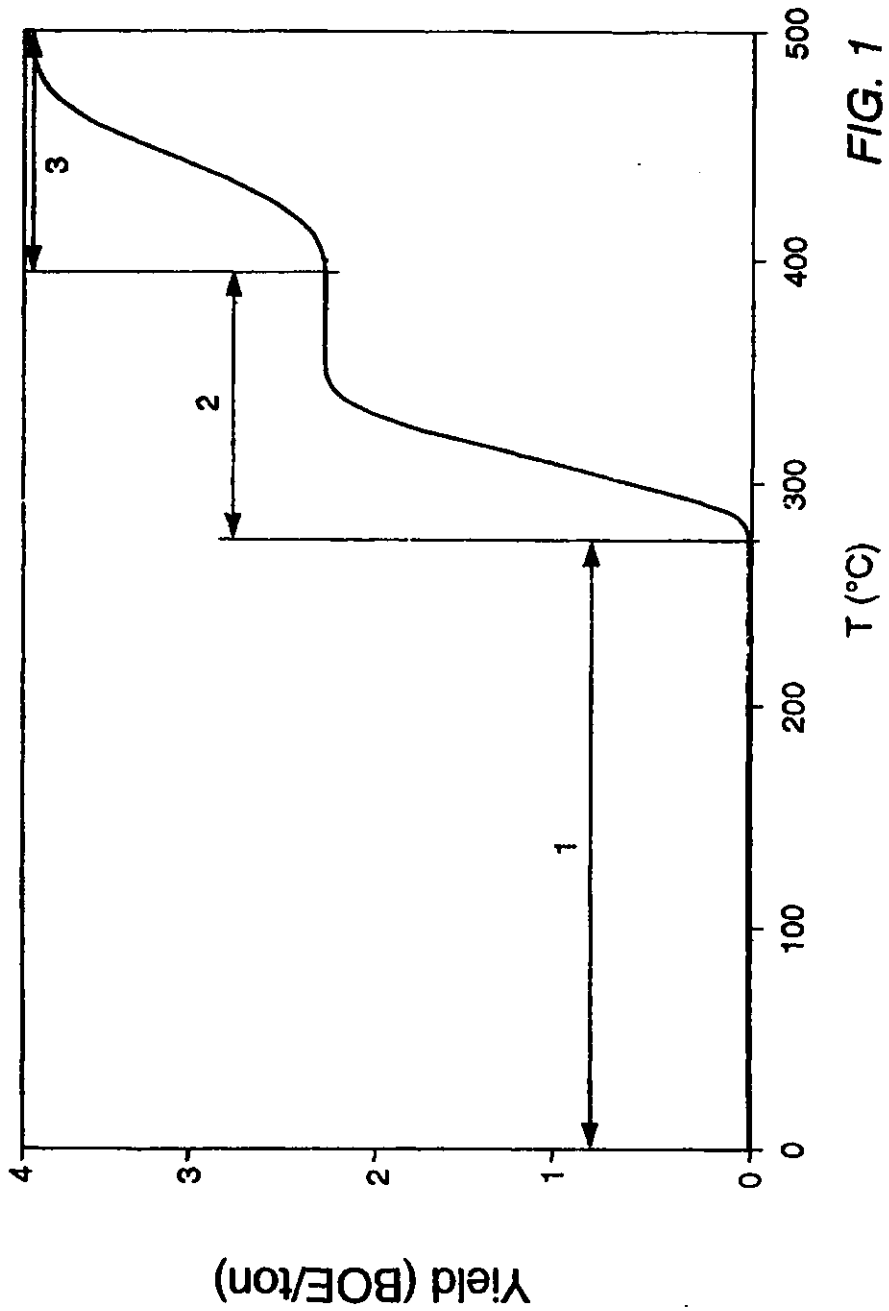


FIG. 1

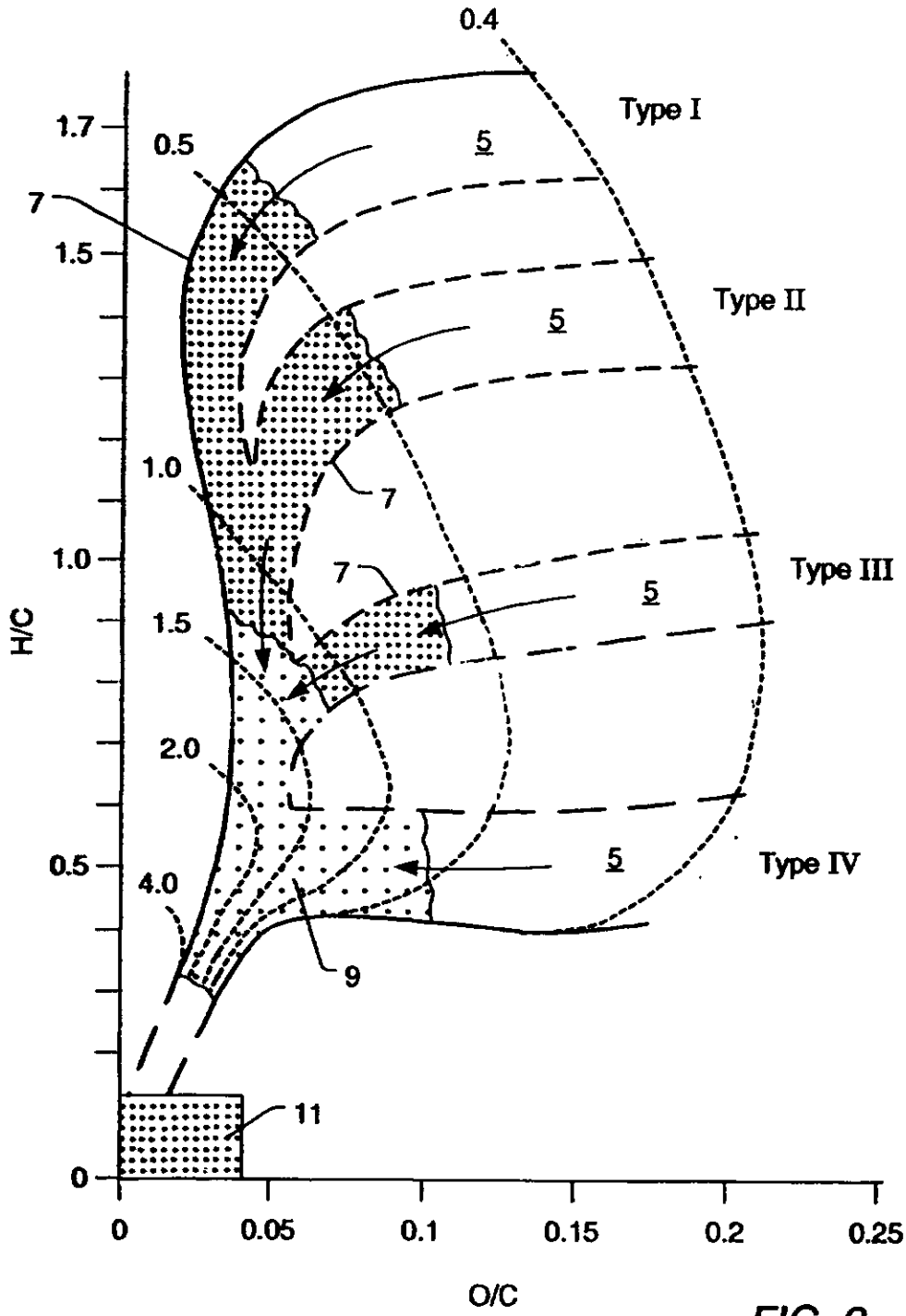

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FIG. 2

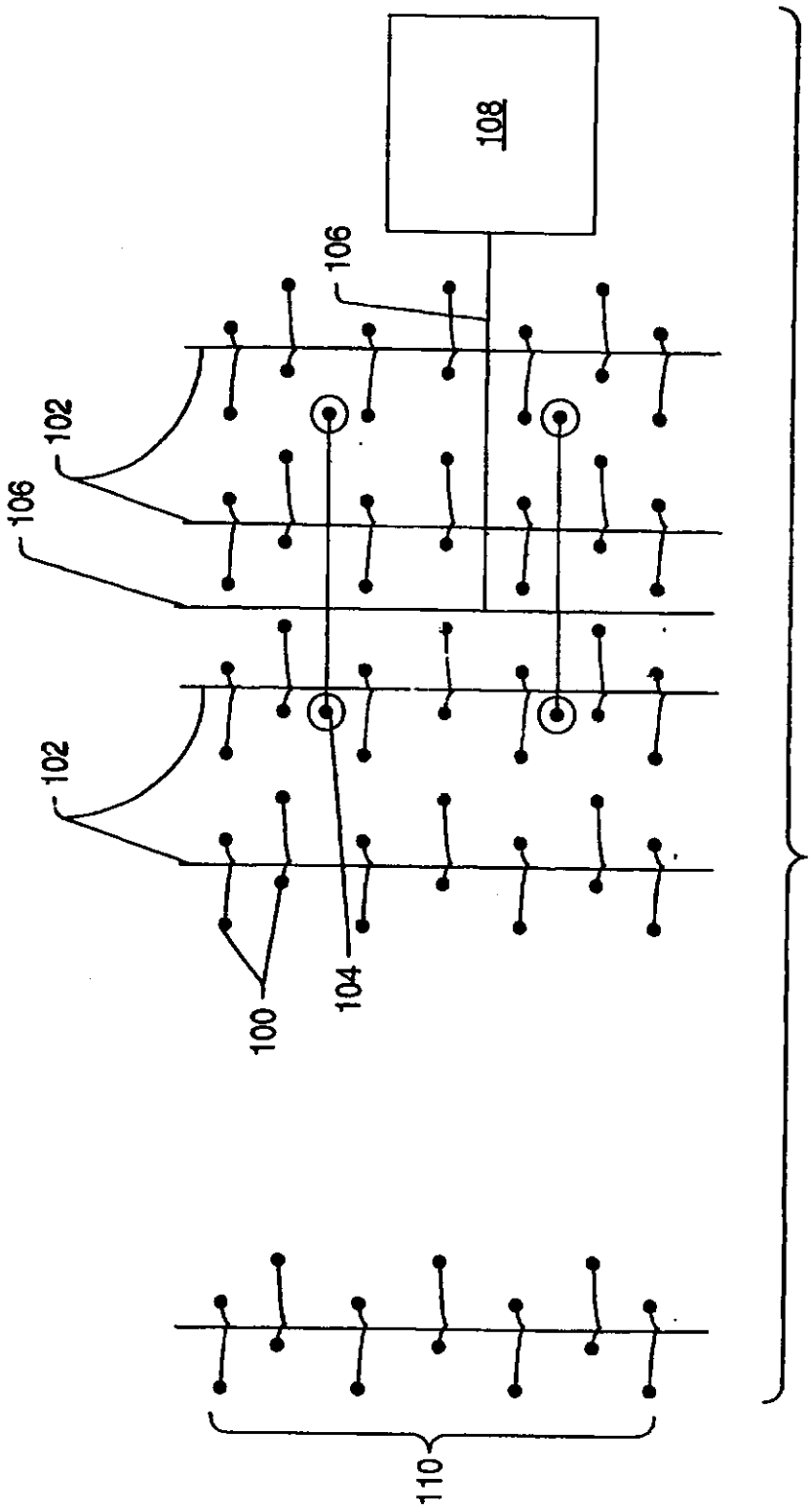


FIG. 3

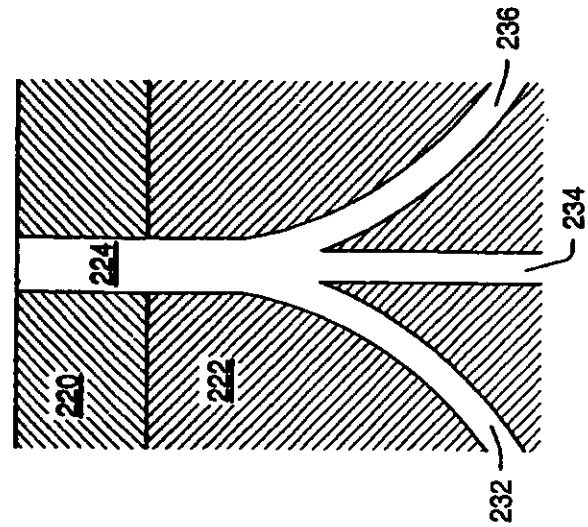


FIG. 3c

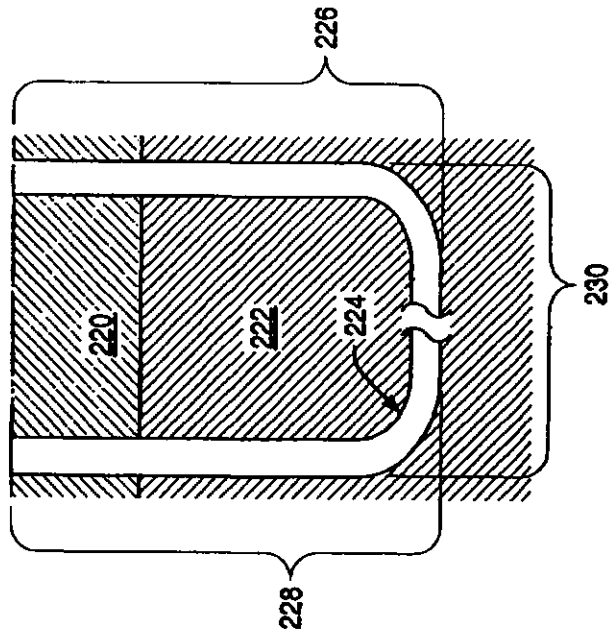


FIG. 3b

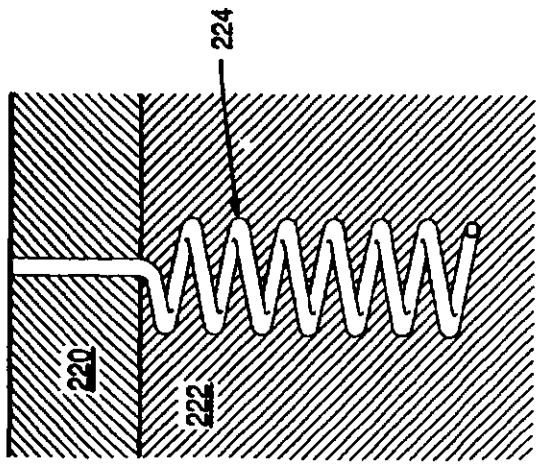


FIG. 3a

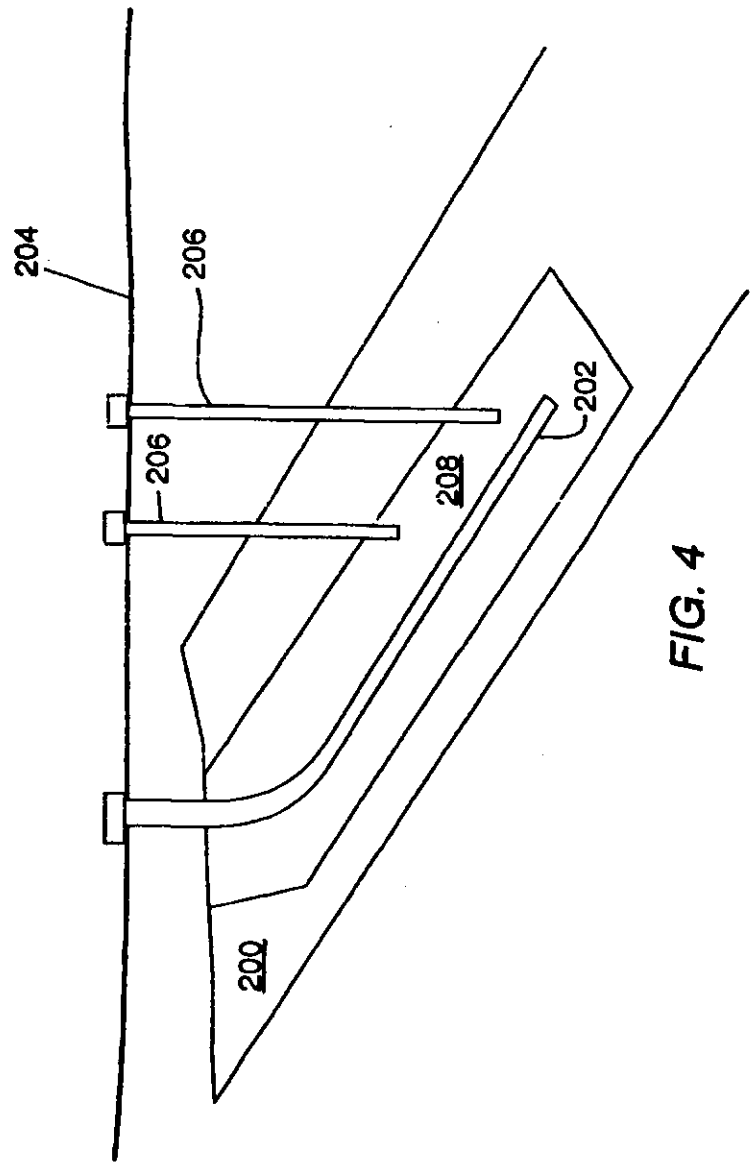
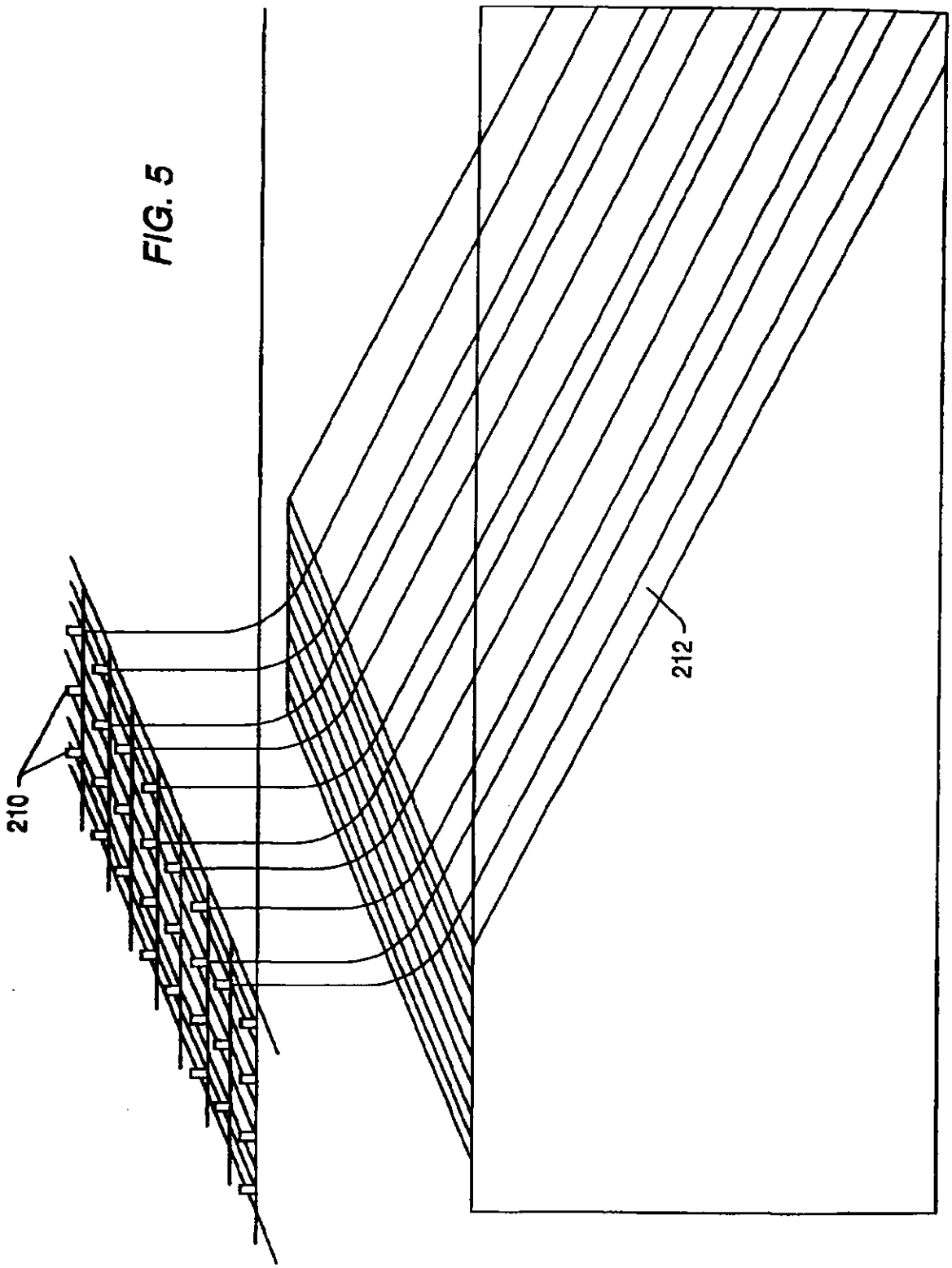


FIG. 4

FIG. 5



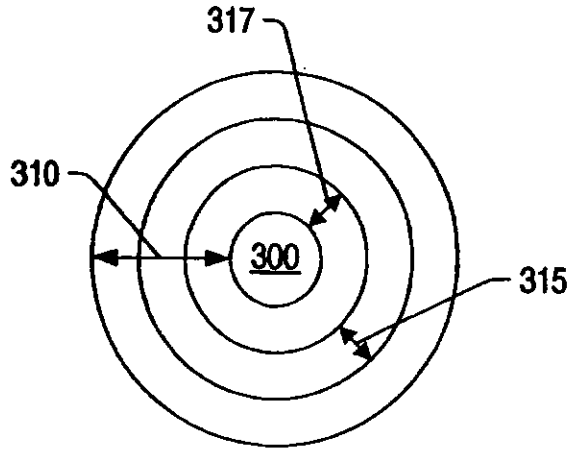


FIG. 6

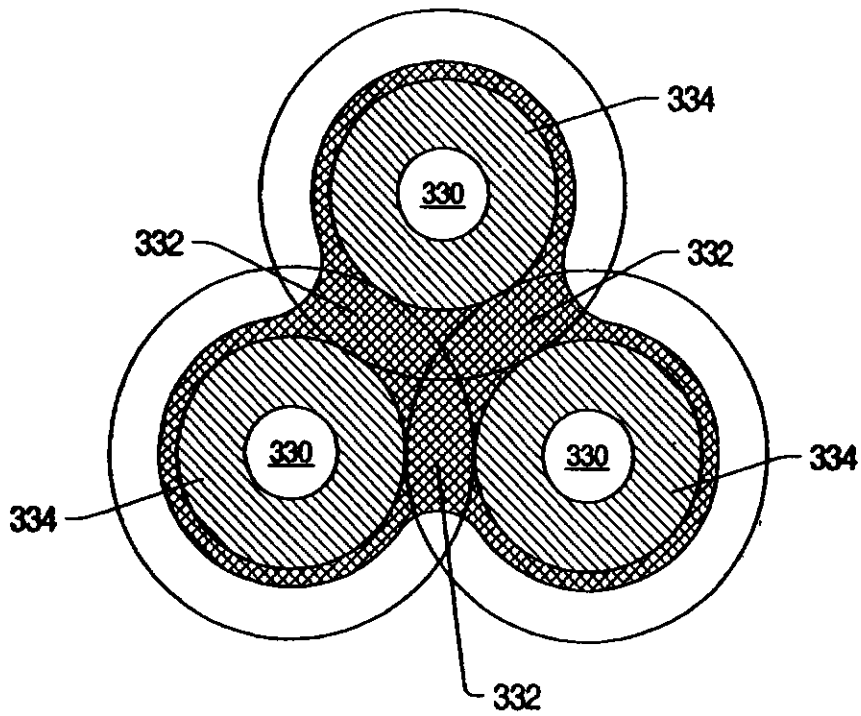


FIG. 7

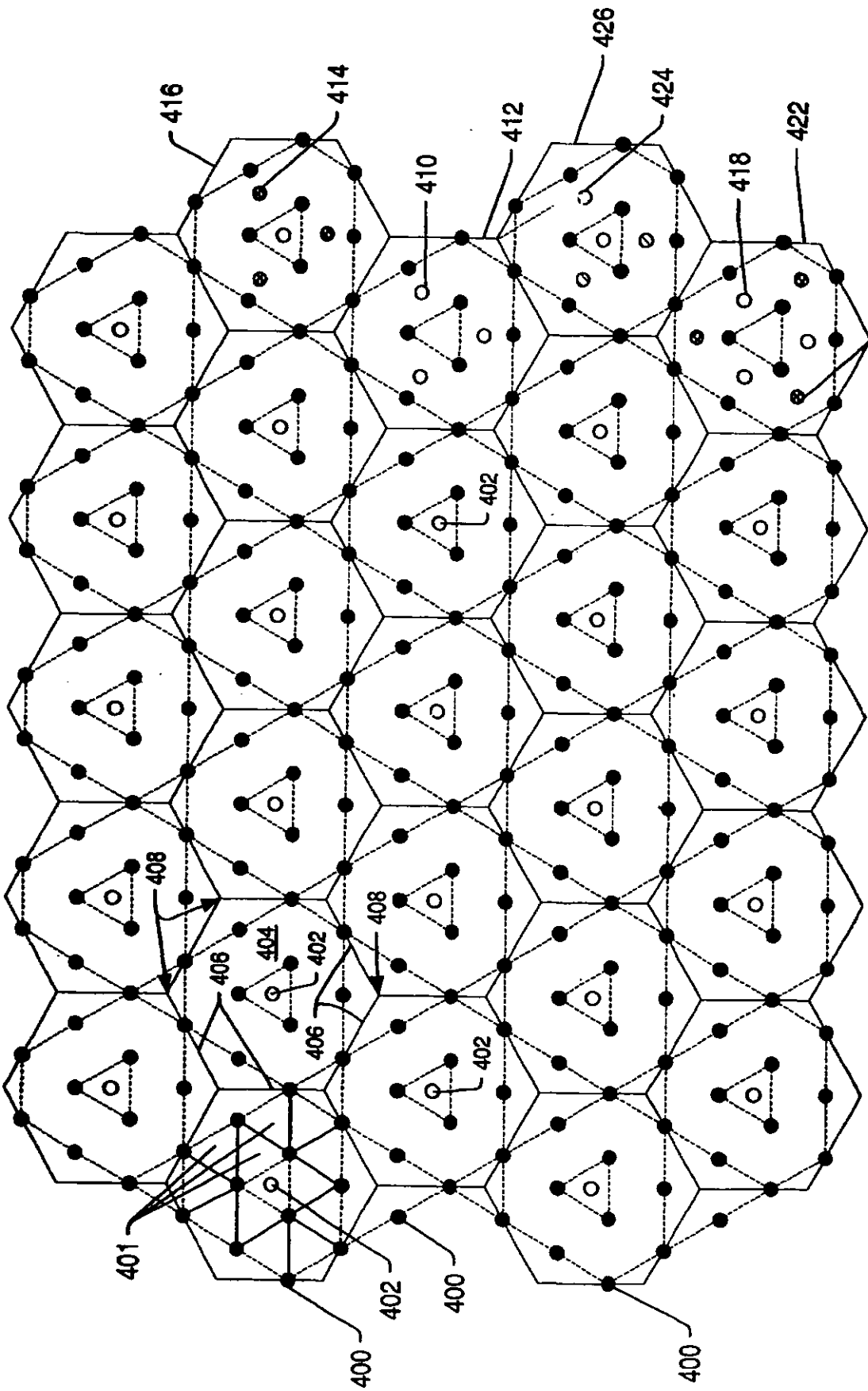
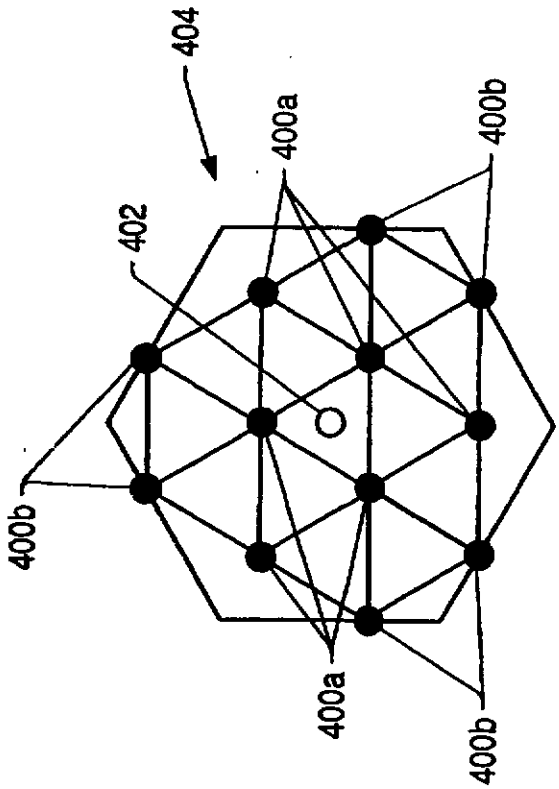


FIG. 8

FIG. 9



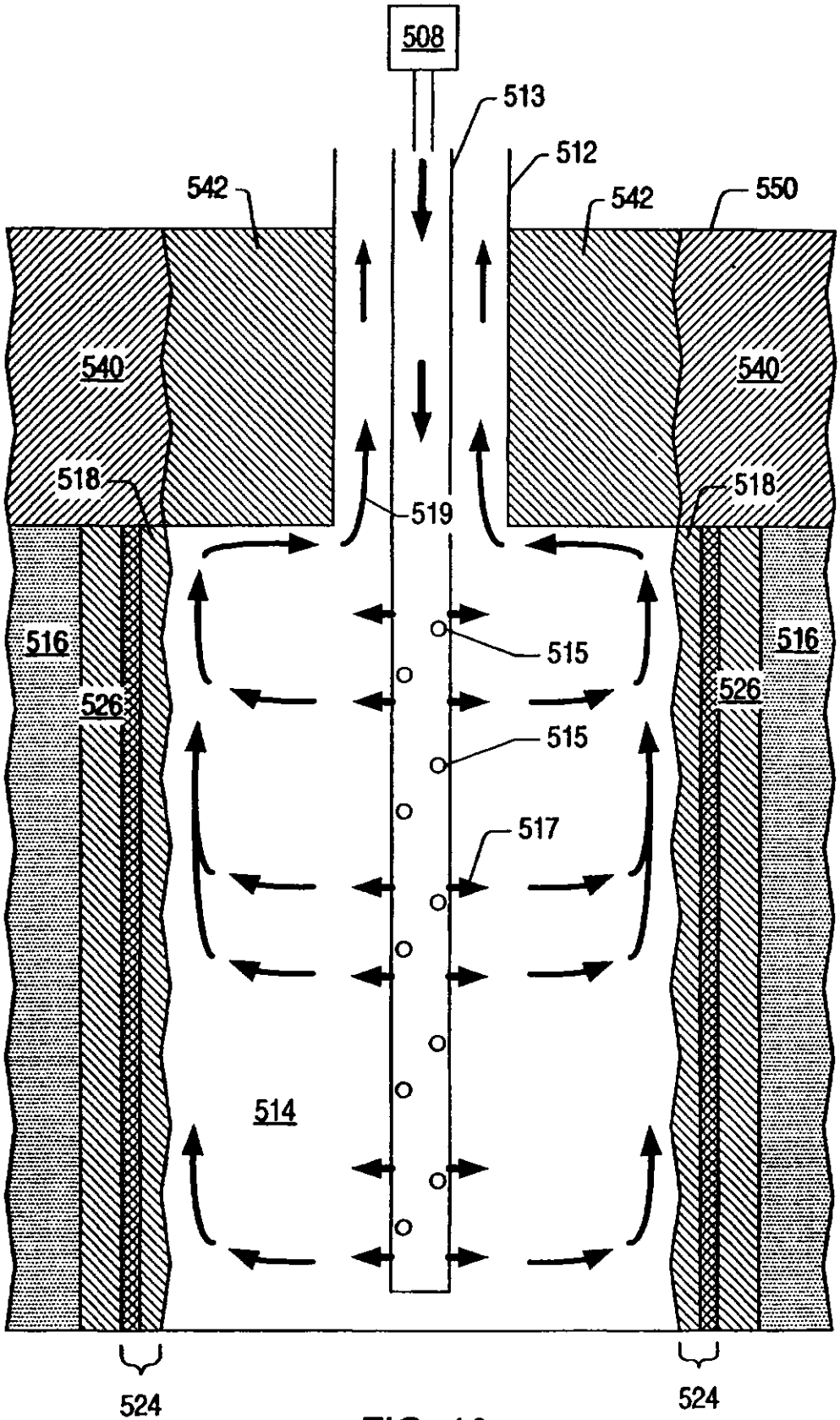

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FIG. 10

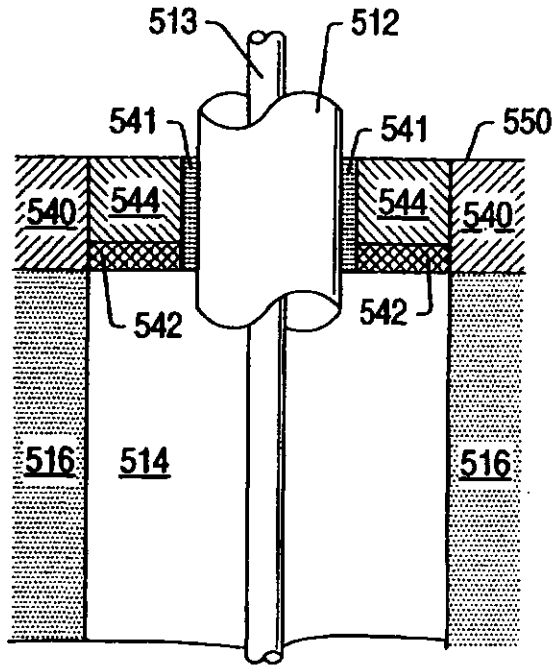

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FIG. 11

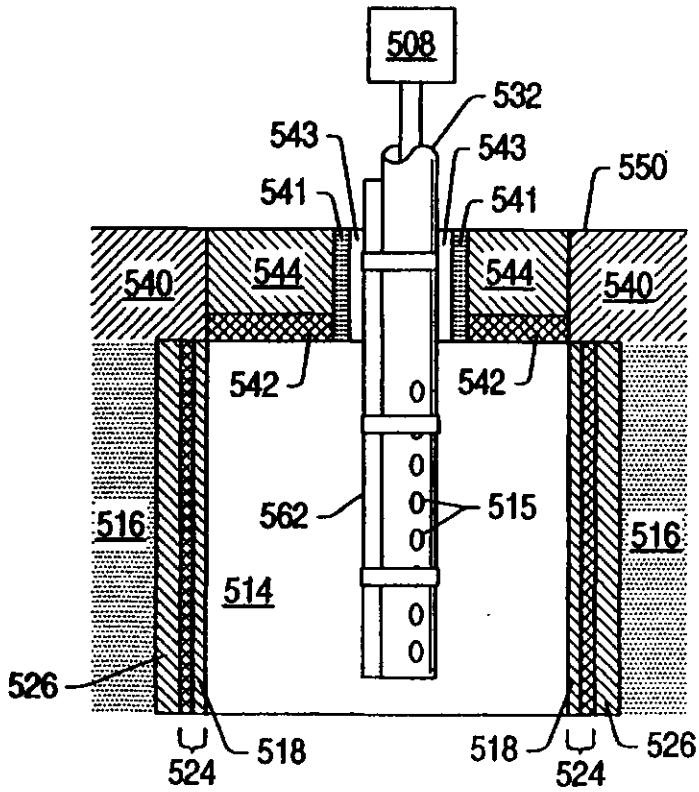

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FIG. 12

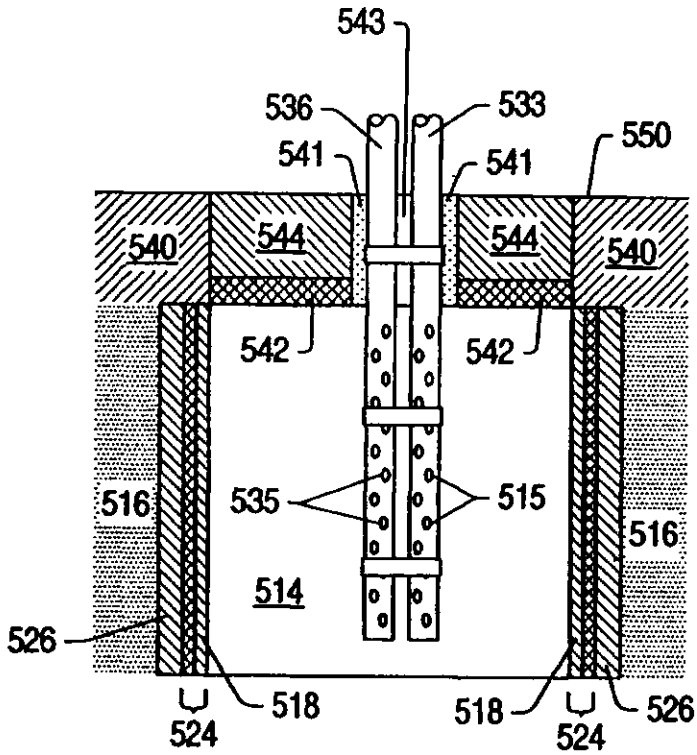

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Fig. 13

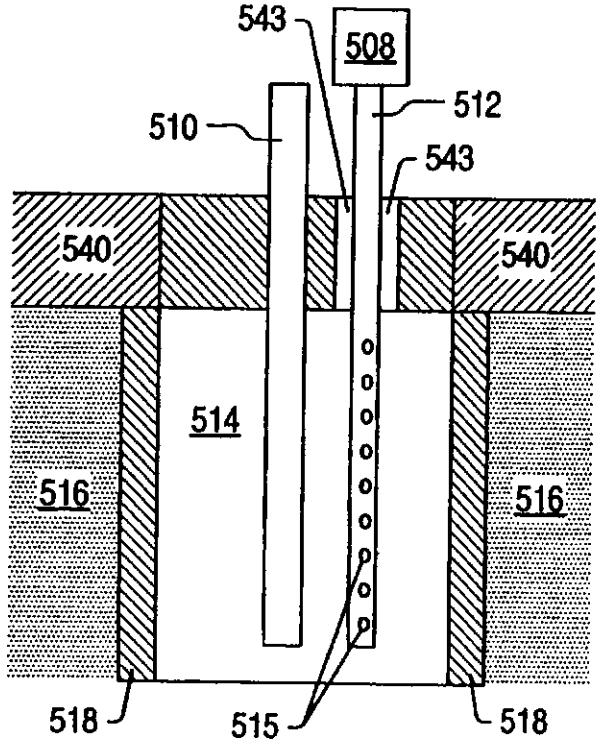

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FIG. 14

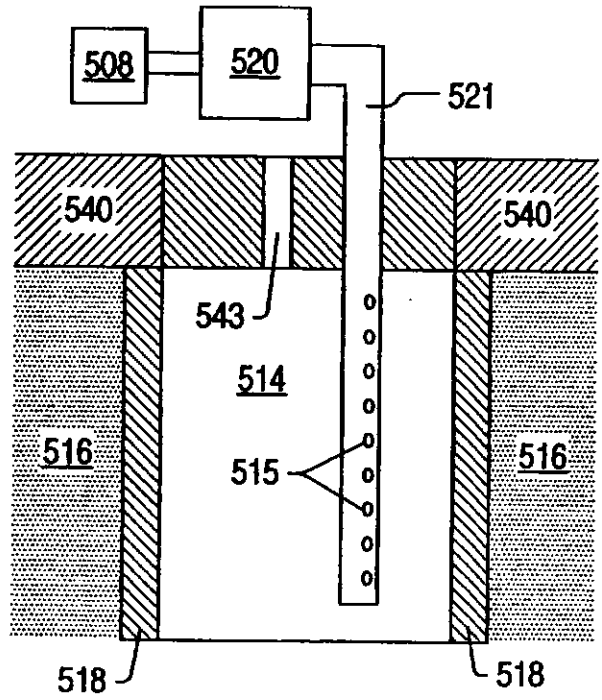

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FIG. 15

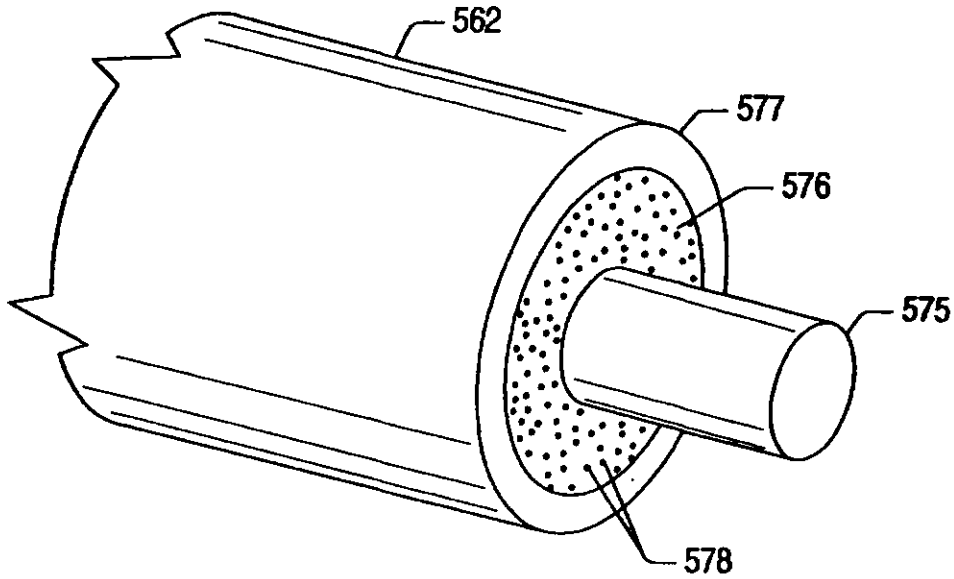


FIG. 16

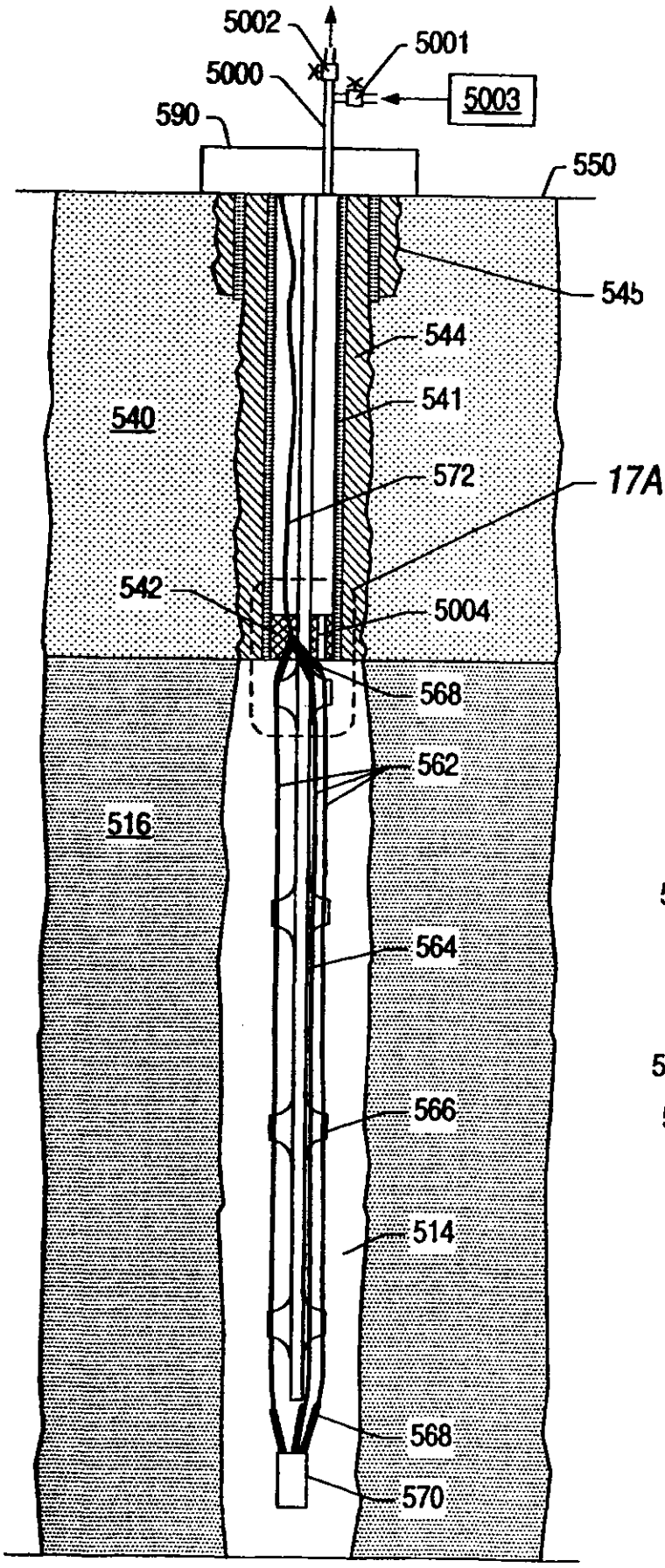


FIG. 17

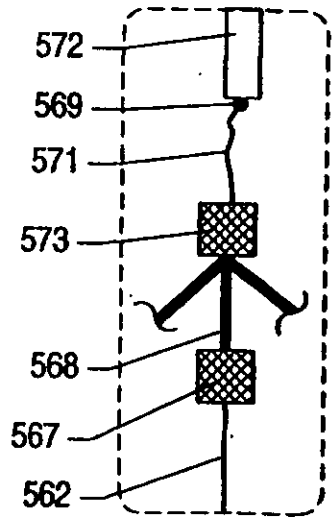


FIG. 17A

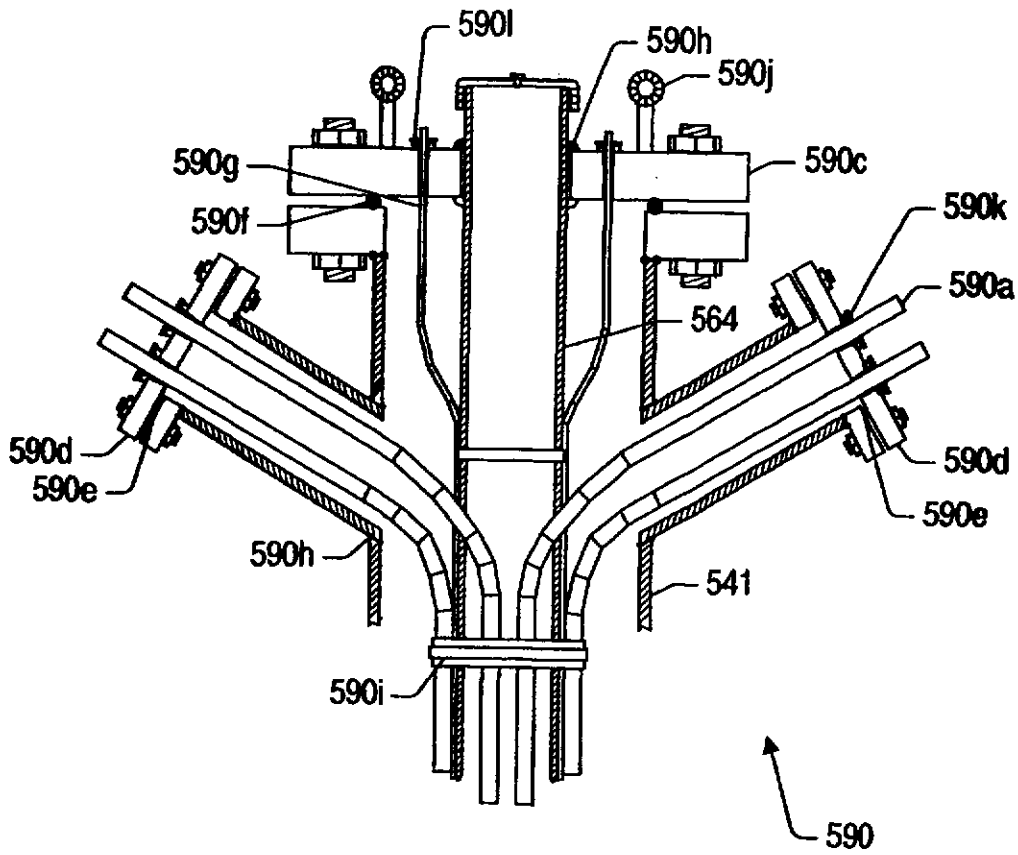

590l
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590d
590e
590h
590d
590e
541
590i
590

FIG. 18

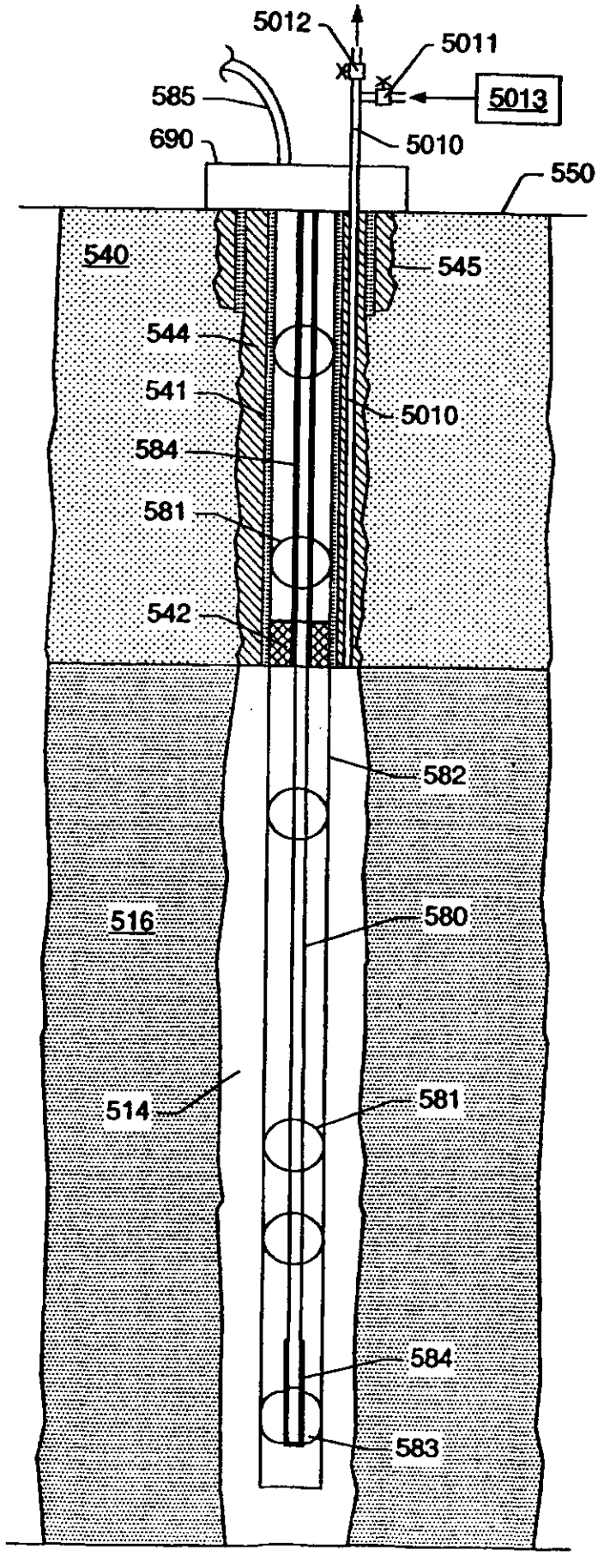

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FIG. 19

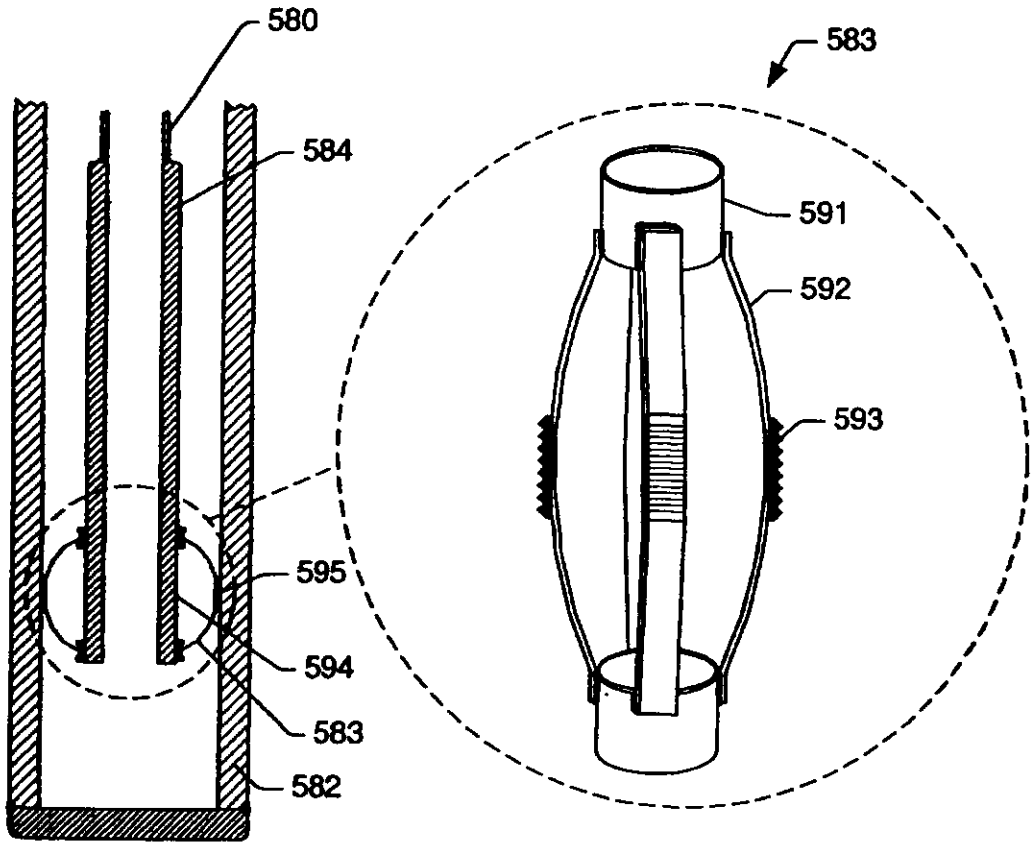


FIG. 20

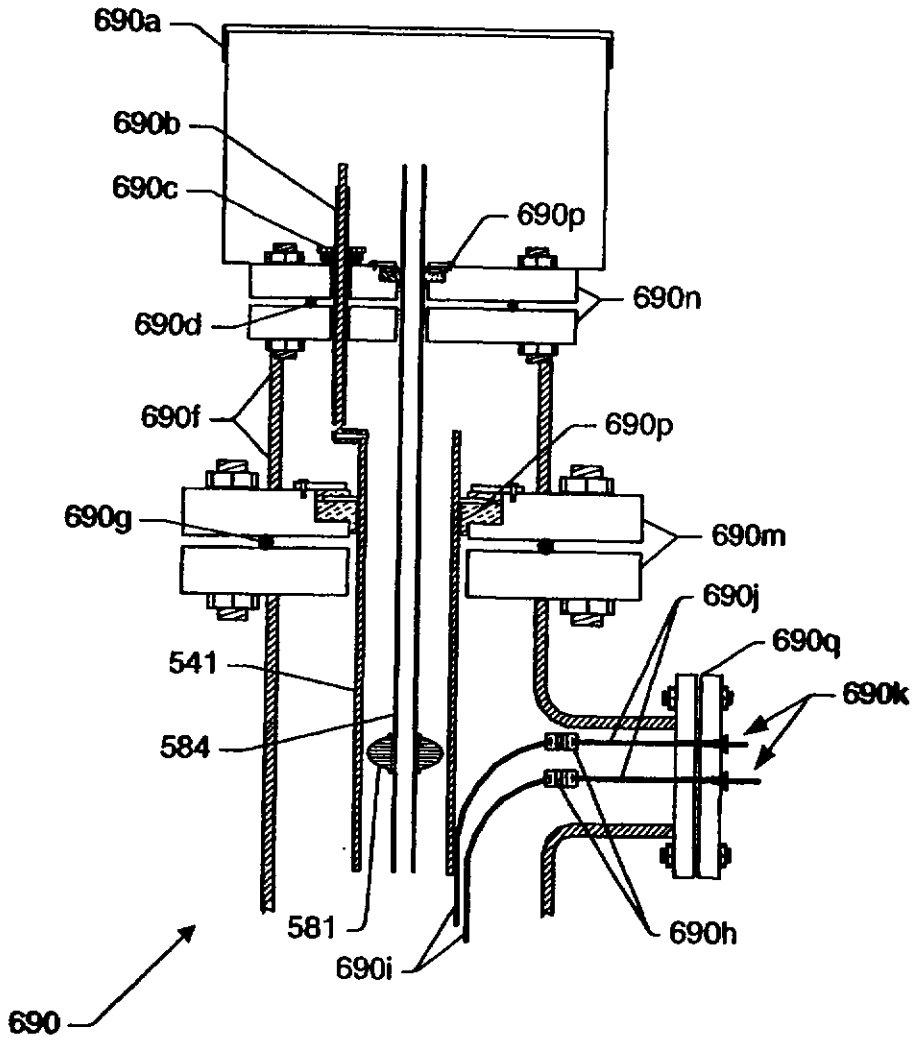

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FIG. 21

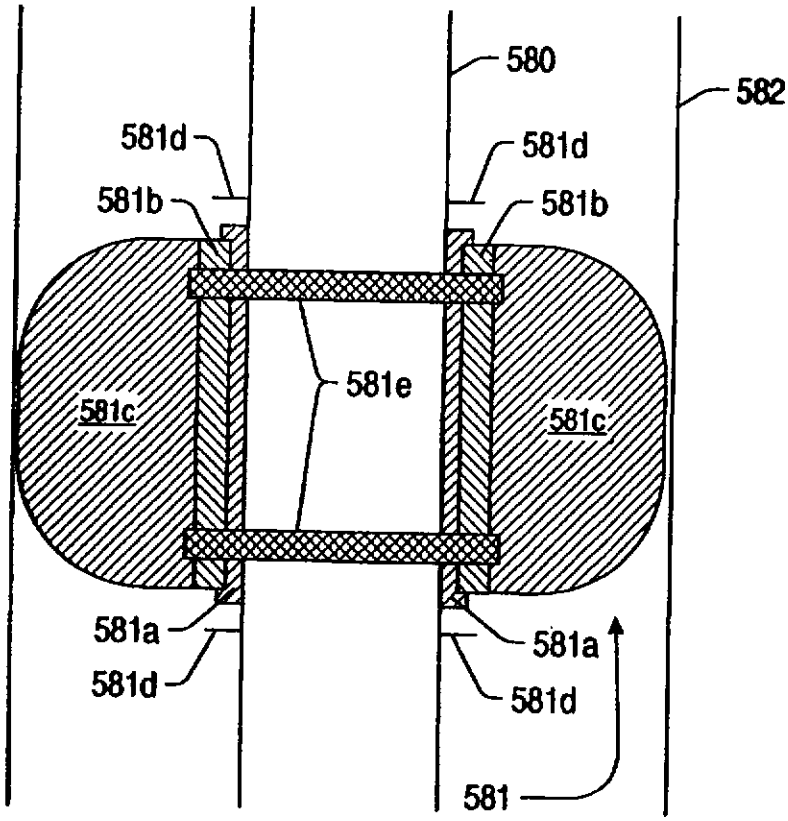

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581a
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FIG. 22

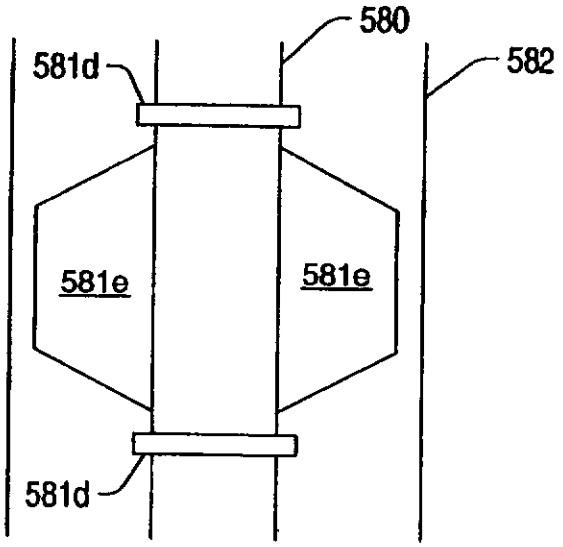


FIG. 23a

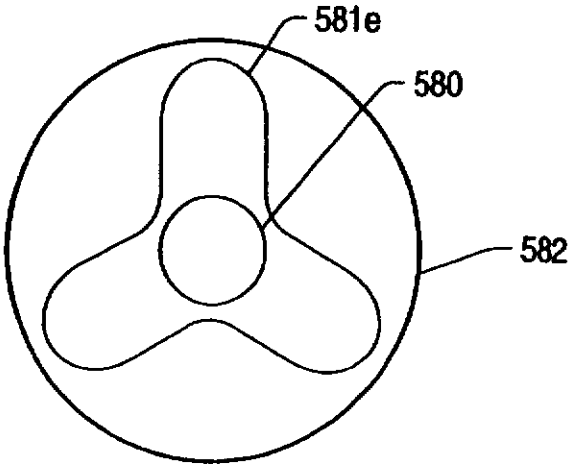


FIG. 23b

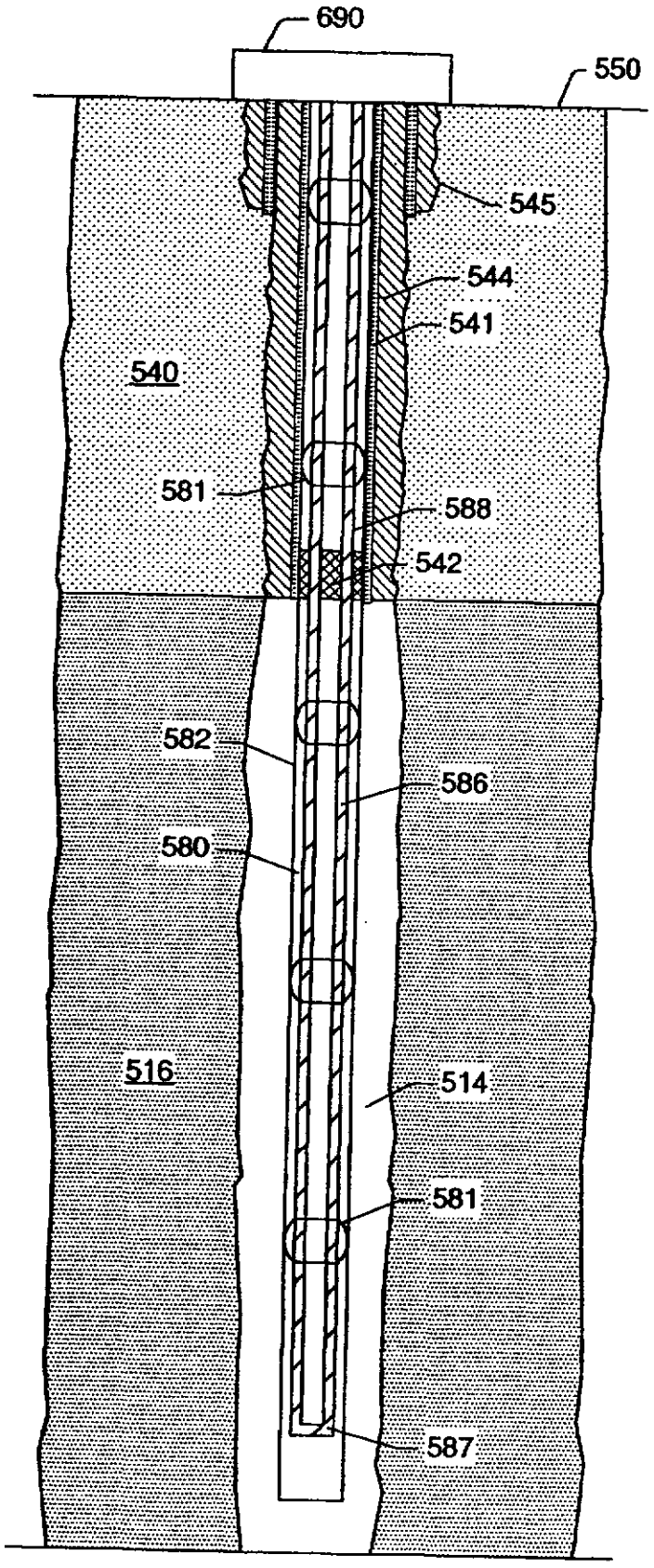


Fig. 24

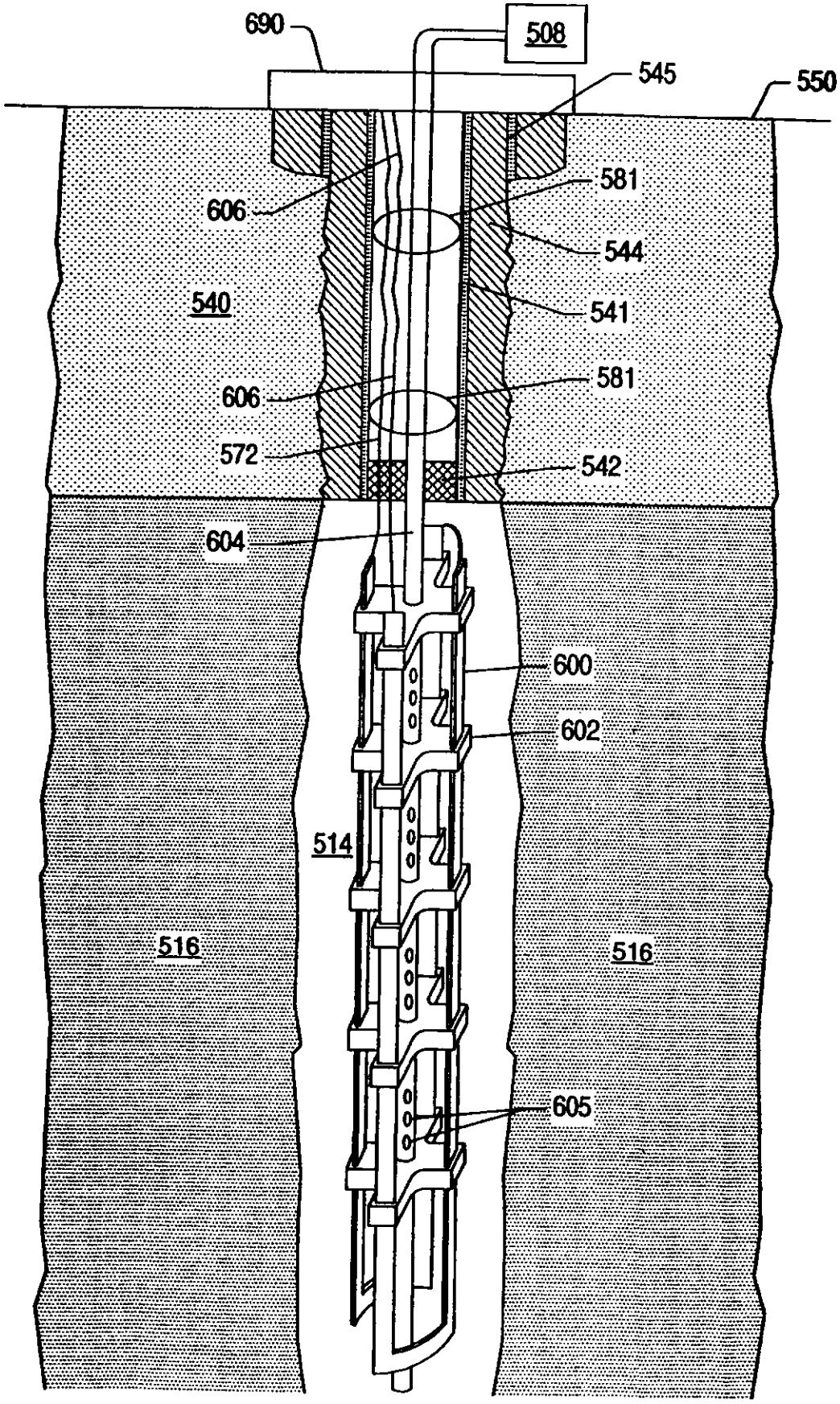

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FIG. 25

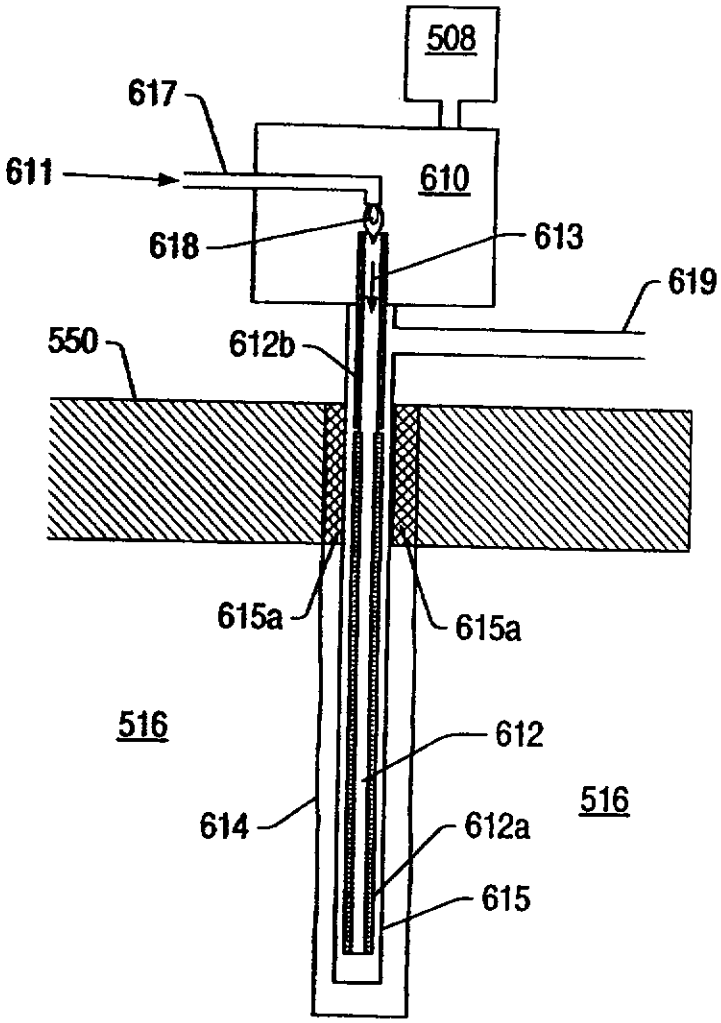

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FIG. 26

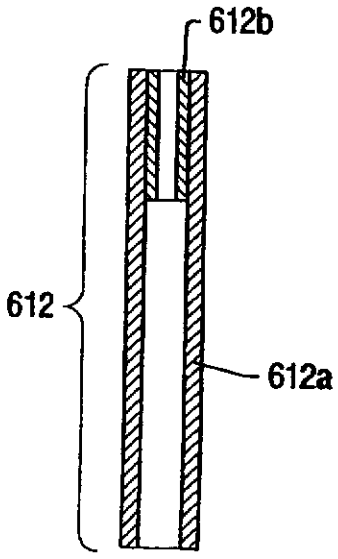

612b
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FIG. 27

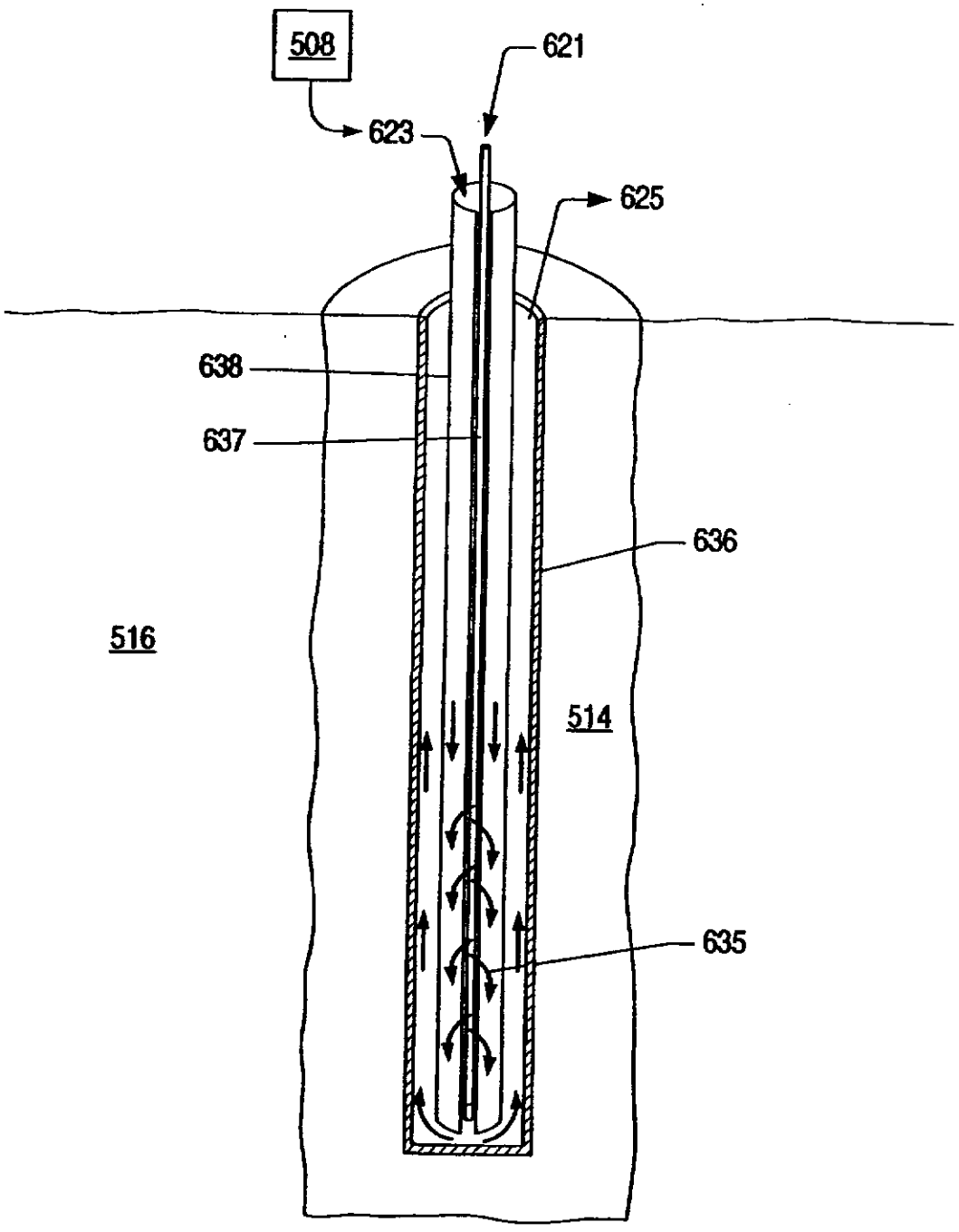


FIG. 28

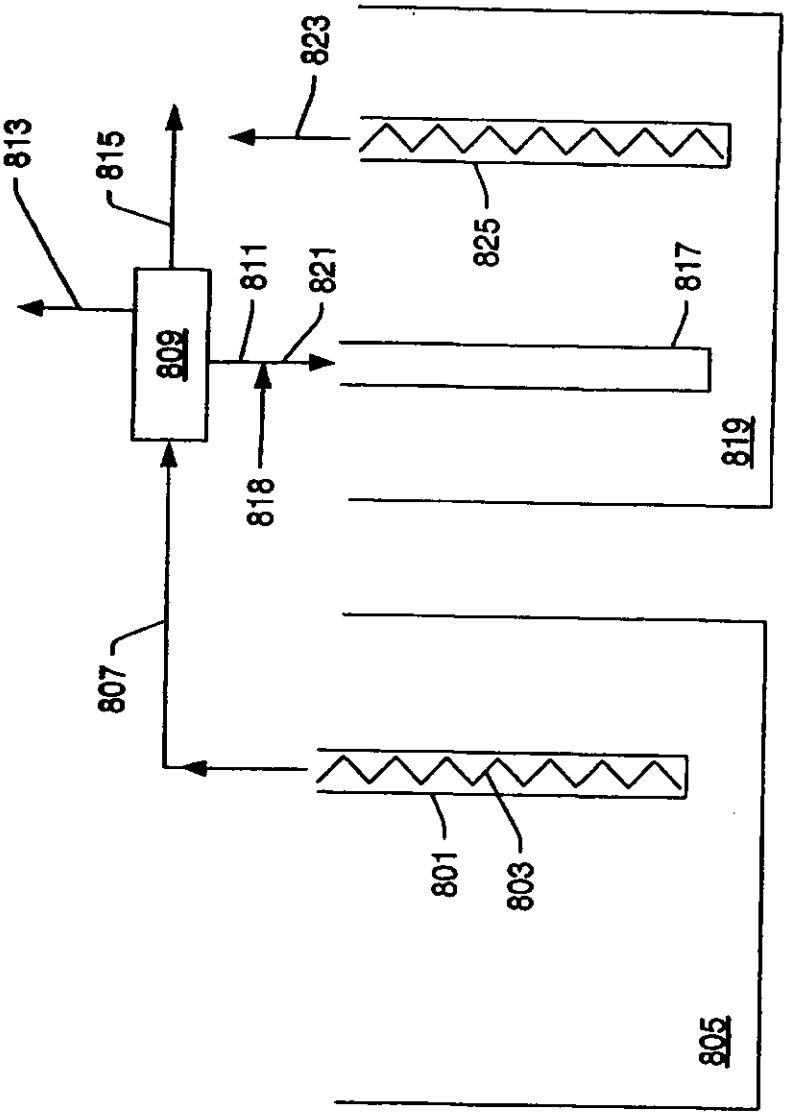


FIG. 29

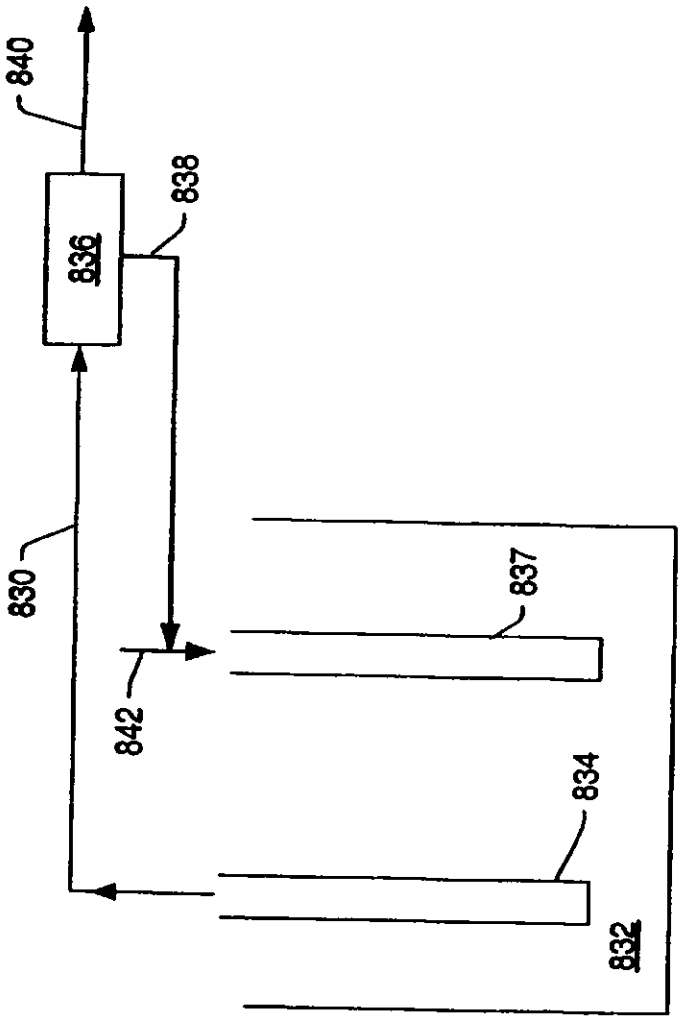


FIG. 30

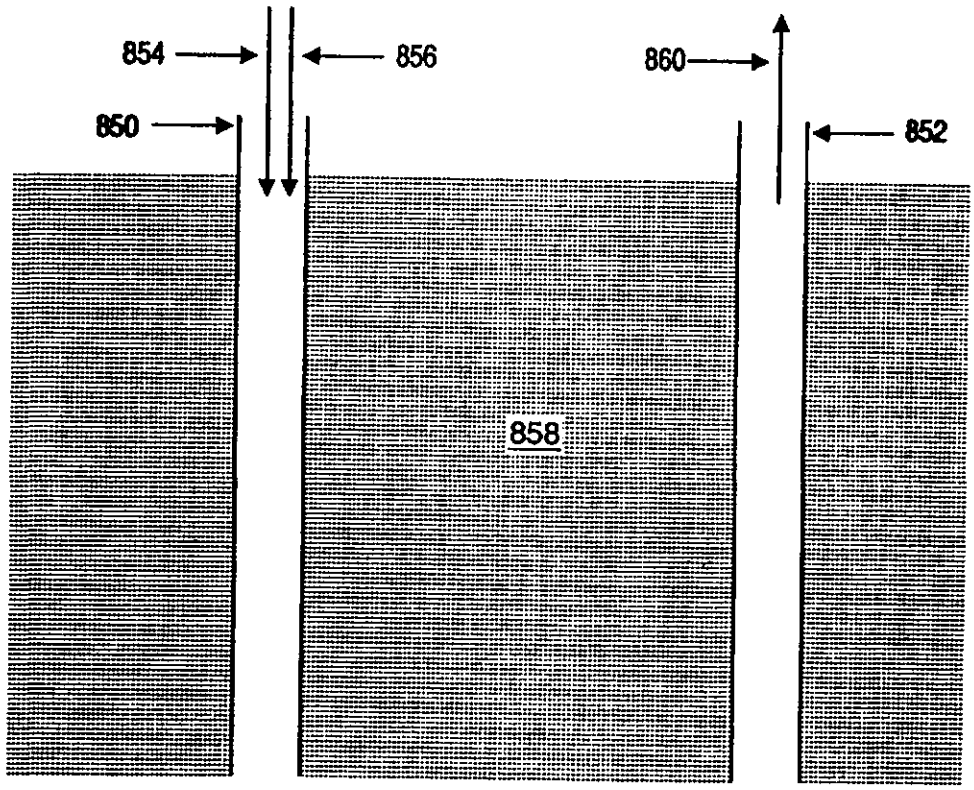


FIG. 31

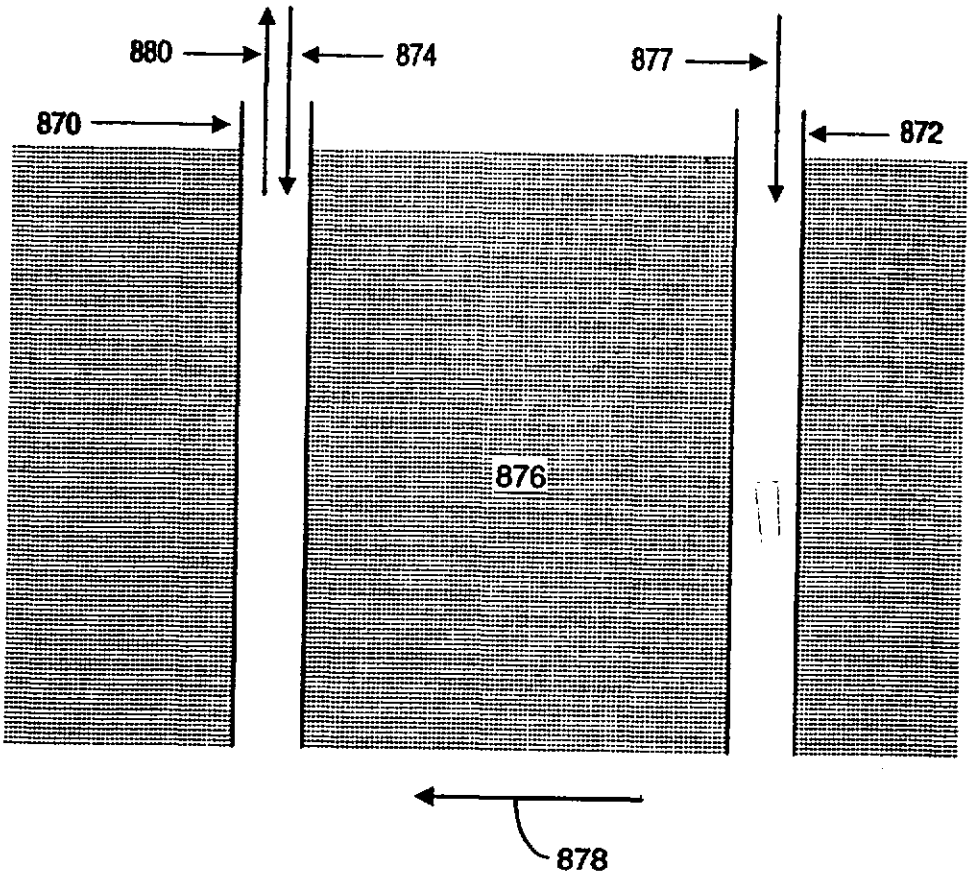


FIG. 32

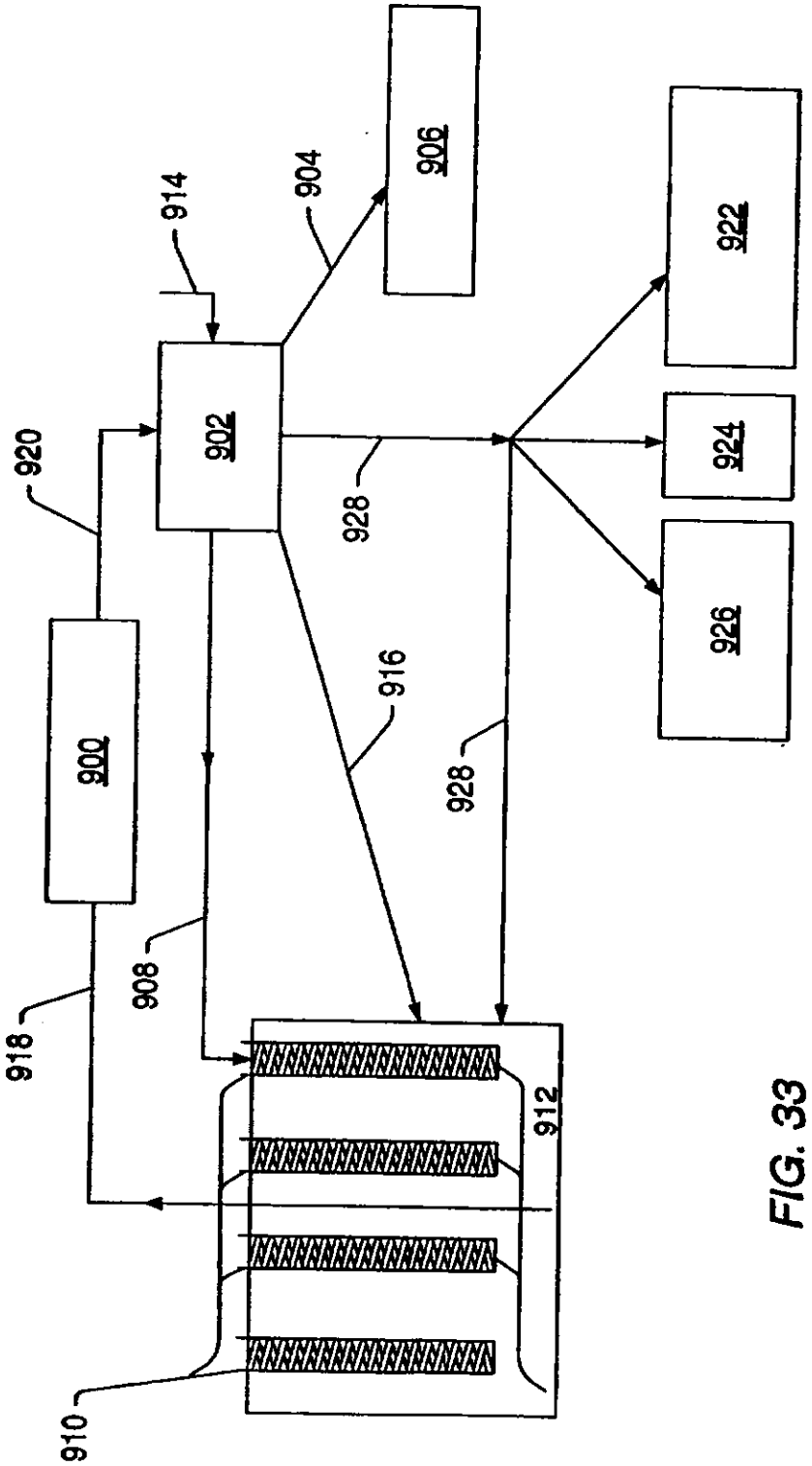


FIG. 33

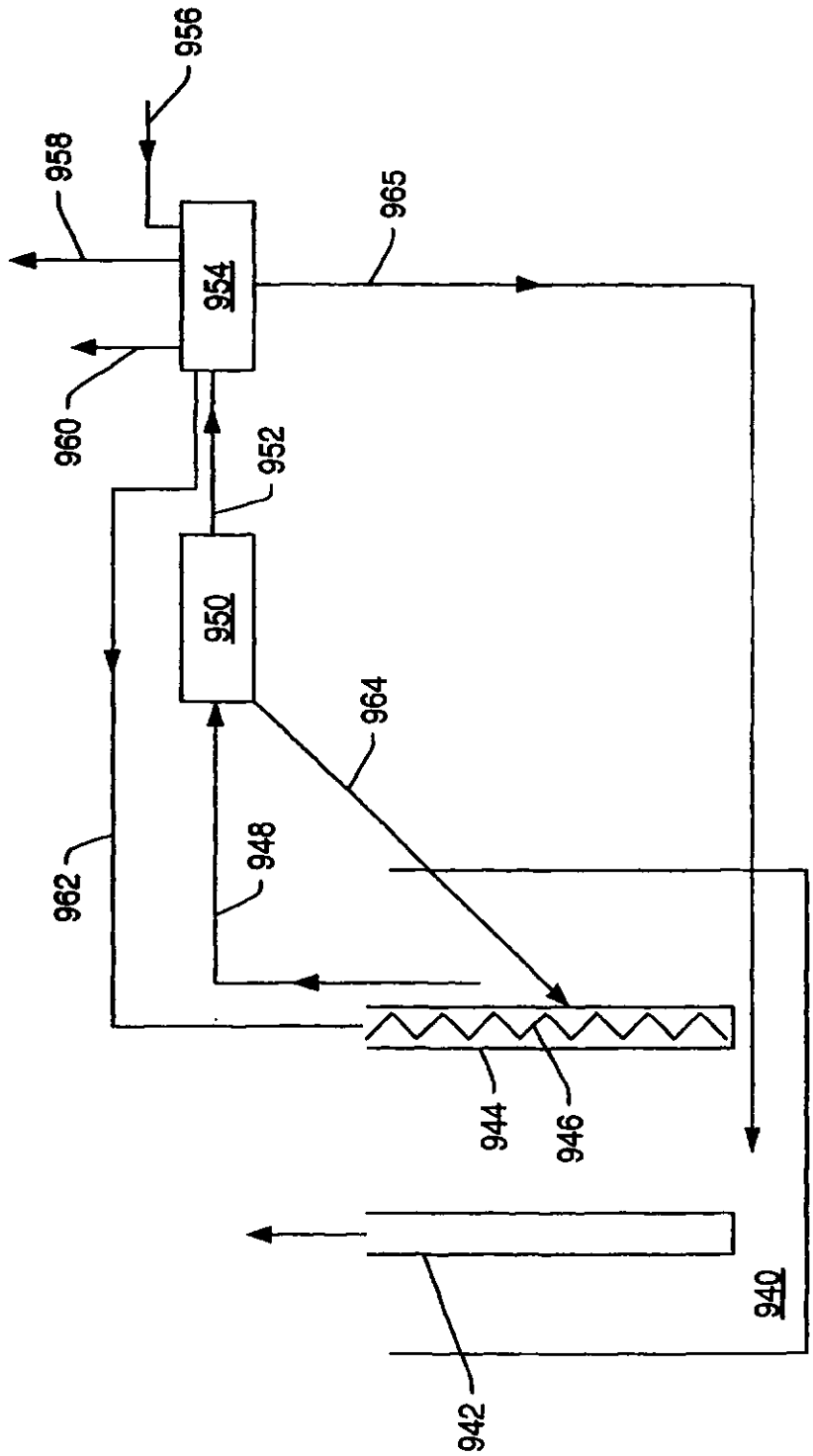


FIG. 34

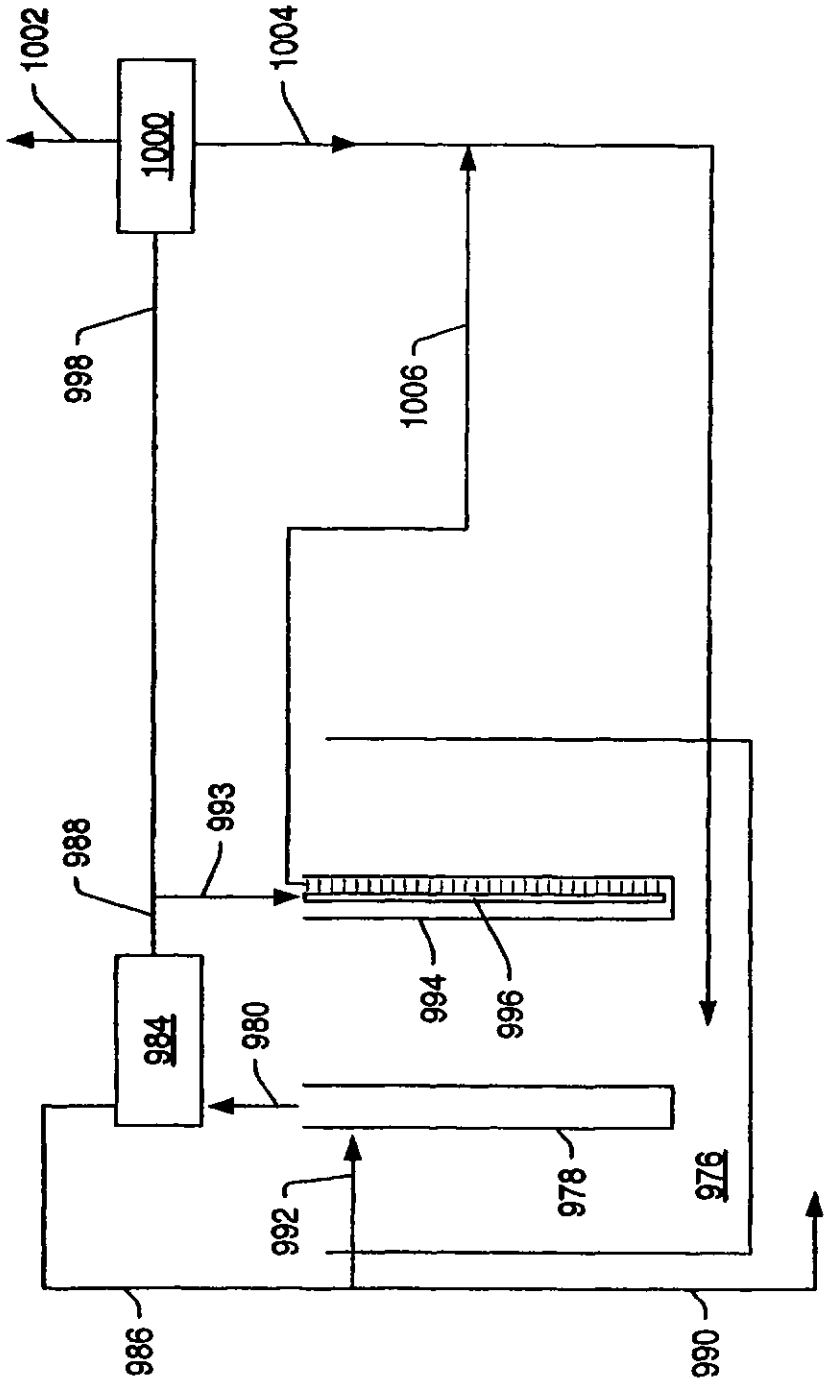

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FIG. 35

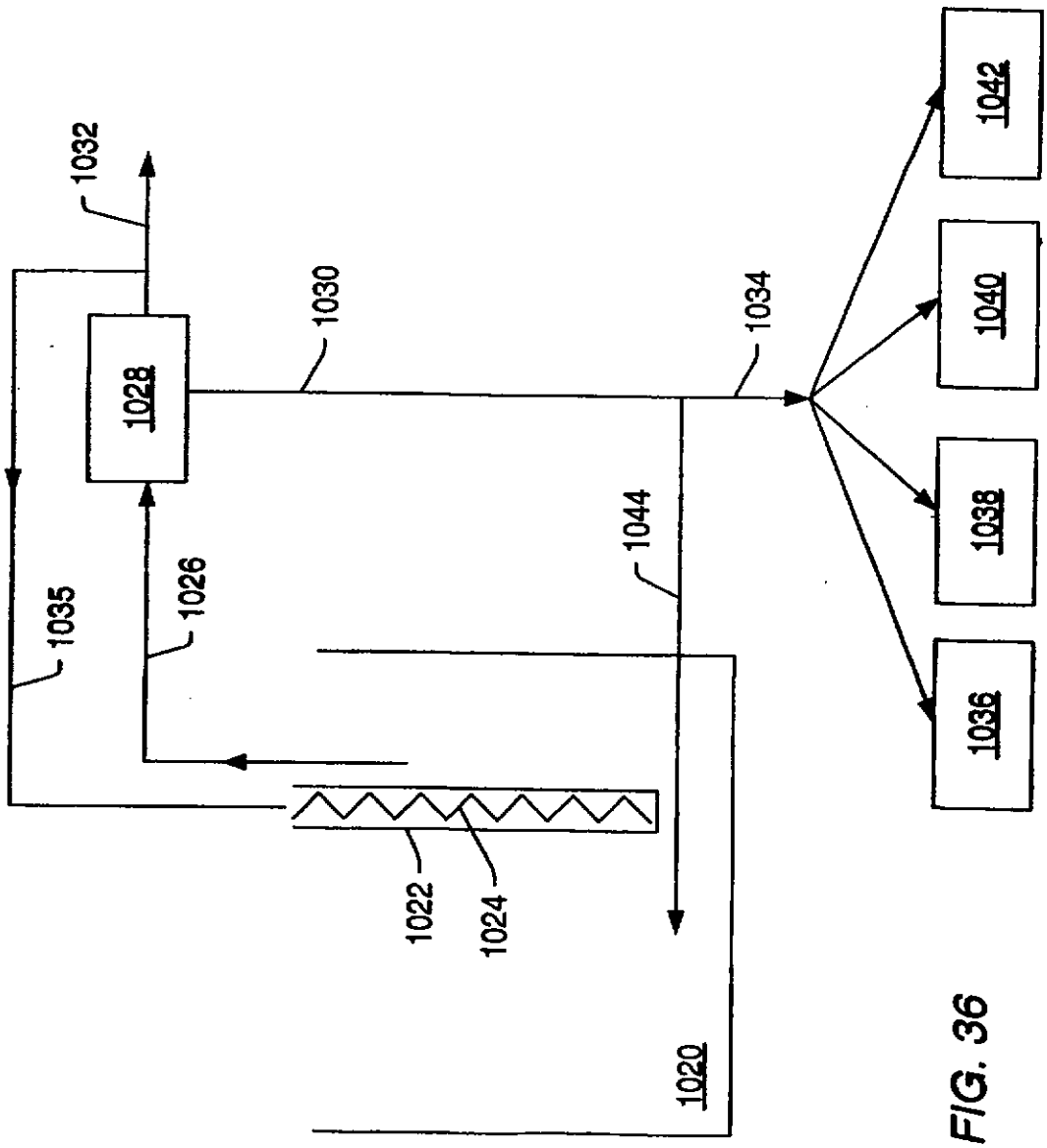

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FIG. 36

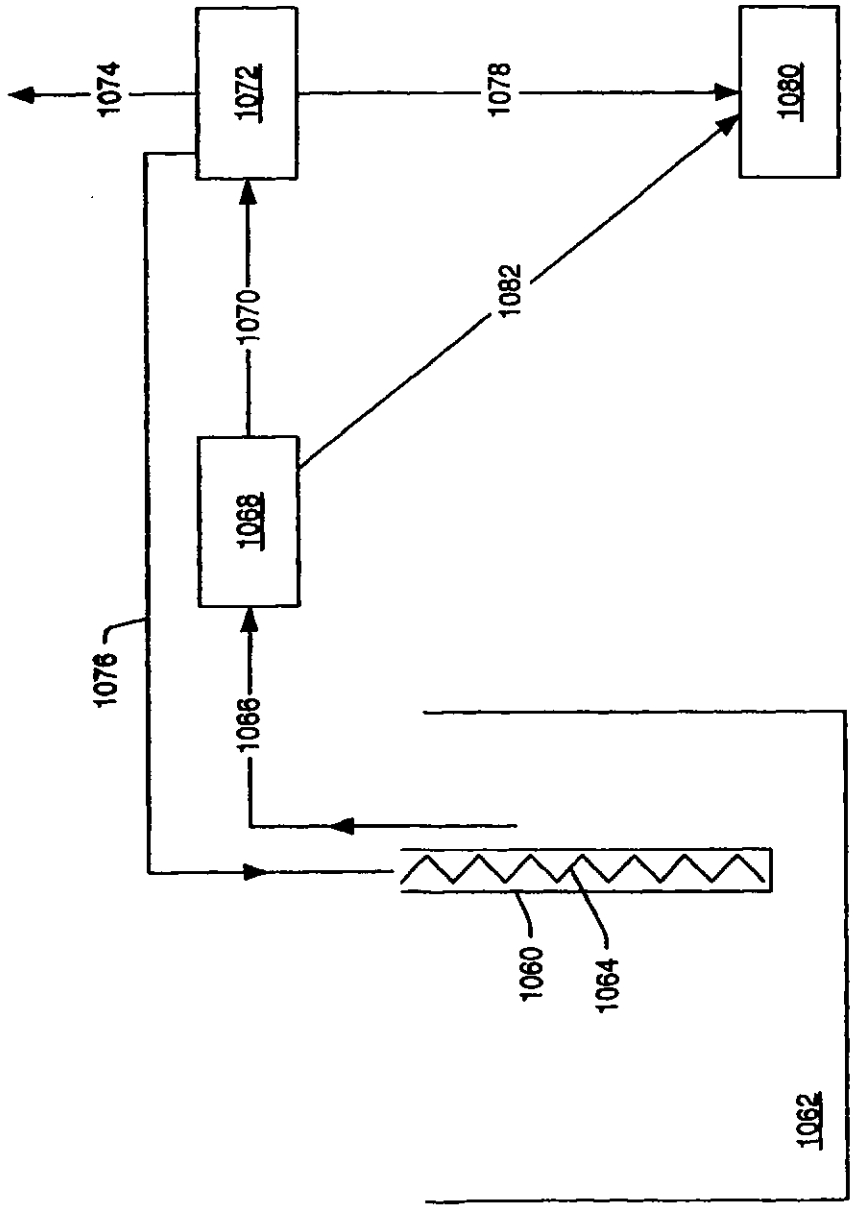


FIG. 37

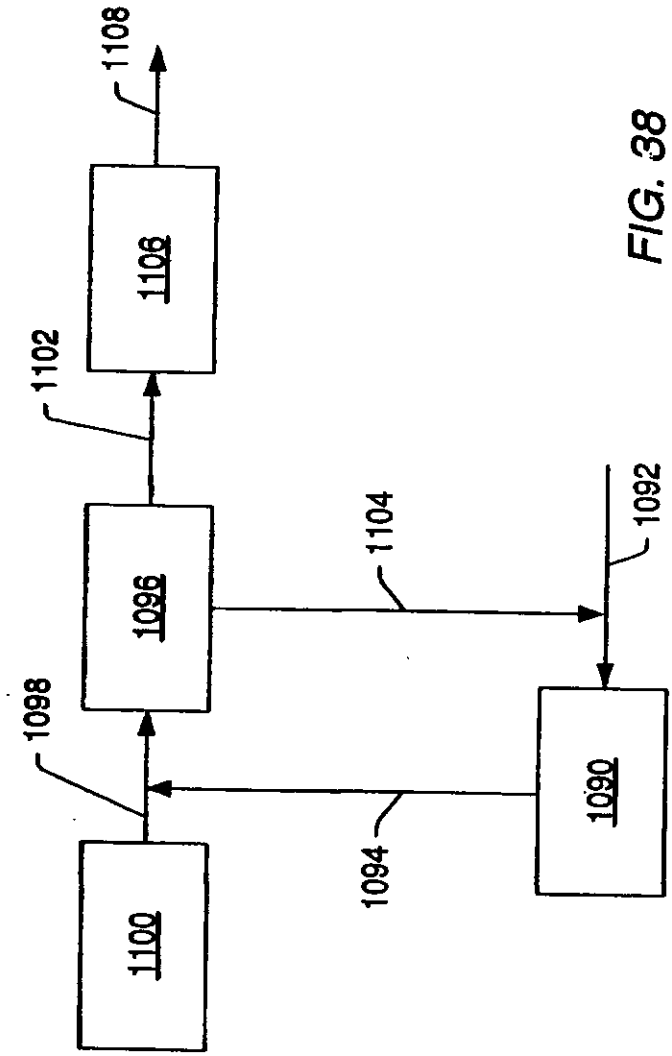


FIG. 38

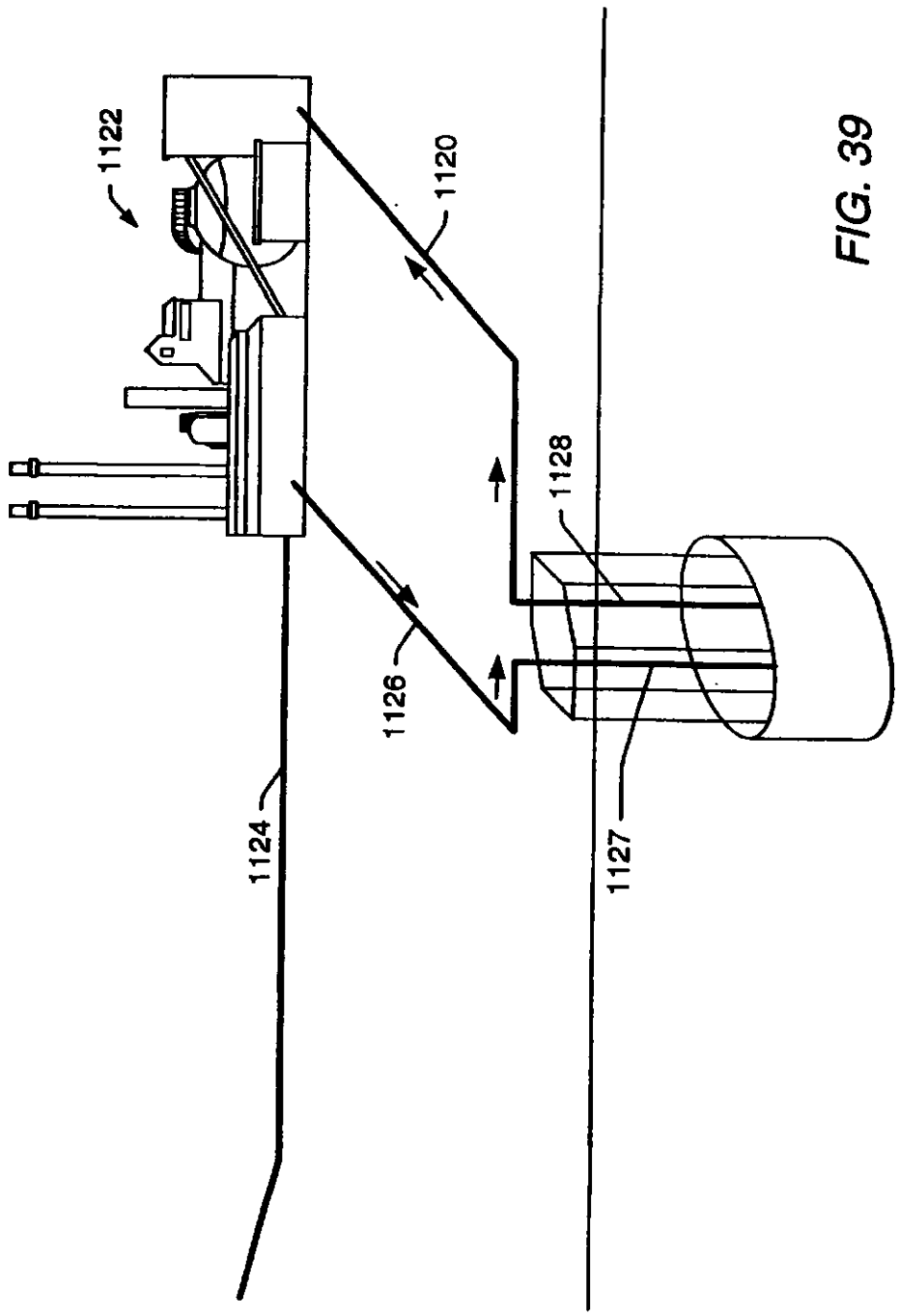


FIG. 39

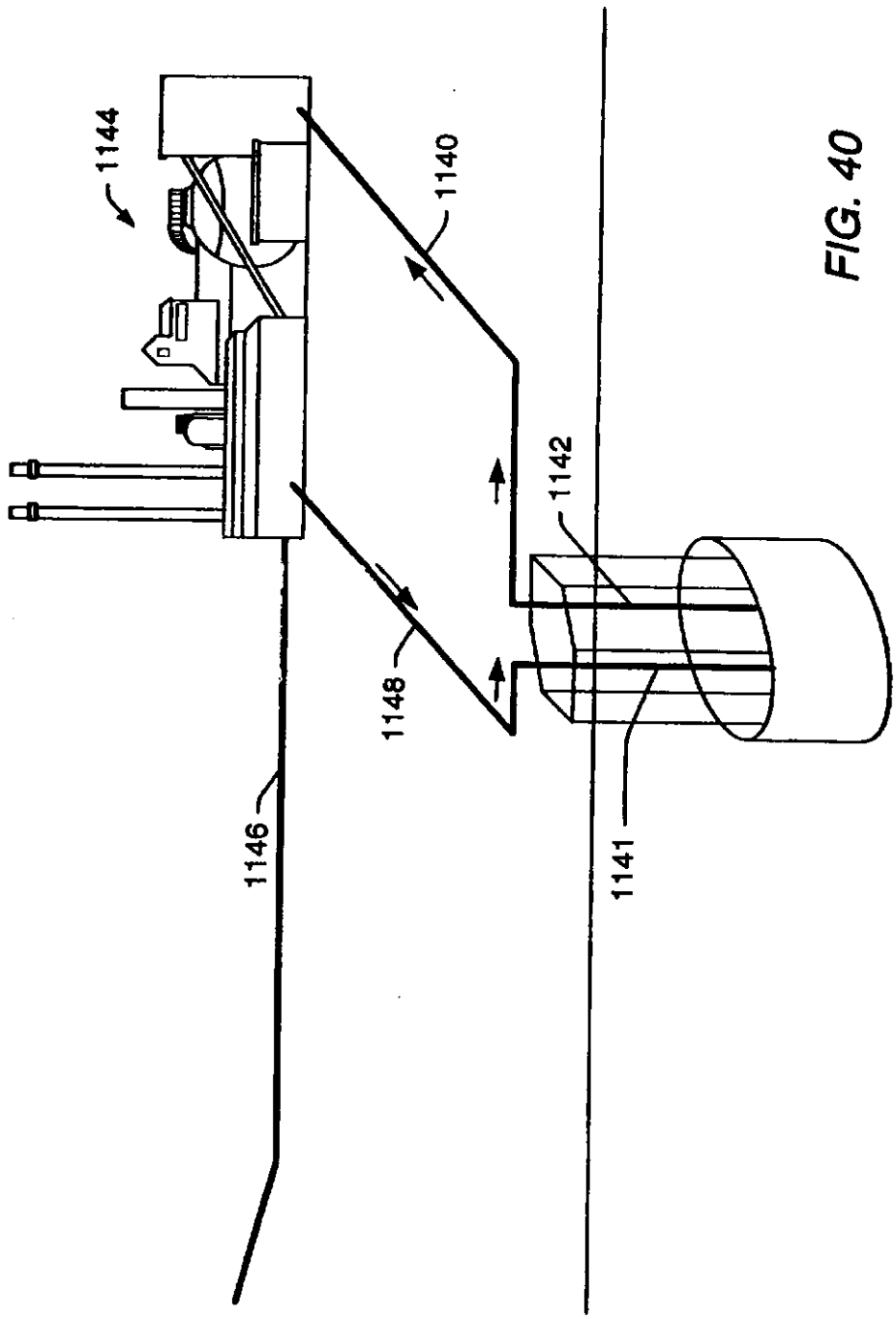


FIG. 40

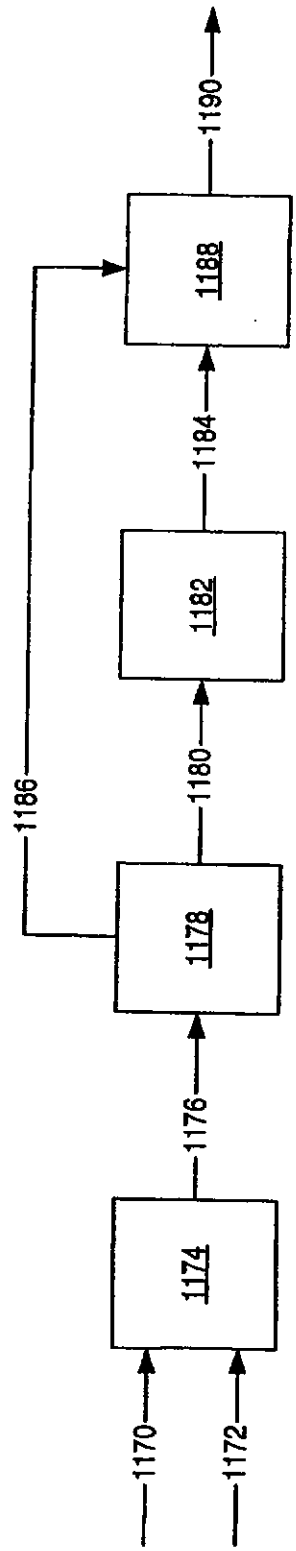


FIG. 41

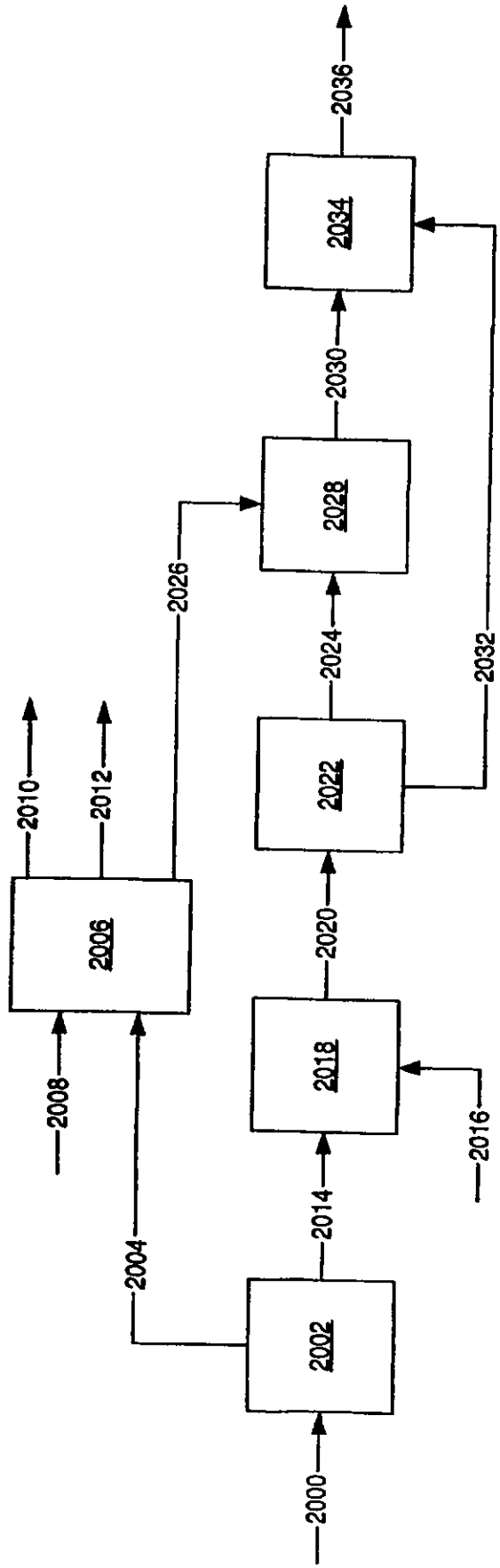

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FIG. 42

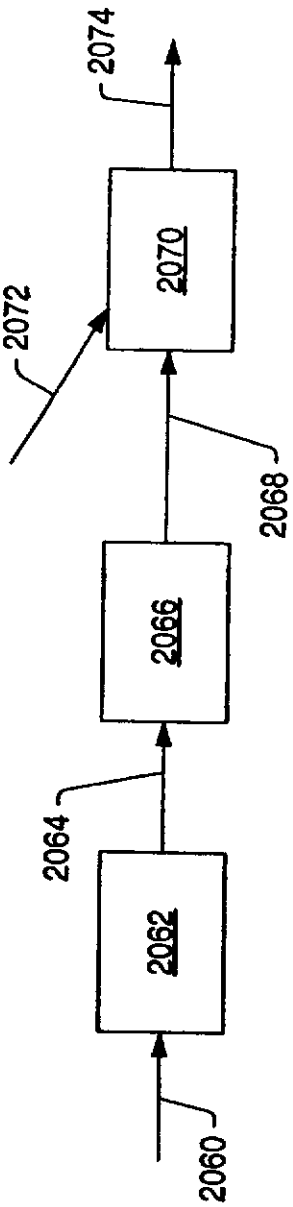


FIG. 43

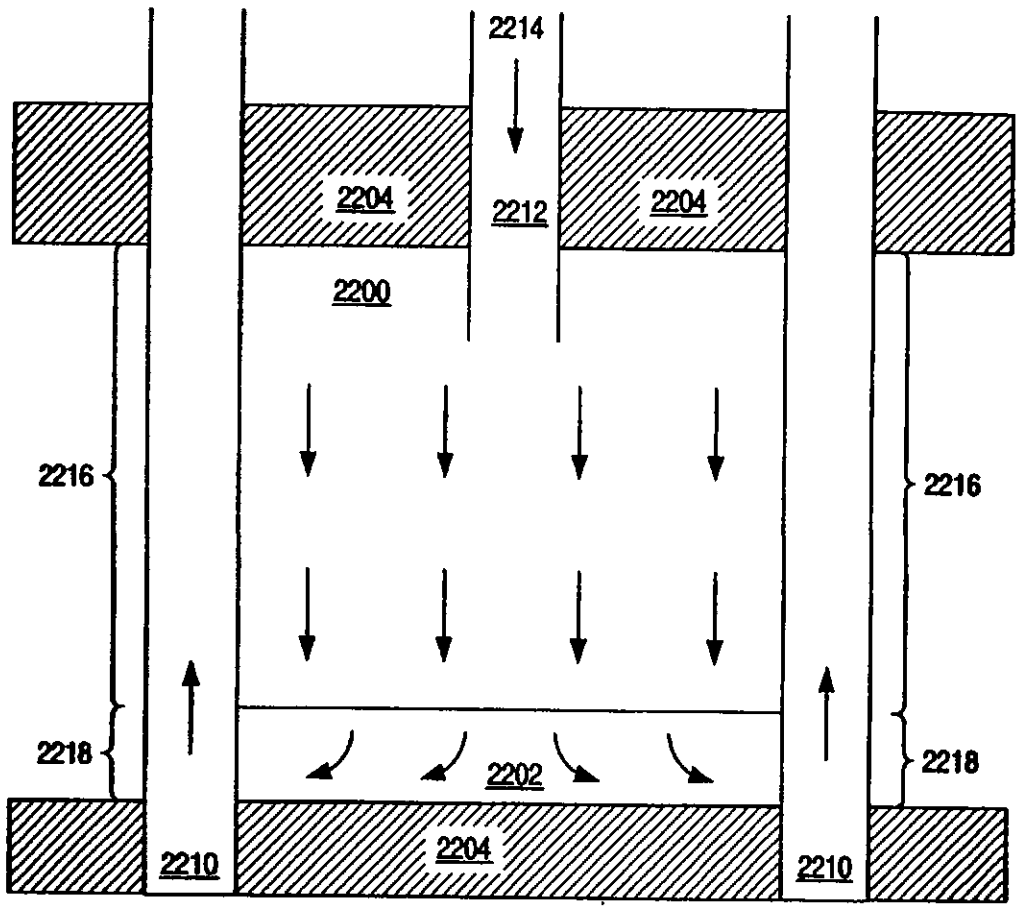

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FIG. 44

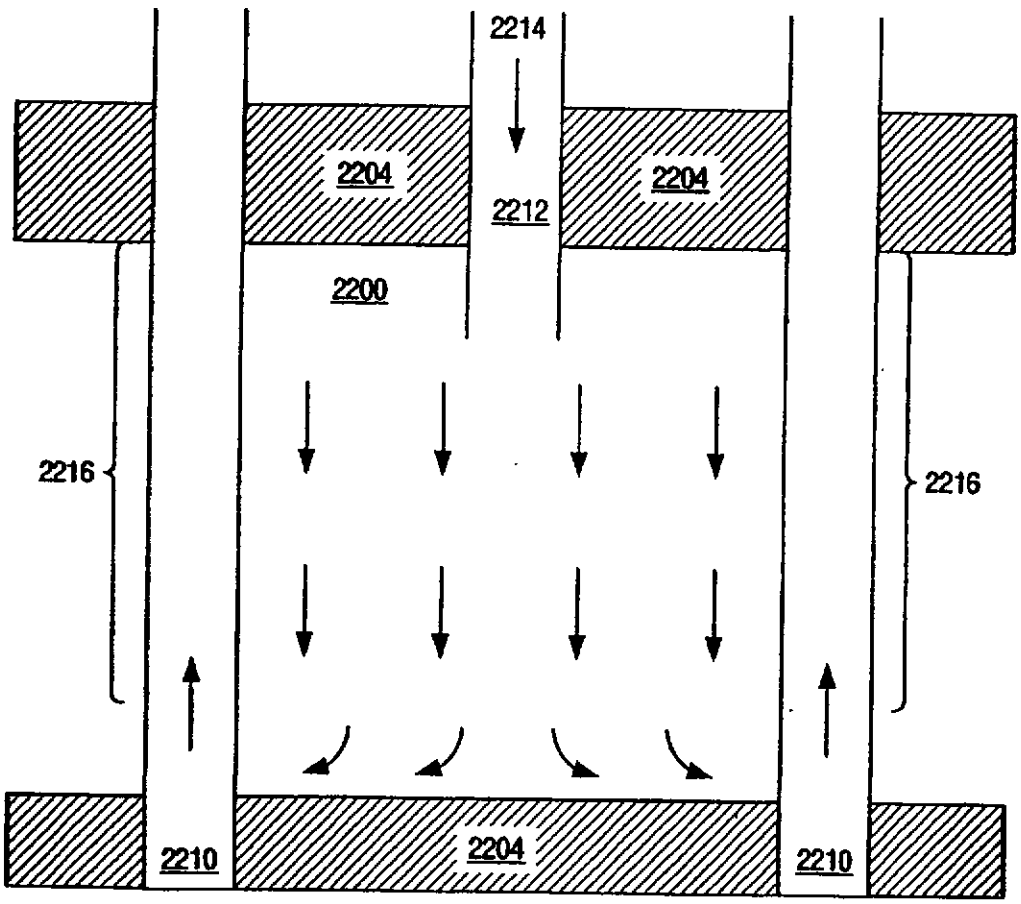


FIG. 45

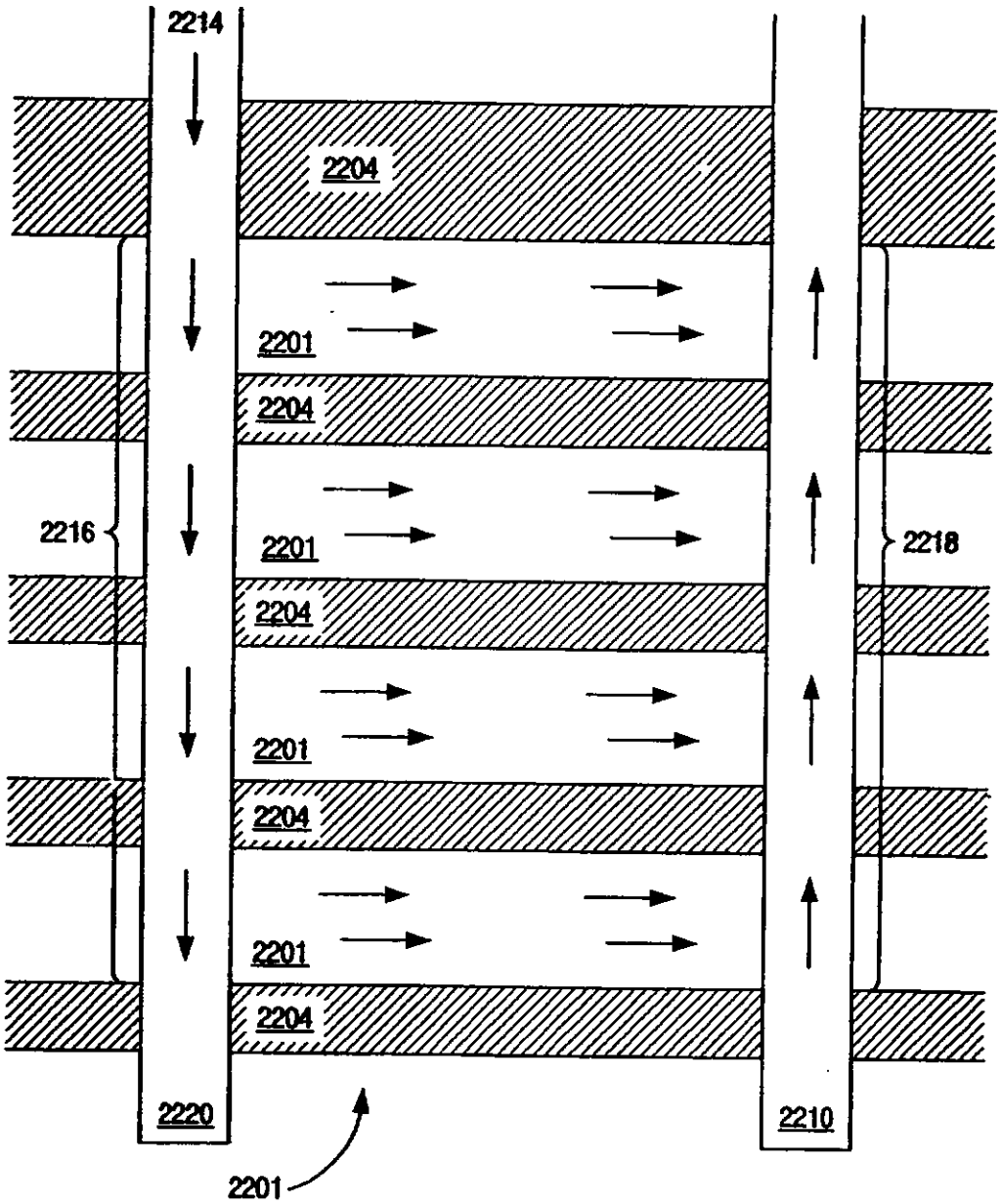

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FIG. 46

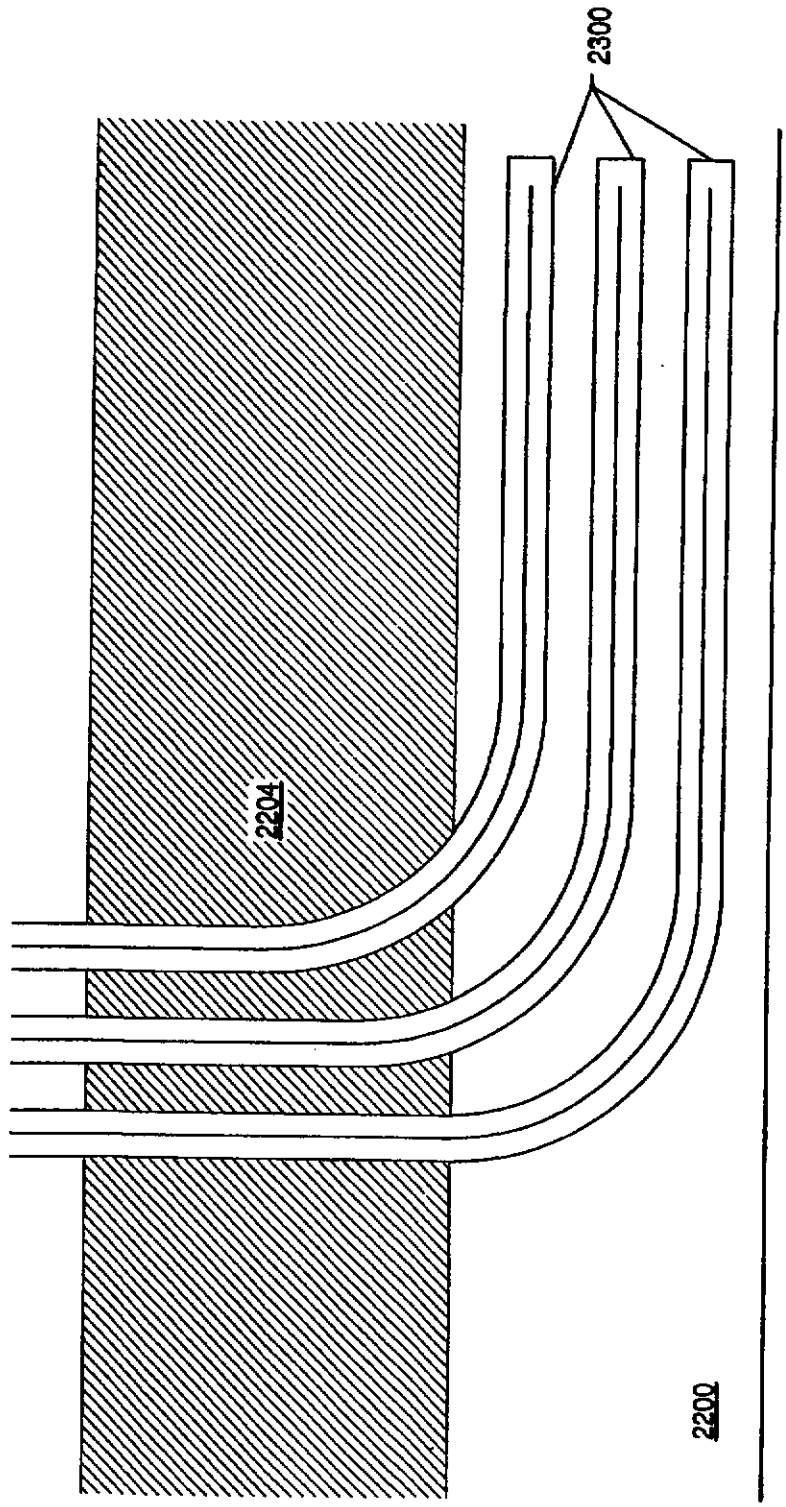


FIG. 47

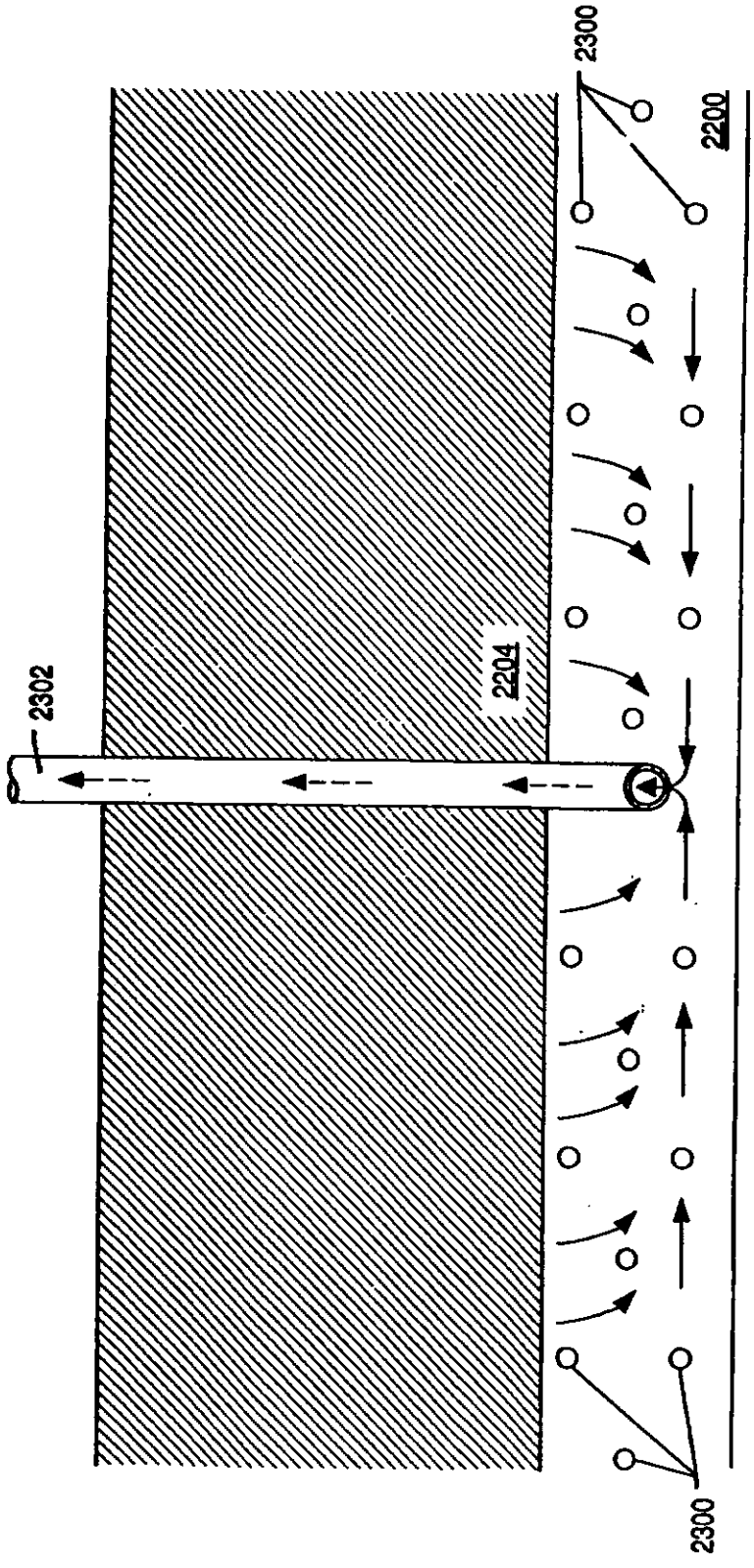


FIG. 48

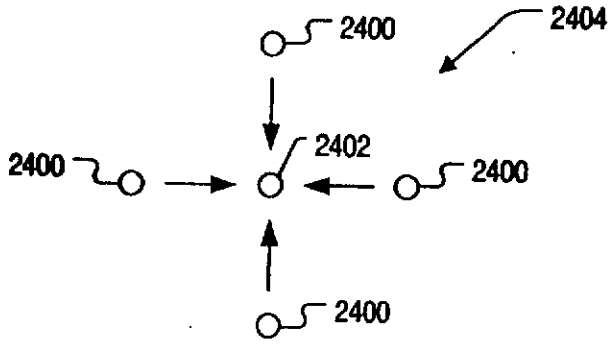

2400
2404
2402
2400
2400
2400

FIG. 49

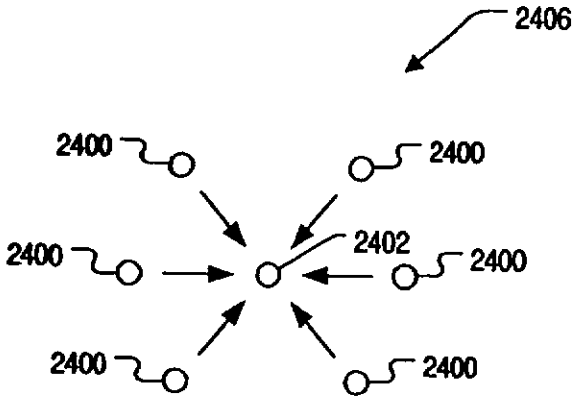

2406
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2400
2402
2400
2400
2400

FIG. 50

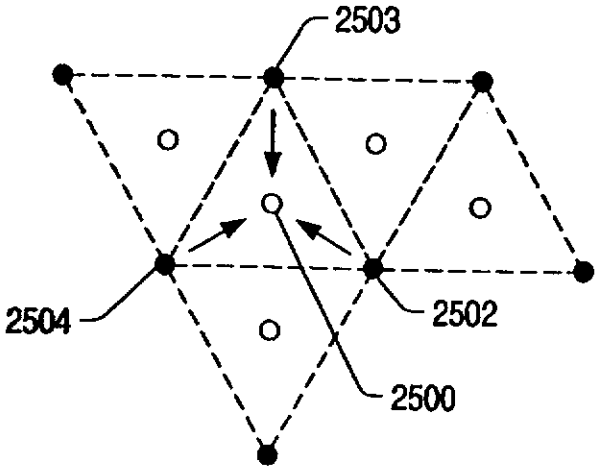


FIG. 51

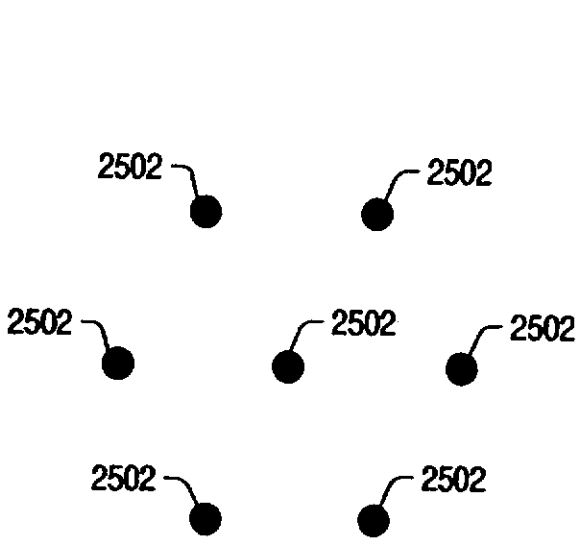


FIG. 52

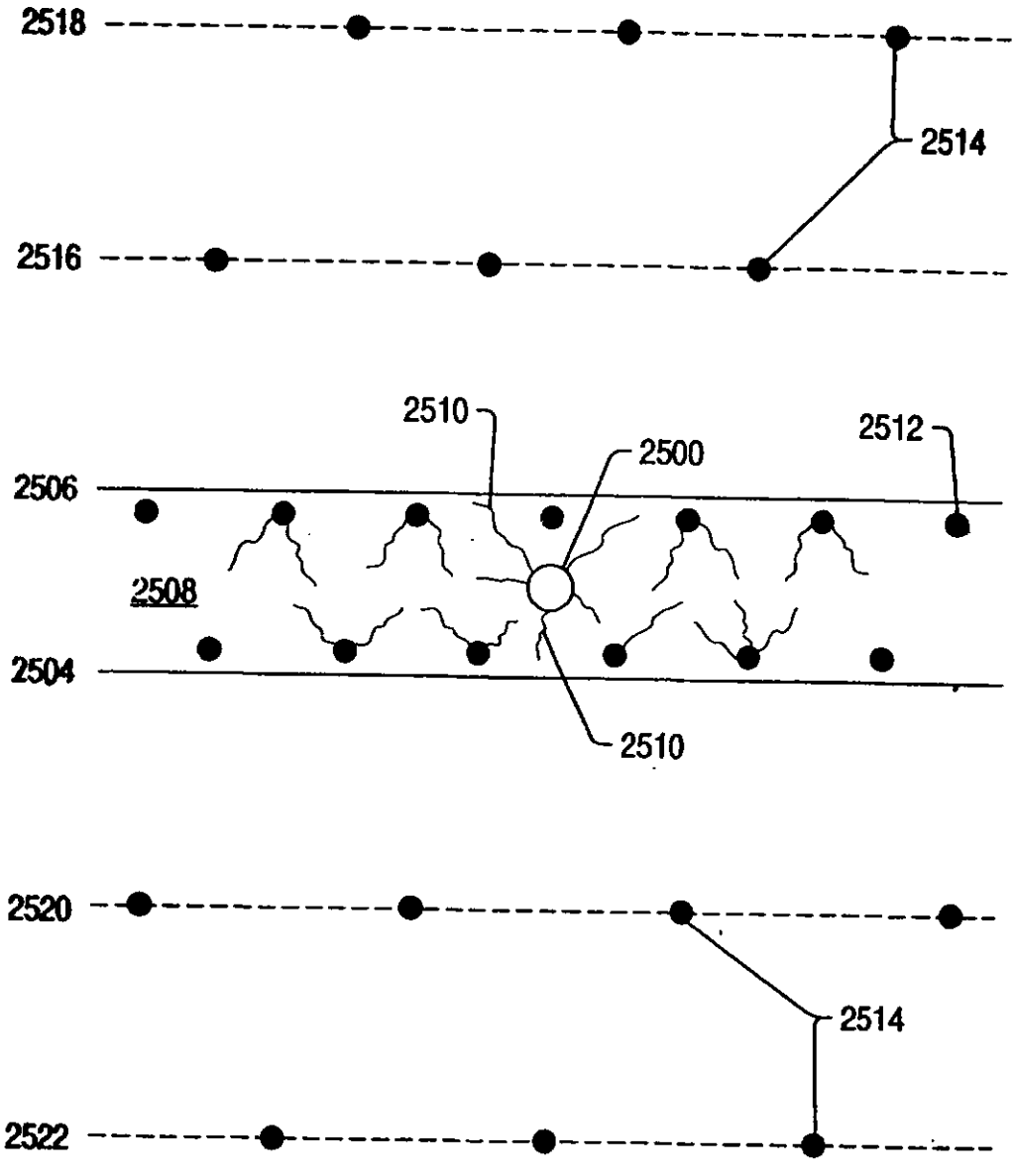

2518
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2510
2500
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2504
2510
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2514
2522

FIG. 53

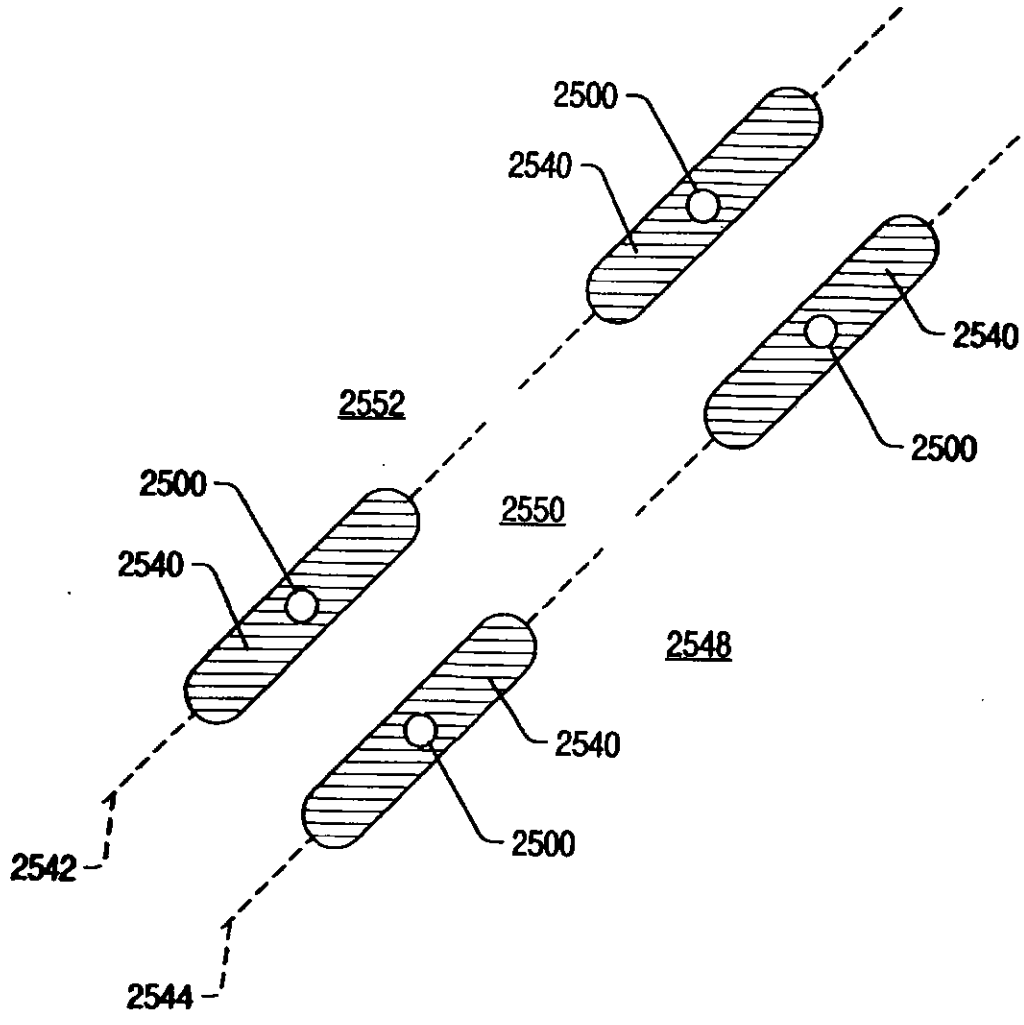

2500
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2500
2550
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2500
2548
2540
2500
2542
2544

FIG. 54

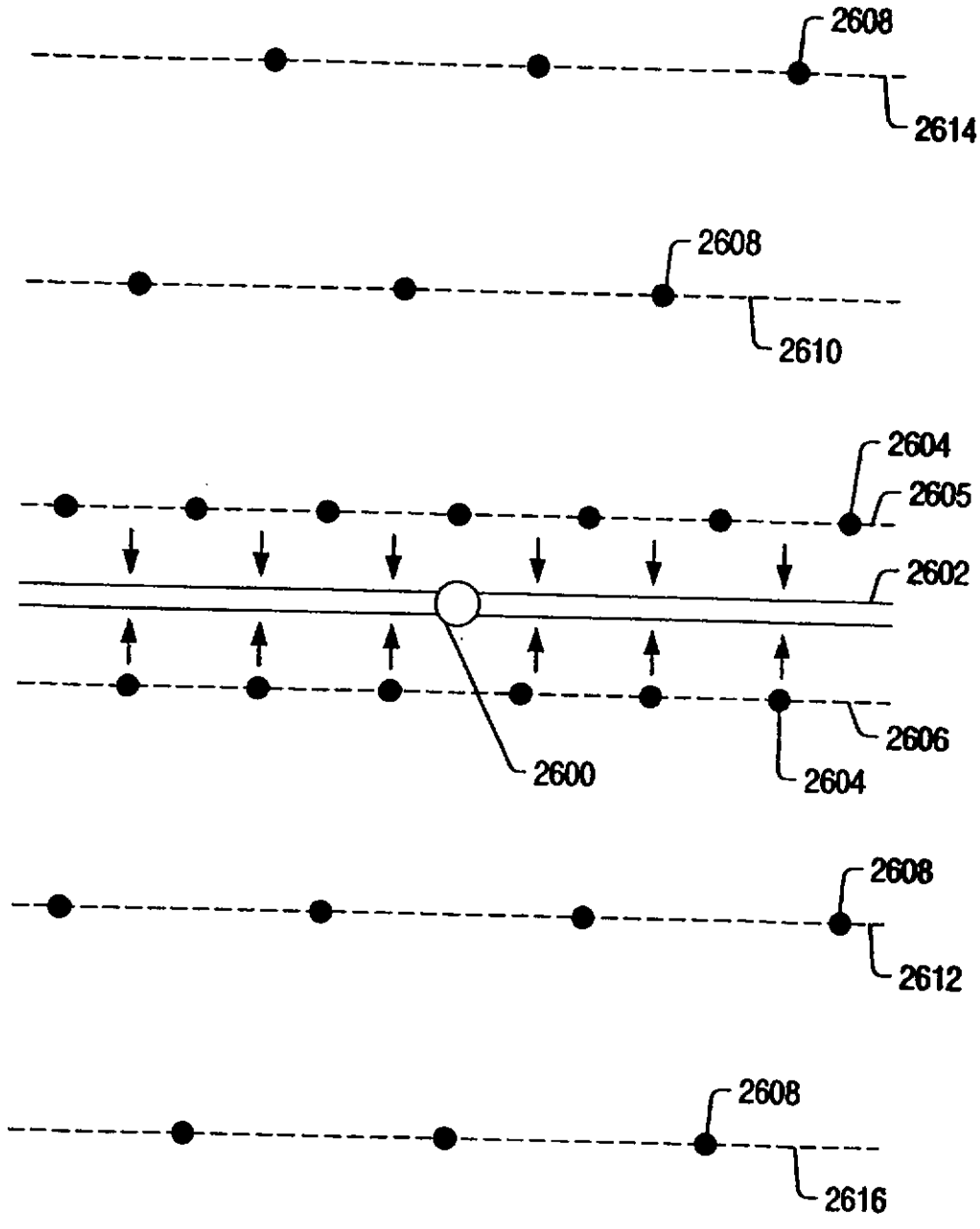

2608
2614
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2600
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2608
2616

FIG. 55

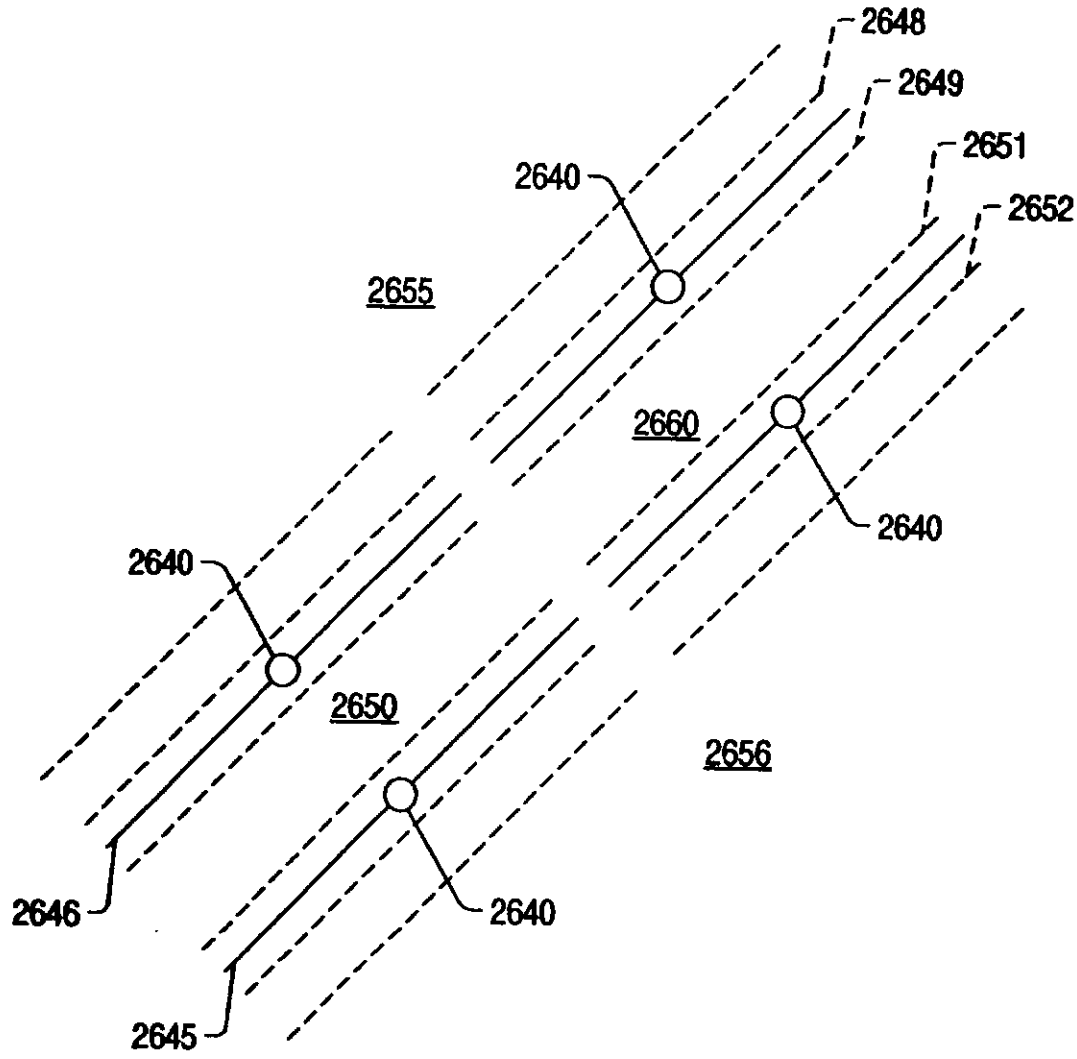

2648
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FIG. 56

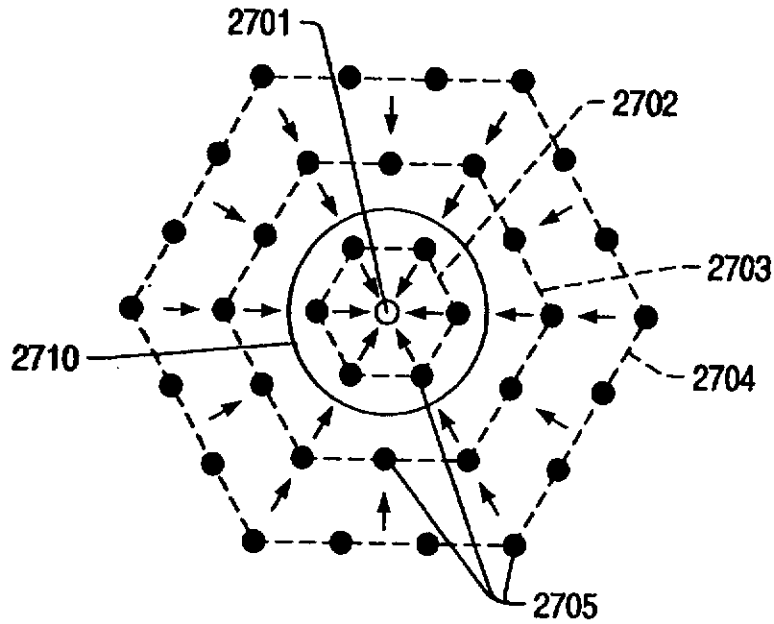


FIG. 57

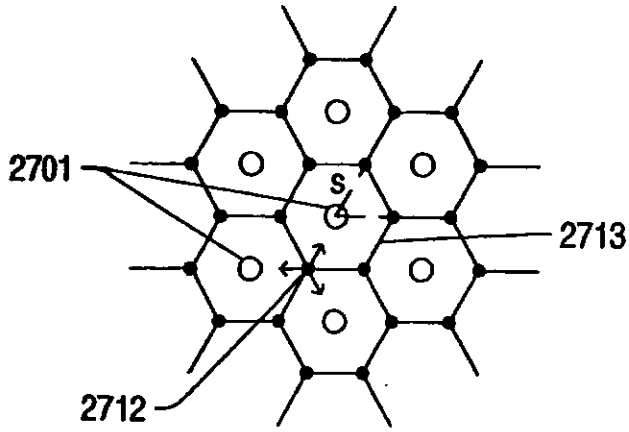


FIG. 58

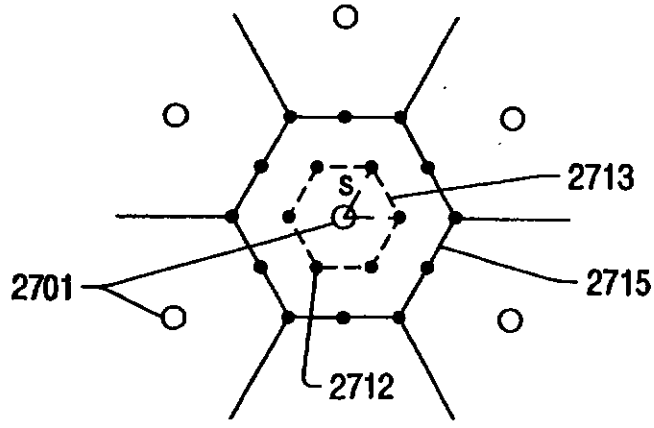


FIG. 59

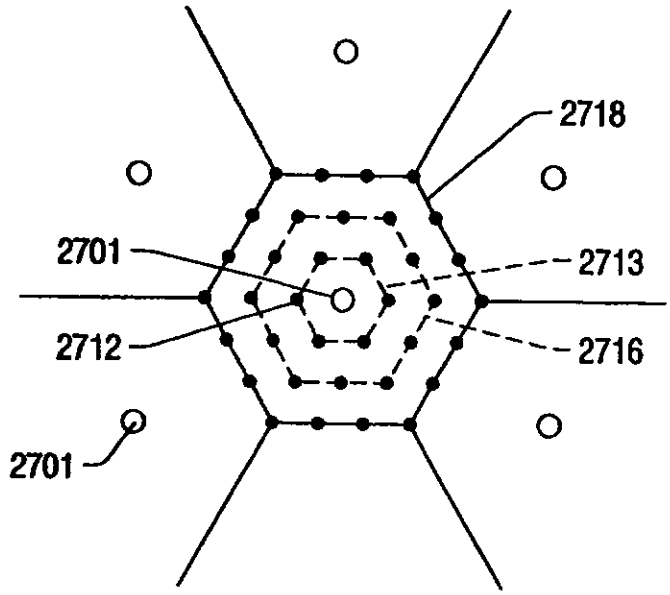


FIG. 60

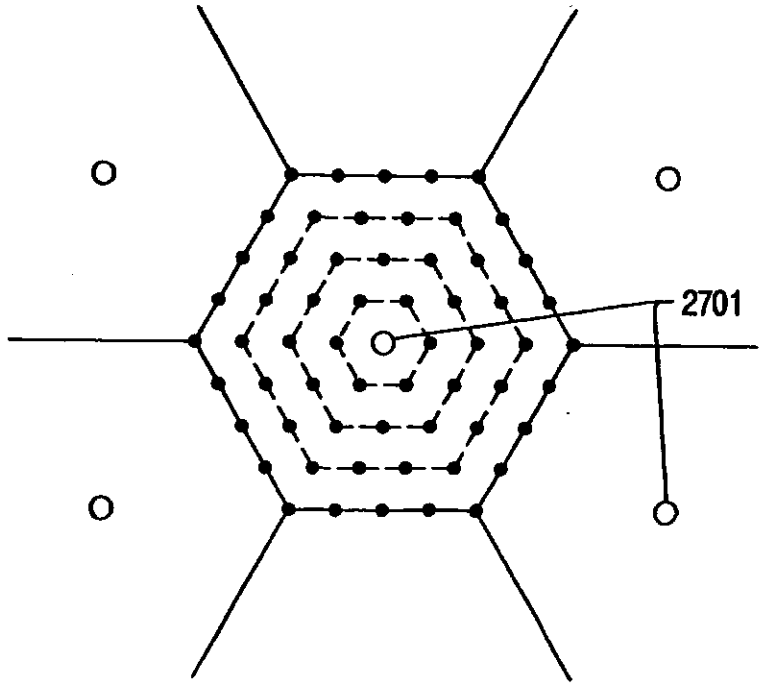


FIG. 61

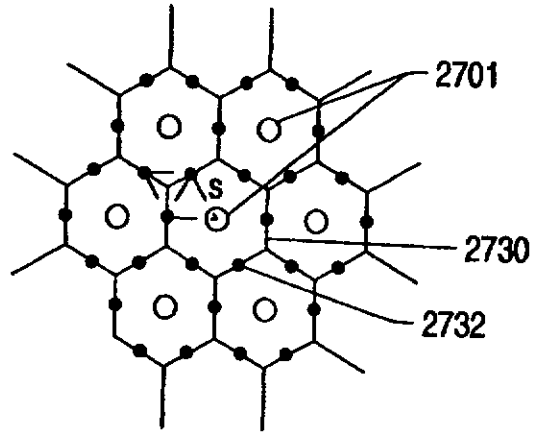


FIG. 62

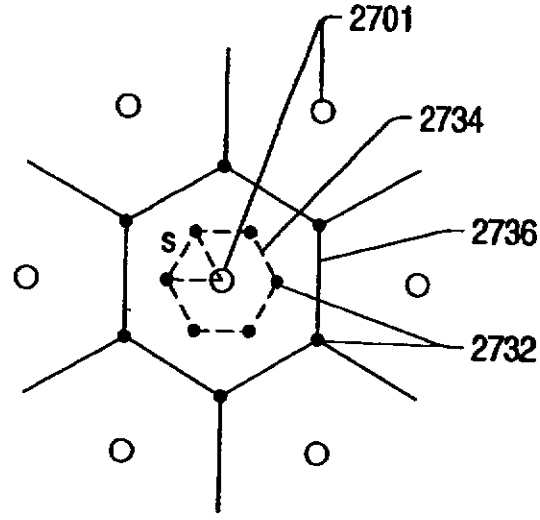


FIG. 63

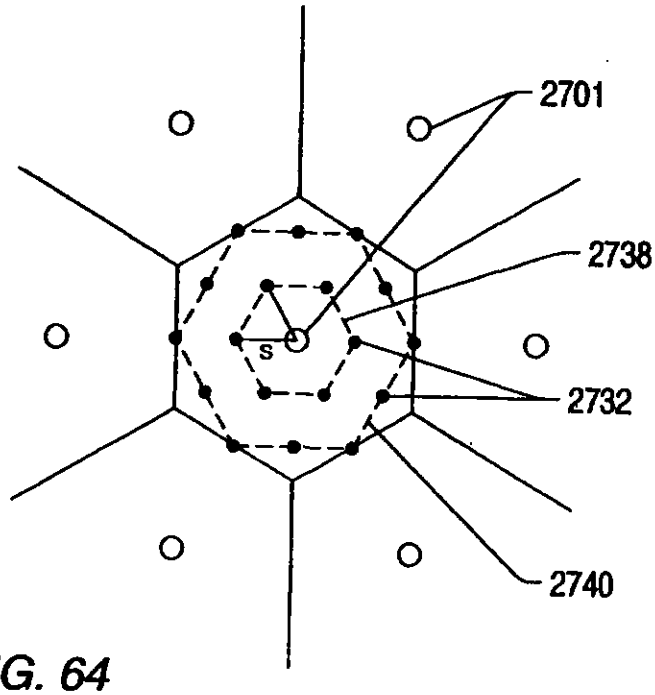


FIG. 64

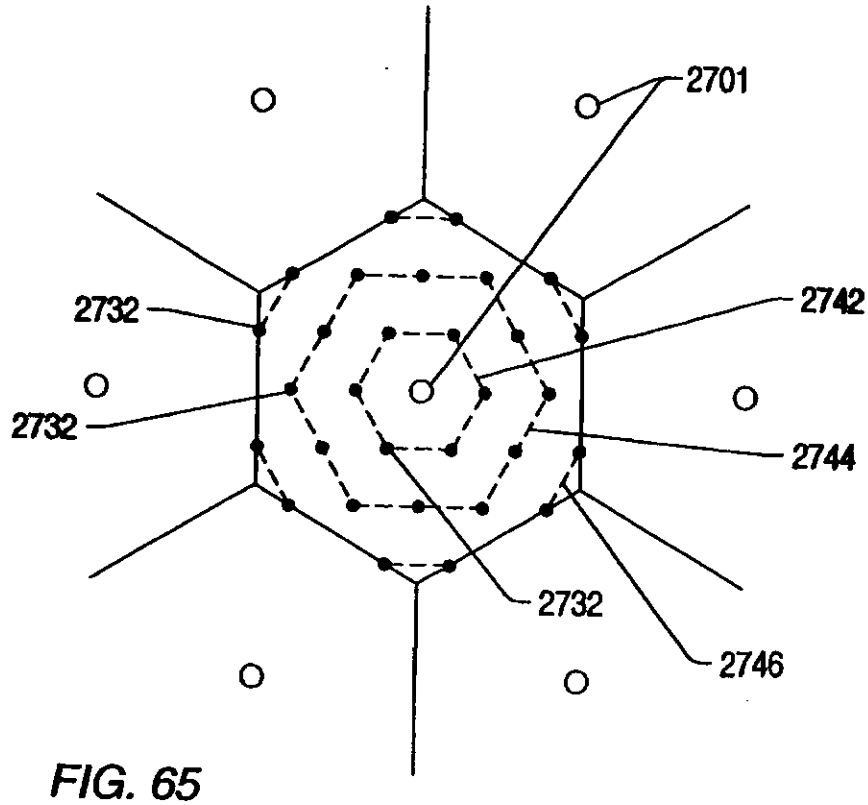


FIG. 65

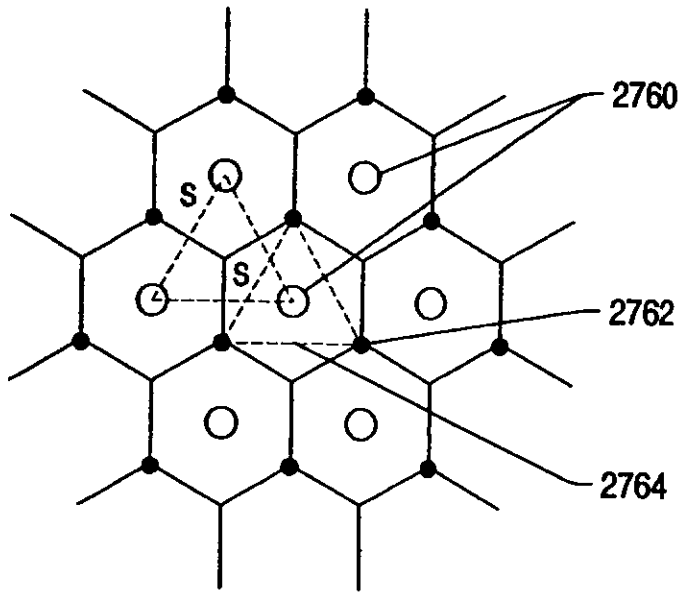


FIG. 66

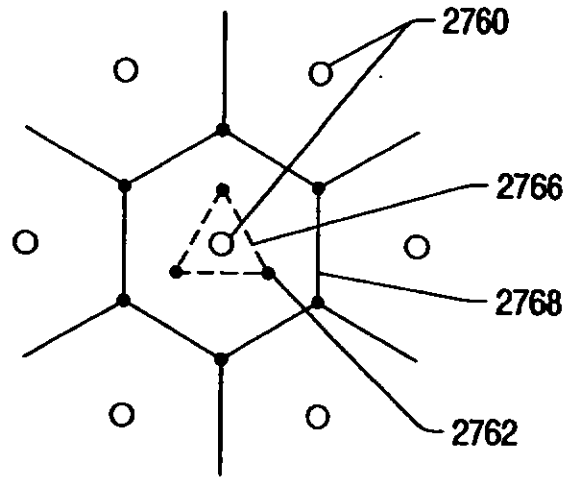


FIG. 67

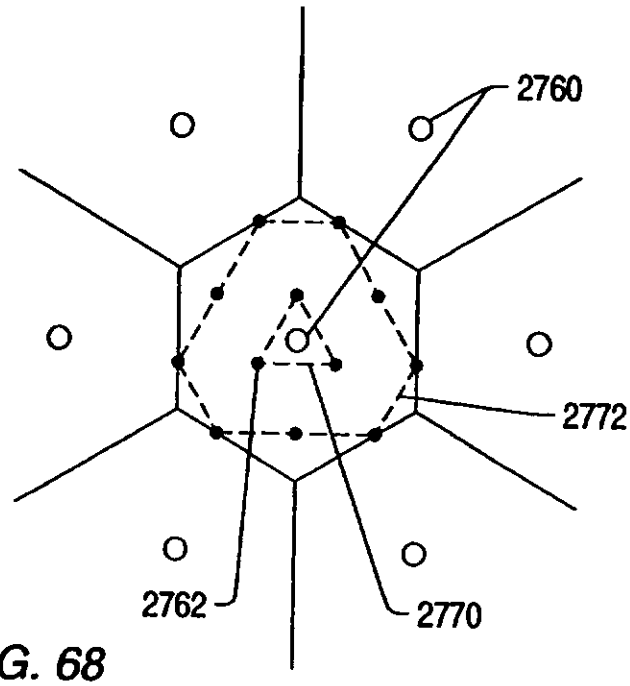


FIG. 68

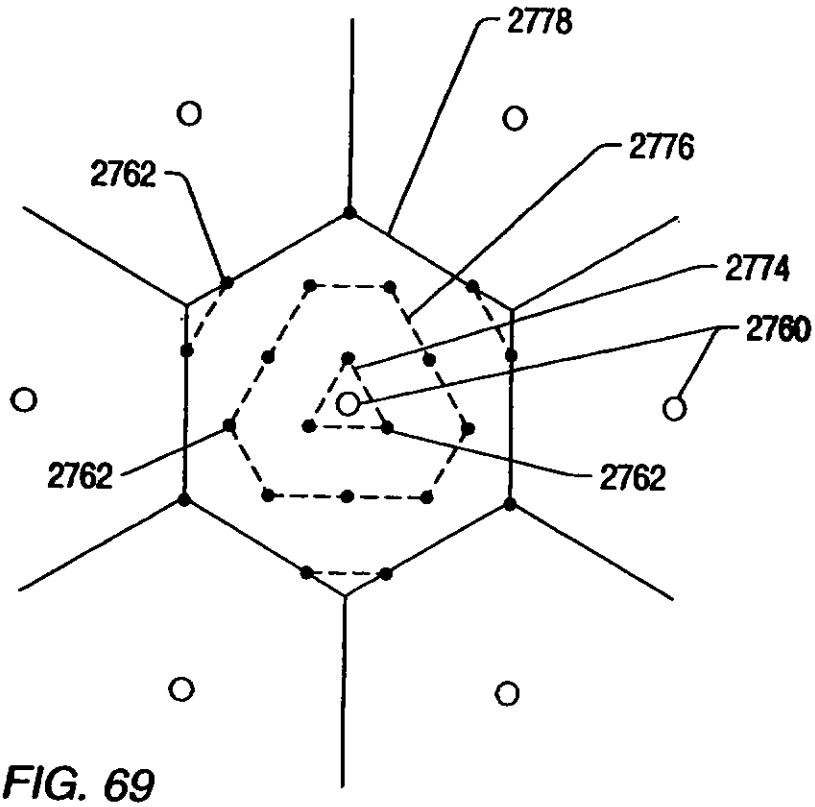


FIG. 69

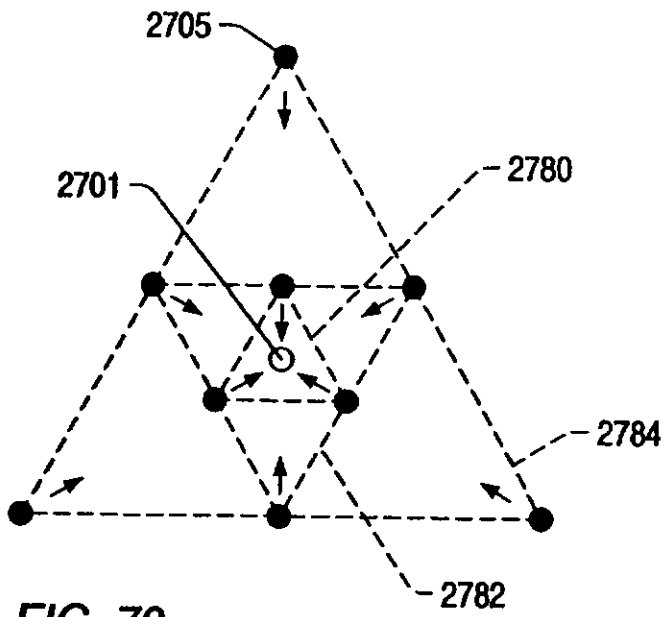


FIG. 70

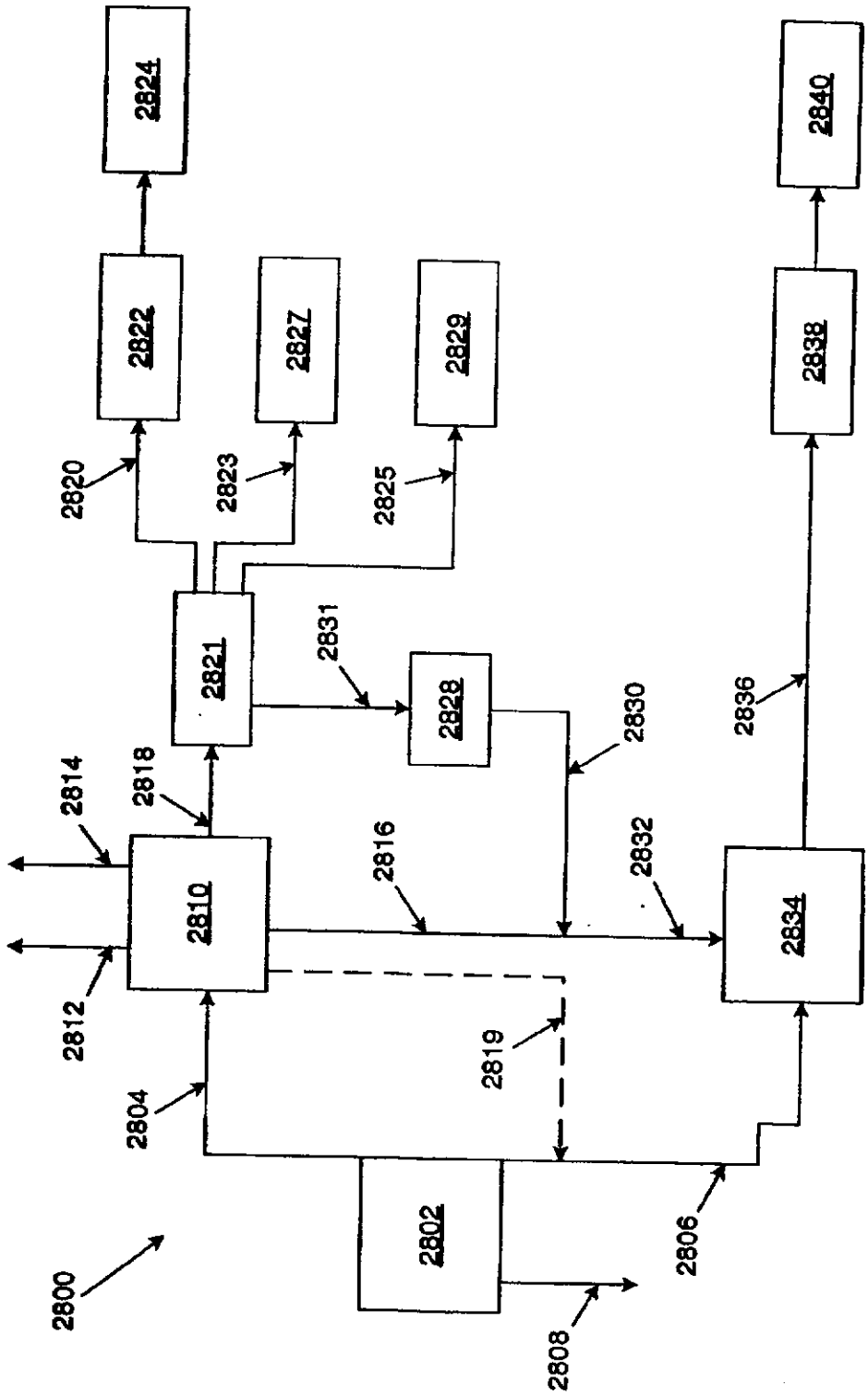

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2800
2808

Fig. 71

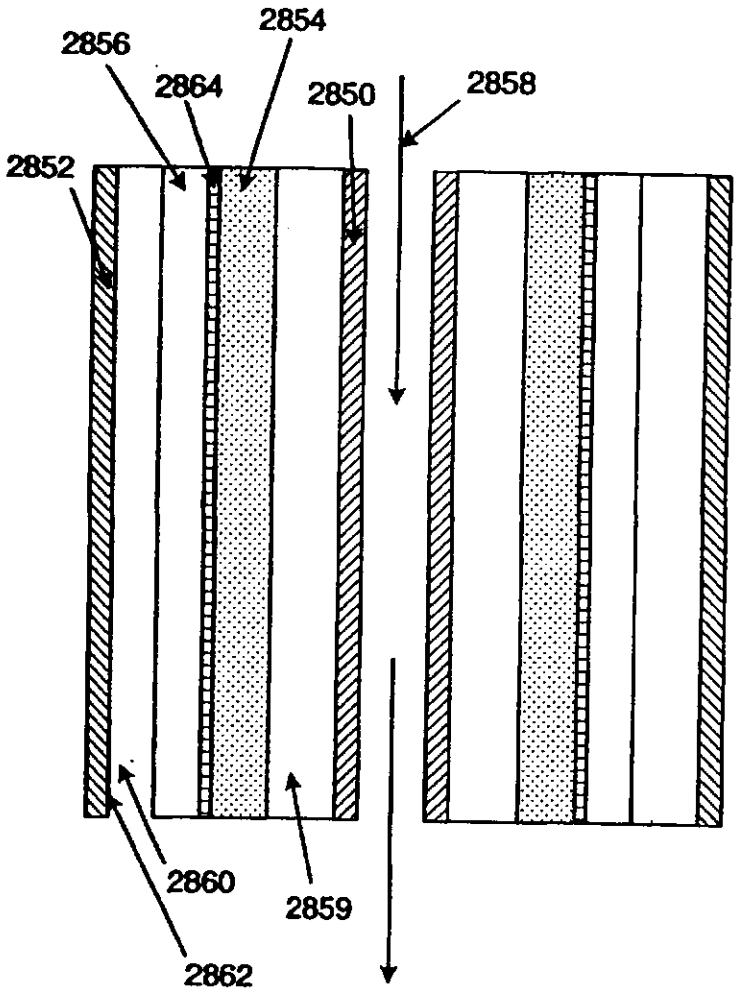


Fig. 72

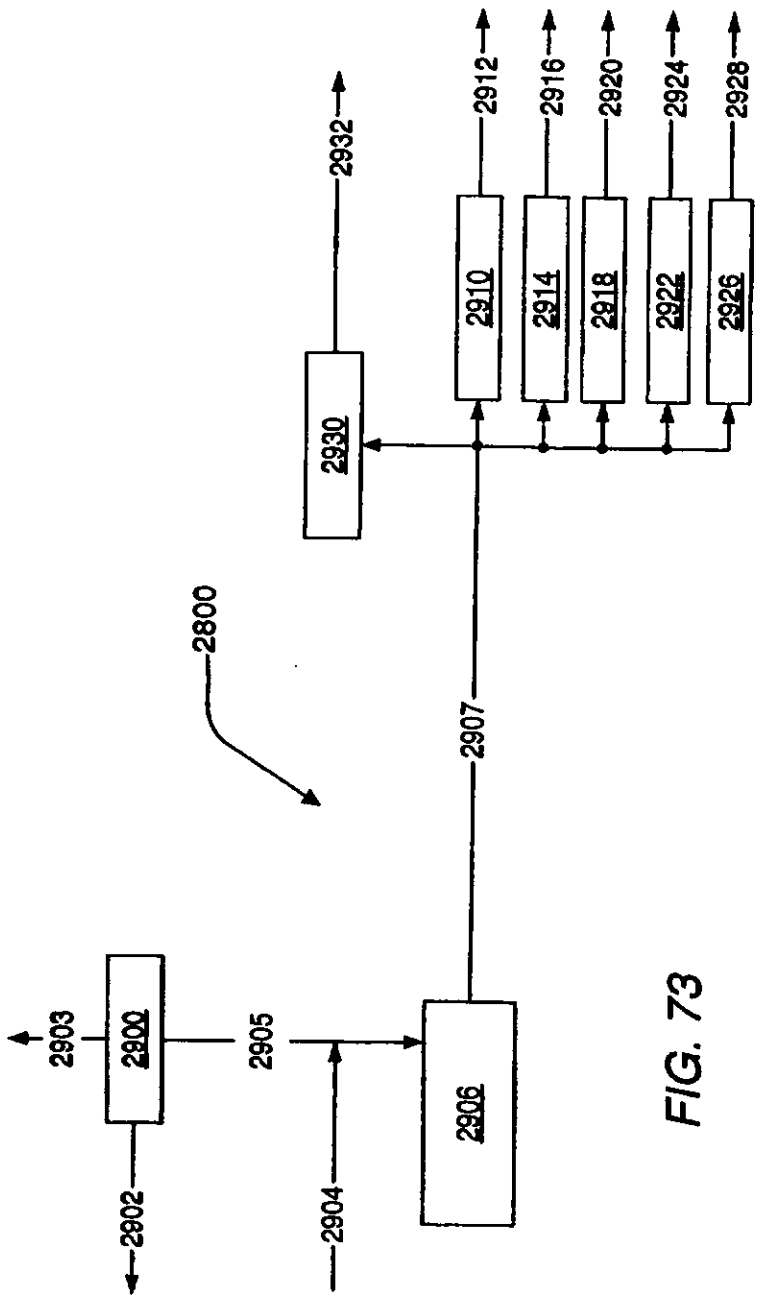

2800
2900
2902
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2932

FIG. 73

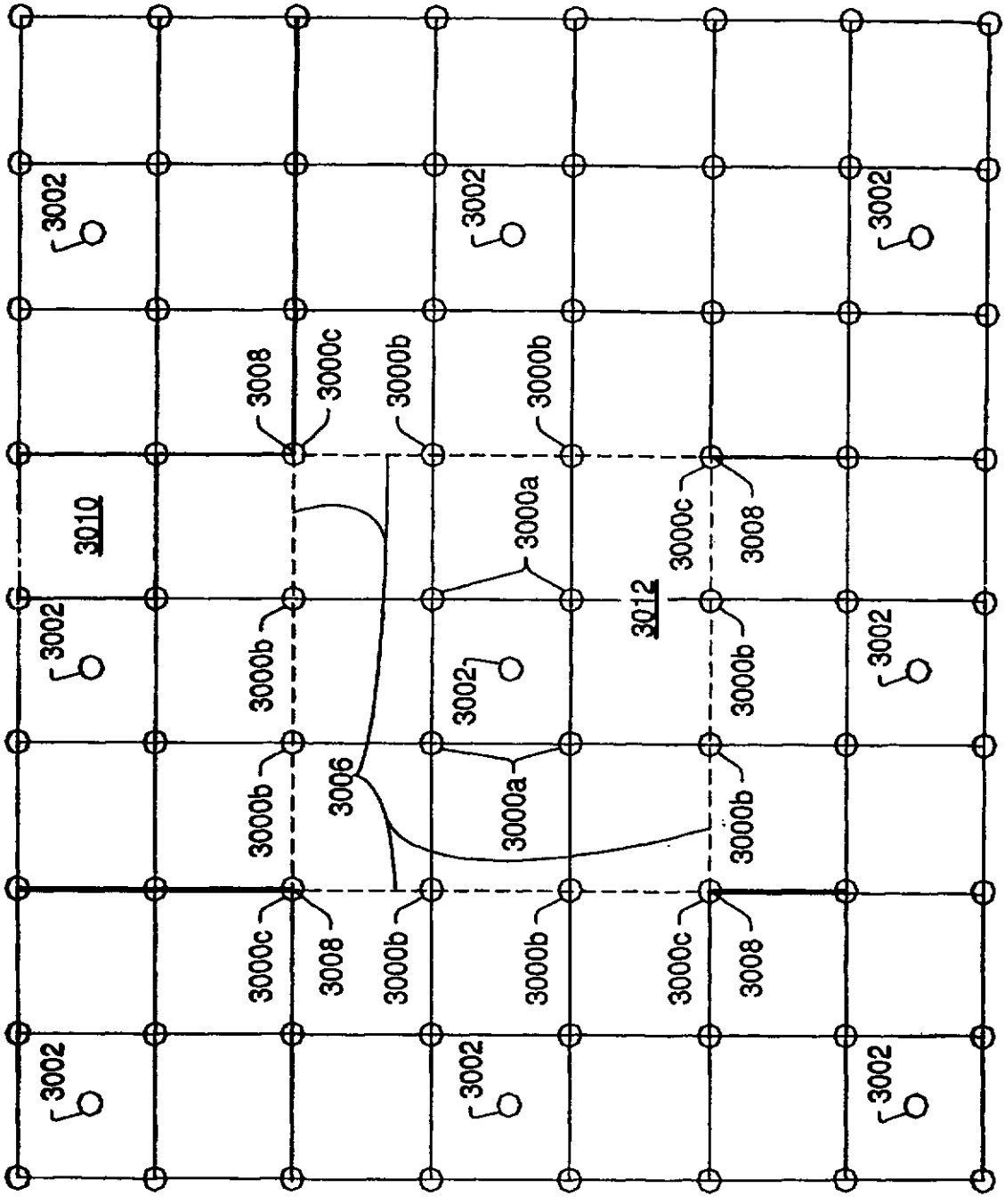


FIG. 74

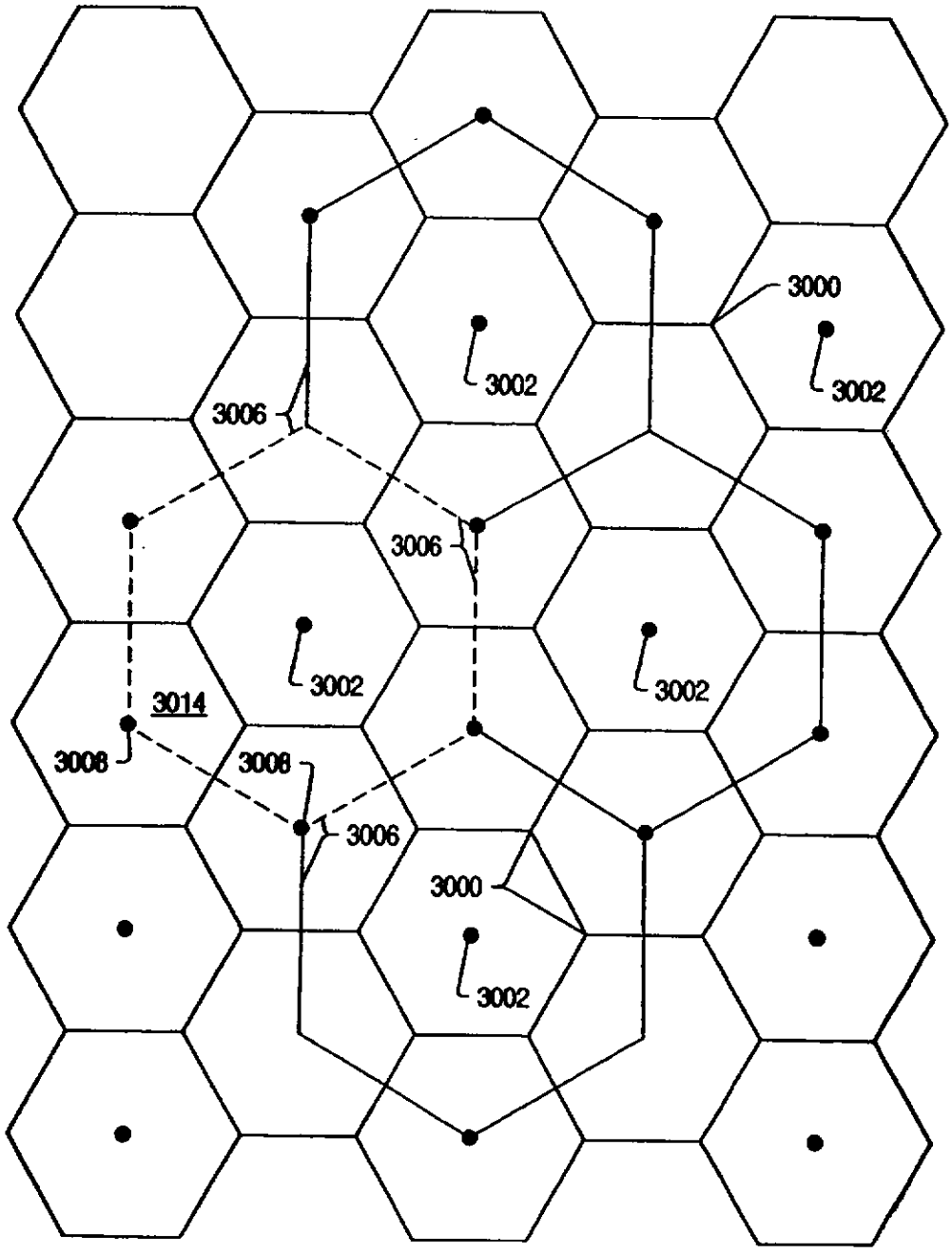

3000
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3002
3006
3006
3002
3002
3014
3008
3008
3006
3000
3002

FIG. 75

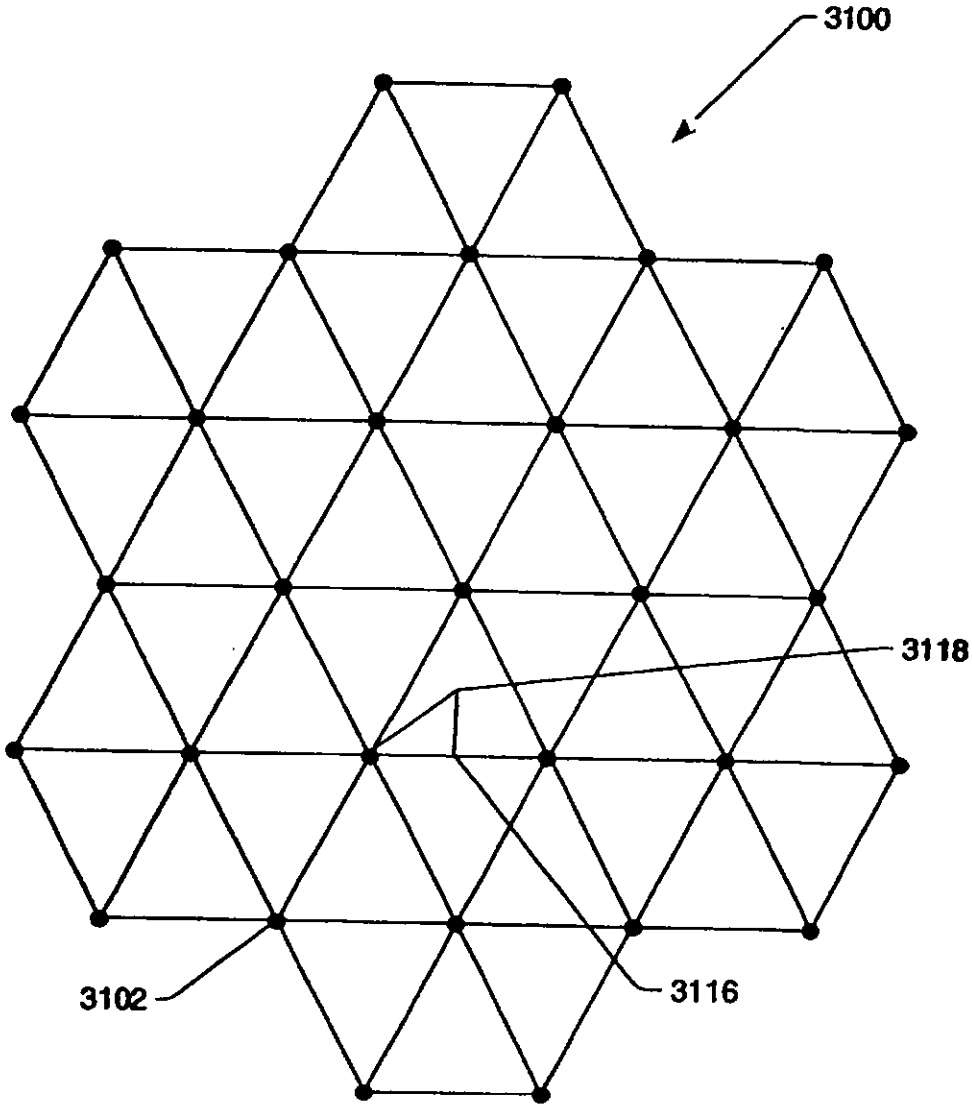


FIG. 76

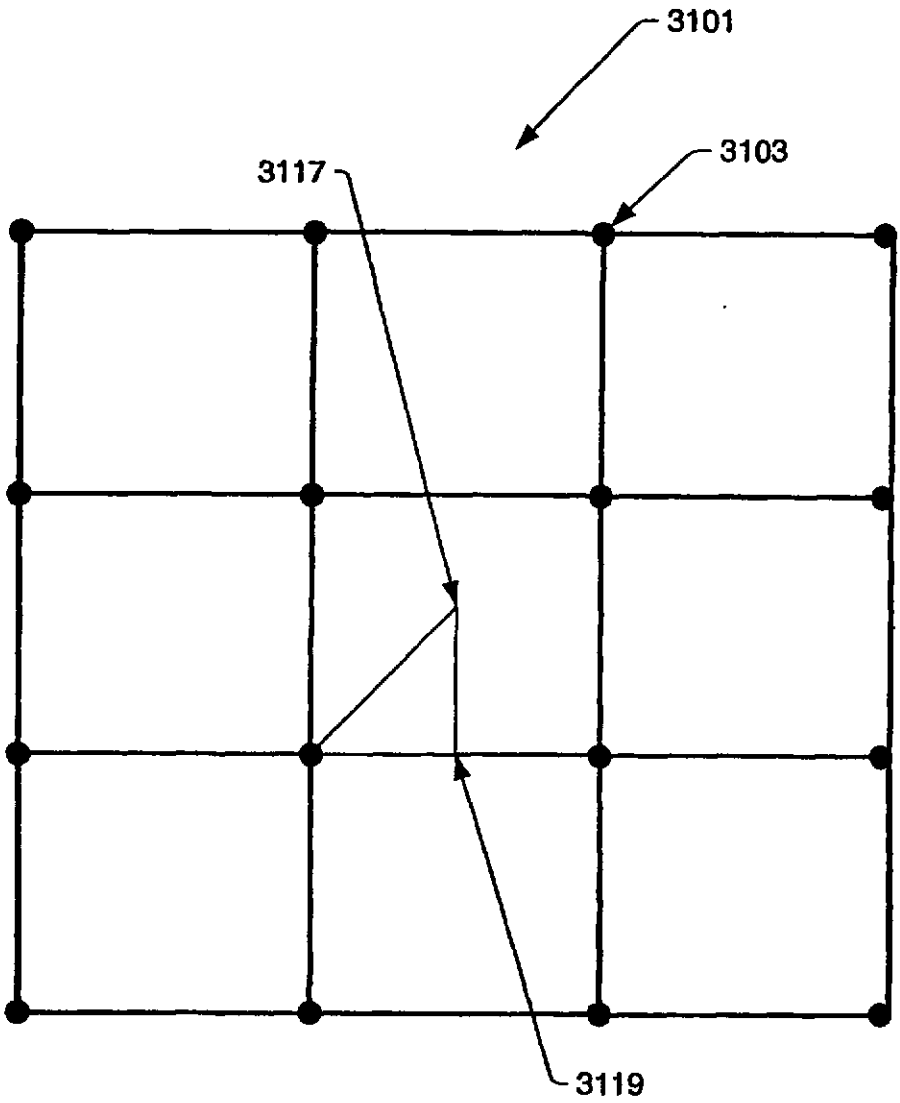


FIG. 76a

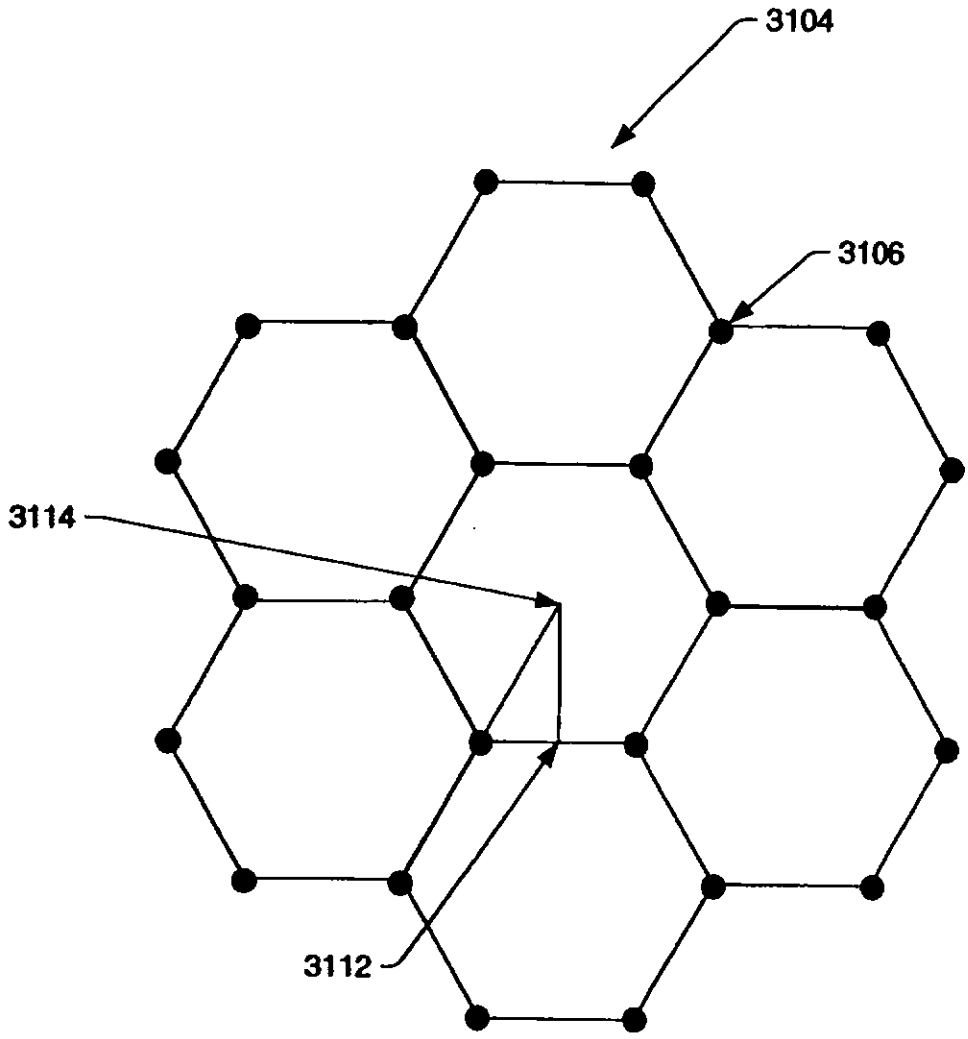


FIG. 77

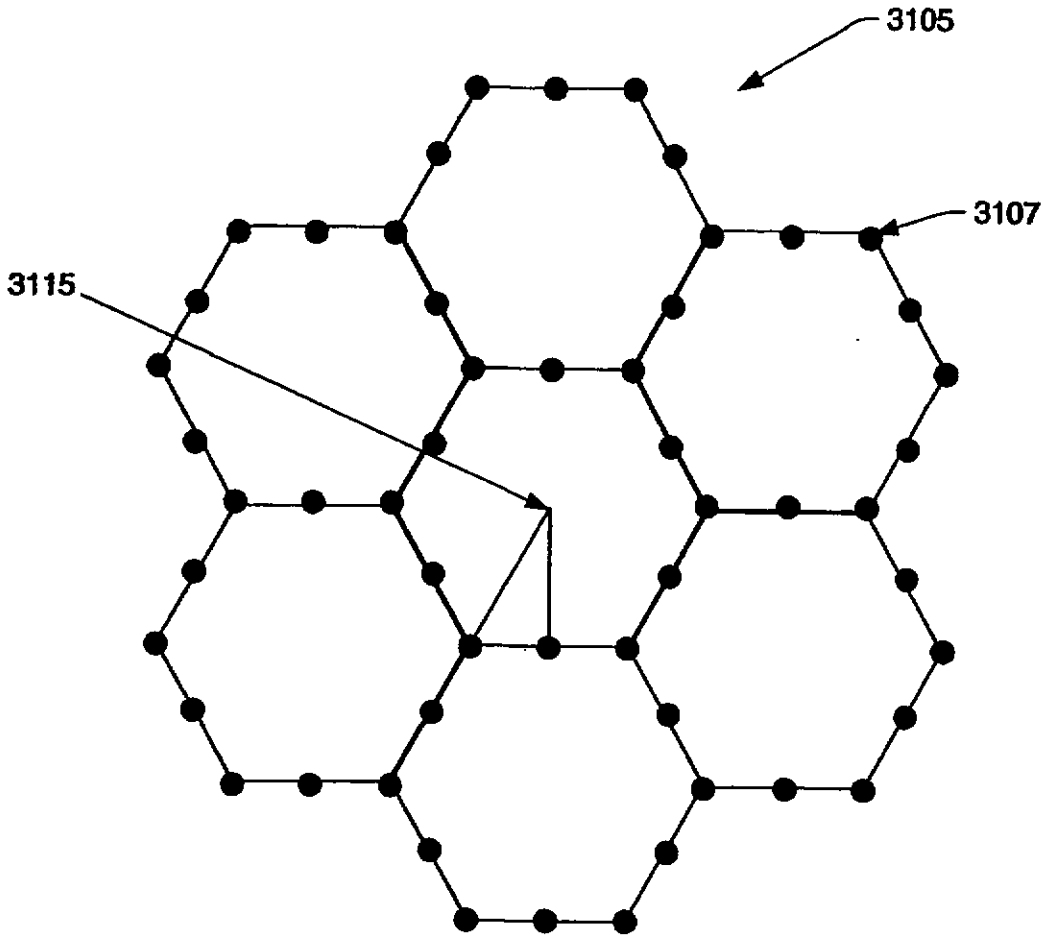


FIG. 77a

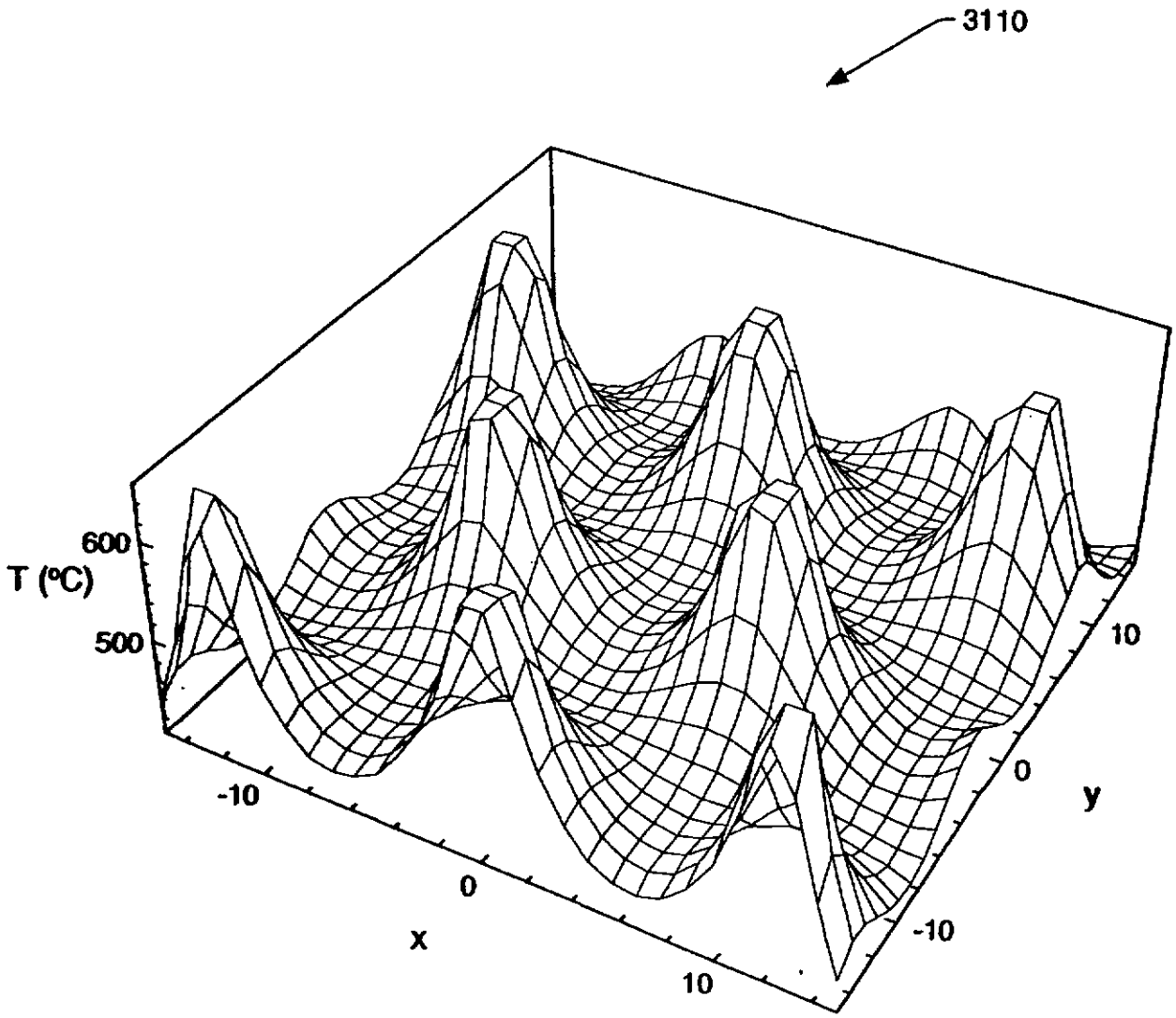


FIG. 78

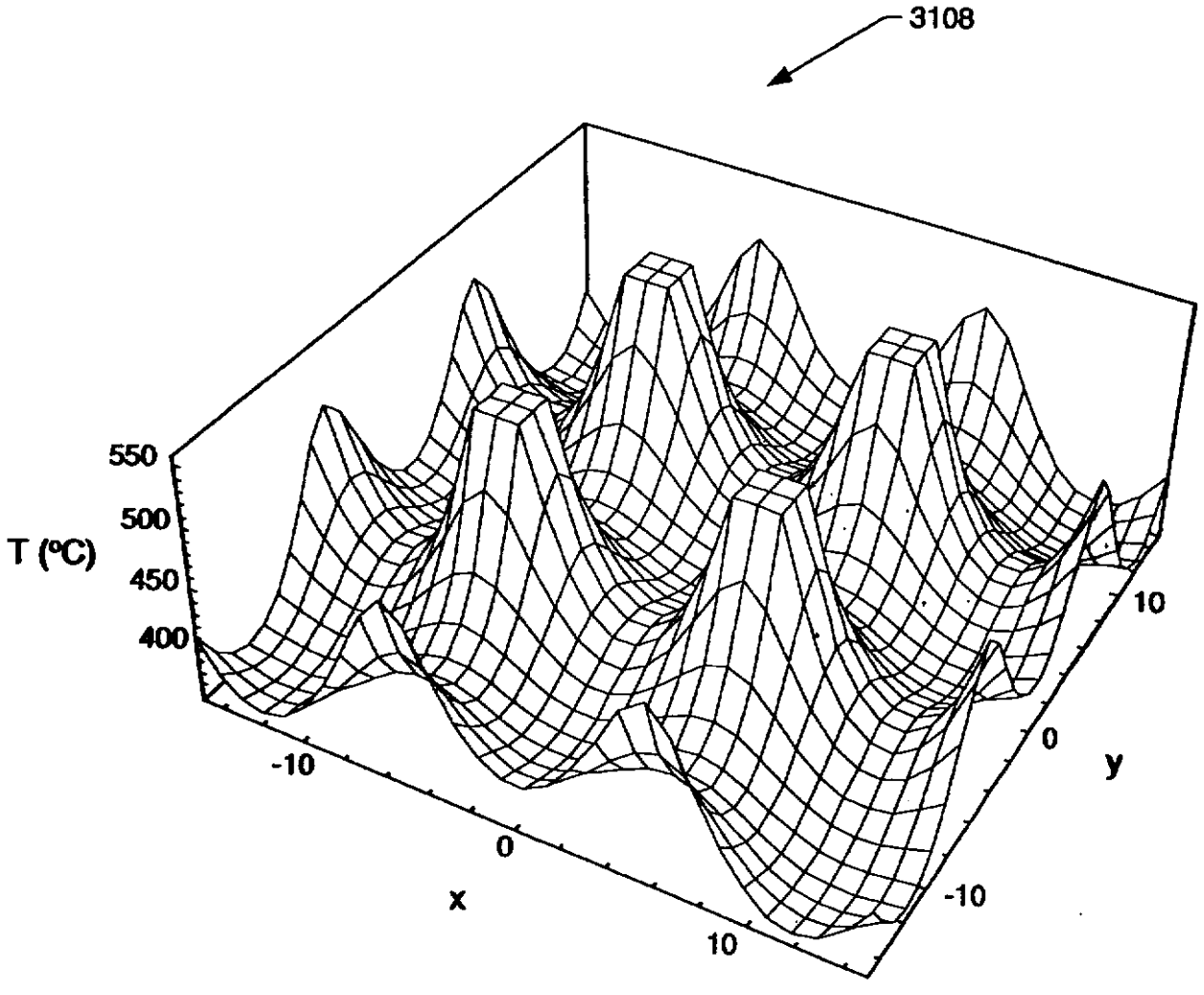


FIG. 79

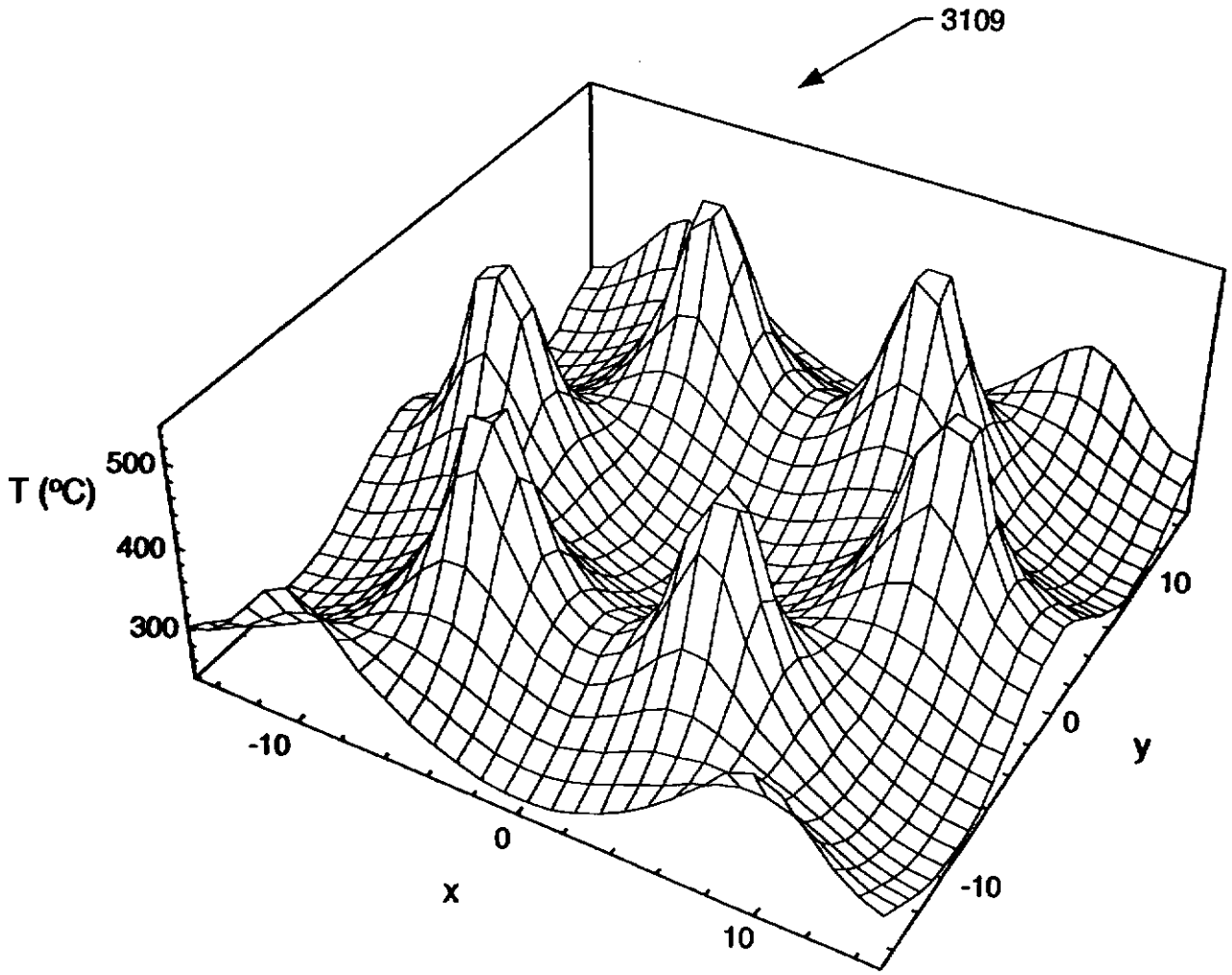


FIG. 79a

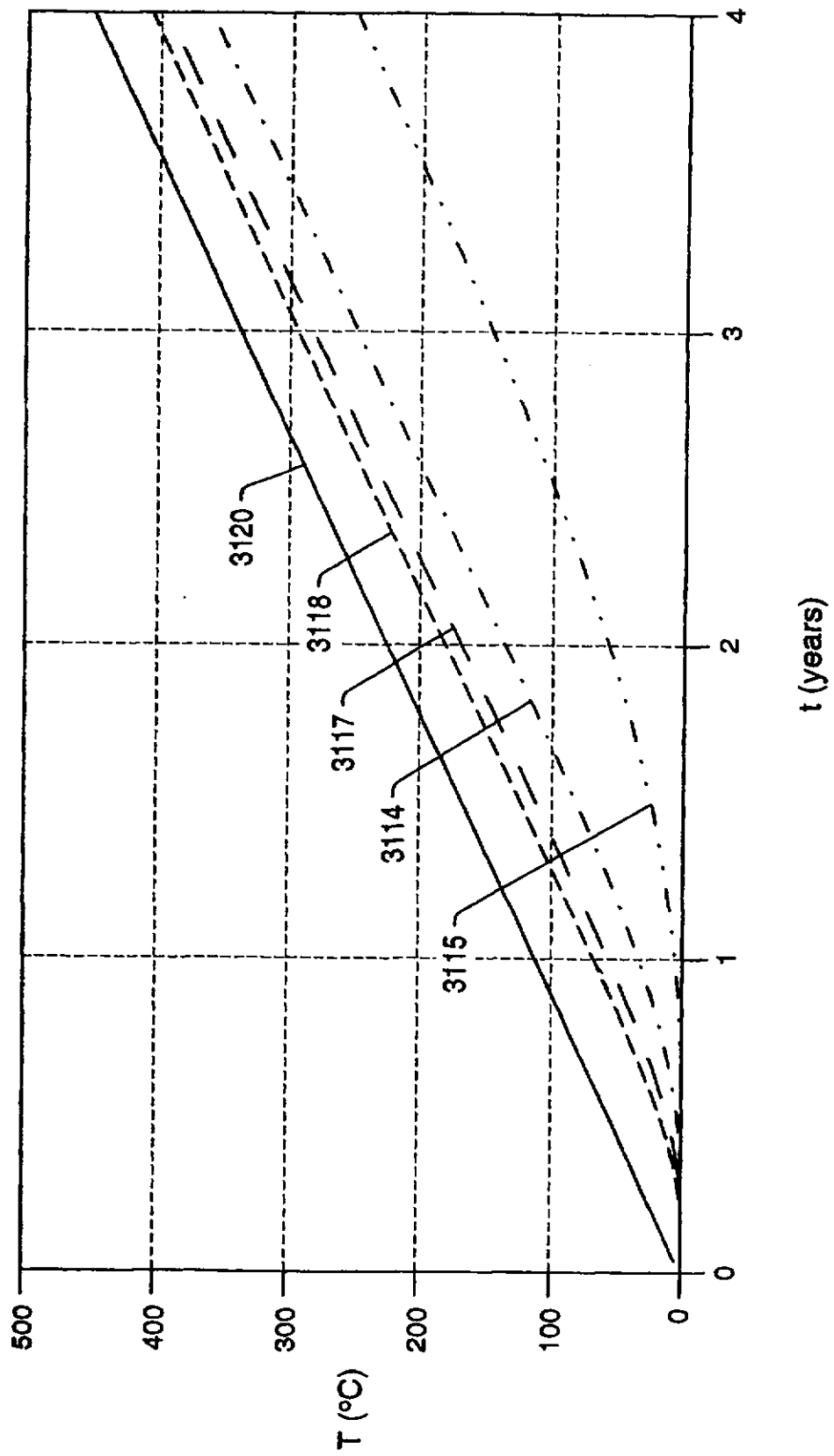


FIG. 80

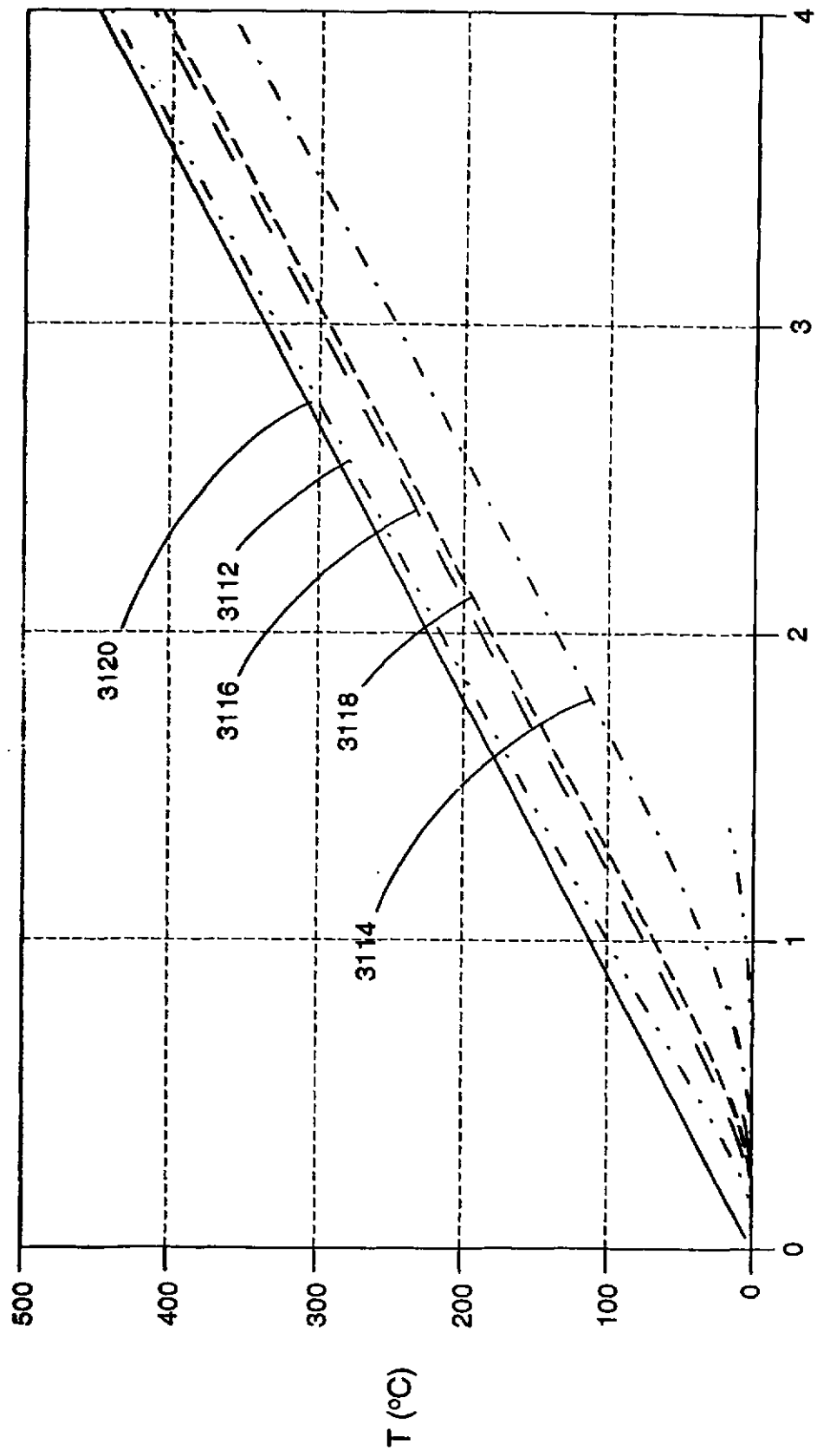


FIG. 81

FIG. 81a

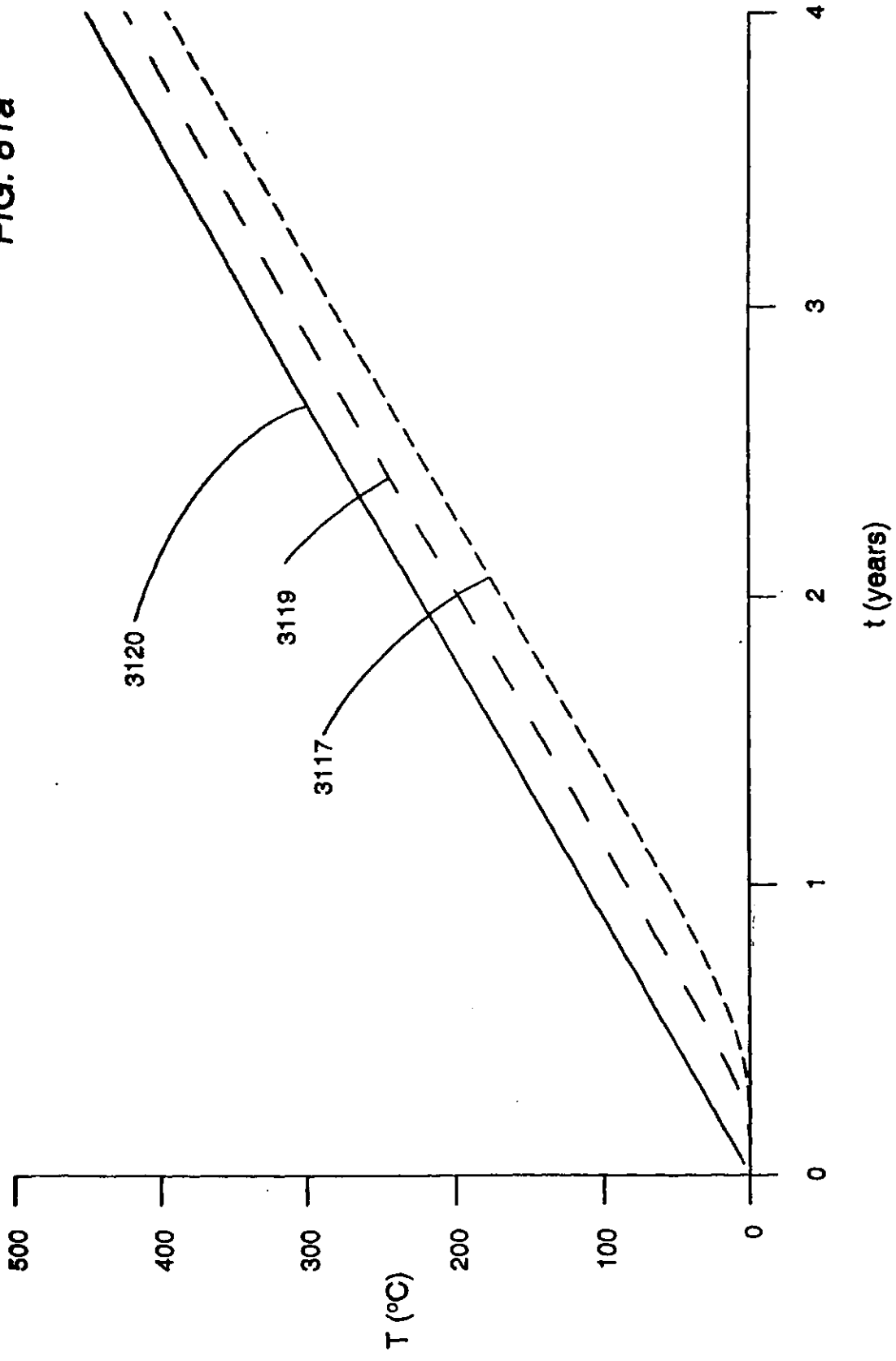
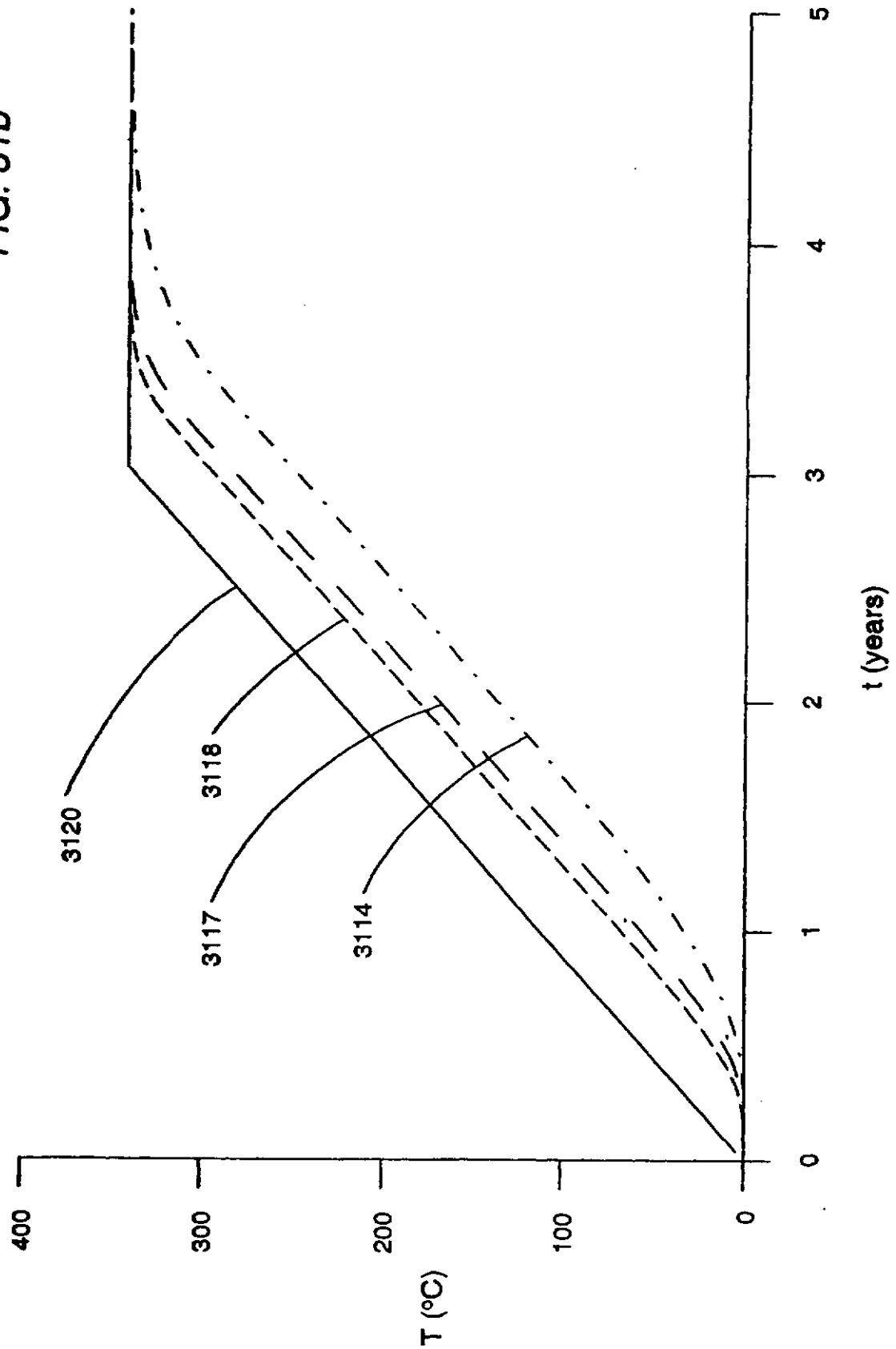


FIG. 81b



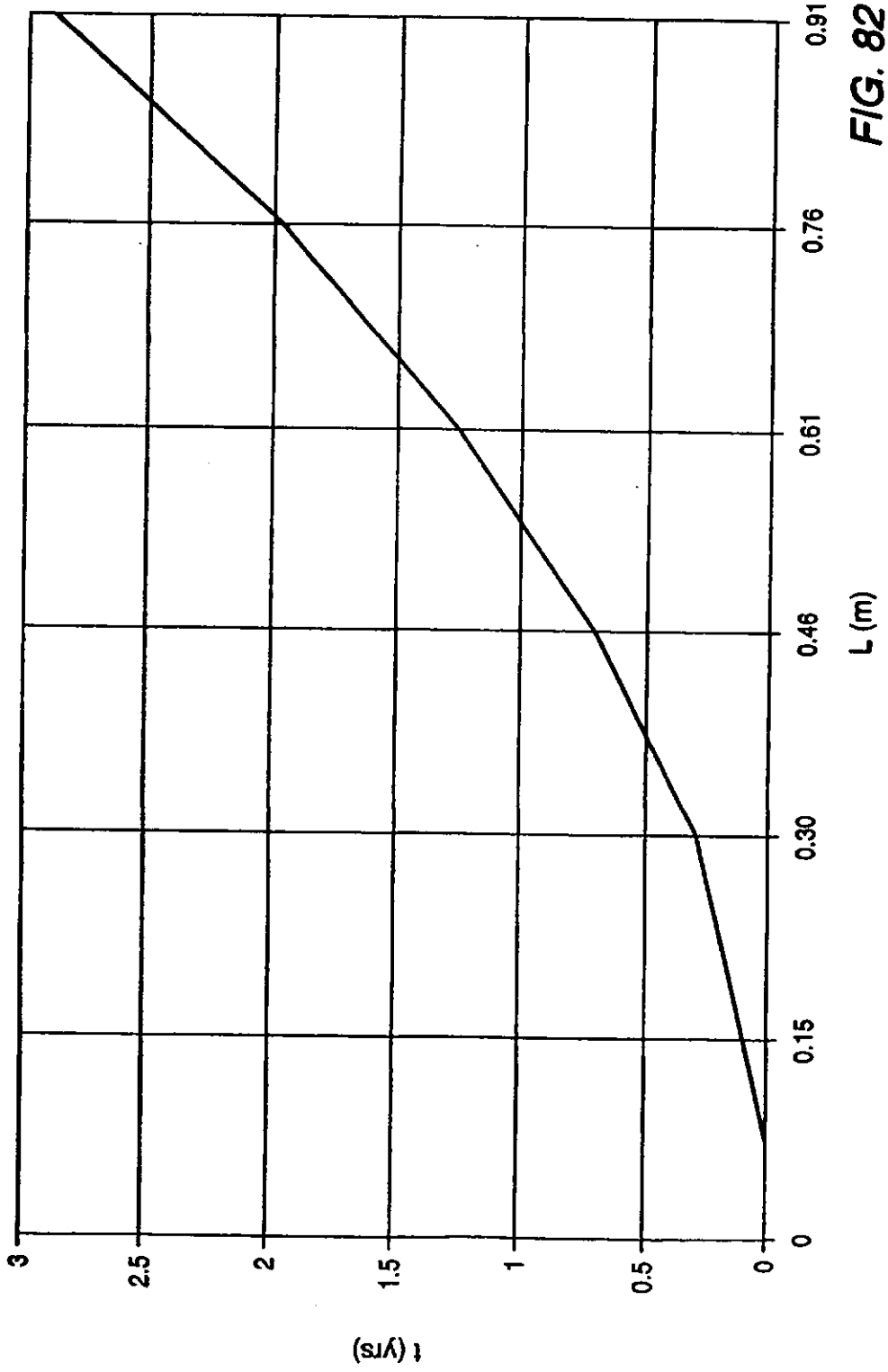


FIG. 82

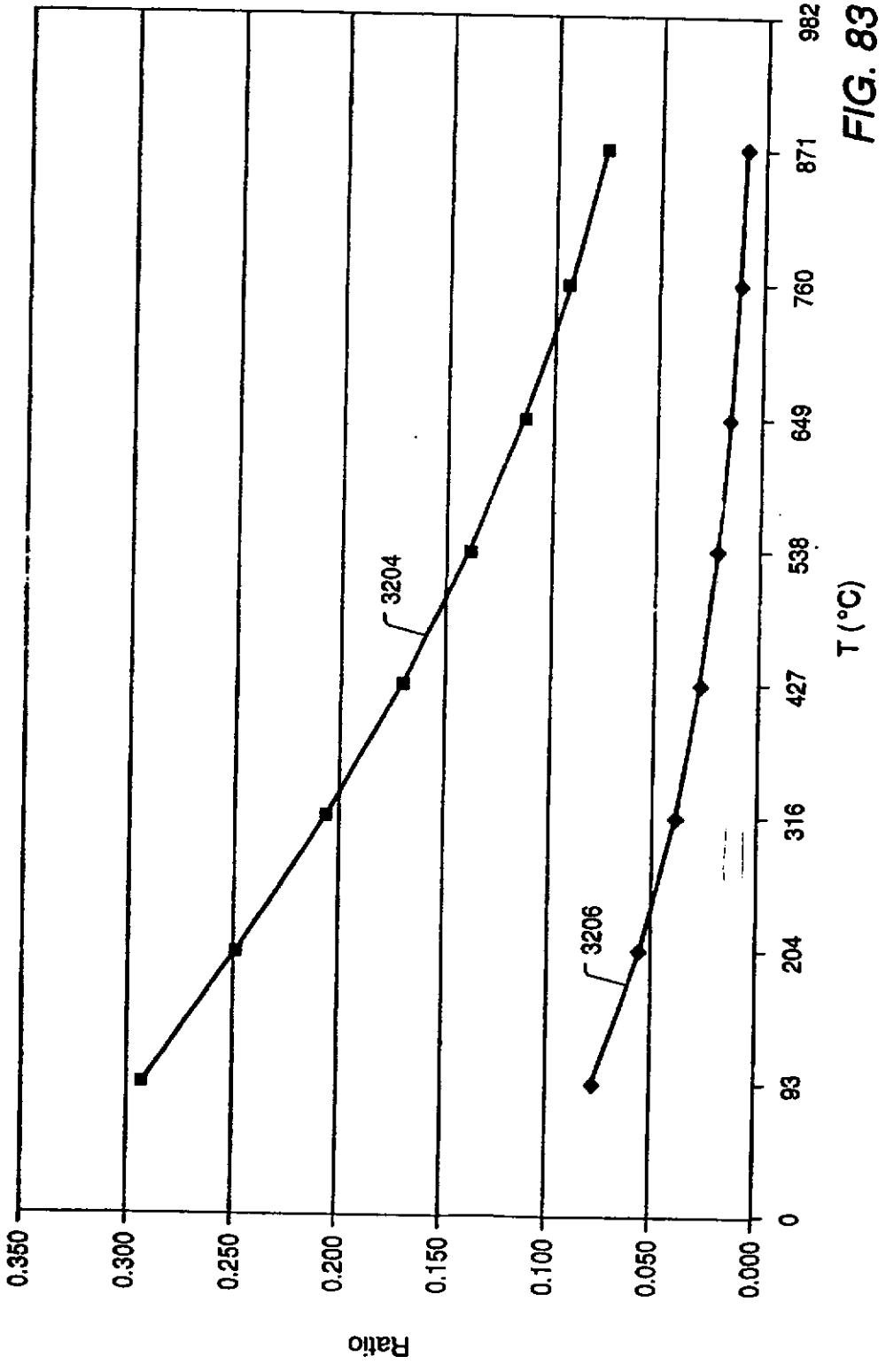

Ratio
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
0
93
204
316
427
538
649
760
871
982
T (°C)
3204
3206

FIG. 83

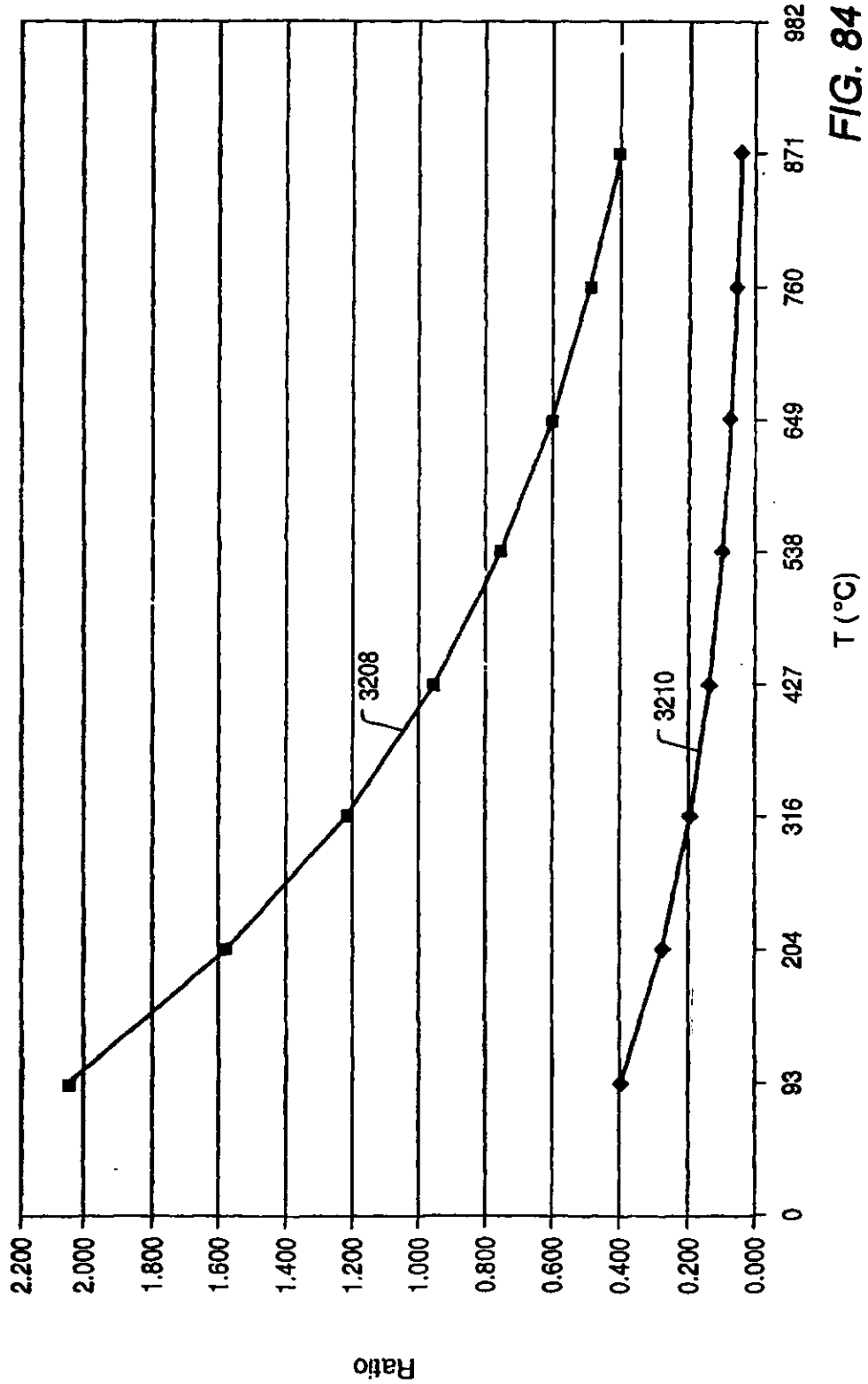

Ratio
2.200
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
0
93
204
316
427
538
649
760
871
982
T (°C)
3208
3210

FIG. 84

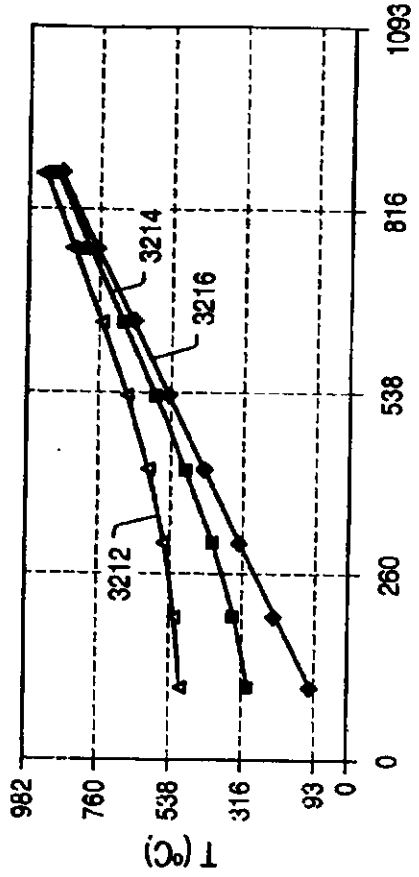


FIG. 86

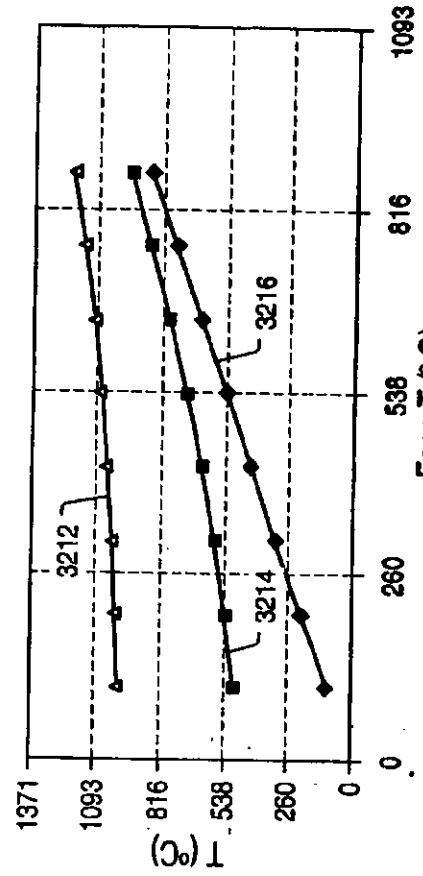


FIG. 88

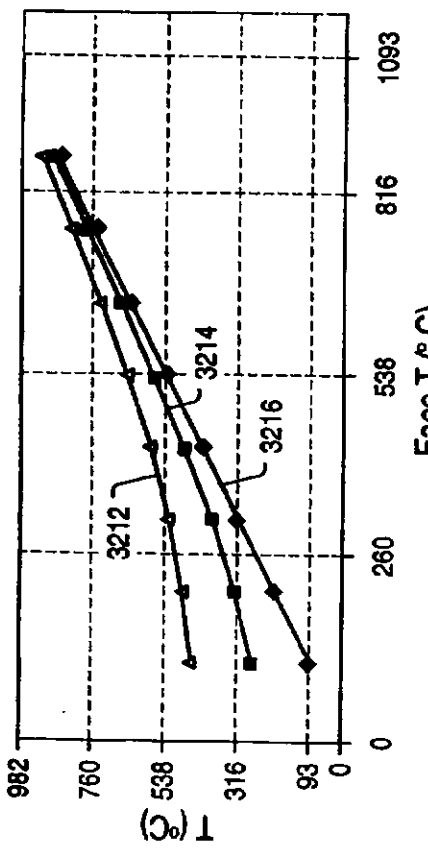


FIG. 85

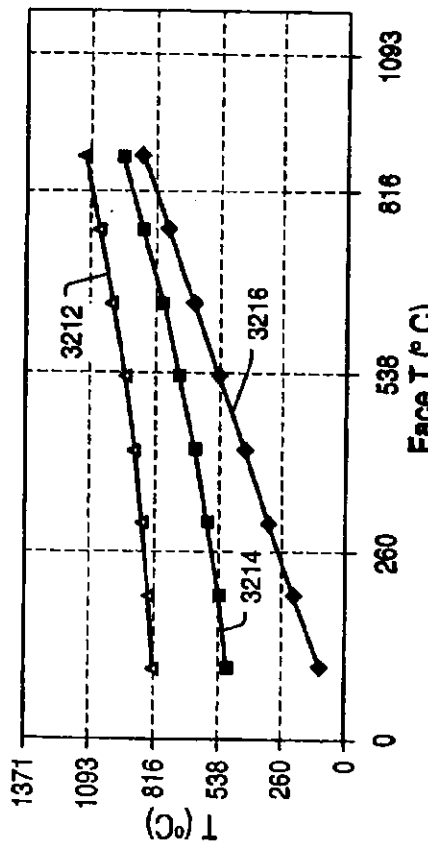


FIG. 87

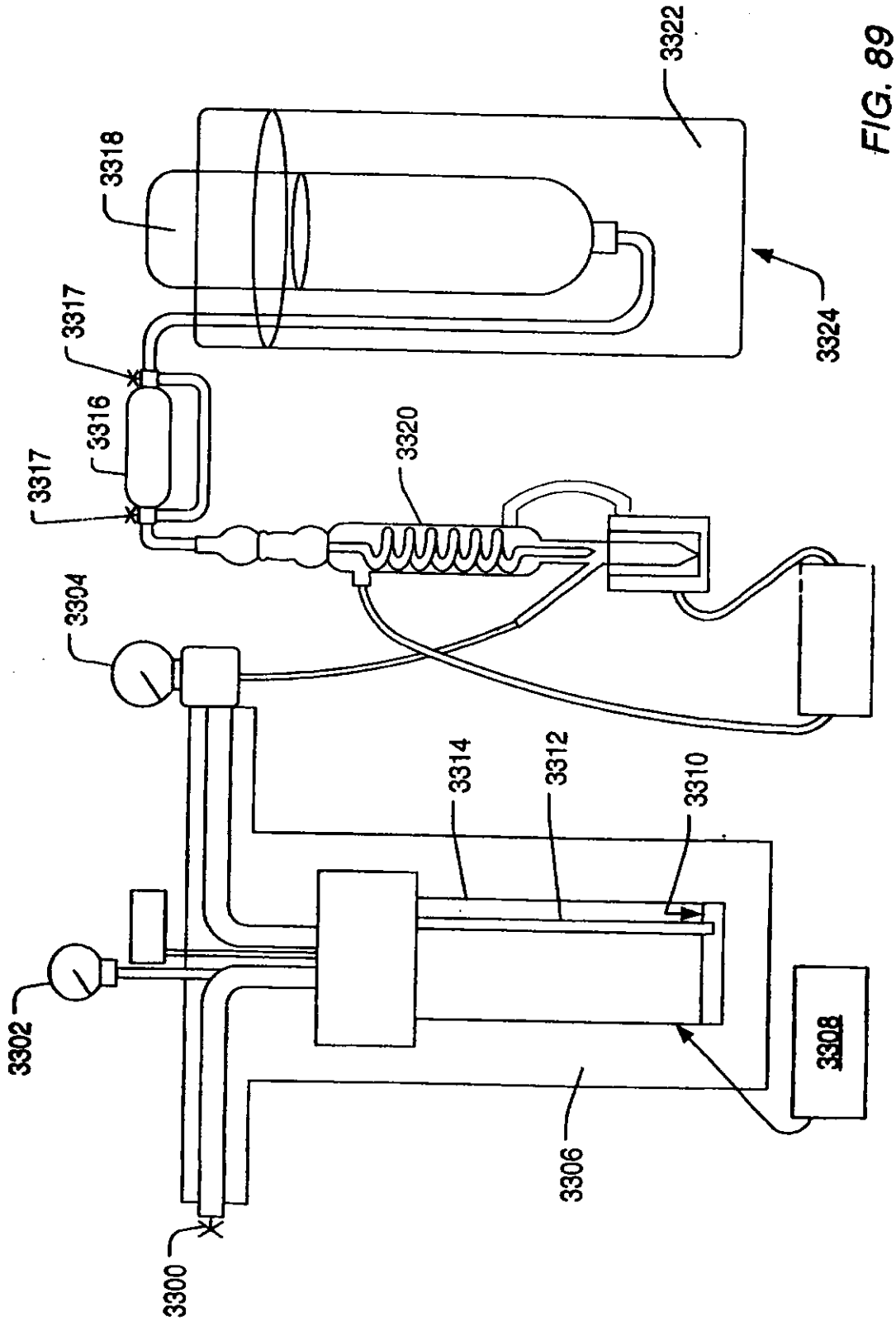

3322
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3308
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FIG. 89

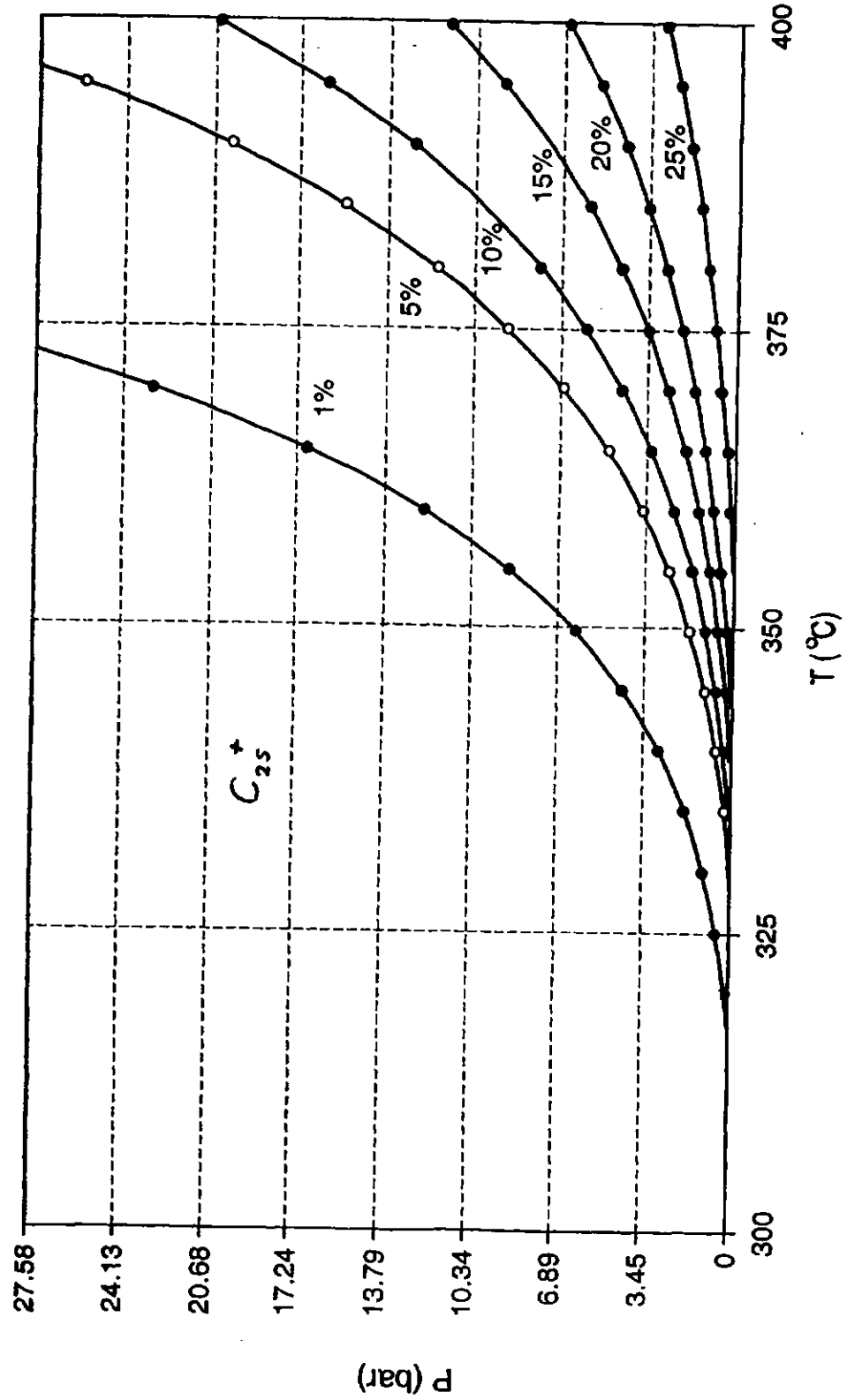

P (bar)
27.58
24.13
20.68
17.24
13.79
10.34
6.89
3.45
0
300
325
350
375
400
T (°C)
C_{2s}^{+}
1%
5%
10%
15%
20%
25%

FIG. 90

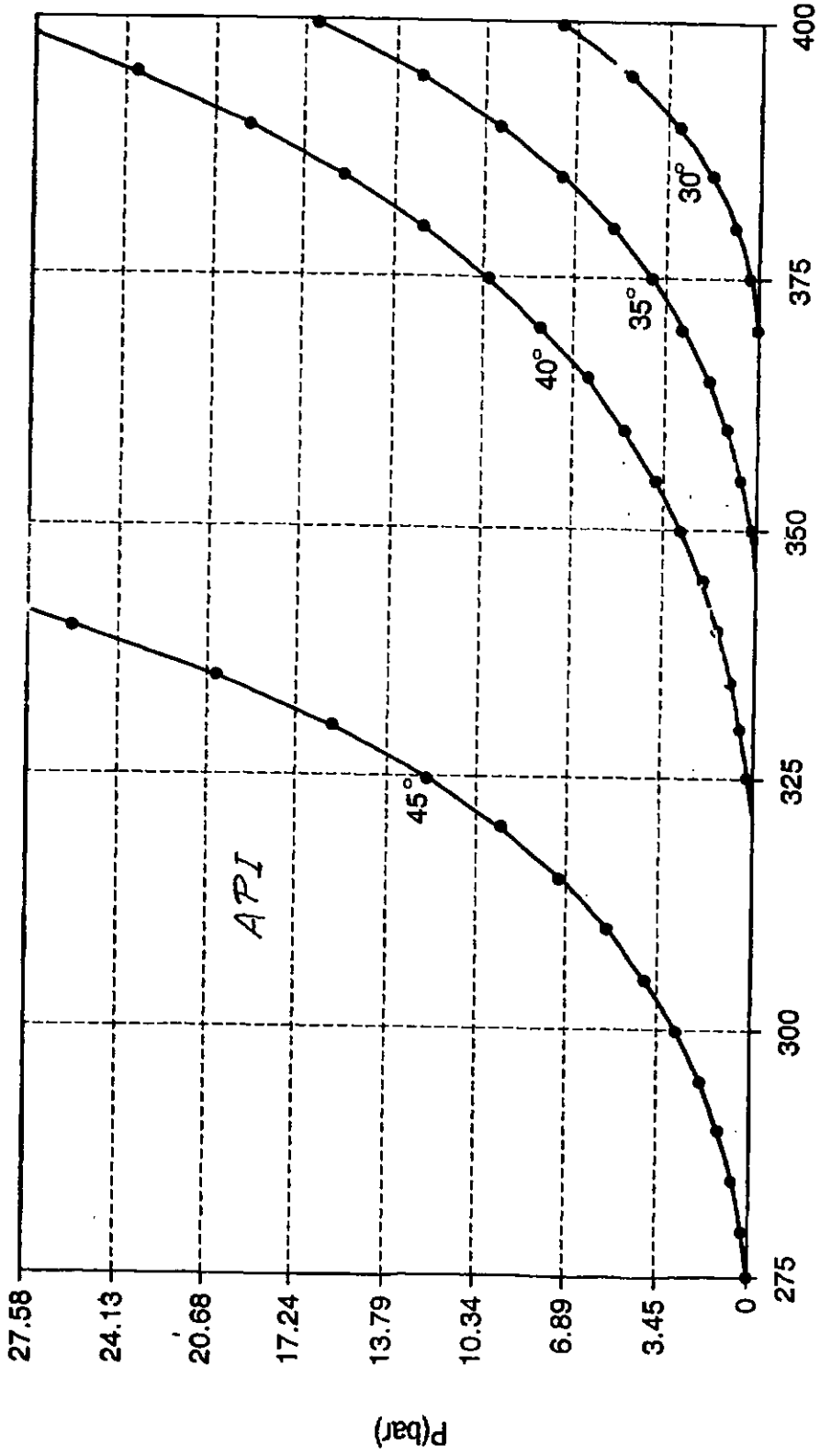

P(bar)
27.58
24.13
20.68
17.24
13.79
10.34
6.89
3.45
0
275
300
325
350
375
400
T (°C)
API
30°
35°
40°
45°

FIG. 91

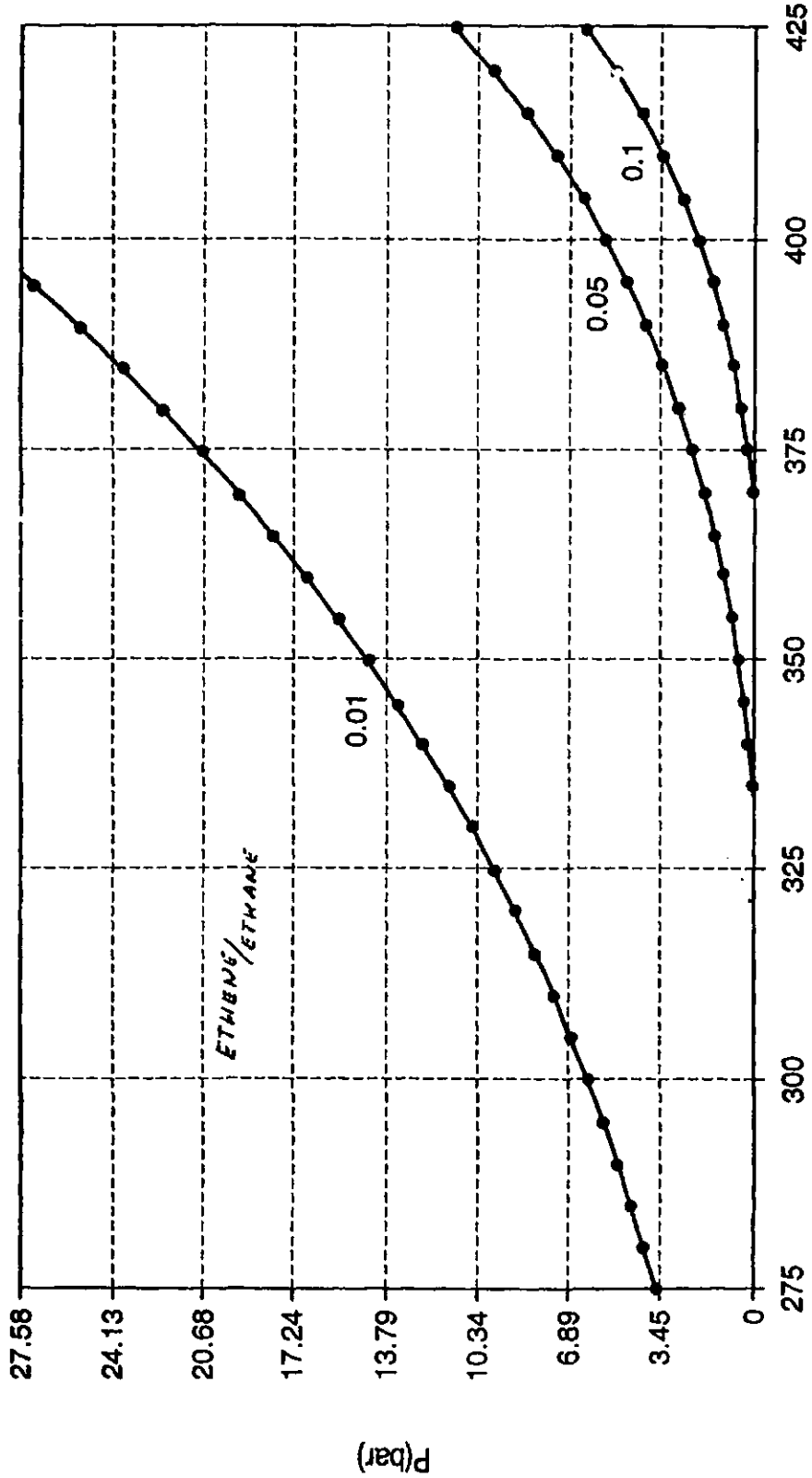

P(bar)
27.58
24.13
20.68
17.24
13.79
10.34
6.89
3.45
0
275
300
325
350
375
400
425
T(°C)
0.01
0.05
0.1
ETHENE/ETHANE

FIG. 92

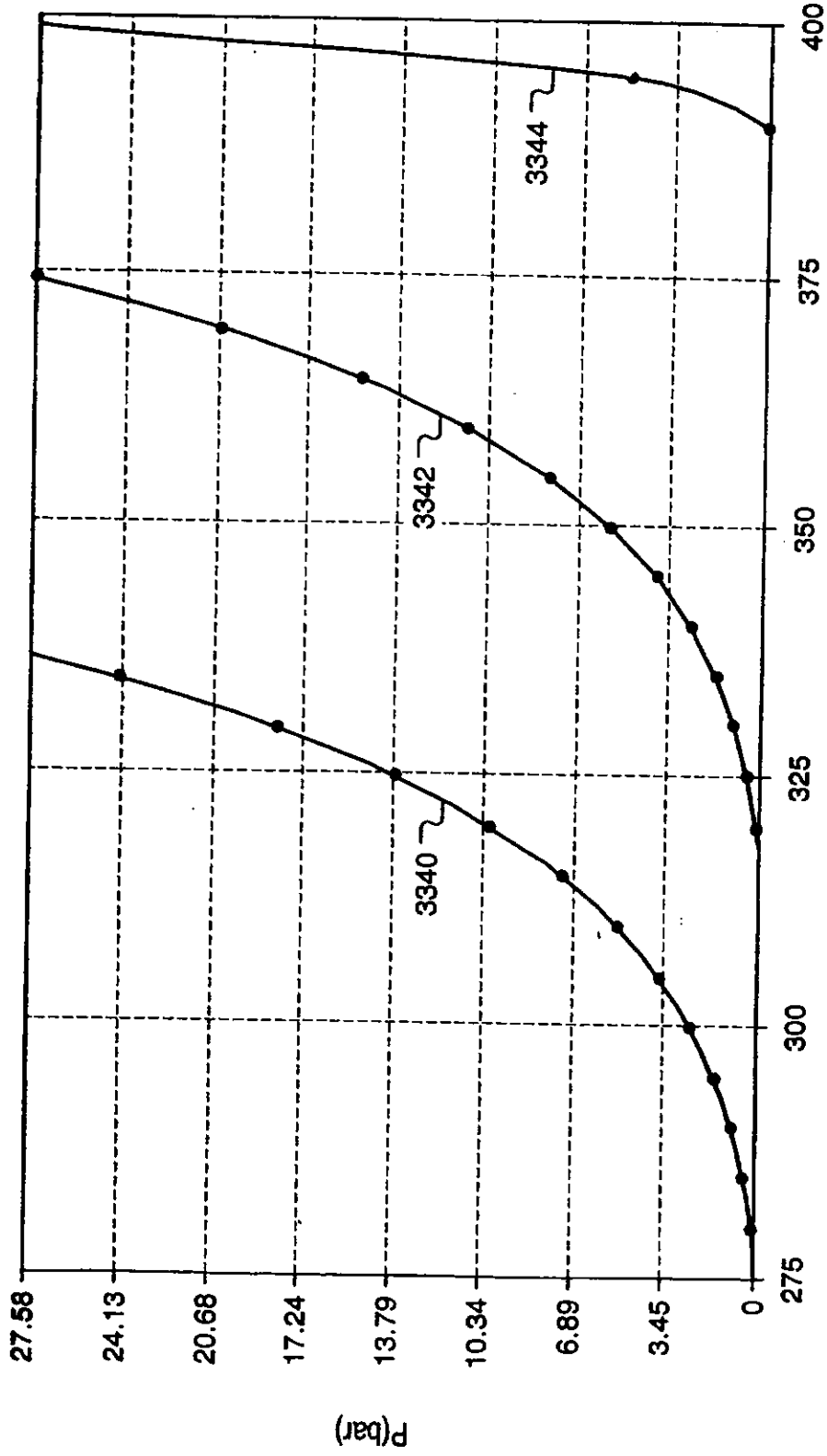

3344
3342
3340
400
375
350
325
300
275
T (°C)
27.58
24.13
20.68
17.24
13.79
10.34
6.89
3.45
0
P(bar)

FIG. 93

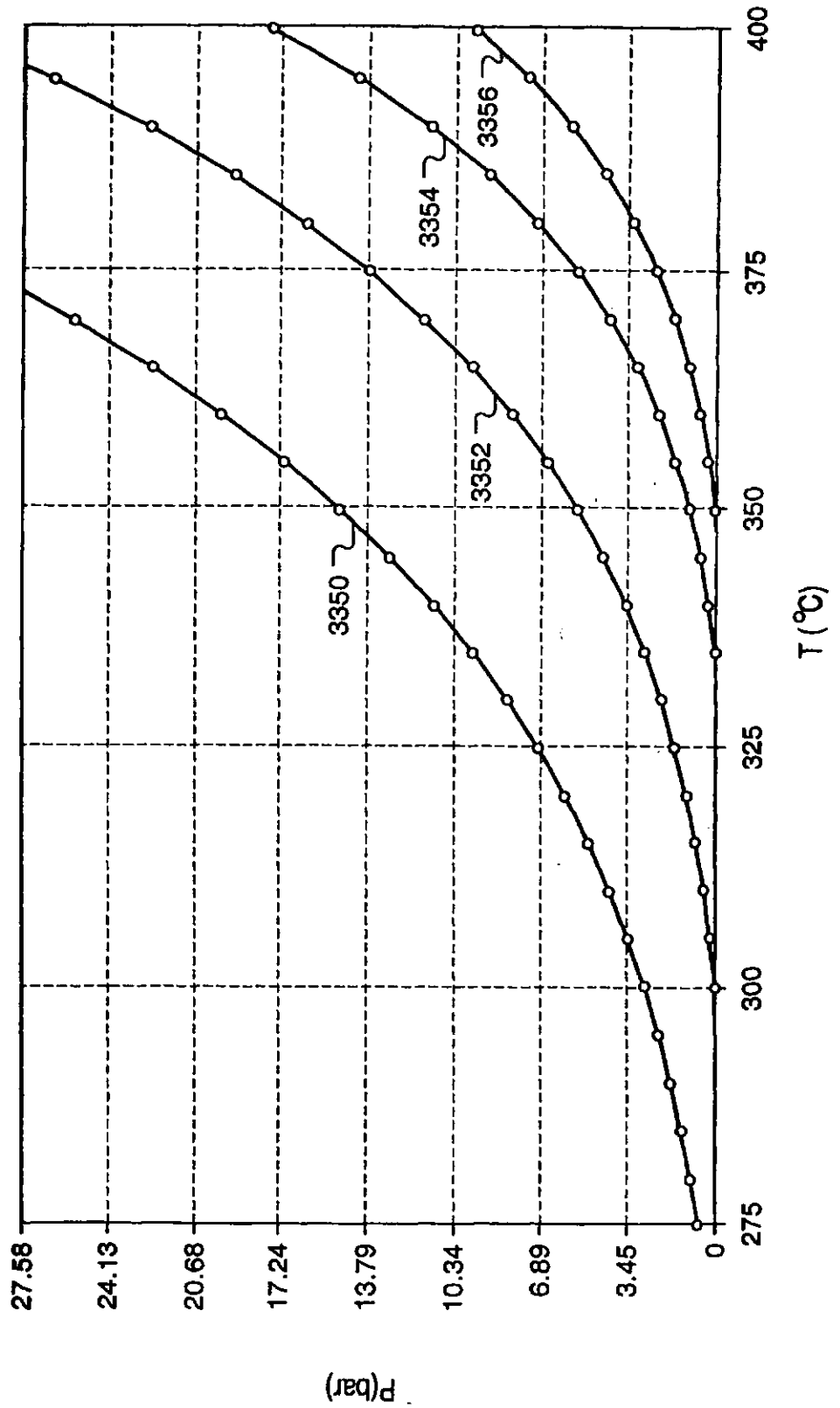

3350
3352
3354
3356
27.58
24.13
20.68
17.24
13.79
10.34
6.89
3.45
0
275
300
325
350
375
400
T (°C)
P(bar)

FIG. 94

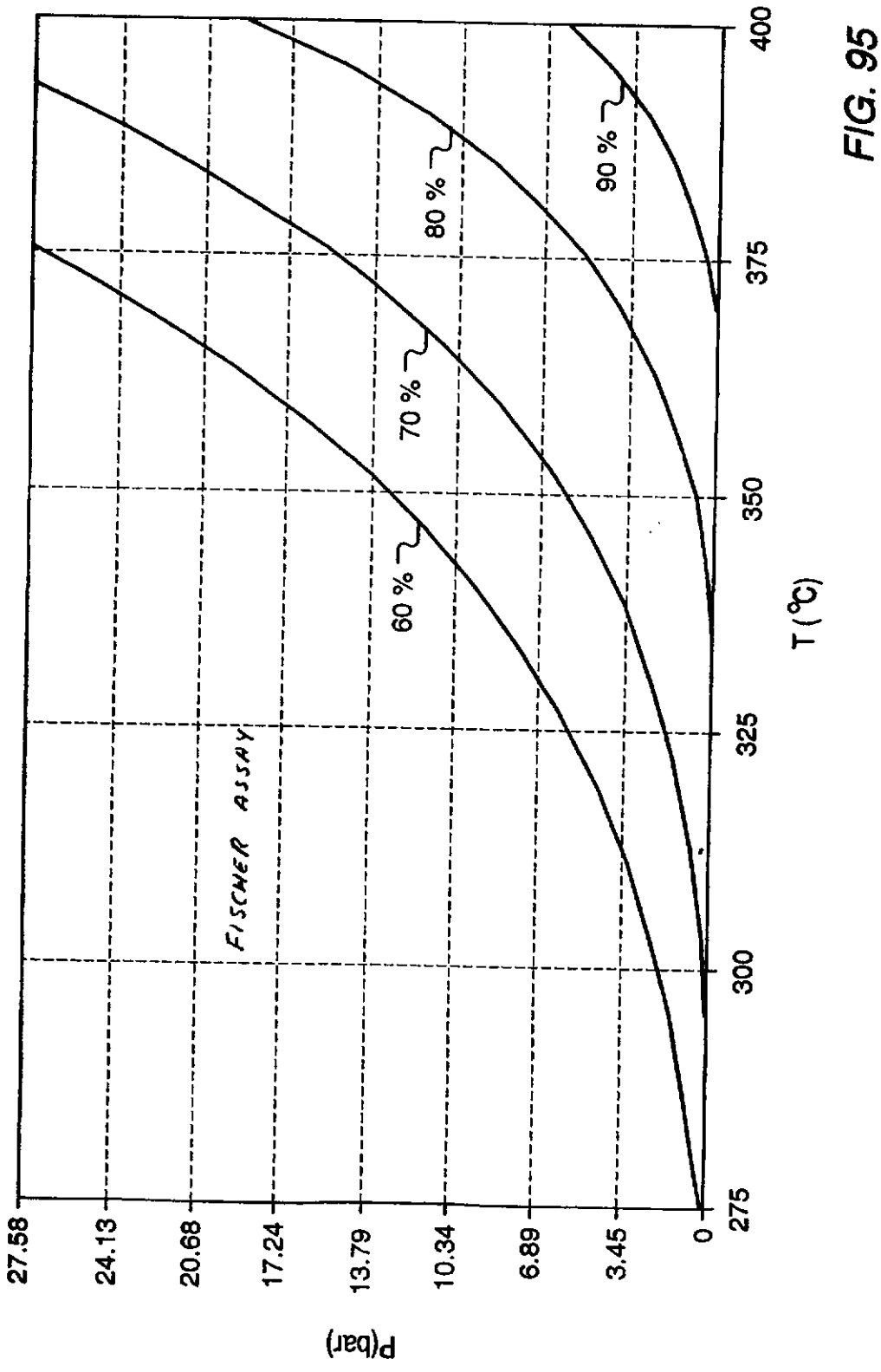

FISCHER ASSAY
60 %
70 %
80 %
90 %
P(bar)
27.58
24.13
20.68
17.24
13.79
10.34
6.89
3.45
0
T (°C)
275
300
325
350
375
400

FIG. 95

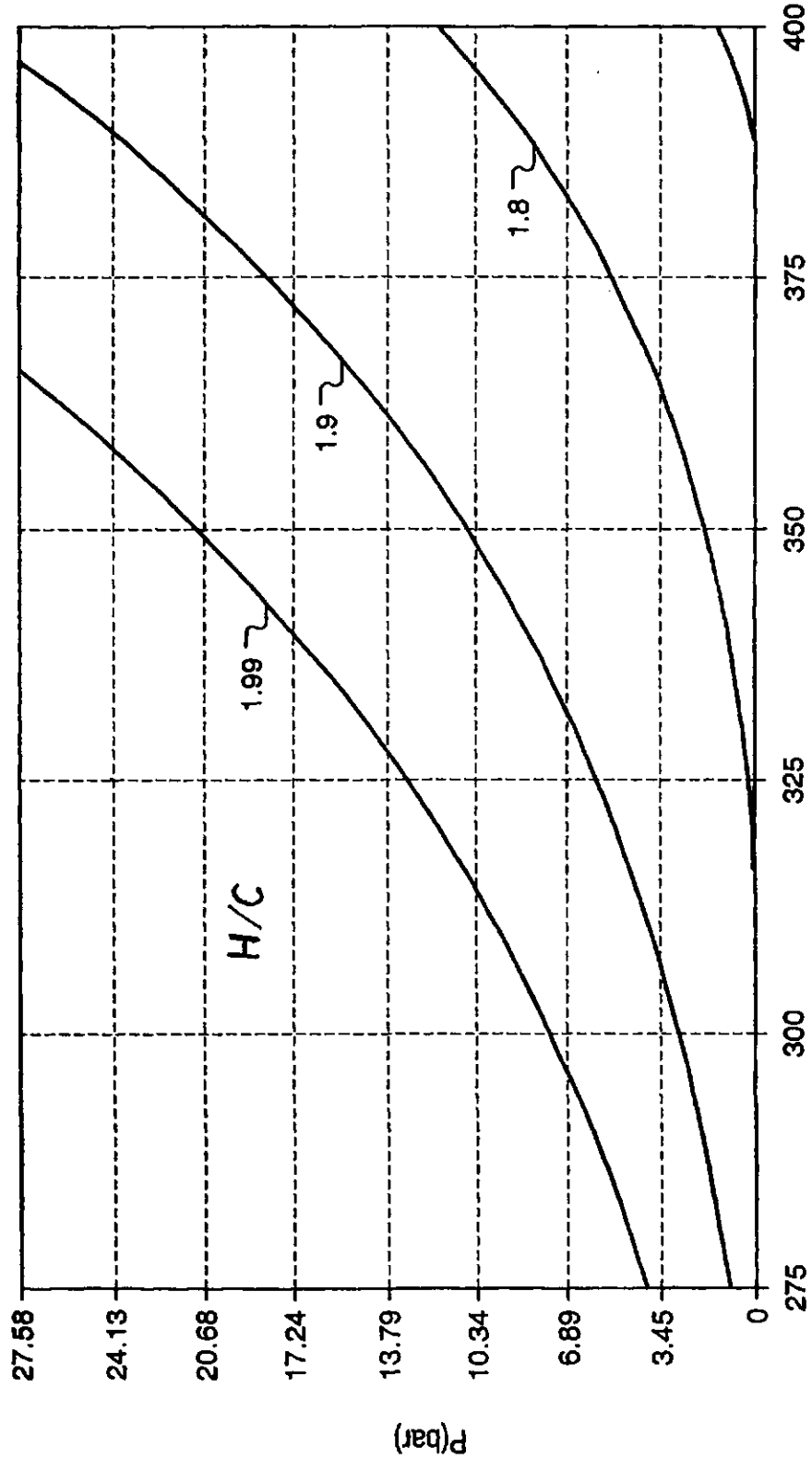

P(bar)
27.58
24.13
20.68
17.24
13.79
10.34
6.89
3.45
0
T (°C)
275
300
325
350
375
400
H/C
1.99
1.9
1.8

FIG. 96

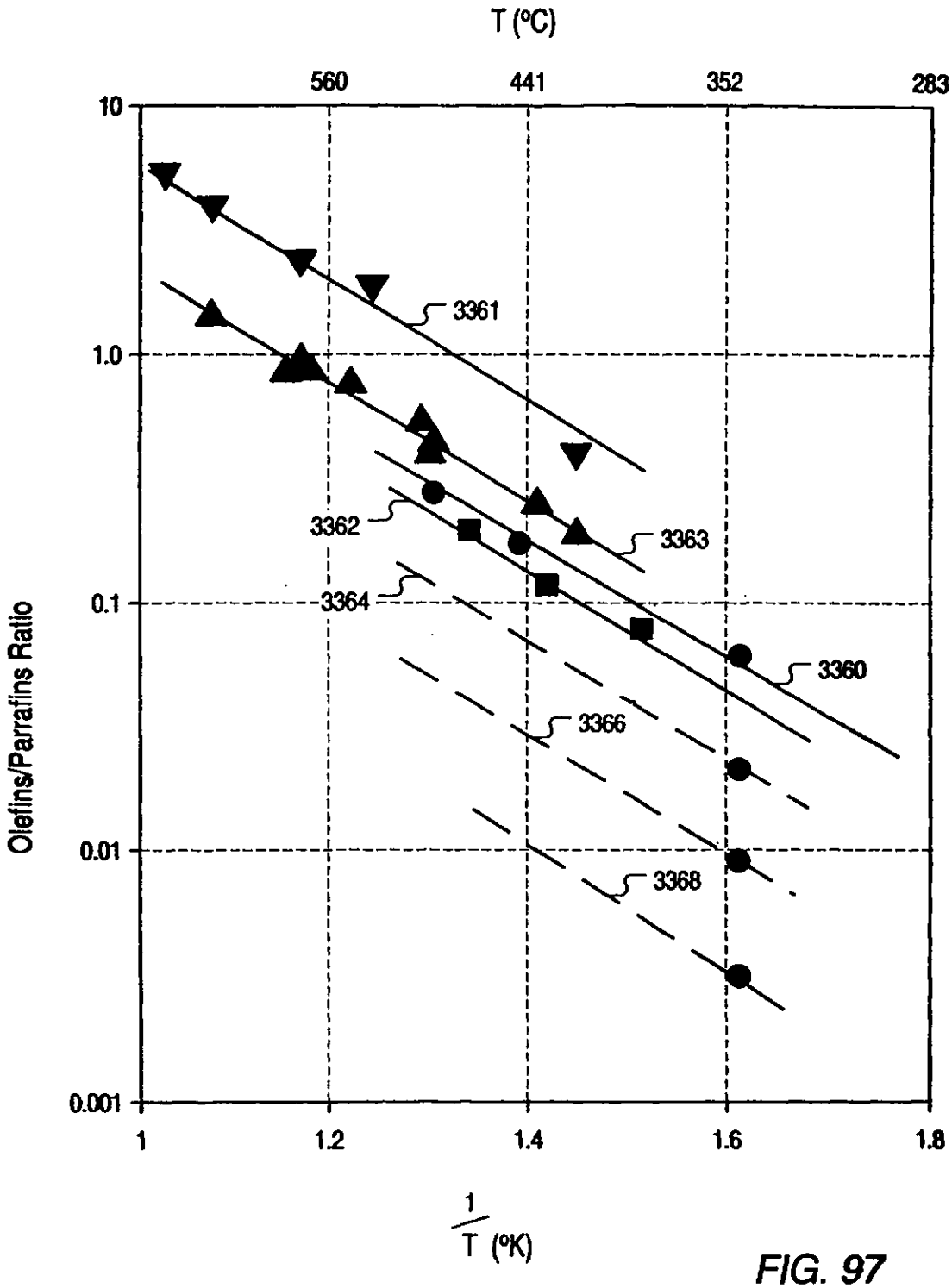

T (°C)
560
441
352
283
10
1.0
0.1
0.01
0.001
Olefins/Parrafins Ratio
3361
3362
3363
3364
3360
3366
3368
1
1.2
1.4
1.6
1.8
1/T (°K)

FIG. 97

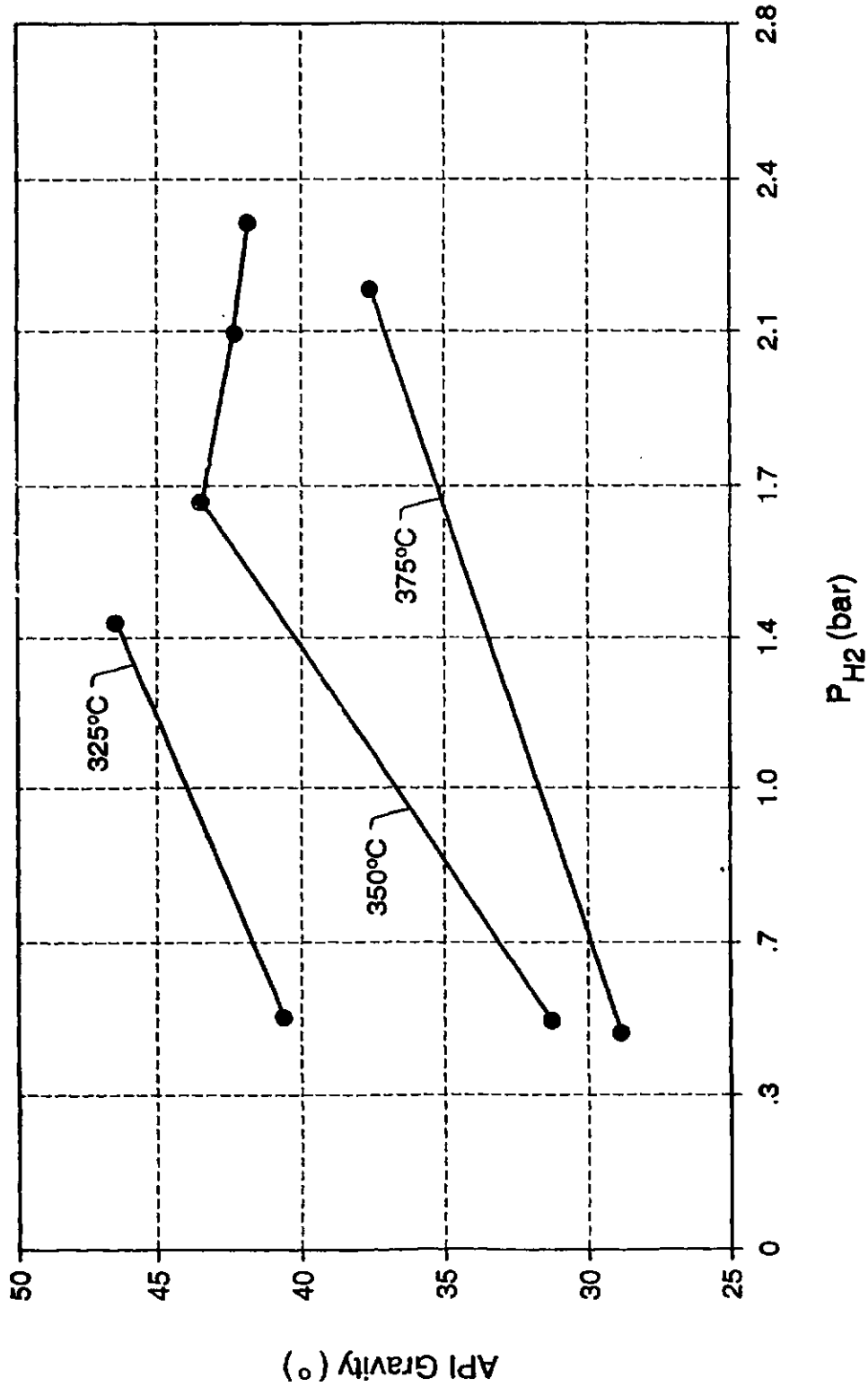

API Gravity (°)
50
45
40
35
30
25
0
.3
.7
1.0
1.4
1.7
2.1
2.4
2.8
P_{H2} (bar)
325°C
350°C
375°C

FIG. 98

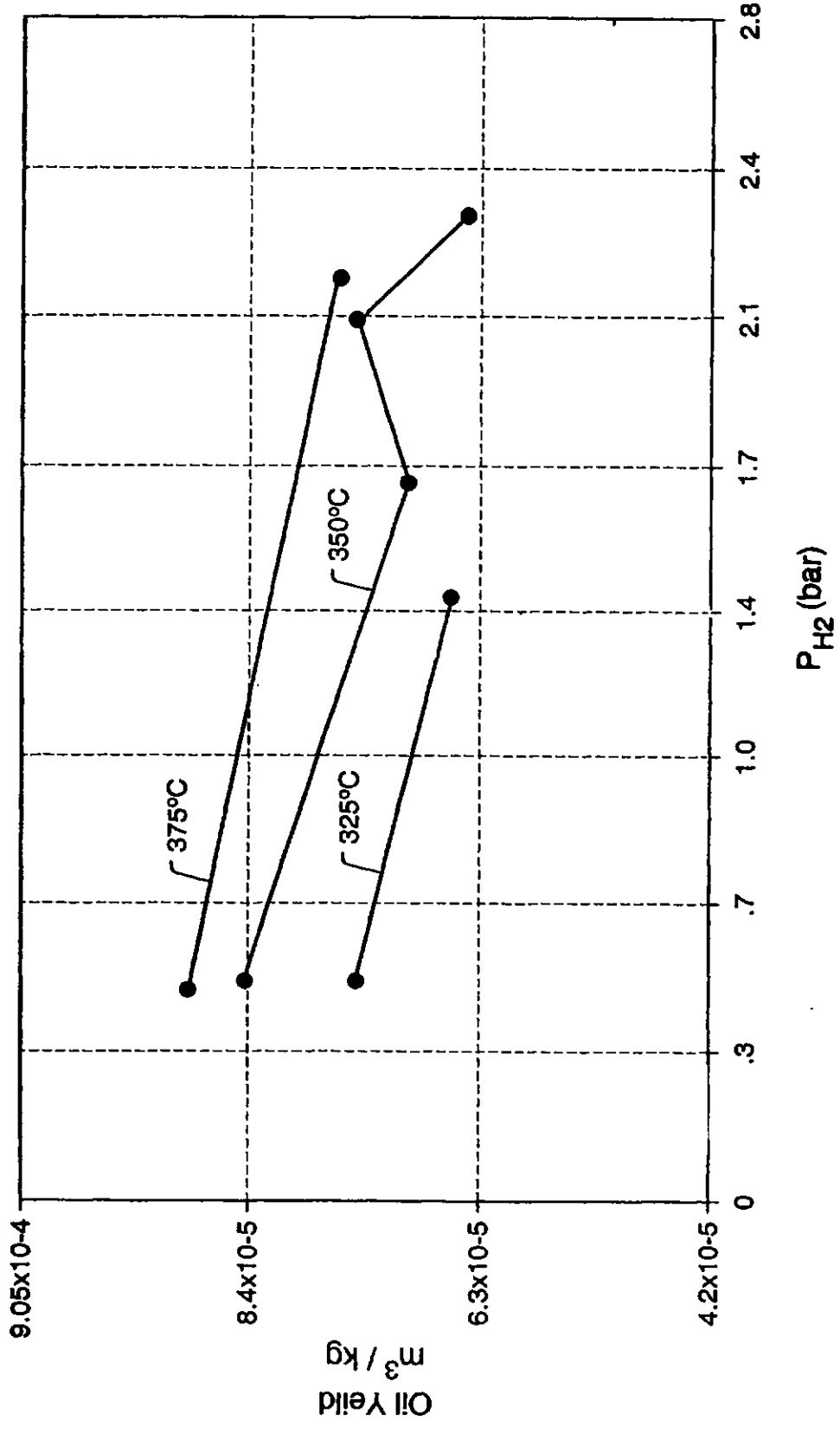

Oil Yeild
m³ / kg
9.05x10-4
8.4x10-5
6.3x10-5
4.2x10-5
0
.3
.7
1.0
1.4
1.7
2.1
2.4
2.8
P H2 (bar)
375°C
350°C
325°C

FIG. 99

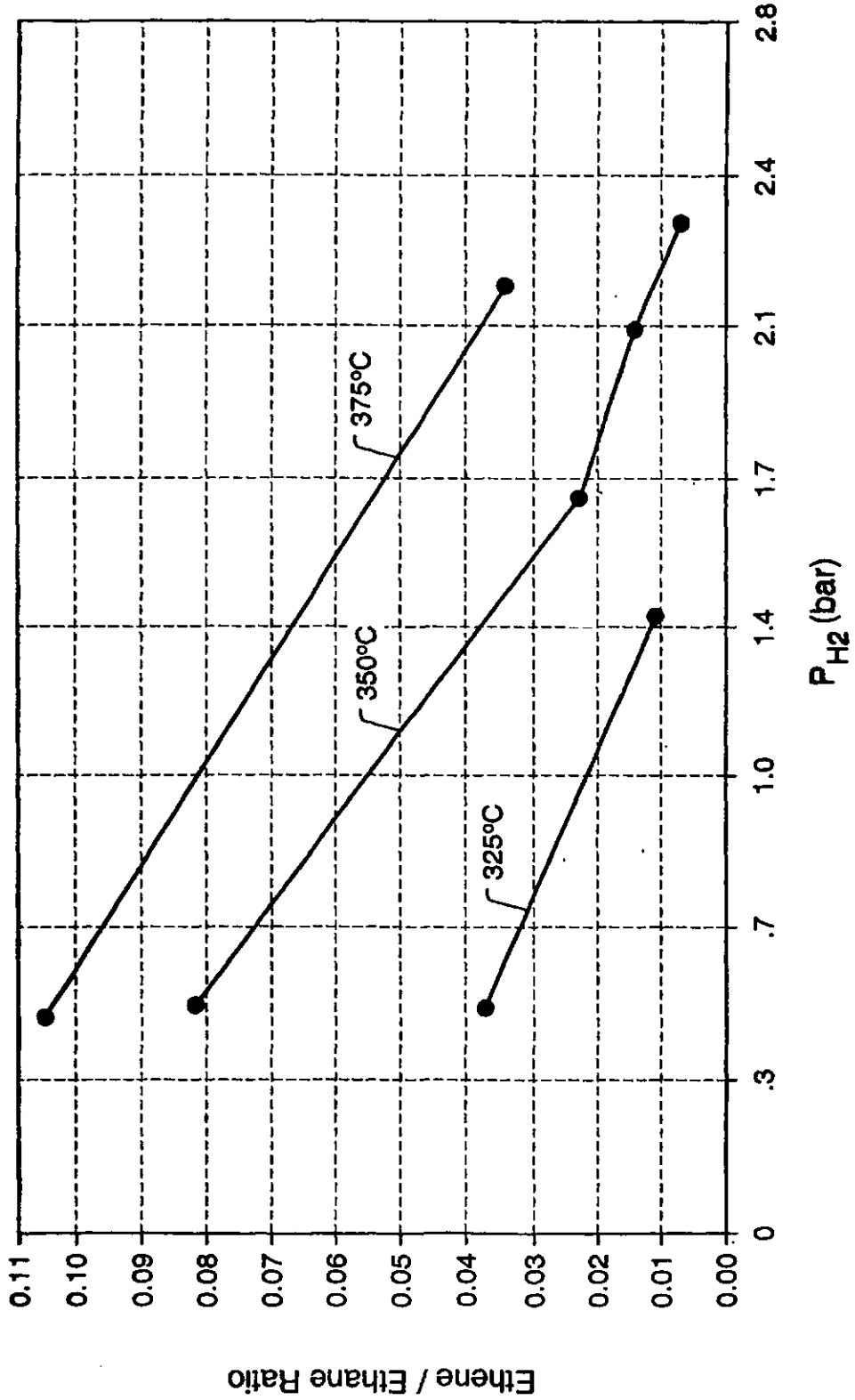

Ethene / Ethane Ratio
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0
.3
.7
1.0
1.4
1.7
2.1
2.4
2.8
P_{H2} (bar)
375°C
350°C
325°C

FIG. 100

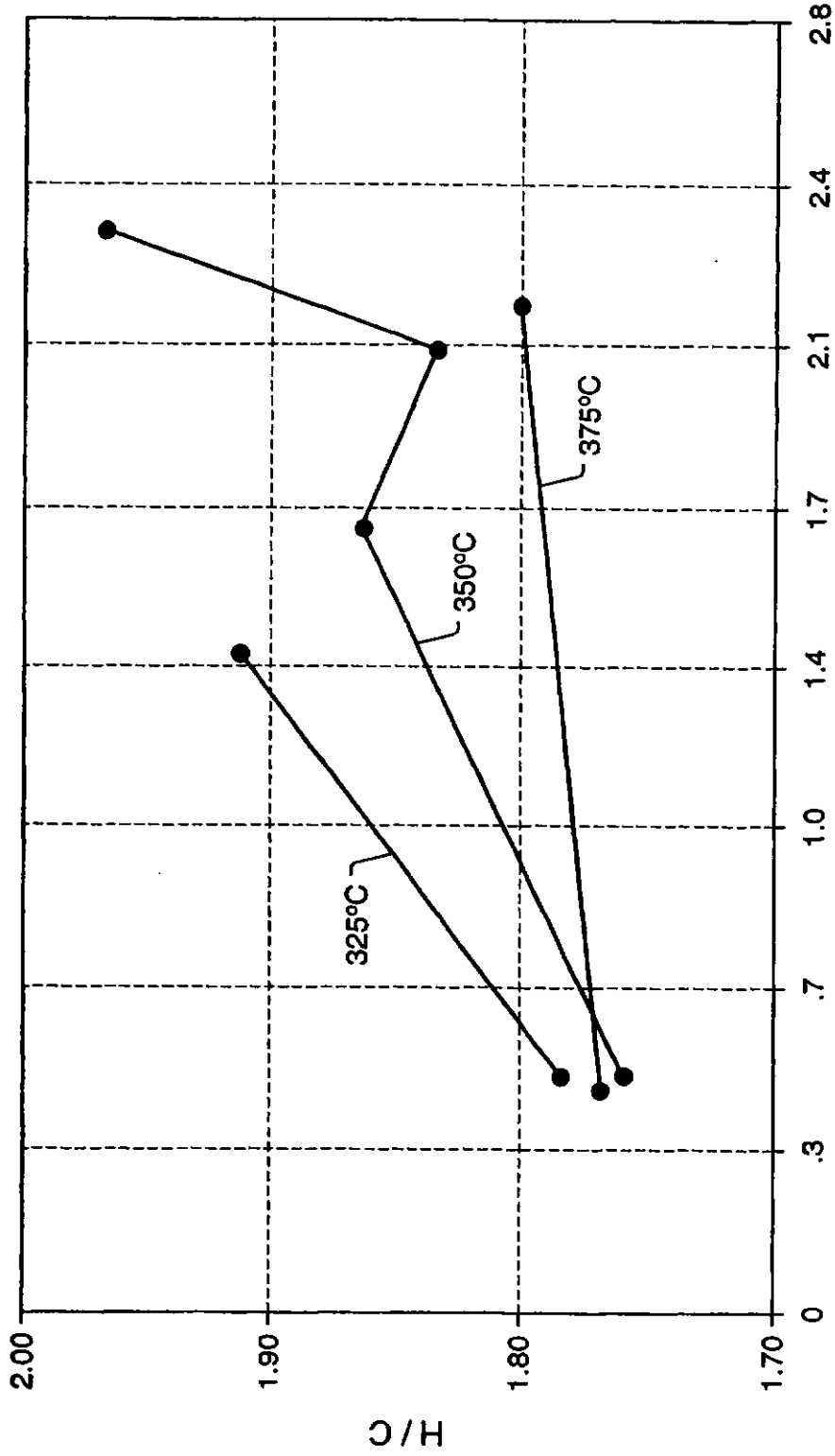


FIG. 101

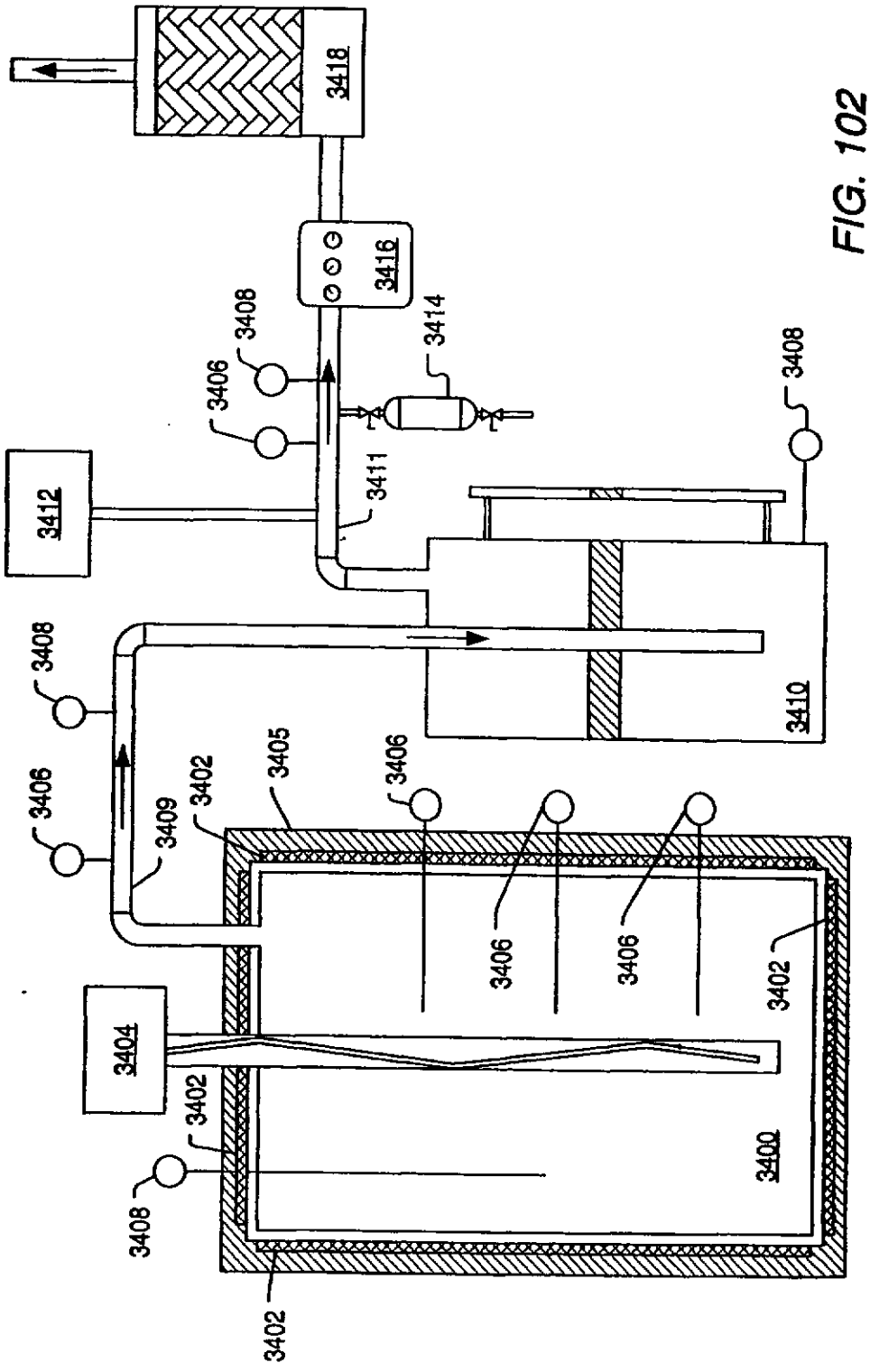

3418
3416
3408
3406
3414
3411
3412
3408
3410
3408
3406
3409
3402
3405
3406
3406
3406
3402
3404
3402
3400
3408
3402

FIG. 102

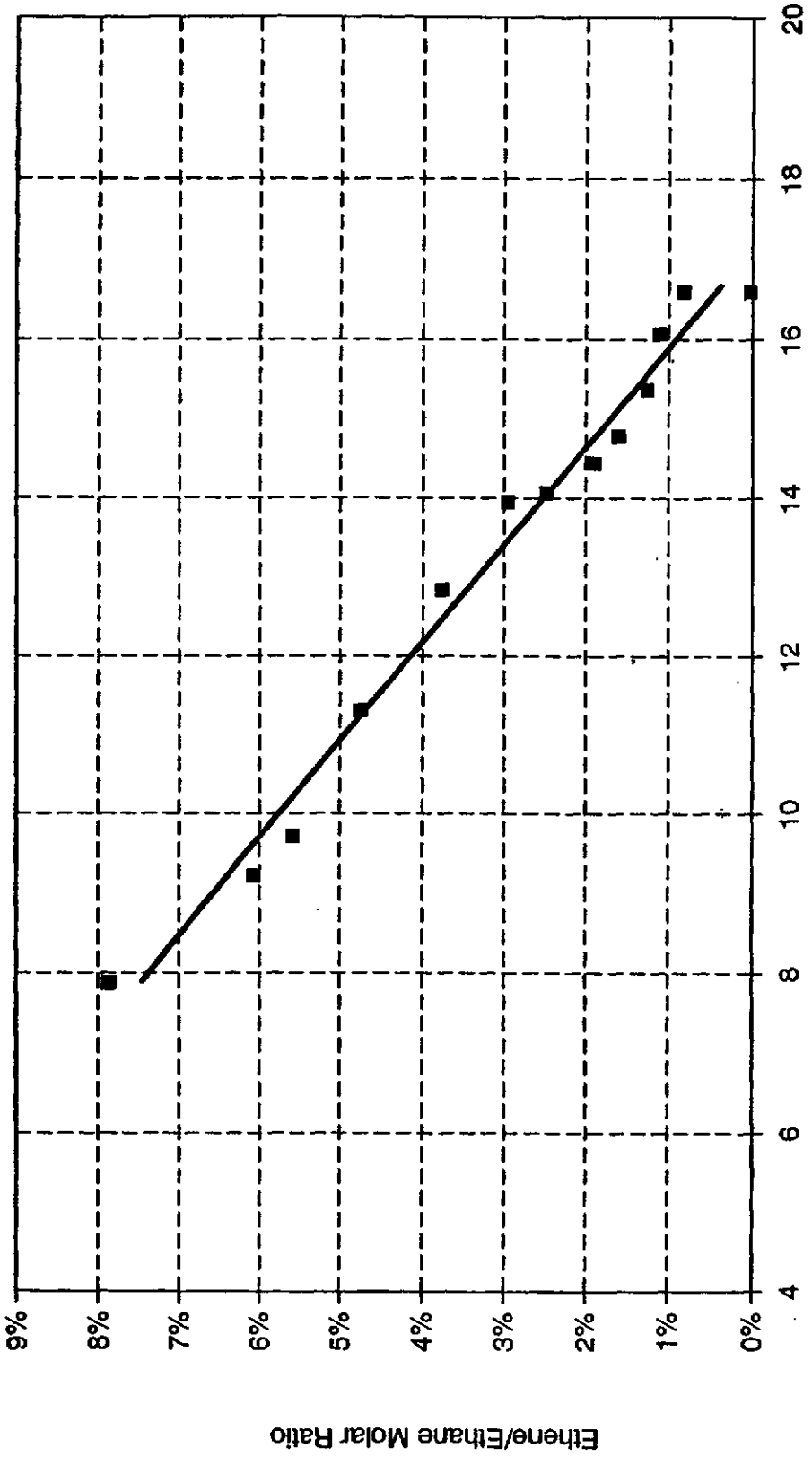

20
18
16
14
12
10
8
6
4
9%
8%
7%
6%
5%
4%
3%
2%
1%
0%
Ethene/Ethane Molar Ratio
H2 Concentration (mol%)

FIG. 103

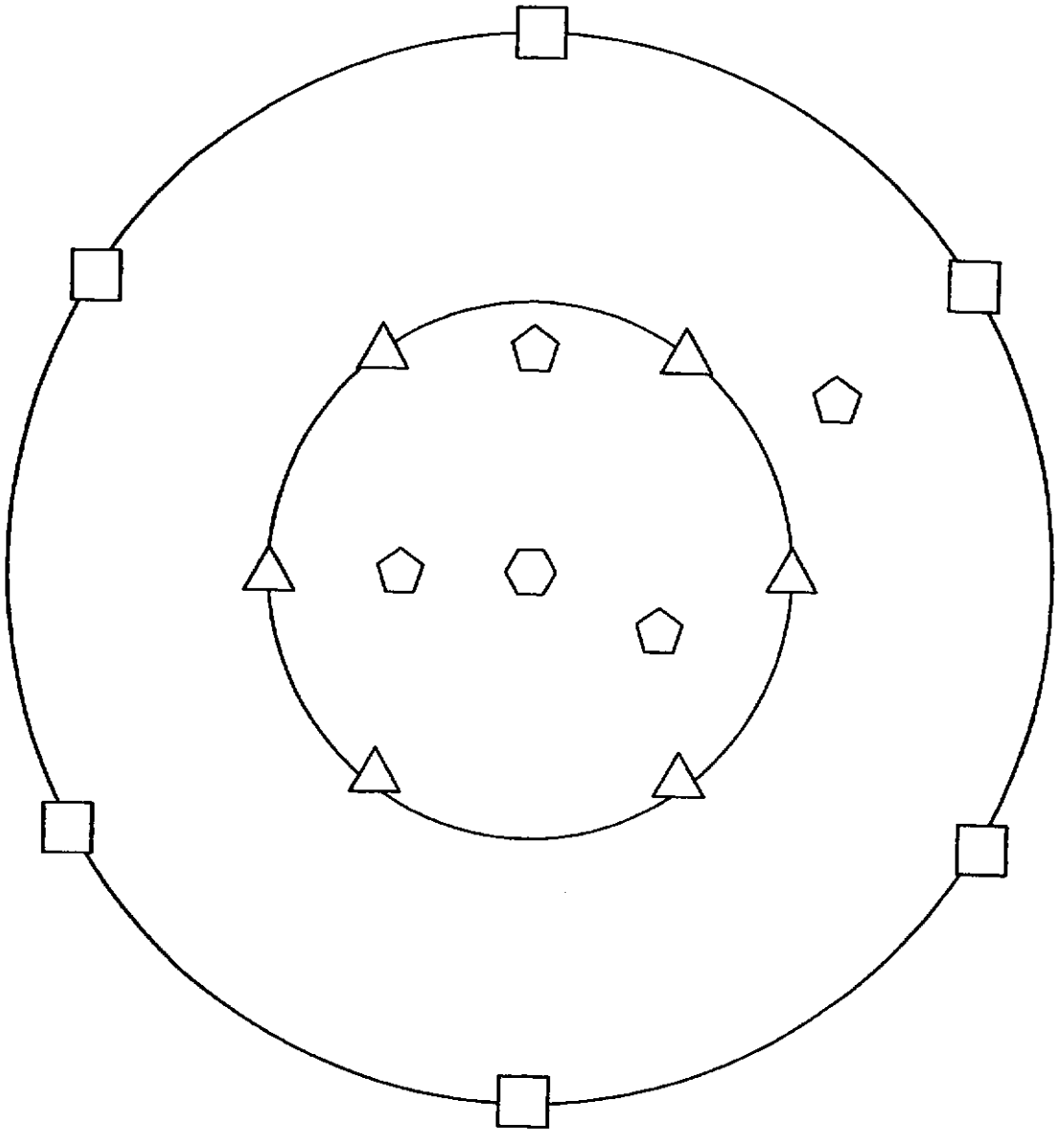


FIG. 104

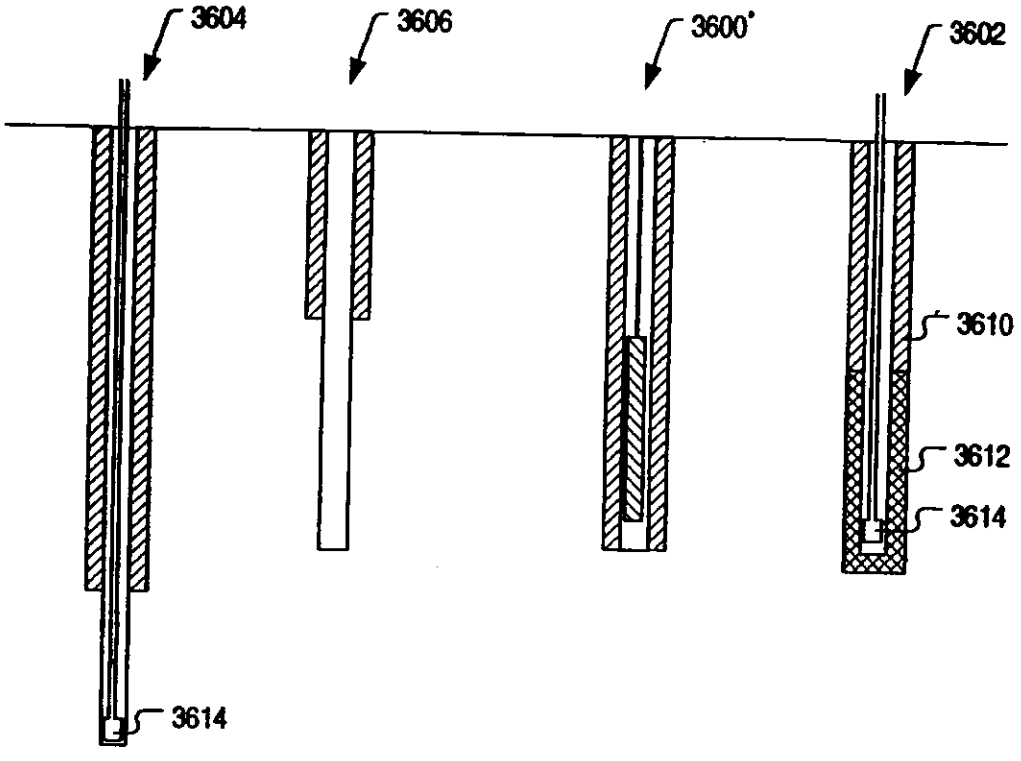


FIG. 105

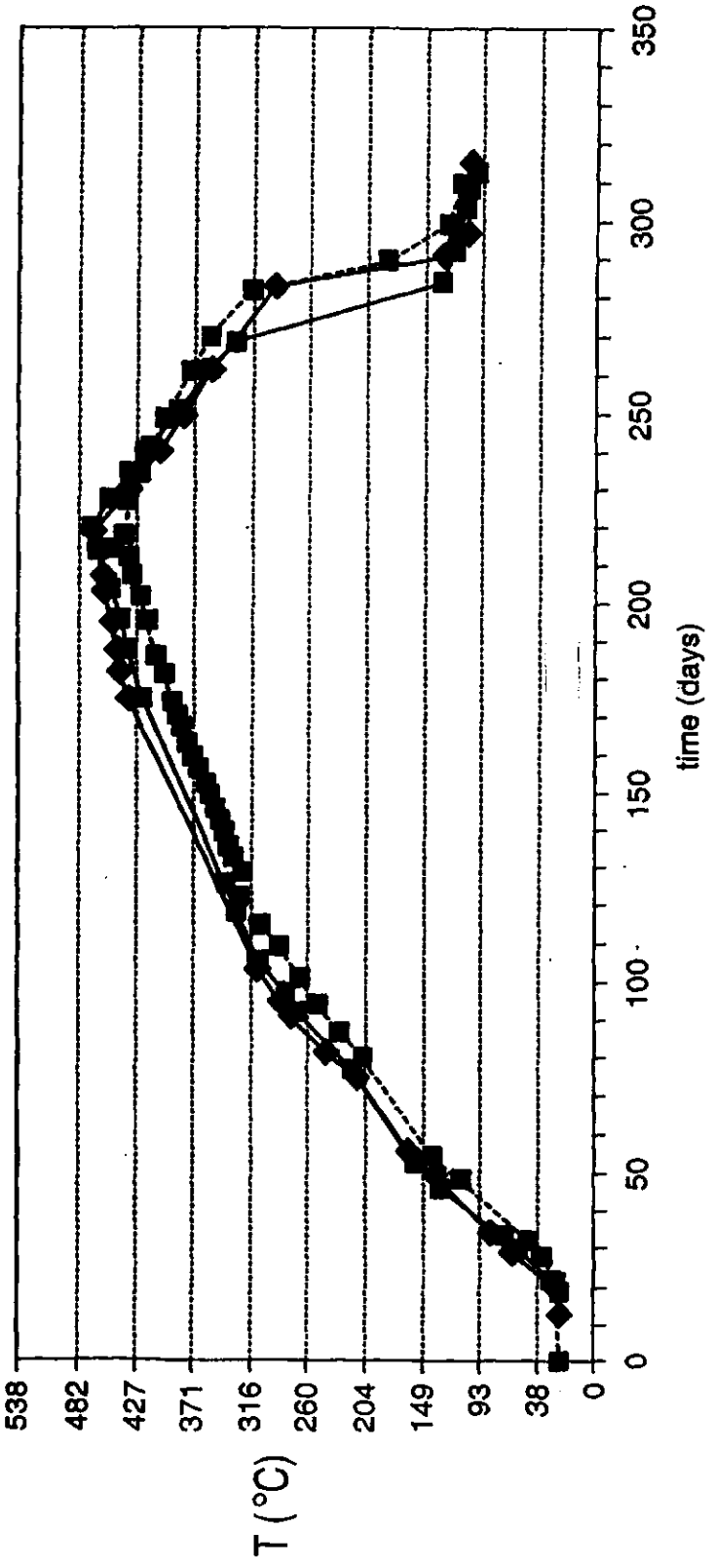

538
482
427
371
316
260
204
149
93
38
T (°C)
0
50
100
150
200
250
300
350
time (days)

FIG. 106

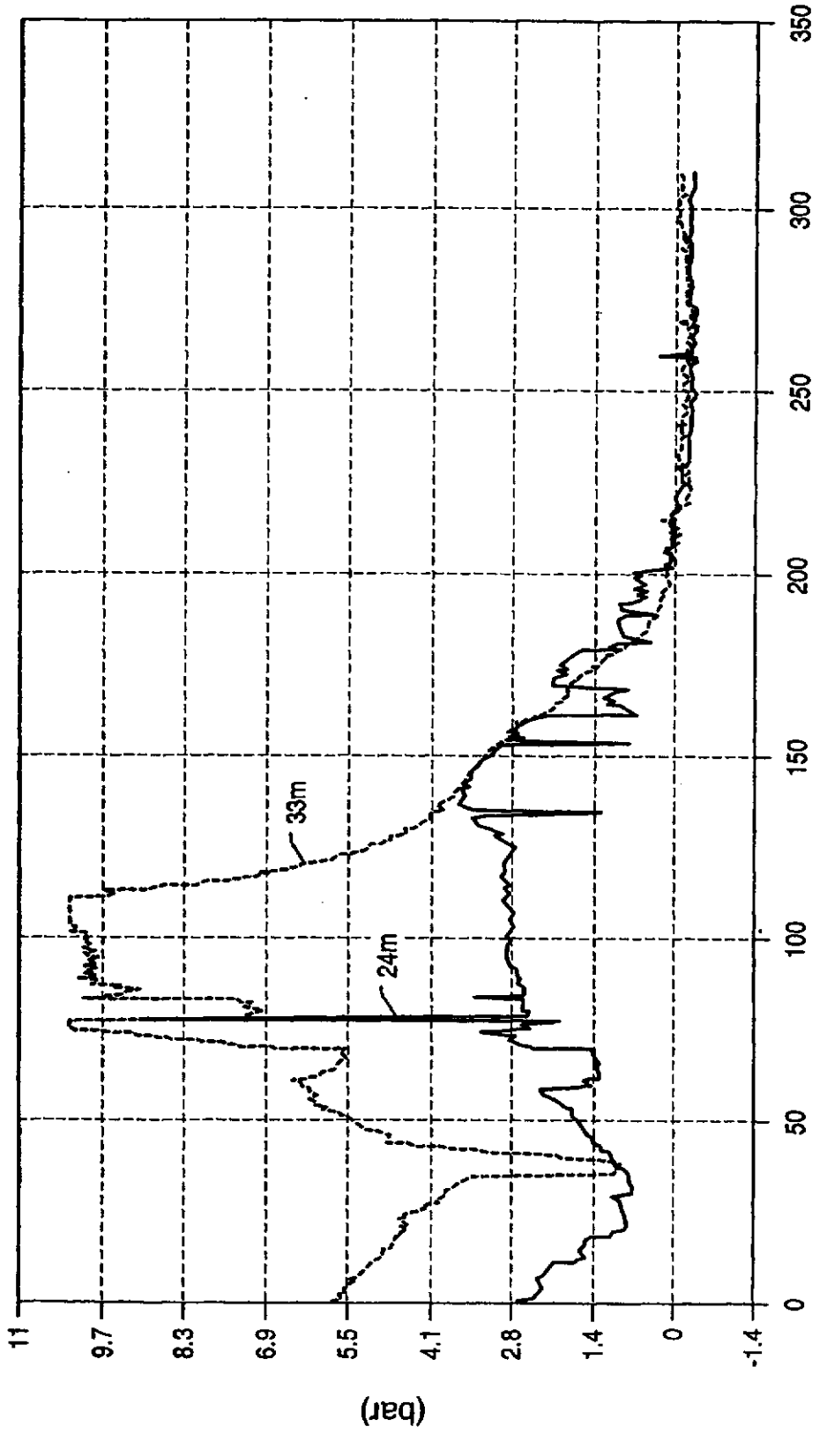

11
9.7
8.3
6.9
5.5
4.1
2.8
1.4
0
-1.4
(bar)
0
50
100
150
200
250
300
350
t (days)
33m
24m

FIG. 107

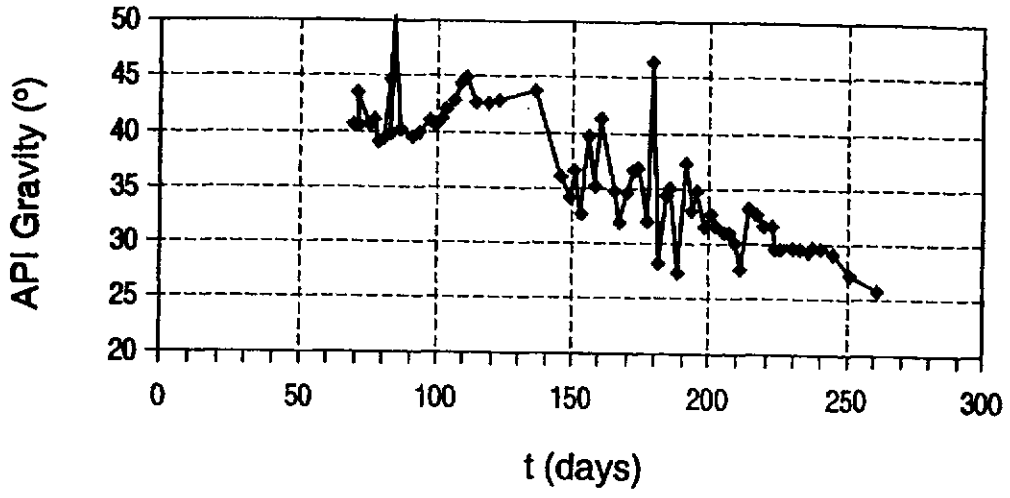


FIG. 108

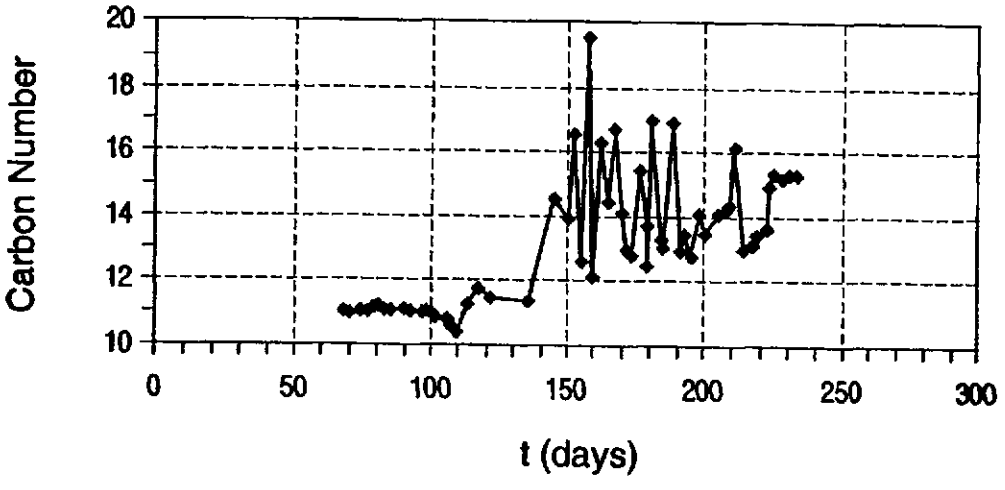


FIG. 109

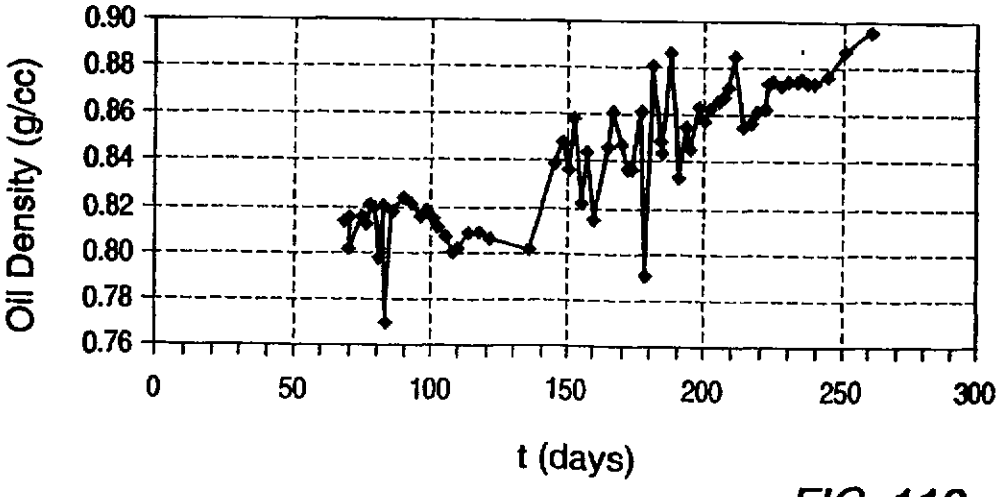


FIG. 110

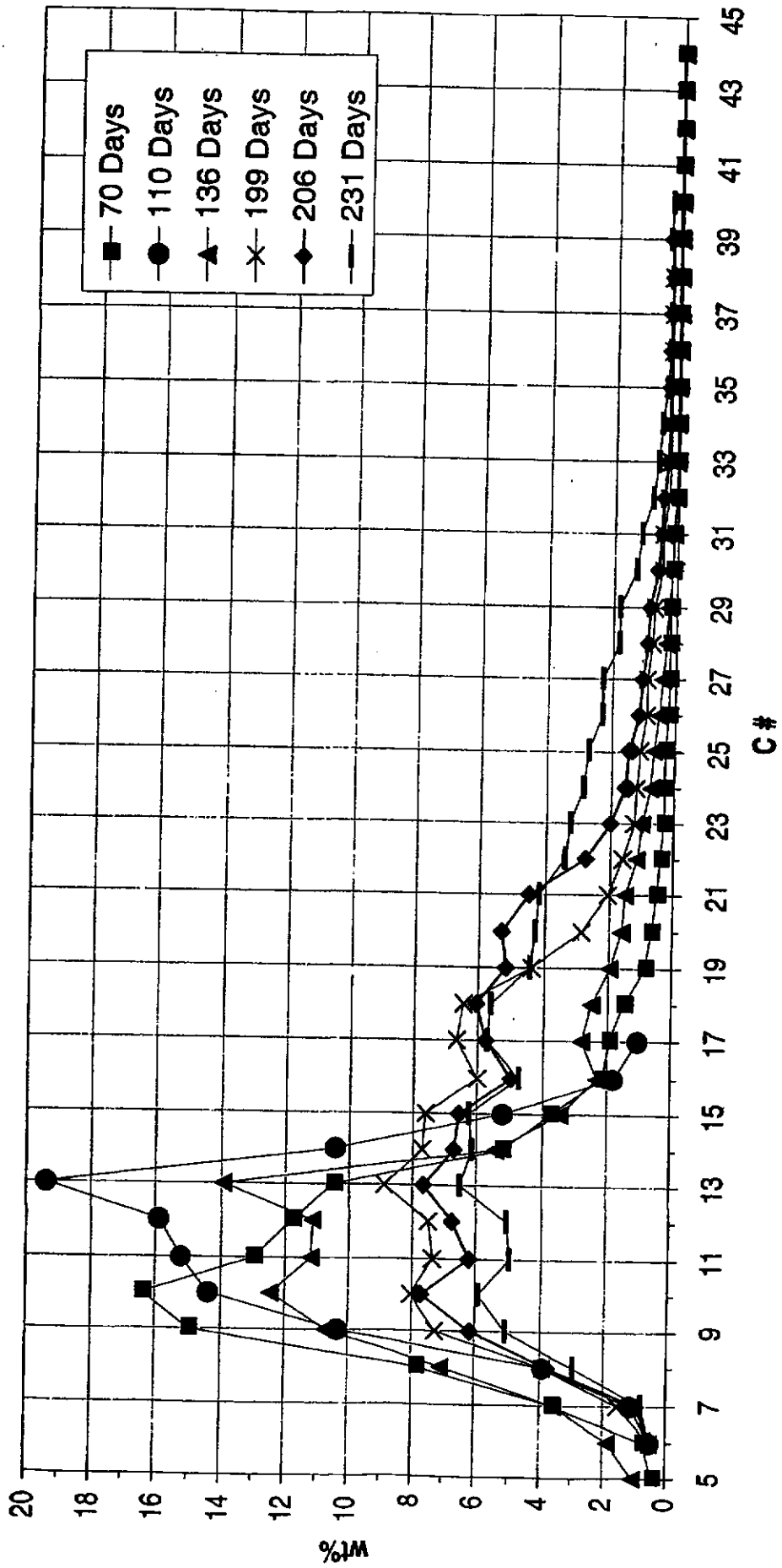

70 Days
110 Days
136 Days
199 Days
206 Days
231 Days
wt%
C #
0
2
4
6
8
10
12
14
16
18
20
5
7
9
11
13
15
17
19
21
23
25
27
29
31
33
35
37
39
41
43
45

FIG. 111

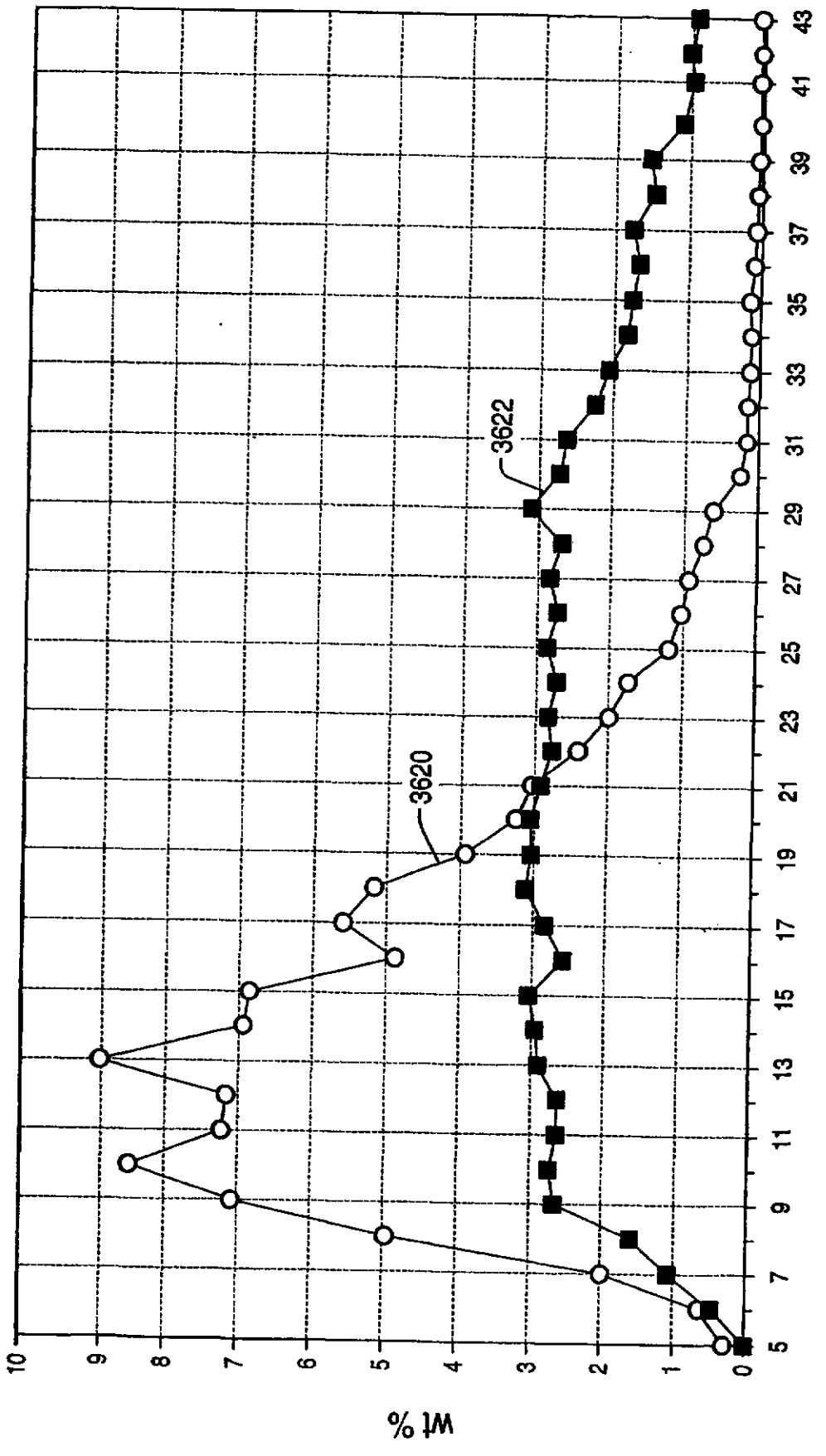

3622
3620
wt %
C #
0
1
2
3
4
5
6
7
8
9
10
5
7
9
11
13
15
17
19
21
23
25
27
29
31
33
35
37
39
41
43

FIG. 112

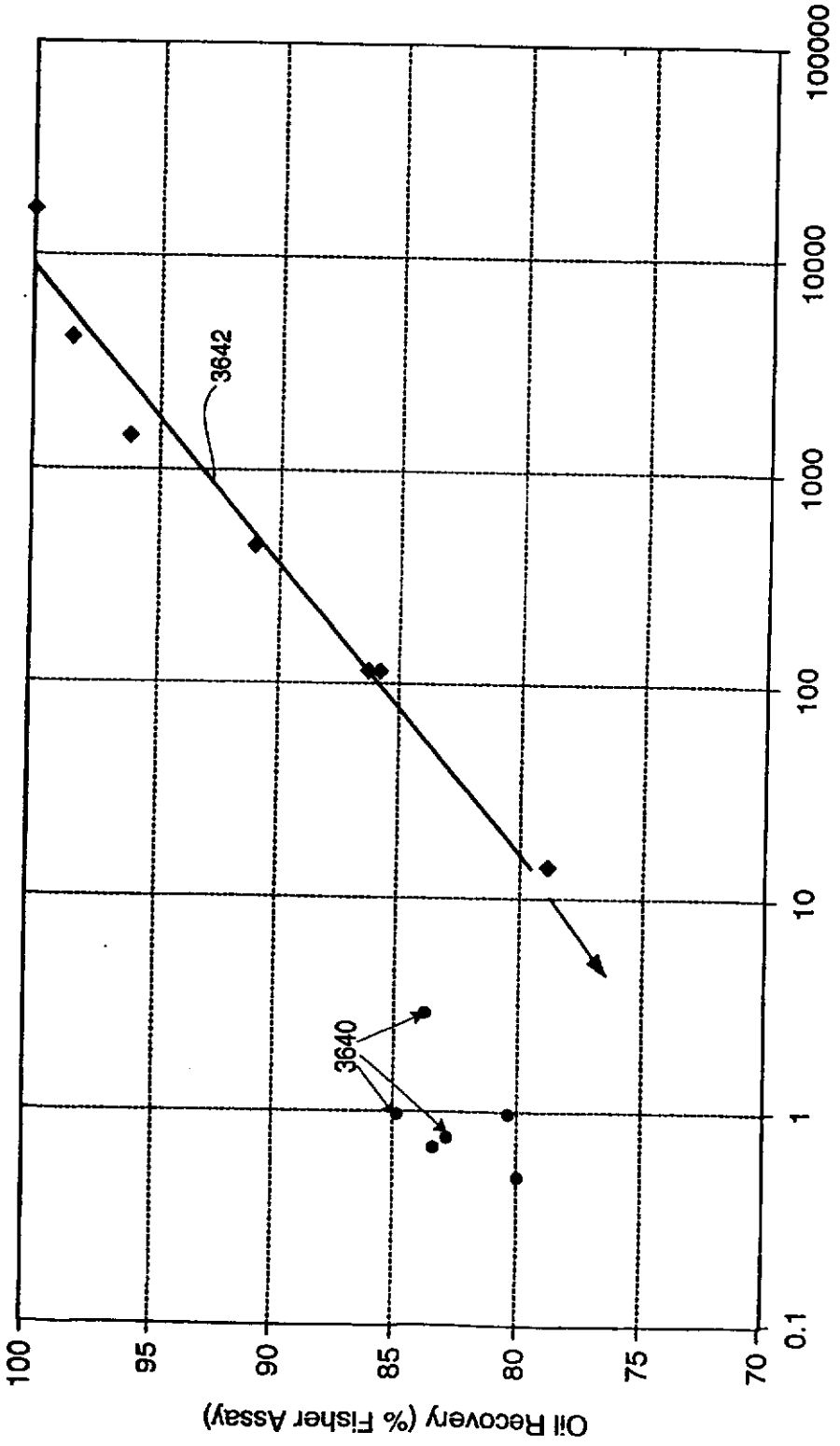

Oil Recovery (% Fisher Assay)
100
95
90
85
80
75
70
Heating Rate (°C/day)
0.1
1
10
100
1000
10000
100000
3642
3640

FIG. 113

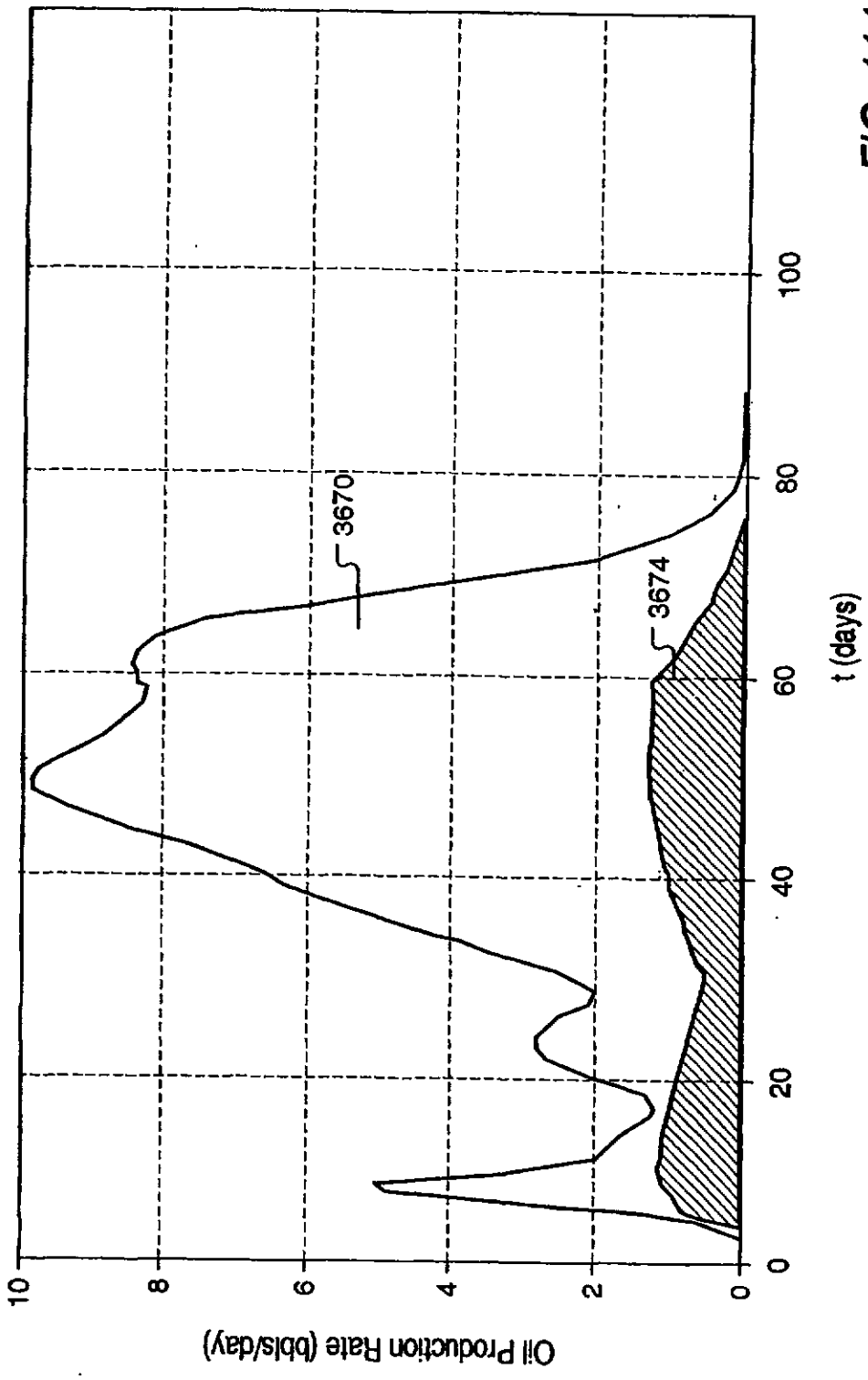

Oil Production Rate (bbls/day)
0
2
4
6
8
10
0
20
40
60
80
100
t (days)
3670
3674

FIG. 114

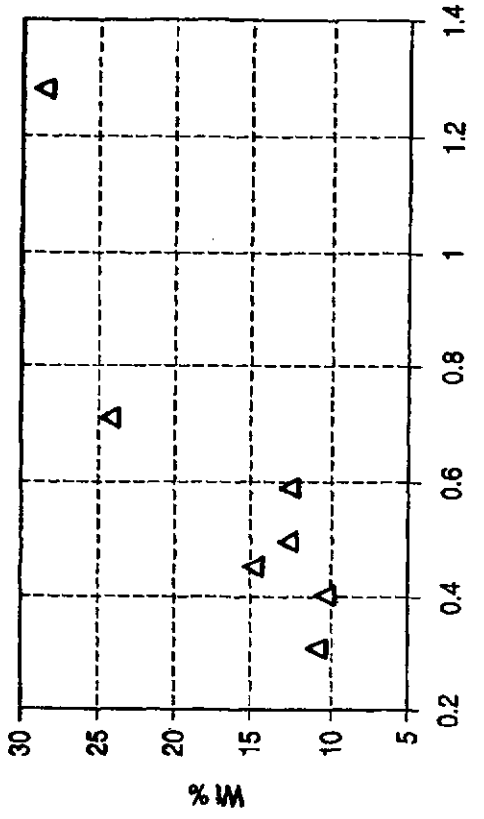


FIG. 116

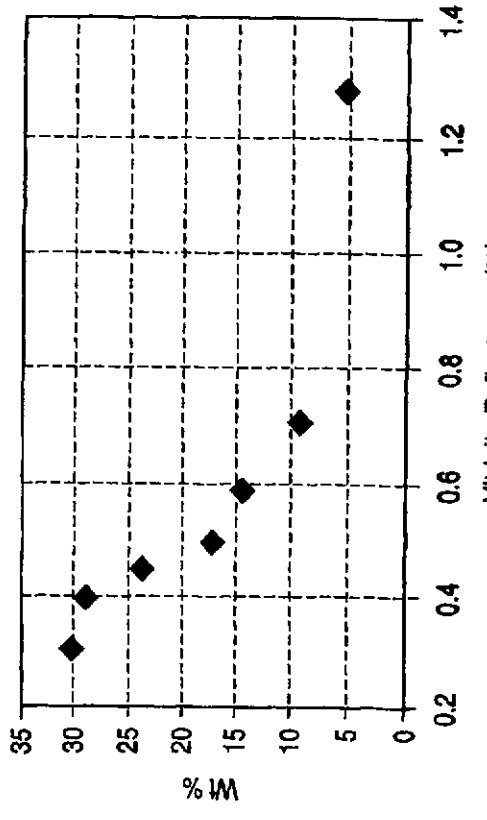


FIG. 118

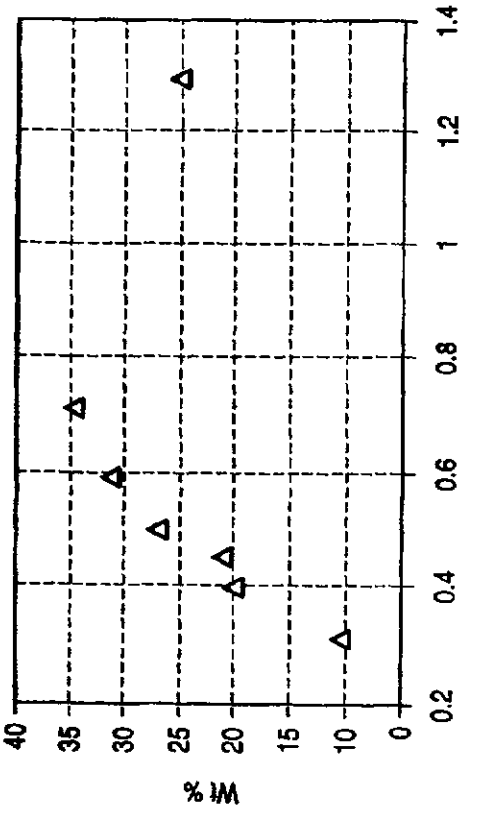


FIG. 115

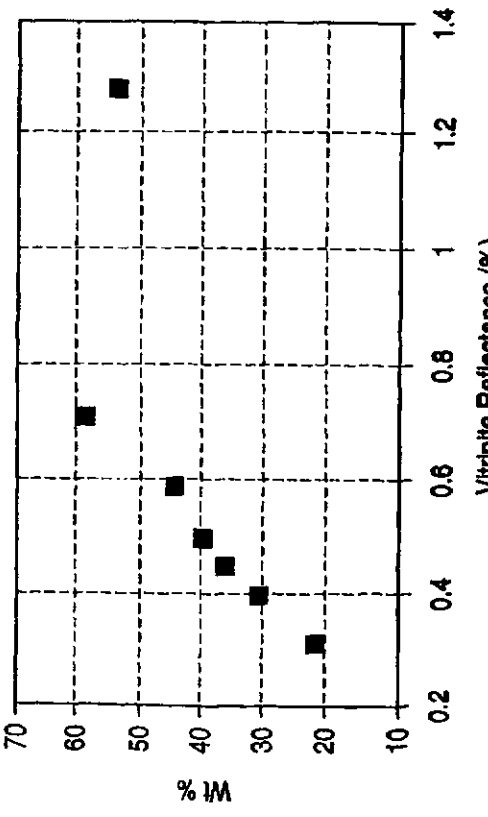


FIG. 117

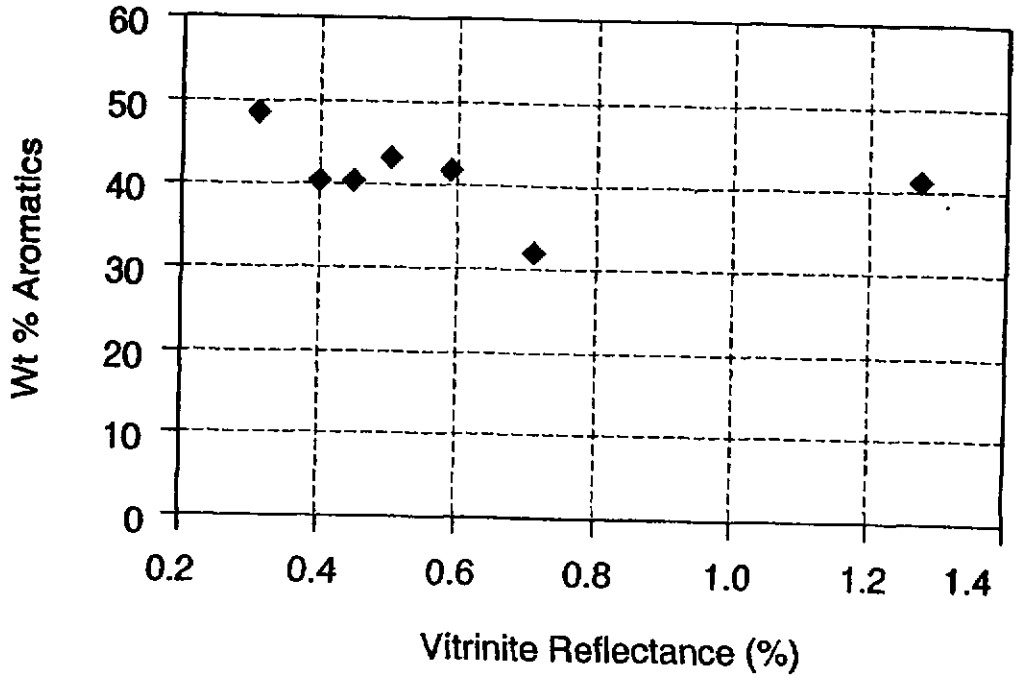


FIG. 119

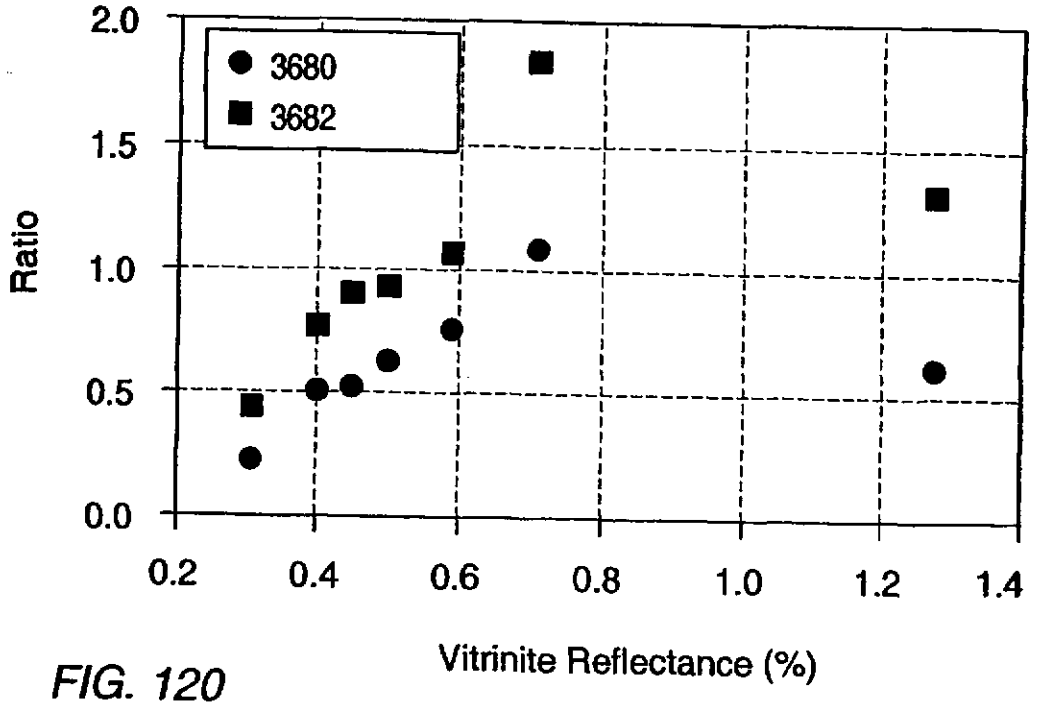


FIG. 120

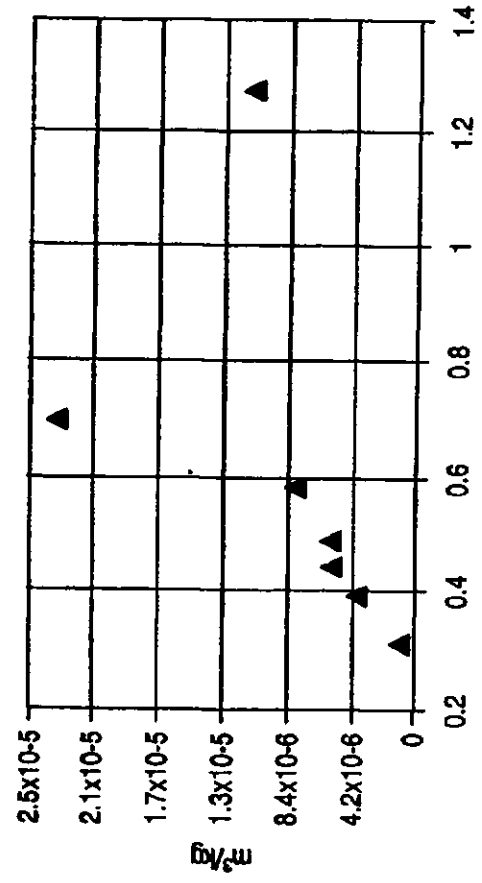


FIG. 122

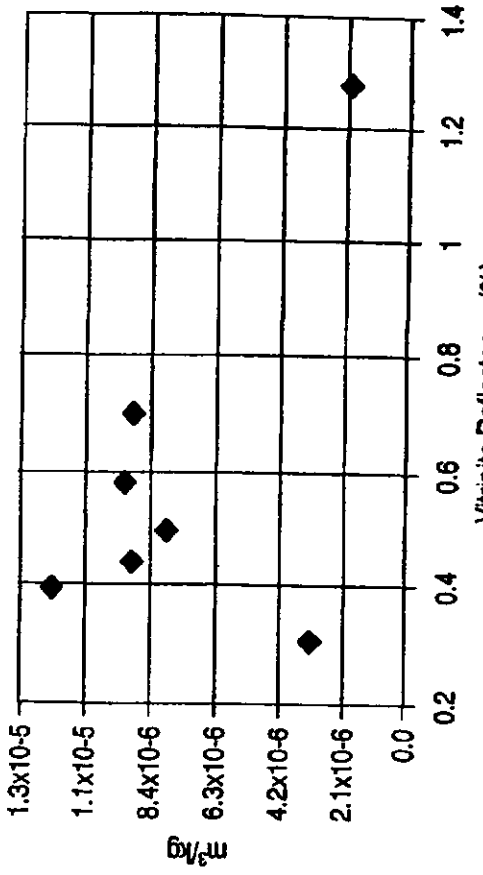


FIG. 124

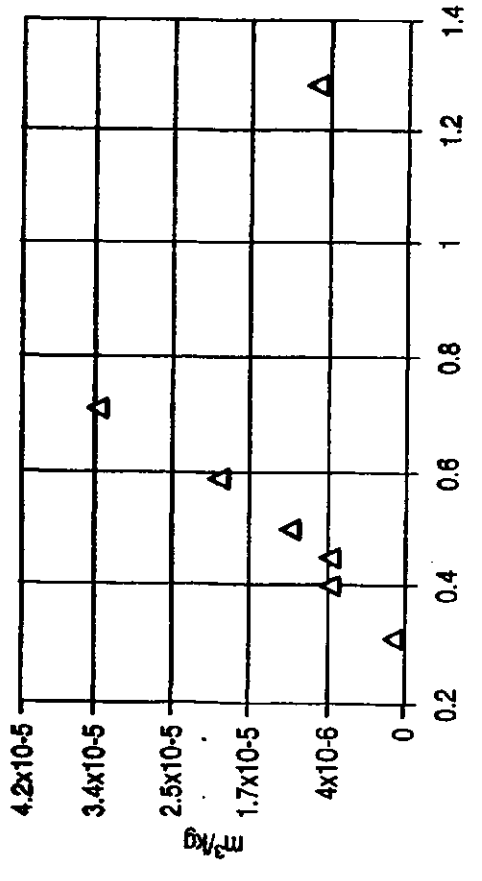


FIG. 121

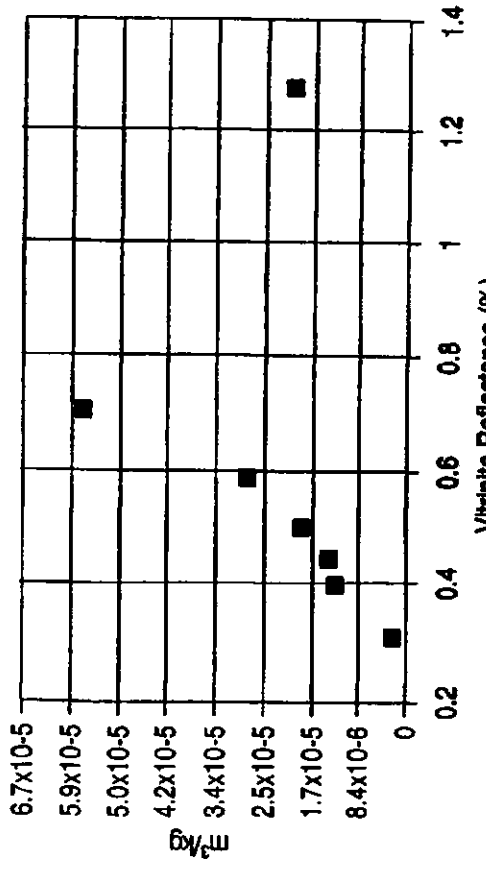


FIG. 123

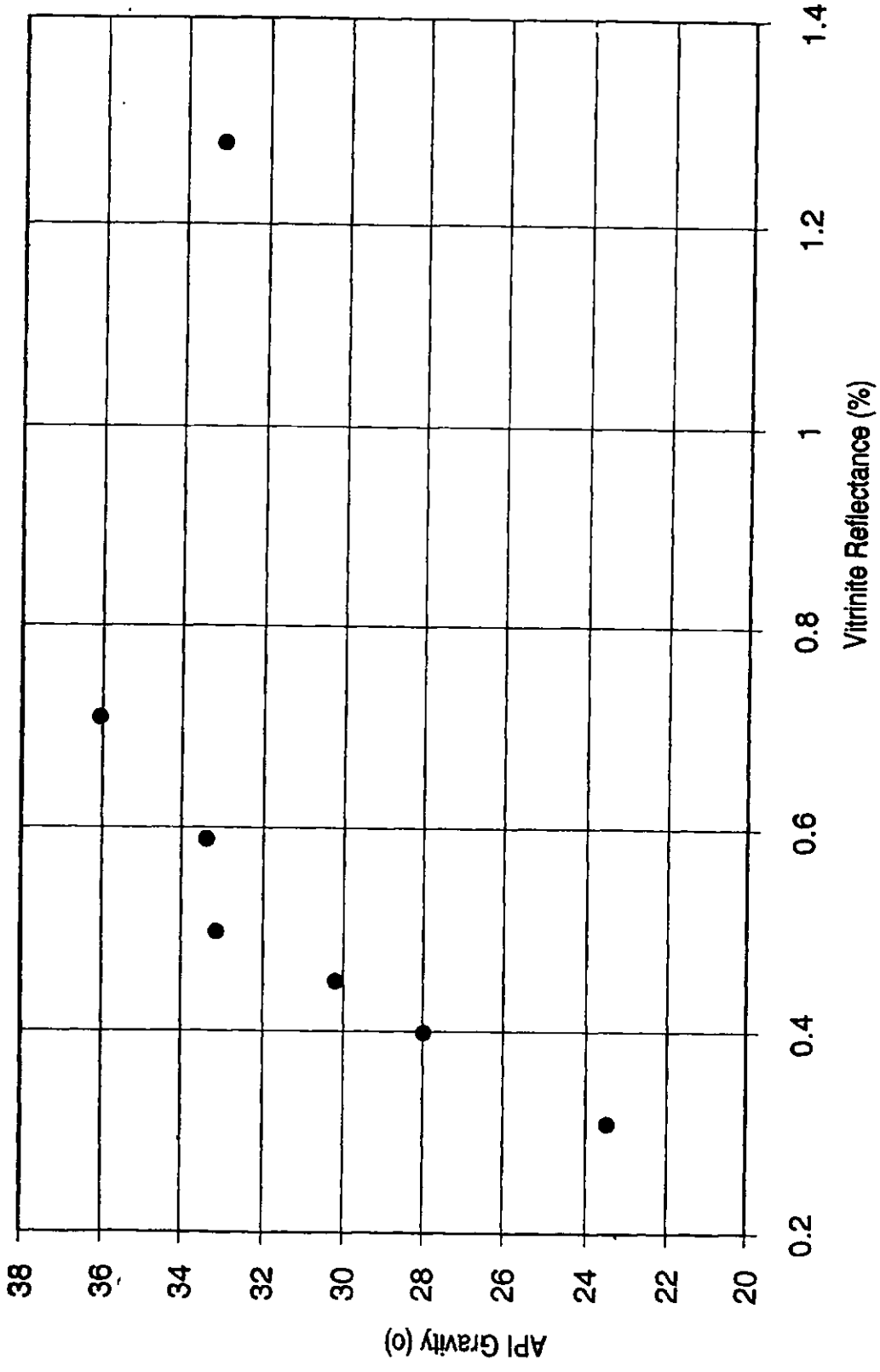

API Gravity (o)
38
36
34
32
30
28
26
24
22
20
Vitrinite Reflectance (%)
0.2
0.4
0.6
0.8
1
1.2
1.4

FIG. 125

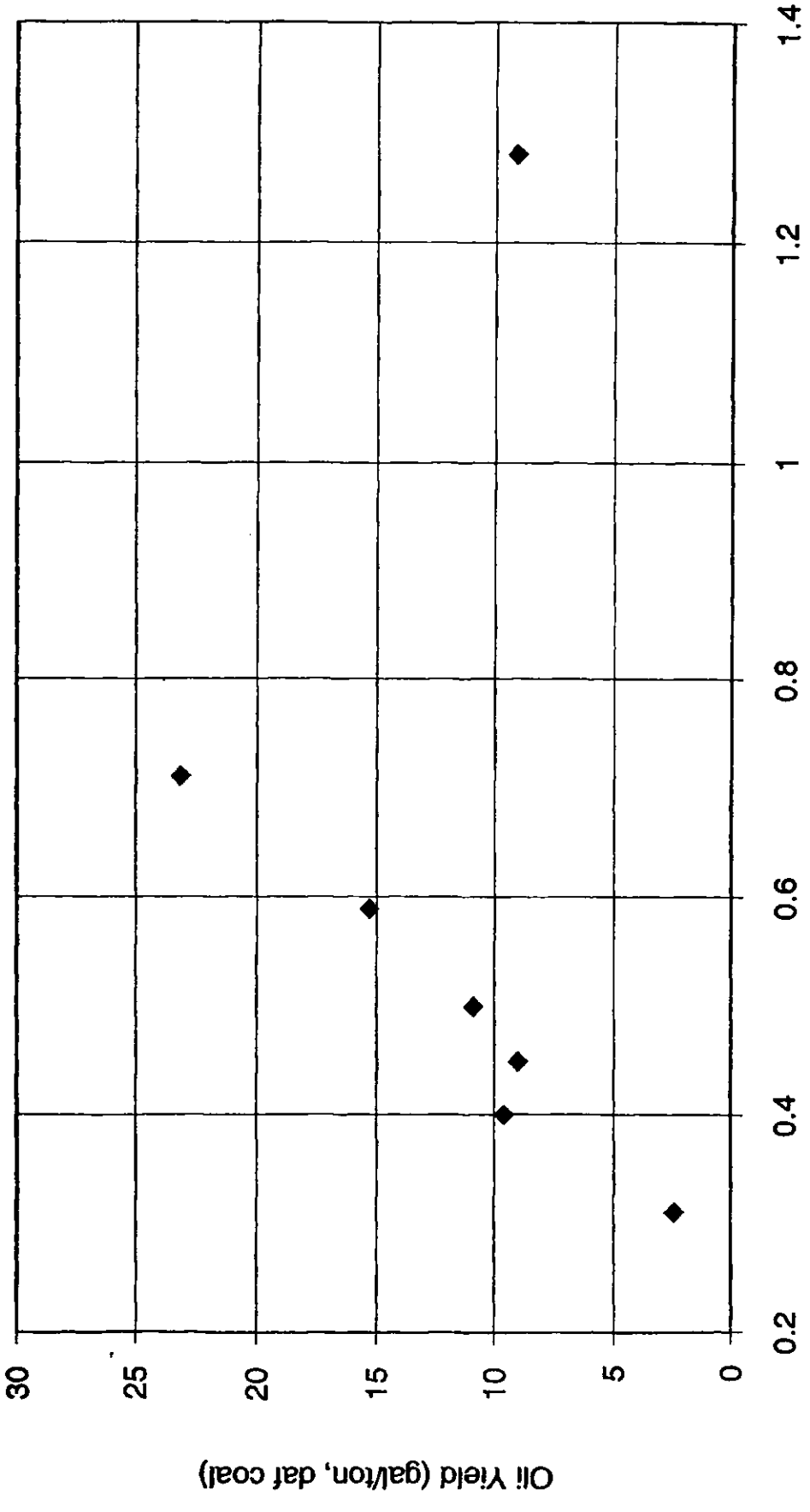

Oil Yield (gal/ton, daf coal)
30
25
20
15
10
5
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Vitrinite Reflectance (%)

FIG. 126

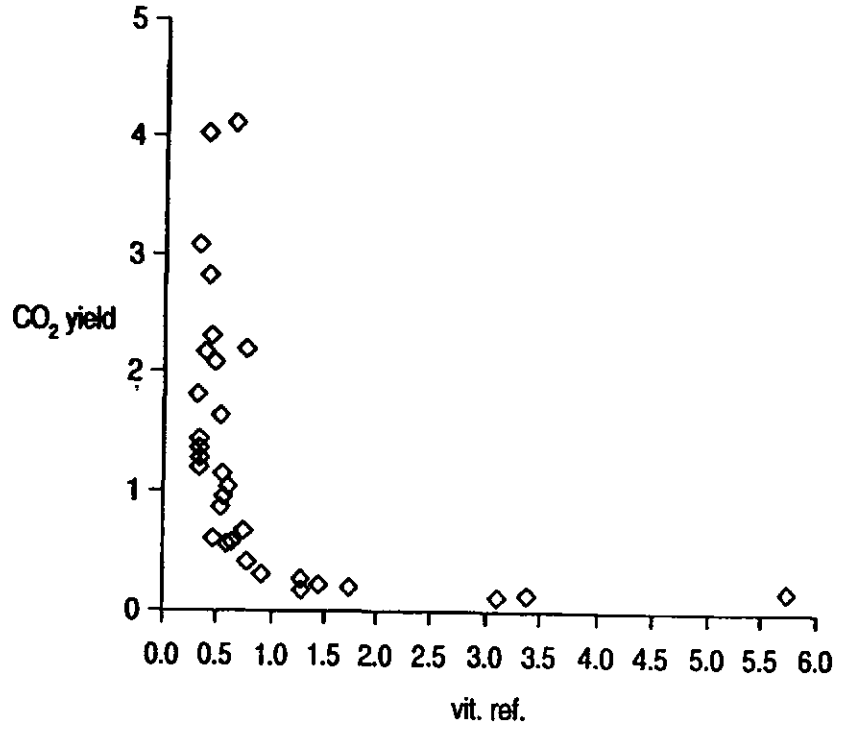


FIG. 127

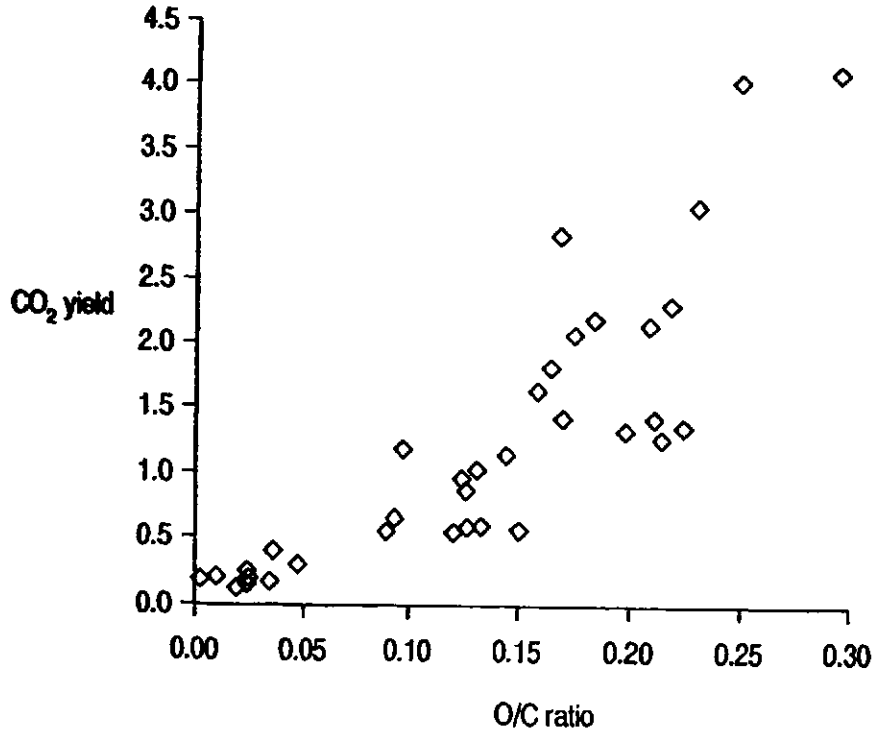


FIG. 128

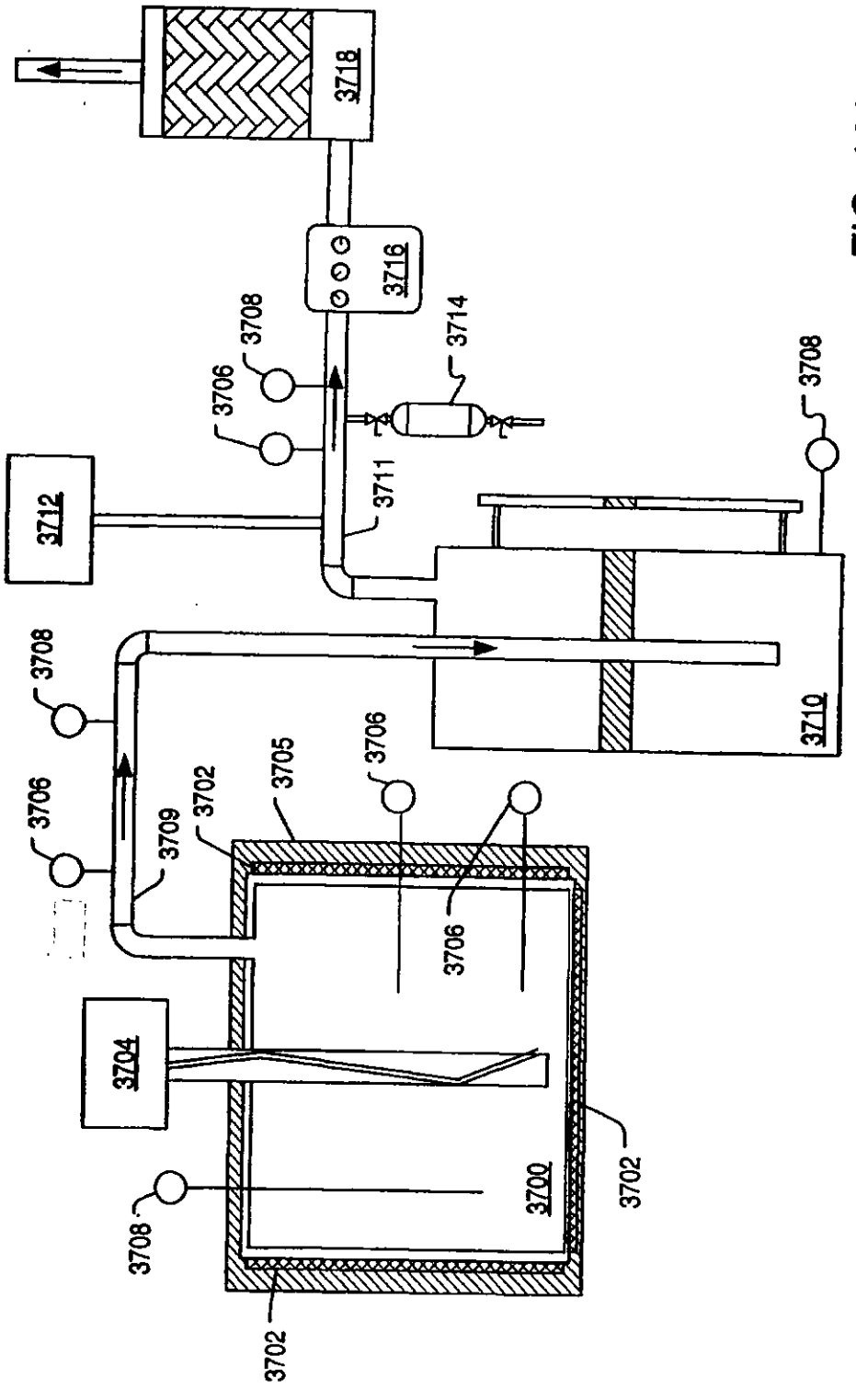

3718
3716
3708
3706
3714
3712
3711
3710
3705
3709
3702
3704
3700

FIG. 129

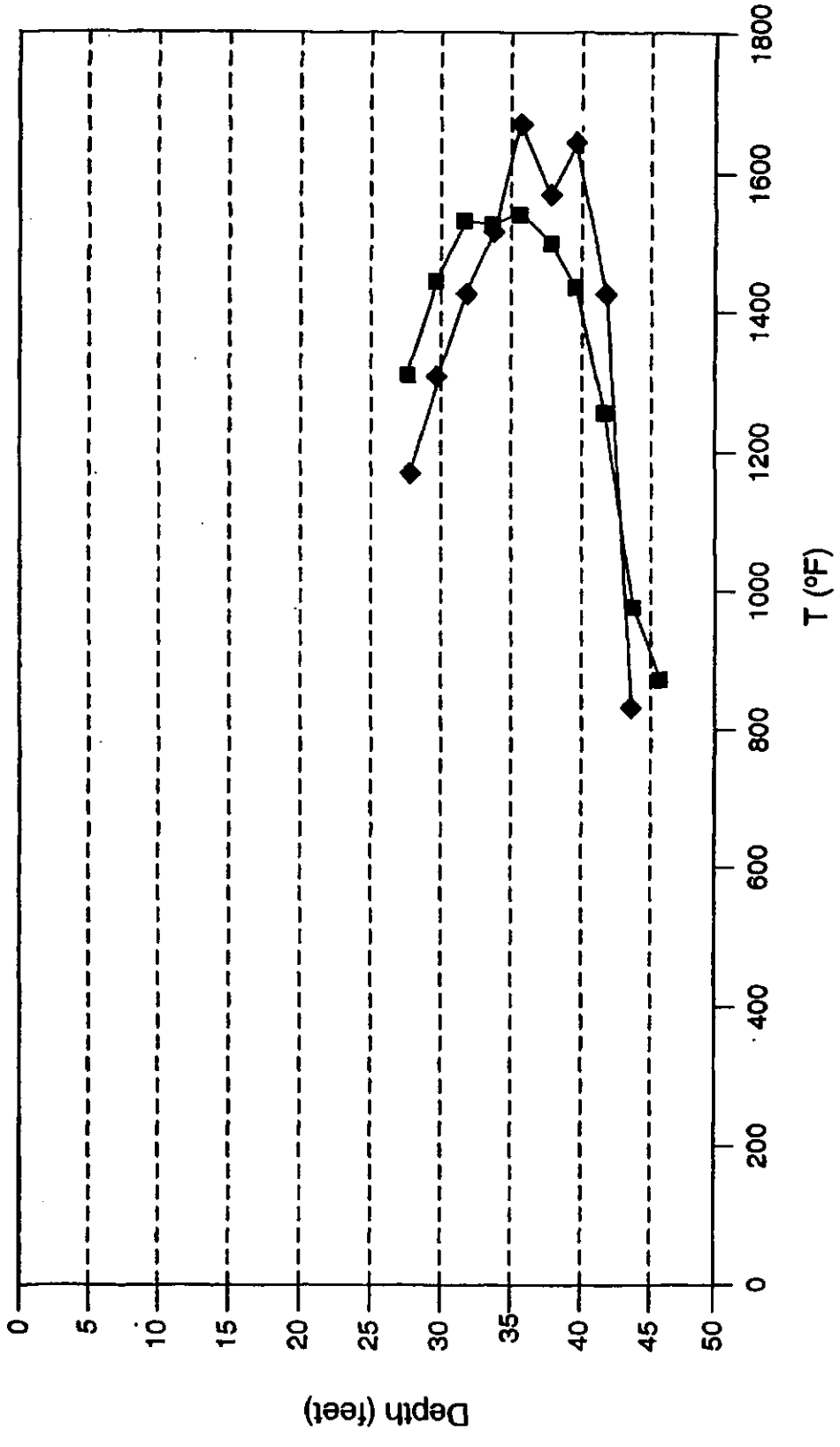

Depth (feet)
0
5
10
15
20
25
30
35
40
45
50
T (°F)
0
200
400
600
800
1000
1200
1400
1600
1800

FIG. 130

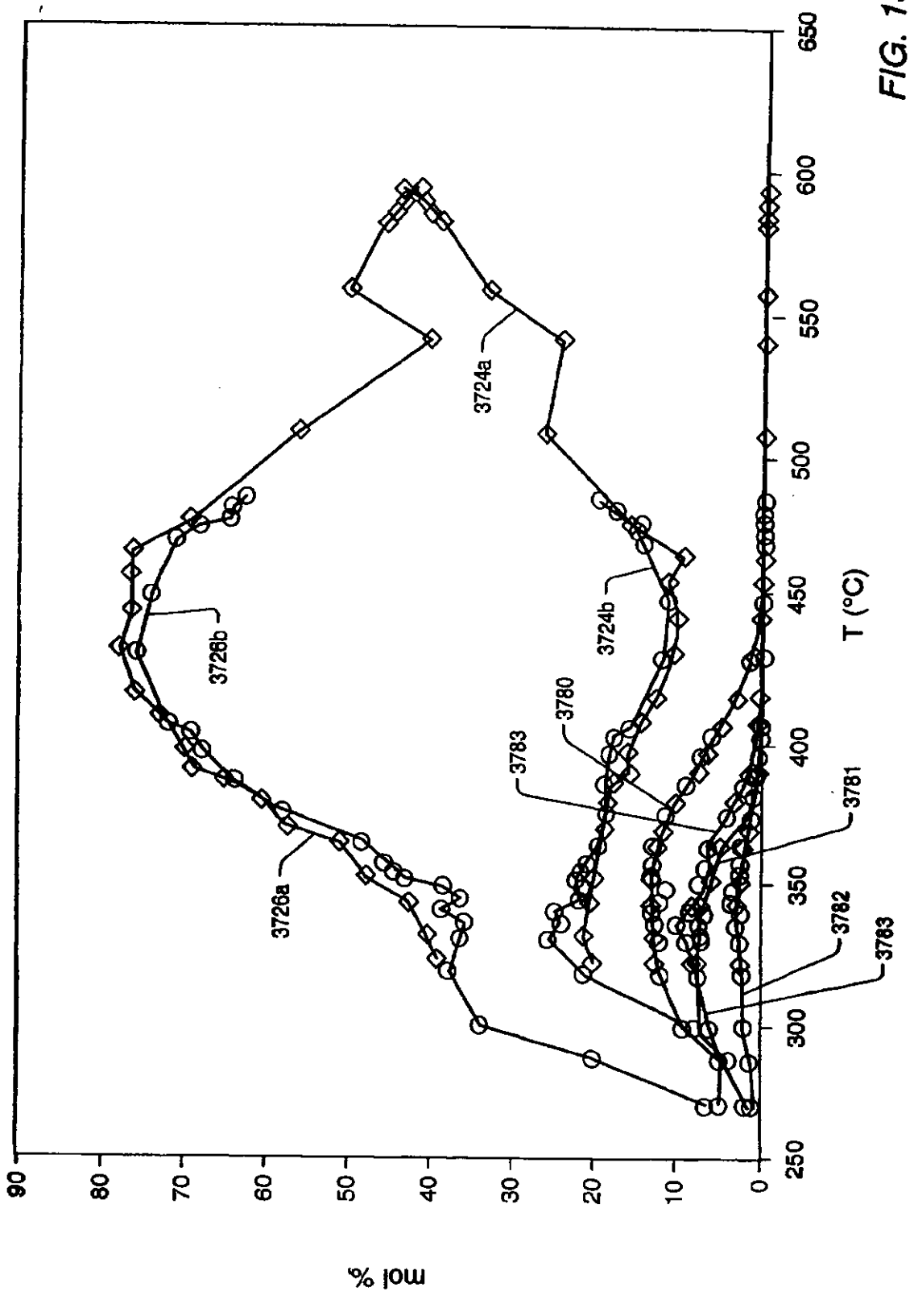

mol %
90
80
70
60
50
40
30
20
10
0
250
300
350
400
450
500
550
600
650
T (°C)
3726a
3728b
3724a
3724b
3780
3783
3781
3782
3783

FIG. 131

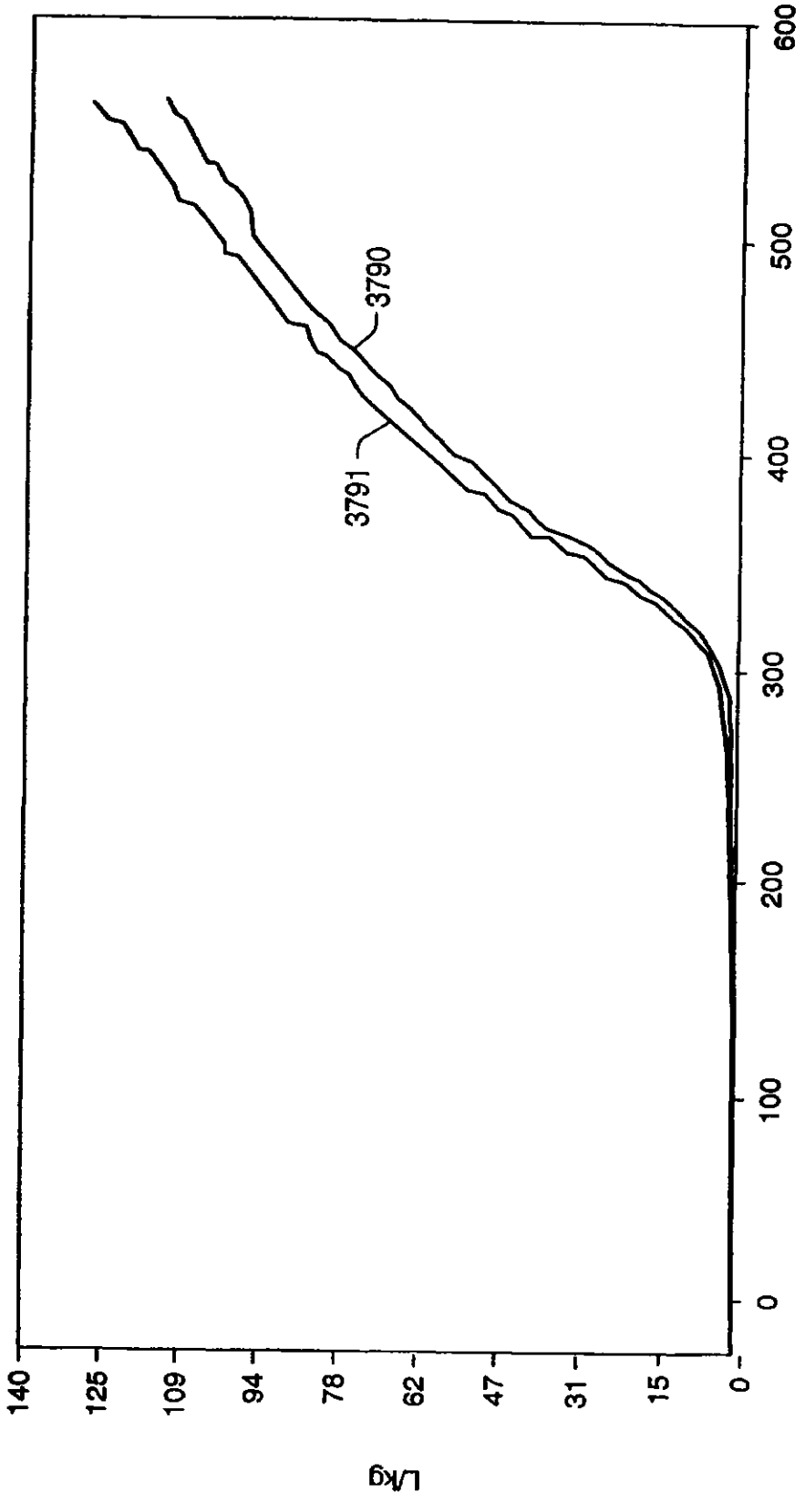

140
125
109
94
78
62
47
31
15
0
L/kg
0
100
200
300
400
500
600
T (°C)
3790
3791

FIG. 132

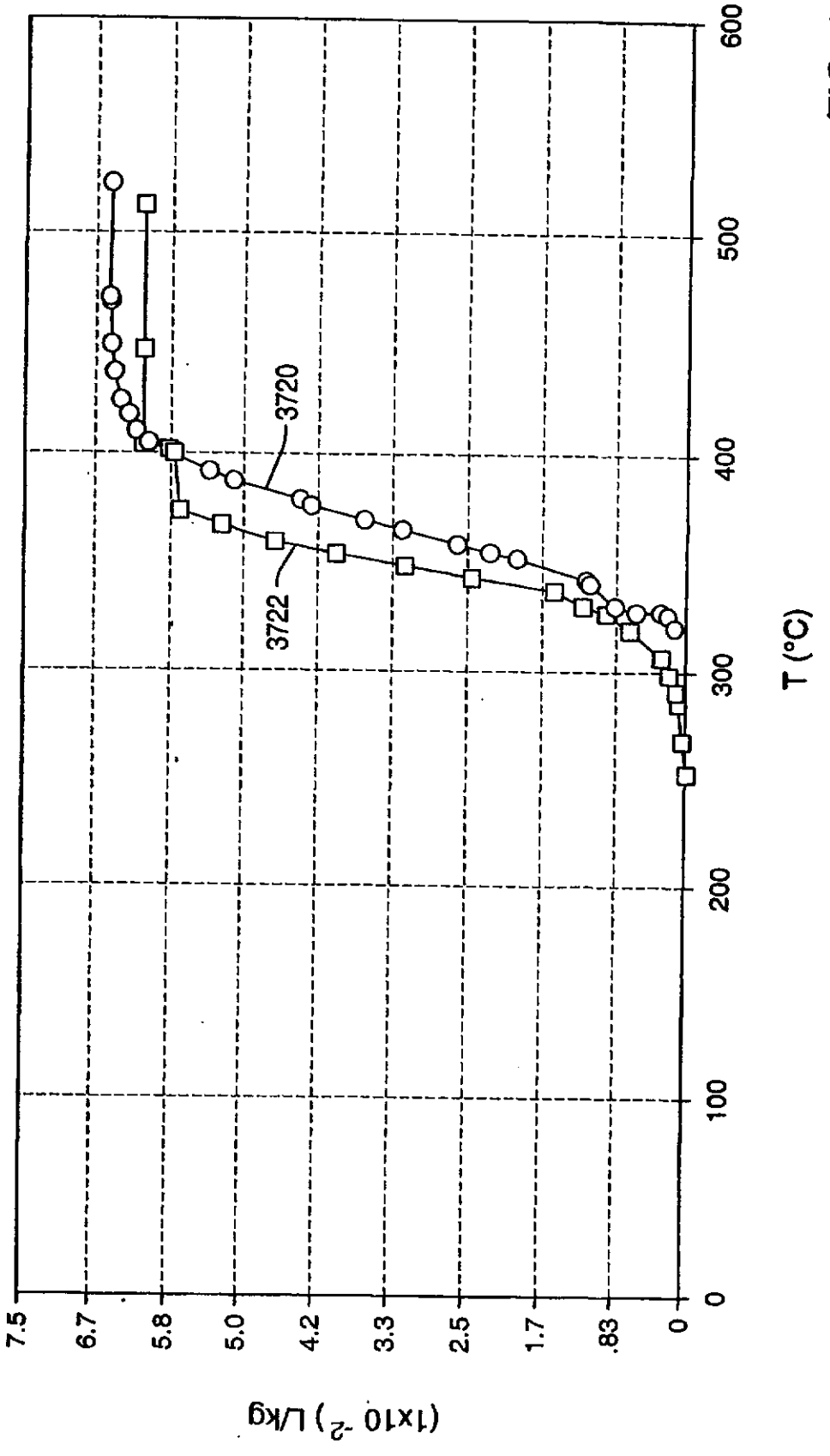

3720
3722
T (°C)
0
100
200
300
400
500
600
7.5
6.7
5.8
5.0
4.2
3.3
2.5
1.7
.83
0
(1x10 -2) L/kg

FIG. 133

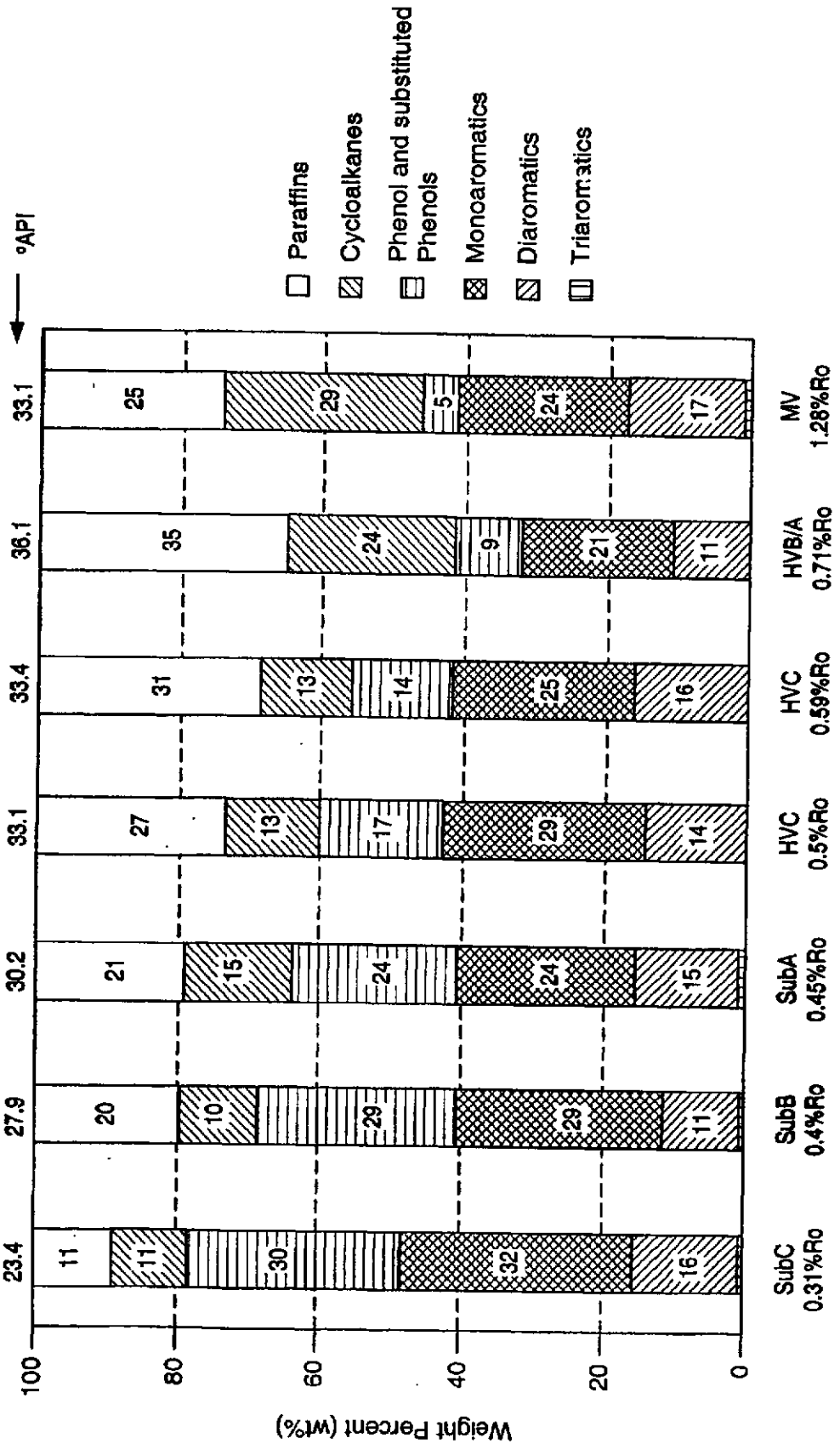

Paraffins
Cycloalkanes
Phenol and substituted Phenols
Monoaromatics
Diaromatics
Triaromatics
°API
Weight Percent (wt%)
100
80
60
40
20
0
23.4
27.9
30.2
33.1
33.4
36.1
33.1
11
11
30
32
16
SubC
0.31%Ro
20
10
29
29
11
SubB
0.4%Ro
21
15
24
24
15
SubA
0.45%Ro
27
13
17
29
14
HVC
0.5%Ro
31
13
14
25
16
HVC
0.59%Ro
35
24
9
21
11
HVB/A
0.71%Ro
25
29
5
24
17
MV
1.28%Ro

FIG. 134

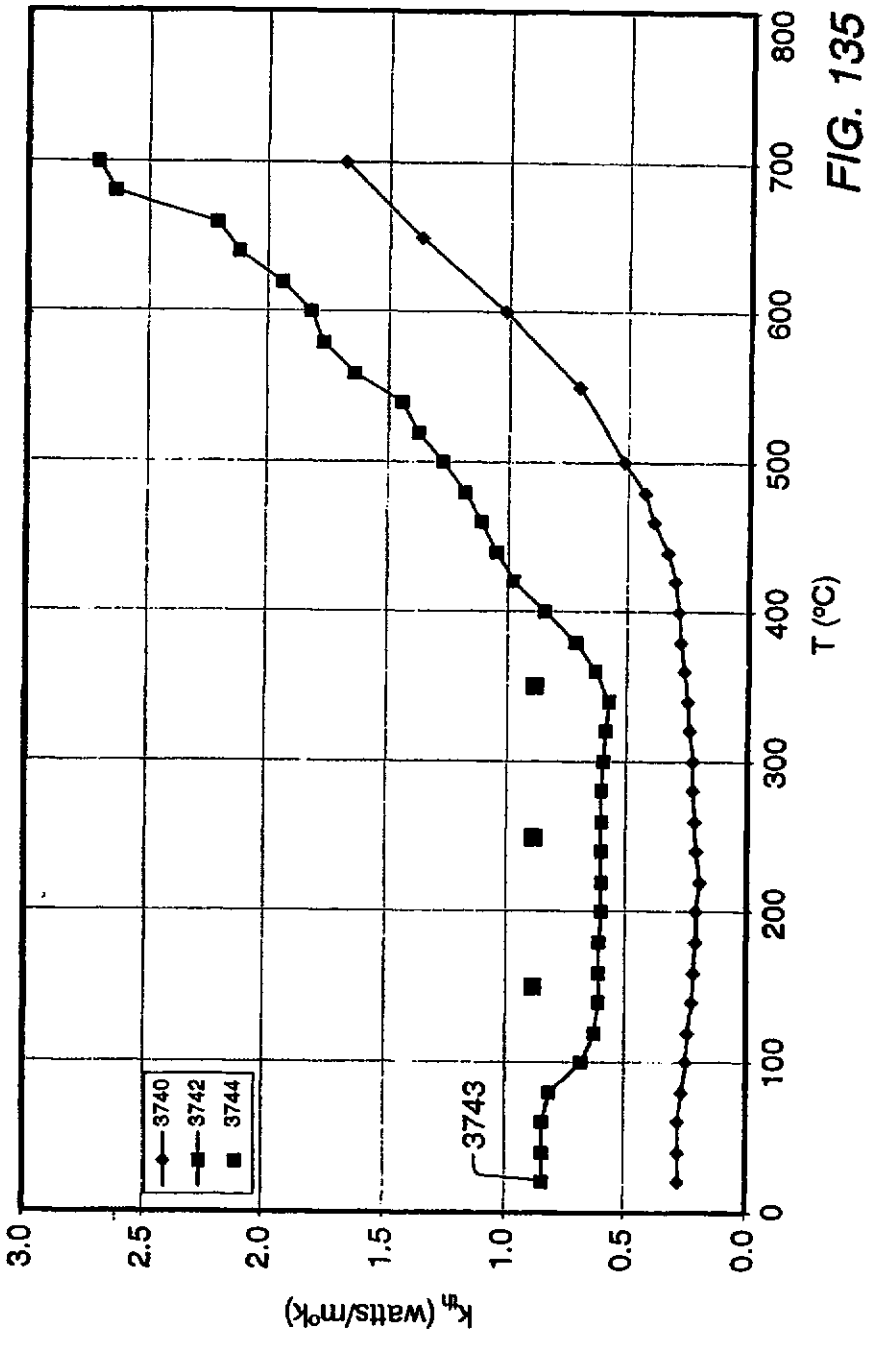

3740
3742
3744
3743
3.0
2.5
2.0
1.5
1.0
0.5
0.0
k_{th} (watts/m°k)
0
100
200
300
400
500
600
700
800
T (°C)

FIG. 135

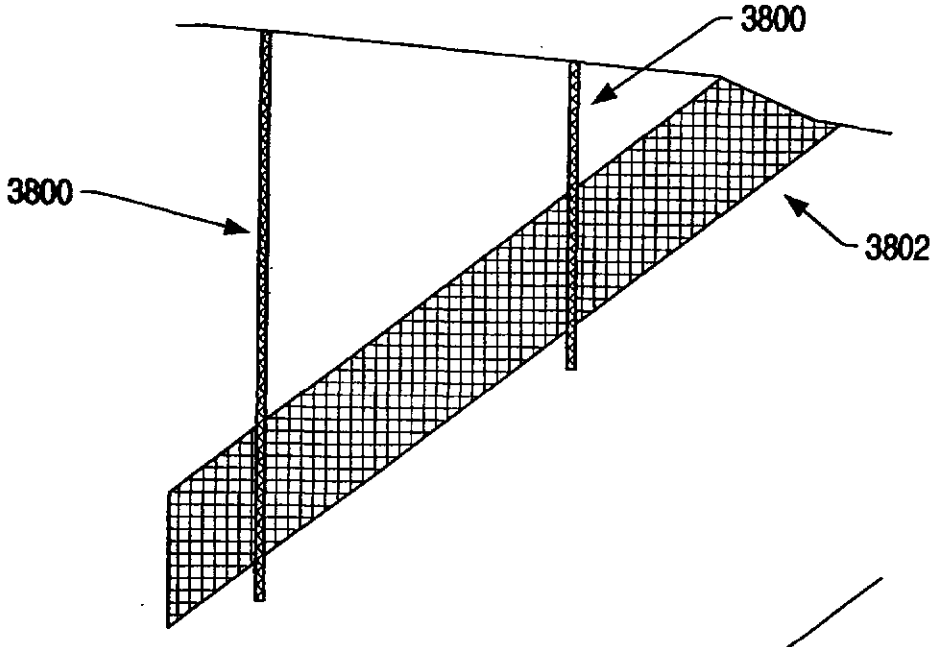


FIG. 136

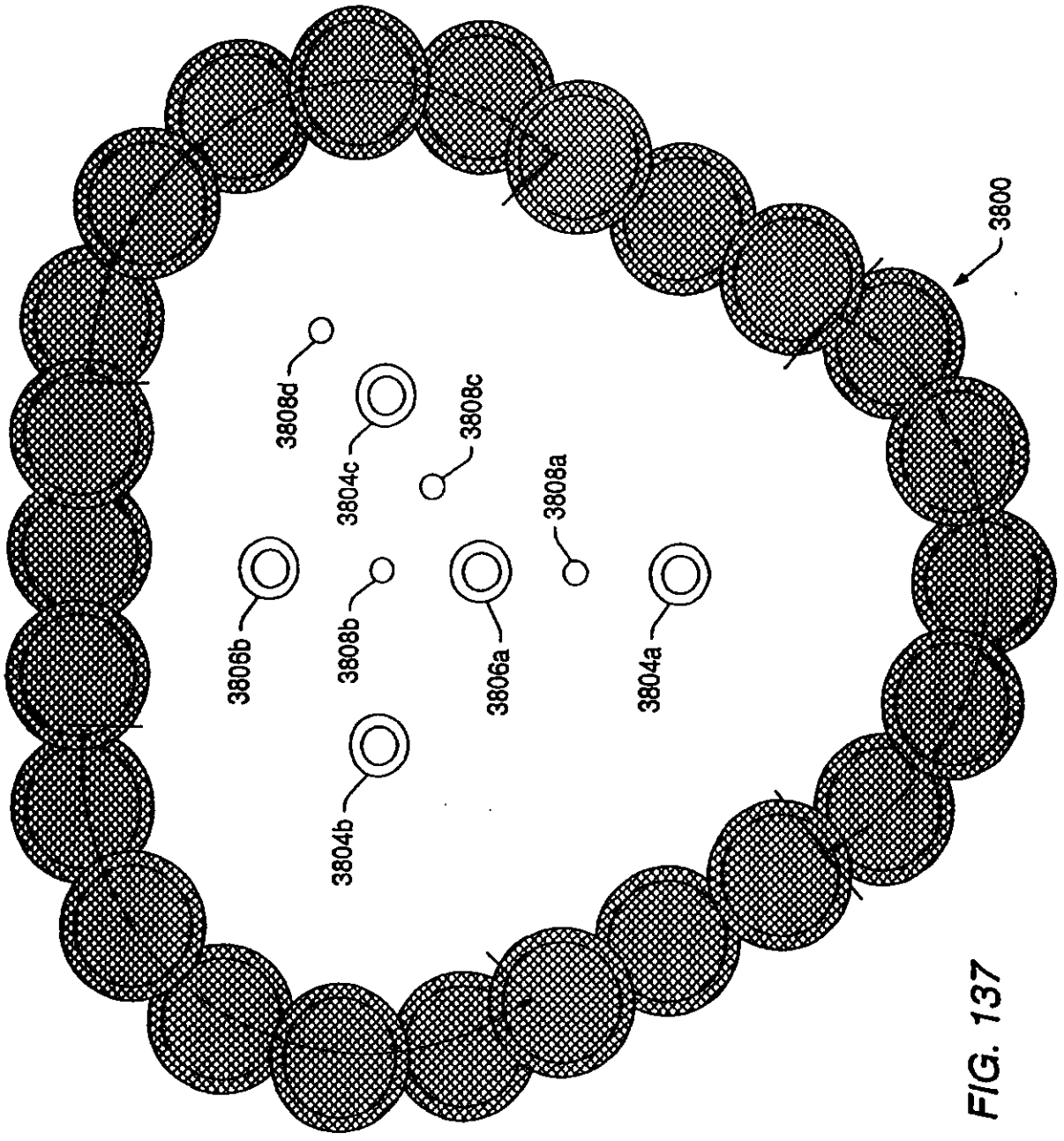


FIG. 137

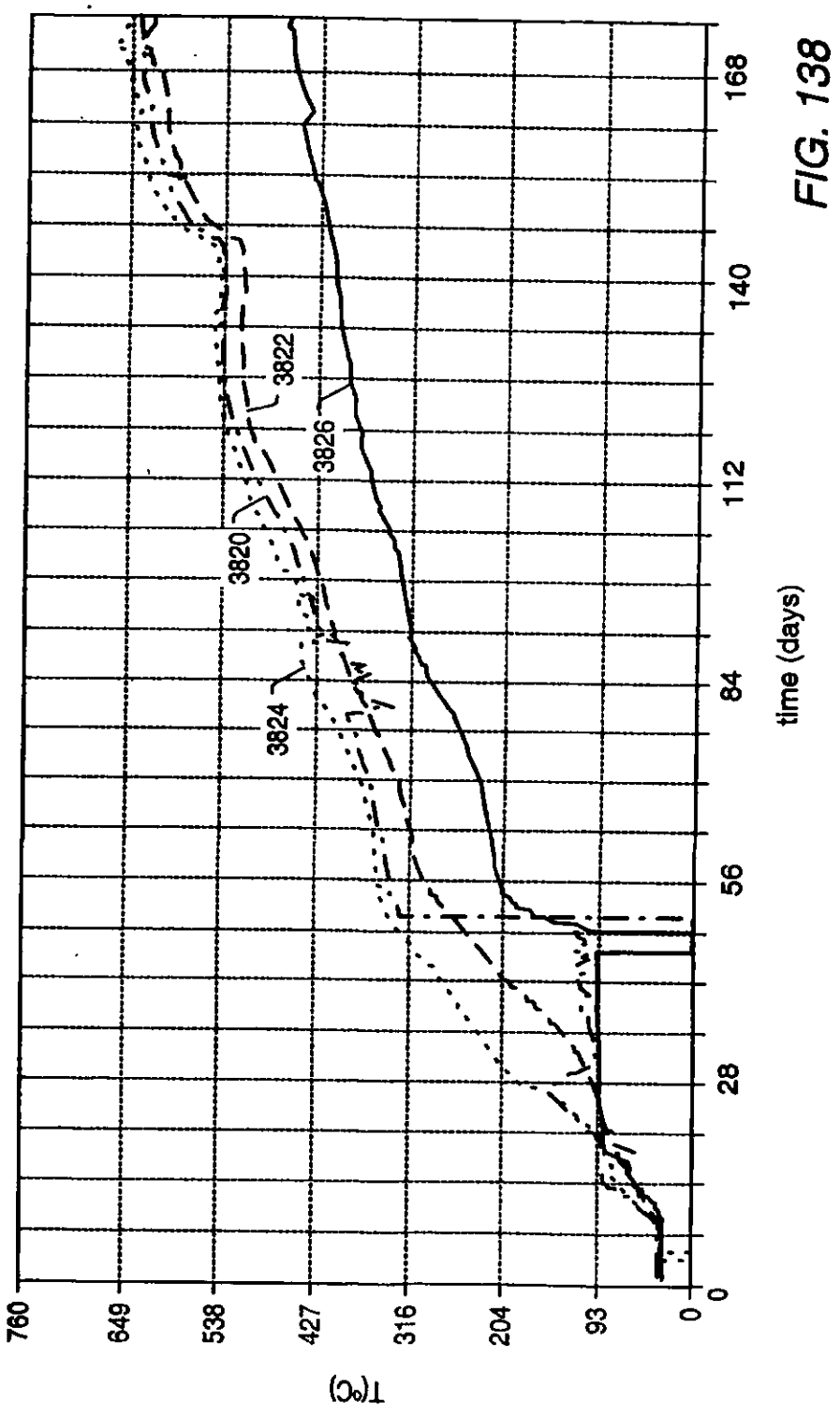

760
649
538
427
316
204
93
0
T(°C)
0
28
56
84
112
140
168
time (days)
3820
3822
3824
3826

FIG. 138

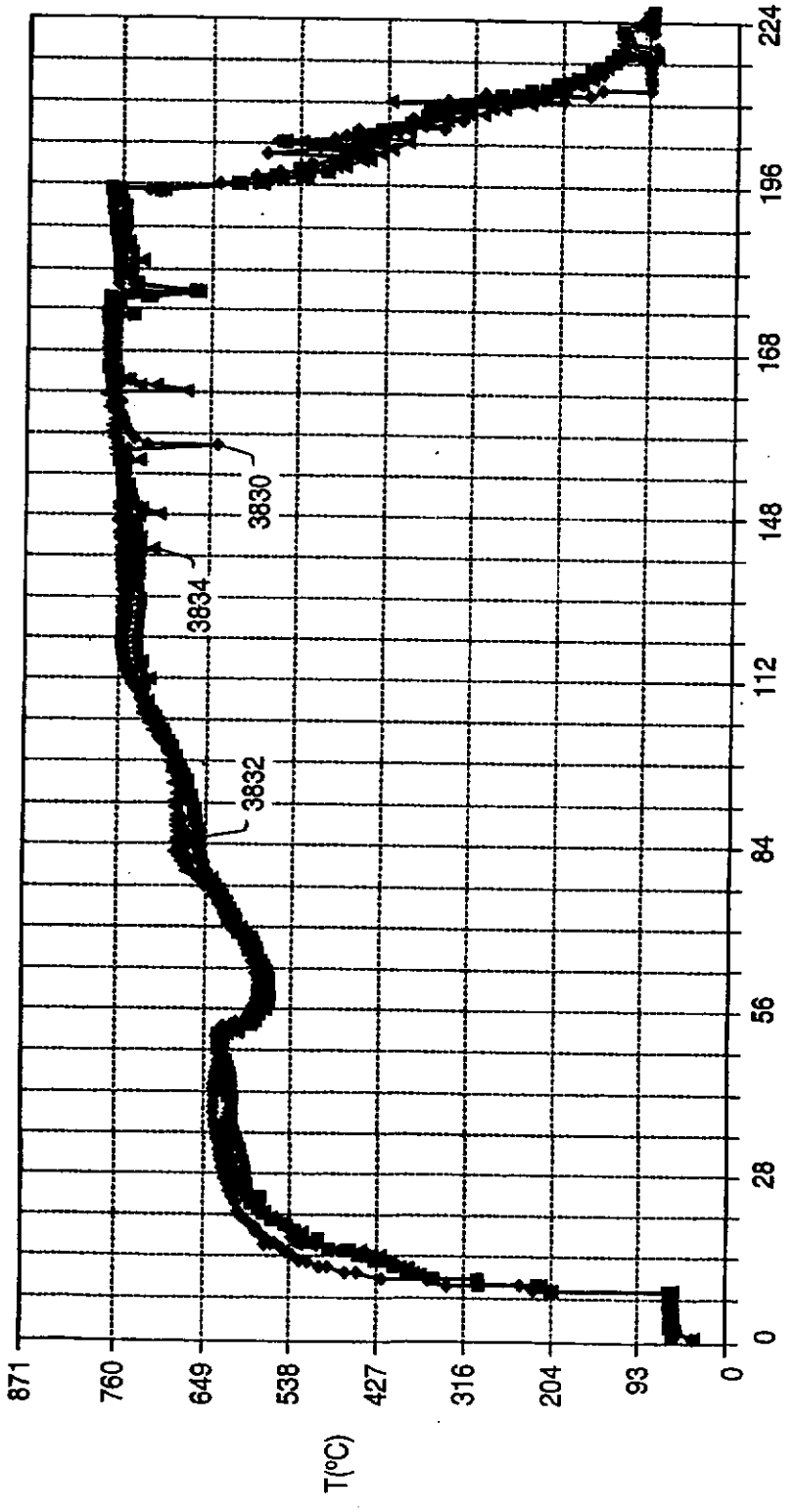

871
760
649
538
427
316
204
93
0
T(°C)
0
28
56
84
112
148
168
196
224
time (days)
3830
3834
3832

FIG. 139

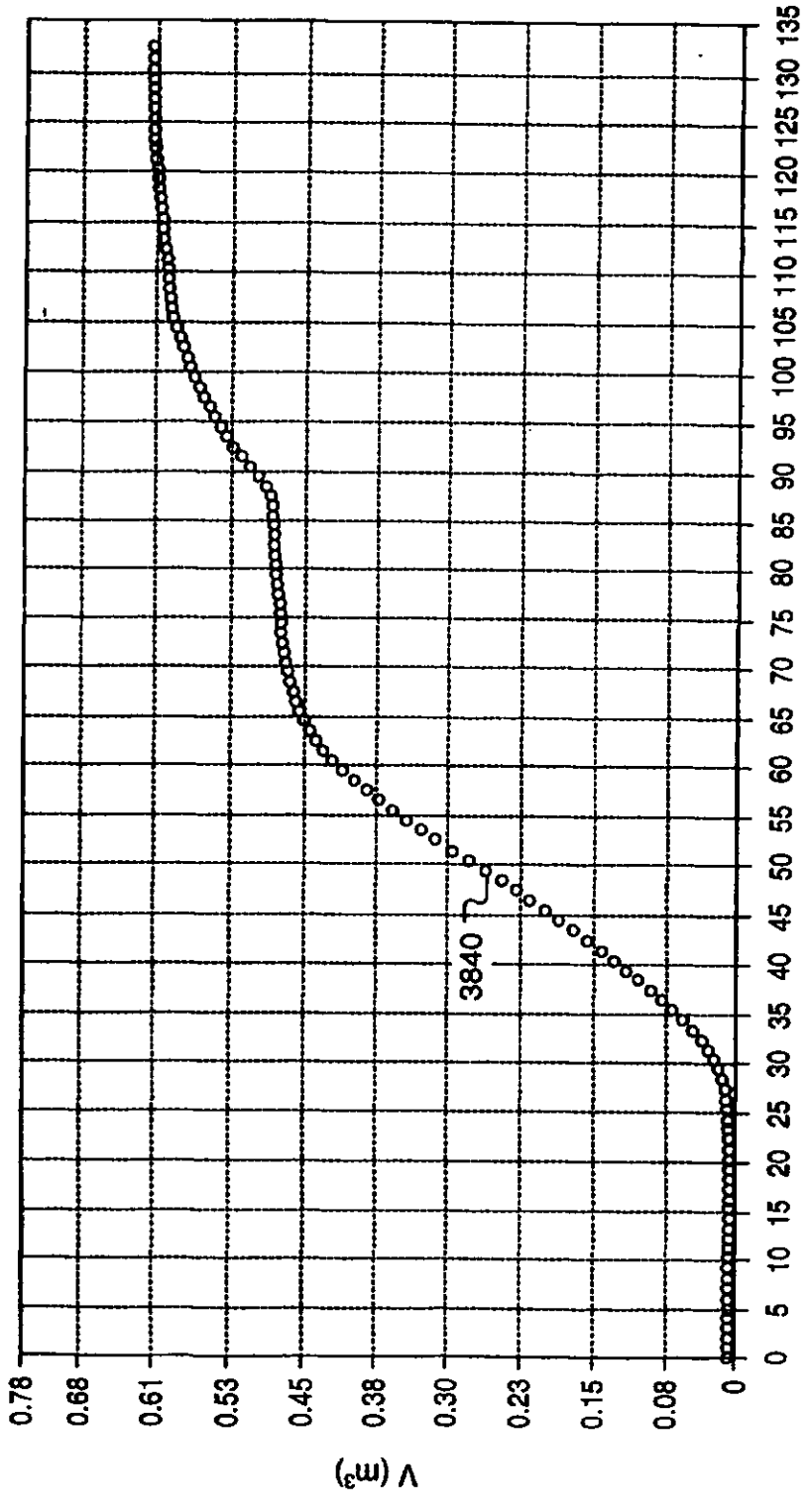

V (m³)
0.78
0.68
0.61
0.53
0.45
0.38
0.30
0.23
0.15
0.08
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135
time (days)
3840

FIG. 140

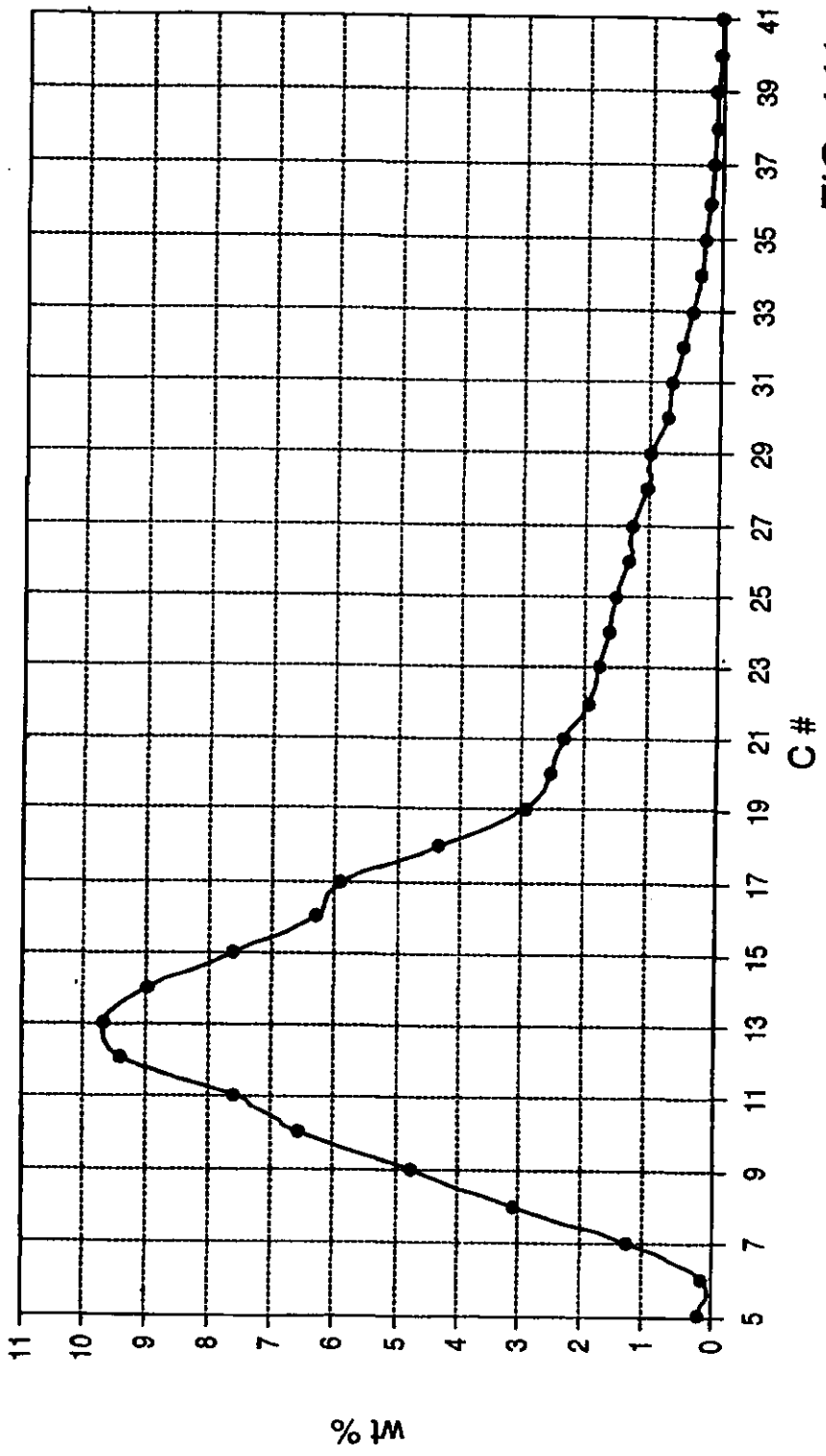

wt %
0
1
2
3
4
5
6
7
8
9
10
11
C #
5
7
9
11
13
15
17
19
21
23
25
27
29
31
33
35
37
39
41

FIG. 141

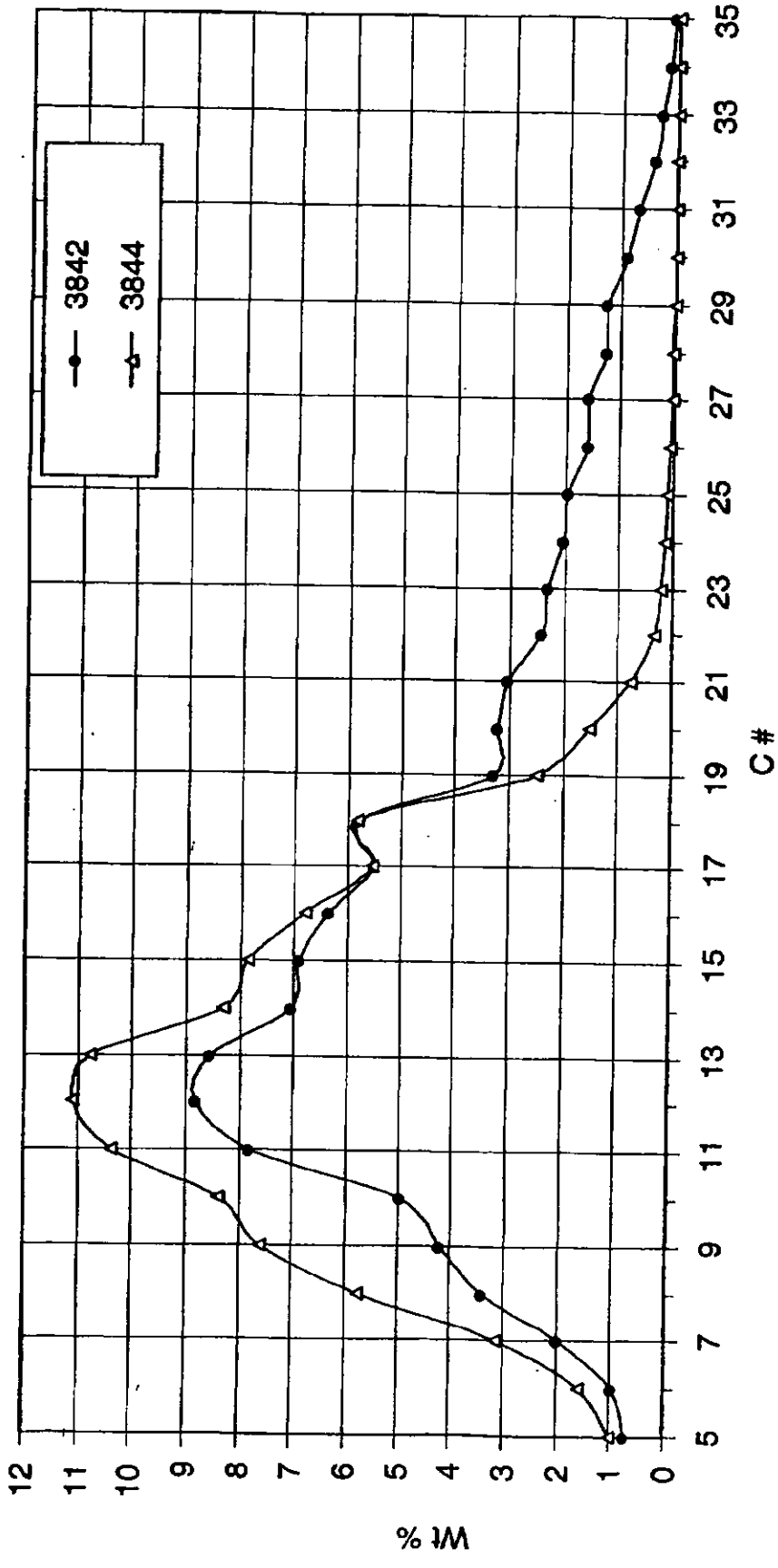

3842
3844
Wt %
C #
0
1
2
3
4
5
6
7
8
9
10
11
12
5
7
9
11
13
15
17
19
21
23
25
27
29
31
33
35

FIG. 142

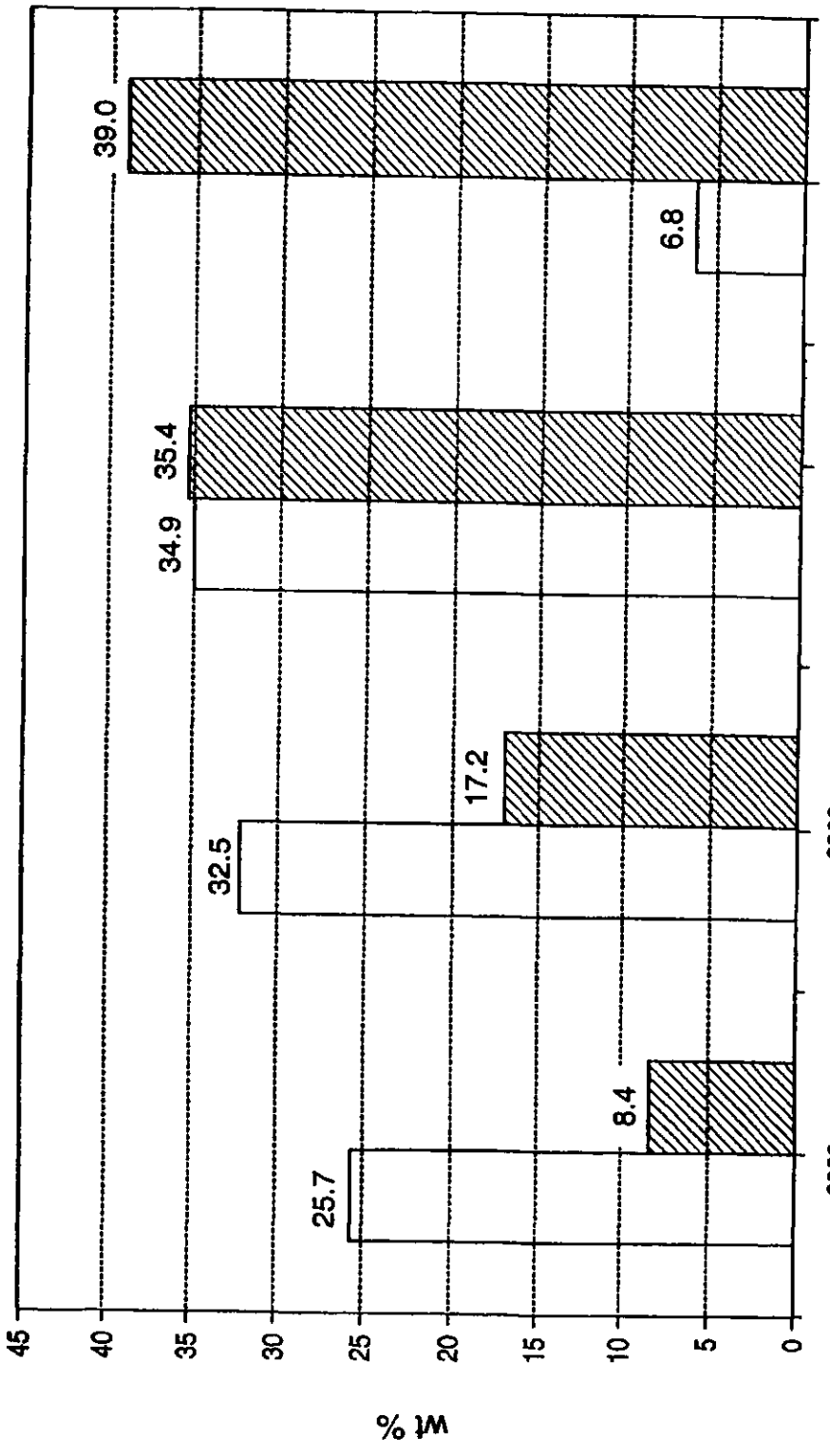

39.0
6.8
3866
35.4
34.9
3864
17.2
32.5
3862
8.4
25.7
3860
45
40
35
30
25
20
15
10
5
0
wt %

FIG. 143

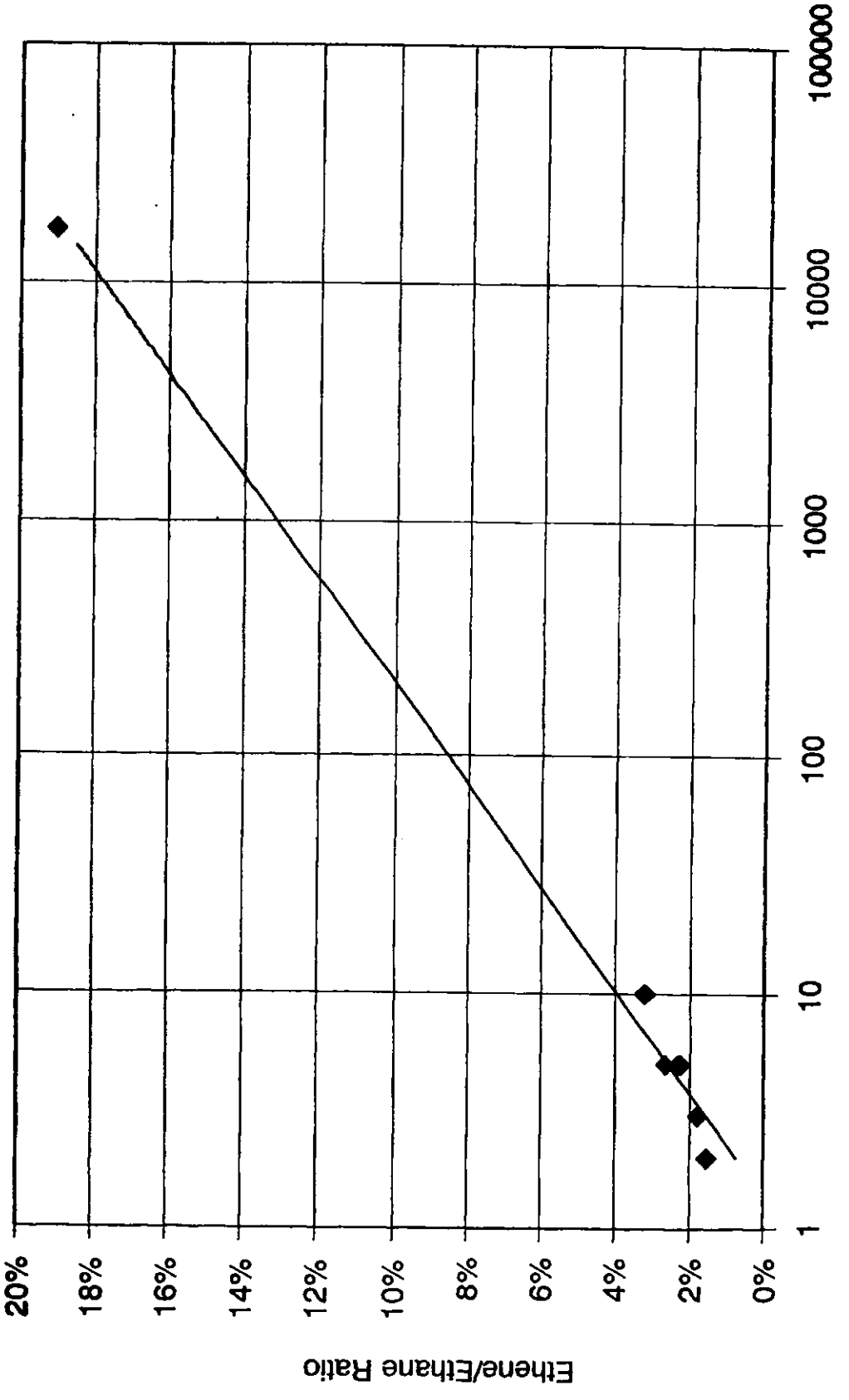

Ethene/Ethane Ratio
20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
1
10
100
1000
10000
100000
°C/day

FIG. 144

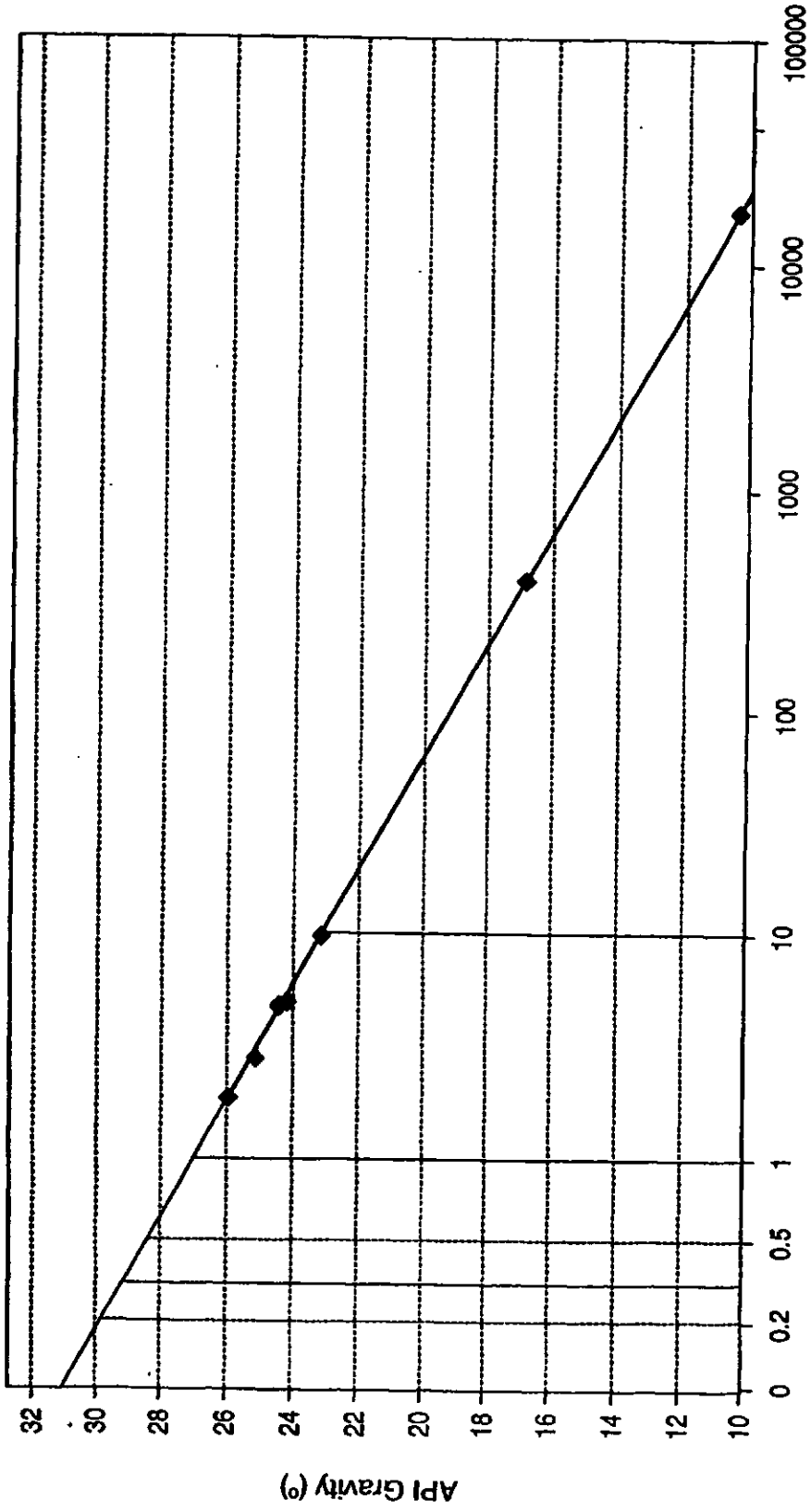

API Gravity (°)
32
30
28
26
24
22
20
18
16
14
12
10
Heating Rate (°C/day)
0
0.2
0.5
1
10
100
1000
10000
100000

FIG. 145

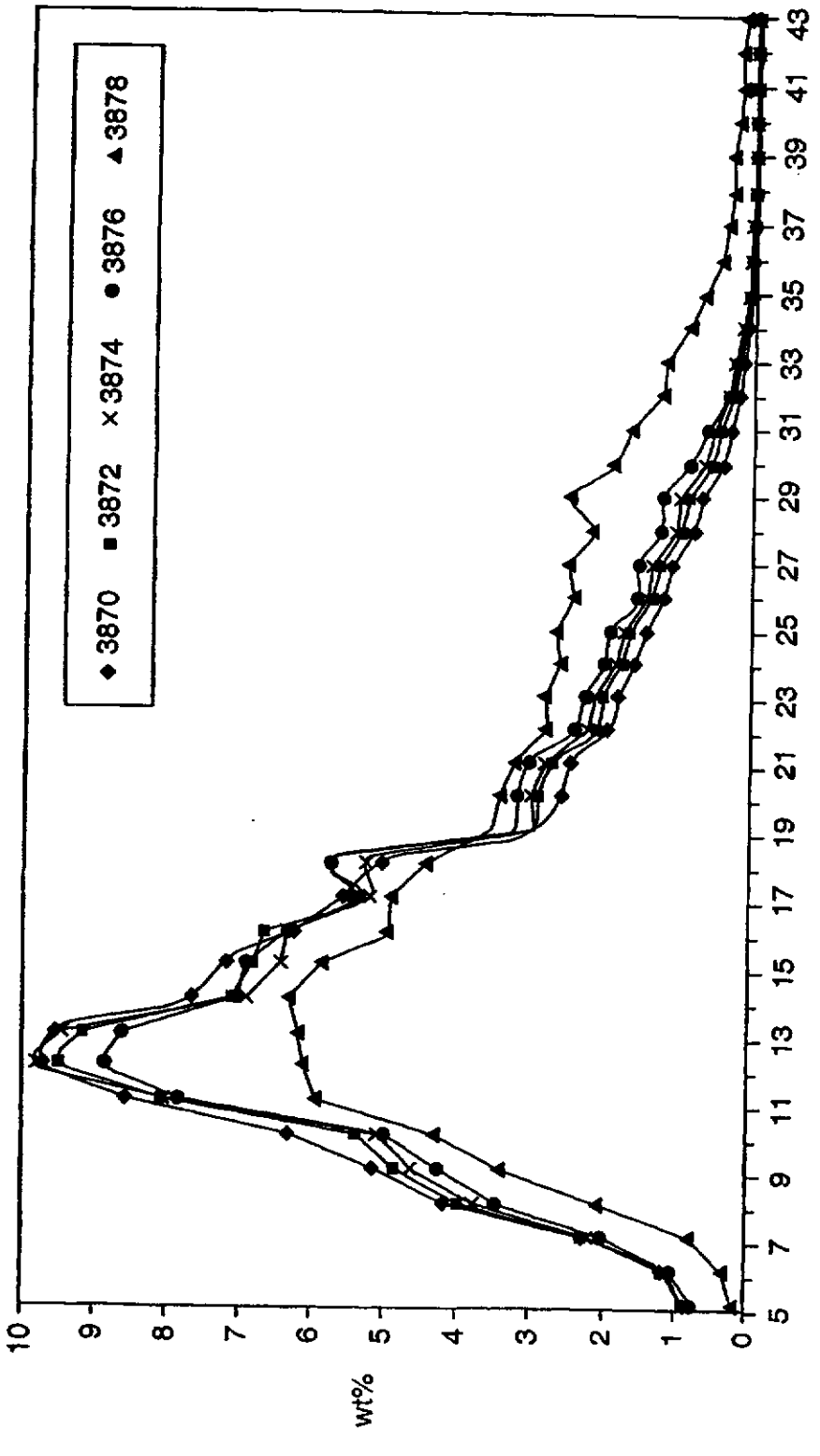

◆ 3870 ■ 3872 × 3874 ● 3876 ▲ 3878
wt%
C. No.
0
1
2
3
4
5
6
7
8
9
10
5
7
9
11
13
15
17
19
21
23
25
27
29
31
33
35
37
39
41
43

FIG. 146

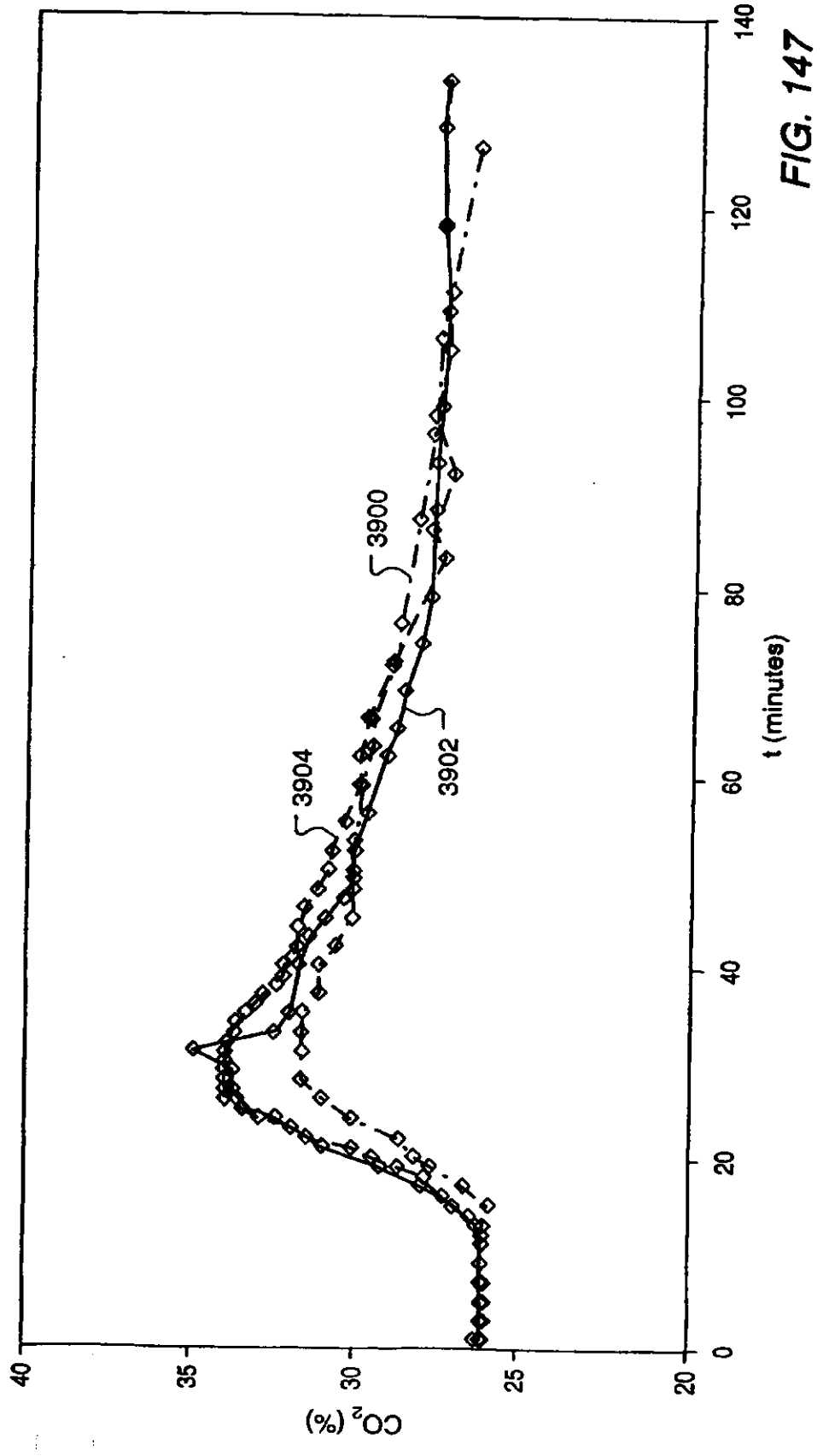

3900
3902
3904
t (minutes)
CO_2 (%)
0
20
40
60
80
100
120
140
20
25
30
35
40

FIG. 147

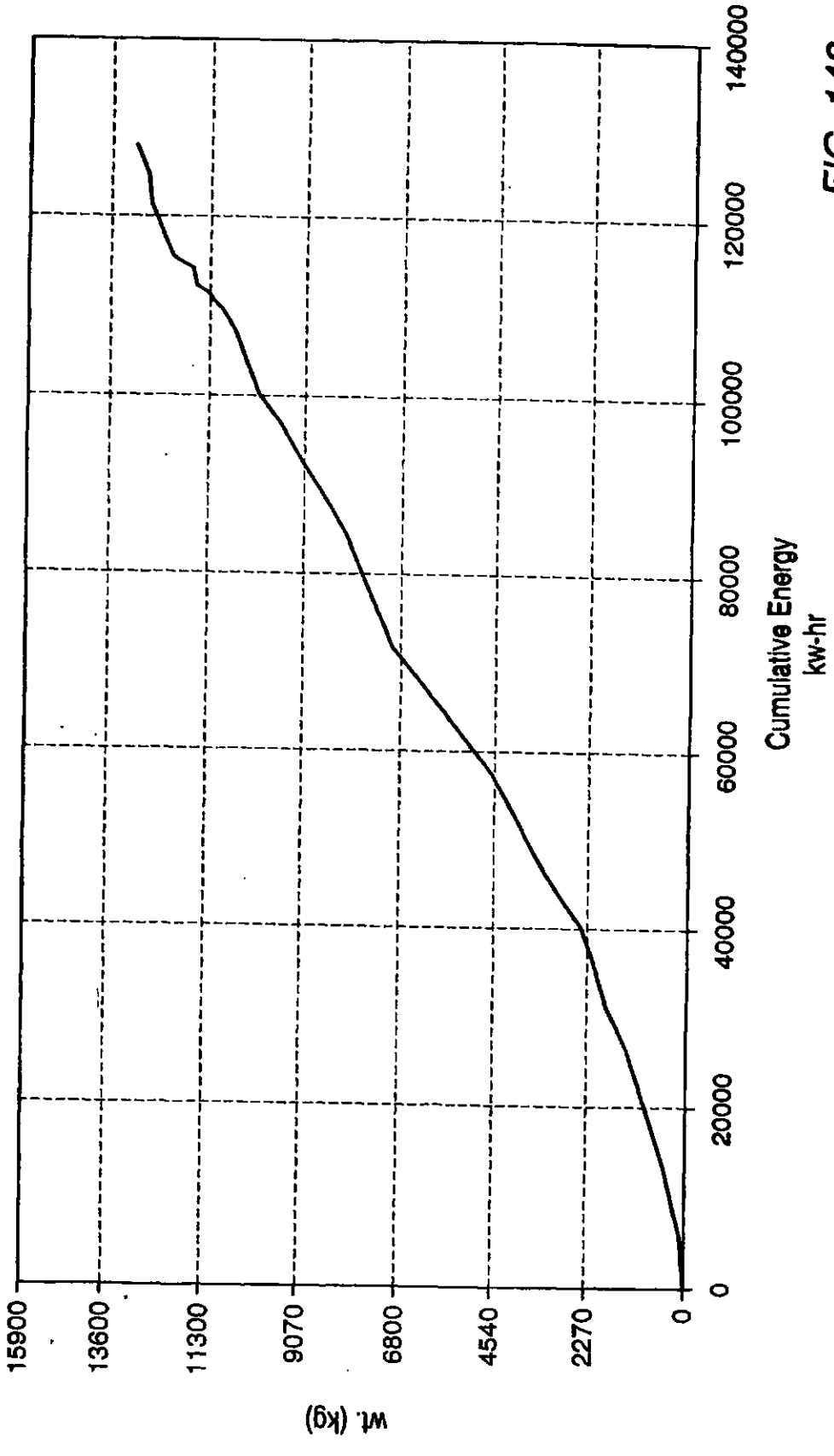

wt. (kg)
15900
13600
11300
9070
6800
4540
2270
0
0
20000
40000
60000
80000
100000
120000
140000
Cumulative Energy
kw-hr

FIG. 148

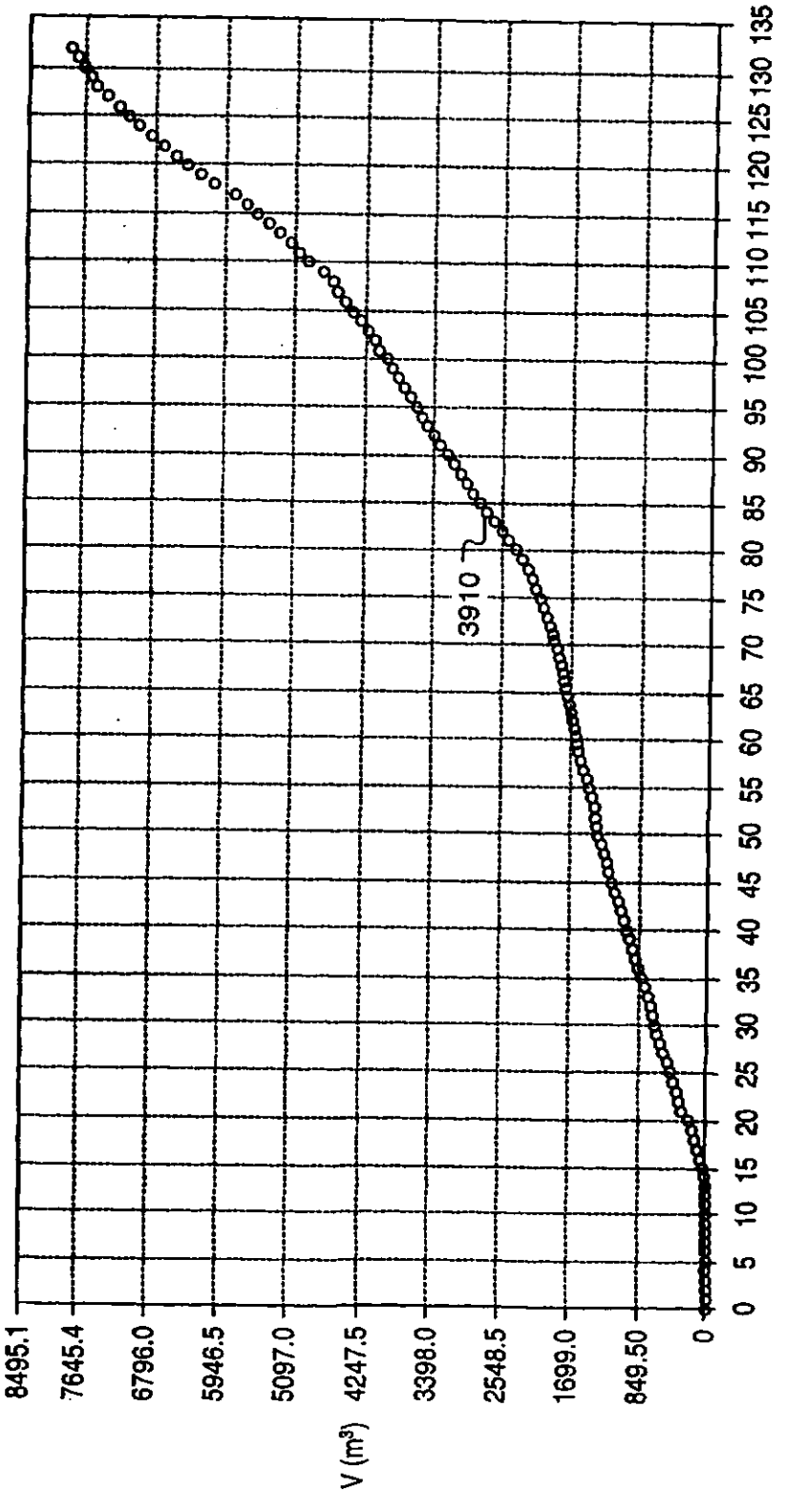

8495.1
7645.4
6796.0
5946.5
5097.0
4247.5
3398.0
2548.5
1699.0
849.50
0
V (m³)
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135
t (days)
3910

FIG. 149

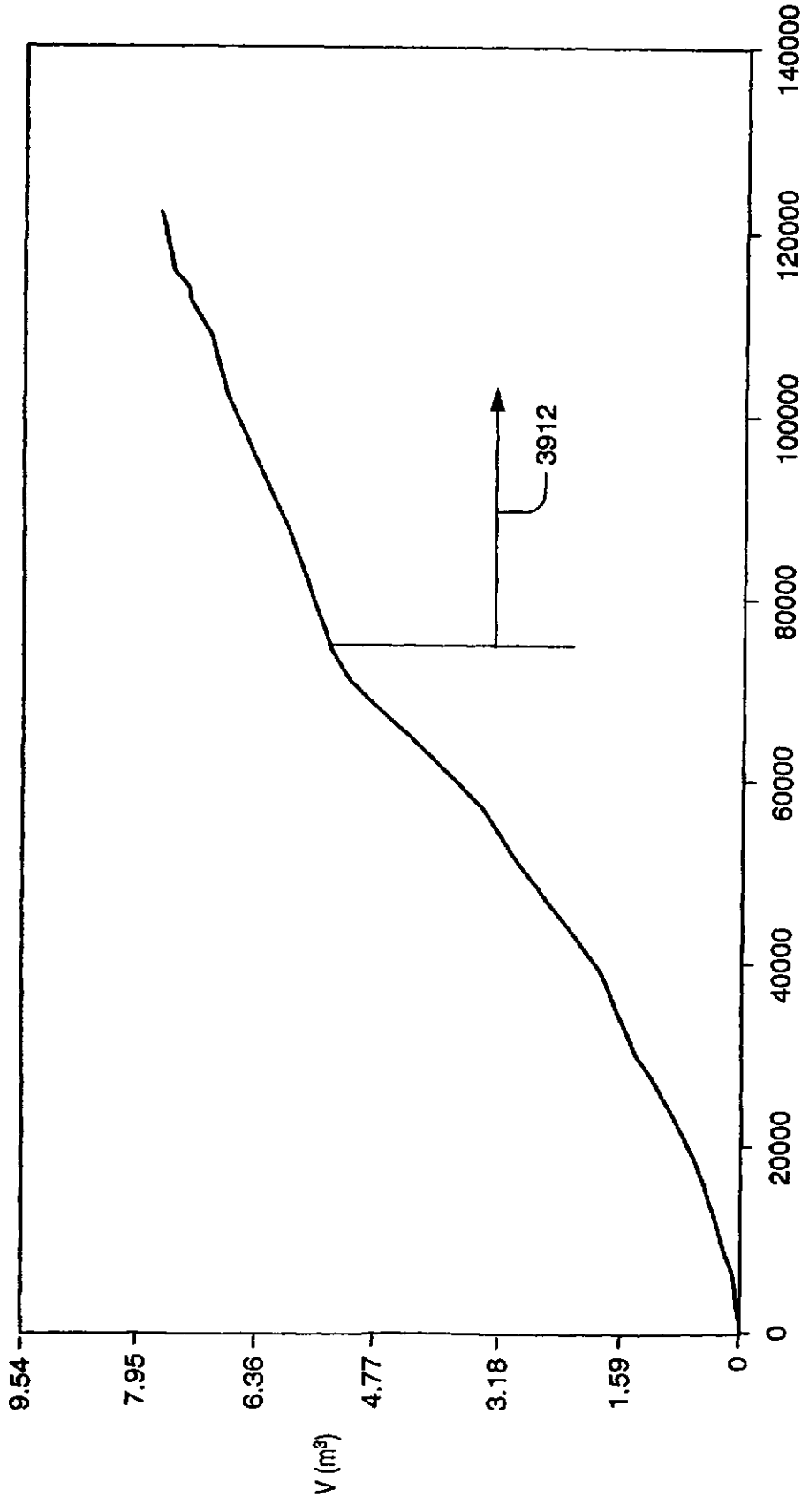

9.54
7.95
6.36
4.77
3.18
1.59
0
V (m³)
0
20000
40000
60000
80000
100000
120000
140000
(kWh)
3912

FIG. 150

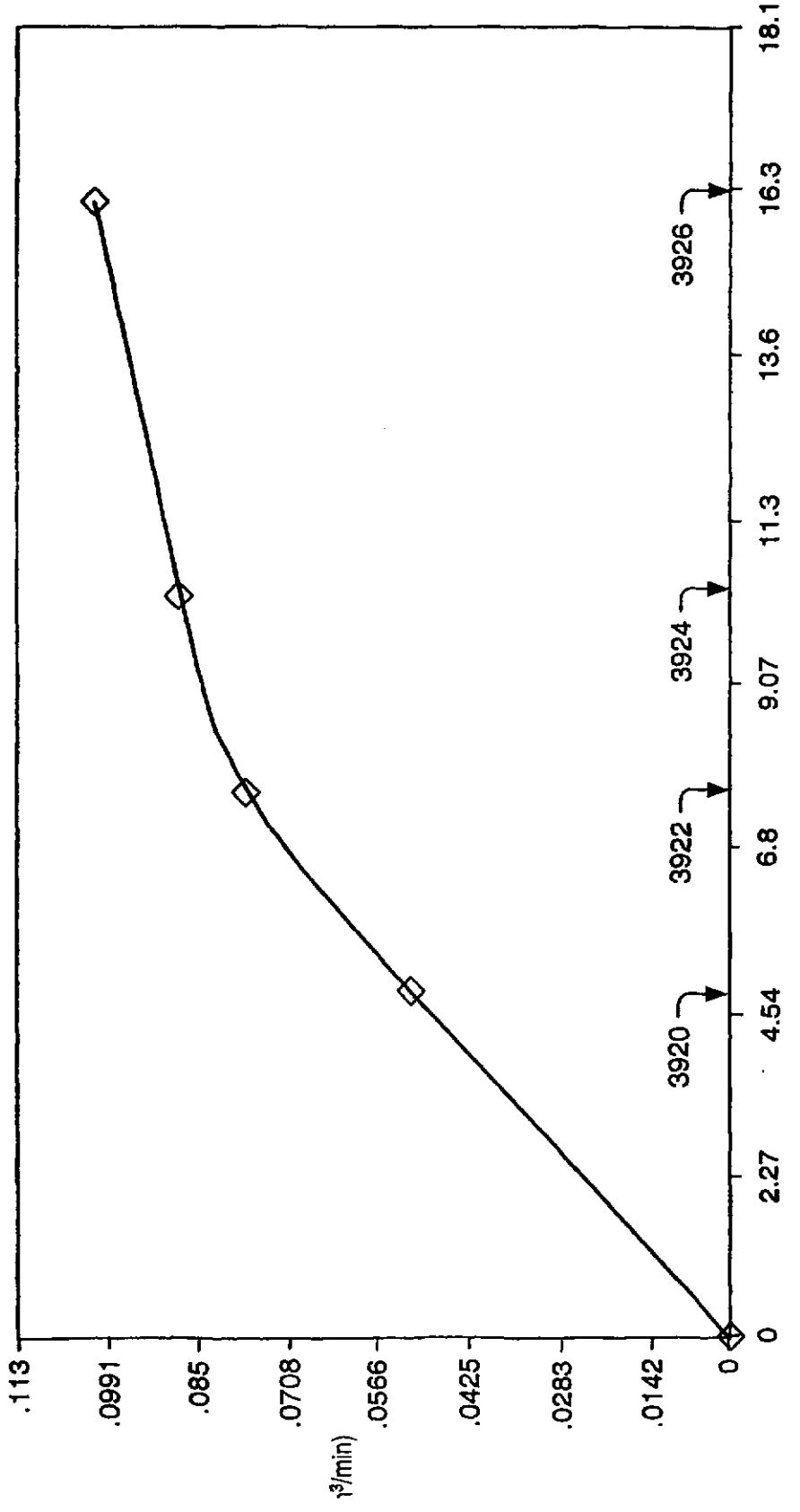

.113
.0991
.085
.0708
.0566
.0425
.0283
.0142
0
m³/min)
0
2.27
4.54
6.8
9.07
11.3
13.6
16.3
18.1
(kg/h)
3920
3922
3924
3926

FIG. 151

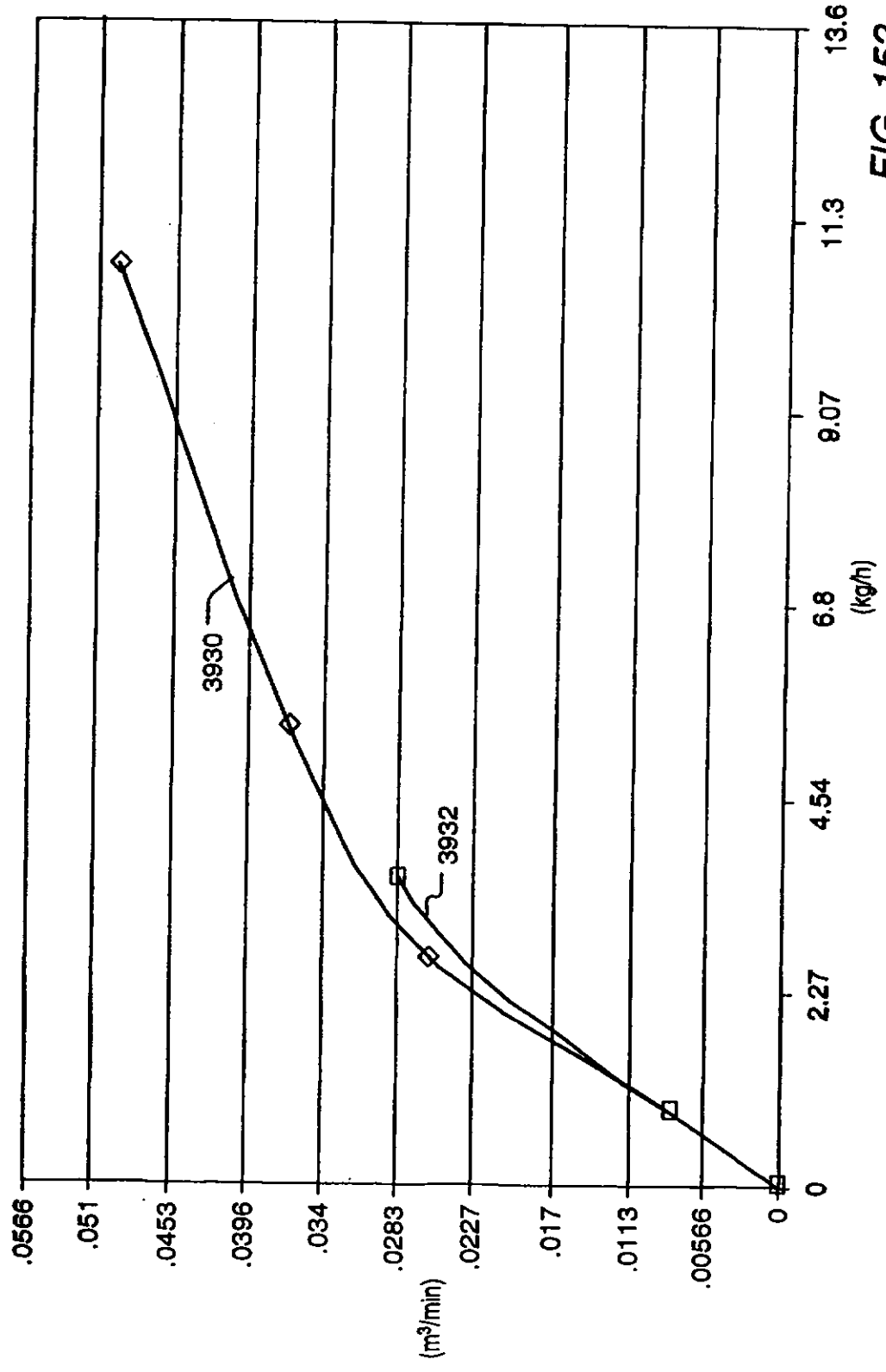

.0566
.051
.0453
.0396
.034
.0283
.0227
.017
.0113
.00566
0
(m³/min)
0
2.27
4.54
6.8
9.07
11.3
13.6
(kg/h)
3930
3932

FIG. 152

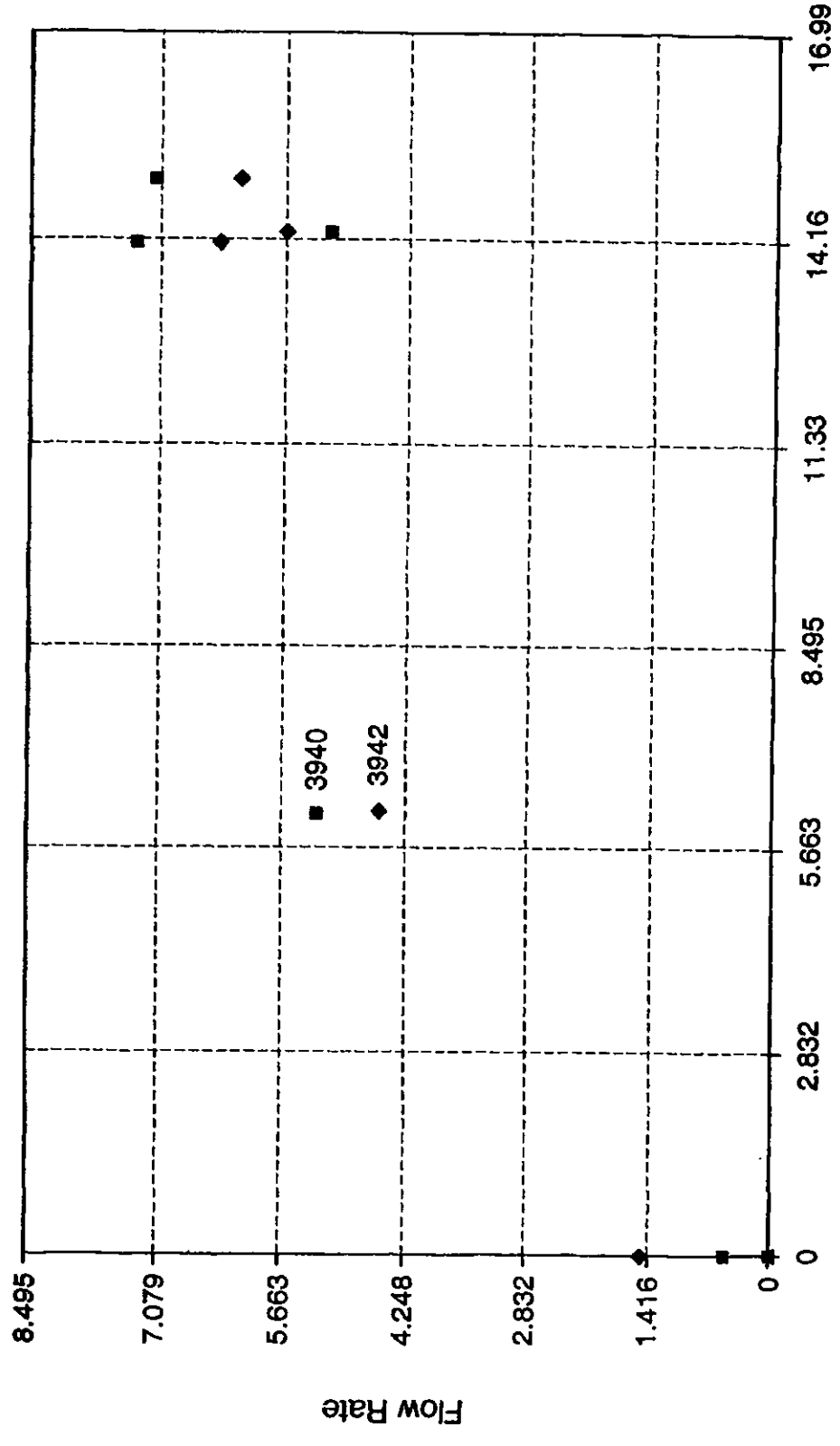

Flow Rate
8.495
7.079
5.663
4.248
2.832
1.416
0
0
2.832
5.663
8.495
11.33
14.16
16.99
Methane Injection Rate (m3/hr)
3940
3942

FIG. 153

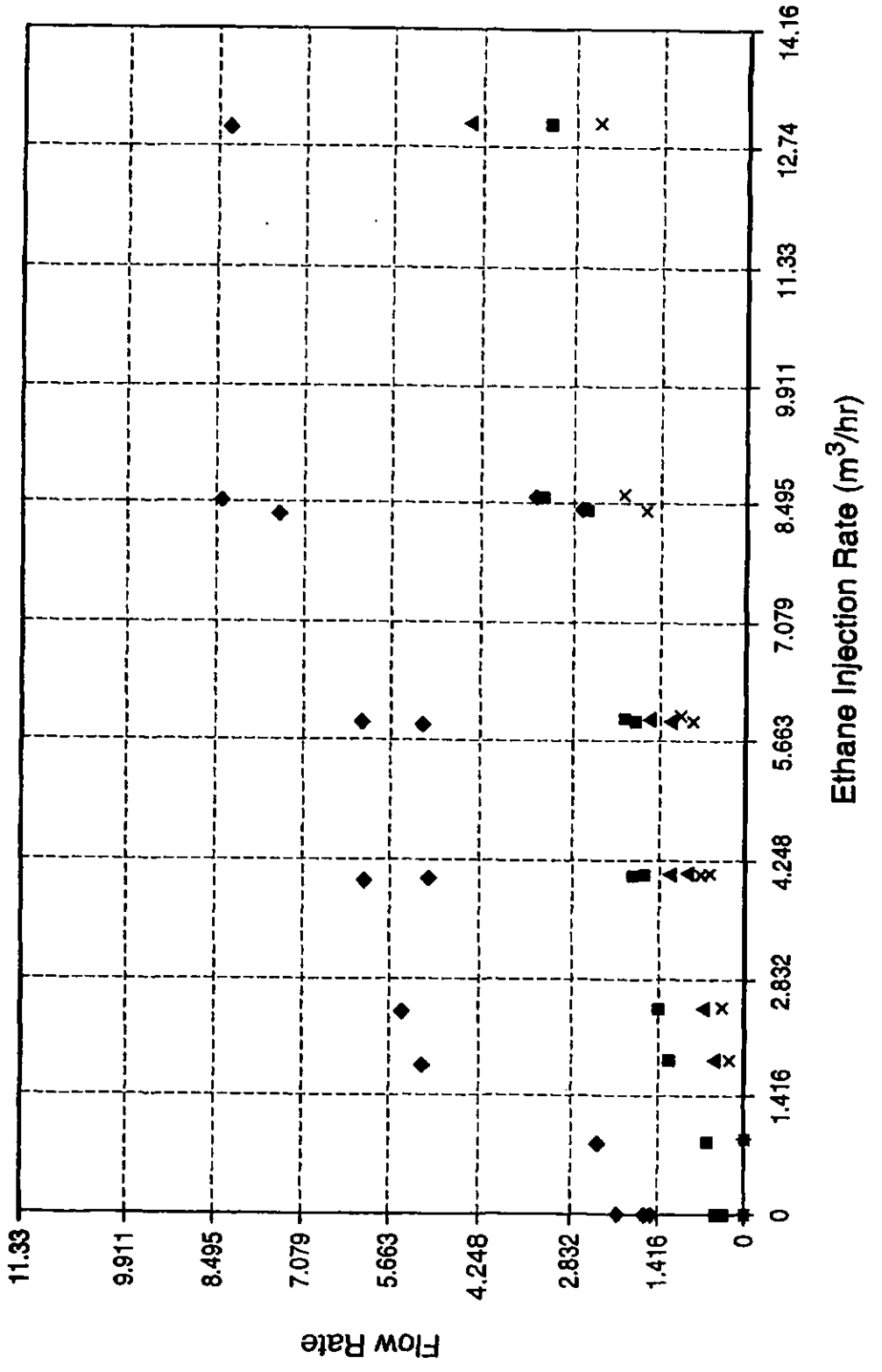

Flow Rate
11.33
9.911
8.495
7.079
5.663
4.248
2.832
1.416
0
0
1.416
2.832
4.248
5.663
7.079
8.495
9.911
11.33
12.74
14.16
Ethane Injection Rate (m3/hr)
3950
3952
3954
3956

FIG. 154

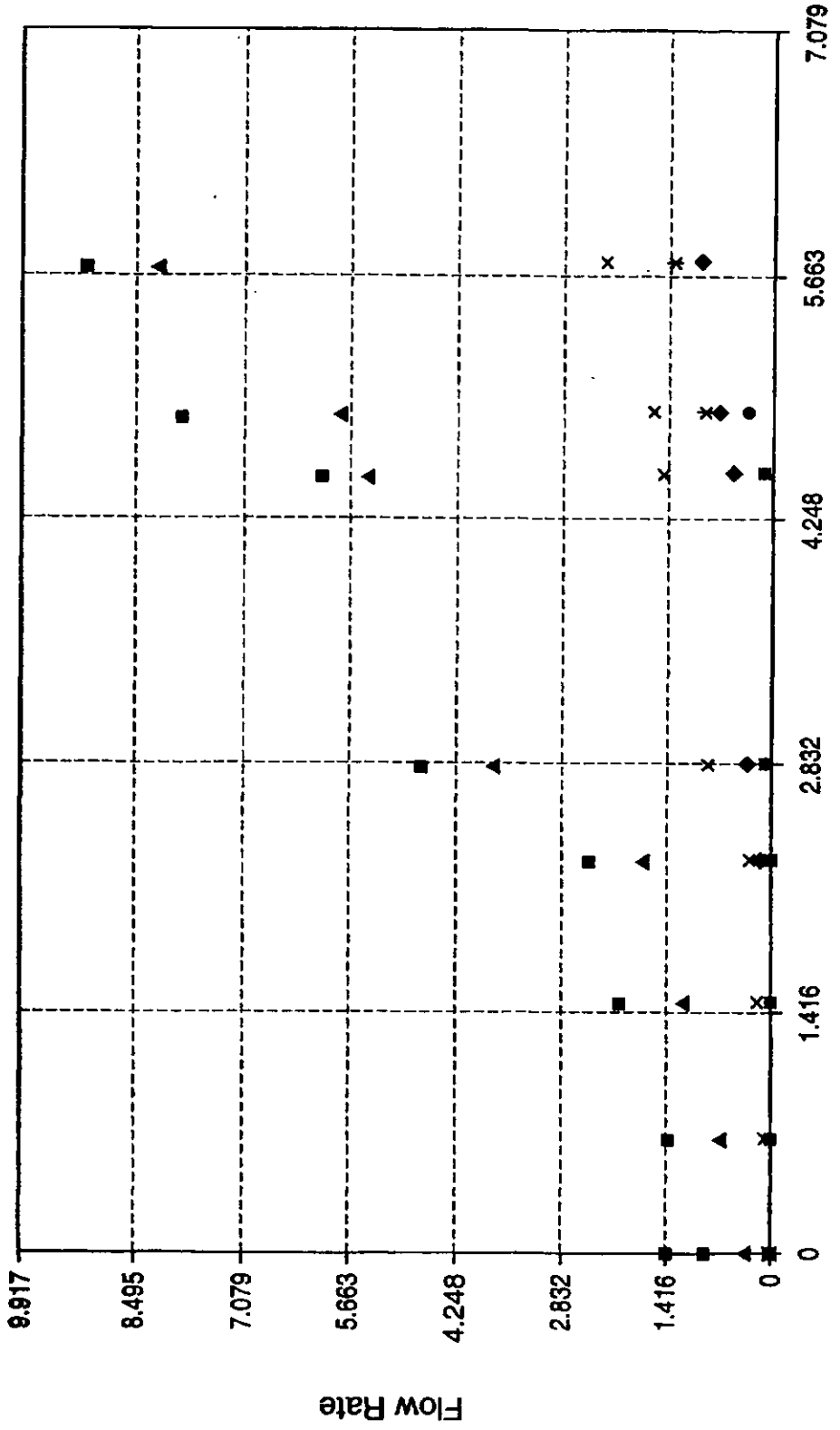

Flow Rate
9.917
8.495
7.079
5.663
4.248
2.832
1.416
0
0
1.416
2.832
4.248
5.663
7.079
Propane Injection Rate (m3/hr)
■ 3960
▲ 3962
◆ 3964
× 3966
✱ 3968
● 3969

FIG. 155

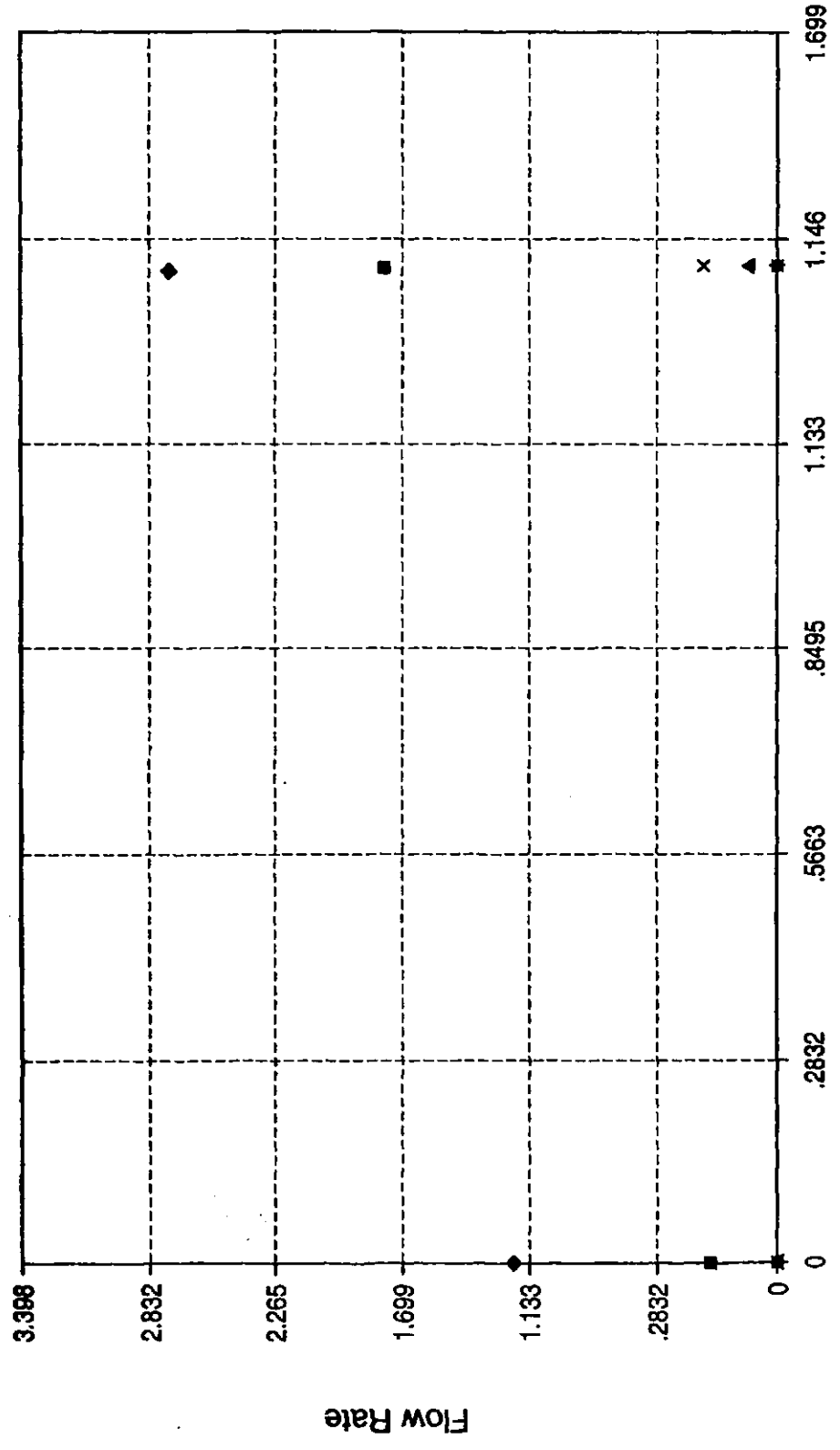

Flow Rate
3.398
2.832
2.265
1.699
1.133
.2832
0
.2832
.5663
.8495
1.133
1.146
1.699
Butane Injection Rate (m3/hr)
■ 3970
▲ 3972
◆ 3974
× 3976
∗ 3978
● 3979

FIG. 156

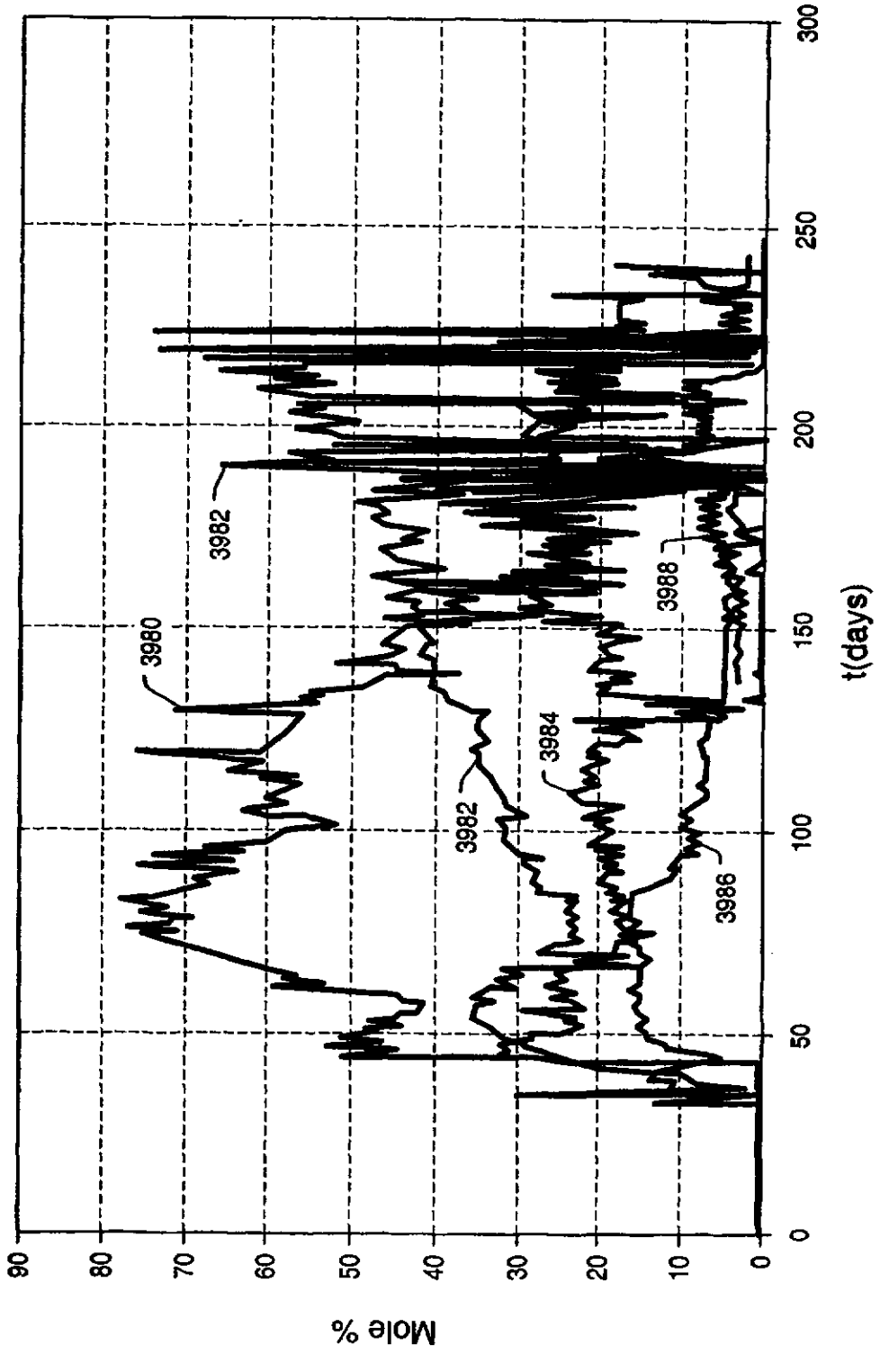

Mole %
90
80
70
60
50
40
30
20
10
0
t(days)
0
50
100
150
200
250
300
3980
3982
3982
3984
3986
3988

FIG. 157

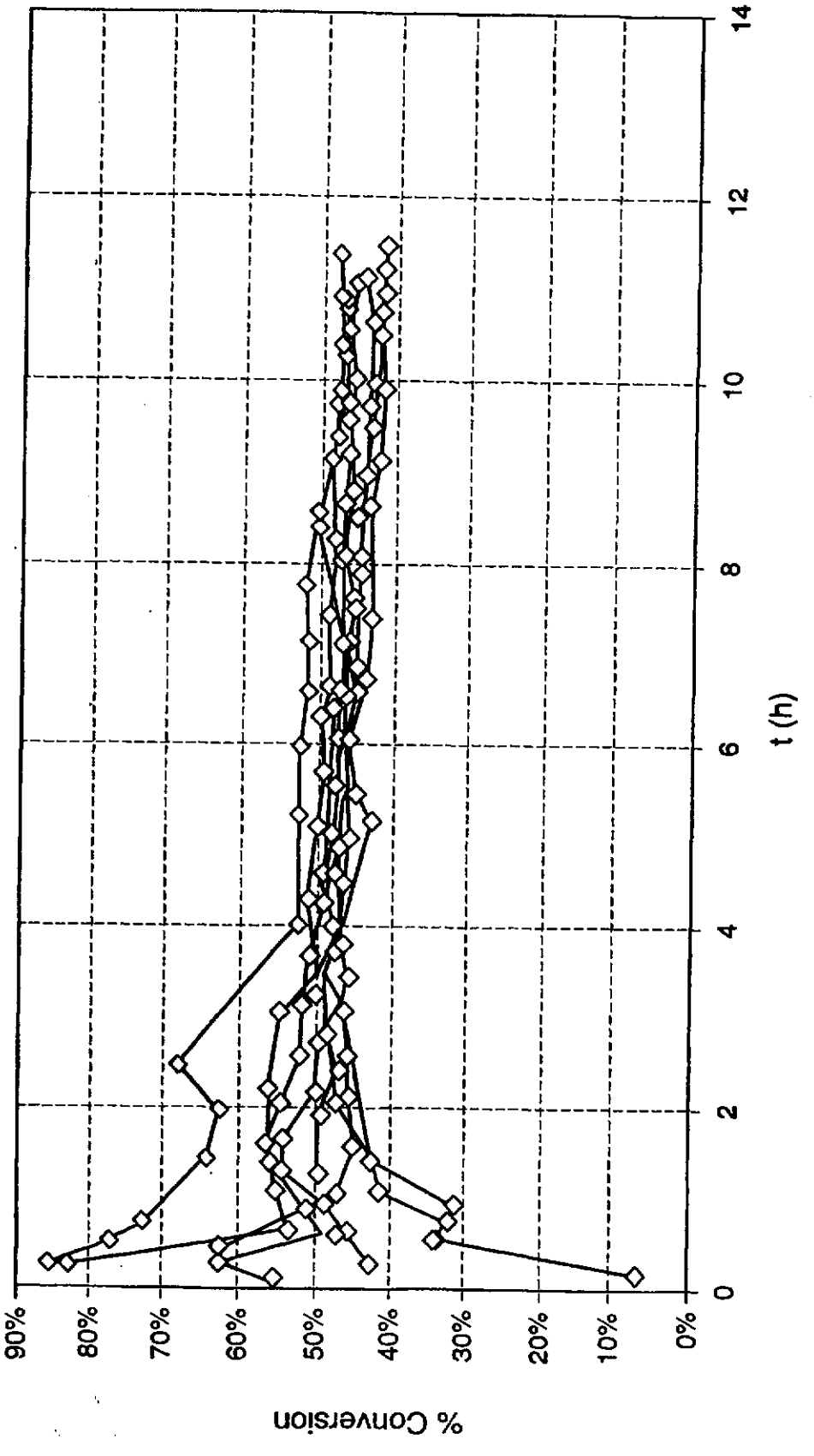


FIG. 158

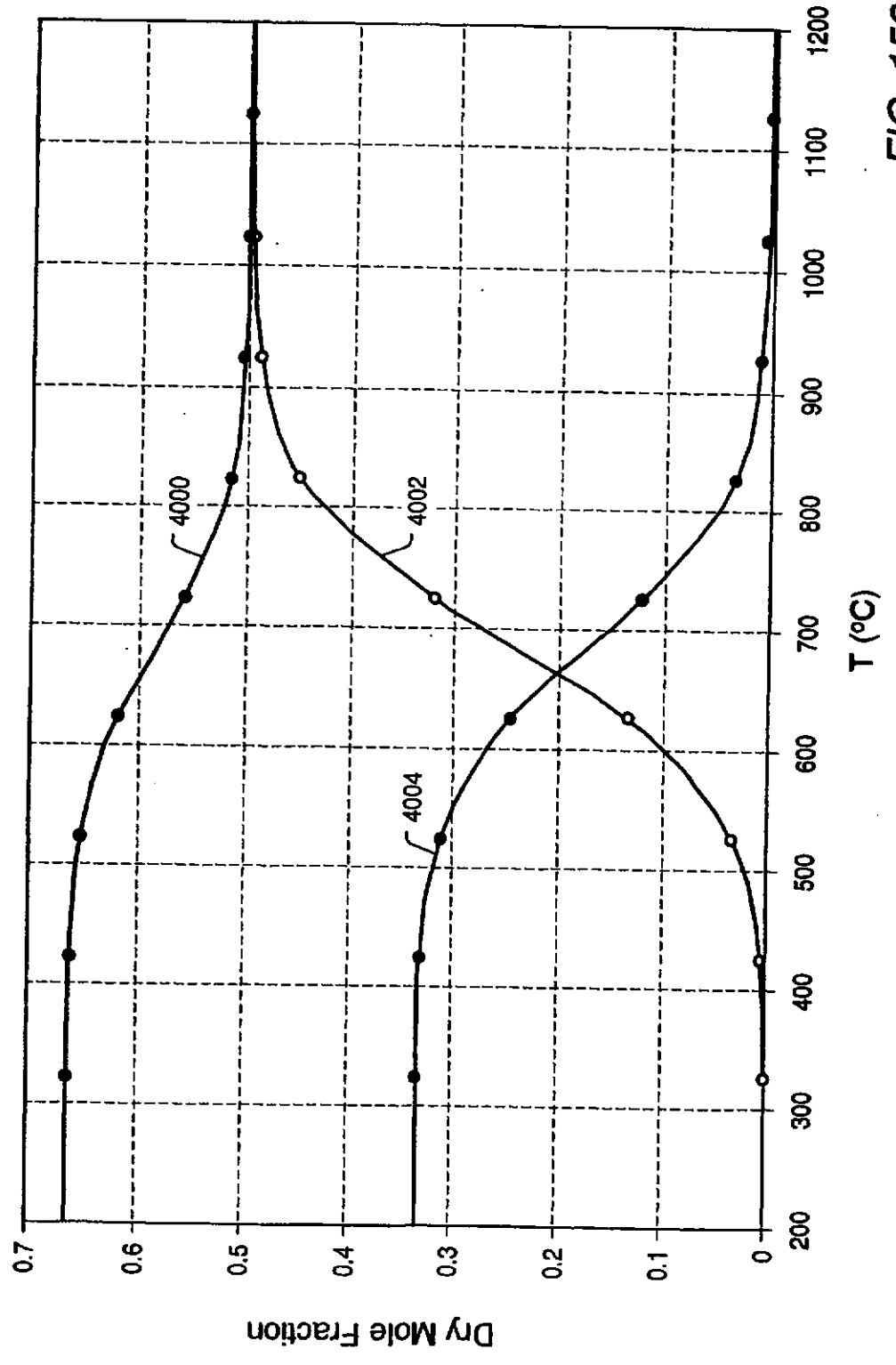

Dry Mole Fraction
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
T (°C)
200
300
400
500
600
700
800
900
1000
1100
1200
4000
4002
4004

FIG. 159

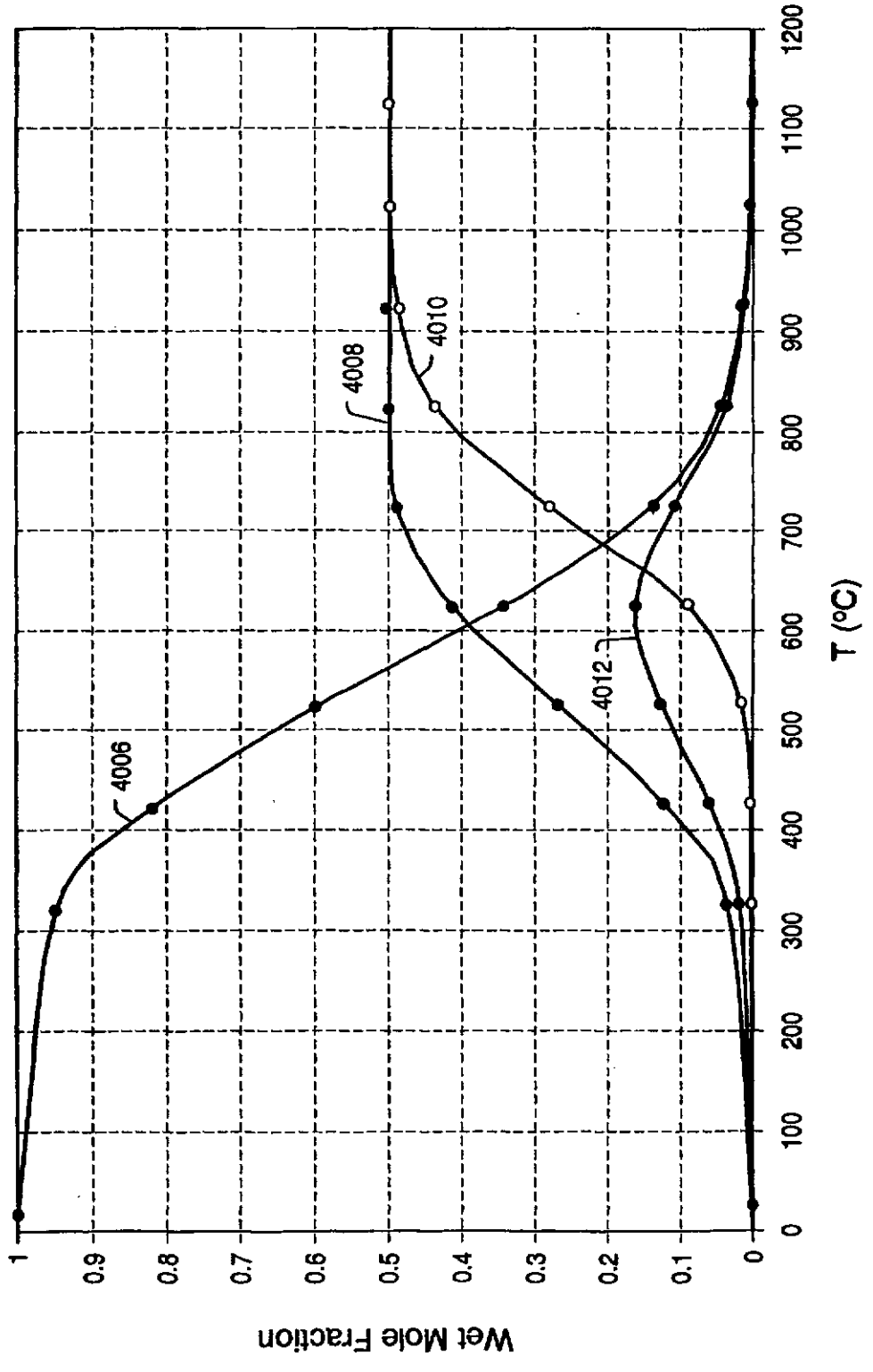

Wet Mole Fraction
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
T (°C)
4006
4008
4010
4012

FIG. 160

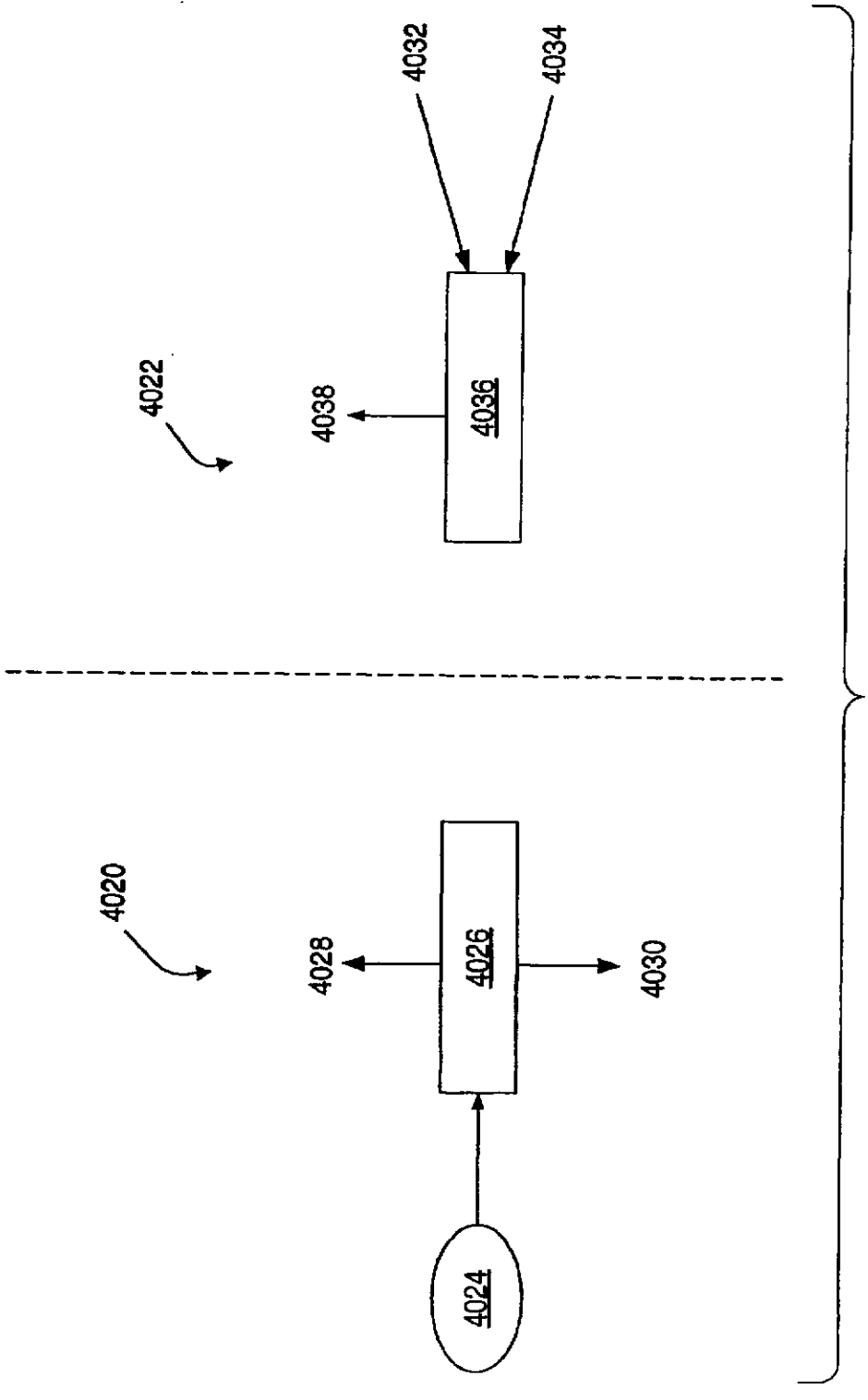


FIG. 161

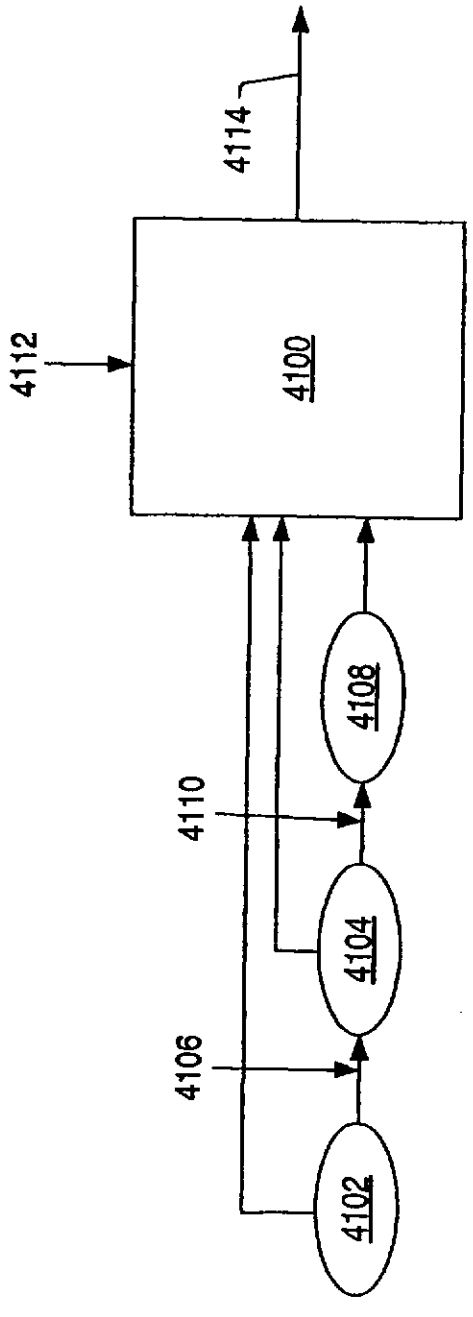


FIG. 162

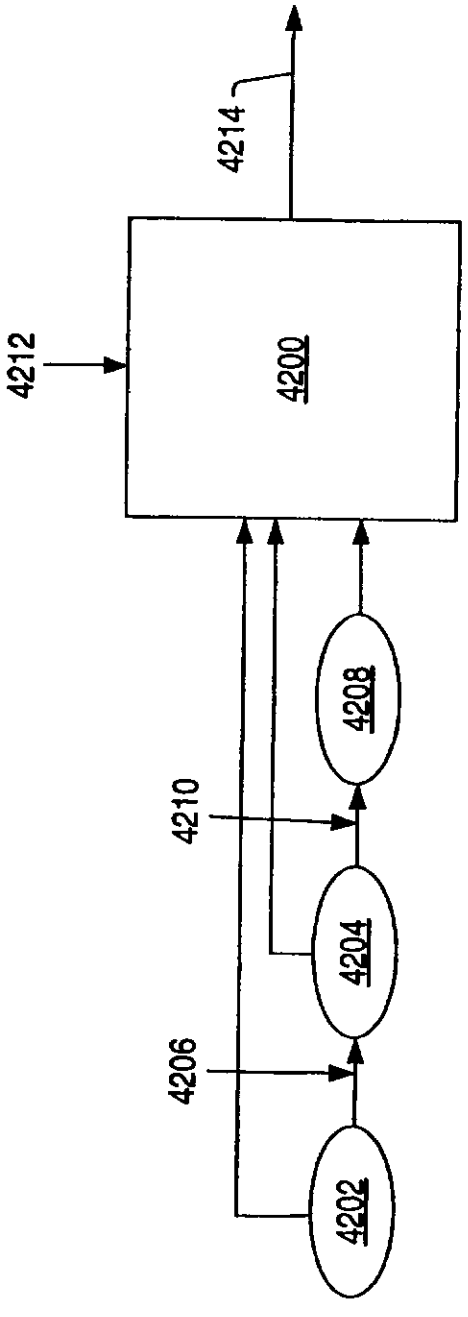


FIG. 163

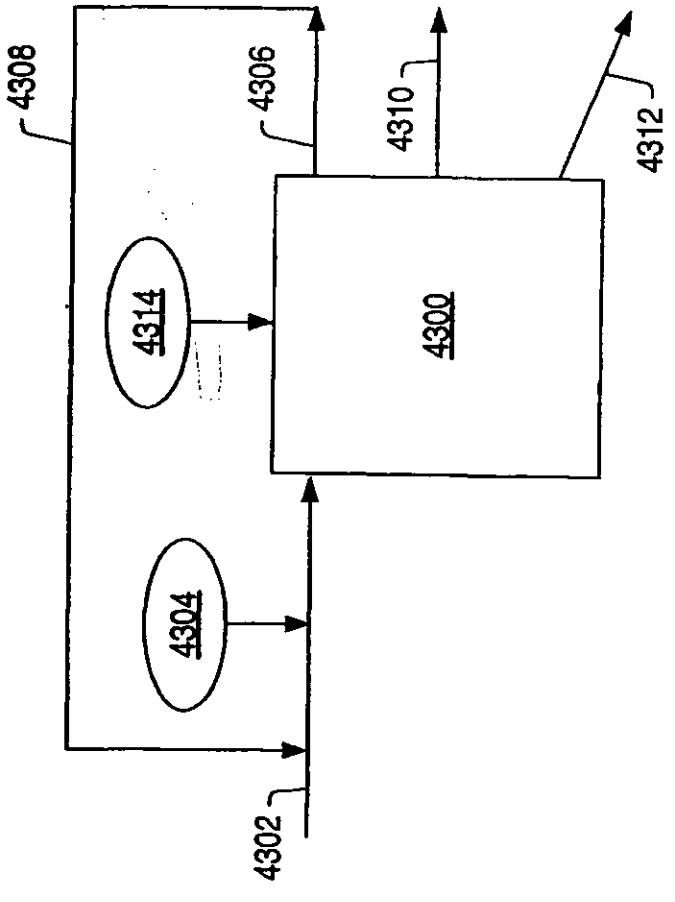


FIG. 164

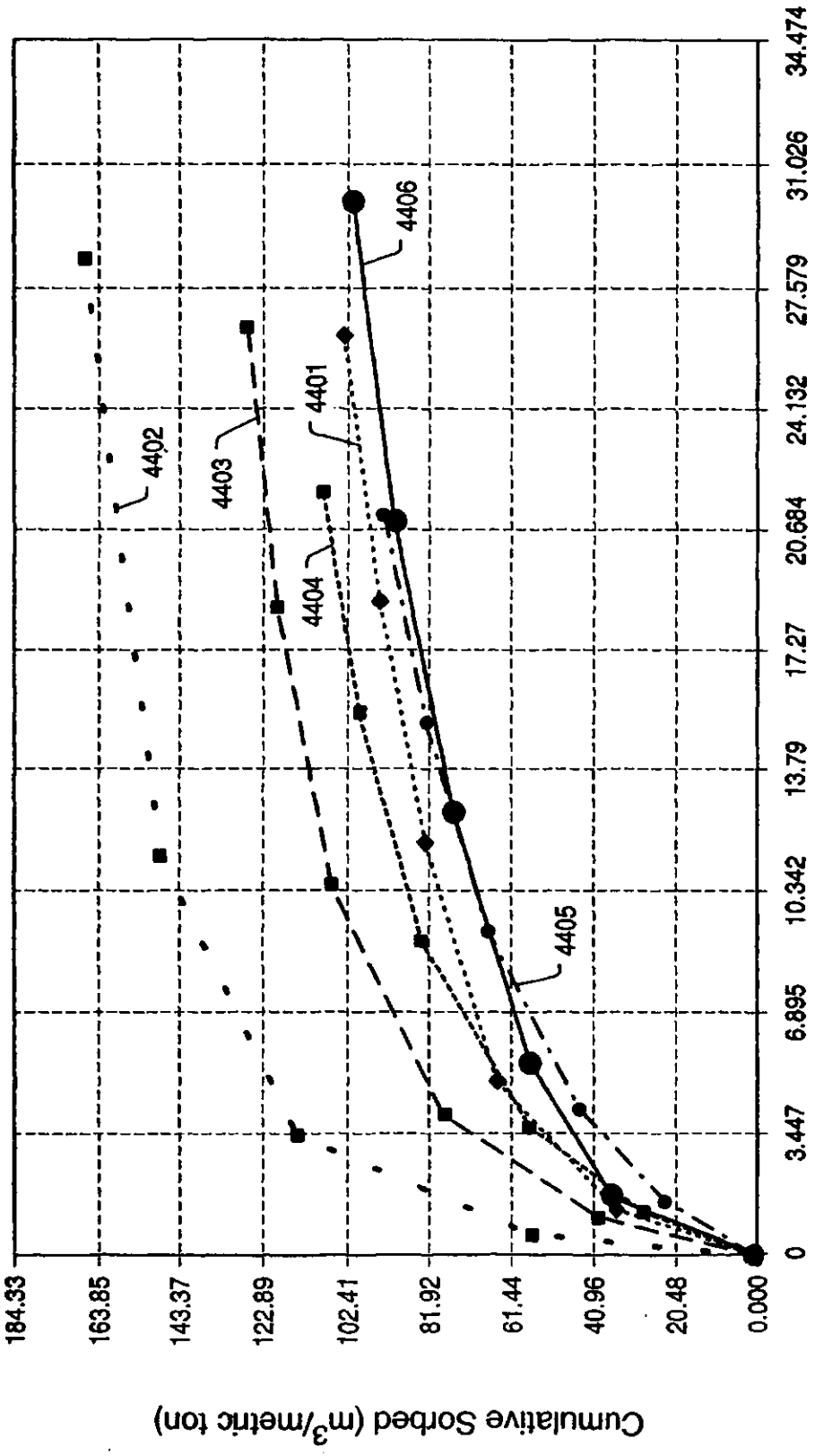

Cumulative Sorbed (m^3/metric ton)
184.33
163.85
143.37
122.89
102.41
81.92
61.44
40.96
20.48
0.000
0
3.447
6.895
10.342
13.79
17.27
20.684
24.132
27.579
31.026
34.474
Pressure (bars absolute)
4401
4402
4403
4404
4405
4406

FIG. 165

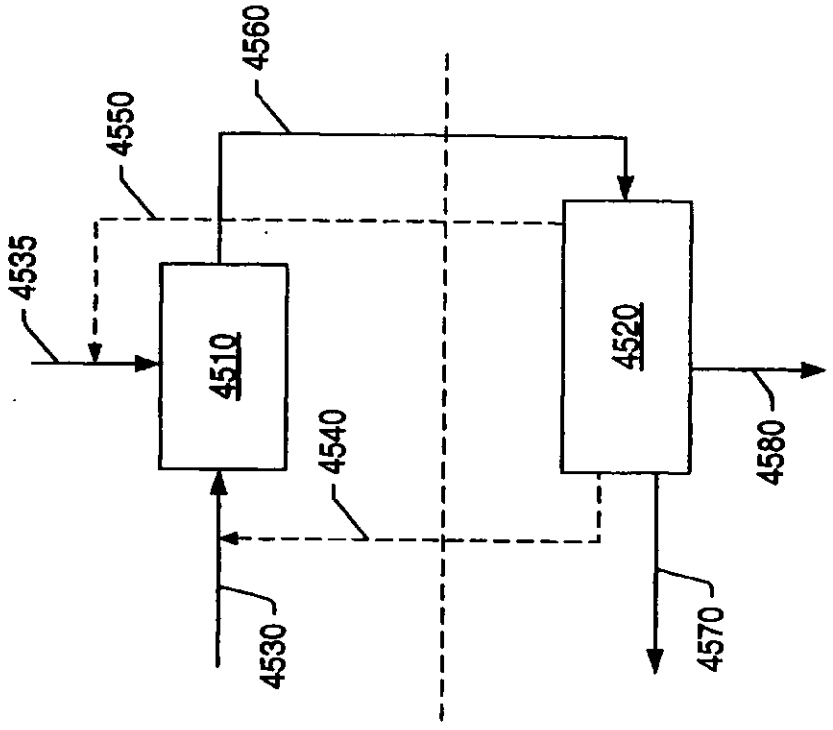


FIG. 166

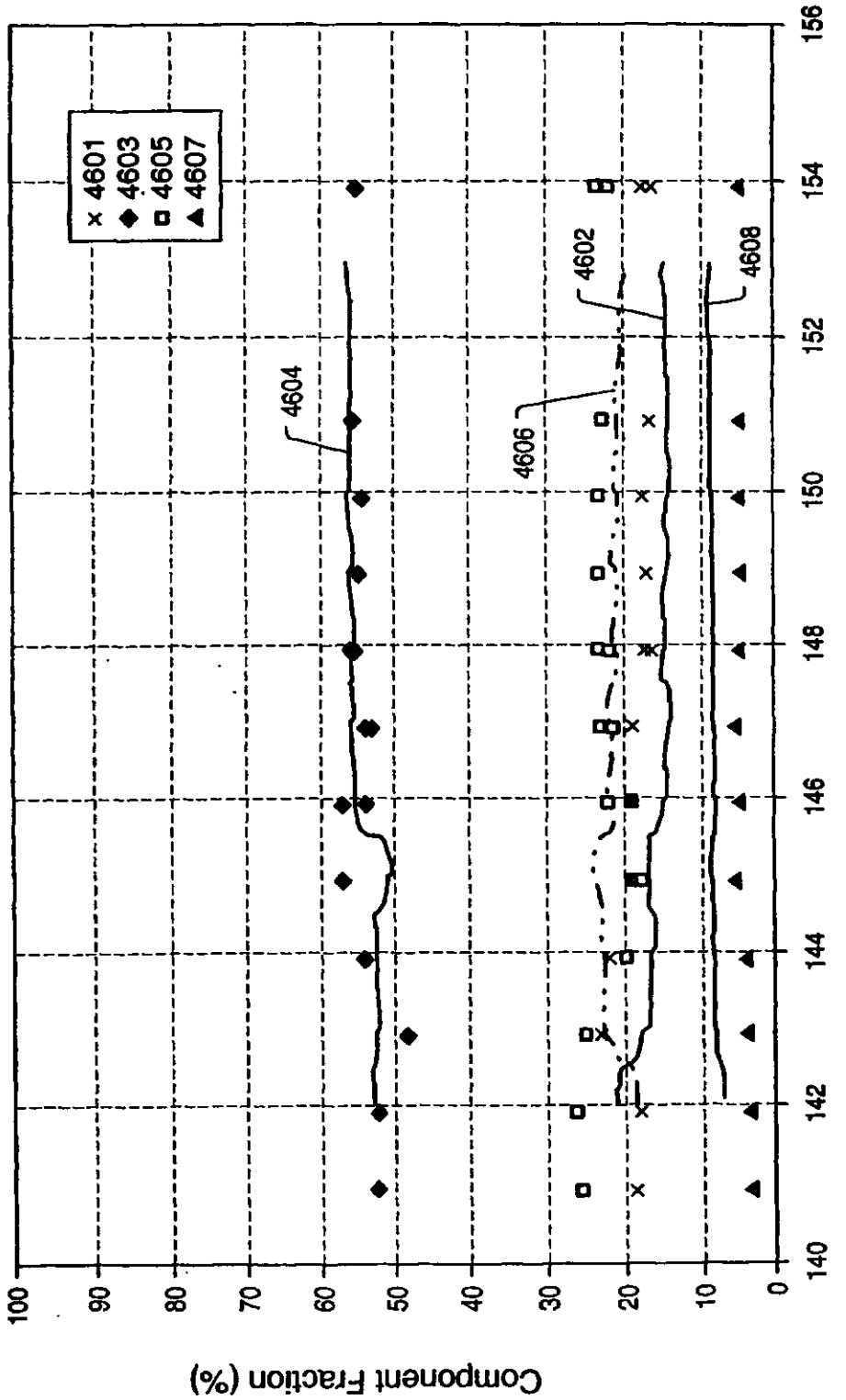

× 4601
◆ 4603
□ 4605
▲ 4607
4602
4604
4606
4608
Component Fraction (%)
Time (days)
100
90
80
70
60
50
40
30
20
10
0
140
142
144
146
148
150
152
154
156

FIG. 167

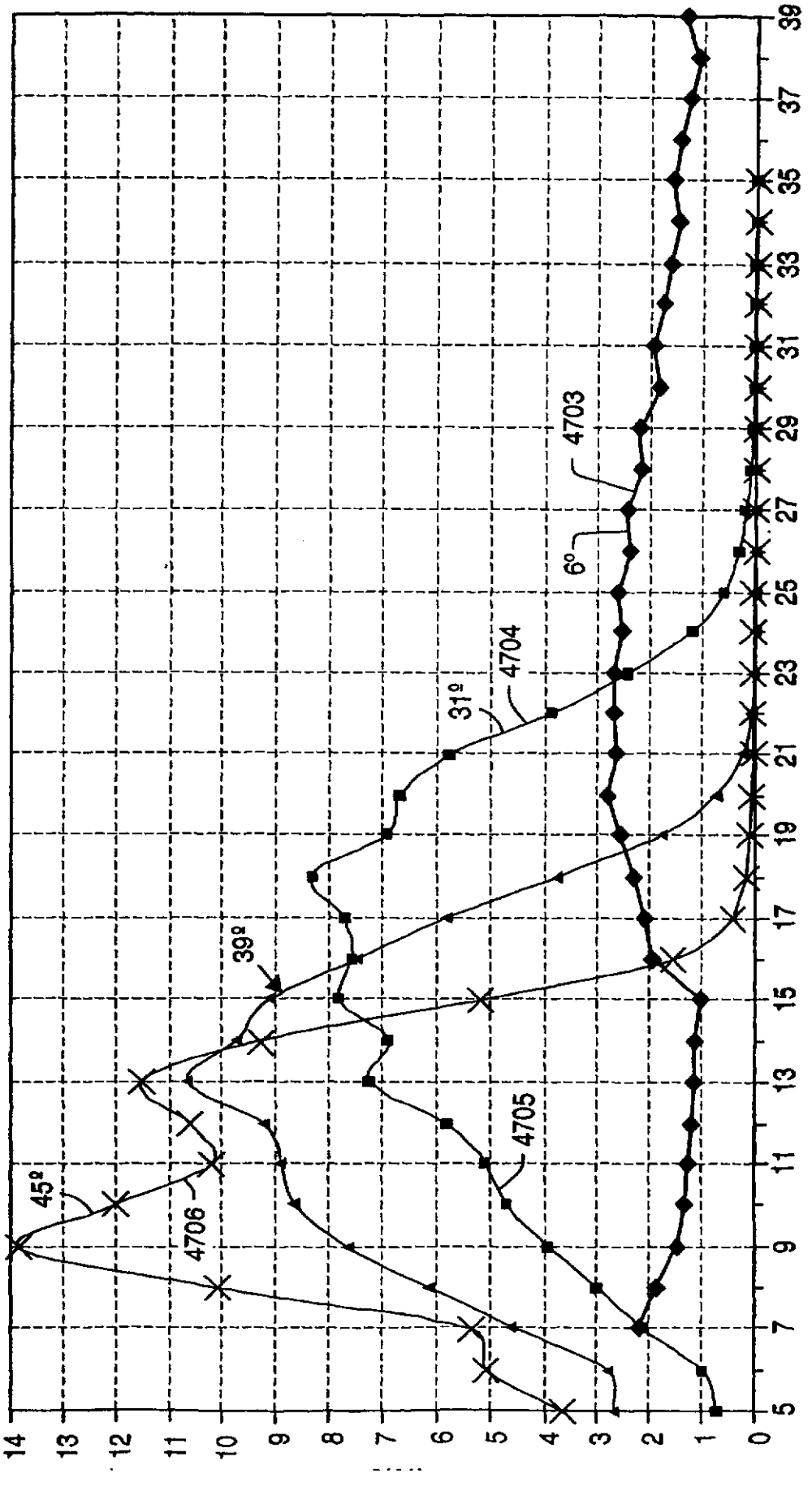

4703
6°
4704
31°
39°
4705
4706
45°
Carbon Number
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
5
7
9
11
13
15
17
19
21
23
25
27
29
31
33
35
37
39

FIG. 168

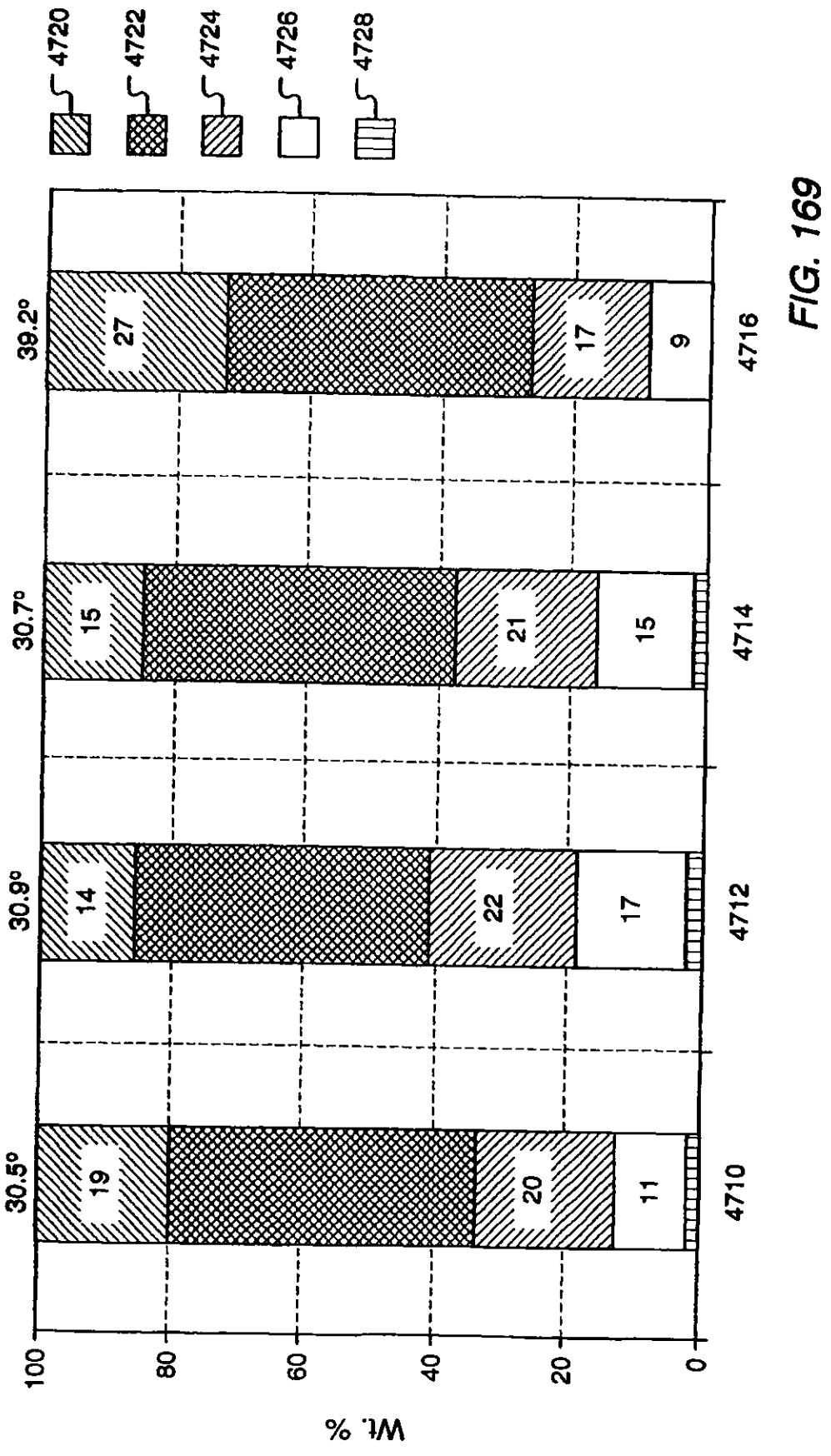

4720
4722
4724
4726
4728
39.2°
30.7°
30.9°
30.5°
27
17
9
15
21
15
14
22
17
19
20
11
4716
4714
4712
4710
100
80
60
40
20
0
Wt. %

FIG. 169

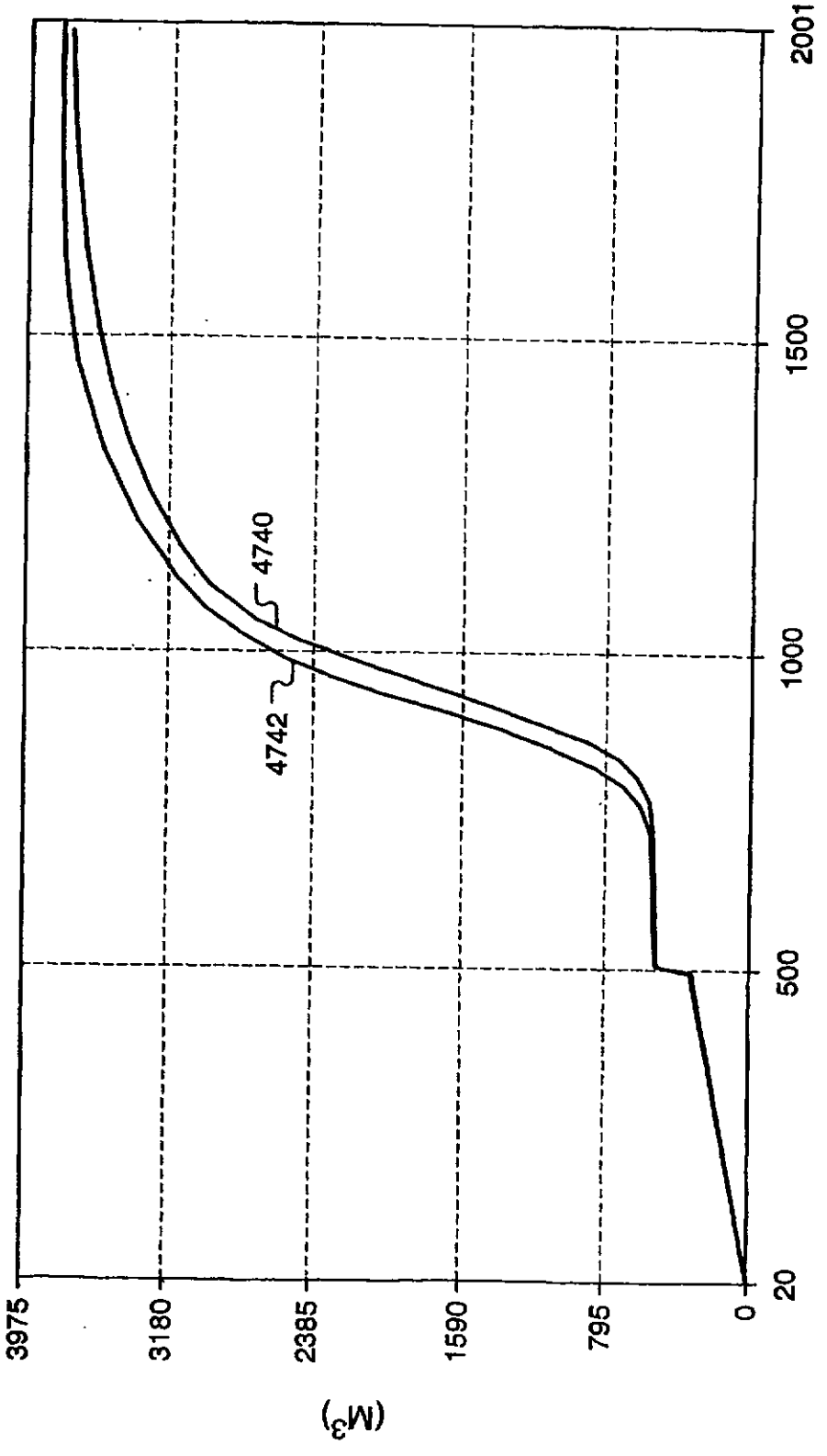

3975
3180
2385
1590
795
0
(M³)
20
500
1000
1500
2001
time (days)
4740
4742

FIG. 170

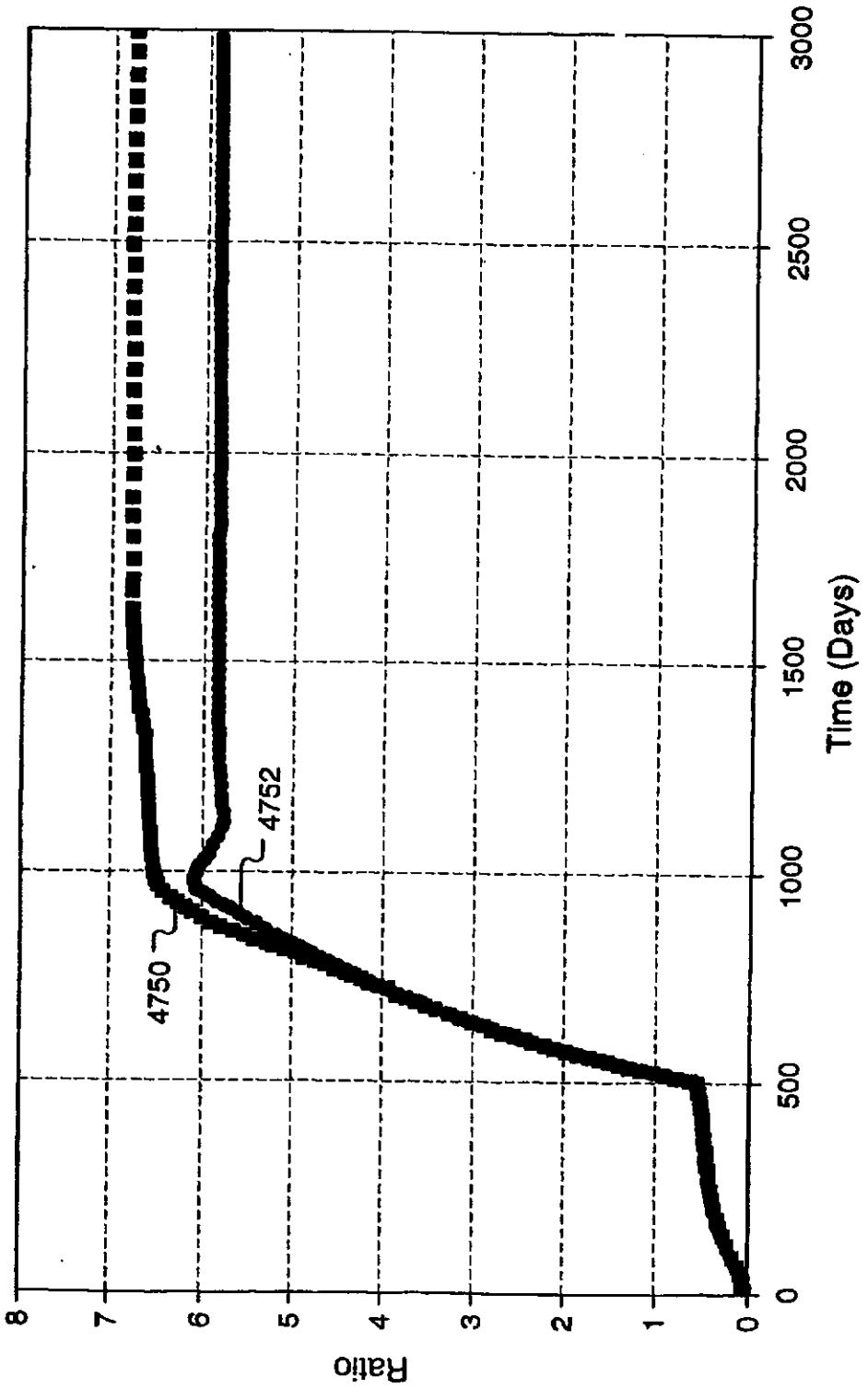

Ratio
0
1
2
3
4
5
6
7
8
Time (Days)
0
500
1000
1500
2000
2500
3000
4750
4752

FIG. 171

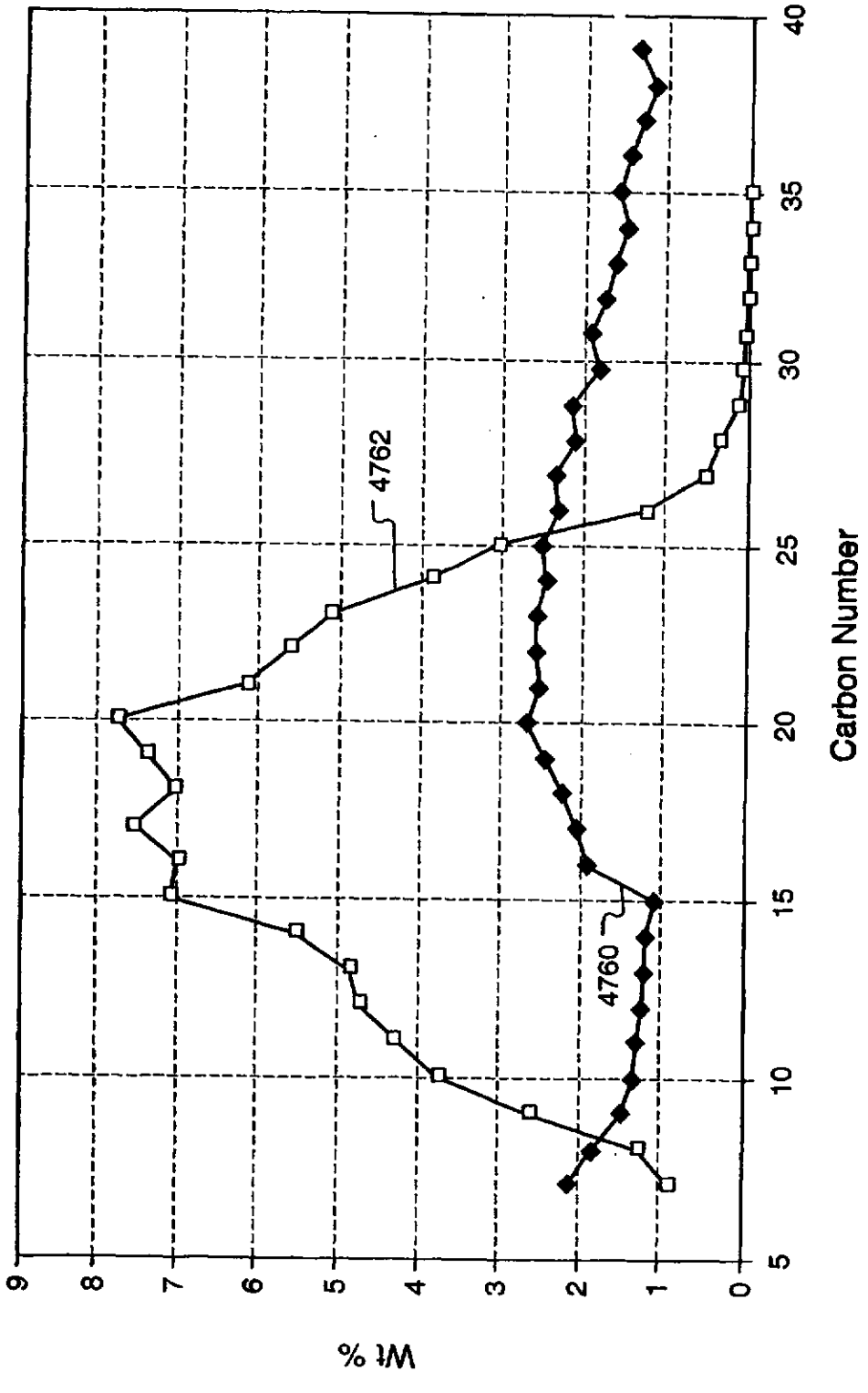


FIG. 172

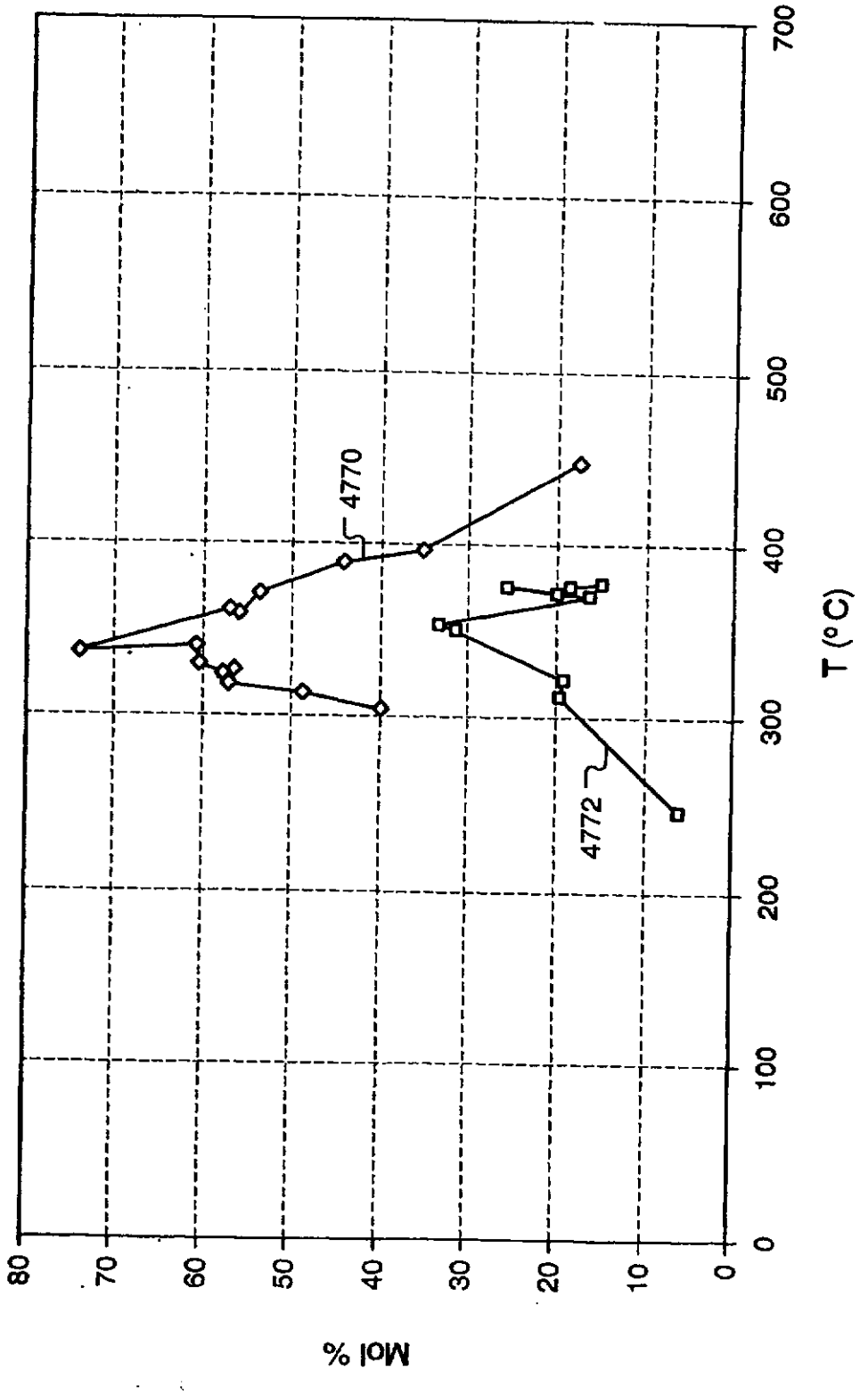

4770
4772
Mol %
T (°C)
0
10
20
30
40
50
60
70
80
100
200
300
400
500
600
700

FIG. 173

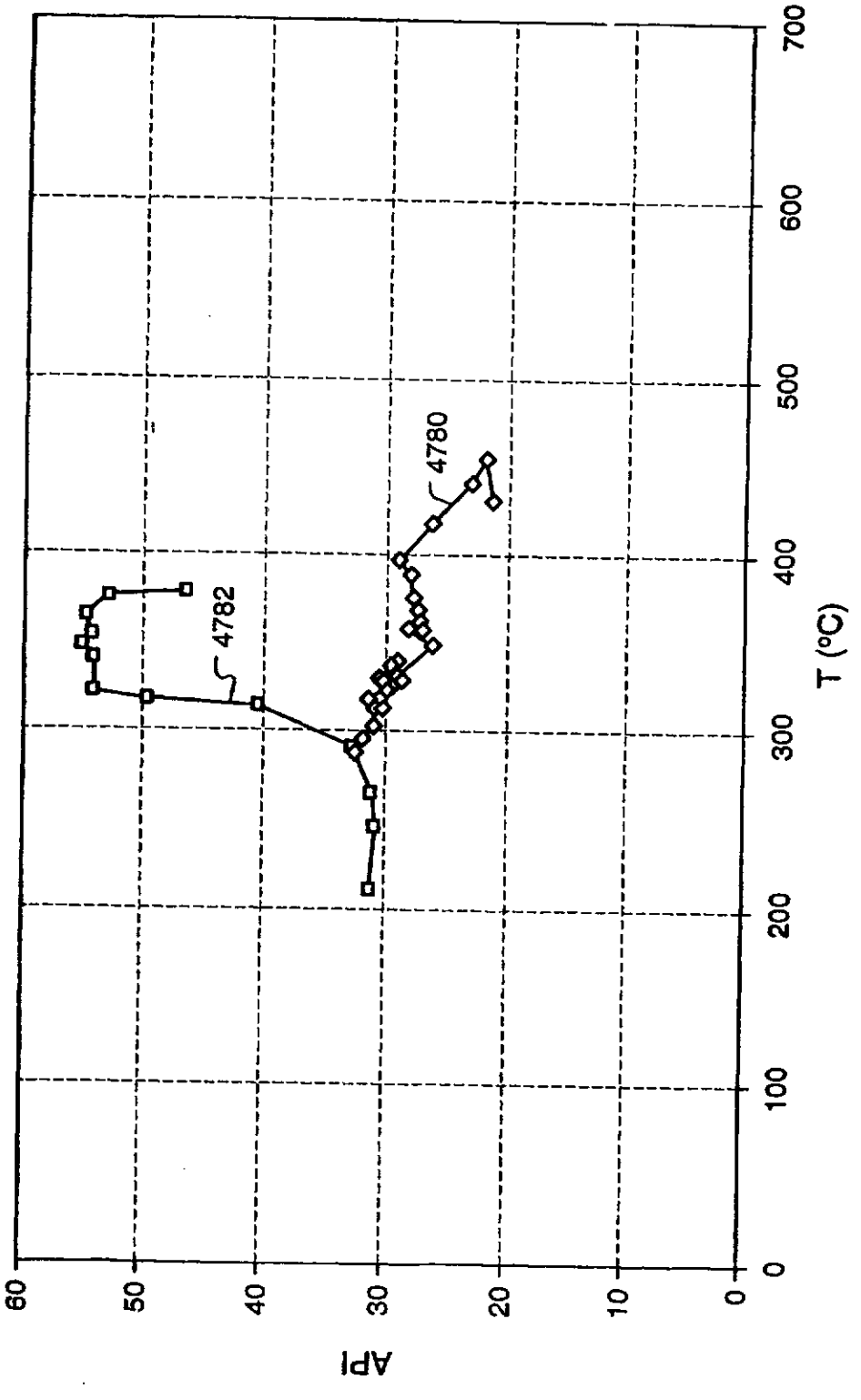


FIG. 174

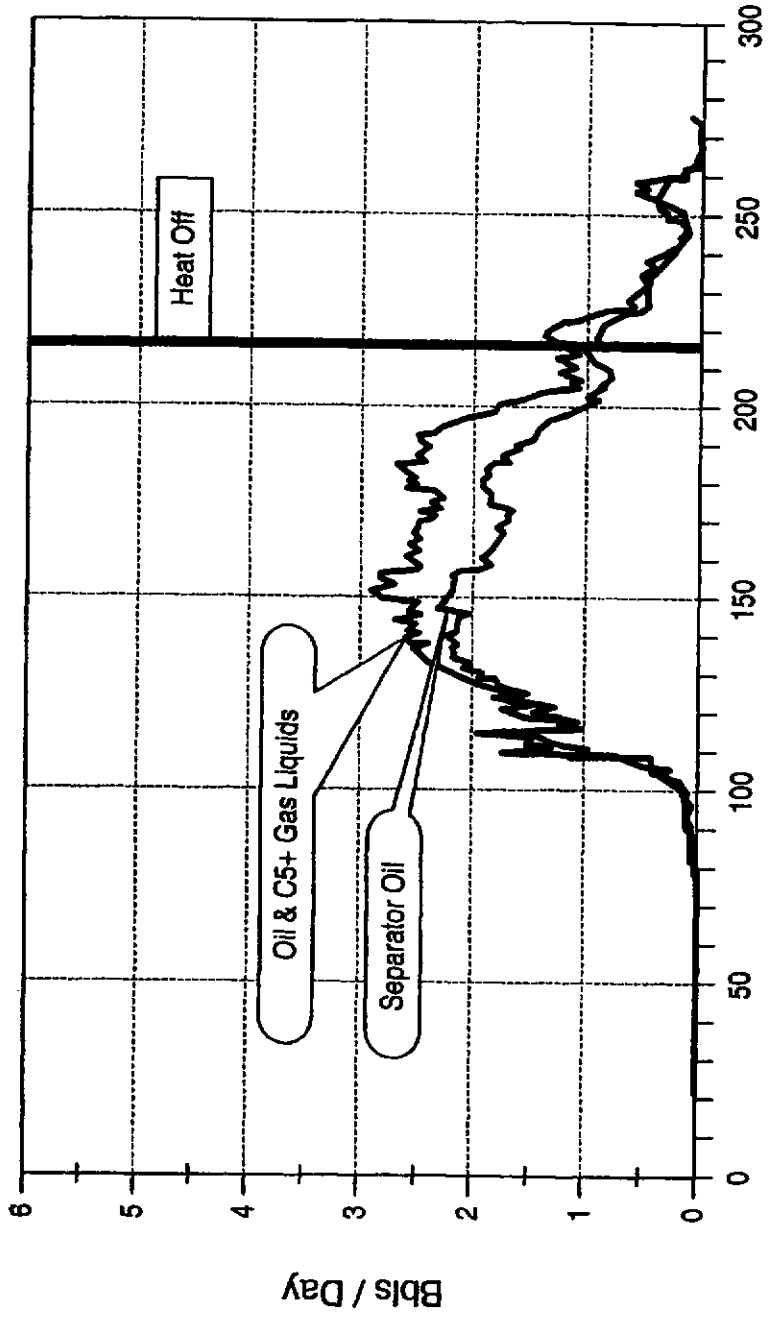

Heat Off
Oil & C5+ Gas Liquids
Separator Oil
Bbls / Day
0
1
2
3
4
5
6
0
50
100
150
200
250
300
Days From Start of Heat Injection

FIG. 175

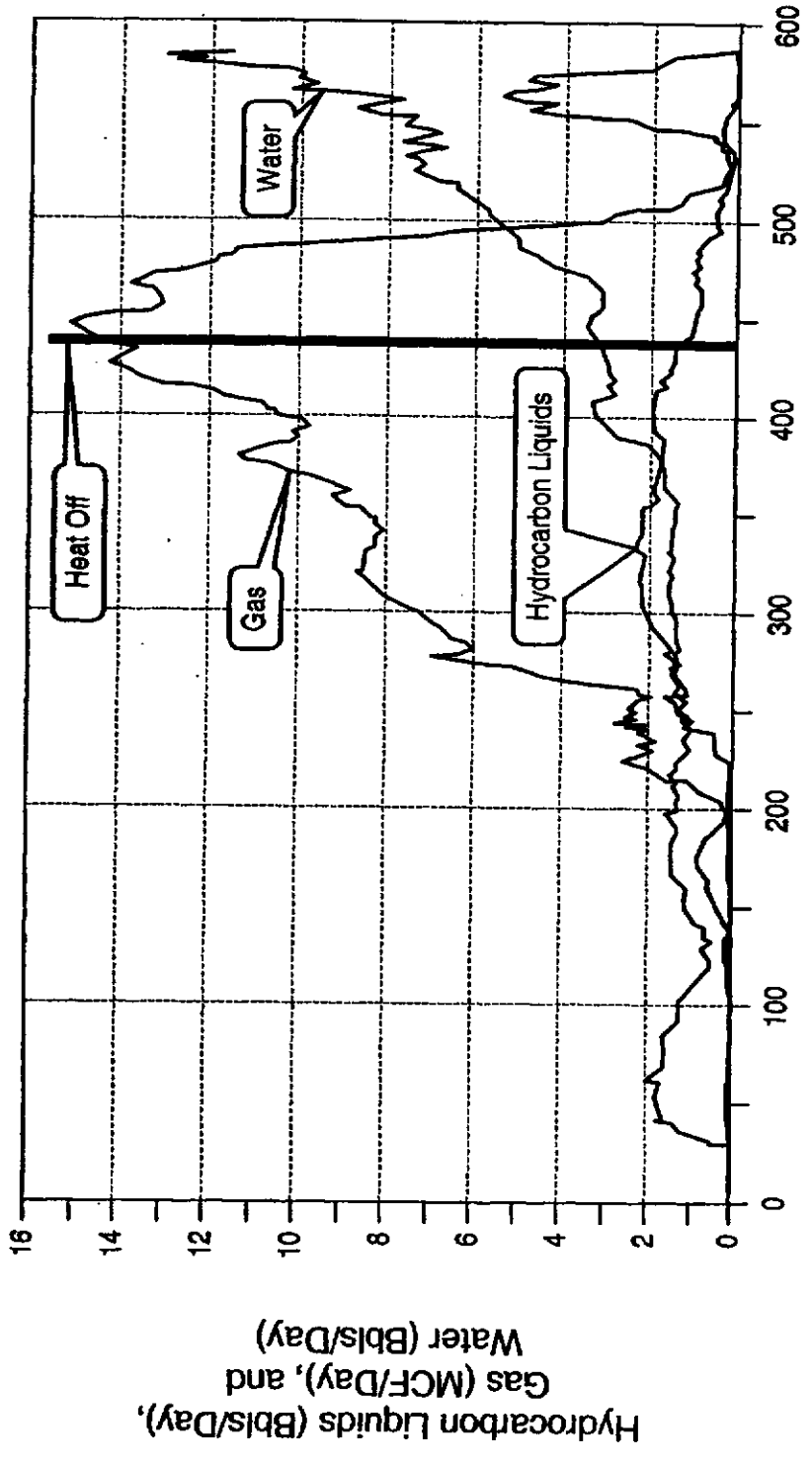

Hydrocarbon Liquids (Bbls/Day),
Gas (MCF/Day), and
Water (Bbls/Day)
16
14
12
10
8
6
4
2
0
0
100
200
300
400
500
600
Mega Watt - Hours
Heat Off
Gas
Water
Hydrocarbon Liquids

FIG. 176

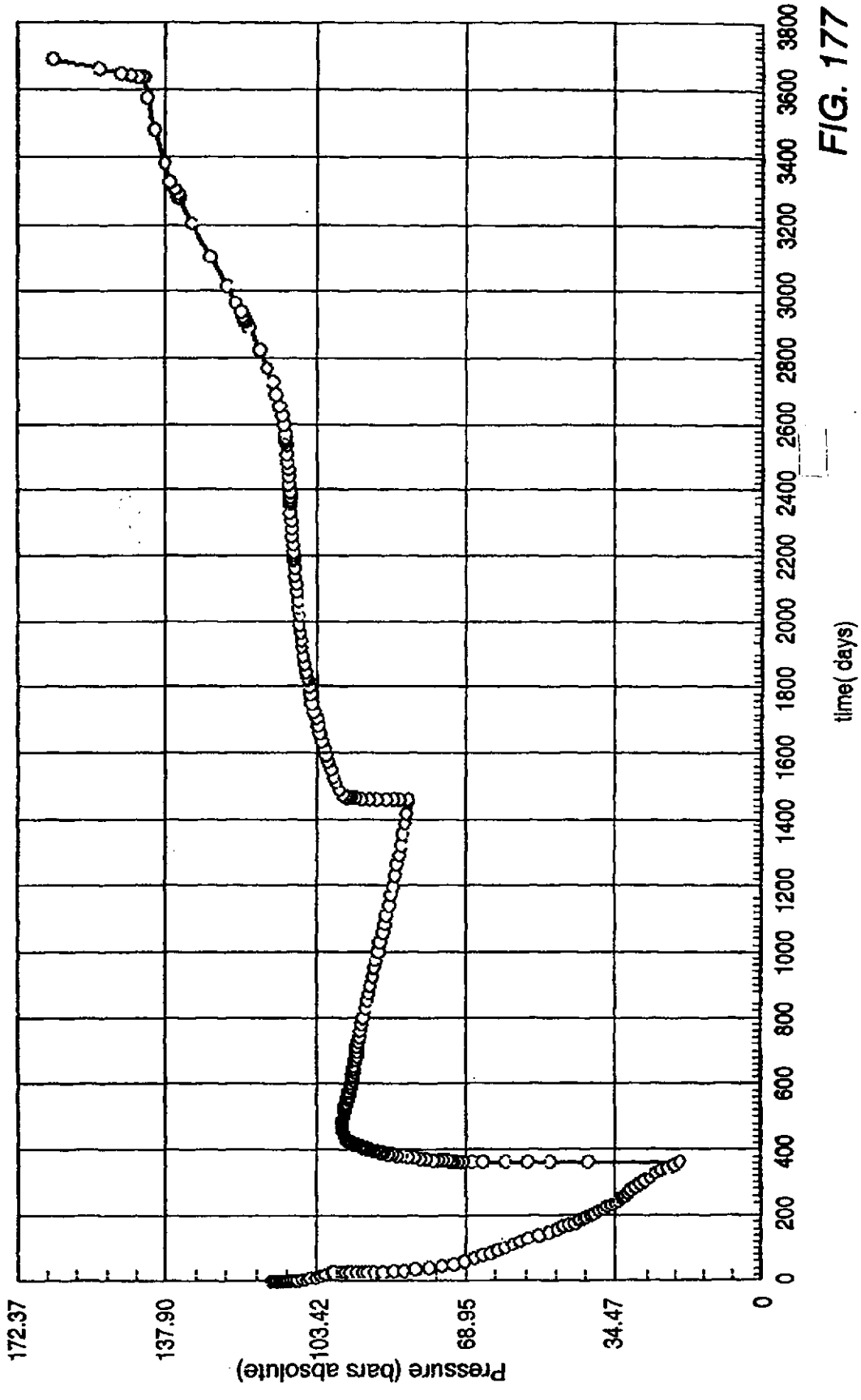

Pressure (bars absolute)
172.37
137.90
103.42
68.95
34.47
0
time(days)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400
3600
3800

FIG. 177

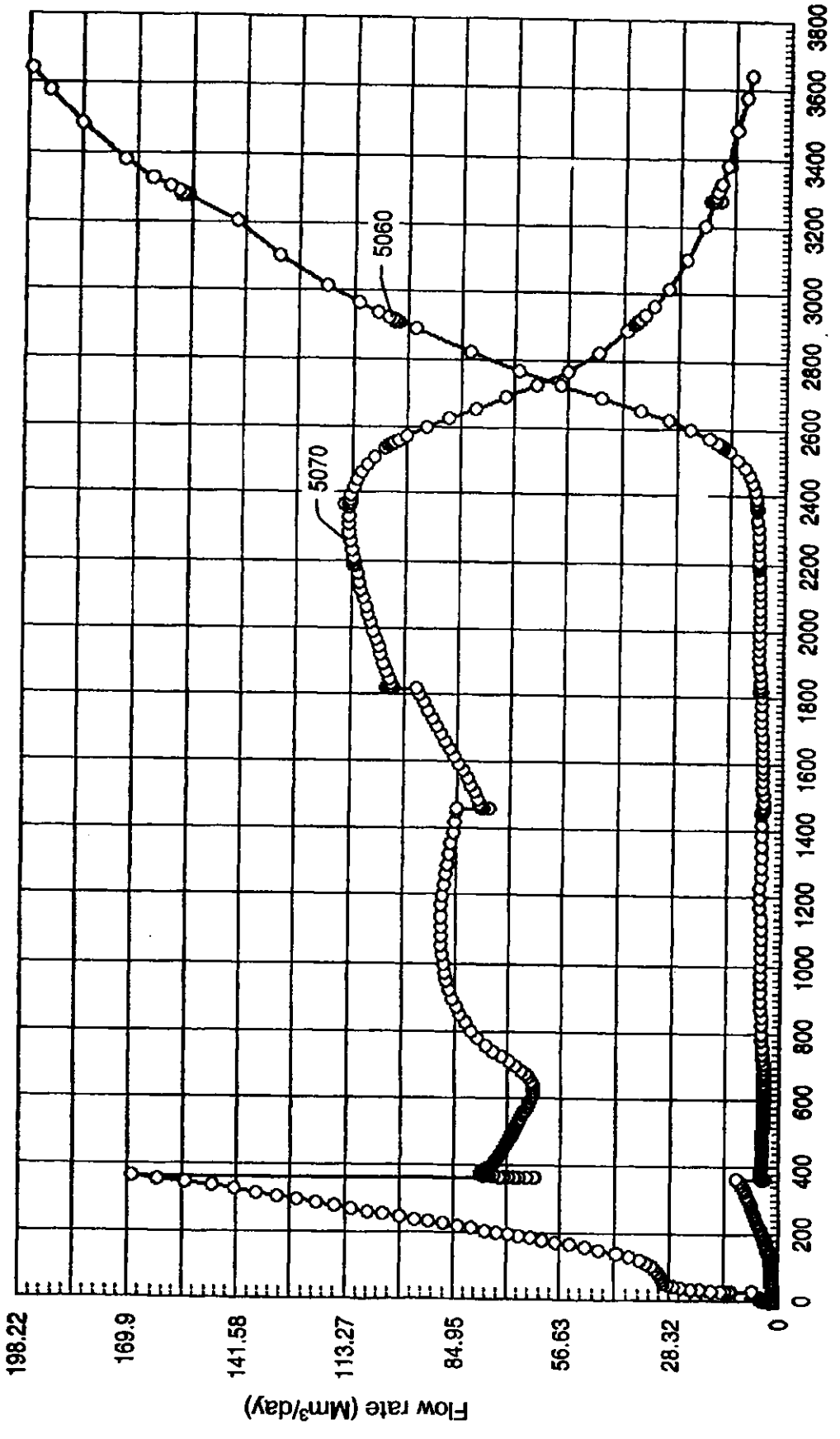

198.22
169.9
141.58
113.27
84.95
56.63
28.32
0
Flow rate (Mm3/day)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400
3600
3800
time (days)
5060
5070

FIG. 178

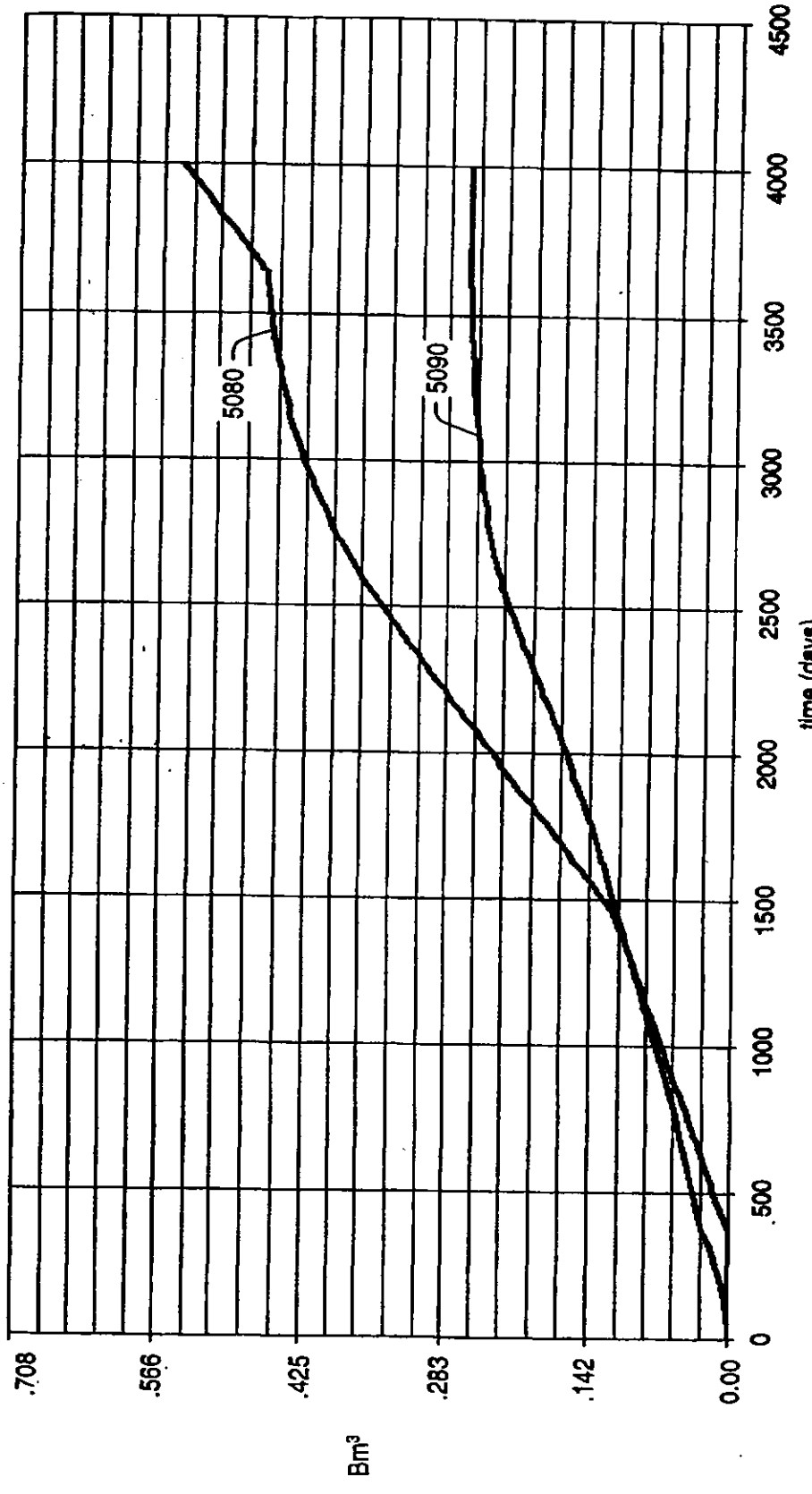

5080
5090
time (days)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
.708
.566
.425
.283
.142
0.00
Bm³

FIG. 179

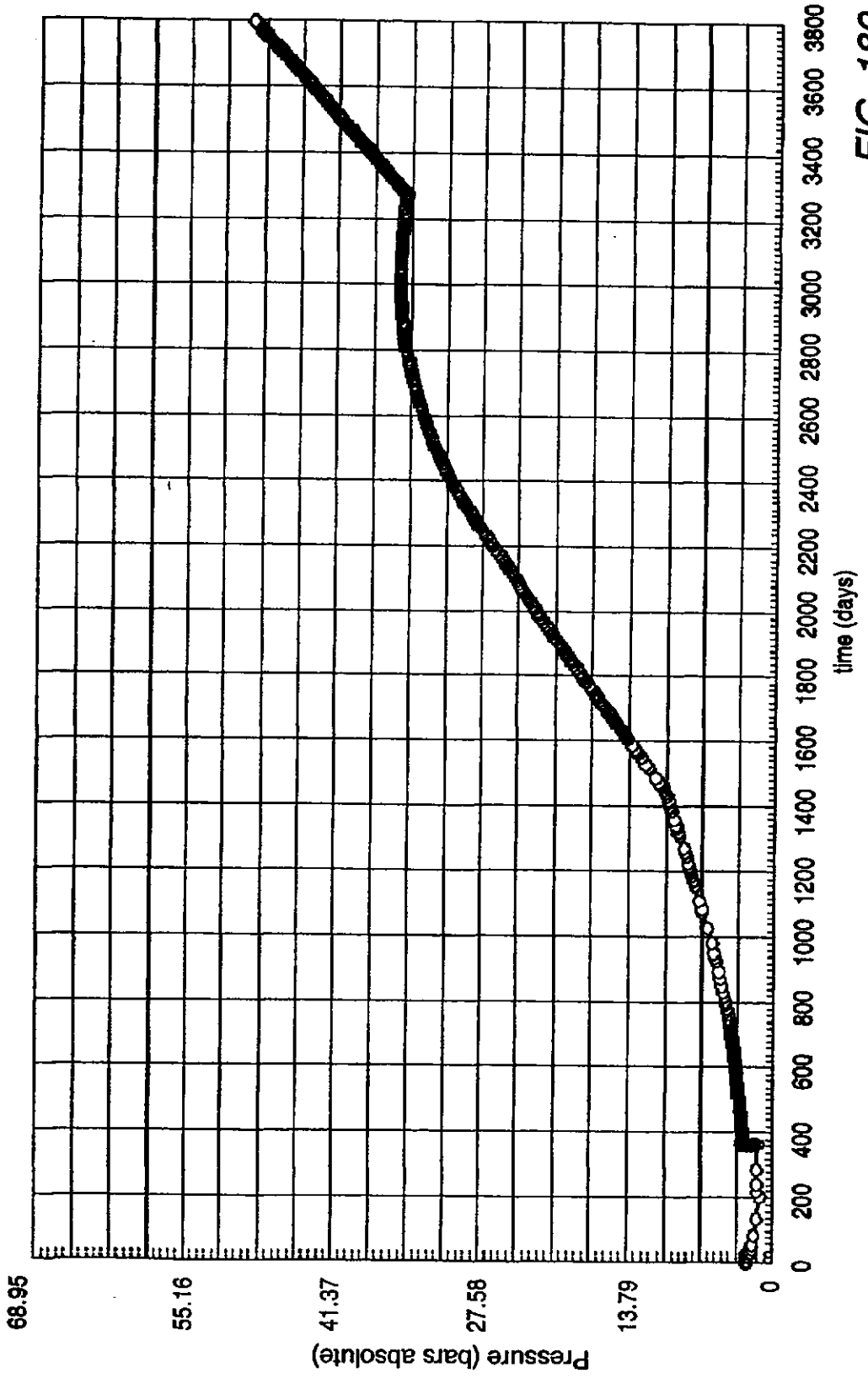

68.95
55.16
41.37
27.58
13.79
0
Pressure (bars absolute)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400
3600
3800
time (days)

FIG. 180

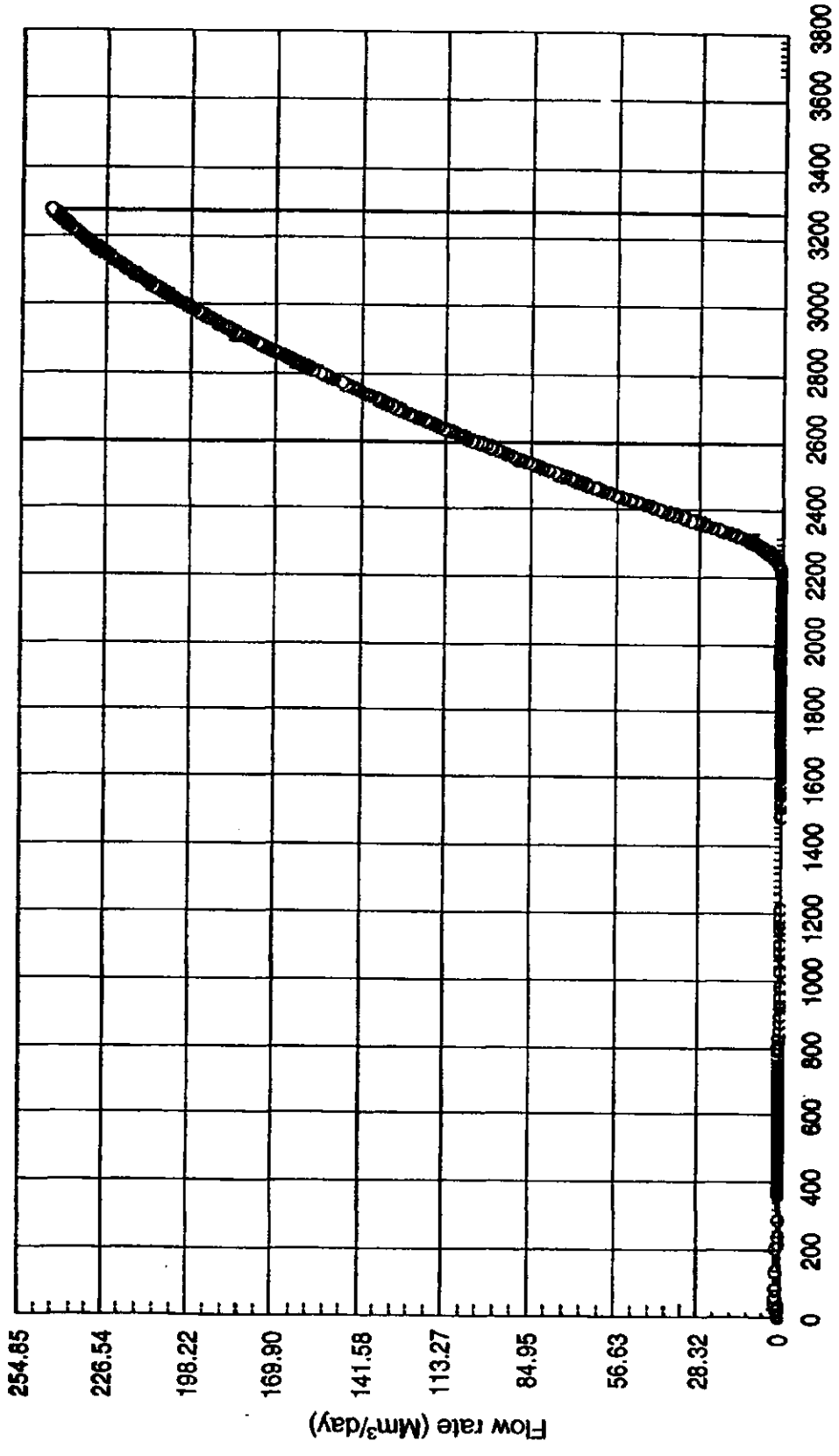

254.85
226.54
198.22
169.90
141.58
113.27
84.95
56.63
28.32
0
Flow rate (Mm3/day)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400
3600
3800
time (days)

FIG. 181

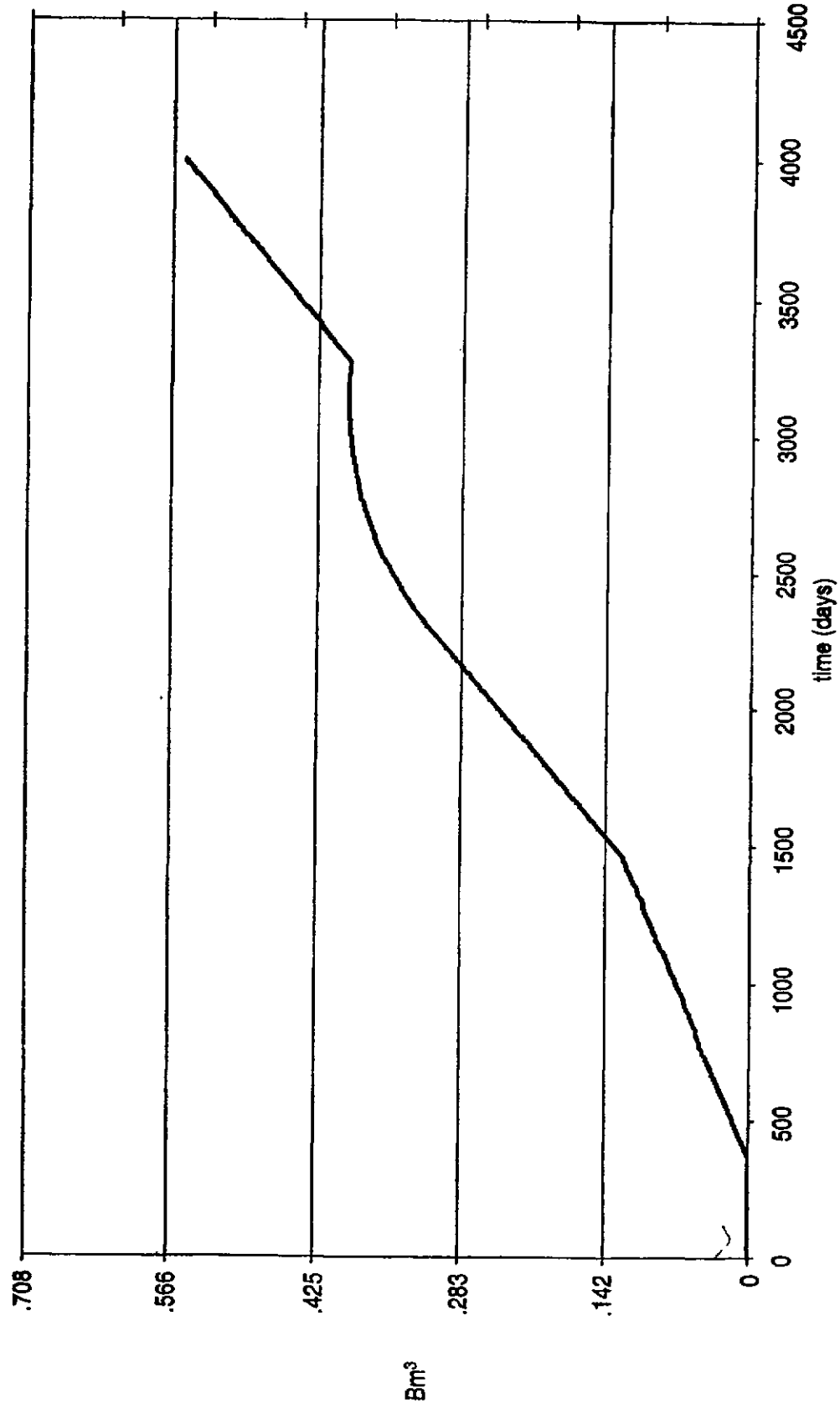

.708
.566
.425
.283
.142
0
Bm³
0
500
1000
1500
2000
2500
3000
3500
4000
4500
time (days)

FIG. 182