Fig. 1

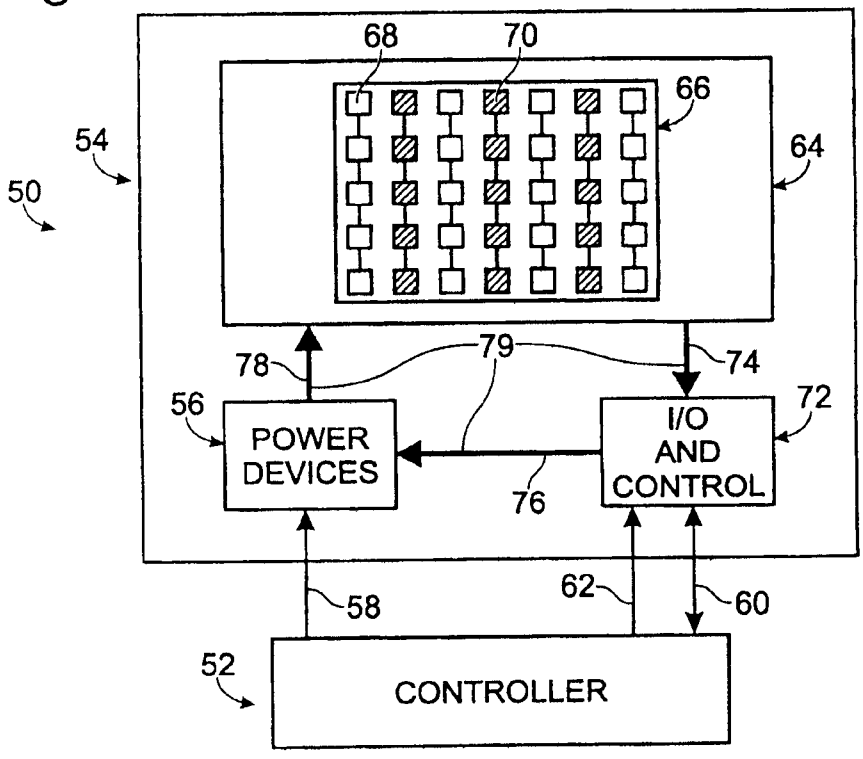

68
70
66
54
64
50
78
79
74
72
56
POWER DEVICES
I/O AND CONTROL
76
58
62
60
52
CONTROLLER

Fig. 2

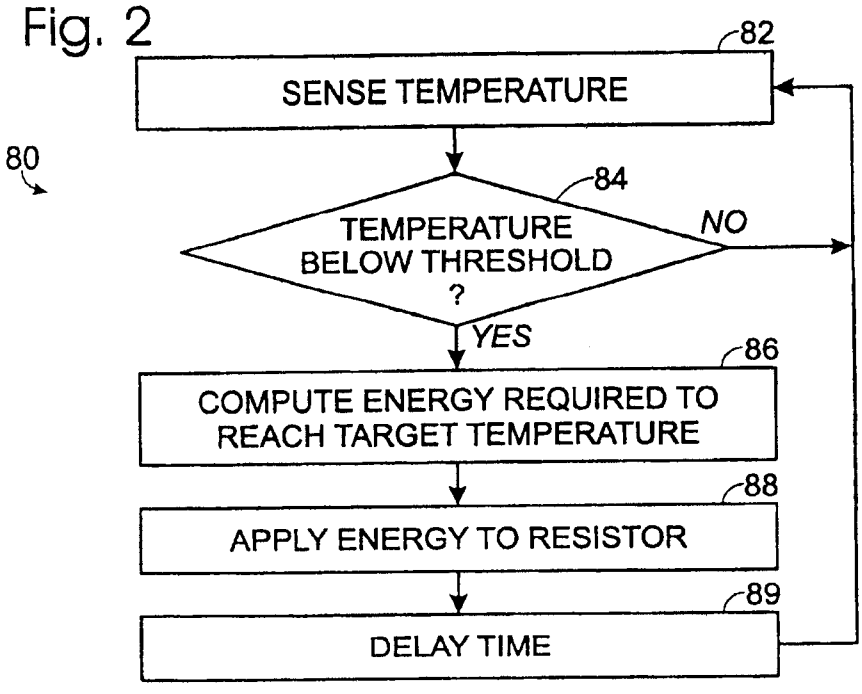

82
SENSE TEMPERATURE
80
84
TEMPERATURE BELOW THRESHOLD ?
NO
YES
86
COMPUTE ENERGY REQUIRED TO REACH TARGET TEMPERATURE
88
APPLY ENERGY TO RESISTOR
89
DELAY TIME

Fig. 3

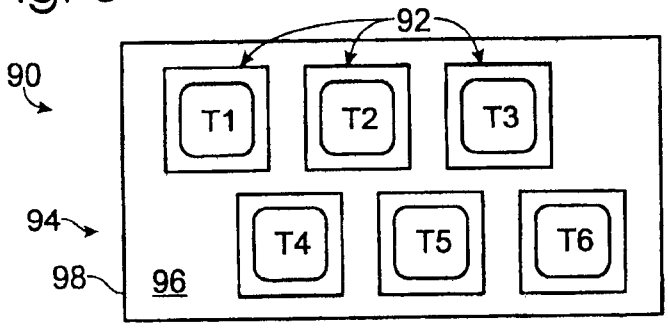



Fig. 4

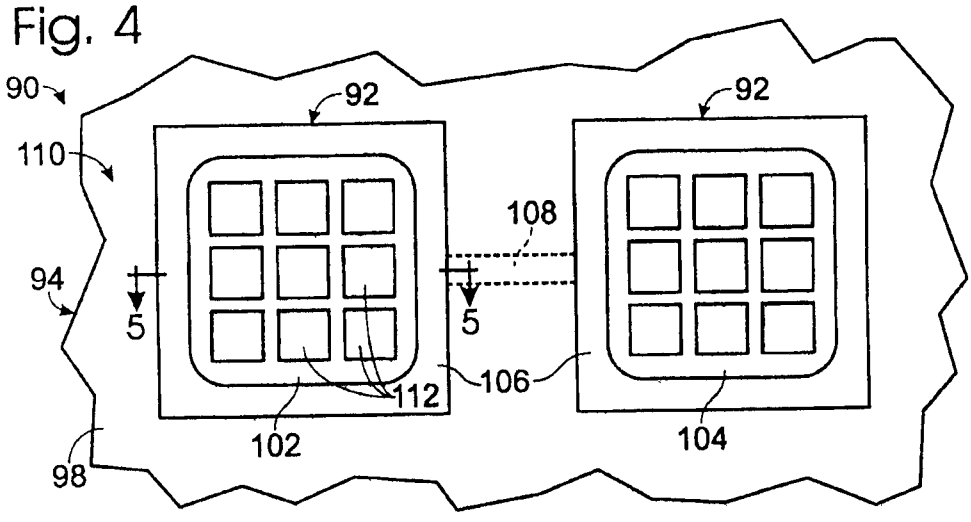
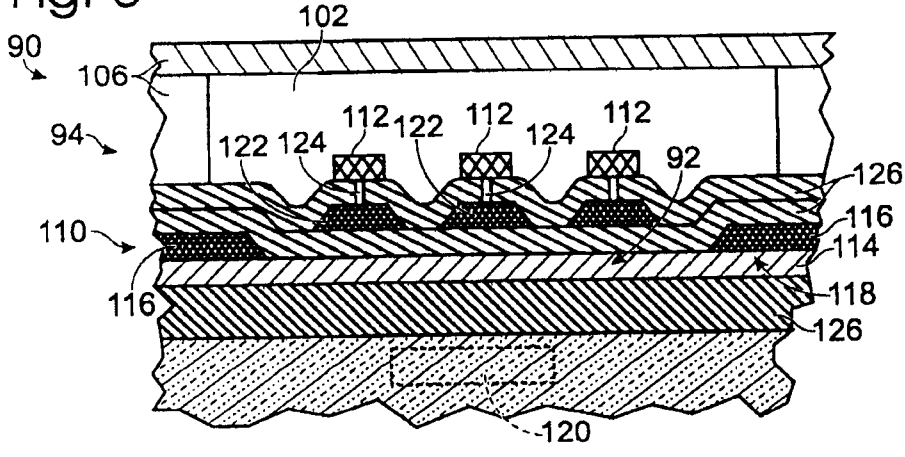



Fig. 5



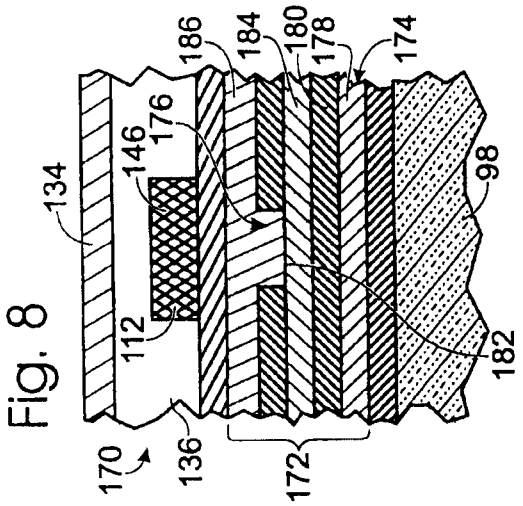



Fig. 8

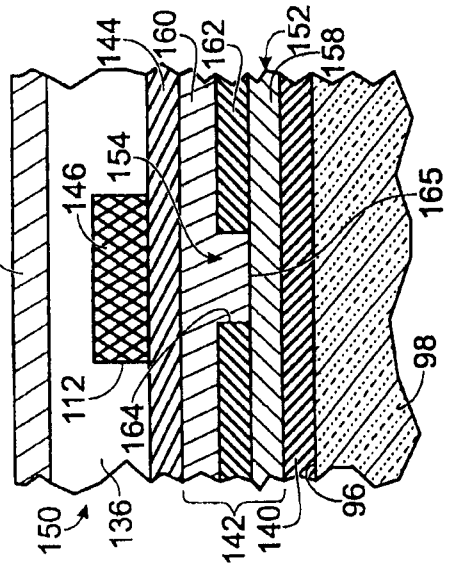



Fig. 7

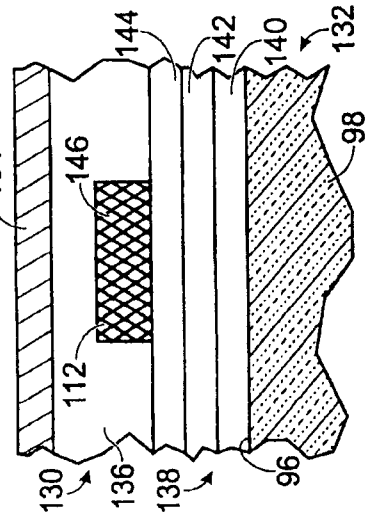



Fig. 6

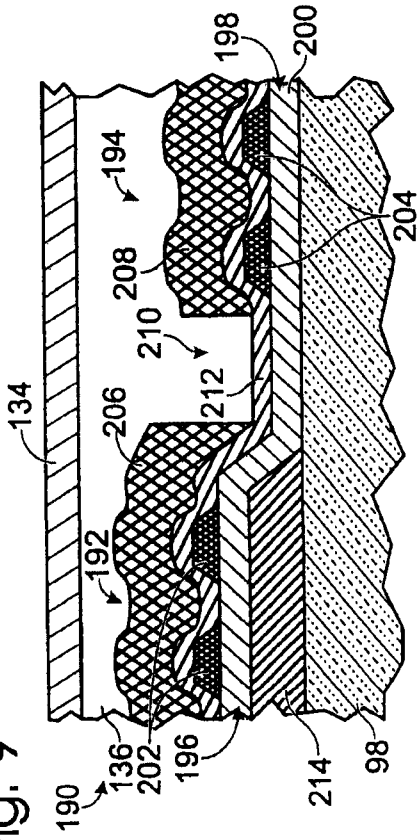



Fig. 9

Fig. 10

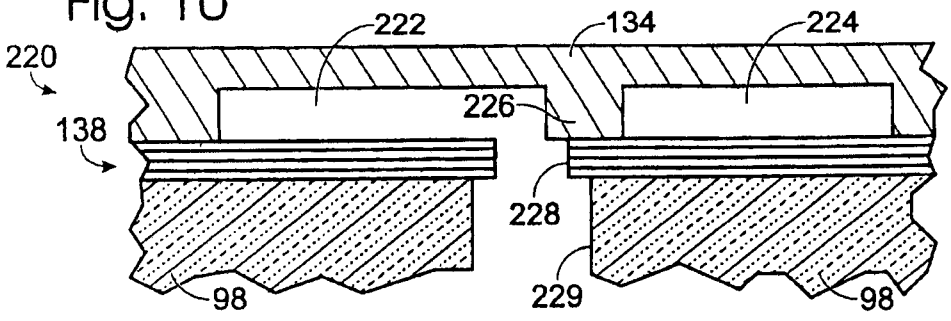

220
222
134
224
226
138
228
229
98
98

Fig. 11

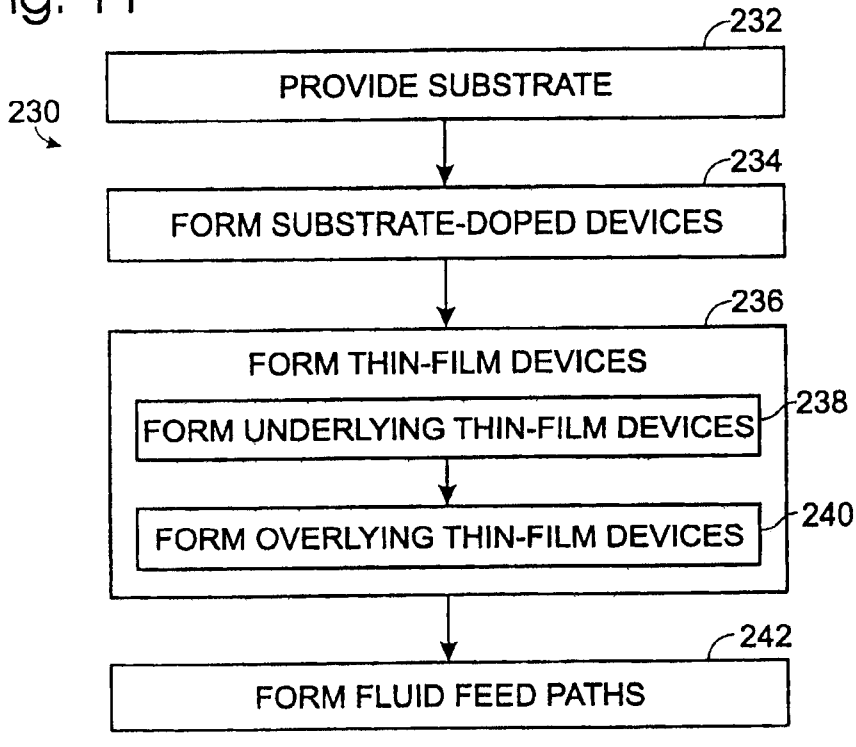

230
232
PROVIDE SUBSTRATE
234
FORM SUBSTRATE-DOPED DEVICES
236
FORM THIN-FILM DEVICES
238
FORM UNDERLYING THIN-FILM DEVICES
240
FORM OVERLYING THIN-FILM DEVICES
242
FORM FLUID FEED PATHS

Fig. 12

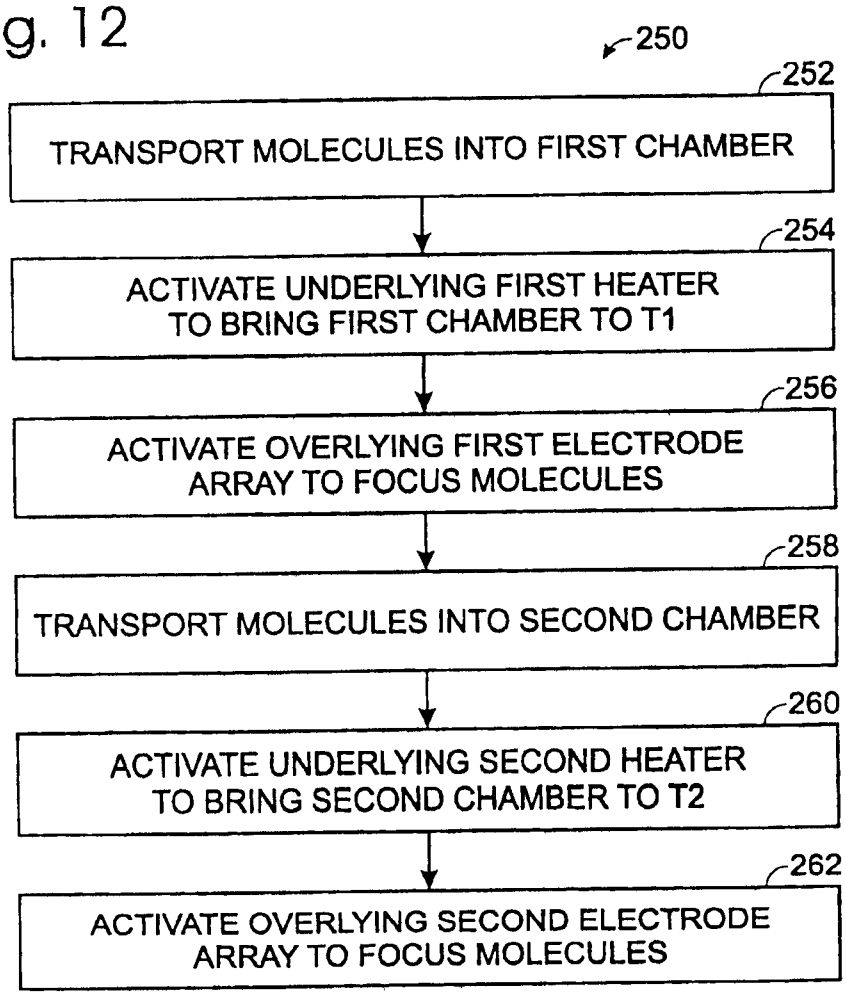

250
252
TRANSPORT MOLECULES INTO FIRST CHAMBER
254
ACTIVATE UNDERLYING FIRST HEATER TO BRING FIRST CHAMBER TO T1
256
ACTIVATE OVERLYING FIRST ELECTRODE ARRAY TO FOCUS MOLECULES
258
TRANSPORT MOLECULES INTO SECOND CHAMBER
260
ACTIVATE UNDERLYING SECOND HEATER TO BRING SECOND CHAMBER TO T2
262
ACTIVATE OVERLYING SECOND ELECTRODE ARRAY TO FOCUS MOLECULES

Fig. 13

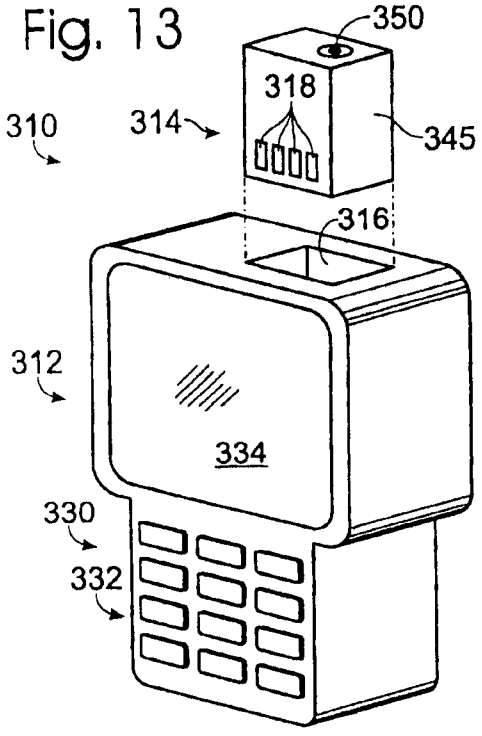



Fig. 14

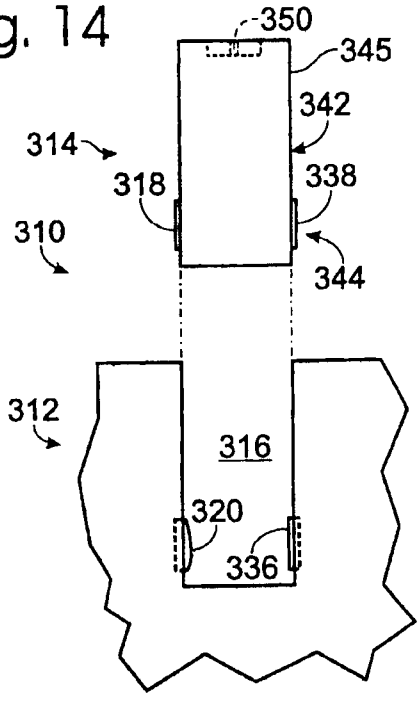



Fig. 15

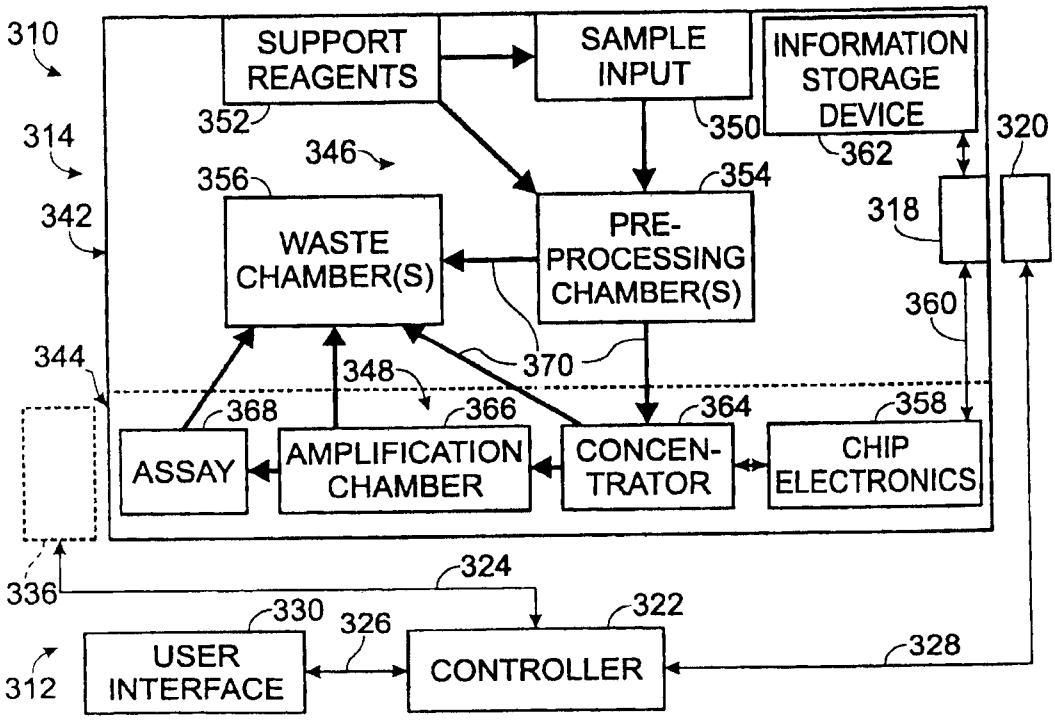


Fig. 16

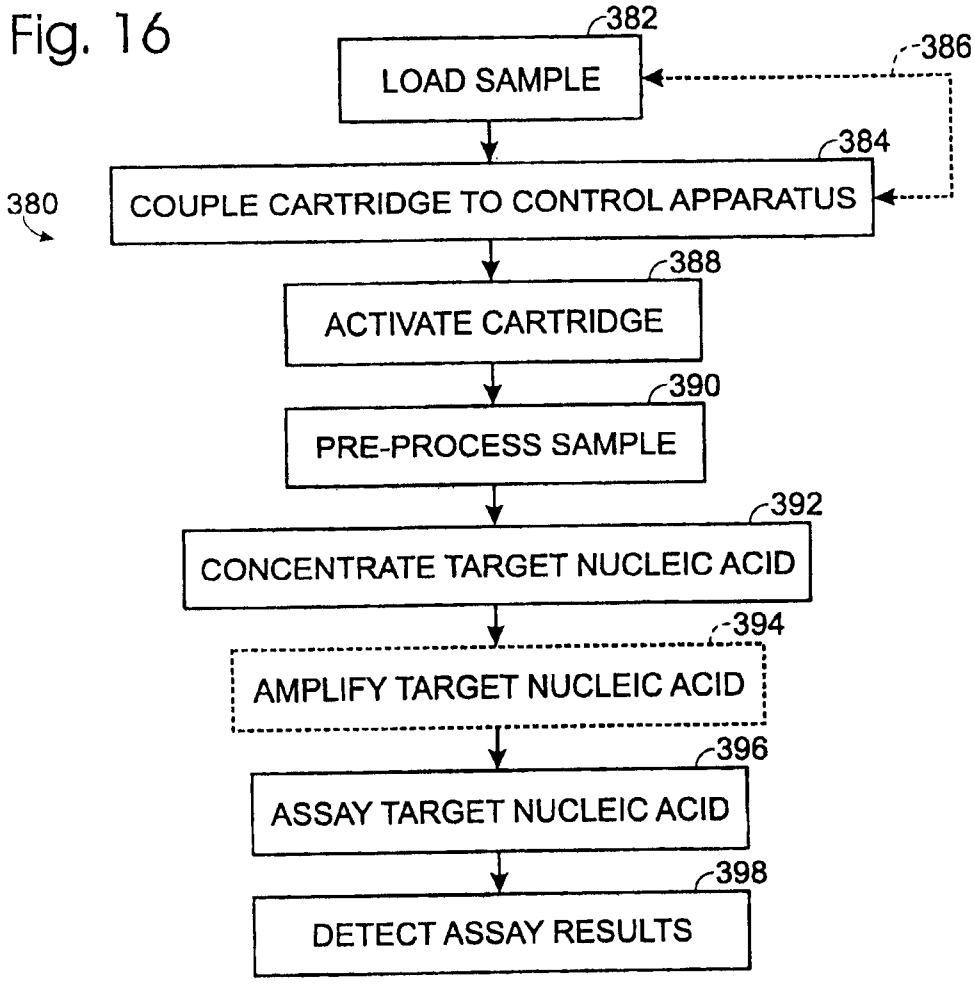

382
LOAD SAMPLE
386
384
380
COUPLE CARTRIDGE TO CONTROL APPARATUS
388
ACTIVATE CARTRIDGE
390
PRE-PROCESS SAMPLE
392
CONCENTRATE TARGET NUCLEIC ACID
394
AMPLIFY TARGET NUCLEIC ACID
396
ASSAY TARGET NUCLEIC ACID
398
DETECT ASSAY RESULTS

Fig. 23

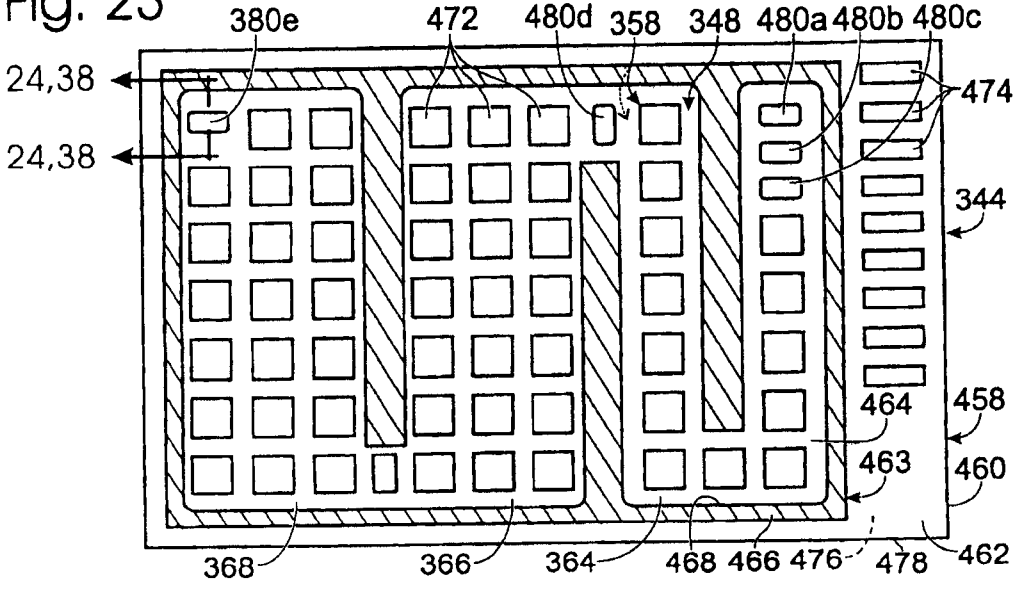

380e
472
480d
358
348
480a
480b
480c
24,38
24,38
474
344
464
458
463
460
368
366
364
468
466
476
478
462

Fig. 17

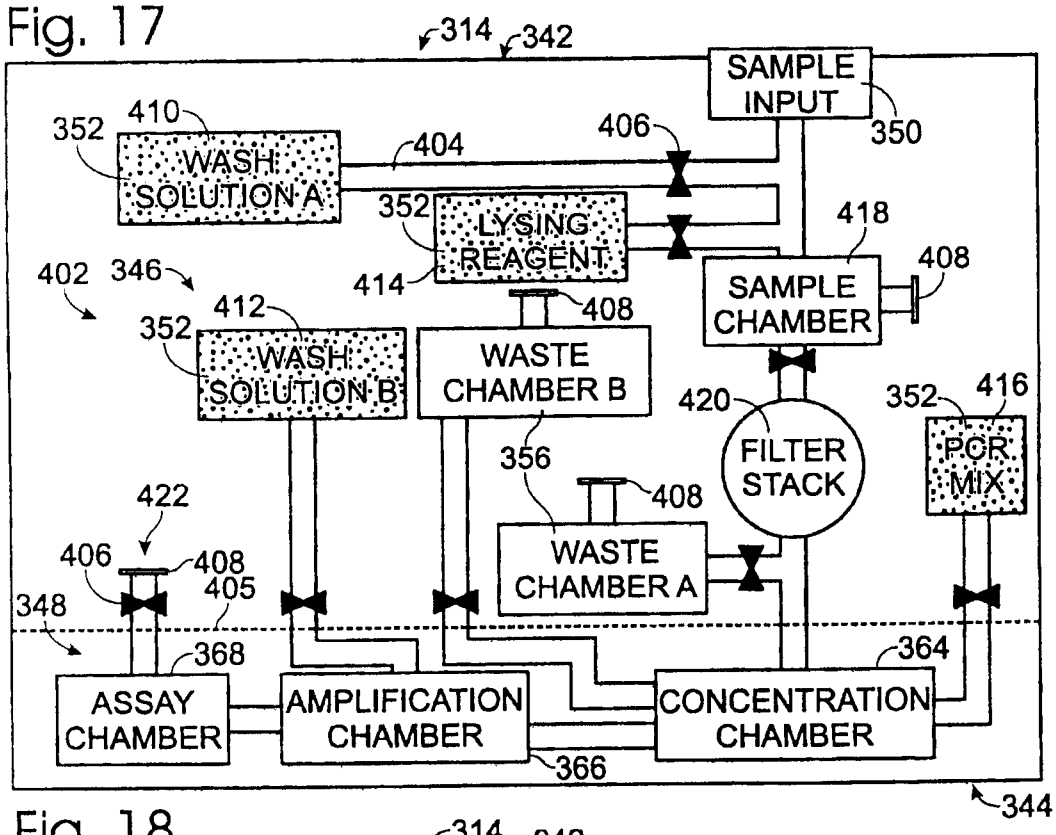

314
342
SAMPLE INPUT
350
352
410
WASH SOLUTION A
404
406
352
LYSING REAGENT
418
408
SAMPLE CHAMBER
402
346
414
408
412
352
WASH SOLUTION B
WASTE CHAMBER B
420
FILTER STACK
352
416
PCR MIX
356
408
422
WASTE CHAMBER A
406
408
405
348
368
364
ASSAY CHAMBER
AMPLIFICATION CHAMBER
CONCENTRATION CHAMBER
366
344

Fig. 18

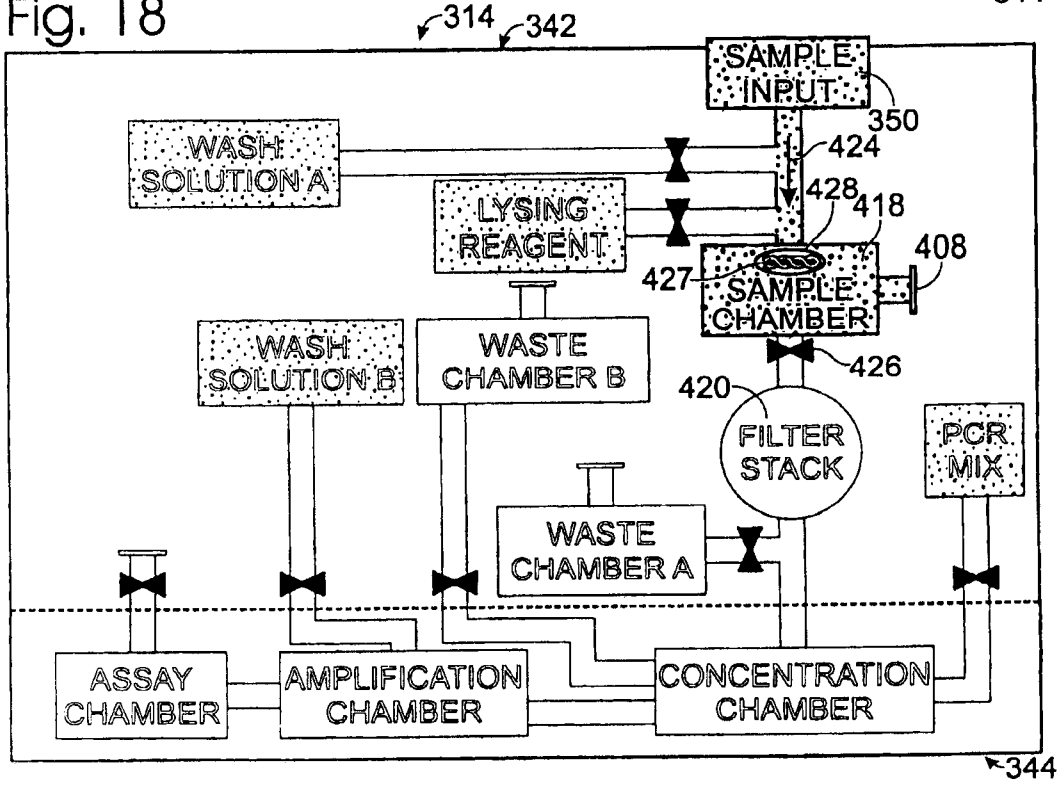

314
342
SAMPLE INPUT
350
WASH SOLUTION A
424
428
418
LYSING REAGENT
408
427
SAMPLE CHAMBER
WASH SOLUTION B
WASTE CHAMBER B
426
420
FILTER STACK
PCR MIX
WASTE CHAMBER A
ASSAY CHAMBER
AMPLIFICATION CHAMBER
CONCENTRATION CHAMBER
344

Fig. 19

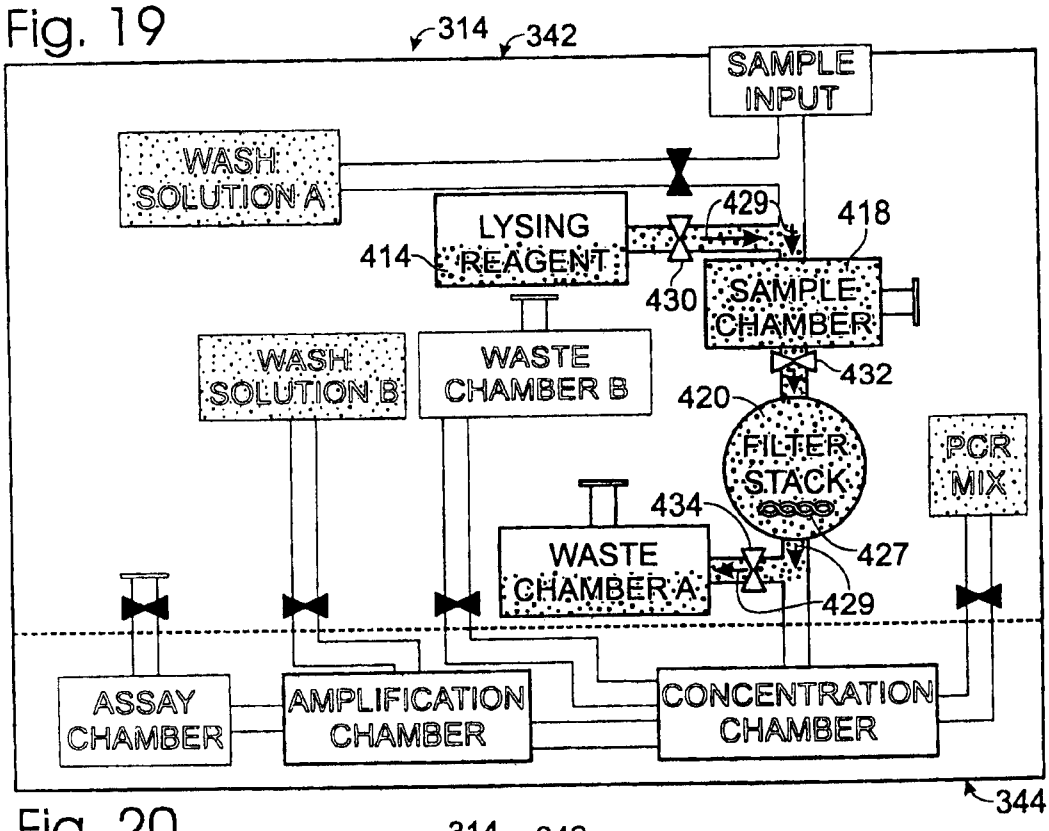

314
342
SAMPLE INPUT
WASH SOLUTION A
LYSING REAGENT
414
429
418
430
SAMPLE CHAMBER
WASH SOLUTION B
WASTE CHAMBER B
432
420
FILTER STACK
PCR MIX
434
WASTE CHAMBER A
427
429
ASSAY CHAMBER
AMPLIFICATION CHAMBER
CONCENTRATION CHAMBER
344

Fig. 20

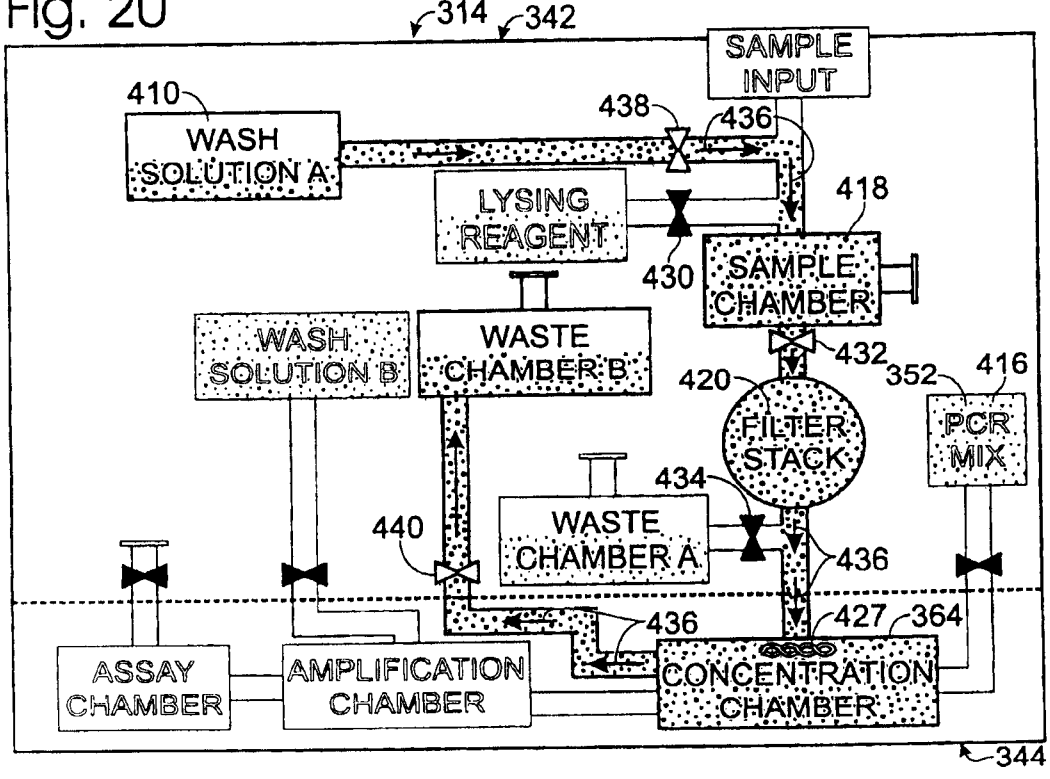

314
342
SAMPLE INPUT
410
438
436
WASH SOLUTION A
LYSING REAGENT
418
430
SAMPLE CHAMBER
WASH SOLUTION B
WASTE CHAMBER B
432
352
416
420
FILTER STACK
PCR MIX
434
440
WASTE CHAMBER A
436
436
427
364
ASSAY CHAMBER
AMPLIFICATION CHAMBER
CONCENTRATION CHAMBER
344

Fig. 21

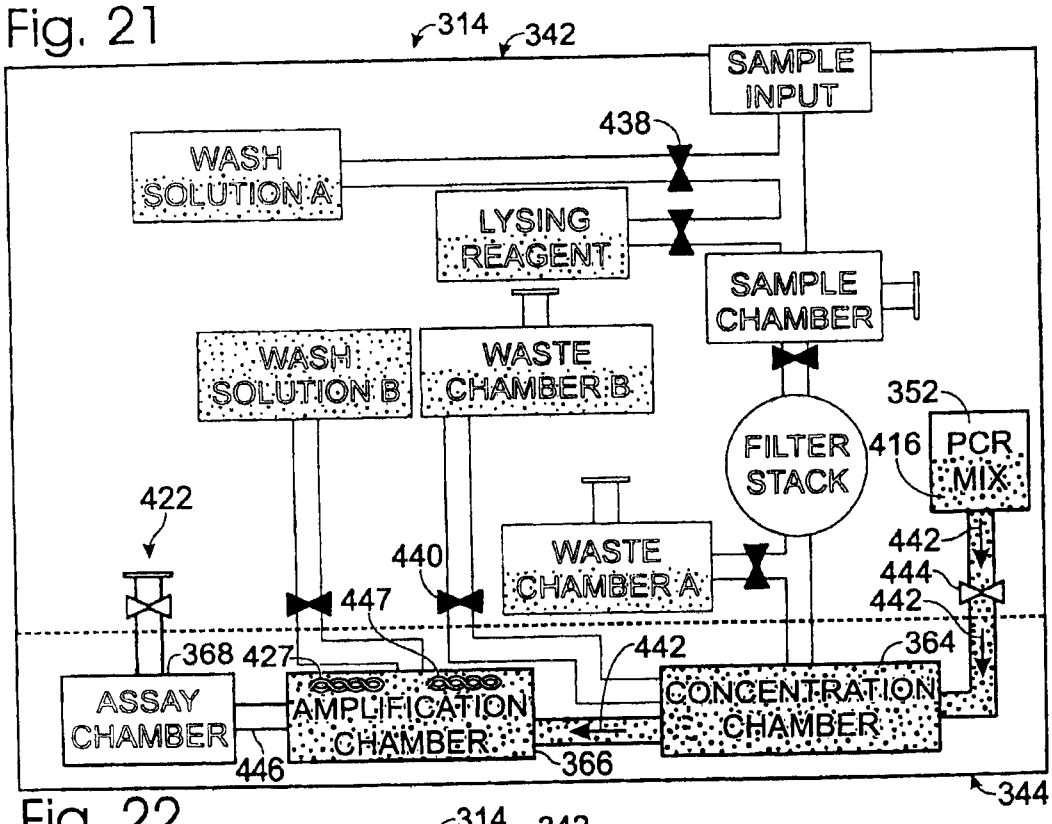

314
342
SAMPLE INPUT
438
WASH SOLUTION A
LYSING REAGENT
SAMPLE CHAMBER
WASH SOLUTION B
WASTE CHAMBER B
352
FILTER STACK
416
PCR MIX
422
440
WASTE CHAMBER A
442
444
447
442
368
427
442
364
ASSAY CHAMBER
AMPLIFICATION CHAMBER
CONCENTRATION CHAMBER
446
366
344

Fig. 22

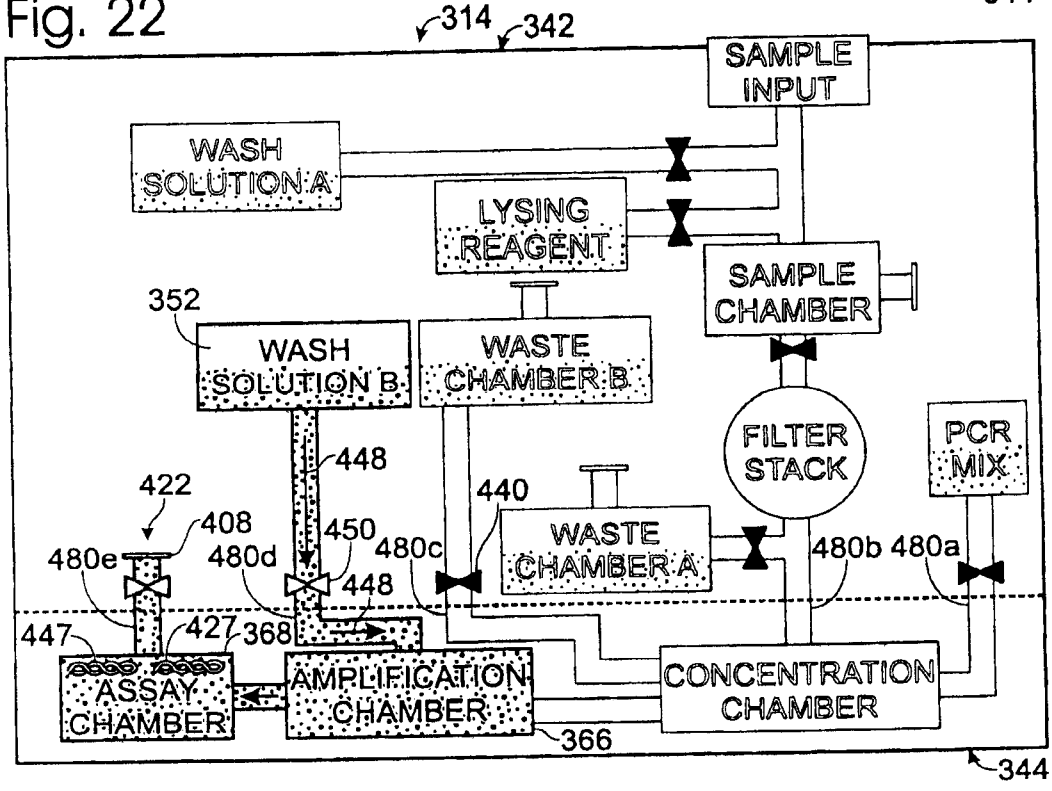

314
342
SAMPLE INPUT
WASH SOLUTION A
LYSING REAGENT
SAMPLE CHAMBER
352
WASH SOLUTION B
WASTE CHAMBER B
FILTER STACK
PCR MIX
448
422
440
408
450
480e
480d
480c
480b
480a
WASTE CHAMBER A
448
447
427
368
ASSAY CHAMBER
AMPLIFICATION CHAMBER
CONCENTRATION CHAMBER
366
344

Fig. 24

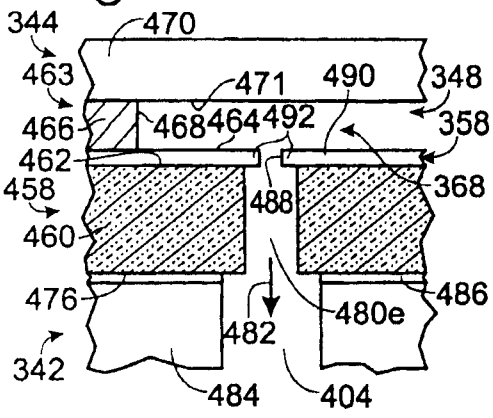



Fig. 25

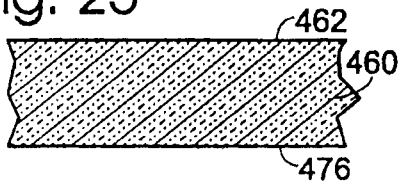



Fig. 26

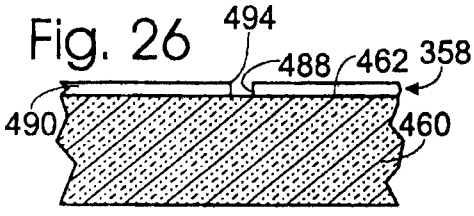



Fig. 27

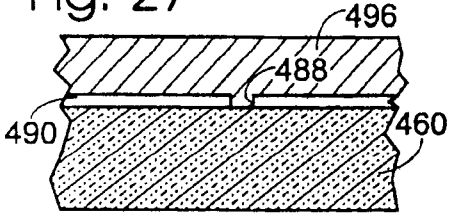



Fig. 28

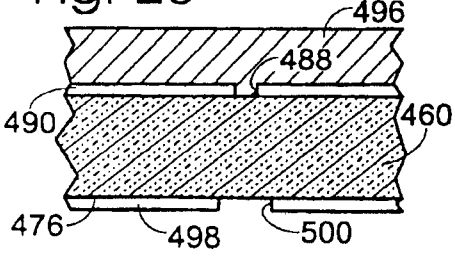



Fig. 29

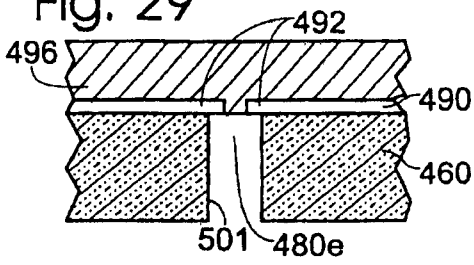



Fig. 30

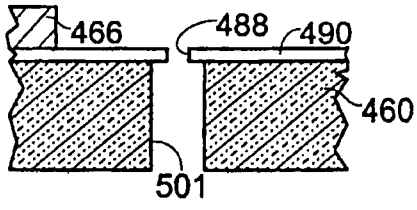



Fig. 31

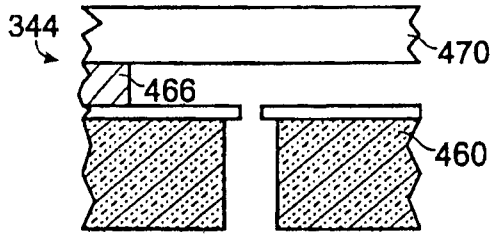



Fig. 32

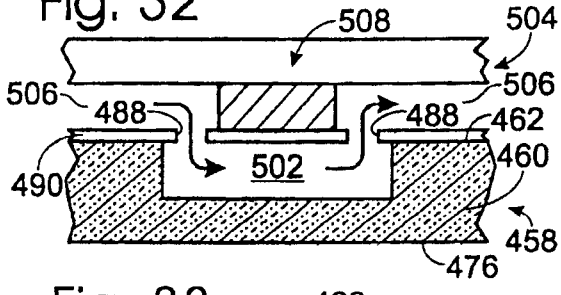



Fig. 33

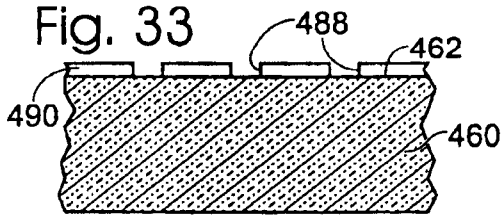



Fig. 34

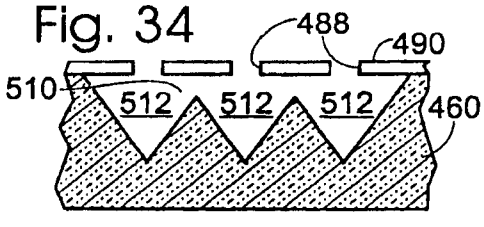


Fig. 35

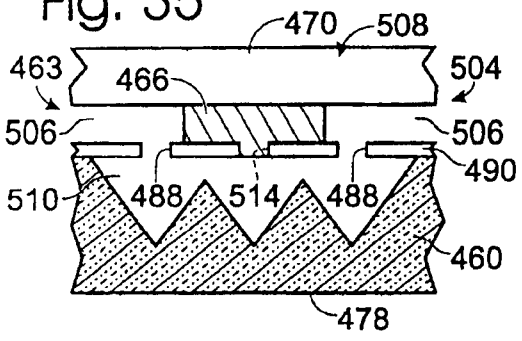



Fig. 36

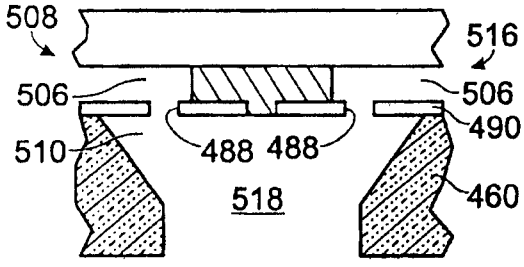



Fig. 37

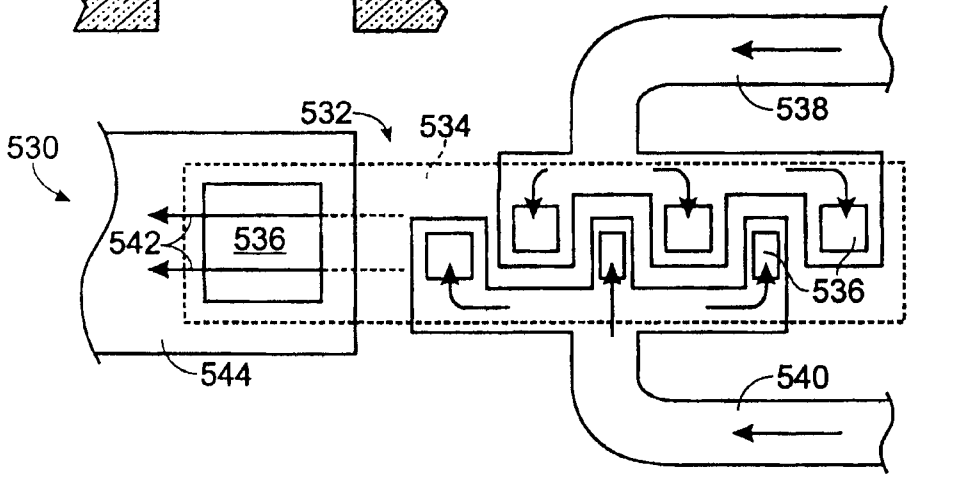



Fig. 38

