

(19) (KR)
(12) (A)

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(30) 60/334,009 2001 11 28 (US)

(71) 55133-3427 . . 33427

(72) , , .
, 97219, ,222

, , .
, 97007, ,17852

(74) :

(54) DMD T I R

(9) (25), TIR (13)
(15) , , (25) (13) (55)
, , (25) (53) T 20 °

7

TIR , , , , , , ,

(micro-display projection systems)
(digital micromirror device; DMD) TIR

A. DMD

DMD(, (relay optic)), (field sequential color) (color wheel) (illumination light) (flipping) (reject state)
가

, TIR 가 DMD TIR

5,552,922 5,604,624 , Peterson 6,250,763 , Okamori
DMD TIR DMD TIR 'Simon Magarill' Magarill
6,185,047 , Poradish 6,349,006 Magarill 6,249,387 , Fielding 6,461,000

DMD TIR TIR
1a 1b (11) DMD (9) DMD TIR
2 (11)가 TV
(19, 21) (13) DMD (15) (17)
(25), (33) (23) (27), (29), (31), (35)
37)가

B. TIR
DMD () 45 °
3 45 ° DMD 3 , 39
, 47 , 41 () , 43 TIR , 45
, 51 () , 49

(45) (15) (53), (41) 45 ° 가 T
IR (49)가 (45) (, 3) (47)

가 , 가 , 3 (47)

3 (49) (51) , (49) (15) (53) 가

4 (13) TIR (13a) , DMD (15)

4 (13a) TIR (57) (55) , 45 °
 (59) 4 (53) 45 ° (59) (53) 4
 (+) , 4 (41) +45 ° 가 (41) -45 ° 가

5a, 5b 5c TIR , ' '
 (+10 °) (67)

5a (61) TIR (57) , (63) TIR (57) DMD ,
 (n=1.493) 10 ° F/3.0 (light cone)
 35 °

5b (61) TIR (57) (63) TIR , ' - ' ,
 5a (-) 5a () .
 , 5b 5a

5b , TIR 가 5a DM
 10 ° 35 ° 가 , F/3.0 5b

D , 5a TIR , 45 ° 가

5c (57) (65) , 5b , Peters
 on 6,185,047 , 5c , 5a 5b ,

, TIR DMD (1) , (2)
 TIR (3) , 가

, 가 , 가 9
 0 ° 90 ° TIR TIR

13 (73, 75) , 69 71 TIR . 90 ° (75, 77) . 90 ° TIR

15a 15b DMD 45 °
.

9 : DMD 11 :

13 : 13a :

13b : 15 : DMD

17 : 19 :

21 : 23 :

25 : 27 :

29 : 31 :

33 : 35 :

37 : 39 : -

41 : 43 : TIR

45 : 47 :

49 : 51 :

53 : DMD 55 :

57 : TIR 59 :

61 : 63 :

65 : TIR 67 : ' ' -

69 : 71 : TIR

73 : 75 : TIR

77 : 81 : TIR

83 : TIR 85 :

87 : 89 : TIR

91 : 가

93 : 가

TIR

DMD

6 . 6 1

DMD , 10 ° DMD
F/2.4 DMD 12 °
BK7 d (587nm) 1.5168 (436nm) 1.5266
가 , n = 1.5266 (θ_{tir}) :
 $\theta_{tir} = \sin^{-1} (1/n)$
 $\theta_{tir} = 40.92055$.
1.5266 θ_{tir} , TIR
BK7
8 9
8 , z x DMD (53) (, 9 , TIR)가
45 °
45 ° , () 45 °
TV 20 ° 45 ° , 45 °
TIR
DMD , m f- U , 10a 10b
1 10 ° DMD m U 2 $n_g = 1.52669$ 가 , 10 ° DMD 12 ° DMD 1 ,

[1]

| | 10 ° DMD | 12 ° DMD | (5a) 10 ° DMD |
|-----------------------------|-------------|---------------|-------------------|
| m | 10 ° | 12 ° | 10 ° |
| | 22.5 ° | 26.5 ° | 20 ° |
| FNO (FNO amp; [, U °]) | 3.6[9.6 °] | 2.5[11.54 °] | 3.0[9.6 °] |

, TIR (, TIR) ,

11 TIR (89) (85) (87) , (91, 93) 가 (89) (91, 93) 가 (89) , (91, 93) TIR , TIR () 2 10 ° DMD 12 ° DMD BK7 [i,j,k] 8 2 (x,y,z) .

[2]

| | 10 ° DMD | 12 ° DMD | (5a) 10 ° DMD |
|-----|---------------------|---------------------|--------------------|
| TIR | 34.65 ° | 33.0 ° | 34.5 ° |
| | 12.5 ° | 5.0 ° | 45 ° |
| | 20.16 ° | 16.08 ° | 45 ° |
| TIR | [.555, -.123,.823] | [.543, -.047,.8.39] | [.401, -.401,.824] |
| | [.928, -.3408,.149] | [.995, -.271,.184] | [.700, -.700,.14] |

12 12 ° DMD , 13 12 , 14 , 15 . 4 9 , 12 DMD TIR 12 , 12 45 ° (, 2 12 ° DMD , = 5 °) , () 45 ° (, 2 12 ° DMD , = 16 °) . 12, 13 14 (, 26.5 ° , 45 °) , TIR , 45 ° () . , 2 , 20 ° , , DMD 2~4 가 , 가 , DMD TIR () 45 ° , 가 = 45 ° , DMD 2 가 , 20 ° , 가 , 1 6 가 , DMD 2 가 , = 45 ° , 20 ° ,

5,999,306 16 17 DMD (, Adobe
2 3 DMD . , TIR 45 ° DMD ,

가

가

TIR ,

(57)

1.

- (A) ;
- (B) , 1 2 가
가 ;
- (C) ;
- (D) , (I) 2 , (III) 2 1 , (II) 1 3
;
- (a) 2 3 ,
- (b) 1 2 (i) 90 ° (ii) 90 ° .

2.

1 , (i) 20 ° , (ii) , (iii) .

3.

1 , (i) 3 45 ° 가 , (ii) , (iii) .

4.

- (i) 1 ;
- (ii) 1 ;
- (iii) , 1 .

5.

- (A) ;
- (B) , 1 2 가
가 ;
- (C) ;

(D) , (I) , (II)
 , (III)
 ;

(a) 가 , (b) .

6.
5 ,
.

7.
5 , (i) , (ii) , (iii)
20 ° .

8.
5 , (i)
가 , (ii) , (iii) 45 ° .

9.
(i) 5 ;
(ii) 5 ;
(iii) , 5 .

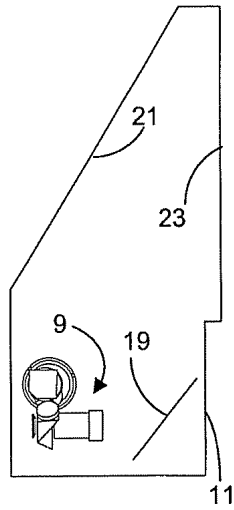
10.
(a) ;
(b) 1 2 가 ;
가
(c) ;
(d) ;
(e) .

11.
10 , (b)
.

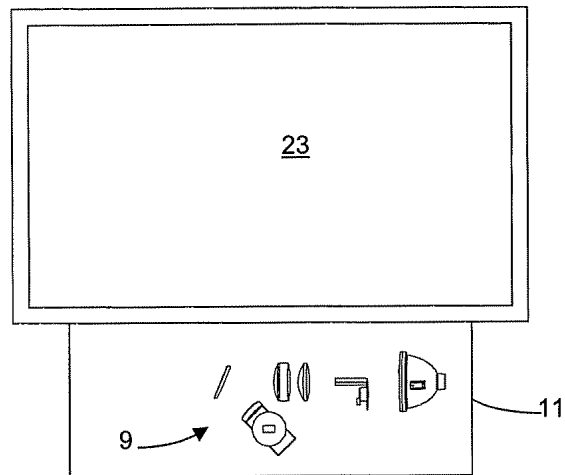
12.
10 ,
.

13.
10 ,
.

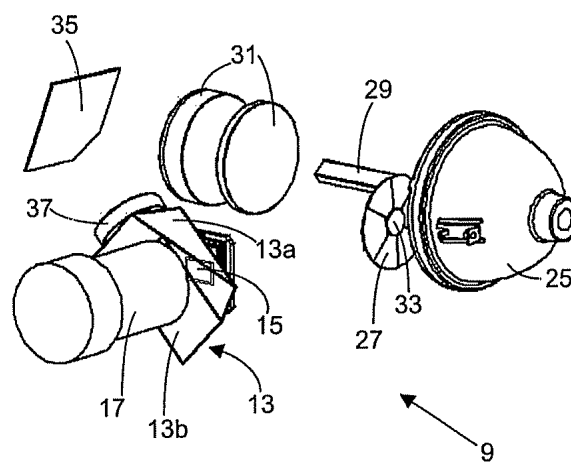
1a



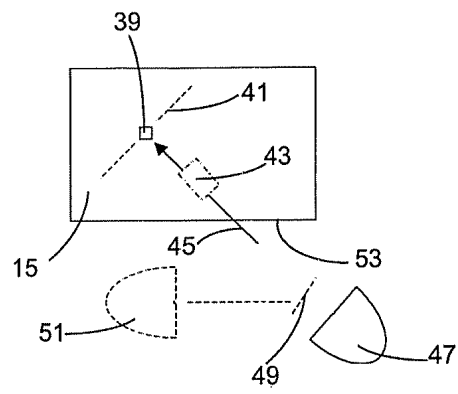
1b



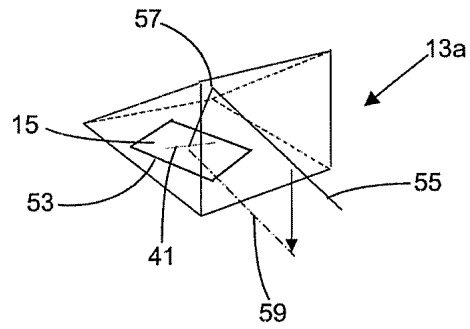
2



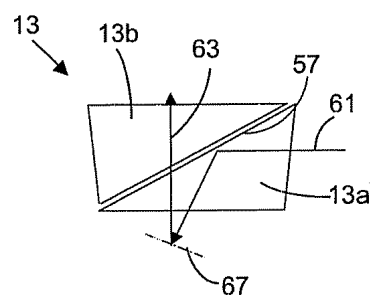
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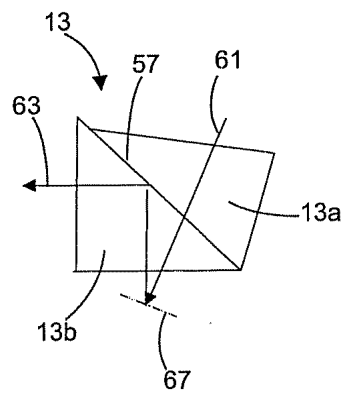
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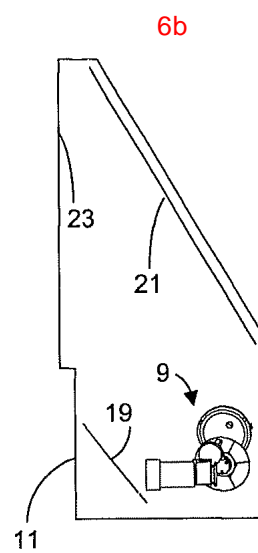
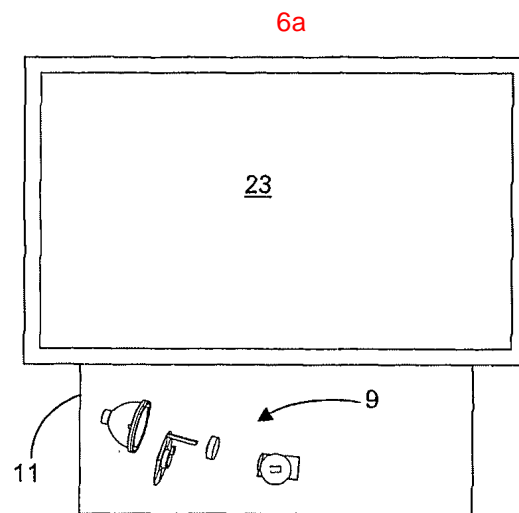
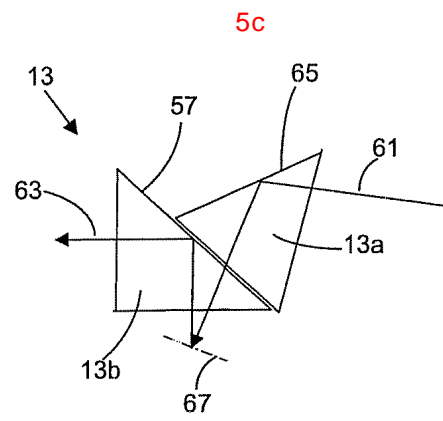


5a

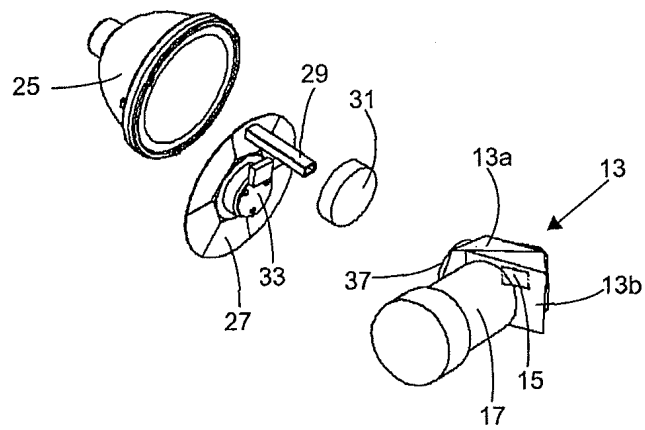


5b

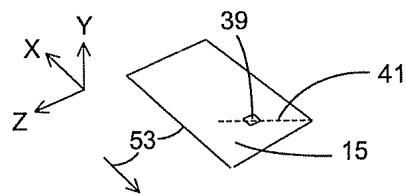




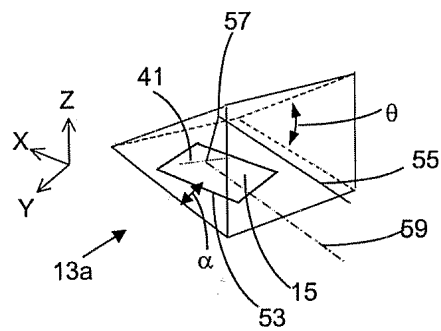
7



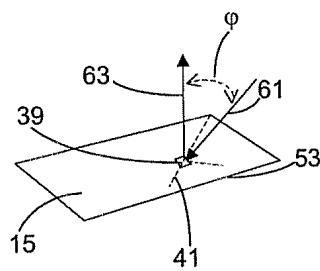
8



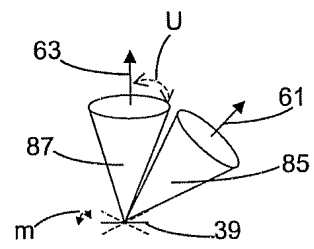
9



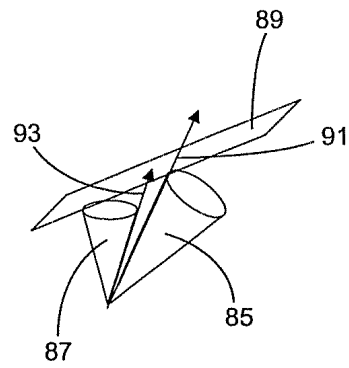
10a



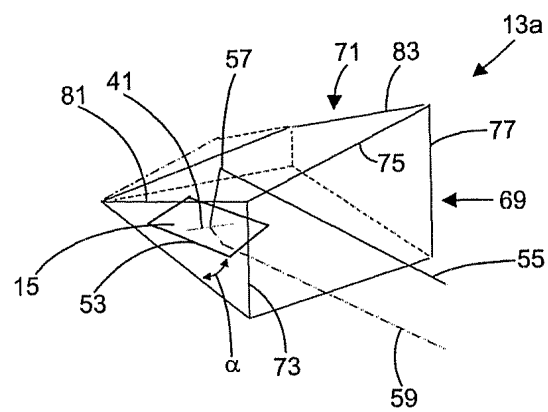
10b



11



12



13a

