

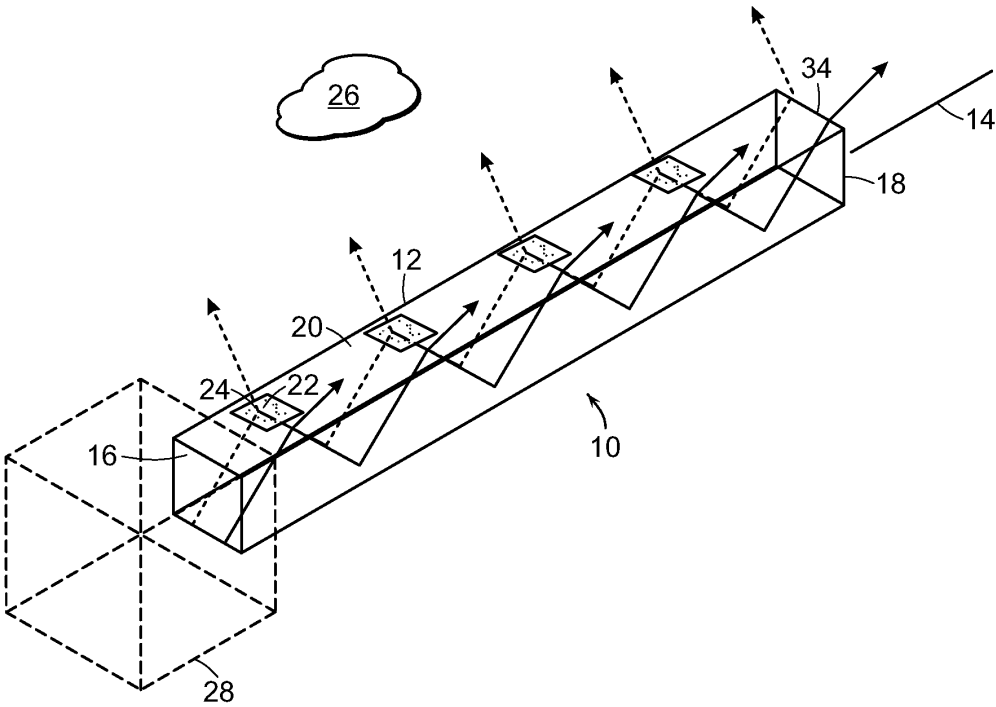


FIG. 1

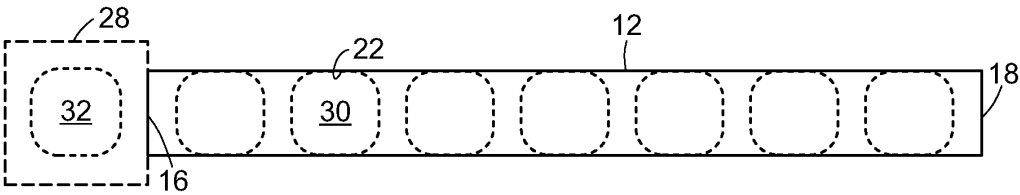


FIG. 2

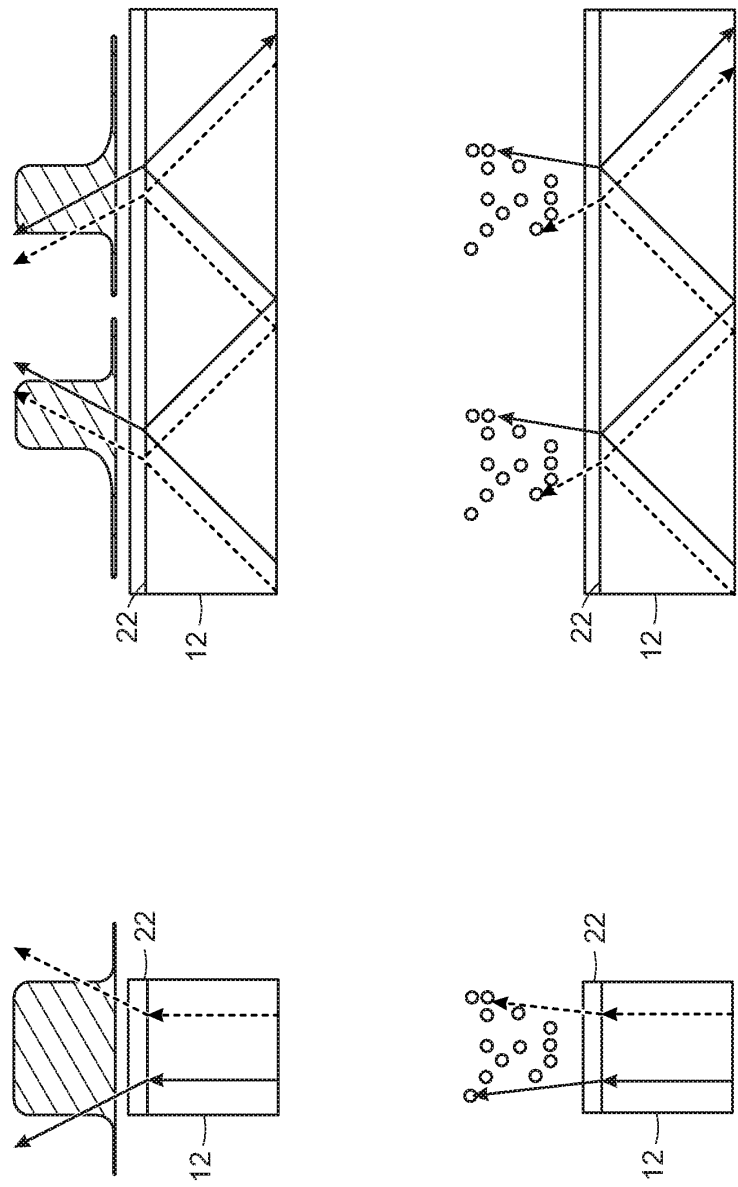


FIG. 3

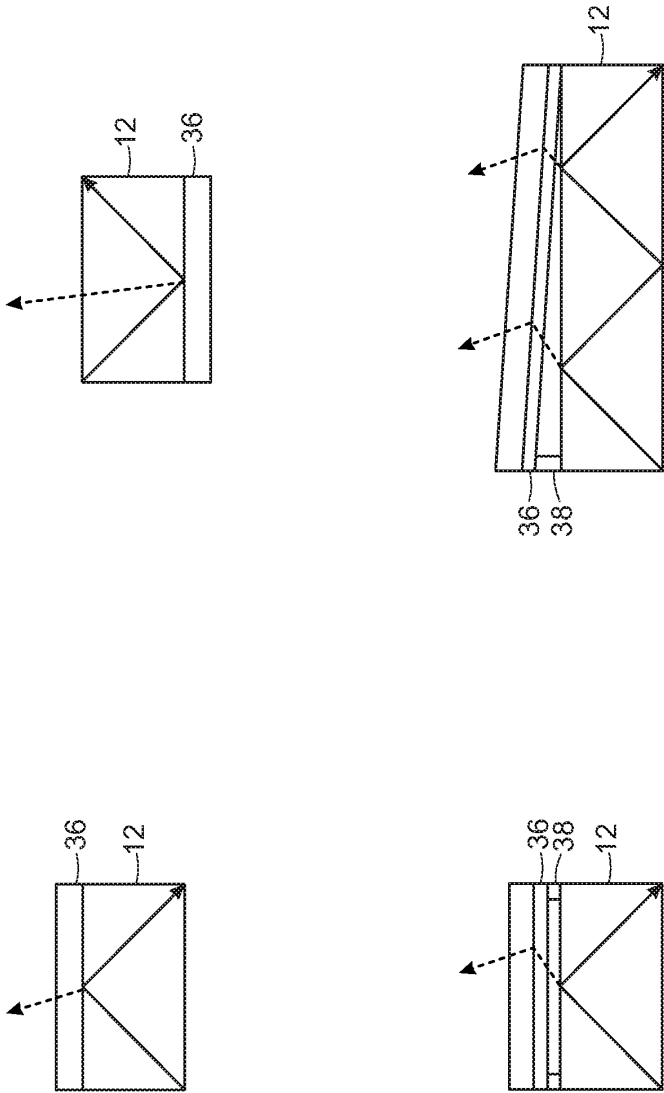


FIG. 4

| <i>Design</i>                              | <i>Number VCSELS</i> | <i>Dimensions VCSEL<sup>a</sup></i> | <i>Dimensions Light Bar</i> | <i>Number Bar Illuminations</i> | <i>Total Dimensions</i> | <i>Illumination Ripple<sup>b</sup></i> |
|--------------------------------------------|----------------------|-------------------------------------|-----------------------------|---------------------------------|-------------------------|----------------------------------------|
| <i>Single VCSEL</i>                        | 1                    | 100x100µm                           | No light bar                | 0                               | 1x1mm                   | 100%                                   |
| <i>VCSEL array*</i>                        | 200                  | 1x1mm                               | No light bar                | 0                               | 1x1mm                   | 7%                                     |
| <i>Single VCSEL with small bar</i>         | 1                    | 100x100µm                           | 1x2x0.04mm                  | 20                              | 1x2x1mm                 | 22%                                    |
| <i>VCSEL array* with small bar</i>         | 200                  | 1x1mm                               | 1x2x0.4mm                   | 2                               | 1x3x1mm                 | 5%                                     |
| <i>VCSEL array* with medium bar</i>        | 200                  | 1x1mm                               | 1x3x0.4mm                   | 3                               | 1x4x1mm                 | 4%                                     |
| <i>Narrow VCSEL array** with small bar</i> | 100                  | 1x0.25mm                            | 1x2x0.1mm                   | 8                               | 1x2.25x1mm              | 3%                                     |
| <i>Narrow VCSEL array** with med bar</i>   | 100                  | 1x0.25mm                            | 1x3x0.1mm                   | 12                              | 1x3.25x1mm              | 2.8%                                   |
| <i>Narrow VCSEL array** with long bar</i>  | 100                  | 1x0.25                              | 1x25x0.1mm                  | 100                             | 1x25x1mm                | 1%                                     |

<sup>a</sup> The dimension is that of the VCSEL itself; the die may be bigger

<sup>b</sup> The actual illumination variation will be less than (estimated 50% of) this estimate, due to the spectral bandwidth of the VCSELS, and possibility of illumination on the return path

\* The VCSEL array is similar to the current ams/Heptagon/Princeton Optronics VCSEL array

\*\* Custom aspect ratio VCSEL array

FIG. 5

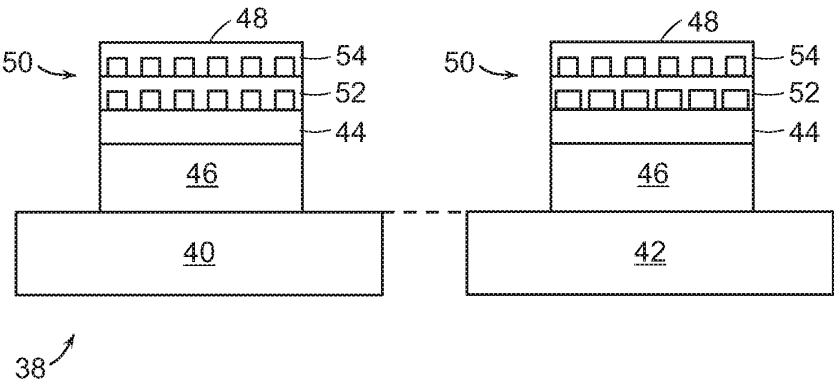


FIG. 6

| $L$         | $m$ | $n$ | $\delta\phi_2, \delta\phi_{DBR}$ | $\delta\phi_1$ | $\lambda$   |
|-------------|-----|-----|----------------------------------|----------------|-------------|
| $0.28\mu m$ | 2   | 3   | 0                                | 0              | $0.85\mu m$ |
| $0.28\mu m$ | 2   | 3   | 0                                | $\pi/8$        | $1.05\mu m$ |
| $0.28\mu m$ | 2   | 3   | 0                                | $\pi/4$        | $1.36\mu m$ |
| $0.57\mu m$ | 4   | 3   | 0                                | 0              | $0.85\mu m$ |
| $0.57\mu m$ | 4   | 3   | 0                                | $\pi/8$        | $0.94\mu m$ |
| $0.57\mu m$ | 4   | 3   | 0                                | $\pi/4$        | $1.04\mu m$ |
| $1.7\mu m$  | 12  | 3   | 0                                | 0              | $0.85\mu m$ |
| $1.7\mu m$  | 12  | 3   | 0                                | $\pi/4$        | $0.91\mu m$ |
| $1.7\mu m$  | 12  | 3   | 0                                | $\pi/2$        | $0.97\mu m$ |

FIG. 7

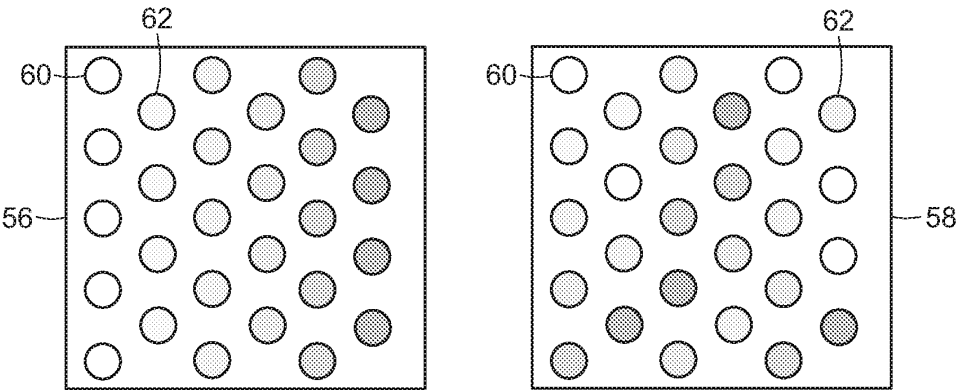


FIG. 8

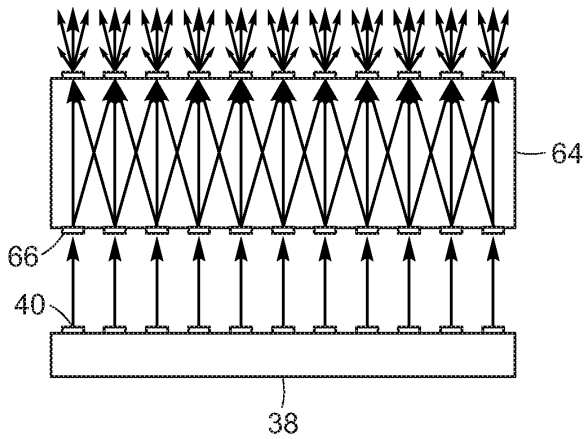


FIG. 9

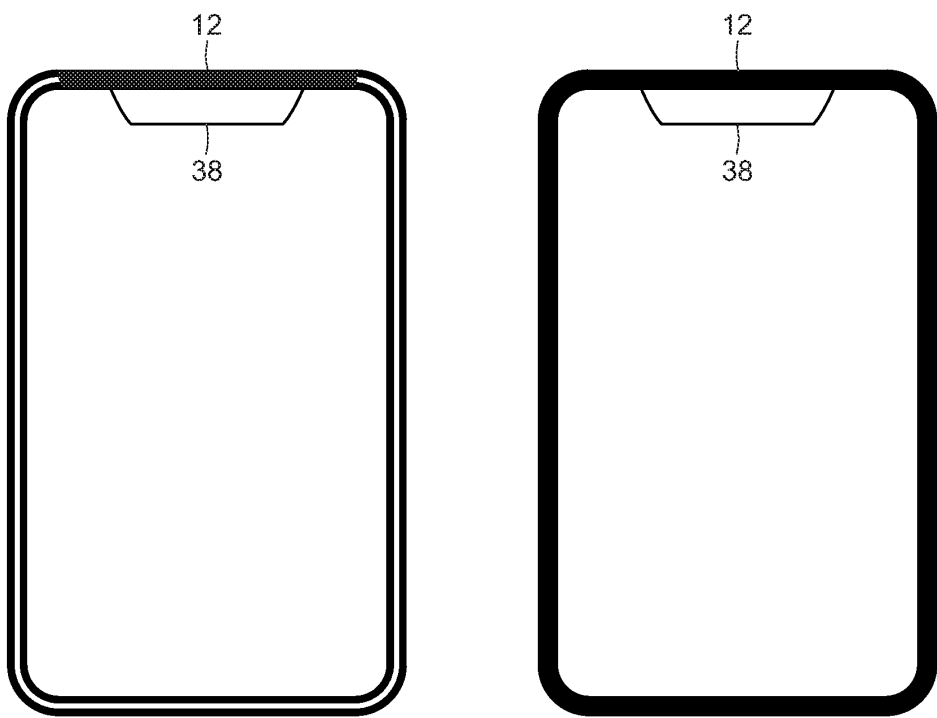


FIG. 10

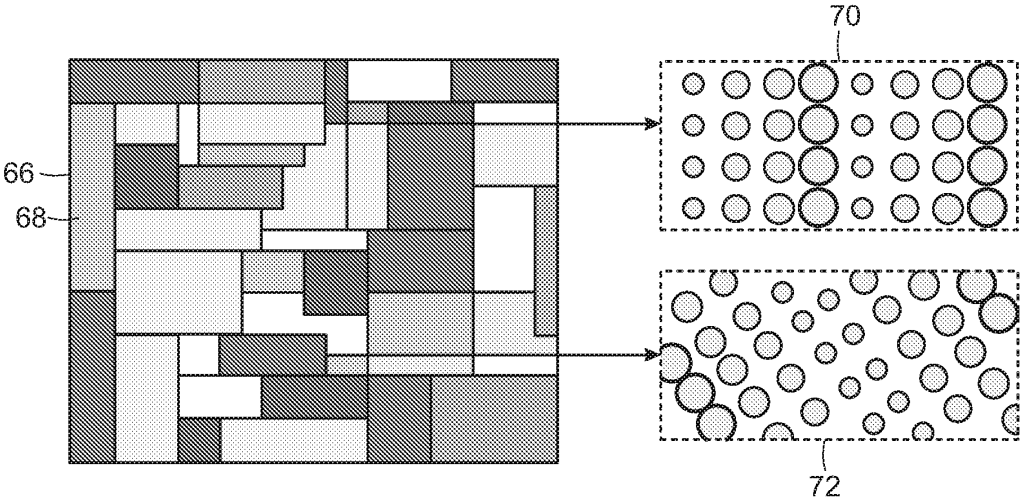


FIG. 11

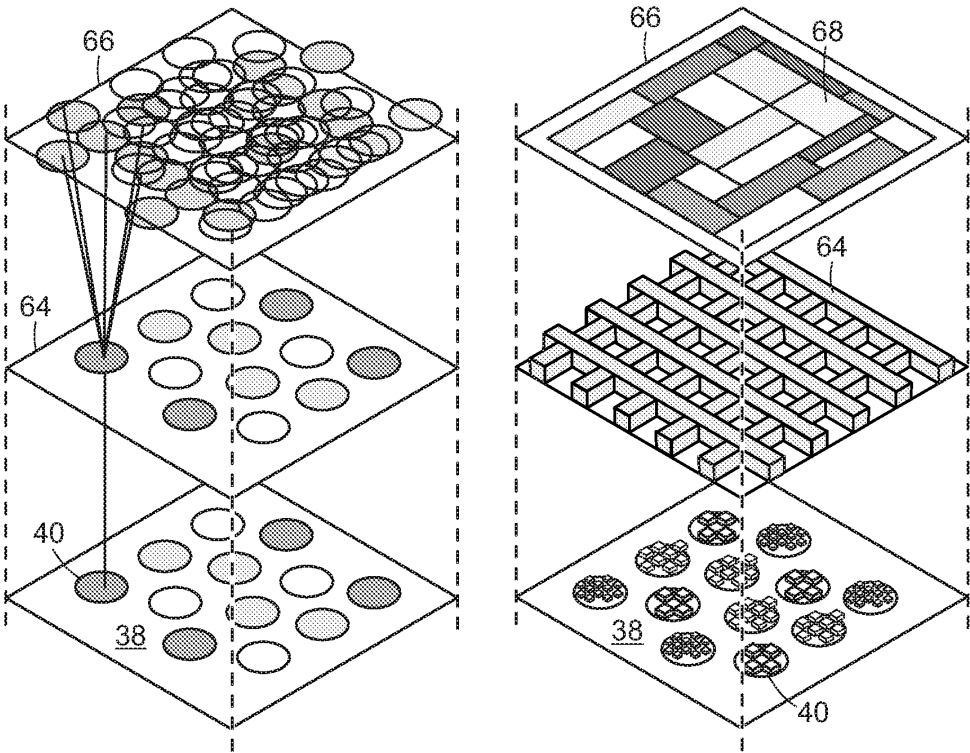


FIG. 12