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[Continued on next page]

(54) Title: LED LUMINANCE-AUGMENTATION VIA SPECULAR RETROREFLECTION, INCLUDING COLLIMATORS THAT ESCAPE THE ETENDUE LIMIT

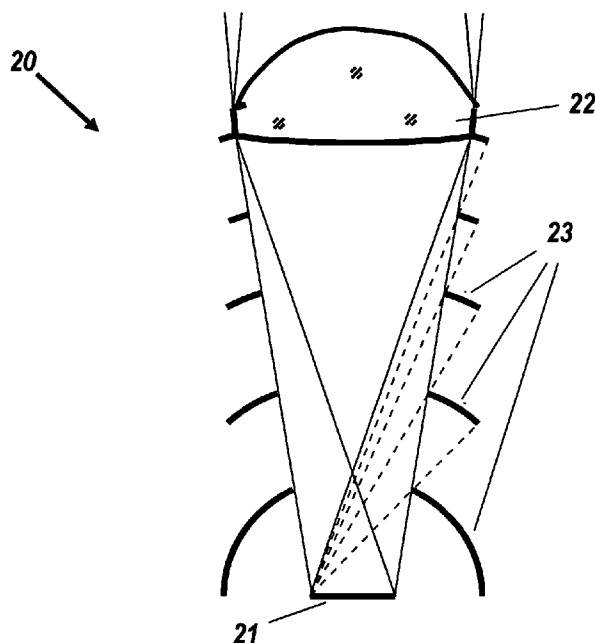


FIG. 9

(57) Abstract: The diffuse reflectivity of an LED source is utilized to recycle some of its emission, thereby enabling a luminaire to escape the etendue limit. Retroreflectors intercept the rays destined for the outer part of the luminaire aperture, which can then be truncated. The resulting smaller aperture has the same beam-width as the full original, albeit with lesser flux due to recycling losses. A reduction to half the original area is possible.

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