

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
31 October 2024 (31.10.2024)



(10) International Publication Number
WO 2024/226963 A1

(51) International Patent Classification:

G02B 27/01 (2006.01) G02B 6/00 (2006.01)
G02B 27/09 (2006.01) G02B 5/18 (2006.01)

(21) International Application Number:

PCT/US2024/026495

(22) International Filing Date:

26 April 2024 (26.04.2024)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

63/462,337 27 April 2023 (27.04.2023) US

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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG,
KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY,
MA, MD, MG, MK, MN, MU, MW, MX, MY, MZ, NA,
NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO,
RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH,
TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS,
ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, CV,

(54) Title: ARCHITECTURE TO ENHANCE IMAGE SHARPNESS OF WAVEGUIDE DISPLAYS

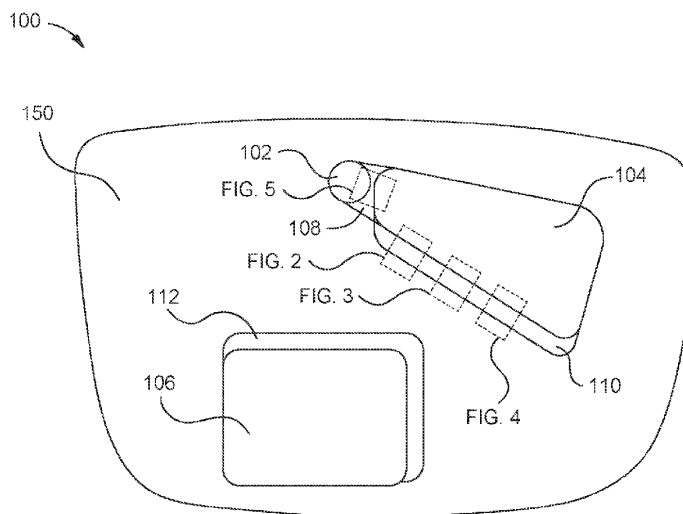


FIG. 1

(57) Abstract: Embodiments described provide for waveguide combiners with phase matching regions. The waveguide includes one or more gratings. The one or more gratings includes grating structures disposed over a waveguide substrate. A phase matching region is disposed over the waveguide substrate between the one or more gratings and a waveguide region. The phase matching region includes a waveguide layer having a thickness varying from a first end to a second end of the waveguide layer, or a plurality of structures having depths therebetween. The one or more of the depths are different from each other, or at least two or more structures of the plurality of structures have a first duty cycle different than a second duty cycle of the plurality of structures.

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GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))