

2003 09 13
10-0397227
2003 08 26

(81)

가

가

가

가

가

AP ARIPO : 가

EA :

EP :

OA OAPI : 가

(74)

(54)

a) 1 (2) 가 1 (4)
1 , b) (58) 1 가
1 , c) 1 1

17

(electrochemical deposition)

(microfabrication processes; 가) (micron)
(submicron) (feature)
(macroscopic scale) 가 (bulk) 가 ;
(synchrotron-processed) LIGA
2.5-D 1-4
(geometries,)
(rapid prototyping) (solid freeform fabrication)
(macroscopic parts) 50-100 μ m (features)
50-150 μ m

a) 1 1 가 1
1 ; b) 1 가 1
1 ; c) 1
; d) 2 2
2 , 2 , a) 2 2
2 가 2 ; b) 2 2 가
2 2 가 ; c) 2
2 가 ;
3 a)~c)
1 , 1 가

21
22
23
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25
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4
2

23

3

25

3

(2

)

3

3

3

가

(

,

)

(

)

(

,

,

(microscopic)

)

(mesoscopic)

가

(articles)

가

가

(electroplating article)

1

(4)

(8; support)

가

(6; confo

rmable mask)

가

(p

orous medium;

),

2

(4)

(13)

가

(flash;

)

(

)

가

(

,

)

,

/

,

(

가

)

가

가

)

가

(

,

가

)

(

,

)

)

가

(negat

ive and positive features)

(rigid)

가

(peak)

(

valley)

(

,

10^{-14} Ohm-cm)

,

(hy

drophilic)

가

,

(hydrophobic)

가

, 15X15 μ m)

(positive feature)

(

(

,

)

(, 10 25 μm) 가 .
 (,) . (wall angle; ,)
) . (,)
 가 SU-8 (synchrotron-processed
 methyl methacrylate) 가 AZ4620
 (positive photoresist) .
 RMS-033 가 (Sylgard; 가 182 184)
 (porous medium) 가
 (pores) 가 , 가
 가 .
 1% , , 0.3 3 μm 20
 (retention rating) . , 가
 .
 가 가 가 (permeable)
 (shedding) (,) ,
 (rigid, hydrophilic, slip cast ceramic disk porous medium;
 가) , (GH 가),
 (polyvinylidene fluoride; " " 가)
 (polytetrafluoroethylene; LCR 가)
 (hydrophilized) (edge)
 (porous membranes)
 (masking application)
 (backing) .
 , (,)
 () . (,)
) (, ,) .
 ,
 가 가 가
 가
 (dummy) . 가
 가 , , (,)
) , .
 가 (microrvolume)
 (bulk)
 (granular) , (tiny spheres),
 가 /
 (,)

(). / . /
 _____ (anode)
 e), 가 (soluble) 가 (insolubl
 가 (,) 가
 가 " (redressed)"
 가 (through-mask) 가

 , ,
 () (cured; , , (hardened), ,
)

 ,
 hemical microetching), (lapping), (sandblasting) (sintering) (c
 (promotor; 가 (Sylgard Prime Coat))가
 (mechanical interlocking)
 가 ,
 가 (,) ,
 가 (,) (, 가 (microns
)) (, 가)
 " "
 가 ;
 (barrier) 가
 ;
 가 (acetone-soluble) (waxes) (lacquers),
 (investment casting cores) 가 , 509, 가
 [, , (electrorheological fluids)]
 3 (131;) (132) (, (130) 1
 (136) (spun-on) (132) (3a) , (132)
 (3b) , (132) , (132)
 (130) 1 (130) 2 (138) (1
 34) (,) (134) (134)
 () (132)
 (132) , (132)가 (134)
 (soak in) (130)
 가
 , 가 가 (transfer

) (,).
 가
 (barrier layer)
 (application)
 가 (ion milling), 가
 (dry film)
 ;
 ;
 (CVD)
 ;
 ;
 (filling)
 ;
 4
 (144;) (142) ()
 SU-85 (micromold; 140) (micron) 가 (photopatternable)
 e) (not-stick) (excimer ablation) (master mold)
 (passivated) (146) 가 -1,1,2,2-
 (148)가 (140) 가
 (146) (148) (150)
 (146) (142) (152)
 (oven) (154)
 (148) (156) (140)
 (156) (140) (148) (140)
 (140) (stripper), CCR(가)
 (156) (158) (, O₂ CF₂ 가
) (dummy)"
 가
 가
 5
 (148; , (142)
 (142) (148)

(148) (146) ,
 가 (vacuum degassing) (160) (148) (142) (146) 가
 (, PTFE) (146) (160) (142) (160) (O₂ CF₂ 가
 (146) , (160) (가
) (142) . 가 ,
 .
 6 , 가 (146),
 [photoinitiator; (, 2,2- -2 (가 (148) (, (Mylar))
 가)) RMS-033(가] (146) - [, (Mylar)]
) .
 (146) [, (162)] .
 가 (, (xylene)) ((146)
 146) . 가 (156) (negative working) (가
) . 가 (developer)
 , (textured)
 , (textured)
 .
 7 , (148) ((146;
 146;) ; (156) (164) ; (156)
 ; ; (164) (164) , () (lift off) (156)
 ; [, (164;)
 (156) [, (ion mill)] ; (164;
 ; (164;) ,
 ;
 8 , (146;
) (148) ; (156) () (146;
 ; (ablating) ()
 (156) ; (148)가 (156)
 ; () (170)
 .
 (relief printing)
 AZ4620 SU-8 (aspect ratio)
 ;
 / 가 ;
 (inverse pattern) (, SU-8)
 ;
 / 가) (,) / ; ()
 ;
 9 , (148) (156) (148) ((174)
 174) . (174) " " ,
 , ,
 ,
 ;
 /
 가 (,) .

,
 ; 1 ,
 ; 2 ,
 2
 2 (blanket)
 가
 ()
 2 10 , 1
 1 (230) 2 (232) (234)
 2 (232) 1 (230) 가 11 (6) (8) 1 (4)
 (2) , 1 [, (10)] 1 (12;
) , (16) (18) 2 (14) (2)
 , 2 [, (22)] 2 (20; ,)
 , (4a, 4b, 14a, 14b)
 (12) (26)가 (24)
 2 1
 가 1
 12 (12; , () 2 (20; (2) 12b)
 , 1 (12b)
 (, 가) (,), -
 1-6
 (segregation) 가
 가
 (slurry)
 (wear resistant stops)
 (precision flat metal plate) 가
 가
 " (conditioni
 X/
 ng ring)"
 Y (motion stage)
 360 ° (delivery)
 가 $r=r_0 + A\sin B$
 ()
 13 (pad)
 (bus) 13
 (36) (34) (40),
 (42), (41) (44; passivation layer) (38)
 (36) ; (38)
 (40, 41) (46) (38)
 (35) ; (40) (41) (38)

; (degreasing) ;
 (48) (41) ; (41) (48) ;
 (48) (48) ; (35) ; (52)
 40) (50) ; (36) ; (34)
 ; (48) (51) 52) (54)(13i)
 (38; ,) (cyclic plating)
 가
 가 , 가
 (micorvolume) 가 (break-down)
 가 (,) 가 가
 (taper) (draft;
)
 가
 가
 가 (bulk) ; 가
 / (, (hydrophobic microporous)) ;
 가 가 (antipitting) (, SNAP) (pi
 ts) 가 가 ; (, CMOS
)
 OMI 가 C38 가 (surfactant)
 가 (projections)
 (flash)
 1 5 μ m
 ,
 (200; retaining clips) (192) 14 (192; gear)
 (194) (190) (188) (198) , (chuck, 196;
) (196) (194)가 (192) (190) (192) (190)
 가 14c (188) (184) 14d-e (200) (196)
 가 (238) (240) 15 (236) (238)
 (, , (thermoforming),
) (stacking axis) (mold insert) (ejection axis)
 2 (parting surface) 16a (undercut
 s) , 16b (draft)가 ,
 , 16c 16d [,
 (801-805)] 16c , (800) (801)
(electroplating apparatus)

가 17 (56) 2 (baths; 58, 60, (58, 60) (58, 60) (59, 67) (4, 14) (56) (2) (4, 14) (6, 16)

0) (66) DC (64x, 64y, 64z) (68) (2) 1 (58, 6 (precision encoder)가 (58) (2) (6) (6) 2 (60) , 2 2 (16 (58) (2) 1 (5

8) PC (frame grabber) (62) (56) 가 (degas)

ink) [ball joint;] (counters 가

가 (, X/Y (,) 가 (244) (2) (250) 17 18 (67)가 (14)

eaning) 가 , (agitation) (HEPA) - (self-cl 가

oop thickness control) ; (closed I 가 ; 1 2 가 ; 1 (, 0.1 μ m) 1 ; 1 2 () 2 (vernier) 1 2

19 , 1 (68), 2 (70), (72a-f) 74a-f (66) (72a) (72a) (2; 2a-e) (68) (76) (66) (70) (74a) , (74a) 2 , ()

(72b) (68) 가 . (2a) 1 3 4 1
) (2a) 2 (2b) (2a) , (2c)
 (,) ,
 가 20
 (78) 8 (2) 24 (78) (concentric) , 2
 (80, 82) (85) (80) 1
 (84) (82) (82) 2 (86)
 (lapping) (85;) (78) (2)
 , 8 1 1
 , 1 가 ,
 , (2) (78)
 X 200 (500 micron square by 200 microns tall) 250 8 500
 가 (, 가 (Watt bath))
 2 J.
 Material Sci., 22 494 (1987)
 " 2 ,
 , 3 () 21
 , 2 (90), 1 (92), 2
 (94) (2a-e) (88)가 (92a) (92
 a) (2) (90) (96) (88) (94a) (94a)
 2 1 (92b) 가 , (2a)
 a) 1 3 4 (2c) (2a) 2 1 2 (2b) (2
 , (pulsing) ,
 가 (; laser enhanced plating) ,
 , 가 (galvanost
 atic) 20-50mA/cm² (1-2mm
) 가
 , (poten
 tionstatically)
 가 (98) (volume) 22 가 (98) (100) ,
 (104) (102) , (106;
 (98) (98)
 (98)
 ,
 positive potential) (biased) , 가 (more
 , 가 (bias) ,
 가 23 (260) (262, 264;),
 (266) (268; lapping station) (262, 264)
 (262, 264) (270, 272) (264) 1
 (274) (262) 2 (blanket)
 (262) (2) (276)
 24 , (262)
 (276) (2) (278)

25 (280) , 가 .
 (2) (108) (110) ,
 (112) 가 , (112)
 (114) (114) (2) , (116)
 (110) (118) (114) (,)
 26 (112) (120) 가 .
 (112) (112)
 (110) (112) (112) O- (124) (112)
 (122) (112) " "(126; barrel) (128)
 (112) (110) (126)
 (2) (112) (2)
 (intermediate compliant material;
 (open pore foam) (112) (110) ,
 3 3

27 (602) (valve) (602)
 (A-D) B C A D
 B C 가 (가) 가
 가 ,
 1 CMOS 가
 28 3 (610) (612), [614; (RAM) ,
 28 (, ROM 가 (ROM)], (616) (6
 18) (CPU) (612) PC, (614) (612)
 가 (612) (614)
 가 (616)
 RT (, , , , C
 (linotronic) (618) , , , ,)
 29 3 (parameter
) 620 가 (612)
 622 (612) (616) 623 3
 (612) 624 (,)
 M 1 , M 3 (612) 625 , (copies) ,
 , (scaling), (612) 616
 M 628 630 M
 (614) 628 632 M
 634 (614) 632 3 가 (612)
 (612) M 가 , 636 M
 N 0(zero) (612) 638 640 , M
 가 M-N (612) 642 646 , M

(612), 648, M, M-N
(612) M (650 652
)
, 654, (612) M-N 1
, (612) N 가 642 M
M-N (612)가 M
가 656, M (612) M
(660) (658) (612) M
52 (612) 가 3 (650 6
) (634
, (612) M 가
30 3 (slice)
, 722, 720, 가
ro) (612) M 가(724 0(ze
) 1 P((biased) (612)
(730) (732) (728 M P
(612) 734 (612) 736
(612) (turned off) (612) 738
M (bias) D (740) (612)
4 (740) (746 M (74
) , P가 M
1) (612) P 1 가(748) M P(, Pi+
(612)
, P가 M (750)
, (612) M 752
, (612) 724 M 1 가 (612)
, (firmware),
rogrammable processor) 가 (pr
(program of instructions) 가
, 가
가
(compiled) (interpreted)
memory) / (random access memory) (real only
) (non-volatile mem
ory) EPROM, EEPROM ;
가 ; CD-ROM
ASICs(; application-specific integrated circuit)
LCD 가

(trackball)

(non-plana

r)

(powdered medium)

가,

2

가

(

(182)

(178)

(186)

(184;

(180; amateur winding)

(rotor core)

(184)

(, Ne-Fe-B)

(sintered),

(sputtered)

(topography)

(porosity;

(sense)

(flushing),

(deplating)

(reconditioned)

32

가

(200)

(coextensive)

(204)

32a

(202)

(206)

(204)

(208)

(208)

(32c),

(210)

(210)

가

가

가

(engrave)

(57)

1.

a) 1

1

1

가

1

- b) 1 가 1 1 1 ;
- c) 1 ;
- d) 2 2 .
- 2.**
- 3.**
- 1 ,
- 2 ,
- a) 2 2 2 가 2
- b) 2 ; 2 가 2 2
- c) ; 2 .
- 4.**
- 3 ,
- 1 a)~d) 1 , 1 가 .
- 5.**
- a) 가 ;
- b) 가 ; 1
- c) ;
- d) a)~c) 3 .
- 6.**
- a)) 1 1 가 1 1
- 1 ,) 1 가 1 ,)
- 1 2 2 ,)
- b) 1 2 ; 1 2 .
- 7.**
- 6 ,
- 2 ,
- a) 2 2 2 가 2
- b) 2 ; 2 가 2 2
- c) 2 ; 2 .
- 8.**
- a) 1 ;
- b) 1 가 - 가
- 가 1 - ; 1 2
- 1 2 .
- 9.**
- a) 1 ;
- b) ;
- c) ;
- d) 1 - 1 i) 1 ,) 1
- 가 , 가
- ;
- e) 1 1 ;

f) 1
, 3 .

10.

a) 1 1 - 1 i) 1 1 1 1 ,)
1 , 2) 1 가 1) 1 ,

가
b) 2 2 - 2 i) 2 2 - ; 2 ,)
2 - ; 가 ;
c) 1 2
d) , 1 , 2 ,
; 1 2
e) .

11.

a) 가 1 ;
b) 2 ;
c) 1 가 2 가 ;
d) 가 가 가 1 2
e) 가 가 1 - 가 2 가 2
- ,
가

12.

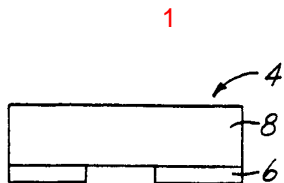
a) 1 ;
b) ;
c) 1 ;
d) 가 ;
e) 가 ,

13.

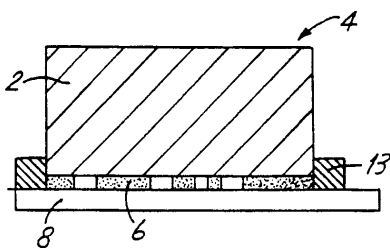
3 , 2

14.

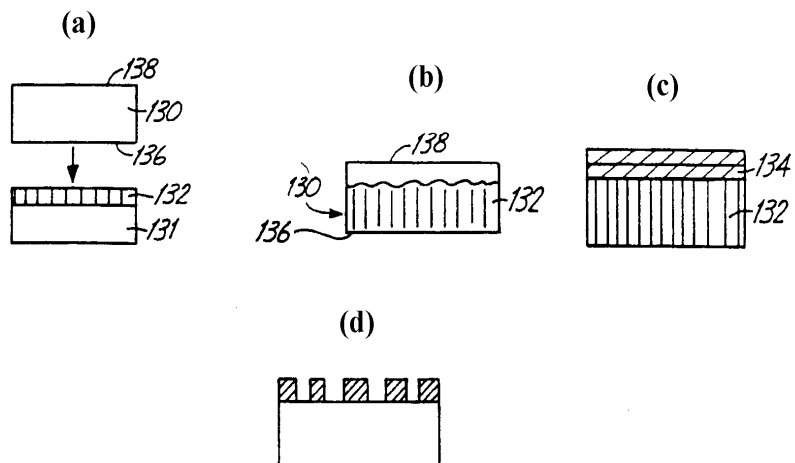
3 , 2



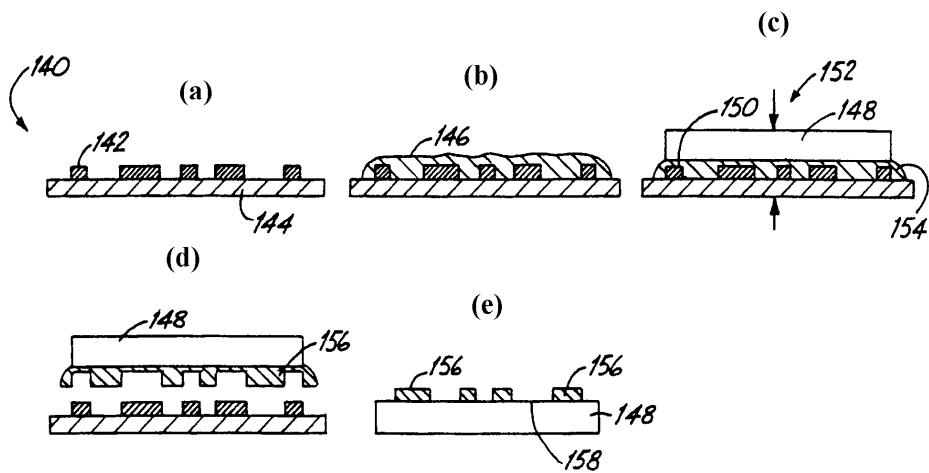
2



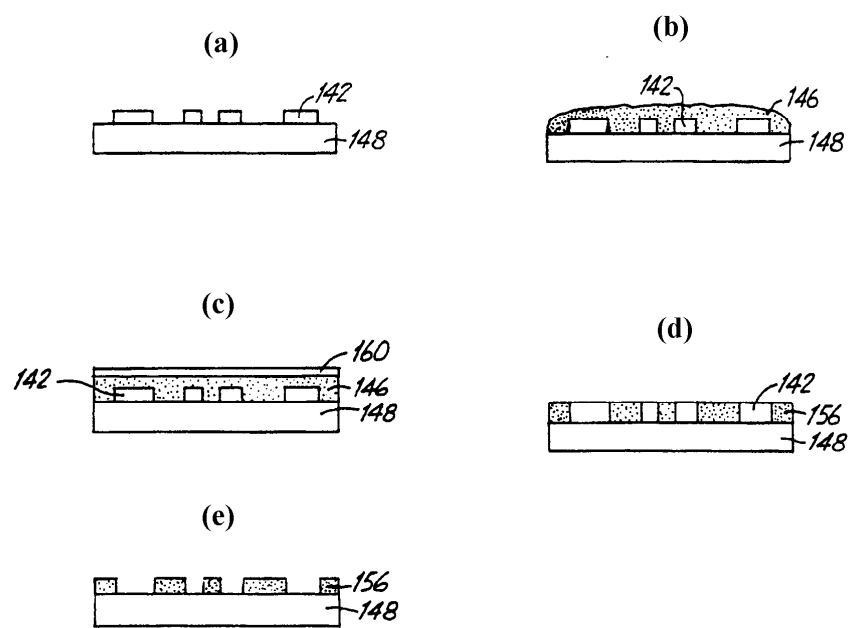
3



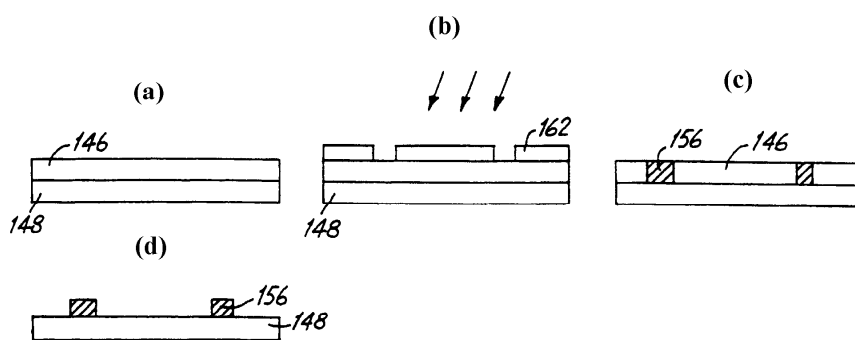
4



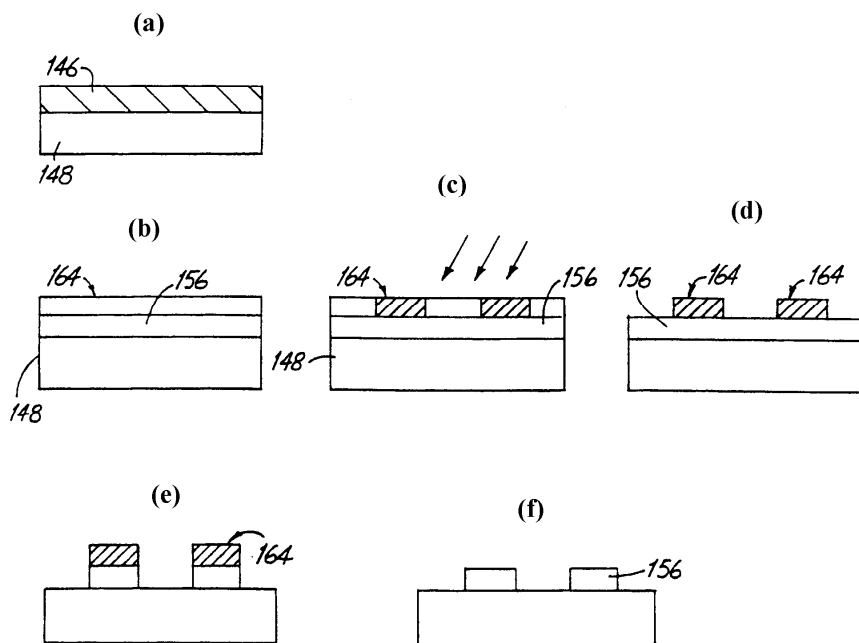
5



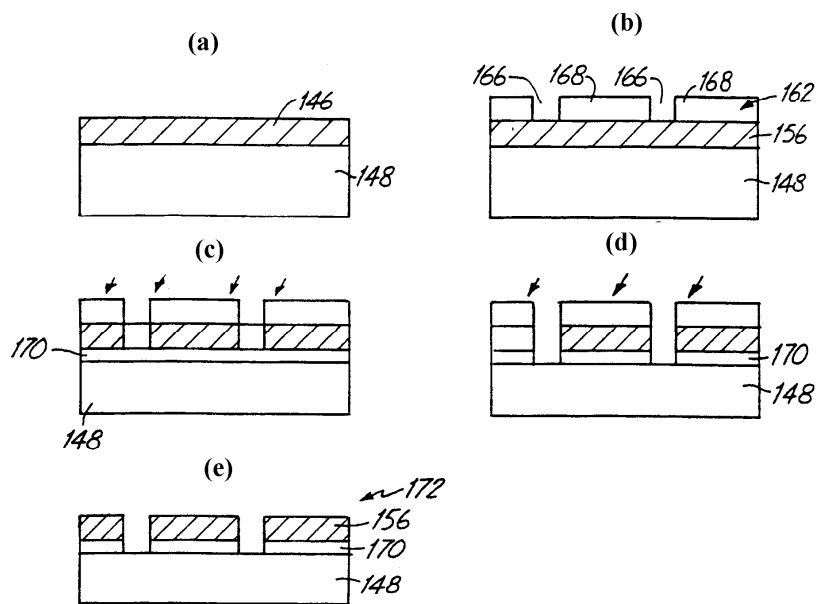
6



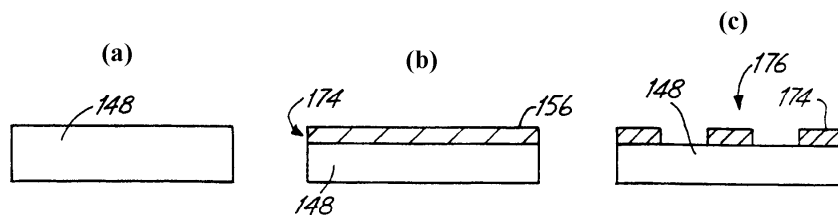
7



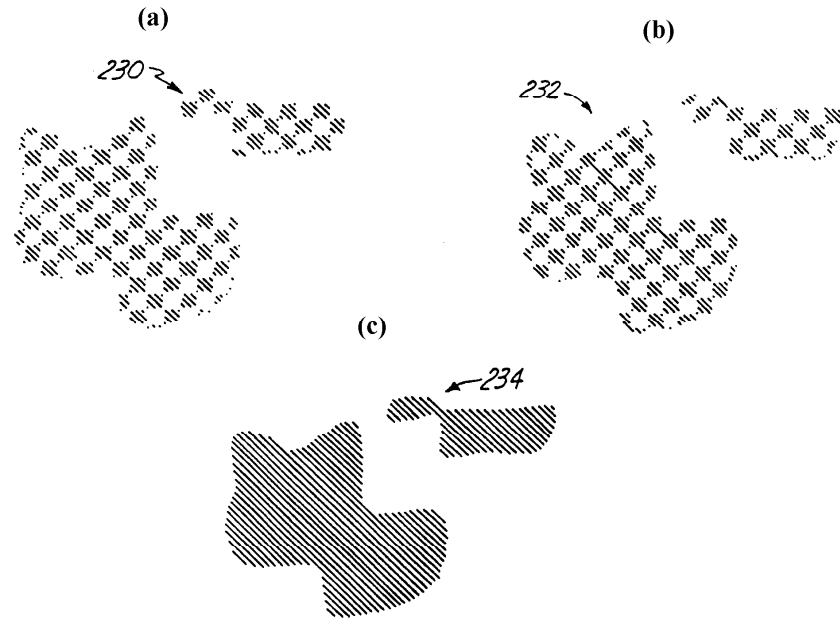
8



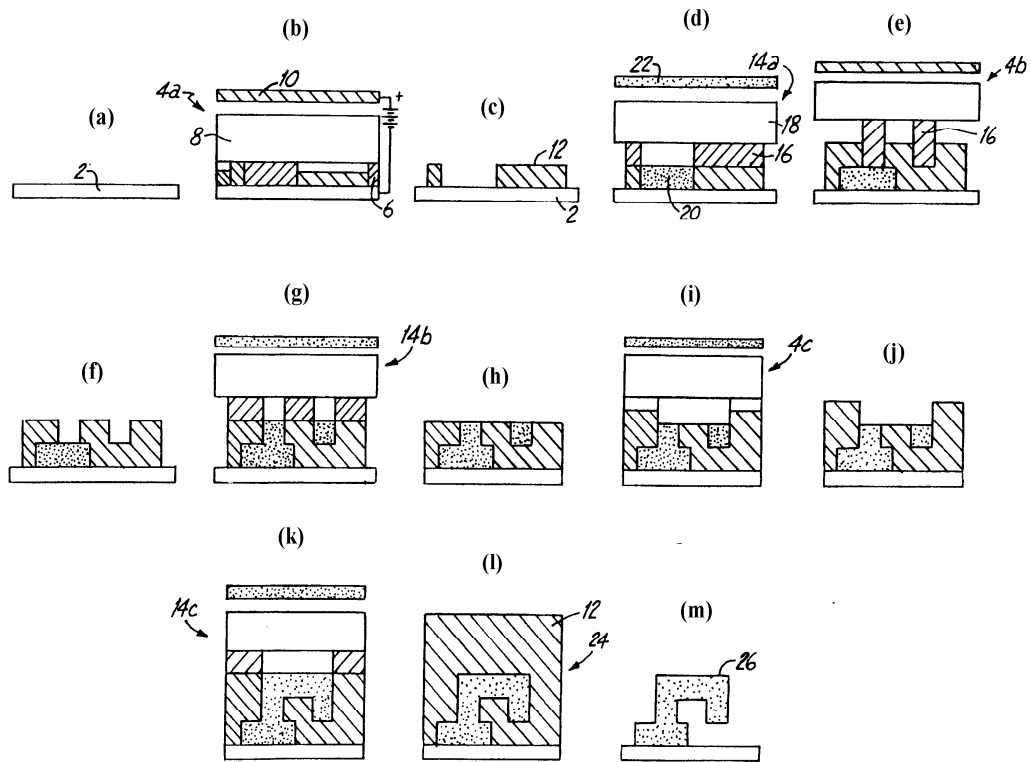
9



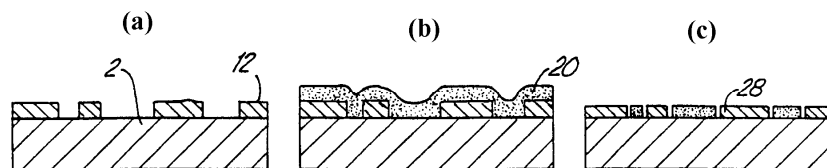
10



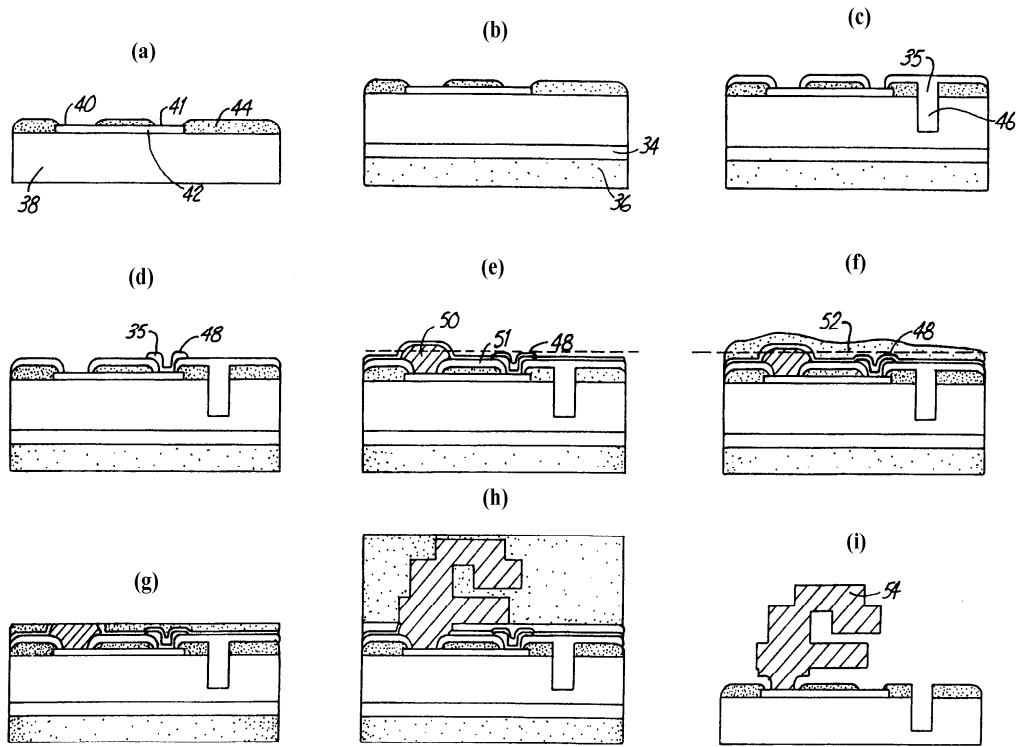
11



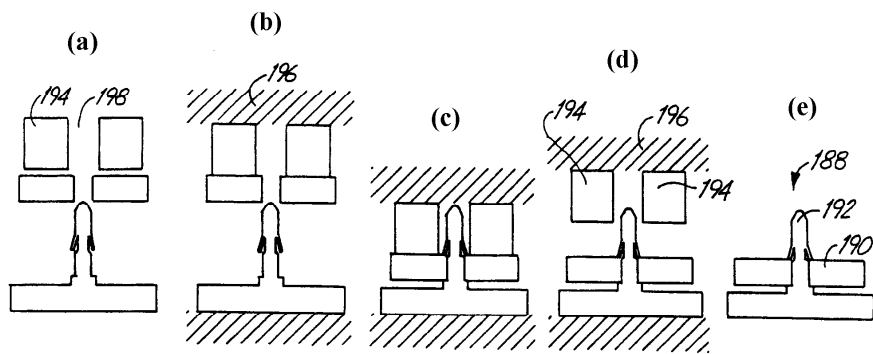
12



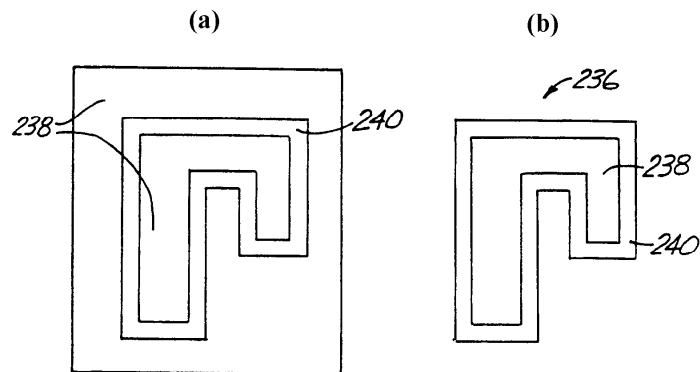
13



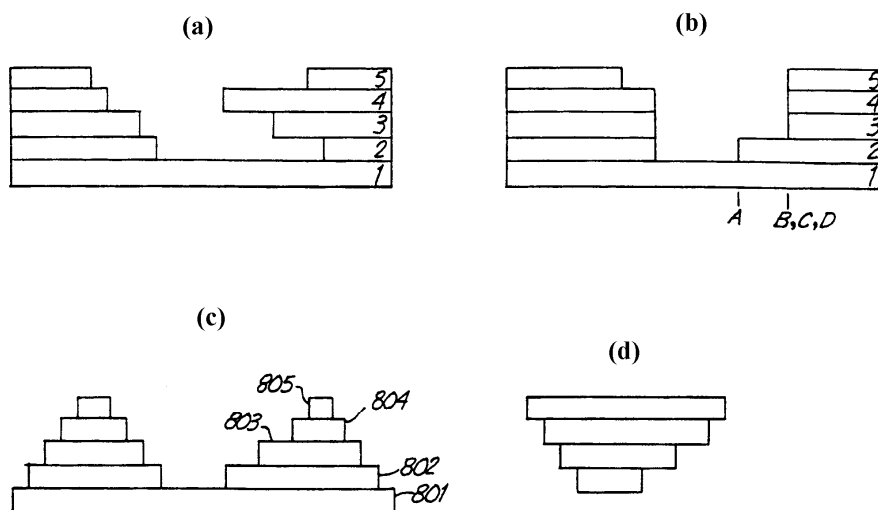
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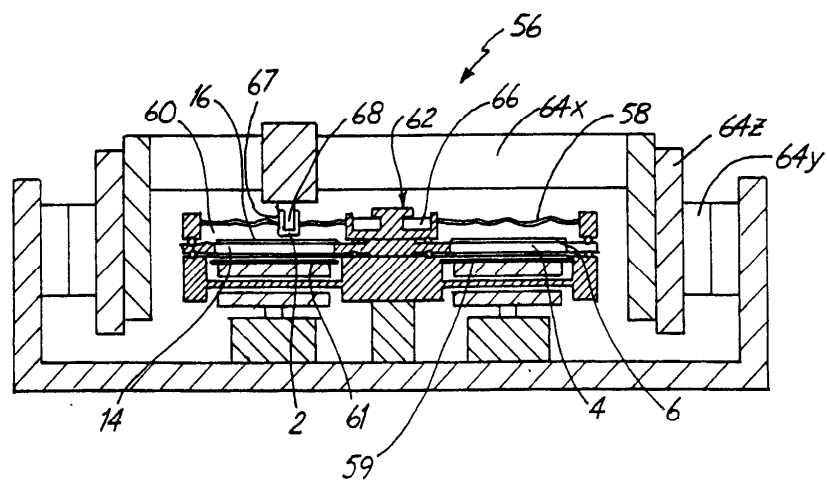
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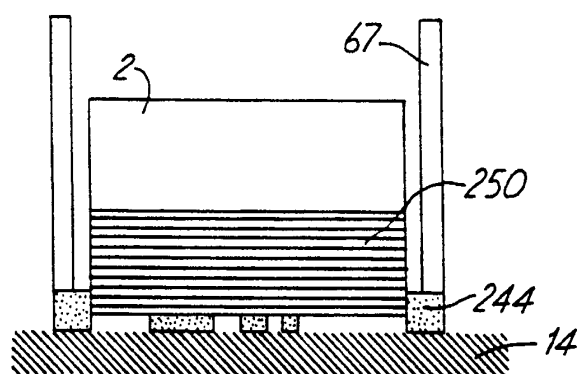
16



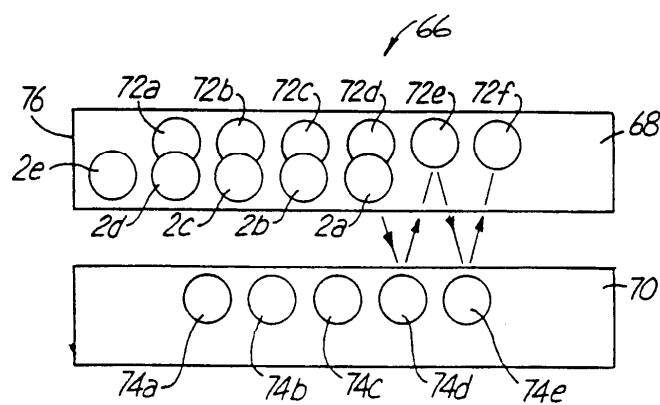
17



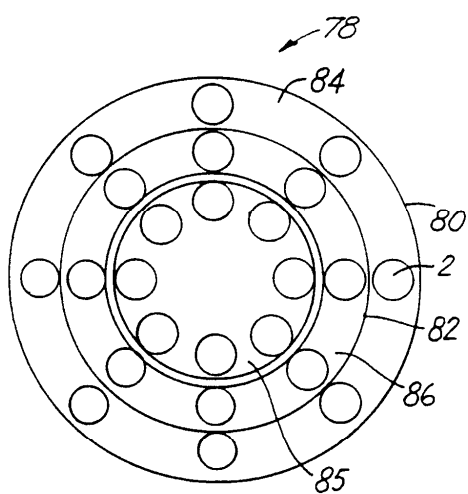
18



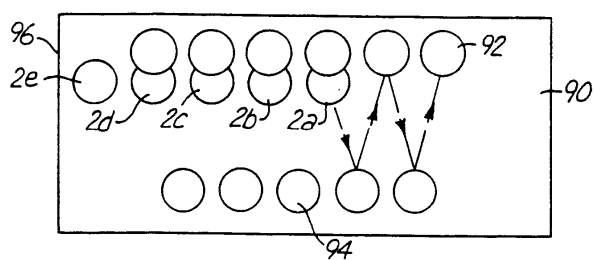
19



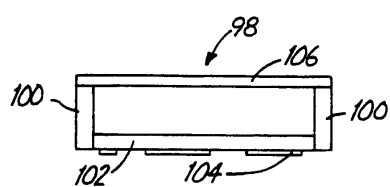
20



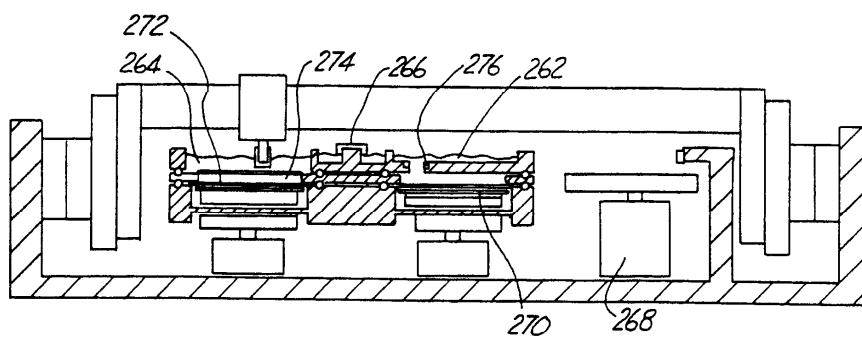
21



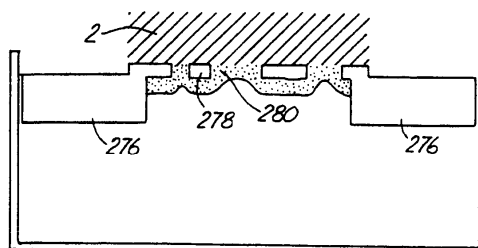
22



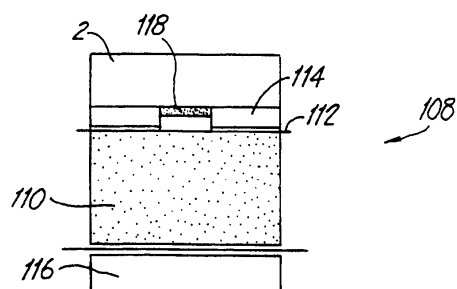
23



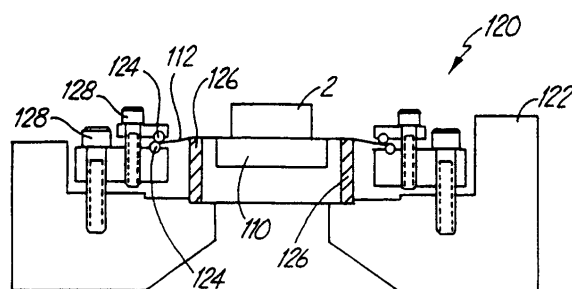
24



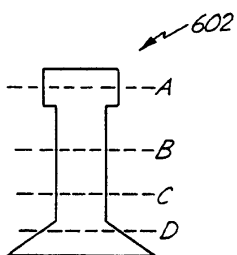
25



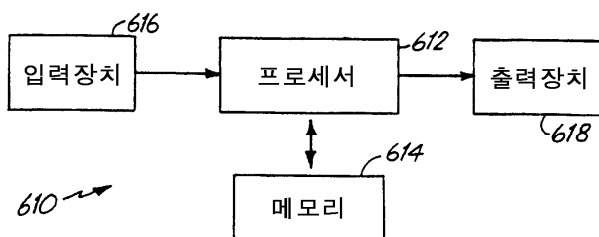
26

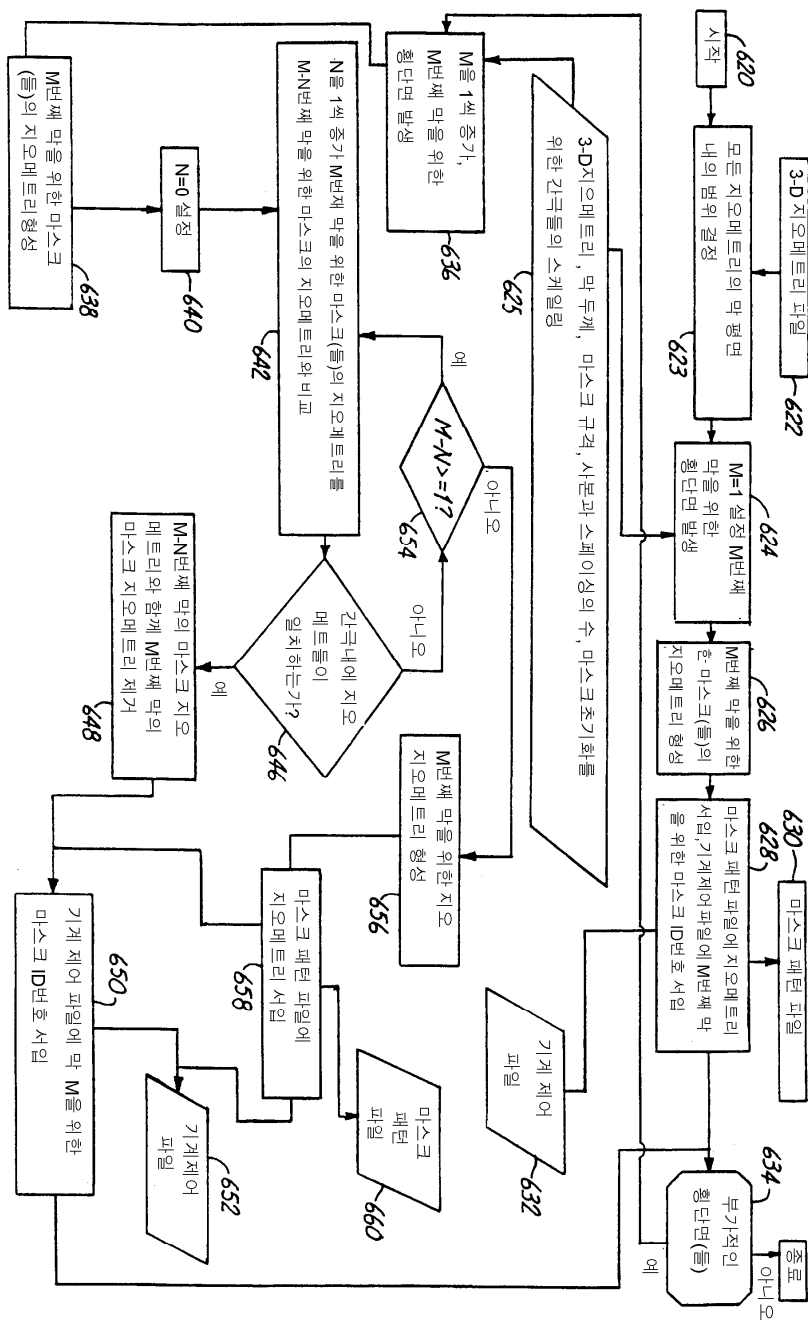


27

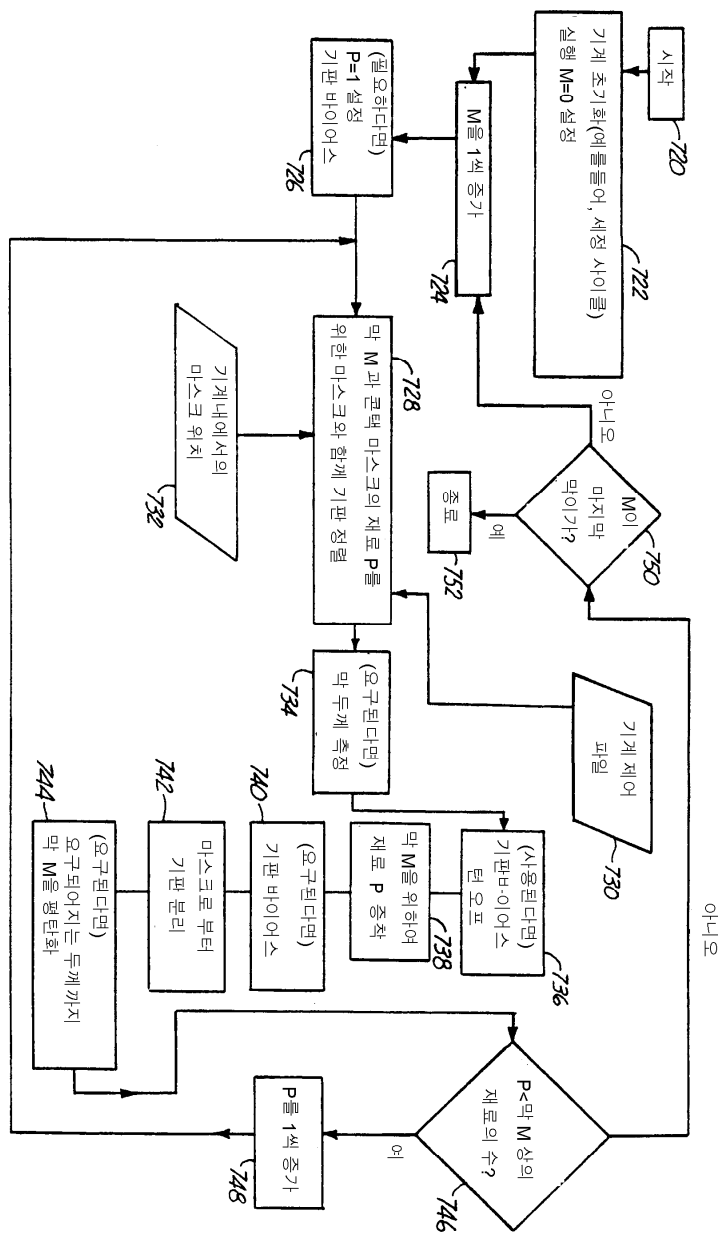


28

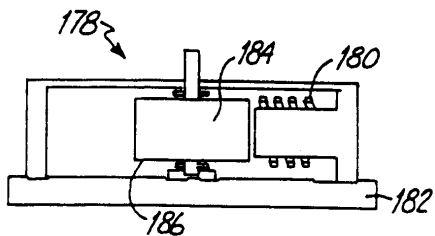




30



31



32

