

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
20 March 2025 (20.03.2025)



(10) International Publication Number
WO 2025/059357 A1

(51) International Patent Classification:

G02B 27/01 (2006.01) G02B 27/02 (2006.01)
G02B 27/00 (2006.01) G02B 6/00 (2006.01)

(21) International Application Number:

PCT/US2024/046464

(22) International Filing Date:

12 September 2024 (12.09.2024)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

63/583,148 15 September 2023 (15.09.2023) US

(71) Applicant: **APPLIED MATERIALS, INC.** [US/US];
3050 Bowers Avenue, Santa Clara, California 95054 (US).

(72) Inventors: **LORENZO, Simon**; c/o Applied Materials,
Inc., Law Dept., M/S 1269, 3050 Bowers Avenue, Santa
Clara, California 95054 (US). **WANG, Evan**; c/o Applied
Materials, Inc., Law Dept., M/s 1269, 3050 Bowers Avenue,
Santa Clara, California 95054 (US). **MESSER, Kevin**; c/o
Applied Materials, Inc., Law Dept., MS/1269, 3050 Bowers

Avenue, Santa Clara, California 95054 (US). **BHARGA-
VA, Samarth**; c/o Applied Materials, Inc., Law Dept., M/S
1269, 3050 Bowers Avenue, Santa Clara, California 95054
(US).

(74) Agent: **PATTERSON, B. Todd** et al.; 24 Greenway Plaza,
Suite 1600, Houston, Texas 77046 (US).

(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,
GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST,

(54) Title: DIFFRACTIVE WAVEGUIDE COMBINERS WITH COMPENSATED-WRAP FOR RAINBOW MITIGATION

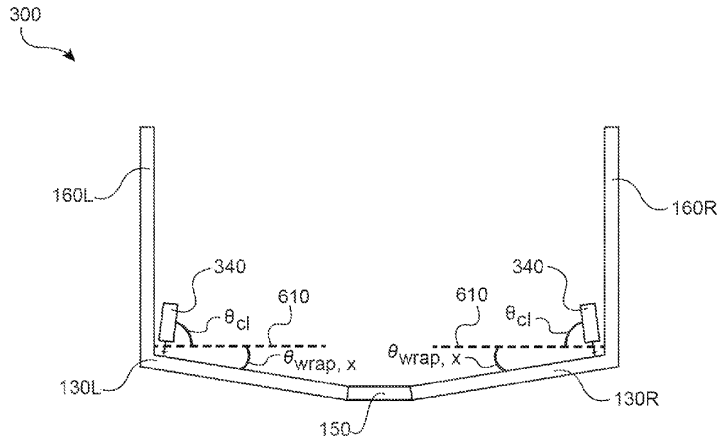


FIG. 6A

(57) Abstract: Embodiments herein are generally directed to a waveguide display assembly and a near-eye display system incorporating the waveguide display assembly. In an embodiment, the waveguide display includes a light engine, a waveguide combiner, an input coupling grating, and one or more coupling gratings exposed to an ambient environment of the waveguide display assembly. The waveguide combiner extends across a user's eye at a wrap angle $\theta_{wrap}(xy)$ relative to a waveguide plane, and the light engine is configured to project light toward the input coupling grating at a compensation angle θ_{ci} so as to increase the grating vector of the exposed gratings and reduce the angles and wavelengths at which light can be diffracted and coupled by the exposed grating into the waveguide combiner to the user's eye.

[Continued on next page]

WO 2025/059357 A1

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))*