Fig. 1

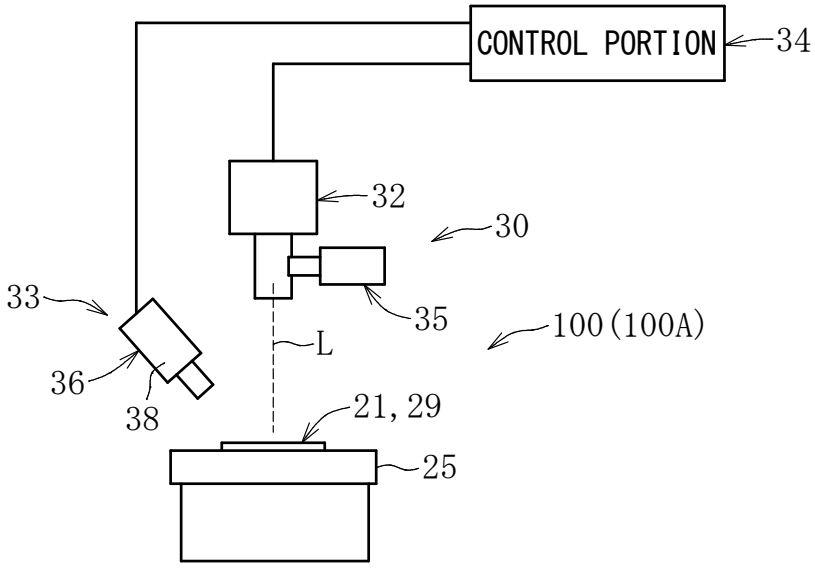

CONTROL PORTION
34
32
30
33
35
100(100A)
L
36
38
21, 29
25

Fig. 2

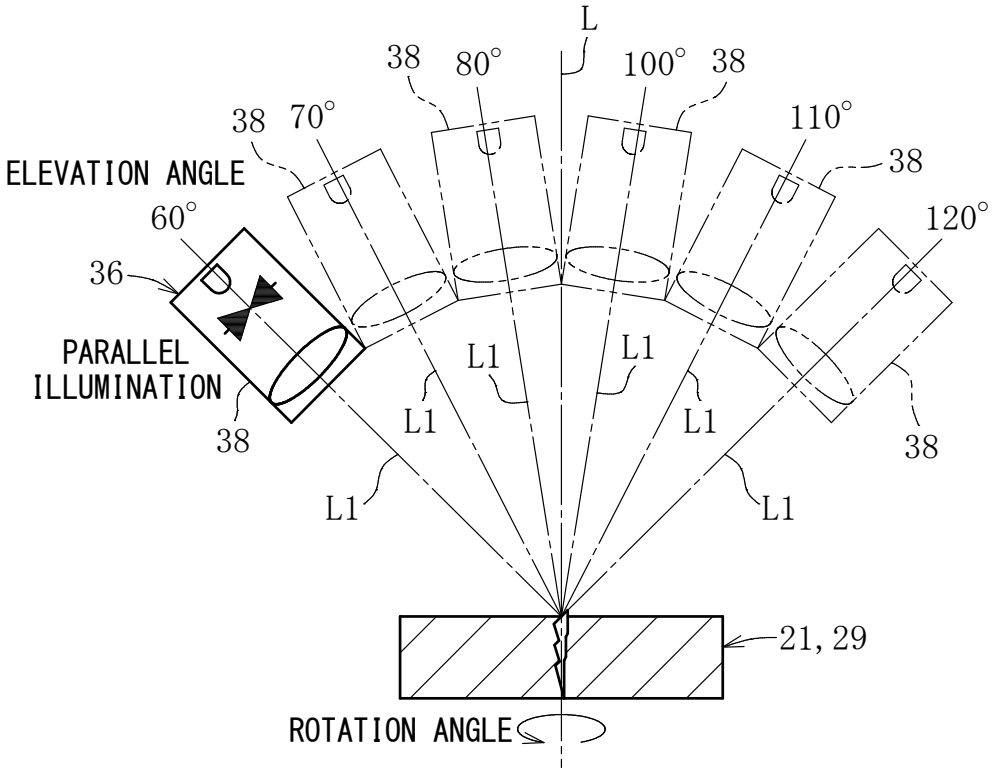

L
38
80°
100°
38
38
70°
110°
ELEVATION ANGLE
38
60°
120°
36
PARALLEL
ILLUMINATION
L1
L1
L1
L1
38
38
L1
L1
21, 29
ROTATION ANGLE

Fig. 3

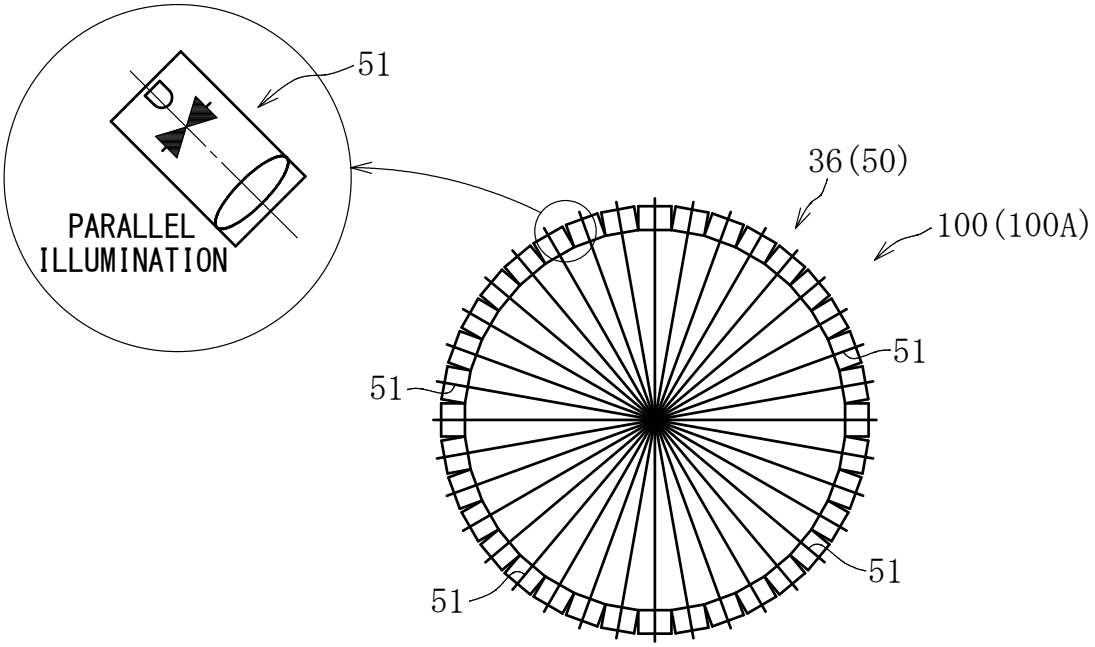


Fig. 4C

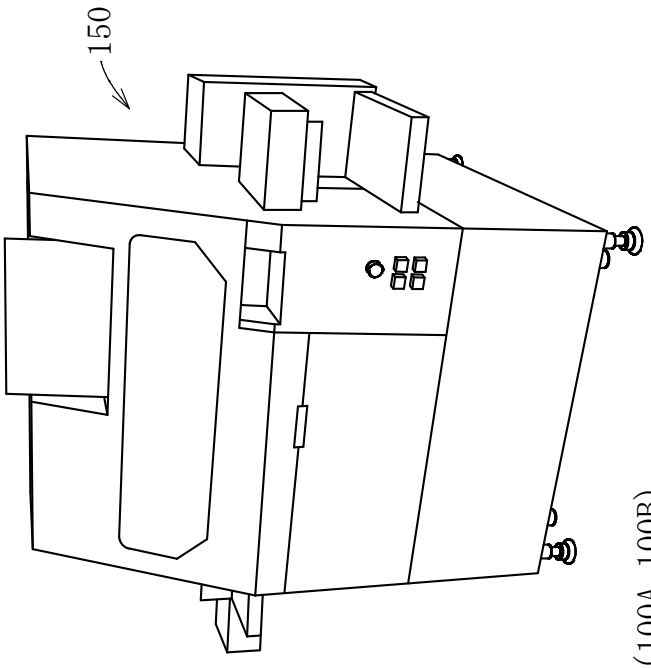


Fig. 4A

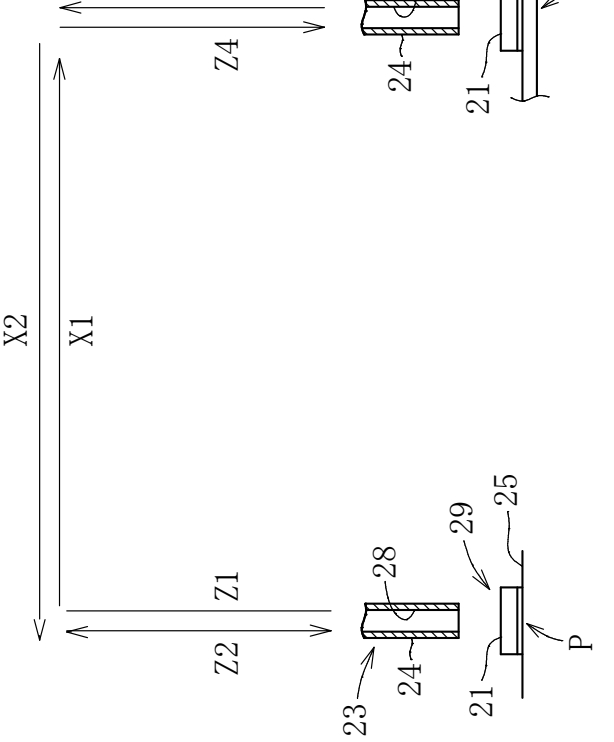


Fig. 4B

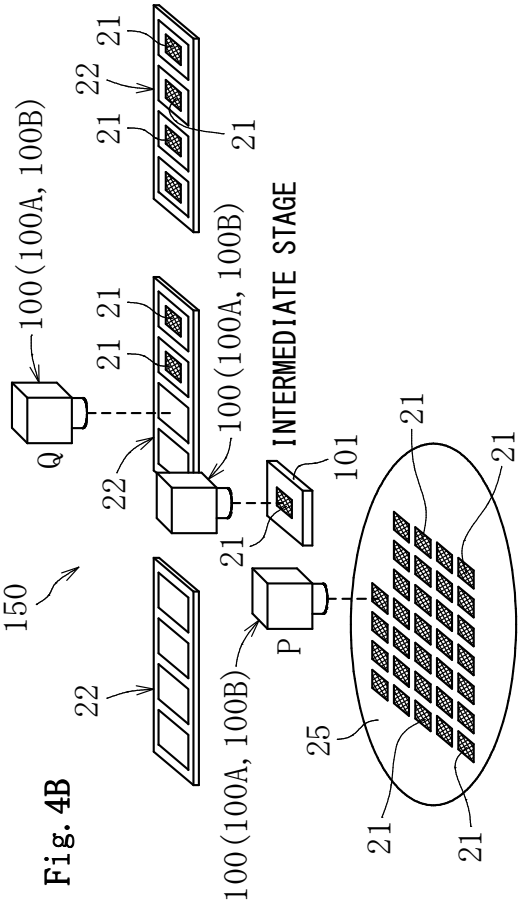


Fig. 5

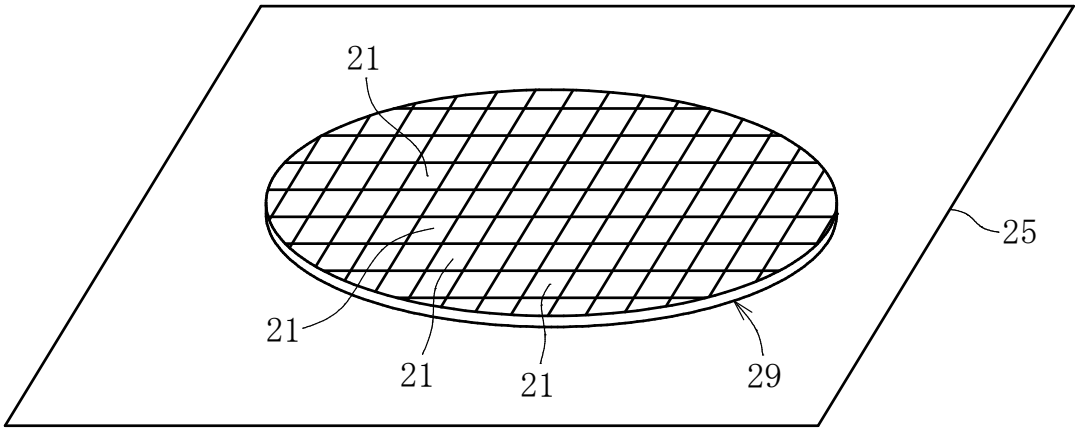


Fig. 6C

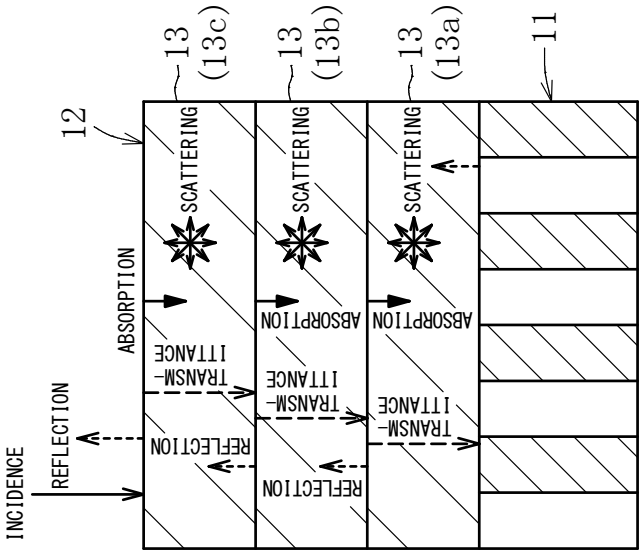


Fig. 6B

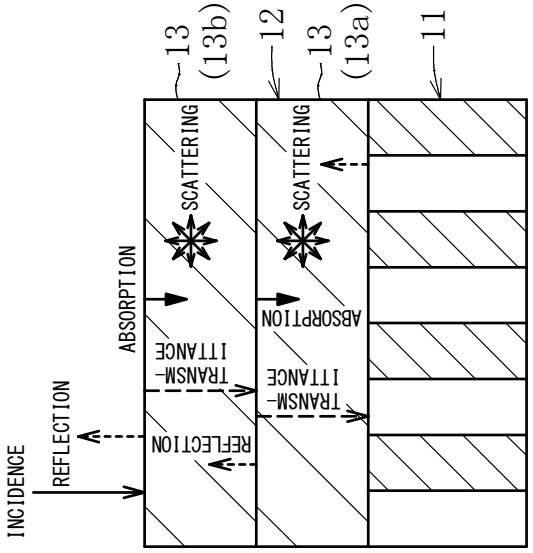


Fig. 6A

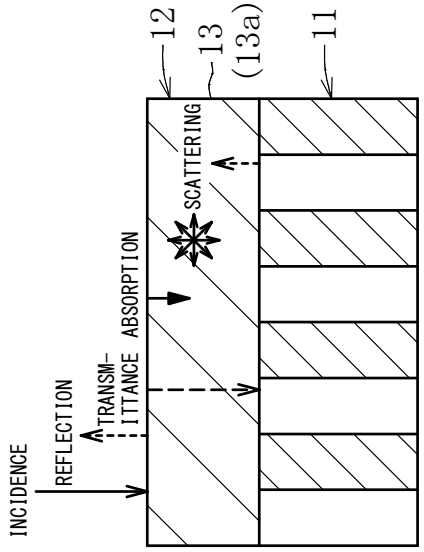


Fig. 7

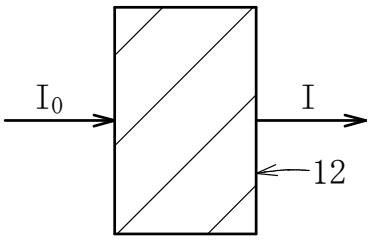


Fig. 8A

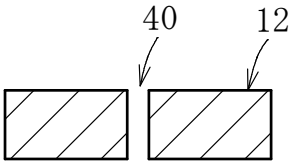


Fig. 8B

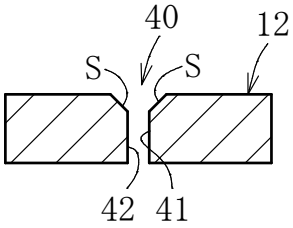


Fig. 8C

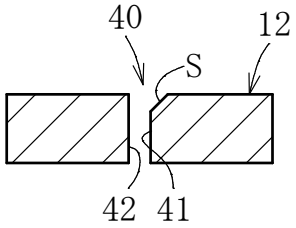


Fig. 8D

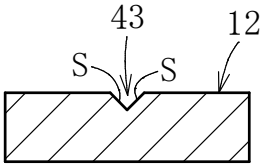


Fig. 8E

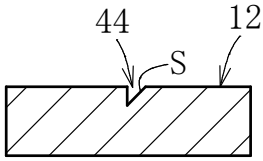


Fig. 8F

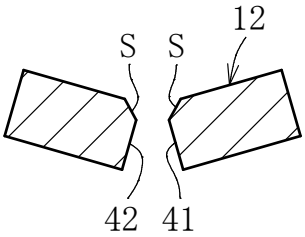


Fig. 8G

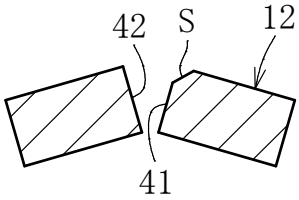


Fig. 8H

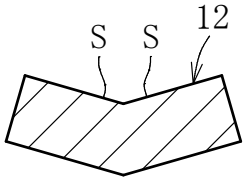


Fig. 8I

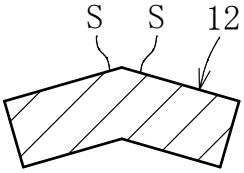


Fig. 8J

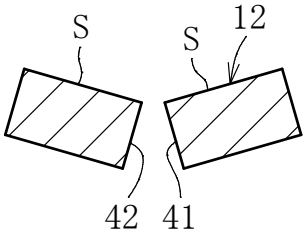


Fig. 8K

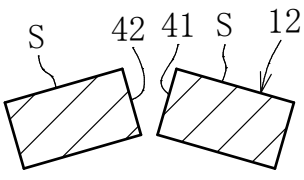


Fig. 9A

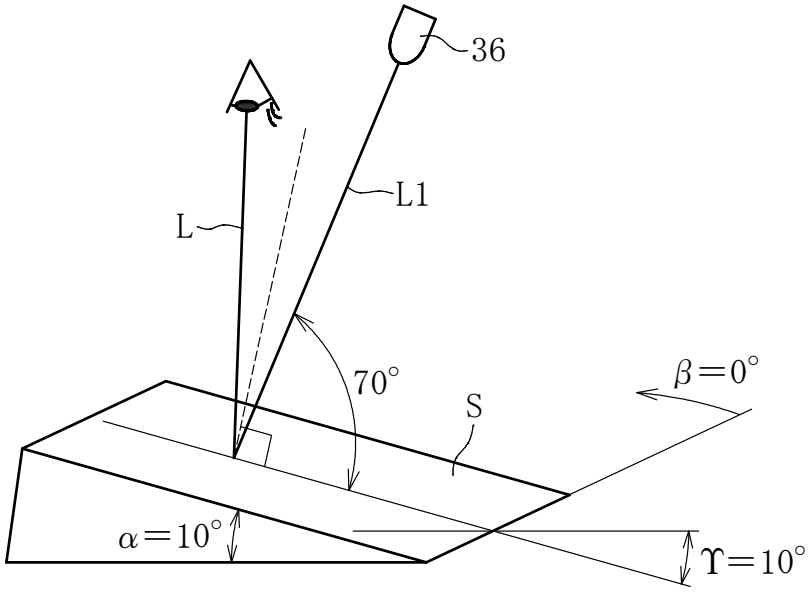


Fig. 9B

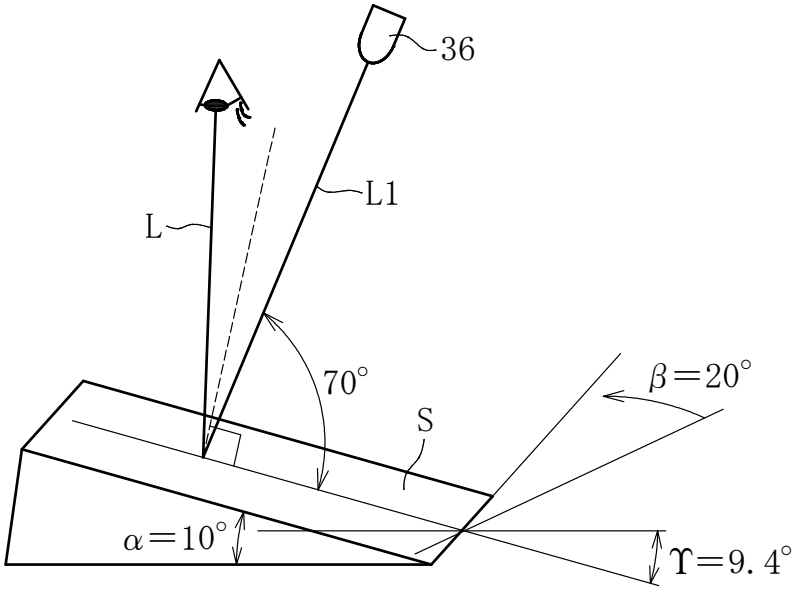


Fig. 10

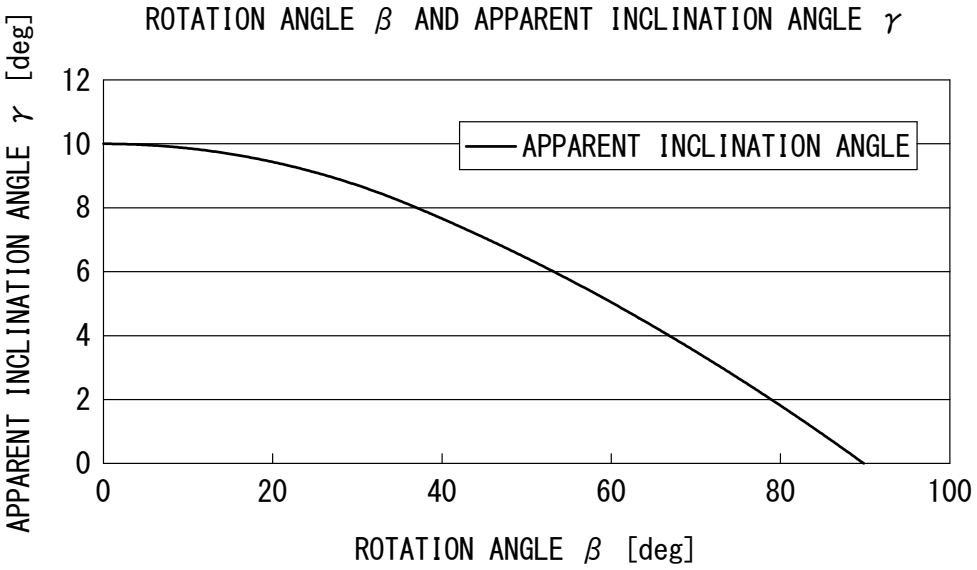

ROTATION ANGLE β AND APPARENT INCLINATION ANGLE γ
APPARENT INCLINATION ANGLE γ [deg]
12
10
8
6
4
2
0
0
20
40
60
80
100
APPARENT INCLINATION ANGLE
ROTATION ANGLE β [deg]

Fig. 11

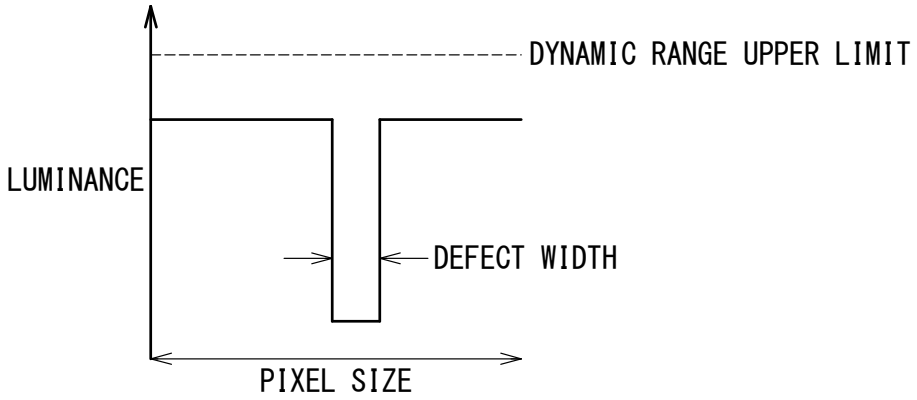

DYNAMIC RANGE UPPER LIMIT
LUMINANCE
DEFECT WIDTH
PIXEL SIZE

Fig. 12

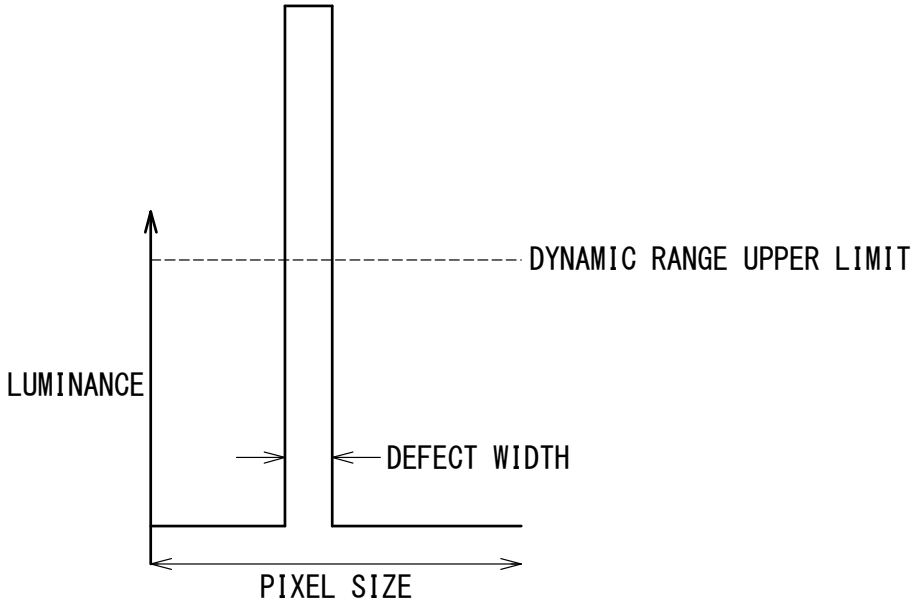

DYNAMIC RANGE UPPER LIMIT
LUMINANCE
DEFECT WIDTH
PIXEL SIZE

Fig. 13

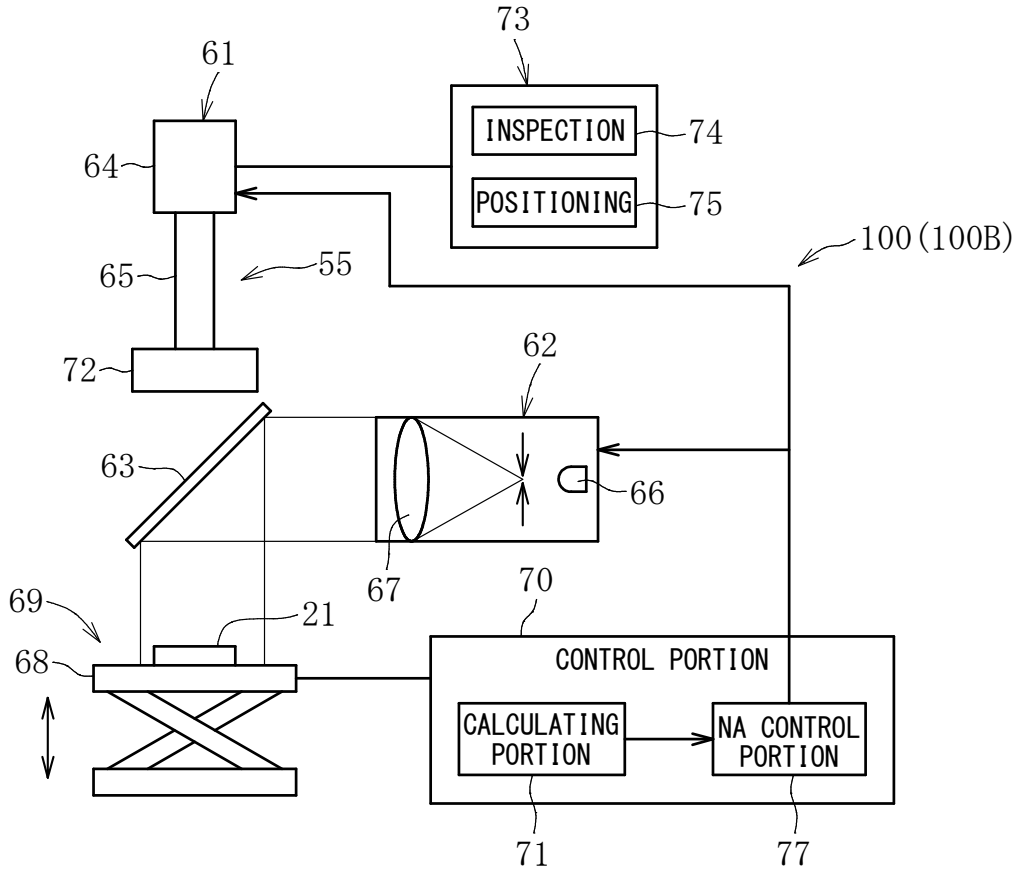

73
61
INSPECTION
74
64
POSITIONING
75
100(100B)
65
55
62
72
63
66
67
70
69
21
68
CONTROL PORTION
CALCULATING PORTION
NA CONTROL PORTION
71
77

Fig. 14A

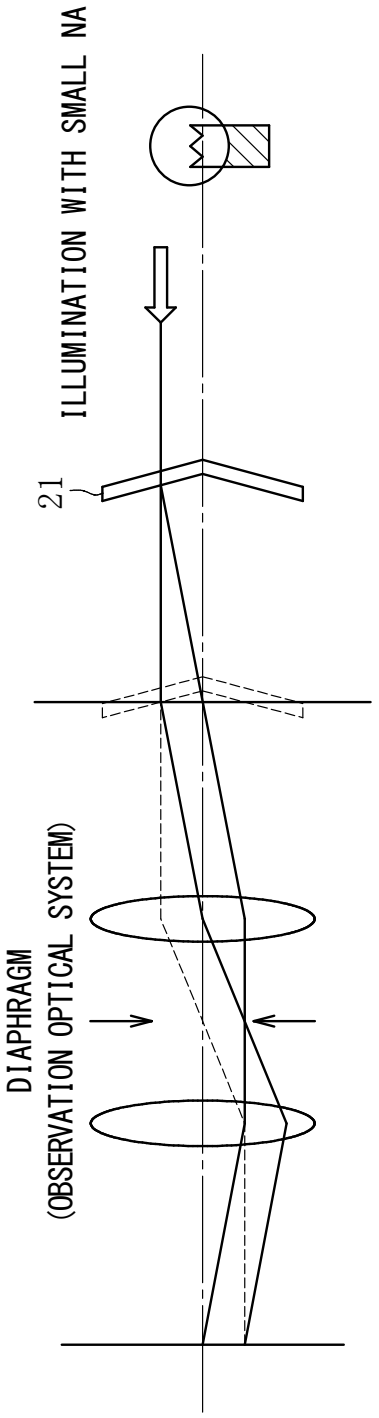


Fig. 14B

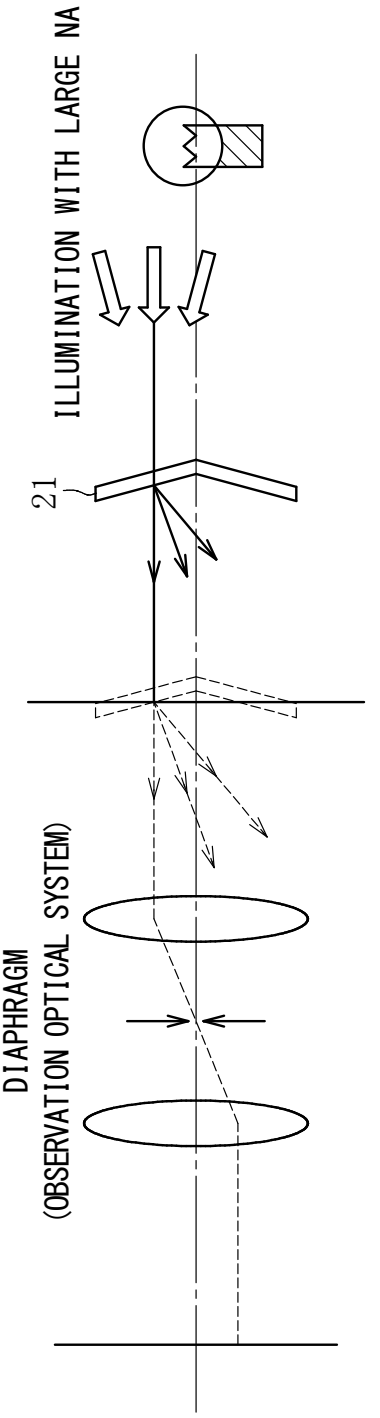


Fig. 15

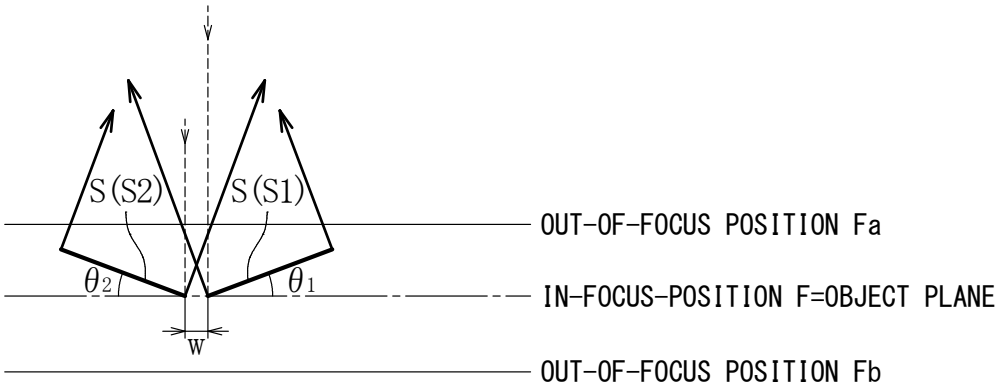

S(S2)
S(S1)
θ2
θ1
W
OUT-OF-FOCUS POSITION Fa
IN-FOCUS-POSITION F=OBJECT PLANE
OUT-OF-FOCUS POSITION Fb

Fig. 16

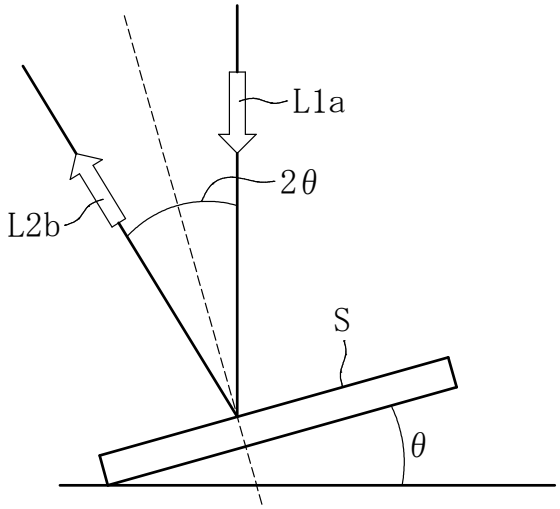

L1a
2θ
L2b
S
θ

Fig. 17

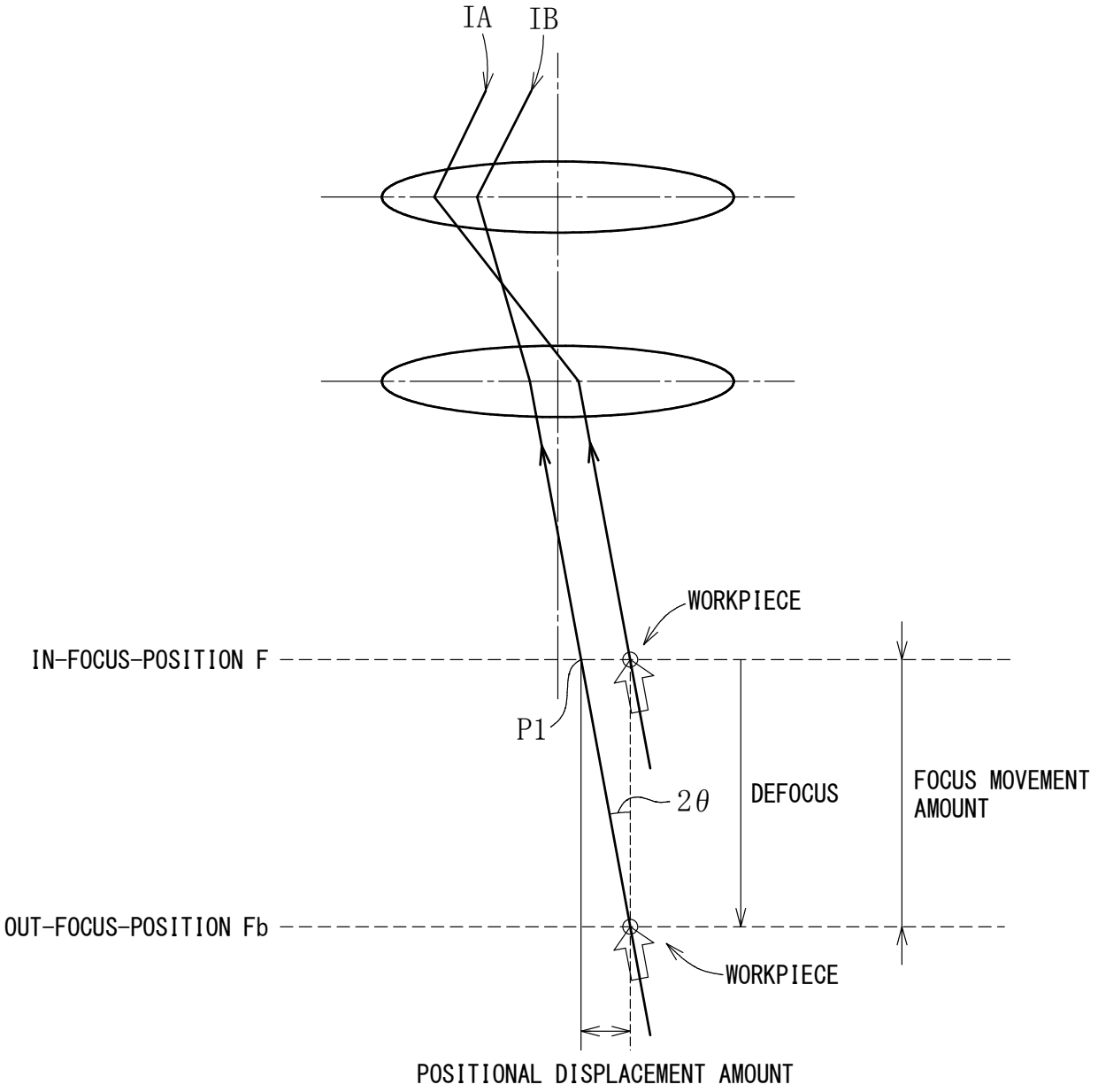

IA
IB
WORKPIECE
IN-FOCUS-POSITION F
P1
2θ
DEFOCUS
FOCUS MOVEMENT AMOUNT
OUT-FOCUS-POSITION Fb
WORKPIECE
POSITIONAL DISPLACEMENT AMOUNT

Fig. 18

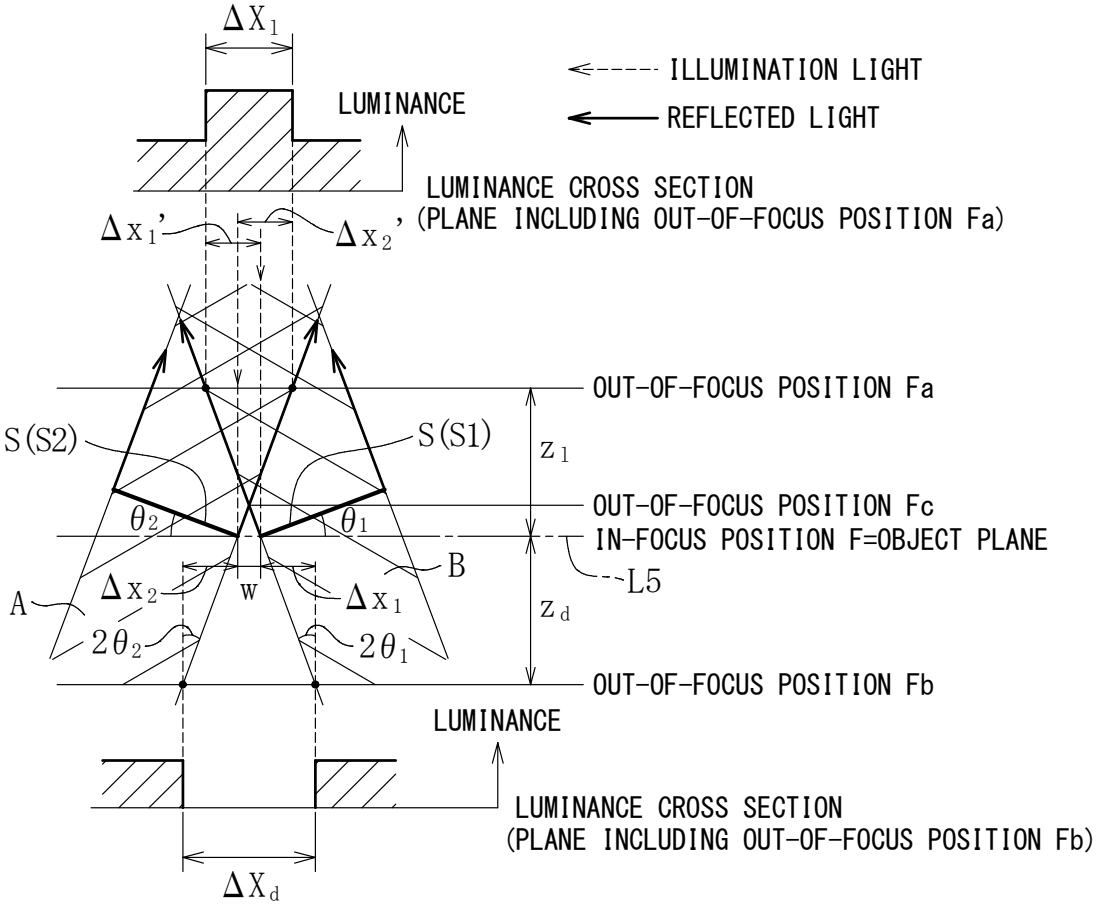

ΔX1
LUMINANCE
ILLUMINATION LIGHT
REFLECTED LIGHT
LUMINANCE CROSS SECTION
(PLANE INCLUDING OUT-OF-FOCUS POSITION Fa)
Δx1'
Δx2'
OUT-OF-FOCUS POSITION Fa
S(S2)
S(S1)
z1
OUT-OF-FOCUS POSITION Fc
θ2
θ1
IN-FOCUS POSITION F=OBJECT PLANE
B
L5
A
Δx2
w
Δx1
zd
2θ2
2θ1
OUT-OF-FOCUS POSITION Fb
LUMINANCE
LUMINANCE CROSS SECTION
(PLANE INCLUDING OUT-OF-FOCUS POSITION Fb)
ΔXd

Fig. 19G

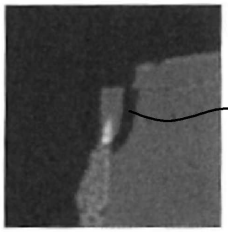


Fig. 19F

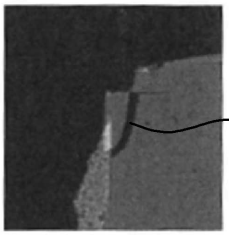


Fig. 19E

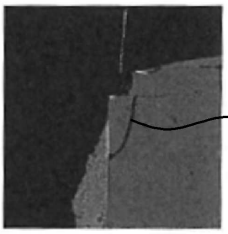


Fig. 19D

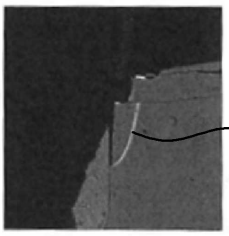


Fig. 19C

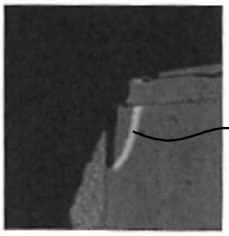


Fig. 19B

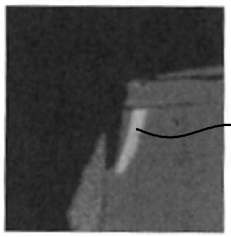


Fig. 19A

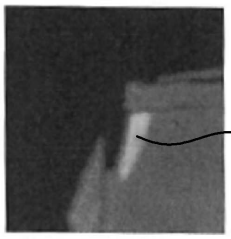


Fig. 20

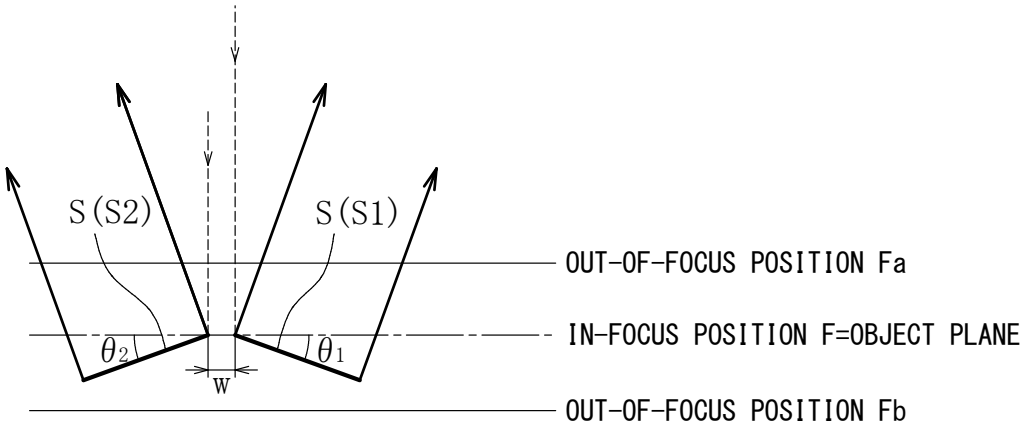

S(S2)
S(S1)
OUT-OF-FOCUS POSITION Fa
IN-FOCUS POSITION F=OBJECT PLANE
θ2
θ1
W
OUT-OF-FOCUS POSITION Fb

Fig. 21

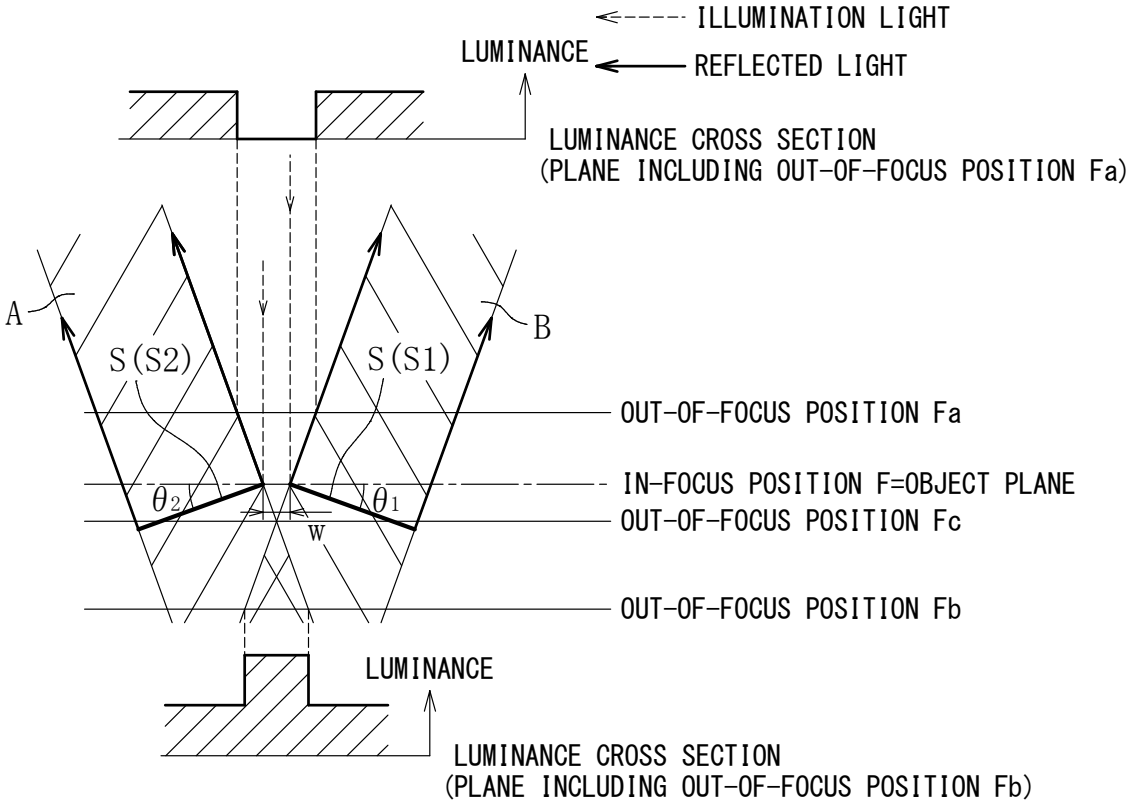

ILLUMINATION LIGHT
LUMINANCE
REFLECTED LIGHT
LUMINANCE CROSS SECTION
(PLANE INCLUDING OUT-OF-FOCUS POSITION Fa)
A
B
S(S2)
S(S1)
OUT-OF-FOCUS POSITION Fa
IN-FOCUS POSITION F=OBJECT PLANE
θ2
θ1
OUT-OF-FOCUS POSITION Fc
W
OUT-OF-FOCUS POSITION Fb
LUMINANCE
LUMINANCE CROSS SECTION
(PLANE INCLUDING OUT-OF-FOCUS POSITION Fb)

Fig. 22

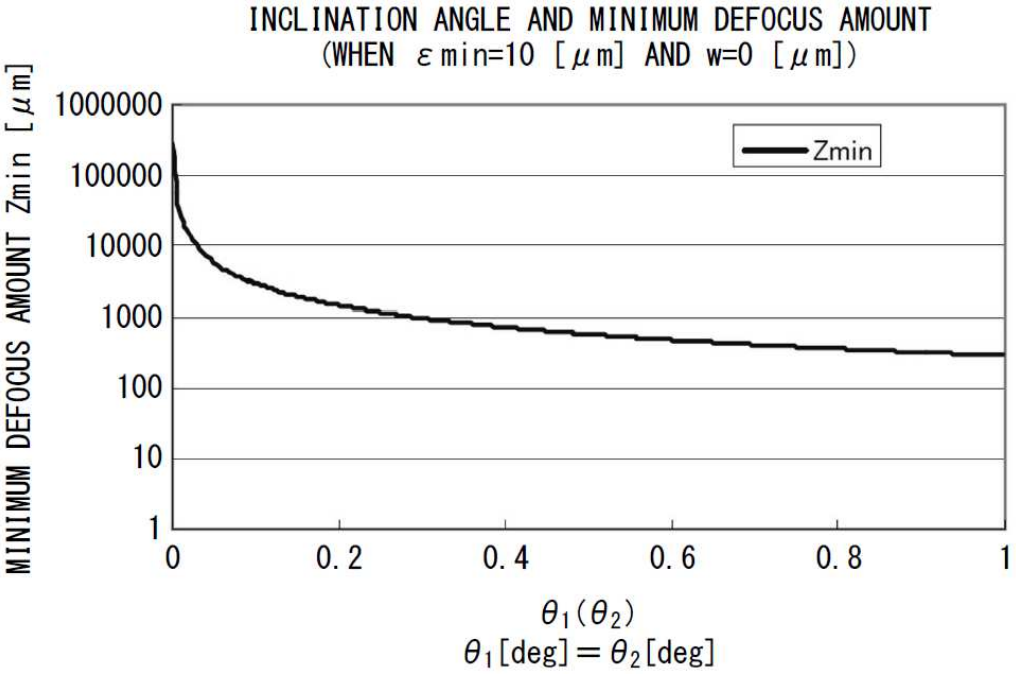

INCLINATION ANGLE AND MINIMUM DEFOCUS AMOUNT
(WHEN εmin=10 [μm] AND w=0 [μm])
MINIMUM DEFOCUS AMOUNT Zmin [μm]
1000000
100000
10000
1000
100
10
1
0
0.2
0.4
0.6
0.8
1
Zmin
θ1(θ2)
θ1[deg]＝θ2[deg]

Fig. 23

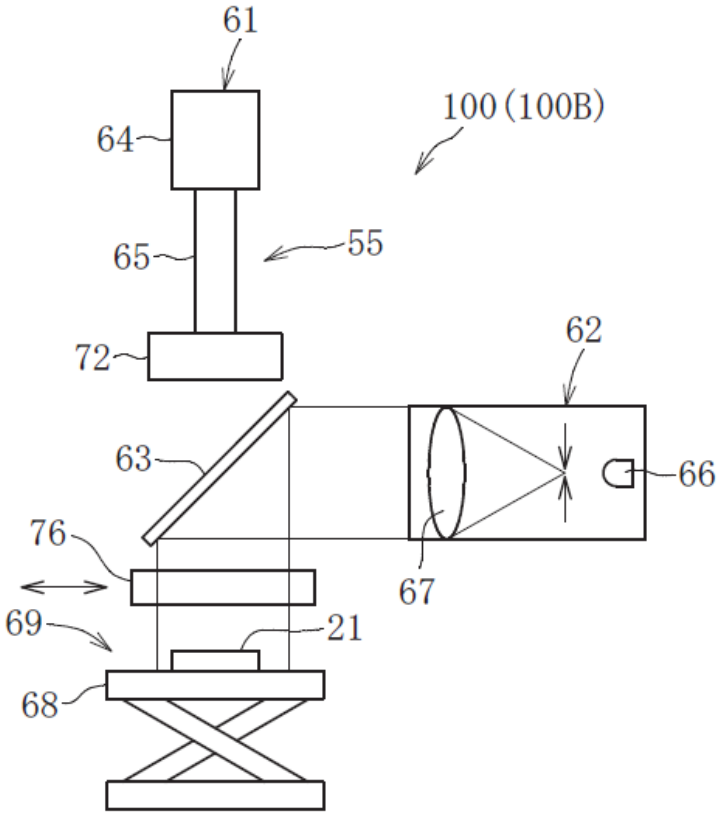

61
64
100(100B)
65
55
72
62
63
66
76
67
69
21
68

Fig. 24

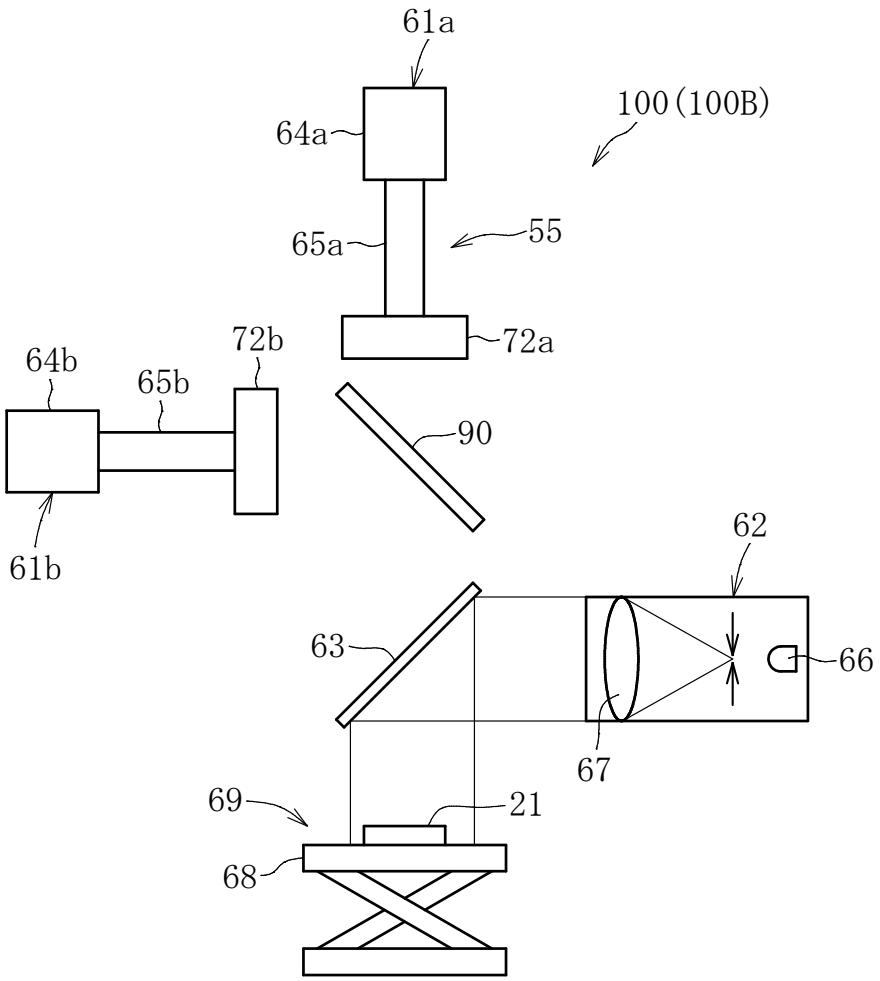


Fig. 25

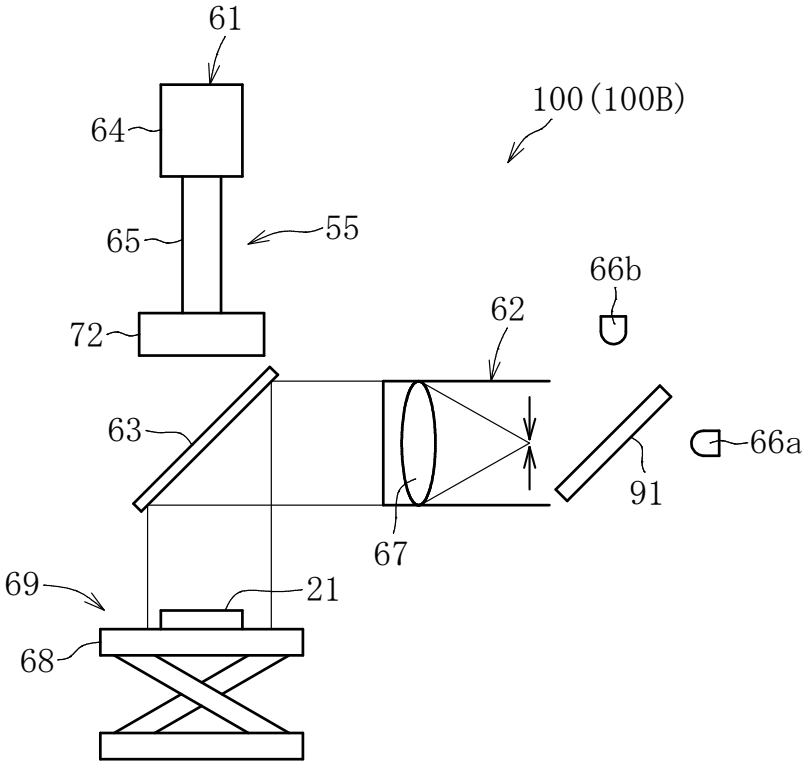

61
64
100(100B)
65
55
66b
62
72
63
66a
91
67
69
21
68

Fig. 26

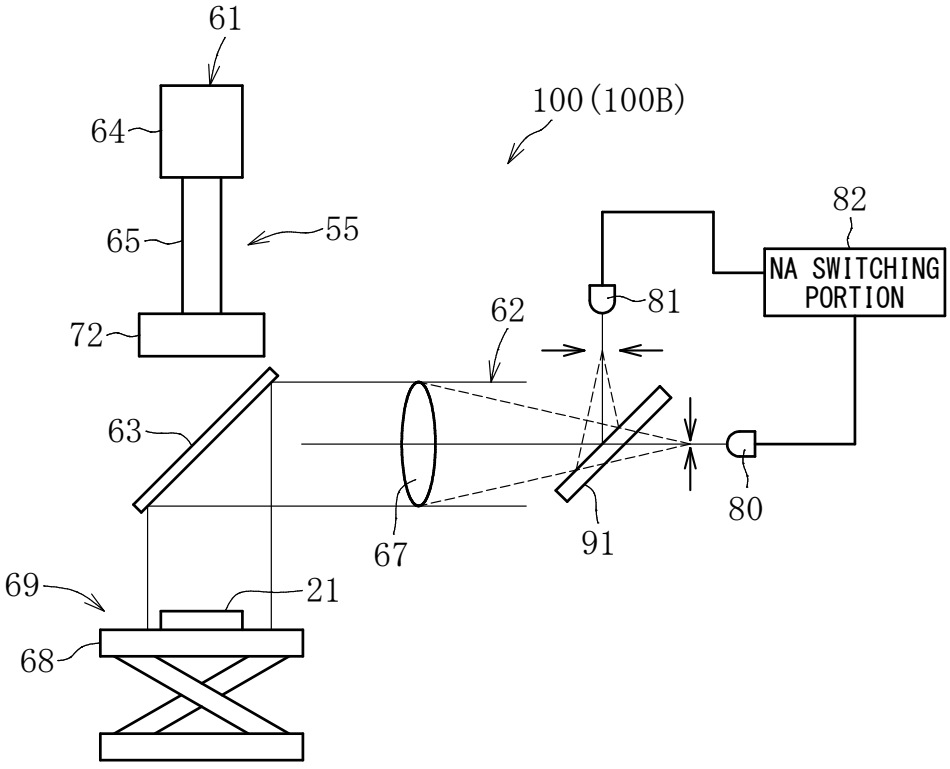

61
64
100(100B)
82
65
55
NA SWITCHING PORTION
81
62
72
63
80
67
91
69
21
68

Fig. 27

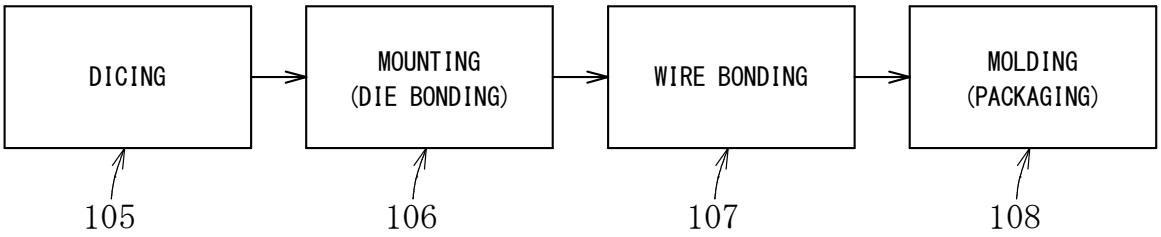
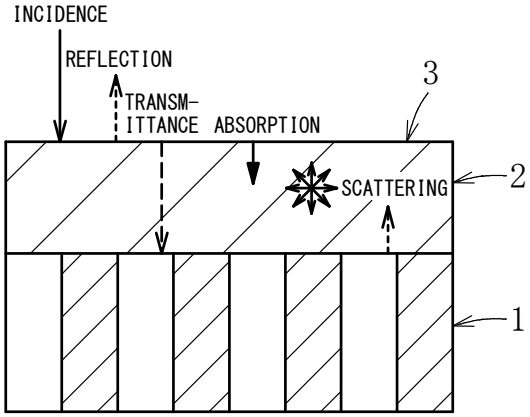

DICING
MOUNTING
(DIE BONDING)
WIRE BONDING
MOLDING
(PACKAGING)
105
106
107
108

Fig. 28


INCIDENCE
REFLECTION
TRANSM-
ITTANCE
ABSORPTION
3
SCATTERING
2
1