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United States Patent [19]

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Winston et al.

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- [54] **TAPERED MULTILAYER LUMINAIRE DEVICES**
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- [73] Assignee: **NiOptics Corporation, Evanston, Ill.**
- [21] Appl. No.: **29,883**
- [22] Filed: **Mar. 11, 1993**

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Related U.S. Application Data

- [63] Continuation-in-part of Ser. No. 855,838, Mar. 23, 1992, Pat. No. 5,237,641.
- [51] Int. Cl.⁵ **G02B 6/26**
- [52] U.S. Cl. **385/146; 385/43; 385/901; 385/129; 385/131**
- [58] Field of Search **385/43, 129, 130, 131, 385/140, 146, 147, 901, 31; 359/599, 833, 834**

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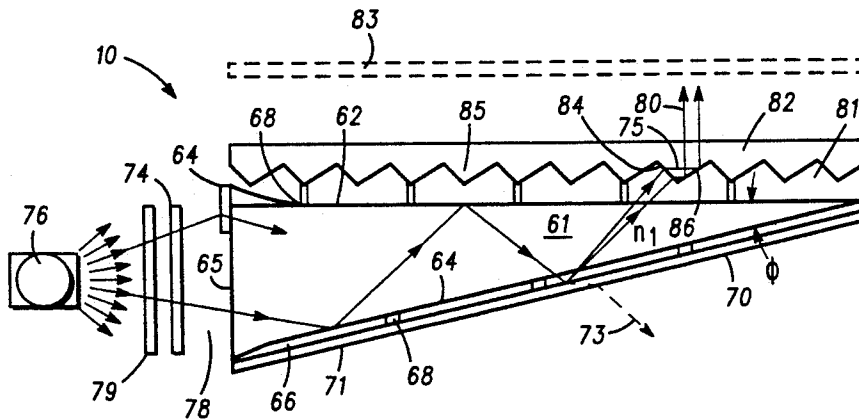
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[57] ABSTRACT

An optical device for collecting light and selectively outputting or concentrating the light. A wedge layer has an optical index of refraction n_1 , and top, bottom and side surfaces intersecting to define an angle of inclination d . A back surface spans the top, bottom and side surface. A first layer is coupled to the bottom surface of the layer and has an index of refraction n_2 . The first layer index n_2 causes light input through the back surface of the layer to be preferentially output into the first layer. A second layer is coupled to the bottom of the first layer and selectively causes output of light into ambient. Additional layers, such as an air gap, can be provided adjacent to the wedge shaped layer. The wedge shaped layer can also have a variable index of refraction $n(x,y,z)$.

69 Claims, 23 Drawing Sheets



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Fig. 1

— PRIOR ART —

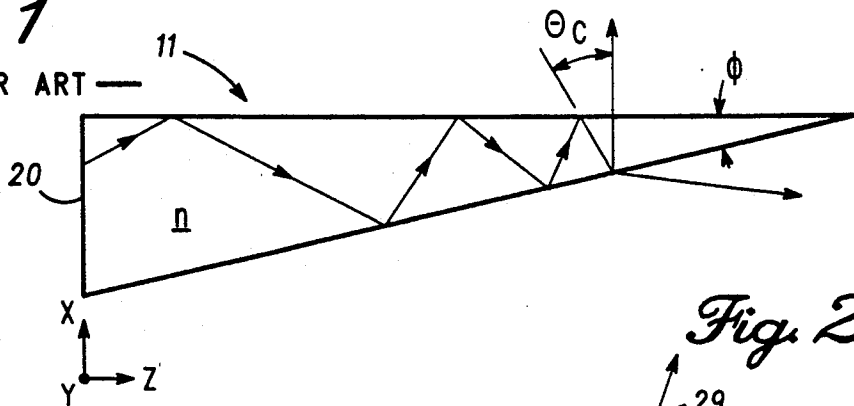


Fig. 2A

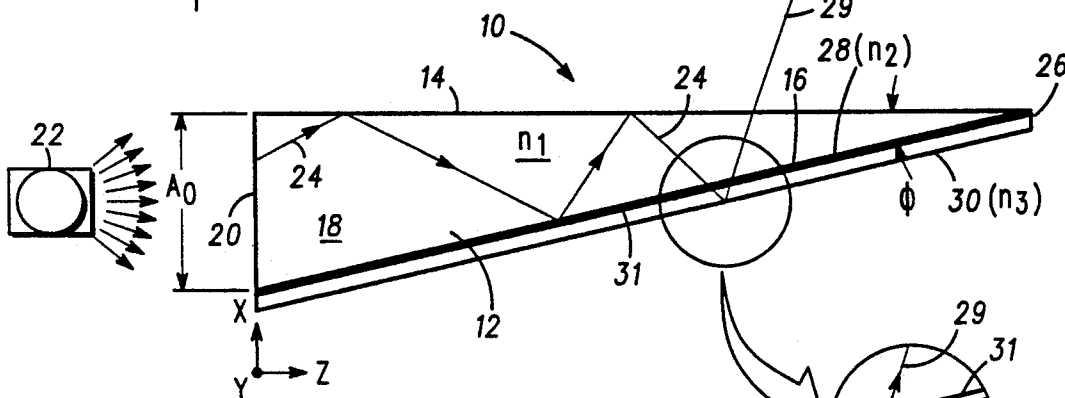


Fig. 2B

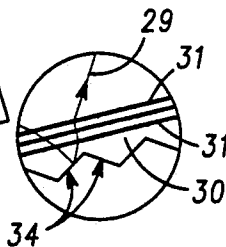


Fig. 2C

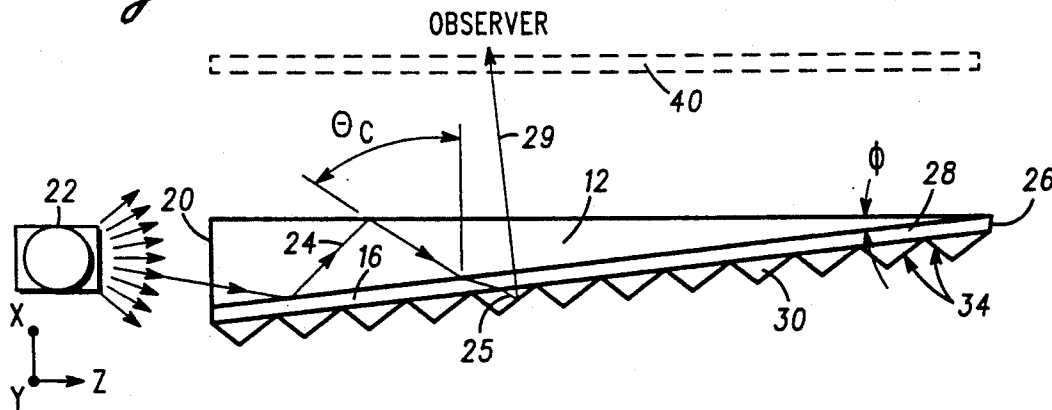
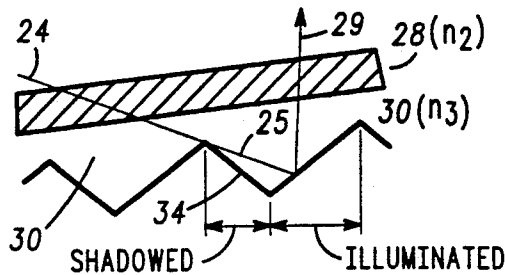


Fig. 2D



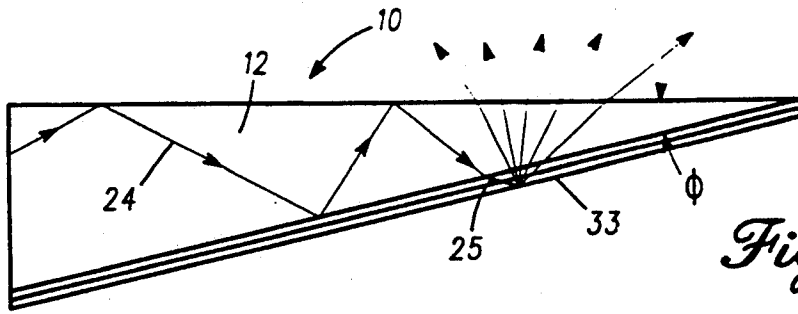


Fig. 2E

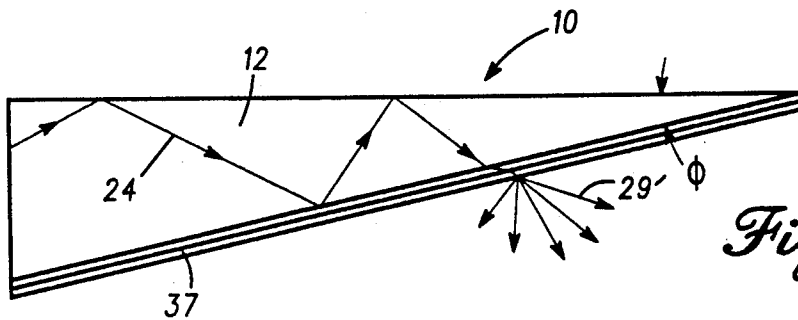


Fig. 2F

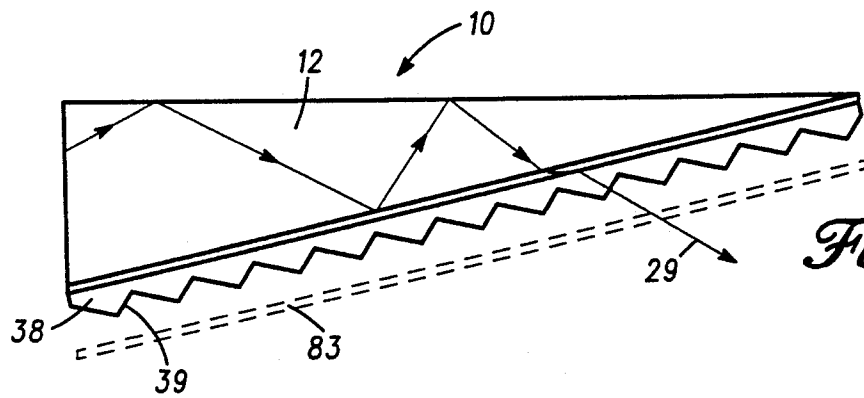


Fig. 2G

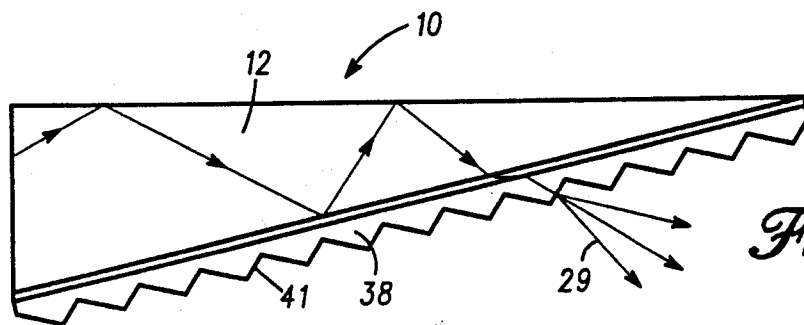


Fig. 2H

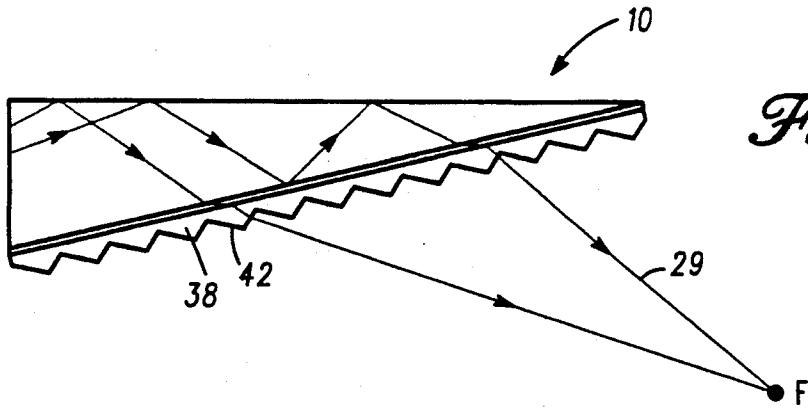


Fig. 2I

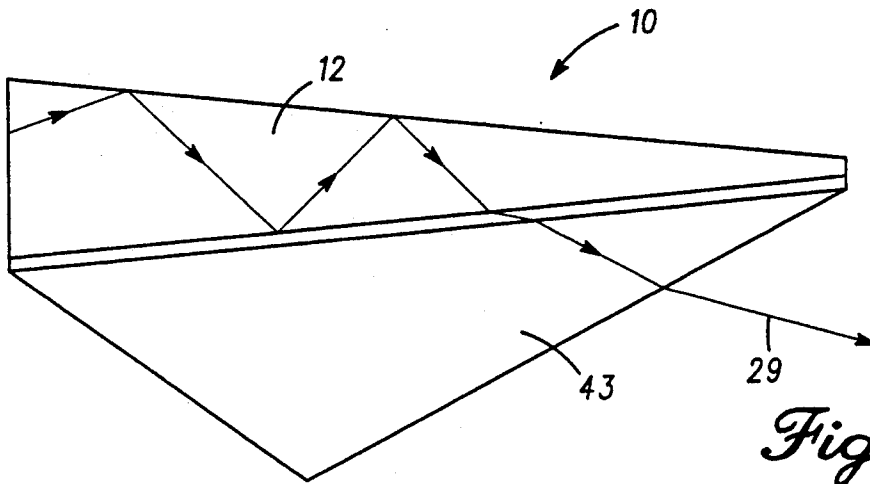


Fig. 2J

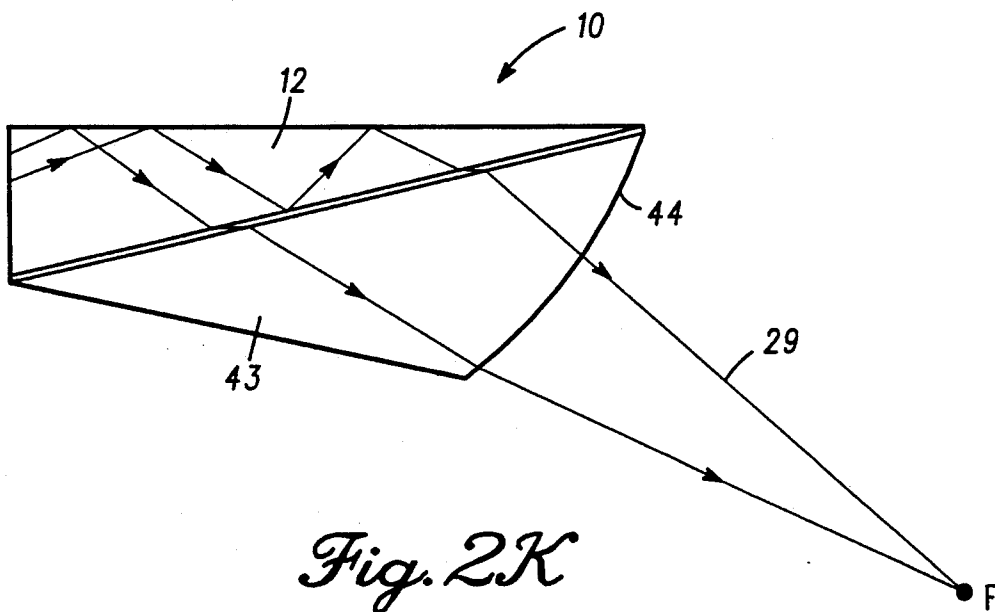


Fig. 2K

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