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SCULLY SCOTT MURPHY & PRESSER, PC
400 GARDEN CITY PLAZA
SUITE 300
GARDEN CITY, NY 11530

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MICHAEL DAVID SIMMONDS
and MOHMED SALIM VALERA

Appeal 2018-003337
Application 13/265,260
Technology Center 2800

Before THU A. DANG, ELENI MANTIS MERCADER, and
HUNG H. BUI, *Administrative Patent Judges*.

MANTIS MERCADER, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant[1] appeals under 35 U.S.C. § 134(a) from a rejection of claims 1, 3, 5–8, and 12–15. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

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[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as BAE SYSTEMS plc. App. Br. 3.

CLAIMED SUBJECT MATTER

The claimed invention is directed to a display device having an optical waveguide with an input grating of high angular bandwidth and high reflective efficiency. *See* Abstract and Spec. 1.

Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. A display device for displaying an image, the device comprising:

    an optical waveguide arrangement for directing image-bearing light, received from an image source over a range of angles relative to an injection axis, through the optical waveguide arrangement for output to form a viewable image; and

    an input grating for diffracting into the optical waveguide arrangement the received image-bearing light such that all of the diffracted light is totally internally reflected within the optical waveguide arrangement and so that image bearing light output from the optical waveguide arrangement has a field of view corresponding to said range of angles,

    wherein the input grating is a surface relief grating for diffracting light over said range of angles into the optical waveguide arrangement, the input grating having a profiled surface and a layered structure applied thereto comprising a layer of reflective material providing a reflective surface and at least one layer of dielectric material, each of the reflective surface and the at least one layer of dielectric material being conformal in profile with said profiled surface and disposed such that the received image-bearing light interacts with both the at least one layer of dielectric material and the reflective surface, and

    wherein the thickness of the at least one layer of dielectric material with which the light interacts is configured to control the angular bandwidth of the input grating such that the image bearing light that is incident upon the input grating over said range of angles is diffracted into the optical waveguide arrangement.

See App. Br., Claims App'x, 15.

REFERENCES

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Upatnieks	US 4,711,512	Dec. 8, 1987
Shimmo	US 2002/0044359 A1	Apr. 18, 2002

Perry, Michael (NPL: Multilayer Dielectric Gratings: Increasing the Power of Light, Science & Technology Review, p. 25, 1995, available at https://str.llnl.gov/str/pdfs/09 95.2.pdf; hereinafter "Perry").

THE REJECTION

Claims 1, 3, 5–8, and 12–15 stand rejected under 35 U.S.C § 103(a) as being unpatentable over Upatnieks in view of Shimmo and Perry.

OPINION

Claim 1 recites the limitation of

> wherein the thickness of the at least one layer of dielectric material with which the light interacts is configured to control the angular bandwidth of the input grating such that the image bearing light that is incident upon the input grating over said range of angles is diffracted into the optical waveguide arrangement.

See Claim 1. The Examiner quotes Perry to address this limitation by stating that Perry on page 30 states

> [t]he efficiency of a multilayer dielectric grating can be adjusted for any given wavelength and polarization by altering the phase retardation properties of the multilayer stack, the depth and shape of the grating grooves, and the beam's angle of incidence. We adjust these properties during manufacture to control the

> distribution of energy among the reflected, transmitted, and diffracted beams. Diffraction efficiency for specific incident radiation can be adjusted between 0.01% and 98%.

Final Act. 6 (citing Perry, pg. 30). The Examiner explains that Perry links angular distribution with diffraction efficiency of reflective diffraction gratings and points us to Perry quoting "[t]he behavior of a grating is primarily governed by the spacing and the shape of the grooves as well as by the optical properties of the metal." Ans. 4 (citing Perry, pg. 29).

Appellant argues that Perry does not teach or suggest, as alleged by the Examiner, that the thickness of the top dielectric layer can be configured to control the angular bandwidth of the grating. App. Br. 6.

A preponderance of the evidence does not support the Examiner's finding that Perry teaches or suggests that the thickness of the top dielectric layer can be configured to control the angular bandwidth of the grating. As set forth in the section relied on by the Examiner, Perry teaches (1) "the efficiency of a [] dielectric grating can be adjusted for any given wavelength and polarization by altering [] the depth and shape of the grating grooves, and the beam's angle of incidence" and (2) "[a] grating can be designed to have nearly any desired efficiency and bandwidth." Perry p. 30. In other words, Perry teaches that the depth and the shape of the *grating grooves* can change the grating efficiency. However, this cited section of Perry is silent as to adjusting the thickness of any dielectric layer to control the angular bandwidth of the grating.

Furthermore, while one skilled in the art may understand that changing the thickness of any dielectric layer of a diffraction grating may in turn change the angular bandwidth of the grating, the Examiner is still required to articulate a sufficient reason with some rational underpinning to support a conclusion that a person having ordinary skill in the art would have combined Perry with Upanieks and Shimmo in the manner claimed by the Appellant. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)); *In re NuVasive, Inc.*, 842 F.3d 1376, 1383 (Fed. Cir. 2016) ("'[C]onclusory statements' alone are insufficient and, instead, the finding must be supported by a 'reasoned explanation.'" (internal citation omitted)).

Here, the Examiner's conclusion of obviousness appears to have been constructed using hindsight, wherein the Examiner appears to have worked backward to modify Perry to arrive at the claimed invention rather than showing evidence that would have suggested the claimed invention. *See Ex parte Markovitz*, Appeal No. 1999–1942, slip op. at 8–9 (PTAB Sept. 26, 2001). We find that to affirm the Examiner on this record would require us to engage in some degree of speculation. That is, the Examiner has not explained, and we are not willing to speculate, how the depth and the shape of the grating grooves extrapolates to changing the thickness of at least one layer of dieletric material to control the angular bandwidth of the grating as required by claim 1.

Accordingly, we are constrained by the record before us and, thus, we reverse the Examiner's rejection of claim 1 and for the same reasons the rejections of claims 3, 5–8, and 12–15.

DECISION

The Examiner's rejections of claims 1, 3, 5–8, and 12–15 are reversed.

DECISION SUMMARY

Claims Rejected	**Basis**	**Affirmed**	**Reversed**
1, 3, 5–8, and 12–15	§ 103	1, 3, 5–8, and 12–15	

REVERSED