Fig. 1

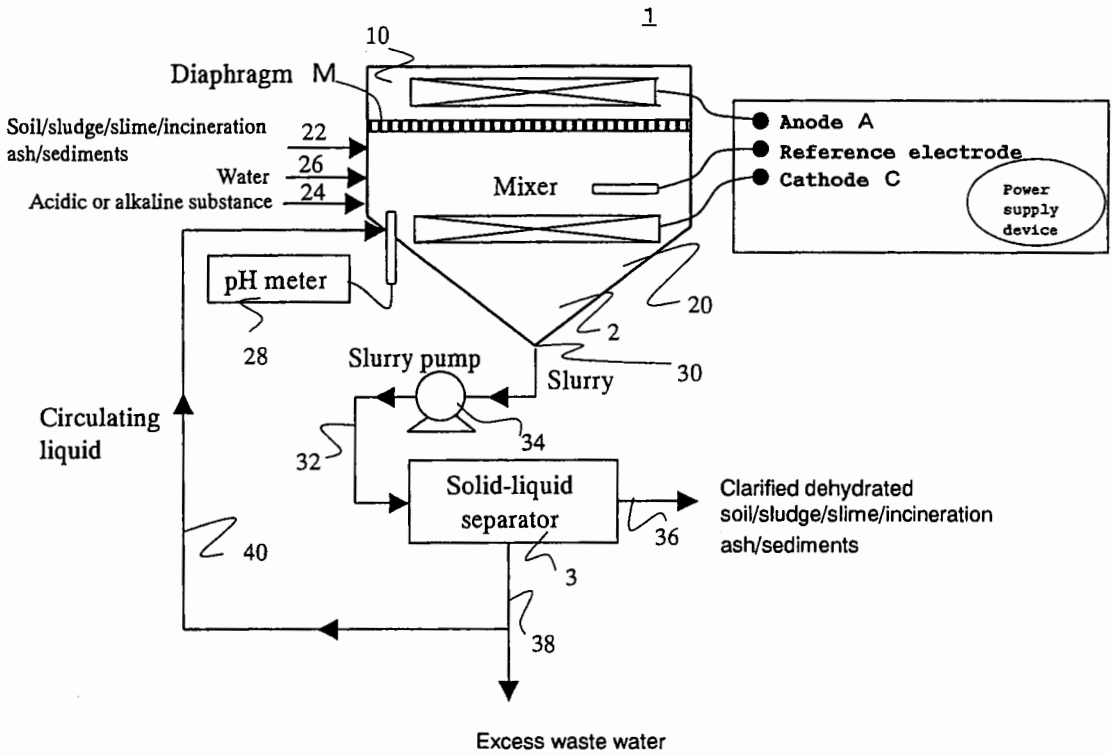

1
10
Diaphragm M
Soil/sludge/slime/incineration ash/sediments
22
Water
26
Acidic or alkaline substance
24
Mixer
Anode A
Reference electrode
Cathode C
Power supply device
pH meter
28
20
2
Slurry pump
Slurry
30
34
Circulating liquid
32
Solid-liquid separator
Clarified dehydrated soil/sludge/slime/incineration ash/sediments
36
40
3
38
Excess waste water

Fig. 2

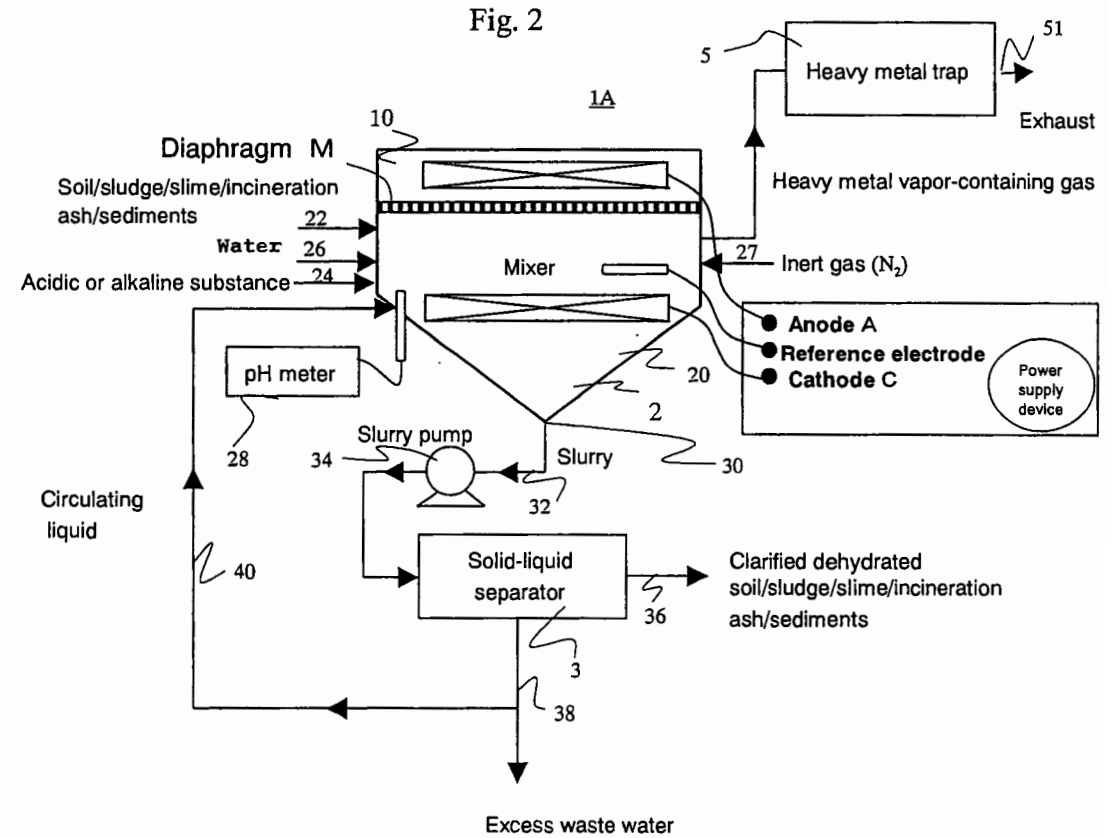
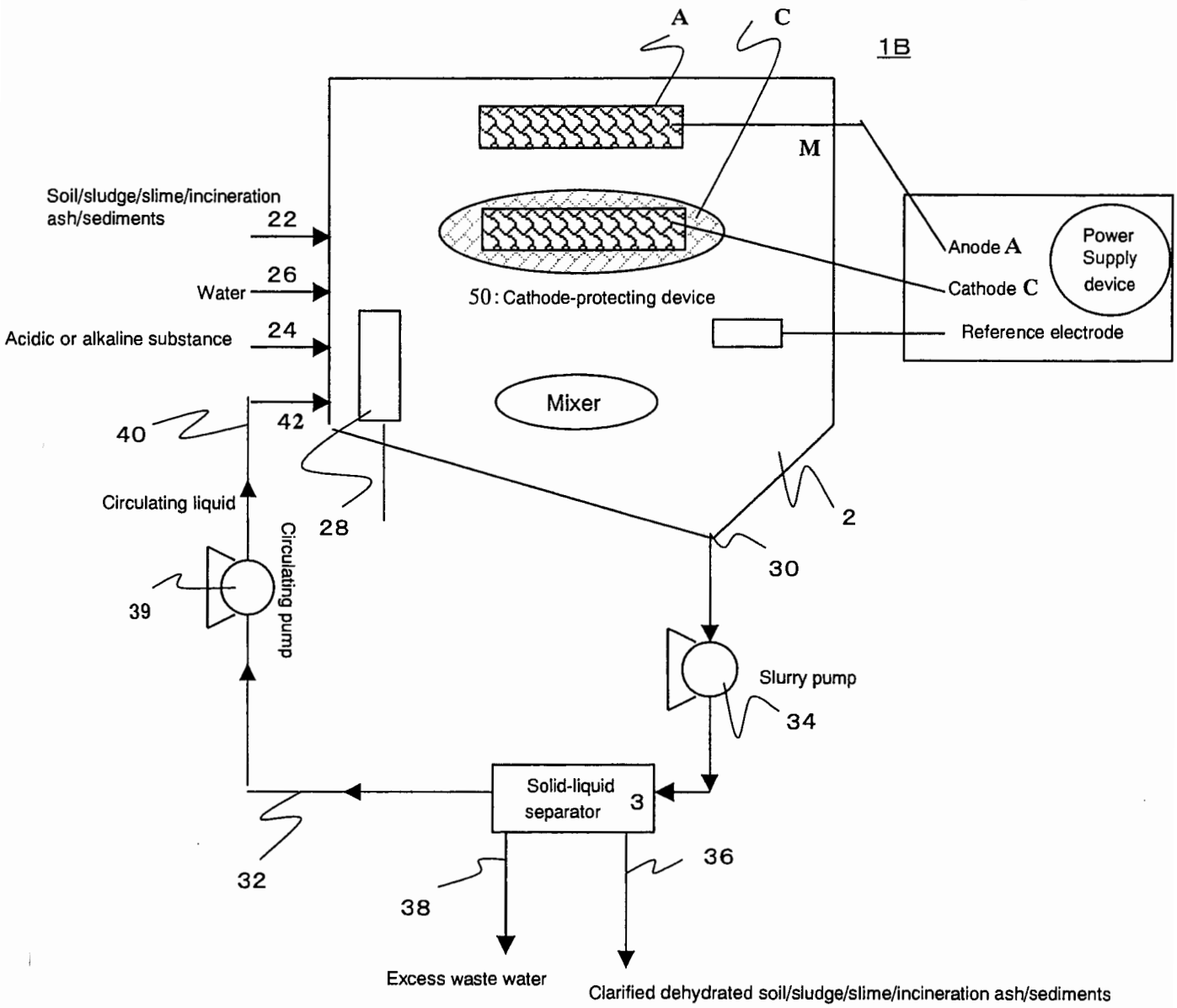

5
Heavy metal trap
51
Exhaust
1A
10
Diaphragm M
Heavy metal vapor-containing gas
Soil/sludge/slime/incineration ash/sediments
22
Water
26
27
Inert gas (N_2)
Acidic or alkaline substance
24
Mixer
Anode A
Reference electrode
Cathode C
Power supply device
pH meter
20
2
28
34
Slurry pump
Slurry
30
32
Circulating liquid
Solid-liquid separator
Clarified dehydrated soil/sludge/slime/incineration ash/sediments
36
40
3
38
Excess waste water

Fig. 3


A
C
1B
M
Soil/sludge/slime/incineration ash/sediments
22
Water
26
Acidic or alkaline substance
24
50 : Cathode-protecting device
Anode A
Cathode C
Power Supply device
Reference electrode
Mixer
40
42
28
2
30
Circulating liquid
Circulating pump
39
Slurry pump
34
Solid-liquid separator
3
32
36
38
Excess waste water
Clarified dehydrated soil/sludge/slime/incineration ash/sediments

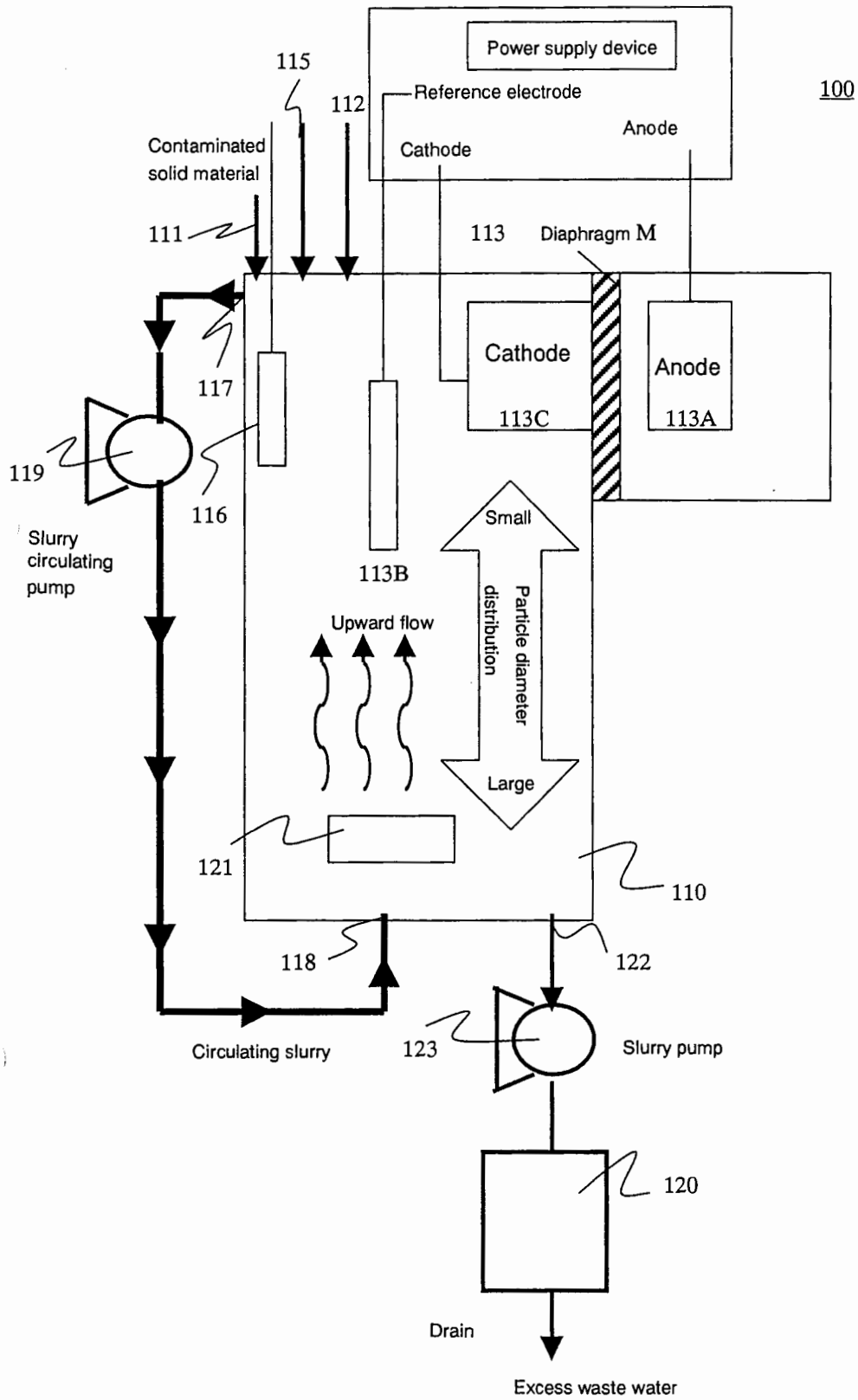

Power supply device
Reference electrode
Anode
Cathode
100
115
112
Contaminated solid material
111
113
Diaphragm M
Cathode
113C
Anode
113A
117
119
116
Slurry circulating pump
113B
Small
Particle diameter distribution
Large
Upward flow
121
110
118
122
Circulating slurry
123
Slurry pump
120
Drain
Excess waste water

Fig.4

Fig. 5

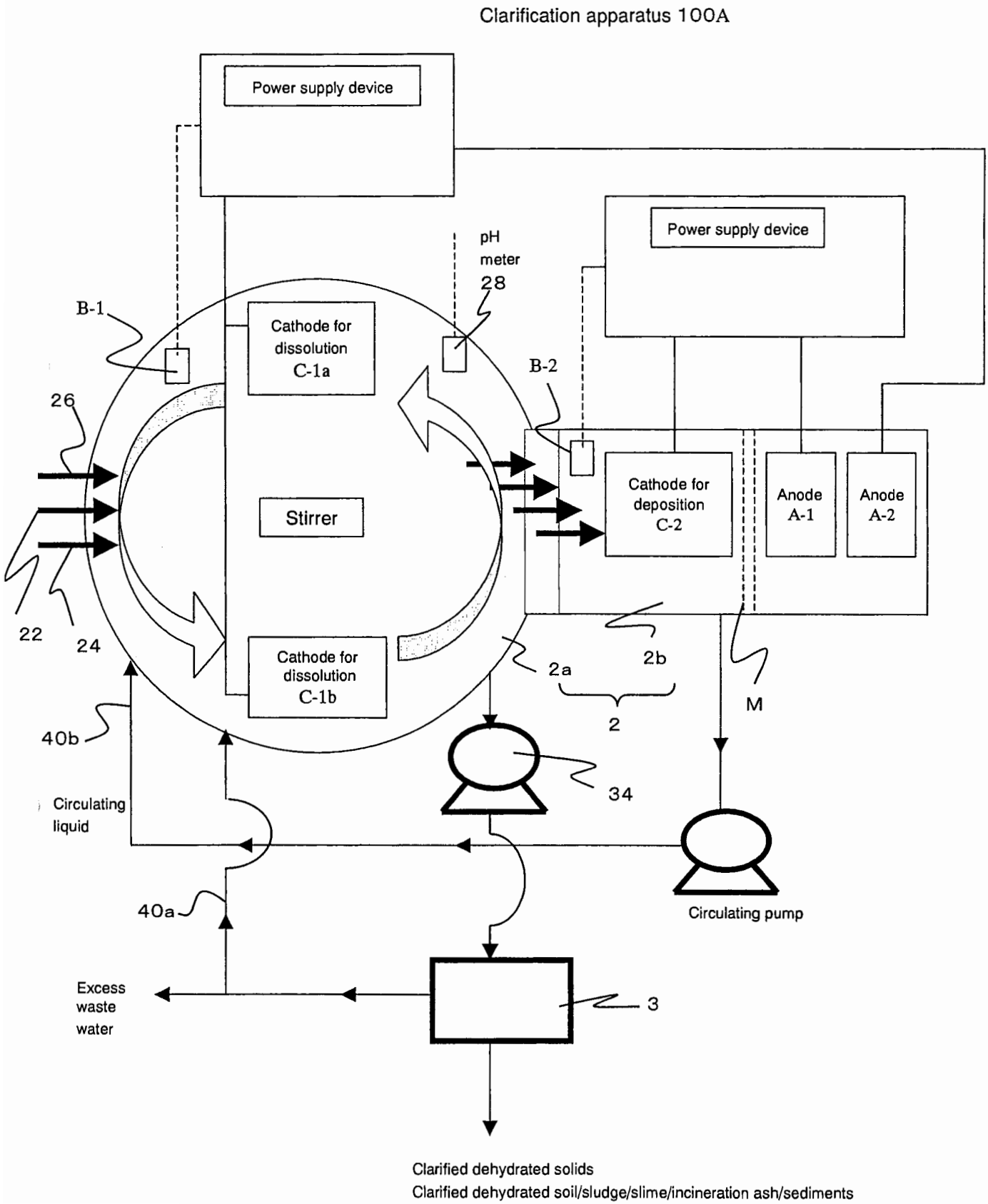

Clarification apparatus 100A
Power supply device
Power supply device
pH meter
28
B-1
B-2
Cathode for dissolution C-1a
26
Stirrer
Cathode for deposition C-2
Anode A-1
Anode A-2
22
24
Cathode for dissolution C-1b
2a
2b
2
M
40b
34
Circulating liquid
40a
Circulating pump
Excess waste water
3
Clarified dehydrated solids
Clarified dehydrated soil/sludge/slime/incineration ash/sediments

Fig. 6

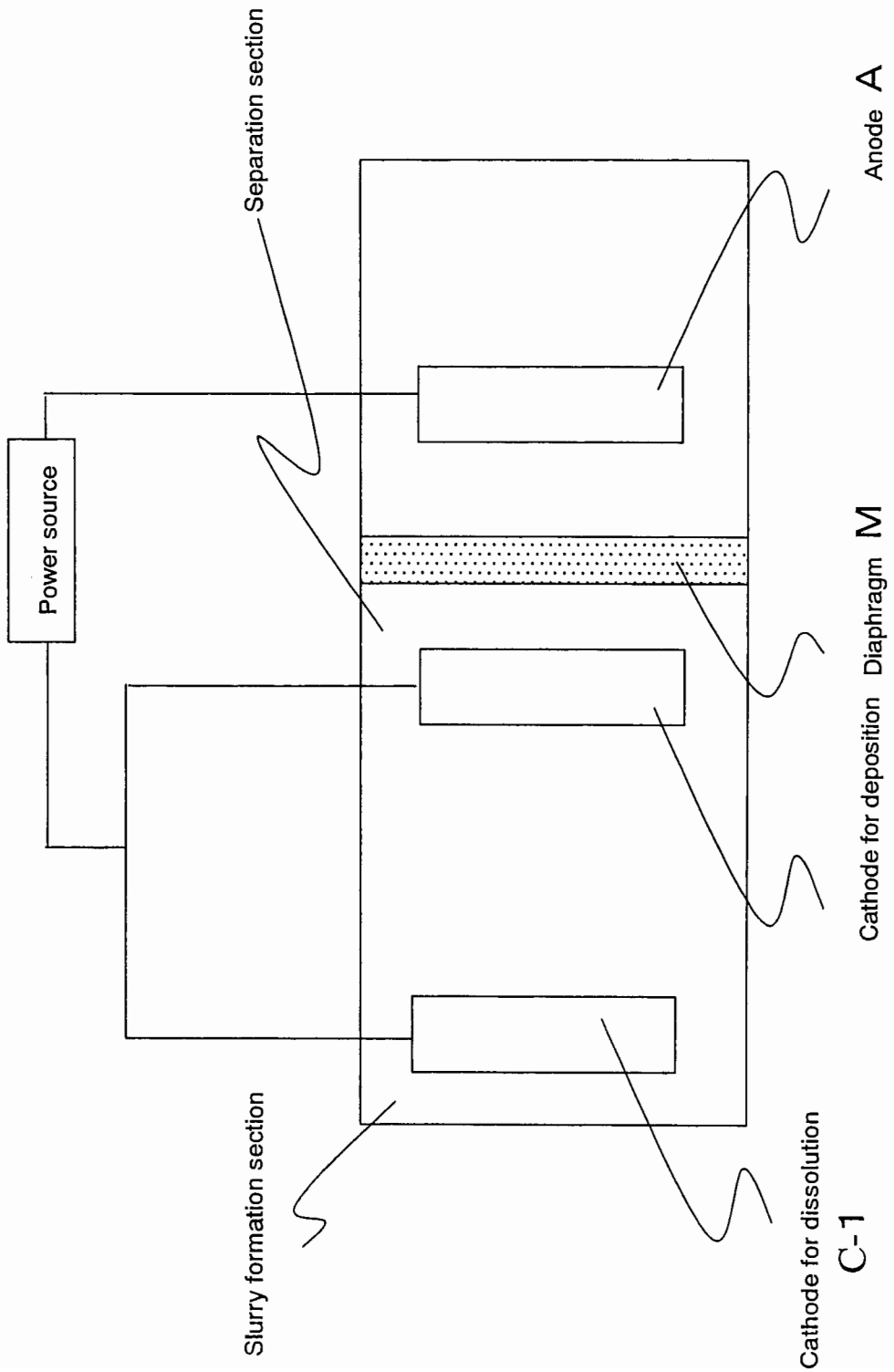

Power source
Separation section
Anode A
Diaphragm M
Cathode for deposition
C-2
Slurry formation section
Cathode for dissolution
C-1

Fig. 7

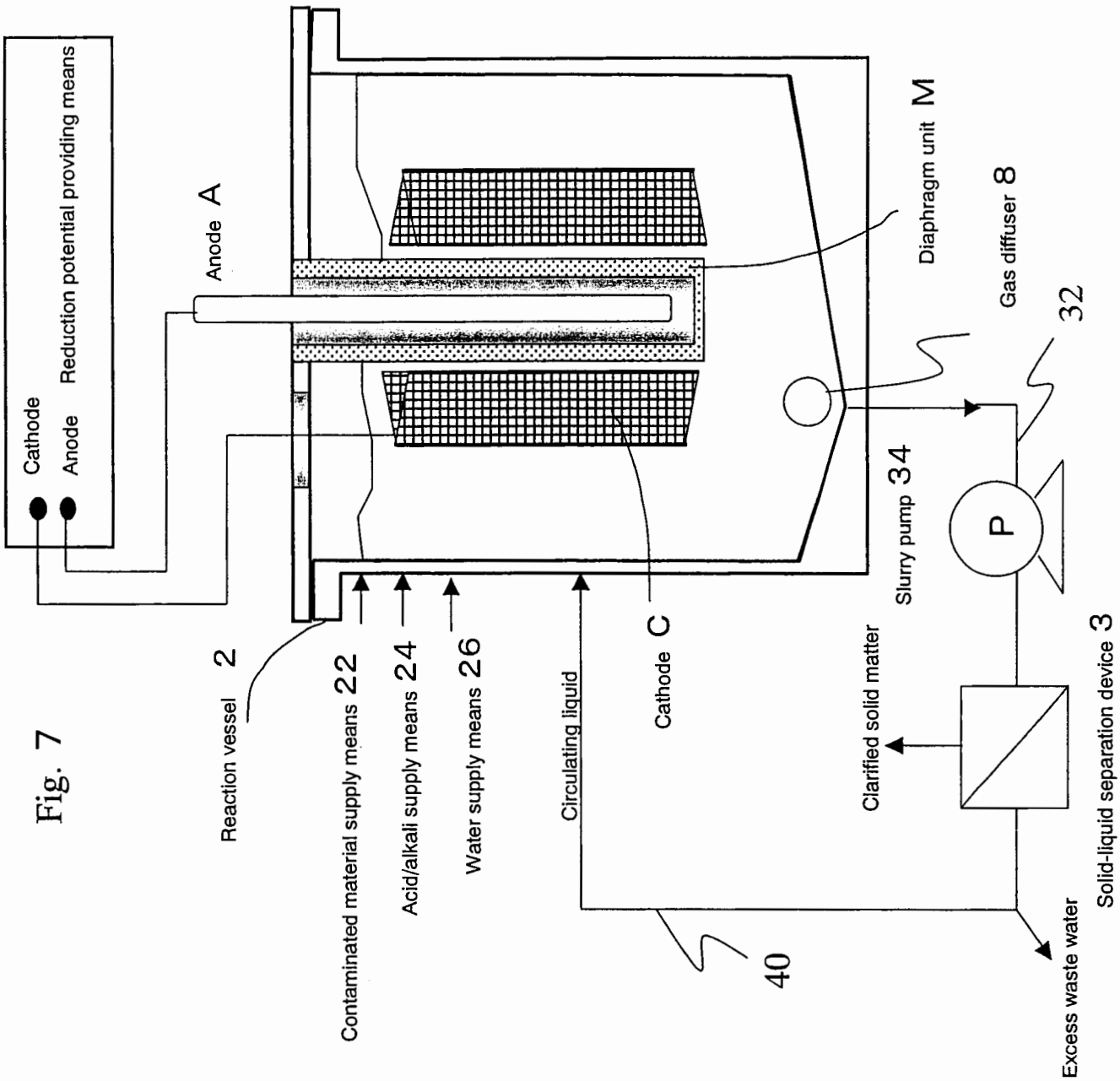

Cathode
Anode
Reduction potential providing means
Anode A
Diaphragm unit M
Gas diffuser 8
32
Slurry pump 34
P
Reaction vessel 2
Contaminated material supply means 22
Acid/alkali supply means 24
Water supply means 26
Circulating liquid
Cathode C
Clarified solid matter
Solid-liquid separation device 3
Excess waste water
40

Fig. 8

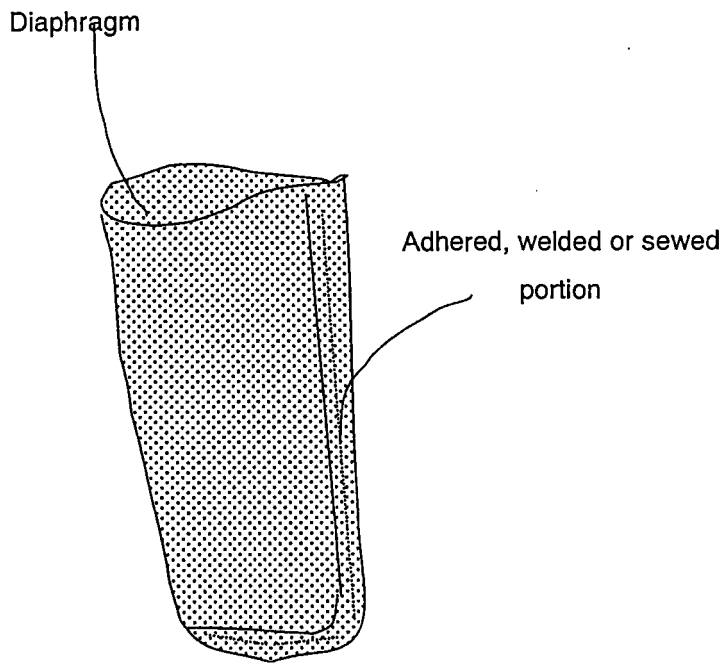


Fig. 9

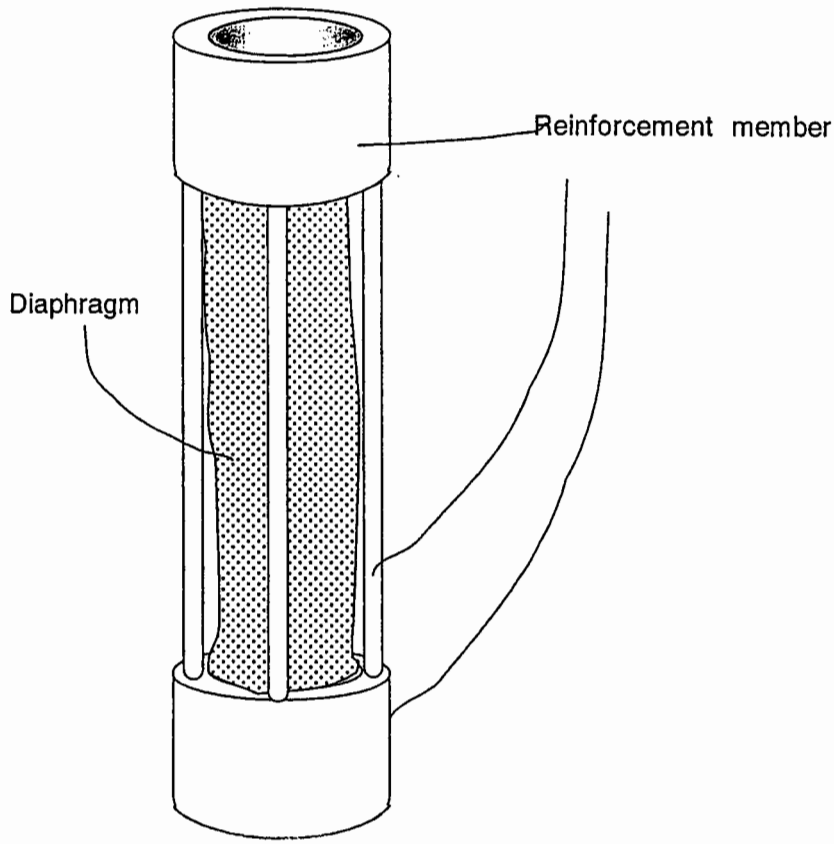


Fig.10

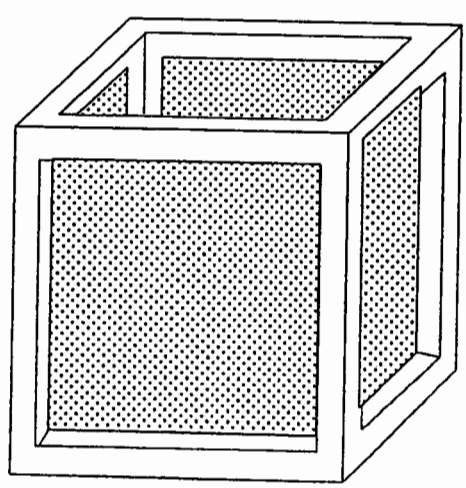
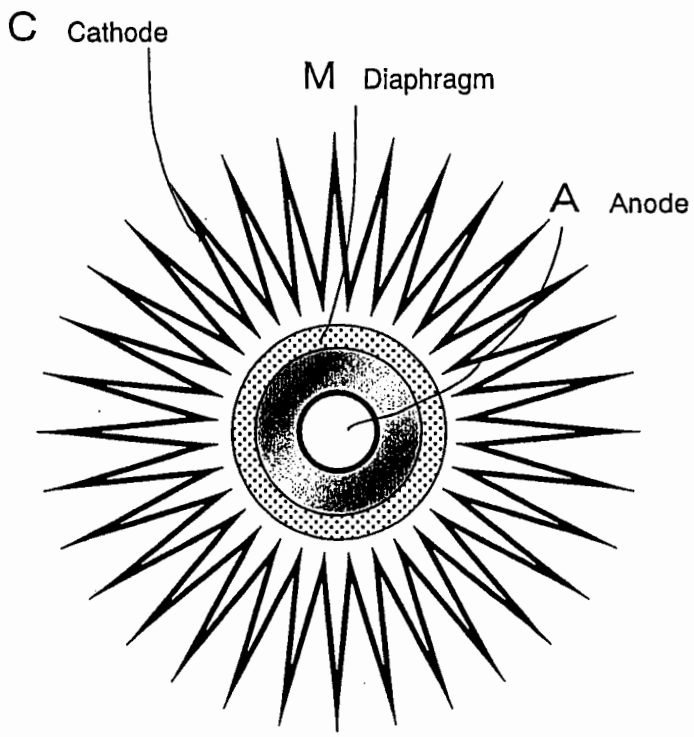
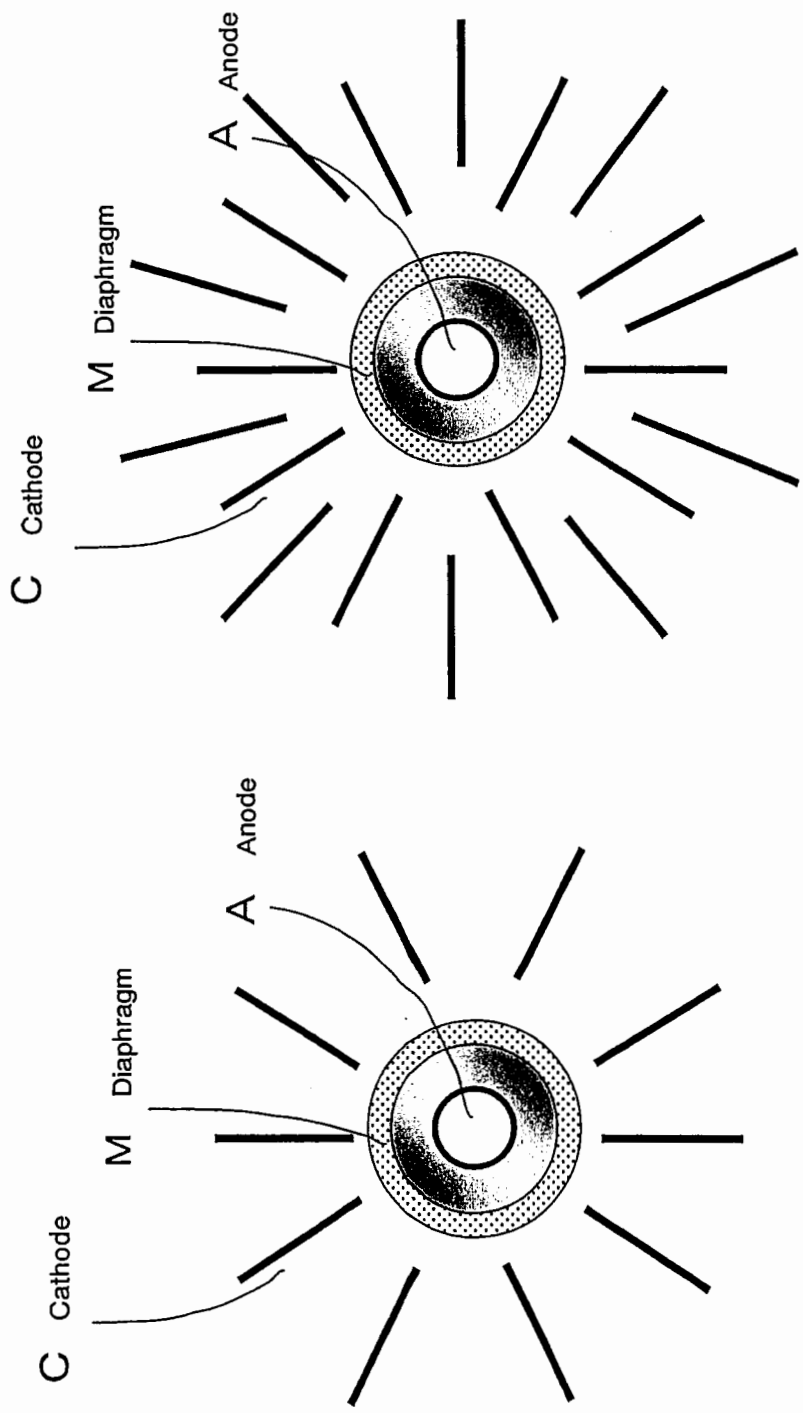


Fig. 11



Diaphragm-electrode unit and cathode viewed from above

Fig. 12


C Cathode
M Diaphragm
A Anode
(a)
C Cathode
M Diaphragm
A Anode
(b)

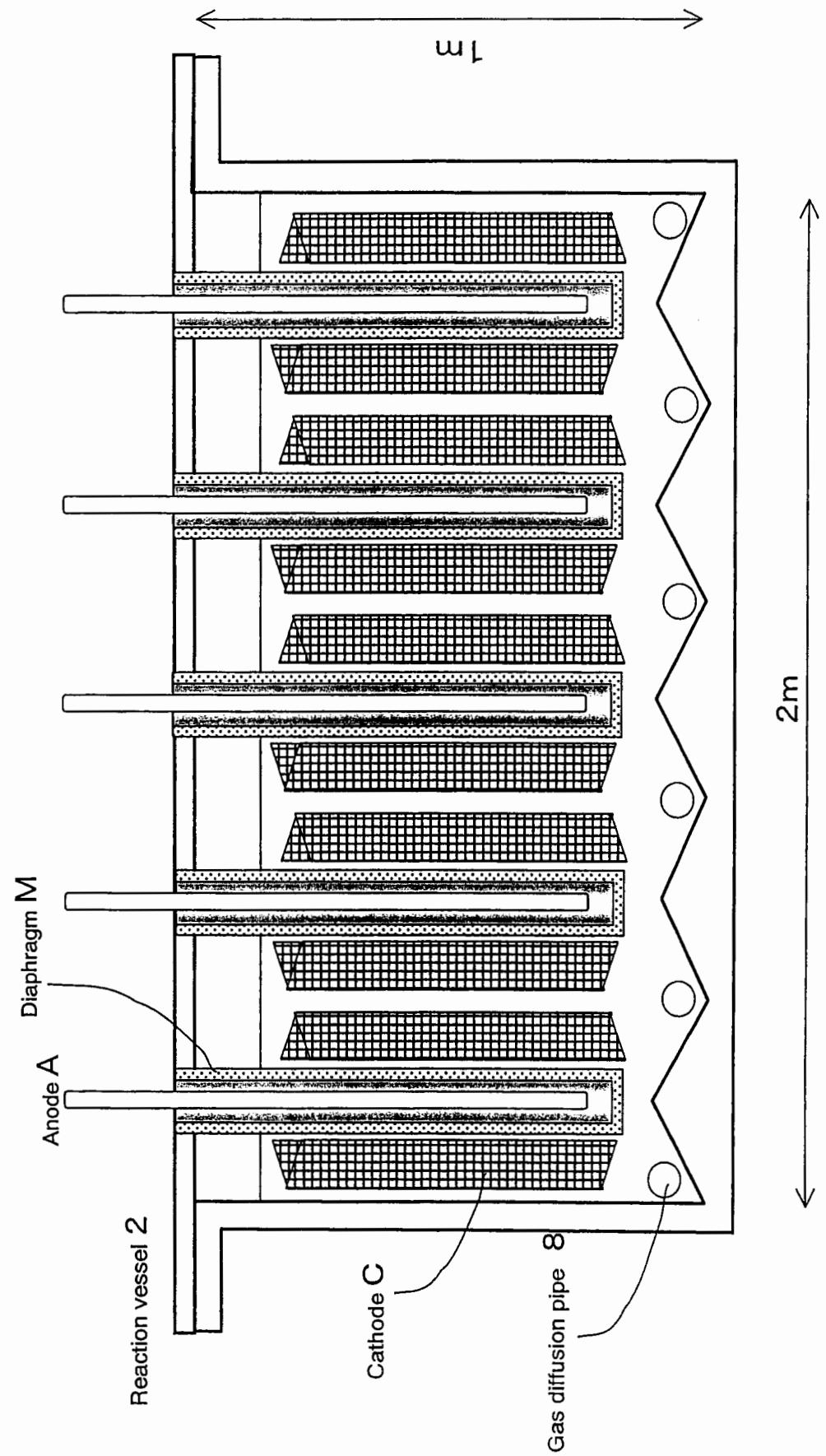

1m
2m
Diaphragm M
Anode A
Reaction vessel 2
Cathode C
Gas diffusion pipe 8

Fig. 13

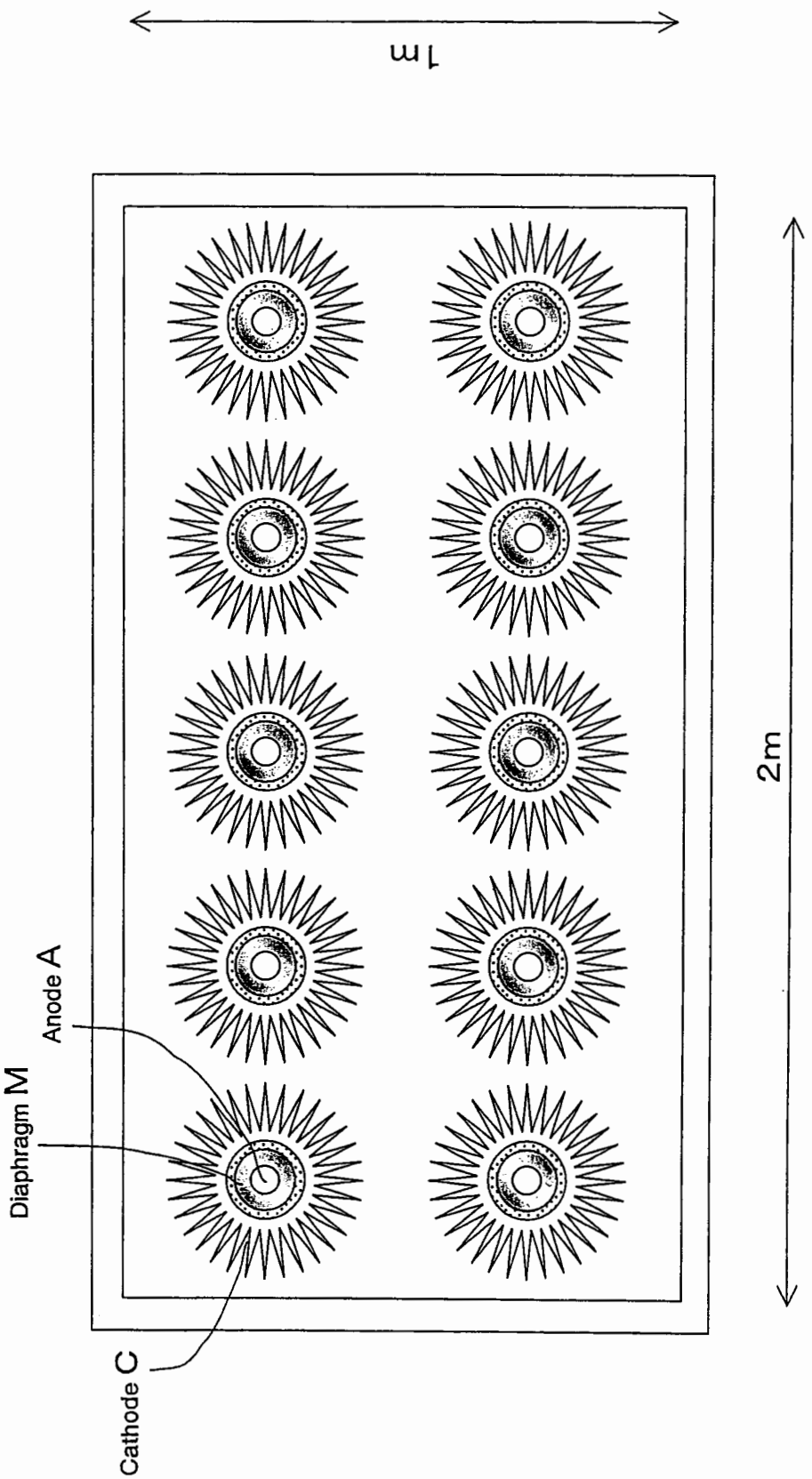
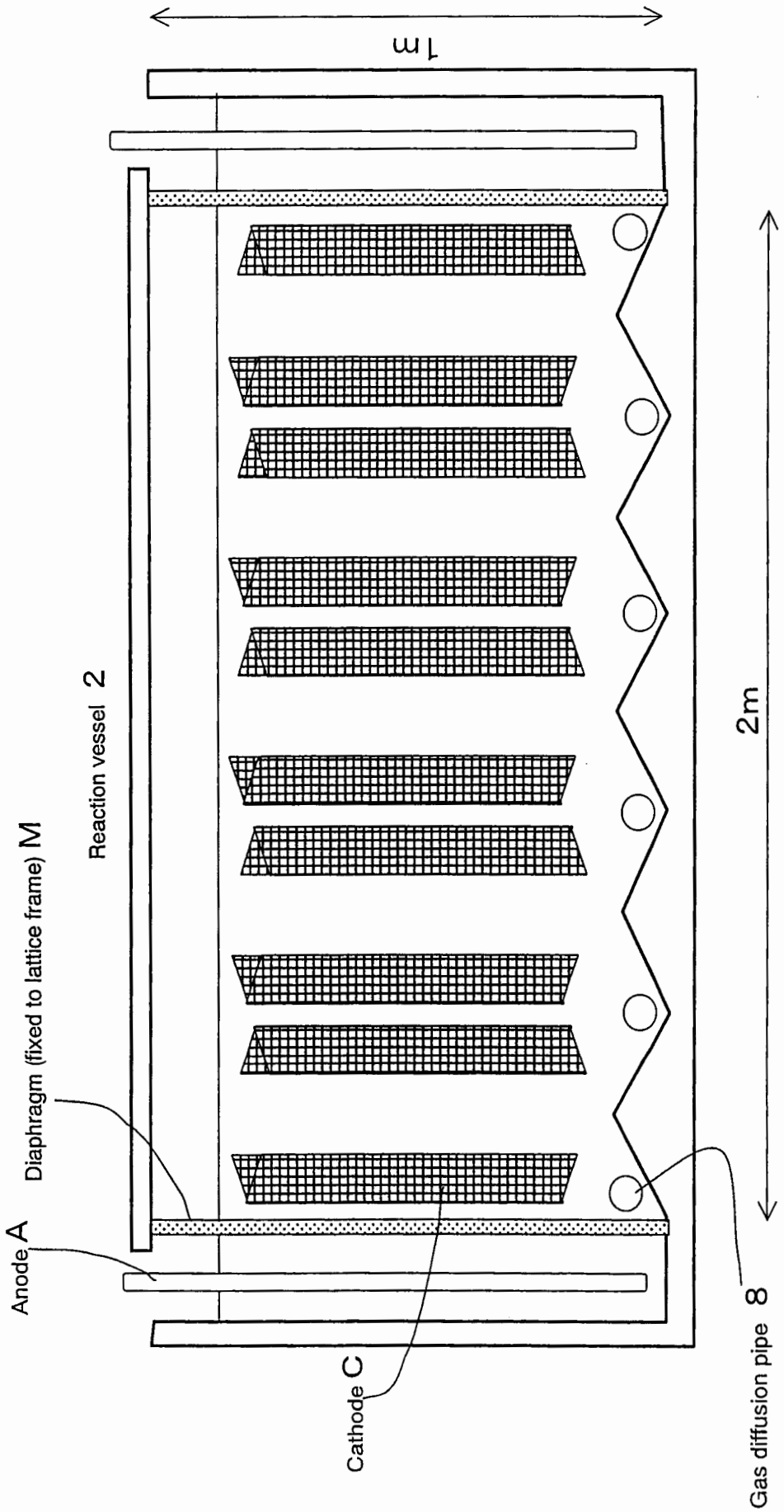


Fig. 14

Fig. 15


1m
2m
Reaction vessel 2
Diaphragm (fixed to lattice frame) M
Anode A
Cathode C
Gas diffusion pipe 8

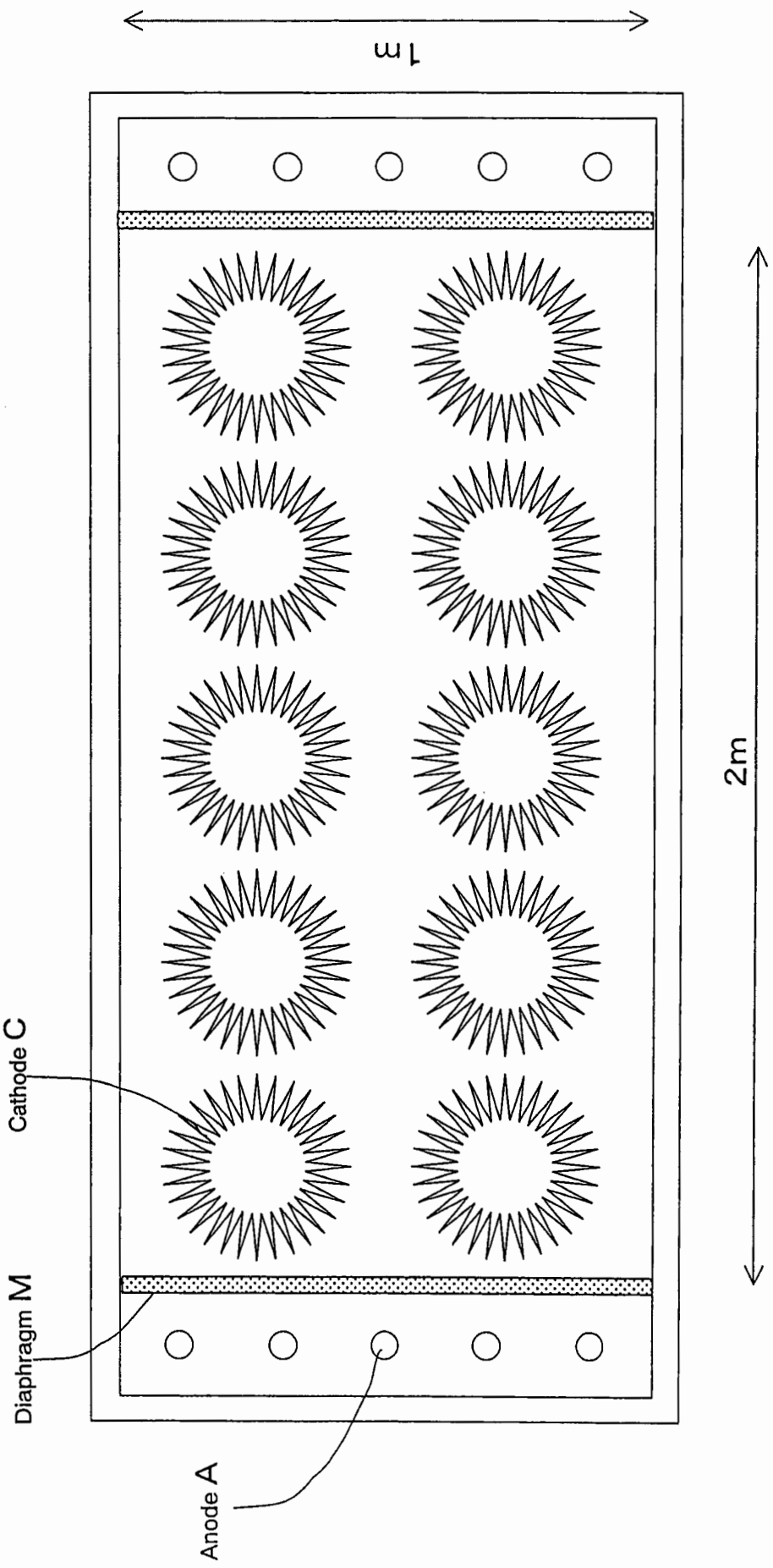


Fig. 16