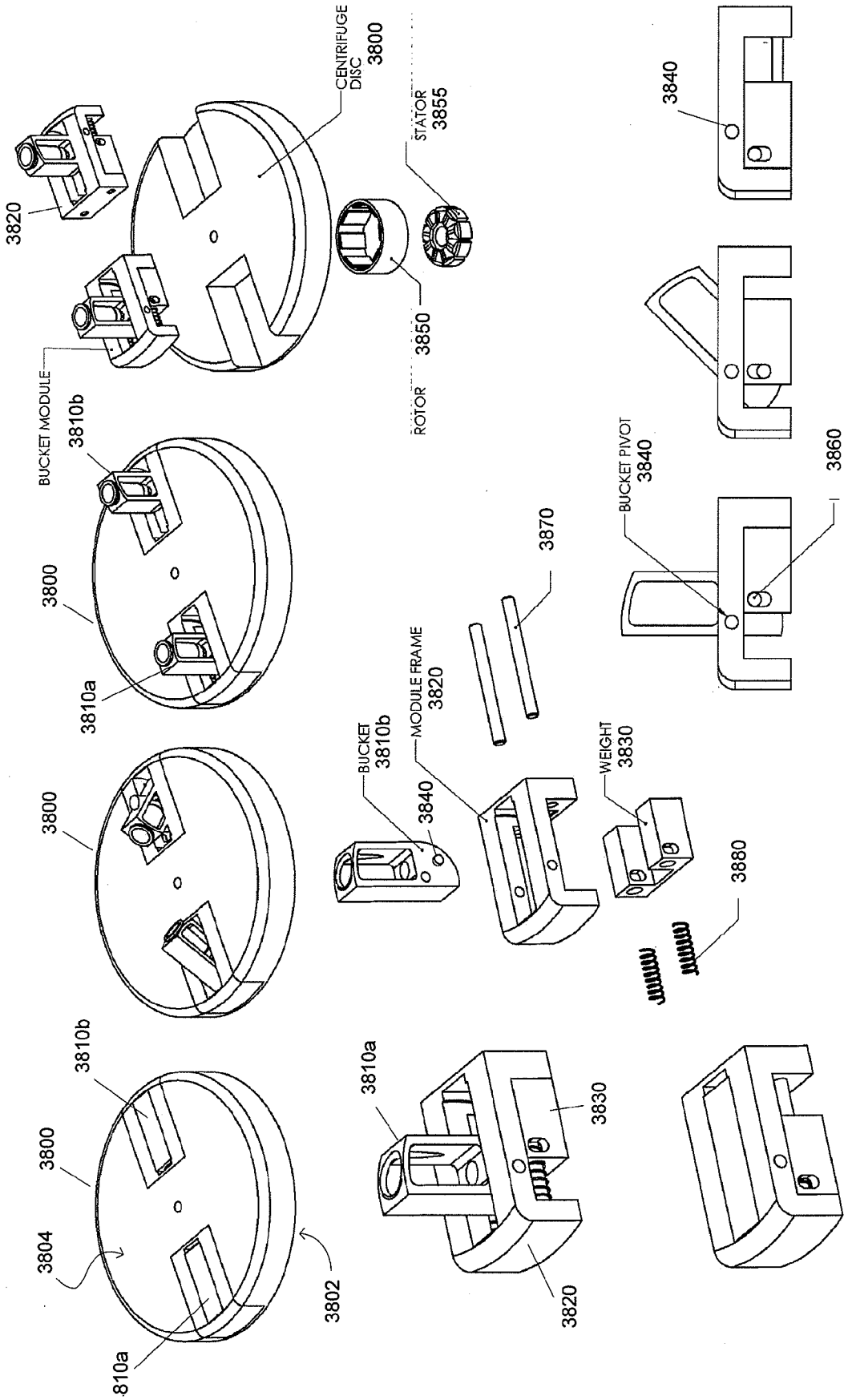

CENTRIFUGE DISC 3800
STATOR 3855
3820
3850
ROTOR
BUCKET MODULE
3810b
3800
3810a
3870
BUCKET PIVOT 3840
3860
3840
BUCKET 3810b
MODULE FRAME 3820
WEIGHT 3830
3880
3804
3802
810a
3830
3820

FIG. 38

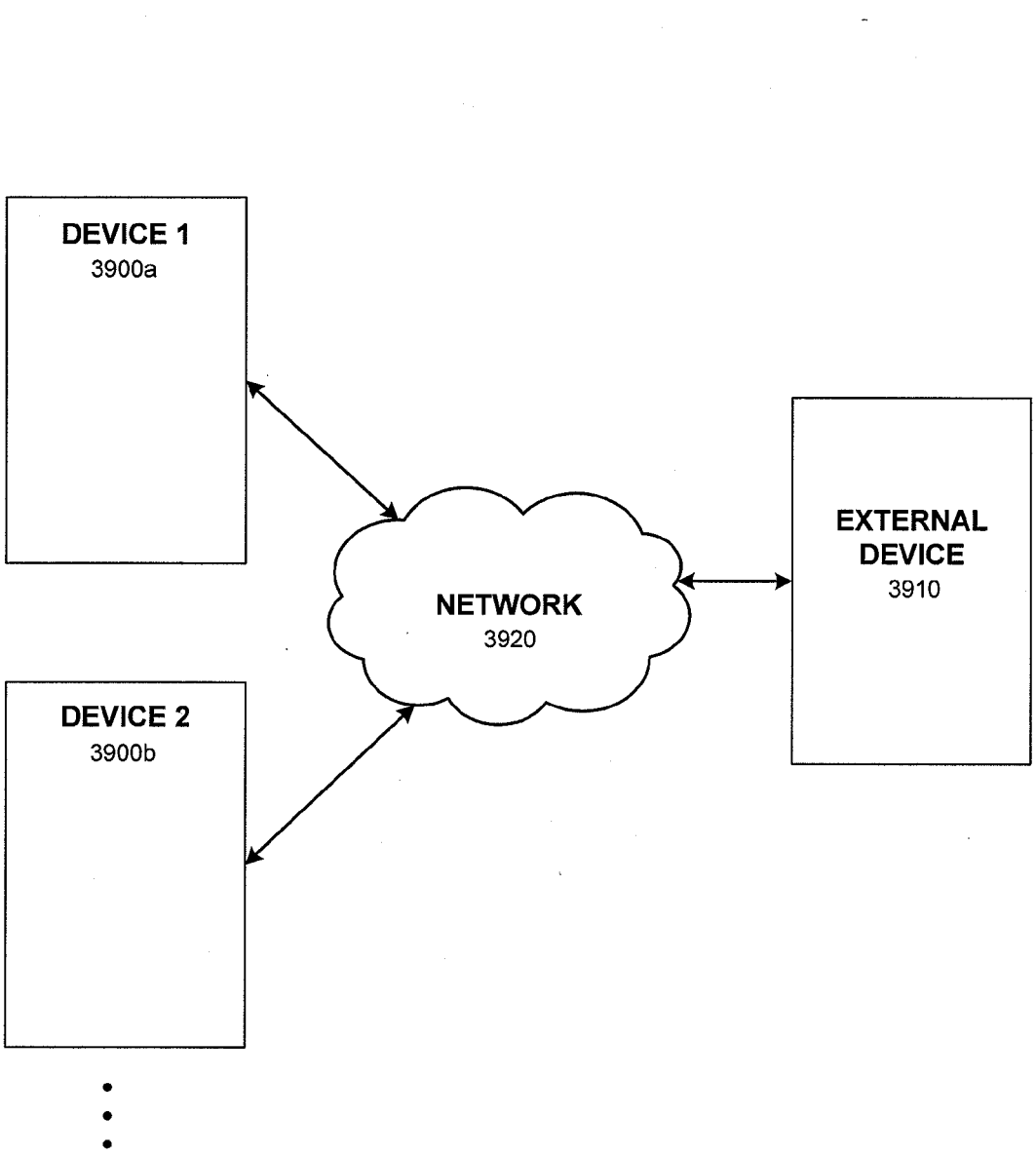

DEVICE 1
3900a
DEVICE 2
3900b
NETWORK
3920
EXTERNAL DEVICE
3910

FIG. 39

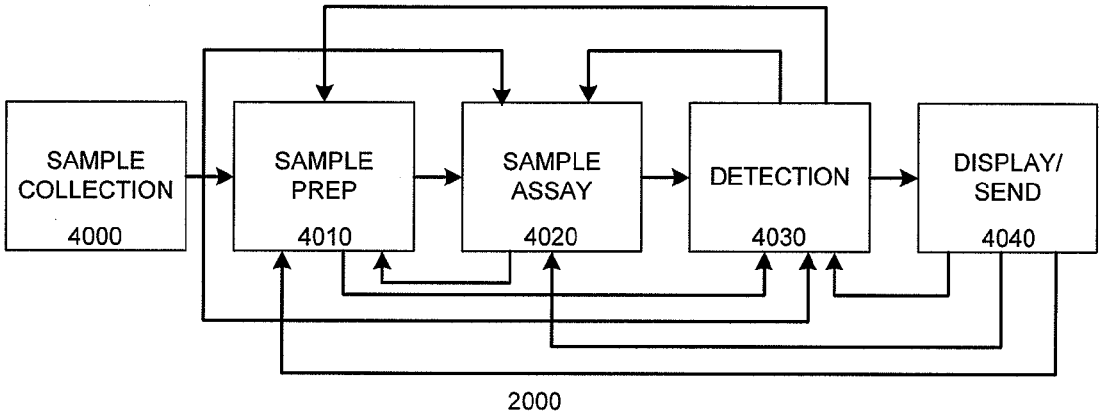

SAMPLE COLLECTION
4000
SAMPLE PREP
4010
SAMPLE ASSAY
4020
DETECTION
4030
DISPLAY/ SEND
4040
2000

FIG. 40

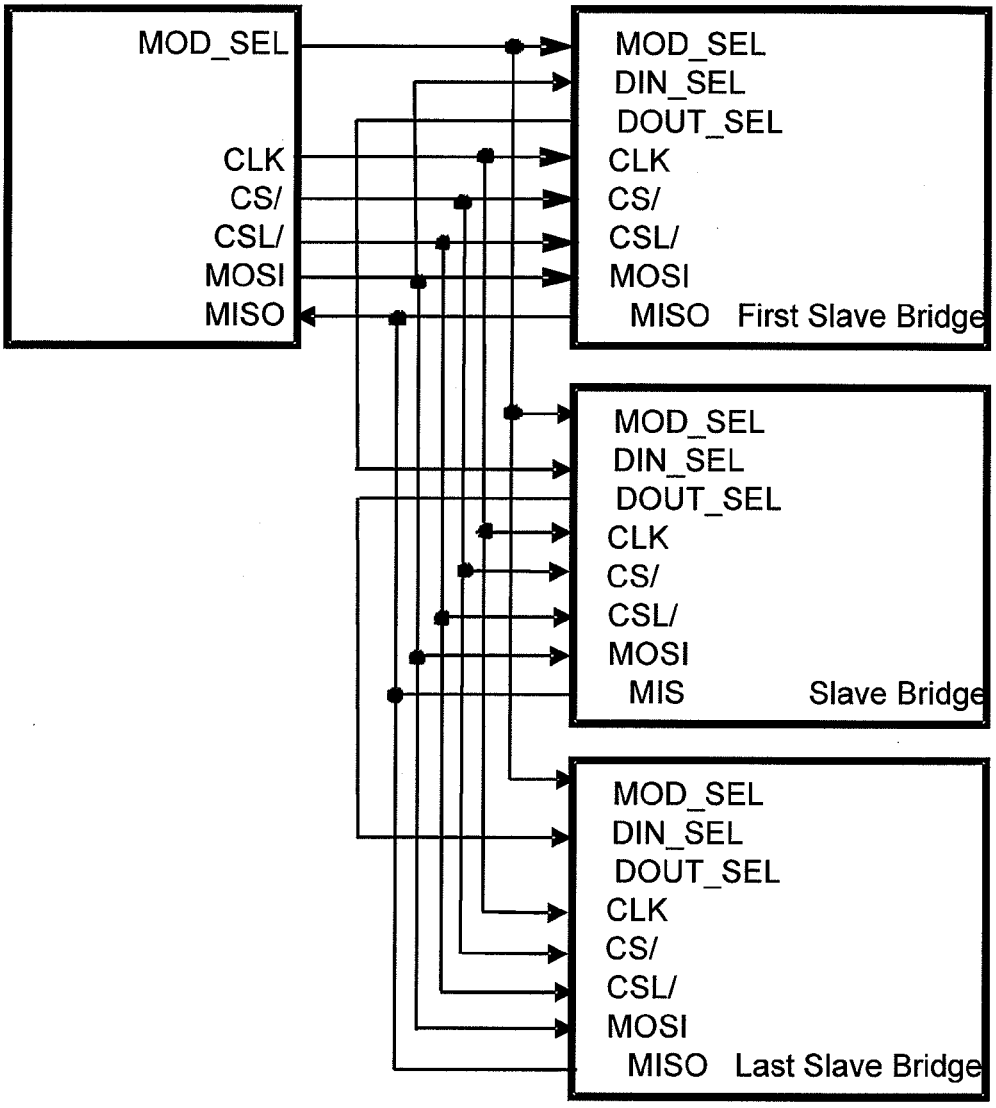

MOD_SEL
CLK
CS/
CSL/
MOSI
MISO
MOD_SEL
DIN_SEL
DOUT_SEL
CLK
CS/
CSL/
MOSI
MISO
First Slave Bridge
MOD_SEL
DIN_SEL
DOUT_SEL
CLK
CS/
CSL/
MOSI
MIS
Slave Bridge
MOD_SEL
DIN_SEL
DOUT_SEL
CLK
CS/
CSL/
MOSI
MISO
Last Slave Bridge

FIG. 41A

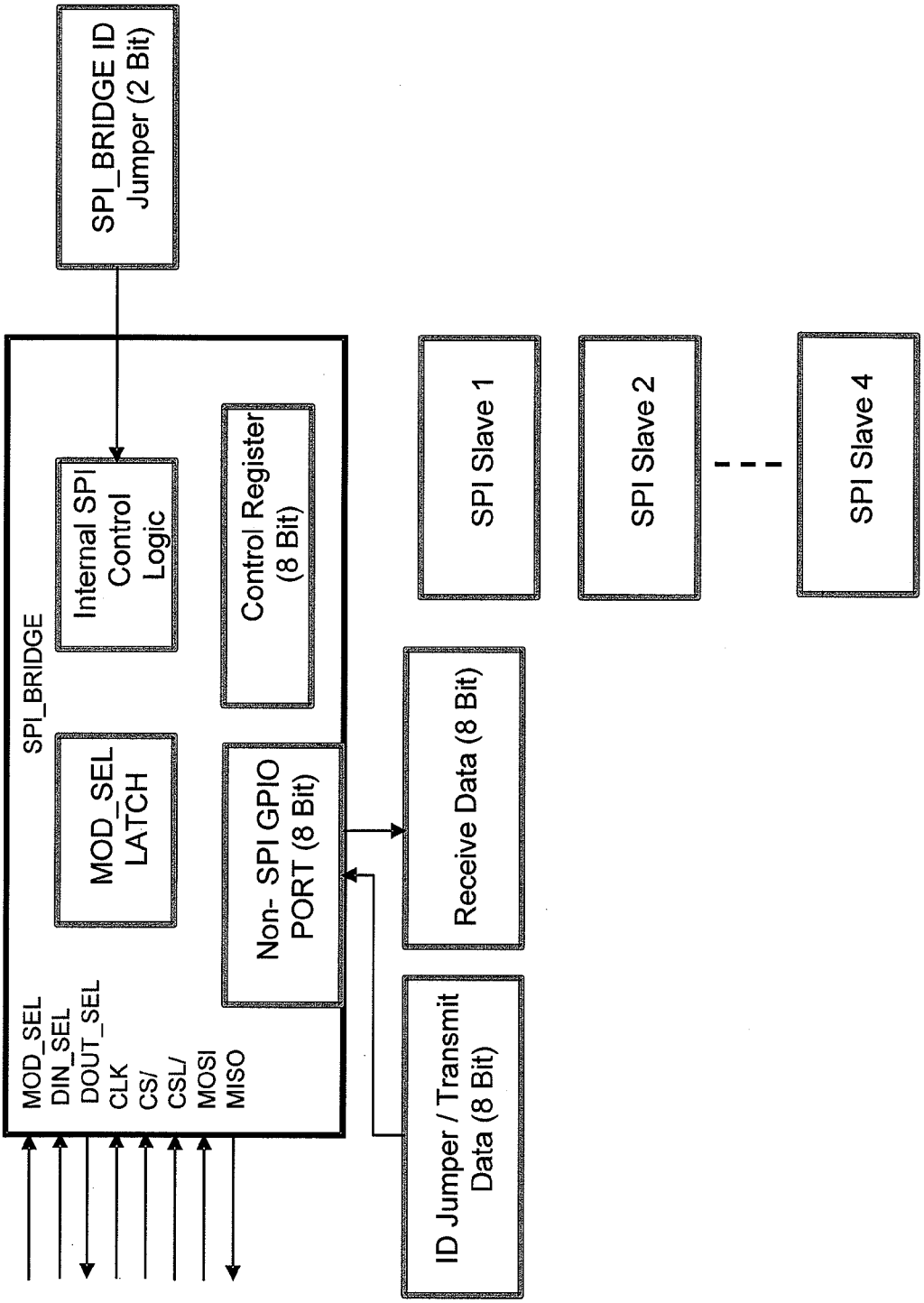

SPI_BRIDGE ID Jumper (2 Bit)
SPI_BRIDGE
Internal SPI Control Logic
Control Register (8 Bit)
MOD_SEL LATCH
Non- SPI GPIO PORT (8 Bit)
MOD_SEL
DIN_SEL
DOUT_SEL
CLK
CS/
CSL/
MOSI
MISO
SPI Slave 1
SPI Slave 2
SPI Slave 4
Receive Data (8 Bit)
ID Jumper / Transmit Data (8 Bit)

FIG. 41B

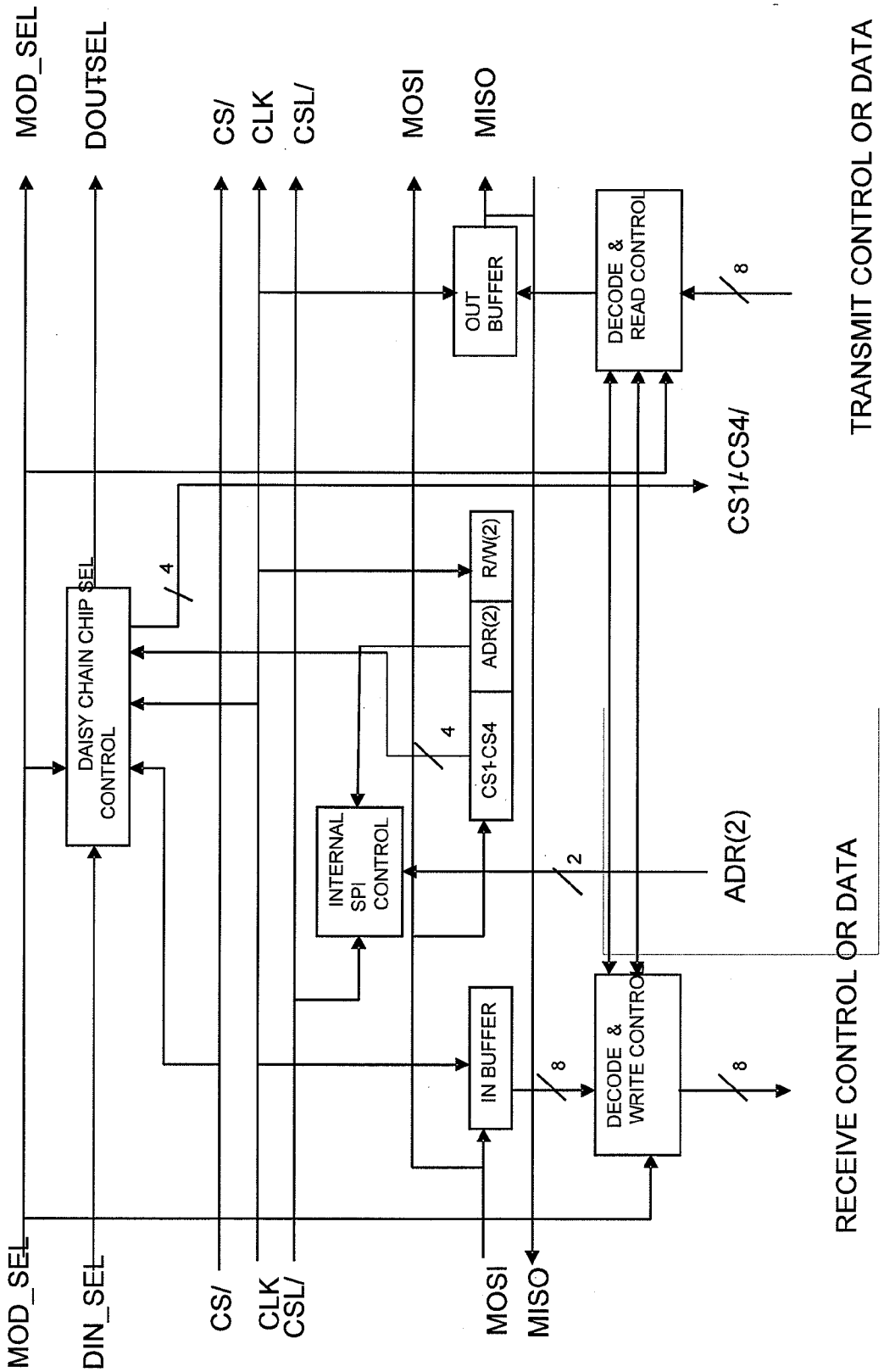

MOD_SEL
DOUTSEL
CS/
CLK
CSL/
MOSI
MISO
OUT BUFFER
DECODE & READ CONTROL
8
TRANSMIT CONTROL OR DATA
CS1-CS4/
DAISY CHAIN CHIP SEL CONTROL
4
R/W(2)
ADR(2)
CS1-CS4
4
INTERNAL SPI CONTROL
2
ADR(2)
IN BUFFER
8
DECODE & WRITE CONTROL
8
RECEIVE CONTROL OR DATA
MOD_SEL
DIN_SEL
CS/
CLK
CSL/
MOSI
MISO

FIG. 41C

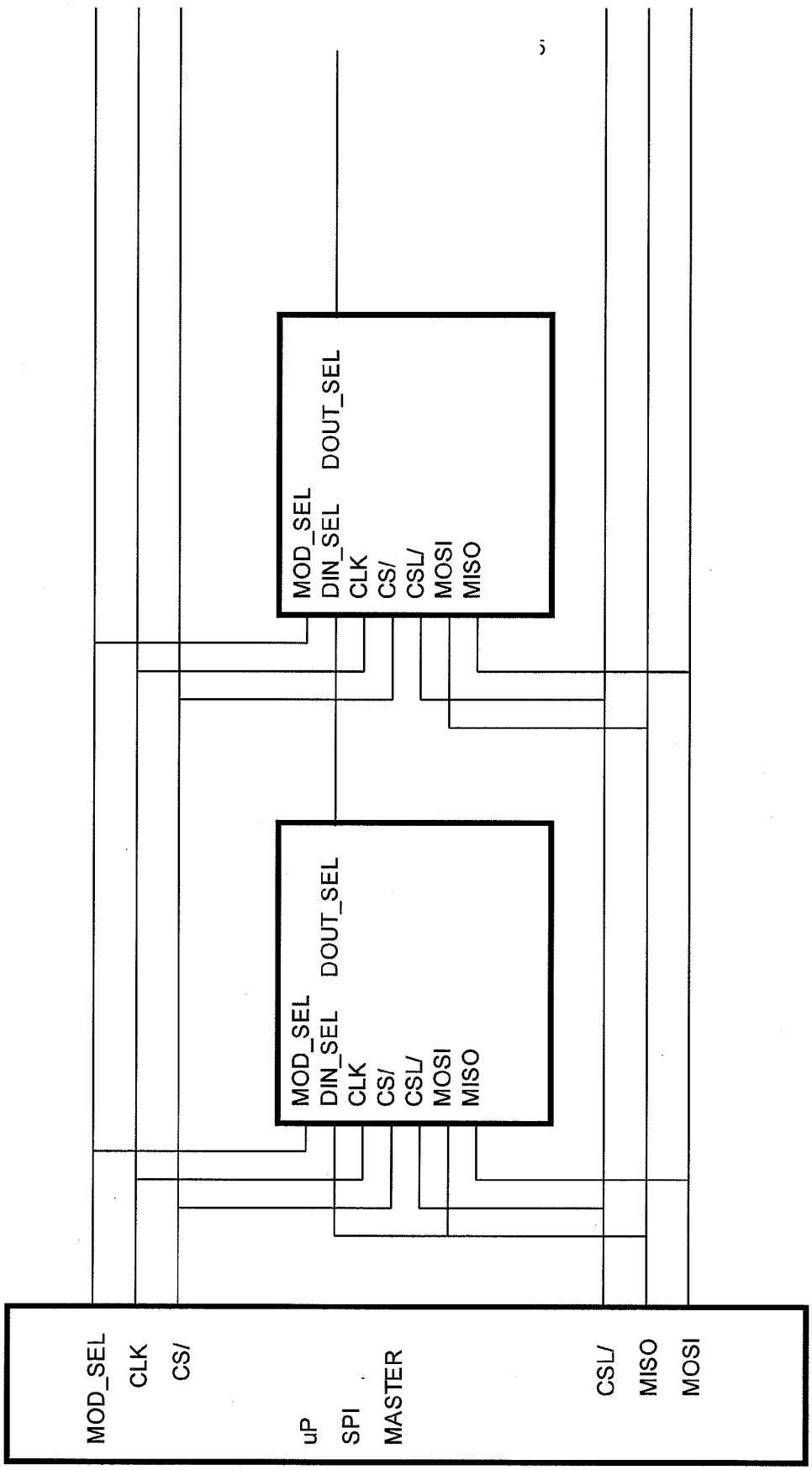

MOD_SEL
DIN_SEL
CLK
CS/
CSL/
MOSI
MISO
DOUT_SEL
MOD_SEL
DIN_SEL
CLK
CS/
CSL/
MOSI
MISO
DOUT_SEL
MOD_SEL
CLK
CS/
uP
SPI
MASTER
CSL/
MISO
MOSI

FIG. 41D

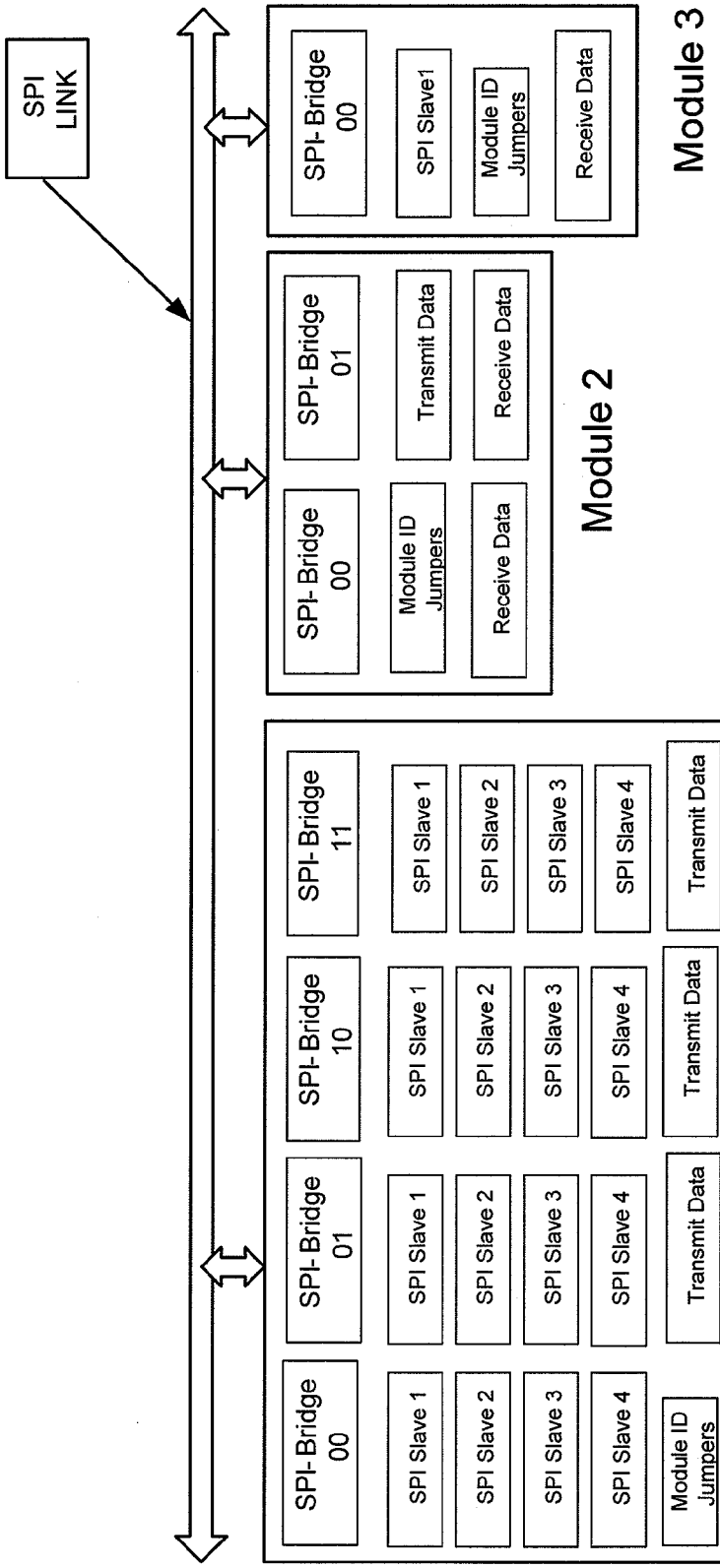

SPI LINK
Module 3
SPI- Bridge 00
SPI Slave1
Module ID Jumpers
Receive Data
Module 2
SPI- Bridge 01
SPI- Bridge 00
Transmit Data
Module ID Jumpers
Receive Data
Receive Data
Module 1
SPI- Bridge 11
SPI- Bridge 10
SPI- Bridge 01
SPI- Bridge 00
SPI Slave 1
SPI Slave 2
SPI Slave 3
SPI Slave 4
Transmit Data
Module ID Jumpers
Receive Data

FIG. 41E

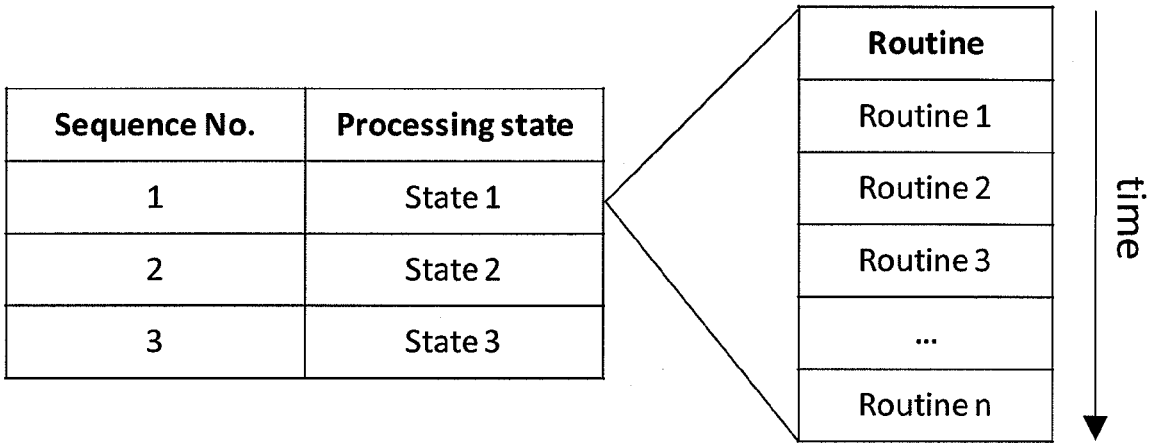

Sequence No.
Processing state
1
State 1
2
State 2
3
State 3
Routine
Routine 1
Routine 2
Routine 3
...
Routine n
time

FIG. 42

Sequence No.	Processing state
1	Centrifuge sample
2	Perform cytometry on sample
3	Conduct agglutination assay on sample

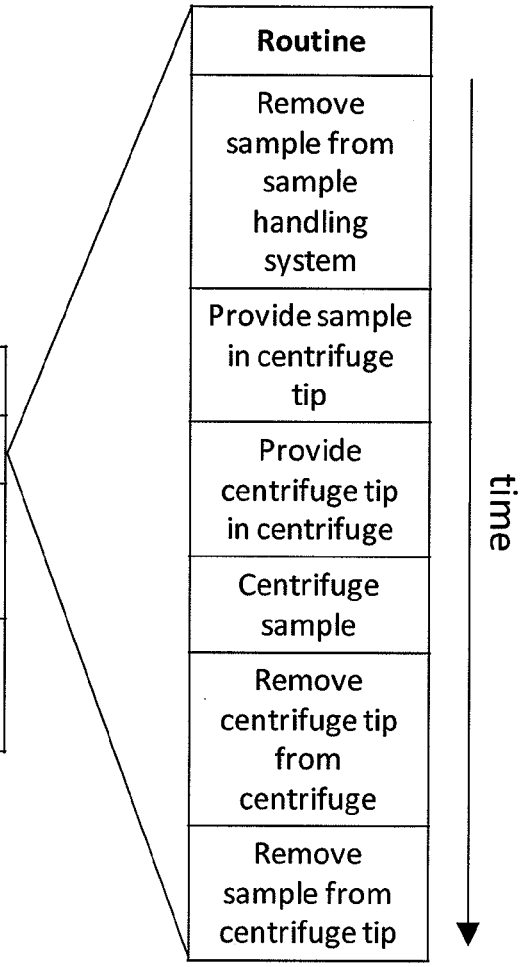


FIG. 43

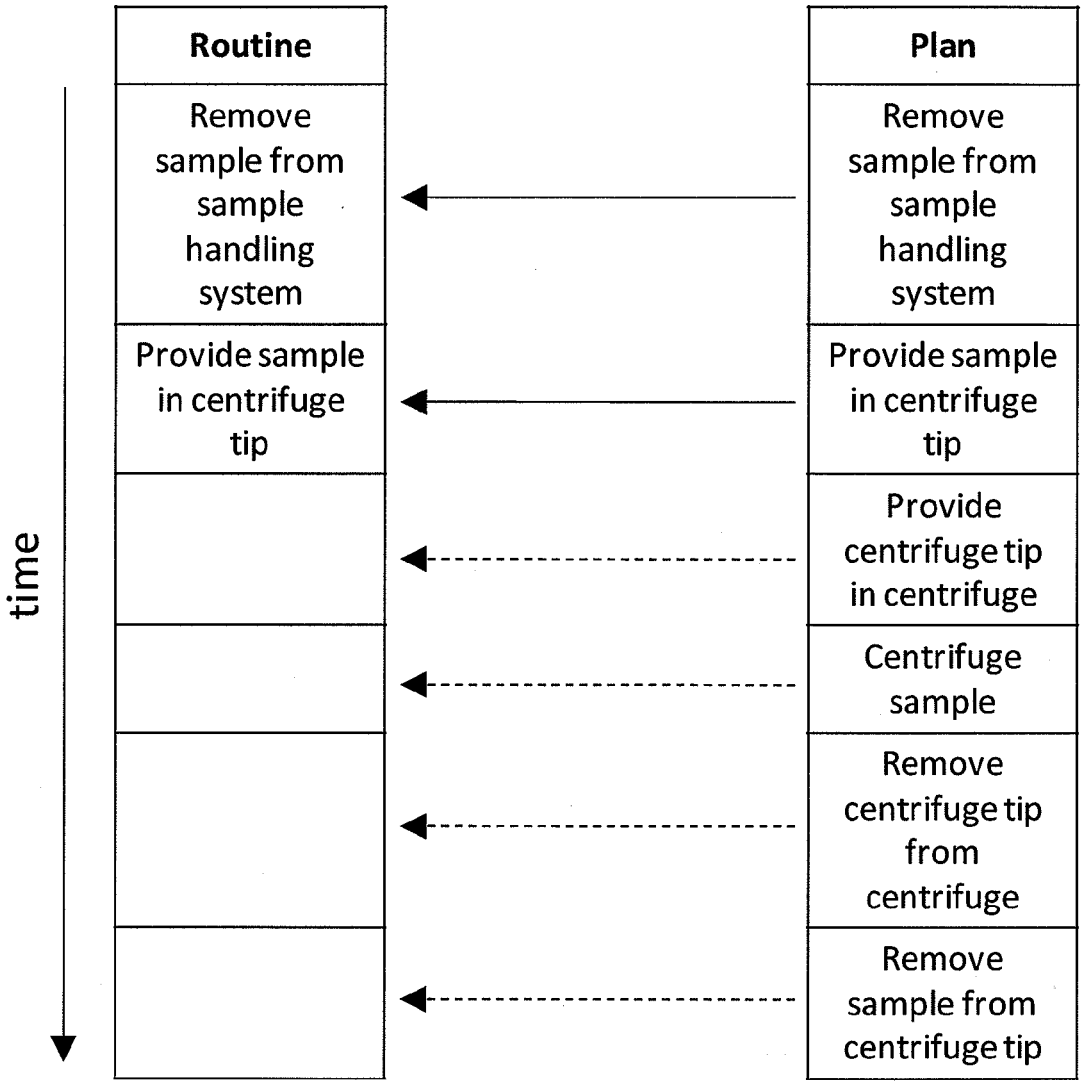

Routine
Plan
Remove sample from sample handling system
Remove sample from sample handling system
Provide sample in centrifuge tip
Provide sample in centrifuge tip
Provide centrifuge tip in centrifuge
Centrifuge sample
Remove centrifuge tip from centrifuge
Remove sample from centrifuge tip
time

FIG. 44

SequenceNo.	Processing state
1	**Centrifuge sample**
2	**Perform cytometry on sample**
3	**Conduct agglutination assay on sample**

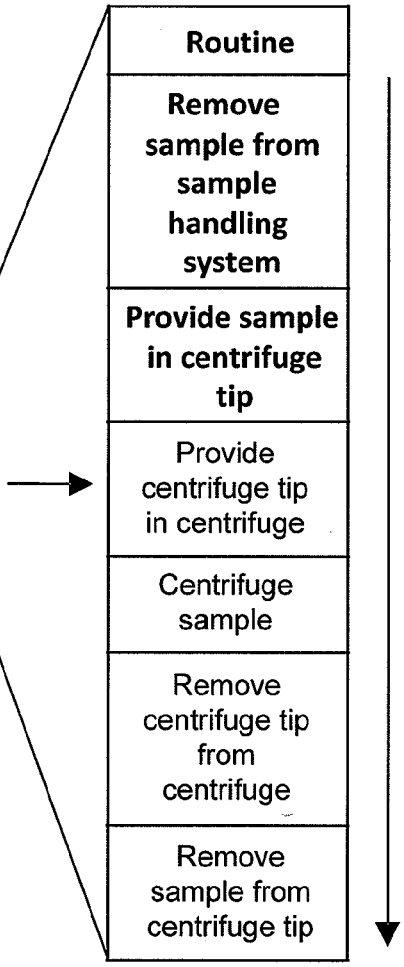


FIG. 45A

Sequence No.	Processing state
1	Centrifuge sample
2	Perform cytometry on sample
3	Conduct agglutination assay on sample

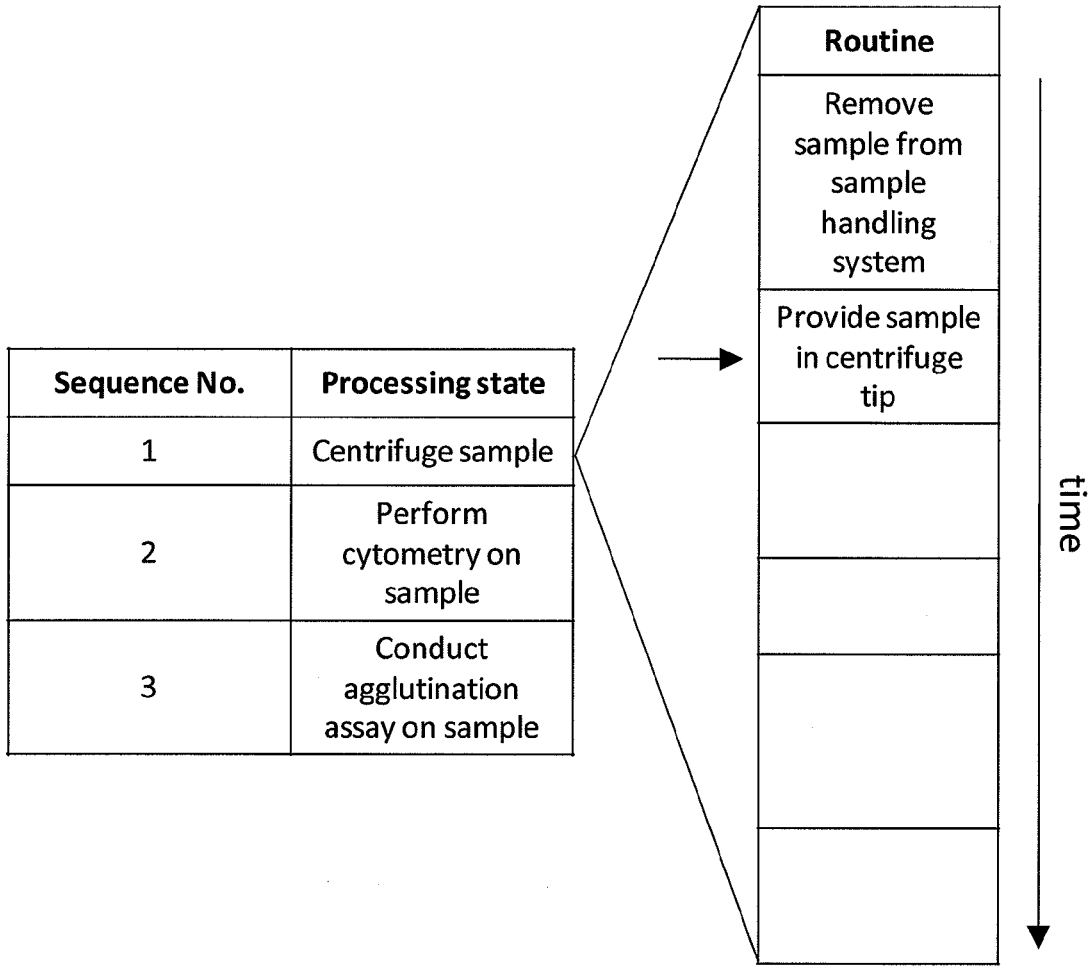


FIG. 45B

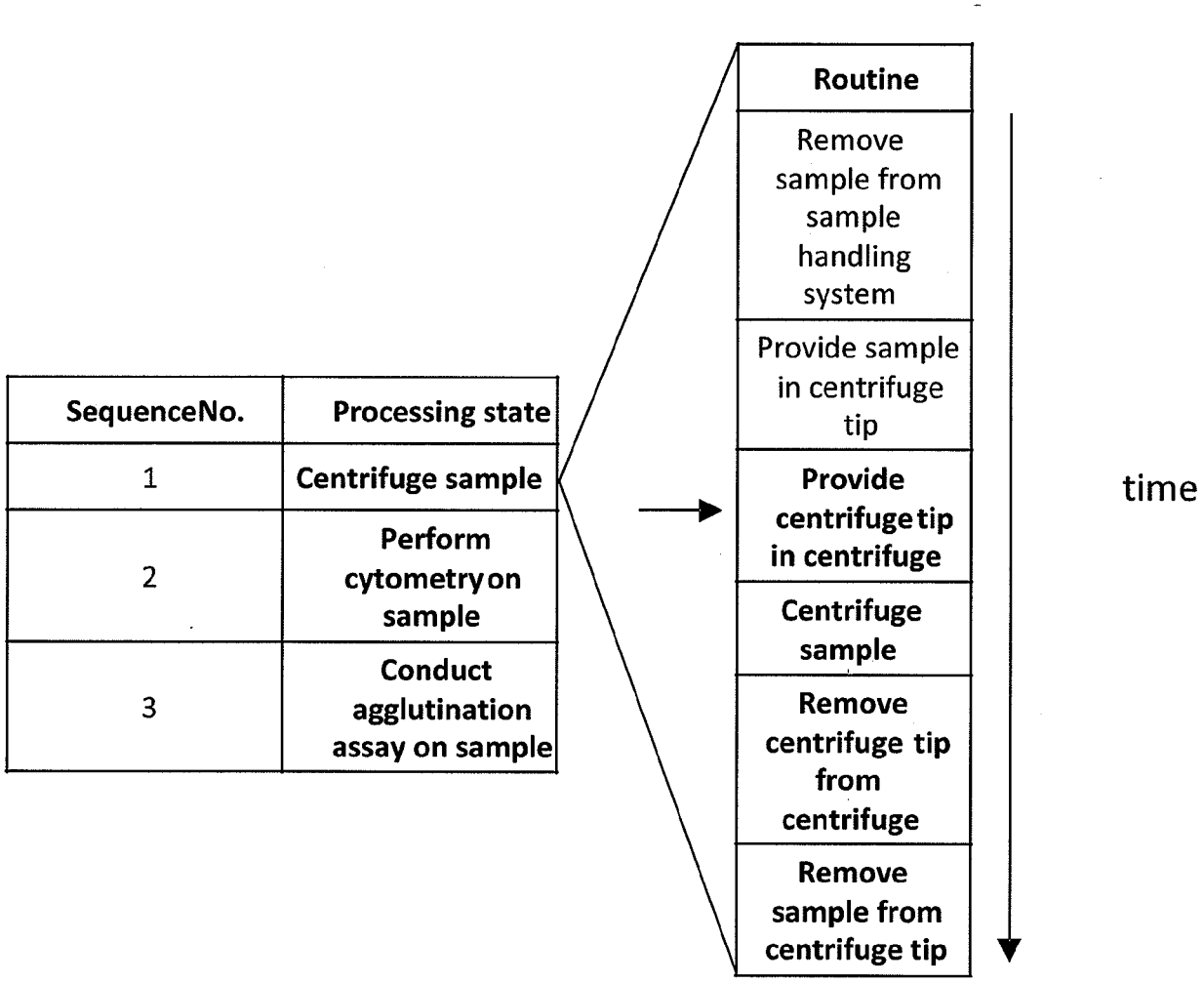

SequenceNo.
Processing state
1
Centrifuge sample
2
Perform cytometry on sample
3
Conduct agglutination assay on sample
Routine
Remove sample from sample handling system
Provide sample in centrifuge tip
Provide centrifuge tip in centrifuge
Centrifuge sample
Remove centrifuge tip from centrifuge
Remove sample from centrifuge tip
time

FIG. 45C

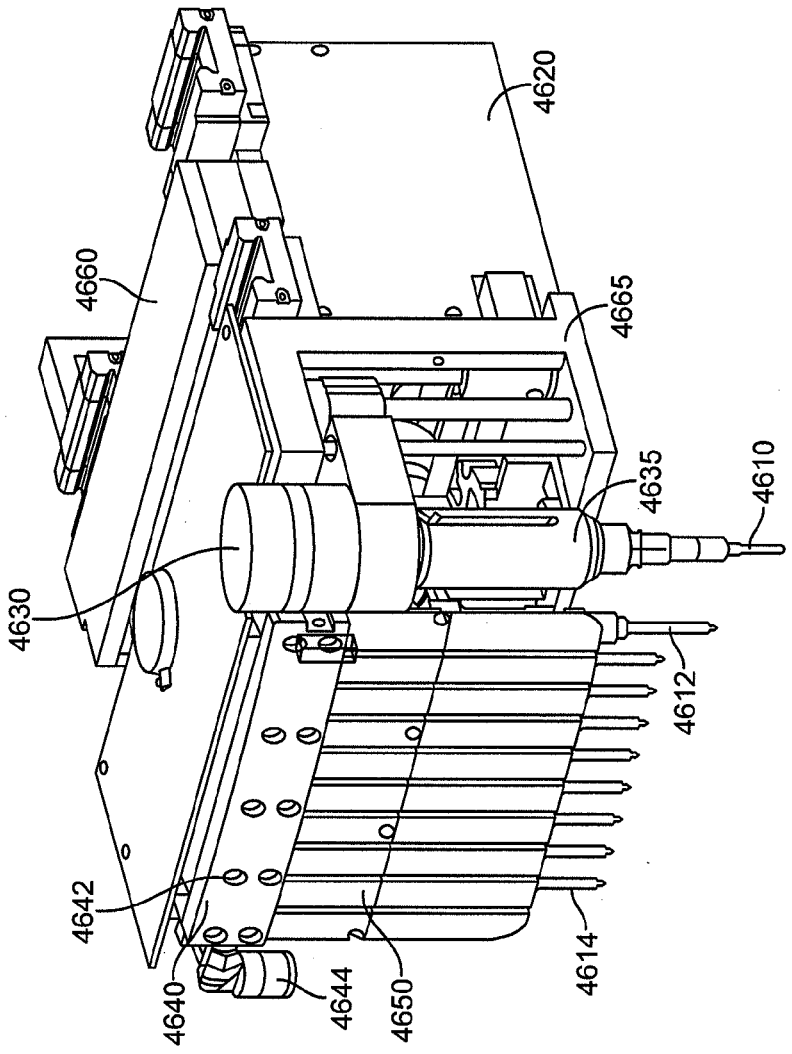


FIG. 46

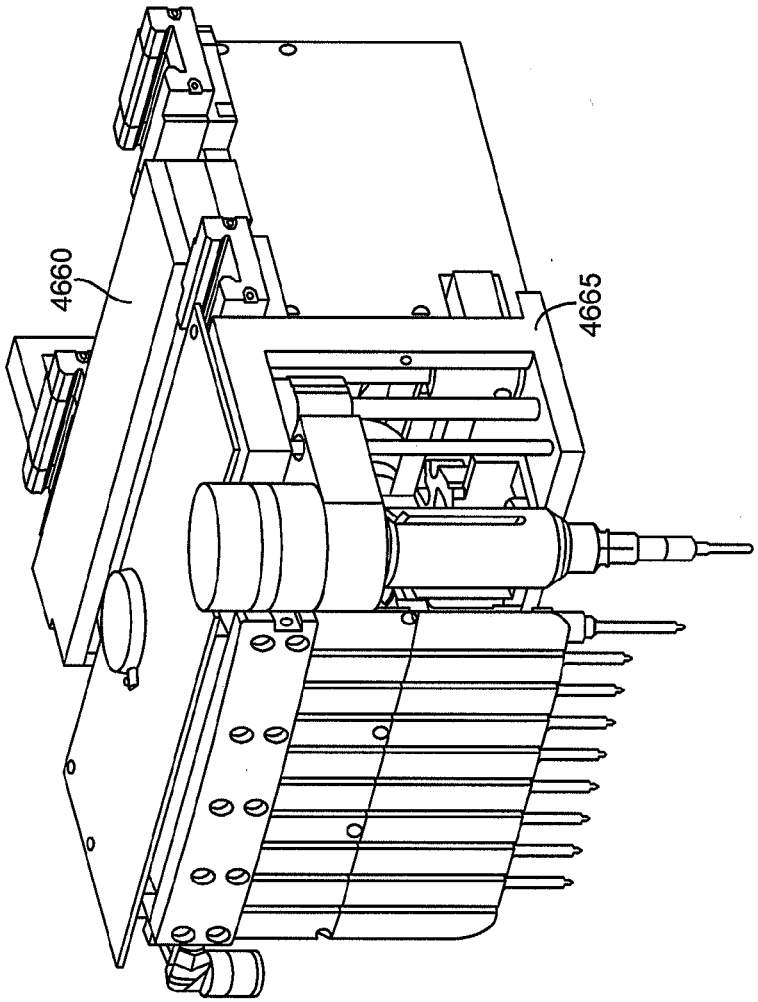


FIG. 46A

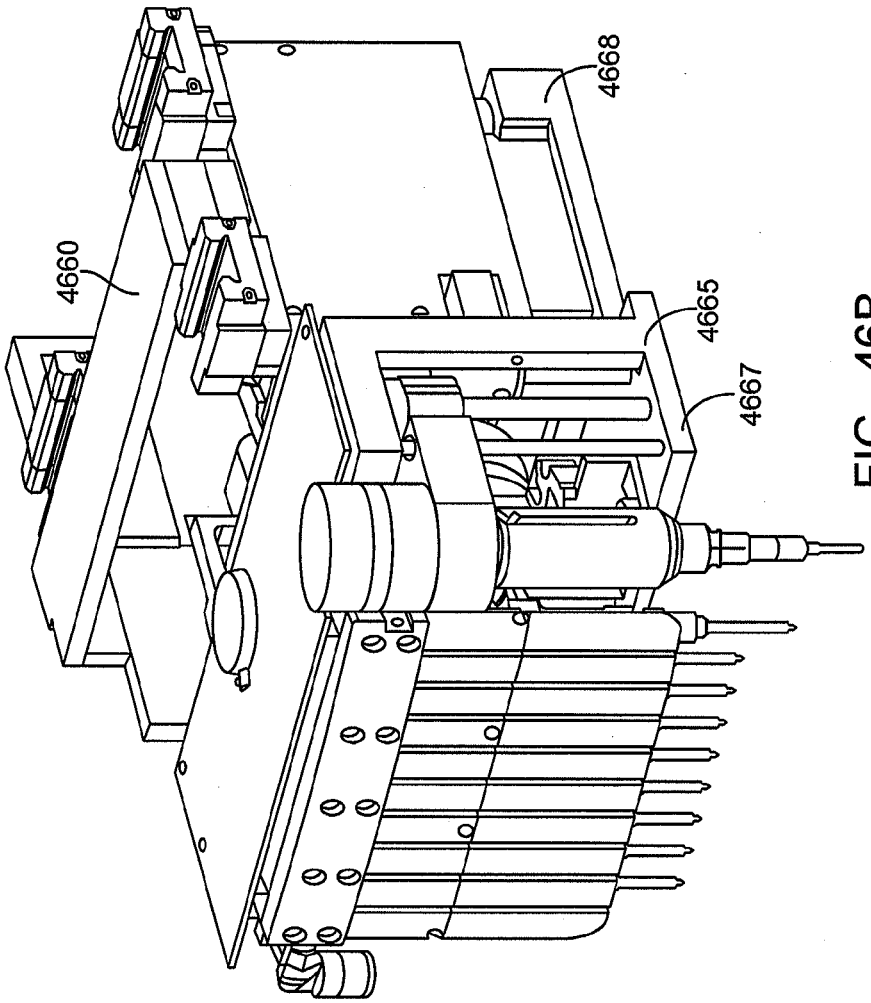


FIG. 46B

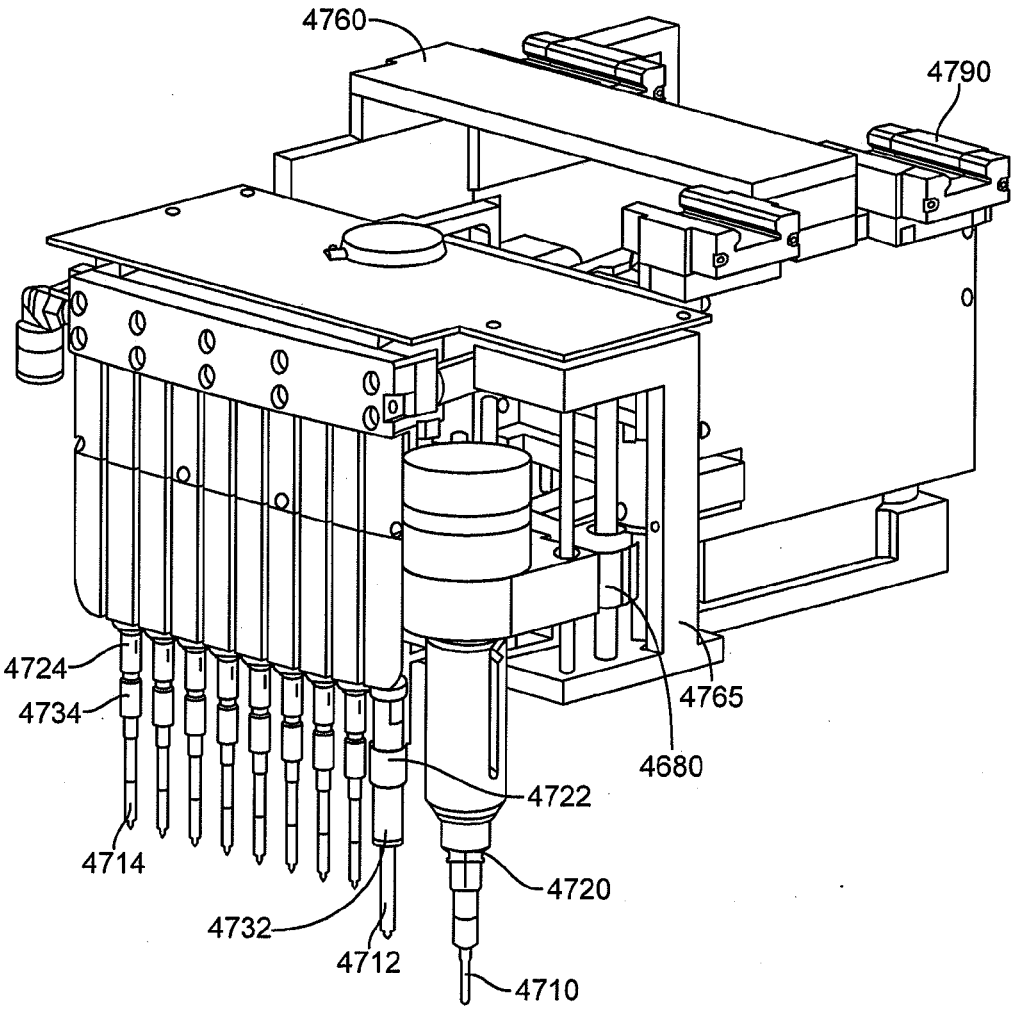


FIG. 47

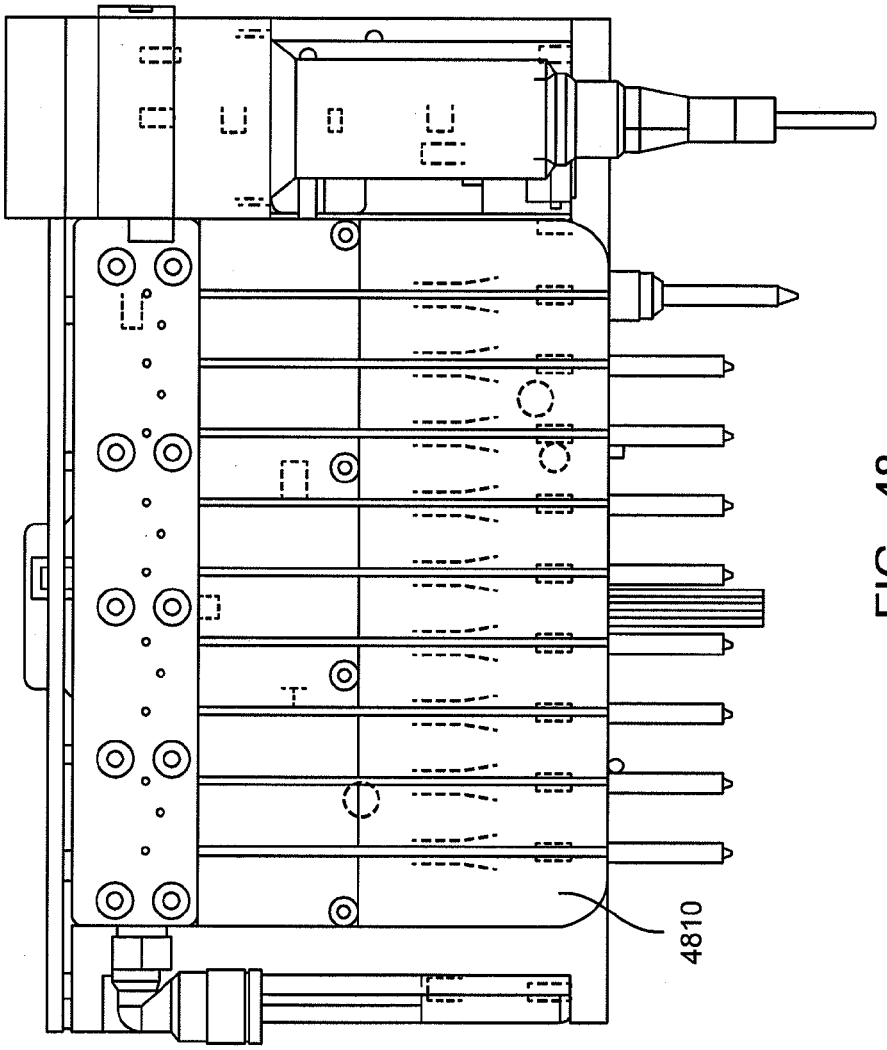


FIG. 48

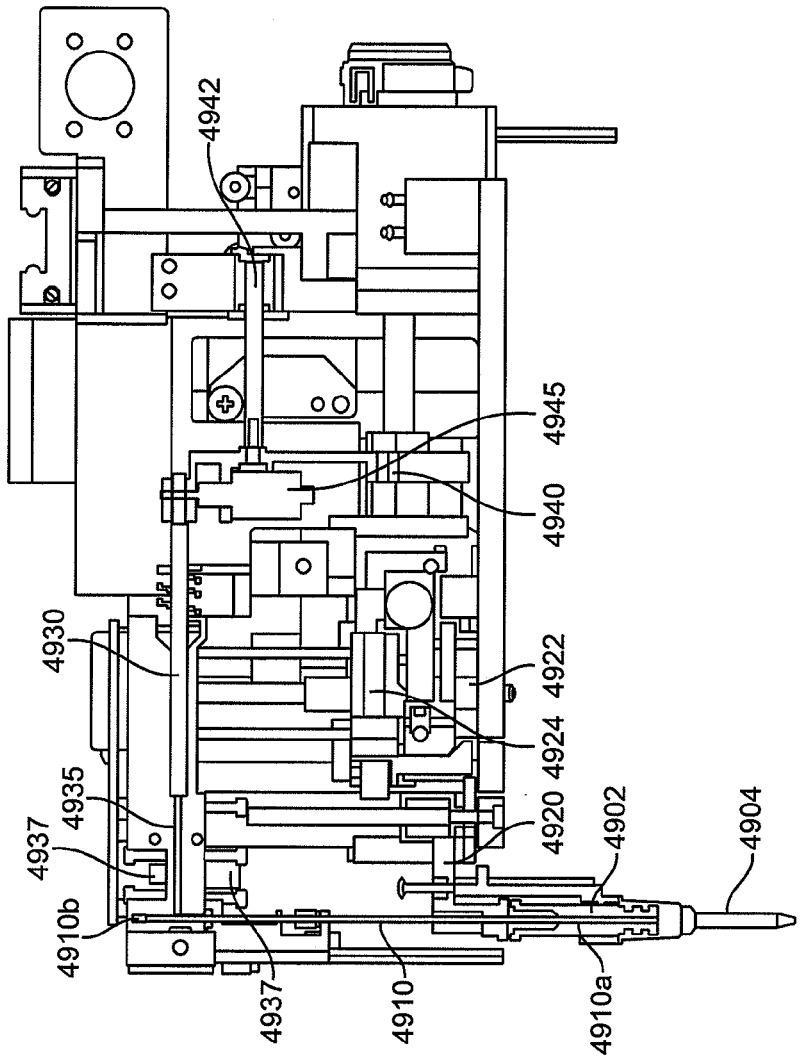

4942
4945
4940
4930
4922
4924
4935
4920
4902
4904
4937
4910b
4937
4910
4910a

FIG. 49

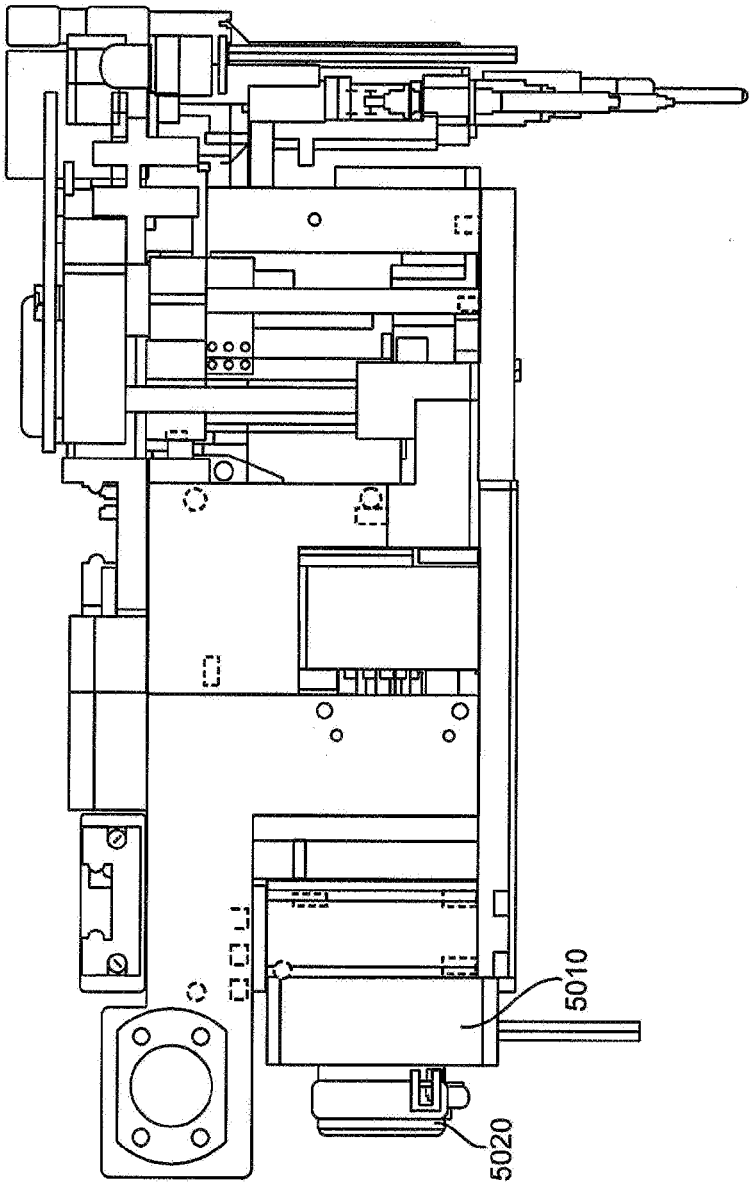


FIG. 50

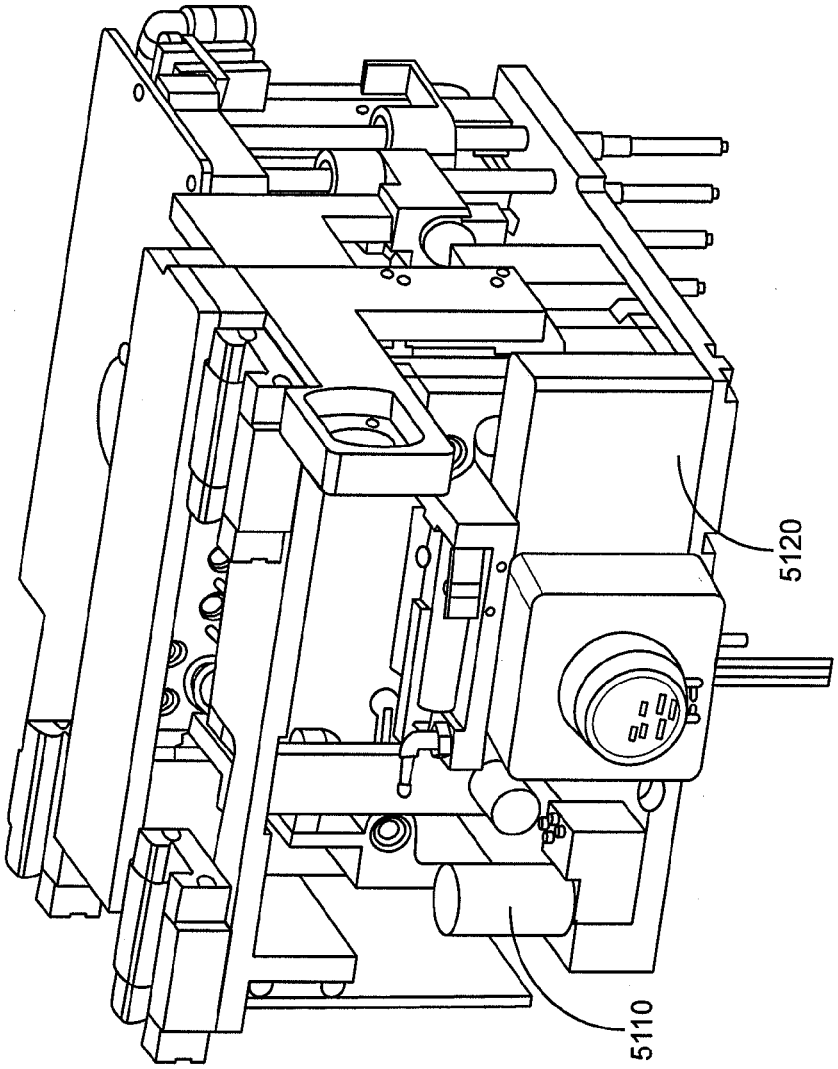


FIG. 51

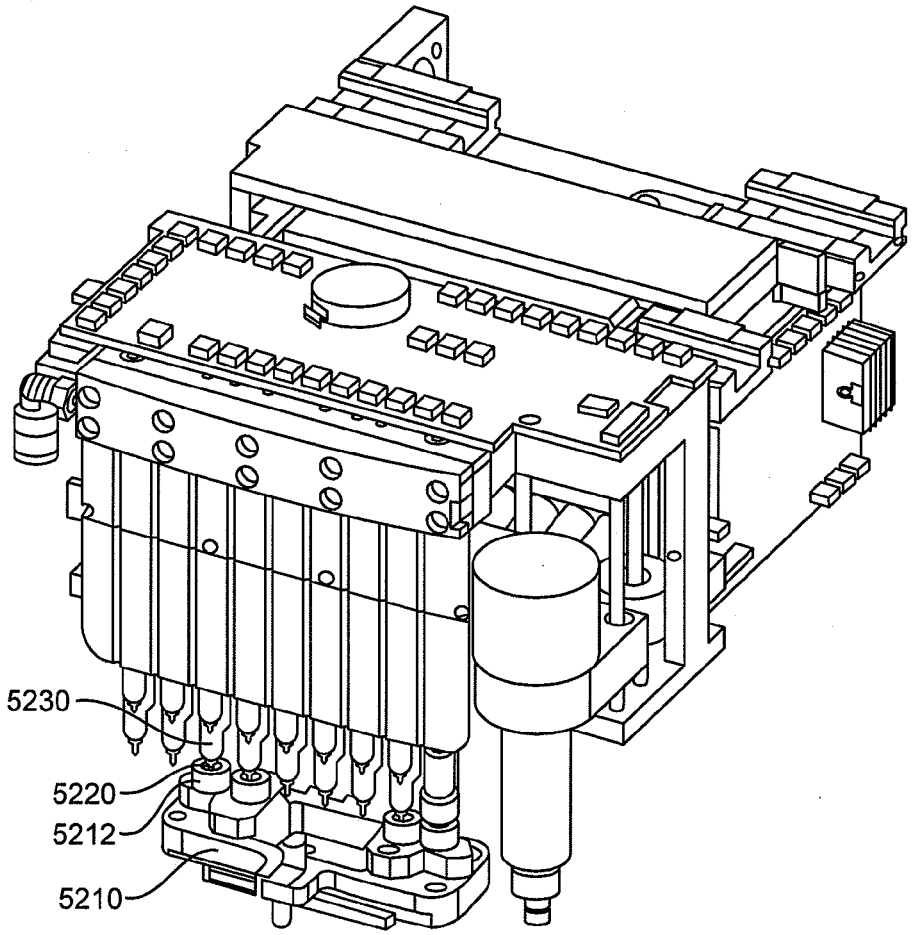


FIG. 52

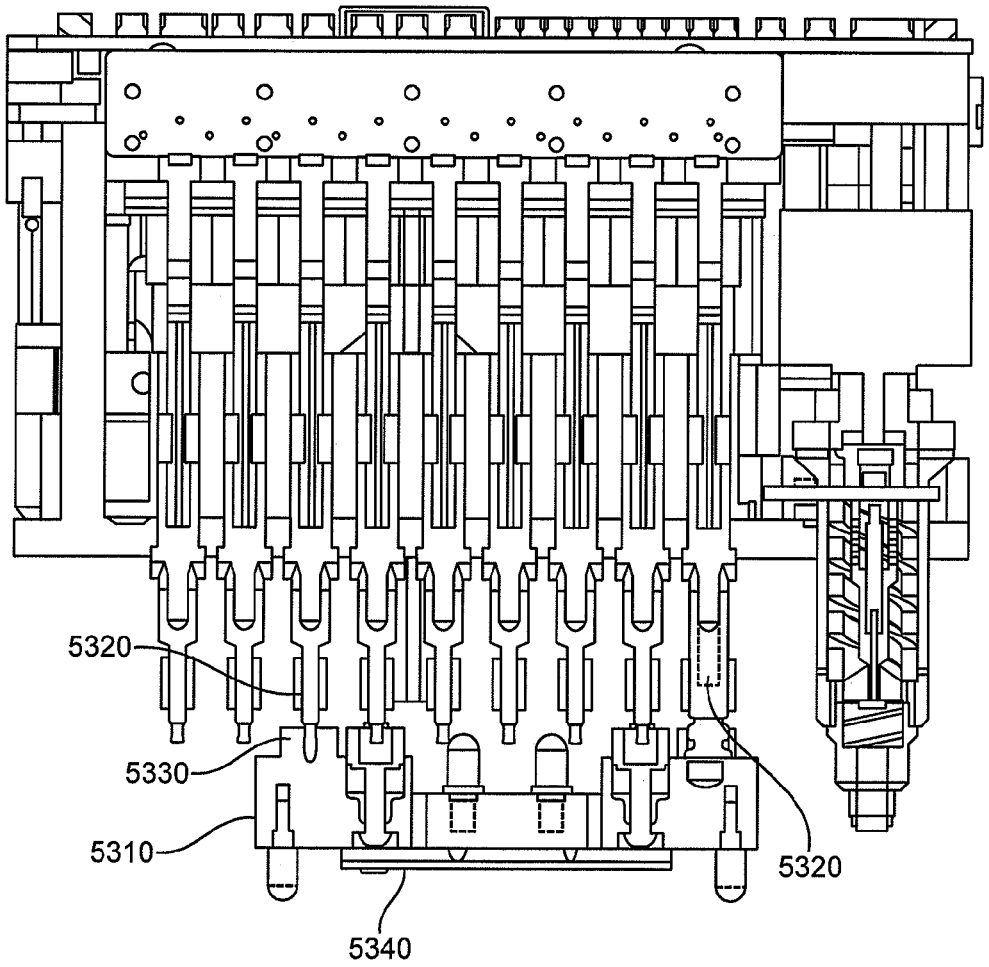


FIG. 53

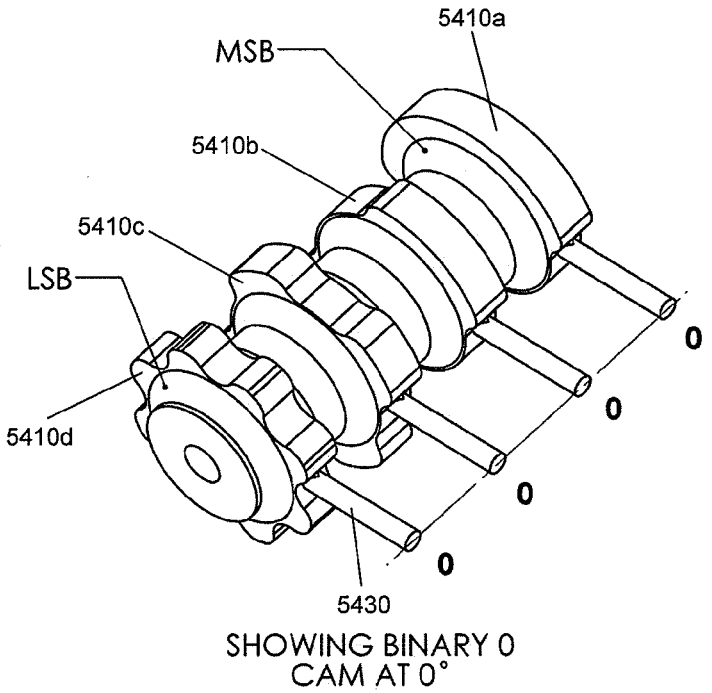
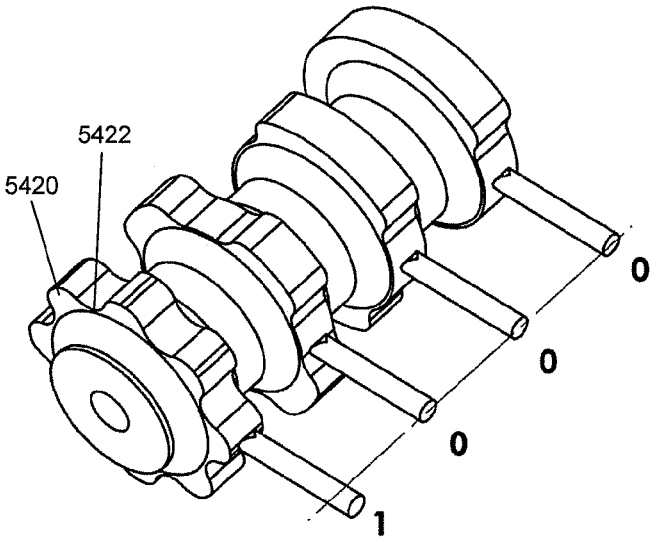
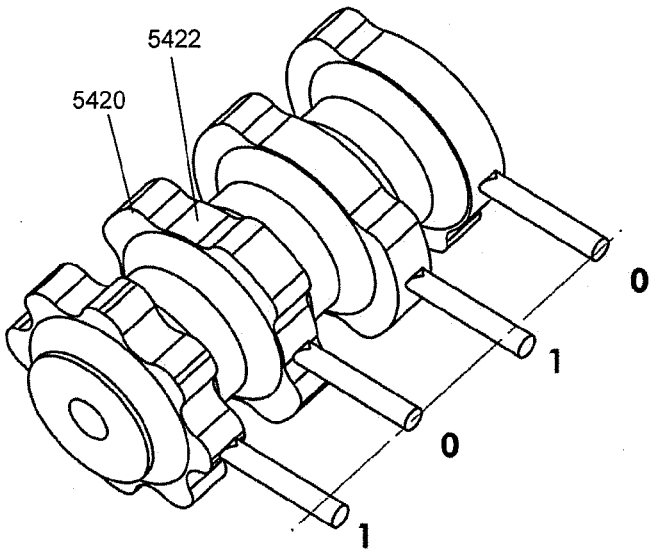

5410a
MSB
5410b
5410c
LSB
5410d
0
0
0
0
5430
SHOWING BINARY 0
CAM AT 0°

FIG. 54A



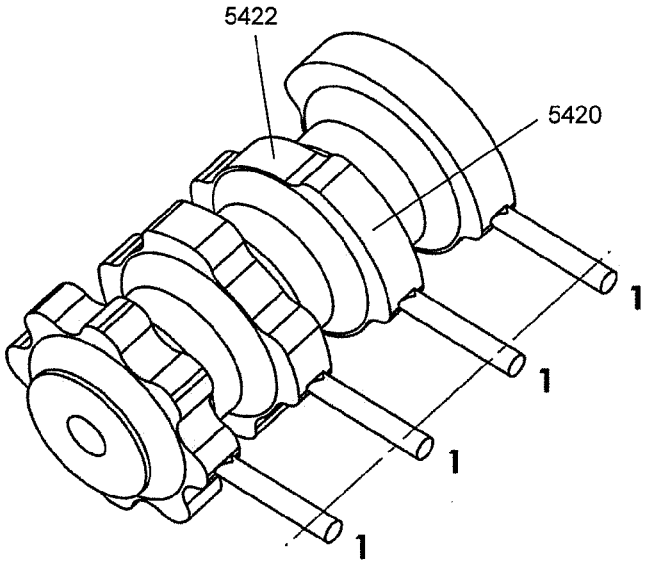
SHOWING BINARY 1
CAM AT 22.5°

FIG. 54B



SHOWING BINARY 5
CAM AT 112.5°

FIG. 54C



SHOWING BINARY 15
CAM AT 337.5°

FIG. 54D

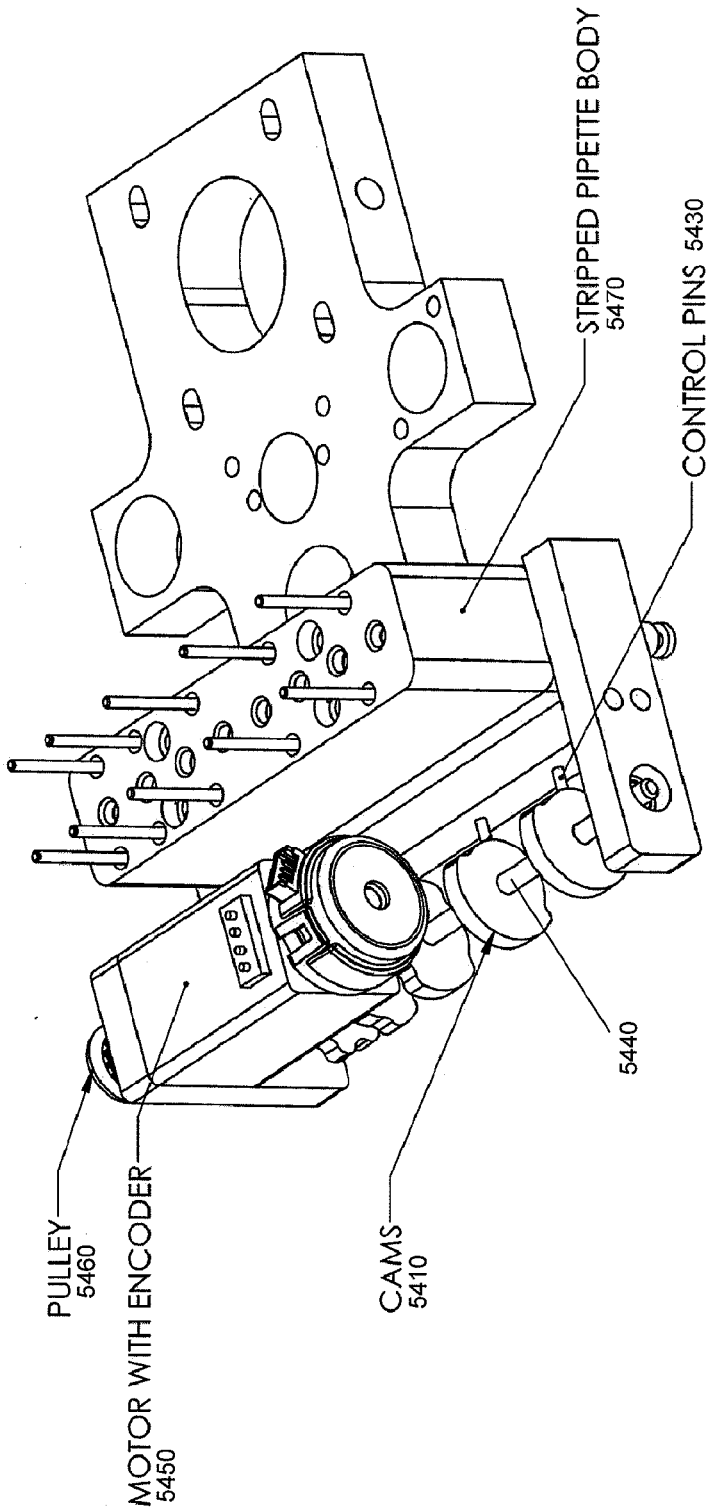

STRIPPED PIPETTE BODY
5470
CONTROL PINS 5430
SELECTION CAM MOUNTED WITH MOTOR
5440
PULLEY
5460
MOTOR WITH ENCODER
5450
CAMS
5410

FIG. 54E

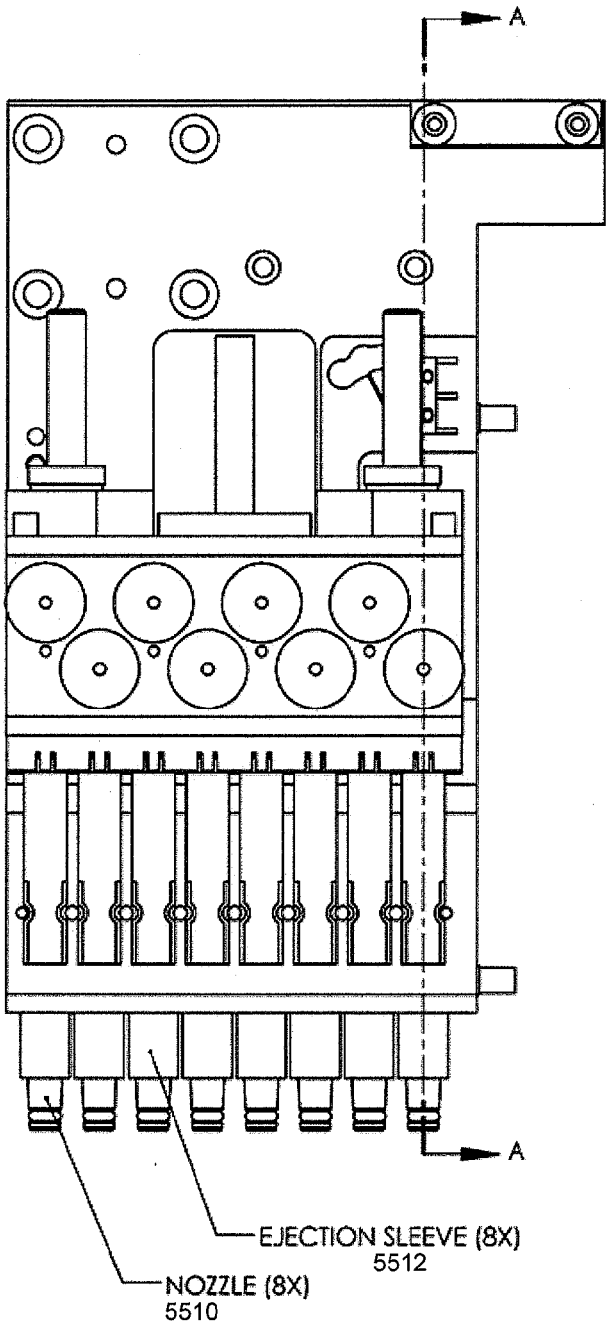
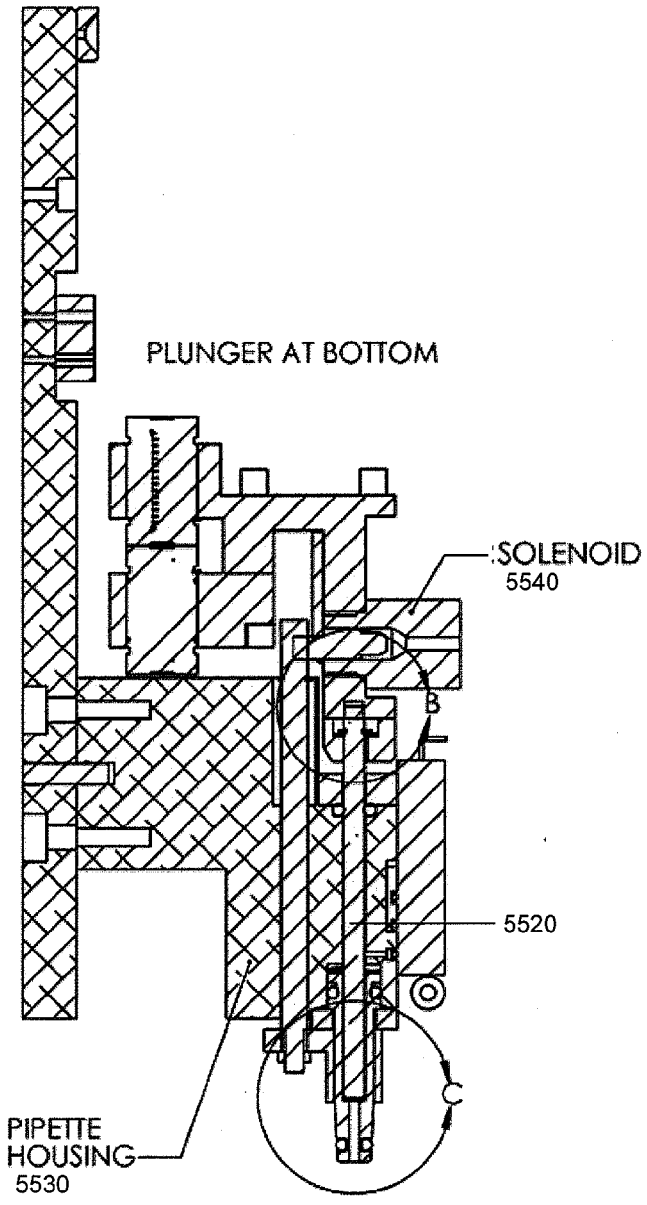


FIG. 55A



SECTION A-A
SCALE 1 : 1

FIG. 55B

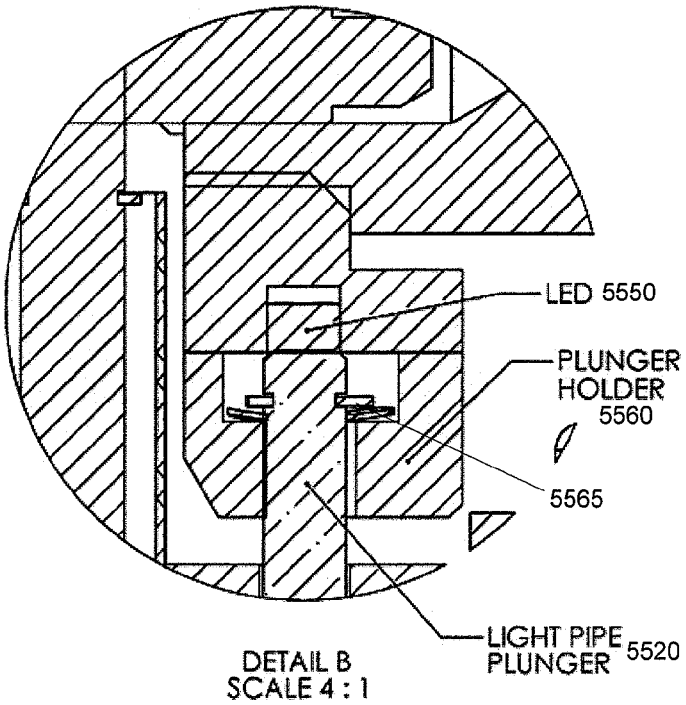

LED 5550
PLUNGER HOLDER 5560
5565
LIGHT PIPE PLUNGER 5520
DETAIL B
SCALE 4 : 1

FIG. 55C

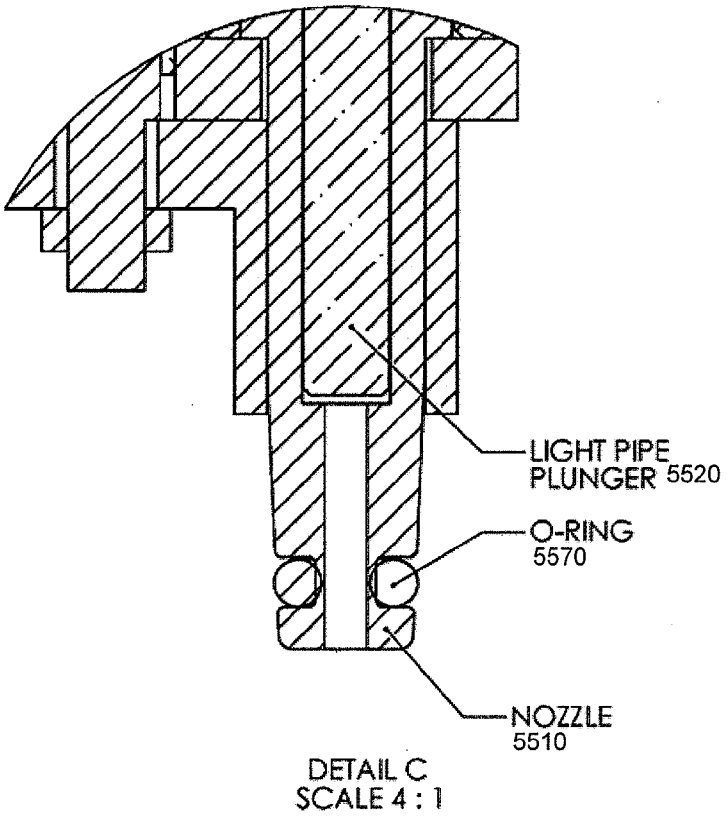

LIGHT PIPE
PLUNGER 5520
O-RING
5570
NOZZLE
5510
DETAIL C
SCALE 4 : 1

FIG. 55D

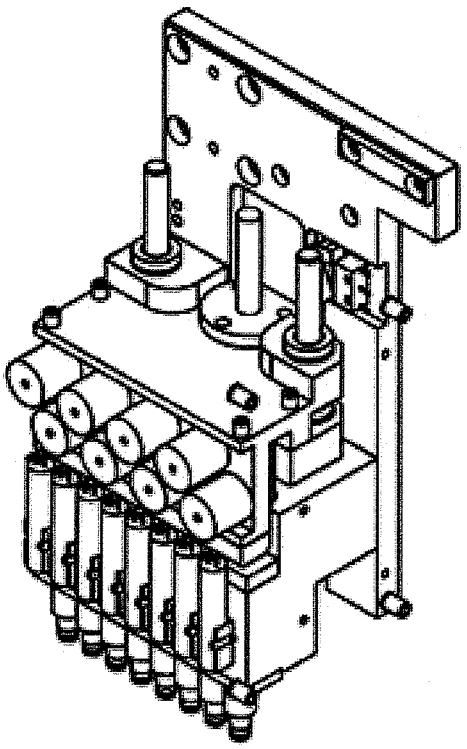


FIG. 55E

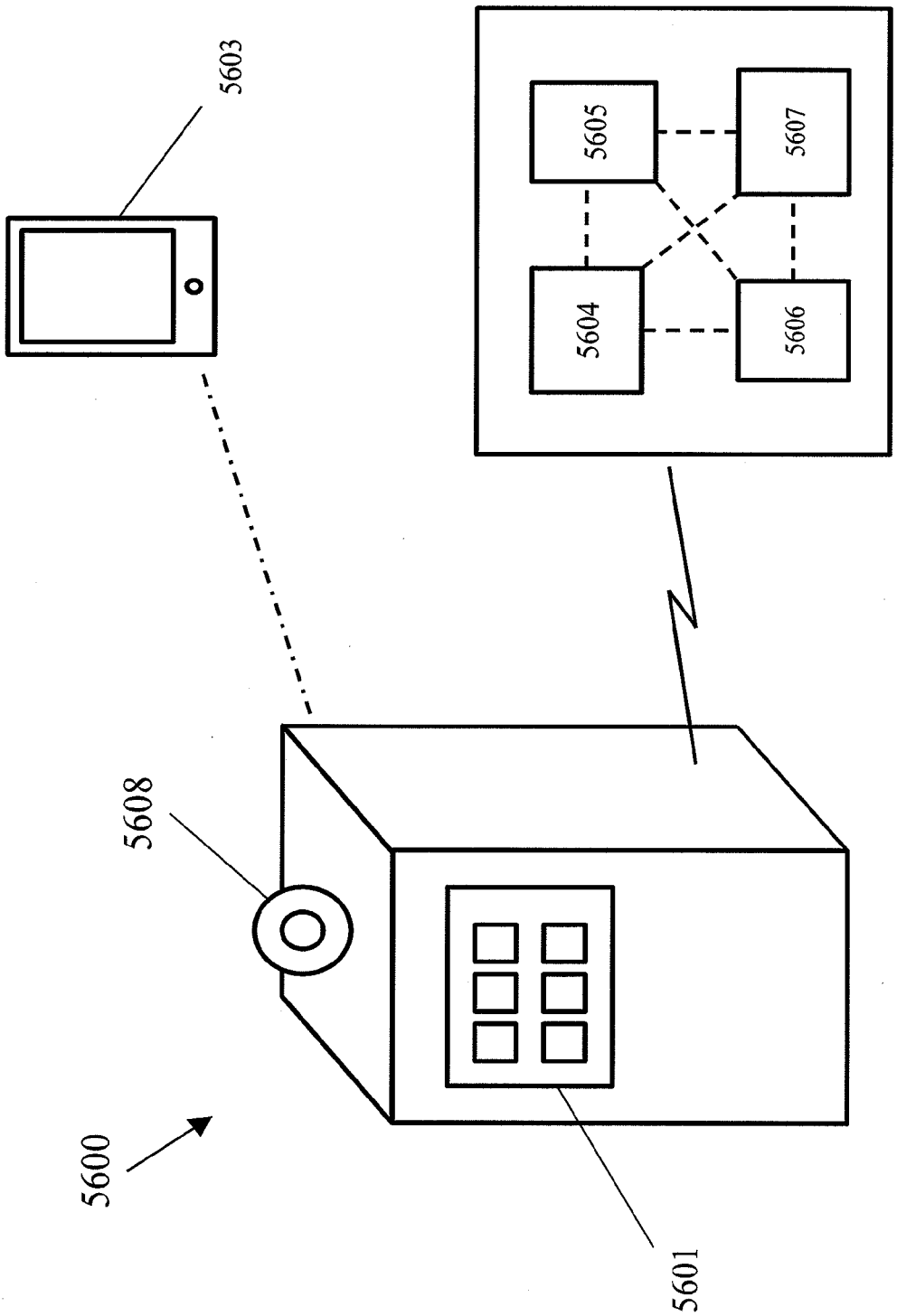


FIG. 56

Examples of sample processing with blood	Examples of sample processing with urine	Examples of sample processing with feces	Examples of sample processing with others
		Weighing or volume measurement of sample	**Weighing or volume measurement of sample**
Anticoagulation EDTA Heparin Citrate Oxalate Other			
Separation of formed elements (red cells, white cells and platelets) from plasma Centrifugation Filtration Magnetic removal of selected cells Density gradient centrifugation Ficoll Hypaque Gradient Elutriation Other	**Separation and concentration of cells (Bacteria)** Centrifugation	**Dispersion/dissolution of solid matter** Addition of buffer Mechanical mixing	**Dispersion/dissolution of solid matter** Addition of buffer Mechanical mixing
Physical removal of plasma, cells, lysate Use of pipette Other			
Concentration of selected cells Centrifugation Magnetic selection Other		**Concentration of selected cells** Centrifugation Magnetic selection Other	**Concentration of selected cells** Centrifugation Magnetic selection Other
Coagulation (produces serum) Removal of red cells and fibrin clot by centrifugation Separation using a serum separator (gel plug which allows only serum to pass)			

FIG. 57

SUBSTITUTE SHEET (RULE 26)

Examples of sample processing with blood	Examples of sample processing with urine	Examples of sample processing with feces	Examples of sample processing with others
Processing of formed elements			
Lysis of red cells (provides a hemolysate)			
Lysis of all formed elements			
Fixation of white cells (to prevent lysis)			
Dilution (and mixing)	**Dilution (and mixing)**	**Dilution (and mixing)**	**Dilution (and mixing)**
Dilution of blood			
Dilution of plasma			
Dilution of serum			
Physical processes	**Physical processes**	**Physical processes**	**Physical processes**
Heating	Heating	Heating	Heating
Cooling	Cooling	Cooling	Cooling
Mixing	Mixing	Mixing	Mixing
Addition of reagent(s)	**Addition of reagent(s)**	**Addition of reagent(s)**	**Addition of reagent(s)**
Liquid	Liquid	Liquid	Liquid
Solid	Solid	Solid	Solid
Removal of interfering factors	**Removal of interfering factors**	**Removal of interfering factors**	**Removal of interfering factors**
Precipitation and centrifugation	Precipitation and centrifugation	Precipitation and centrifugation	Precipitation and centrifugation
Flocculation	Flocculation	Flocculation	Flocculation
Coacervation	Coacervation	Coacervation	Coacervation
Denaturation	Denaturation	Denaturation	Denaturation
Extraction	Extraction	Extraction	Extraction
Concentration of analyte on solid phase	**Concentration of analyte on solid phase**	**Concentration of analyte on solid phase**	**Concentration of analyte on solid phase**
Magnetic	Magnetic	Magnetic	Magnetic
Affinity	Affinity	Affinity	Affinity

FIG. 57 Con't.

Example of sample processing with blood	Example of sample processing with urine	Example of sample processing with feces	Example of sample processing with others
Preparation of a cell smear	**Preparation of a cell smear**	**Preparation of a smear**	**Preparation of a smear**
Measurements used subsequently to process assay data Measurement of sample volume Measurement of hematocrit	**Measurements used subsequently to process assay data** Measurement of sample volume	**Measurements used subsequently to process assay data** Measurement of sample volume	**Measurements used subsequently to process assay data** Measurement of sample volume
Measurement of sample optical properties	Measurement of sample optical properties	Measurement of sample optical properties	Measurement of sample optical properties
Aspiration of subsamples for use in different types of assay Pipette	**Aspiration of subsamples for use in different types of assay** Pipette	**Aspiration of subsamples for use in different types of assay** Pipette	**Aspiration of subsamples for use in different types of assay** Pipette
Extraction and concentration of nucleic acids Cell lysis	**Extraction and concentration of nucleic acids** Cell lysis	**Extraction and concentration of nucleic acids** Cell lysis	**Extraction and concentration of nucleic acids** Cell lysis
Adsorption of nucleic acid onto a solid phase	Adsorption of nucleic acid onto a solid phase	Adsorption of nucleic acid onto a solid phase	Adsorption of nucleic acid onto a solid phase
Elution of nucleic acid from solid phase	Elution of nucleic acid from solid phase	Elution of nucleic acid from solid phase	Elution of nucleic acid from solid phase

FIG. 57 Con't

Measurement and assay classes	Class	Sub-class	Sub-sub-class	Acronym	Examples
Measurement types					
Optical					
	Imaging				
		Gross	(RGB)		
		Microscopic			
			Bright field		
			Dark field		
			Fluorescence		
			Luminescence		
		Video			
		Particle-size measurement	Cell size measurement		
		Particle distribution measurement	Agglutination		
		Particle movement measurement			
	imaging means	Camera			
		CCD			
		Scanner			
	Spectrometry/spectroscopy				
		UV			
		Visible			
		IR			
		Raman			
		Transmission			
		Absorbance			

FIG. 58

Measurement and assay classes	Class	Sub-class	Sub-sub-class	Acronym	Examples
		Fluorescence			
	Single or limited wavelength measurements				
		Difference spectrometry			
		Colorimetry			
		Measurement of spectra			
		Refractometry			
		Reflectometry			
		Polarimetry		FP	
		Turbidimetry			
		Nephelometry			
		Aggregometry			
		Light scattering measurement			
		Luminometry			
			Bioluminescence		
			Chemiluminescence		
			Electrochemiluminescence	ECL	
			Phosphorescence		
		Optical rotatory dispersion		ORD	
		Circular dichroism		CD	
		Scintillation counting			
		Scintillation proximity			
		Evanescent Wave		EW	
		Surface plasmon resonance		SPR	
		Fluorescence resonance energy transfer		FET	

FIG. 58 Con't.

Measurement and assay classes	Class	Sub-class	Sub-sub-class	Acronym	Examples
		Time-resolved FET		HTRF	
		Electron-spin resonance		ESR	
		Mass spectrometry		MS	
		Nuclear magnetic resonance		NMR	
Physical, other than optical					
	Electrophoresis				
		Capillary			
		Polyacrylamide			
		Agarose gel			
		Isoelectric focusing			
		Isotachophoresis			
		Mobility shift			
	Chromatography				
		Size exclusion			
		Ion-exchange			
		Affinity			
		Hydrophobiic			
	Sedimentation				
		Under gravity	Erythrocyte sedimentation rate	ESR	
	Centrifugation				
		Sedimentation velocity			

FIG. 58 Con't.

Measurement and assay classes	Class	Sub-class	Sub-sub-class	Acronym	Examples
		Sedimentation equilibrium			
		Gradient centrifugation			
			Sucrose		
			Ficoll-Hypaque		
Classification by analyte type	Small molecule				
		Drug	Therapeutic drug monitoring	TDM	
				CAD	Digoxin
				AED	Valproic acid
				AND	Methotrexate
				AMD	Gentamycin
			Drugs of abuse in urine	DAU	Tetrahydrocanabanol
		Modified drugs			
			Glycosylated		
			Sulfated		
			Oxidized		
			Hydroxylated		
		Prostaglandins			Thromboxane
		Hormone			T3
		Toxin			
		Metabolite			Cholesterol
		Ion			Mg2+
		pH			
		Dissolved gas	Blood (Oximetry)		O2

FIG. 58 Con't.

Measurement and assay classes	Class	Sub-class	Sub-sub-class	Acronym	Examples
		Advanced glycosylation end products		AGEs	
	Macromolecule				
		Drug			
		Peptide			Humanized antibody
		Hormone			
		Cell stimulating factor			VEGF
		Protein	Binding factor		Haptoglobin
			Enzyme		CKMB
			Coagulation factor		Factor VIII
		Antibody			
		Antigen			
		Tumor antigen			CEA
		Carbohydrate			
		Nucleic acid			
			DNA		
			RNA		
		Modified proteins			
			Hemoglobin A1c	HbA1c	
			Glycated albumin		
			Bence-Jones proteins		
			Deamidated enzymes		
			Proteolytic fragments		
			Phosphorylated proteins		
			Glycated proteins		
		Molecular complexes			
		Lipids			

FIG. 58 Con't.

Measurement and assay classes	Class	Sub-class	Sub-sub-class	Acronym	Examples
			High density lipoprotein	HDL	
			Low density lipoprotein	LDL	
			Very Low density lipoprotein	VLDL	
			Chylomicrons		
		Troponin isoforms		TNI:TNC	(Many others)
	Functional activities				
		Complement			
		Coagulation		PT	
			Prothrombin time		
			Activated partial thromboplastin time	APTT	
			Bleeding time		
		Clot lysis			
		Iron-binding capacity			
		T4-uptake			
		Rheumatoid factor		RF	
		Anti-nuclear antibodies		ANA	
	Cells and infectious agents				
	Infectious agent	Virus			
		Bacterium			
		Yeast			
		Fungus			
		Parasite			

FIG. 58 Con't.

Measurement and assay classes	Class	Sub-class	Sub-sub-class	Acronym	Examples
	Human cell				
		Red cell			
		Reticulocyte			
		White cell			
			B-cell		
			T-cell		
			Macrophage		
			Lymphocyte		
			Leukocyte		
			Basophil		
			Neutrophil		
			Eosinophil		
			Dendritic cell		
			Plasma cell		
			Natural killer cell		
			Tumor cell		
	Physical property				
		Viscosity			
		Density			
		Osmolarity			
		Tonicity			
		pH			
		Ionic strength			
		Refractive index			
	Gross sample characteristic				

FIG. 58 Con't.

Measurement and assay classes	Class	Sub-class	Sub-sub-class	Acronym	Examples
		Hemolysis			
		Lipemia			
		Icteria			
		Turbidity			
		Total protein concentration			
Classification by assay method					
	Compleximetry				
	Stoichiometric conversion				
	Receptor-based (competitive)				
		Radioimmunoassay		RIA	
		Enzyme immunoassay		EIA	EMIT, CEDIA
		Fluorescence immunoassay		FIA	
	Receptor-based (non-competitive)				
		Immunoradiometric assay		IRMA	
		Enzyme linked immunosorbent assay		ELISA	
		Polymerase chain reaction		PCR	Many other
		Reverse-transcription-PCR		RT-PCT	
		Fluorescence activated cell sorting		FACS	
		Flow cytometry (counting)			

FIG. 58 Con't.

Measurement and assay classes	Class	Sub-class	Sub-sub-class	Acronym	Examples
		Cell image analysis			
Classification by protocol					
	Rate				
	End-point				
	Approach to end-point				
	Single analyte				
	Multiplexed analyte measurement				Luminex
	Thermocycling				
	Isothermal			PCR	Taq-man
				LAMP	

FIG. 58 Con't.

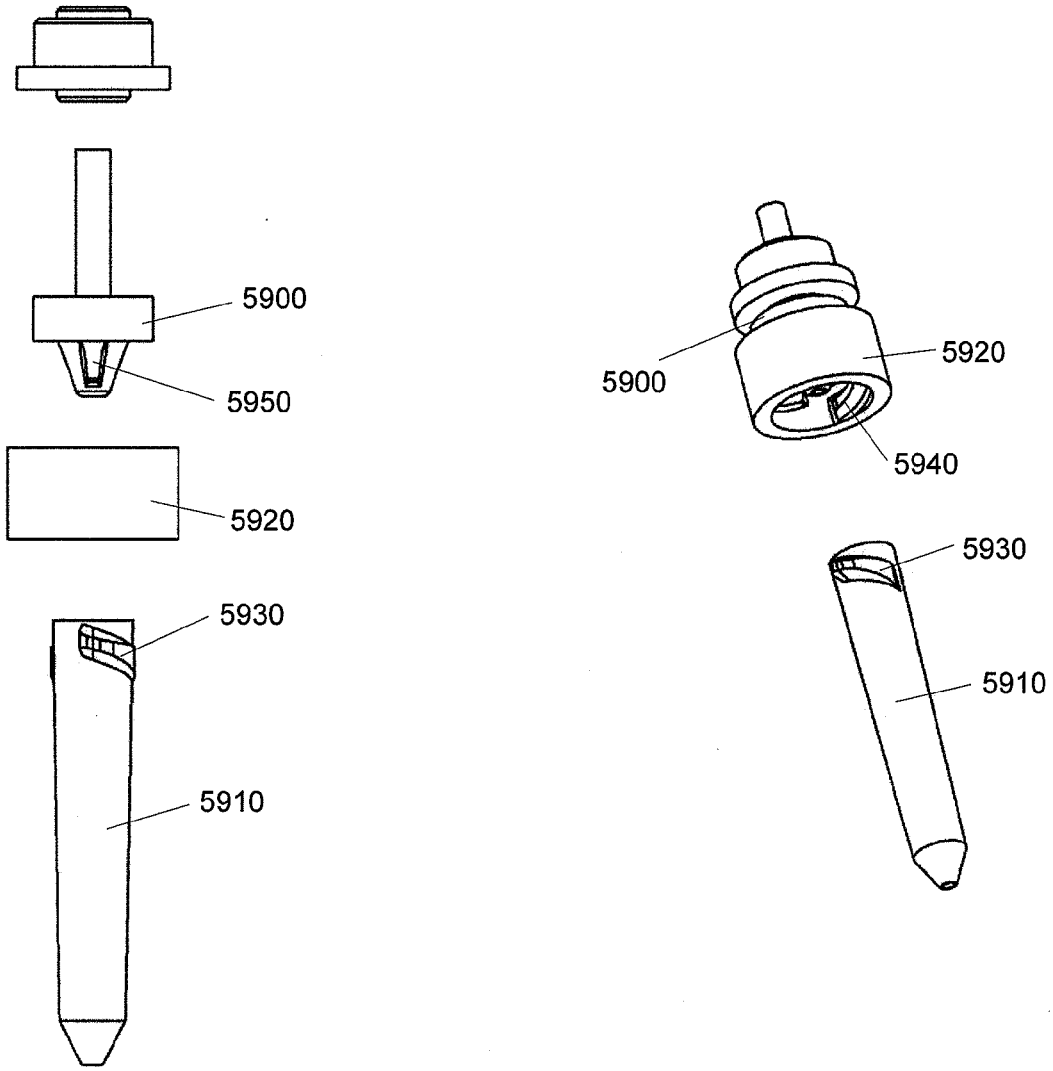
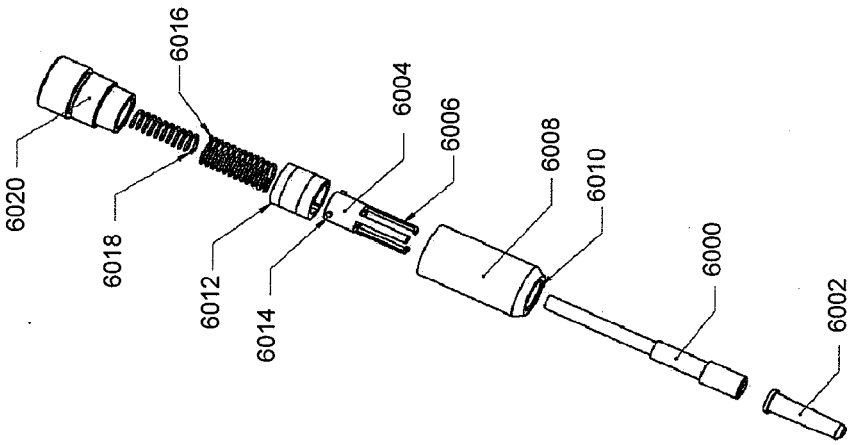


FIG.59


6016
6004
6006
6008
6010
6020
6018
6012
6014
6000
6002

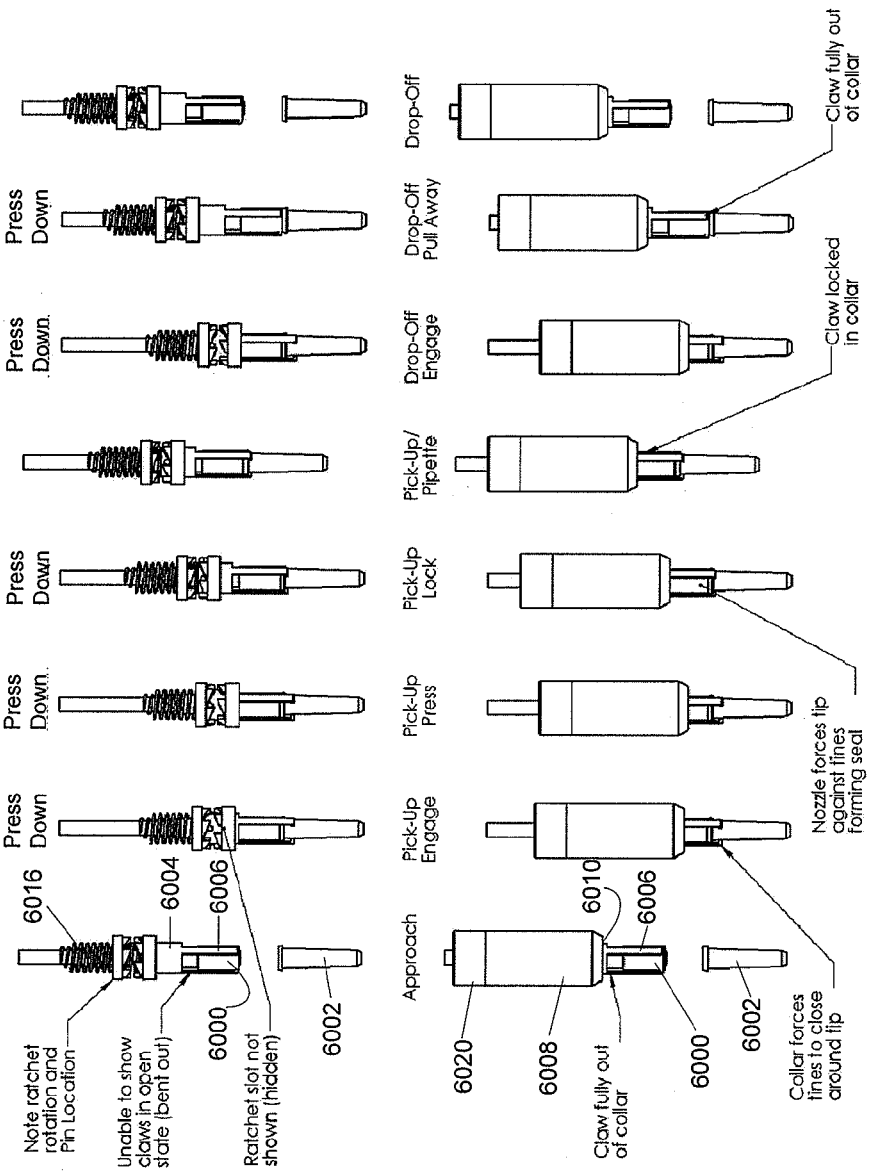

Drop-Off
Claw fully out of collar
Press Down
Drop-Off Pull Away
Press Down
Drop-Off Engage
Claw locked in collar
Pick-Up/ Pipette
Press Down
Pick-Up Lock
Press Down
Pick-Up Press
Nozzle forces tip against fines forming seal
Press Down
Pick-Up Engage
Approach
6016
6004
6006
6010
6020
6008
6000
6002
Note ratchet rotation and Pin Location
Unable to show claws in open state (bent out)
Ratchet slot not shown (hidden)
Claw fully out of collar
Collar forces fines to close around tip

FIG. 60

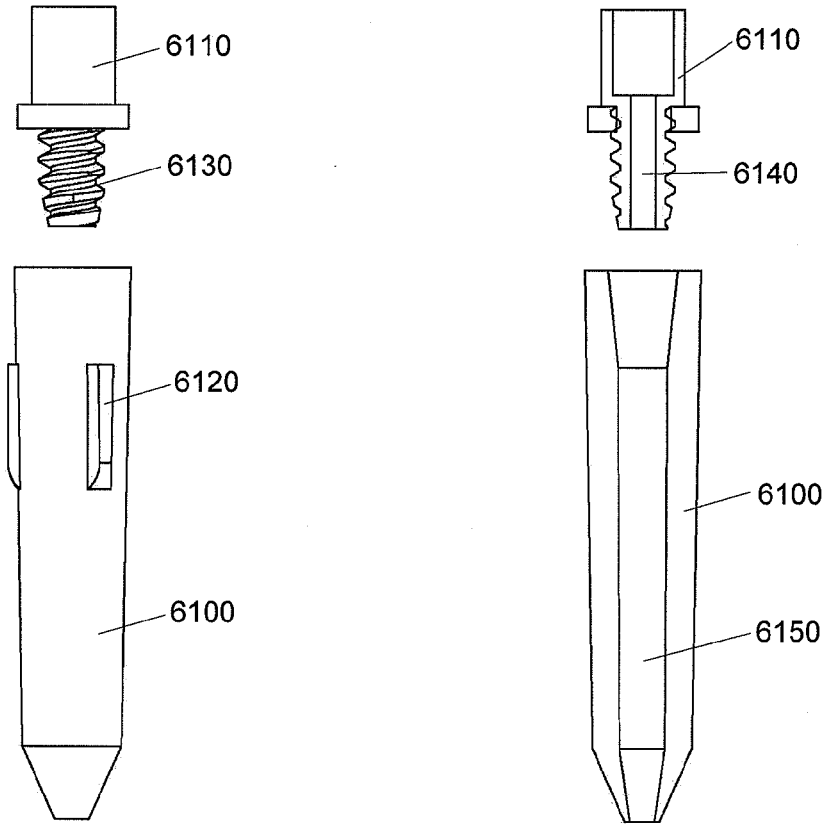


FIG. 61

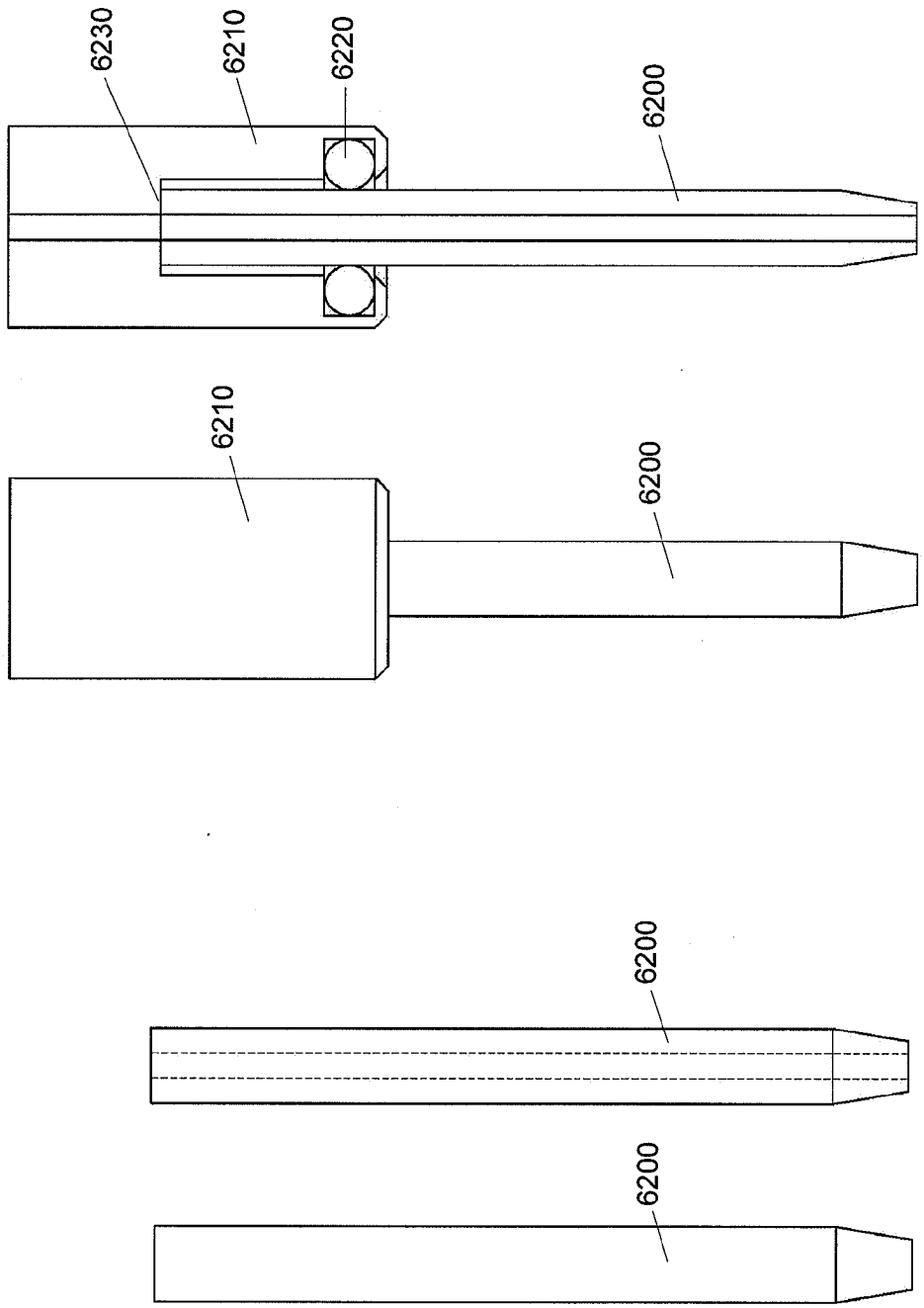


FIG. 62

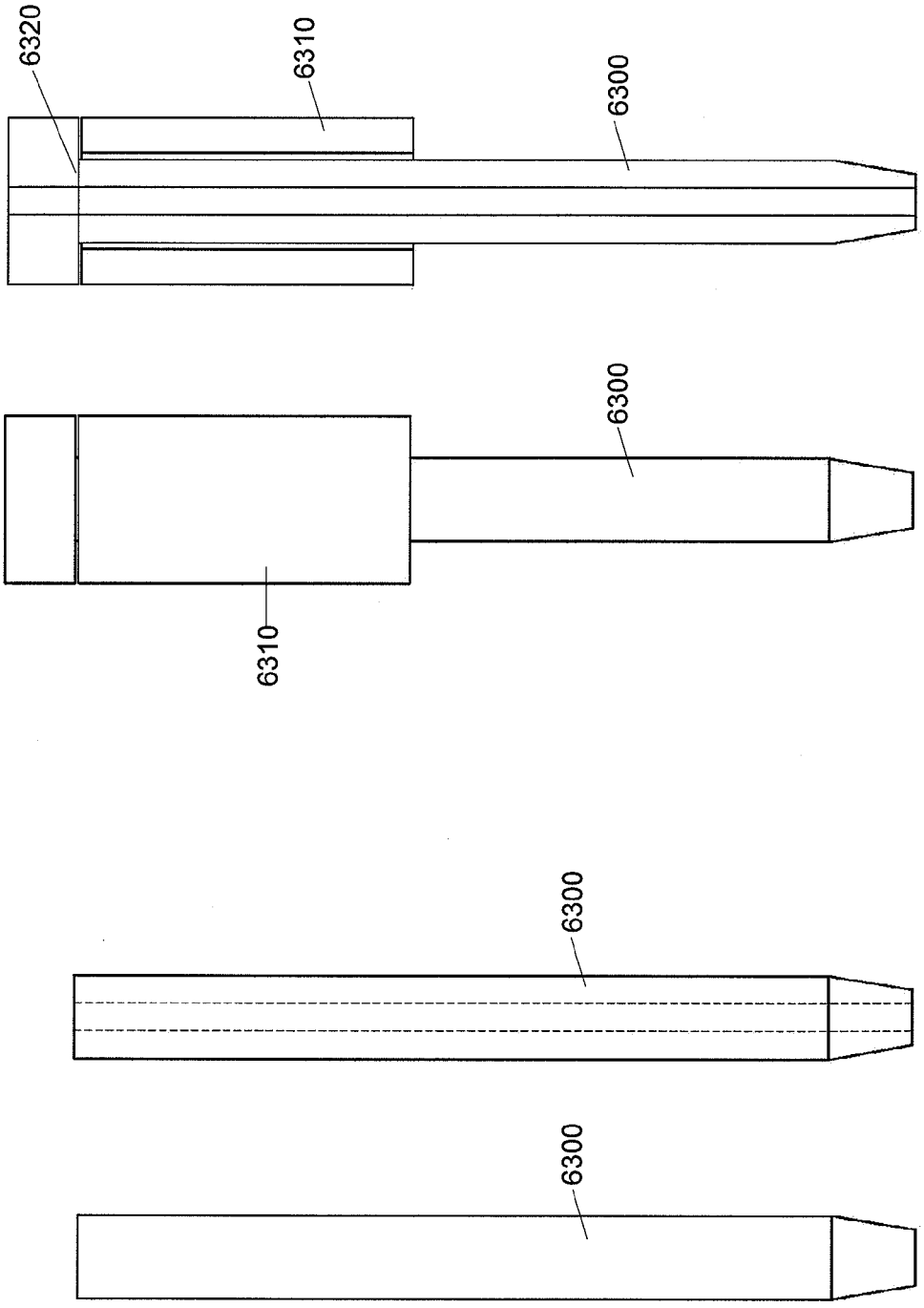


FIG. 63

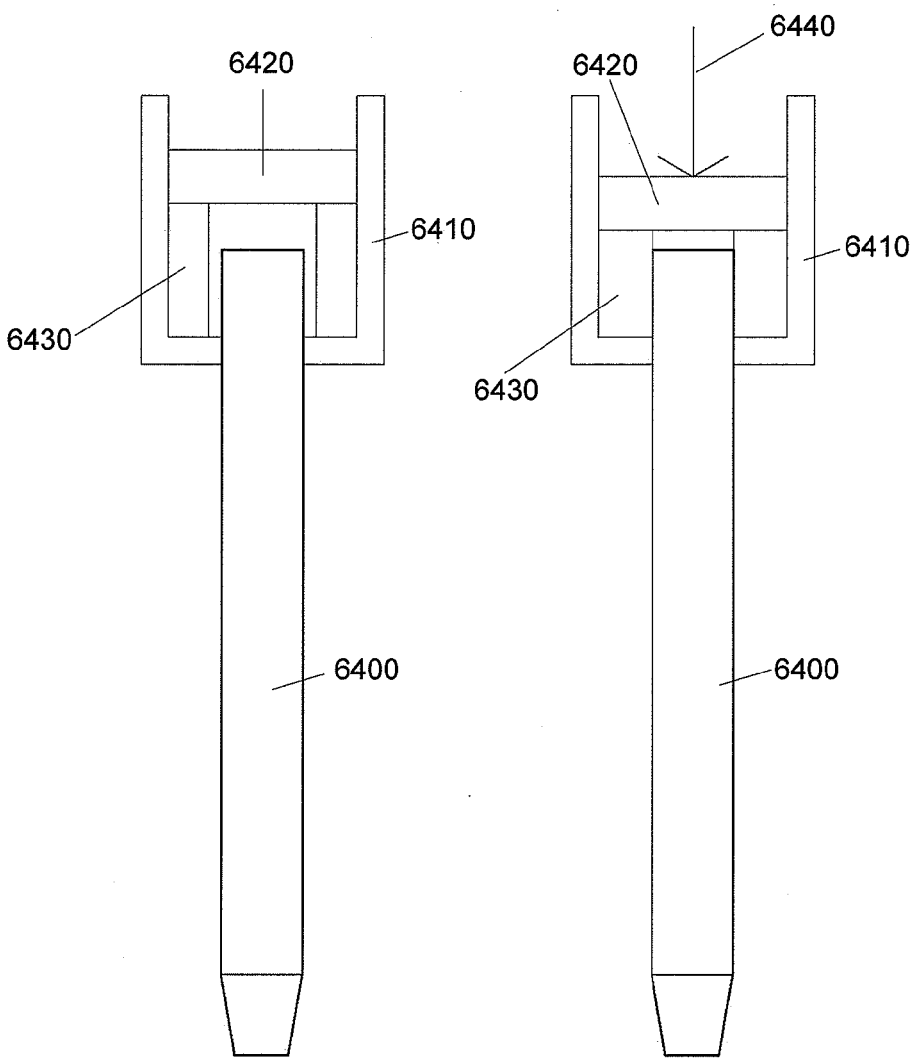


FIG. 64

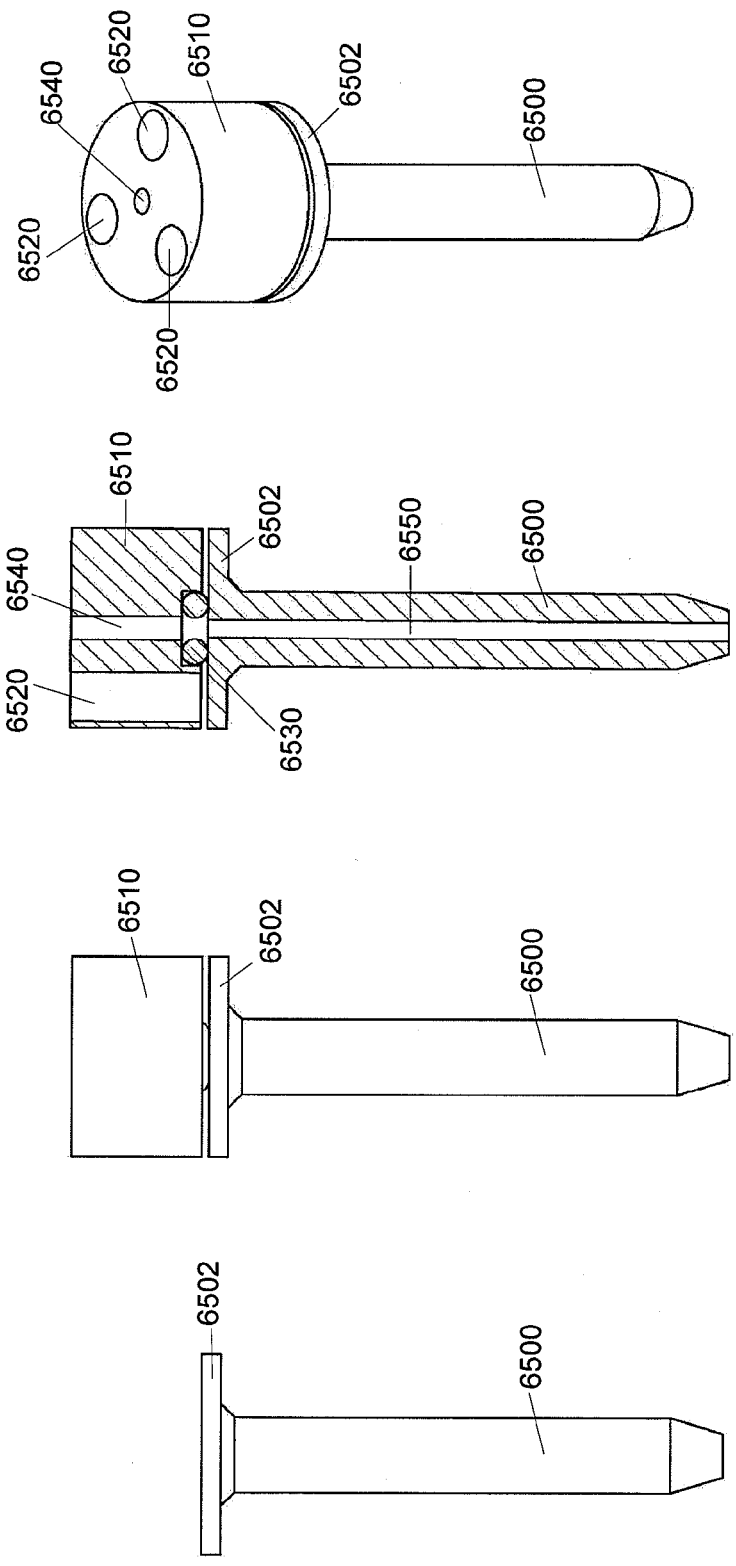

6520
6510
6540
6502
6500
6520
6520
6510
6502
6550
6500
6540
6520
6530
6510
6502
6500
6502
6500

FIG. 65

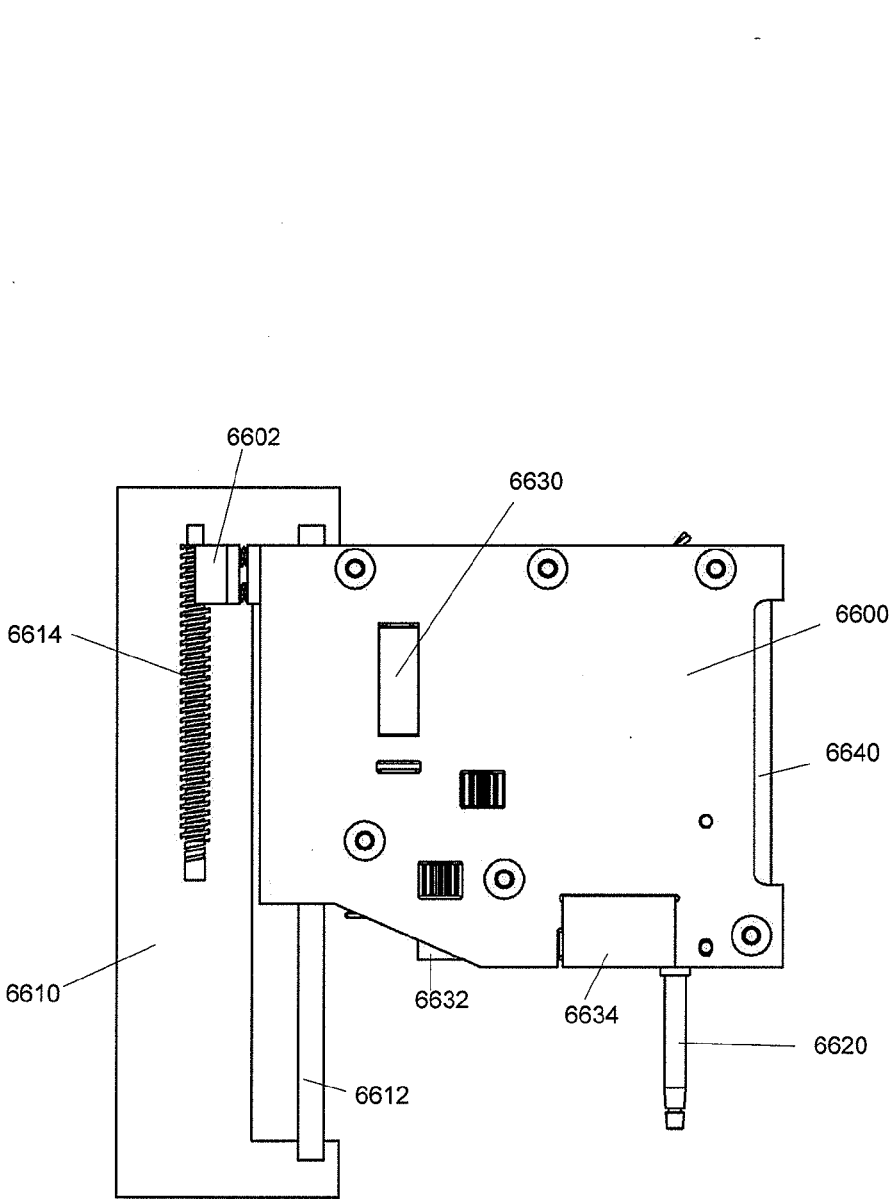


FIG. 66

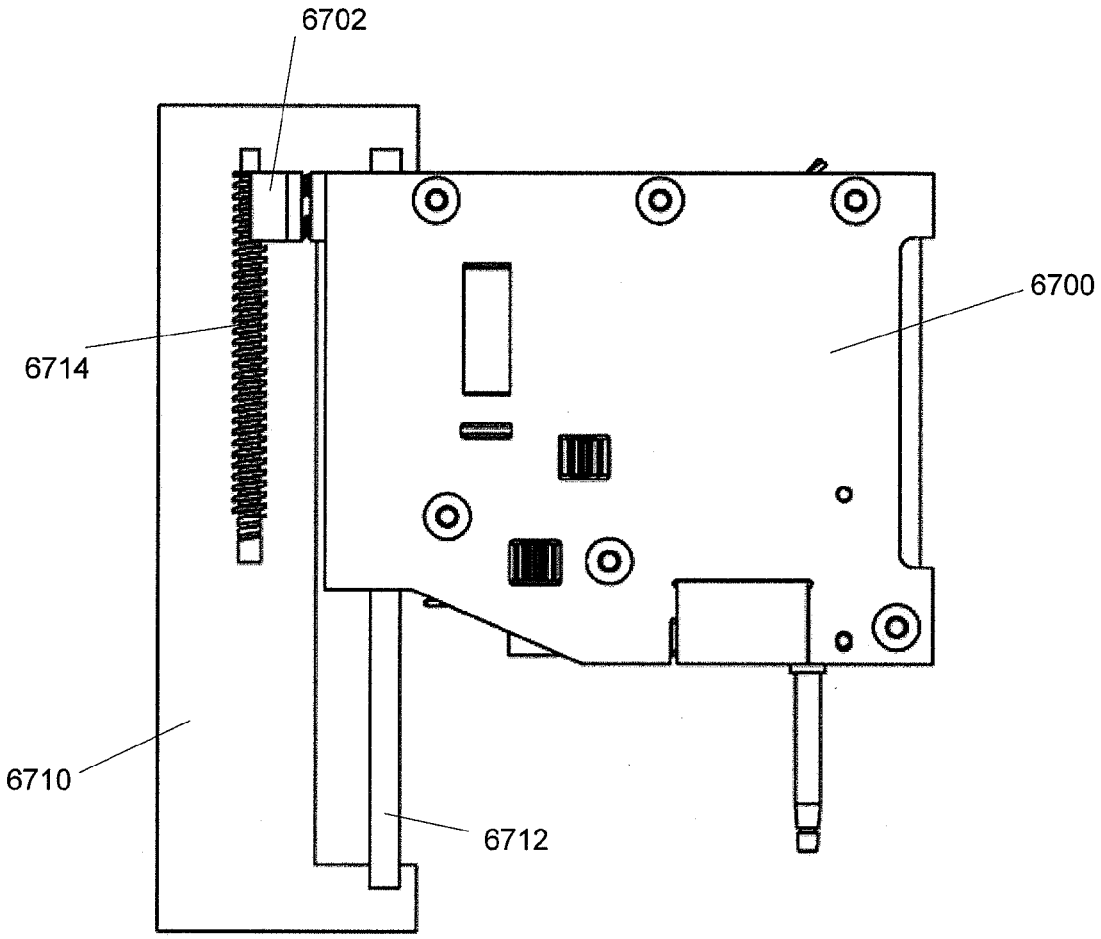


FIG. 67A

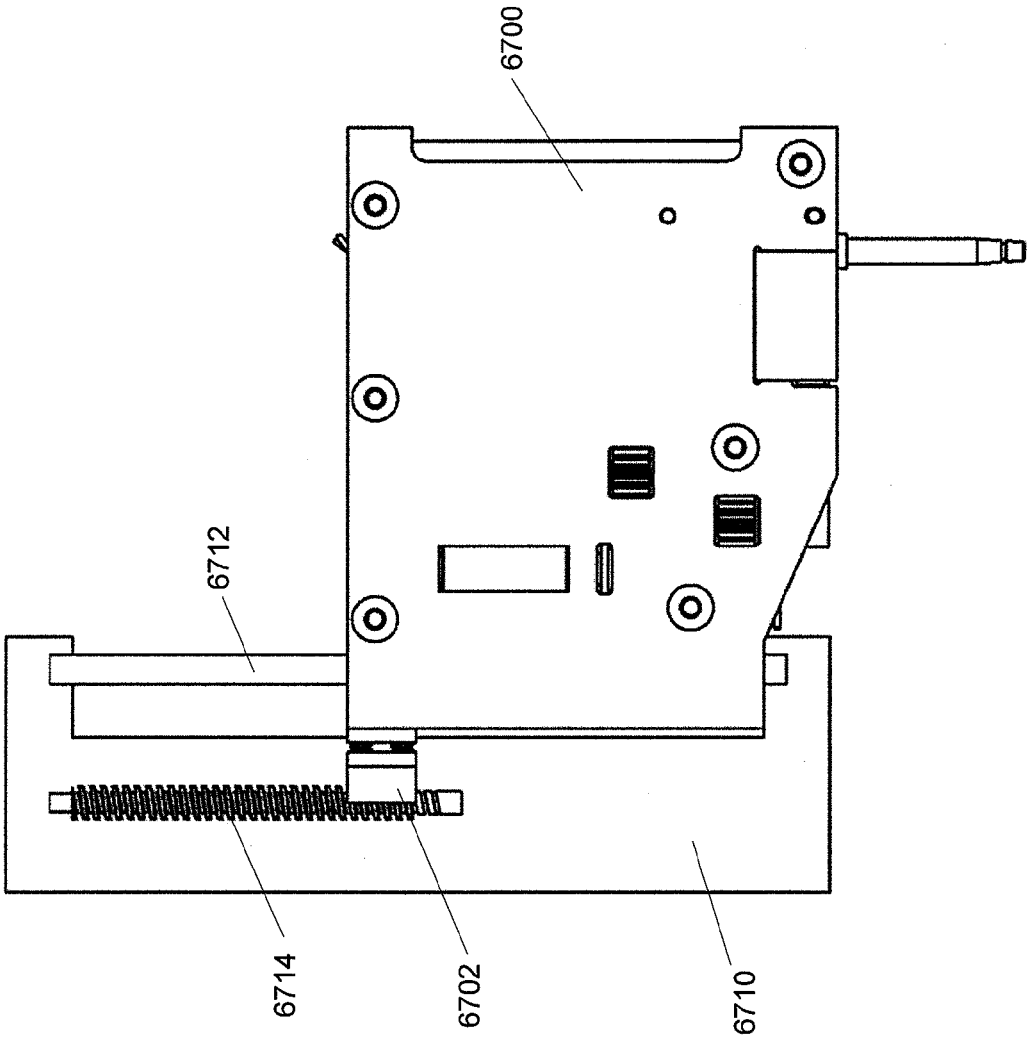


FIG. 67B

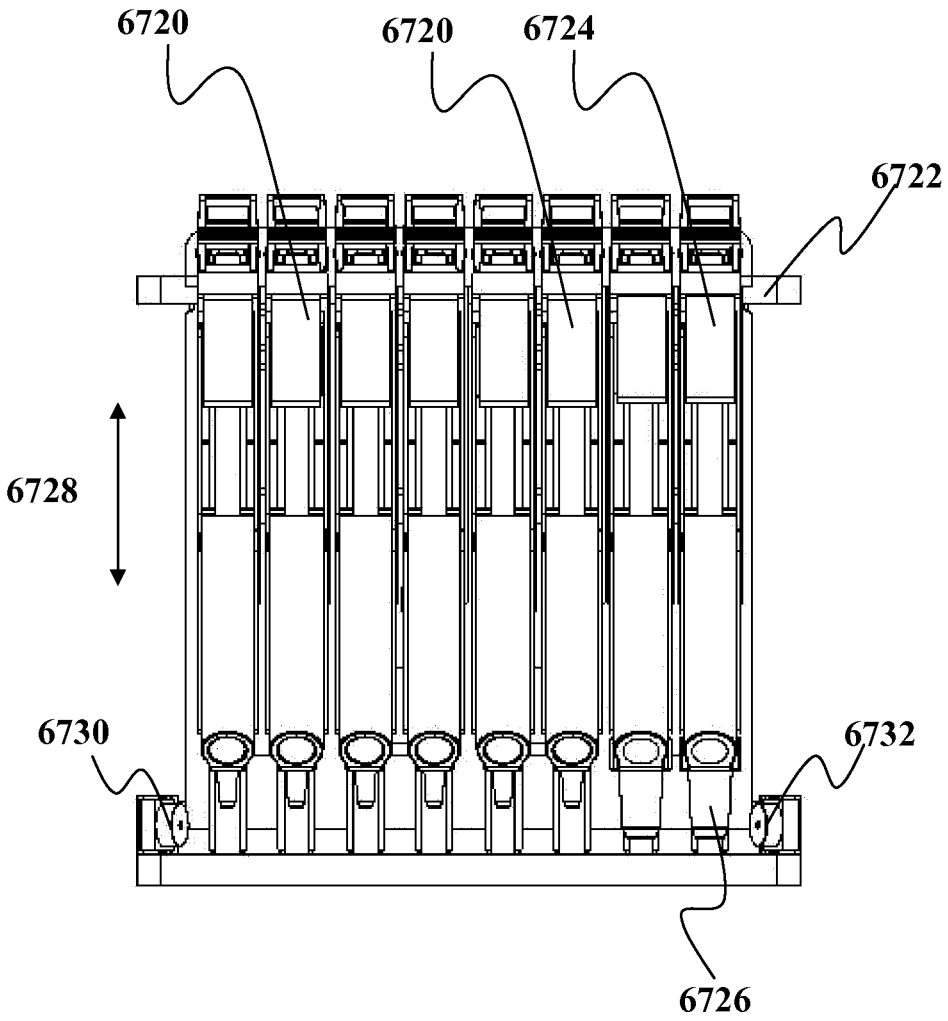


FIG. 67C

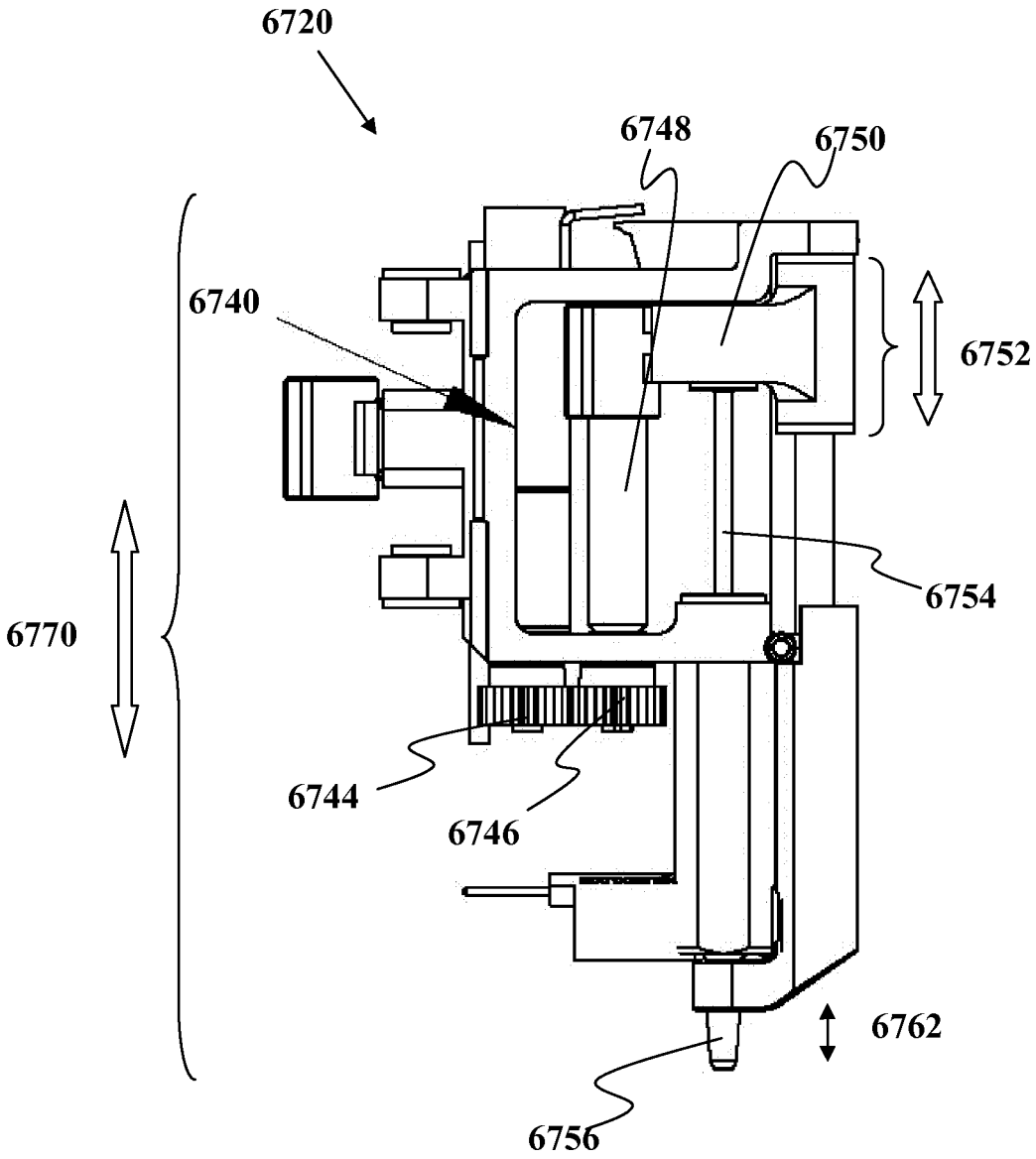


FIG. 67D

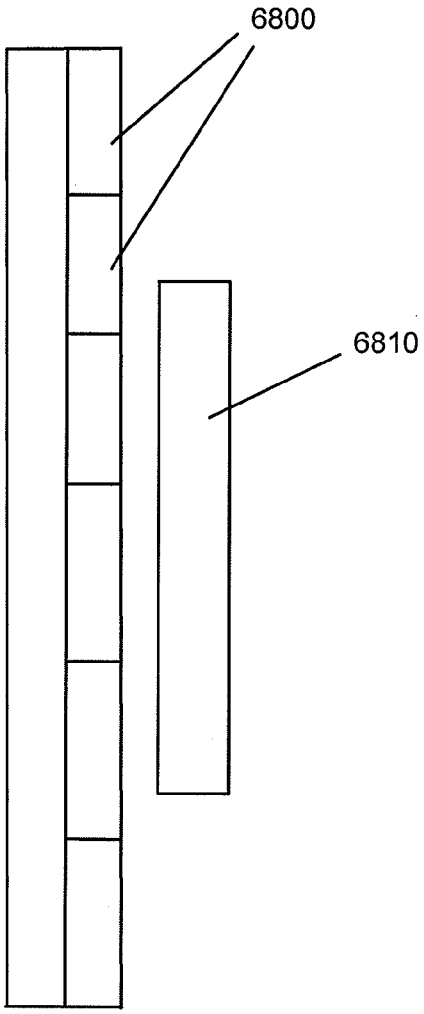


FIG. 68A

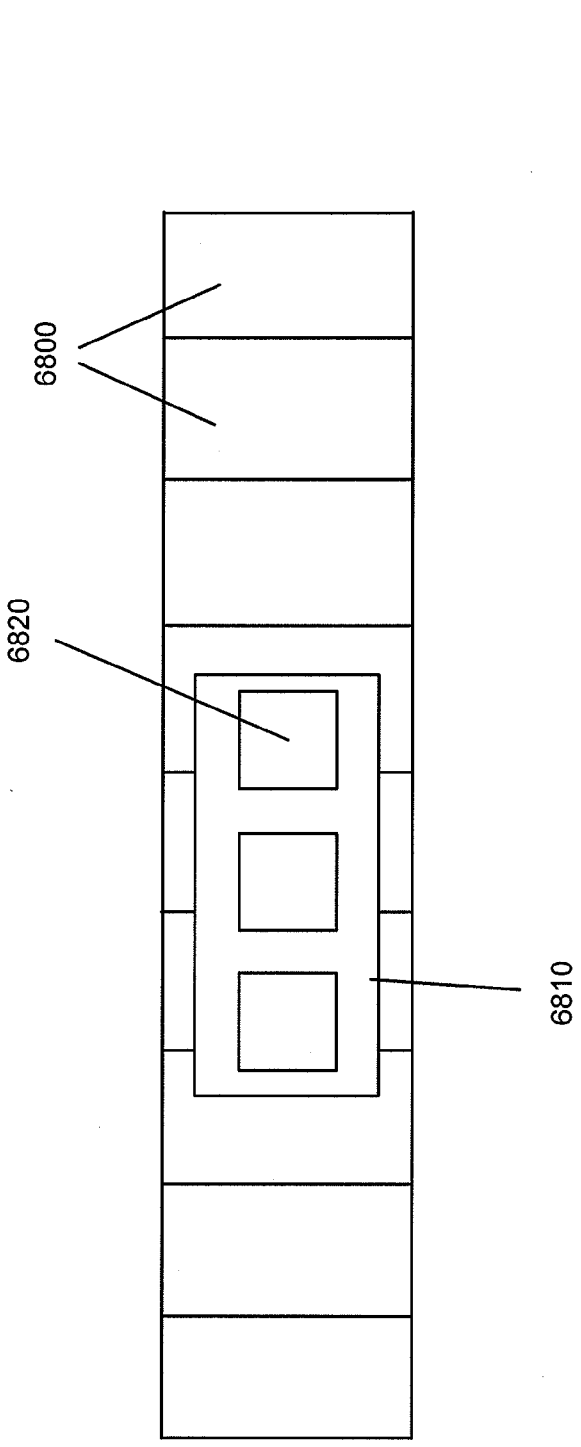


FIG. 68B

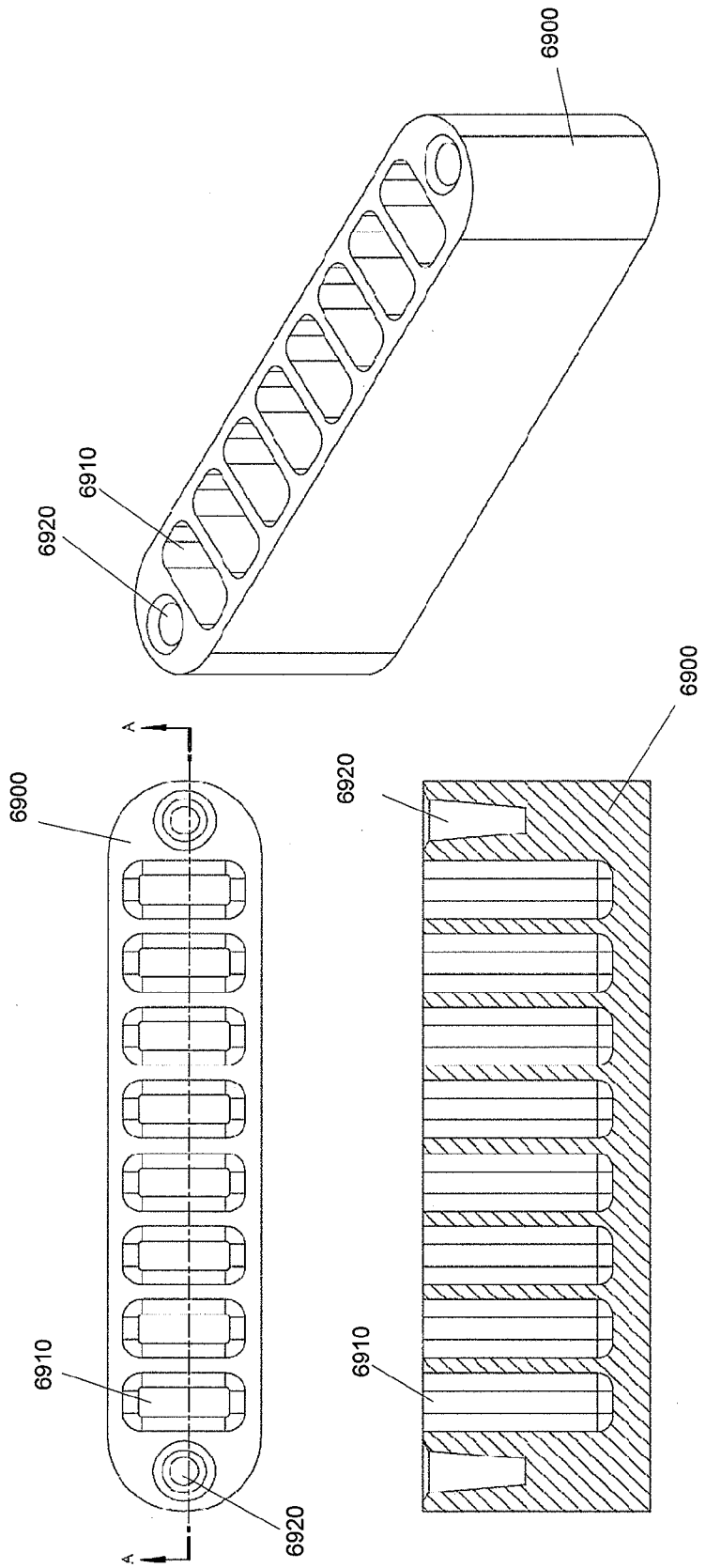


FIG. 69

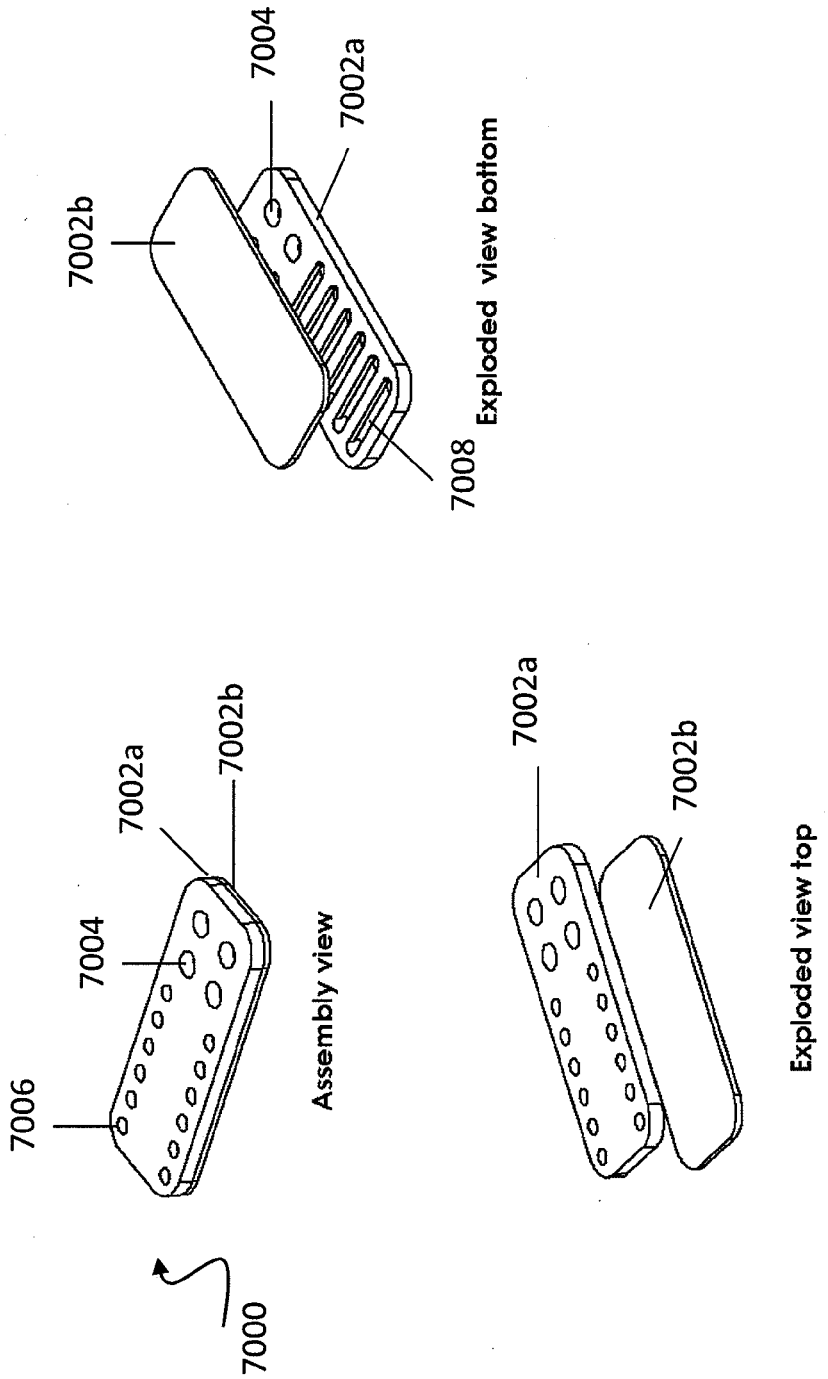
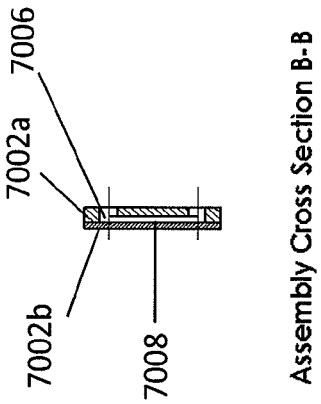
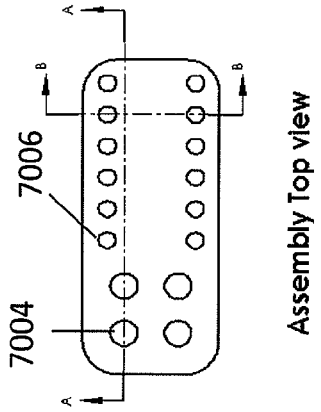

7004
7002a
7002b
7008
Exploded view bottom
7002a
7002b
7004
7006
Assembly view
7000
7002a
7002b
Exploded view top

FIG. 70A


7006
7002a
7002b
7008
Assembly Cross Section B-B


A
B
B
7006
7004
A
Assembly Top view

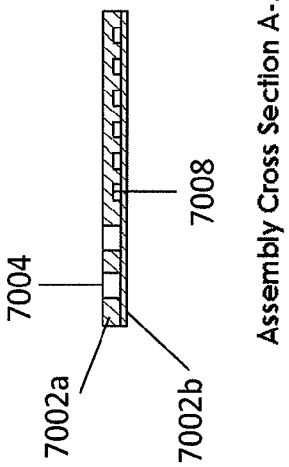
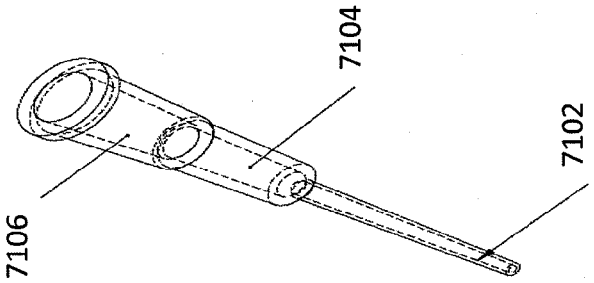

7004
7008
7002a
7002b
Assembly Cross Section A-A

FIG. 70B



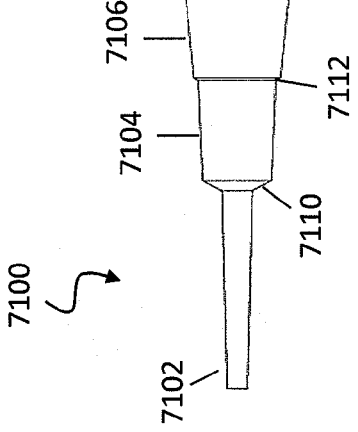


FIG. 71

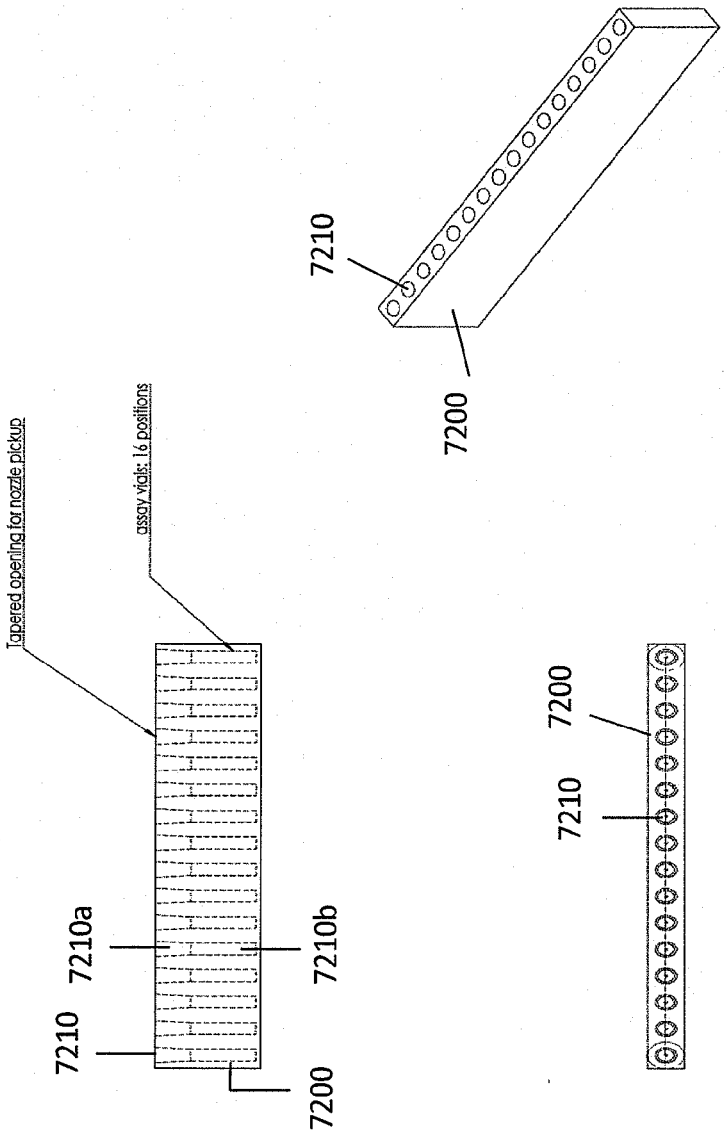

7210
7200
Tapered opening for nozzle pickup
assay vials: 16 positions
7210a
7210b
7210
7200
7200
7210

FIG. 72

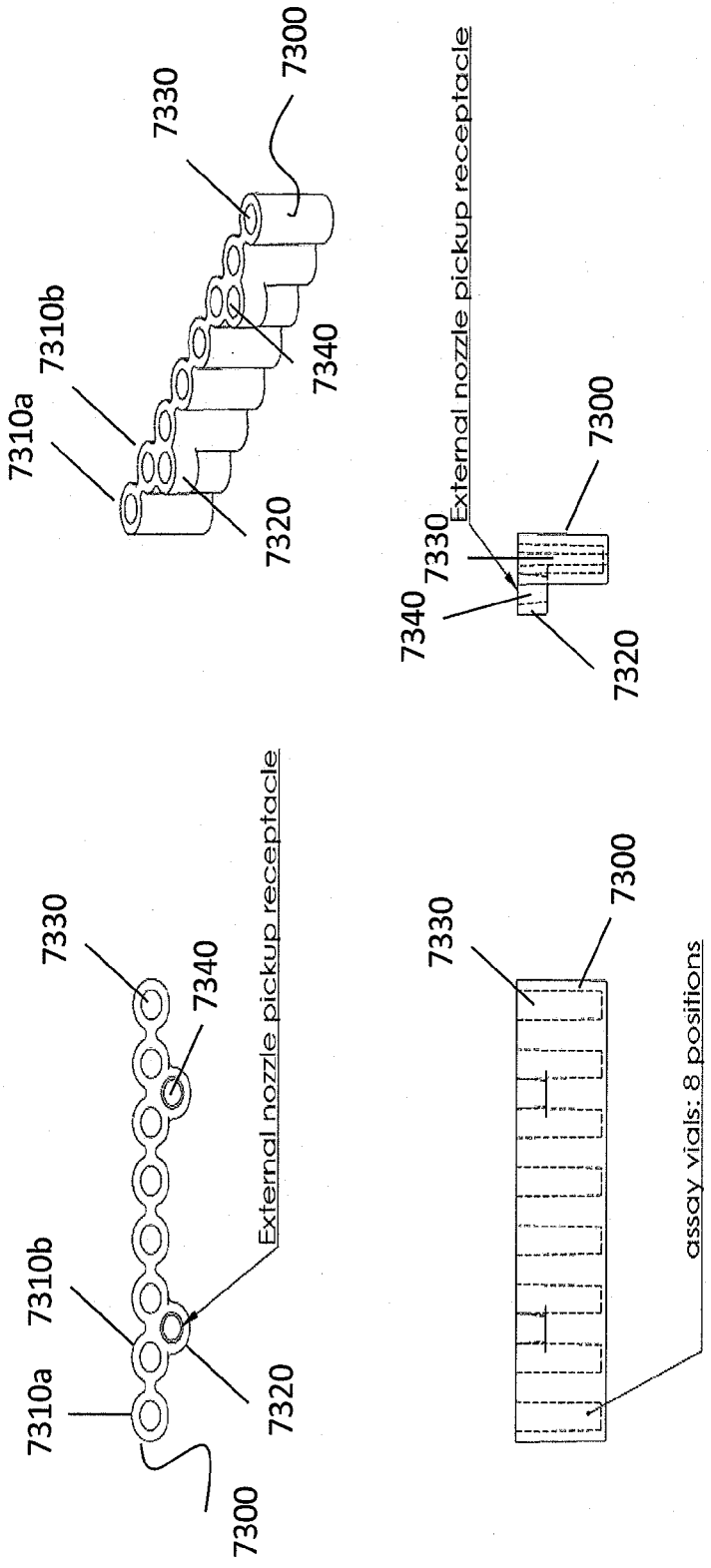

7330
7300
7310b
7340
7310a
7320
External nozzle pickup receptacle
7300
7330
7340
7320
7330
External nozzle pickup receptacle
7340
7310b
7310a
7320
7300
7330
7300
assay vials: 8 positions

FIG. 73

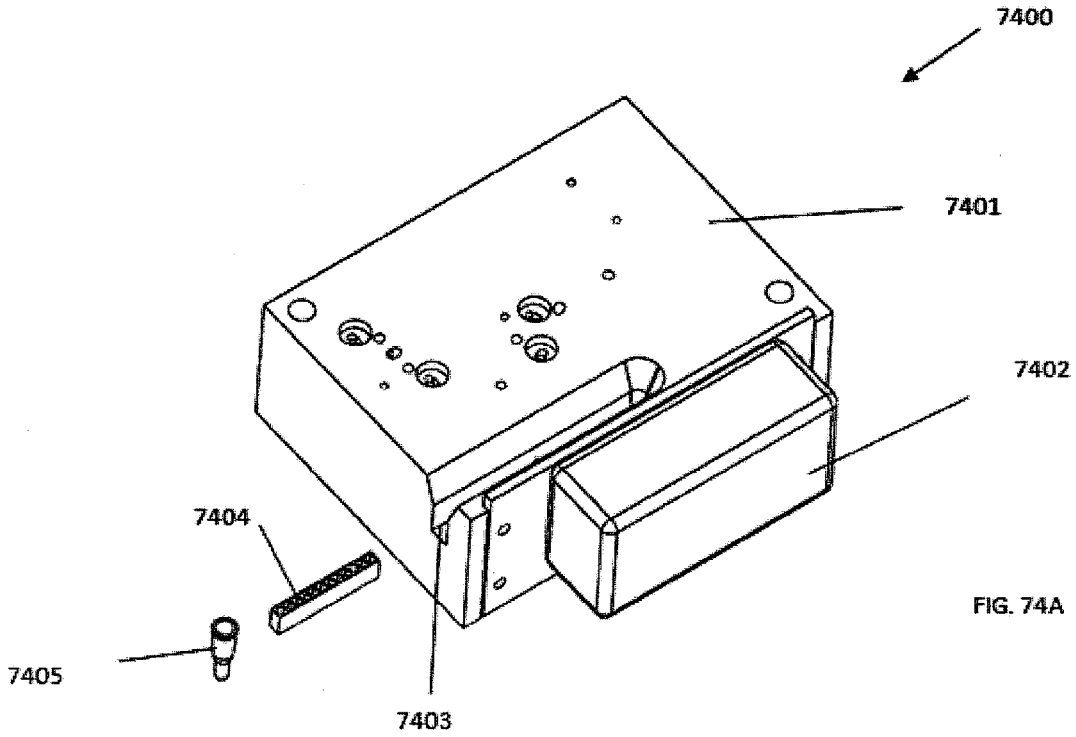


FIG. 74A

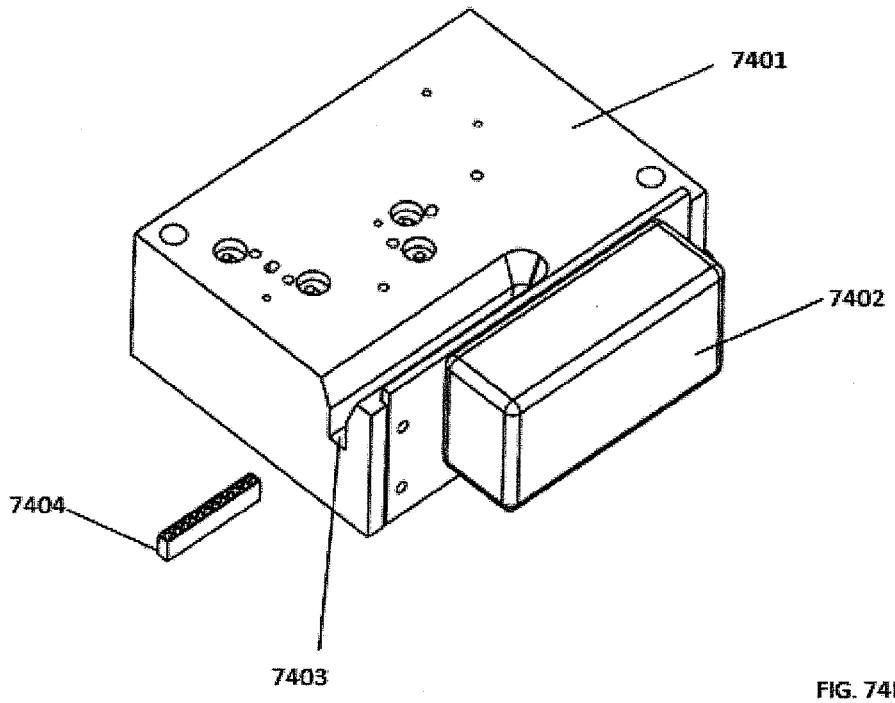


FIG. 74B

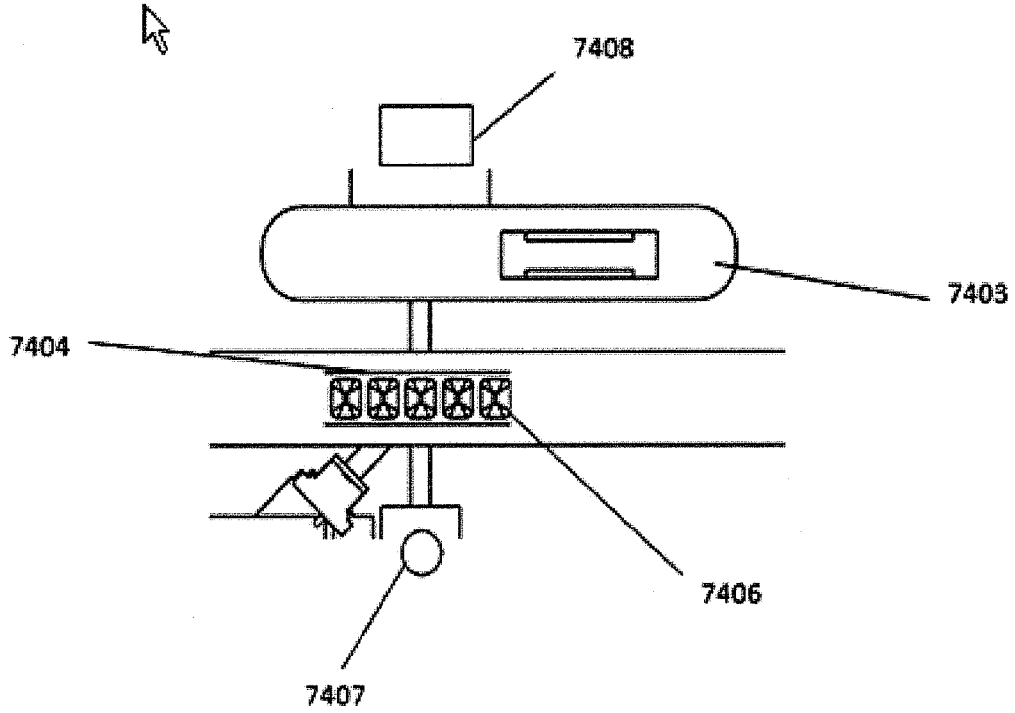


FIG. 74C

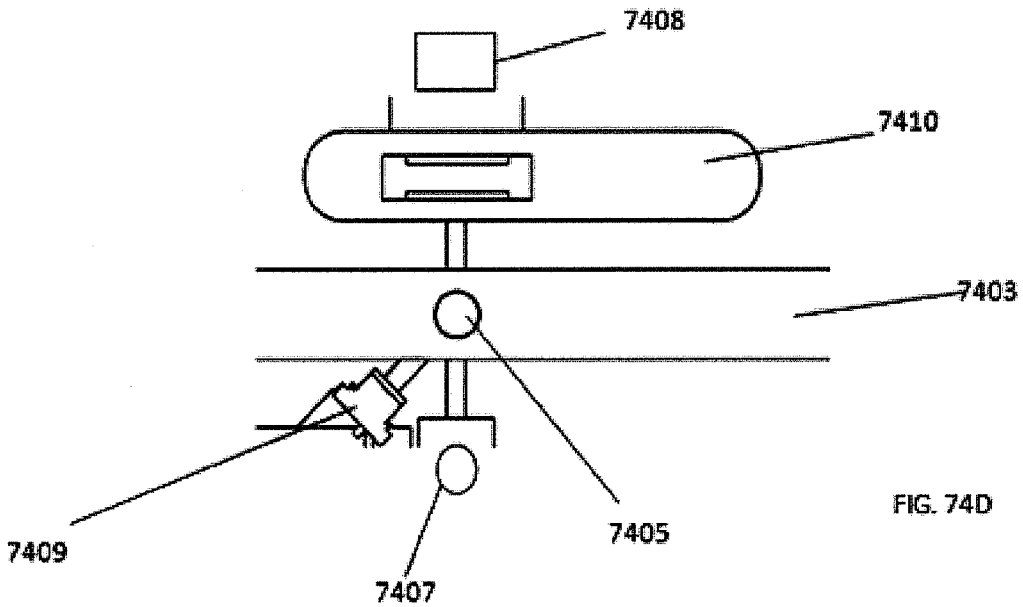


FIG. 74D

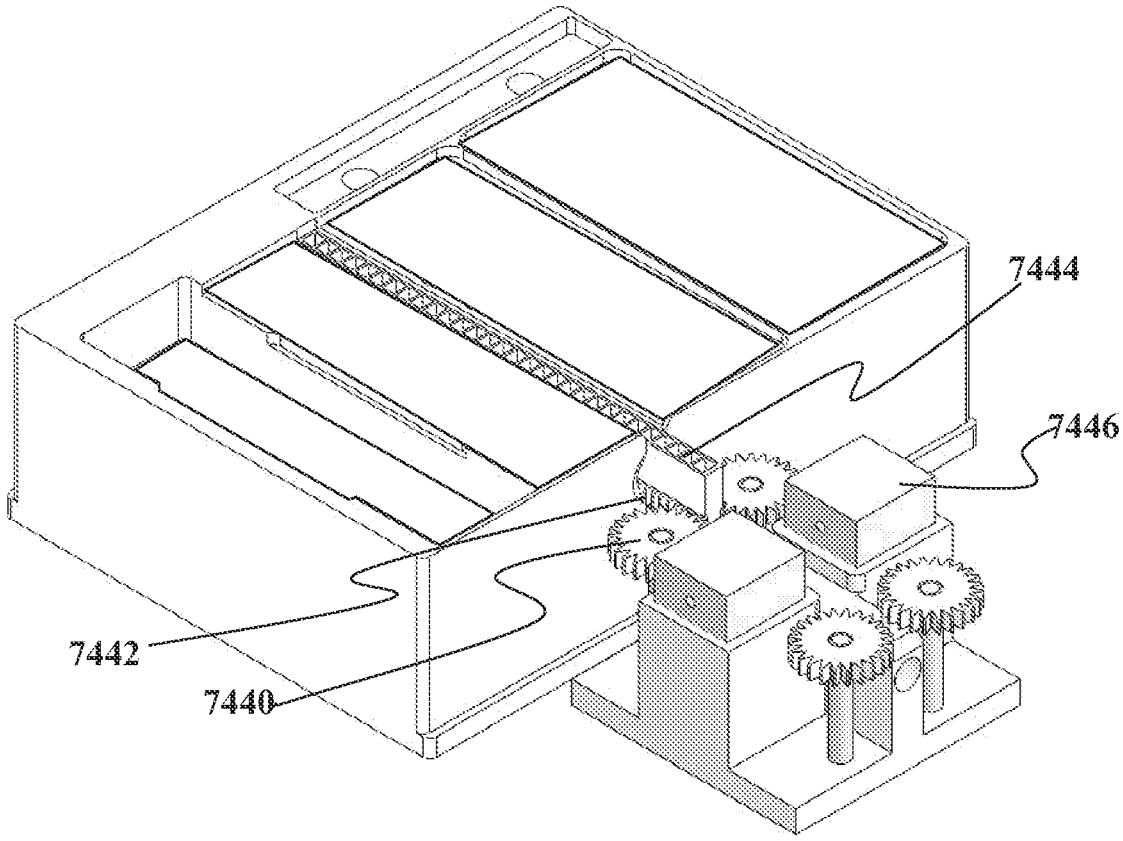


FIG. 74E

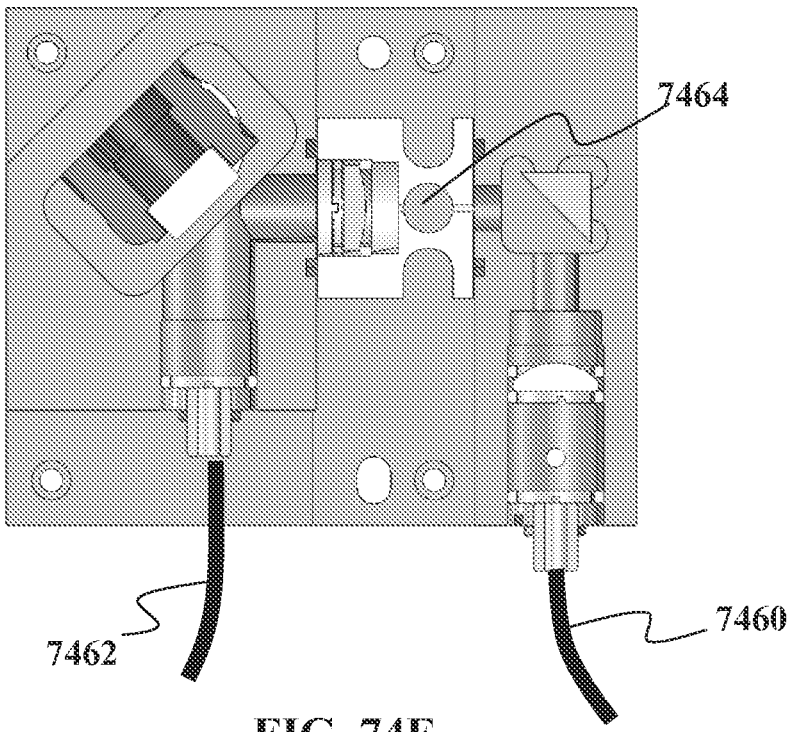


FIG. 74F

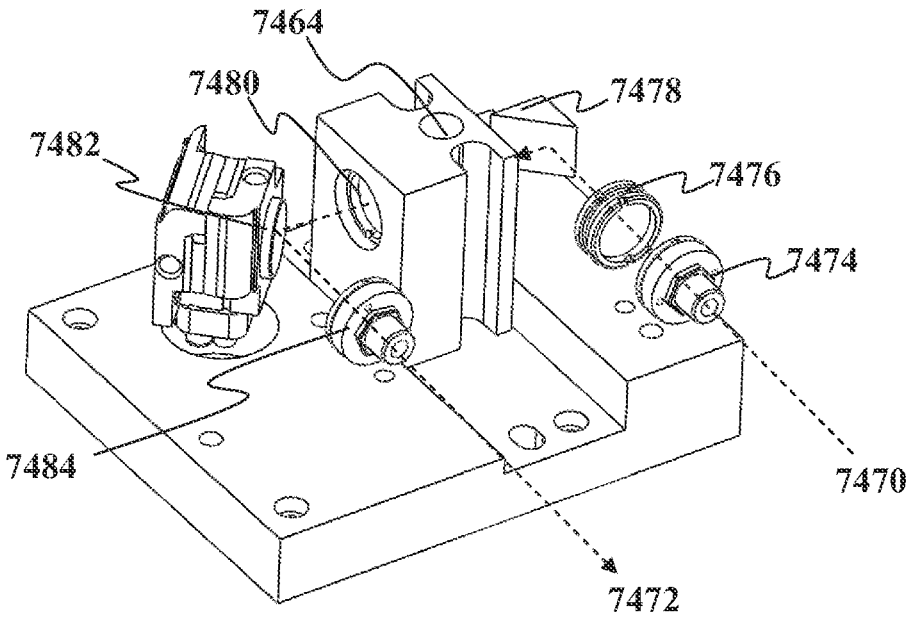


FIG. 74G

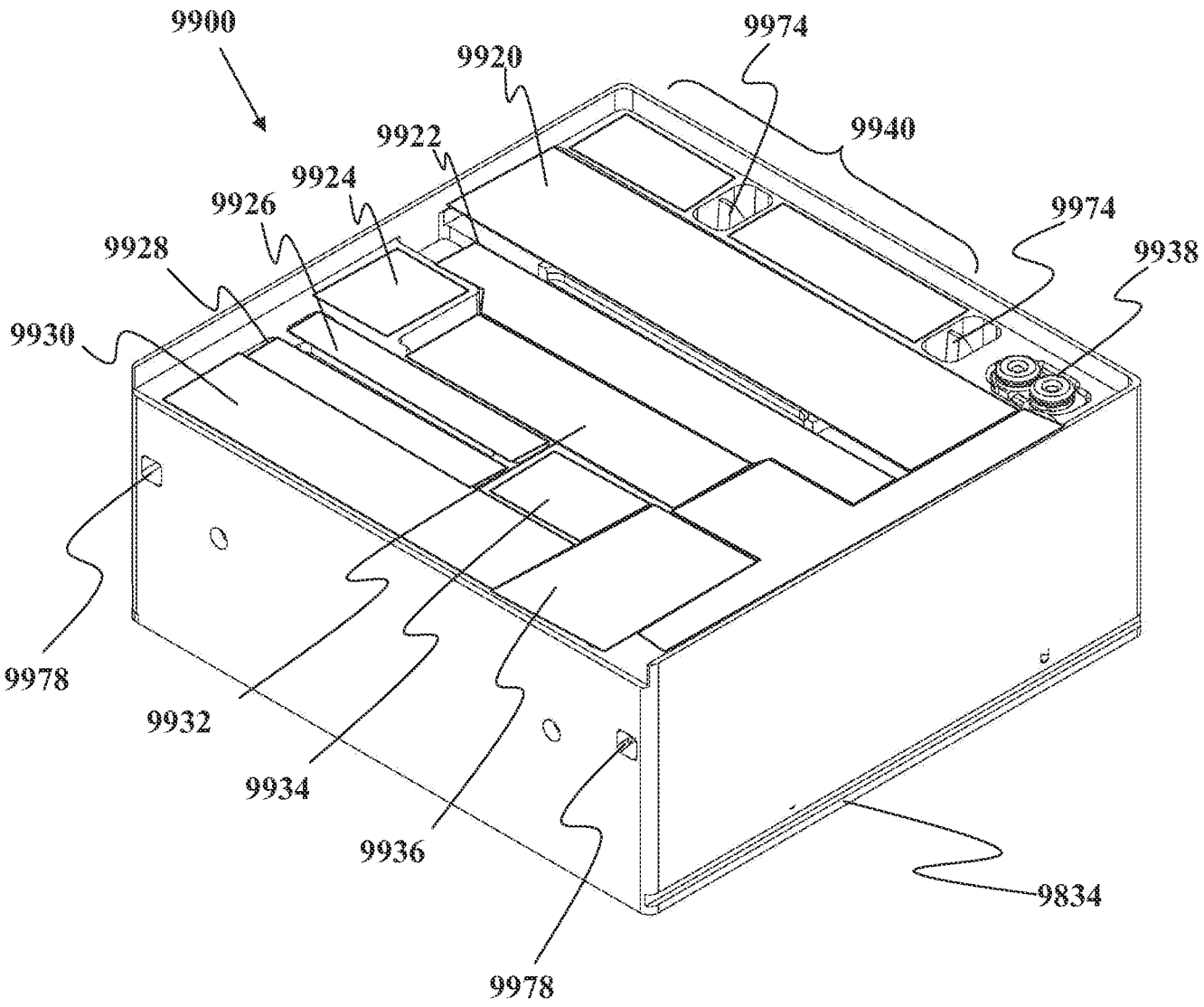

9900
9974
9920
9940
9922
9924
9926
9974
9928
9938
9930
9978
9932
9934
9936
9834
9978

FIG. 75

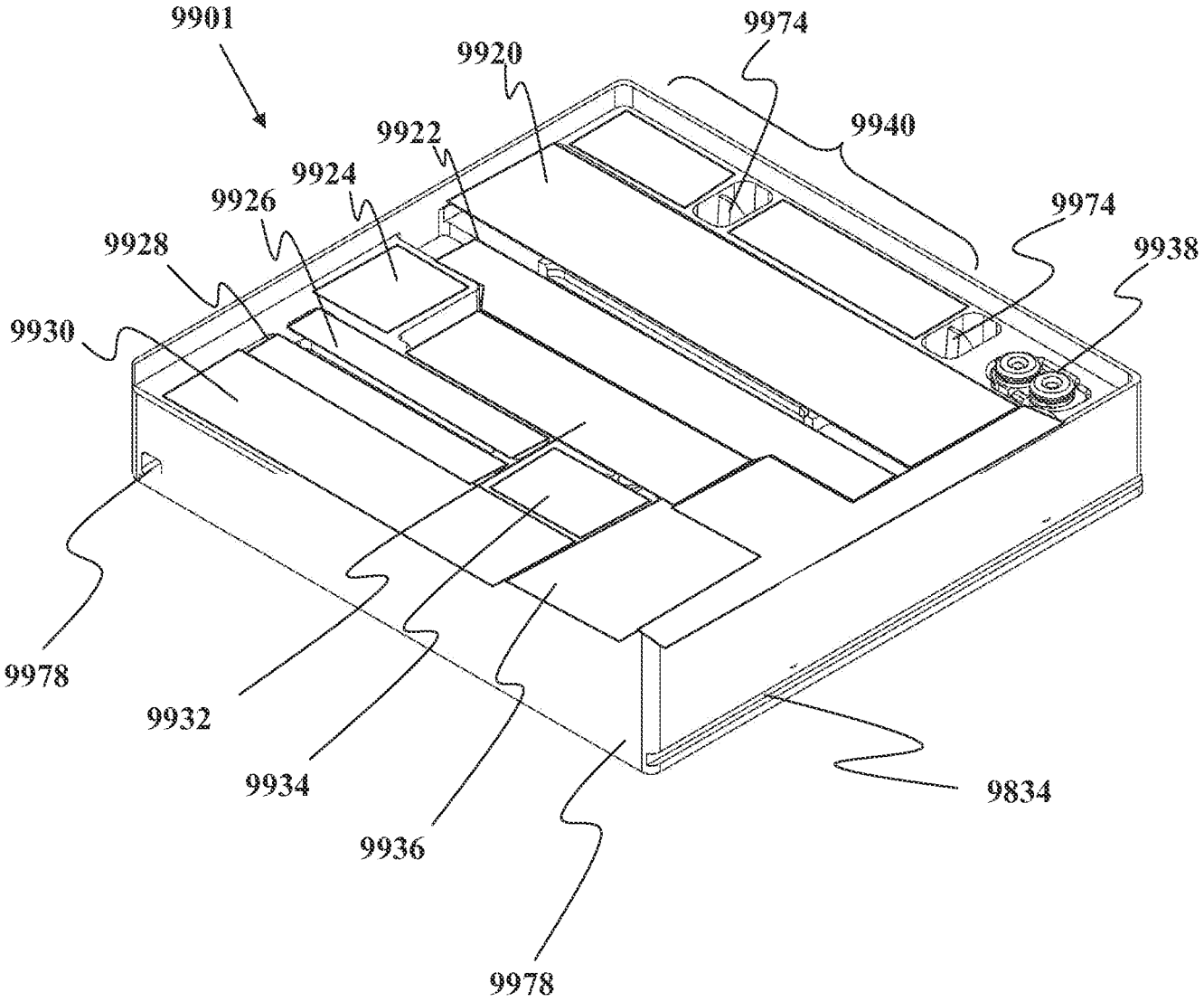

9901
9974
9920
9940
9922
9924
9926
9974
9928
9938
9930
9978
9932
9934
9834
9936
9978

FIG. 76

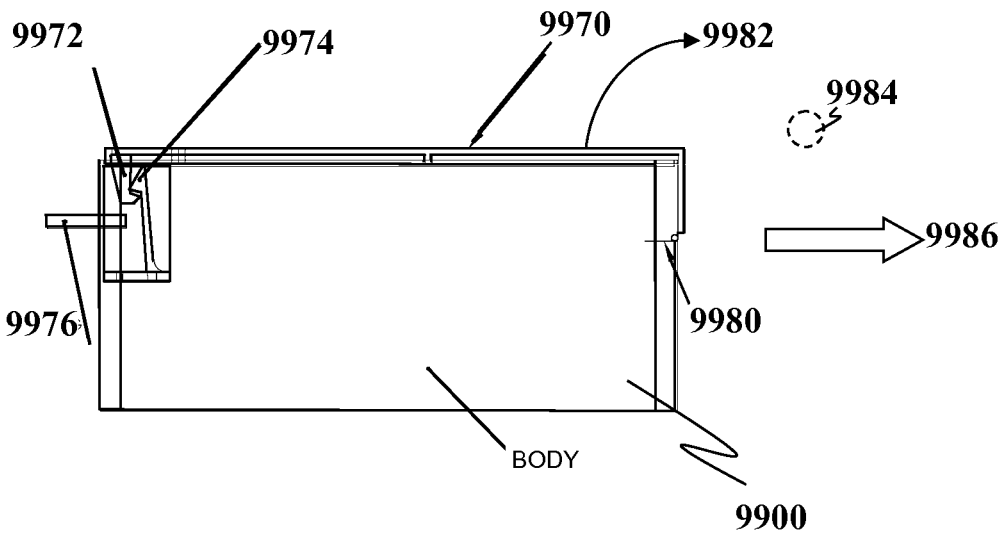

9972
9974
9970
9982
9984
9986
9976
9980
BODY
9900

FIG. 77

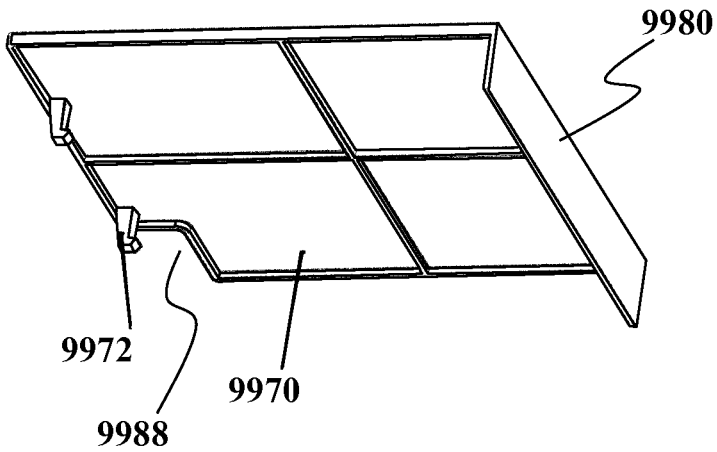

9980
9972
9970
9988

FIG. 78

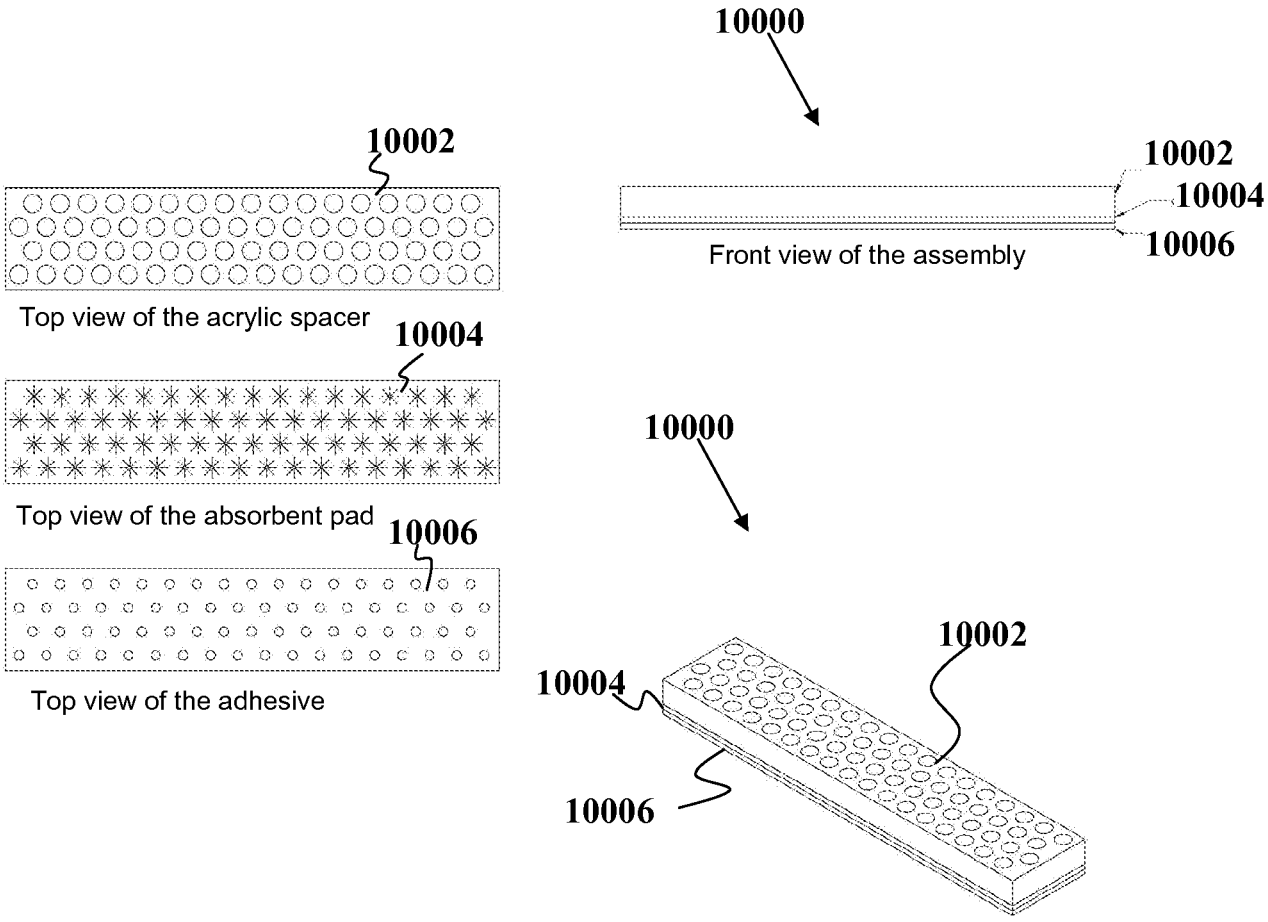

10000
10002
10004
10006
Front view of the assembly
10002
Top view of the acrylic spacer
10004
Top view of the absorbent pad
10006
Top view of the adhesive
10000
10002
10004
10006

FIG. 79

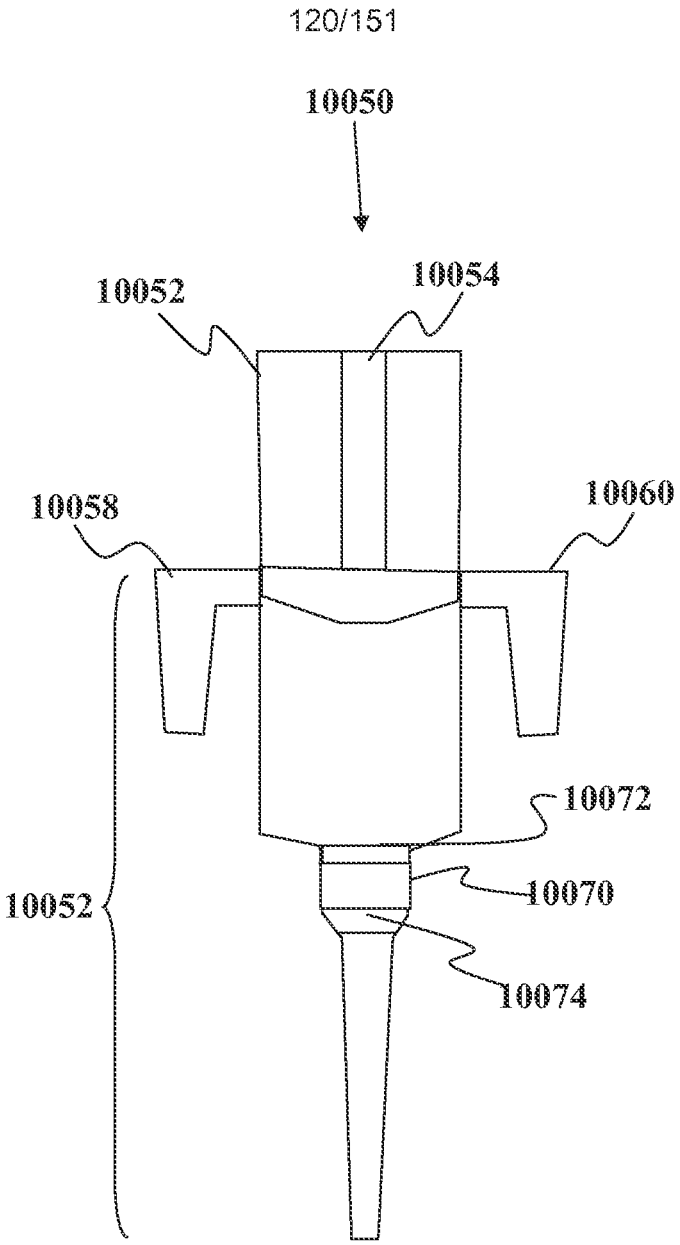

120/151
10050
10052
10054
10058
10060
10072
10052
10070
10074

FIG. 80

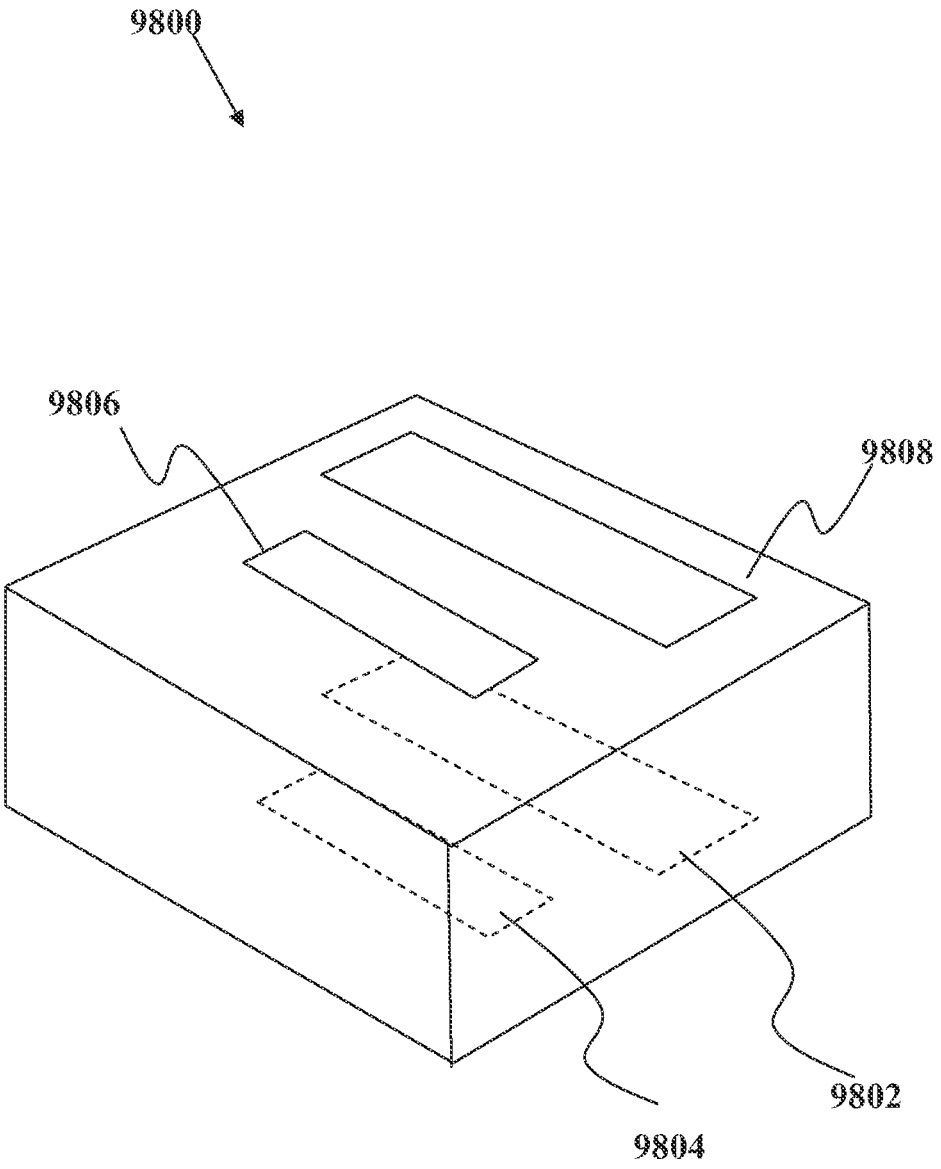


FIG. 81A

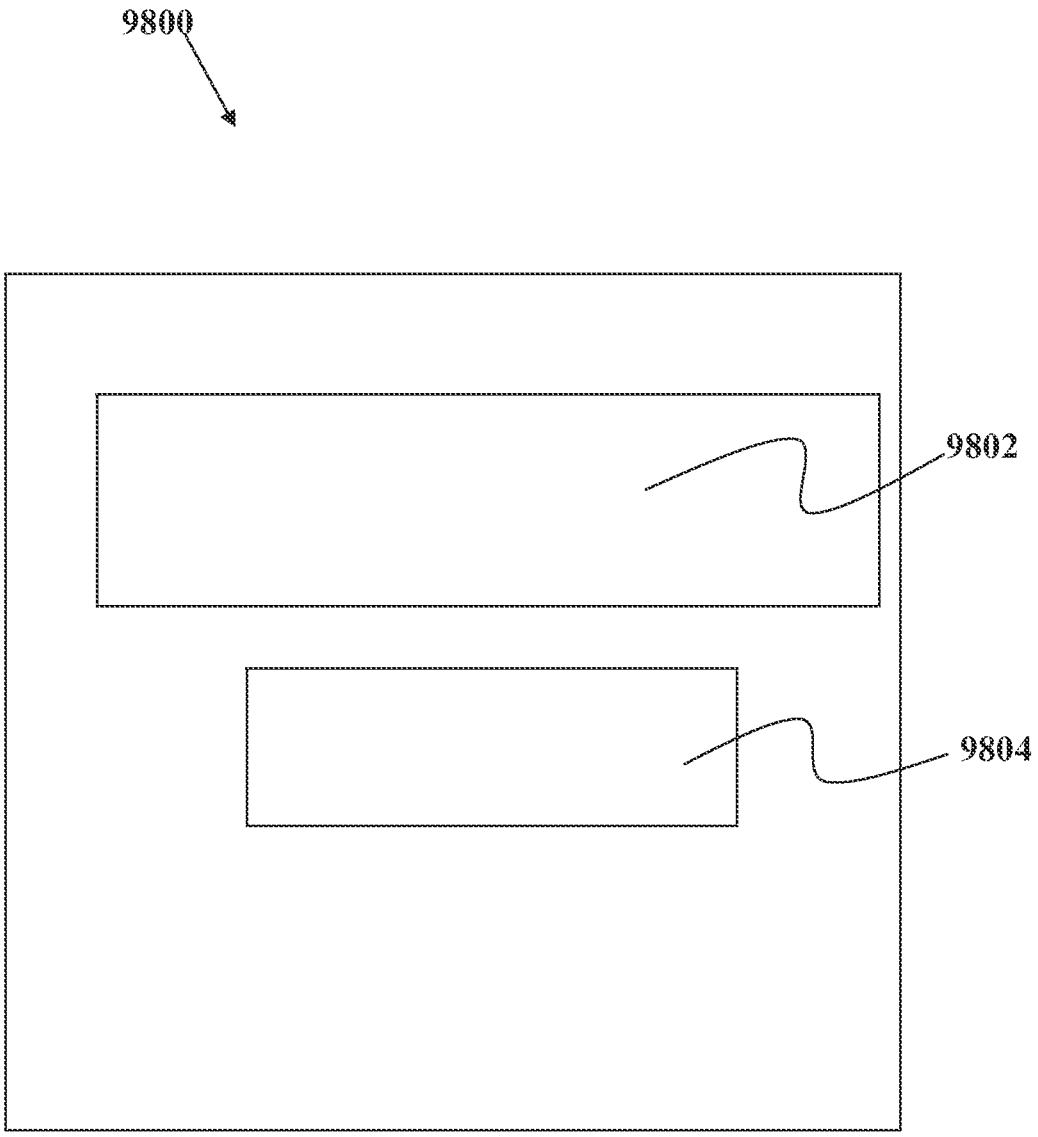


FIG. 81B

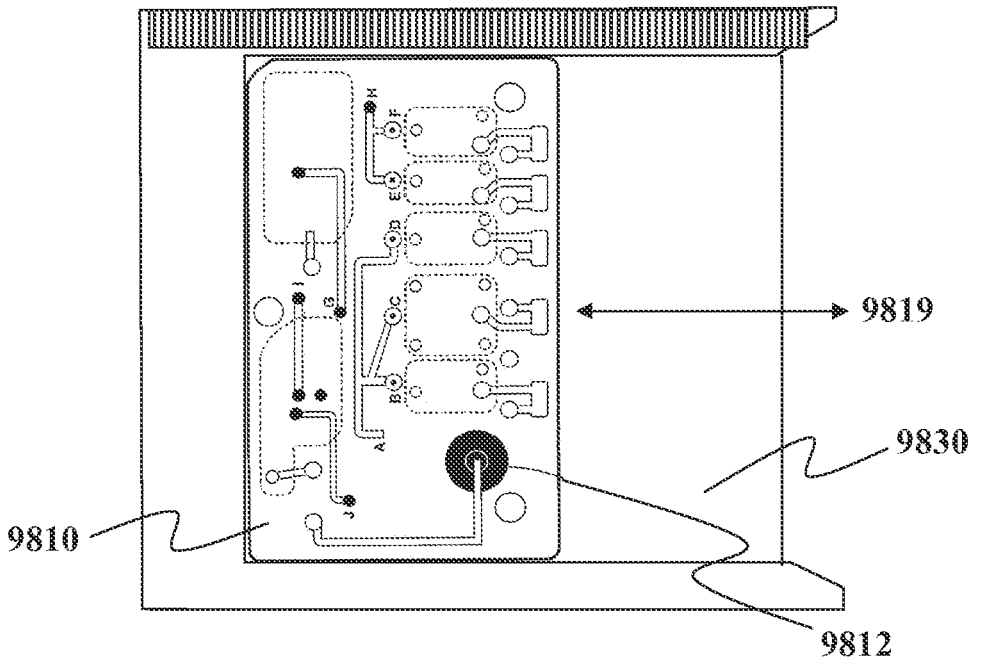


FIG. 82

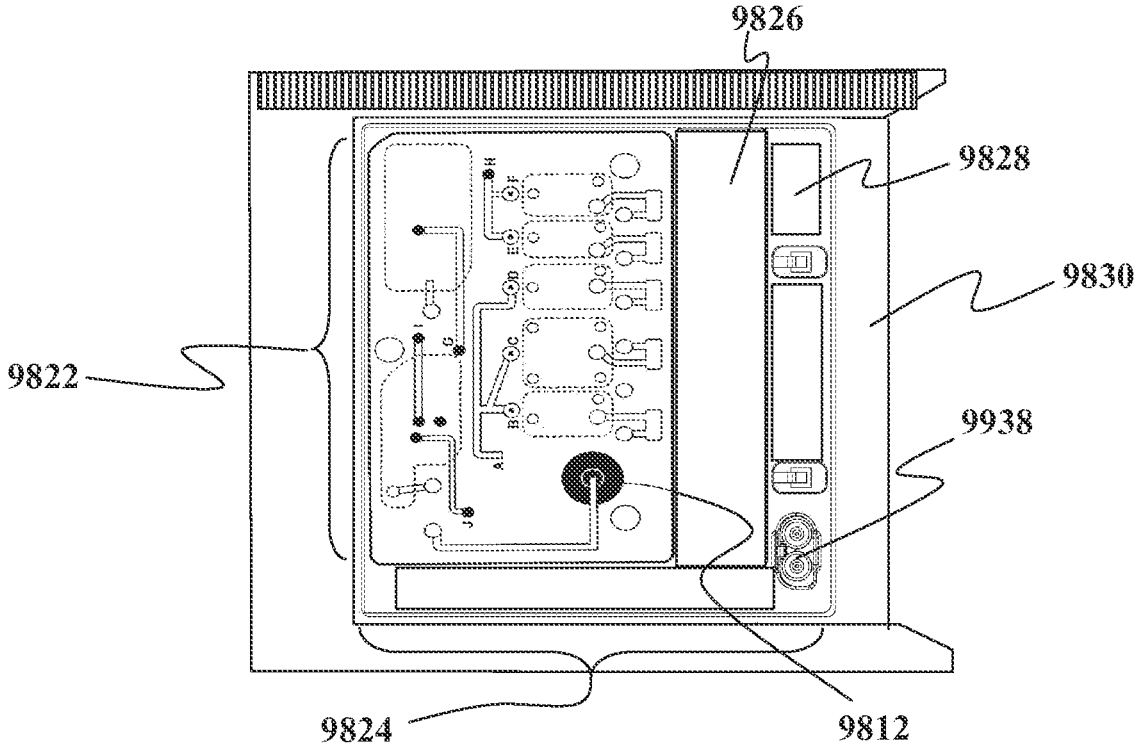


FIG. 83

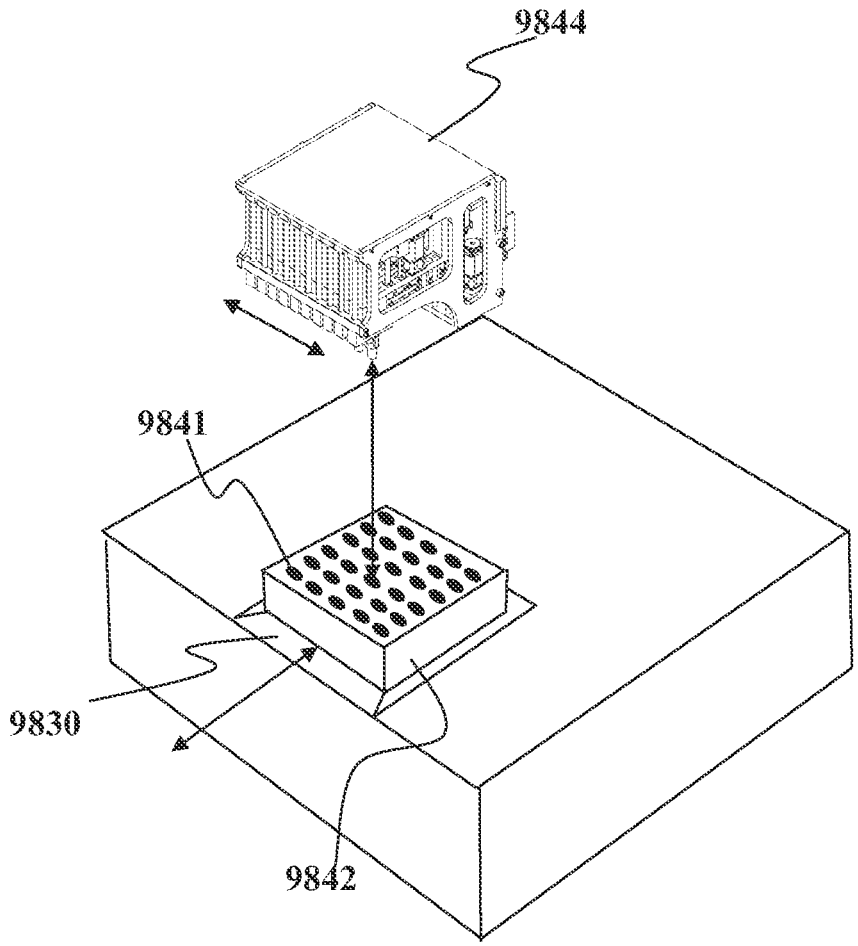


FIG. 84

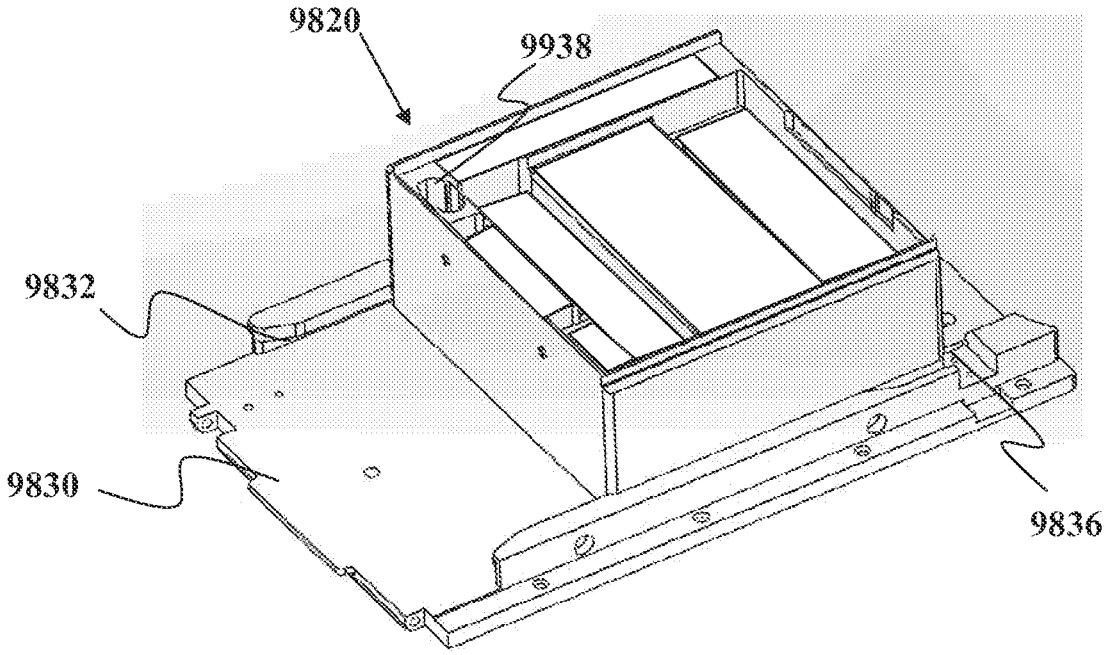


FIG. 85

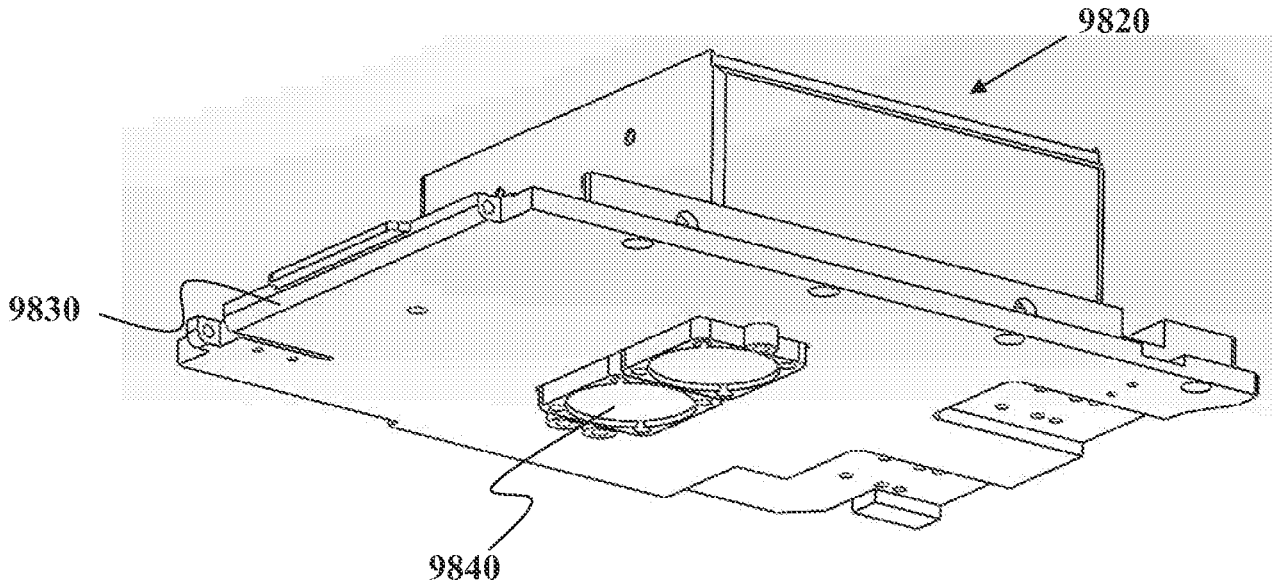


FIG. 86

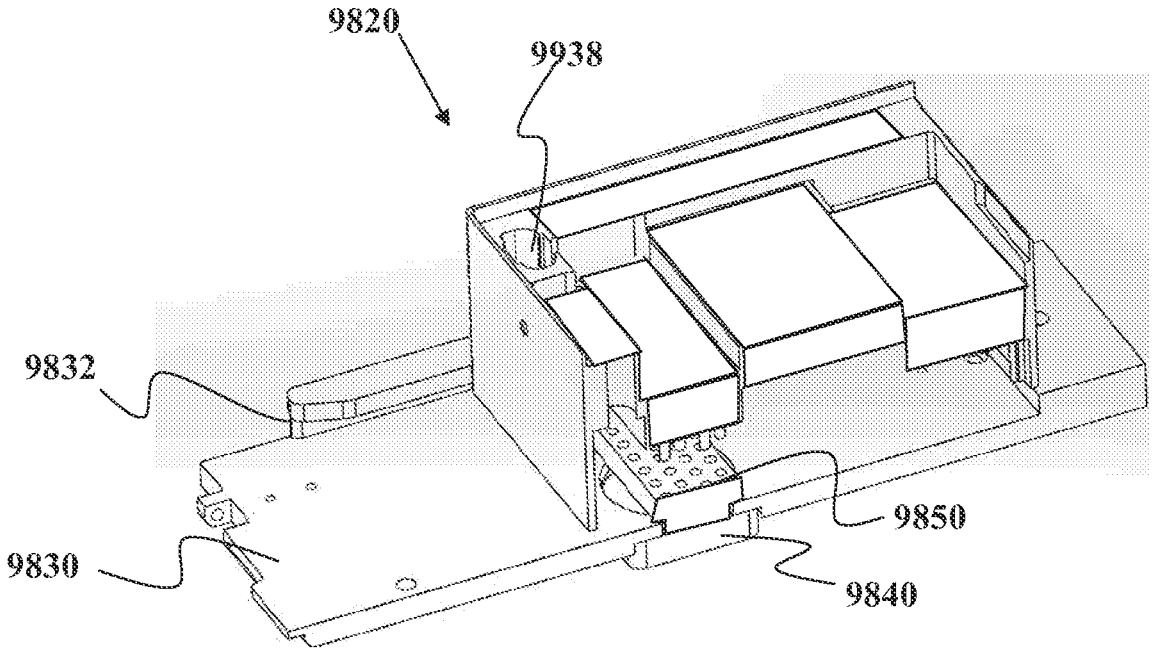

9820
9938
9832
9850
9830
9840

FIG. 87

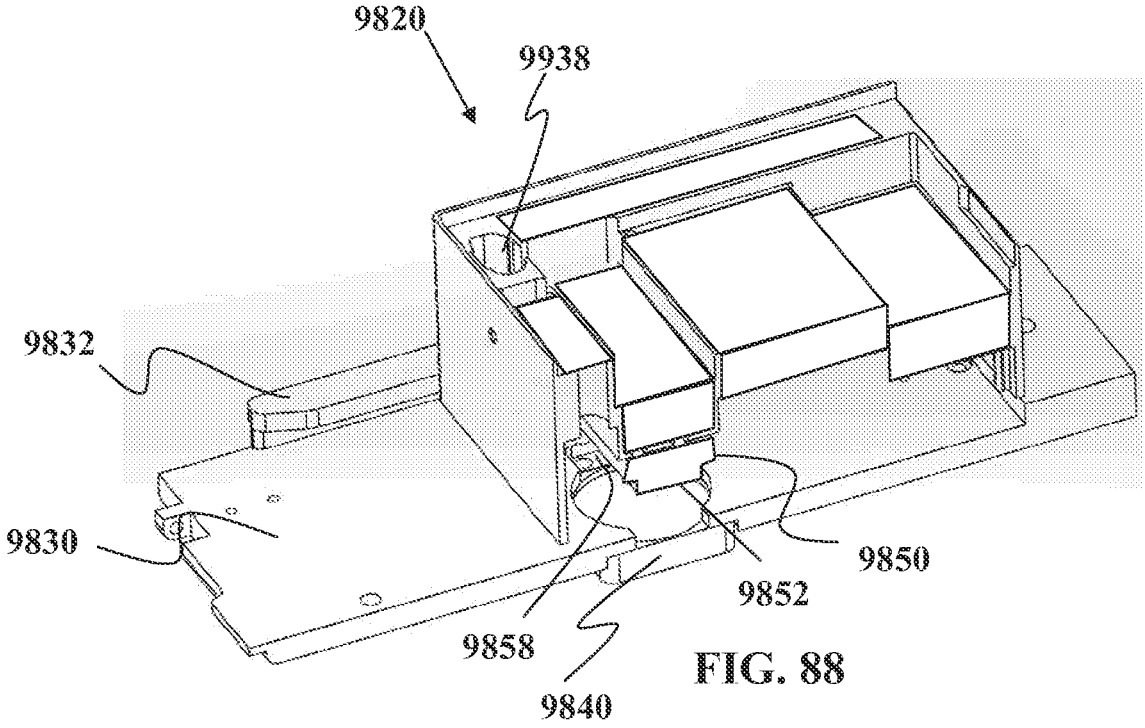

9820
9938
9832
9830
9850
9852
9858
9840

FIG. 88

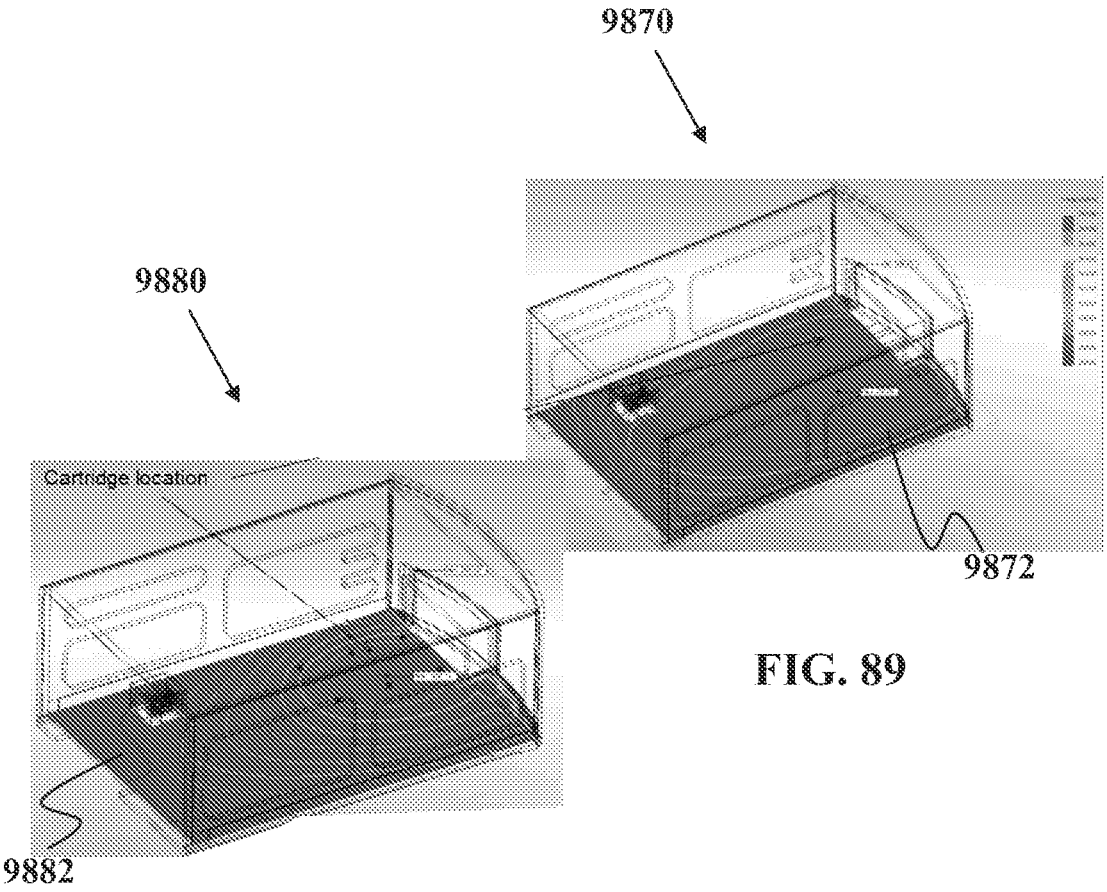


FIG. 89

FIG. 90

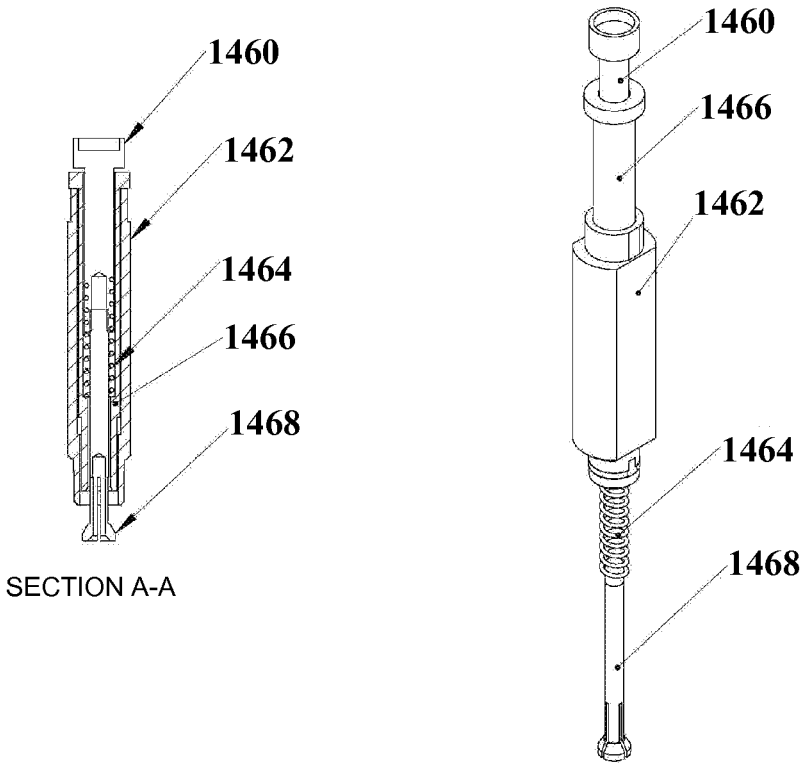


FIG. 91

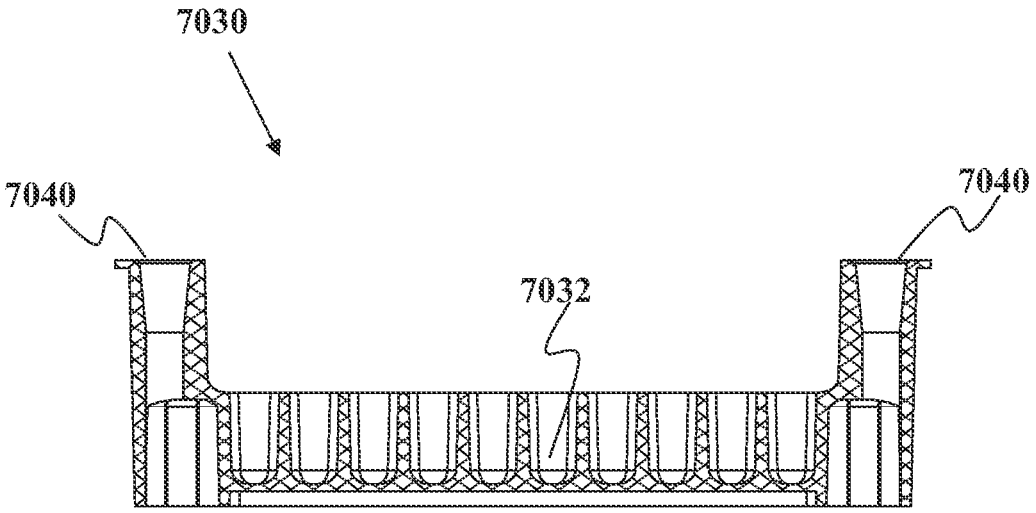


FIG. 92

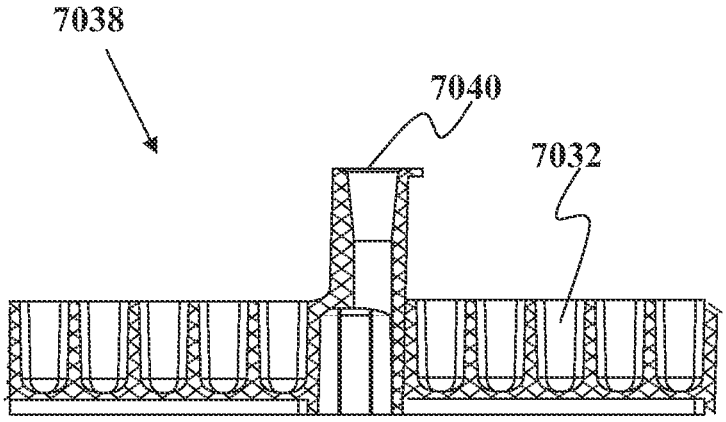


FIG. 93

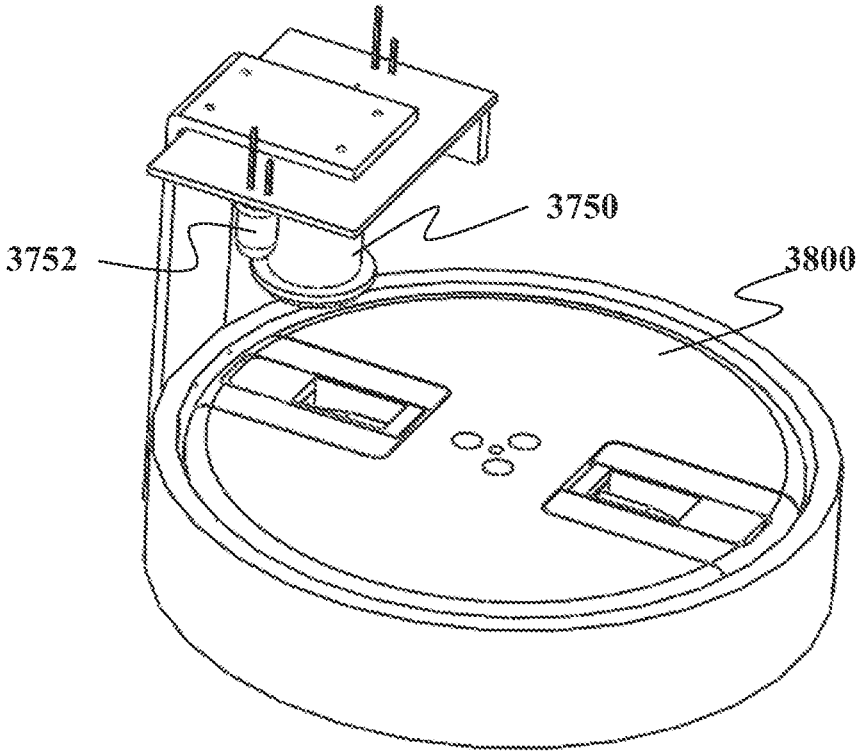


FIG. 94

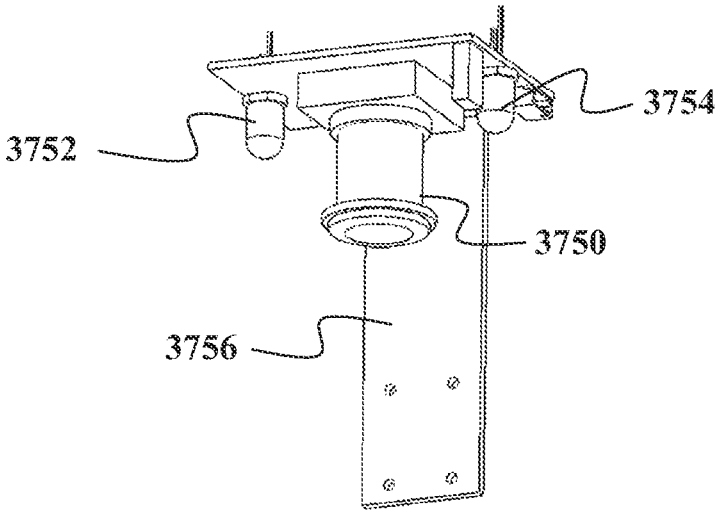


FIG. 95

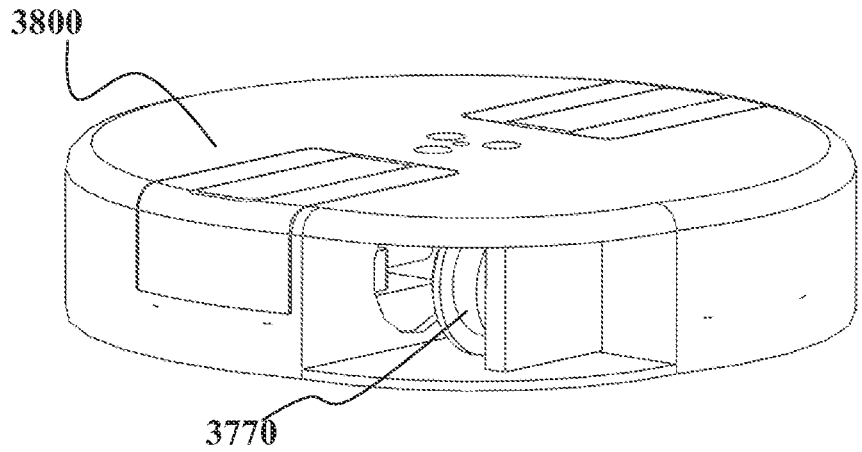


FIG. 96

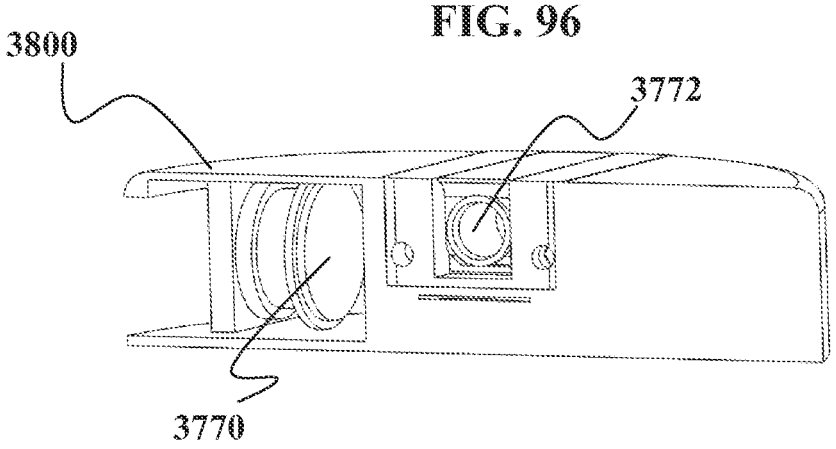


FIG. 97

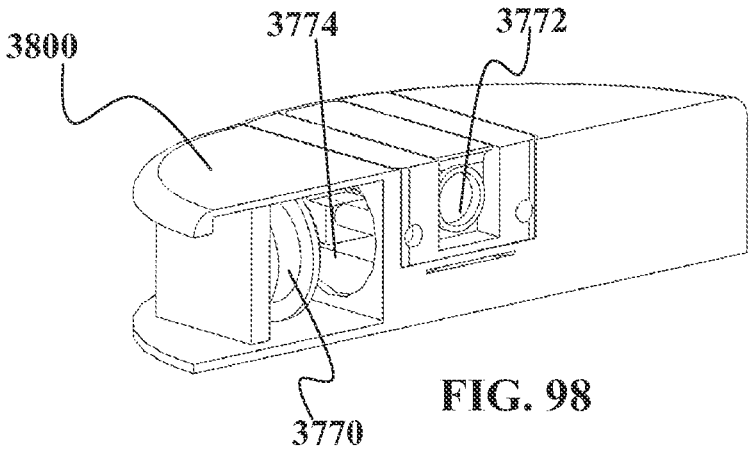


FIG. 98

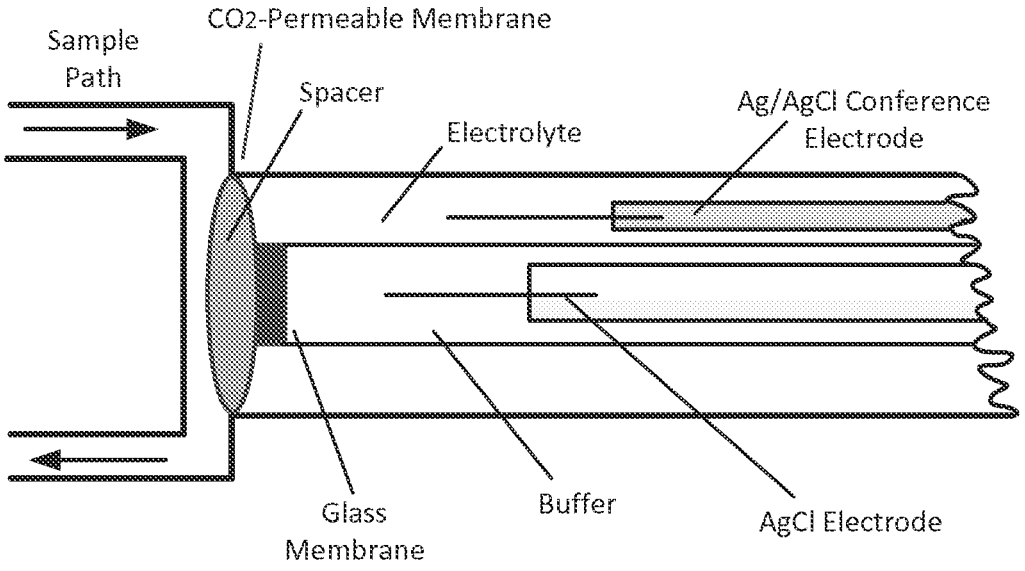


FIG. 99

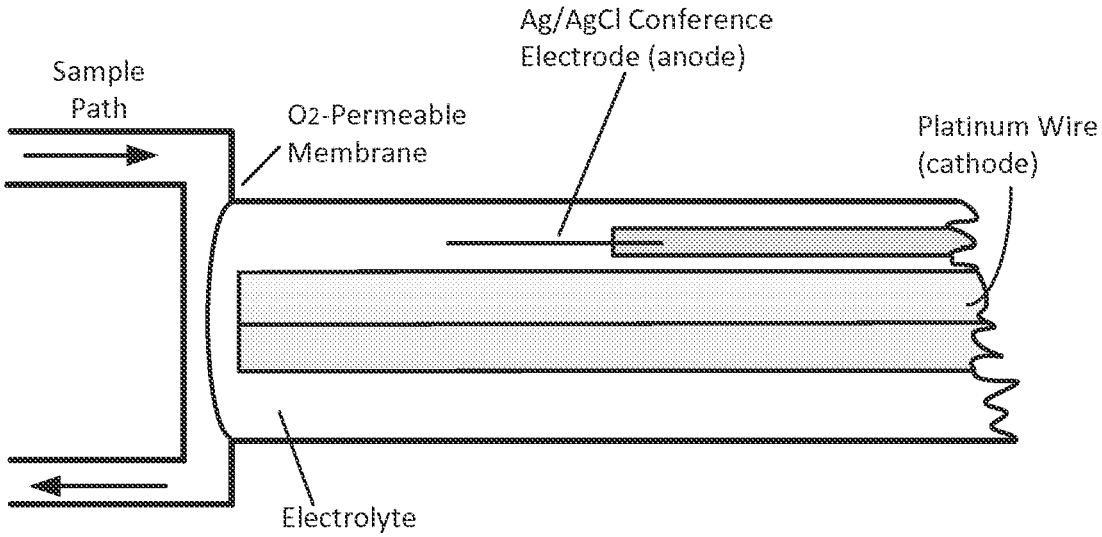


FIG. 100

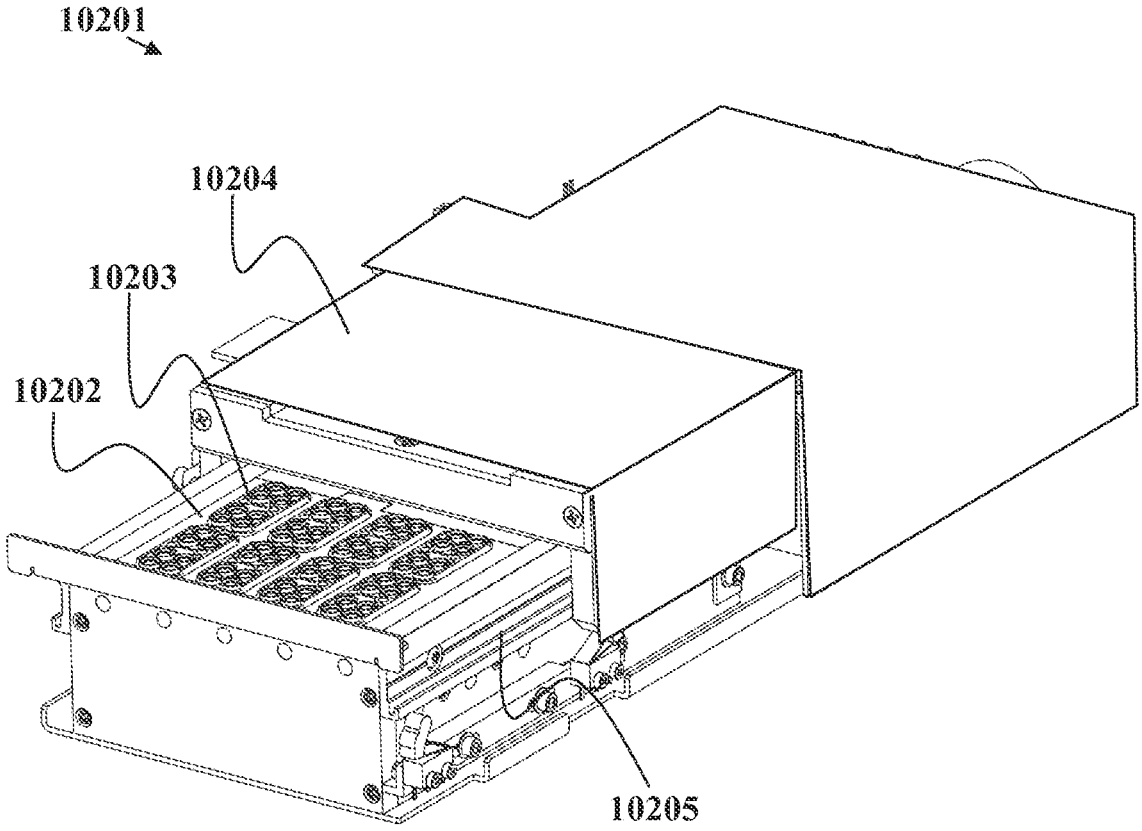


FIG. 101

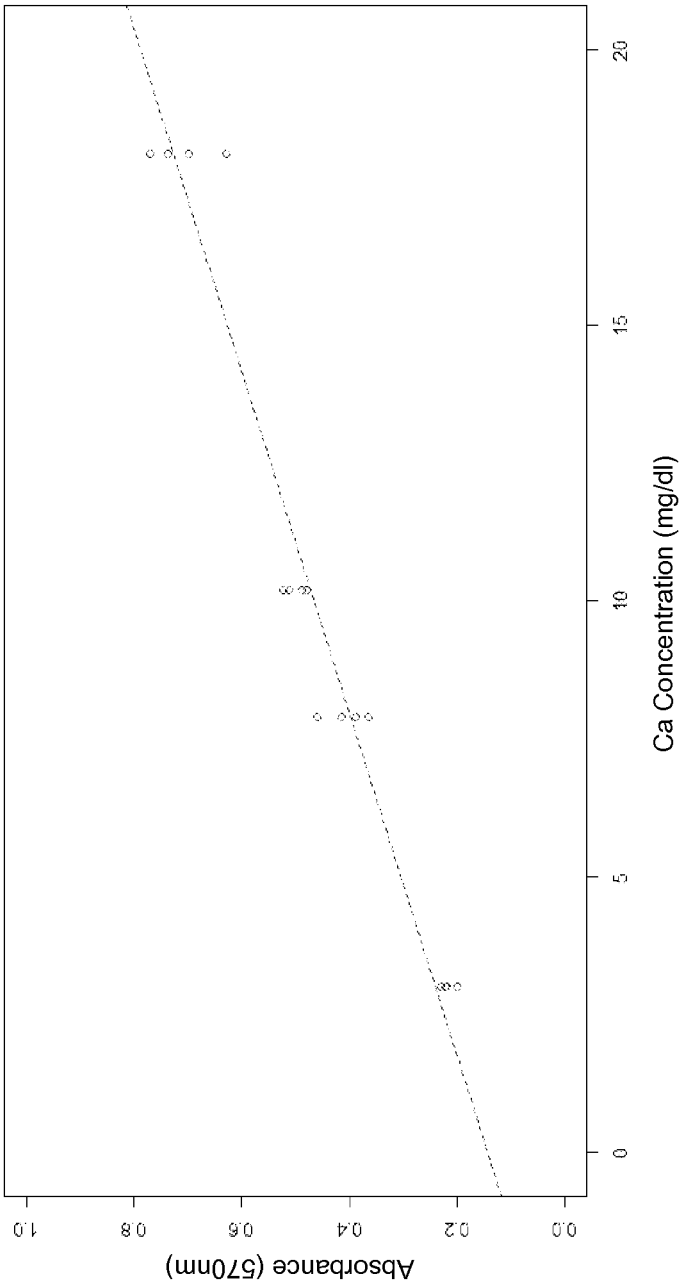

Absorbance (570nm)
0.0
0.2
0.4
0.6
0.8
1.0
0
5
10
15
20
Ca Concentration (mg/dl)

Figure 102

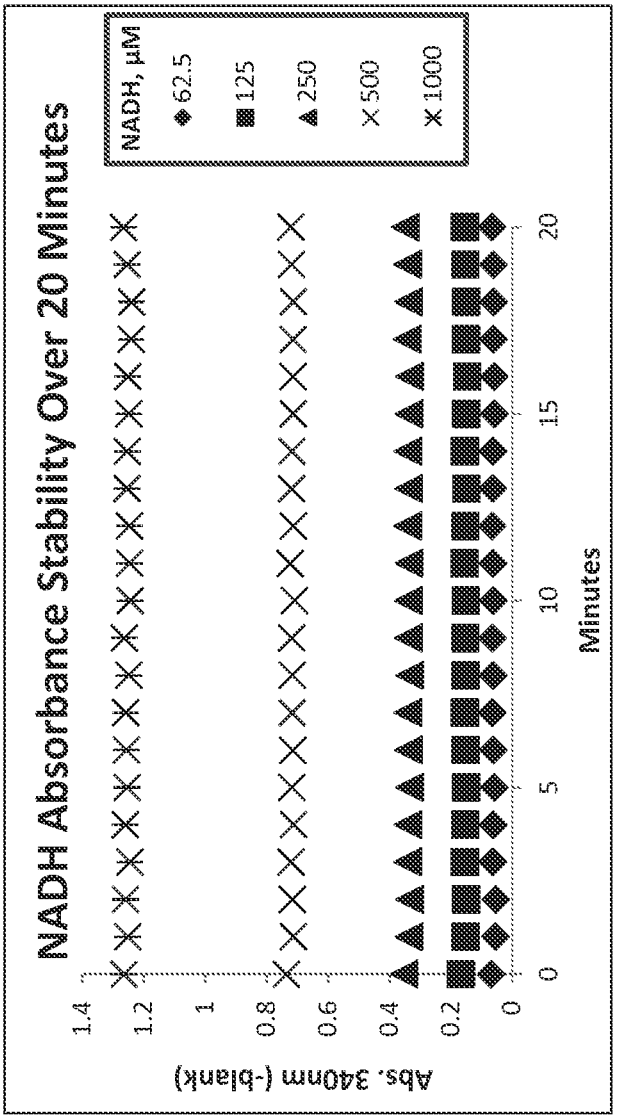

NADH Absorbance Stability Over 20 Minutes
NADH, µM
62.5
125
250
500
1000
Abs. 340nm (-blank)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
5
10
15
20
Minutes

Figure 103

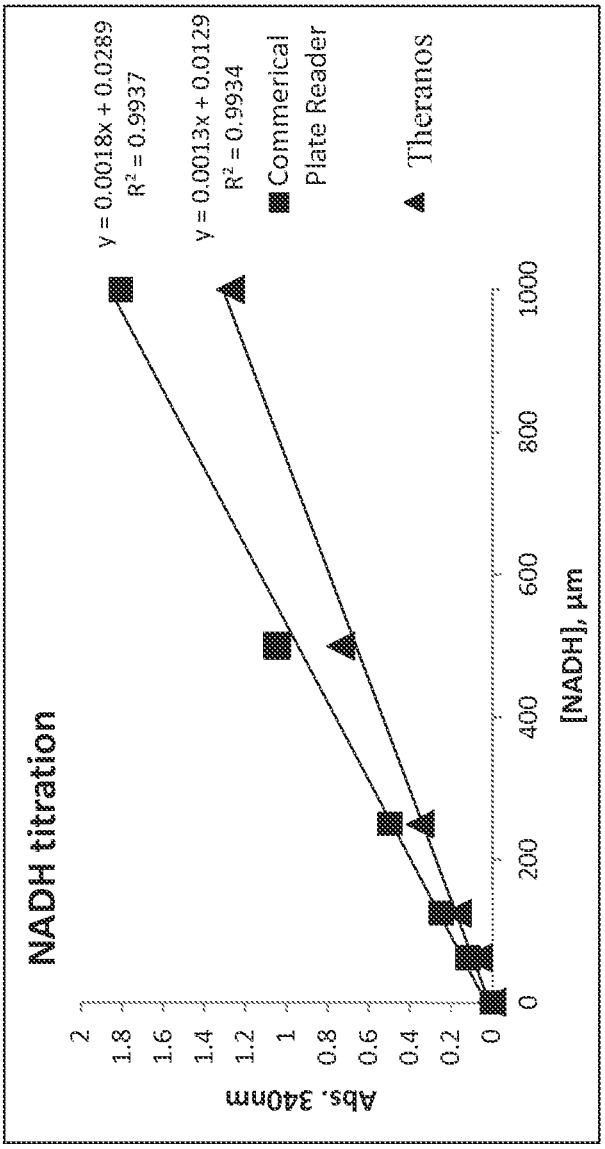

NADH titration
Abs. 340nm
[NADH], µm
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
200
400
600
800
1000
y = 0.0018x + 0.0289
R² = 0.9937
y = 0.0013x + 0.0129
R² = 0.9934
Commerical Plate Reader
Theranos

Figure 104

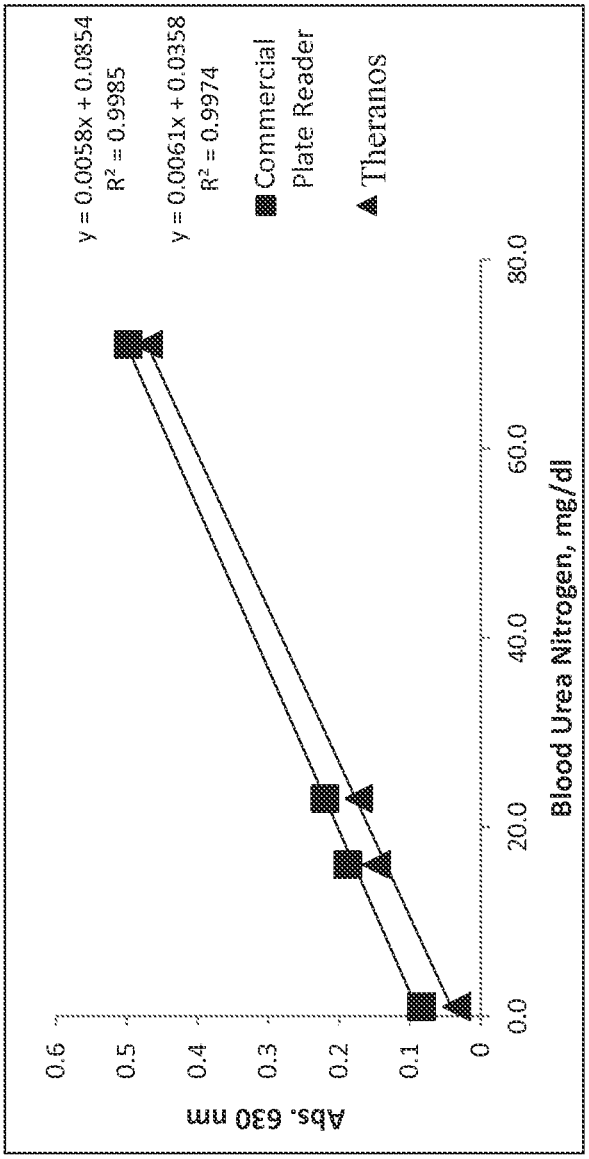

y = 0.0058x + 0.0854
R² = 0.9985
y = 0.0061x + 0.0358
R² = 0.9974
Commercial Plate Reader
Theranos
Abs. 630 nm
0.6
0.5
0.4
0.3
0.2
0.1
0
0.0
20.0
40.0
60.0
80.0
Blood Urea Nitrogen, mg/dl

Figure 105

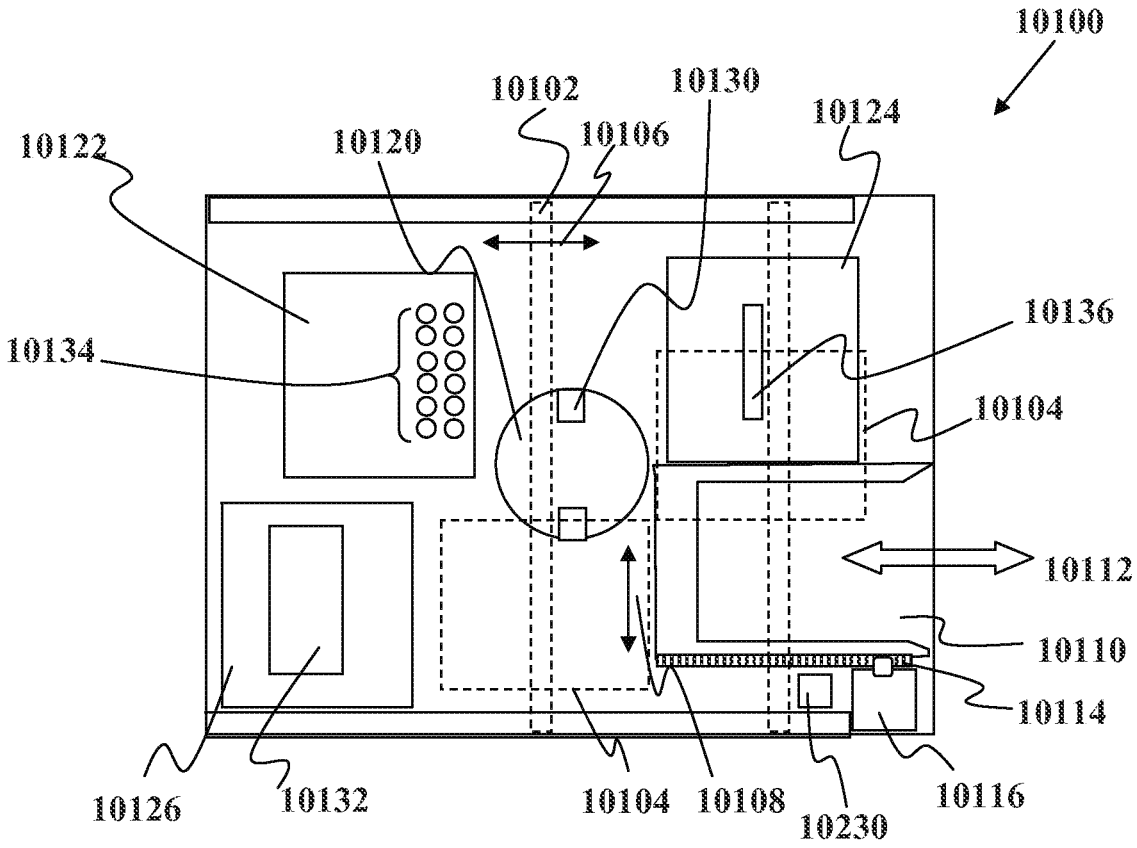


FIG. 106A

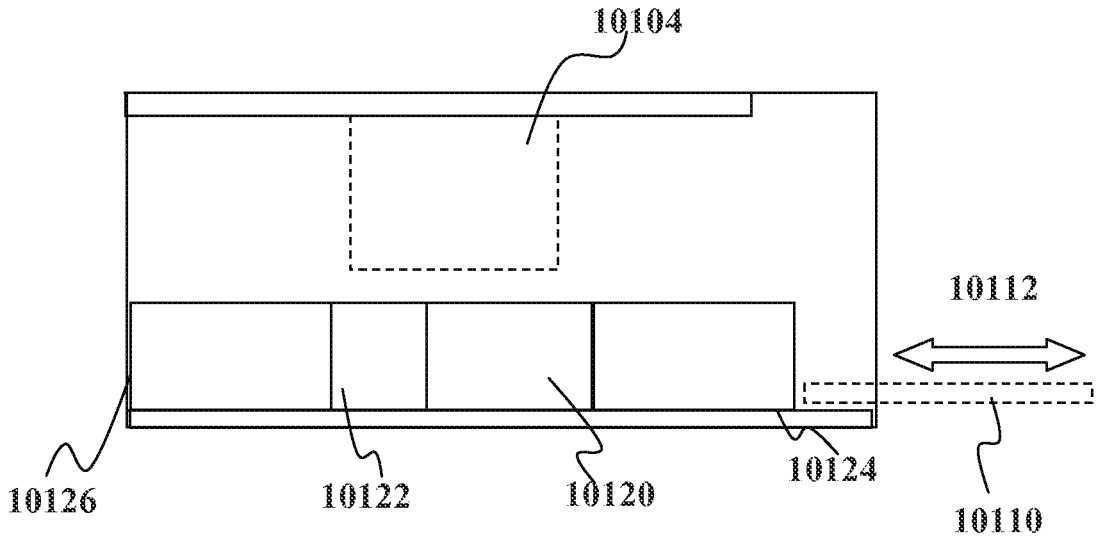


FIG. 106B

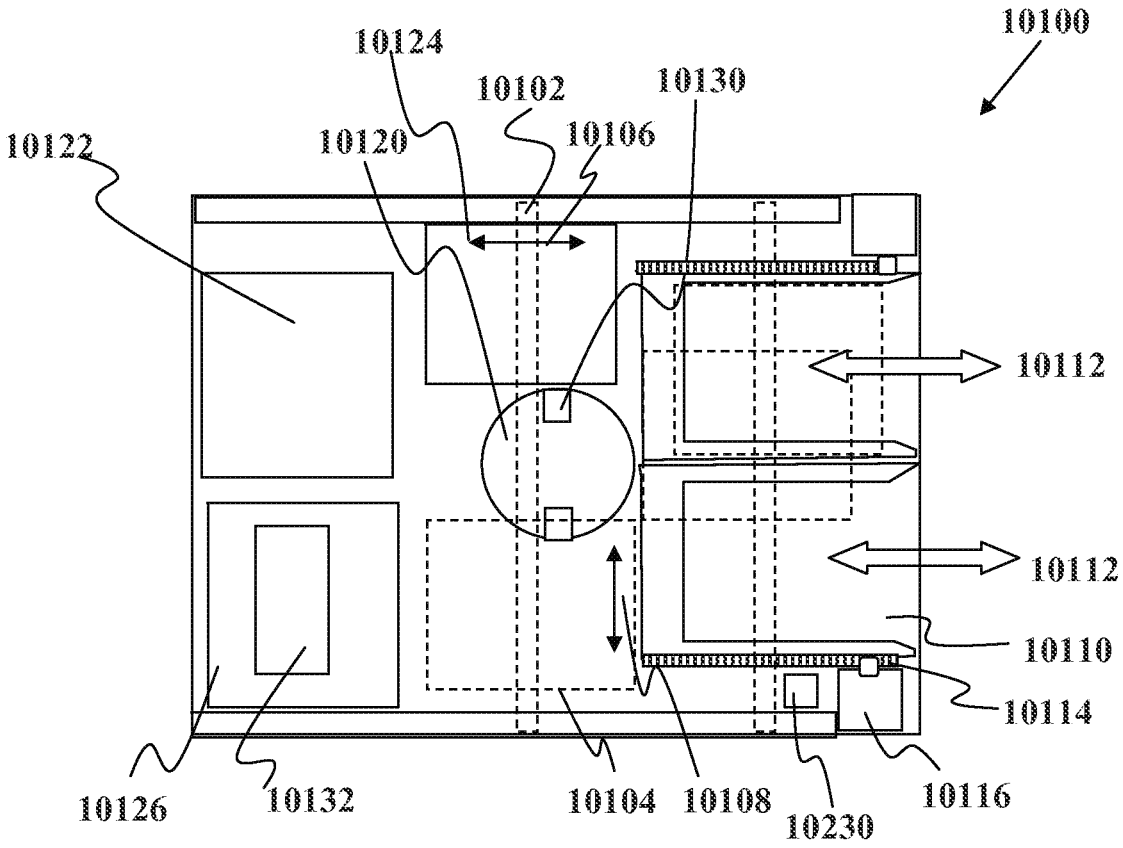

10100
10124
10102
10130
10122
10120
10106
10112
10112
10110
10114
10126
10132
10104
10108
10230
10116

FIG. 107A

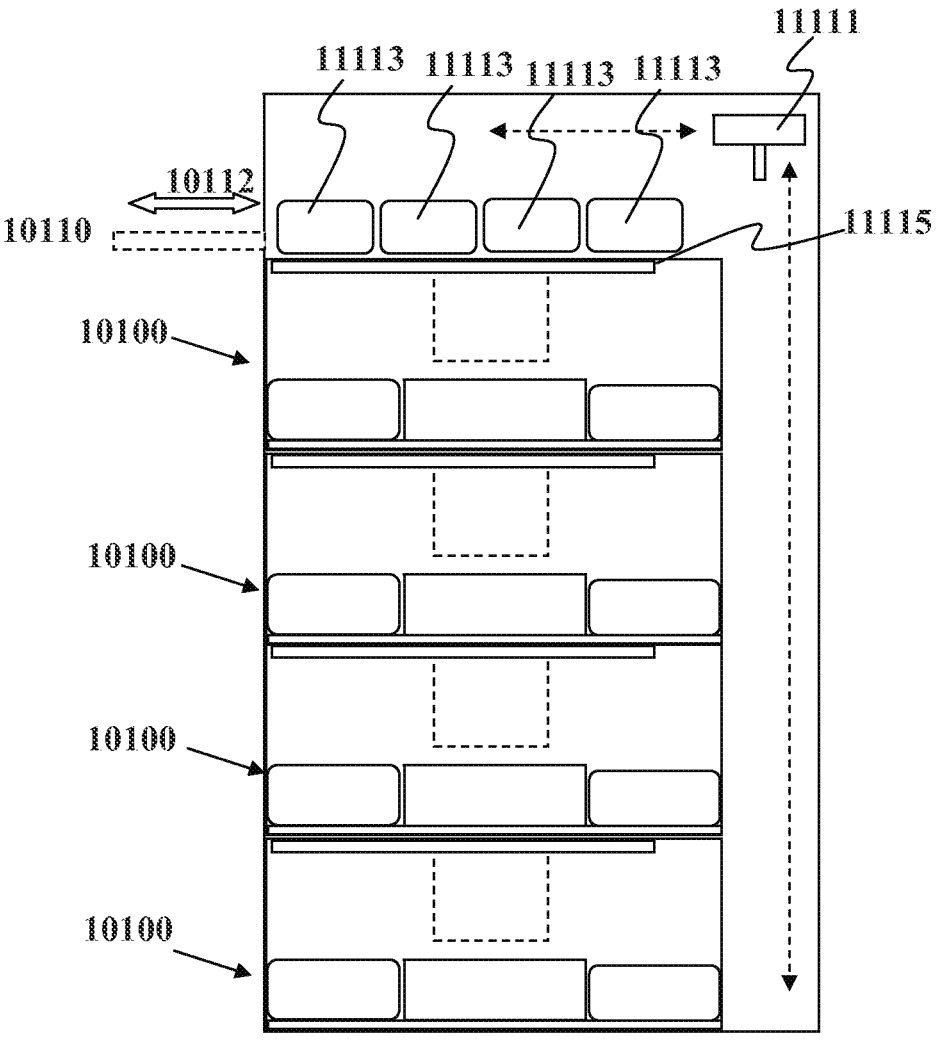

11111
11113
11113
11113
11113
10112
10110
11115
10100
10100
10100
10100

FIG. 107B

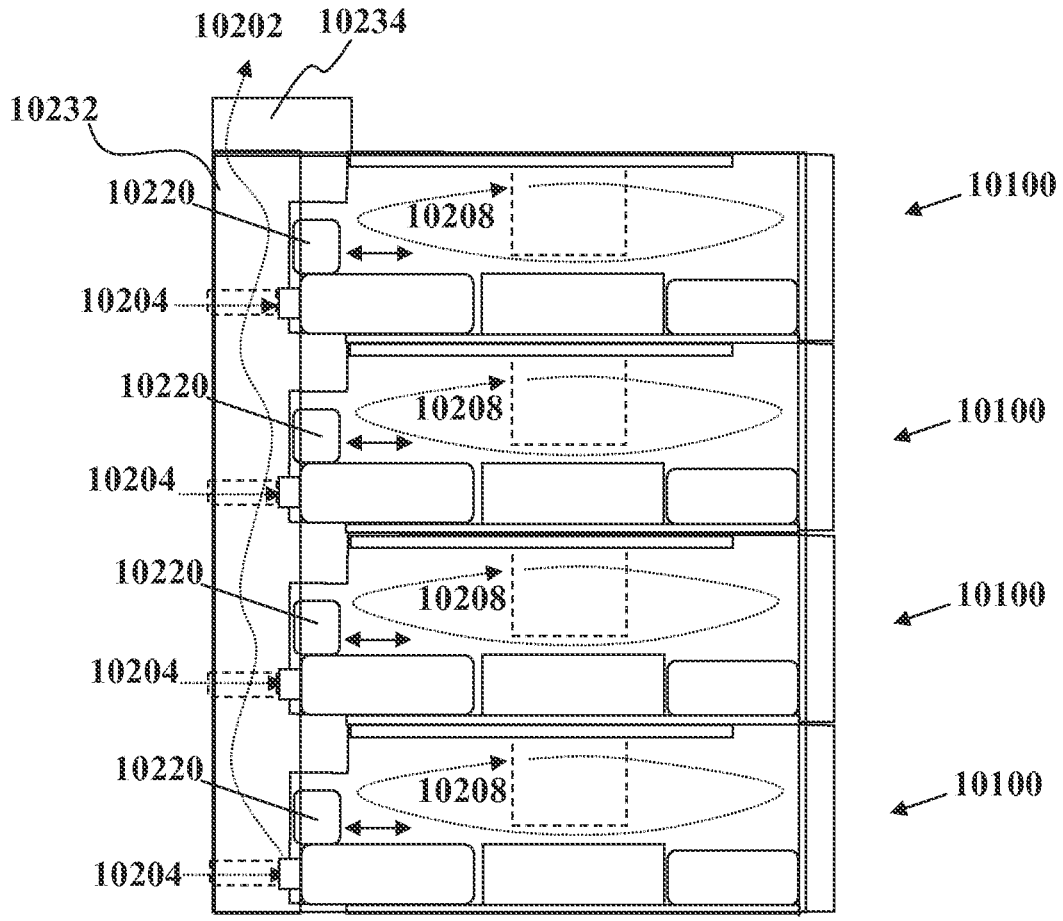

10202
10234
10232
10220
10208
10100
10204
10220
10208
10100
10204
10220
10208
10100
10204
10220
10208
10100
10204

FIG. 108

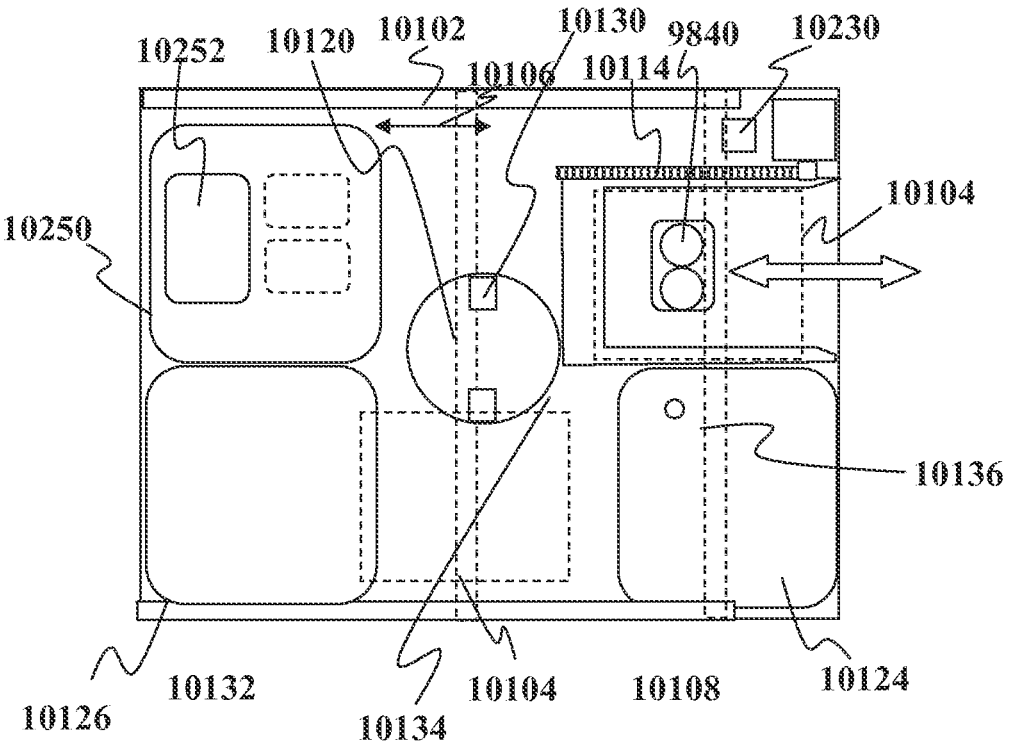


FIG. 109

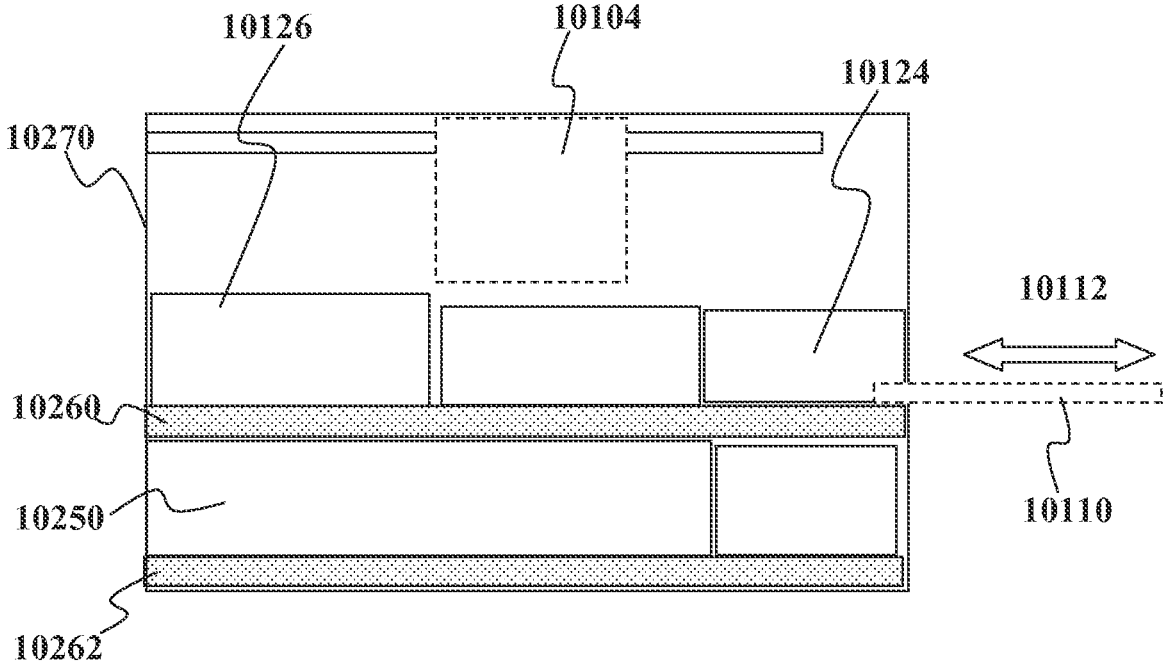


FIG. 110

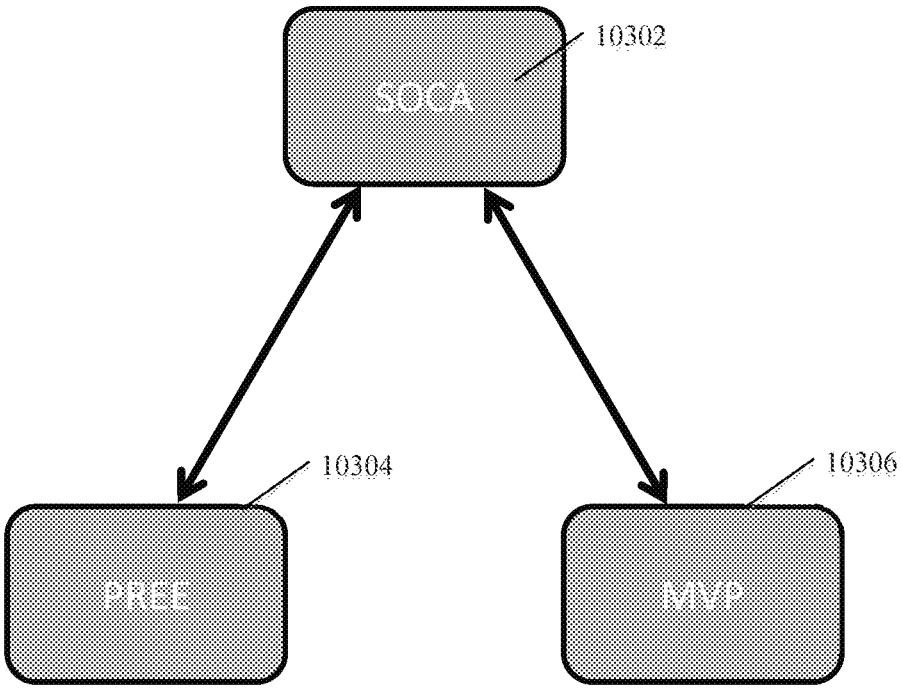


Figure 111

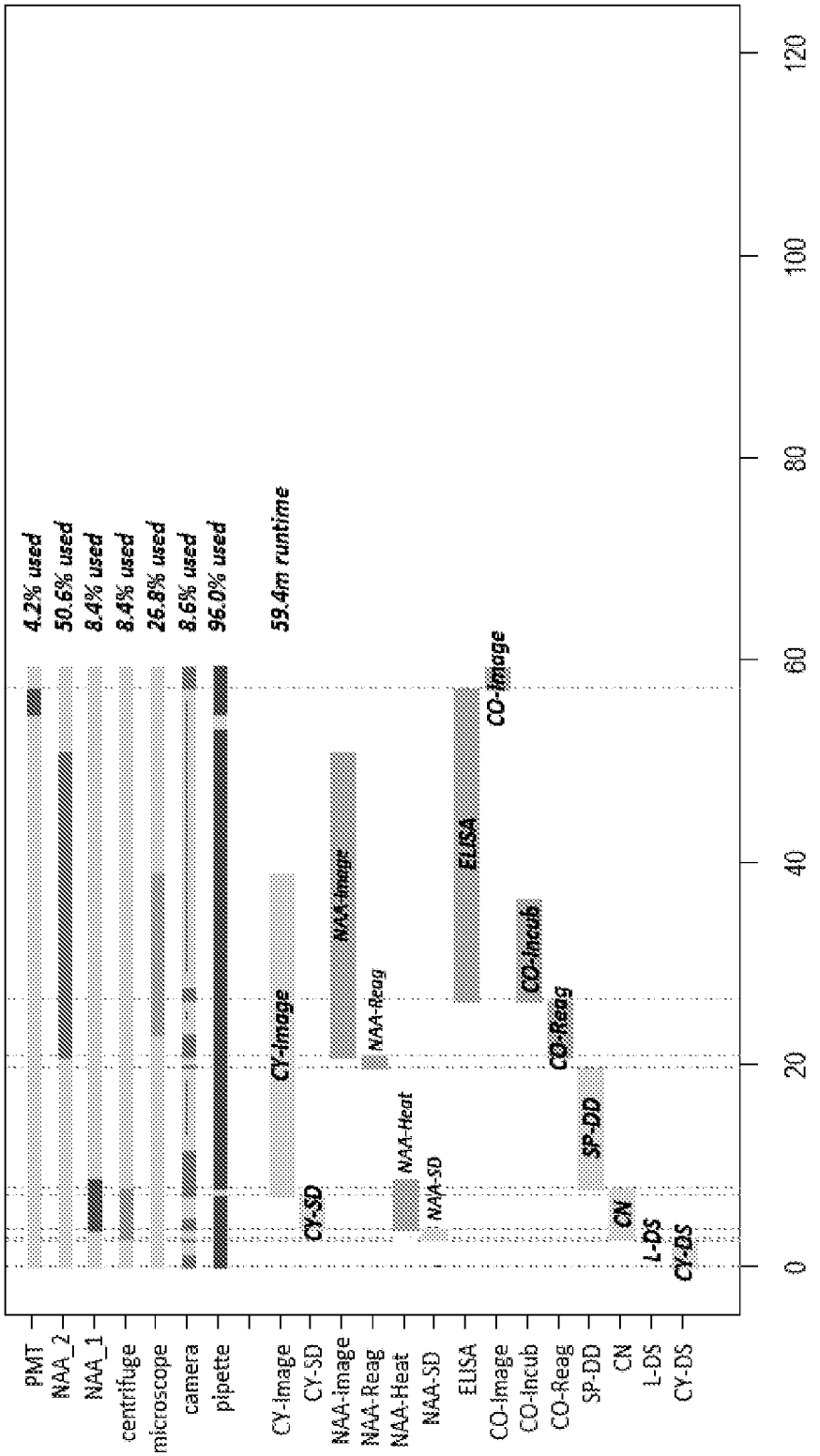

PMT
NAA_2
NAA_1
centrifuge
microscope
camera
pipette
CY-image
CY-SD
NAA-image
NAA-Reag
NAA-Heat
NAA-SD
ELISA
CO-image
CO-Incub
CO-Reag
SP-DD
CN
L-DS
CY-DS
4.2% used
50.6% used
8.4% used
8.4% used
26.8% used
8.6% used
96.0% used
59.4m runtime
0
20
40
60
80
100
120

Figure 112

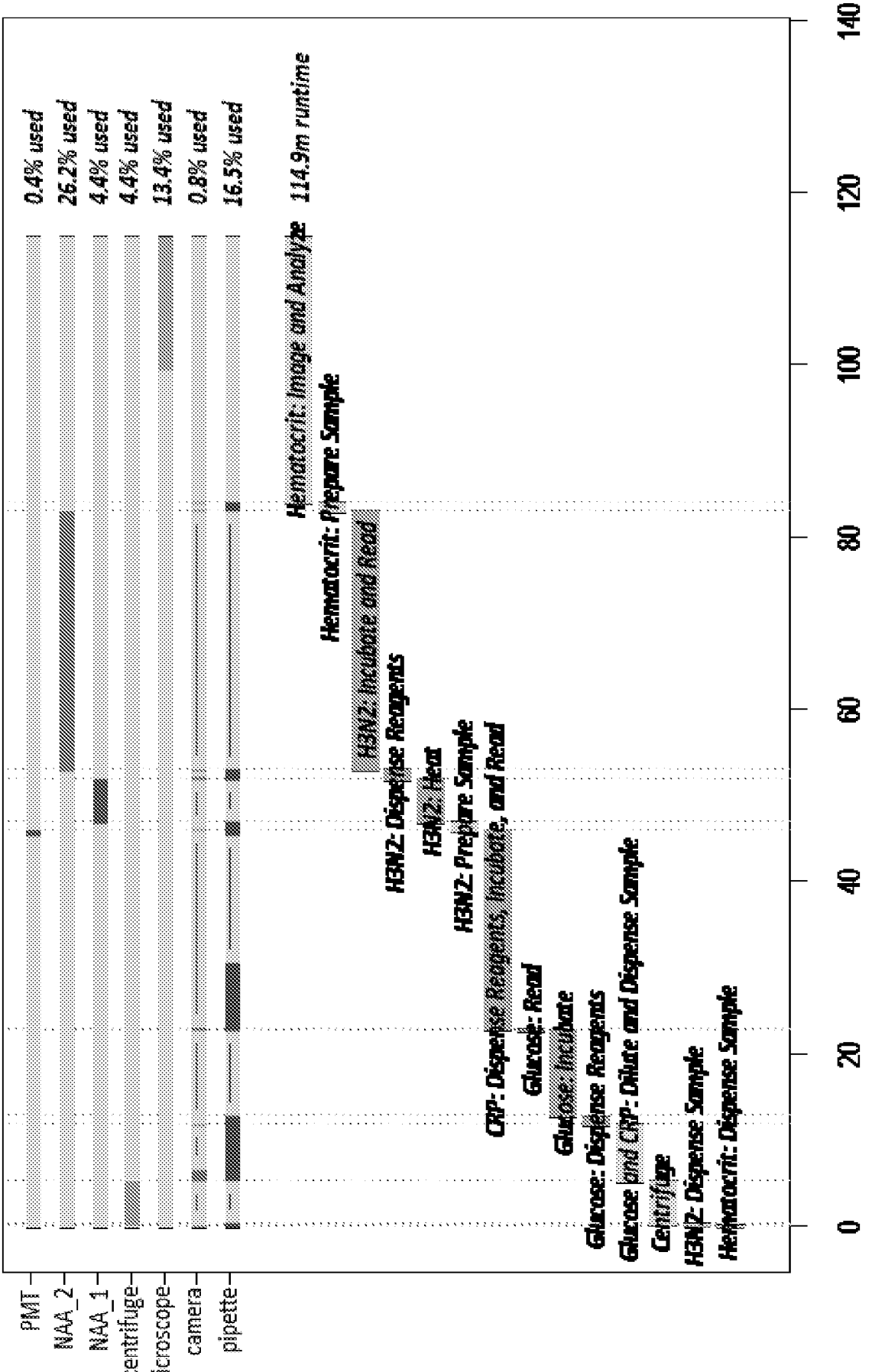

PMT
NAA_2
NAA_1
centrifuge
microscope
camera
pipette
0.4% used
26.2% used
4.4% used
4.4% used
13.4% used
0.8% used
16.5% used
114.9m runtime
Hematocrit: Image and Analyze
Hematocrit: Prepare Sample
H3N2: Incubate and Read
H3N2: Dispense Reagents
H3N2: Heat
H3N2: Prepare Sample
CRP: Dispense Reagents, Incubate, and Read
Glucose: Read
Glucose: Incubate
Glucose: Dispense Reagents
Glucose and CRP: Dilute and Dispense Sample
Centrifuge
H3N2: Dispense Sample
Hematocrit: Dispense Sample
0
20
40
60
80
100
120
140

Figure 113

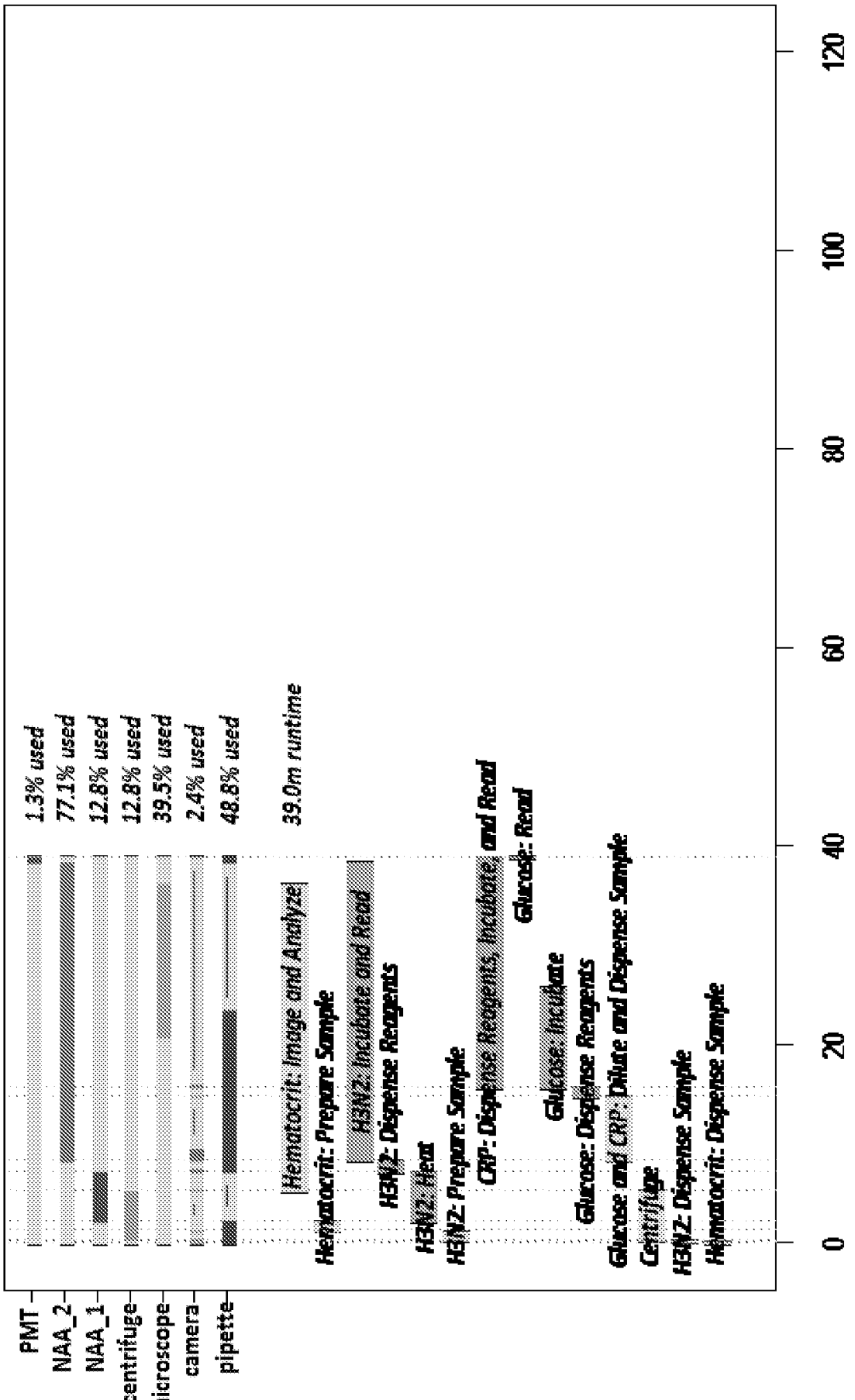

PMT
NAA_2
NAA_1
centrifuge
microscope
camera
pipette
1.3% used
77.1% used
12.8% used
12.8% used
39.5% used
2.4% used
48.8% used
39.0m runtime
Hematocrit: Image and Analyze
Hematocrit: Prepare Sample
H3N2: Incubate and Read
H3N2: Dispense Reagents
H3N2: Heat
H3N2: Prepare Sample
CRP: Dispense Reagents, Incubate, and Read
Glucose: Read
Glucose: Incubate
Glucose: Dispense Reagents
Glucose and CRP: Dilute and Dispense Sample
Centrifuge
H3N2: Dispense Sample
Hematocrit: Dispense Sample
0
20
40
60
80
100
120

Figure 114

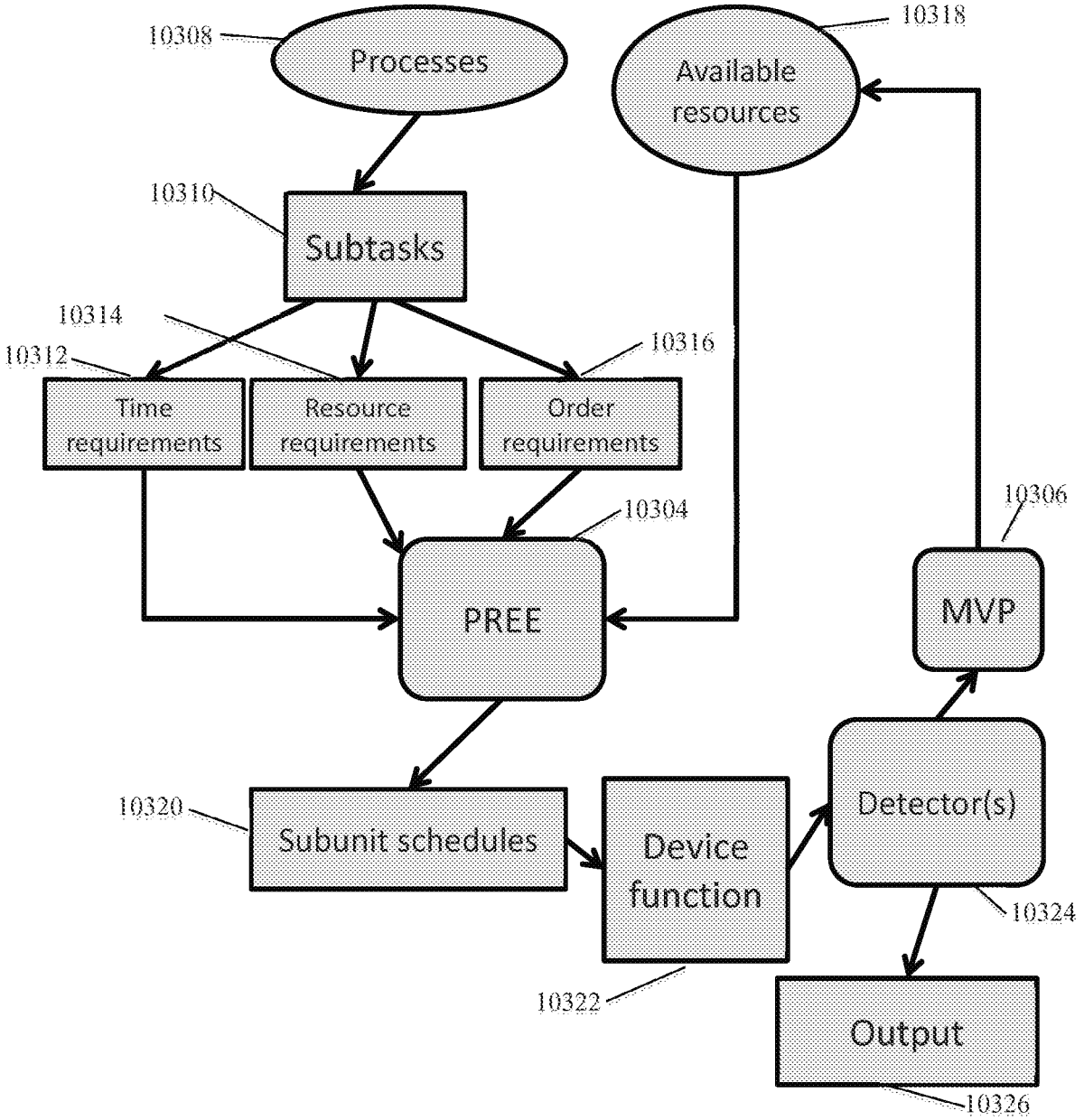

10308
Processes
10318
Available resources
10310
Subtasks
10314
10312
10316
Time requirements
Resource requirements
Order requirements
10304
10306
PREE
MVP
10320
Subunit schedules
Device function
Detector(s)
10324
10322
Output
10326

Figure 115

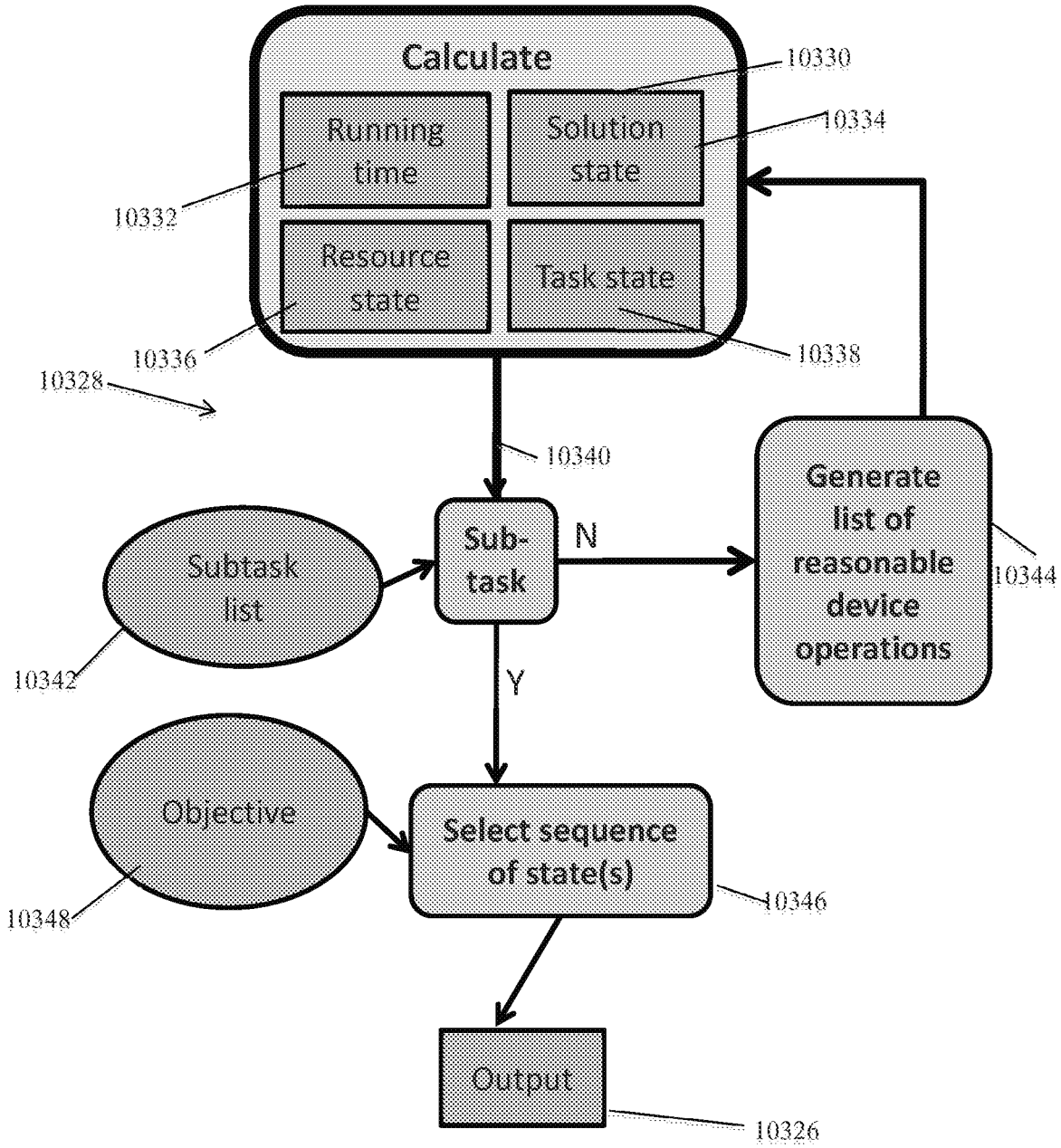

Calculate
10330
Running time
Solution state
10334
10332
Resource state
Task state
10336
10338
10328
10340
Sub-task
N
Subtask list
Generate list of reasonable device operations
10344
10342
Y
Objective
Select sequence of state(s)
10348
10346
Output
10326

Figure 116

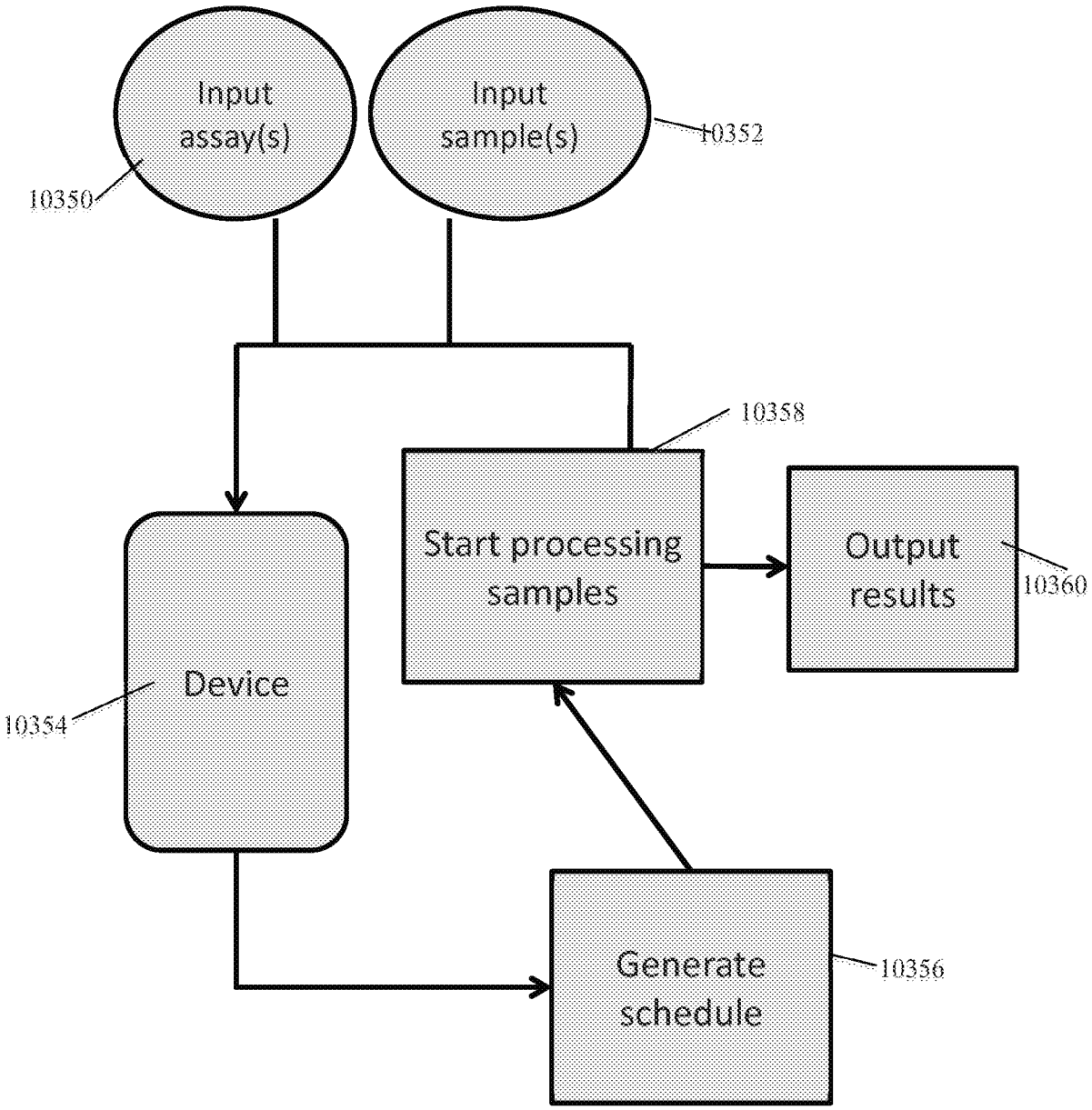

Input assay(s)
10350
Input sample(s)
10352
10358
Start processing samples
Output results
10360
Device
10354
Generate schedule
10356

Figure 117

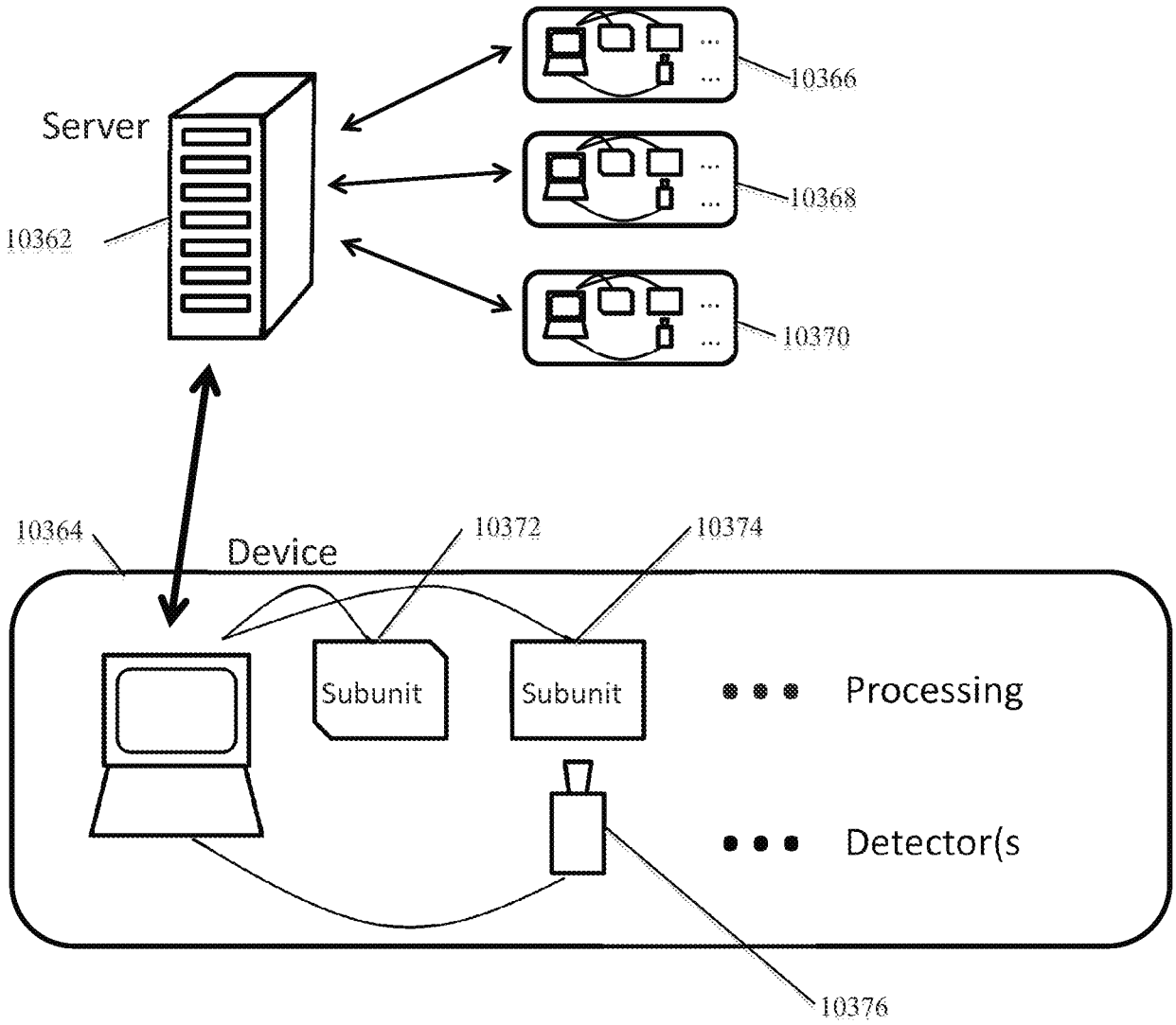

Server
10362
10366
10368
10370
10364
Device
10372
10374
Subunit
Subunit
Processing
Detector(s
10376

Figure 118

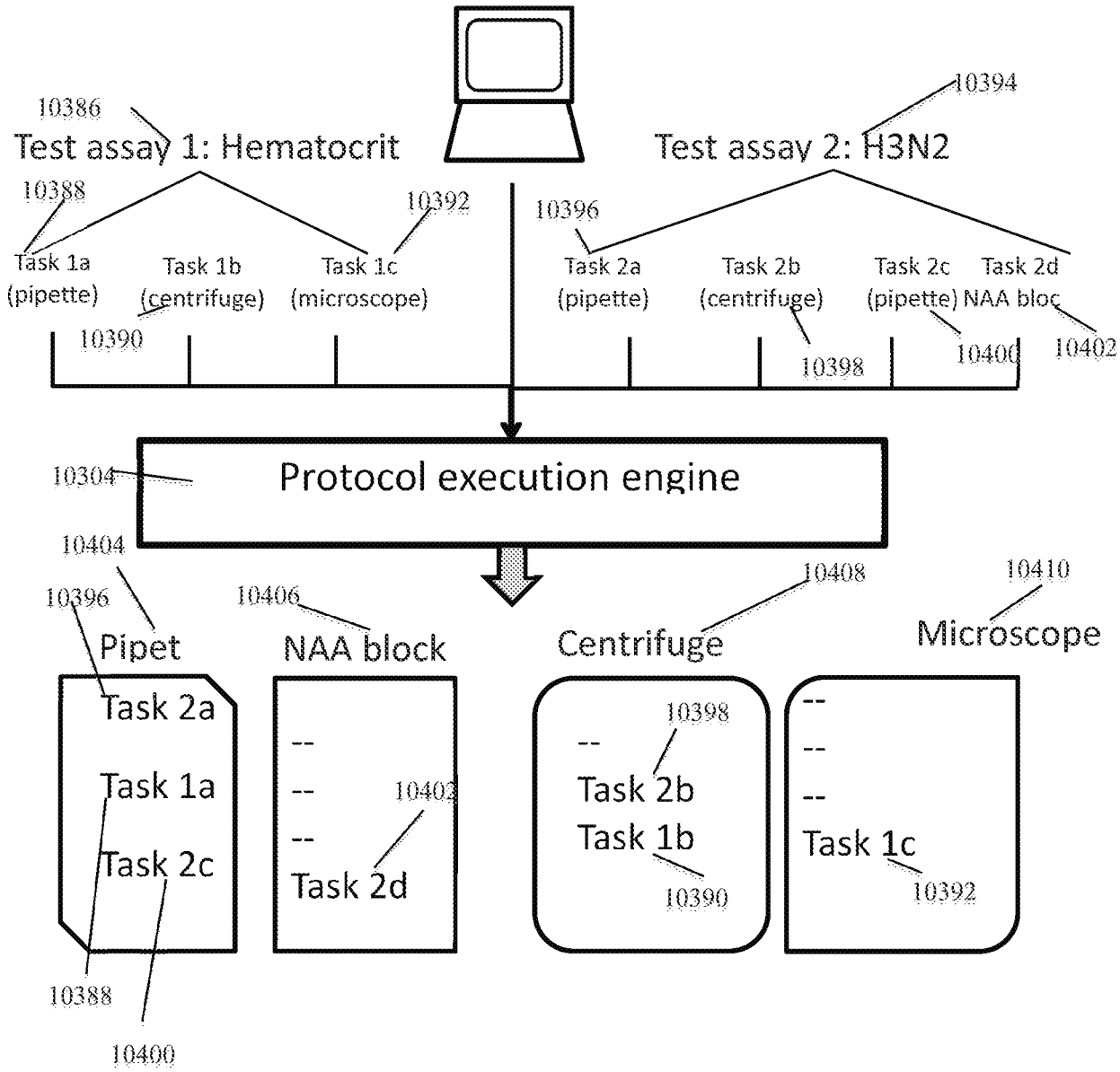

10386
Test assay 1: Hematocrit
10394
Test assay 2: H3N2
10388
10392
10396
Task 1a
(pipette)
Task 1b
(centrifuge)
Task 1c
(microscope)
Task 2a
(pipette)
Task 2b
(centrifuge)
Task 2c
(pipette)
Task 2d
NAA bloc
10390
10398
10400
10402
10304
Protocol execution engine
10404
10396
10406
10408
10410
Pipet
NAA block
Centrifuge
Microscope
Task 2a
Task 1a
Task 2c
--
--
--
Task 2d
10402
10398
--
Task 2b
Task 1b
10390
--
--
--
Task 1c
10392
10388
10400

Figure 119