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Vasylyev

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(54) **COLLIMATING ILLUMINATION SYSTEMS EMPLOYING PLANAR WAVEGUIDE**

G02F 1/133605 (2013.01); *G02F 2001/133607* (2013.01); *G02F 2001/133628* (2013.01); *Y02E 10/52* (2013.01)

(71) Applicant: **Sergiy Vasylyev**, Elk Grove, CA (US)

(58) **Field of Classification Search**
CPC *G02B 6/0038*; *G02B 6/0053*; *G02B 3/005*; *G02B 3/0056*; *G02F 1/133605*; *G02F 2001/133607*; *G02F 2001/133628*; *H01L 31/0547*; *H01L 31/0549*
USPC 385/33-36; 349/56-67; 136/246, 136/256-257; 362/600-629
See application file for complete search history.

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 123 days.

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(51) **Int. Cl.**

G02B 6/32 (2006.01)
F21V 8/00 (2006.01)
G02B 3/00 (2006.01)
G03B 21/20 (2006.01)
H01L 31/054 (2014.01)
G02F 1/1335 (2006.01)

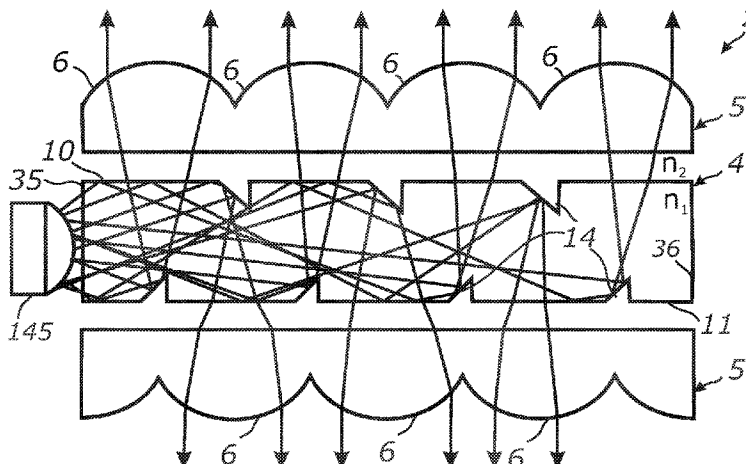
(57) **ABSTRACT**

An apparatus for distributing light from a planar waveguide through a collimating array. Light received within a waveguide is propagated transmissively and retained by total internal reflection, except in response to impinging upon deflector elements which sufficiently redirect the light to escape the waveguide into a collimator array that further aligns and distributes the light.

(52) **U.S. Cl.**

CPC *G02B 6/005* (2013.01); *G02B 3/005* (2013.01); *G02B 3/0056* (2013.01); *G02B 6/0038* (2013.01); *G02B 6/0055* (2013.01); *G03B 21/208* (2013.01); *G03B 21/2066* (2013.01); *H01L 31/0547* (2014.12); *H01L 31/0549* (2014.12); *G02B 6/0053* (2013.01);

33 Claims, 23 Drawing Sheets



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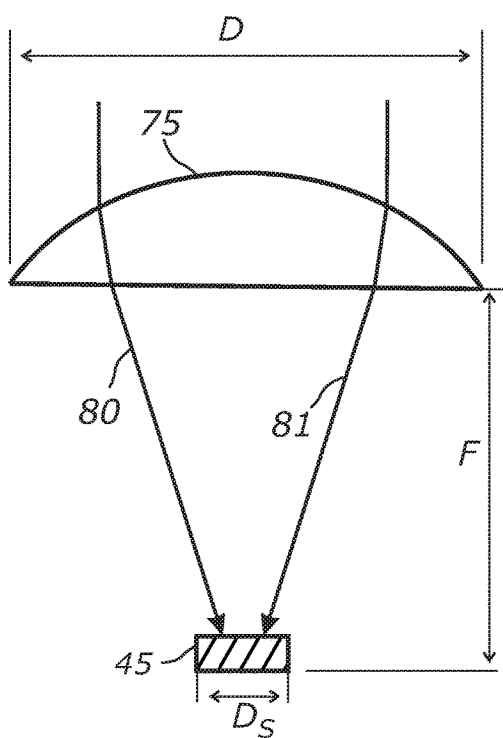


FIG. 1A
(PRIOR ART)

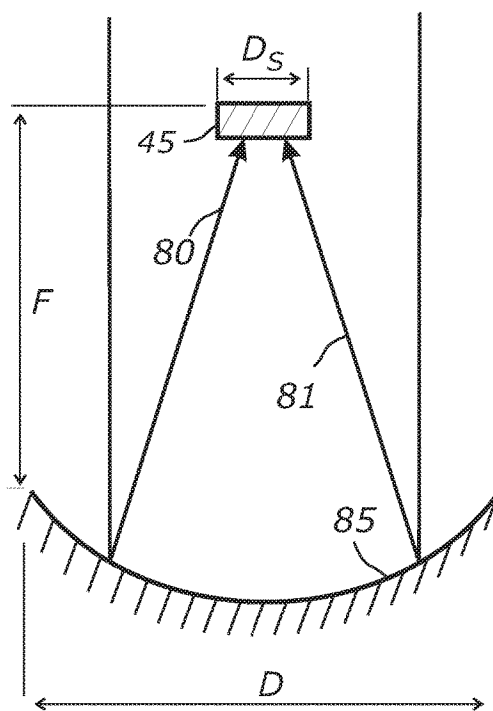


FIG. 1B
(PRIOR ART)

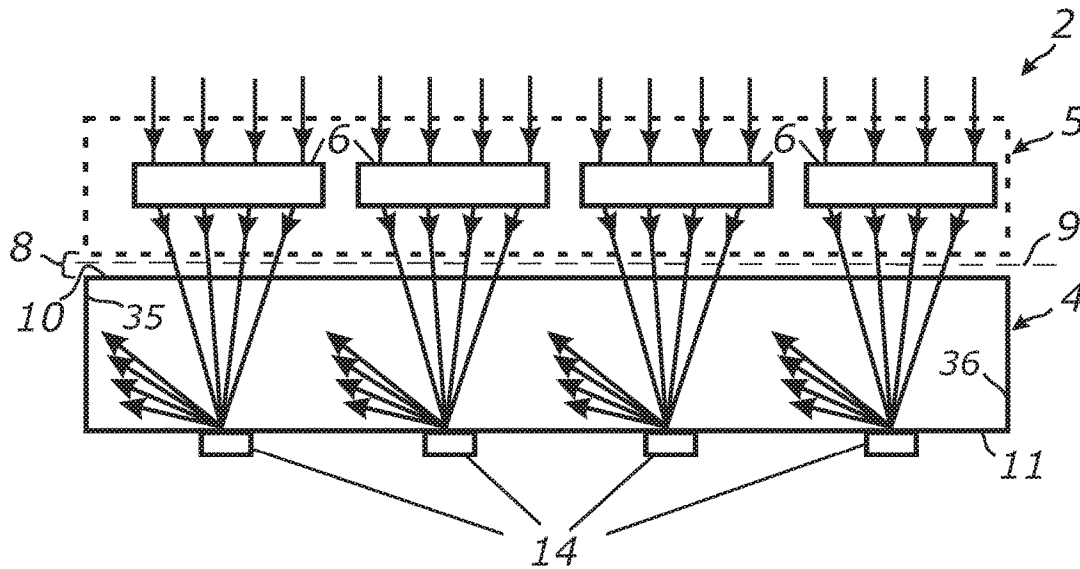


FIG. 2

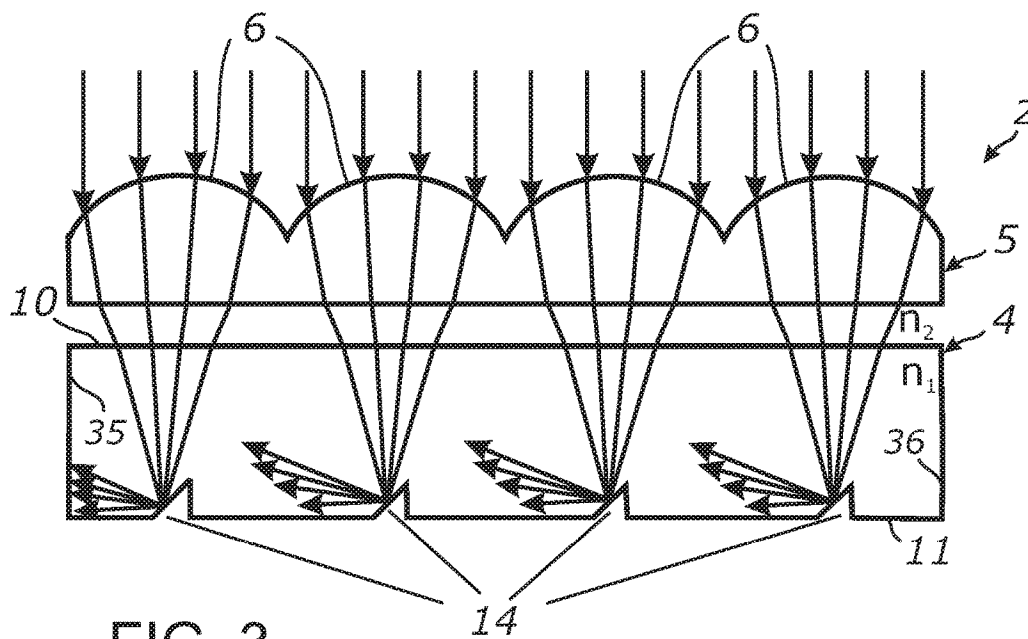
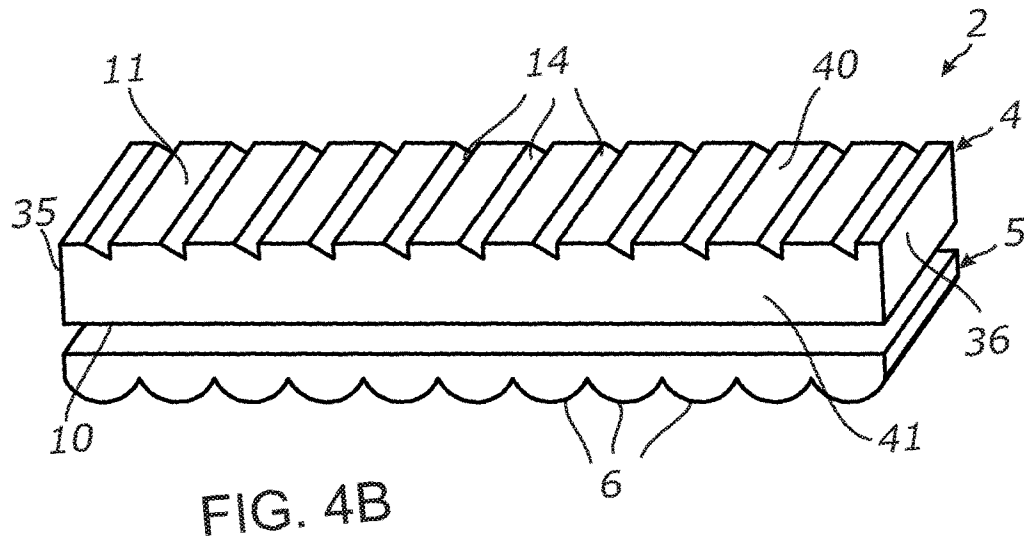
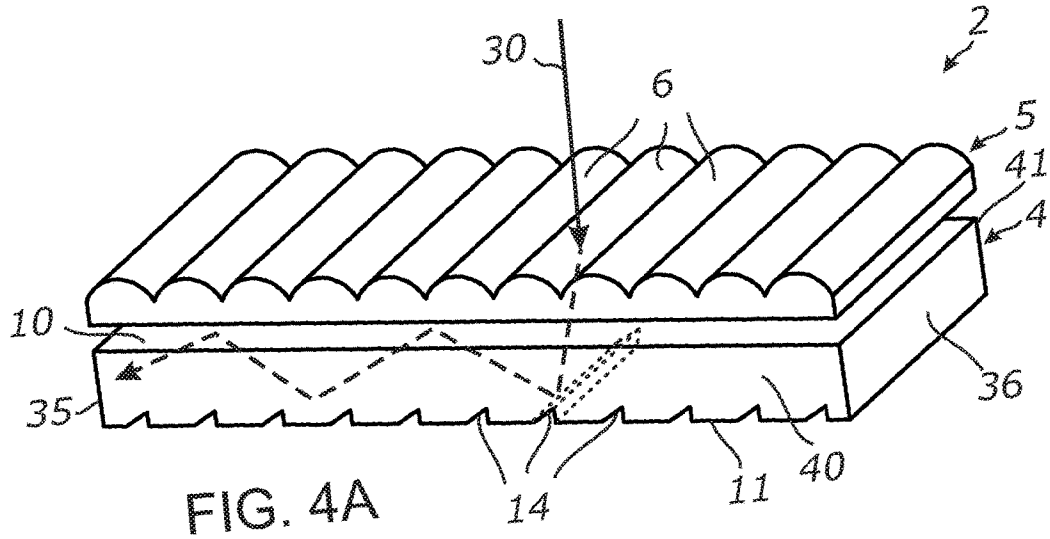


FIG. 3



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