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Sakai et al.

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(45) **Date of Patent: Aug. 19, 2025**

(54) **LIGHT-EMITTING DEVICE**

(71) Applicant: **NICHIA CORPORATION**, Anan (JP)

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(73) Assignee: **NICHIA CORPORATION**, Anan (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 477 days.

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**
H10H 20/85 (2025.01)
H01L 25/075 (2006.01)
H10H 20/856 (2025.01)
H10H 20/857 (2025.01)

(52) **U.S. Cl.**
CPC ***H10H 20/856*** (2025.01); ***H01L 25/0753*** (2013.01); ***H10H 20/857*** (2025.01)

(58) **Field of Classification Search**
CPC H10H 20/856; H10H 20/857; H10H 20/85; H10H 20/855; H01L 25/0753
See application file for complete search history.

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(57) **ABSTRACT**

A light-emitting device includes a resin package including a plurality of recessed portions, a plurality of light-emitting elements, each disposed in the corresponding one of the plurality of recessed portions, a plurality of reflective members, and a mold resin portion including a first lens portion, a second lens portion, and a third lens portion. In the plan view, a maximum width of the first lens portion is less than a maximum width of an inner upper surface of the corresponding one of the plurality of recessed portions, a maximum width of the second lens portion is less than a maximum width of an inner upper surface of the corresponding one of the plurality of recessed portions, and a maximum width of the third lens portion is less than a maximum width of an inner upper surface of the corresponding one of the plurality of recessed portions.

32 Claims, 76 Drawing Sheets

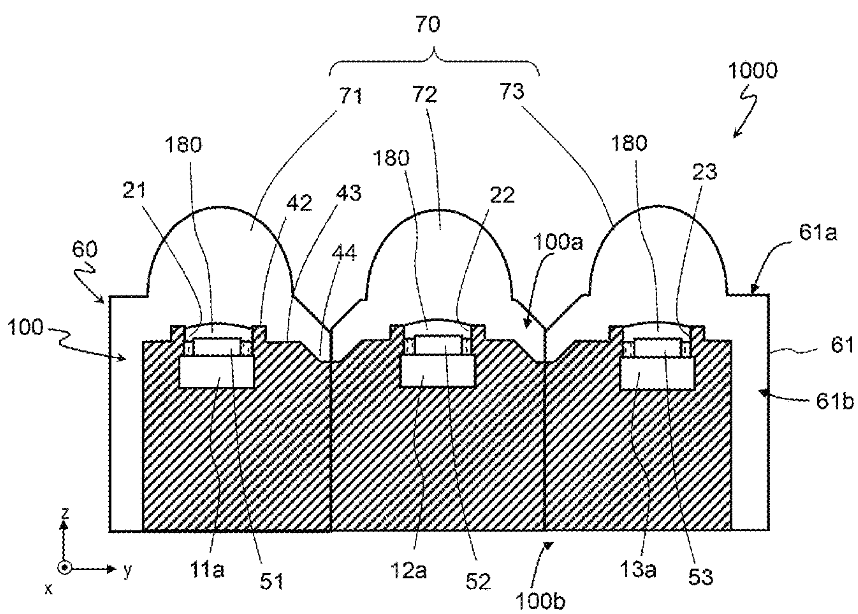

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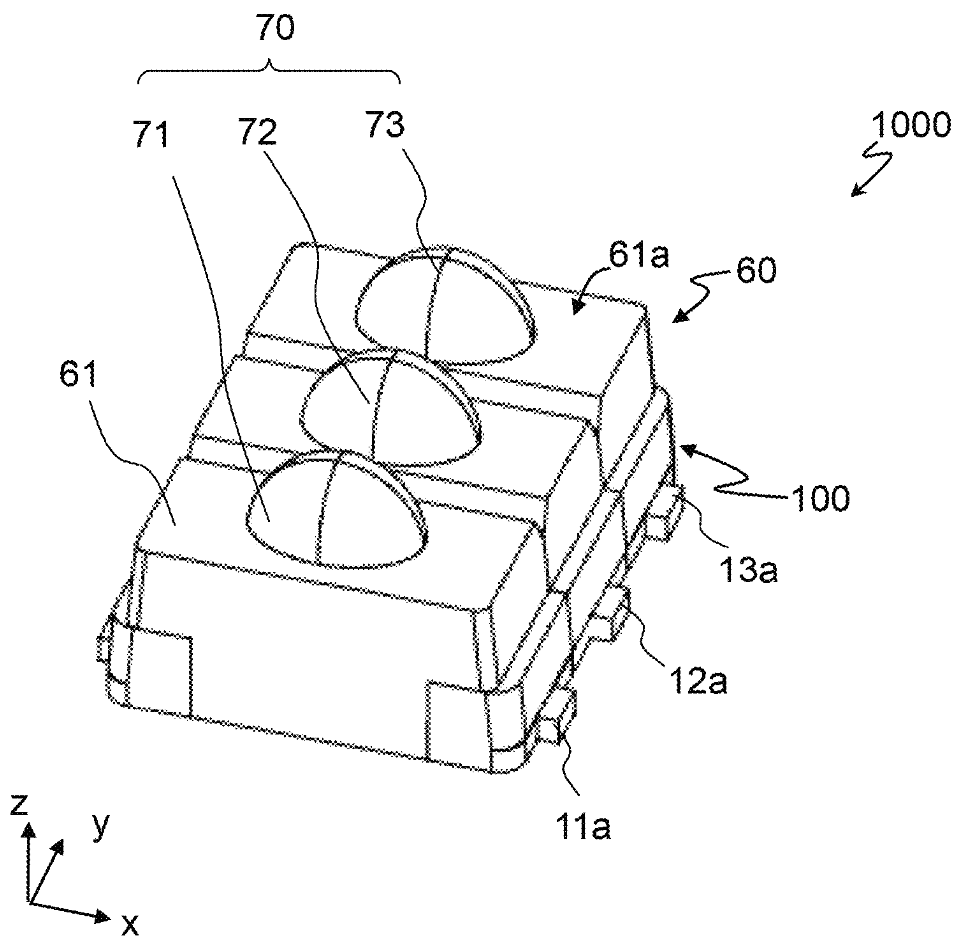
Fig.1



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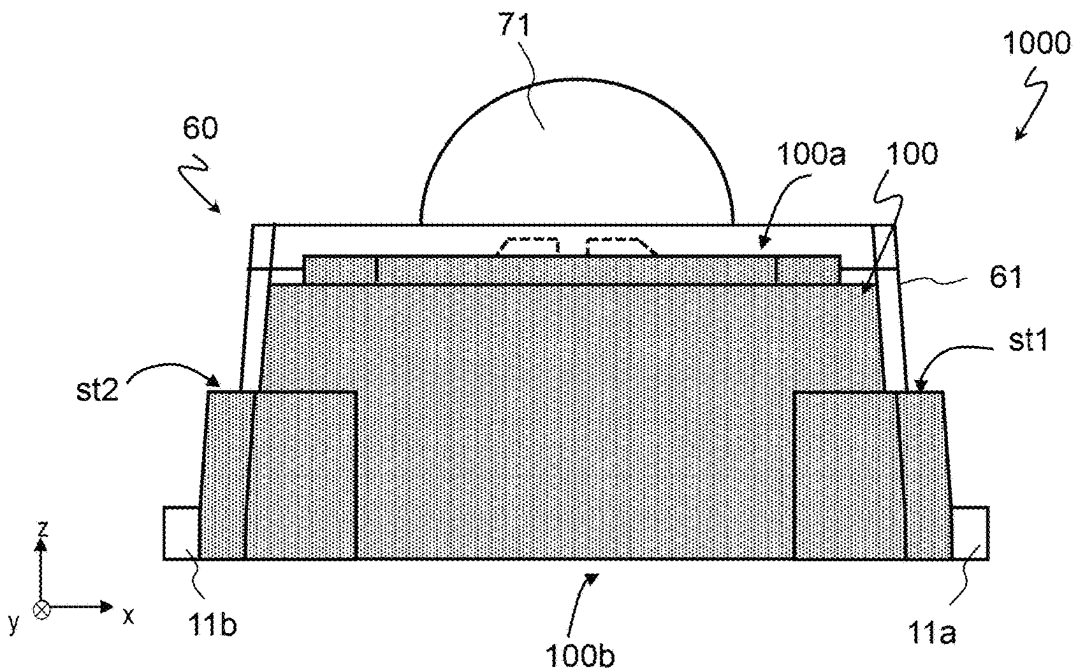
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st1
st2
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y
x
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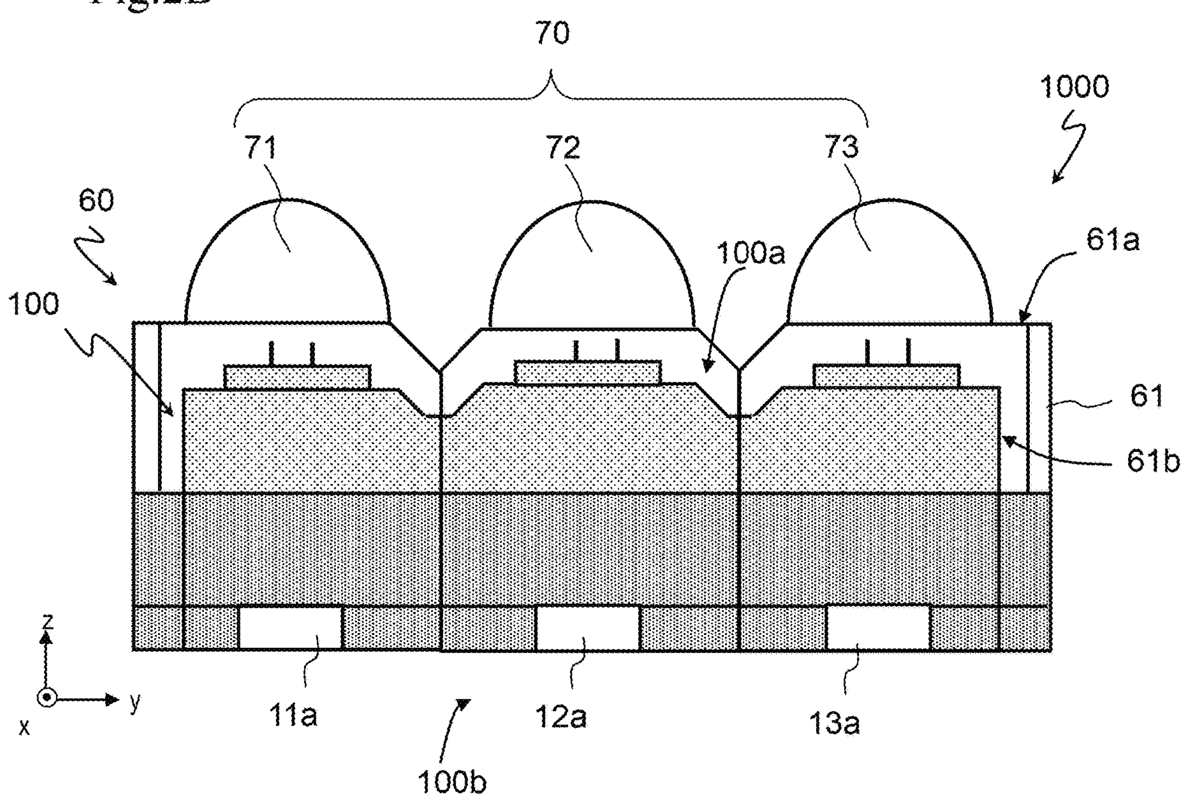
Fig.2B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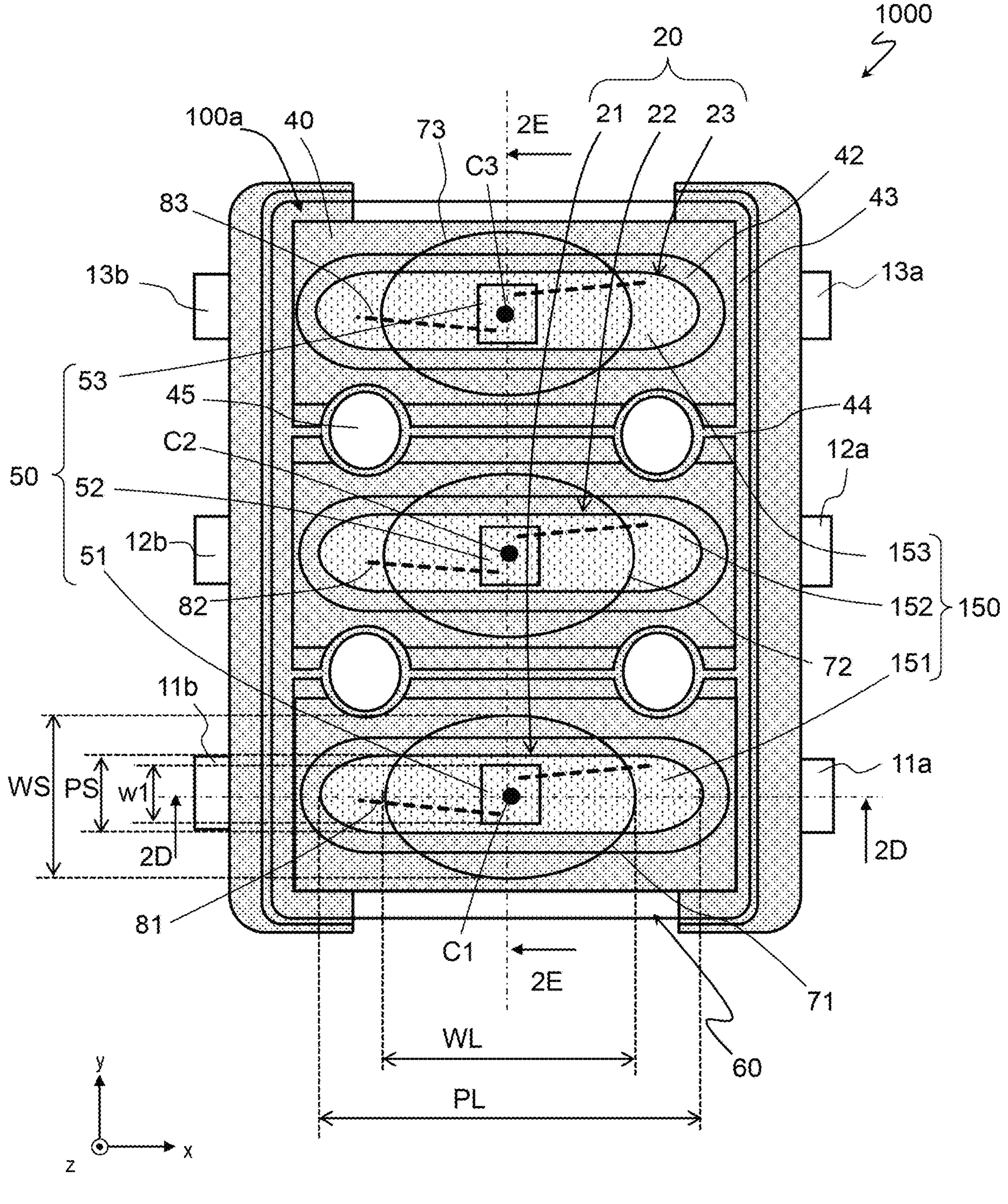
61b
z
x
y
11a
12a
13a
100b

Fig.2C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C3
42
43
83
13b
13a
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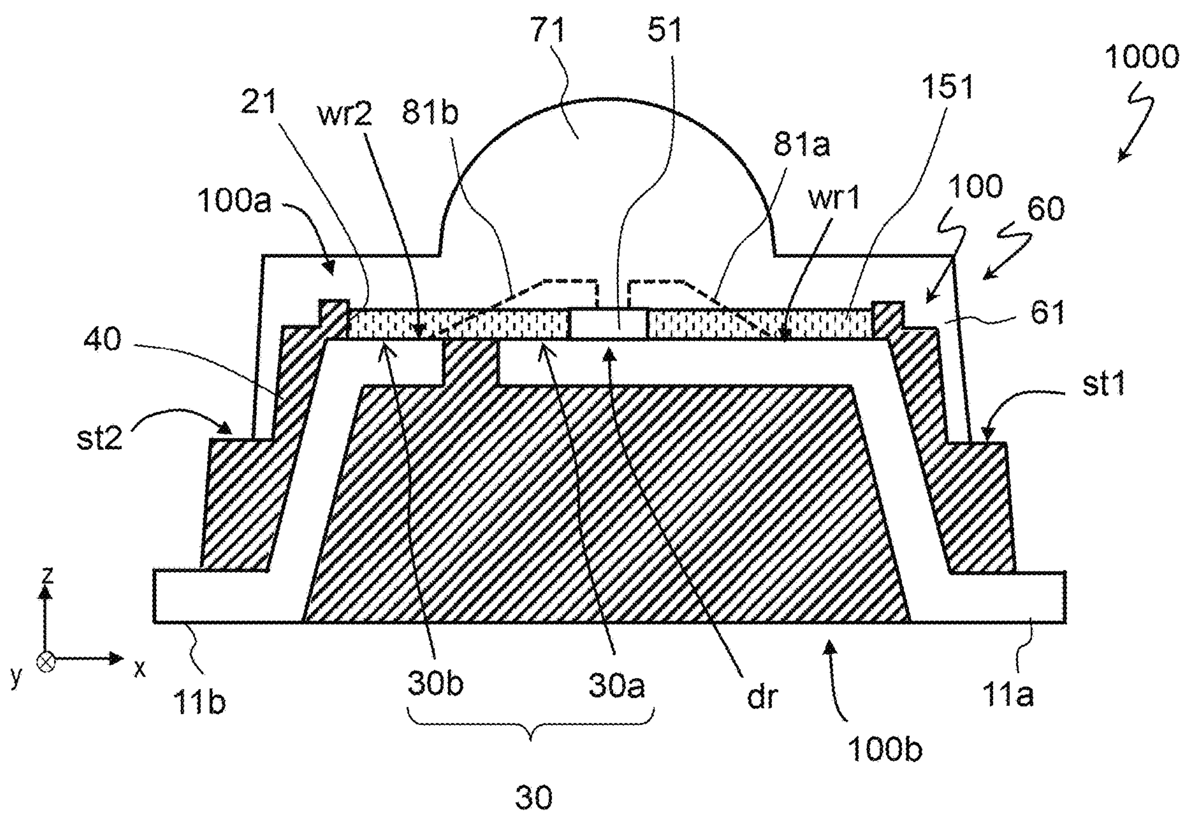
45
44
50
C2
12a
52
12b
153
152
150
82
51
72
151
11b
11a
WS
PS
w1
2D
2D
81
C1
2E
71
WL
60
PL
y
x
z

Fig.2D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1000
21
wr2
81b
81a
151
100a
wr1
100
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61
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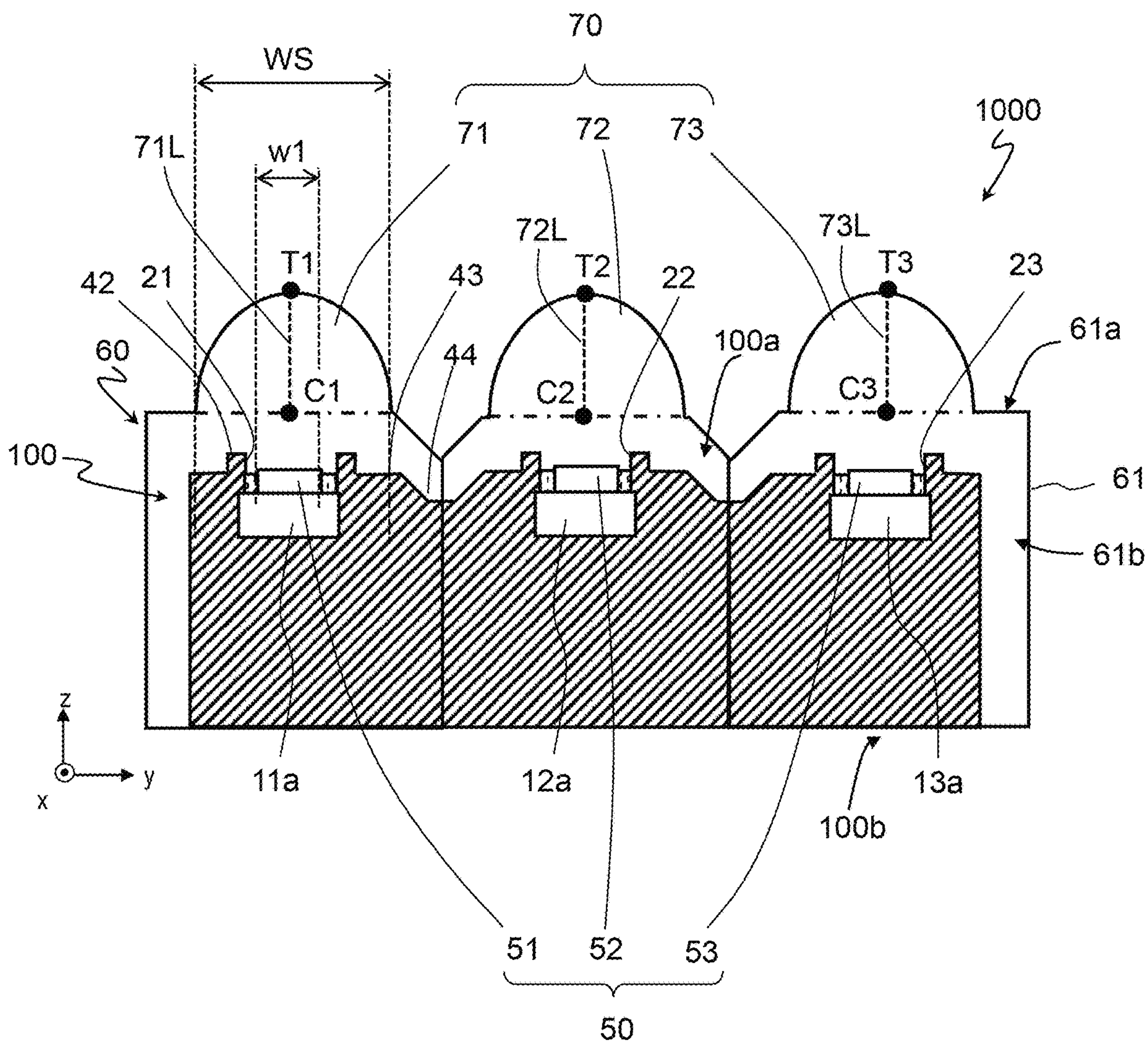
st1
st2
z
y
x
11b
30b
30a
dr
11a
100b
30

Fig.2E



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w1
71
72
73
72L
73L
T1
T2
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43
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23
60
44
100a
61a
C1
C2
C3
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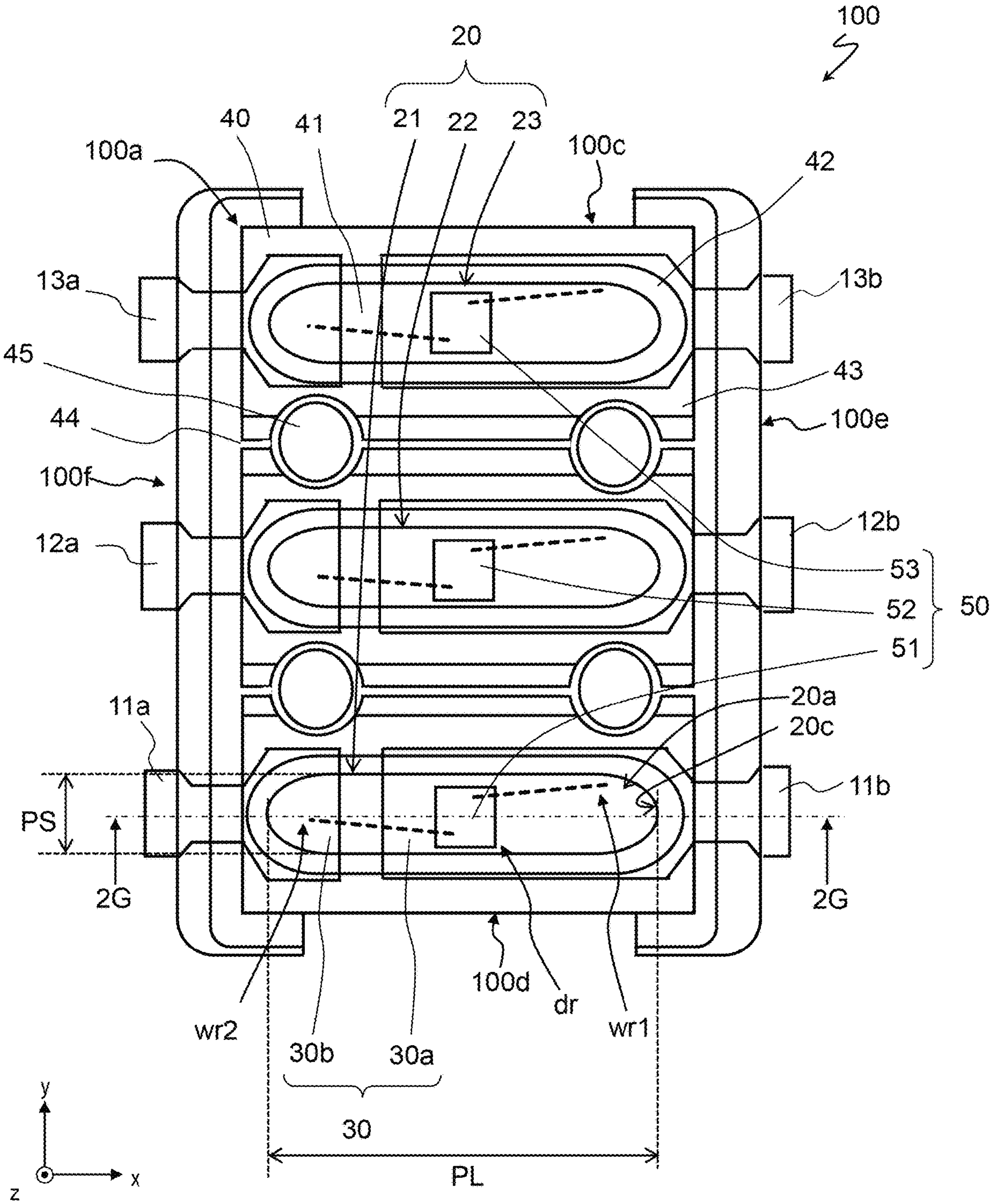
61
61b
z
y
x
11a
12a
13a
100b
51
52
53
50

Fig.2F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52
50
51
11a
20a
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2G
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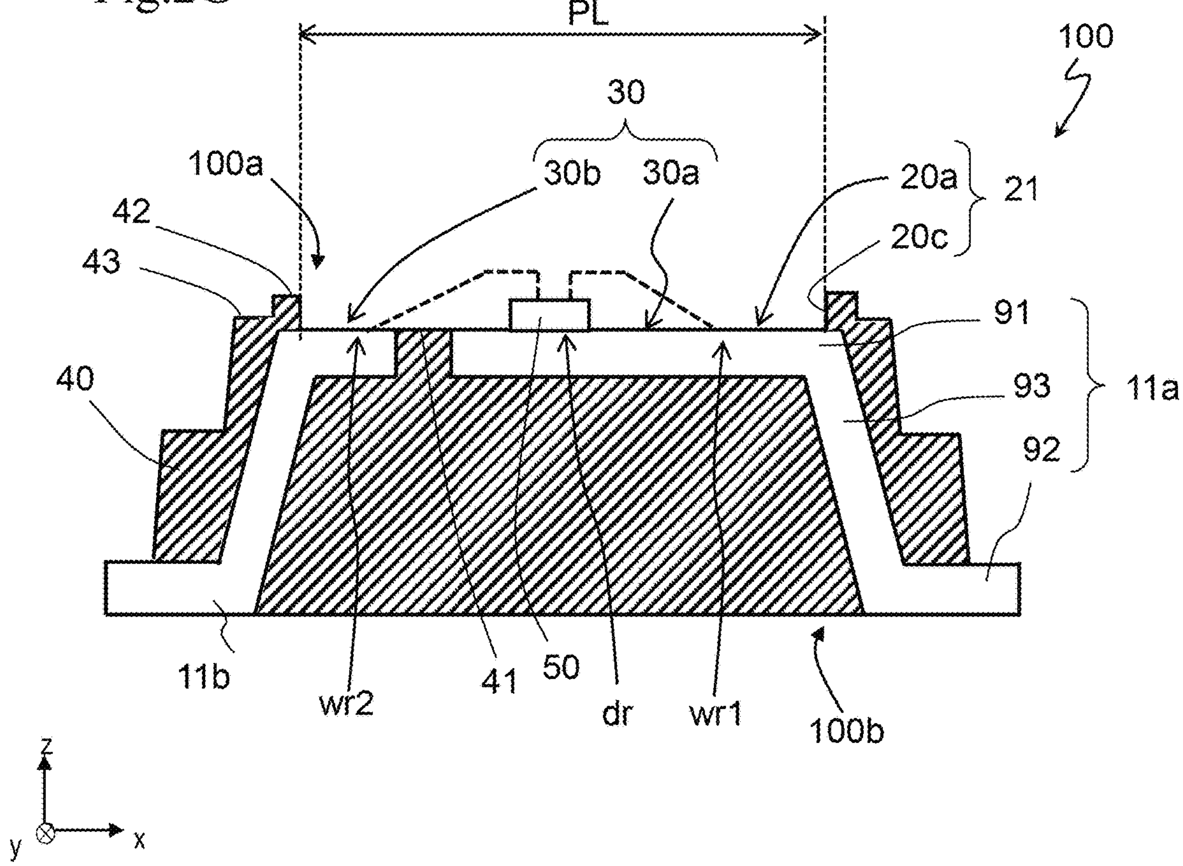
dr
wr1
wr2
30b
30a
30
PL
y
x
z

Fig.2G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30a
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42
20c
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91
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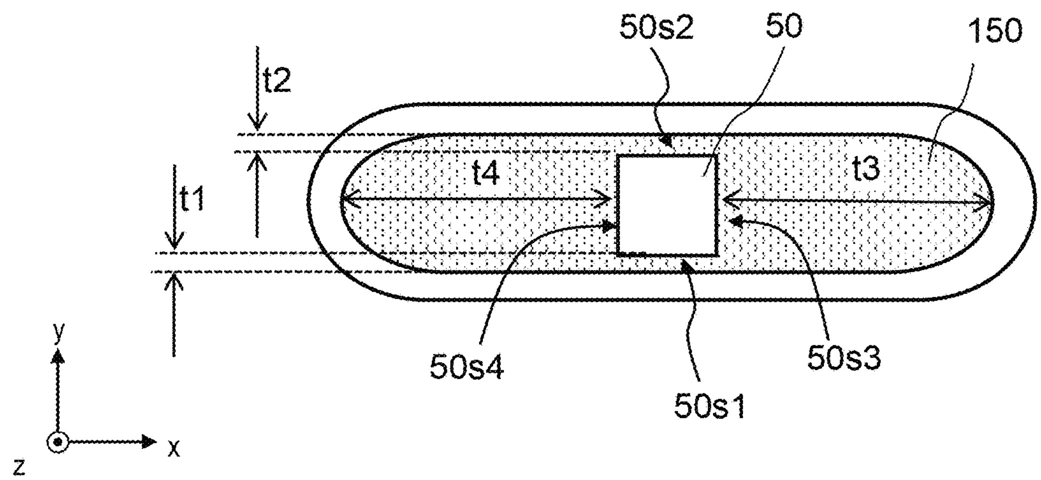
41
50
dr
wr1
100b
z
y
x

Fig.2H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t3
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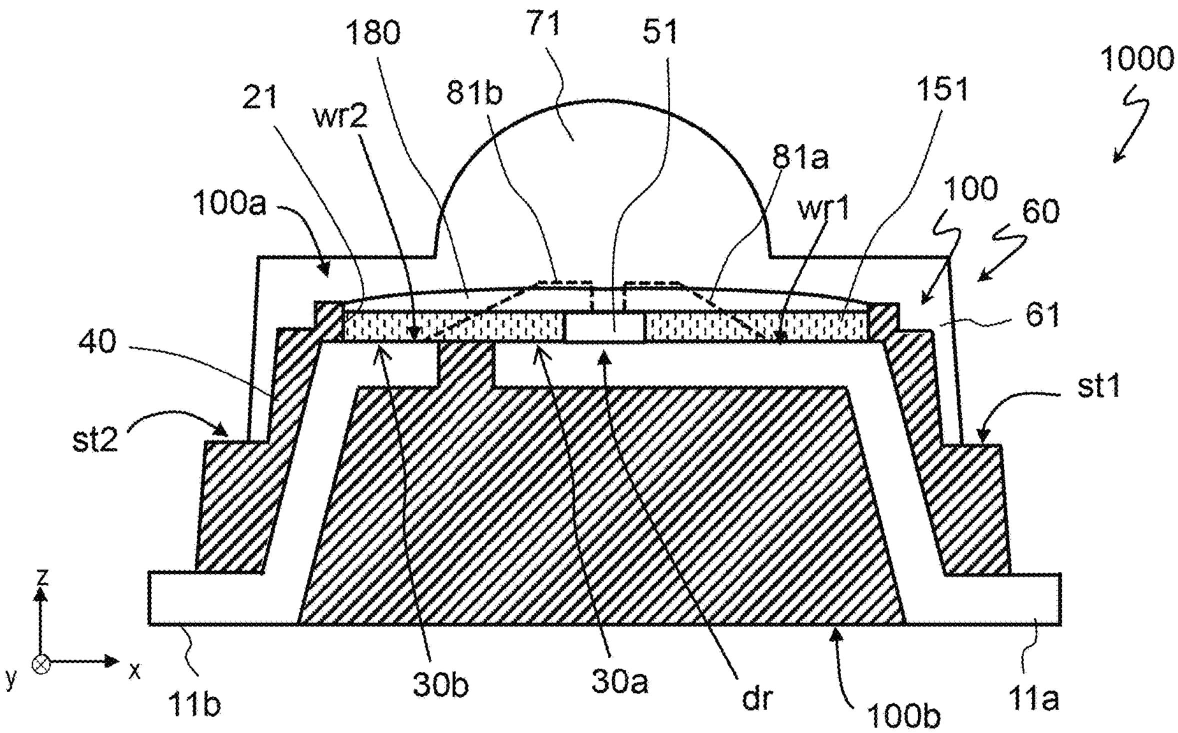
50s1
y
z
x

Fig.2I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100a
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st2
z
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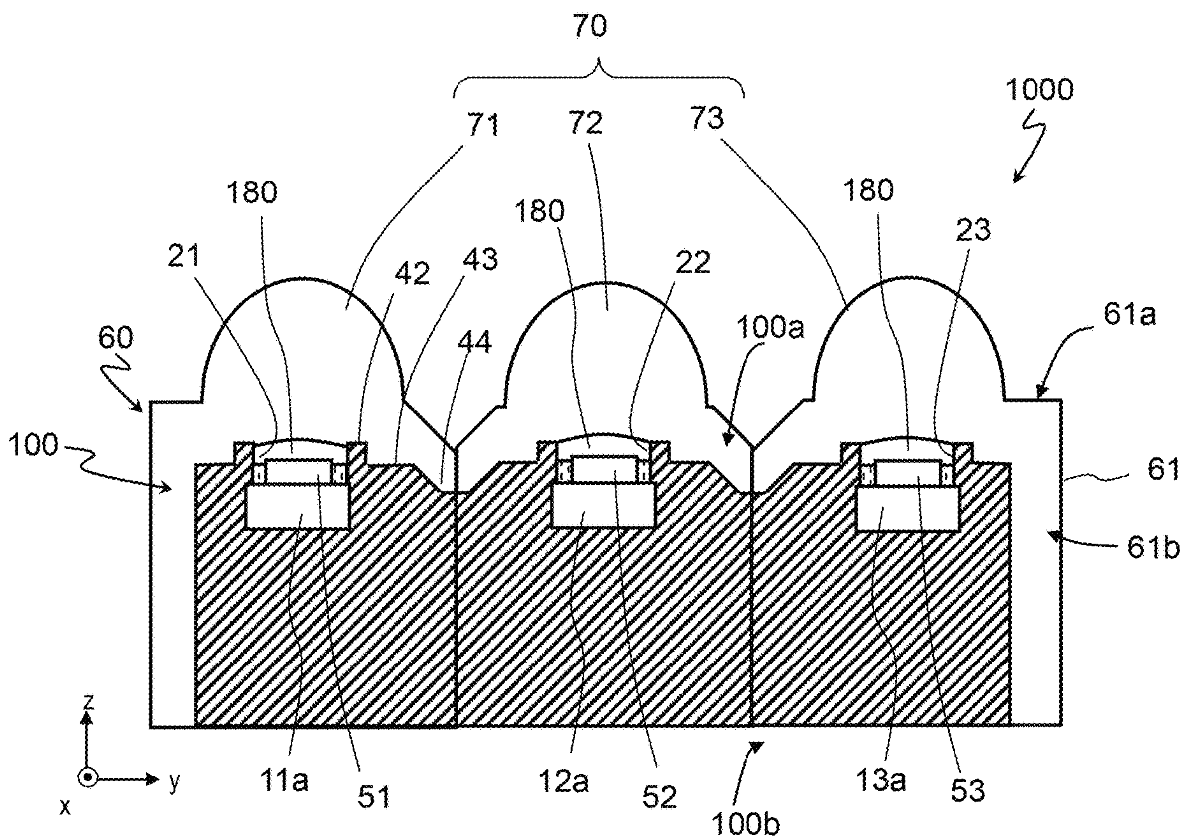
x
11b
30b
30a
dr
100b
11a

Fig.2J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61b
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x
11a
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12a
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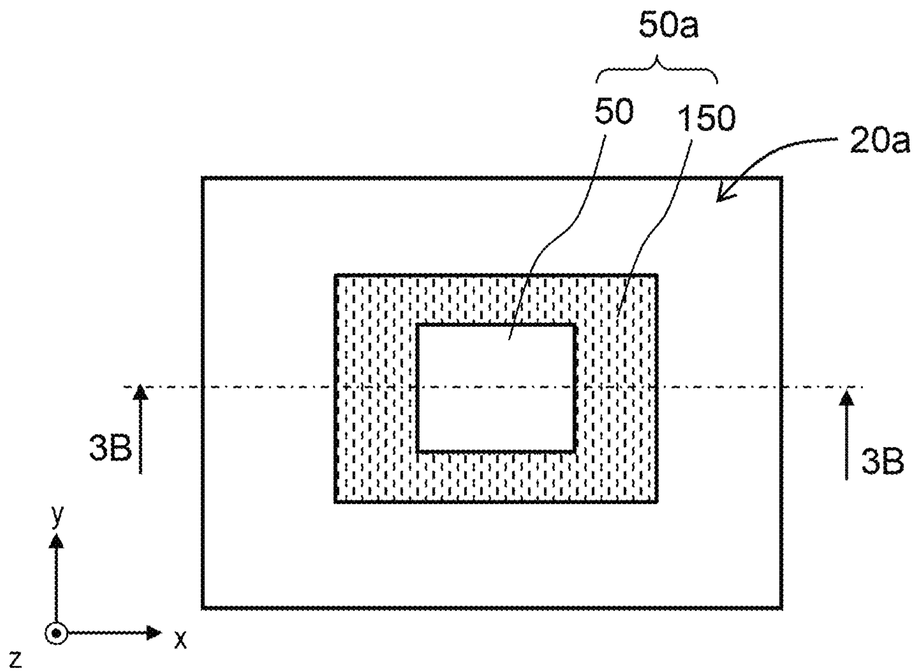
100b
13a
53

Fig.3A



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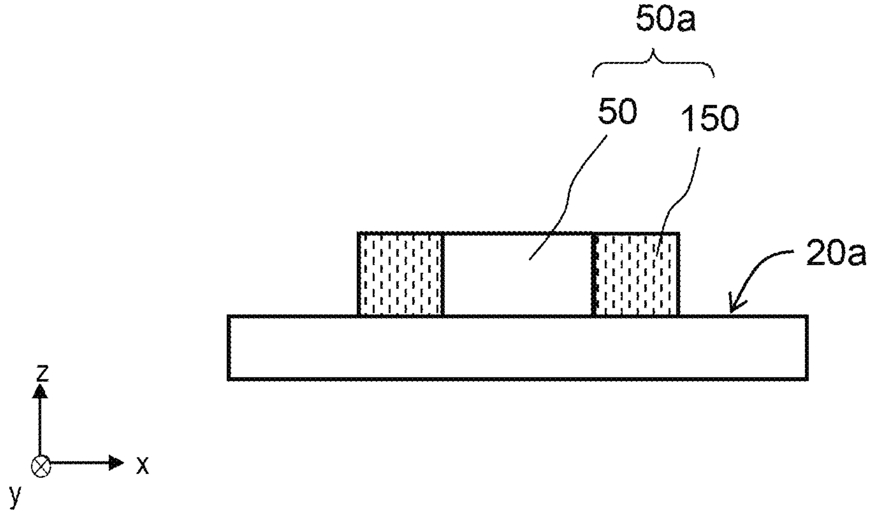

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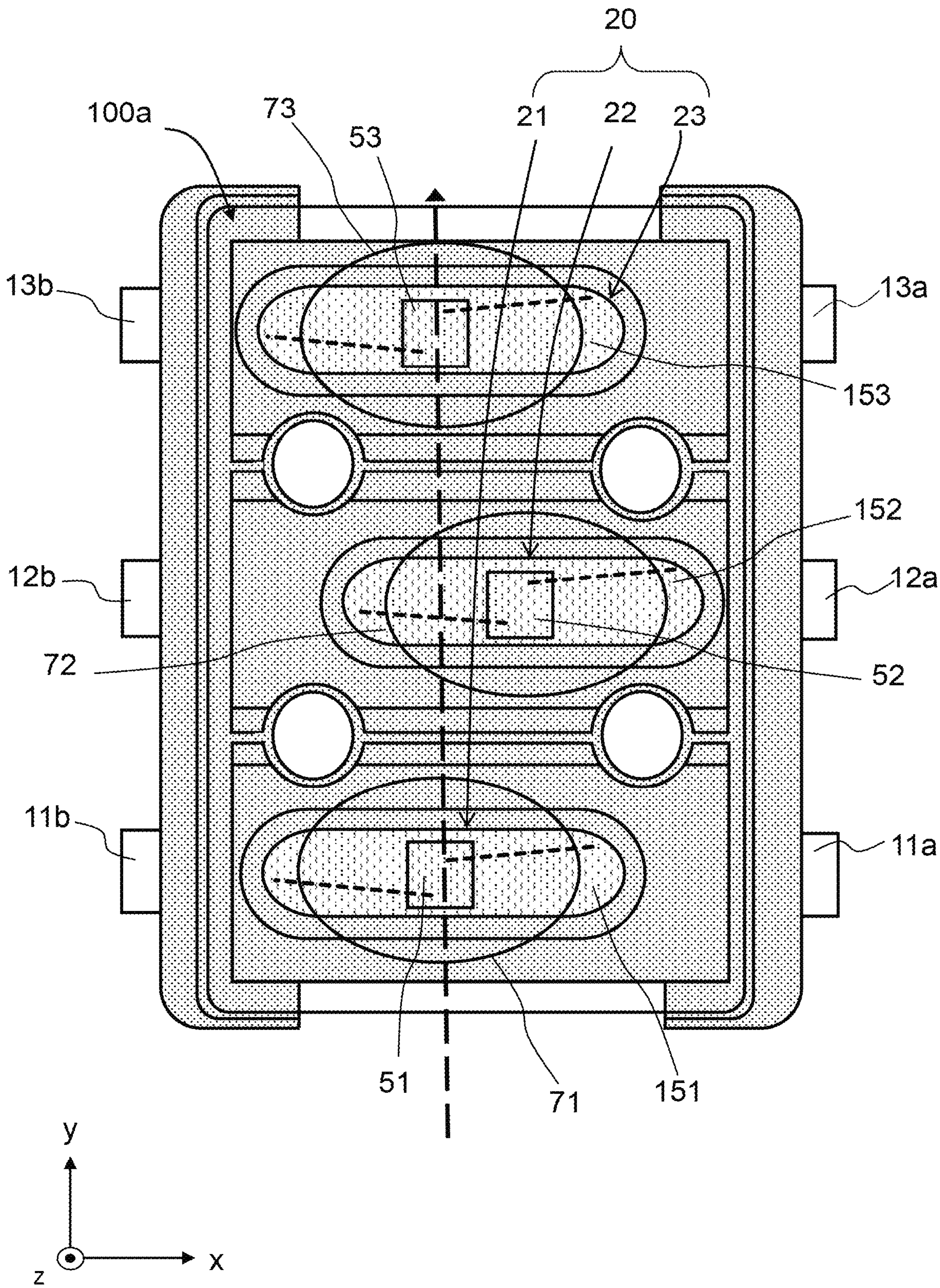
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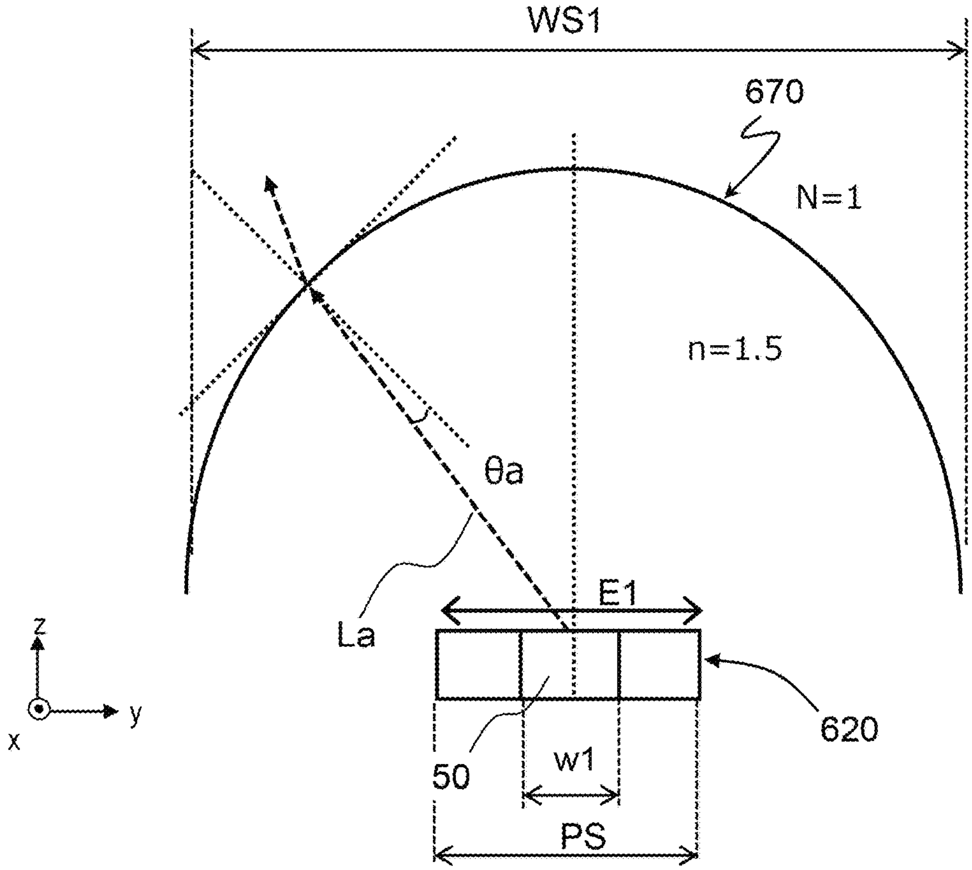
71
151
y
x
z

Fig.5A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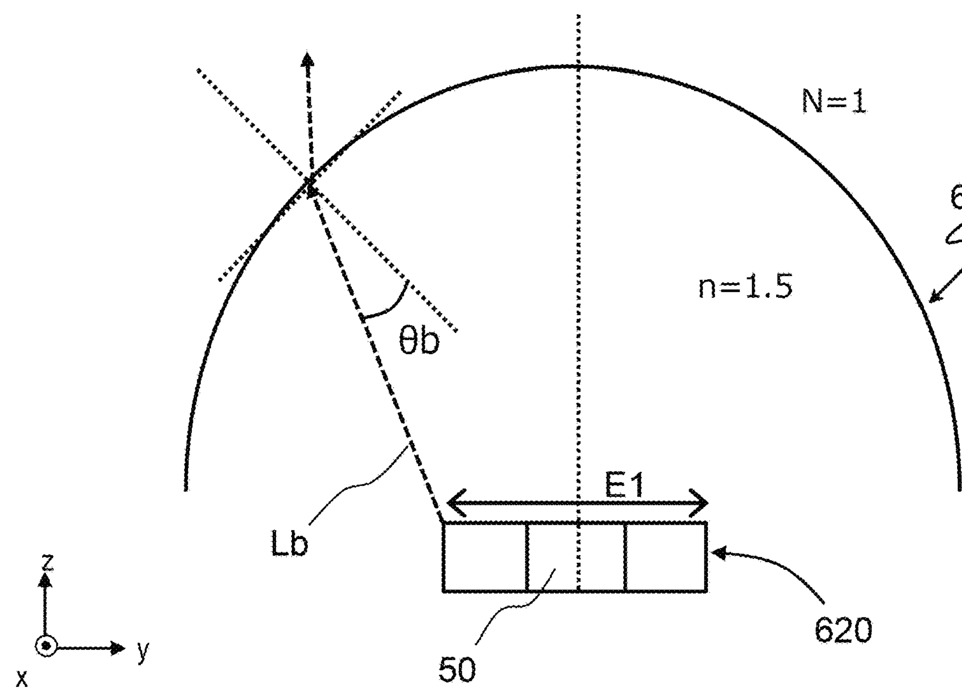
N=1
n=1.5
θa
La
E1
620
50
w1
PS
z
y
x

Fig.5B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Lb
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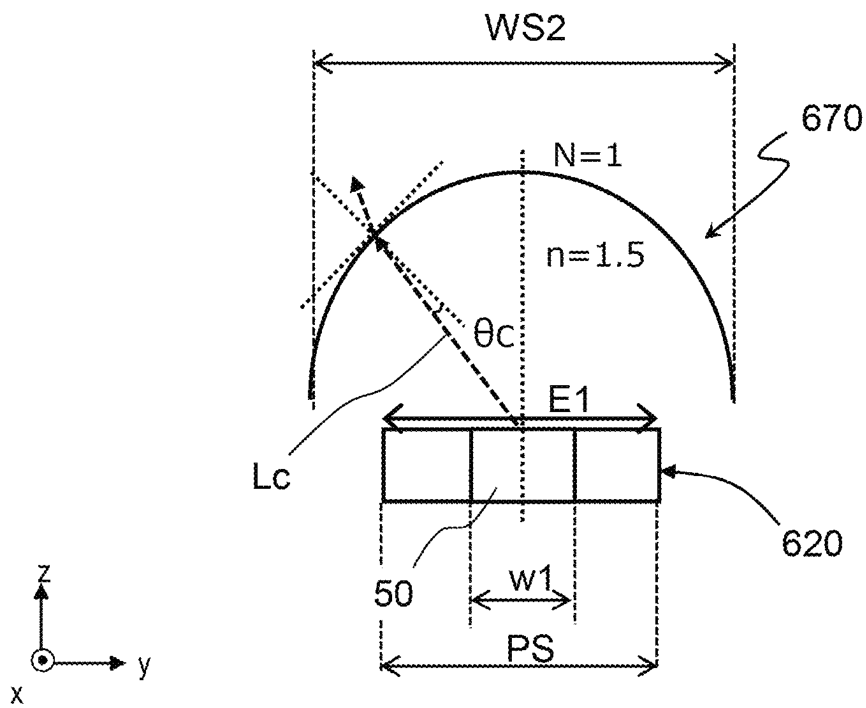
z
y
x

Fig.5C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E1
Lc
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w1
PS
z
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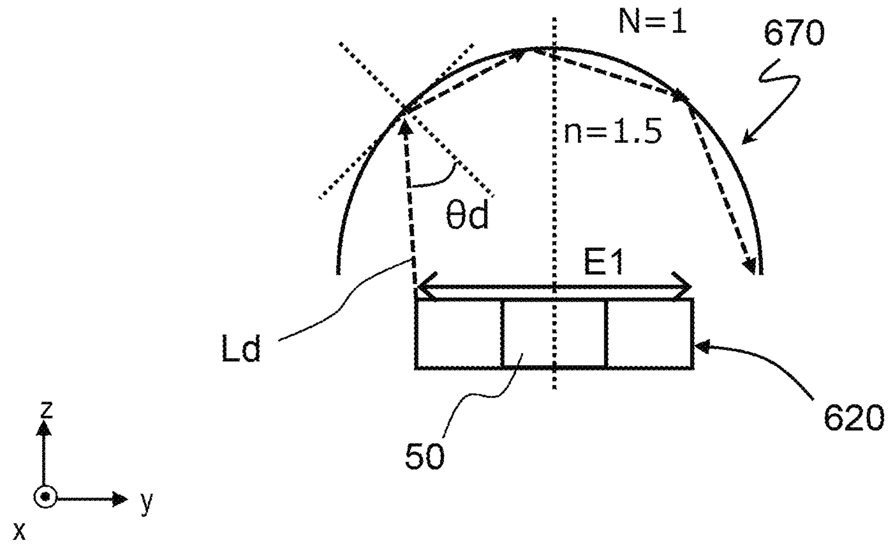
x

Fig.5D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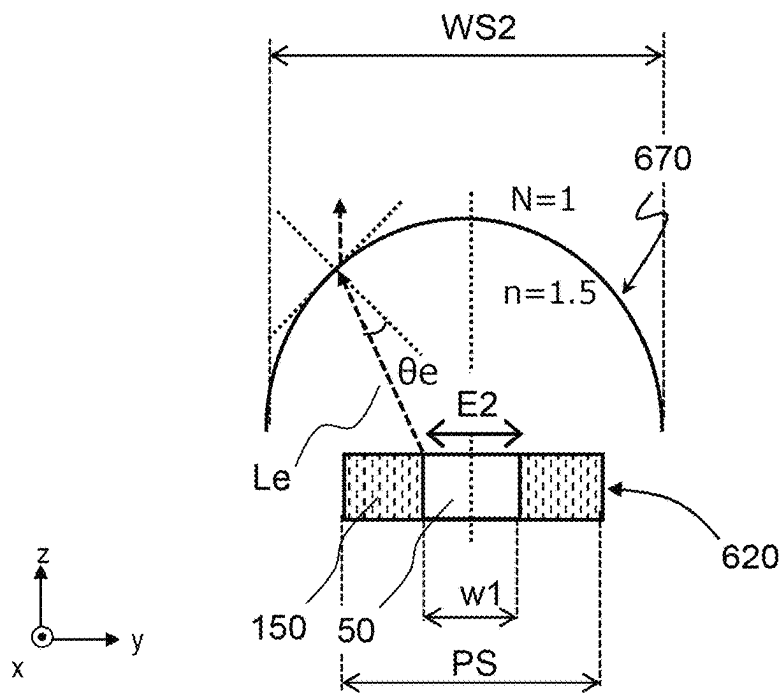
E1
Ld
620
50
z
y
x

Fig.5E



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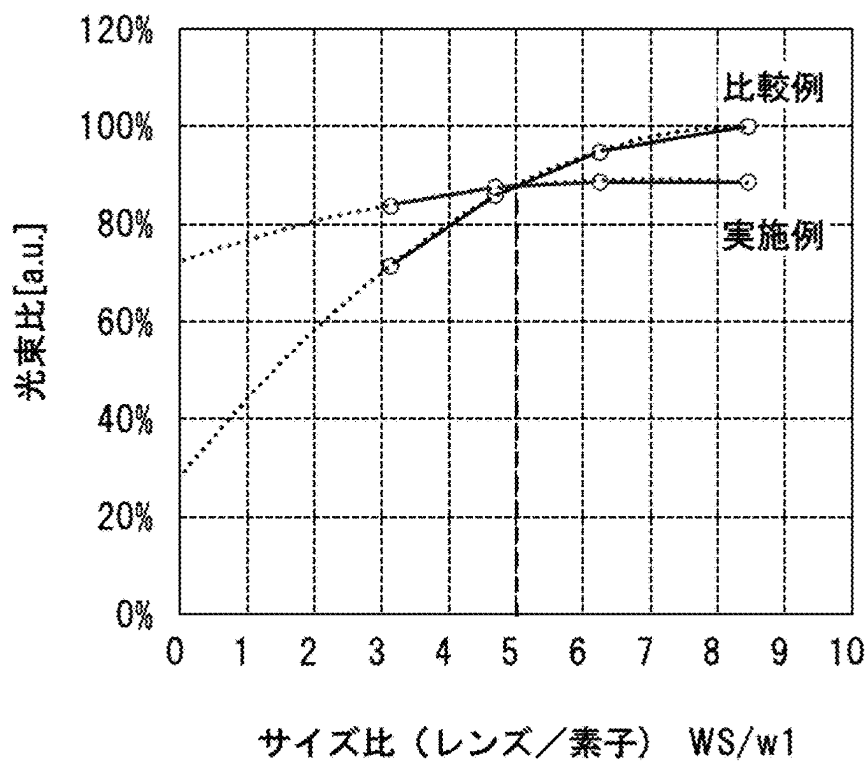
θe
E2
Le
620
z
y
x
150
50
w1
PS

Fig.6



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光束比[a.u.]
比較例
実施例
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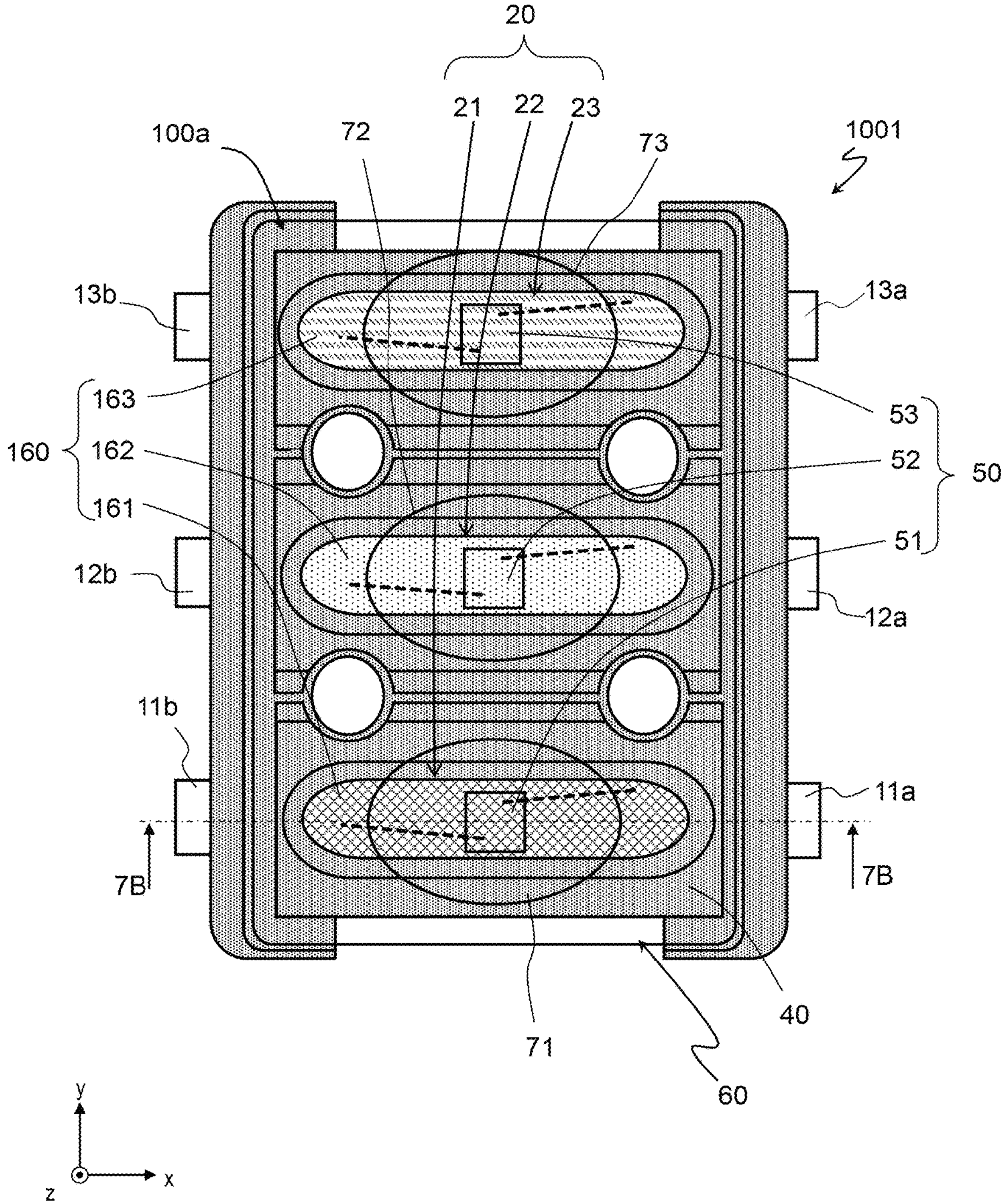
9
10
サイズ比（レンズ／素子） WS/w1

Fig.7A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11b
11a
7B
7B
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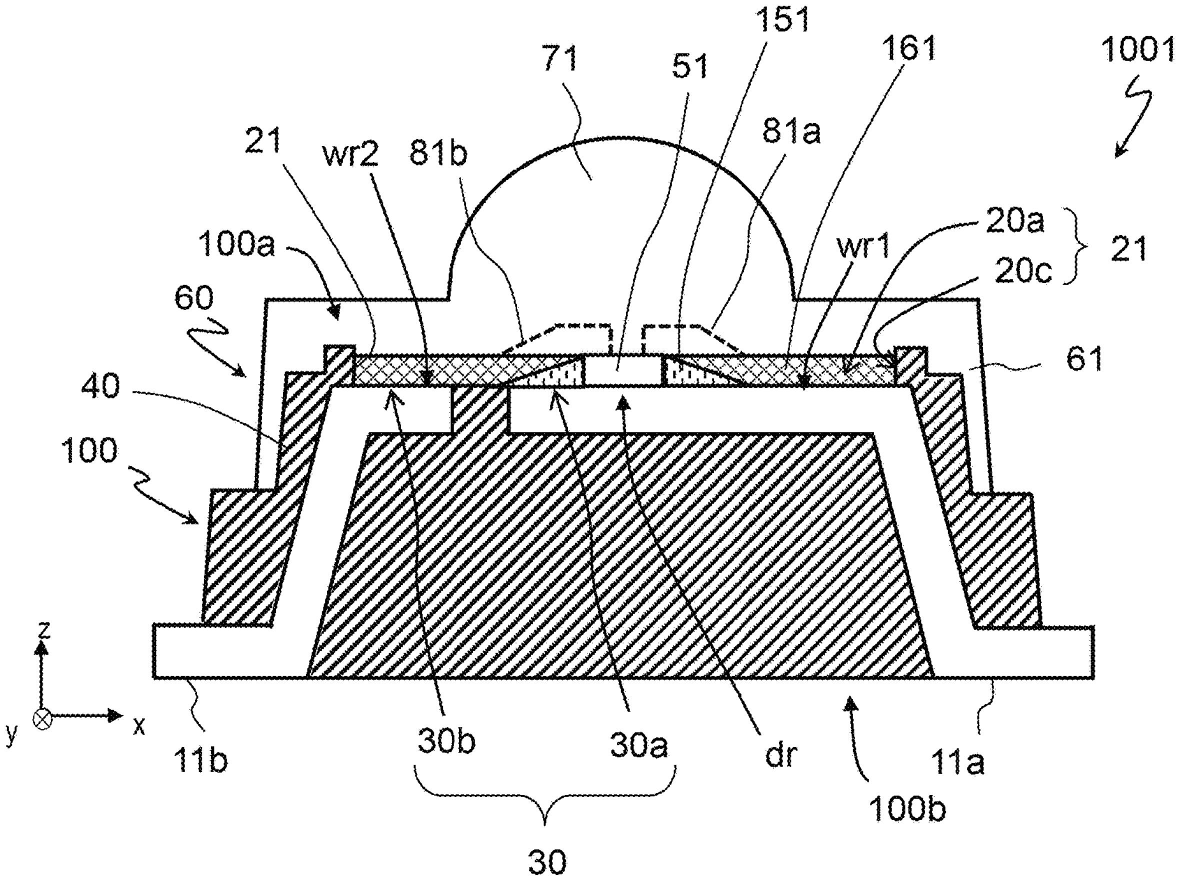
71
60
y
x
z

Fig.7B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wr1
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z
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x
11b
30b
30a
dr
11a
100b
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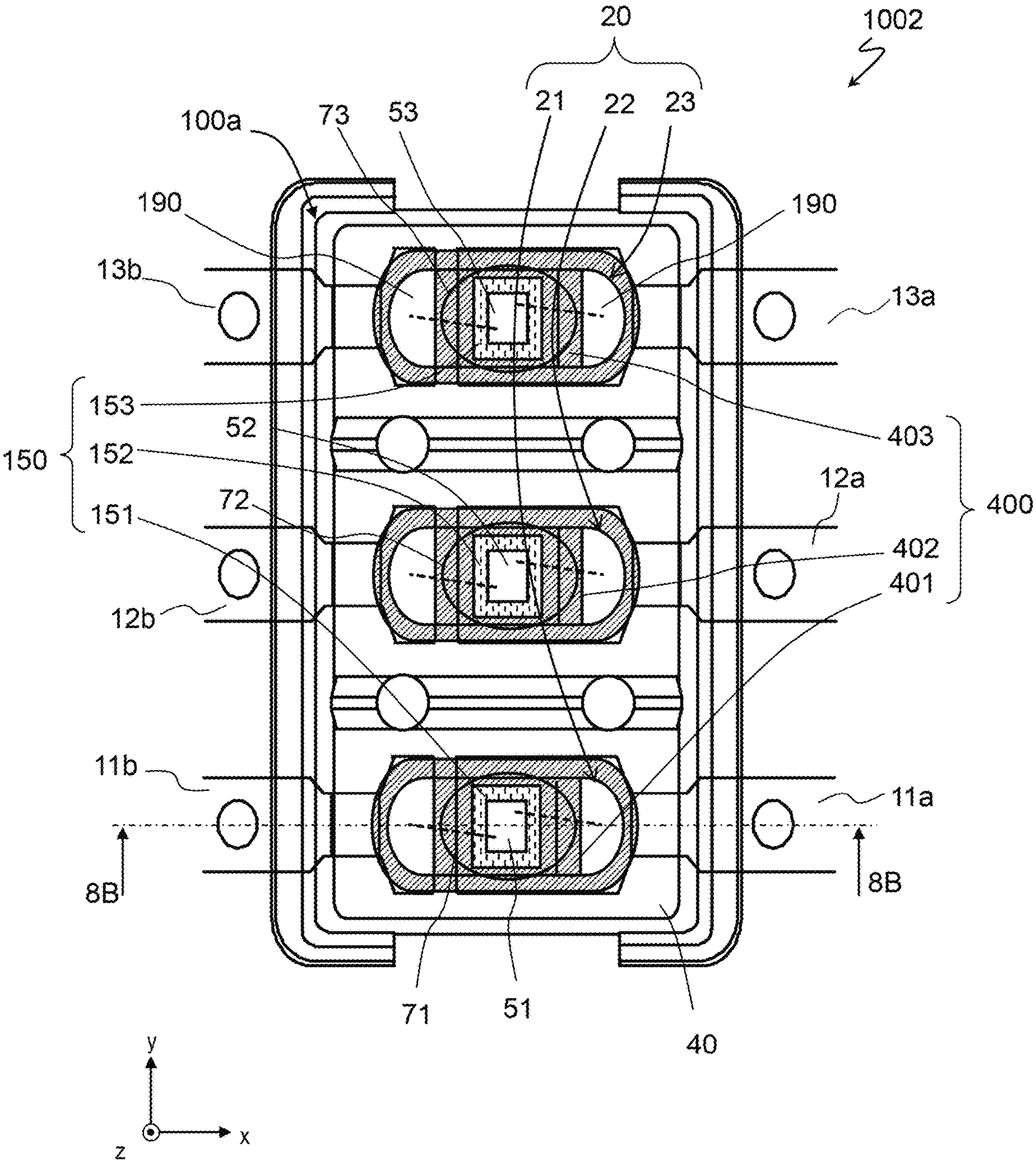
Fig.8A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8B
8B
71
51
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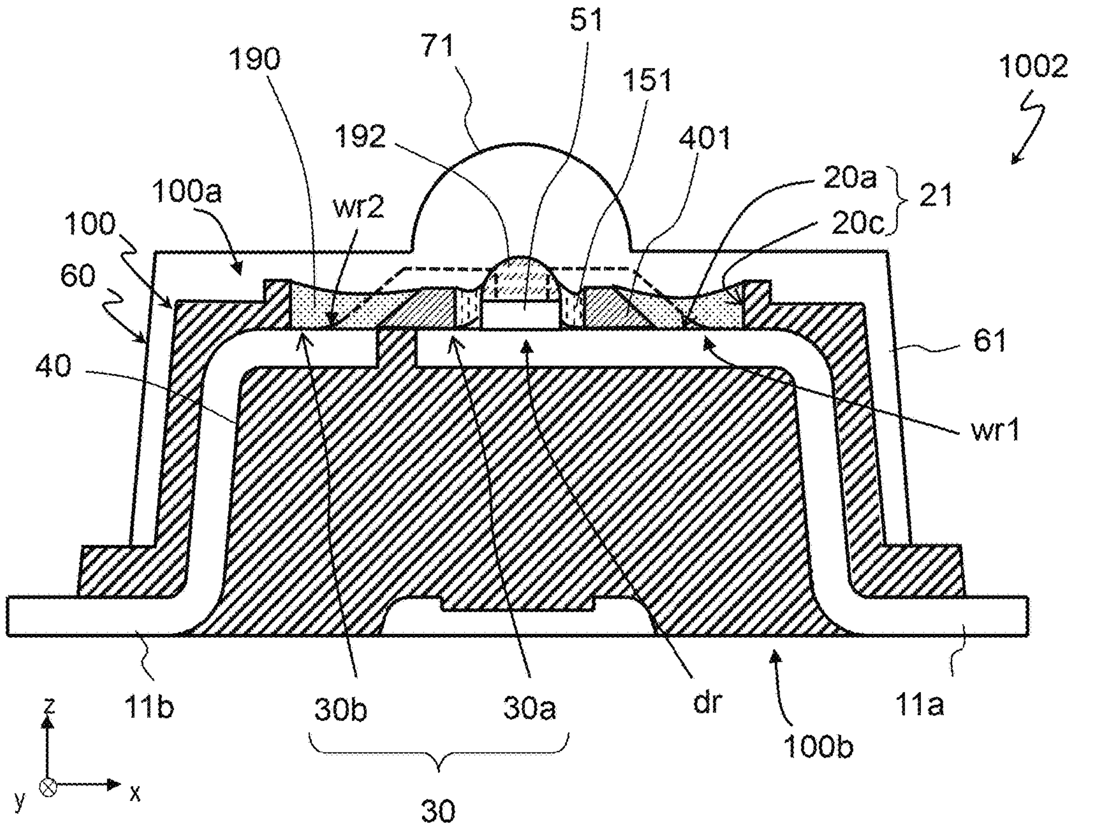
y
x
z

Fig.8B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wr1
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30b
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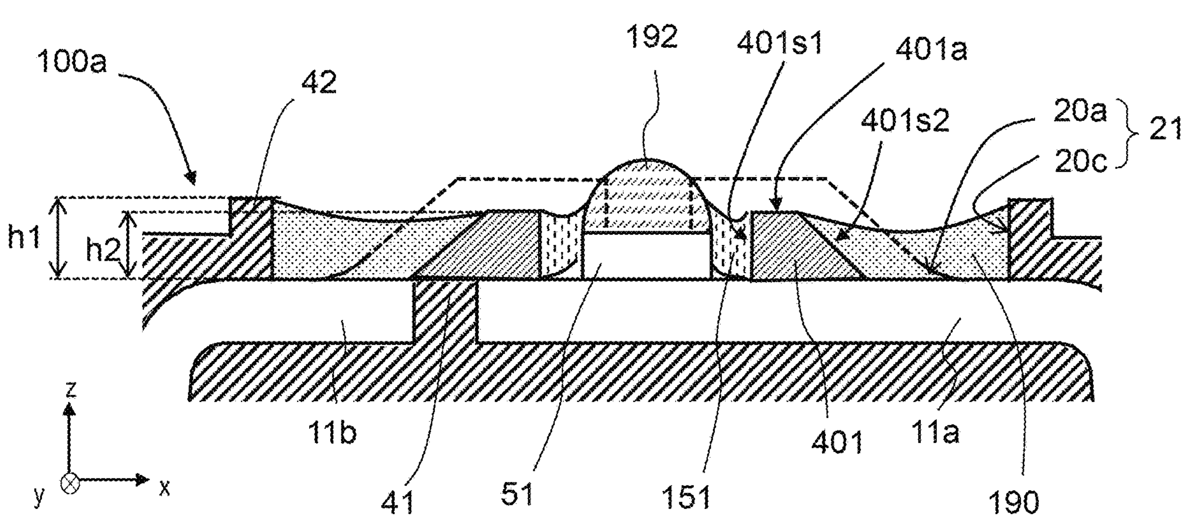
dr
11a
100b
30
z
y
x

Fig.8C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100a
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h2
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151
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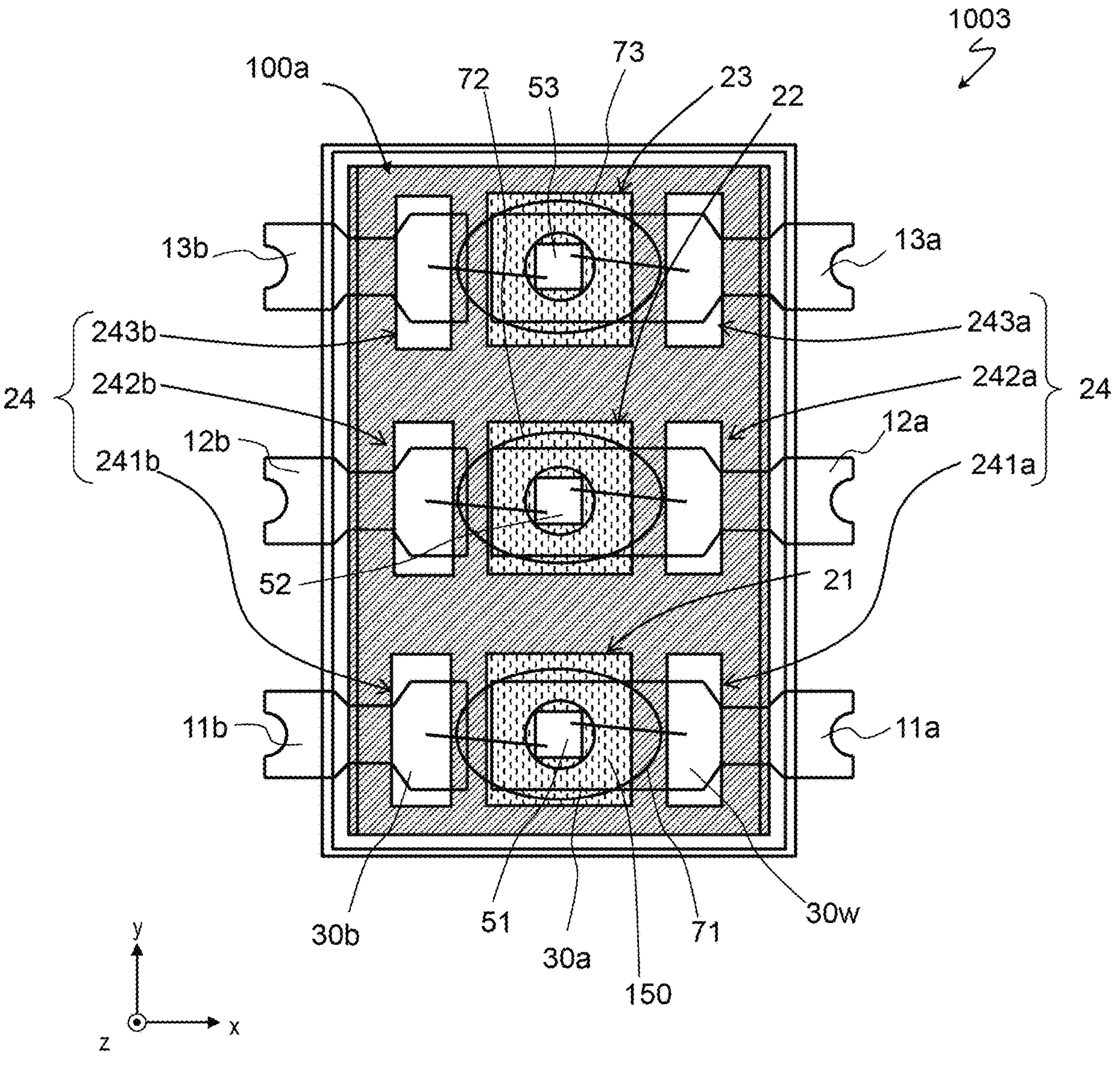
190
z
y
x

Fig.9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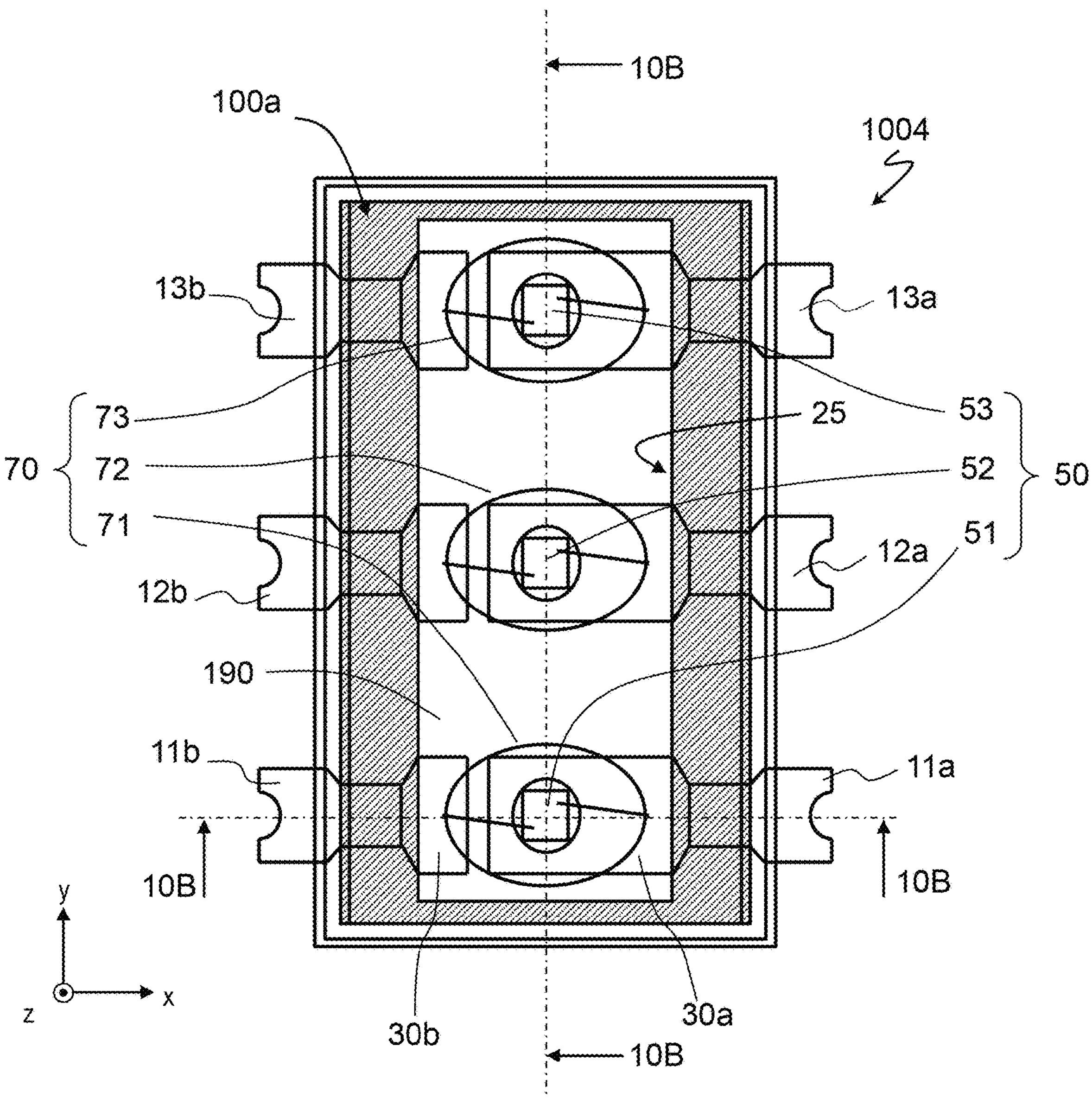
71
30w
y
x
z

Fig.10A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10B
y
x
z
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30a
10B

Fig.10B

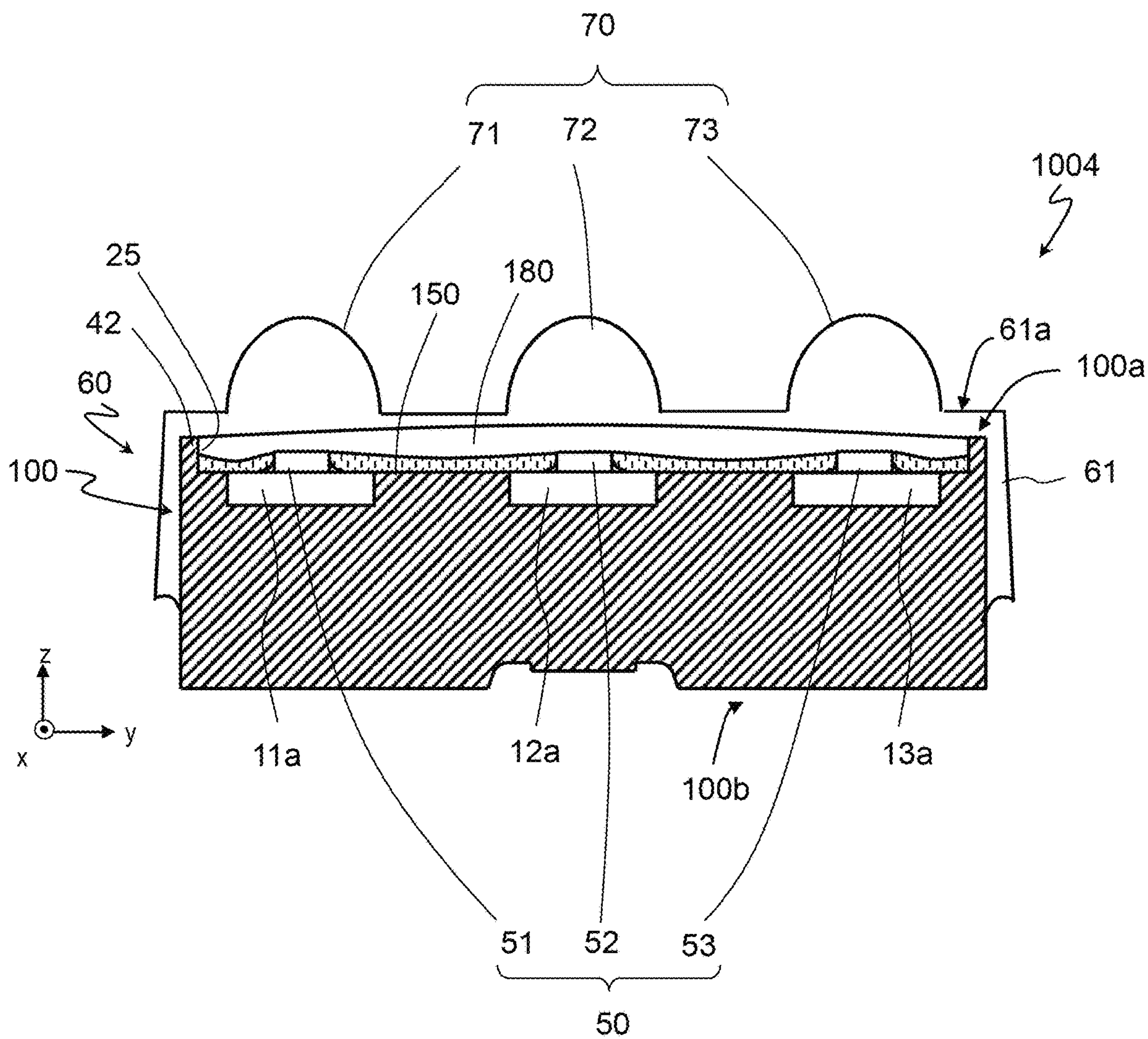

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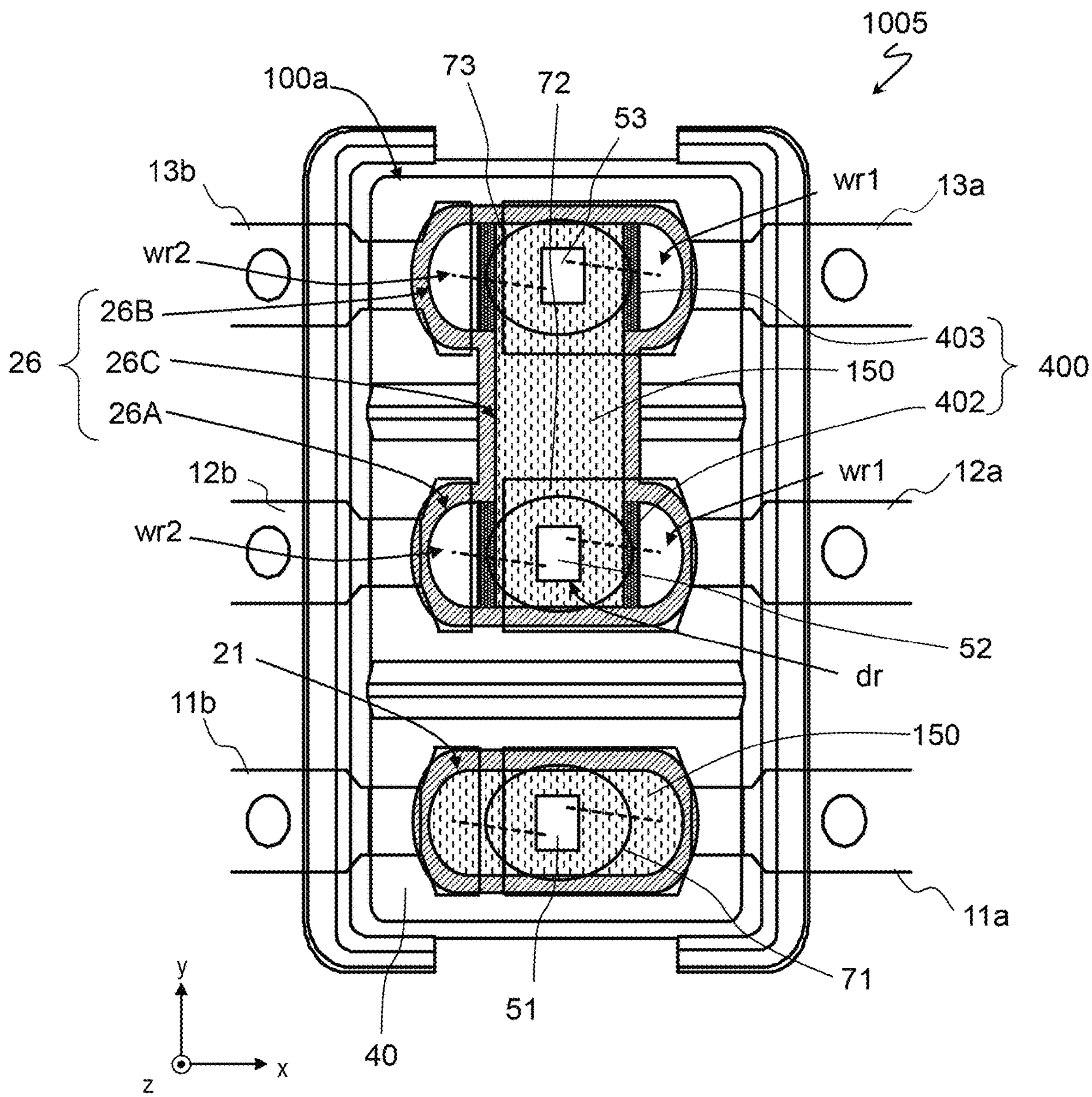
Fig.11A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wr2
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dr
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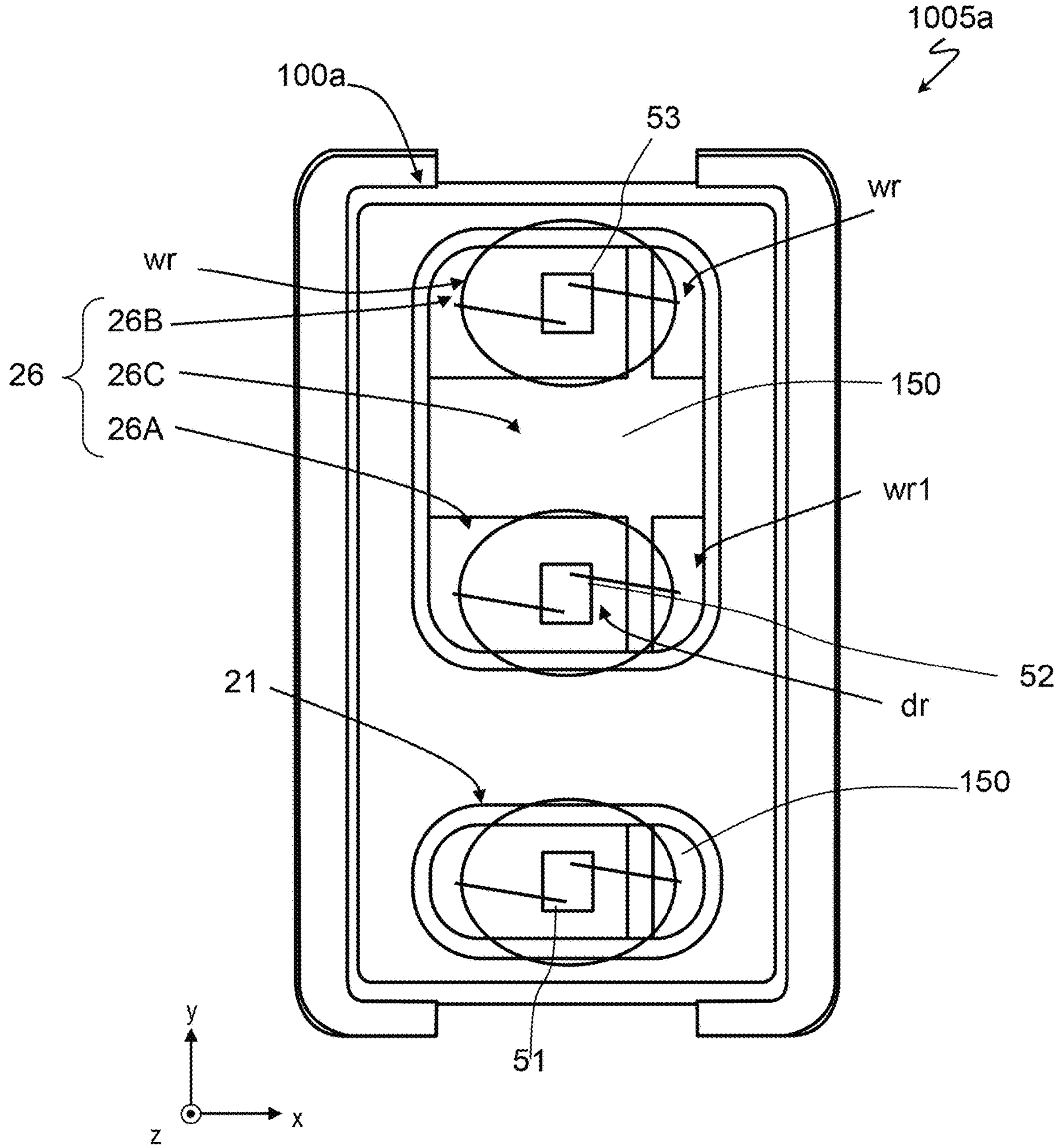
11a
71
51
40
y
x
z

Fig.11B



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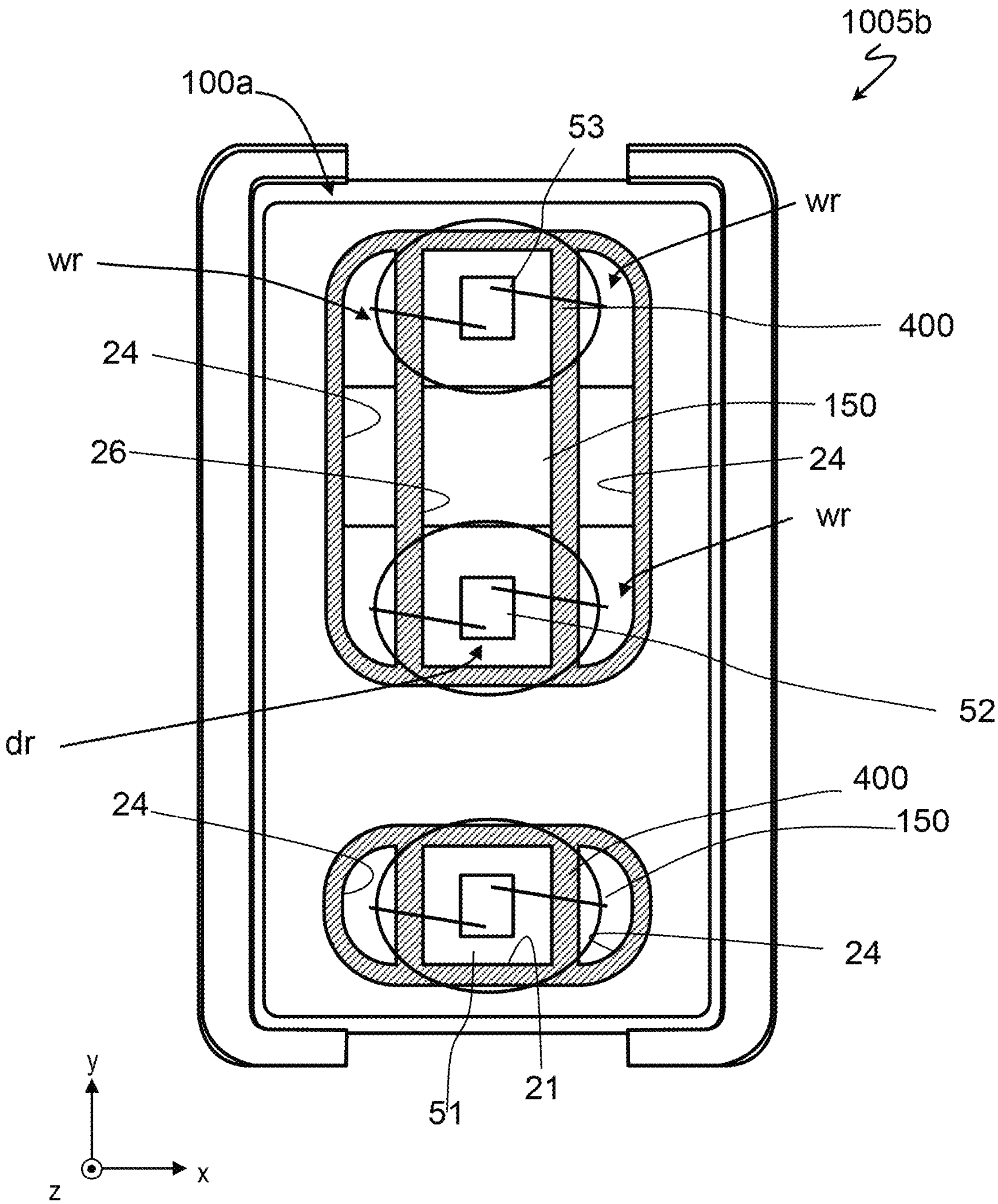
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51
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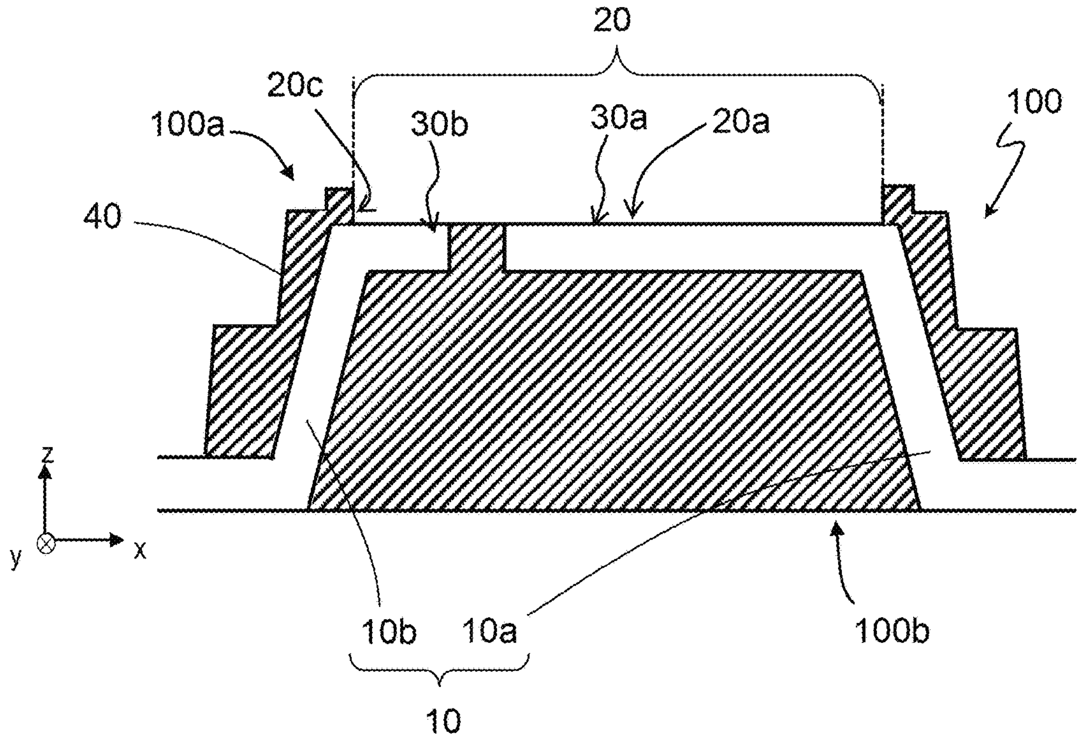
y
x
z

Fig.12A



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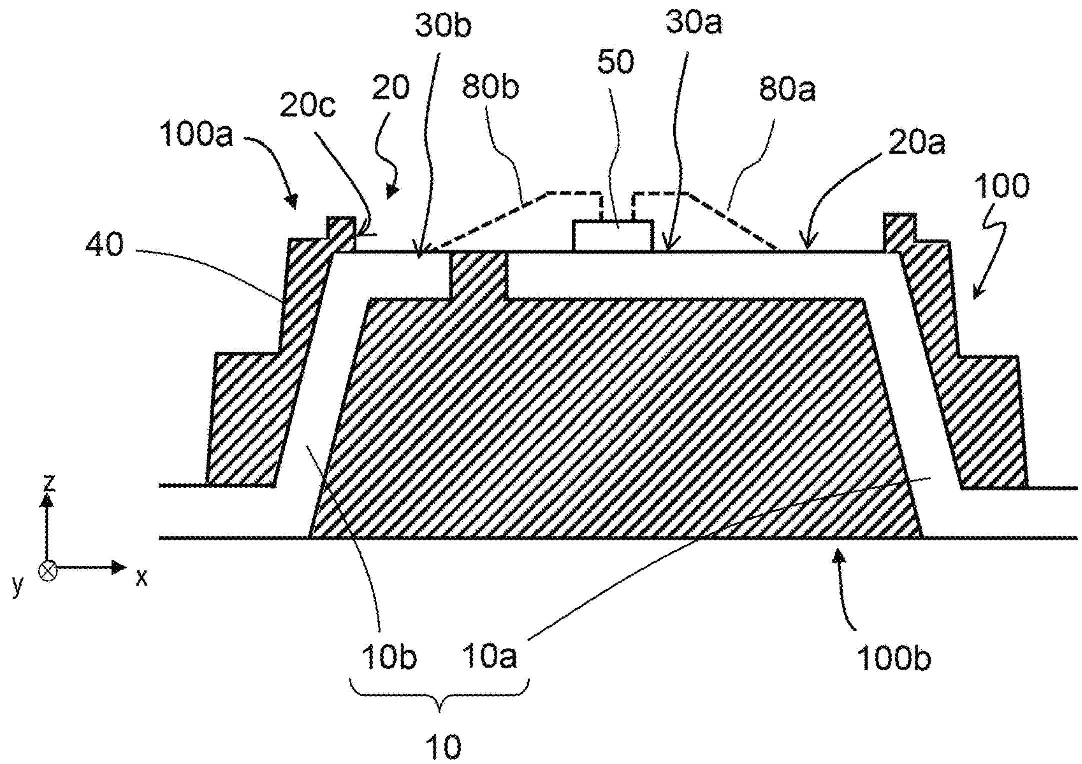
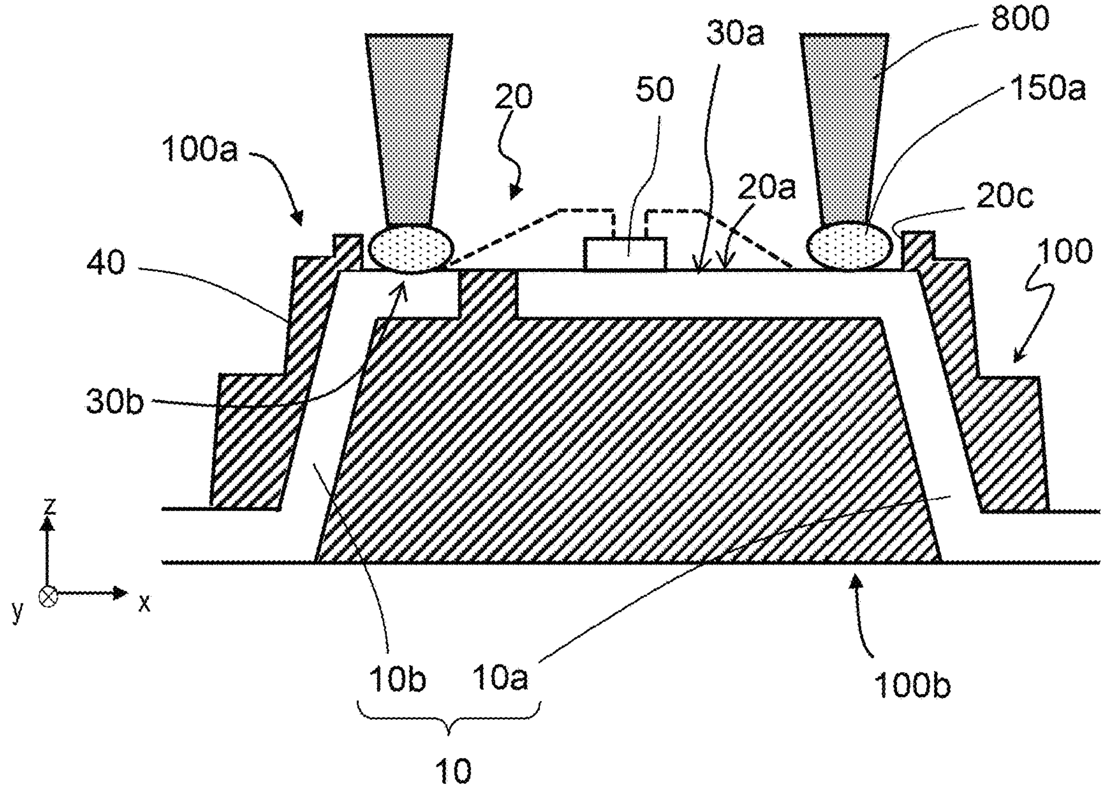


Fig.12C



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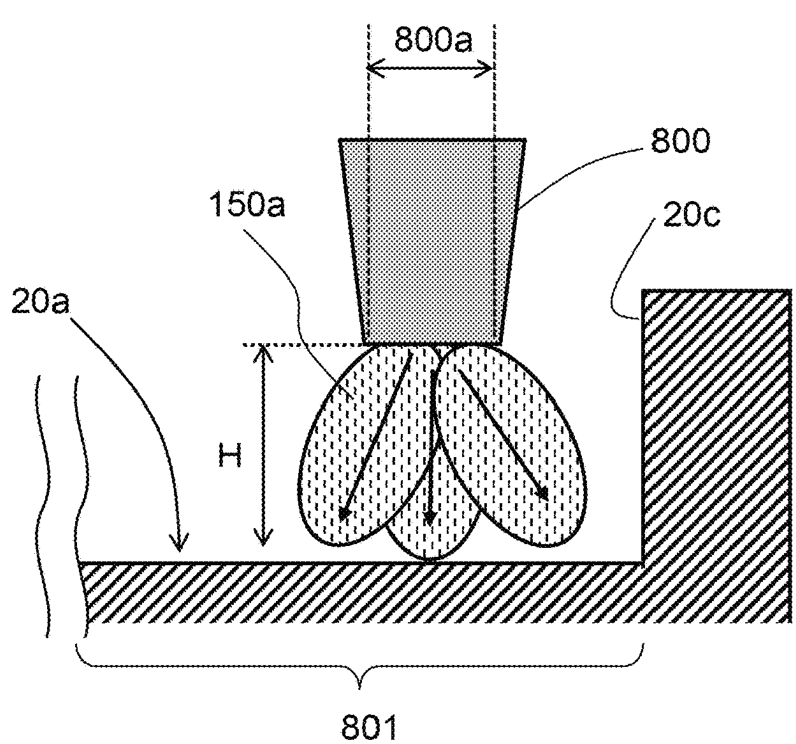


Fig.12E

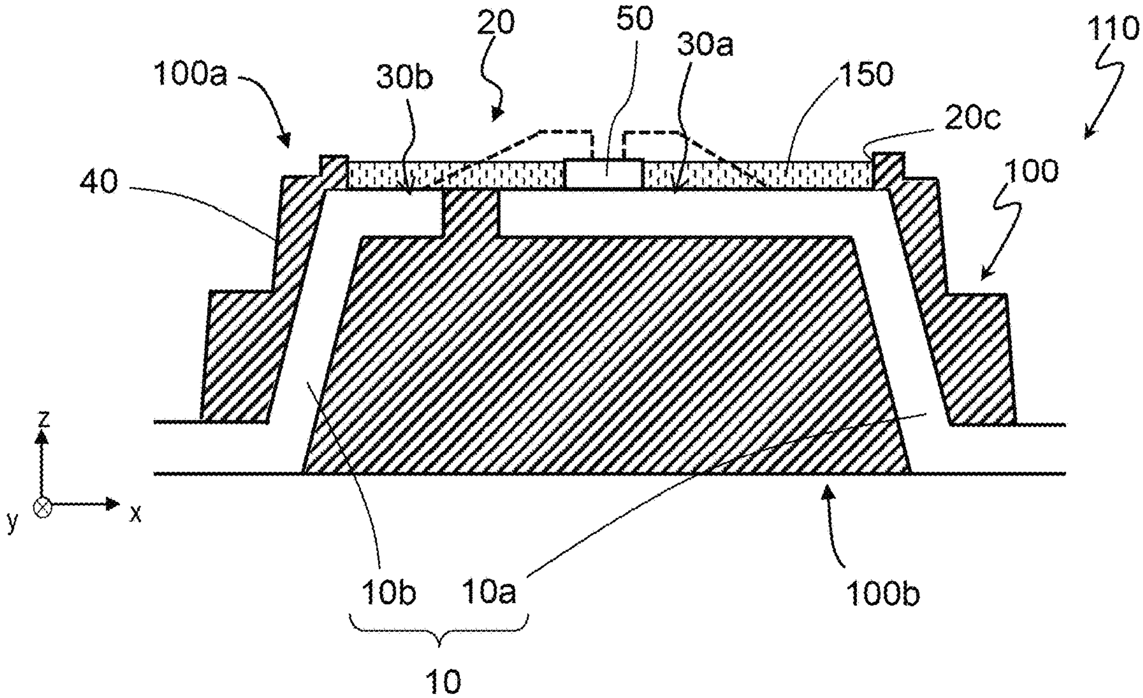


Fig.12F

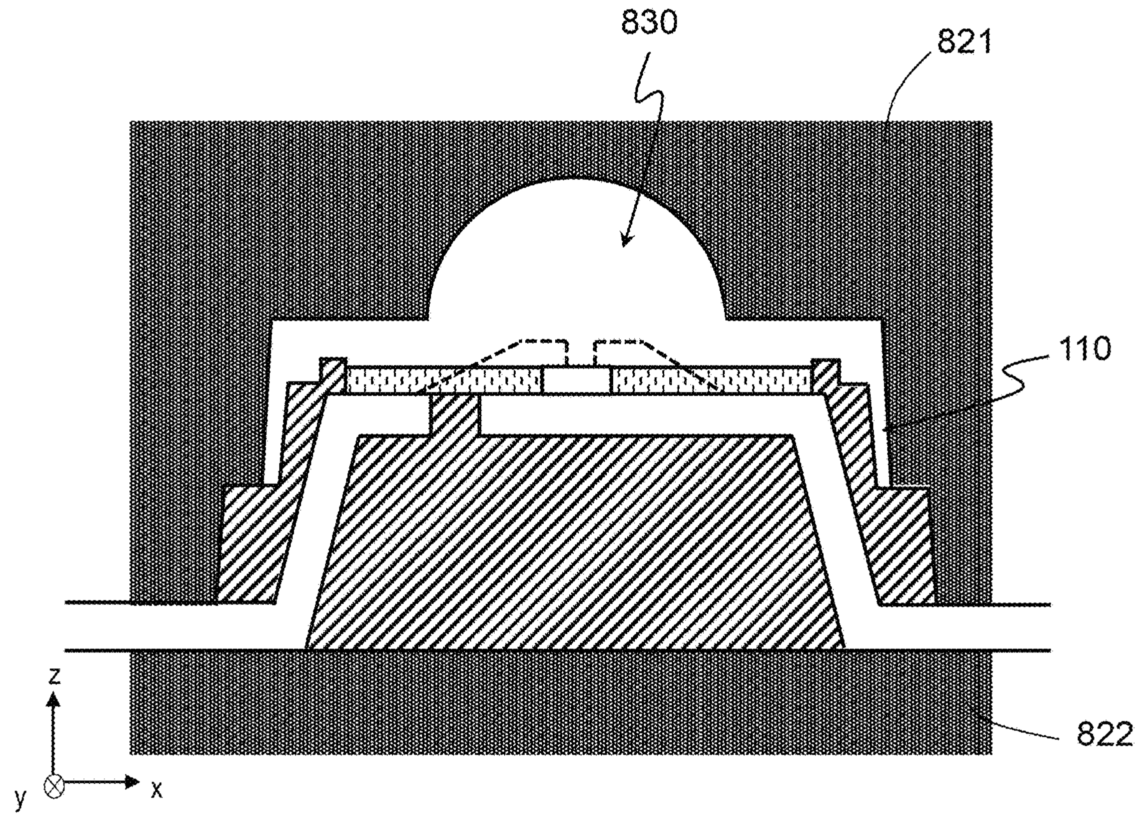


Fig.13

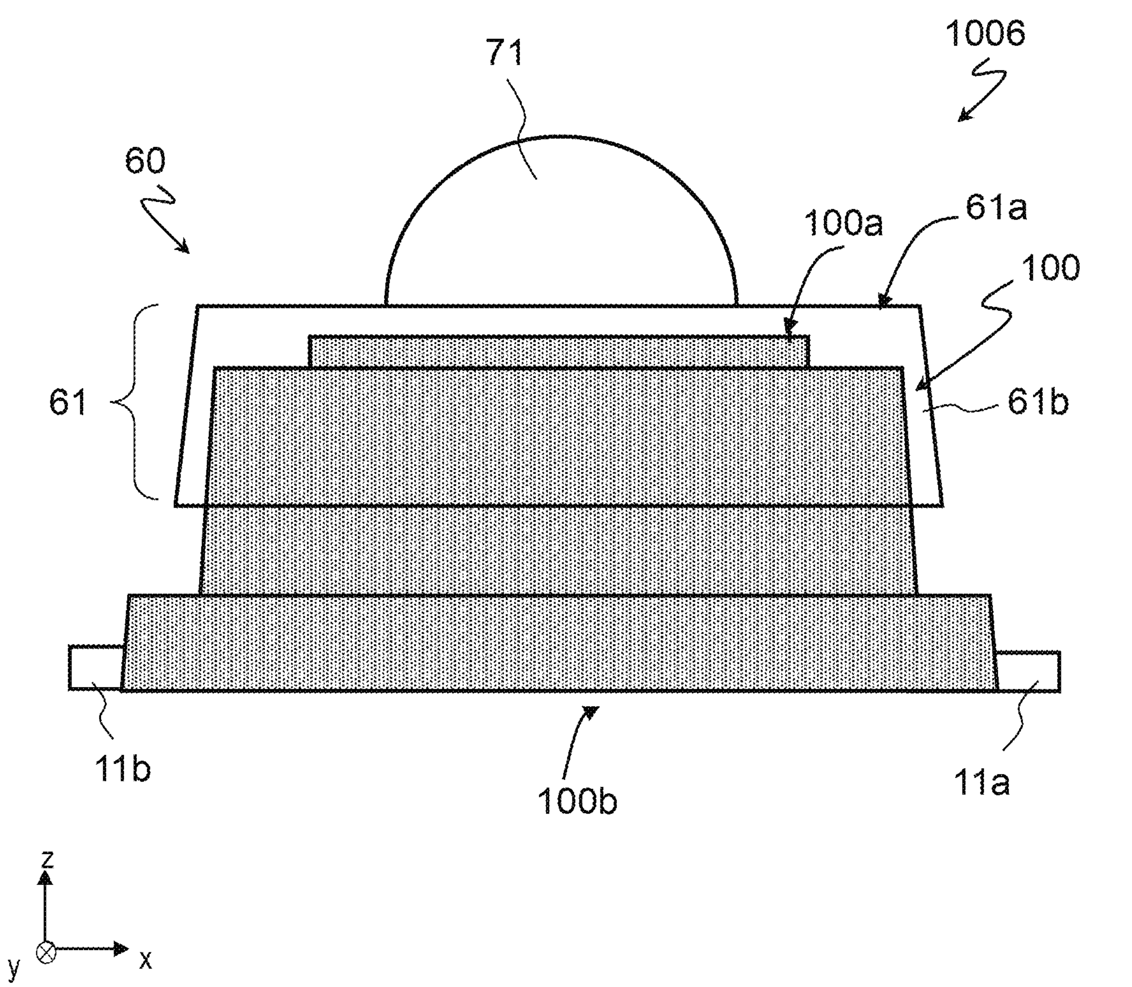
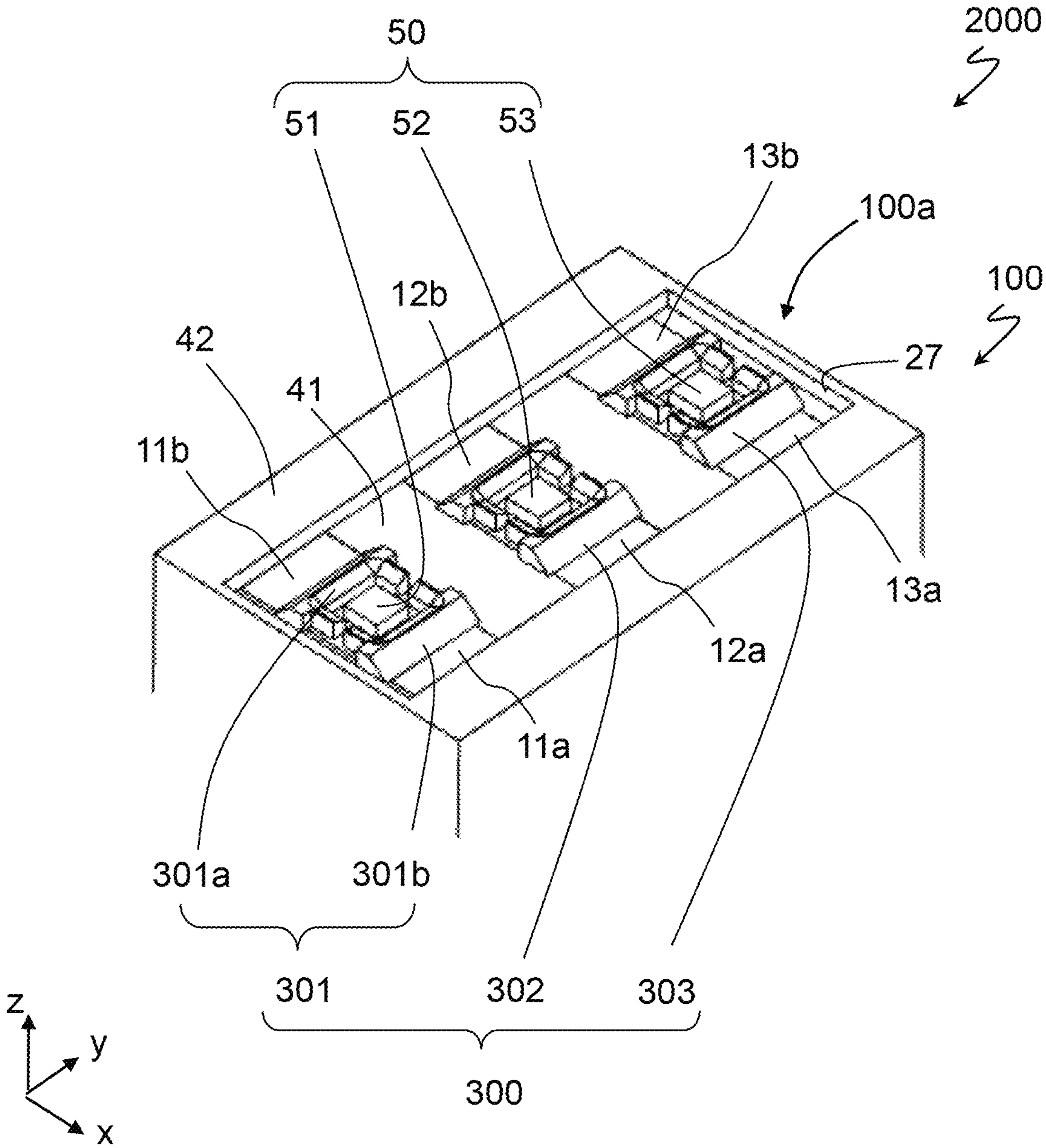


Fig.14



50
51
52
53
2000
13b
100a
100
12b
27
42
41
11b
13a
12a
11a
301a
301b
301
302
303
300
z
y
x

Fig.15A

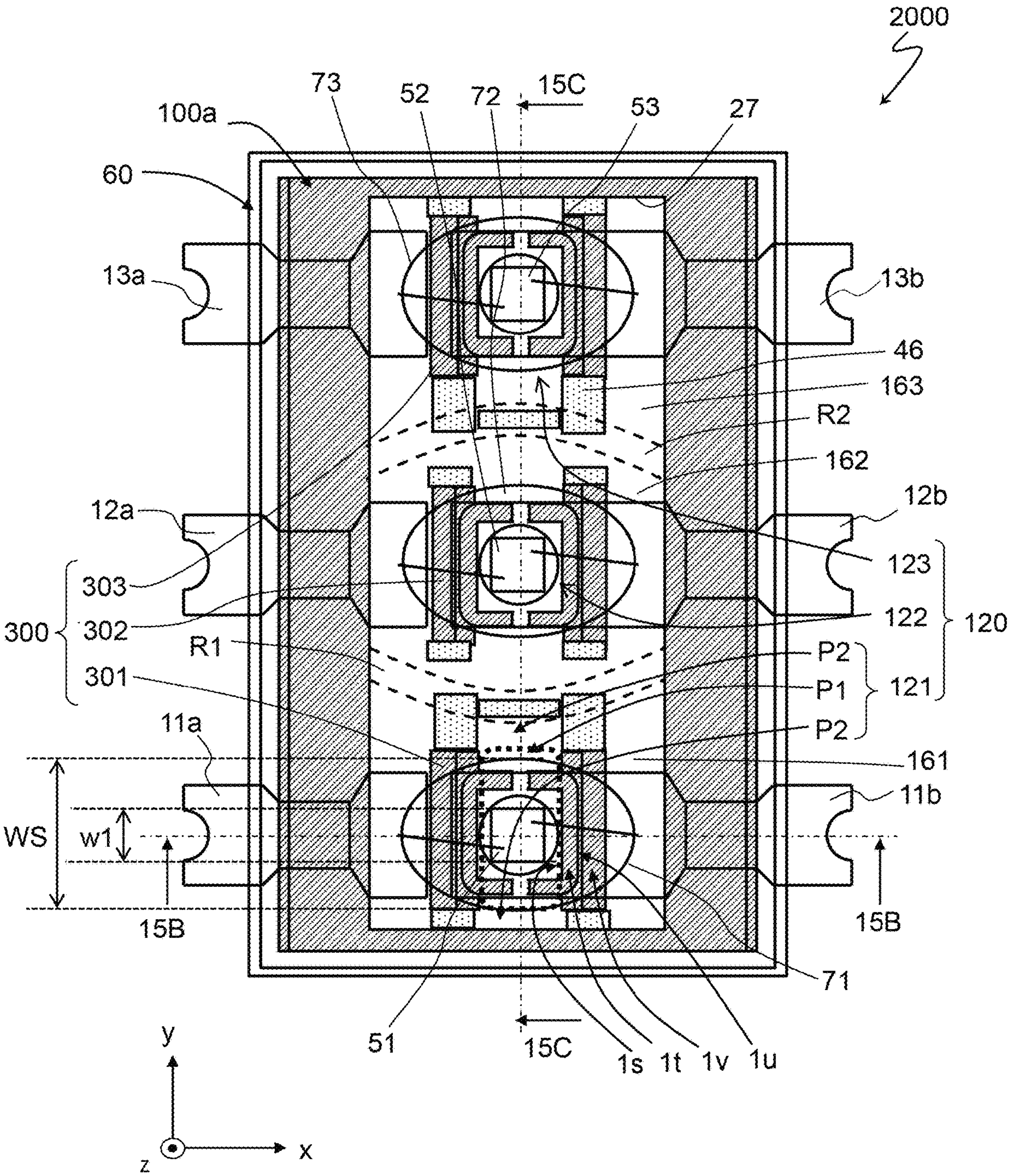

2000
73
52
72
15C
53
27
100a
60
13a
13b
46
163
R2
162
12a
12b
123
303
122
120
300
302
R1
P2
P1
121
301
P2
11a
161
11b
WS
w1
15B
15B
71
51
15C
1s
1t
1v
1u
y
z
x

Fig.15B

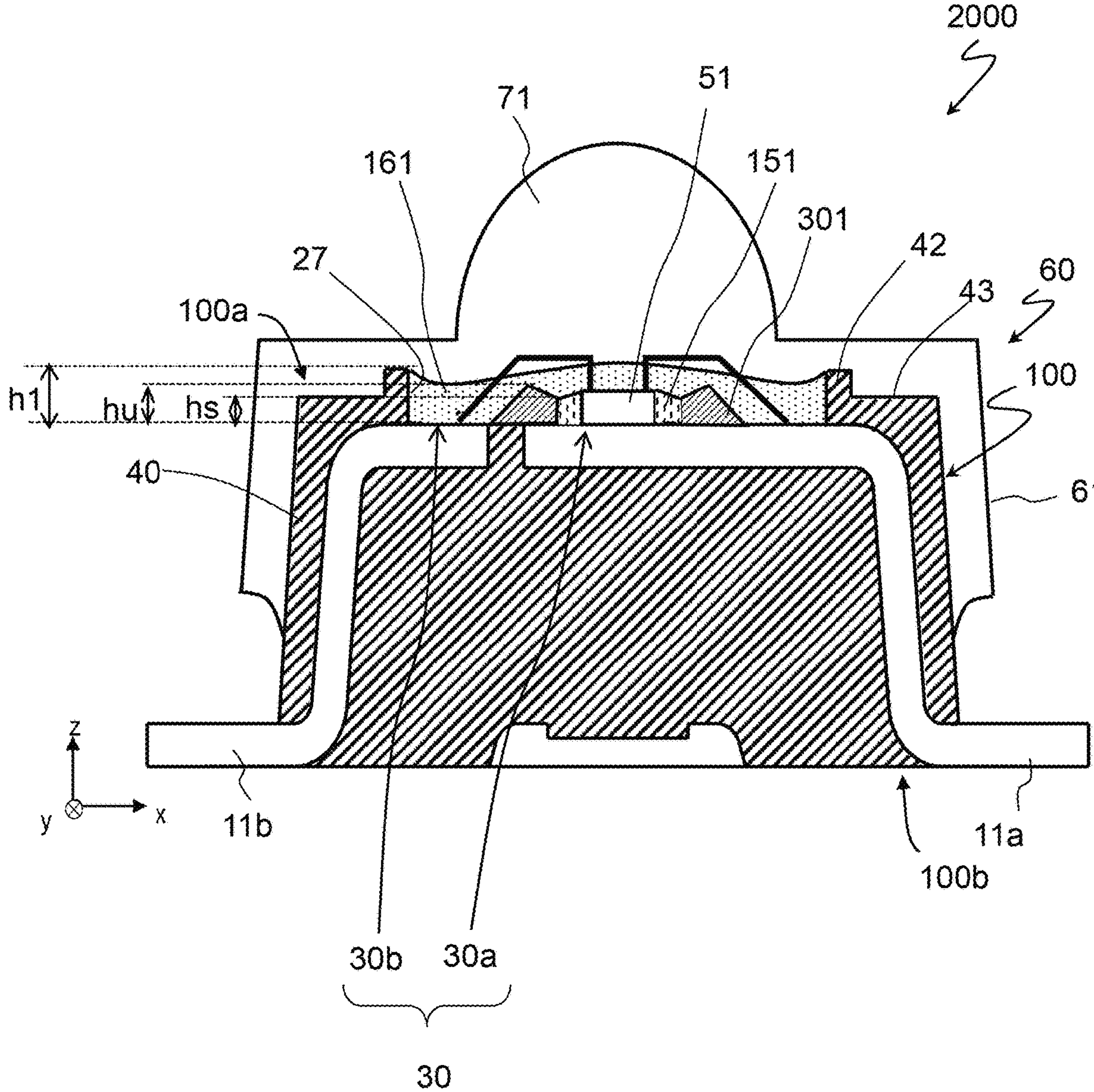
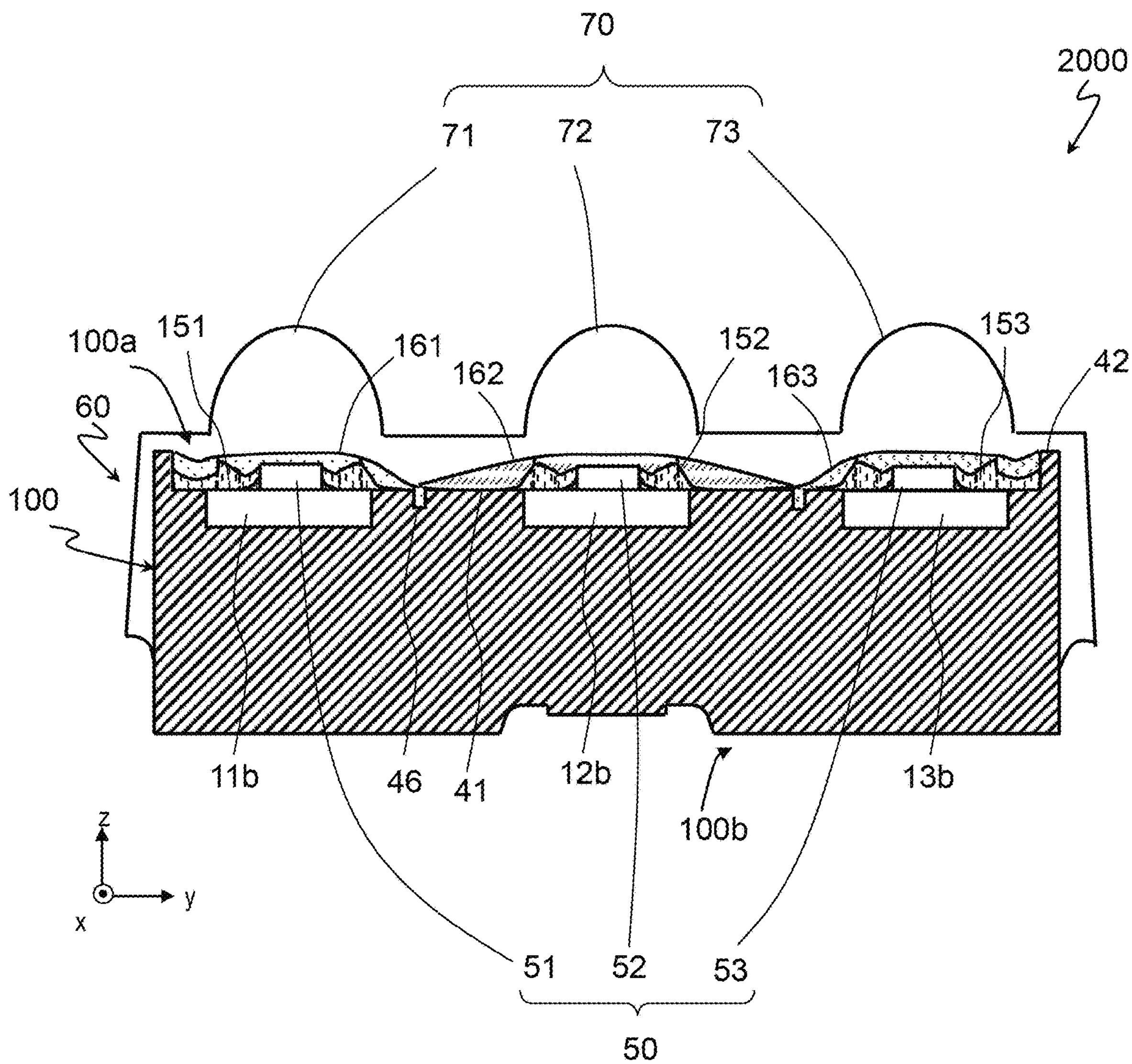

2000
71
51
161
151
301
27
42
60
100a
43
100
h1
hu
hs
40
61
z
y
x
11b
11a
100b
30b
30a
30

Fig.15C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2000
71
72
73
151
100a
161
152
153
162
163
42
60
100
11b
46
41
12b
100b
13b
z
y
x
51
52
53
50

Fig.15D

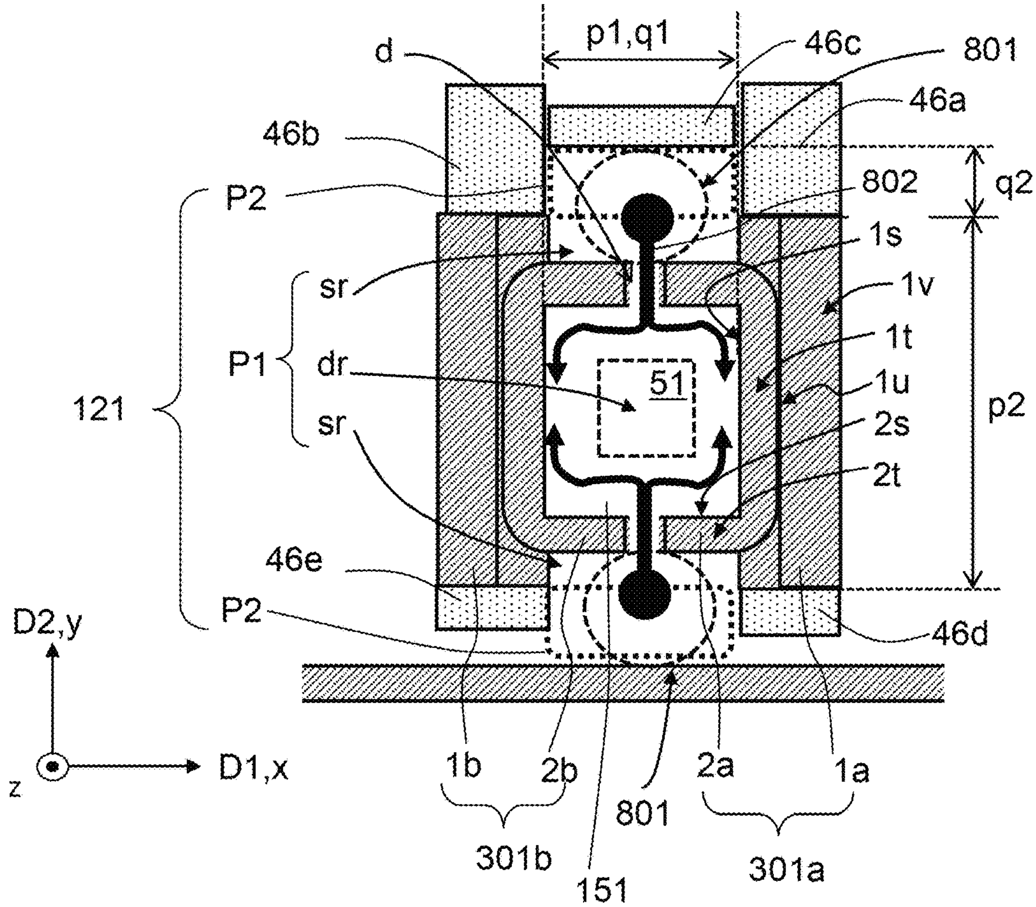


Fig.15E

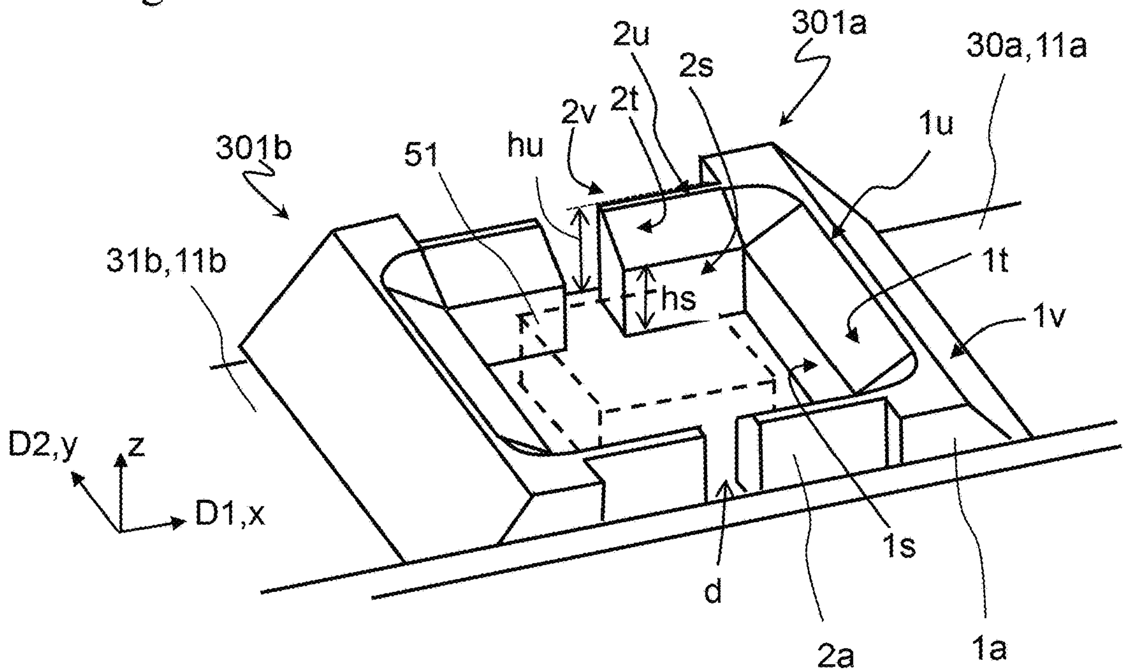


Fig.16

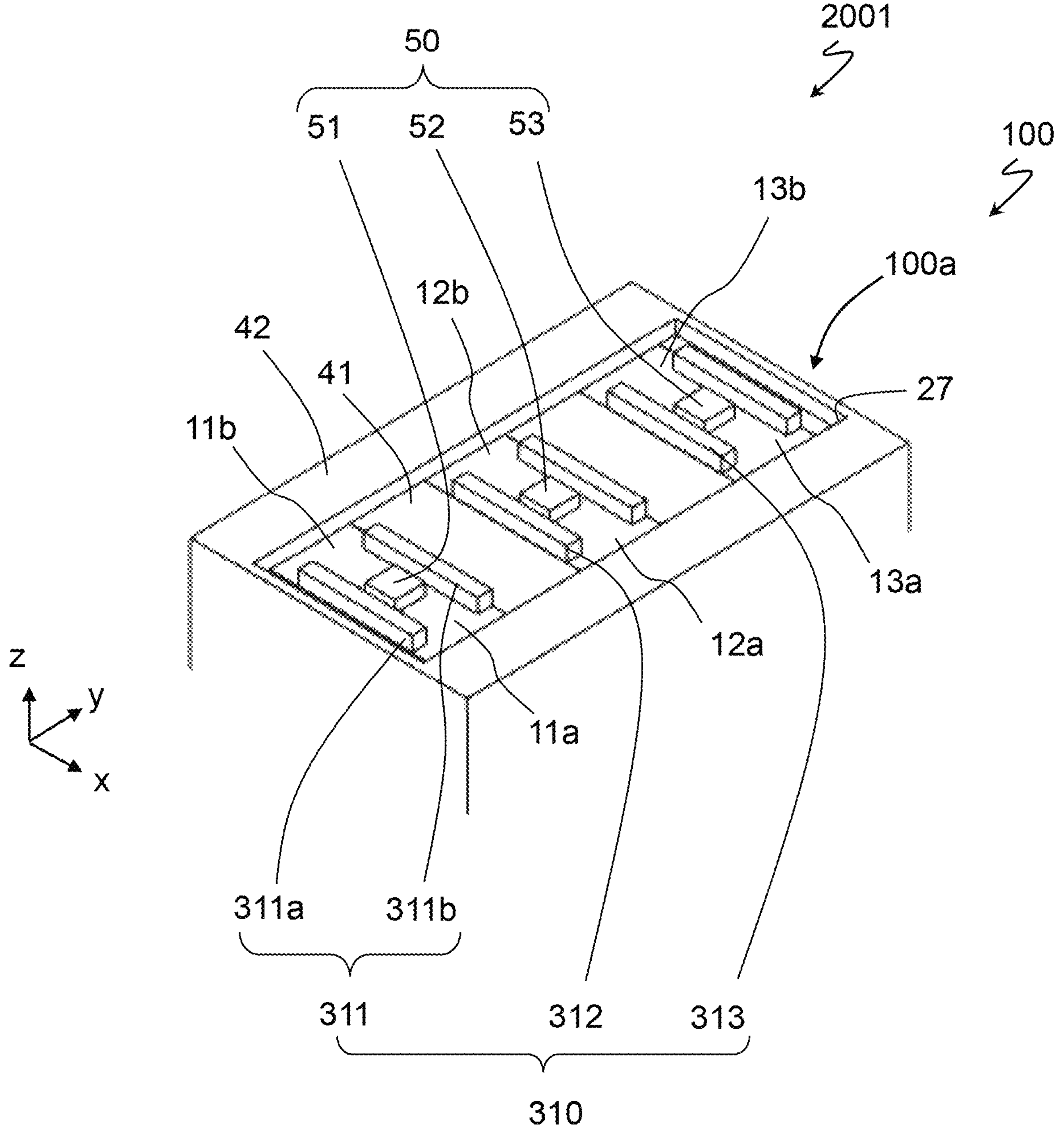

50
51
52
53
2001
100
13b
100a
12b
42
41
27
11b
13a
12a
z
y
x
11a
311a
311b
311
312
313
310

Fig.17A

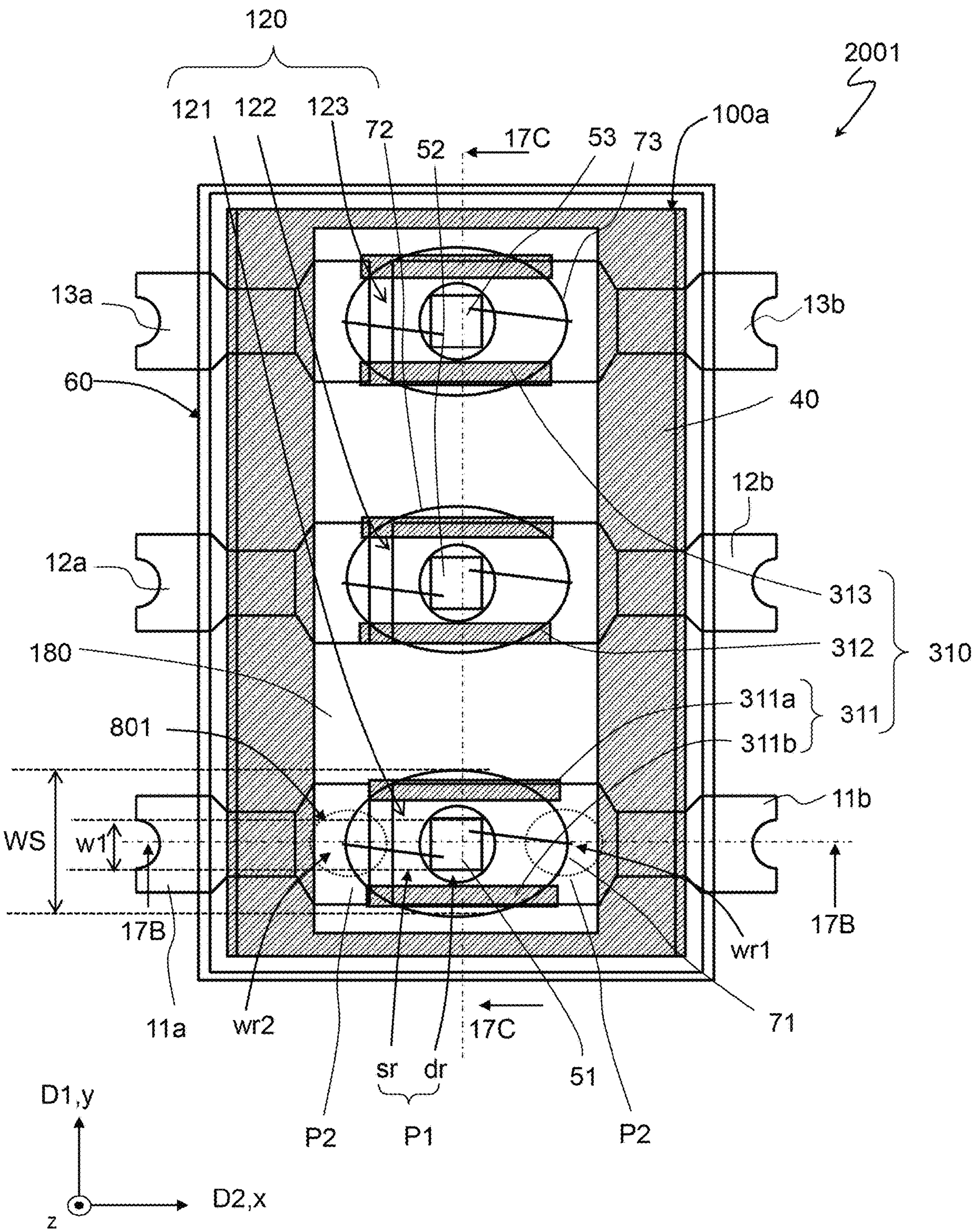

120
121
122
123
72
52
17C
53
73
100a
2001
13a
13b
60
40
12b
12a
313
312
310
180
311a
311
801
311b
11b
WS
w1
17B
17B
wr1
71
11a
wr2
17C
sr
dr
51
P2
P1
P2
D1,y
D2,x
z

Fig.17B

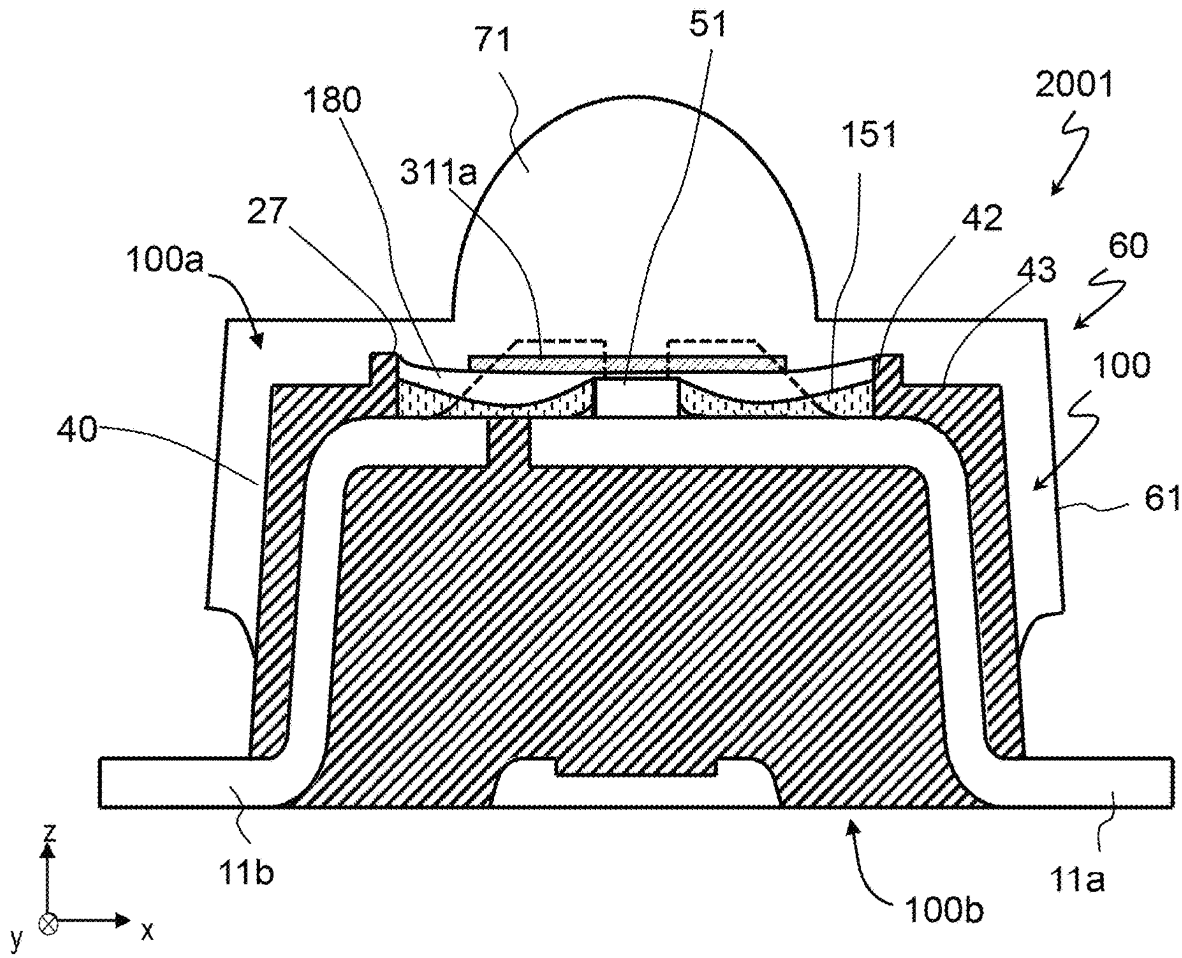

71
51
180
311a
2001
151
27
42
60
100a
43
100
40
61
z
11b
100b
11a
y
x

Fig.17C

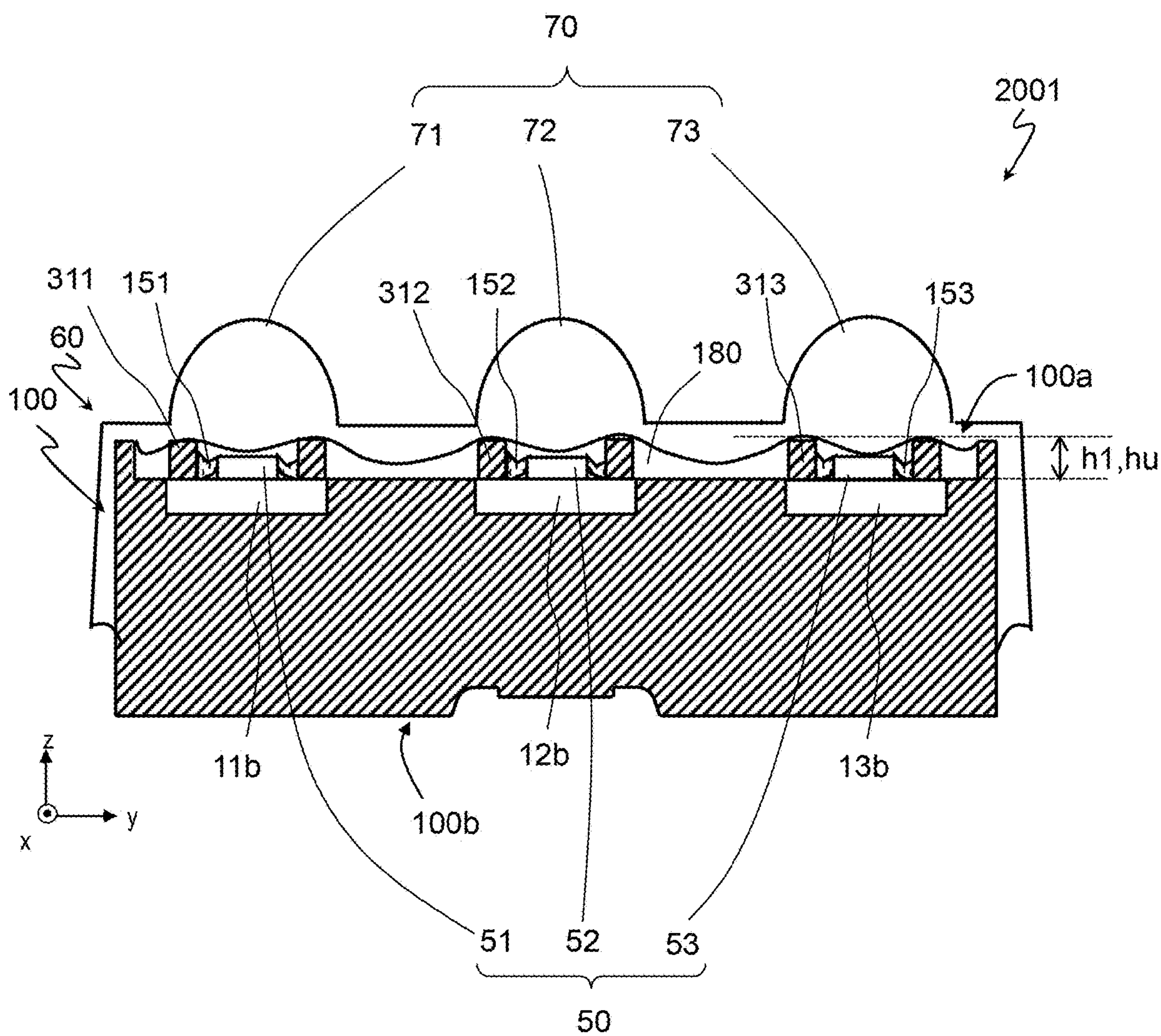

70
71
72
73
2001
311
151
312
152
313
153
60
180
100a
100
h1,hu
11b
12b
13b
100b
z
y
x
51
52
53
50

Fig.17D

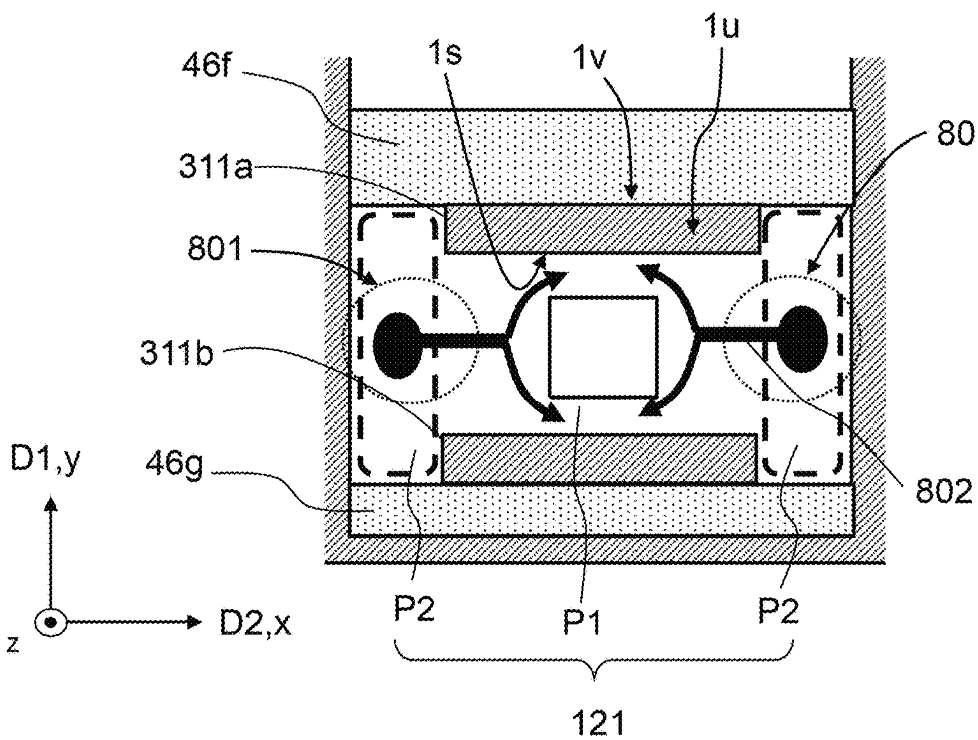


Fig.17E

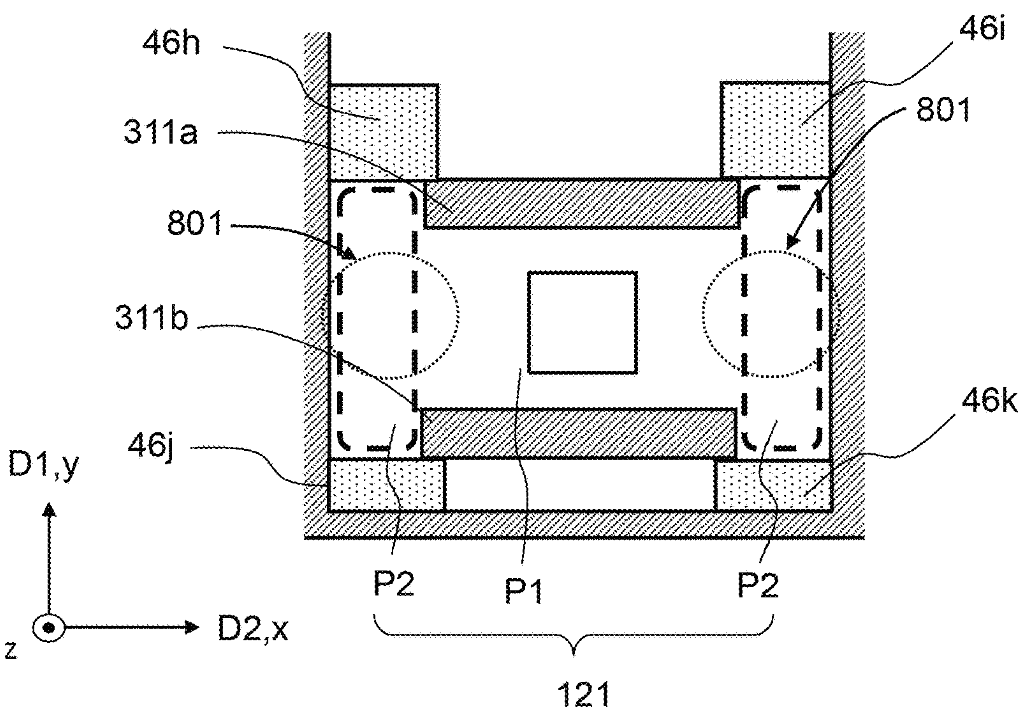


Fig.18

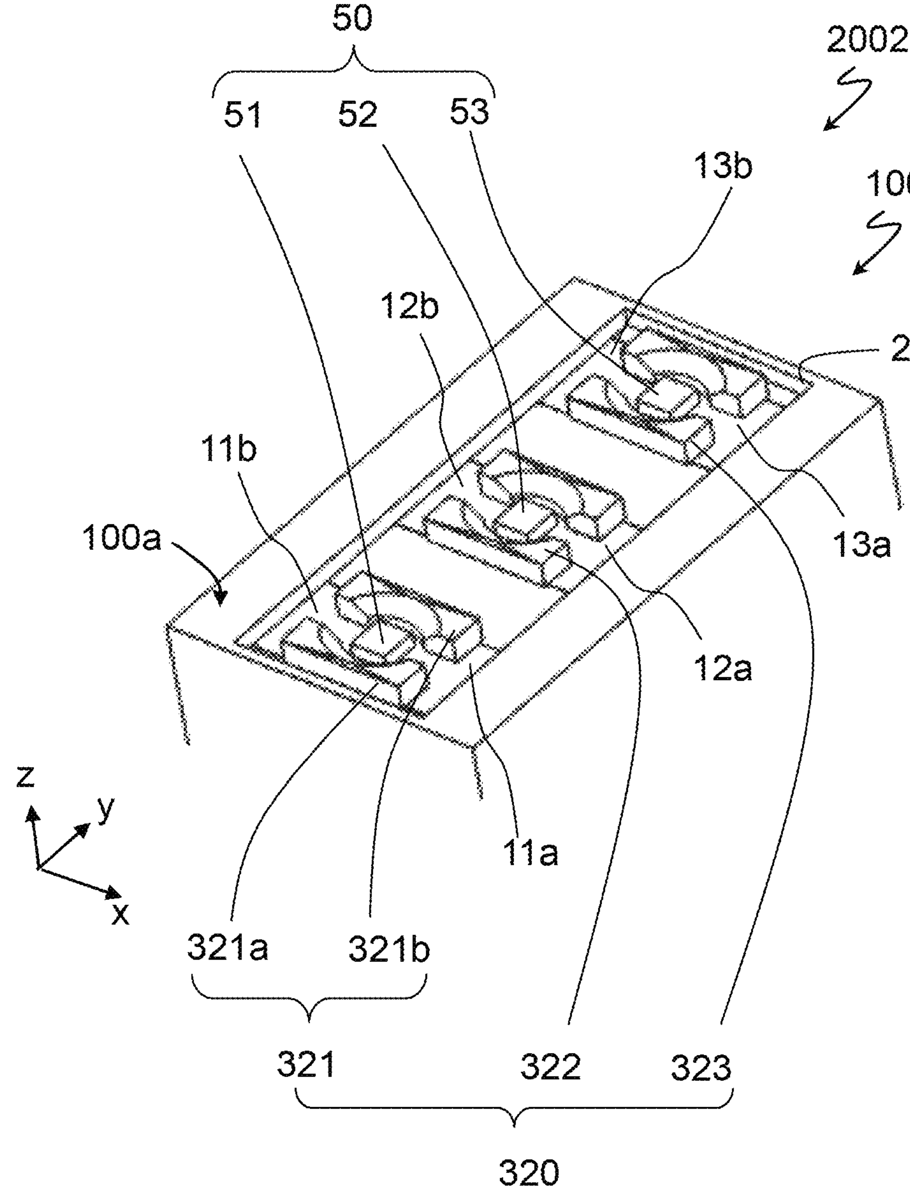

50
51
52
53
2002
100
13b
12b
27
11b
100a
13a
12a
11a
z
y
x
321a
321b
321
322
323
320

Fig.19A

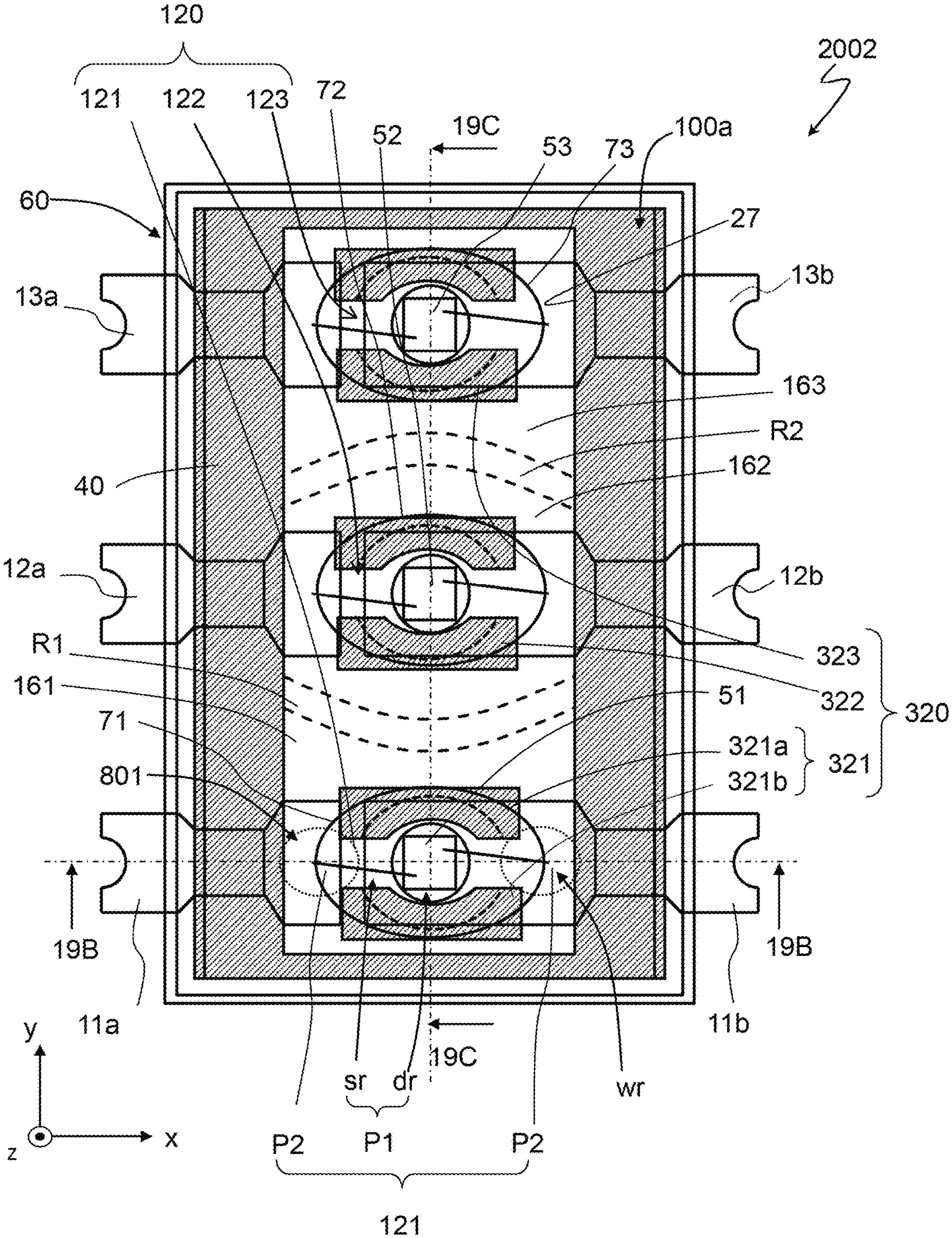

120
121
122
123
72
52
19C
53
73
100a
2002
60
27
13a
13b
163
R2
162
40
12a
12b
R1
323
161
322
320
51
71
321a
321
321b
801
19B
19B
11a
11b
y
19C
sr
dr
wr
z
x
P2
P1
P2
121

Fig.19B

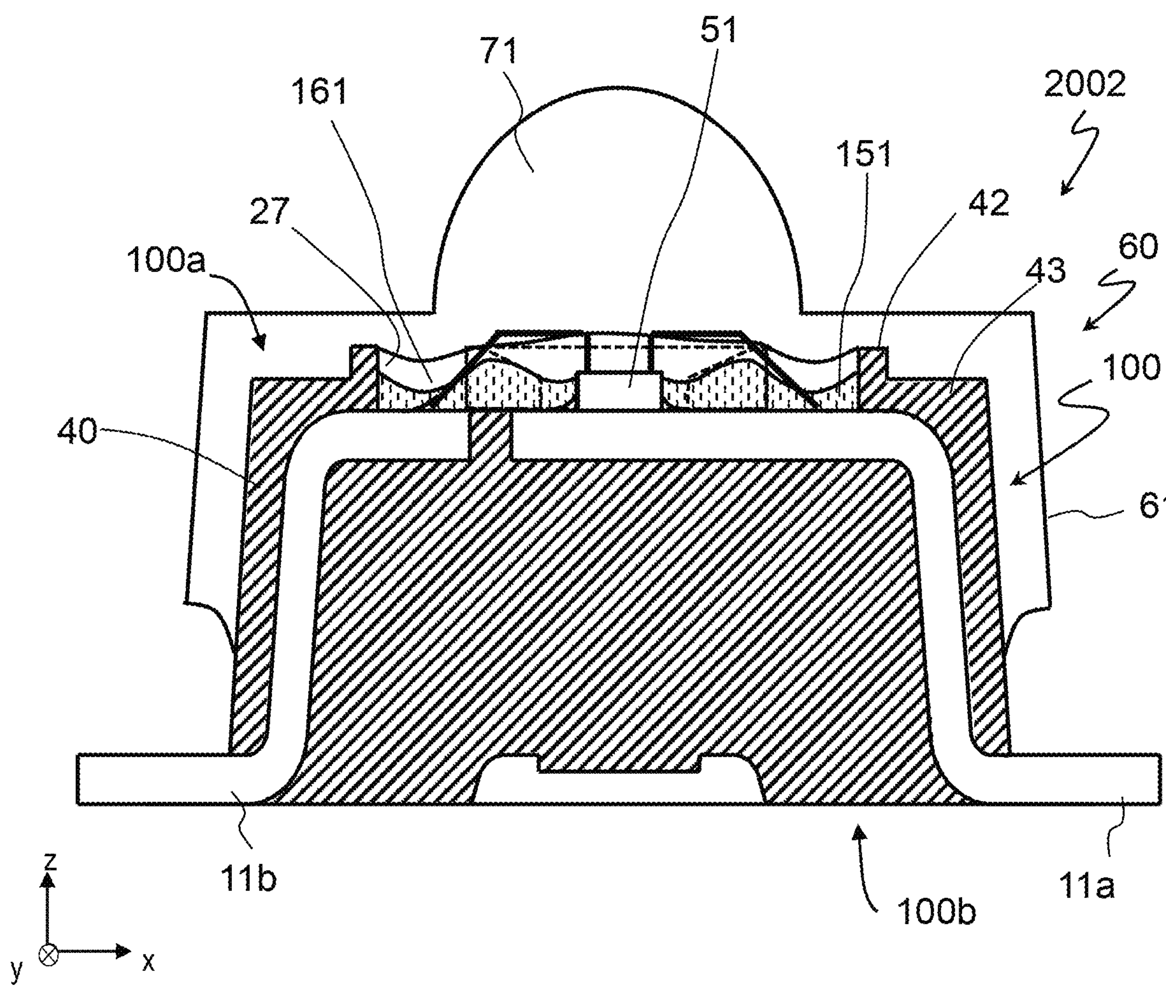
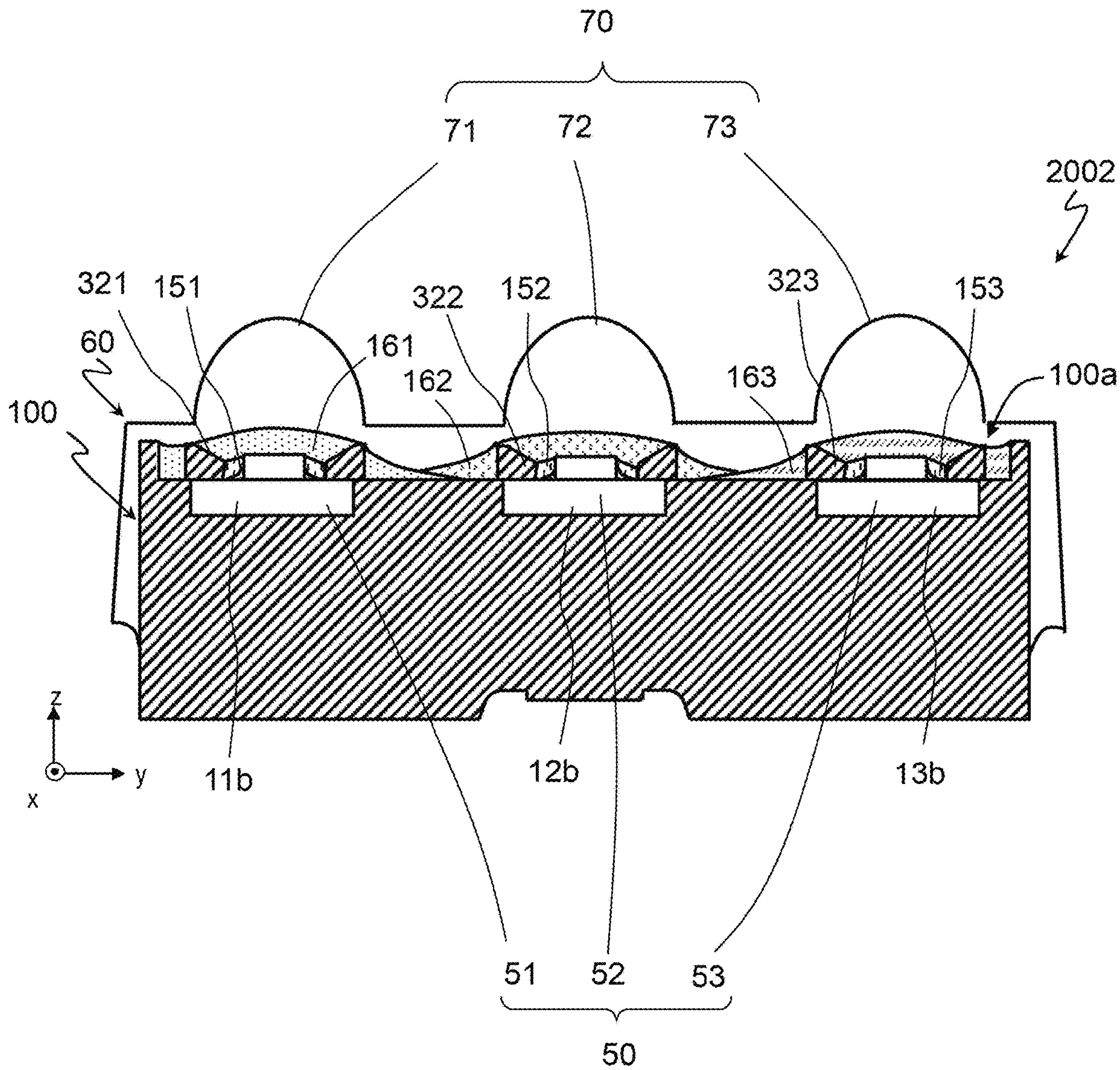


Fig.19C



70
71
72
73
2002
321
151
322
152
323
153
60
161
162
163
100a
100
z
y
x
11b
12b
13b
51
52
53
50

Fig.19D

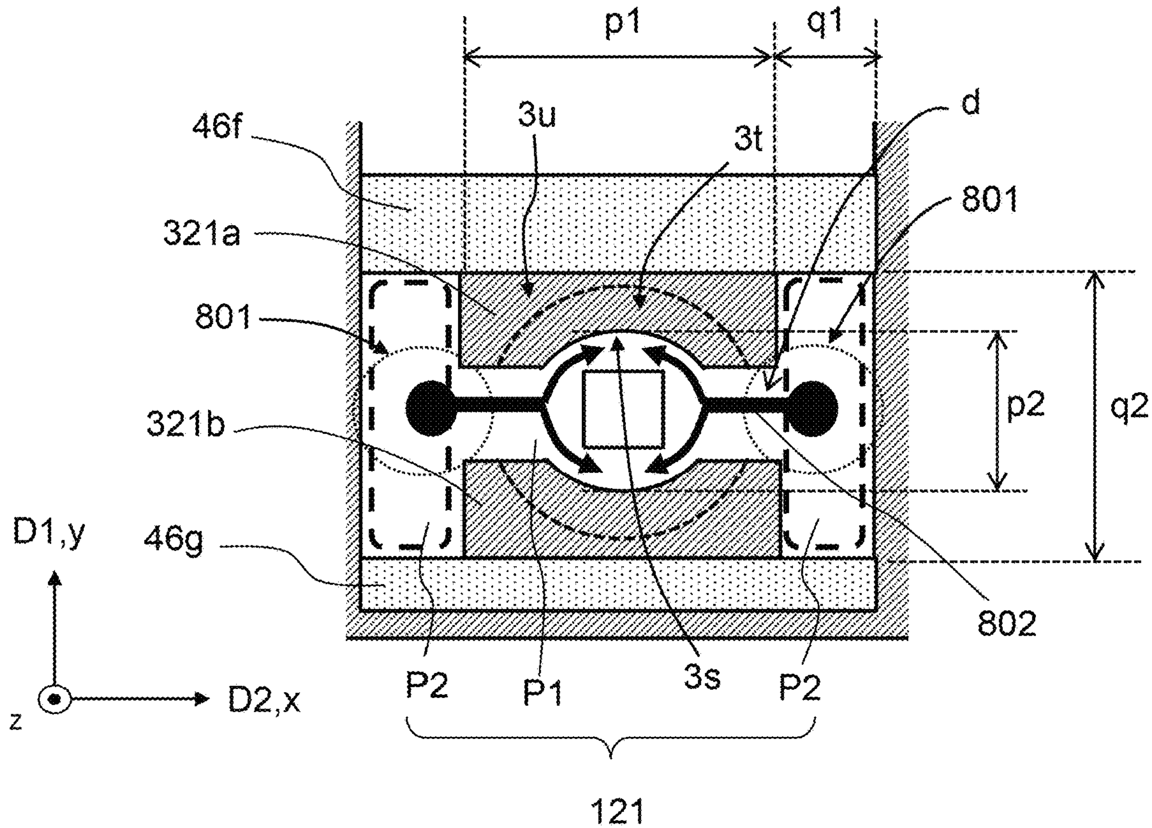


Fig.19E

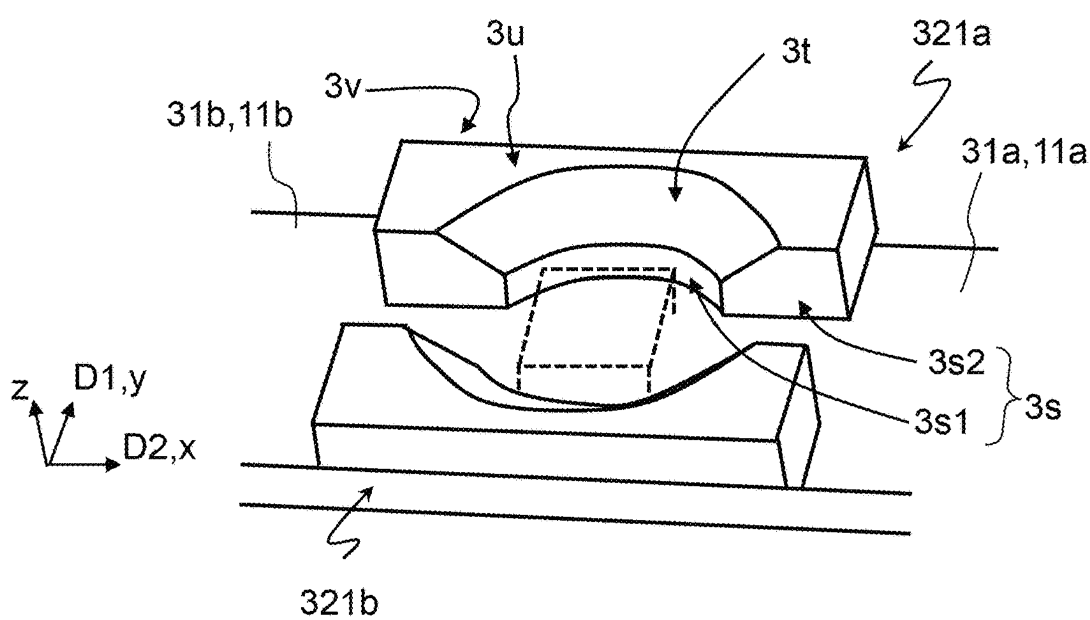


Fig.19F

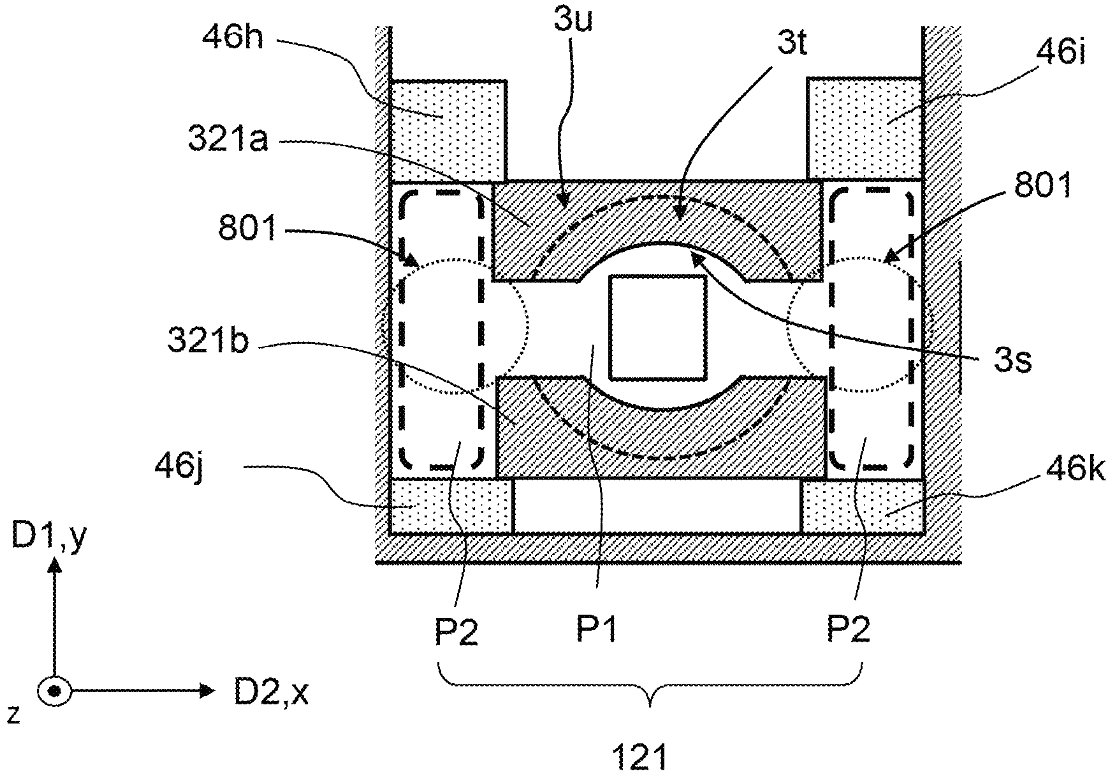


Fig.20

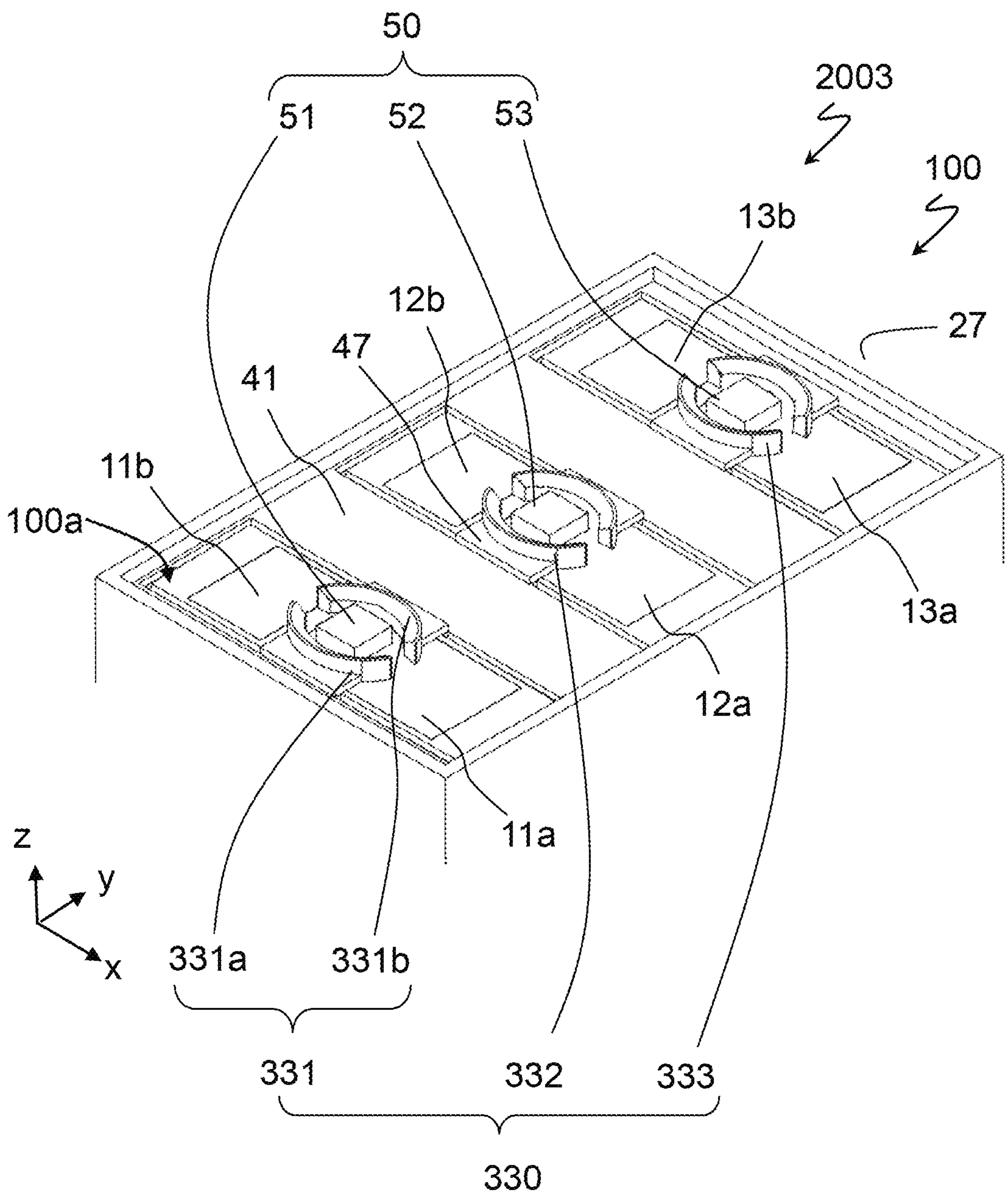

50
51
52
53
2003
100
13b
27
12b
47
41
11b
100a
13a
12a
11a
z
y
x
331a
331b
331
332
333
330

Fig.21

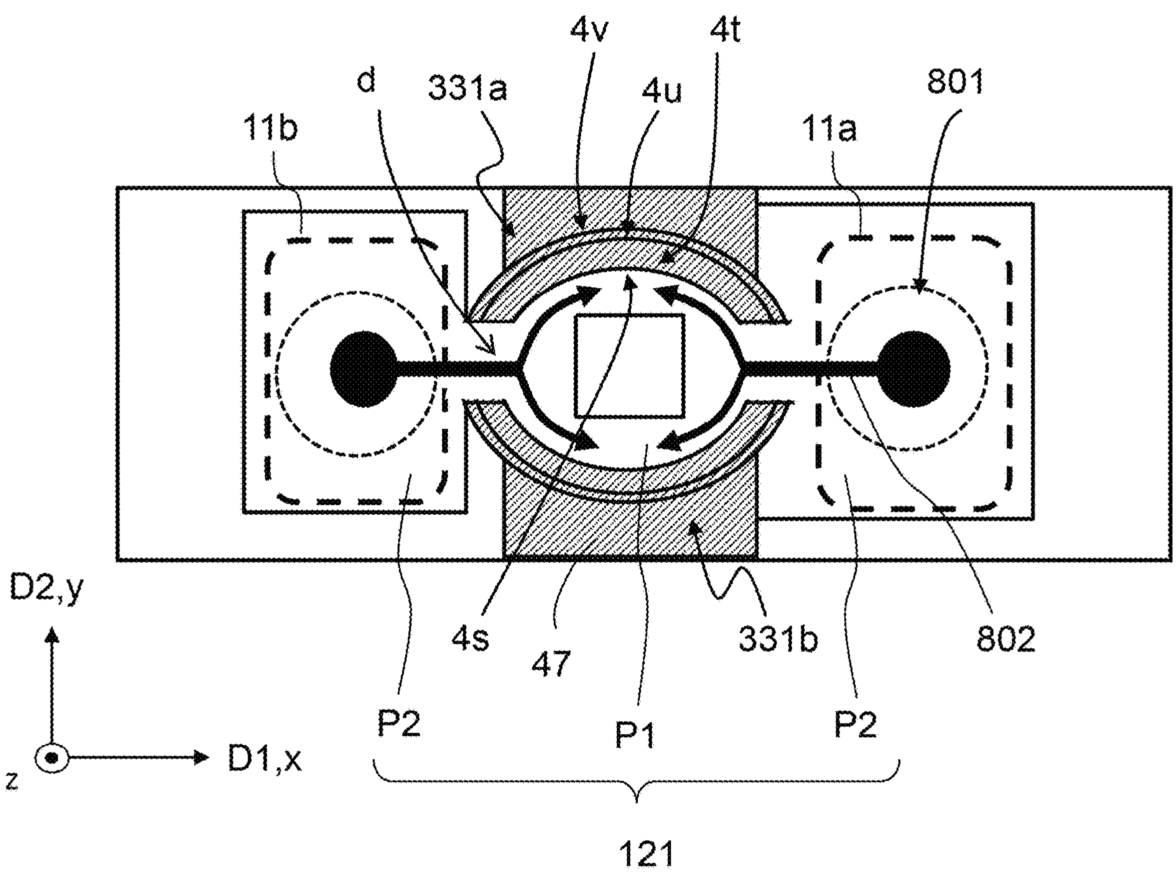


Fig.22

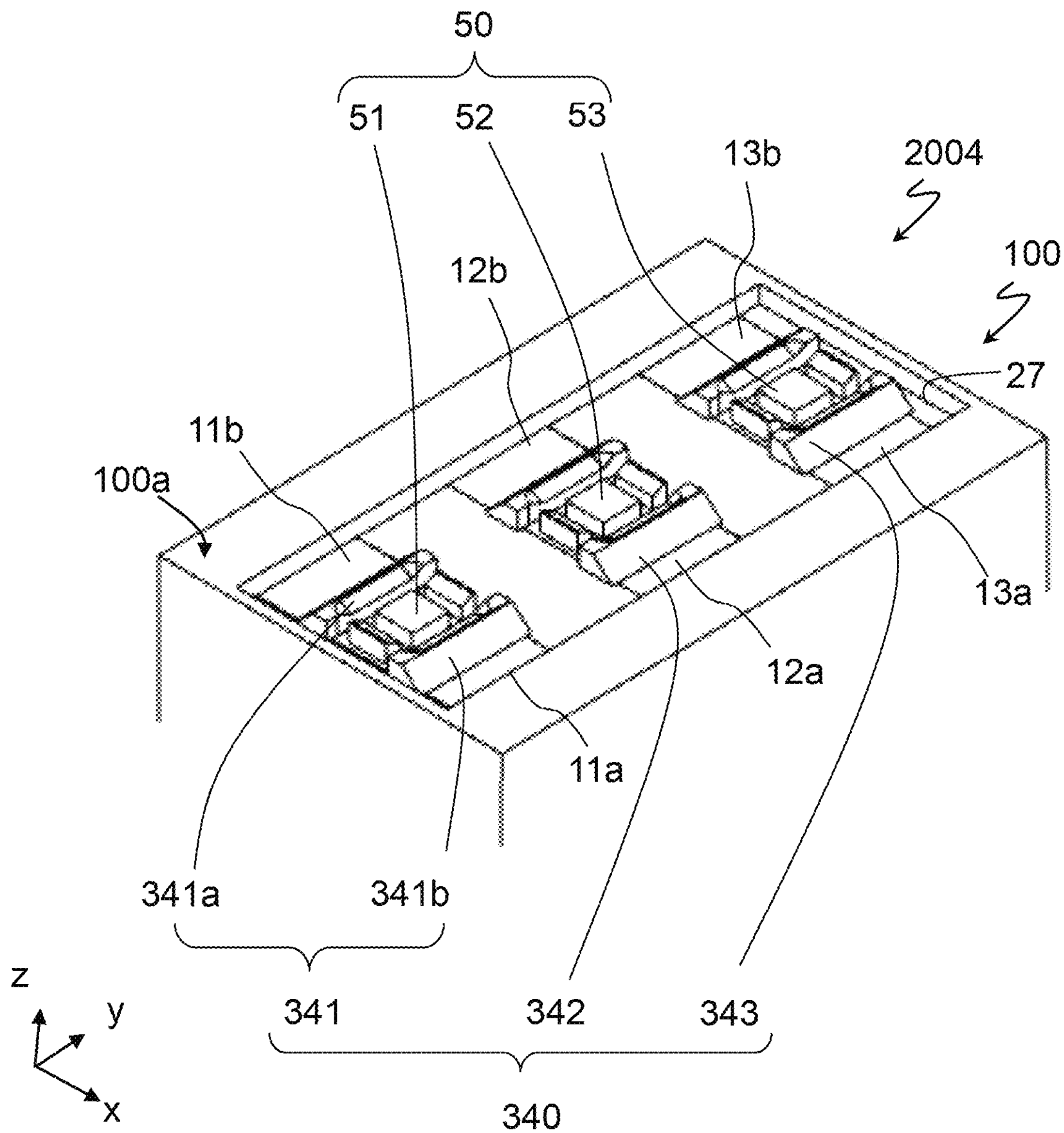

50
51
52
53
13b
2004
100
12b
27
11b
100a
13a
12a
11a
341a
341b
z
y
x
341
342
343
340

Fig.23

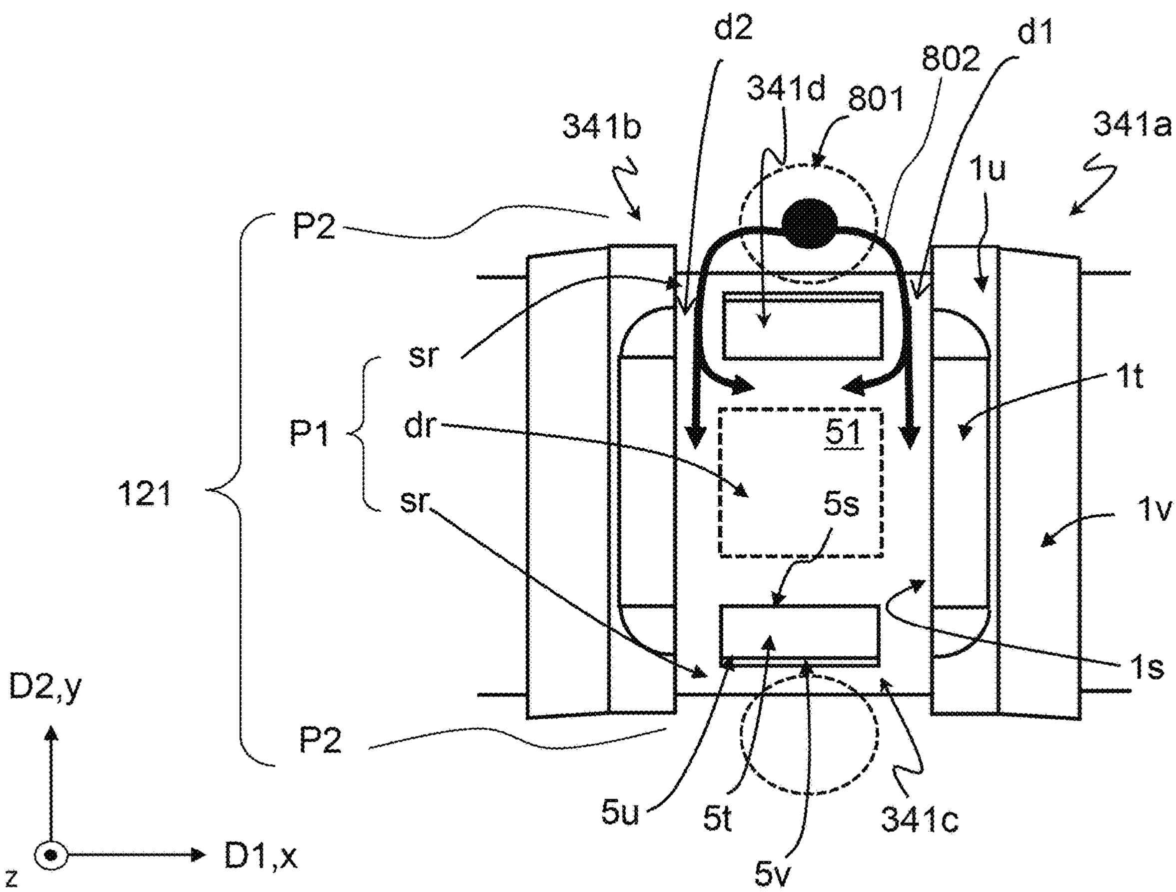
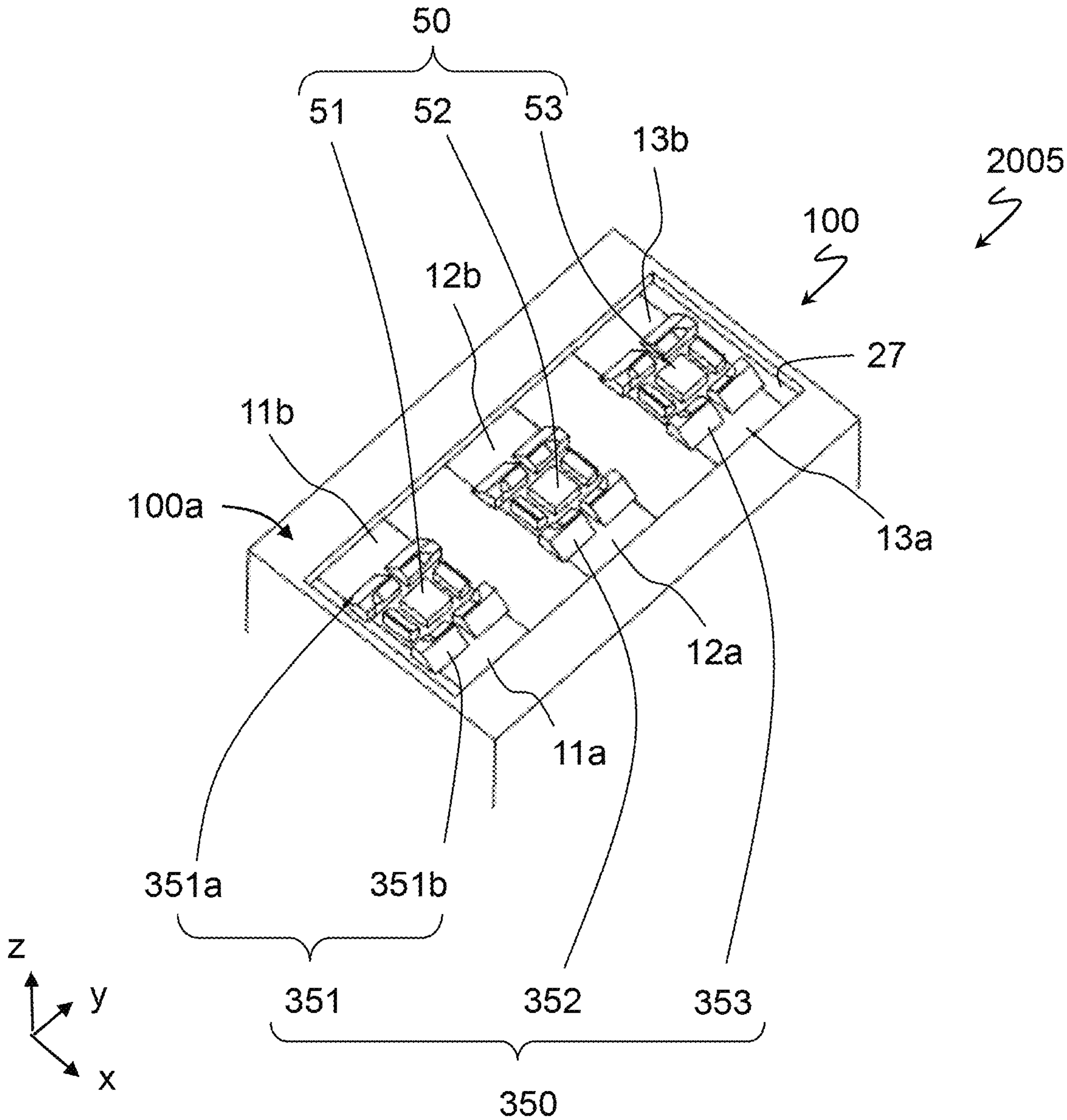

d2
802
d1
341d
801
341b
341a
1u
P2
sr
1t
P1
dr
51
121
sr
5s
1v
1s
D2,y
P2
5u
5t
341c
z
D1,x
5v

Fig.24



50
51
52
53
13b
2005
100
12b
27
11b
100a
13a
12a
11a
351a
351b
351
352
353
350
z
y
x

Fig.25

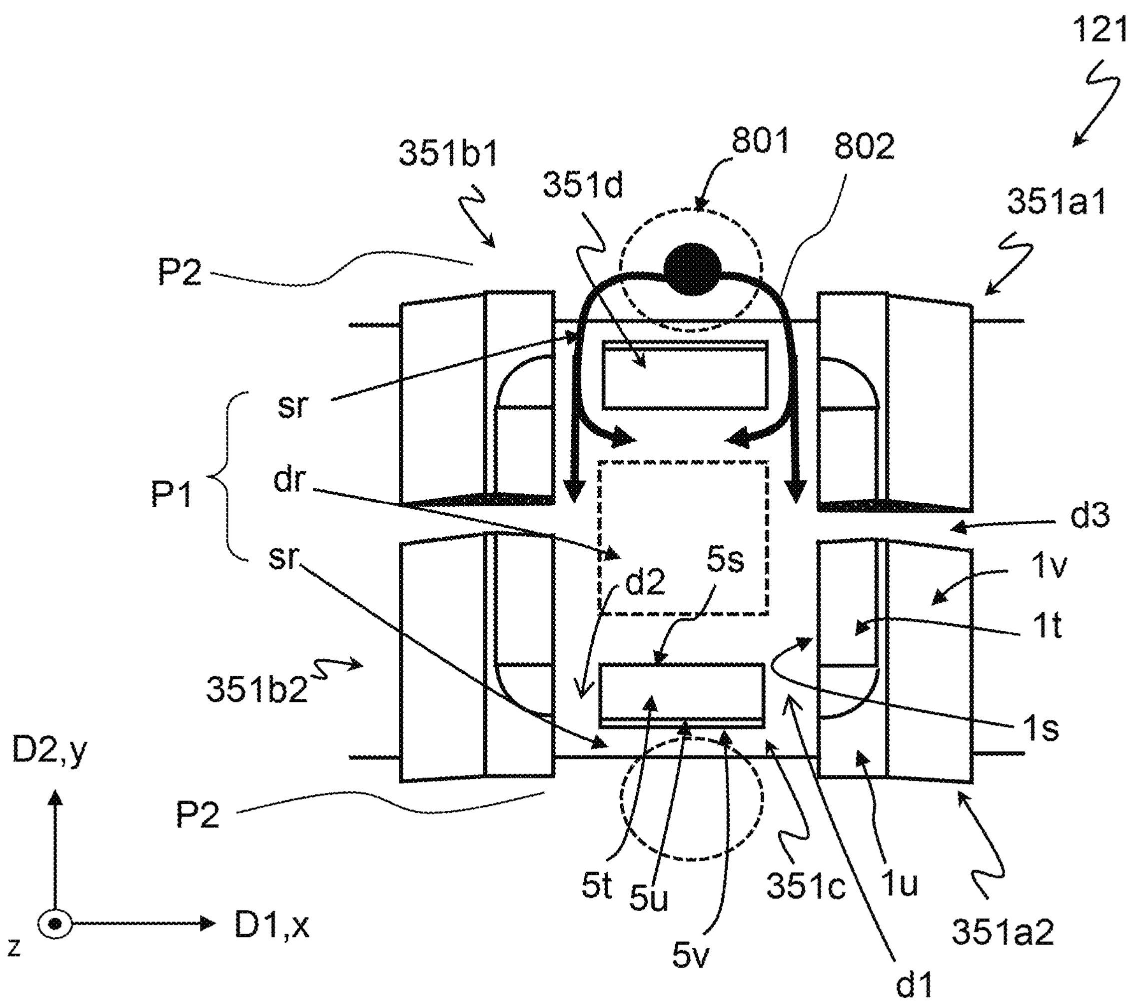

121
801
802
351b1
351d
351a1
P2
sr
P1
dr
d3
sr
5s
1v
d2
1t
351b2
1s
D2,y
P2
5t
5u
351c
1u
351a2
z
D1,x
5v
d1

Fig.26

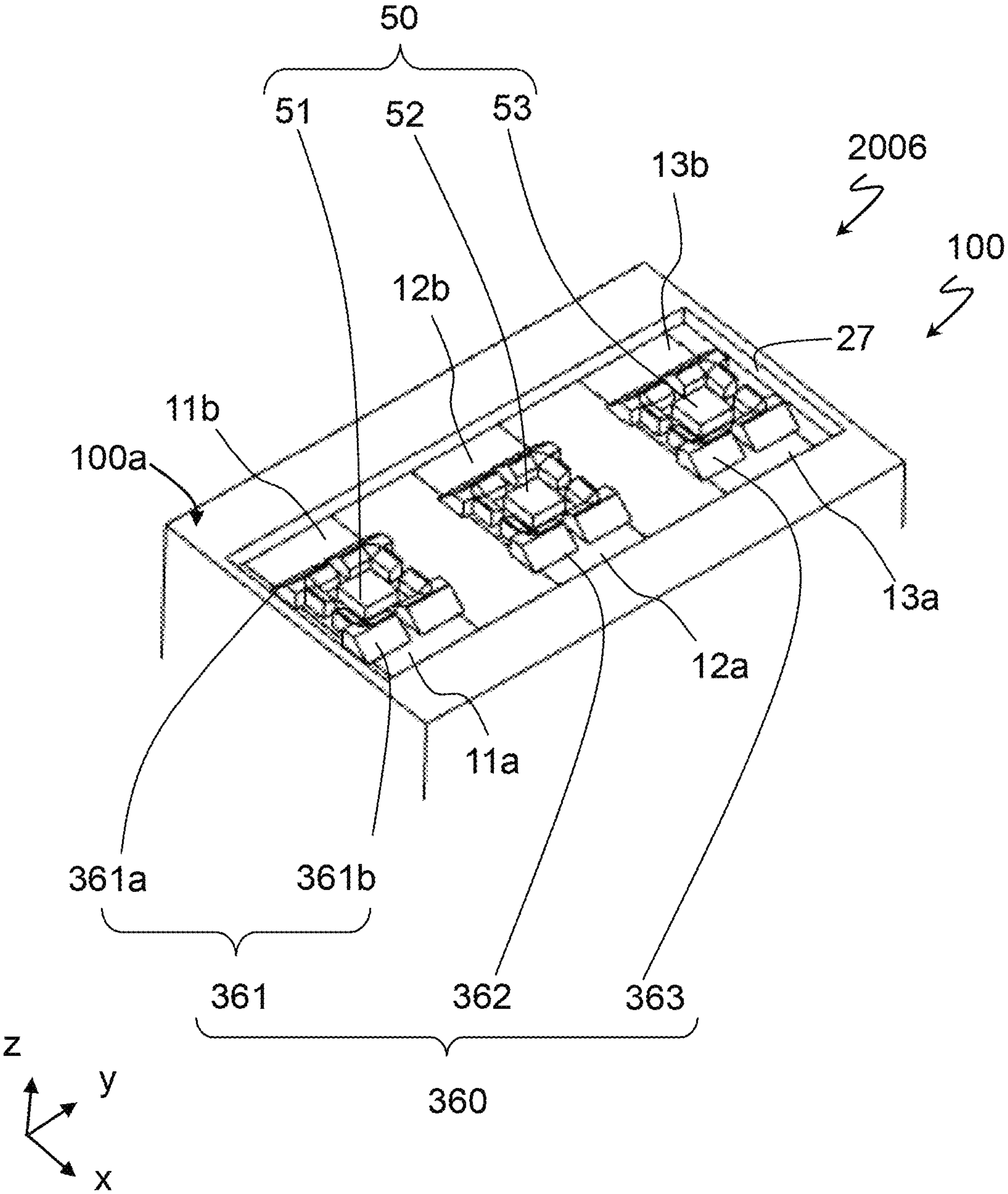

50
51
52
53
2006
13b
100
12b
27
11b
100a
13a
12a
11a
361a
361b
361
362
363
360
z
y
x

Fig.27

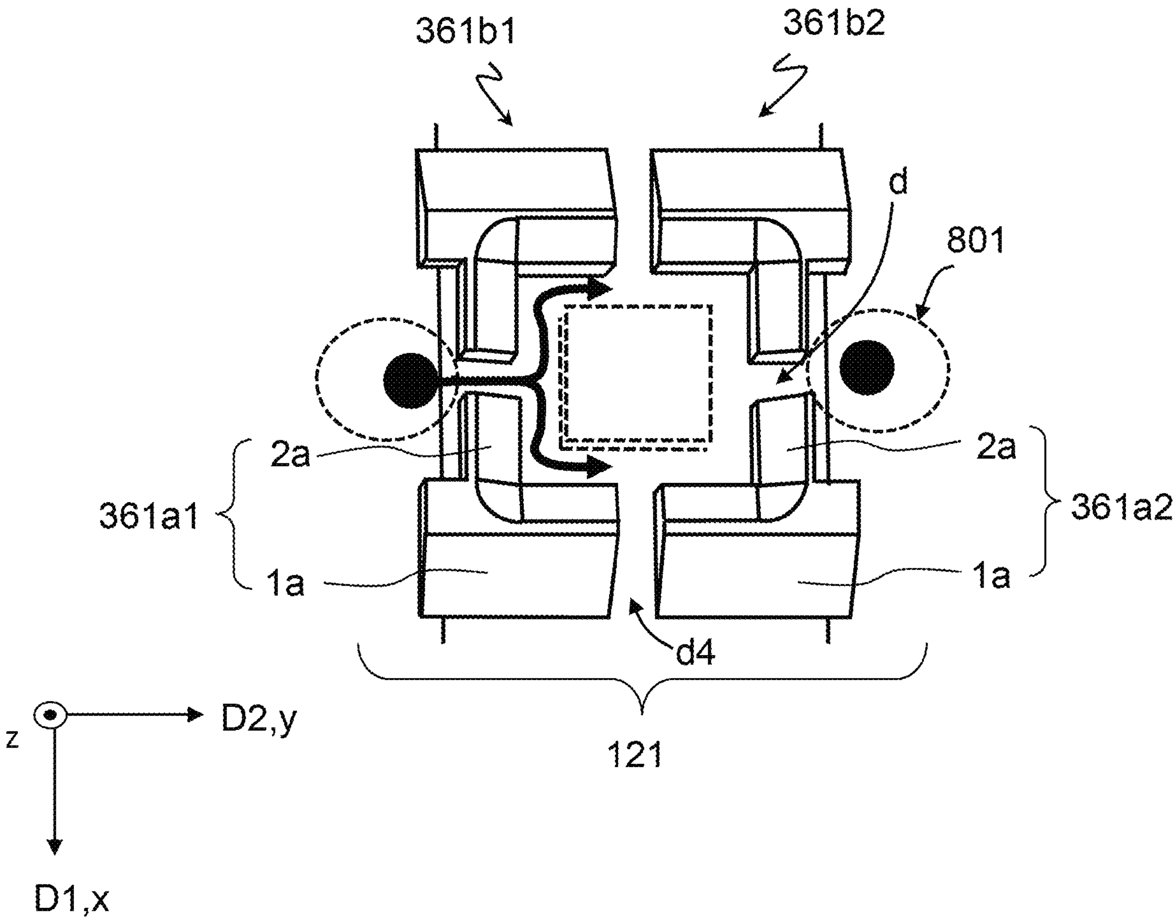


Fig.28

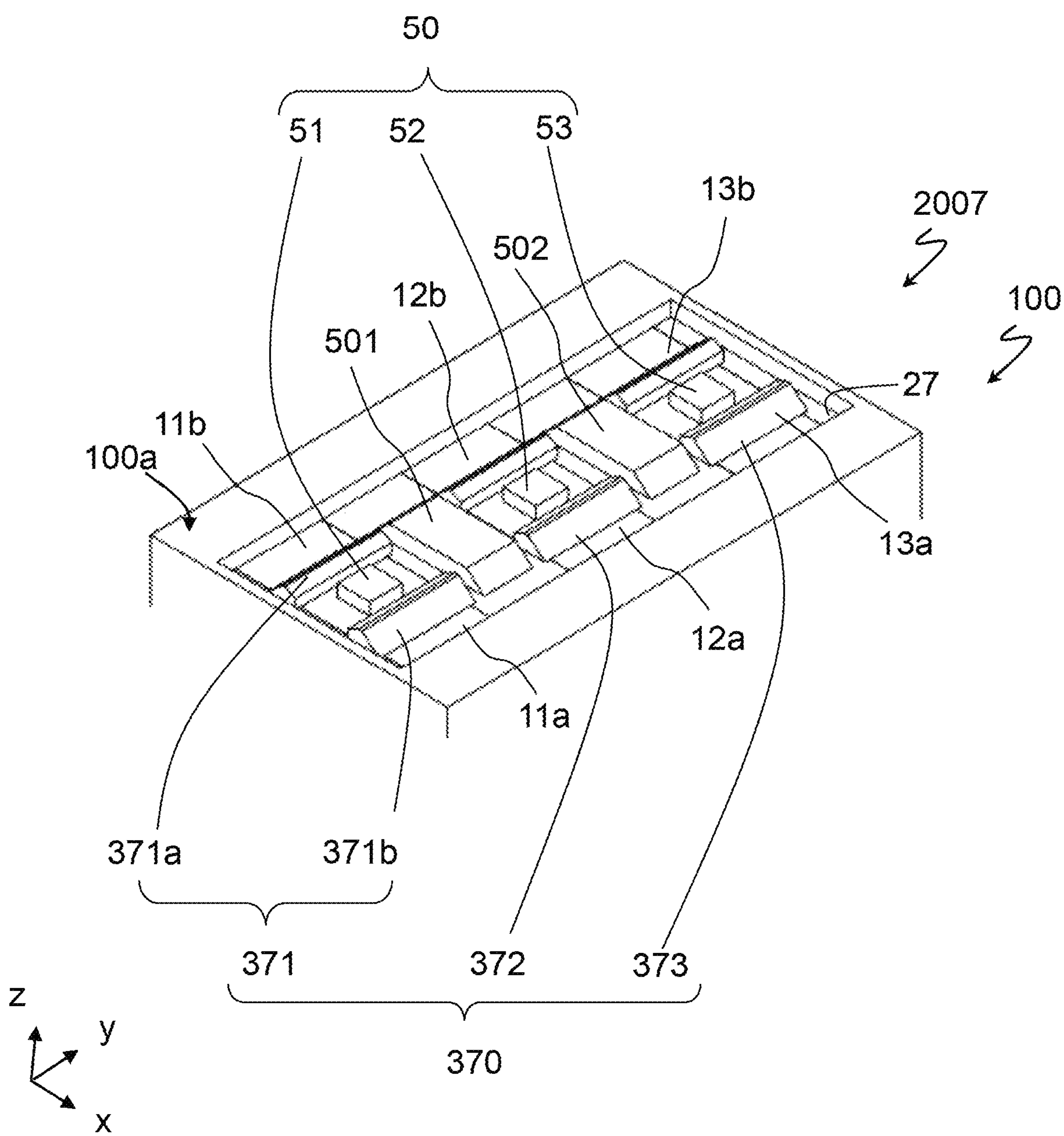
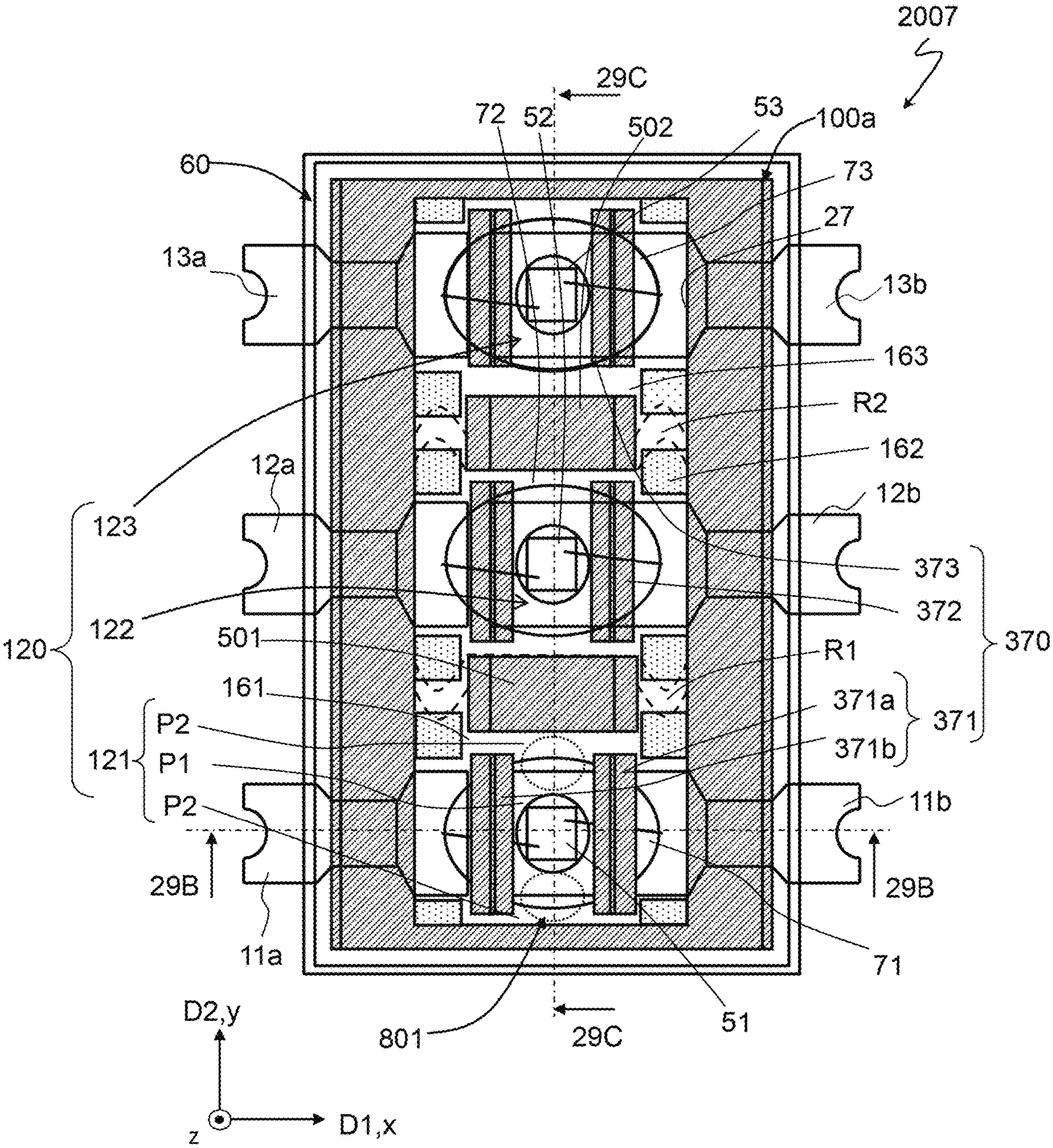

50
51
52
53
13b
2007
502
100
12b
501
27
11b
100a
13a
12a
11a
371a
371b
371
372
373
370
z
y
x

Fig.29A



2007
29C
72
52
502
53
100a
60
73
27
13a
13b
163
R2
162
12a
12b
123
373
372
370
122
501
R1
120
161
371a
371
P2
371b
121
P1
P2
11b
29B
29B
11a
71
801
51
29C
D2,y
z
D1,x

Fig.29B

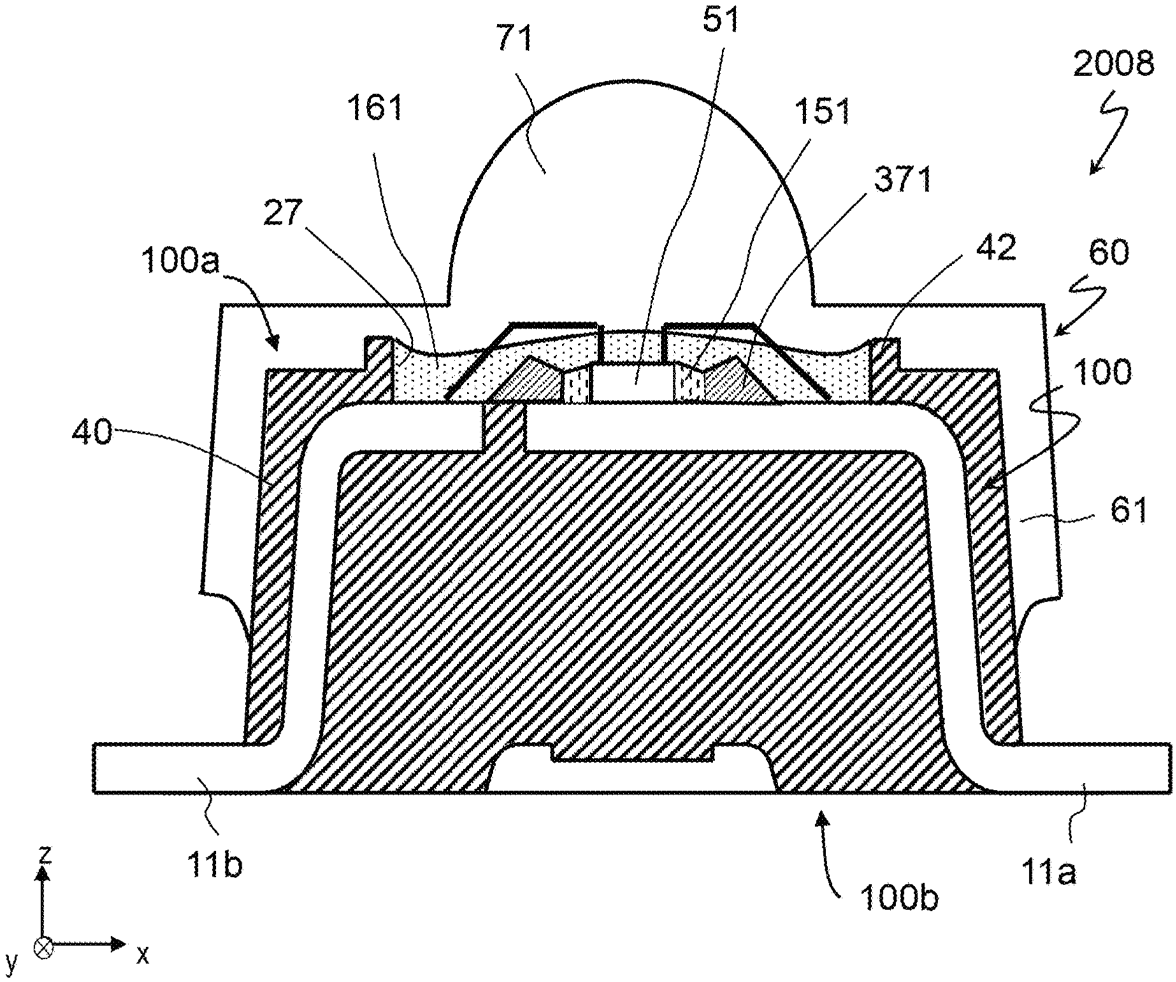
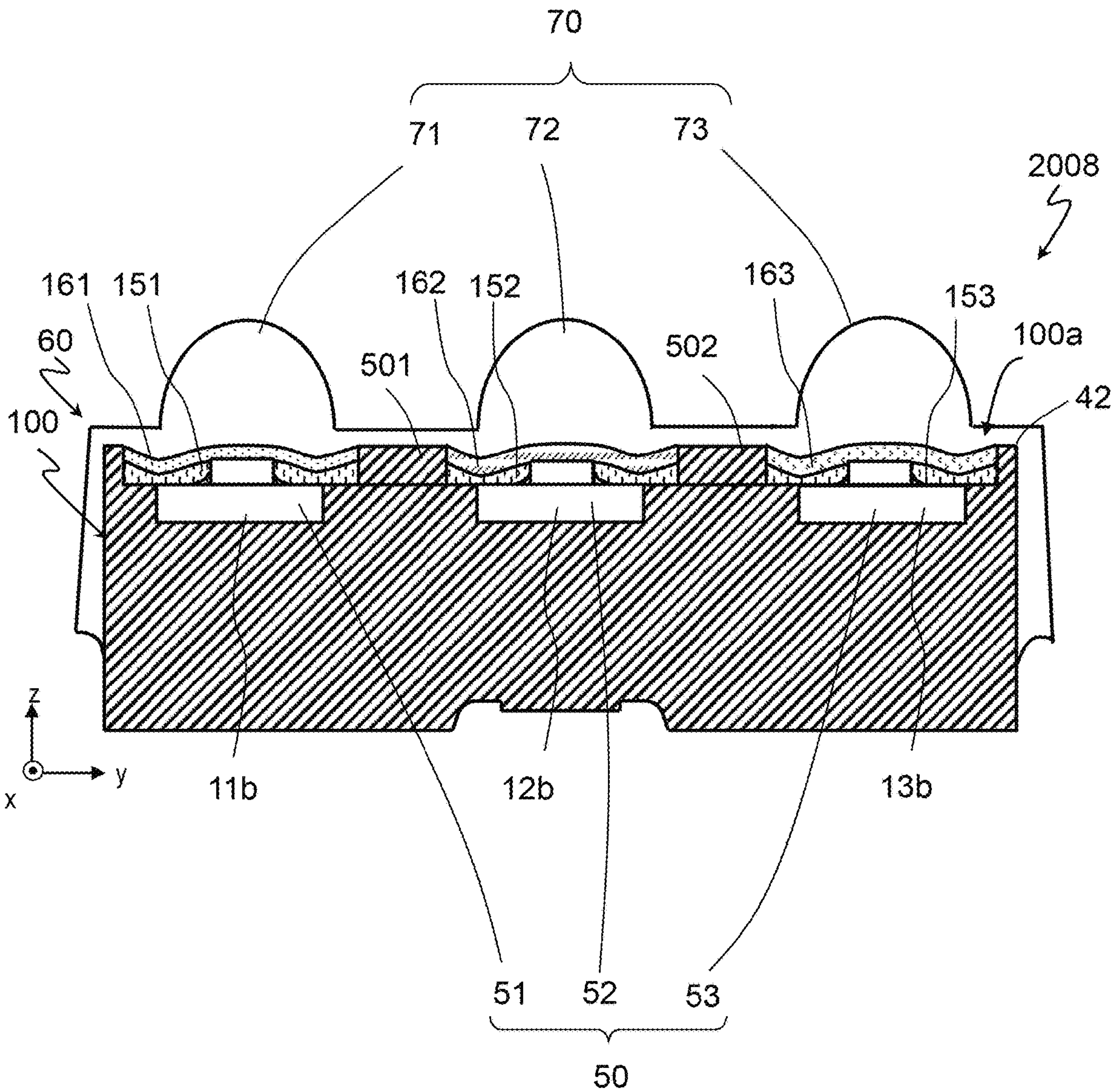


Fig.29C



70
71
72
73
2008
161
151
162
152
163
153
60
501
502
100a
42
100
z
y
x
11b
12b
13b
51
52
53
50

Fig.29D

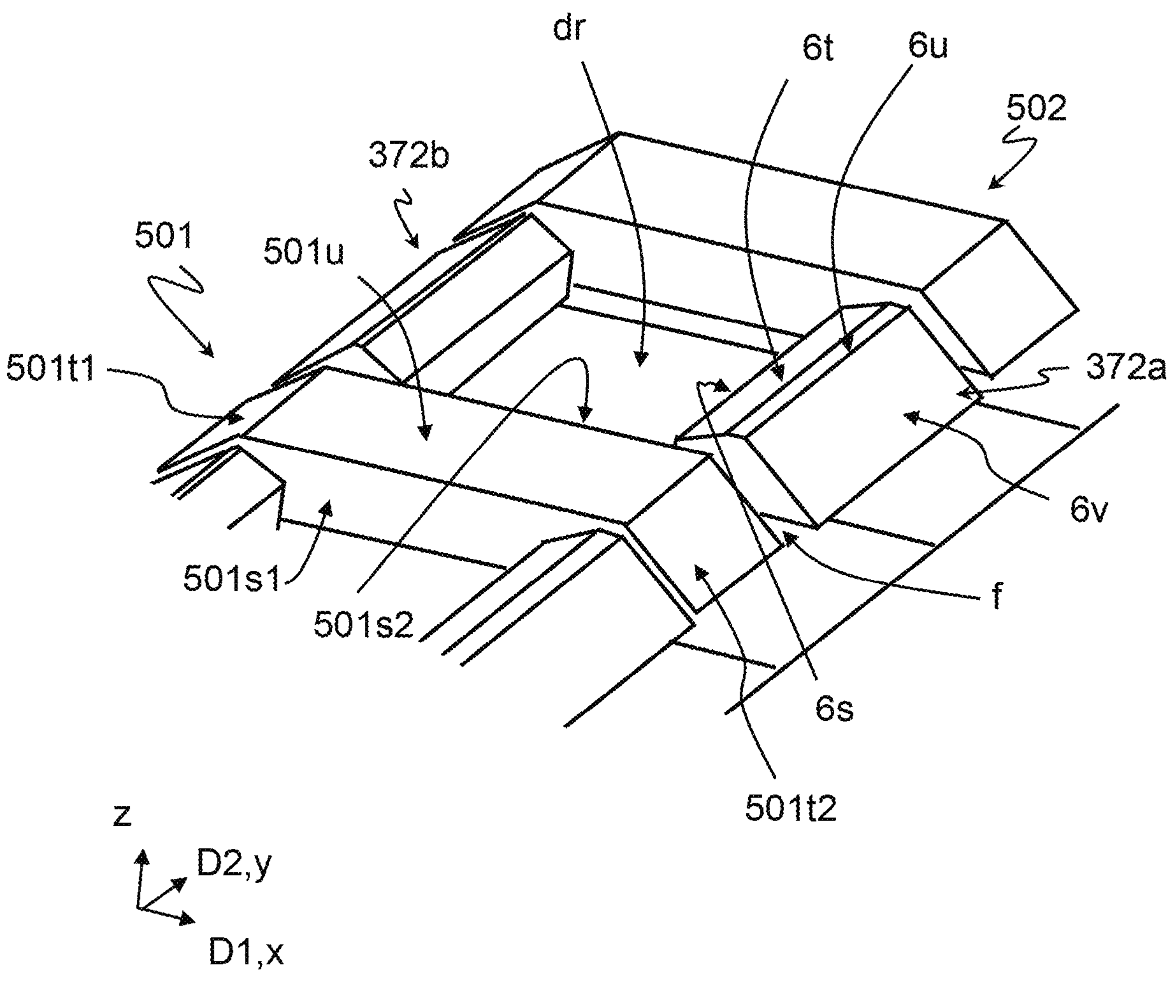

dr
6t
6u
502
372b
501
501u
501t1
372a
6v
501s1
501s2
f
6s
501t2
z
D2,y
D1,x

Fig.30A

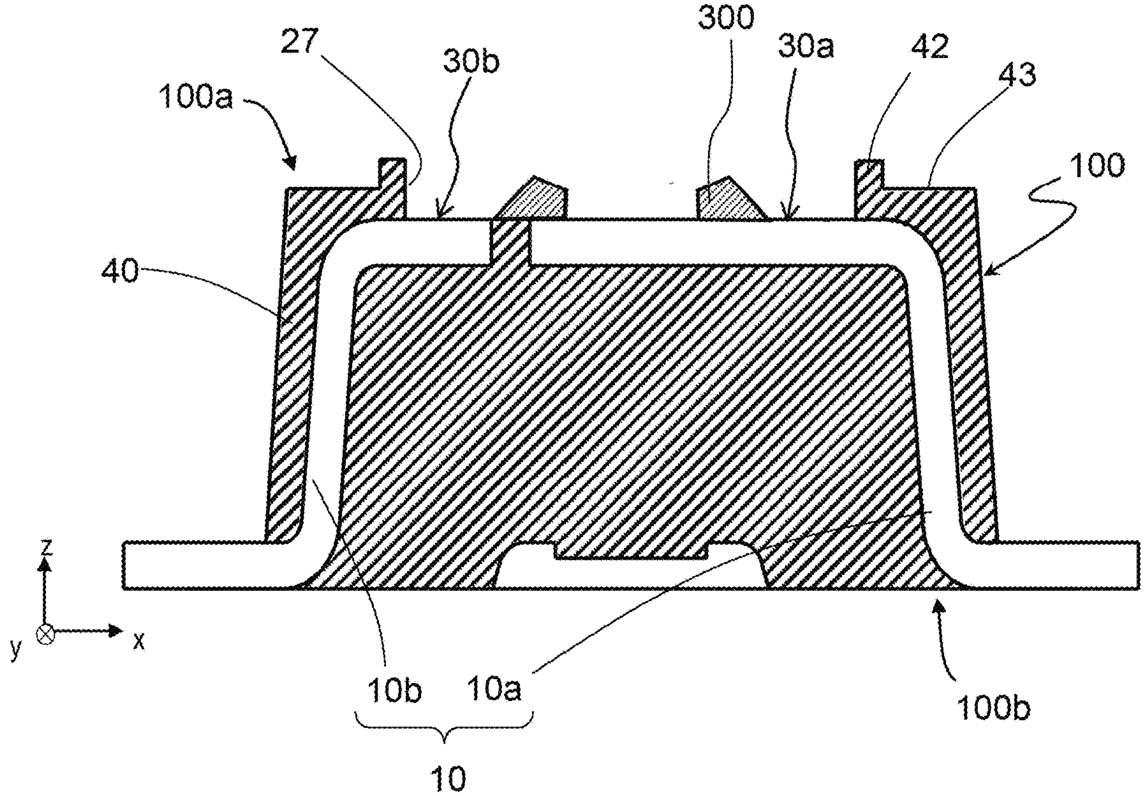


Fig.30B

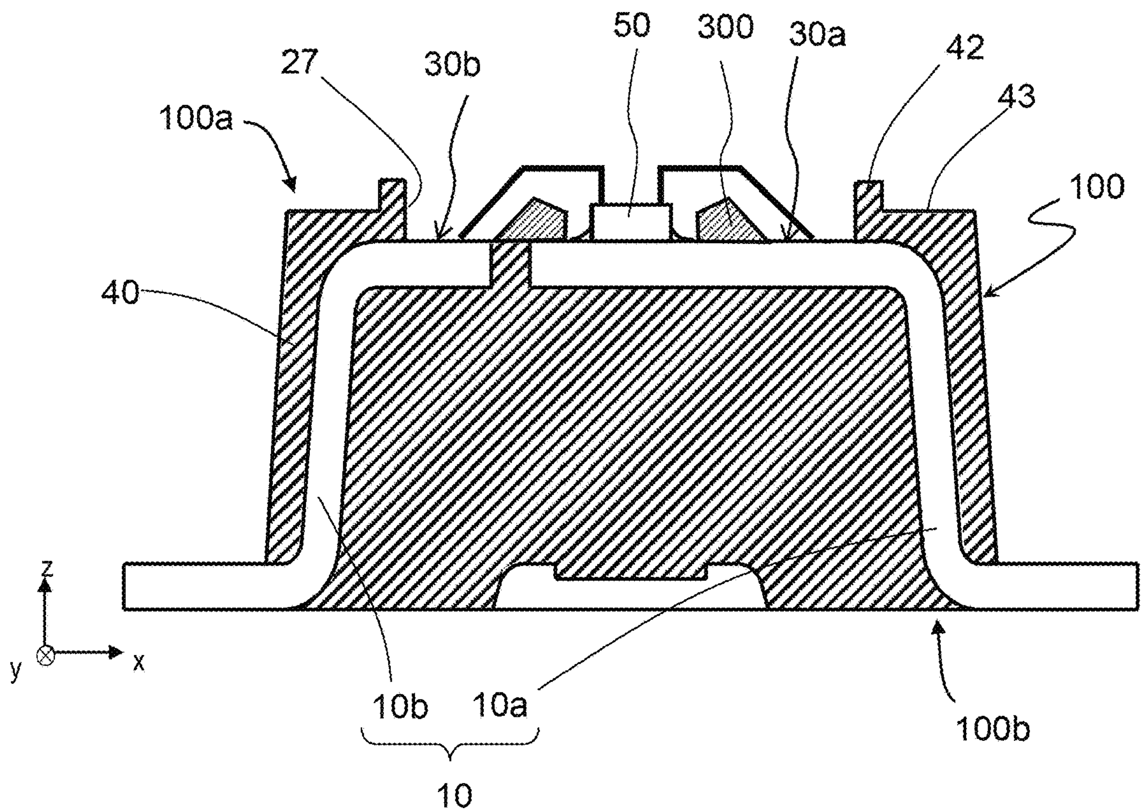


Fig.30C

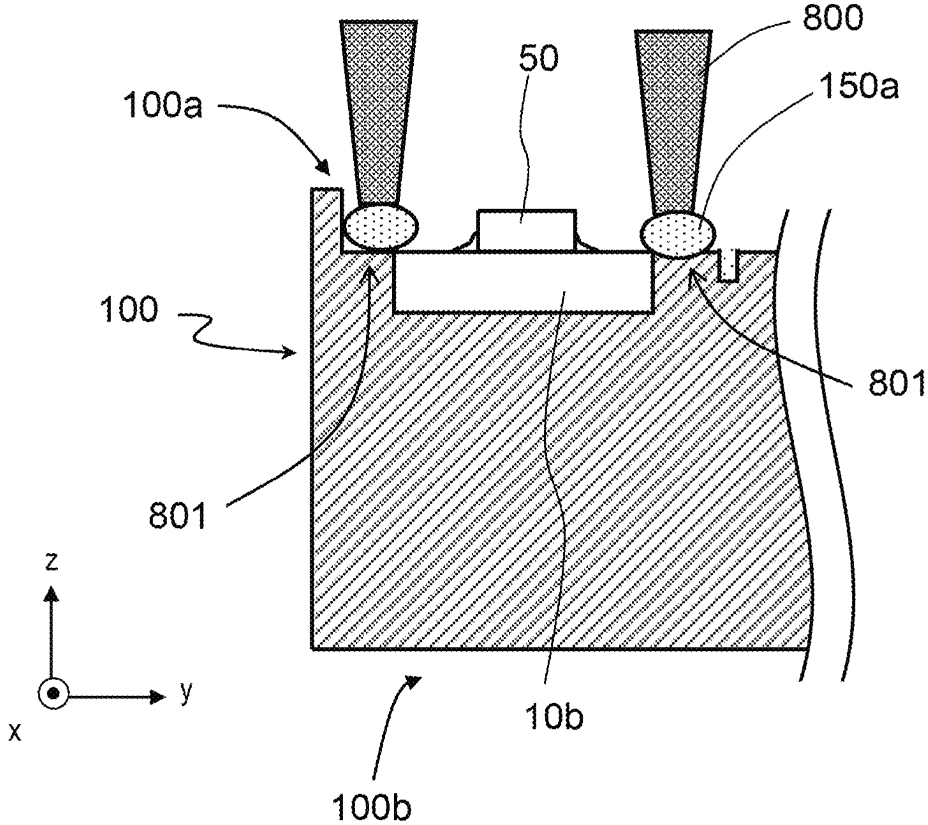


Fig.30D

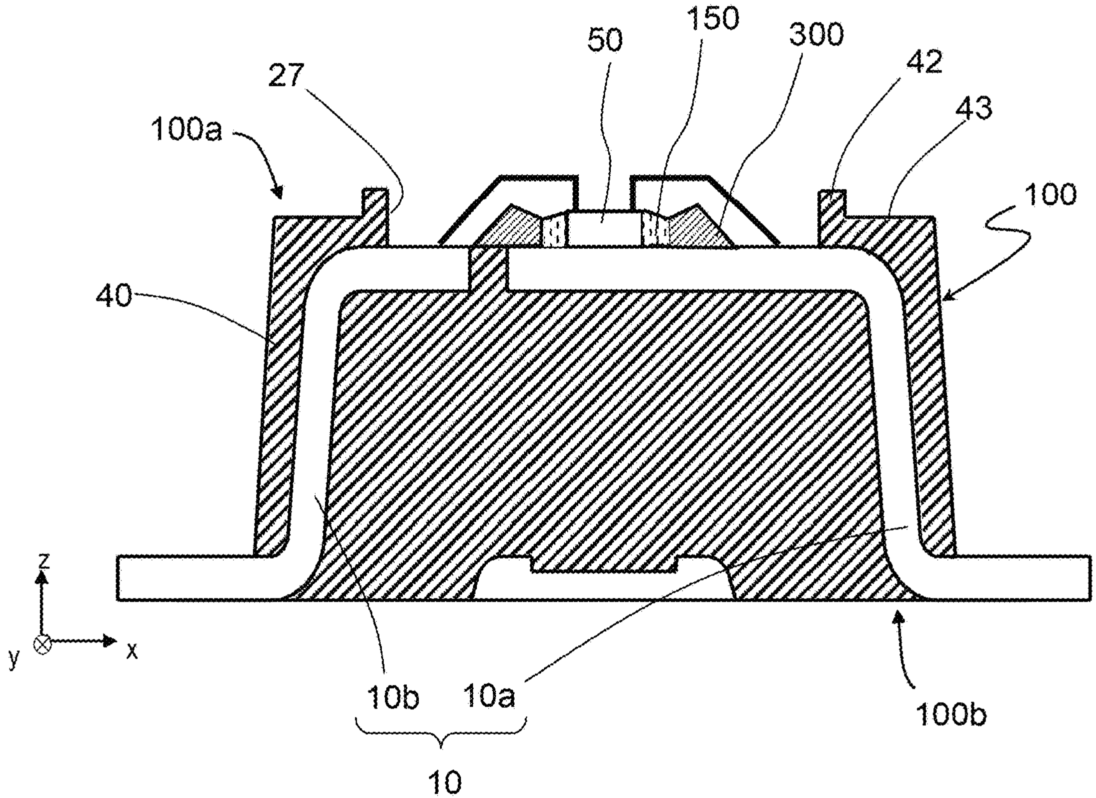


Fig.30E

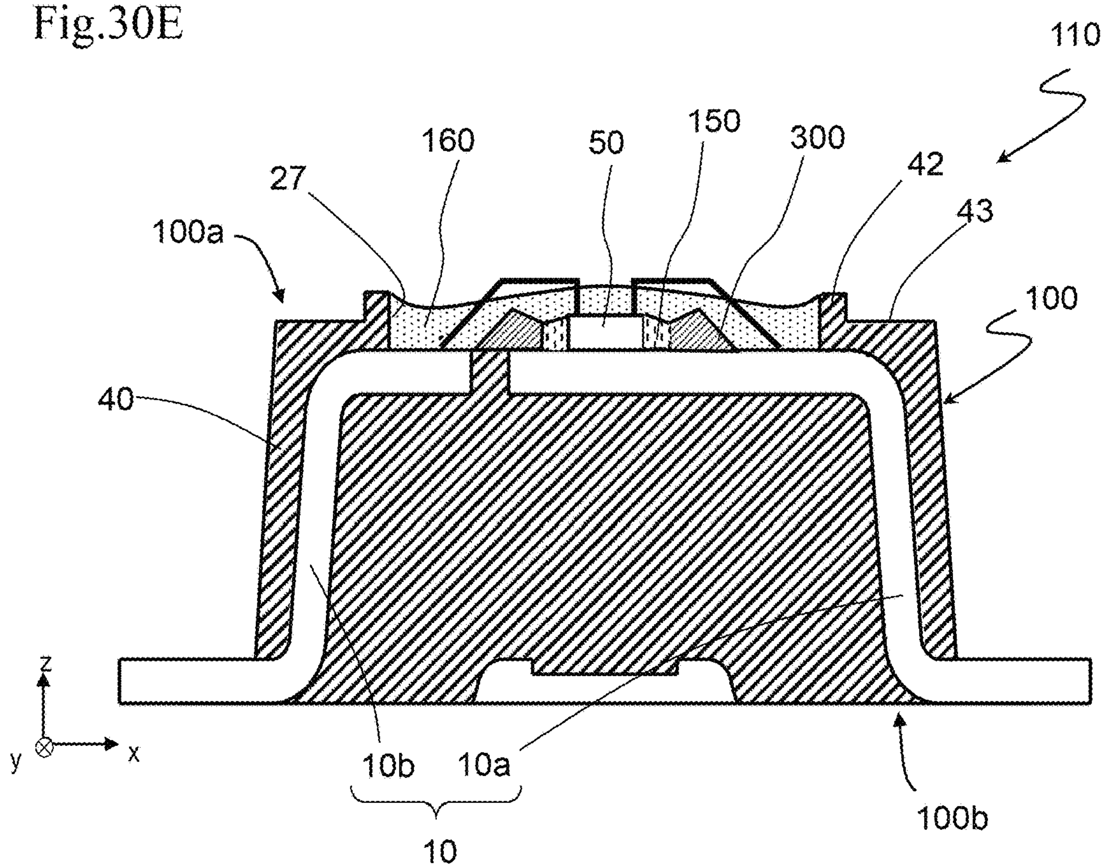


Fig.31A

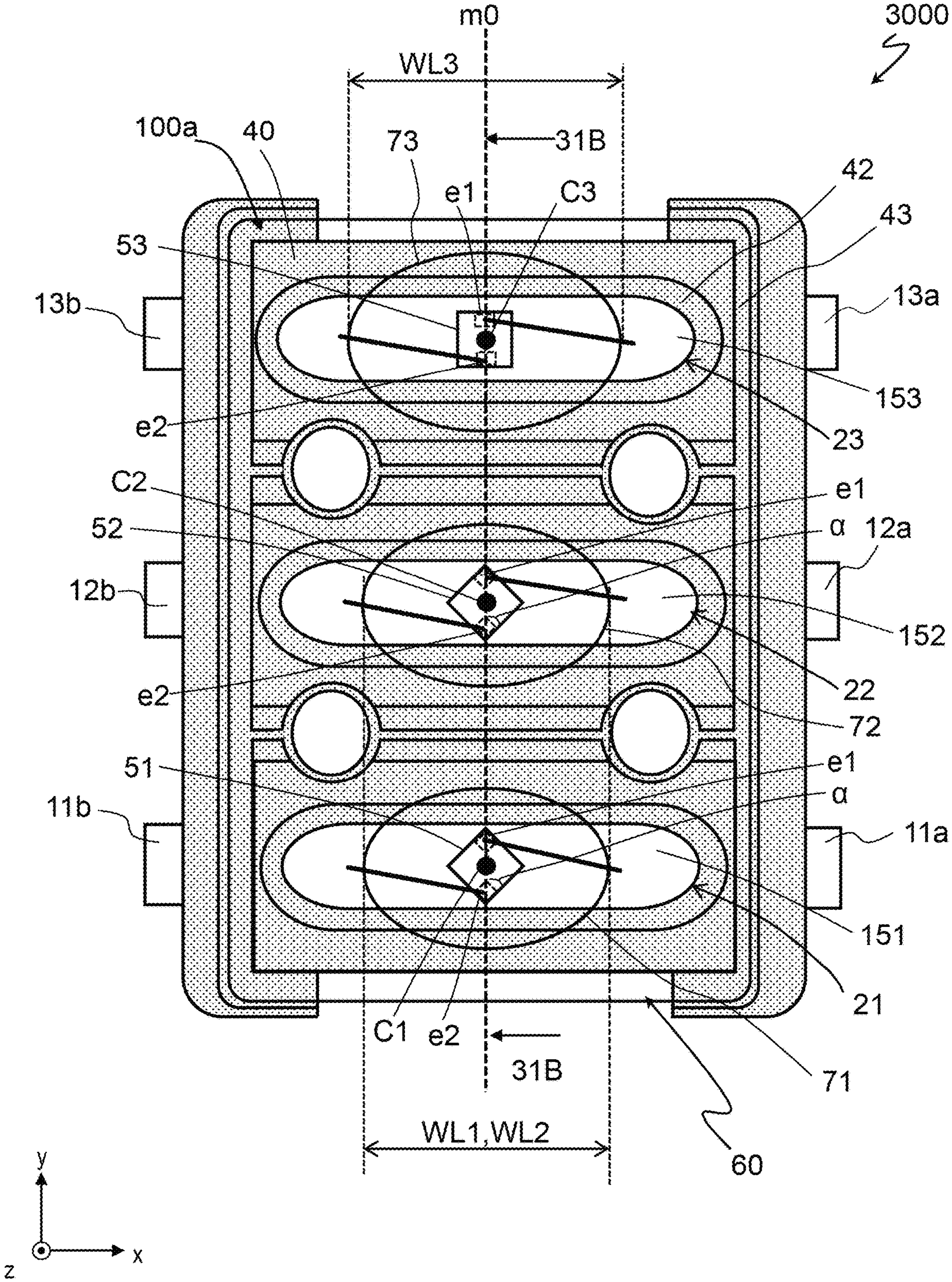

m0
3000
WL3
100a
40
73
31B
42
43
e1
C3
53
13b
13a
153
e2
23
C2
e1
52
α
12a
12b
152
e2
22
72
51
e1
α
11b
11a
151
21
C1
e2
31B
71
WL1,WL2
60
y
x
z

Fig.31B

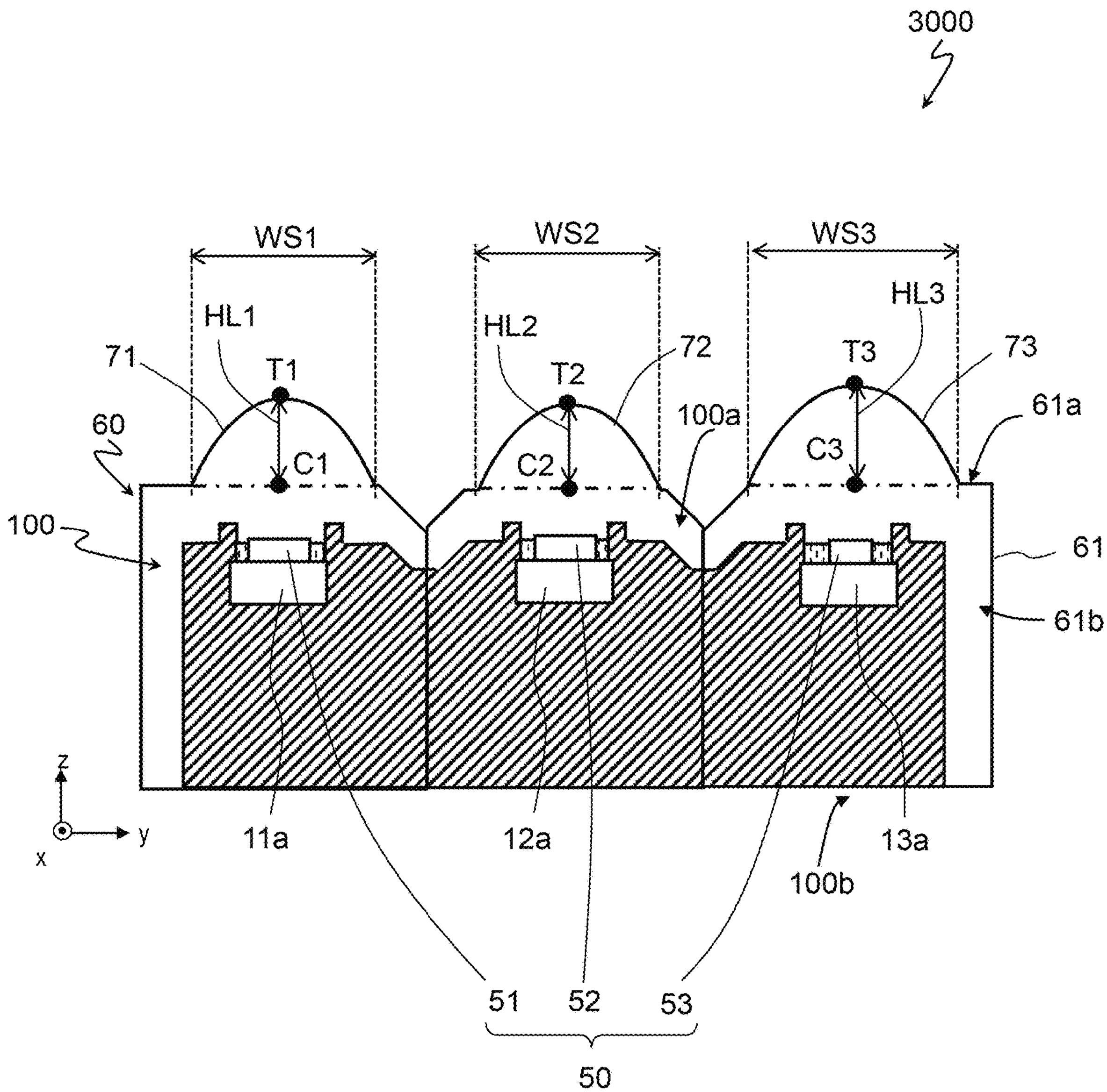

3000
WS1
WS2
WS3
HL1
HL2
HL3
71
72
73
T1
T2
T3
C1
C2
C3
60
100a
61a
100
61
61b
z
y
x
11a
12a
13a
100b
51
52
53
50

Fig.32A

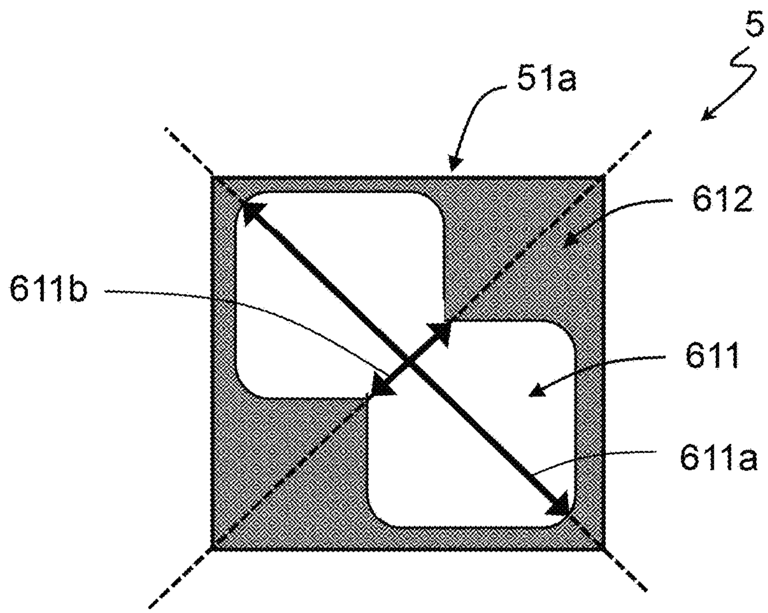


Fig.32B

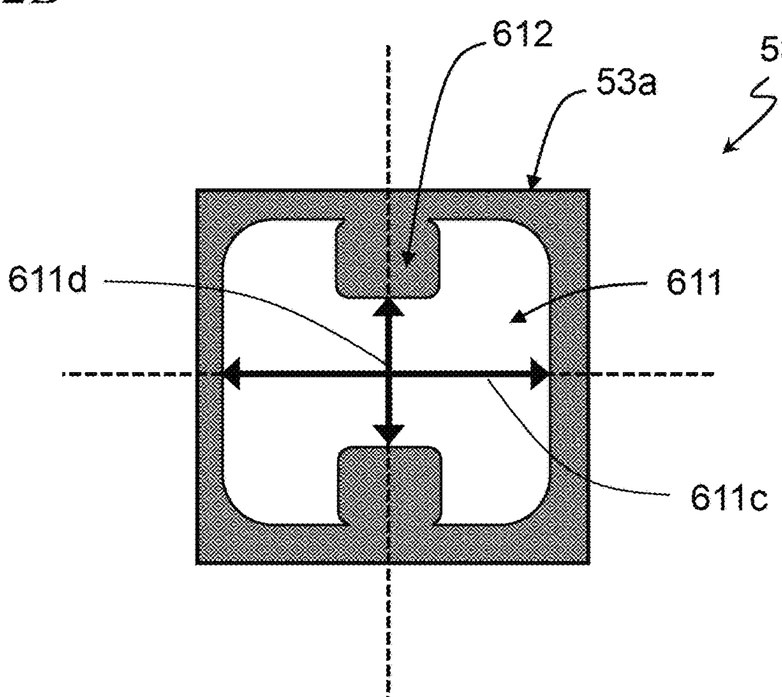


Fig.33

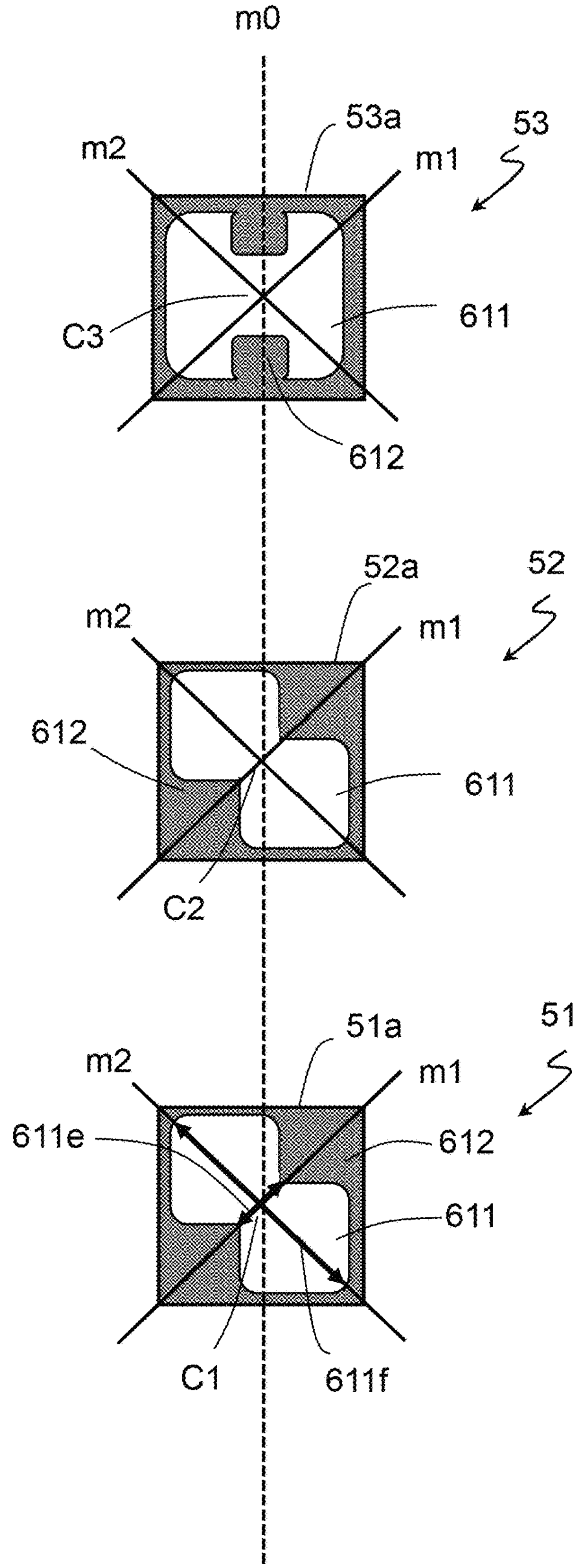

m0
53a
53
m2
m1
C3
611
612
52a
52
m2
m1
612
611
C2
51a
51
m2
m1
611e
612
611
C1
611f

Fig.34

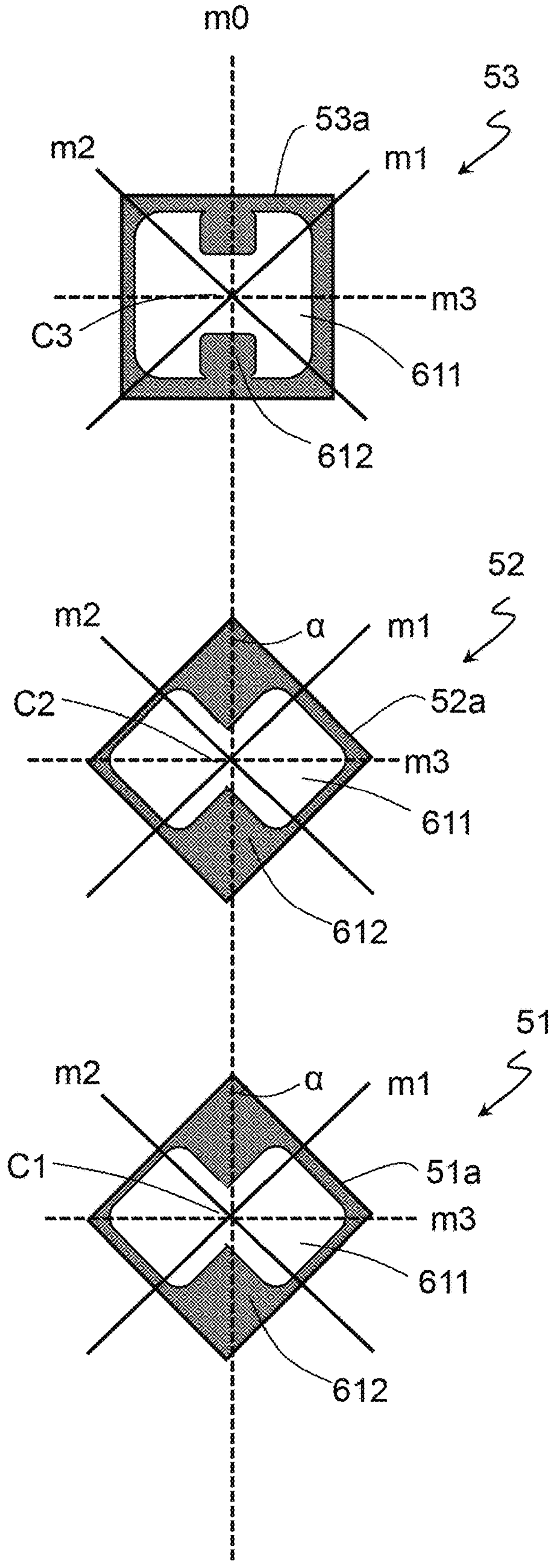

m0
53
53a
m2
m1
m3
C3
611
612
52
m2
α
m1
C2
52a
m3
611
612
51
m2
α
m1
C1
51a
m3
611
612

Fig.35

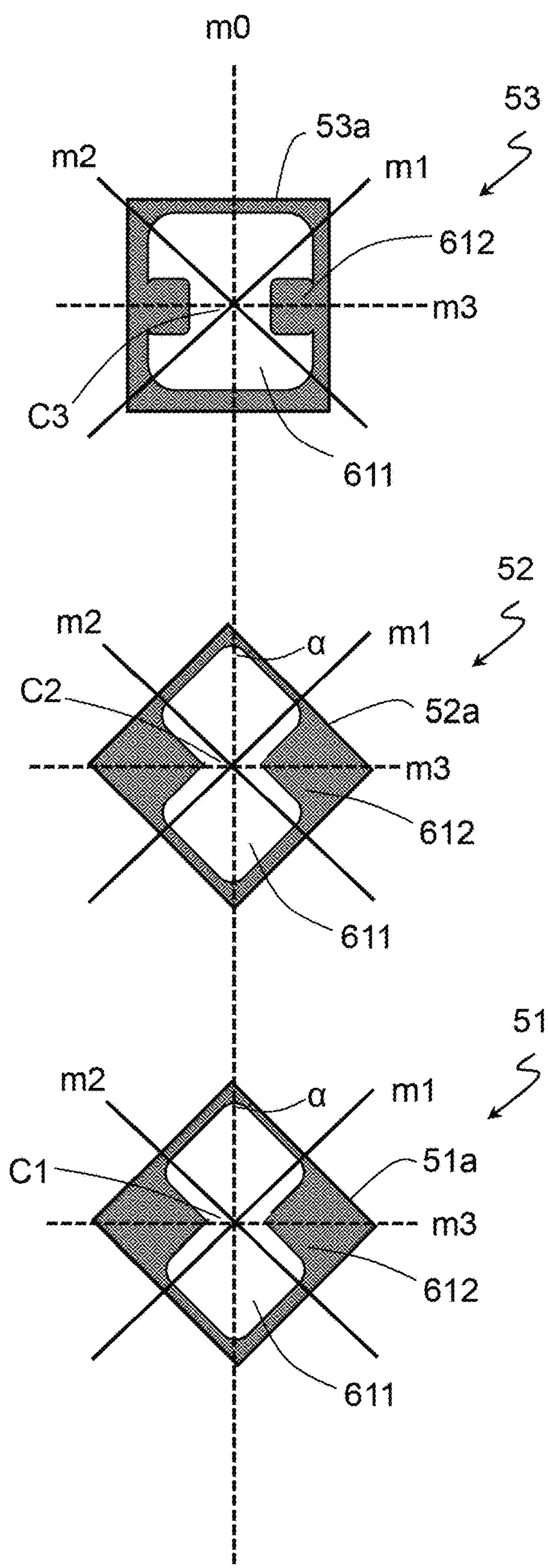

m0
53
53a
m2
m1
612
m3
C3
611
52
m2
α
m1
C2
52a
m3
612
611
51
m2
α
m1
51a
C1
m3
612
611

Fig.36A

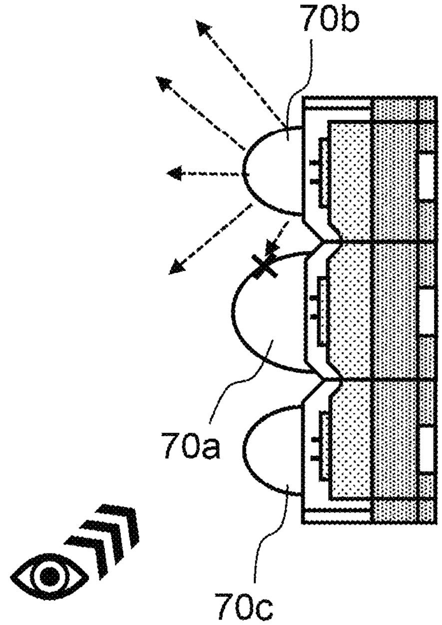


Fig.36B

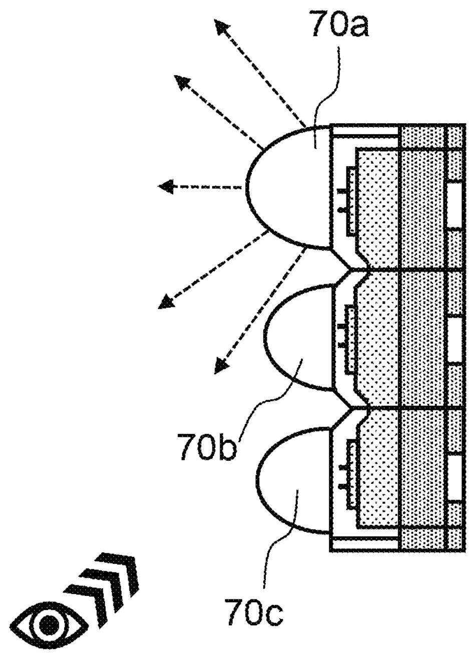


Fig.36C

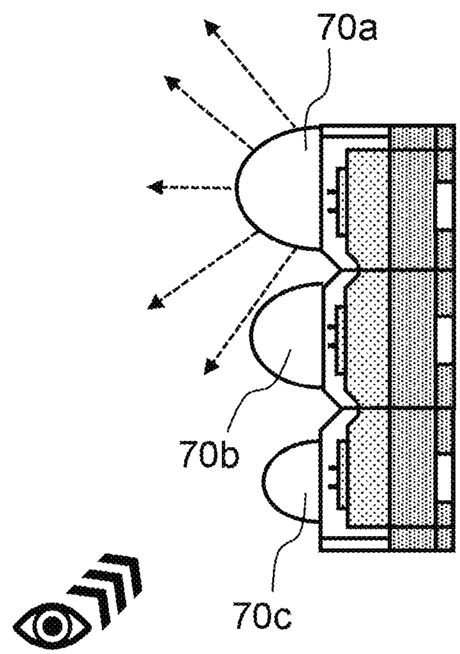
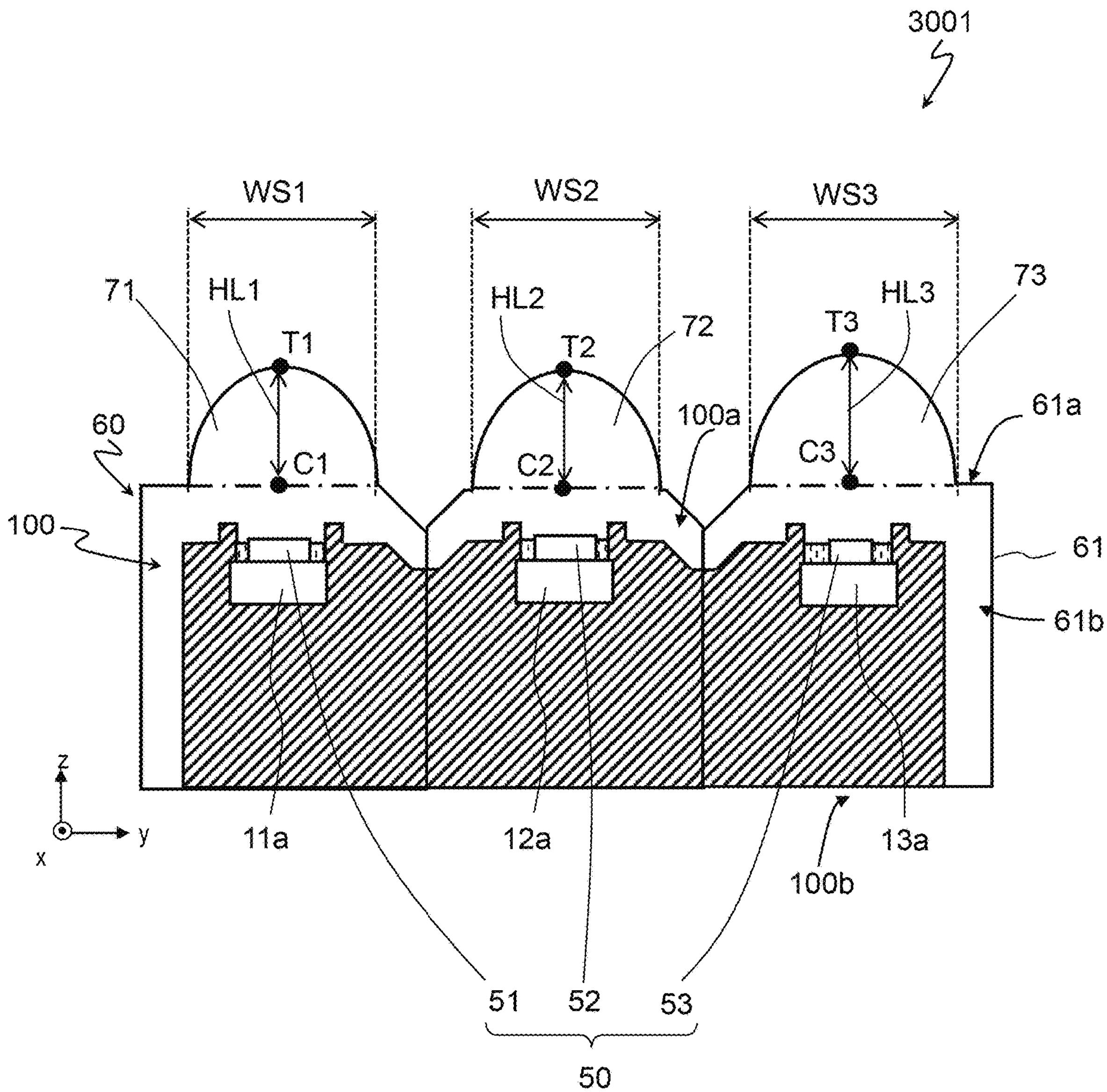


Fig.37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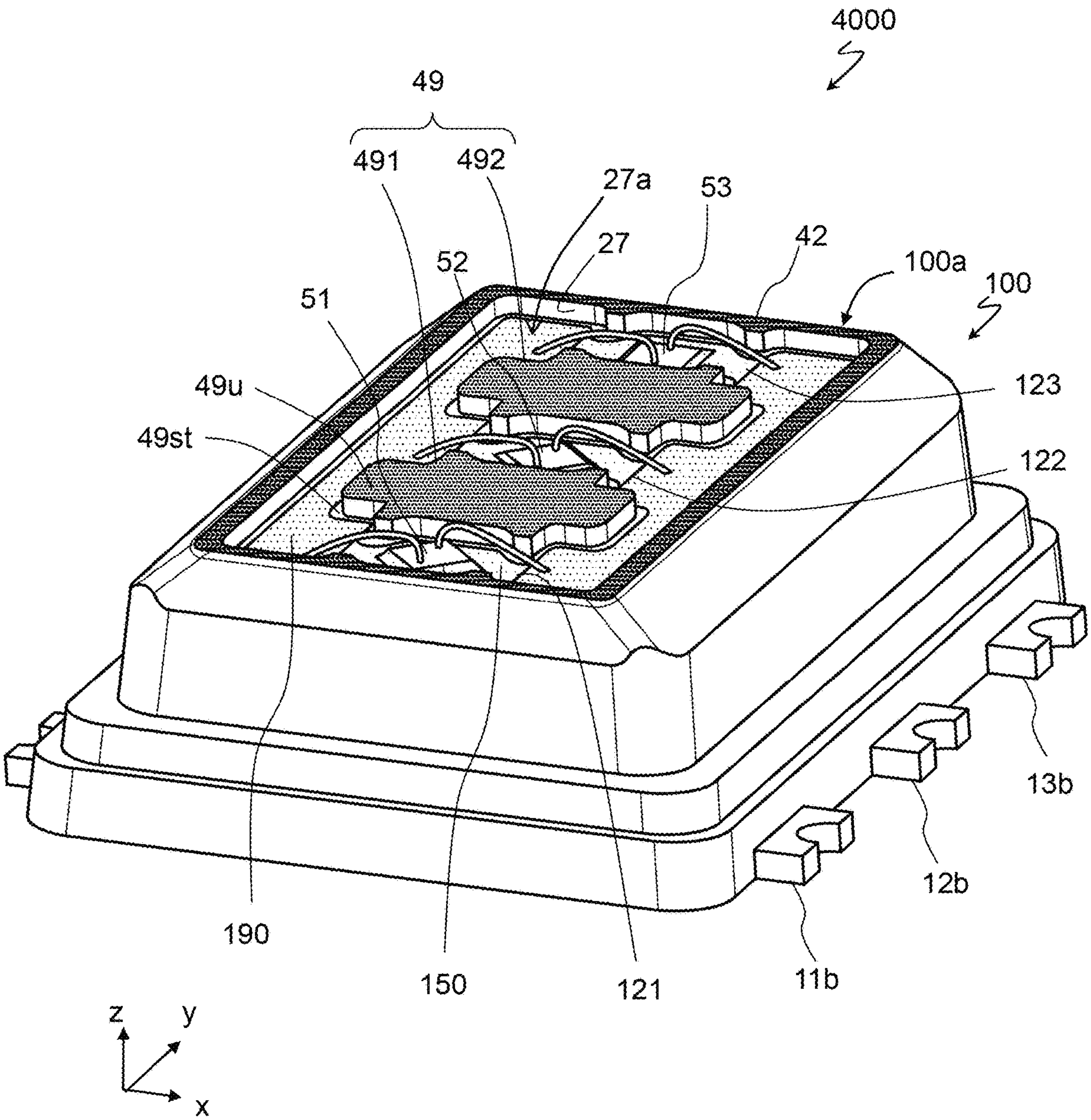
WS1
WS2
WS3
71
HL1
T1
HL2
T2
72
T3
HL3
73
60
C1
C2
100a
C3
61a
100
61
61b
z
y
x
11a
12a
13a
100b
51
52
53
50

Fig.38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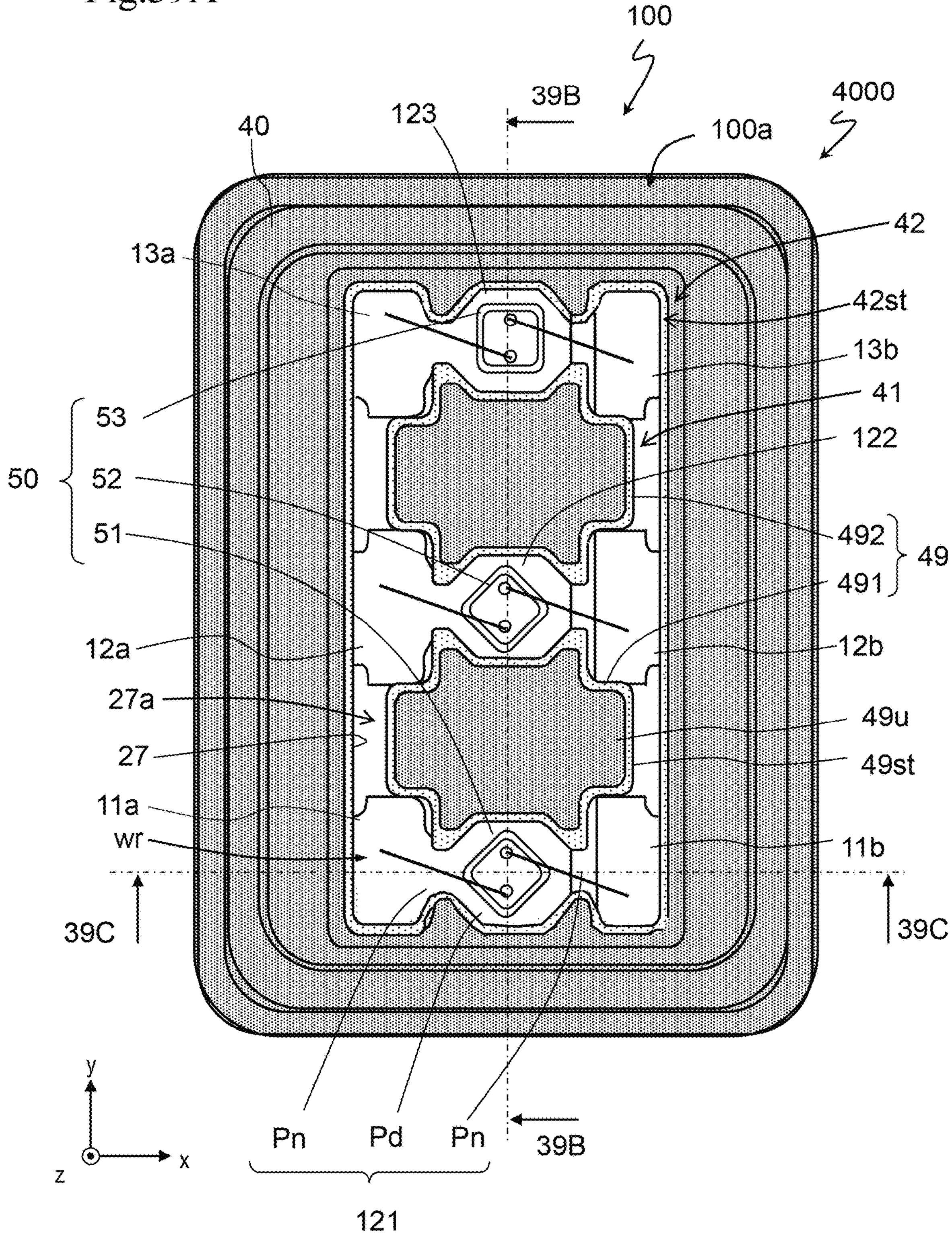
49
491
492
27a
53
27
42
52
100a
100
51
123
49u
49st
122
13b
12b
190
150
121
11b
z
y
x

Fig.39A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39B
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13b
41
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122
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12a
12b
27a
49u
27
49st
11a
wr
11b
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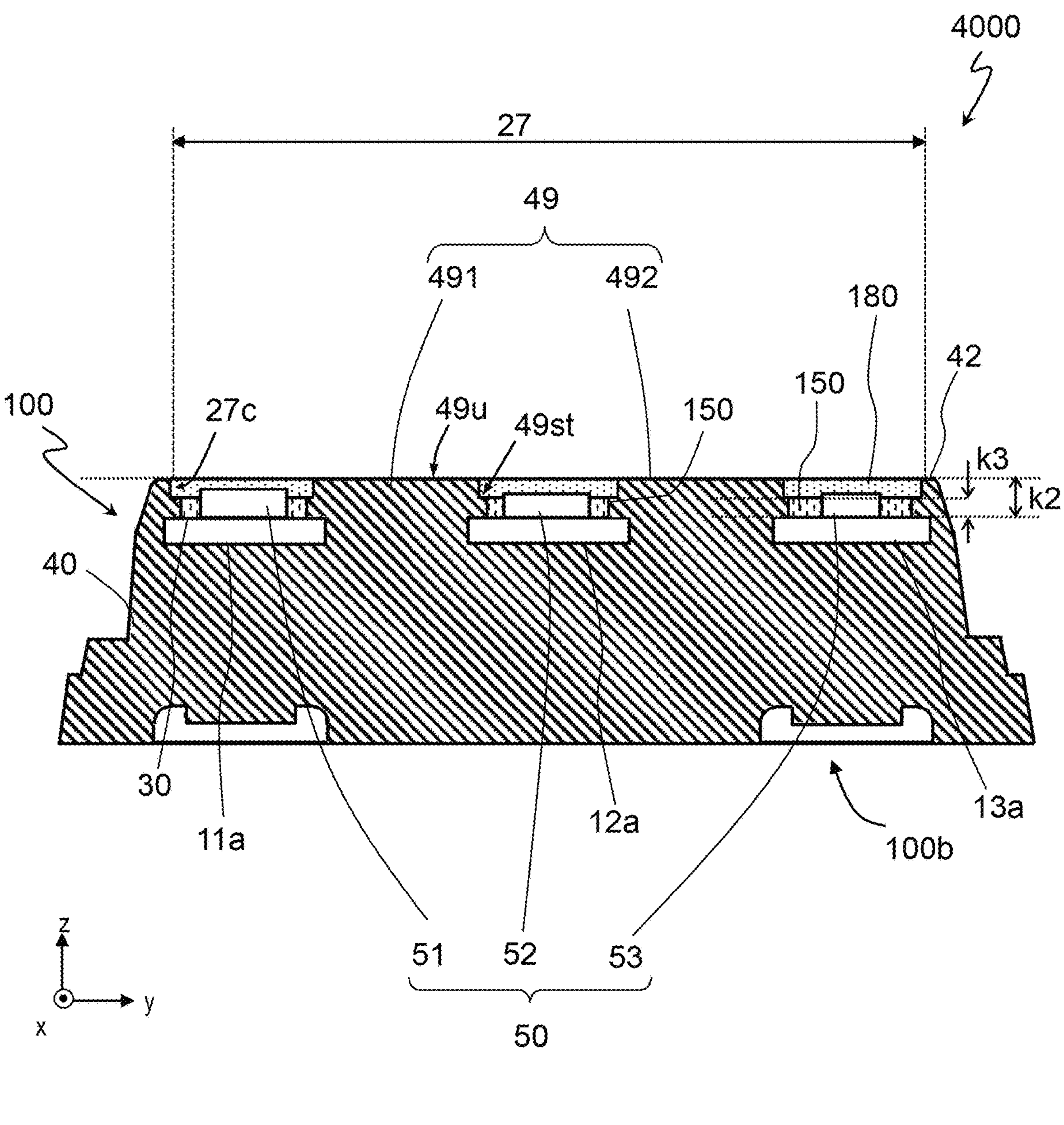
39C
y
x
z
Pn
Pd
Pn
39B
121

Fig.39B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49
491
492
180
42
100
27c
49u
49st
150
150
k3
k2
40
30
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52
53
12a
100b
13a
50
z
y
x

Fig.39C

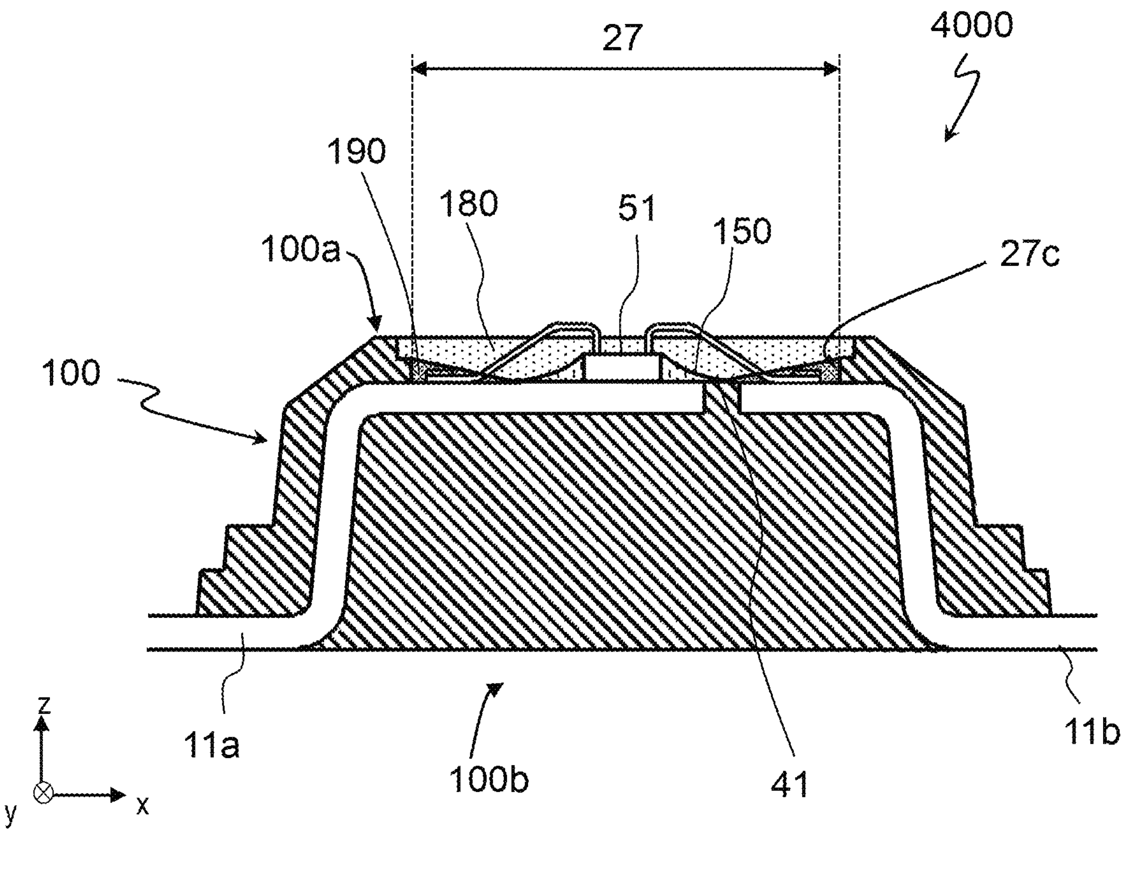


Fig.39D

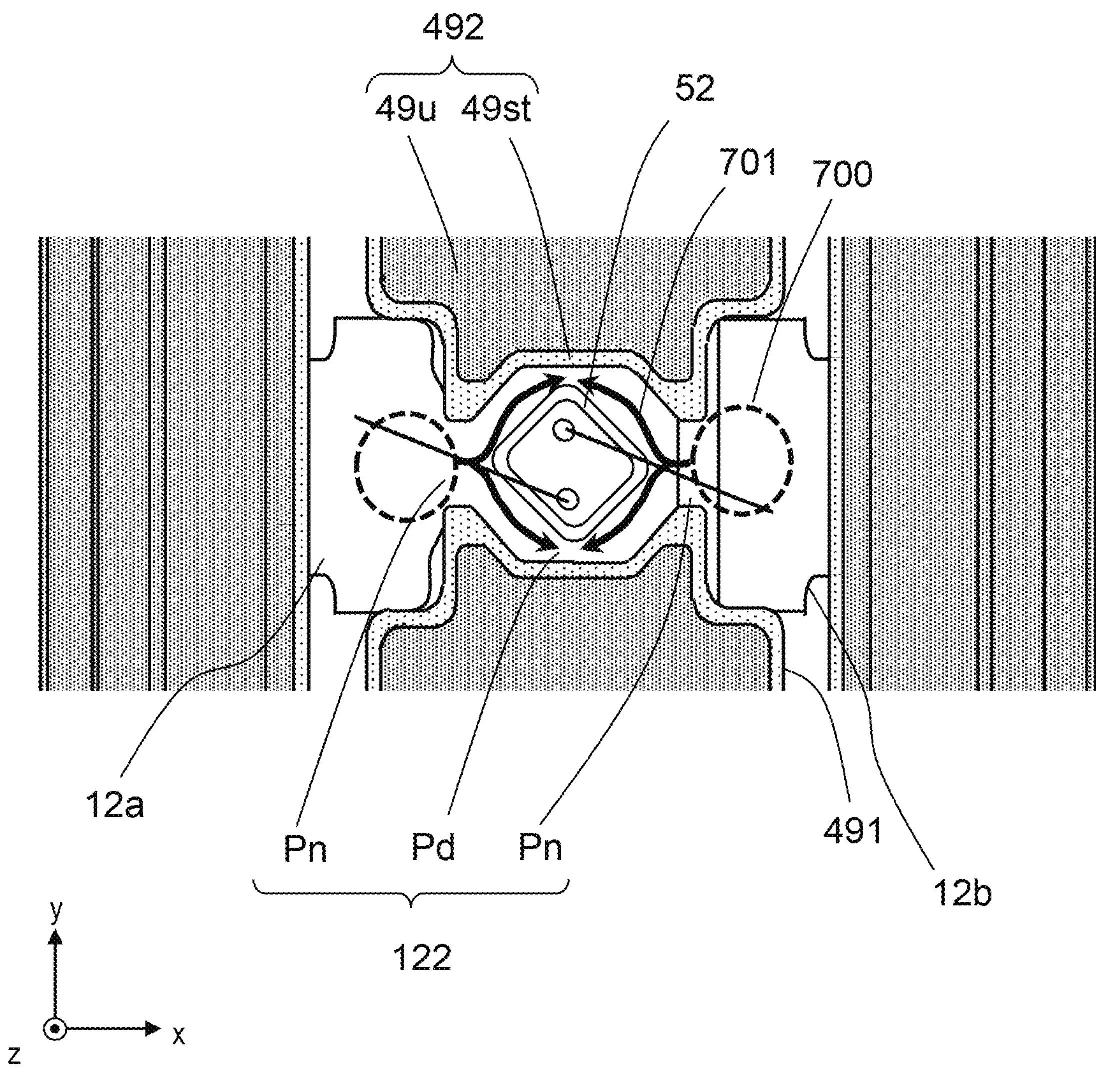
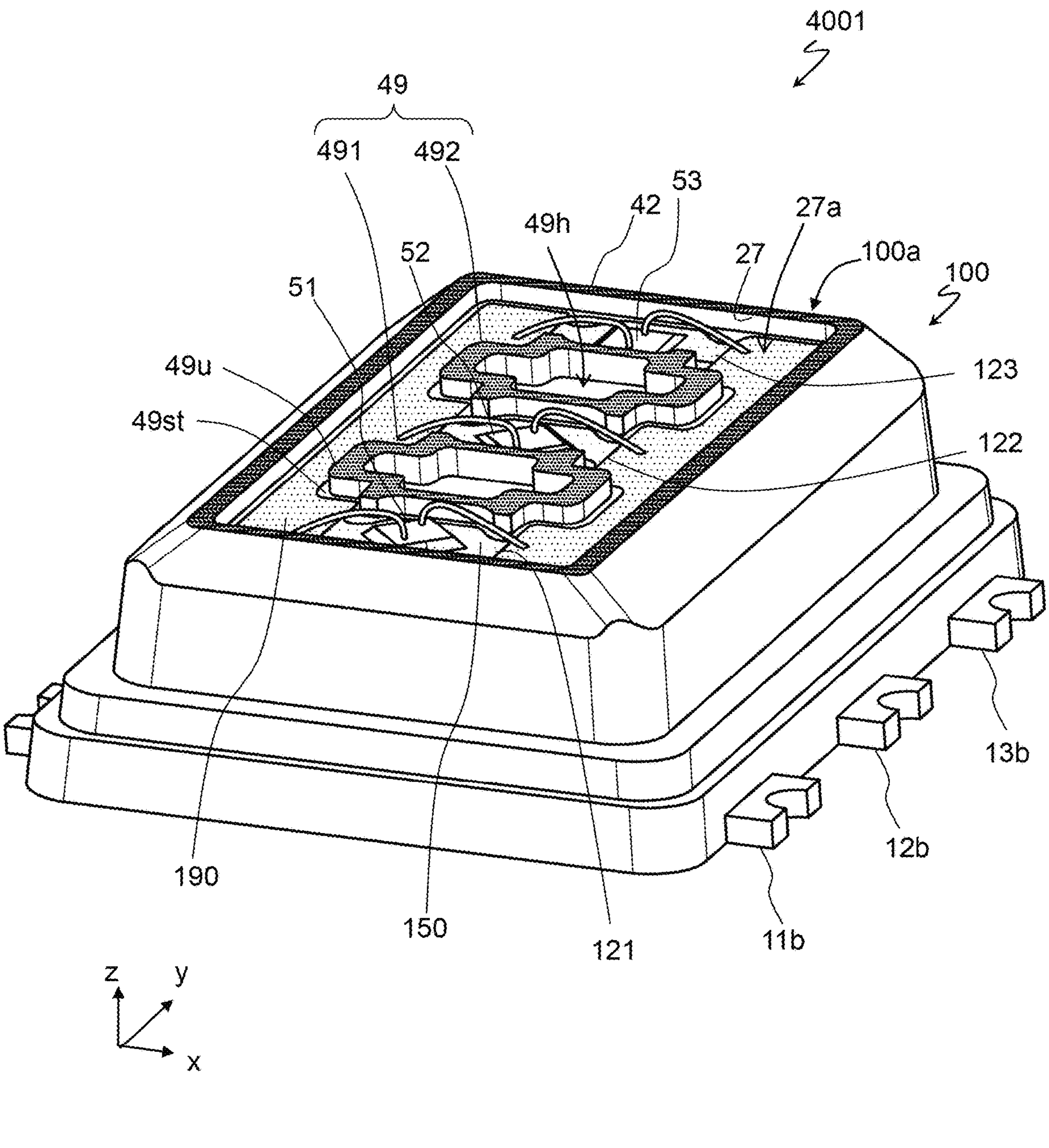


Fig.40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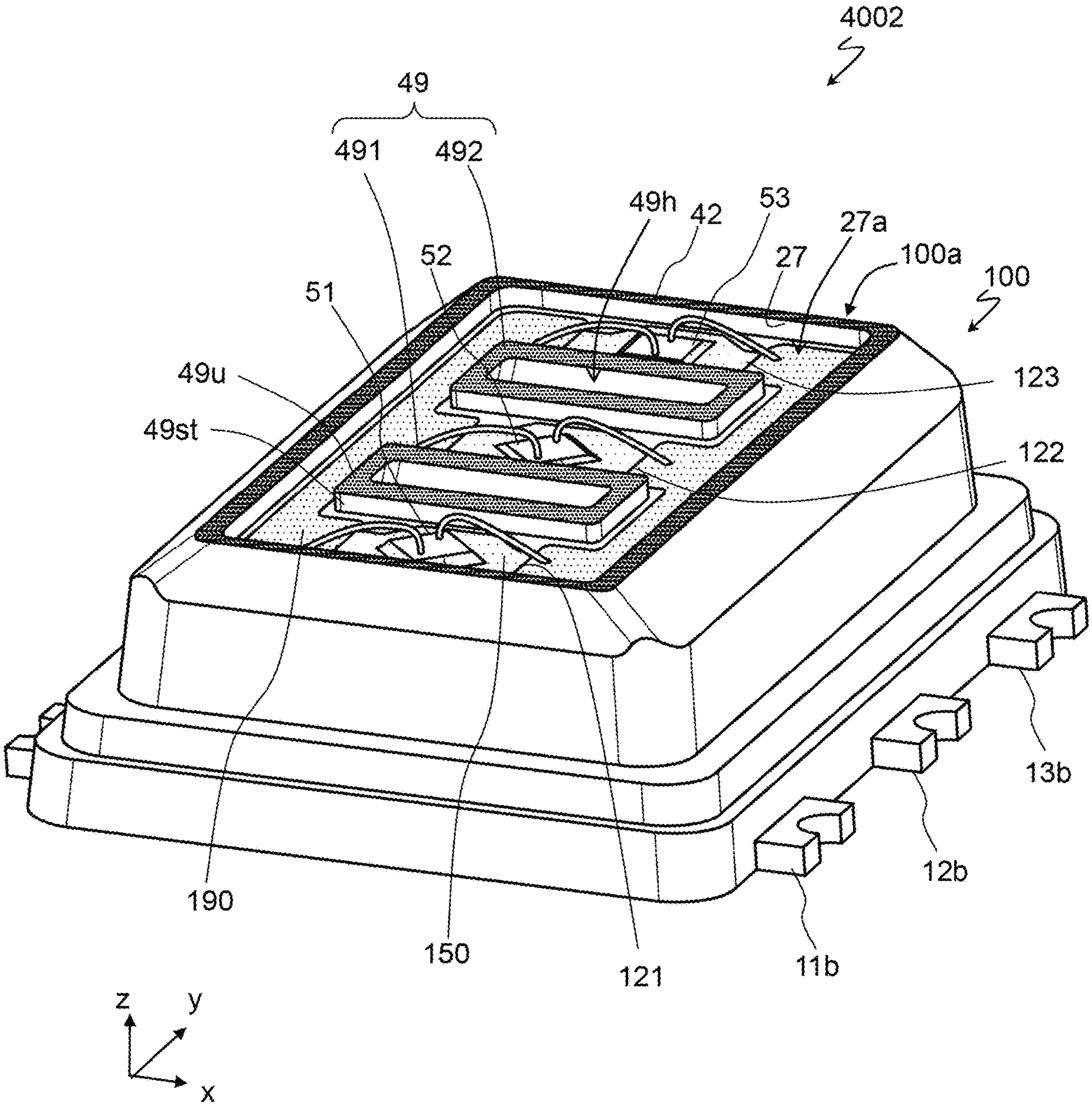
491
492
53
42
27a
49h
52
27
100a
100
51
49u
123
49st
122
13b
12b
190
150
121
11b
z
y
x

Fig.41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49u
49st
122
13b
12b
190
150
121
11b
z
y
x

LIGHT-EMITTING DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority to Japanese Patent Application No. 2021-162286, filed on Sep. 30, 2021, Japanese Patent Application No. 2022-024240 filed on Feb. 18, 2022 and Japanese Patent Application No. 2022-083492 filed on May 23, 2022, the disclosures of which are hereby incorporated by reference in their entirety.

BACKGROUND

The present disclosure relates to a light-emitting device.

As a light-emitting device including a light-emitting diode (LED), a shell-shaped (lamp-type) light-emitting device, a surface mounting type (SMD type) light-emitting device, and the like are known. Because he lamp-type light-emitting devices have high light distribution in a frontward direction, such light-emitting devices are preferably used for large display devices, such as an LED display device, in which light-emitting devices are arranged in a matrix pattern as pixels.

JP 2006-93435 A and US 2020/0176643 describe a surface-mountable light-emitting device including a lens on a light-emitting surface of the light-emitting device.

SUMMARY

One non-limiting exemplary embodiment of the present disclosure provides a light-emitting device that can extract light with high efficiency in the frontward direction and that can be miniaturized.

A light-emitting device according to an embodiment of the present disclosure includes a resin package including a plurality of leads and a resin member fixing at least a part of the plurality of leads. The resin package is provided, on a primary surface, with a plurality of recessed portions including a first recessed portion, a second recessed portion, and a third recessed portion each defined by the resin member and the plurality of leads. An inner upper surface of each of the first recessed portion, the second recessed portion, and the third recessed portion includes an exposed region where a part of any one of the plurality of leads is exposed. The light-emitting device further includes a first light-emitting element disposed in the exposed region of the first recessed portion, a second light-emitting element disposed in the exposed region of the second recessed portion, a third light-emitting element disposed in the exposed region of the third recessed portion, a first reflective member disposed in the first recessed portion and surrounding, in a plan view, the first light-emitting element, a second reflective member disposed in the second recessed portion and surrounding, in the plan view, the second light-emitting element, a third reflective member disposed in the third recessed portion and surrounding, in the plan view, the third light-emitting element, and a mold resin portion including a first lens portion positioned above the first light-emitting element, a second lens portion positioned above the second light-emitting element, and a third lens portion positioned above the third light-emitting element. Each of the first lens portion, the second lens portion, and the third lens portion has a convex shape protruding upward from the primary surface. In the plan view, a maximum width of the first lens portion is less than a maximum width of the inner upper surface of the first recessed portion, a maximum width of the second lens portion is less than a maximum width of the inner upper surface of the second recessed portion, and a maximum width of the third lens portion is less than a maximum width of the inner upper surface of the third recessed portion.

A light-emitting device according to another embodiment of the present disclosure includes a resin package including a plurality of leads and a resin member fixing at least a part of the plurality of leads. The resin package is provided, on a primary surface, with a first region, a second region, and a third region each defined by the resin member and the plurality of leads. Each of the first region, the second region, and the third region includes an exposed region where a part of any one of the plurality of leads is exposed. The light-emitting device further includes a first light-emitting element disposed in the exposed region of the first region, a second light-emitting element disposed in the exposed region of the second region, a third light-emitting element disposed in the exposed region of the third region, a first reflective member disposed in the first region and surrounding, in a plan view, the first light-emitting element, a second reflective member disposed in the second region and surrounding, in the plan view, the second light-emitting element, a third reflective member disposed in the third region and surrounding, in the plan view, the third light-emitting element, and a mold resin portion including a first lens portion positioned above the first light-emitting element, a second lens portion positioned above the second light-emitting element, and a third lens portion positioned above the third light-emitting element. Each of the first lens portion, the second lens portion, and the third lens portion has a convex shape protruding upward from the primary surface. A width of the first lens portion in a cross-section in which the width of the first lens portion is minimized, among cross-sections including a line connecting a vertex of the first lens portion and a center point, in the plan view, of the first lens portion, is no greater than 5 times a width of the first light-emitting element. A width of the second lens portion in a cross-section in which the width of the second lens portion is minimized, among cross-sections including a line connecting a vertex of the second lens portion and a center point, in the plan view, of the second lens portion, is no greater than 5 times a width of the second light-emitting element. A width of the third lens portion in a cross-section in which the width of the third lens portion is minimized, among cross-sections including a line connecting a vertex of the third lens portion and a center point, in the plan view, of the third lens portion, is no greater than 5 times a width of the third light-emitting element.

According to an embodiment of the present disclosure, it is possible to provide a light-emitting device that can extract light with high efficiency in the frontward direction and that can be miniaturized.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a schematic perspective view of a light-emitting device according to an embodiment of the present disclosure.

FIG. **2**A is a schematic lateral side view of the light-emitting device illustrated in FIG. **1** when viewed in a y-axis direction.

FIG. **2**B is a schematic lateral side view of the light-emitting device illustrated in FIG. **1** when viewed in an x-axis direction.

FIG. **2**C is a schematic top view of the light-emitting device illustrated in FIG. **1**.

FIG. 2D is a schematic cross-sectional view taken along line 2D-2D illustrated in FIG. 2C.

FIG. 2E is a schematic cross-sectional view taken along line 2E-2E illustrated in FIG. 2C.

FIG. 2F is a schematic top transparent view illustrating a resin package 100 on which light-emitting elements 50 are formed.

FIG. 2G is a schematic cross-sectional view taken along line 2G-2G illustrated in FIG. 2F.

FIG. 2H is an enlarged schematic plan view illustrating a reflective member and a light-emitting element.

FIG. 2I is a schematic cross-sectional view taken along line 2D-2D illustrated in FIG. 2C, illustrating an example in which a precoating resin is provided to the light-emitting device.

FIG. 2J is a schematic cross-sectional view taken along line 2E-2E illustrated in FIG. 2C, illustrating an example in which the precoating resin is provided to the light-emitting device.

FIG. 3A is a schematic plan view illustrating another example of the light-emitting element.

FIG. 3B is a schematic cross-sectional view taken along line 3B-3B illustrated in FIG. 3A.

FIG. 4 is a schematic top view of another light-emitting device of the present disclosure.

FIG. 5A is a schematic cross-sectional view for describing light incident on a lens portion from the light-emitting element in a light-emitting device of a comparative example.

FIG. 5B is a schematic cross-sectional view for describing light incident on the lens portion from the light-emitting element in the light-emitting device of the comparative example.

FIG. 5C is a schematic cross-sectional view for describing light incident on the lens portion from the light-emitting element in the light-emitting device of the comparative example.

FIG. 5D is a schematic cross-sectional view for describing light incident on the lens portion from the light-emitting element in the light-emitting device of the comparative example.

FIG. 5E is a schematic cross-sectional view for describing light incident on the lens portion from the light-emitting element in the light-emitting device of an example.

FIG. 6 is a schematic diagram illustrating a relationship between a size ratio WS/w1 of the lens portion to the light-emitting element and a luminous flux ratio.

FIG. 7A is a schematic top view of a light-emitting device according to a first modified example.

FIG. 7B is a schematic cross-sectional view taken along line 7B-7B illustrated in FIG. 7A.

FIG. 8A is a schematic top transparent view of a light-emitting device according to a second modified example.

FIG. 8B is a schematic cross-sectional view taken along line 8B-8B illustrated in FIG. 8A.

FIG. 8C is an enlarged schematic cross-sectional view illustrating a part of the cross-section illustrated in FIG. 8B.

FIG. 9 is a schematic top transparent view of a light-emitting device according to a third modified example.

FIG. 10A is a schematic top transparent view of a light-emitting device according to a fourth modified example.

FIG. 10B is a schematic cross-sectional view taken along line 10B-10B illustrated in FIG. 10A.

FIG. 11A is a schematic top transparent view of another light-emitting device of the fourth modified example.

FIG. 11B is a schematic top view of yet another light-emitting device of the fourth modified example.

FIG. 11C is a schematic top view of yet another light-emitting device of the fourth modified example.

FIG. 12A is a step cross-sectional view illustrating a manufacturing method of the light-emitting device illustrated in FIG. 1.

FIG. 12B is a step cross-sectional view illustrating the manufacturing method of the light-emitting device illustrated in FIG. 1.

FIG. 12C is a step cross-sectional view illustrating the manufacturing method of the light-emitting device illustrated in FIG. 1.

FIG. 12D is an enlarged schematic cross-sectional view for describing the step illustrated in FIG. 12C.

FIG. 12E is a step cross-sectional view illustrating the manufacturing method of the light-emitting device illustrated in FIG. 1.

FIG. 12F is a step cross-sectional view illustrating the manufacturing method of the light-emitting device illustrated in FIG. 1.

FIG. 13 is a schematic lateral side view of another light-emitting device.

FIG. 14 is a schematic perspective view of a light-emitting device according to another embodiment of the present disclosure, with the mold resin portion removed.

FIG. 15A is a schematic top transparent view of the light-emitting device illustrated in FIG. 14.

FIG. 15B is a schematic cross-sectional view taken along line 15B-15B illustrated in FIG. 15A.

FIG. 15C is a schematic cross-sectional view taken along line 15C-15C illustrated in FIG. 15A.

FIG. 15D is an enlarged schematic plan view illustrating a part of a primary surface of a resin package of the light-emitting device illustrated in FIG. 14.

FIG. 15E is an enlarged schematic perspective view illustrating a part of the primary surface of the resin package of the light-emitting device illustrated in FIG. 14.

FIG. 16 is a schematic perspective view of a light-emitting device according to an embodiment of a fifth modified example, with the mold resin portion removed.

FIG. 17A is a schematic top transparent view of the light-emitting device illustrated in FIG. 16.

FIG. 17B is a schematic cross-sectional view taken along line 17B-17B illustrated in FIG. 17A.

FIG. 17C is a schematic cross-sectional view taken along line 17C-17C illustrated in FIG. 17A.

FIG. 17D is an enlarged schematic plan view illustrating a part of the primary surface of the resin package of another light-emitting device of the fifth modified example.

FIG. 17E is an enlarged schematic plan view illustrating a part of the primary surface of the resin package of another light-emitting device of the fifth modified example.

FIG. 18 is a schematic perspective view of a light-emitting device according to an embodiment of a sixth modified example, with the mold resin portion removed.

FIG. 19A is a schematic top transparent view of the light-emitting device illustrated in FIG. 18.

FIG. 19B is a schematic cross-sectional view taken along line 19B-19B illustrated in FIG. 19A.

FIG. 19C is a schematic cross-sectional view taken along line 19C-19C illustrated in FIG. 19A.

FIG. 19D is an enlarged schematic plan view illustrating a part of the primary surface of the resin package of another light-emitting device of the sixth modified example.

FIG. 19E is an enlarged schematic perspective view illustrating a part of the primary surface of the resin package of another light-emitting device of the sixth modified example.

FIG. **19**F is an enlarged schematic plan view illustrating a part of the primary surface of the resin package of another light-emitting device of the sixth modified example.

FIG. **20** is a schematic perspective view of a light-emitting device according to an embodiment of a seventh modified example, with the mold resin portion removed.

FIG. **21** is an enlarged schematic plan view illustrating a part of the primary surface of the resin package of the light-emitting device illustrated in FIG. **20**.

FIG. **22** is a schematic perspective view of a light-emitting device according to an embodiment of an eighth modified example, with the mold resin portion removed.

FIG. **23** is an enlarged schematic plan view illustrating a part of the primary surface of the resin package of the light-emitting device illustrated in FIG. **22**.

FIG. **24** is a schematic perspective view of a light-emitting device according to an embodiment of a ninth modified example, with the mold resin portion removed.

FIG. **25** is an enlarged schematic view illustrating a part of the primary surface of the resin package of the light-emitting device illustrated in FIG. **24**.

FIG. **26** is a schematic perspective view of a light-emitting device according to an embodiment of a tenth modified example, with the mold resin portion removed.

FIG. **27** is an enlarged schematic view illustrating a part of the primary surface of the resin package of the light-emitting device illustrated in FIG. **26**.

FIG. **28** is a schematic perspective view of a light-emitting device according to an embodiment of an eleventh modified example, with the mold resin portion removed.

FIG. **29**A is a schematic top transparent view of the light-emitting device illustrated in FIG. **28**.

FIG. **29**B is a schematic cross-sectional view taken along line **29**B-**29**B illustrated in FIG. **29**A.

FIG. **29**C is a schematic cross-sectional view taken along line **29**C-**29**C illustrated in FIG. **29**A.

FIG. **29**D is an enlarged schematic perspective view illustrating a part of the primary surface of the resin package of the light-emitting device illustrated in FIG. **28**.

FIG. **30**A is a step cross-sectional view illustrating a manufacturing method of the light-emitting device illustrated in FIG. **14**.

FIG. **30**B is a step cross-sectional view illustrating the manufacturing method of the light-emitting device illustrated in FIG. **14**.

FIG. **30**C is a step cross-sectional view illustrating the manufacturing method of the light-emitting device illustrated in FIG. **14**.

FIG. **30**D is a step cross-sectional view illustrating the manufacturing method of the light-emitting device illustrated in FIG. **14**.

FIG. **30**E is a step cross-sectional view illustrating the manufacturing method of the light-emitting device illustrated in FIG. **14**.

FIG. **31**A is a schematic top transparent view of a light-emitting device according to a twelfth modified example.

FIG. **31**B is a schematic cross-sectional view taken along line **31**B-**31**B illustrated in FIG. **31**A.

FIG. **32**A is a schematic plan view exemplifying a light emission luminance distribution of a first light-emitting element **51**.

FIG. **32**B is a schematic plan view exemplifying a light emission luminance distribution of a third light-emitting element **53**.

FIG. **33** is a schematic plan view illustrating an arrangement of the first light-emitting element **51** to the third light-emitting element **53** in a reference example.

FIG. **34** is a schematic plan view illustrating an arrangement of the first light-emitting element **51** to the third light-emitting element **53** in the light-emitting device illustrated in FIG. **31**A.

FIG. **35** is a schematic plan view illustrating another arrangement example of the first light-emitting element **51** to the third light-emitting element **53**.

FIG. **36**A is a schematic lateral side view exemplifying an array of lens portions.

FIG. **36**B is a schematic lateral side view illustrating another example of the array of the lens portions.

FIG. **36**C is a schematic lateral side view illustrating yet another example of the array of the lens portions.

FIG. **37** is a schematic cross-sectional view of another light-emitting device of the twelfth modified example.

FIG. **38** is a schematic perspective view of a light-emitting device according to a thirteenth modified example, with the mold resin portion removed.

FIG. **39**A is a schematic top view of the light-emitting device illustrated in FIG. **38**.

FIG. **39**B is a schematic cross-sectional view taken along line **39**B-**39**B illustrated in FIG. **39**A.

FIG. **39**C is a schematic cross-sectional view taken along line **39**C-**39**C illustrated in FIG. **39**A.

FIG. **39**D is an enlarged schematic top view illustrating a part of the light-emitting device illustrated in FIG. **38**.

FIG. **40** is a schematic perspective view of another light-emitting device according to a thirteenth modified example, with the mold resin portion removed.

FIG. **41** is a schematic perspective view of yet another light-emitting device of the thirteenth modified example, with the mold resin portion removed.

DESCRIPTION OF EMBODIMENTS

Embodiments of the present disclosure will be described below with reference to the drawings as appropriate. Light-emitting devices to be described below are intended to embody technical idea of the present disclosure, and the present disclosure is not limited to the description below unless otherwise specified. Further, the content described in one embodiment can also be applied to another embodiment or modified example. Furthermore, sizes, positional relationships, or the like of members illustrated in each of the drawings may be exaggerated for clarity of description.

In the description below, components having substantially the same function may be denoted by the same reference numerals and respective description thereof may be omitted. Also, components that are not referenced in the description may not be designated with reference numerals. In the following description, terms indicating a specific direction or position ("upper", "lower", "right", "left", and other terms including those terms) may be used. These terms are used merely facilitate understanding relative directions or positions in the referenced drawing. As long as the relative direction or position is the same as that described in the referenced drawing using the term such as "upper" or "lower", in drawings other than the drawings of the present disclosure, actual products, manufacturing devices, and the like, components is not necessarily arranged in the same manner as in the referenced drawing. In the present disclosure "parallel" includes, unless otherwise stated, in a case in which two straight lines, sides, faces, or the like are in a range from 0° to about +5°. Further, in the present disclosure, "perpendicular" or "orthogonal" includes, unless otherwise stated, in a case in which two straight lines, sides, faces, or the like are in a range of about +5° from 90°.

When describing a direction with reference to an axis and a positive (+) direction or a negative (−) direction of the axis relative to a reference is important, description will be made by distinguishing + and − of the axis. Accordingly, a direction toward the + side of the x-axis will be referred to as a "+x direction" and a direction toward the − side of the x-axis will be referred to as a "−x direction". Similarly, directions toward the + sides of the y-axis and the z-axis will be referred to as a "+y direction" and a "+z direction" and directions toward the − sides of the y-axis and the z-axis will be referred to as a "−y direction" and a "−z direction". On the other hand, in a case in which the direction along a certain axis is important and whether the direction is the + direction or the − direction of the axis is inconsequential, the direction will simply be described as the "axis direction". Further, a plane including the x-axis and the y-axis will be referred to as an "xy plane", a plane including the x-axis and the z-axis will be referred to as an "xz plane", and a plane including the y-axis and the z-axis will be referred to as a "yz plane".

First Embodiment

FIG. **1** is a schematic perspective view of a light-emitting device **1000** of a first embodiment according to the present disclosure.

In FIG. **1**, arrows indicating an x-axis, a y-axis, and a z-axis that are mutually orthogonal are illustrated together. The arrows indicating these directions may also be illustrated in other drawings of the present disclosure. In a configuration exemplified in FIG. **1**, an outer shape of the light-emitting device **1000** is a basically rectangular shape in a top view. Each side of the rectangular outer shape is parallel to the x-axis or the y-axis illustrated in the drawing. The z-axis is perpendicular to the x-axis and the y-axis. Note that the outer shape of the light-emitting device **1000** may not be the rectangular shape in a top view.

FIG. **2**A is a schematic lateral side view of the light-emitting device **1000** when viewed in the y-axis direction, and FIG. **2**B is a schematic lateral side view of the light-emitting device **1000** when viewed in the x-axis direction. FIG. **2**C is a schematic top view of the light-emitting device **1000**. FIGS. **2**D and **2**E are schematic cross-sectional views taken along line **2**D-**2**D illustrated in FIG. **2**C and line **2**E-**2**E illustrated in FIG. **2**C, respectively.

As illustrated in FIGS. **2**C to **2**E, the light-emitting device **1000** includes a resin package **100**, a plurality of light-emitting elements **50**, a plurality of reflective members **150**, and a mold resin portion **60** including a plurality of lens portions **70**.

The resin package **100** includes a plurality of leads **11***a* to **13***b* and a resin member. In the present embodiment, the resin member is, for example, a first dark-colored resin member **40** formed of a dark-colored resin. The resin member may be formed of a dark-colored resin as a whole. Further, the resin member may be formed of a dark-colored resin in at least a portion exposed at a primary surface **100***a* of the resin package **100** in a plan view. The resin package **100** includes a plurality of recessed portions **20** including a first recessed portion **21**, a second recessed portion **22**, and a third recessed portion **23**. Each of the recessed portions **20** is defined by the plurality of leads **11***a* to **13***b* and the first dark-colored resin member **40**. An inner upper surface of each recessed portion **20** includes an exposed region **30** where a part of any one of the plurality of leads **11***a* to **13***b* is exposed.

Each of the plurality of light-emitting elements **50** is disposed in the exposed region **30** exposed in the corresponding one recessed portion **20**. The plurality of light-emitting elements **50** include a first light-emitting element **51** disposed in the first recessed portion **21**, a second light-emitting element **52** disposed in the second recessed portion **22**, and a third light-emitting element **53** disposed in the third recessed portion **23**.

Each of the plurality of reflective members **150** is disposed in a corresponding one recessed portion **20**. In a plan view, each reflective member **150** surrounds the light-emitting element **50** in the recessed portion **20**.

The plurality of lens portions **70** include a first lens portion **71**, a second lens portion **72**, and a third lens portion **73** respectively positioned above (light emission side, +z direction) the first light-emitting element **51**, the second light-emitting element **52**, and the third light-emitting element **53**. Each of the plurality of lens portions **70** has a convex shape protruding upwardly from the primary surface **100***a* of the resin package **100**.

In the present embodiment, the lens portions **70** are provided on the emission side of the corresponding light-emitting elements **50**. With this structure, light can be extracted in a frontward direction (+z direction) with high efficiency, making it possible to obtain the light-emitting device **1000** having high brightness. Further, in a plan view when viewed in the z-axis direction, the reflective member **150** surrounds the light-emitting element **50**, and thus the light emission of the light-emitting element **50** can be made into a point light source. Creating the point light source refers to light being emitted from the lateral surface of the light-emitting element **50** at 10% or less. With this structure, the size of each lens portion **70** can be reduced, making it possible to miniaturize the light-emitting device **1000**.

As illustrated in FIG. **2**C, in a plan view as viewed in the z-axis direction, a maximum width of each lens portion **70** is smaller than a maximum width of the inner upper surface of the corresponding recessed portion **20**, for example. That is, in a plan view, the maximum width of the first lens portion **71** is smaller than the maximum width of the inner upper surface of the first recessed portion **21**. Similarly, the maximum width of the second lens portion **72** is smaller than the maximum width of the inner upper surface of the second recessed portion **22**, and the maximum width of the third lens portion **73** is smaller than the maximum width of the inner upper surface of the third recessed portion **23**. In this description, "lens portion" is a portion having a convex shape and an optical function, and "the maximum width of the lens portion" is a maximum length passing through an optical axis (center) of the lens portion in a plan view. In FIG. **2**C, a position of the optical axis of the lens portion **70** is indicated by a center point C**1**. The center point C**1** of the lens portion **70** in a plan view is a center of a shape demarcated by the lens portion **70** in a plan view, that is, a center of a shape demarcated by the outer shape of the lens portion **70** (shape of an imaginary plane corresponding to a bottom surface of the lens portion **70** indicated by the dot-dash line in FIG. **2**E). For example, in a case in which a planar shape of the lens portion is elliptical as illustrated, the maximum width is a length WL of a major axis of the ellipse. When the planar shape of the lens portion is circular, a diameter of the circle is the maximum width.

Further, as illustrated in FIG. **2**E, among cross-sections including a line **71**L connecting a vertex T**1** of the first lens portion **71** and the center point C**1** of the first lens portion **71** (that matches the optical axis, here) in a plan view, in a first cross-section in which the width of the first lens portion **71** is smallest, the width (length WS in this example) of the first lens portion **71** may be no greater than 5 times a width (length w**1** in this example) of the first light-emitting element **51**. Similarly, among cross-sections including a line **72**L connecting a vertex T**2** of the second lens portion **72** and a center point C**2** of the second lens portion **72** in a plan view, in a second cross-section in which the width of the second lens portion **72** is smallest, the width of the second lens portion **72** may be no greater than 5 times a width of the second light-emitting element **52**. Among cross-sections including a line **73**L connecting a vertex T**3** of the third lens portion **73** and a center point C**3** of the third lens portion **73** in a plan view, in a third cross-section in which the width of the third lens portion **73** is smallest, the width of the third lens portion **73** is no greater than 5 times a width of the third light-emitting element **53**. In a case in which the first lens portion **71** to the third lens portion **73** are each elliptical or circular in a plan view, the center points C**1** to C**3** described above are the centers of the elliptical or circular shapes. In this example, the first cross-section to the third cross-section are all the cross-sections illustrated in FIG. **2**E (cross-section parallel to the yz plane). In FIG. **2**E, the center point C**1** of the lens portion **70** in a plan view is illustrated at the same height as a height of a base portion **61** in the z-axis direction to be described below. For example, in a case in which the lens portion **70** has an elliptical shape in a plan view, the width of the lens portion **70** in a cross-section including a minor axis of the elliptical shape (that is, the length WS of the minor axis of the elliptical shape) is no greater than 5 times the width of the light-emitting element **50**. In a case in which the lens portion **70** has a circular shape in a plan view, the width of the lens portion **70** in any one cross-section including a diameter of the circular shape (that is, length of the diameter of the circle) is no greater than 5 times the width of the light-emitting element **50**. Further, a height from the vertex of each lens portion **70** to an upper surface of the corresponding light-emitting element **50** in the z-axis direction is, for example, about 0.9 mm.

In the present embodiment, at least two of the first light-emitting element **51**, the second light-emitting element **52**, and the third light-emitting element **53** overlap each other in a lateral side view from one direction of the x-axis direction and the y-axis direction (here, y-axis direction). In a lateral side view from the x-axis direction orthogonal to the y-axis direction, the maximum width of each lens portion **70** may be no greater than 5 times the maximum width of the corresponding light-emitting element **50**. Further, when the light-emitting device **1000** is viewed in a plan view, the maximum width of each lens portion **70** in the direction (here, y-axis direction) in which the at least two light-emitting elements **50** overlap in a lateral side view may be no greater than 5 times the maximum width of the corresponding light-emitting element **50**. With such a configuration, the light-emitting device **1000** can be further miniaturized.

Note that "plan view" refers to a plan view as viewed in the +z-axis direction. "Top view" refers to a top view as viewed in the +z-axis direction. "Lateral side view" refers to a lateral side view as viewed in a direction orthogonal to any lateral surface of the external shape of the light-emitting device in a plan view. "At least two light-emitting elements overlapping in a lateral side view" can include not only a case in which these light-emitting elements fully overlap, but also a case in which the light-emitting elements partially overlap. For example, such overlapping includes a case in which a center of a certain light-emitting element overlaps another light-emitting element in a lateral side view. Note that the sizes and the shapes of the light-emitting elements in a lateral side view may all be the same, or may be different from one another.

In the example illustrated, the three light-emitting elements **50** overlap one another in a lateral side view from the y-axis direction. Each lens portion **70** has an elliptical planar shape with a major axis in the x-axis direction and a minor axis in the y-axis direction, and thus the maximum width of each lens portion **70** in a lateral side view from the x-axis direction is the length WS of the minor axis of the elliptical shape. Each light-emitting element **50** has a rectangular planar shape with sides parallel to the x-axis and the y-axis, and thus the maximum width of each light-emitting element **50** in a lateral side view from the x-axis direction is the length w**1** of the sides of the rectangular shape parallel to the y-axis. In this case, the length WS of the minor axis in the lens portion **70** may be no greater than 5 times the length w**1** of the side of the light-emitting element **50**.

Each of the components will be described in detail below.

Resin Package **100**

In the present embodiment, the resin package **100** is a surface-mounted package.

FIG. **2**F is a schematic top view illustrating the resin package **100** in which the light-emitting elements **50** are formed, and illustrates a structure in which the mold resin portion **60** and the reflective members **150** are removed from the light-emitting device **1000**. FIG. **2**G is a schematic cross-sectional view taken along line **2**G-**2**G illustrated in FIG. **2**F.

As illustrated in FIGS. **2**F and **2**G, the resin package **100** includes the primary surface **100**_a_, a back surface **100**_b_ opposite to the primary surface **100**_a_, and side portions **100**_c_ to **100**_f_ each positioned between the primary surface **100**_a_ and the back surface **100**_b_. The side portions **100**_c_, **100**_d_, **100**_e_, and **100**_f_ are positioned on the +y side, the −y side, the +x side, and the −x side, respectively. The back surface **100**_b_ of the resin package **100** includes a mounting surface of each of the leads **11**_a_ to **13**_b_. The mounting surface is used when fixing the light-emitting device **1000** to a mounting substrate. The back surface **100**_b_ is parallel to the xy plane. The mounting surface of the leads **11**_a_ to **13**_b_ may be parallel to the xy plane.

The resin package **100** includes the plurality of leads **11**_a_ to **13**_b_ and the first dark-colored resin member **40** that fixes at least a part of the plurality of leads **11**_a_ to **13**_b_. The first dark-colored resin member **40** is integrally formed with the plurality of leads **11**_a_ to **13**_b_.

In the illustrated configuration, a shape of the primary surface **100**_a_ of the resin package **100** is quadrangular in a top view. Each side of a quadrangular shape of the primary surface **100**_a_ is parallel to the x-axis or the y-axis. Note that the shape of the primary surface **100**_a_ in a top view may be a shape other than the quadrangular shape, and may be, for example, a substantially triangular shape, a substantially quadrangular shape, a substantially pentagonal shape, a substantially hexagonal shape, another polygonal shape, or a shape including a curved line such as a circular shape or an elliptical shape.

Recessed Portion **20**

As illustrated in FIGS. **2**F and **2**G, each of the plurality of recessed portions **20** is demarcated by an inner upper surface **20**_a_ and an inner lateral surface **20**_c_ surrounding the inner upper surface **20**_a_. The inner upper surface **20**_a_ of the recessed portion **20** is an upward facing surface (surface facing the +z side). The inner upper surface **20**_a_ is, for example, a bottom surface (inner upper surface) of the recessed portion **20**. The inner upper surface **20**_a_ of each recessed portion **20** is surrounded by a surface or a ridge line positioned above the inner upper surface **20***a* in a plan view and formed of the first dark-colored resin member **40**. In this example, in a plan view, the inner upper surface **20***a* of each recessed portion **20** is surrounded by an upper surface of a second resin portion **42** to be described below.

A part of any one of the plurality of leads **11***a* to **13***b* and the first dark-colored resin member **40** are exposed at the inner upper surface **20***a* of each recessed portion **20**. The inner lateral surface **20***c* of the recessed portion **20** is formed of the first dark-colored resin member **40**, for example. The inner lateral surface **21***c* (here, lateral surfaces s**1** and s**2**) of the first recessed portion **21** may be perpendicular to the inner upper surface **21***a* of the first recessed portion **21** or may be inclined relative to a vertical plane of the inner upper surface **21***a*.

As illustrated in FIG. **2**G, the inner upper surface **20***a* of each recessed portion **20** includes an element placement region dr in which the corresponding light-emitting element **50** is to be disposed. The inner upper surface **20***a* of each recessed portion **20** may further include connection regions wr**1** and wr**2** in which wires for electrically connecting the light-emitting element **50** and any one of the leads **11***a* to **13***b* are bonded.

As illustrated in FIG. **2**F, in the present embodiment, the plurality of recessed portions **20** include the first recessed portion **21**, the second recessed portion **22**, and the third recessed portion **23**. In the illustrated example, the first recessed portion **21** to the third recessed portion **23** are arrayed in one direction (y-axis direction in this example) in a plan view. A planar shape of each recessed portion **20** is an oval long in the x-axis direction. Note that the arrangement, the planar shape, and the like of each recessed portion **20** are not limited to those in the example illustrated. The recessed portion **20** may have, for example, an elliptical shape or a block shape such as a rectangle.

The inner upper surface **20***a* of each recessed portion **20** preferably has a shape that is longer in one direction than in another direction. A width PL of each inner upper surface **20***a* in a longer direction (x-axis direction in this example) may be greater than or equal to 1.5 times a width PS in a shorter direction (y-axis direction in this example). Note that, in a case in which the planar shape of the inner upper surface **20***a* is oval or elliptical, the width PL in the longer direction is the maximum width of the inner upper surface **20***a*. The width of the inner upper surface **20***a* of each of the first recessed portion **21** to the third recessed portion **23** in the longer direction is greater than the maximum width of each of the first lens portion **71** to the third lens portion **73** in the longer direction of each inner upper surface **20***a*, and the width of the inner upper surface **20***a* of each of the first recessed portion **21** to the third recessed portion **23** in the shorter direction is less than the maximum width of each of the first lens portion **71** to the third lens portion **73** in the shorter direction of each inner upper surface **20***a*. Here, the width PL in the longer direction is the longest width of straight lines passing through a center of the inner upper surface **20***a*, which has an oval shape, of the recessed portion **20** and parallel to the x-axis. Further, the width PS in the shorter direction is the longest width of straight lines passing through the center of the inner upper surface **20***a* of the recessed portion **20** and parallel to the y-axis.

By lengthening the shape of the inner upper surface **20***a* of the recessed portion **20** in one direction (here, x-axis direction), it is possible to reduce lifting of the light-emitting element **50** while ensuring the connection regions wr**1** and wr**2**, and a nozzle arrangement region on the +x side and the −x side of the light-emitting element **50**. By lengthening the shape of the inner upper surface **20***a* of the recessed portion **20** in one direction (here, x-axis direction), it is possible to ensure the region for arranging nozzles used to apply the reflective member **150** in the recessed portion **20** ("nozzle arrangement region" to be described below). Further, it is possible to arrange the connection regions wr**1** and wr**2** for wire bonding in the recessed portion **20**. Furthermore, by suppressing the width PS of the inner upper surface **20***a* of the recessed portion **20** in the shorter direction to a smaller size, it is possible to reduce a volume (application area) of the reflective member **150**. When the volume of the reflective member **150** is large, stress applied to the light-emitting element **50** increases in a curing step when the mold resin portion **60** is formed, and the light-emitting element **50** may lift from the lead surface. Therefore, by making the width PS of the recessed portion **20** in the shorter direction (here, y-axis direction) small relative to the width of the recessed portion **20** in the longer direction (here, x-axis direction), it is possible to reduce a volume of a portion of the reflective member **150** positioned on the +y side and the −y side of the light-emitting element **50**, and thus reduce the stress applied to the light-emitting element **50** from the reflective member **150** when forming the mold resin portion **60**.

In a plan view, the width PL of the inner upper surface **20***a* of each recessed portion **20** in the longer direction may be greater than or equal to 3 times, for example, the maximum width of the light-emitting element **50** along the longer direction of this recessed portion **20**. This makes it possible to more easily connect the wire in the recessed portion **20**, and apply the reflective member **150**. From the perspective of miniaturization of the light-emitting device **1000**, the width PL of the inner upper surface **20***a* of each recessed portion **20** in the longer direction (x-axis direction in this example) may be no greater than 10 times, for example, the maximum width of the light-emitting element **50**. On the other hand, the maximum width of the inner upper surface **20***a* of the recessed portion **20** in the shorter direction (here, y-axis direction) may be in a range from 1.3 times to 2 times, for example, the maximum width of light-emitting element **50** along the shorter direction of the recessed portion **20**. When it is 1.3 times or greater, the reflective member **150** can be disposed with a predetermined thickness on the +y side and the −y side of the light-emitting element **50** as well. When it is no greater than 2 times, the lifting of the light-emitting element **50** caused by the reflective member **150** as described above can be more effectively reduced.

A depth of each recessed portion **20** is not particularly limited, but is preferably greater than a thickness of the light-emitting element **50**. The depth of each recessed portion **20** is a distance from a surface of the lead exposed at the inner upper surface **20***a* of the recessed portion **20** to an uppermost portion of the inner lateral surface **20***c* of the recessed portion **20** along the z-axis direction. The depth of the recessed portion **20** may be, for example, in a range from 0.1 mm to 0.25 mm (in a range from 1 times to 2.5 times the thickness of the light-emitting element **50**).

Leads **11***a* to **13***b*

Each of the plurality of leads **11***a* to **13***b* is conductive and functions as an electrode for supplying power to the corresponding light-emitting element **50**.

In a configuration exemplified in FIG. **2**G, each of the plurality of leads **11***a* and **11***b* is bent so as to include a portion **91** positioned on the primary surface **100***a* of the resin package **100**, a portion **92** positioned on the back surface **100***b* of the resin package **100**, and a portion **93** positioned between these portions **91** and **92**, and extending along the side portions (here, side portions **100***e* and **100***f*) of the resin package **100**. At least a part of the portion **92** of each of the leads **11***a* and **11***b* is exposed at the back surface **100***b* of the resin package **100** and forms the mounting surface used when fixing the light-emitting device **1000** to the mounting substrate. The mounting surfaces of the leads **11***a* and **11***b* may be flush with a lowermost surface of the first dark-colored resin member **40**. This is because, by being flush, it is possible to suppress an inclination of the light-emitting device when the light-emitting device is mounted on a mounting substrate. Note that the other leads **12***a*, **12***b*, **13***a*, and **13***b* can also have structures similar to that of the leads **11***a* and **11***b* illustrated in FIG. **2**G.

As illustrated in FIG. **2**F, in the present embodiment, the lead **11***a* and the lead **11***b* constitute a first lead pair, the lead **12***a* and the lead **12***b* constitute a second lead pair, and the lead **13***a* and the lead **13***b* constitute a third lead pair.

In the primary surface **100***a* of the resin package **100**, the first lead pair, the second lead pair, and the third lead pair are arrayed in the y-axis direction. In the primary surface **100***a*, end portions of the two leads constituting each of the lead pairs are spaced apart from each other and disposed facing each other.

The light-emitting elements **50** are respectively disposed at the one leads **11***a*, **12***a*, and **13***a* of the first lead pair, the second lead pair, and the third lead pair, respectively. In the primary surface **100***a* of the resin package **100**, the leads **11***a*, **12***a*, and **13***a* may be longer than the other leads **11***b*, **12***b*, and **13***b*. With this structure, in a case in which the primary surface **100***a* of the resin package **100** has a polygonal (for example, quadrangular) planar shape, for example, the light-emitting element **50** can be disposed on (or near) a straight line connecting a center point of one side of the polygon in a plan view and a point positioned at a substantially center of the primary surface **100***a* in a plan view. In this example, the planar shape of the primary surface **100***a* is rectangular and, in a plan view, the light-emitting element **50** is disposed on a straight line passing through the respective center points of two sides parallel to the x-axis of the rectangle.

The one lead **11***a* of the first lead pair includes an exposed region **30***a* at the inner upper surface **20***a* of the first recessed portion **21**. The one lead **12***a* of the second lead pair includes an exposed region **30***a* at the inner upper surface **20***a* of the second recessed portion **22**. The one lead **13***a* of the third lead pair includes an exposed region **30***a* at the inner upper surface **20***a* of the third recessed portion **23**. Each exposed region **30***a* includes the element placement region dr in which the corresponding light-emitting element **50** is disposed and the first connection region wr**1**. The other lead **11***b* of the first lead pair includes an exposed region **30***b* at the inner upper surface **20***a* of the first recessed portion **21**. The other lead **12***b* of the second lead pair includes an exposed region **30***b* at the inner upper surface **20***a* of the second recessed portion **22**. The other lead **13***b* of the third lead pair includes an exposed region **30***b* at the inner upper surface **20***a* of the third recessed portion **23**. Each exposed region **30***b* includes the second connection region wr**2**. The first connection region wr**1** and the second connection region wr**2** are each a region in which the corresponding light-emitting element **50** is electrically connected to a positive or negative electrode by a wire. In each recessed portion **20**, the element placement region dr may be positioned between the first connection region wr**1** and the second connection region wr**2** in a plan view.

The leads **11***a* to **13***b* may be composed of a base material and a metal layer covering a surface of the base material. Examples of the base material include metals such as copper, aluminum, gold, silver, iron, nickel, alloys thereof, phosphor bronze, or ferrous copper. These base materials may have a single-layer structure or a layered structure (a clad material, for example). Copper may be used for the base material. The metal layer is, for example, the plating layer. Examples of the metal layer include silver, aluminum, nickel, palladium, rhodium, gold, copper, or alloys thereof. With the leads **11***a* to **13***b* including such a metal layer, light reflectivity and/or bonding properties with metal wires (described below) and the like of the leads **11***a* to **13***b* can be improved. For example, a lead including a silver-plated layer on a surface of a copper alloy that serves as the base material may be used.

First Dark-Colored Resin Member **40**

The first dark-colored resin member **40** has insulating properties for electrically isolating the light-emitting element **50** from the outside. Preferably, at least a portion of the first dark-colored resin member **40** positioned proximate to the primary surface **100***a* of the resin package **100**, that is, proximate to a light emission observation surface, is a dark color such as black or gray. The first dark-colored resin member **40** may be colored to the dark color, for example. Alternatively, the first dark-colored resin member **40** may be obtained by printing dark-colored ink on a white-colored resin. Alternatively, the first dark-colored resin member **40** may be formed in two colors of a dark-colored resin and a white-colored resin. With this structure, it is possible to make external light or the like less likely to reflect on the primary surface **100***a* of the resin package **100**. Thus, a contrast of the light-emitting device **1000** can be improved. Note that, in this description, "dark color" refers to a color having a color value of 4.0 or less in the Munsell color system (20 hues). The hue is not particularly limited, and the chroma may be freely determined as necessary. Preferably, the color value is 4.0 or less and the chroma is 4.0 or less.

In the example illustrated in FIGS. **2**F and **2**G, in the primary surface **100***a*, the first dark-colored resin member **40** includes a first resin portion **41** exposed at the inner upper surface of each recessed portion **20**, and the second resin portion **42** surrounding the inner upper surface of each recessed portion **20**. An upper surface of the second resin portion **42** is positioned above (+z direction) an upper surface of the first resin portion **41**. The second resin portion **42** is a wall surrounding the recessed portion **20**, and an inner wall of the wall formed of the second resin portion **42** may be the inner lateral surface **20***c* of the recessed portion **20**. In the primary surface **100***a*, the first dark-colored resin member **40** may further include a third resin portion **43** positioned outward of the second resin portion **42**. An upper surface of the third resin portion **43** is positioned below (−z direction) the second resin portion **42**. The third resin portion **43** may include a groove **44** positioned between two adjacent recessed portions **20**. The groove **44** extends in the x-axis direction from the side portion **100***e* to the side portion **100***f* of the resin package **100**. A portion of the upper surface of the third resin portion **43** other than the groove **44** may be positioned above the first resin portion **41**, and an inner upper surface of the groove **44** may be positioned below the first resin portion **41**. An adhesion between the mold resin portion **60** and the first dark-colored resin member **40** can be enhanced by the groove **44**.

The first dark-colored resin member **40** may include a hole **45** positioned between two adjacent recessed portions **20** and passing through the resin package **100** in the z-axis direction. In this example, two holes **45** are disposed between the first recessed portion **21** and the second recessed portion **22**, and two holes **45** are disposed between the second recessed portion **22** and the third recessed portion **23**, in a plan view. A planar shape of the hole **45** is circular in this example, but may be elliptical or rectangular.

In the side portion of the resin package **100**, the first dark-colored resin member **40** may include a step facing upward (that is, facing the +z direction). The step of the first dark-colored resin member **40** can support a mold that is used during formation of the mold resin portion **60** (refer to FIG. **12**F). By including a step, it is possible to reduce defects such as resin leakage that occur due to a gap formed between the mold and the resin package **100**. In this example, the resin package **100** includes a step surface st**1** extending from +x side end portion of the side portion **100***c* through the side portion **100***e* and to +x side end portion of the side portion **100***d*, and a step surface st**2** extending from −x side end portion of the side portion **100***c* through the side portion **100***f* and to −x side end portion of the side portion **100***d*. In this description, in an outer lateral surface having a stepped shape in a cross-sectional view, a surface corresponding to a tread of a step is referred to as a "step surface". A step surface is not formed in central portions of the side portions **100***c*, **100***d*. Therefore, in a top view, the resin package **100** includes a cutout portion in centers of the side portion **100***c* and the side portion **100***d*.

The first dark-colored resin member **40** has a shape with which the first dark-colored resin member **40** can hold at least a part of the plurality of leads **11***a* to **13***b*, and the shape is not limited to that illustrated in the drawings. Preferably, the first dark-colored resin member **40** integrally fixes the plurality of leads **11***a* to **13***b* (here, three pairs of leads). With the leads **11***a* to **13***b* being firmly fixed by the first dark-colored resin member **40**, vibration of the leads **11***a* to **13***b* can be reduced when the mold resin portion **60** is formed by a transfer molding method.

As a material of the first dark-colored resin member **40**, a material having a small coefficient of thermal expansion and an excellent adhesion performance with the mold resin portion **60** may be selected. The coefficient of thermal expansion of the first dark-colored resin member **40** may be substantially equal to the coefficient of thermal expansion of the mold resin portion **60** or, taking into account an influence of heat from the light-emitting elements **50**, may be smaller than the coefficient of thermal expansion of the mold resin portion **60**.

The first dark-colored resin member **40** can be formed by using a thermoplastic resin, for example. As the thermoplastic resin, a thermoplastic resin, such as an aromatic polyamide resin, a polyphthalamide resin (PPA), a sulfone resin, a poly amide-imide resin (PAI), a polyketone resin (PK), a polycarbonate resin, polyphenylene sulfide (PPS), a liquid crystal polymer (LCP), an ABS resin, and a PBT resin, can be used. Note that a thermoplastic resin containing glass fibers may also be used as a thermoplastic material. In this manner, by adding the glass fibers to the thermoplastic resin, it is possible to form a resin package having a high rigidity and a high strength. Note that, in this description, the "thermoplastic resin" refers to a material having a linear polymer structure that softens and then becomes liquid when heated and that solidifies when cooled. Examples of such a thermoplastic resin include styrene-based, acrylic-based, cellulose-based, polyethylene-based, vinyl-based, polyamide-based, and fluorocarbon-based resins.

Alternatively, the first dark-colored resin member **40** may be formed by using a thermosetting resin such as a silicone resin or an epoxy resin, for example.

A colorant that colors the first dark-colored resin member **40** to a dark color may be added to the resin material of the first dark-colored resin member **40**. Various dyes and pigments are suitably used as the colorant. Specific examples include Cr_2O_3, MnO_2, Fe_2O_3, and carbon black. An amount of the colorant to be added may be, for example, in a range from 0.3% to 1.5%, and preferably in a range from 0.5% to 1.0% with respect to the resin material that forms the base material. As an example, as the thermoplastic resin material, a thermoplastic resin material in which a small amount of dark-colored particles such as carbon particles is added to the polyphthalamide (PPA) may be used.

Reflective Member **150**

As illustrated in FIGS. **2**C to **2**E, the reflective member **150** includes a first reflective member **151** disposed in the first recessed portion **21**, a second reflective member **152** disposed in the second recessed portion **22**, and a third reflective member **153** disposed in the third recessed portion **23**.

The reflective member **150** surrounds each light-emitting element **50** in the corresponding recessed portion **20**. The reflective member **150** reflects light emitted from a lateral surface of the light-emitting element **50** and guides the light to above the light-emitting element **50**. Accordingly, the use efficiency of the light emitted from the light-emitting elements **50** can be improved.

In this description, "the reflective member surrounding the light-emitting element" includes a case in which the reflective member **150** is positioned close to the lateral surface of the light-emitting element **50** in a plan view. The reflective member **150** may be in direct contact or may not be in contact with the lateral surface of the light-emitting element **50**. Preferably, the reflective member **150** is in contact with the lateral surface of the light-emitting element **50**. More preferably, the reflective member **150** surrounds the lateral surface of the light-emitting element **50** in a plan view. It is further preferred that the reflective member **150** is provided in contact with entire lateral surface of the light-emitting element **50**. With the reflective member **150** in contact with entire lateral surface of the light-emitting element **50** (all four side portions positioned on the +x, −x, +y, and −y sides in this example), it is possible to more effectively reduce leakage, in the ±x directions and the ±y directions, of the light emitted from the light-emitting element **50**.

In the example illustrated in FIGS. **2**C to **2**E, the reflective member **150** is disposed over the entire region of the inner upper surface **20***a* of the recessed portion **20** other than the region in which the light-emitting element **50** is disposed, in a plan view. For example, in a plan view, the entire arrangement region of the reflective member **150** is positioned outside the corresponding lens portion **70**. The reflective member **150** may be in contact with the inner lateral surface **20***c* of the recessed portion **20**.

The reflective member **150** can be disposed between the inner upper surface **20***a* of the recessed portion **20** and a lower surface of the light-emitting element **50** as well. For example, the reflective member (resin including a light reflective material, for example) **150** may be applied in advance in the recessed portion **20**, and the light-emitting element **50** may then be disposed thereon. This makes it possible to more effectively reduce leakage, in the −z direction, of the light emitted from the light-emitting element **50**. Further, a die bond resin is not required to bond the light-emitting element **50** to the primary surface **100***a*.

In the primary surface **100***a* of the resin package **100**, the reflective member **150** is preferably not disposed on a region (second resin portion **42** and third resin portion **43**, for example) positioned outside the recessed portion **20**.

In a plan view, a length t of the reflective member **150** covering a lateral surface of the light-emitting element **50**, from a lateral surface of the light-emitting element **50** to a peripheral edge of the reflective member **150**, along a normal line direction of the lateral surface of the light-emitting element **50** may be 10 μm or greater such as, for example, about 50 μm, or may be about 100 μm. In a plan view, in a case in which the light-emitting element **50** is rectangular, the lengths t described above of the portions of the reflective member **150** positioned across the two mutually facing sides of the light-emitting element **50** are preferably about the same.

For example, as illustrated in FIG. **2**H, in a case in which the light-emitting element **50** includes two lateral surfaces **50***s***1** and **50***s***2** parallel to the x-axis and two lateral surfaces **50***s***3** and **50***s***4** parallel to the y-axis, lengths t**1** and t**2** of the portions of the reflective member **150** covering the lateral surfaces **50***s***1** and **50***s***2** of the first light-emitting element **51**, respectively, may be the same. Similarly, lengths t**3** and t**4** of the portions of the reflective member **150** covering the lateral surfaces **50***s***3** and **50***s***4** of the light-emitting element **50**, respectively, may be the same. When the lengths t**3** and t**4** are the same, the light leakage from the lateral surface **50***s***3** on the +x side and the lateral surface **50***s***4** on the −x side of the light-emitting element **50** can be suppressed to the same degree by the reflective member **150**, and when the lengths t**1** and t**2** are the same, light leakage from the lateral surface **50***s***1** on the −y side and the lateral surface **50***s***2** on the +y side of the light-emitting element **50** can be suppressed to the same degree. Thus, the influence of the reflective member **150** on light distribution can be suppressed. In a case in which the lengths t**1** to t**4** are, for example, 50 μm or less, the lengths t**1** to t**4** can be set as described above, making it possible to reduce the influence on the light distribution more effectively. Further, when the lengths t**1**, t**2** are the same and the lengths t**3**, t**4** are the same, an asymmetry of stress applied to the light-emitting element **50** when the reflective member **150** is heated can be reduced. The "asymmetry of stress" here refers to a large stress being applied to only one of the two lateral surfaces **50***s***3** and **50***s***4** positioned on the +x sides of the light-emitting element **50**, or a large stress being applied to only one of the two lateral surfaces **50***s***1** and **50***s***2** positioned on the +y sides of the light-emitting element **50**. With this structure of reducing the asymmetry of stress, it is possible to reduce the lifting of the reflective member **150** and the light-emitting element **50** from the leads **11***a*, **12***a*, and **13***a*. For example, in a case in which the lengths t**1** to t**4** are, for example, 50 μm or greater, the lengths t**1** to t**4** can be set as described above, and thus the floating of the light-emitting element **50** and the like can be reduced more effectively. As illustrated in FIGS. **2**D and **2**E, in a cross-sectional view passing through a center line of the light-emitting element **50** and parallel to the xz plane or the yz plane, shapes of the reflective members **150** positioned on both sides of each light-emitting element **50** are preferably generally line symmetrical with respect to the center line of the light-emitting element **50**. With the shapes of the reflective members **150** being line symmetrical, a thickness of a precoating resin **180** to be described below can be made uniform.

Note that the reflective member **150** is disposed in close proximity to the lateral surface of the light-emitting element **50**, and may not be disposed over the entire inner upper surface of the recessed portion **20**. For example, as exemplified in FIGS. **3**A and **3**B, a light-emitting element **50***a* with the lateral surface covered by the reflective member **150** may be prepared, and the light-emitting element **50***a* may then be disposed on the inner upper surface **20***a* of the recessed portion **20**. Alternatively, as will be described below, a resin wall for controlling the position of the reflective member **150** may be provided in the recessed portion **20**. With this structure, an area of a region of the inner upper surface **20***a* of the recessed portion **20** in which the reflective member **150** is disposed can be made smaller. For example, the entire arrangement region of each reflective member **150** may be positioned inside the corresponding lens portion **70**. Specifically, in a plan view, the first reflective member **151** may be positioned inside the first lens portion **71**, the second reflective member **152** may be positioned inside the second lens portion **72**, and the third reflective member **153** may be positioned inside the third lens portion **73**.

The reflective member **150** may be a reflective resin, for example. The reflective resin includes a resin serving as a base material and a light reflective material dispersed in the resin. As the base material, a light-transmissive material such as an epoxy resin, a silicone resin, a resin obtained by mixing them, glass, or the like can be used. From the perspective of light resistance and ease of formation, a silicone resin is preferably selected as the base material.

As the light reflective material, titanium oxide, silicon oxide, zirconium oxide, yttrium oxide, yttria-stabilized zirconia, potassium titanate, aluminum oxide, aluminum nitride, boron nitride, mullite, and the like can be used. In the present embodiment, for example, titanium oxide is used. A concentration of the light reflective material in the reflective member **150** is preferably in a range from 10 wt. % to 70 wt. %. The reflective member **150** preferably includes titanium oxide as the light reflective material. Further, the reflective member **150** may include a glass filler or the like in order to reduce expansion and contraction caused by heat of the resin of the base material. A concentration of the glass filler is preferably greater than 0 wt. % and less than 30 wt. %. Note that the concentrations of the light reflective material, the glass filler, and the like are not limited thereto.

The reflective member **150** is a member that reflects the light emitted from the light-emitting element **50**. The reflective member **150** is preferably formed of a material having a reflectance of 80% or greater with respect to the light emitted from the light-emitting element **50**. Note that the reflective member **150** may be a member that blocks the light emitted from the light-emitting element **50**. For example, as the reflective member **150**, a single layer film or multilayer film made of a metal, or a multilayer film (dielectric multilayer film) formed by layering a plurality of dielectrics of two or more types can be used. As the dielectric multilayer film, a distributed Bragg reflector (DBR) film, for example, may be used.

Light-Emitting Element **50**

The light-emitting element **50** is a semiconductor light-emitting element such as a semiconductor laser or a light-emitting diode. An emission wavelength of each of the light-emitting elements **50** can be selected as desired.

A shape of the light-emitting element **50** in a plan view is, for example, rectangular or hexagonal. A size of each light-emitting element **50** is not particularly limited. Vertical and horizontal lengths of the light-emitting element **50** are, for example, in a range from 0.1 mm to 1 mm. For example, each light-emitting element **50** has a square shape with one side being 320 μm in a plan view.

In the present embodiment, the plurality of light-emitting elements **50** include the first light-emitting element **51** that emits first light, the second light-emitting element **52** that emits second light having a wavelength shorter than that of the first light, and the third light-emitting element **53** that emits third light having a wavelength shorter than that of the second light. The emission wavelength of each of the light-emitting elements **50** may be selected so as to obtain white light or mixed-color light of a light bulb color when the plurality of light-emitting elements **50** are illuminated. For example, the first light-emitting element **51** may be a red light-emitting element that emits red light, the second light-emitting element **52** may be a green light-emitting element that emits green light, and the third light-emitting element **53** may be a blue light-emitting element that emits blue light. The combination of the number of light-emitting elements and the emitted light colors is merely an example and is not limited to this example. The three light-emitting elements **50** may emit light having the same wavelength. For example, three blue light-emitting elements may be selected by using phosphors to be described below.

As the blue and green light-emitting elements, light-emitting elements using ZnSe or a nitride-based semiconductor ($In_XAl_YGa_{1-X-Y}N$, $0 \leq X$, $0 \leq Y$, $X+Y \leq 1$) can be used. For example, a light-emitting element in which a semiconductor layer including GaN is formed on a support substrate such as sapphire may be used. As the red light-emitting element, a GaAs-based, AlInGaP-based, or AlGaAs-based semiconductor or the like can be used. For example, a light-emitting element in which a semiconductor layer including AlInGaP is formed on a support substrate such as silicon, aluminum nitride, or sapphire may be used. Furthermore, a semiconductor light-emitting element made from materials other than above can be used. The composition, emitted light color, size, number, and the like of the light-emitting element can be selected as appropriate in accordance with an intended purpose.

Further, by disposing phosphor, which performs wavelength conversion of light emitted from a semiconductor chip, around the semiconductor chip composed of a nitride-based semiconductor or the like, any desired light emission can be obtained. In this description, the "light-emitting element **50**" includes not only the semiconductor chip composed of the nitride-based semiconductor or the like, but also an element composed of the semiconductor chip and the phosphor. Specific examples of the phosphor include yttrium-aluminum-garnet activated by cerium, lutetium-aluminum-garnet activated by cerium, nitrogen containing calcium aluminosilicate activated by europium and/or chromium (part of the calcium can be substituted with strontium), sialon activated by europium, silicate activated by europium, strontium aluminate activated by europium, and potassium fluorosilicate activated by manganese. As an example, the first light-emitting element **51**, the second light-emitting element **52**, and the third light-emitting element **53** may each include a semiconductor chip that emits blue light. In this case, by disposing the phosphor around the semiconductor chip in each of at least two of those light-emitting elements, the emitted light colors of the first light-emitting element **51**, the second light-emitting element **52**, and the third light-emitting element **53** can be caused to be different from each other.

Each of the first light-emitting element **51**, the second light-emitting element **52**, and the third light-emitting element **53** can be bonded, using a bonding member such as a resin, solder, or a conductive paste, to the exposed region **30** of any of the plurality of leads **11***a* to **13***b*.

The first light-emitting element **51** to the third light-emitting element **53** may be respectively disposed in the exposed regions **30** of three different leads (here, leads **11***a*, **12***a*, and **13***a*). With this structure, heat dissipation paths of the first light-emitting element **51**, the second light-emitting element **52**, and the third light-emitting element **53** can be separated from each other, and thus heat generated by each of the light-emitting elements **50** can be efficiently dissipated.

As illustrated in FIG. **2**D, positive and negative electrodes of the first light-emitting element **51** are respectively electrically connected to the lead **11***a* and the lead **11***b* of the first lead pair by a pair of wires **81** composed of wires **81***a* and **81***b*. Further, one end of the wire **81***a* is connected to a part (connection region wr**1**) of the exposed region **30***a* of the lead **11***a*, and the other end is connected to one of the positive and negative electrodes of the first light-emitting element **51**. Further, one end of the wire **81***b* is connected to a part (connection region wr**2**) of the exposed region **30***b* of the lead **11***b*, and the other end is connected to the other of the positive and negative electrodes of the first light-emitting element **51**. Similarly, as illustrated in FIG. **2**C, positive and negative electrodes of the second light-emitting element **52** and the third light-emitting element **53** are respectively electrically connected to the leads of the second lead pair and the third lead pair by a pair of wires **82**, **83**.

As the wires **81** to **83**, metal wires made of gold, silver, copper, platinum, aluminum, or alloys thereof can be used. Among these, it is preferable to use a gold wire having excellent ductility, or a gold-silver alloy wire having a higher reflectivity than that of the gold wire.

In the configuration illustrated in FIG. **2**C, in a lateral side view from the y-axis direction, the first light-emitting element **51** to the third light-emitting element **53** overlap one another as described above. Note that the arrangement of the first light-emitting element **51** to the third light-emitting element **53** is not limited to the illustrated example. For example, as exemplified in FIG. **4**, in a plan view, one light-emitting element **52** positioned in a center in the y-axis direction may be shifted from a line connecting the centers of the other two light-emitting elements **51** and **53**. In such a configuration, in a lateral side view from the y-axis direction, only the two light-emitting elements **51** and **53** of the three light-emitting elements may overlap each other.

Precoating Resin **180**

As exemplified in FIGS. **21** and **2**J, the light-emitting device **1000** may further include the precoating resin **180** having light transmissivity, between the first reflective member **151** as well as the first light-emitting element **51** and the mold resin portion **60** in the first recessed portion **21**. Similarly, the precoating resin **180** may be provided respectively between the second reflective member **152** as well as the second light-emitting element **52** and the mold resin portion **60** in the second recessed portion **22**, and between the third reflective member **153** as well as the third light-emitting element **53** and the mold resin portion **60** in the third recessed portion **23**. In the present embodiment, the upper surfaces of the second resin portions **42** each surrounding the first recessed portion **21** to the third recessed portion **23** can be respectively used to form the precoating resins **180**, having a certain thickness, in the first recessed portion **21** to the third recessed portion **23**. The thickness of the precoating resin **180** may be, for example, about 100 μm. The precoating resin **180** preferably has substantially the same thickness on the ±y sides of the light-emitting element **50**, and substantially the same thickness on the ±x sides of the light-emitting element **50**, in a plan view. More preferably, the thickness is entirely uniform in the first recessed portion **21**. With the thickness of the precoating resin **180** being constant, the light distribution can be easily controlled. Further, the upper surface of the precoating resin **180** (interface between the precoating resin **180** and the mold resin portion **60**) can be made substantially flat, making it possible to less likely reduce the controllability of the light distribution by the lens portion **70**. Further, a thickness from the upper surface of each light-emitting element **50** to the precoating resin is uniform, making it possible to keep the mold resin portion **60** to be described below away from the light and the heat emitted by the light-emitting element **50**, and thus further enhance reliability.

The precoating resin can cover the reflective member **150** and the light-emitting element **50**, for example. As the precoating resin, a resin having excellent high heat resistance and high weather resistance (epoxy resin, silicone resin, or resin obtained by mixing them, for example) can be used. As will be described below, a resin (colored resin member) containing a colorant may be used as the precoating resin.

Mold Resin Portion

The mold resin portion **60** includes the plurality of lens portions **70** integrally formed. In the present embodiment, the mold resin portion **60** includes the base portion **61** and the plurality of lens portions **70**. The base portion **61** and the lens portions **70** are integrally formed. Note that the base portion of the mold resin portion **60** and the lens portions **70** may be separate.

Base Portion **61**

As illustrated in FIGS. **2**A to **2**E, the base portion **61** of the mold resin portion **60** covers the primary surface **100***a* of the resin package **100** and the plurality of light-emitting elements **50**. The base portion **61** has functions of sealing the light-emitting elements **50**, and of holding the lens portions **70** integrally formed with the base portion **61** in predetermined positions.

In the present embodiment, the base portion **61** includes, for example, the upper surface **61***a* positioned above the primary surface **100***a* of the resin package **100**. The upper surface **61***a* may be one size larger than the primary surface **100***a* of the resin package **100**.

The base portion **61** includes a lateral surface portion **61***b* covering at least a part of the side portions **100***c* to **100***f* of the resin package **100**. In the illustrated example, the lateral surface portion **61***b* of the base portion **61** is in contact with the step surfaces st**1** and st**2** formed in the side portions **100***c* to **100***f* of the resin package **100**. Further, a part of the lateral surface portion **61***b* of the base portion **61** covers a portion of each of the side portions **100***c* and **100***d* where a step surface is not formed and extends downward (−z direction) of the step surfaces st**1** and st**2**. A lowermost end of the base portion **61** may be flush with the back surface **100***b* of the resin package **100**.

Apart of the base portion **61** is positioned in interiors of the grooves **44** and the holes **45** of the first dark-colored resin member **40**. Accordingly, peeling, shifting, and the like of the lens portion **70** can be reduced, and the lens portion **70** can be held more stably. In a cross-sectional view, a part of the base portion **61** disposed inside the hole **45** is preferably disposed below (−z direction) the step surface st**1** or the step surface st**2** of the resin package **100**, and more preferably disposed down to a position of the back surface **100***b* of the resin package **100**. Note that the shape, the light transmittance, and the like of the base portion **61** are not particularly limited.

Lens Portion **70**

As illustrated in FIGS. **2**A to **2**E, each of the plurality of lens portions **70** has a convex shape protruding upwardly (+z direction) from an upper surface of the base portion **61**. The lens portion **70** has a light distribution function of controlling a direction and a distribution of the light to be emitted.

The planar shape of each lens portion **70** is, for example, elliptical or circular. In the illustrated example, the planar shape of each lens portion **70** is elliptical, with a major axis of the elliptical shape extending in the x-axis direction and a minor axis of the elliptical shape extending in the y-axis direction. Thus, a light distribution that is wide in the x-axis direction and narrow in the y-axis direction can be obtained. The light-emitting device **1000** having such a light distribution can be particularly suitably used in a display device such as an LED display. Note that, in a lateral side view as viewed in the x-axis direction or the y-axis direction, an outer edge of the lens portion **70** may have a linear portion in addition to a curved portion such as an elliptical arc shape or an arc shape. The linear portion may be positioned between the curved portion and the upper surface **61***a* of the base portion **61**. For example, the lens portion **70** may have a shape in which a part of a sphere (hemisphere, for example) is disposed on a circular truncated cone, or a shape in which a part of an ellipsoid is disposed on an elliptical truncated cone.

Each of the plurality of lens portions **70** is disposed correspondingly to one of the light-emitting elements **50** in a one-to-one relationship. An optical axis of each lens portion **70** may coincide with a center of the corresponding light-emitting element **50** (center of the light-emitting surface). With this structure, controllability of the light distribution of the light-emitting device **1000** can be further improved.

The major axis of the elliptical shape of each lens portion **70** may be parallel to the longer direction of the corresponding recessed portion **20**, and the minor axis of the elliptical shape of each lens portion **70** may be parallel to the shorter direction of the corresponding recessed portion **20**. Further, the minor axis of the elliptical shape of each lens portion **70** may be parallel to the array direction of the lens portions **70** (here, y-axis direction). With this structure, the light-emitting device **1000** can be further miniaturized. Furthermore, in a case in which the light-emitting element **50** has a rectangular shape, the longer direction of the light-emitting element **50** and the major axis of the elliptical shape of the lens portion **70** may be parallel, and the shorter direction of the light-emitting element **50** and the minor axis of the elliptical shape of the lens portion **70** may be parallel.

Note that the shape and arrangement of each of the lens portions **70** in a plan view can be selected as appropriate taking into account light distribution performance, light collection performance, and the like.

In the present embodiment, the first light emitted from the first light-emitting element **51** is transmitted through the first lens portion **71** and exits from an emission surface of the light-emitting device **1000**. The direction of emission and the distribution of the first light are controlled by the first lens portion **71**. Similarly, the second light emitted from the second light-emitting element **52** is transmitted through the second lens portion **72**, and the third light emitted from the third light-emitting element **53** is transmitted through the third lens portion **73**. The second lens portion **72** and the third lens portion **73** control the light distribution of the second light and the third light, respectively.

As illustrated in FIG. **2**C, in a plan view, the first lens portion **71** may overlap the first light-emitting element **51** and at least a part of the first reflective member **151**. Similarly, the second lens portion **72** may overlap the second light-emitting element **52** and at least a part of the second reflective member **152**, and the third lens portion **73** may overlap the third light-emitting element **53** and at least a part of the third reflective member **153**.

Further, in the present embodiment, in a plan view, the maximum width of each lens portion **70** is smaller than the maximum width of the corresponding recessed portion **20**, and thus a part of the inner upper surface **20***a* of each recessed portion **20** can be positioned outside the lens portion **70**. As illustrated, in a plan view, a part of the first reflective member **151** in the first recessed portion **21** may be positioned outside the first lens portion **71**. Similarly, a part of the second reflective member **152** in the second recessed portion **22** may be positioned outside the second lens portion **72**, and a part of the third reflective member **153** in the third recessed portion **23** may be positioned outside the third lens portion **73**.

In a case in which each lens portion **70** has an elliptical shape with a major axis and a minor axis in a plan view, the length WL of the major axis of the elliptical shape may be smaller than the width PL of the corresponding recessed portion **20** in the longer direction, and the length WS of the minor axis of the elliptical shape may be smaller than the width PS of the corresponding recessed portion **20** in the shorter direction.

As described above, in the present embodiment, in a lateral side view from the x-axis direction, the maximum width of each lens portion **70** (length WS of the minor axis of the elliptical shape in this example) may be no greater than 5 times the maximum width of the corresponding light-emitting element **50** (here, length w**1** of the side of the rectangle). On the other hand, in a lateral side view from the x-axis direction, the maximum width of each lens portion **70** is greater than 1 times, for example, and preferably greater than or equal to 3 times the maximum width of the corresponding light-emitting element **50**. This makes it possible to more reliably realize the desired light distribution control.

Further, as described above, among the cross-sections including a line connecting the vertex of each lens portion **70** and the center point of the lens portion **70** in a plan view, in a cross-section in which the width of the lens portion **70** is minimized, the width of the lens portion **70** may be no greater than 5 times the width of the corresponding light-emitting element **50**. On the other hand, in the cross-section described above, the width of the lens portion **70** is greater than 1 times, preferably greater than or equal to 3 times, the width of the corresponding light-emitting element **50**. This makes it possible to more reliably realize the desired light distribution control.

In the example illustrated in FIG. **2**C, in a plan view, the first lens portion **71**, the second lens portion **72**, and the third lens portion **73** are arrayed in the y-axis direction. In a plan view, centers of the first lens portion **71** to the third lens portion **73** may be positioned on a straight line parallel to the y-axis. Note that the arrangement of the lens portions **70** is not limited to this example. For example, as illustrated in FIG. **4**, the center of the lens portion among the first lens portion **71**, the second lens portion **72**, and the third lens portion **73** that is positioned centrally in the x-axis direction or the y-axis direction may not be positioned on a line connecting the centers of the other two lens portions.

Material of Mold Resin Portion **60**

The mold resin portion **60** includes a base material having light transmissivity. The mold resin portion **60** preferably has a light transmittance of 90% or greater at respective peak wavelengths of the plurality of light-emitting elements **50**. With this structure, the light extraction efficiency of the light-emitting device **1000** can be further improved.

As the base material of the mold resin portion **60**, a thermosetting resin, such as an epoxy resin, a urea resin, a silicone resin, and the like having excellent weather resistance and light transmissivity, glass, and the like is suitably used.

The mold resin portion **60** according to the present embodiment can also contain a light-diffusing material in order to improve a uniformity of the quality of the light of the light-emitting device **1000**. With the mold resin portion **60** containing the light-diffusing material, the light emitted from the light-emitting element **50** can be diffused to suppress unevenness in light intensity. As such a light-diffusing material, an inorganic material such as barium oxide, barium titanate, silicon oxide, titanium oxide, and aluminum oxide, or an organic material such as a melamine resin, a CTU guanamine resin, and a benzoguanamine resin is suitably used.

The mold resin portion **60** may contain various fillers. Although a specific material of the filler is similar to the light-diffusing material, the central particle size (D_{50}) differs from that of the light-diffusing material. In this description, filler refers to a filler having a central particle size in a range from 5 μm to 100 μm. When the filler having such a particle size is contained in a light-transmissive resin, chromaticity variation of the light-emitting device **1000** can be improved by a light-scattering effect, and further heat shock resistance of the light-transmissive resin can be enhanced, and internal stress of the resin can be alleviated.

A surface roughness of the base portion **61** is not particularly limited, but from the perspective of improving the display contrast, the surface roughness is preferably large. A part or all of the surface of the base portion **61** may be roughened, for example. Of the upper surface **61***a* of the base portion **61**, at least the portion that does not overlap the plurality of lens portions **70** in a plan view is preferably roughened. An outer surface of the lateral surface portion **61***b* of the base portion **61** may also be roughened. A surface roughness of the upper surface **61***a* and a surface roughness of the outer surface of the lateral surface portion **61***b* may be the same or may be different. From the perspective of ease of processing, the surface roughness of the upper surface **61***a* and the surface roughness of the outer surface of the lateral surface portion **61***b* are preferably the same. With the surface roughness of the base portion **61** being large, the external light such as sunlight can be scattered on the surface of the base portion **61**, and thus the reflection intensity can be suppressed. Accordingly, it is possible to make the light-emitting device **1000** less susceptible to a deterioration in contrast due to the external light reflection.

The surface roughness of the portion, of the upper surface **61***a* of the base portion **61**, that does not overlap the plurality of lens portions **70** in a plan view may be greater than the surface roughness of the lens portion **70**, for example. Such a structure is obtained by, for example, forming the mold resin portion **60** including the base portion **61** and the lens portions **70**, and subsequently performing roughening processing such as blasting on a predetermined region of the surface of the base portion **61**. Alternatively, a casting case whose inner surface is partially roughened may be used for forming the mold resin portion **60**. As will be described in detail below, for example, by roughening, in advance, a portion of the inner surface of the casting case that forms the upper surface **61***a* of the base portion **61**, the surface roughness of a portion of the upper surface **61***a* of the base portion **61** that does not overlap the plurality of lens portions **70** in a plan view can be increased.

An arithmetic mean roughness Ra of the upper surface **61***a* of the base portion **61** is preferably in a range from 0.4 μm to 5 μm. More preferably, Ra is in a range from 0.8 μm to 3 μm. Ra of an outer surface of the lateral surface portion **61***b* of the base portion **61** may also be in the same range as described above. Ra can be measured in accordance with the method for measuring the surface roughness stipulated in JIS B 0601-2001. Specifically, Ra is expressed by the following equation, when a portion of a measurement length L is extracted from a roughness curve in the direction of the center line thereof, the center line of the extracted portion is the x-axis, a direction of the longitudinal magnification is the y-axis, and the roughness curve is y=f(x).

$$Ra = \frac{1}{L}\int_O^L |f(x)|dx$$

A contact type surface roughness measuring machine, a laser microscope, or the like can be used for measuring Ra. In this description, the laser microscope VK-250 available from Keyence is used.

The base portion **61** preferably has a light transmittance of 90% or greater at respective peak wavelengths of the plurality of light-emitting elements **50**. With this structure, the light extraction efficiency of the light-emitting device **1000** can be further improved.

In the present embodiment, the reflective member **150** surrounds each of the light-emitting elements **50**, making it possible to reduce the size of the surface that serves as the light source (create a point light source). This makes it possible to reflect light from the lateral surface of each light-emitting element **50** toward the light-emitting element **50** and emit the light from the upper surface of the light-emitting element **50** in the frontward direction (+z direction) of the light-emitting device **1000**. Thus, even if the lens portion **70** is miniaturized, light can be extracted with high efficiency from the light-emitting element **50**. With the size of each lens portion **70** miniaturized, it is possible to reduce a size of the light-emitting device **1000**.

The creation of a point light source will now be described with reference to the drawings.

FIGS. **5**A to **5**D are each a schematic view for describing a part of light emitted from a light-emitting element and incident on a lens portion in a light-emitting device of a comparative example not including a reflective member. FIG. **5**E is a schematic view for describing a part of light emitted from a light-emitting element and incident on a lens portion in a light-emitting device of an example including a reflective member. FIGS. **5**A to **5**E are each a yz cross-sectional view including a vertex of the lens portion and a center point, in a plan view, of the lens portion.

In the comparative example illustrated in FIGS. **5**A to **5**D, the light-emitting element **50** is disposed in a recessed portion **620** in which an inner upper surface and a lateral surface are constituted by leads, for example. With such a configuration, a part of the light leaking from the lateral surface of the light-emitting element **50** is reflected by an inner lateral surface and an inner upper surface of the recessed portion **620** and emitted toward a lens portion **670**. Therefore, in a top view, the entire inner upper surface of the recessed portion **620** is in a light-emitting state and functions as a light source E**1**. The size of the light source E**1** in the y-axis direction (hereinafter referred to as "light source size") is a size of the inner upper surface of the recessed portion **620**.

As illustrated in FIGS. **5**A and **5**B, when a size of the lens portion **670** (length in the y-axis direction: WS**1**) is sufficiently large relative to that of the light source E**1**, light La from a central portion of the light source E**1** and light Lb from an end portion of the light source E**1** are both incident on an inner surface of the lens portion **70** at angles θa and θb, respectively, that are smaller than a critical angle. The inner surface of the lens portion **70** is a surface on which the light emitted from the light-emitting element **50** is incident from an inner side. The inner surface of the lens portion **70** may be referred to as an outer surface of the light-emitting device **1000**. When the lens portion **70** is made of, for example, an epoxy resin (refractive index n: 1.5), the critical angle is approximately 40°. The light beams La and Lb are extracted from the lens portion **670** to the outside at an interface between the lens portion **670** and an external air layer (refractive index N=1).

On the other hand, as illustrated in FIGS. **5**C and **5**D, when the size of the lens portion **670** is reduced (length in the y-axis direction: WS**2**, WS**2**<WS**1**), light Lc from the central portion of the light source E**1** is incident on an inner surface of the lens portion **670** at an angle θc less than 40°, and thus light is extracted to the outside by the lens portion **670**. However, a part of the light from the light source E**1** such as, for example, light Ld from the end portion of the light source E**1**, is incident on the inner surface of the lens portion **670** at an angle θd that is greater than the critical angle. The light Ld is totally reflected by the inner surface of lens portion **670**. The totally reflected light Ld may not be emitted from above the lens portion **670**, such as in FIG. **5**D, for example, which can be a loss of luminous flux. Therefore, the smaller size of the lens portion **670** tends to increase the loss of luminous flux due to total reflection, thereby decreasing the light extraction efficiency.

The light-emitting element **50** is disposed in the recessed portion **620** in the comparative example illustrated in FIGS. **5**C and **5**D, whereas the light-emitting element **50** and the reflective member **150** in contact with the lateral surface of the light-emitting element **50** are disposed in the recessed portion **620** in the example illustrated in FIG. **5**E. In the example illustrated in FIG. **5**E, the reflective member **150** fully covers the lateral surface of the light-emitting element **50**. According to this configuration, a part of light emitted from the lateral surface of the light-emitting element **50** is reflected toward the light-emitting element **50** by the reflective member **150** and is emitted from the upper surface of the light-emitting element **50**. Thus, a light source E**2** is an upper surface of the light-emitting element **50** in a top view. A size of the light source E**2** in the example has the width w**1** in the y-axis direction of the light-emitting element **50**. Accordingly, for example, when the size of the lens portion **670** is the same (lengths in the y-axis direction: WS**2**) for the lens portions **670** illustrated in FIGS. **5**C and **5**D and the lens portion **670** illustrated in FIG. **5**E, an incident angle θe of light Le from an end portion of the light source E**2** toward the inner surface of the lens portion **670** is less than the critical angle, and an exit direction of the light Le can be controlled by the lens portion **670**.

Thus, in the example, the light source size is reduced as compared with the comparative example, and thus an exit range of the light from the light source E**2** is limited to a range narrower than that in the comparative example. Accordingly, the luminous flux loss due to total reflection is reduced at the inner surface of the lens portion **670**. Thus, the lens size can be reduced while maintaining light extraction. Because the lens size can be reduced, light can be extracted with high efficiency in the frontward direction, and a light-emitting device that can be miniaturized can be obtained.

Further, according to the present embodiment, the light distribution can be controlled by the lens portion **70** provided on the emission side of the light-emitting element **50**. For example, in the configuration illustrated in FIG. **2**A, in a plan view, each lens portion **70** has an elliptical shape having a major axis in the x-axis direction, and thus a light distribution that is wide in the x-axis direction and narrow in the y-axis direction is obtained. By thus controlling the light distribution, it is possible to further improve the extraction efficiency of the light of the light-emitting device **1000** in the frontward direction. Thus, according to the present embodiment, it is possible to obtain the light-emitting device **1000** having a light distribution suitable for a display device such as an LED display, and a light extraction efficiency further enhanced in the frontward direction. Further, with the light extraction efficiency enhanced and thus the brightness of the light-emitting device **1000** increased, a service life of the light-emitting device can be further improved without applying excessive power to the light-emitting device **1000**.

The light-emitting device **1000** of the present embodiment has a structure that is surface mountable by reflow soldering. Thus, a mounting cost and the number of mounting steps can be reduced as compared with those of the lamp-type light-emitting device in the related art mounted by flow soldering.

Study on Size of Lens Portion

The results of a study on the relationship between the size of the lens portion and the size of the light-emitting element will be described below.

Here, examples in which the reflective member **150** is disposed on the lateral surface of the light-emitting element **50** and comparative examples in which the reflective member **150** is not disposed on the lateral surface of the light-emitting element **50** are used. The examples and the comparative examples have the same configuration other than the presence or absence of the reflective member **150**. Lengths of the light-emitting element **50**, the recessed portion **620**, and the lens portion **670** in the x-axis direction and the y-axis direction in a plan view of each of the examples and the comparative examples are shown in Table 1. In this example, the light-emitting element **50** is rectangular in a plan view, and the lengths of the light-emitting element **50** in the x-axis direction and the y-axis direction are the lengths w**2** and w**1** of the sides of the rectangle (here, square), respectively. The lens portion **670** has an elliptical shape in a plan view, the length of the lens portion **670** in the x-axis direction is the length WL of the major axis of the elliptical shape, and the length of the lens portion **670** in the y-axis direction is the length WS of the minor axis of the elliptical shape.

Further, for each of the examples and the comparative examples, a ratio (hereinafter abbreviated as "size ratio") WS/w**1** of the length WS of the lens portion **670** in the y-axis direction (shorter direction of the lens portion) to the length w**1** of the light-emitting element in the y-axis direction is also shown in Table 1.

In the light-emitting devices A**1** and B**1**, the total luminous flux was determined by measuring the luminous flux of an upper hemispherical surface of the light-emitting element **50** using an integrating sphere. A 10-inch integrating sphere manufactured by LabSphere Inc. was used as the integrating sphere. The total luminous flux was measured in accordance with the measurement method of JIS C 8152. In the light-emitting devices A**2** to A**4** and B**2** to B**4**, the total luminous flux was determined using the optical simulation software Light Tools (trade name). Simulations were performed under the same conditions as those of the measurement environment of the integrating sphere.

Given 100% as the total luminous flux of the light emitted from the light-emitting device B**1** of the comparative example, a relative value of the total luminous flux (hereinafter referred to as "luminous flux ratio") of each light-emitting device was determined. The results are also shown in Table 1.

TABLE 1

		Length of lens portion [mm]		Width of light-emitting element [mm]		Width of recessed portion [mm]			
		Length in y-axis direction (Length of minor axis) WS	Length in x-axis direction (Length of major axis) WL	Width w1 in y-axis direction	Width w2 in x-axis direction	Width PS in y-axis direction	Width PL in x-axis direction	WS/w1 [—]	Luminous flux ratio [%]
Example	A1	1.88	3.76	0.32	0.32	1.14	1.25	8.4	89
	A2	1.39	2.79					6.3	89
	A3	1.04	2.09					4.7	88
	A4	0.70	1.39					3.1	84
Comparative example	B1	1.88	3.76	0.32	0.32	1.14	1.25	8.4	100
	B2	1.39	2.79					6.3	95
	B3	1.04	2.09					4.7	86
	B4	0.70	1.39					3.1	72

Light-emitting devices A**1** to A**4** of the examples and light-emitting devices B**1** to B**4** of the comparative examples, each including the lens portion **670** of a different size, were used, and the total luminous flux of light emitted from each light-emitting device was determined.

In each light-emitting device of the examples and the comparative examples, the light-emitting element is disposed in the recessed portion **620** including the inner upper surface having an elliptical shape, and the lens portion **670** is disposed thereabove. Lengths of the light-emitting ele-

FIG. **6** is a diagram illustrating a relationship between the size ratios WS/w**1** of the lens portion to the light-emitting element and the luminous flux ratios of the examples and the comparative examples.

From FIG. **6**, it is understood that, when the size of the lens portion **670** is sufficiently large and the reflective member **150** is disposed, the luminous flux ratio is slightly smaller than that of a case in which the reflective member **150** is absent. For example, the total luminous flux of the light-emitting device A**1** of the example is approximately

89% of the total luminous flux of the light-emitting device B**1** of the comparative example. This is conceivably because, in this example, a part of the light leaked from the lateral surface of the light-emitting element is absorbed by the reflective member or is transmitted through the reflective member and absorbed by the dark-colored resin member, and thus not emitted toward the lens portion **670**, increasing the loss of the luminous flux as compared with the comparative example.

Further, it is understood from FIG. **6** that the luminous flux ratio tends to decrease when the size ratio WS/w**1** of the lens portion **670** to the light-emitting element **50** is reduced, regardless of the presence or absence of the reflective member **150**. In particular, in the comparative examples in which the reflective member **150** is not disposed, the luminous flux ratio is significantly reduced in association with a reduction in lens size. On the other hand, in the examples including the reflective member **150**, a decrease in the luminous flux ratio due to a reduction in lens size is suppressed as compared with the comparative examples. This is conceivably because, as described above with reference to FIGS. **5**A to **5**E, in the examples, the light source size is reduced by the reflective member **150**, resulting in a reduction in the loss of luminous flux caused by miniaturization of the lens portion.

According to the results illustrated in FIG. **6**, when the size ratio WS/w**1** of the lens to the light-emitting element is no greater than a predetermined value (no greater than 5.0, for example), the luminous flux ratios of the light-emitting devices of the examples are higher than those of the comparative examples. From this, it is understood that, in the light-emitting devices of the examples, when the size ratio WS/w**1** of the lens to the light-emitting element is no greater than 5.0, a range of improvement in the luminous flux ratio due to the creation of a point light source exceeds the loss of luminous flux due to the reflective member, and luminous flux ratios higher than those of the comparative examples are obtained.

Further, it is understood that, in the light-emitting devices of the examples, when the size ratio WS/w**1** is, for example, 3.0 or greater, a luminous flux ratio of 84% or higher can be obtained.

Note that the examples described above indicate study results obtained using the lens portion **670** having an elliptical planar shape, but the planar shape of the lens portion **70** may not be elliptical. A similar effect can be obtained when a minimum length passing through the center (optical axis) of the lens portion **70** is no greater than 5 times the width of the light-emitting element **50** along a direction parallel to the minimum length, in a plan view. When the lens portion **70** is circular, it is sufficient that the diameter of the lens portion **70** be no greater than 5 times the maximum width of the light-emitting element **50**.

Further, the study described above was conducted using a light-emitting device in which the light-emitting element and the reflective member **150** were disposed in the recessed portion **620**, but the same effect can be obtained even in a light-emitting device in which the light-emitting element and the reflective member are not disposed in the recessed portion **620**. That is, as long as the reflective member **150** is disposed near the lateral surface of the light-emitting element, regardless of the presence or absence of the recessed portion **620**, the light source size can be reduced (a point light source can be created). Accordingly, as with the study results shown in FIG. **6**, as long as the size ratio WS/w**1** is no greater than 5.0, it is possible to more effectively improve the light extraction efficiency.

Various modified examples can be conceived with respect to the light-emitting device. For example, the structure and the arrangement of the light-emitting elements, the structure and the form of the resin package, and the configuration of the mold resin portion are not limited to those modes described in the above-described embodiment. Modes other than those described in the above-described embodiment can be suitably used in the light-emitting device of the present disclosure.

Modified examples of the light-emitting device of the present disclosure will be described below. In the following, points different from those of the light-emitting device **1000** will be mainly described, and a description of structures similar to those of the light-emitting device **1000** will be omitted.

First Modified Example

FIG. **7**A is a schematic top view of another light-emitting device **1001** according to a first modified example. FIG. **7**B is a schematic cross-sectional view of the light-emitting device **1001** taken along line **7**B-**7**B illustrated in FIG. **7**A.

The light-emitting device **1001** of the first modified example differs from the light-emitting device **1000** in that the light-emitting device **1001** further includes a plurality of colored resin members **160**.

In the present modified example, the colored resin members **160** include a first colored resin member **161** disposed in the first recessed portion **21**, a second colored resin member **162** disposed in the second recessed portion **22**, and a third colored resin member **163** disposed in the third recessed portion **23**. In a plan view, the first lens portion **71** to the third lens portion **73** overlap at least a part of the first colored resin member **161** to the third colored resin member **163**, respectively. The position of each colored resin member **160** may be defined by the inner lateral surface **20***c* of the recessed portion **20**.

In the present modified example, the first light-emitting element **51** to the third light-emitting element **53** emit light having different wavelengths from one another. The first colored resin member **161** is colored to the same type of color as first light emitted from the first light-emitting element **51**. The second colored resin member **162** is colored to the same type of color as second light emitted from the second light-emitting element **52**. The third colored resin member **163** is colored to the same type of color as third light emitted from the third light-emitting element **53**.

In this description, "the same type of color" means that, in the Munsell color system (20 hues), the hue is within three ranges in the hue circle, the color value is within three ranges, and the chroma is within three ranges. That is, in the constant hue planes of the Munsell color system (20 hues), colors up to both sides of the hue, the color value, and the chroma are the same type of color.

With the colored resin members **160** thus disposed, it is possible to reduce the reflection of external light by the inner upper surface of each recessed portion **20** (exposed regions **30** of the leads **11***a* to **13***b* and surface of the reflective member **150**, for example) when the light-emitting element **50** is turned off. Thus, the display contrast of the light-emitting device **1001** can be improved. Further, when the first light-emitting element **51**, the second light-emitting element **52**, and the third light-emitting element **53** are all turned off, each of the colored resin members **160** appears darker than the color with which it is colored, that is, as a color of a lower color value than that of the color with which it is colored, due to subtractive color mixing of the colors of the three colored resin members **160**. Such an effect is referred to as a "dark color effect". Because a light emission surface of the light-emitting device **1001** appears darker due to the dark color effect, display contrast can be further improved.

Within each recessed portion **20**, the colored resin member **160** may be disposed on the reflective member **150**. That is, at least a part of the first colored resin member **161** may be positioned on the first reflective member **151**, at least a part of the second colored resin member **162** may be positioned on the second reflective member **152**, and at least a part of the third colored resin member **163** may be positioned on the third reflective member **153**.

The reflective member **150** may be disposed only in a part of the inner upper surface **20***a* of each recessed portion **20** in a cross-sectional view. For example, the reflective member **150** may only be disposed in a region near the lateral surface of the light-emitting element **50**. In this case, the colored resin member **160** preferably covers at least a portion of the exposed region **30** of the lead in each recessed portion **20** that is not covered by the reflective member **150**.

In the example illustrated, the reflective member **150** comes into contact with the lateral surface of the light-emitting element **50**. An upper surface of the reflective member **150** is inclined so as to become lower as a distance from the lateral surface of the light-emitting element **50** increases. The colored resin member **160** is disposed on the upper surface of the reflective member **150** and on a portion of the inner upper surface **20***a* of the recessed portion **20** exposed from the reflective member **150**.

In a plan view, the colored resin member **160** may be disposed over the entire inner upper surface **20***a* of each recessed portion **20**. The colored resin member **160** may be in contact with the inner lateral surface **20***c* of the recessed portion **20**. The colored resin member **160** may cover a part or all of the upper surface of the corresponding light-emitting element **50**. Note that the colored resin member **160** may not be disposed on the primary surface **100***a* of the resin package **100**, between two adjacent recessed portions **20**.

When the light-emitting device is used in a large display device used outdoors such as a billboard and the light-emitting elements are turned off, the external light or the like incident on the light-emitting device may be reflected by the areas surrounding the light-emitting elements, reducing the display contrast. In the present modified example, the display contrast can be further improved. The reasons will be described below.

In the present embodiment, the light-emitting element **50** and the colored resin member **160** colored to the same type of color as the emitted light color of the light-emitting element **50** are disposed in each of the recessed portions **20**. With this structure, the emitted light color is not obstructed when the light-emitting element **50** is turned on, and external light reflection in the recessed portion **20** when the light-emitting element **50** is turned off can be reduced. Thus, the display contrast can be improved.

Furthermore, when the first light-emitting element **51**, the second light-emitting element **52**, and the third light-emitting element **53** are turned off, due to the subtractive color mixing of the first colored resin member **161**, the second colored resin member **162**, and the third colored resin member **163**, the first colored resin member **161**, the second colored resin member **162**, and the third colored resin member **163** each appear darker than the color with which it is colored, that is, appear as a color of a lower color value than that of the color with which it is colored. For example, when the light-emitting device **1001** is mounted on a display device or the like and a viewer looks at the display device, the first colored resin member **161**, the second colored resin member **162**, and the third colored resin member **163** appear to be disposed in close proximity to each other, and thus subtractive color mixing occurs. Because the light emission surface of the light-emitting device **1001** appears darker, the display contrast can be further increased.

In the light-emitting device **1001**, when the first light-emitting element **51**, the second light-emitting element **52**, and the third light-emitting element **53** are turned on, mixed light of the light beams transmitted through the first lens portion **71**, the second lens portion **72**, and the third lens portion **73** is, for example, white. On the other hand, when the first light-emitting element **51**, the second light-emitting element **52**, and the third light-emitting element **53** are turned off, the first colored resin member **161**, the second colored resin member **162**, and the third colored resin member **163** may each appear as a dark color, such as gray or black, for example, that is a color of a lower color value than that of the color with which it is colored.

Colored Resin Member **160**

The colored resin member **160** includes a resin material as a base material and a colorant. As the base material of the colored resin member **160**, a thermosetting resin or the like having excellent weather resistance and light transmissivity, such as an epoxy resin, a urea resin, or a silicone resin, is used, for example. Note that the thermosetting resin in this description refers to a plastic that cures when heated under pressure. Once cured, a thermosetting resin cannot be re-melted or re-shaped without losing initial properties. Examples of such a thermosetting resin include epoxy-based, melamine-based, phenol-based, and urea-based resins.

Various dyes, pigments, and the like can be used as the colorant contained in the resin material. The colorant may be an inorganic member or may be an organic member. Specific examples include perylene red, condensed azo red, quinacridone red, copper phthalocyanine blue, copper phthalocyanine green, curcumin, and coal tar dye. With the resin material containing a colorant, a dark color effect such as described above can be achieved. Note that, when the content of the colorant is increased, the light extraction efficiency may be reduced. Therefore, the content of the colorant is preferably selected so as to achieve a high display contrast due to the dark color effect while ensuring the light extraction efficiency.

Second Modified Example

FIG. **8**A is a schematic top transparent view of a light-emitting device **1002** according to a second modified example. FIG. **8**B is a schematic cross-sectional view taken along line **8**B-**8**B illustrated in FIG. **8**A. FIG. **8**C is an enlarged schematic cross-sectional view illustrating a part of FIG. **8**B.

The light-emitting device **1002** according to the second modified example differs from the light-emitting device **1000** in that each recessed portion **20** includes, in an interior thereof, a resin wall **400** formed of the first dark-colored resin member **40**. In a plan view, the resin wall **400** is positioned between the light-emitting element **50** and at least one of the first connection region wr**1** and the second connection region wr**2**. In each recessed portion **20**, at least a part of the reflective member **150** is positioned between the resin wall **400** and the light-emitting element **50**.

Resin Wall **400**

In the present modified example, the resin wall **400** includes a first resin wall **401** to a third resin wall **403** respectively positioned in the interior of the first recessed portion **21** to the third recessed portion **23**. Hereinafter, a structure including the resin wall **400** will be described using the first recessed portion **21** of the three recessed portions **20** as an example. The second recessed portion **22** and the third recessed portion **23** also have similar structures, and thus description thereof will be omitted to avoid repeated descriptions.

The first recessed portion **21** includes, in the interior thereof, at least one first resin wall **401** formed of the first dark-colored resin member **40**. In this example, in the interior of the first recessed portion **21**, two first resin walls **401** facing each other across the light-emitting element **50** in a plan view are disposed. The two first resin walls **401** are respectively positioned between the first light-emitting element **51** and the first connection region wr**1** as well as the second connection region wr**2** in a plan view. A lateral surface of the first resin wall **401** proximate to the first light-emitting element **51** may be parallel to any one lateral surface of the first light-emitting element **51**. At least a part of the first reflective member **151** is positioned between each first resin wall **401** and the lateral surface of the first light-emitting element **51**. The lateral surface of the first light-emitting element **51** may be in contact with the first reflective member **151**. The lateral surface of each first resin wall **401** proximate to the first light-emitting element **51** may be in contact with the first reflective member **151**. With the first resin wall **401** provided, a region on which the first reflective member **151** is applied can be controlled to a predetermined range, making it possible to reduce the volume of the first reflective member **151** while maintaining the effect of the creation of a point light source by the first reflective member **151**.

Each first resin wall **401** may be separated from the inner lateral surface of the first recessed portion **21**, or a part of the first resin wall **401** may be in contact with the inner lateral surface of the first recessed portion **21**. In the illustrated example, in a plan view, each first resin wall **401** extends in the shorter direction of the first recessed portion **21** (here, y-axis direction), and both ends of the first resin wall **401** are in contact with the inner lateral surface of the first recessed portion **21**. With this structure, the application range of the first reflective member **151** can be reliably reduced.

In the configuration illustrated in FIG. **8**C, each first resin wall **401** includes a lateral surface **401***s***1** positioned proximate to the first light-emitting element **51**, a lateral surface **401***s***2** positioned opposite to the first light-emitting element **51**, and an upper surface **401***a* positioned between the lateral surfaces **401***s***1** and **401***s***2**. The lateral surface **401***s***1** is substantially perpendicular to the xy plane, and the lateral surface **401***s***2** may be a tapered surface (forwardly tapered) inclined so as to become lower as a distance from the light-emitting element **50** increases. Each first resin wall **401** is not limited to this form, and may be, for example, a form composed of only the lateral surface **401***s***1** and the lateral surface **401***s***2**, without the upper surface **401***a*.

A portion of each first resin wall **401** positioned on the +z-most side (upper surface **401***a* in this example) may be positioned above the upper surface of the first light-emitting element **51**. A maximum height h**2** of the first resin wall **401** may be smaller than a height h**1** of the upper surface of the second resin portion **42**. The height h**2** of the first resin wall **401** is a distance from the exposed region **30** of the leads **11***a* and **11***b* in the first recessed portion **21** to an uppermost surface or an uppermost portion of the first resin wall **401** along the z-axis direction and is, for example, in a range from 0.15 mm to 0.2 mm.

In the first recessed portion **21**, a second dark-colored resin member **190** may be disposed outward of the upper surface **401***a* of the first resin wall **401**. The second dark-colored resin member **190** preferably covers a connection portion of the wires and the leads **11***a* and **11***b*. Further, when the first reflective member **151** is formed in a process to be described below, a part of the first reflective member **151** may be positioned outward of the upper surface **401***a* of the first resin wall **401**. In this case, the second dark-colored resin member **190** may cover a portion of the first reflective member **151** positioned outward of the upper surface **401***a*. In this case, "a portion of the first reflective member **151** positioned outward of the upper surface **401***a*" refers to, for example, a portion positioned in a region surrounded by the lateral surface **401***s***2** of the first resin wall **401**, the inner lateral surface **20***c* of the first recessed portion **21**, and the inner upper surface **20***a* of the first recessed portion **21**. The second dark-colored resin member **190** may be in contact with the lateral surface **401***s***2** of the first resin wall **401** and the inner lateral surface **20***c* of the first recessed portion **21**, for example.

The second dark-colored resin member **190** may be formed by using a resin material and a colorant similar to those of the first dark-colored resin member **40**. As the second dark-colored resin member **190**, a silicone resin material to which carbon black has been added can be used, for example.

Further, a high-viscosity resin **192** may be disposed on the upper surface of each light-emitting element **50**. The high-viscosity resin **192** is a resin having a viscosity that is at least higher than that of the reflective member **150**, and may be, for example, a high-viscosity polycarbonate resin. The high-viscosity resin **192** may be formed by using a resin material similar to that of reflective member **150**. Further, the viscosity of the resin material of the high-viscosity resin **192** may be raised by using an additive (SiO_2 filler, for example). By raising the viscosity, it is possible to keep the high-viscosity resin **192** on the upper surface of the light-emitting element **50** and heighten a top portion of the high-viscosity resin **192**.

The first reflective member **151** can be formed, for example, as follows. First, the high-viscosity resin **192** is disposed on the upper surface of the first light-emitting element **51**. Subsequently, a resin material serving as the reflective member is disposed between the first light-emitting element **51** and the first resin wall **401**. The amount of the resin material can be set so that a volume of the resin material is larger than that of a space positioned between the first light-emitting element **51** and the first resin wall **401**. Subsequently, a height of the resin material is controlled by utilizing centrifugal sedimentation or the like. Accordingly, the space between the first light-emitting element **51** and the first resin wall **401** is filled with the resin material up to a position higher than the upper surface of the first light-emitting element **51**, and excess resin material flows outwardly from the upper surface **401***a* of the first resin wall **401** along the lateral surface **401***s***2**, which is the tapered surface. At this time, because the upper surface of the first light-emitting element **51** is covered by the high-viscosity resin **192**, a part of the resin material being disposed on the upper surface of the first light-emitting element **51** is reduced. Then, the resin material is cured and thus the first reflective member **151** is obtained. Subsequently, the second dark-colored resin member **190** may be disposed on a portion of the first reflective member **151** positioned outward of the upper surface **401***a* of the first resin wall **401**.

In the present modified example as well, the reflective member **150** surrounding each light-emitting element **50** make it possible to miniaturize the lens portion **70**. For example, as described above with reference to FIG. **6**, the size ratio of the lens portion to the light-emitting element may be no greater than 5.0. Note that, in the present modified example, when both ends of each resin wall **400** are in contact with the inner lateral surface **20***c* of the recessed portion **20**, the recessed portion demarcated by a lateral surface of each resin wall **400** proximate to the light-emitting element **50**, a part of the inner lateral surface **20***c* of each recessed portion **20**, and the inner upper surface surrounded by them corresponds to each of the first recessed portion to the third recessed portion of the light-emitting device **1002**. In this case, a maximum width of the recessed portion constituted by the lateral surface of each resin wall **400** proximate to the light-emitting element **50** and the inner lateral surface **20***c* may be less than or equal to the maximum width of the lens portion **70**.

Third Modified Example

FIG. **9** is a schematic top transparent view of a light-emitting device **1003** according to a third modified example.

The light-emitting device **1003** of the third modified example differs from the light-emitting device **1000** illustrated in FIG. **2**C and the like in that each light-emitting element **50** and the connection region for wire bonding are disposed in different recessed portions.

In the third modified example, the plurality of recessed portions **20** further include at least one fourth recessed portion **24** positioned in a region different from those of the first recessed portion **21** to the third recessed portion **23** in the primary surface **100***a* of the resin package **100**. A plurality of the fourth recessed portions **24** separated from each other in a plan view may be provided. The region where any one of the leads is exposed in the inner upper surface of each fourth recessed portion **24** includes a connection region used for wire bonding. At least one light-emitting element of the first light-emitting element **51** to the third light-emitting element **53** is electrically connected to the connection region of the fourth recessed portion **24** by a wire.

In the illustrated example, the plurality of recessed portions **20** include the first recessed portion **21** to the third recessed portion **23**, fourth recessed portions **241***a* and **241***b* respectively positioned on both sides (±x sides) of the first recessed portion **21**, fourth recessed portions **242***a* and **242***b* respectively positioned on both sides of the second recessed portion **22**, and fourth recessed portions **243***a* and **243***b* respectively positioned on both sides of the third recessed portion **23**.

The one lead **11***a* of the first lead pair includes the exposed region **30***a* exposed at the inner upper surface of the recessed portion **20** and an exposed region **30***w* exposed at the fourth recessed portion **241***a*. The one lead **12***a* of the second lead pair includes the exposed region **30***a* exposed at the inner upper surface of the recessed portion **20** and an exposed region **30***w* exposed at the fourth recessed portion **242***a*. The one lead **13***a* of the third lead pair includes the exposed region **30***a* exposed at the inner upper surface of the recessed portion **20** and an exposed region **30***w* exposed at the fourth recessed portion **243***a*. The other leads **11***b*, **12***b*, and **13***b* includes the exposed regions **30***b* exposed at the fourth recessed portions **241***b*, **242***b*, and **243***b*, respectively. The first light-emitting element **51** to the third light-emitting element **53** are disposed in the first recessed portion **21** to the third recessed portion **23**, respectively. One electrode of the first light-emitting element **51** to the third light-emitting element **53** is connected by a wire to the exposed regions **30***w* of the leads **11***a* to **13***a* in the fourth recessed portions **241***a* to **243***a*, and the other electrodes are connected by wires to the exposed regions **30***b* of the leads **11***b* to **13***b* in the fourth recessed portions **241***b* to **243***b*, respectively.

The reflective member **150** is disposed in each of the first recessed portion **21** to the third recessed portion **23**. In contrast, the reflective member **150** is preferably not disposed in each of the fourth recessed portions **24**. For example, the second dark-colored resin member may be disposed in each of the fourth recessed portions **24** so as to cover the connection portion with the wire.

According to the present modified example, the connection region for wire bonding is disposed in a recessed portion separate from the light-emitting element, making it possible to reduce the volume in which the first reflective member **151** is disposed.

Note that the illustrated example illustrates an example in which the fourth recessed portion **24** is disposed on both sides of each light-emitting element **50** in a plan view, but the fourth recessed portion **24** may be disposed only on one side of each light-emitting element **50**. For example, for each light-emitting element **50**, one recessed portion including the element placement region and the first connection region, and one recessed portion including the second connection region may be formed. Alternatively, when two or more light-emitting elements **50** of the first light-emitting element **51** to the third light-emitting element **53** are connected to a common lead, the first connection region (or the second connection region) of each of the two or more light-emitting elements **50** may be disposed in one fourth recessed portion **24**.

In the present modified example as well, the reflective member **150** surrounding each light-emitting element **50** makes it possible to miniaturize the lens portion **70**. For example, as described above with reference to FIG. **6**, the size ratio of the lens portion to the light-emitting element may be no greater than 5.0. Note that, in present modified example, the maximum width of each lens portion **70** may be greater than or equal to the maximum width of the corresponding recessed portion among the first recessed portion **21** to the third recessed portion **23** each on which the light-emitting element **50** is placed.

Fourth Modified Example

FIG. **10**A is a schematic top transparent view of a light-emitting device **1004** according to a fourth modified example, and FIG. **10**B is a schematic cross-sectional view taken along line **10**B-**10**B illustrated in FIG. **10**A.

The light-emitting device **1004** of the fourth modified example differs from the light-emitting device **1000** illustrated in FIG. **2**C and the like in that two or more of the light-emitting elements **50** among the first light-emitting element **51** to the third light-emitting element **53** are disposed in one recessed portion.

In the light-emitting device **1004**, the primary surface **100***a* of the resin package **100** includes one recessed portion **25** defined by the first dark-colored resin member **40** and the plurality of leads **11***a* to **13***b*. In the example illustrated, the first light-emitting element **51** to the third light-emitting element **53** are disposed in the exposed regions **30***a* of the leads **11***a* to **13***a* in the recessed portion **25**, respectively. The connection region for the wire bonding of each of the leads **11***a* to **13***b* is also disposed in the recessed portion **25**.

In the light-emitting device **1004**, the reflective member **150** may be disposed over the entire recessed portion **25**. Alternatively, as will be described below, a resin wall may be provided in an interior of the recessed portion **25**, making it possible to narrow the region where the reflective member **150** is disposed.

As illustrated in FIG. **10**B, the precoating resin **180** may be disposed between the reflective member **150** and the mold resin portion **60**. In the recessed portion **20**, the upper surface of the reflective member **150** may be curved in a concave shape between the light-emitting elements **50**, and an upper surface of the precoating resin **180** may be curved in a convex shape. The thickness of the precoating resin **180** positioned on the upper surface of each light-emitting element **50** disposed in the recessed portion **20** is preferably constant. The thickness of the precoating resin **180** positioned between each light-emitting element **50** disposed in the recessed portion **20** is preferably symmetrical starting from a center of a distance between each light-emitting element **50**.

FIG. **11**A is a schematic top transparent view of another light-emitting device **1005** according to the fourth modified example.

In the light-emitting device **1005**, the primary surface **100***a* of the resin package **100** includes two recessed portions **21** and **26** defined by the first dark-colored resin member **40** and the plurality of leads **11***a* to **13***b*. Two light-emitting elements **50** (second light-emitting element **52** and third light-emitting element **53** in FIG. **11**A) are disposed on an inner upper surface of the recessed portion **26**. The reflective member **150** surrounds the second light-emitting element **52** and the third light-emitting element **53** in the recessed portion **26**.

The remaining one light-emitting element **50** (first light-emitting element **51** in FIG. **11**A) is disposed on an inner upper surface of the recessed portion **21**. The arrangement and the shape of the recessed portion **21**, the first light-emitting element **51**, and the first reflective member **151** are similar to those of the recessed portion **20** (in FIG. **11**A, first recessed portion **21**) in the light-emitting device **1000**.

The recessed portion **26** has a structure in which two recessed portions **20** (in FIG. **11**A, second recessed portion **22** and third recessed portion **23**) of the light-emitting device **1000** are connected. In this example, the inner upper surface of the recessed portion **26** includes a region **26**A including the element placement region dr on which the second light-emitting element **52** is placed, a region **26**B including the element placement region dr on which the third light-emitting element **53** is placed, and an intervening region **26**C positioned between the regions **26**A and **26**B. The region **26**A, the intervening region **26**C, and the region **26**B are arrayed in the y-axis direction. In the example illustrated in FIG. **11**A, a width of the intervening region **26**C in the x-axis direction is less than widths of the regions **26**A and **26**B in the x-axis direction. In the example illustrated in FIG. **11**A, the widths of the regions **26**A and **26**B in the x-axis direction are the same. Each of the regions **26**A and **26**B may further include the first connection region wr**1** and the second connection region wr**2** for wire bonding.

A plurality of the resin walls **400** formed of the first dark-colored resin member **40** may be disposed in an interior of the recessed portion **26**. In this example, the plurality of resin walls **400** include a pair of the resin walls **402**, in the region **26**A, in which one of the pair of the resin walls **402** is disposed between the element placement region dr and the first connection region wr**1** and the other of the pair of the resin walls **402** is disposed between the element placement region dr and the second connection region wr**2**, and a pair of the resin walls **403**, in the region **26**B, in which one of the pair of the resin walls **403** is disposed between the element placement region dr and the first connection region wr**1** and the other of the pair of the resin walls **403** is disposed between the element placement region dr and the second connection region wr**2**. The resin walls **402** and **403** may be a rectangular parallelepiped, or may have a shape similar to that of the resin wall **400** described in the second modified example. In the example illustrated in FIG. **11**A, the pair of resin walls **402** and the pair of resin walls **403** have a rectangular shape long in the y-axis direction. With the resin walls **400** provided, the arrangement of the reflective member **150** can be controlled.

In the illustrated example, the reflective member **150** is disposed, for example, between the light-emitting element **50** in the region **26**A and one of the pair of the resin walls **402**, between the light-emitting element **50** in the region **26**A and the other of the pair of the resin walls **402**, between the light-emitting element **50** in the region **26**B and one of the pair of the resin walls **403**, between the light-emitting element **50** in the region **26**B and the other of the pair of the resin walls **403**, and in the intervening region **26**C. Note that the reflective member **150** may be disposed over the entire recessed portion **26**.

In the present modified example as well, both ends or one end portion of the resin walls **402** and **403** may be in contact with an inner surface of the recessed portion **26** in a plan view. When both ends of the resin walls **402** and **403** are in contact with the inner surface of recessed portion **26**, the lateral surface of each resin wall **402** proximate to the second light-emitting element **52**, the lateral surface of each resin wall **403** proximate to the third light-emitting element **53**, and the inner surface of the recessed portion **26** constitute the inner lateral surface of one recessed portion.

The reflective member **150** may be disposed in the one recessed portion.

FIG. **11**B is a schematic top view of yet another light-emitting device **1005***a* according to the fourth modified example. The light-emitting device **1005***a* illustrated in FIG. **11**B differs from the light-emitting device **1005** illustrated in FIG. **11**A in that the widths of the regions **26**A and **26**B in the x-axis direction and the width of the intervening region **26**C in the x-axis direction are the same. Other components are similar to those of the light-emitting device **1005**.

FIG. **1**C is a schematic top view of yet another light-emitting device **1005***b* according to the fourth modified example. The light-emitting device **1005***b* illustrated in FIG. **1**C differs from the light-emitting device **1005** illustrated in FIG. **11**A in that the element placement region dr on which the light-emitting element **50** is placed and the connection region wr for wire bonding that connects the light-emitting element **50** and the leads are positioned in recessed portions different from each other. In the example illustrated in FIG. **1**C, in a plan view, the fourth recessed portions **24**, each including the connection region wr, are respectively disposed on both sides (+x sides) of the recessed portion **26** on which the second light-emitting element **52** and the third light-emitting element **53** are placed. Further, in a plan view, the fourth recessed portion **24**, each including the connection region wr, are respectively disposed on both sides of the recessed portion **21** on which the first light-emitting element **51** is placed. The recessed portion **26** and the fourth recessed portion **24** are demarcated by the resin wall **400**. An inner lateral surface of the recessed portion **26** extending in the y-axis direction and an inner lateral surface of the fourth recessed portion **24** extending in the y-axis direction are formed by the resin wall **400** common thereto.

Method of Manufacturing Light-Emitting Device **1000**

An example of a method of manufacturing the light-emitting device according to the present embodiment will be described below using the light-emitting device **1000** as an example.

FIGS. **12**A to **12**F are each a step cross-sectional view for describing the method of manufacturing the light-emitting device **1000**, each illustrating a cross-section taken along line **2**D-**2**D illustrated in FIG. **2**C.

First Step: Preparation of Resin Package **100**

In a first step, the resin package **100** is prepared that includes the first dark-colored resin member **40** and a plurality of leads **10**, as illustrated in FIG. **12**A. The resin package **100** can be formed by transfer molding, insert molding, or the like. Here, a method of forming the resin package **100** using a transfer molding method will be described.

First, a lead frame including the plurality of leads **10** is prepared. In this example, the plurality of leads **10** include three pairs of leads per package. Each of the lead pairs includes the leads **10***a* and **10***b* that are spaced apart from each other.

Subsequently, a mold is prepared, and the lead frame is placed in the mold. After this, a thermoplastic resin material colored to a dark color is injected into the mold and solidified by being cooled. Thus, the first dark-colored resin member **40** that holds the plurality of leads **10** is formed. The resin package **100** is obtained.

The primary surface **100***a* of the resin package **100** includes the plurality of recessed portions **20**. The leads **10***a* and **10***b* of each lead pair include the exposed regions **30***a* and **30***b*, respectively, at the inner upper surface of the corresponding recessed portion **20**. Note that the resin wall disposed in the interior of the recessed portion **20** (second modified example and the like) can be formed by a shape of a mold in this step.

Second Step: Mounting of Light-Emitting Elements **50**

In a second step, as illustrated in FIG. **12**B, the light-emitting element **50** is mounted on the resin package **100**. First, in the primary surface **100***a* of the resin package **100**, the light-emitting element **50** is bonded to a part of the exposed region **30***a* of one lead **10***a* of each lead pair by using, for example, a non-conductive paste or a conductive paste. Subsequently, the positive and negative electrodes of each light-emitting element **50** are electrically connected to the exposed regions **30***a* and **30***b* of the two leads **10***a* and **10***b* of the lead pair by a pair of wires **80***a* and **80***b*, respectively.

Third Step: Formation of Reflective Member **150**

In a third step, the reflective member **150** is formed around each light-emitting element **50**. In this example, as illustrated in FIG. **12**C, first resin materials **150***a* are applied around each light-emitting element **50** (in each recessed portion **20** of the resin package **100** in this example) by nozzles **800**.

When the first resin material **150***a* is applied to the inner upper surface **20***a* of the recessed portion **20** by using the nozzle **800**, preferably the first resin material **150***a* is applied in contact with the inner upper surface **20***a* of the recessed portion **20** as exemplified in FIG. **12**D. A distance H from a tip of the nozzle **800** to the inner upper surface **20***a* of the recessed portion **20** can be set in a range from, for example, 200 μm to 300 μm. When the distance H is too long, variation occurs in a direction in which the first resin material **150***a* is ejected from an opening of the nozzle **800**, potentially making it difficult to control an application position of the first resin material **150***a*.

In this description, of the inner upper surface **20***a* of the recessed portion **20**, a region **801** in which the tip of the nozzle **800** can be brought close is referred to as a "nozzle arrangement region". The nozzle arrangement region **801** is a region where the nozzle is arranged aiming at the region, the "aimed" region so to speak, and is preferably somewhat larger than an actual nozzle diameter. A width of the nozzle arrangement region **801** is set to be, for example, about the same as or larger than an outer diameter **800***a* of the tip of the nozzle **800**, and is preferably set to be larger than the outer diameter **800***a* of the nozzle **800**. Here, the outer diameter **800***a* of the nozzle **800** is, for example, in a range from 200 μm to 300 μm. Accordingly, the nozzle arrangement region **801** has a size that is larger than a circle having a diameter of, for example, 200 μm or greater, preferably 300 μm or greater.

The inner upper surface **20***a* of the recessed portion **20** preferably includes the nozzle arrangement regions **801**, each having a sufficient size, respectively on both sides (±x sides in this example) of the region where the light-emitting element **50** is disposed. Thus, because the first resin material **150***a* can be disposed near the light-emitting element **50** from both sides of the light-emitting element **50**, the first resin material **150***a* readily covers the entire lateral surface of the light-emitting element **50**.

Subsequently, as illustrated in FIG. **12**E, the first resin material **150***a* is cured, and thus the reflective member **150** is obtained. Thereafter, a second resin material may be applied and cured on the reflective member **150**, thereby forming the precoating resin (second modified example) or the colored resin member (first modified example). By curing each resin material and then forming the next resin material, it is possible to cure each resin material under optimum conditions.

Note that the first resin material **150***a* may be heated and provisionally cured at a temperature lower than a curing temperature, and then the second resin material may be disposed on the provisionally cured body. Subsequently, the provisionally cured body of the first resin material **150***a* and the second resin material may be heated at a temperature equal to or higher than the curing temperature and fully cured. Alternatively, the mold resin portion may be formed in a state in which the first resin material **150***a* (and second resin material) is provisionally cured. In this case, the first resin material **150***a* (and second resin material) may be fully cured in a curing step for forming the mold resin portion. With formation of a provisionally cured state, the time required for the full curing is shortened, making it possible to reduce a manufacturing time.

Thus, a structure **110** is obtained in which the light-emitting elements **50** and the reflective members **150** are disposed on the primary surface **100***a* of the resin package **100**.

Fourth Step: Formation of Mold Resin Portion **60**

In a fourth step, the mold resin portion **60** is formed by using, for example, a transfer molding method. The mold resin portion **60** can be formed, for example, by a process as described in JP 2003-332634 A by the present applicant.

First, as illustrated in FIG. **12**F, the structure **110** is interposed between an upper mold **821** and a lower mold **822** and fixed while pressurizing. The upper mold **821** and the lower mold **822** seal a sealed space **830** that includes the light-emitting elements **50**.

Subsequently, a third resin material having a thermosetting resin as a base material is cast into the sealed space **830** in the y-axis direction, thereby sealing off the sealed space **830** with the third resin. Air present in the sealed space **830** is replaced with the third resin and is discharged outside the sealed space **830**. The third resin material is also disposed in the interior of the holes **45** (refer to FIG. 2C) provided in the resin package **100**.

After the third resin material is injected, a temperature of the molds is maintained at a temperature equal to or higher than a curing temperature of the third resin material (here, 150° C.) for a predetermined time. Accordingly, the third resin material is cured. Subsequently, the molds are removed, and thus a mold resin portion including the plurality of lens portions positioned above the corresponding light-emitting elements **50** is formed.

Fifth Step: Cutting of Leads **10**

Subsequently, the leads **10** are cut from the lead frame and separated into individual pieces. The leads **10** thus cut are bent to desired shapes, and thus the light-emitting device **1000** is obtained.

According to the method of manufacturing the present embodiment, the plurality of lens portions and the base portion can be integrally formed by using the same molds. Thus, it is possible to reduce an increase in manufacturing costs and in the number of manufacturing steps. Further, the plurality of lens portions can be stably held in predetermined positions.

The method of manufacturing the light-emitting device according to the present embodiment is not limited to the method described above. For example, the mold resin portion may be formed by using, for example, a casting method.

FIG. **13** is a schematic lateral side view illustrating a light-emitting device **1006** in which the mold resin portion **60** is formed by using a casting method. When a casting method is used, in the same steps as described above, after a structure in which the light-emitting elements **50** and the reflective members **150** are disposed on the primary surface **100***a* of the resin package **100** is formed, this structure is impregnated with resin material in a casting case and cured to obtain the mold resin portion **60**. When a casting method is used, the mold resin portion **60** providing coverage from the upper surface to a part of the side portion (here, upper side portion) of the resin package **100** is formed.

Second Embodiment

FIG. **14** is a schematic perspective view of a light-emitting device **2000** of a second embodiment according to the present disclosure, with the mold resin portion **60** and the plurality of reflective members **151** to **153** removed. FIG. **15**A is a schematic top transparent view of the light-emitting device **2000**. FIGS. **15**B and **15**C are schematic cross-sectional views respectively taken along lines **15**B-**15**B and **15**C-**15**C illustrated in FIG. **15**A. The schematic perspective view of the light-emitting device **2000** is similar to that in FIG. **1**.

Below, the light-emitting device of the second embodiment according to the present disclosure will be described with reference to the drawings. The light-emitting device of the present embodiment differs from the light-emitting device **1000** illustrated in FIGS. **2**B to **2**E and the like in that the primary surface **100***a* of the resin package **100** does not include the recessed portion **20** for each light-emitting element **50**.

In the following, points differing from those of the light-emitting device **1000** of the first embodiment will be mainly described, and description of structures similar to those of the light-emitting device **1000** will be omitted.

As illustrated in FIGS. **15**A to **15**C, the light-emitting device **2000** includes the resin package **100** including the plurality of leads **11***a* to **13***b* and the resin member, the plurality of light-emitting elements **50**, the plurality of reflective members **151** to **153**, and the mold resin portion **60** including the plurality of lens portions **70**.

The resin package **100** includes, on the primary surface **100***a*, a first region **121**, a second region **122**, and a third region **123** defined by the plurality of leads **11***a* to **13***b* and the first dark-colored resin member **40**. The first region **121** to the third region **123** (hereinafter, also collectively referred to as "region **120**") are separated from each other. Each region **120** includes the exposed region **30** in which a part of any one of the plurality of leads **11***a* to **13***b* is exposed.

The plurality of light-emitting elements **50** include the first light-emitting element **51** disposed in the first region **121**, the second light-emitting element **52** disposed in the second region **122**, and the third light-emitting element **53** disposed in the third region **123**. Each of the first light-emitting element **51** to the third light-emitting element **53** is disposed in the exposed region **30** of the lead of the corresponding one of the first region **121** to the third region **123**.

The plurality of reflective members include the first reflective member **151** to the third reflective member **153** spaced apart from one another. The first reflective member **151** is disposed in the first region **121** and surrounds the first light-emitting element **51** in a plan view. The second reflective member **152** is disposed in the second region **122** and surrounds the second light-emitting element **52** in a plan view. The third reflective member **153** is disposed in the third region **123** and surrounds the third light-emitting element **53** in a plan view.

In the present embodiment as well, similarly to the first embodiment, the lens portion **70** is provided on the emission side of each of the light-emitting elements **50**, making it possible to extract light in the frontward direction with high efficiency. Further, the reflective members **151** to **153** surround the corresponding light-emitting elements **50**, thereby making it possible to make the light emission of each light-emitting element **50** into a point light source. This makes it possible to reduce the size of the lens portion **70**.

In the light-emitting device **2000** of the present embodiment as well, similarly to the light-emitting device of the embodiment described above, in a lateral side view from the y-axis direction, two or more light-emitting elements **50** overlap each other. In a lateral side view from the x-axis direction orthogonal to the y-axis, the maximum width of the first lens portion **71** may be no greater than 5 times the maximum width of the first light-emitting element **51**, the maximum width of the second lens portion **72** may be no greater than 5 times the maximum width of the second light-emitting element **52**, and the maximum width of the third lens portion **73** may be no greater than 5 times the maximum width of the third light-emitting element **53** (refer to FIG. **6**). Accordingly, the light-emitting device **2000** can be further miniaturized.

In the present embodiment, on the primary surface **100***a* of the resin package **100**, the first dark-colored resin member **40** may include a plurality of resin walls **300** spaced apart from one another. The plurality of resin walls **300** include at least one first resin wall **301** defining a part of a peripheral edge of the first reflective member **151**, at least one second resin wall **302** defining a part of a peripheral edge of the second reflective member **152**, and at least one third resin wall **303** defining a part of a peripheral edge of the third reflective member **153**. The first resin wall **301** to the third resin wall **303** are respectively disposed near the first region **121** to the third region **123**.

The plurality of resin walls **300** may include two or more first resin walls **301** separated from each other, two or more second resin walls **302** separated from each other, and two or more third resin walls **303** separated from each other. In the illustrated example, in a plan view, a pair of the first resin walls **301** are disposed so as to face each other across the first light-emitting element **51**, and at least a part of the first reflective member **151** is positioned between the pair of first resin walls **301**. Similarly, in a plan view, a pair of the second resin walls **302** facing each other across the second light-emitting element **52**, and a pair of the third resin walls **303** facing each other across the third light-emitting element **53** are disposed. At least a part of the second reflective member **152** is positioned between the pair of second resin walls **302**, and at least a part of the third reflective member **153** is positioned between the pair of third resin walls **303**.

In the present embodiment, in a plan view, each light-emitting element **50** can be disposed in a region defined by two or more resin walls **300**. With this structure, it is possible to apply, through the space between two adjacent resin walls **300**, the first resin material **150***a* (FIG. **12**D and FIG. **30**C to be described below) that is to become the reflective members **151** to **153** near the light-emitting elements **50** from outside the region defined by the resin walls **300**. Accordingly, the reflective members **151** to **153** can be disposed in a narrower region close to the light-emitting elements **50** while ensuring a sufficient space that can function as the nozzle arrangement region in which the nozzle for applying the first resin material **150***a* can be arranged. Further, the volume of the reflective members **151** to **153** surrounding the corresponding light-emitting elements **50** can be reduced by the resin walls **300**. Accordingly, stress applied to the light-emitting elements **50** by the reflective members **151** to **153** during formation of the mold resin portion **60** (during heat treatment for curing) can be more effectively mitigated. Accordingly, the lifting of the light-emitting elements **50** from the leads **11***a* to **13***a* can be more effectively reduced.

In the following, each of the components will be described more specifically.

Region **120**

The region **120** is a region in which one light-emitting element **50** and one of the reflective members **151** to **153** surrounding the light-emitting element **50** are disposed.

Hereinafter, a more specific structure of the region **120** will be described by using the first region **121** as an example. Note that, in the various light-emitting devices of the present embodiment, the first region to the third region can have similar structures. Further, the first resin wall to the third resin wall can also have similar structures. In this description, to avoid duplication of description, the first region or the first resin wall may be described as an example, and description of other regions or other resin walls may be omitted. Furthermore, although it is preferable that the first region to the third region all have the structure described by using the first region as an example, it is sufficient if at least one of the first region to the third region have the structure. Similarly, although it is preferable that the first resin wall to the third resin wall all have the structure described by using the first resin wall to the third resin wall as an example, it is sufficient if at least one of the first resin wall to the third resin wall have the structure.

FIG. **15**D is an enlarged schematic plan view illustrating the first region **121** of the resin package **100** of the light-emitting device **2000**. In FIG. **15**D, the first light-emitting element **51** is indicated by a dotted line. The mold resin portion **60** is removed.

The first region **121** includes a first portion P**1** defined by two or more resin walls **301** in a plan view. The first portion P**1** is, for example, a portion positioned between a pair of resin walls **301***a* and **301***b*. The first portion P**1** is connected to a region positioned outside the first portion P**1** through the gap between the resin walls **301***a* and **301***b*. The first light-emitting element **51** and at least a part of the reflective member **151** are disposed in the first portion P**1**.

In the illustrated example, the first region **121** includes the first portion P**1** positioned between the pair of first resin walls **301***a* and **301***b*, and a pair of second portions P**2** in a plan view. In a plan view, the first resin walls **301***a* and **301***b* face each other across the first light-emitting element **51** in a first direction (x-axis direction in this example) D**1**. The pair of second portions P**2** are positioned across the first portion PT in a second direction (here, y-axis direction) D**2** orthogonal to the first direction D**1**. Each second portion P**2** is in contact with the first portion P**1**. That is, each second portion P**2** is connected to the first portion P**1**.

In the first portion P**1**, the lead **11***a* is exposed. In this example, the entire first portion P**1** is the exposed region **30***a* of the lead **11***a*.

The first portion P**1** includes the element placement region dr in which the first light-emitting element **51** is disposed in a plan view. In this example, in a plan view, parts of the first resin walls **301***a* and **301***b* (second wall portions **2***a* and **2***b* to be described below) are positioned between the element placement region dr and each second portion P**2**.

A first reflective member **151** is disposed on at least a part of the first portion P**1**. Preferably, the first reflective member **151** surrounds the first light-emitting element **51**. The first reflective member **151** may be in contact with the lateral surface of the first light-emitting element **51** and lateral surfaces of the first resin walls **301***a*, **301***b* proximate to the first light-emitting element **51**.

A maximum width p**1** of the first portion P**1** in the first direction D**1** may be, for example, in a range from 1.1 times to 2 times a width of the first light-emitting element **51** in the first direction D**1**. A width p**2** of the first portion P**1** in the second direction D**2** may be, for example, in a range from 2 times to 4 times a width of the first light-emitting element **51** in the second direction D**2**.

In each second portion of the pair of second portions P**2**, the first dark-colored resin member **40** may be exposed, or either of the leads **11***a* or **11***b* may be exposed. The second portion P**2** and the first portion P**1** may be flush with each other. With this structure, the first resin material **150***a* (FIG. **30**C to be described below) that is to become the first reflective member **151** readily flows from the second portion P**2** to the first portion P**1**.

A width q**1** of each second portion P**2** in the first direction D**1** may be greater than or equal to the width p**1** of the first portion P**1** in the first direction D**1**. In this example, the width q**1** of the second portion P**2** is the same as the width p**1** of the first portion P**1**. The width q**1** of each second portion P**2** may be greater than the width p**1** of the first portion P**1**.

According to the configuration described above, the regions **801** each including a region sr, which is a part of the first portion P**1**, and one of the pair of second portions P**2** and having a relatively large area can be formed on both sides of the first light-emitting element **51** in the second direction D2. This region **801** has a size allowing arrangement of the nozzle used when applying the first resin material **150***a* (FIG. **30**C to be described below) that is to become the first reflective member **151** and can be used as the "nozzle arrangement region" described above. In this description, the region sr that is a part of the first portion P**1** positioned between the pair of resin walls and can constitute the nozzle arrangement region along with the second portion P**2** is referred to as a "side region".

Note that a space that can function as the nozzle arrangement region **801** is preferably formed on both sides of the first light-emitting element **51**, but may be formed only on one side of the first light-emitting element **51**.

Resin Wall **300**

As illustrated in FIGS. **15**A to **15**C, each of the plurality of resin walls **300** is a resin portion having a wall shape or a columnar shape with an upper surface (or upper portion) positioned above the exposed regions **30** of the leads **11***a* to **13***b*.

The resin walls **300** are each positioned near any one of the regions **120** in a plan view and define a part of the peripheral edges of the corresponding one of the reflective members **151** to **153**. The resin walls **300** may each have a lateral surface directly in contact with the corresponding one of the reflective members **151** to **153**. Each of the resin walls **300** is preferably near the corresponding light-emitting element **50** yet separated from the corresponding light-emitting element **50**, and at least a part of the corresponding one of the reflective members **151** to **153** is preferably positioned between the light-emitting element **50** and the resin wall **300**.

The plurality of resin walls **300** may include a resin wall positioned between at least one of the first connection region or the second connection region of the two leads connected to each light-emitting element **50**, and the light-emitting element **50**.

In the present embodiment, positions and heights of the resin walls **300**, shapes of the side walls, and the like can be used to control the positions of the reflective members **151** to **153**, heights of the upper surfaces of reflective members **151** to **153**, and the like. For example, in a plan view, in a case in which the resin wall **300** extends along either lateral surface of the light-emitting element **50**, a thickness of portions of the reflective members **151** to **153** covering the lateral surface of the corresponding light-emitting elements **50** can be controlled by a distance between the lateral surface of the resin wall **300** proximate to the light-emitting element **50** and the light-emitting element **50**.

Further, by providing the resin wall **300**, an arrangement region of each of the reflective members **151** to **153** can be reduced. For example, in a plan view, the first reflective member **151** may be positioned inside the first lens portion **71**, the second reflective member **152** may be positioned inside the second lens portion **72**, and the third reflective member **153** may be positioned inside the third lens portion **73**.

Hereinafter, the shape and the structure of the resin wall **300** and a positional relationship of the resin wall **300** with the light-emitting elements **50** and the reflective members **151** to **153** will be specifically described with reference to FIG. **15**D, using the first resin wall **301** as an example.

As described above, the first resin wall **301** includes the pair of first resin walls **301***a* and **301***b* facing each other across the first light-emitting element **51** in the first direction (x-axis direction in this example) D**1**, in a plan view. The first resin wall **301***a* is positioned on the +x side of the first light-emitting element **51**, and the first resin wall **301***b* is positioned on the −x side of the first light-emitting element. In a plan view, the first resin walls **301***a* and **301***b* may face each other with the first light-emitting element **51** interposed therebetween along the two sides of the first light-emitting element **51** that face each other.

In a plan view, the first resin wall **301***a* includes a first wall portion **1***a* extending in the second direction D**2**, and a pair of the second wall portions **2***a* extending in parallel from the first wall portion **1***a* toward the first resin wall **301***b* in the first direction D**1**. The first wall portion **1***a* and the second wall portions **2***a* are integrally formed (that is, connected). Similarly, the first resin wall **301***b* includes a first wall portion **1***b* extending in the second direction D**2**, and a pair of the second wall portions **2***b* extending in parallel from the first wall portion **1***b* toward the first resin wall **301***a* in the first direction D**1**. The first wall portion **1***b* and the second wall portions **2***b* are integrally formed. In a plan view, a length of the second wall portions **2***a* and **2***b* in the first direction D**1** is, for example, less than one half of the width p**1** of the first portion PT (here, space between the first wall portions **1***a* and Tb).

The second wall portions **2***a* of the first resin wall **301***a* and the second wall portions **2***b* of the first resin wall **301***b* face each other spaced apart by a space d. The space d is smaller than the width q**1** of the second portion P**2** and the width p**1** of the first portion PT. The space d may be smaller than the width of the first light-emitting element **51** in the first direction D**1**. When the first resin material **150***a* (FIG. **30**C to be described below) is applied by utilizing capillary action as will be described below, the space d may be, for example, in a range from 100 μm to 200 μm.

The first light-emitting element **51** is disposed in an interior of a region defined by the first wall portions **1***a* and **1***b* and the second wall portions **2***a* and **2***b*. A distance between the lateral surface of each of the first wall portions **1***a* and **1***b* and the second wall portions **2***a* and **2***b* proximate to the first light-emitting element **51** and the first light-emitting element **51** is, for example, 300 μm or less, preferably in a range from 100 μm to 200 μm.

Flow of First Resin Material from Nozzle Arrangement Region **801**

The flow of the first resin material **150***a* (FIG. **30**C to be described below) applied to the nozzle arrangement region **801** will be described with reference to FIG. **15**D. The first resin material is a resin material that is cured to form the reflective member.

The nozzle arrangement region **801** is a region in which a nozzle for applying the first resin material can be arranged and is a region aimed when arranging the nozzle. In a case in which a nozzle having the size described above with reference to FIG. **12**D is used, the nozzle arrangement region **801** can have a size greater than that of a circle having a diameter of 200 μm or greater, preferably 300 μm or greater, for example.

In the present embodiment, the nozzle arrangement region **801** is positioned outside a region defined by the plurality of resin walls **300** in a plan view. In this example, the region **801** including the side region sr, which is a part of the first portion P**1**, and the second portion P**2** is the "nozzle arrangement region". In the illustrated example, the side region sr is a region of the first portion P**1** positioned outward of the second wall portions **2***a* and **2***b* of the first resin walls **301***a* and **301***b*, respectively.

In a plan view, when the nozzle is arranged in the nozzle arrangement region **801** positioned on the +y side of the first portion P**1** and the first resin material is ejected, the first resin material flows through the space d between the first resin walls **301***a* and **301***b* and into a region defined by the first wall portions **1***a* and **1***b* and the second wall portions **2***a* and **2***b*, as indicated by an arrow **802**, by capillary action. The first resin material is pulled by surface tension to corner portions formed by the exposed region of the leads **11***a* and **11***b* or the first resin portion **41** (FIG. **15**B) and the first resin wall **301**, causing the first resin material flowing in from the space d to flow around from the +y side to the +x sides of the first light-emitting element **51**. In a case in which the nozzle is arranged in the nozzle arrangement region **801** positioned on the −y side of the first portion P**1** as well, the same applies and the first resin material passes through the space d by capillary action and flows in and around from the −y side to the +x sides of the first light-emitting element **51**. Thus, the first resin material can be brought into contact with entire lateral surface of the first light-emitting element **51**. A part of the first resin material may remain in the side regions sr, the second portions P**2**, or both.

Detailed Structure of First Resin Wall **301**

The structure of each of the first resin walls **301***a* and **301***b* will be described in more detail. In the following, description will be made using the first resin wall **301***a* as an example, but the first resin wall **301***b* can also have a similar structure.

FIG. **15**E is an enlarged schematic perspective view of the pair of first resin walls **301**.

As illustrated in FIG. **15**E, the first wall portion **1***a* of the first resin wall **301***a* includes a first lateral surface is positioned proximate to the first light-emitting element **51** and in contact with the first reflective member **151**, a second lateral surface **1***v*, an upper surface (or upper portion) **1***u* positioned between the first lateral surface is and the second lateral surface **1***v*, and a tapered surface **1***t* positioned between the first lateral surface is and the upper surface **1***u*. The first lateral surface is may be parallel to the lateral surface of the first light-emitting element **51** (lateral surface corresponding to the first wall portion **1***a*). The upper surface **1***u* is positioned above an upper end of the first lateral surface **1***s*. The tapered surface **1***t* is inclined from the upper end of the first lateral surface is toward the upper surface **1***u*. The second lateral surface **1***v* may be a tapered surface inclined so as to become lower from the upper surface **1***u* toward the exposed region **30***a* of the lead **11***a*.

Each second wall portion **2***a* of the first resin wall **301***a* includes a first lateral surface **2***s* positioned proximate to the first light-emitting element **51**, a second lateral surface **2***v*, an upper surface (or upper portion) **2***u* positioned between the first lateral surface **2***s* and the second lateral surface **2***v*, and a tapered surface **2***t* positioned between the first lateral surface **2***s* and the upper surface **2***u*. The second lateral surface **2***v* may be a tapered surface, or may be a surface perpendicular to the xy plane.

The upper surface **1***u* of the first wall portion **1***a* and the upper surface **2***u* of each second wall portion **2***a* are connected. The tapered surface **1***t* of the first wall portion **1***a* may include a fan-shaped surface at a corner portion between each second wall portion **2***a* and the first wall portion **1***a* so as to be continuous with the tapered surface **2***t* of each second wall portion **2***a*.

With the first resin wall **301***a* having the configuration described above, it is possible to control the height of the upper surface of the first reflective member **151** by a height hs of the first lateral surfaces **1***s* and **2***s*. A height hs of the first lateral surfaces is and **2***s* may be about the same as a height of the first light-emitting element **51** or may be lower than the height of the first light-emitting element **51**. With this structure, the flow of the first reflective member **151** to the upper surface of the first light-emitting element **51** can be reduced.

A height hu of the upper surfaces **1***u* and **2***u* is preferably higher than the height of the first light-emitting element **51**. In a case in which a precoating resin such as the colored resin members **161** to **163** is formed on the first reflective member **151**, the thickness of the precoating resin (height of an upper surface of the precoating resin) can be controlled by utilizing the upper surfaces **1***u* and **2***u*. The upper surfaces **1***u* and **2***u* may be positioned below the upper surface of the second resin portion **42** (FIG. **15**B). By adjusting the height of the upper surfaces **1***u* and **2***u* of each resin wall **300** and the upper surface of the second resin portion **42** (FIG. **15**B), it is possible to make the thickness of the precoating resin more uniform and ensure the thickness of the precoating resin to a certain degree or above.

Further, with the first resin wall **301***a* including the tapered surfaces **1***t* and **2***t* with the upper surfaces **1***u* and **2***u* as the uppermost surfaces, respectively, it is possible to reduce the blocking of light from the first light-emitting element **51** by the upper surfaces **1***u* and **2***u* of the first resin wall **301***a* that are higher than the first light-emitting element **51**. Furthermore, with the second lateral surface **1***v* of the first wall portion **1***a* having a tapered surface inclined so as to become lower as the distance from the upper surface **1***u* increases, it is possible to reduce, when forming a loop of the wire, contact of the loop of the wire with the first wall portion **1***a*.

Note that, in this description, the height of each component such as the first light-emitting element **51** and the first resin wall **301***a* disposed on the primary surface **100***a* of the resin package **100** (including the heights hs and hu described above) is a distance from the exposed region of the lead exposed at the primary surface **100***a* to the upper surface (or upper portion) of the component in the z-axis direction.

Resin Groove **46**

As illustrated in FIG. **15**A, the first dark-colored resin member **40** may include at least one resin groove (also referred to as "third portion") **46** positioned outside of each region **120** in a plan view. An upper surface of the resin groove **46** may be positioned below (−z direction) the exposed region **30** of the leads **11***a* to **13***b*, for example. The resin groove **46** may be a groove or a depression formed in the first resin portion **41** of the first dark-colored resin member **40**. The resin groove **46** is at least partially in contact with the second portion P**2** in a plan view. The upper surface of the resin groove **46** is positioned below surfaces of the first portion P**1** and the second portion P**2** facing upward.

With the resin groove **46** provided in contact with the second portion P**2**, it is possible to utilize surface tension, when the first reflective member **151** is formed, to reduce the outflow of the first resin material **150***a* (FIG. **30**C), which is ejected into an interior of the nozzle arrangement region **801**, from the second portion P**2** in a direction different from that of the element placement region dr.

At least one resin groove **46** is disposed for each region **120**. A plurality of the resin grooves **46** may be disposed for each region **120**. The plurality of resin grooves **46** may include two resin grooves **46** disposed across the second portion P**2** in the first direction D**1** in a plan view.

A depth of each resin groove **46** is not particularly limited, but may be, for example, in a range from 100 μm to 200 μm. The depth of the resin groove **46** is a distance from the exposed region **30** of the leads **11***a* to **13***b* to a bottom portion of the resin groove **46** in the z-axis direction.

The resin groove **46** preferably defines a part of a peripheral edge of the nozzle arrangement region **801** to be aimed for arranging the nozzle. Accordingly, the first resin material **150***a* (FIG. **30**C) applied to the nozzle arrangement region **801** can be more effectively guided to a region near the light-emitting element **50**.

In the example illustrated in FIG. **15**D, resin grooves **46***a* to **46***e* spaced apart from one another are disposed in the first region **121**. In a plan view, one of the second portions **P2** is interposed between the resin grooves **46***a* and **46***b* in the first direction **D1**, and the other of the second portions **P2** is interposed between the resin grooves **46***d* and **46***e* in the first direction **D1**. The width q**1** of each second portion **P2** in the first direction **D1** is defined by these resin grooves **46**. The resin groove **46***c* is positioned between the resin groove **46***a* and the resin groove **46***b* in a plan view. This makes it possible to more effectively reduce the outflow of the first reflective member **151** toward other adjacent regions **120** (second region **122** in this example). Further, the number of the resin grooves **46***c* provided may be one less than the number of light-emitting elements. Note that the resin grooves **46***a* to **46***c* may be three separated grooves or may be a U-shaped groove formed integrally.

Recessed Portion **27**

As illustrated in FIGS. **15**A to **15**C, the primary surface **100***a* of the resin package **100** may include a recessed portion **27** defined by the leads **11***a* to **13***b* and the first dark-colored resin member **40**. In the illustrated example, an inner upper surface of the recessed portion **27** includes the first region **121** to the third region **123**. For example, the recessed portion **27** has a substantially rectangular shape in a plan view. In a plan view, the plurality of resin walls **300** and the plurality of resin grooves **46** formed of the first dark-colored resin member **40** are positioned in an interior of the recessed portion **27**. Note that the configuration of the recessed portion **27** is not limited to the above. The inner upper surface of the recessed portion **27** includes at least two regions **120** of the first region **121** to the third region **123** including the first region **121** and at least one first resin wall **301** being positioned inside the recessed portion **27**.

The first dark-colored resin member **40** includes the first resin portion **41** exposed at the inner upper surface of the recessed portion **27** and the second resin portion **42** surrounding the inner upper surface of the recessed portion **27**. The upper surface of the second resin portion **42** is positioned above (+z direction) the upper surface of the first resin portion **41**. The second resin portion **42** may be a wall surrounding the recessed portion **27**. The height h**1** of the upper surface of the second resin portion **42** may be higher than the height hu of the upper surface (or portion positioned uppermost) of the resin wall **300**.

A precoating resin (light-transmissive resin member) having light transmissivity may be disposed in the recessed portion **27** so as to cover at least the first light-emitting element **51** and the first reflective member **151**. In this example, the colored resin members **161** to **163** are disposed in the recessed portion **27** as precoating resins.

Colored Resin Members **161** to **163**

As illustrated in FIGS. **15**A to **15**C, the light-emitting device **2000** includes the colored resin members **161** to **163** as precoating resins between the primary surface **100***a* of the resin package **100** and the mold resin portion **60**. The material and the effect of the colored resin members **161** to **163** are the same as those of the first modified example described above.

In the present embodiment, the first light emitted from the first light-emitting element **51**, the second light emitted from the second light-emitting element **52**, and the third light emitted from the third light-emitting element **53** are light beams having wavelengths different from one another. The colored resin member includes the first colored resin member **161** colored to the same type of color as the first light, the second colored resin member **162** colored to the same type of color as the second light, and the third colored resin member **163** colored to the same type of color as the third light.

In a plan view, at least a part of the first colored resin member **161** is positioned in the first region **121**, at least a part of the second colored resin member **162** is positioned in the second region **122**, and at least a part of the third colored resin member **163** is positioned in the third region **123**. At least a part of the first colored resin member **161** may be positioned on the first reflective member **151**, at least a part of the second colored resin member **162** may be positioned on the second reflective member **152**, and at least a part of the third colored resin member **163** may be positioned on the third reflective member **153**. In a plan view, the first colored resin member **161** to the third colored resin member **163** may overlap the first light-emitting element **51** to the third light-emitting element **53**, respectively.

In the illustrated example, the first colored resin member **161** to the third colored resin member **163** are disposed in the recessed portion **27**. The first colored resin member **161** to the third colored resin member **163** may each be in contact with a part of the inner lateral surface of the recessed portion **27**. In a plan view, a region **R1** in which the first colored resin member **161** and the second colored resin member **162** overlap may be disposed between the first region **121** and the second region **122**. Similarly, a region **R2** in which the second colored resin member **162** and the third colored resin member **163** overlap may be disposed between the second region **122** and the third region **123**.

Fifth Modified Example

FIG. **16** is a schematic perspective view of a light-emitting device **2001** according to a fifth modified example, with the mold resin portion **60** and the reflective members **151** to **153** removed. FIG. **17**A is a schematic top transparent view of the light-emitting device **2001**. FIGS. **17**B and **17**C are schematic cross-sectional views respectively taken along lines **17**B-**17**B and **17**C-**17**C illustrated in FIG. **17**A.

The light-emitting device **2001** according to the present modified example differs from the light-emitting device **2000** described above in that pairs of resin walls **310** are each disposed across the corresponding one of the light-emitting elements **50** in the y-axis direction in a plan view. In the present modified example, the first direction **D1** is the y-axis direction.

The plurality of resin walls **310** in the present modified example include a pair of first resin walls **311** defining a part of the peripheral edge of the first reflective member **151**, a pair of second resin walls **312** defining a part of the peripheral edge of the second reflective member **152**, and a pair of third resin walls **313** defining a part of the peripheral edge of the third reflective member **153**. The first resin walls **311** to the third resin walls **313** each have a rectangular planar shape long in the x-axis direction.

A structure of the region **120** in the present modified example will be described with reference to FIG. **17**A by using the first region **121** as an example. The first region **121** includes the first portion **P1** positioned between a pair of first resin walls **311***a* and **311***b* and the pair of second portions **P2** facing each other across the first portion P1 in the second direction D2 (here, x-axis direction).

In a plan view, the first portion P1 includes the element placement region dr in which the first light-emitting element **51** is to be disposed and the side regions sr each positioned between the element placement region dr and the corresponding one of the pair of second portions P2. Each second portion P2 is in contact with the corresponding side region sr of the first portion P1. In the first direction D1, a width of the second portion P2 is greater than a width of the first portion P1. As illustrated, the pair of second portions P2 may respectively include the connection regions wr1 and wr2 for wire bonding.

In the present modified example as well, the nozzle arrangement regions **801** that allow nozzle arrangement and that each include the side region sr, which is a part of the first portion P1, and the second portion P2 can be formed on both sides of the first light-emitting element **51** in the second direction D2.

The first portion P1 may be positioned between the first connection region wr1 of the lead **11***a* and the second connection region wr2 of the lead **11***b* in a plan view. In this case, in a plan view, a pair of wires may respectively extend from the first light-emitting element **51** across the space between the first resin walls **311***a* and **311***b* and to the first connection region wr1 and the second connection region wr2. This makes it possible to easily and stably arrange the wires by utilizing the space between the pair of resin walls **310**.

In the illustrated example, a planar shape of each of the first resin walls **311***a* and **311***b* is a rectangular shape extending in the second direction D2 (here, y-axis direction), for example. Each of the first resin walls **311***a* and **311***b* includes the first lateral surface is positioned proximate to the first light-emitting element **51**, the second lateral surface **1***v* positioned opposite to the first lateral surface **1***s*, and the upper surface **1***u* positioned between the first lateral surface is and the second lateral surface **1***v*. As illustrated in FIG. **17**C, the height hu of the upper surface **1***u* is higher than the height of the upper surface of the first light-emitting element **51**. The height hu may be substantially the same as the height h1 of the upper surface of the second resin portion **42**, for example.

In the present modified example as well, the first dark-colored resin member **40** may include at least one resin groove **46** around the first region **121**.

FIGS. **17**D and **17**E are each an enlarged schematic plan view exemplifying the first region **121** in the resin package **100** of the present modified example. As illustrated in FIG. **17**D, in a plan view, a resin groove **46***f* extending in the x-axis direction so as to be in contact with end portions of the two second portions P2 on the +y side, and a resin groove **46***g* extending in the x-axis direction so as to be in contact with end portions of the two second portions P2 on the −y side may be provided. Alternatively, as illustrated in FIG. **17**E, two resin grooves **46***h* and **46***i* being in contact with the corresponding end portions of second portions P2 on the +y side, and two resin grooves **46***j* and **46***k* being in contact with the corresponding end portions of second portions P2 on the −y side may be provided spaced apart from each other.

Sixth Modified Example

FIG. **18** is a schematic perspective view of a light-emitting device **2002** according to a sixth modified example, with the mold resin portion **60** and the reflective members **151** to **153** removed. FIG. **19**A is a schematic top transparent view of the light-emitting device **2002**. FIGS. **19**B and **19**C are schematic cross-sectional views respectively taken along lines **19**B-**19**B and **19**C-**19**C illustrated in FIG. **19**A. FIG. **19**D is an enlarged schematic plan view illustrating the first region **121** of the resin package **100** of the light-emitting device **2002**.

As illustrated in FIGS. **19**A and **19**D, the plurality of resin walls **320** in the present modified example include, similarly to the fifth modified example, a pair of first resin walls **321** disposed in the y-axis direction across the first light-emitting element **51**, a pair of second resin walls **322** disposed in the y-axis direction across the second light-emitting element **52**, and a pair of third resin walls **323** disposed in the y-axis direction across the third light-emitting element **53**. In the present modified example, the first direction D1 is the y-axis direction.

Although each of the resin walls of the fifth modified example described above has a rectangular planar shape, the planar shape of each of the resin walls **320** in the sixth modified example is formed with a notch portion curved in a concave shape on one side of the rectangular shape (side proximate to the corresponding light-emitting element). Each light-emitting element **50** is positioned between the notch portions of the pair of resin walls **320** in a plan view.

A structure of the resin wall **320** will be more specifically described by using the first resin wall **321** as an example. FIG. **19**E is an enlarged schematic perspective view of the pair of first resin walls **321**.

As illustrated in FIG. **19**E, first resin walls **321***a* and **321***b* each have a shape of a rectangular parallelepiped with a part cut away. The first resin walls **321***a* and **321***b* each include a first lateral surface **3***s*, a second lateral surface **3***v* positioned opposite to the first lateral surface **3***s*, an upper surface **3***u* positioned between the first lateral surface **3***s* and the second lateral surface **3***v*, and a tapered surface **3***t* positioned between the upper surface **3***u* and the first lateral surface **3***s*.

The first lateral surface **3***s* includes a curved portion **3***s***1** having a surface that curves into a recessed shape relative to the first light-emitting element **51**, and planar portions **3***s***2** positioned on both sides of the curved portion **3***s***1** in the second direction D2. In this example, the curved portion **3***s***1** and the planar portions **3***s***2** are all perpendicular to the xy plane. The curved portion **3***s***1** is curved in an arc shape in a top view. The curved portion **3***s***1** is, for example, a recessed arc surface. The tapered surface **3***t* is in contact with the curved portion **3***s***1**, the planar portion **3***s***2**, and the upper surface **3***u*. The tapered surface **3***t* may have a shape defined by a pair of arc-shaped portions parallel to each other and straight lines parallel to the x-axis direction and positioned at both ends of the pair of arc-shaped portions, in a plan view.

In the present modified example, in a plan view, the curved portion **3***s***1** of the first resin wall **321***a* and the curved portion **3***s***1** of the first resin wall **321***b* face each other and the first light-emitting element **51** is disposed therebetween, making it possible to decrease the area of the first portion P1 positioned between the first resin walls **321***a* and **321***b*. Accordingly, the volume of the first reflective member **151** can be reduced. Further, by forming the tapered surface **3***t*, it is possible to reduce the blocking of light from the first light-emitting element **51** by the upper surfaces **3***u* of the first resin walls **321***a* and **321***b* that are higher than the first light-emitting element **51**.

In the present modified example as well, as illustrated in FIG. **19**D, the nozzle arrangement regions **801** that allow nozzle arrangement and that each include the side region sr of the first portion P1 and the second portion P2 can be formed on both sides of the first light-emitting element **51** in the second direction D2. In the present modified example, the space d between the first resin walls **321***a* and **321***b* (space between the planar portions **3***s***2** facing each other) can be made smaller in a plan view. Accordingly, when the first resin material **150***a* (FIG. **30**C) is applied using the nozzle, the capillary action can be utilized in the same manner as with the light-emitting device **2000** (FIG. **15**D).

Although, in the example illustrated in FIG. **19**D, a pair of resin grooves **46***f* and **46***g* are disposed across the first portion P1 and the second portions P2 in a plan view, four resin grooves **46***h* to **46***k* sandwiching the second portions P2 in the first direction D1 may be formed as illustrated in FIG. **19**F.

Seventh Modified Example

FIG. **20** is a schematic perspective view of a light-emitting device **2003** according to a seventh modified example, with the mold resin portion **60** and the reflective members **151** to **153** removed. FIG. **21** is an enlarged schematic top view illustrating one of the regions **120** (here, first region **121**) of the resin package **100** of the light-emitting device **2003**.

As illustrated in FIG. **20**, a plurality of resin walls **330** in the present modified example include a pair of first resin walls **331** disposed in the y-axis direction across the first light-emitting element **51**, a pair of second resin walls **332** disposed in the y-axis direction across the second light-emitting element **52**, and a pair of third resin walls **333** disposed in the y-axis direction across the third light-emitting element **53**. In the present modified example, the first direction D1 is the y-axis direction.

As illustrated in FIG. **21**, a pair of first resin walls **331***a* and **331***b* in the present modified example each include a first lateral surface **4***s* curved in a recessed shape relative to the corresponding light-emitting element **50**, a second lateral surface **4***v* positioned opposite to the first lateral surface **4***s* and parallel to the first lateral surface **4***s*, an upper surface **4***u* positioned between the first lateral surface **4***s* and the second lateral surface **4***v*, and a tapered surface **4***t* positioned between the first lateral surface **4***s* and the second lateral surface **4***v*. The tapered surface **4***t* is inclined so as to become higher from an upper end of the first lateral surface **4***s* toward an upper end of the second lateral surface **4***v*. The first lateral surface **4***s* is, for example, perpendicular to the xy plane. The first lateral surface **4***s* is, for example, a recessed arc surface. A shape of the tapered surface **4***t* is, for example, an annular fan shape.

The curved portion **3***s***1** and the tapered surface **3***t* are formed proximate to the light-emitting element in each of the resin walls **321** in the sixth modified example (refer to FIG. **19**E) by cutting away a part of a rectangular parallelepiped. In contrast, in the present modified example, in each resin wall, a part of a hollow cylindrical body (more specifically, a part of a column body obtained by cutting the hollow cylindrical body in a plane perpendicular to the xy plane) is cut away, thereby forming the first side **4***s* that is curved and a part of an inner surface of the hollow cylindrical body, and the tapered surface **4***t* having an annular fan shape.

The first lateral surface **4***s* and the tapered surface **4***t* in the present modified example have shapes corresponding to the curved portion **3***s***1** and the tapered surface **3***t* of the resin wall **321** in the sixth modified example illustrated in FIG. **19**E. Thus, the resin wall of the seventh modified example also achieves effects similar to those of the sixth modified example. Specifically, in a plan view, the first light-emitting element **51** is disposed between the first lateral surfaces **4***s*, which are curved, of the first resin walls **331***a* and **331***b*, making it possible to decrease the area of the first portion P1 positioned between the first resin walls **331***a* and **331***b*. Accordingly, the volume of the first reflective member **151** can be reduced. Further, the space d between the first resin walls **331***a* and **331***b* can be made smaller, and thus capillary action can be utilized when applying the first resin material **150***a* using the nozzle. With the first resin walls **331***a* and **331***b* including the tapered surface **4***t*, it is possible to reduce the blocking of light from the light-emitting element **50** by the upper surfaces **4***u* of the first resin walls **331***a* and **331***b* that are higher than the light-emitting element **50**.

Note that a fourth resin portion **47** positioned above the first resin portion **41** may be disposed so as to connect the second lateral surface **4***v* of each of the resin walls **331***a* and **331***b* and the first resin portion **41**. Further, the resin groove **46** may be included as in the other modified examples.

Eighth Modified Example

A light-emitting device according to an eighth modified example differs from the light-emitting devices described above in that two pairs of resin walls are disposed for each light-emitting element.

FIG. **22** is a schematic perspective view of a light-emitting device **2004** according to the eighth modified example, with the mold resin portion **60** and the reflective members **151** to **153** removed. FIG. **23** is an enlarged schematic top view illustrating one of the regions **120** (here, first region **121**) of the resin package **100** of the light-emitting device **2004**.

A plurality of resin walls **340** in the present modified example include two pairs of first resin walls **341**, two pairs of second resin walls **342**, and two pairs of third resin walls **343**. The first light-emitting element **51** to the third light-emitting element **53** each have a quadrangular planar shape. One pair of the two pairs of first resin walls **341** face each other across one set of sides of the quadrangular shape of the first light-emitting element **51** facing each other, in a plan view. The other pair of the two pairs of first resin walls **341** face each other across the other set of sides of the quadrangular shape of the first light-emitting element **51** facing each other, in a plan view. Similarly, one pair of the two pairs of second resin walls **342** face each other across one set of sides of the quadrangular shape of the second light-emitting element **52** facing each other, in a plan view, the other pair of the two pairs of second resin walls **342** face each other across the other set of sides of the quadrangular shape of the second light-emitting element **52** facing each other, in a plan view, one pair of the two pairs of third resin walls **343** face each other across one set of sides of the quadrangular shape of the third light-emitting element **53** facing each other, in a plan view, and the other pair of the two pairs of third resin walls **343** face each other across the other set of sides of the quadrangular shape of the third light-emitting element **53** facing each other, in a plan view.

A structure of the first region **121** and the first resin walls **341** will be described as an example with reference to FIG. **23**.

First resin walls **341***a* to **341***d* include one pair of the first resin walls **341***a* and **341***b* disposed across the first light-emitting element **51** in the x-axis direction (first direction D1), and the other pair of the first resin walls **341***c* and **341***d* disposed across the first light-emitting element **51** in the y-axis direction (second direction D2) between the first resin walls **341***a* and **341***b*. In the illustrated example, the first portion P1 of the first region **121** is a portion positioned between the first resin walls **341***a* and **341***b*. The first resin walls **341***c* and **341***d* are disposed in the first portion P1.

The first resin walls **341***a* and **341***b* each have a rectangular planar shape long in the y-axis direction. The first resin walls **341***a* and **341***b* have structures similar to those of the first wall portion **1***a* of the first resin walls **301***a* and **301***b*, respectively, in the light-emitting device **2000** illustrated in FIGS. **14** to **15**E. That is, the first resin walls **341***a* and **341***b* differ from the first resin walls **301***a* and **301***b* (FIG. **15**E) in the light-emitting device **2000**, respectively, in not including the second wall portion **2***a*.

The first resin walls **341***c* and **341***d* each have a rectangular planar shape. Each of the first resin walls **341***c* and **341***d* is spaced apart by a space d**1** from the first lateral surface is of the first resin wall **341***a* and spaced apart by a space d**2** from the first lateral surface is of the first resin wall **341***b*.

The first resin walls **341***c* and **341***d* have structures similar to those of the second wall portions **2***a* and **2***b* of the first resin walls **301***a* and **301***b* of the light-emitting device **2000**, respectively. Specifically, the first resin walls **341***c* and **341***d* each include a first lateral surface **5***s* positioned proximate to the first light-emitting element **51**, a second lateral surface **5***v* positioned opposite to the first lateral surface **5***s*, an upper surface **5***u* positioned between the first lateral surface **5***s* and the second lateral surface **5***v*, and a tapered surface **5***t* positioned between the upper surface **5***u* and the first lateral surface **5***s*. In this example, a height of the upper surface **5***u* is the same as the height of the upper surface **1***u* of each of the first resin walls **341***a* and **341***b*. A height of an upper end of the first lateral surface **5***s* is the same as the height of the upper end of the first lateral surface is of each of the first resin walls **341***a* and **341***b*.

In the present modified example, the first light-emitting element **51** is disposed in a region defined by the four first resin walls **341***a* to **341***d*.

The first region **121** includes the first portion P**1** including the element placement region dr and the pair of side regions sr, and the pair of second portions P**2** positioned across the first portion P**1** in the second direction D**2**. In the illustrated example, the side regions sr are regions of the first portion P**1** positioned outward of the corresponding first resin walls **341***c* and **341***d*. The nozzle arrangement regions **801** each including the second portion P**2** and the side region sr can be formed on the +y side and the −y side of the first light-emitting element **51**.

As illustrated by the arrows **802** in FIG. **23**, the first resin material **150***a* (FIG. **30**C) ejected from the nozzle arranged in the nozzle arrangement region **801** flows through the space d**1** between the first resin walls **341***c* as well as **341***d* and the first resin wall **341***a*, and the space d**2** between the first resin walls **341***c* as well as **341***d* and the first resin wall **341***b*, into the region defined by the first resin walls **341***a* to **341***d*, and around the first light-emitting element **51**. Accordingly, by curing the first resin material **150***a* arranged in this manner, it is possible to form the first reflective member **151** on each lateral surface of the first light-emitting element **51**.

In the present modified example as well, the same effects as those of the light-emitting device **2000** (FIGS. **14** to **15**E) are achieved. That is, the thickness of the first reflective member **151** in the z-axis direction can be controlled by the heights of the first lateral surfaces is and **5***s*. Further, the thickness of the precoating resin in the z-axis direction (height of the upper surface of the precoating resin) can be controlled by the heights of the upper surfaces **1***u* and **5***u*. Furthermore, the blocking of light emission from the first light-emitting element **51** by the upper surfaces **1***u* and **5***u* of the first resin wall **341** can be reduced by the tapered surfaces **1***t* and **5***t*.

Ninth Modified Example

FIG. **24** is a schematic perspective view of a light-emitting device **2005** according to a ninth modified example, with the mold resin portion **60** and the reflective members **151** to **153** removed. FIG. **25** is an enlarged schematic plan view illustrating the first region **121** of the resin package **100** of the light-emitting device **2005**.

A plurality of resin walls **350** in the present modified example include six first resin walls **351**, six second resin walls **352**, and six third resin walls **353**.

Structures of the first region **121** and the first resin walls **351** will be described as examples with reference to FIG. **25**.

The six first resin walls **351** include first resin walls **351***a***1** and **351***a***2** disposed on the +x side of the first light-emitting element **51** with a space d**3** therebetween in the y-axis direction, first resin walls **351***b***1** and **351***b***2** disposed on the −x side of the first light-emitting element **51** with the space d**3** therebetween in the y-axis direction, and first resin walls **351***c* and **351***d* respectively disposed on the −y side and the +y side of the first light-emitting element **51**.

The first resin walls **351***a***1** and **351***a***2** have shapes obtained by separating the first resin wall **341***a* (FIG. **23**) of the eighth modified example into two with a space provided in a central portion thereof in the y-axis direction. Similarly, the first resin walls **351***b***1** and **351***b***2** have shapes obtained by separating the first resin wall **341***b* (FIG. **23**) of the eighth modified example into two with a space provided in a central portion thereof in the y-axis direction.

The present modified example achieves effects similar to those of the light-emitting device **2004** according to the eighth modified example. Further, in the present modified example, a gap (space d**3**) of the resin walls **350** is positioned between the light-emitting element **50** and the connection region for wire bonding. Therefore, similarly to the fifth modified example, the wires for connecting the light-emitting element **50** and any one of the leads **11***a* to **13***b* can be easily and stably disposed by utilizing the space d**3** between the resin walls **350**.

Tenth Modified Example

FIG. **26** is a schematic perspective view of a light-emitting device **2006** according to a tenth modified example, with the mold resin portion **60** and the reflective members **151** to **153** removed. FIG. **27** is an enlarged schematic plan view illustrating the first region **121** of the resin package **100** of the light-emitting device **2006**.

A plurality of resin walls **360** in the present modified example include four first resin walls **361**, four second resin walls **362**, and four third resin walls **363**. The first light-emitting element **51** to the third light-emitting element **53** each have a quadrangular planar shape, and the four first resin walls **361** respectively face four corner portions of the quadrangular shape of the first light-emitting element **51** in a plan view. In this example, each first resin wall **361** includes lateral surfaces facing a part of the corresponding two sides constituting one corner portion of the quadrangular shape. Each second resin wall **362** and each third resin wall **363** are also similarly disposed facing the corresponding corner portion of the quadrangular shape of the corresponding light-emitting element **50** in a plan view.

A structure of the first region **121** and the first resin walls **361** will be described as examples with reference to FIG. **27**.

The four first resin walls **361** include first resin walls **361**_a_**1** and **361**_a_**2** disposed on the +x side of the first light-emitting element **51** with a space d**4** therebetween in the y-axis direction, and first resin walls **361**_b_**1** and **361**_b_**2** disposed on the −x side of the first light-emitting element **51** with the space d**4** therebetween in the y-axis direction.

The first resin walls **361**_a_**1** and **361**_a_**2** have shapes obtained by separating the first wall portion **1**_a_ of the first resin wall **301**_a_ (FIGS. **15**D and **15**E) of the light-emitting device **2000** into two with a space provided in a central portion thereof in the y-axis direction. Similarly, the first resin walls **361**_b_**1** and **361**_b_**2** have shapes obtained by separating the first wall portion **1**_b_ of the first resin wall **301**_b_ (FIGS. **15**D and **15**E) of the light-emitting device **2000** into two with a space provided in a central portion thereof in the y-axis direction.

In the present modified example as well, effects similar to those of the light-emitting device **2000** are achieved. Further, in the present modified example, a gap (space d) of the resin walls **360** is positioned between the light-emitting element **50** and the connection region for wire bonding. Therefore, similarly to the fifth modified example, the wires for connecting the light-emitting element **50** and any one of the leads **11**_a_ to **13**_b_ can be easily and stably disposed by utilizing this space d**4**.

Eleventh Modified Example

FIG. **28** is a schematic perspective view of a light-emitting device **2007** according to an eleventh modified example, with the mold resin portion **60** and the reflective members **151** to **153** removed. FIG. **29**A is a schematic top transparent view of the light-emitting device **2007**. FIGS. **29**B and **29**C are schematic cross-sectional views respectively taken along lines **29**B-**29**B and **29**C-**29**C illustrated in FIG. **29**A.

The light-emitting device **2007** according to the present modified example differs from the light-emitting devices described above in that, in a plan view, fourth resin walls (hereinafter referred to as "resin blocks") **501** and **502** are provided between the first region **121** and the second region **122** and between the second region **122** and the third region **123**, respectively.

A plurality of resin walls **370** in the present modified example include a pair of first resin walls **371** disposed in the x-axis direction across the first light-emitting element **51**, a pair of second resin walls **372** disposed in the x-axis direction across the second light-emitting element **52**, and a pair of third resin walls **373** disposed in the x-axis direction across the third light-emitting element **53**. In the present modified example, the first direction D**1** is the x-axis direction.

Each of the resin blocks **501** and **502** is positioned between two adjacent regions **120** and defines a part of the peripheral edge of a precoating resin, such as the colored resin members **161** to **163**. That is, a range in which the precoating resin is applied can be controlled by the resin blocks **501** and **502**.

In the illustrated example, the resin blocks **501** and **502** each have a rectangular planar shape. In a plan view, a maximum width of each of the resin blocks **501** and **502** in the x-axis direction is smaller than the width of the inner upper surface of the recessed portion **27** and is, for example, the same as the width of the second portion P**2** adjacent thereto. The resin blocks **501** and **502** are spaced apart from an inner surface of the recessed portion **27**. Further, the resin blocks **501** and **502** are spaced apart from any of the resin walls **370** defining the peripheral edge of the reflective members **151** to **153**.

The resin block **501** will be described below as an example, but the resin block **502** can have a similar structure.

FIG. **29**D is a schematic perspective view illustrating the resin block **501** and second resin walls **372**_a_ and **372**_b_.

In the present modified example, the resin block **501** includes an upper surface **501**_u_, lateral surfaces **501**_s_**1** and **501**_s_**2** positioned on the −y side and +y side, respectively, and lateral surfaces **501**_t_**1** and **501**_t_**2** positioned on the −x side and the +x side, respectively. The lateral surfaces **501**_t_**1** and **501**_t_**2** are tapered surfaces.

The lateral surfaces **501**_t_**1** and **501**_t_**2**, which are both ends of the resin block **501** in the x-axis direction, are each spaced apart from the second resin portion **42** (FIG. **29**C), which is the inner surface of the recessed portion **27**. The lateral surfaces **501**_s_**1** and **501**_s_**2** of the resin block **501** are each spaced apart at a space f from the resin wall that is closest.

As illustrated in FIG. **29**D, the upper surface **501**_u_ of the resin block **501** may be positioned above an upper surface of each of the resin walls **370**, for example. As illustrated in FIG. **29**C, the upper surface of the resin block **501** may be the same as the height of the upper surface of the second resin portion **42**.

As illustrated in FIG. **29**C, with the resin blocks **501** and **502** provided, thicknesses and positions of the colored resin members **161** to **163** can be controlled. In the present modified example, the first colored resin member **161** is disposed on the first reflective member **151** and the first light-emitting element **51**. A peripheral edge of the first colored resin member **161** is defined by the second resin portion **42** and the resin block **501**. The second colored resin member **162** is disposed on the second reflective member **152** and the second light-emitting element **52**. A peripheral edge of the second colored resin member **162** is defined by the second resin portion **42** and the resin blocks **501** and **502**. The third colored resin member **163** is disposed on the third reflective member **153** and the third light-emitting element **53**. A peripheral edge of the third colored resin member **163** is defined by the second resin portion **42** and the resin block **502**.

As illustrated in FIG. **29**A, in a plan view, the regions R**1** and R**2** in which two colored resin members overlap each other may be formed in spaces between the resin blocks **501** as well as **502** and the second resin portion **42**.

A structure of the pair of resin walls **370** in the present modified example is not particularly limited, and any one of the structures described above can be applied.

The structure of the resin wall **370** in the present modified example will be described with reference to FIG. **29**D by using the second resin wall **372** as an example.

In the illustrated example, the second resin walls **372**_a_ and **372**_b_ each have a rectangular planar shape. The second resin walls **372**_a_ and **372**_b_ each include a first lateral surface **6**_s_ positioned proximate to the second light-emitting element, a second lateral surface **6**_v_ positioned opposite to the first lateral surface **6**_s_, an upper surface **6**_u_, and a tapered surface **6**_t_ positioned between the upper surface **6**_u_ and the first lateral surface **6**_s_. For example, the first lateral surface **6**_s_ may be perpendicular to the xy plane. The second lateral surface **6**_v_ may be a tapered surface. The upper surface **6**_u_ is positioned above the upper surface of the second light-emitting element. The upper surface **6***u* may be positioned below or may be the same height as the upper surface **501***u* of the resin block **501**.

As illustrated in FIG. **29**A, in the present modified example as well, the pair of resin grooves **46** may be formed on both sides of the second portion P**2** of each region **120** in the first direction D**1** in a plan view. Thus, a peripheral edge of each second portion P**2** is defined by the resin wall **370**, the resin blocks **501** and **502**, the resin groove **46**, and the second resin portion **42**.

In the present modified example as well, the region **801** including the second portion P**2** described above and the side region of the first portion P**1** can function as a nozzle arrangement region for applying the first resin material **150***a* (FIG. **30**C) that is to become the reflective members **151** to **153**.

Method of Manufacturing Light-Emitting Device **2000**

An example of a method of manufacturing the light-emitting device according to the present embodiment will be described below by using the light-emitting device **2000** as an example. The light-emitting device **2000** can be manufactured by a method similar to that of the light-emitting device **1000** described above. Differences from the method of manufacturing the light-emitting device **1000** will be described below. The other light-emitting devices **2001** to **2008** of the present embodiment differ in the number, the positions, and the shapes of the resin walls and the resin grooves, the presence or absence of the resin blocks, and the like, but can be manufactured using a method similar to that of the light-emitting device **2000**.

FIG. **30**A to **30**E are step cross-sectional views for describing the method of manufacturing the light-emitting device **2000**. Note that FIGS. **30**A, **30**B, **30**D, and **30**E illustrate an xy cross-section, and FIG. **30**C only illustrates a yz cross-section including regions where the nozzles are disposed.

First, as illustrated in FIG. **30**A, the resin package **100** that includes the first dark-colored resin member **40** and the plurality of leads **10** is prepared by a transfer molding method, for example. The plurality of leads **10** include the pair of leads **10***a*, **10***b*. Each of the resin walls **300** and the resin groove **46** can be formed by a shape of a mold used when forming the first dark-colored resin member **40**. Here, a plurality of resin walls **300** formed of the first dark-colored resin members **40** are formed on the primary surface **100***a* of the resin package. Note that the resin blocks **501** and **502** (FIG. **29**A) can be similarly formed by a shape of a mold.

Subsequently, as illustrated in FIG. **30**B, the light-emitting elements **50** are mounted on the primary surface **100***a* of the resin package. In the present embodiment, each light-emitting element **50** is disposed in an interior of a region defined by the plurality of resin walls **300**. That is, in a plan view, the plurality of resin walls **300** spaced apart from each other surround each of the light-emitting elements **50** on the primary surface **100***a* of the resin package.

Subsequently, as illustrated in FIG. **30**C, by arranging the nozzles in the nozzle arrangement regions **801** (refer to FIG. **15**D and the like) of the primary surface **100***a* of the resin package, the first resin material **150***a* that is to become the reflective members is applied around the light-emitting element **50** disposed in the interior of the region defined by the resin walls **300** (FIG. **30**B). As described above, the nozzles may be disposed outside the region defined by the plurality of resin walls **300** (FIG. **30**B), and the first resin material **150***a* may be passed through the spaces between the resin walls **300** and made to surround each of the light-emitting elements **50**. Subsequently, the first resin material **150***a* is cured. Thus, as illustrated in FIG. **30**D, the reflective members **150** are formed.

Subsequently, as illustrated in FIG. **30**E, a colored resin material including a colorant is applied on the reflective members **150** and cured, thereby forming the colored resin member **160**. Thus, the structure **110** is obtained in which the light-emitting elements **50**, the reflective members **150**, and the colored resin members **160** are disposed on the primary surface **100***a* of the resin package.

As illustrated in FIG. **15**C, in a case in which the colored resin members **161** to **163** colored to different colors are formed, the colored resin members **161** to **163** can be formed by the following method, for example. First, a first colored resin material and a third colored resin material containing different colorants are applied to predetermined regions and cured to form the first colored resin member **161** and the third colored resin member **163**. Subsequently, a second colored resin material including a colorant different from those described above is applied between the first colored resin member **161** and the third colored resin member **163**. At this time, the second colored resin material may be applied so as to partially overlap the first colored resin member **161** and the third colored resin member **163**. Subsequently, the second colored resin member **162** is obtained by curing the second colored resin material.

Subsequently, the mold resin portion **60** that seals the light-emitting elements **50** in the structure **110** thus obtained is formed. The mold resin portion **60** can be manufactured using a method similar to that of the light-emitting device **1000** by using, for example, a transfer molding method. Subsequently, the leads of the lead frame are cut and separated into individual pieces, and thus the light-emitting device **2000** illustrated in FIG. **15**C is manufactured. Note that the mold resin portion may be formed using a casting method.

Twelfth Modified Example

FIG. **31**A is a schematic top transparent view of a light-emitting device **3000** according to a twelfth modified example, and FIG. **31**B is a schematic cross-sectional view taken along line **31**B-**31**B illustrated in FIG. **31**A.

The light-emitting device **3000** according to the twelfth modified example differs from the light-emitting device **1000** illustrated in FIGS. **2**A to **2**E in that at least one light-emitting element of the plurality of light-emitting elements **50** is disposed non-parallel to the other light-emitting elements in a plan view, and a height of a vertex of at least one lens portion of the plurality of lens portions **70** differs from a height of vertices of the other lens portions.

In the present modified example, the first light-emitting element **51**, the second light-emitting element **52**, and the third light-emitting element **53** each have a rectangular planar shape. In a plan view, each side of the rectangular shape of at least one light-emitting element (here, the third light-emitting element **53**) of the first light-emitting element **51**, the second light-emitting element **52**, and the third light-emitting element **53** is non-parallel to each side of the rectangular shapes of the other light-emitting elements (here, the first light-emitting element **51** and the second light-emitting element **52**).

This makes it possible to improve the light distribution controllability of the light-emitting device **3000** and achieve the desired light distribution, as described in detail below.

Structure and Arrangement of Light-Emitting Elements

The first light-emitting element **51** to the third light-emitting element **53** each include a first surface positioned proximate to the plurality of leads **11***a* to **13***b*, a second surface positioned opposite to the first surface (that is, proximate to the lens portion), and two electrodes positioned on the second surface. Note that, in each of the first light-emitting element **51** to the third light-emitting element **53**, both the positive and negative electrodes will be described as being positioned on the second surface, but one may be positioned on the first surface and the other may be positioned on the second surface.

In the example illustrated in FIG. **31**A, two electrodes (positive and negative electrodes) e**1** and e**2** are positioned on the second surface of each of the first light-emitting element **51** to the third light-emitting element **53**. The two electrodes e**1** and e**2** of, among the first light-emitting element **51** to the third light-emitting element **53**, each of the first light-emitting element **51** and second light-emitting element **52** are disposed at two mutually facing corner portions (that is, at opposing corner portions) on the second surface having a rectangular shape. In contrast, the two electrodes e**1** and e**2** of the third light-emitting element **53** are respectively disposed near centers of two sides facing each other on the second surface having a rectangular shape. Although the emitted light colors of the first light-emitting element **51** to the third light-emitting element **53** are not particularly limited, in the present modified example, the first light-emitting element **51** may be a red light-emitting element that emits red light, the second light-emitting element **52** may be a blue light-emitting element that emits blue light, and the third light-emitting element **53** may be a green light-emitting element that emits green light.

In the example illustrated in FIG. **31**A, the first light-emitting element **51** to the third light-emitting element **53** are disposed in a single row on a line m**0** that is virtual. Here, the line m**0** is a line connecting center points C**1** to C**3** of the first lens portion **71** to the third lens portion **73**, respectively, in a plan view. The four sides constituting each rectangular planar shape of the first light-emitting element **51** and the second light-emitting element **52** (here, four sides constituting outer edges of each rectangular shape of the second surface) are non-parallel to the line m**0**. In a plan view, the first light-emitting element **51** and the second light-emitting element **52** may each be disposed so that one pair of opposing sides of the outer edges of the rectangular shape of the second surface forms angles of 45° with the line m**0**. On the other hand, one pair of opposing sides of the rectangular planar shape of the third light-emitting element **53** (here, one pair of opposing sides of the outer edges of the rectangular shape of the second surface) is parallel to the line m**0**.

In this description, the smallest angle α of the angles formed by each side of the outer edges of the rectangular shape of the light-emitting element and the line m**0** in a plan view is referred to as an "inclination angle relative to the line m**0**". In the illustrated example, the inclination angle α of each of the first light-emitting element **51** and the second light-emitting element **52** relative to the line m**0** is 45°.

In a light-emitting device having a light-emitting element and a lens positioned above the light-emitting element and covering the light-emitting element, as the size of the lens decreases, the light distribution of the light-emitting device is more susceptible to being affected by light distribution characteristics of a near field of the light-emitting element. Accordingly, light distribution control of the light-emitting device by adjusting the curvature of the lens may be difficult. The light distribution characteristics of the near field of the light-emitting element can be changed by, for example, the structure, such as the positions of the electrodes in the light-emitting element or the electrode size.

In contrast, in the present modified example, it is possible to achieve the light-emitting device **3000** having a desired light distribution (directional properties) by disposing the first light-emitting element **51** to the third light-emitting element **53** in the resin package **100** taking into consideration the positions of the electrodes of the first light-emitting element **51** to the third light-emitting element **53** and, more specifically, taking into consideration the light emission luminance distribution reflecting the positions and the like of electrodes on the second surface of these light-emitting elements.

Below, a relationship between the light emission luminance distribution of the light-emitting elements and the arrangement of the light-emitting elements in a plan view will be specifically described.

FIGS. **32**A and **32**B are schematic plan views exemplifying the light emission luminance distribution of second surfaces **51***a* and **53***a* of the first light-emitting element **51** and the third light-emitting element **53**, respectively. In FIGS. **32**A and **32**B, a region having high light emission luminance is indicated in white, and a region having a light emission luminance lower than that of the region indicated in white is illustrated in black. In the following description, a region of the second surfaces **51***a* and **53***a* having high light emission luminance indicated in white is referred to as a "light-emitting portion", and a region having low light emission luminance indicated in black is referred to as a "non-light-emitting portion". The electrodes of each of the first light-emitting element **51** and the third light-emitting element **53** are connected to the leads by a wire.

As illustrated in FIG. **32**A, the light emission luminance distribution of the second surface **51***a* of the first light-emitting element **51** includes a light-emitting portion **611** and a non-light-emitting portion **612** having brightness lower than that of the light-emitting portion **611**. The non-light-emitting portion **612** is positioned at two corner portions facing each other. The position of the non-light-emitting portion **612** corresponds to the positions of the electrodes e**1** and e**2** (FIG. **31**A). In this description, "non-light-emitting portion" includes not only the region of the second surface that does not emit light, but also regions where light is not emitted due to formation of the electrodes and regions that appear dark due to shadows of the wires. Given 100% as the maximum brightness of the second surface **51***a*, the brightness of the light-emitting portion **611** is in a range from 40% to 100%, and the brightness of the non-light-emitting portion **612** is in a range from 0% to less than 40%. In this example, a width **611***a* of the light-emitting portion **611** on a diagonal line connecting two corner portions of the second surface **51***a* where the electrodes are not formed is greater than a width **611***b* on a diagonal line connecting two corner portions where the electrodes are formed. Note that "the width of the light-emitting portion on a diagonal line" refers to a length of the light-emitting portion cut by the diagonal line, that is, a length of a portion of the light-emitting portion that overlaps the diagonal line in a plan view.

The second light-emitting element **52** includes the electrodes at positions similar to those of the first light-emitting element **51**. Accordingly, in the light emission luminance distribution of the second light-emitting element **52** as well, similarly to the first light-emitting element **51**, a width of the light-emitting portion on a diagonal line connecting two corner portions of the second surface where the electrodes are not formed can be greater than a width of the light-emitting portion on a diagonal line connecting two corner portions where the electrodes are formed.

As illustrated in FIG. **32**B, the light emission luminance distribution of the second surface **53***a* of the third light-emitting element **53** includes the light-emitting portion **611** and the non-light-emitting portion **612** positioned near centers of two sides facing each other and having brightness lower than that of the light-emitting portion **611**. In FIG. **32**B, the position of the non-light-emitting portion **612** of the third light-emitting element **53** corresponds to the positions of the electrodes e**1** and e**2** in FIG. **31**A. A width **611***c* of the light-emitting portion **611** on a line connecting central portions of two sides of the second surface **53***a* where the electrodes are not formed is greater than a width **611***d* of the light-emitting portion **611** on a line connecting central portions of two sides where the electrodes are formed. Note that "the width of the light-emitting portion on a line connecting central portions" refers to a length of the light-emitting portion cut by the line connecting the central portions of the two sides, that is, a length of a portion of the light-emitting portion that overlaps the line connecting the central portions of the two sides in a plan view.

In the present modified example, the first light-emitting element **51** to the third light-emitting element **53** are preferably disposed on the line m**0** connecting the center points C**1** to C**3** of the first lens portion **71** to the third lens portion **73**, respectively, in a plan view. In a plan view, a center of the second surface of each of the first light-emitting element **51** to the third light-emitting element **53** may be disposed on the line m**0**.

FIG. **33** is a schematic plan view illustrating an arrangement of a reference example of the first light-emitting element **51** to the third light-emitting element **53** having the light emission luminance distributions described with reference to FIGS. **32**A and **32**B. FIG. **34** is a schematic plan view illustrating the arrangement of the first light-emitting element **51** to the third light-emitting element **53** in the light-emitting device **3000** of the present modified example illustrated in FIGS. **31**A and **31**B. In FIGS. **33** and **34**, only the second surfaces **51***a* to **53***a* of the first light-emitting element **51** to the third light-emitting element **53** and the light emission luminance distributions of the first light-emitting element **51** to the third light-emitting element **53**, respectively, are illustrated. Other components such as the lens portions are omitted. Further, these drawings also illustrate, in each of the first light-emitting element **51** to the third light-emitting element **53**, a line m**1** virtually passing through the center of the second surface and forming a 45° angle clockwise from the line m**0**, and a line m**2** virtually passing through the center of the second surface and forming a **1350** angle clockwise from the line m**0**. Further, FIG. **34** illustrates, in each of the first light-emitting element **51** to the third light-emitting element **53**, a line m**3** virtually passing through the second surface and orthogonal to the line m**0** with a dashed line. In the example illustrated in FIGS. **33** and **34**, the centers of the second surfaces of the first light-emitting element **51** to the third light-emitting element **53** match the center points C**1** to C**3** of the first lens portion to the third lens portion, respectively.

In the reference example illustrated in FIG. **33**, in a plan view, the two sides (one set of opposing sides) of the second surface, having a rectangular shape, in each of the first light-emitting element **51** to the third light-emitting element **53** are parallel to the line m**0**. In the reference example illustrated in FIG. **33**, in each of the first light-emitting element **51** and the second light-emitting element **52**, a width of the light-emitting portion **611** on the line m**1** is smaller than a width of the light-emitting portion **611** on the line m**2**. In this description, "the width of the light-emitting portion on the line m**1** (or line m**2**)" refers to a length of the light-emitting portion cut by the line m**1** (or line m**2**) in a plan view, that is, a length of a portion of the light-emitting portion that overlaps the line m**1** (or line m**2**) in a plan view. For example, in the first light-emitting element **51** illustrated in FIG. **33**, the width of the light-emitting portion **611** on the line m**1** is a length **611***e* of the light-emitting portion **611** cut by the line m**1**, and the width of the light-emitting portion **611** on the line m**2** is a length **611***f* of the light-emitting portion **611** cut by the line m**2**. Thus, in the first light-emitting element **51** and the second light-emitting element **52**, the light emission distribution on the line m**1** (light emission distribution of a cross-section perpendicular to the second surface and including the line m**1**) and the light emission distribution on the line m**2** (light emission distribution of a cross-section perpendicular to the second surface and including the line m**2**) can be different. A half-value angle (directivity angle) of the first light-emitting element **51** on the line m**1** can be smaller than a half-value angle of the first light-emitting element **51** on the line m**2** by, for example, approximately 6.6° (for example, a difference between the half-value angle (directivity angle) on the line m**1** and the half-value angle (directivity angle) on the line m**2** of the third light-emitting element **53** is, for example, approximately 1.60). In this description, the difference in light distribution indicated by the half-value angles (directivity angles) on the line m**1** and on the line m**2** is sometimes abbreviated as "light distribution difference". Note that, in the third light-emitting element **53**, the width of the light-emitting portion **611** on the line m**1** and the width of the light-emitting portion **611** on the line m**2** are substantially the same. Therefore, the light distribution difference of the third light-emitting element **53** is suppressed to be smaller than those of the first light-emitting element **51** and the second light-emitting element **52**.

When a light-emitting device arranged as in the present reference example is applied to a display device, display characteristics such as image color, video, and the like may be affected by the light distribution difference of the first and second light-emitting elements **51** and **52**. For example, because the light distribution on the line m**1** in the first light-emitting element **51** (red light-emitting element, for example) is narrow (half-value angle is small), when a display device that uses the light-emitting device is viewed from the direction of the line m**1**, image distortion such as a weak red color may occur.

In contrast, in the light-emitting device **3000** according to the present modified example, as illustrated in FIG. **34**, the first light-emitting element **51** and the second light-emitting element **52** are each disposed so that the two sides (one set of opposing sides) of the respective second surfaces **51***a* and **52***a* having a rectangular shape form 45° angles relative to the line m**0**, in a plan view. That is, the inclination angles α, relative to the line m**0**, of the first light-emitting element **51** and the second light-emitting element **52** are 45°. With this structure, in each of the first light-emitting element **51** and the second light-emitting element **52**, the difference between the width of the light-emitting portion **611** on the line m**1** and the width of the light-emitting portion **611** on the line m**2** can be made smaller than that of the reference example. In this example, the width of the light-emitting portion **611** on the line m**1** and the width of the light-emitting portion **611** on the line m**2** can be made substantially the same. With this structure, the difference between the light distribution on the line m**1** and the light distribution on the line m**2** can be reduced. Accordingly, influence of the light distribution characteristics of the near field of each of the first light-emitting element **51** and the second light-emitting element **52** on the light distribution of the light-emitting device **3000** can be further suppressed to be smaller, making it possible to further enhance the light distribution controllability.

In the present modified example, each of the first light-emitting element **51** to the third light-emitting element **53** is disposed so as to achieve a reduction in the difference between the width of the light-emitting portion **611** on the line m**1** and the width of the light-emitting portion **611** on the line m**2**. For example, each of the first light-emitting element **51** to the third light-emitting element **53** may be disposed so that the electrodes do not overlap the line m**1** and the line m**2** in a plan view (that is, so that the electrodes are offset from the lines m**1**, m**2**). Alternatively, each of the first light-emitting element **51** to the third light-emitting element **53** may be disposed so that the shape of the light-emitting portion **611** in a plan view is substantially symmetric (line-symmetric) relative to the line m**0** and/or the line m**3**.

By using the light-emitting device **3000** of the present modified example, it is possible to achieve a display device in which distortion of image color and video caused by a light distribution difference is further reduced.

As illustrated in FIGS. **31**A and **34**, in a plan view, the electrodes e**1** and e**2** of each of the first light-emitting element **51** to the third light-emitting element **53** are preferably disposed on the line m**0**. This makes it possible, in a plan view, to make a direction in which the electrodes e**1** and e**2** of each of the first light-emitting element **51** to the third light-emitting element **53** are connected, that is, a direction in which the width of the light-emitting portion in the light emission luminance distribution of each of the first light-emitting element **51** to the third light-emitting element **53** becomes relatively small, match the minor axis of the corresponding lens portion, and to make a direction in which the width of the light-emitting portion in the light emission luminance distribution of each of the first light-emitting element **51** to the third light-emitting element **53** becomes relatively large match the major axis of the corresponding lens portion. Accordingly, the extraction efficiency of light from each of the light-emitting elements to the corresponding lens can be improved, making it possible to improve the light extraction efficiency.

FIG. **35** is a schematic plan view illustrating another example of an arrangement of the first light-emitting element **51** to the third light-emitting element **53**. The example illustrated in FIG. **35** differs from the example illustrated in FIG. **34** in the positions of the electrodes of the first light-emitting element **51** to the third light-emitting element **53**. In the example illustrated in FIG. **35**, in a plan view, electrodes of each of the first light-emitting element **51** to the third light-emitting element **53** are disposed on the line m**3** that passes through the center of the second surface of each light-emitting element having a rectangular shape, and forms a **900** angle clockwise from the line m**0**. In a plan view, the direction in which the electrodes of each of the first light-emitting element **51** to the third light-emitting element **53** are connected may coincide with the major axis of the corresponding lens portion. In this case as well, the difference generated between the light distribution on the line m**1** and the light distribution on the line m**2** in each of the first light-emitting element **51** to the third light-emitting element **53** can be reduced.

A shape of each of the first light-emitting element **51** to the third light-emitting element **53** in a plan view may be square. In this case, by disposing the first light-emitting element **51** to the third light-emitting element **53** as exemplified in FIG. **34** or **35**, the difference between the light distribution on the line m**1** and the light distribution on the line m**2** in each of the light-emitting elements can be further reduced.

Note that the inclination angle α of each of the first light-emitting element **51** to the third light-emitting element **53** relative to the line m**0** in a plan view can be set in accordance with the positions of the electrodes and the like in the light-emitting element, regardless of a wavelength of the light emitted from the light-emitting element. The inclination angle α of each of the first light-emitting element **51** to the third light-emitting element **53** relative to the line m**0** can be selected in a range from 0° to 45° according to the planar shape of the light-emitting element, the position of the electrode, the electrode shape, and the like. In a case in which the planar shape of the light-emitting element is rectangular and includes the electrodes in two corner portions facing each other, the inclination angle α of the light-emitting element relative to the line m**0** may be greater than 0° and less than 45°.

Size and Shape of Lens Portion

In the present modified example, the height of the vertex of at least one lens portion of the first lens portion **71**, the second lens portion **72**, and the third lens portion **73** differs from the heights of the vertices of the other lens portions.

In the example illustrated in FIG. **31**B, a height HL**3** of a vertex T**3** of the third lens portion **73** is higher than a height HL**1** of a vertex T**1** of the first lens portion **71** and a height HL**2** of a vertex T**2** of the second lens portion **72**. The height HL**1** of the vertex T**1** of the first lens portion **71** and the height HL**2** of the vertex T**2** of the second lens portion **72** may be the same or may be different from each other. Note that the heights HL**1** to HL**3** of the vertices T**1** to T**3** of the first lens portion **71** to the third lens portion **73**, respectively, refer to the height of each vertex T**1** to T**3** from the upper surface **61***a* of the base portion **61**, that is, the shortest distance between each of the vertices T**1** to T**3** and the upper surface **61***a* of the base portion **61**. In the illustrated example, the heights HL**1** to HL**3** of the vertices T**1** to T**3** are the shortest distances between the vertices and the bottom surfaces of the convex shapes of the lens portions **71** to **73**.

Further, in a plan view, sizes of the first lens portion **71** to the third lens portion **73** (widths WS**1** to WS**3** in the minor axis direction, widths WL**1** to WL**3** in the major axis direction) may be different from each other. Here, the width WS**3** of the third lens portion **73** in the minor axis direction is larger than the widths WS**1** and WS**2** of the first lens portion **71** and the second lens portion **72**, respectively, in the minor axis direction, and the width WL**3** of the third lens portion **73** in the major axis direction is larger than the widths WL**1** and WL**2** of the first lens portion **71** and the second lens portion **72**, respectively, in the major axis direction. The sizes of the first lens portion **71** and the second lens portion **72** in a plan view may be the same or may be different from each other.

In the example illustrated in FIG. **31**B, the size of each of the lens portions **71** to **73** may be adjusted so that light emitted from the lens portion has a desired light distribution. For example, the half-value angle of the lens portion on the major axis may be in a range from 100° to 120°, and the half-value angle on the minor axis may be in a range from 50° to 70°. The heights HL**1**, HL**2** of the vertices T**1**, T**2** of the first and second lens portions **71**, **72**, respectively, are in a range from 0.3 mm to 0.5 mm and are, for example, 0.40 mm, and the height HL**3** of the vertex T**3** of the third lens portion **73** is in a range from 0.4 mm to 0.6 mm and is, for example, 0.50 mm. Further, the width WS**1** of the first lens portion **71** in the minor axis direction is in a range from 0.6 mm to 1.0 mm and is, for example 0.8 mm, and the width WL**1** of the first lens portion **71** in the major axis direction is in a range from 1.0 mm to 1.4 mm and is, for example 1.2 mm. The width WS**2** of the second lens portion **72** in the minor axis direction is in a range from 0.6 mm to 1.0 mm and is, for example, 0.8 mm, and the width WL**2** of the second lens portion **72** in the major axis direction is in a range from 1.0 mm to 1.4 mm and is, for example, 1.2 mm. The width WS**3** of the third lens portion **73** in the minor axis direction is in a range from 0.8 mm to 1.2 mm and is, for example, 1.0 mm, and the width WL**3** of the third lens portion **73** in the major axis direction is in a range from 1.4 mm to 1.8 mm and is, for example, 1.6 mm.

As described above, in a lateral side view as viewed in the x-axis direction and/or the y-axis direction, the outer edge of each of the first lens portion **71** to the third lens portion **73** may include a linear portion in addition to a curved portion. As an example, in a lateral side view as viewed in the y-axis direction, each of the lens portions **71** to **73** may include a linear portion, and in a lateral side view as viewed in the x-axis direction, each of the lens portions **71** to **73** may not include a linear portion. Further, shapes of the outer edges of the first lens portion **71** to the third lens portion **73**, in a lateral side view, may be different from each other. For example, in a lateral side view as viewed in the y-axis direction, the outer edge of at least one lens portion of the first lens portion **71** to the third lens portion **73** may include a linear portion, and the outer edges of the other lens portions may not include linear portions.

A curvature of at least one lens portion of the first lens portion **71** to the third lens portion **73** may be different from the curvatures of the other lens portions. The curvatures of the first lens portion **71** to the third lens portion **73** may be different from each other. Alternatively, the first lens portion **71** to the third lens portion **73** may have the same curvature. In this description, “the curvature of the lens portion” refers to the curvature of a curved portion that, in a cross-section along the major axis direction or the minor axis direction of the lens portion including the vertex of the lens portion, includes the vertex of the outer edge of the lens portion.

According to the present modified example, the light distribution controllability of the light that passes through each the lens portions **71** to **73** and is emitted from each of the first light-emitting element **51** to the third light-emitting element **53** can be enhanced by adjusting the size (for example, the heights HL**1** to HL**3** of the vertices T**1** to T**3**, the widths WS**1** to WS**3** in the minor axis direction, and the widths WL**1** to WL**3** in the major axis direction), the curvature, and the like of the corresponding lens portion **70** in accordance with the respective light emission luminance distributions of the first light-emitting element **51** to the third light-emitting element **53**. Further, the light distribution controllability and the light extraction efficiency of the light-emitting device **3000** can be improved by combining a configuration, described above, that makes the direction in which the width of the light-emitting portion in the light emission luminance distribution of each of the first light-emitting element **51** to the third light-emitting element **53** becomes relatively small match the minor axis of the corresponding lens portion and makes the direction in which the width of the light-emitting portion in the light emission luminance distribution of each of the first light-emitting element **51** to the third light-emitting element **53** becomes relatively large match the major axis of the corresponding lens portion, and a configuration that makes the size of the corresponding lens portion **70** increase in accordance with the light emission luminance distribution of each of the first light-emitting element **51** to the third light-emitting element **53**.

For example, when the distribution of light emitted from a certain light-emitting element through the lens portion is to be narrowed, first the curvature of the lens portion is adjusted. When the light distribution is not sufficiently narrowed by the adjustment of the curvature alone, the size of the lens portion may be made larger than those of the other lens portions. Alternatively, the size of the lens portion may be made larger without changing the curvature of the lens portion.

In a case in which the light distribution of a certain light-emitting element (here, third light-emitting element **53**) is wider than the light distribution of the other light-emitting elements, the distribution of the light (here, green light) emitted through the third lens portion **73** can be narrowed by making the size of the third lens portion **73** corresponding to the third light-emitting element **53** (for example, the height HL**3** of the vertex of the lens portion **73**) higher than those of the other lens portions **71** and **72**. For example, as illustrated in FIG. **34**, in a case in which the light distribution of the third light-emitting element **53** on the line m**0** is wider than the light distributions of the first and second light-emitting elements **51** and **52** on the line m**0**, the height HL**3** of the vertex of the third lens portion **73** corresponding to the third light-emitting element **53** may be made higher than those of the other lens portions **71** and **72**.

Note that, in the present modified example, the size of the third lens portion **73** is larger than those of the first lens portion **71** and the second lens portion **72**, but a size relationship between the first lens portion **71** to the third lens portion **73** is not particularly limited. The sizes of these lens portions **71** to **73** can be set in accordance with the light emission luminance distribution caused by the electrode positions and the like of each of the light-emitting elements.

Of the first lens portion **71** to the third lens portion **73**, the lens portion having the highest vertex (hereinafter referred to as the “highest lens portion”) is preferably disposed at one end of a row in which the first lens portion **71** to the third lens portion **73** are arrayed in one direction (hereinafter, “lens row”), in a plan view. In the example illustrated in FIG. **31**A, the third lens portion **73**, which is the highest lens portion, is disposed at one end (here, the end on the +y-most side) of the lens row composed of the first lens portion **71** to the third lens portion **73**. This makes it possible to reduce the proportion of light emitted from the other lens portions that is blocked by the highest lens portion (light from the other lens portions incident on the highest lens portion and changed in emission direction). Note that, in a case in which the heights of the vertices of the first lens portion **71** to the third lens portion **73** differ from each other, the highest lens portion may be disposed on one end of the lens row, and the lens portion having the lowest vertex height (hereinafter, referred to as “lowest lens portion”) may be disposed on the other end of the lens row.

When the light-emitting device according to the present modified example is used in a display device such as an outdoor display, for example, three lens portions **70***a* to **70***c* of the light-emitting device may be disposed in a vertical direction of a display surface (surface from which light is emitted) of the display device. When such a display surface is viewed from below and the highest lens portion **70***a* is positioned in a center of the lens row as exemplified in FIG. **36**A, a part of the light directed downward (toward a direction of an observer) from the lens portion **70***b* positioned at an upper end of the lens row is incident on the highest lens portion **70***a* and less likely to exit to the direction of the observer. In contrast, as illustrated in FIG. **36**B, when the highest lens portion **70***a* is disposed at the upper end of the lens row, of the light directed downward from the lens portion (highest lens portion) **70***a* at the upper end of the lens row, the proportion of light incident on the other lens portions **70***b* and **70***c* can be reduced compared to that in the example illustrated in FIG. **36**A. Accordingly, the light directed downward from each of the three lens portions **70***a* to **70***c* can be more efficiently emitted to the direction of the observer.

When the heights of the vertices of the three lens portions **70***a* to **70***c* are different from each other, the highest lens portion **70***a* is preferably disposed at the upper end of the lens row and the lowest lens portion **70***c* is preferably disposed at the lower end of the lens row as illustrated in FIG. **36**C. This makes it possible to reduce, of the light directed downward from the lens portion (highest lens portion) **70***a* at the upper end of the lens row and the lens portion **70***b* positioned at the center, the proportion of light blocked by another lens portion.

FIG. **37** is a schematic cross-sectional view of another light-emitting device **3001** according to the present modified example, illustrating a cross-section that includes the line m**0** and is parallel to the yz plane.

The light-emitting device **3001** and the light-emitting device **3000** illustrated in FIGS. **31**A and **31**B differ in the shapes and the sizes of the first lens portion **71** to the third lens portion **73**. The shapes, sizes, and the like of the first lens portion **71** to the third lens portion **73** are adjusted so that the light-emitting device **3001** has a light distribution that is narrower (that is, has a higher directivity) than that of the light-emitting device **3000**. In this example, the sizes (heights HL**1** to HL**3** of the vertices, widths WS**1** to WS**3** in the minor axis direction, and widths WL**1** to WL**3** in the major axis direction) of the first lens portion **71** to the third lens portion **73** of the light-emitting device **3001** are larger than those of the light-emitting device **3000**. Further, the curvatures of the first lens portion **71** to the third lens portion **73** of the light-emitting device **3001** are smaller than the curvatures of the first lens portion **71** to the third lens portion **73** of the light-emitting device **3000**.

In the example illustrated in FIG. **37**, the size of each lens portion **71** to **73** may be adjusted so that the light emitted from the lens portion has a desired light distribution. For example, the half-value angle on the major axis of the lens portion may be in a range from 800 to less than 100°, and the half-value angle on the minor axis may be in a range from 350 to less than 50°. The heights HL**1** and HL**2** of the vertices T**1** and T**2** of the first and second lens portions **71** and **72**, respectively, are in a range from 0.6 mm to 0.8 mm and are, for example, 0.7 mm, and the height HL**3** of the vertex T**3** of the third lens portion **73** is in a range from 0.8 mm to 1.0 mm and is, for example, 0.9 mm. Further, the width WS**1** of the first lens portion **71** in the minor axis direction is in a range from 0.8 mm to 1.2 mm and is, for example, 1.0 mm, and the width WL**1** of the first lens portion **71** in the major axis direction is in a range from 1.2 mm to 1.6 mm and is, for example, 1.4 mm. The width WS**2** of the second lens portion **72** in the minor axis direction is in a range from 0.8 mm to 1.2 mm and is, for example 1.0 mm, and the width WL**2** of the second lens portion **72** in the major axis direction is in a range from 1.3 mm to 1.7 mm and is, for example, 1.5 mm. The width WS**3** of the third lens portion **73** in the minor axis direction is in a range from 1.0 mm to 1.4 mm and is, for example, 1.2 mm, and the width WL**3** of the third lens portion **73** in the major axis direction is in a range from 1.6 mm to 2.0 mm and is, for example, 1.8 mm.

Note that, in the present modified example, the arrangement (inclination angle α relative to the line m**0**) of at least one light-emitting element of the first light-emitting element **51** to the third light-emitting element **53** is made to differ from those of the other light-emitting elements in accordance with the light emission luminance distribution of the first light-emitting element **51** to the third light-emitting element **53**, and the sizes of the first lens portion **71** to the third lens portion **73** may be the same. Alternatively, the sizes of at least one lens portion of the first lens portion **71** to the third lens portion **73** is made to differ from those of the other lens portions in accordance with the light emission luminance distribution of the first light-emitting element **51** to the third light-emitting element **53**, and the inclination angles α relative to the line m**0** of the first light-emitting element **51** to the third light-emitting element **53** may be the same.

FIG. **38** is a schematic perspective view of a light-emitting device **4000** according to a thirteenth modified example, with the mold resin portion removed. FIG. **39**A is a schematic top view of the light-emitting device illustrated in FIG. **38**. FIG. **39**B is a schematic cross-sectional view taken along line **39**B-**39**B illustrated in FIG. **39**A. FIG. **39**C is a schematic cross-sectional view taken along line **39**C-**39**C illustrated in FIG. **39**A.

The light-emitting device **4000** differs from the light-emitting devices **2000** to **2008** described above in that, on the primary surface **100***a* of the resin package **100**, the first resin portion **41** positioned on an inner upper surface **27***a* of the recessed portion **27** includes at least one protruding portion **49**. For example, in a plan view, the protruding portion **49** is spaced apart from the inner lateral surface **27***c* of the recessed portion **27**.

In the example illustrated in FIG. **39**A, in the recessed portion **27**, the first resin portion **41** includes a plurality of (here, two) protruding portions **49** spaced apart from each other. A part or all of the plurality of protruding portions **49** may be positioned between two adjacent light-emitting elements of the plurality of light-emitting elements **50**. An upper surface **49***u* of each protruding portion **49** is positioned above the exposed regions **30** of the leads. A portion of the first resin portion **41** other than the protruding portions **49** may be, for example, substantially flush with the exposed regions **30** of the leads. Substantially flush means that errors due to dimensional tolerances, manufacturing tolerances, and material tolerances are included within a permissible range. At least a part of a lateral surface of each protruding portion **49** may be in contact with the reflective member **150**. The lateral surface of the protruding portion **49** may be exposed from the reflective member **150**.

In the example illustrated in FIG. **38**, a height of an upper surface **49***u* of the protruding portion **49** is the same as the height of the upper surface of the second resin portion **42** surrounding the inner upper surface **27***a* of the recessed portion **27**. With the upper surface **49***u* of the protruding portion **49** positioned above the upper surfaces of the light-emitting elements **50** (here, at the same height as the upper surface of the second resin portion **42**), the region in which the reflective member **150** is disposed in the recessed portion **27** is easily controlled. The "height of the upper surface **49***u* of the protruding portion **49**" and the "height of the upper surface of the second resin portion **42**" can be defined by, for example, a distance from the back surface

100*b* of the resin package **100** to the upper surface in the z-axis direction. The upper surface **49***u* of the at least one protruding portion **49** is positioned above the upper surface of the light-emitting element **50**.

In the example illustrated in FIG. **39**A, a plurality of (here, two) protruding portions **49** are disposed in the recessed portion **27**. The two protruding portions **49** include, in a plan view, a protruding portion **491** positioned between the first region **121** and the second region **122** and a protruding portion **492** positioned between the second region **122** and the third region **123**. Each of the protruding portions **491** and **492** is spaced apart from the second resin portion **42**, which is a sidewall of the recessed portion **27**.

The reflective member **150** is disposed in each of the first region **121** to the third region **123**. The reflective member **150** disposed in each of the first region **121** to the third region **123** may be spaced apart from each other by the protruding portions **49**. For example, the reflective member **150** may not be disposed between the inner lateral surface **27***c* of the recessed portion **27** in the y-axis direction and the lateral surface of the protruding portion **49** in the y-axis direction. Note that the reflective member **150** may be disposed continuously in the recessed portion **27**.

According to the present modified example, in a plan view, the reflective member **150** is disposed in a region of the inner upper surface **27***a* of the recessed portion **27** excluding regions in which the protruding portions **49** are formed. With this structure, the volume of the reflective member **150** can be reduced. Thus, it is possible to reduce a stress on the light-emitting elements **50** that occurs during the manufacturing step and reduce the lifting of the light-emitting elements **50** from the leads **11**. Further, with the first resin portion **41** including the protruding portions **49** in the inner upper surface **27***a* of the recessed portion **27**, the reflective members **150** can include holes or grooves corresponding to the protruding portions **49** and can be arranged in two or more regions spaced apart from each other with the protruding portions **49** interposed therebetween. Therefore, during the manufacture or mounting of the light-emitting device **4000**, defects caused by the stress that occurs between the reflective member **150** and the light-emitting elements **50** can be reduced.

In the example illustrated in FIG. **38**, at least the upper surface **49***u* of the protruding portion **49** is exposed from the reflective member **150**. Accordingly, in a plan view, an area of the reflective member **150** occupying the inner upper surface **27***a* of the recessed portion **27** can be reduced, and thus the display contrast can be further improved. In a case in which the light-transmissive resin member **180** is disposed on the reflective member **150** in the recessed portion **27**, at least a part of the upper surface of the protruding portion **49** may be exposed from the light-transmissive resin member **180**. The exposed portion of the protruding portion **49** may be in contact with the mold resin portion.

In a plan view of the primary surface **100***a* of the resin package **100**, each protruding portion **49** may include a portion positioned between two adjacent leads of the plurality of leads and a portion that overlaps each of the two adjacent leads. In the example illustrated in FIG. **39**A, the protruding portion **491** includes a portion overlapping each of the leads **11***a*, **11***b*, **12***a*, and **12***b*, and a portion positioned between these leads, in a plan view. Further, the protruding portion **492** includes a portion overlapping each of the leads **12***a*, **12***b*, **13***a*, and **13***b*, and a portion positioned between these leads, in a plan view. This makes it possible to reduce the lifting of the lead frame from the first dark-colored resin member **40** by the protruding portions **491** and **492** during the manufacture of the resin package **100**.

Below, a planar shape of the protruding portion **49** will be described with reference to FIG. **39**A. The protruding portion **49** includes a first width portion, second width portions, and third width portions, each having a different width in the y-axis direction. The first width portion faces the light-emitting element **50**. The second width portions are positioned on the +x side and the −x side of the light-emitting element **50** and sandwich the light-emitting element **50** therebetween in a plan view. The third width portions are positioned at the very end in the x-axis direction in a plan view. The first width portion has a shorter width in the y-axis direction than the second width portion. The second width portions have longer widths in the y-axis direction than the third width portions. The first width portion has a longer width in the y-axis direction than the third width portions. This makes it possible to dispose the first width portion and the light-emitting element **50** close to each other in a plan view, and reduce the volume of the reflective member **150** disposed between the first width portion and the light-emitting element **50**. Thus, it is possible to reduce the stress on the light-emitting elements **50** that occurs during the manufacturing step and reduce the lifting of the light-emitting elements **50** from the leads **11**. Further, in a plan view, a distance from each third width portion to the second resin portion **42** in the y-axis direction can be made longer. This makes it possible to enlarge the region of the connection region wr. Thus, the connection region and the wire can be easily bonded. Note that the first width portion and each third width portion may have the same width in the y-axis direction. Furthermore, in the lateral surface of each protruding portion **49**, the first resin portion **41** may include a step surface **49***st* oriented in the same direction as the primary surface **100***a*. In a cross-sectional view, each protruding portion **49** includes a lateral surface having a stepped shape, and the step surface **49***st* is an upward facing surface corresponding to a tread of a step. The upper surface of the light-emitting element **50** may be positioned above the step surface **49***st*. By providing the step surface **49***st* that is lower than the upper surface of the light-emitting element **50**, it is possible to reduce the rise of the reflective member **150** to the upper surface of the light-emitting element **50**. As an example, a distance k**2** between the upper surface **49***u* of the protruding portion **49** and the exposed region **30** in the z-axis direction is 0.2 mm, and a distance k**3** between the step surface **49***st* of the protruding portion **49** and the exposed region **30** in the z-axis direction is 0.1 mm. For example, the step surface **49***st* surrounds the upper surface **49***u* of the protruding portion **49**, in a plan view. For example, in a plan view, a shape of an outer edge of the step surface **49***st* of the protruding portion **49** is similar to a shape of an outer edge of the upper surface **49***u* of the protruding portion **49**.

The second resin portion **42** may include a step surface **42***st* oriented in the same direction as the primary surface **100***a*, between the second resin portion **42** and the inner upper surface **27***a* in a plan view. A height of the step surface **42***st* may be the same as the height of the step surface **49***st* of the protruding portion **49**.

In the example illustrated in FIG. **39**A, the first region **121** is defined by a lateral surface (lateral surface in the x-axis direction) of the second resin portion **42** and a lateral surface of the protruding portion **491**, the second region **122** is defined by lateral surfaces (lateral surfaces in the x-axis direction) of the protruding portions **491** and **492**, and the third region **123** is defined by the lateral surface (lateral surface in the x-axis direction) of the second resin portion **42** and the lateral surface of the protruding portion **492**. In a plan view, each of the first region **121** to the third region **123** may include a portion Pd where the corresponding light-emitting element **50** is positioned, and two constricted portions Pn positioned on the +x side and the −x side of the portion Pd. A width of each constricted portion Pn in the y-axis direction is smaller than a width of the portion Pd in the y-axis direction. This makes it easy to utilize capillary action to dispose, via the constricted portions Pn, the first resin material that is to become the reflective member **150** in a region close to each of the light-emitting elements **50**. A planar shape of the second resin portion **42** will now be described. The second resin portion **42** extending in the x-axis direction includes a narrow portion facing the light-emitting element **50** and a wide portion having a width wider than the narrow portion in the y-axis direction. Here, an example is illustrated in which a portion extending in the +y direction is included as the wide portion of the second resin portion **42**. However, the wide portion of the second resin portion **42** may include a portion extending in the −y direction. The wide portion of the second resin portion **42** faces the second width portion of the protruding portion **49**. Thus, the constricted portions Pn and the portion Pd are defined. For example, the wide portions of the two second resin portions **42** sandwich the light-emitting element **50** therebetween.

An example of a method of arranging the reflective members **150** will be described below with reference to FIG. **39**D by using the second region **122** as an example. In the light-emitting device **4000**, for example, regions positioned on the +x side and the −x side of the second region **122** (regions that are to become the connection regions wr) can each be used as a nozzle arrangement region **700** in which a nozzle for applying the first resin material is arranged. The first resin material is a resin material that is to be cured and to become the reflective member **150**. When the nozzle is placed in each of the nozzle arrangement regions **700** and the first resin material is ejected, the first resin material flows through the constricted portion Pn and into the portion Pd of the second region **122** by capillary action, as indicated by arrows **701**. The first resin material flowing in from the constricted portions Pn enters around between the lateral surface of the second light-emitting element **52** and the lateral surface of the protruding portion **491** and around between the lateral surface of the second light-emitting element **52** and the lateral surface of the protruding portion **492**. In this way, it is possible to arrange the reflective member **150** in a space between the lateral surface of the second light-emitting element **52** and the lateral surface of the protruding portion **491** and a space between the lateral surface of the second light-emitting element **52** and the lateral surface of the protruding portion **492**.

The mold resin portion may include a portion disposed in each of the constricted portions Pn. A surface area of the second resin portion **42** is increased by an amount equivalent to that of the constricted portions Pn, making it possible to increase a contact area with the mold resin portion. By the presence of the constricted portions Pn, an adhesive force between the mold resin portion and the resin package **100** can be increased, making it possible to fix the mold resin portion more stably to the resin package **100**.

In the example illustrated in FIG. **38**, in the recessed portion **27**, the second dark-colored resin member **190** is disposed in a region defined by a portion of the lateral surface of each protruding portion **49** that extends in the y-axis direction and a lateral surface of the second resin portion **42**. The plurality of leads **11***a* to **13***b* can be covered by the second dark-colored resin member **190**. Thus, the contrast of the light-emitting device **4000** can be improved. By including a difference in width in the y-axis direction between the second width portion and the third width portion in the protruding portion **49**, it is possible to reduce the overlapping of the second dark-colored resin member **190** on the upper surface of the light-emitting element **50**. Note that the second dark-colored resin member **190** may not be disposed.

FIG. **40** is a schematic perspective view of another light-emitting device **4001** according to a thirteenth modified example, with the mold resin portion removed. The light-emitting device **4001** differs from the light-emitting device **4000** illustrated in FIG. **38** in that, on the primary surface **100***a* of the resin package **100**, the upper surface **49***u* of the at least one protruding portion **49** includes a depression **49***h*.

For example, the mold resin portion **60** includes a portion positioned in an interior of the depression **49***h* of each protruding portion **49**. At this time, an inner surface of the depression **49***h* is in contact with the mold resin portion. For example, when the mold resin portion is formed, a resin material that is to become the mold resin portion is applied so as to fill the depression **49***h* of each protruding portion **49**, and then cured. This makes it possible to increase the adhesive force between the mold resin portion and the resin package **100** (anchor effect). Accordingly, the mold resin portion can be more stably fixed to the resin package **100**. Note that the interior of the depression **49***h* may be in contact with the light-transmissive resin member **180**. The light-transmissive resin member **180** may be disposed in a part of the interior of the depression **49***h*, and the mold resin portion may be disposed in another part of the interior of the depression **49***h*. In the example illustrated in FIG. **40**, an inner upper surface of the depression **49***h* has a cross shape in which a portion extending in the x-axis direction and a portion extending in the y-axis direction intersect in a plan view. In this way, the anchor effect can be further improved. In a top view, a shape of an opening of the recessed portion **27** is, for example, substantially rectangular. In the example illustrated in FIG. **40**, an outer edge of the recessed portion **27** is rounded at corner portions of the rectangle (quadrangle with rounded corners). Further, in the example illustrated in FIG. **40**, the second resin portion **42** extending in the x-axis direction is linear. In the example illustrated in FIG. **40**, a width in the y-axis direction of the second resin portion **42** extending in the x-axis direction in a plan view is constant. Note that a part of the second resin portion **42** in the shape of the opening of the recessed portion **27** may have a deformed shape. For example, the second resin portion **42** may partially or fully include a curved line in a plan view or may have an elliptical shape in a plan view.

FIG. **41** is a schematic perspective view of yet another light-emitting device **4002** according to the thirteenth modified example, with the mold resin portion removed. The light-emitting device **4002** differs from the light-emitting device **4001** illustrated in FIG. **40** in that, in a plan view, an outer edge of each of the two protruding portions **49** disposed in the recessed portion **27** of the resin package **100** has rectangular shape. In the example illustrated in FIG. **41**, an outer edge of the depression **49***h* of each protruding portion **49** has rectangular shape.

According to the light-emitting device **4002**, respective widths of the first region **121** to the third region **123** in the y-axis direction can be made larger than those of the light-emitting device **4001**. Accordingly, for example, respectively arranging the light-emitting elements **50**, which are covered at lateral surfaces by the reflective members **150** in advance, in the first region **121** to the third region **123** is relatively easy.

In the example illustrated in FIG. **41**, in a cross-section parallel to the yz plane, a width of the opening of the depression **49***h* may be greater than a width of a bottom portion (inner upper surface) of the depression **49***h*. This makes it easy to fill the interior of the depression **49***h* with the resin material that is to become the mold resin portion. Note that a width of an opening of the depression **49***h* may be the same as or may be smaller than a width of a bottom portion of the depression **49***h*. In the example illustrated in FIG. **41**, an inner lateral surface of the depression **49***h* is a flat surface inclined relative to the xz plane. The depression **49***h* has a cross-sectional shape that is V-shaped, for example.

The light-emitting device according to the present disclosure can be suitably used as a light-emitting device in various applications. In particular, the light-emitting device according to the present disclosure is suitably used in a display device such as an LED display. The LED display is utilized for billboards, large televisions, advertisements, traffic signs, stereoscopic display devices, and lighting devices, for example.

What is claimed is:

1. A light-emitting device comprising:

a resin package comprising:

a plurality of leads, and

a resin member configured to fix at least a part of the plurality of leads,

the resin package being provided, on a primary surface, with a plurality of recessed portions comprising a first recessed portion, a second recessed portion, and a third recessed portion each being defined by the resin member and the plurality of leads,

an inner upper surface of each of the first recessed portion, the second recessed portion, and the third recessed portion comprising an exposed region where a part of any one of the plurality of leads is exposed;

a first light-emitting element disposed in the exposed region of the first recessed portion;

a second light-emitting element disposed in the exposed region of the second recessed portion;

a third light-emitting element disposed in the exposed region of the third recessed portion;

a first reflective member disposed in the first recessed portion and surrounding, in a plan view, the first light-emitting element;

a second reflective member disposed in the second recessed portion and surrounding, in the plan view, the second light-emitting element;

a third reflective member disposed in the third recessed portion and surrounding, in the plan view, the third light-emitting element; and

a mold resin portion comprising:

a first lens portion positioned above the first light-emitting element,

a second lens portion positioned above the second light-emitting element, and

a third lens portion positioned above the third light-emitting element,

the first lens portion, the second lens portion, and the third lens portion each having a convex shape protruding upward from the primary surface,

in the plan view,

a maximum width of the first lens portion being less than a maximum width of the inner upper surface of the first recessed portion,

a maximum width of the second lens portion being less than a maximum width of the inner upper surface of the second recessed portion,

a maximum width of the third lens portion being less than a maximum width of the inner upper surface of the third recessed portion.

2. The light-emitting device according to claim **1**, wherein in the plan view,

the inner upper surface of each of the first recessed portion, the second recessed portion, and the third recessed portion has a shape longer in one direction than in another direction, and a width of each inner upper surface in a longer direction is at least 1.5 times a width in a shorter direction.

3. The light-emitting device according to claim **1**, wherein in the plan view,

the inner upper surface of each of the first recessed portion, the second recessed portion, and the third recessed portion has a shape longer in one direction than in another direction, a width of the inner upper surface of each of the first recessed portion, the second recessed portion, and the third recessed portion in a longer direction is greater than a maximum width of corresponding one of the first lens portion, the second lens portion and the third lens portion in a longer direction, and a width of the inner upper surface of each of the first recessed portion, the second recessed portion, and the third recessed portion in a shorter direction is less than a maximum width of corresponding one of the first lens portion, the second lens portion and the third lens portion in a shorter direction.

4. The light-emitting device according to claim **1**, wherein in the plan view,

the first lens portion overlaps the first light-emitting element and at least a part of the first reflective member,

the second lens portion overlaps the second light-emitting element and at least a part of the second reflective member, and

the third lens portion overlaps the third light-emitting element and at least a part of the third reflective member.

5. The light-emitting device according to claim **4**, wherein in the plan view,

a part of the first reflective member is positioned outward of the first lens portion,

a part of the second reflective member is positioned outward of the second lens portion, and

a part of the third reflective member is positioned outward of the third lens portion.

6. The light-emitting device according to claim **1**, wherein

a width of the first lens portion in a cross-section where the width of the first lens portion is minimized, among cross-sections comprising a line connecting a vertex of the first lens portion and a center point, in the plan view, of the first lens portion, is no greater than 5 times a width of the first light-emitting element,

a width of the second lens portion in a cross-section where the width of the second lens portion is minimized, among cross-sections comprising a line connecting a vertex of the second lens portion and a center point, in the plan view, of the second lens portion, is no greater than 5 times a width of the second light-emitting element, and

a width of the third lens portion in a cross-section where the width of the third lens portion is minimized, among cross-sections comprising a line connecting a vertex of the third lens portion and a center point, in the plan view, of the third lens portion, is no greater than 5 times a width of the third light-emitting element.

7. The light-emitting device according to claim **1**, wherein

the inner upper surface of the first recessed portion comprises a first connection region and a second connection region where parts of corresponding two leads of the plurality of leads are respectively exposed, and

the first light-emitting element is electrically connected to the first connection region and the second connection region by a wire.

8. The light-emitting device according to claim **7**, wherein

the first recessed portion comprises a resin wall formed of the resin member in an interior of the first recessed portion,

the resin wall is positioned between the first light-emitting element and at least one of the first connection region or the second connection region in the plan view, and

a side wall of the resin wall proximate to the first light-emitting element is in contact with the first reflective member.

9. The light-emitting device according to claim **8**, wherein

the plurality of recessed portions on the primary surface of the resin package further comprise at least one fourth recessed portion positioned in a region different from regions of the first recessed portion, the second recessed portion, and the third recessed portion, an inner upper surface of the at least one fourth recessed portion comprises a connection region where a part of any one of the plurality of leads is exposed, and

at least one light-emitting element of the first light-emitting element, the second light-emitting element, or the third light-emitting element is electrically connected to the connection region of the at least one fourth recessed portion by a wire.

10. The light-emitting device according to claim **1**, wherein

the first light-emitting element emits first light,

the second light-emitting element emits second light,

the third light-emitting element emits third light,

the first light, the second light, and the third light have wavelengths different from one another, and

the light-emitting device further comprises:

a first colored resin member disposed in the first recessed portion and having a color similar to the first light,

a second colored resin member disposed in the second recessed portion and having a color similar to the second light, and

a third colored resin member disposed in the third recessed portion and having a color similar to the third light.

11. A light-emitting device comprising:

a resin package comprising:

a plurality of leads, and

a resin member configured to fix at least a part of the plurality of leads,

the resin package being provided, on a primary surface, with a first region, a second region, and a third region each being defined by the resin member and the plurality of leads,

the first region, the second region, and the third region each comprising an exposed region where a part of any one of the plurality of leads is exposed;

a first light-emitting element disposed in the exposed region of the first region;

a second light-emitting element disposed in the exposed region of the second region;

a third light-emitting element disposed in the exposed region of the third region;

a first reflective member disposed in the first region and surrounding, in a plan view, the first light-emitting element;

a second reflective member disposed in the second region and surrounding, in the plan view, the second light-emitting element;

a third reflective member disposed in the third region and surrounding, in the plan view, the third light-emitting element; and

a mold resin portion comprising:

a first lens portion positioned above the first light-emitting element,

a second lens portion positioned above the second light-emitting element, and

a third lens portion positioned above the third light-emitting element,

the first lens portion, the second lens portion, and the third lens portion each having a convex shape protruding upward from the primary surface,

a width of the first lens portion in a cross-section where the width of the first lens portion is minimized, among cross-sections comprising a line connecting a vertex of the first lens portion and a center point, in the plan view, of the first lens portion, being no greater than 5 times a width of the first light-emitting element,

a width of the second lens portion in a cross-section where the width of the second lens portion is minimized, among cross-sections comprising a line connecting a vertex of the second lens portion and a center point, in the plan view, of the second lens portion, being no greater than 5 times a width of the second light-emitting element,

a width of the third lens portion in a cross-section where the width of the third lens portion is minimized, among cross-sections comprising a line connecting a vertex of the third lens portion and a center point, in the plan view, of the third lens portion, being no greater than 5 times a width of the third light-emitting element.

12. The light-emitting device according to claim **11**, wherein

on the primary surface of the resin package, the resin member comprises a plurality of resin walls spaced apart from each other, and

the plurality of resin walls comprise, in the plan view,

at least one first resin wall defining a part of a peripheral edge of the first reflective member,

at least one second resin wall defining a part of a peripheral edge of the second reflective member, and

at least one third resin wall defining a part of a peripheral edge of the third reflective member.

13. The light-emitting device according to claim **12**, wherein

in the plan view,

the at least one first resin wall comprises a pair of first resin walls facing each other across the first light-emitting element, and

at least a part of the first reflective member is positioned between the pair of first resin walls.

14. The light-emitting device according to claim 13, wherein

the pair of first resin walls face each other across the first light-emitting element in a first direction in the plan view,

the first region comprises, in the plan view,

a first portion positioned between the pair of first resin walls and where the first light-emitting element is disposed, and

a pair of second portions each positioned across the first portion in a second direction orthogonal to the first direction,

each of the pair of second portions is in contact with the first portion, and

a width of each of the pair of second portions in the first direction is greater than or equal to a width of the first portion in the first direction.

15. The light-emitting device according to claim 14, wherein

the primary surface of the resin package comprises at least one third portion at least partially in contact with the pair of second portions in the plan view, and

an upper surface of the at least one third portion is positioned below an upper surface of each of the pair of second portions.

16. The light-emitting device according to claim 15, wherein

in the plan view,

the at least one third portion comprises two third portions each positioned across the pair of second portions in the first direction and each defining a width of corresponding one of the pair of second portions in the first direction.

17. The light-emitting device according to claim 12, wherein

each of the first light-emitting element, the second light-emitting element, and the third light-emitting element has a quadrangular planar shape, and

the at least one first resin wall comprises two pairs of the first resin walls,

one pair of the two pairs of the first resin walls face each other across one set of two sets of sides of the quadrangular planar shape of the first light-emitting element in the plan view, and

the other pair of the two pairs of the first resin walls face each other across the other set of the two sets of sides of the quadrangular planar shape of the first light-emitting element in the plan view.

18. The light-emitting device according to claim 12, wherein

the plurality of resin walls comprise at least one resin wall comprising:

a first lateral surface in contact with any one of the first reflective member, the second reflective member, and the third reflective member,

an upper surface, and

a tapered surface positioned between the first lateral surface and the upper surface,

the upper surface of the at least one resin wall is positioned above an upper end of the first lateral surface, and

the tapered surface is inclined from the first lateral surface toward the upper surface.

19. The light-emitting device according to claim 18, further comprising:

a light-transmissive resin member,

the light-transmissive resin member disposed in a first recessed portion and covering at least the first light-emitting element and the first reflective member.

20. The light-emitting device according to claim 13, wherein

the primary surface of the resin package further comprises a first connection region where a part of one lead of the plurality of leads is exposed and a second connection region where a part of another lead of the plurality of leads is exposed,

the first light-emitting element is electrically connected to the first connection region and the second connection region by a wire, and

the at least one first resin wall comprises a resin wall positioned between the first light-emitting element and at least one of the first connection region or the second connection region in the plan view.

21. The light-emitting device according to claim 13, wherein

the primary surface of the resin package further comprises a first connection region where a part of one lead of the plurality of leads is exposed and a second connection region where a part of another lead of the plurality of leads is exposed,

the first light-emitting element is electrically connected to the first connection region by a first wire and electrically connected to the second connection region by a second wire, and

in the plan view, the first wire extends from the first light-emitting element across a space between the pair of first resin walls to the first connection region and the second wire extends from the first light-emitting element across the space between the pair of first resin walls to the second connection region.

22. The light-emitting device according to claim 11, wherein

in the plan view,

the first reflective member is positioned inside the first lens portion,

the second reflective member is positioned inside the second lens portion, and

the third reflective member is positioned inside the third lens portion.

23. The light-emitting device according to claim 11, wherein

the first light-emitting element emits first light,

the second light-emitting element emits second light,

the third light-emitting element emits third light,

the first light, the second light, and the third light have wavelengths different from one another,

the light-emitting device further comprises:

in between the resin package and the mold resin portion,

a first colored resin member having a color similar to the first light,

a second colored resin member having a color similar to the second light, and

a third colored resin member having a color similar to the third light,

at least a part of the first colored resin member is positioned in the first region,

at least a part of the second colored resin member is positioned in the second region, and at least a part of the third colored resin member is positioned in the third region.

24. The light-emitting device according to claim **10**, wherein

at least a part of the first colored resin member is positioned on the first reflective member,

at least a part of the second colored resin member is positioned on the second reflective member, and

at least a part of the third colored resin member is positioned on the third reflective member.

25. The light-emitting device according to claim **1**, wherein

the mold resin portion further comprises a base portion configured to seal the first light-emitting element, the second light-emitting element, and the third light-emitting element, and

each of the first lens portion, the second lens portion, and the third lens portion has a convex shape protruding upward from an upper surface of the base portion.

26. The light-emitting device according to claim **1**, wherein

each of the first light-emitting element, the second light-emitting element, and the third light-emitting element has a rectangular planar shape, and

sides of the rectangular planar shape of at least one light-emitting element of the first light-emitting element, the second light-emitting element, or the third light-emitting element, in the plan view, is non-parallel to corresponding sides of the rectangular planar shape of a light-emitting element of the first light-emitting element, the second light-emitting element, and the third light-emitting element other than the at least one light-emitting element.

27. The light-emitting device according to claim **1**, wherein

a height of a vertex of at least one lens portion of the first lens portion, the second lens portion, or the third lens portion is greater than a height of a vertex of a lens portion of the first lens portion, the second lens portion, and the third lens portion other than the at least one lens portion.

28. The light-emitting device according to claim **1**, wherein

each of the first light-emitting element, the second light-emitting element, and the third light-emitting element comprises

a first surface positioned proximate to the plurality of leads,

a second surface positioned opposite to the first surface, and

at least one electrode positioned on the second surface, and

the at least one electrode of each of the first light-emitting element, the second light-emitting element, and the third light-emitting element is disposed on a line connecting a center point, in the plan view, of the first lens portion, a center point, in the plan view, of the second lens portion, and a center point, in the plan view, of the third lens portion.

29. The light-emitting device according to claim **11**, wherein

the primary surface of the resin package comprises one recessed portion defined by the resin member and the plurality of leads, and an inner upper surface of the one recessed portion comprises the first region, the second region, and the third region,

on the primary surface of the resin package, the resin member comprises

a first resin portion positioned on the inner upper surface of the one recessed portion, and

a second resin portion surrounding the inner upper surface of the one recessed portion in the plan view,

the first resin portion comprises at least one protruding portion, and

a height of an upper surface of the at least one protruding portion is identical to a height of the upper surface of the second resin portion.

30. The light-emitting device according to claim **29**, wherein

the first resin portion comprises a step surface oriented in a direction identical to the primary surface on a lateral surface of the at least one protruding portion.

31. The light-emitting device according to claim **30**, wherein

an upper surface of the first light-emitting element is positioned above the step surface.

32. The light-emitting device according to claim **29**, wherein

the upper surface of the at least one protruding portion comprises a depression.

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