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Paper 9
Entered: August 21, 2014

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FINISAR CORP.,
Petitioner,

v.

THOMAS SWAN & CO. LTD.,
Patent Owner.

Case IPR2014-00460
Patent 7,145,710 B2

Before SALLY C. MEDLEY, MICHELLE R. OSINSKI, and BARBARA A. PARVIS, *Administrative Patent Judges.*

OSINSKI, *Administrative Patent Judge*.

DECISION

Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

A. Background

Finisar Corp. ("Petitioner") filed a corrected Petition (Paper 5, "Pet.") requesting an *inter partes* review of claims 1–14 of U.S. Patent No. 7,145,710 B2 (Ex. 1001, "the '710 patent"). Thomas Swan & Co. Ltd. ("Patent Owner") filed a Preliminary Response (Paper 8, "Prelim. Resp."). We have jurisdiction under 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted "unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a).

Upon consideration of the Petition and Preliminary Response, we determine that there is a reasonable likelihood that Petitioner would prevail with respect to claims 1, 2, 4–9, and 11–14 of the '710 patent, but not claims 3 and 10. Accordingly, we institute an *inter partes* review of claims 1, 2, 4–9, and 11–14 of the '710 patent. We, however, do not institute an *inter partes* review of claims 3 and 10 of the '710 patent.

B. Related Proceedings

The parties represent that the '710 patent is the subject of a district court proceeding in *Thomas Swan & Co. v. Finisar Corp.*, Case No. 2:13-cv-178 (E.D. Tex.). Pet. 4; Patent Owner's Mandatory Notices Under 37 C.F.R. § 42.8, Paper 7, 2.

Petitioner filed additional Petitions for *inter partes* review of three other patents related to the '710 patent, namely U.S. Patent Nos. 7,664,395 B2; 8,089,683 B2; and 8,335,033 B2. Pet. 4–5; Prelim. Resp. 3; *see* IPR2014-00461 (Papers 1, 5); IPR2014-00462 (Papers 1, 5); IPR2014-00465 (Papers 1, 5).

C. The '710 Patent

The '710 patent relates to optical devices, and methods for operating optical devices, that use a spatial light modulator ("SLM") comprising a two-dimensional array of "phase modulating elements" such as pixels to perform wavelength routing and selection. Ex. 1001, 43:37–40, 61:64–64:22. Figure 28 of the '710 patent is reproduced below.

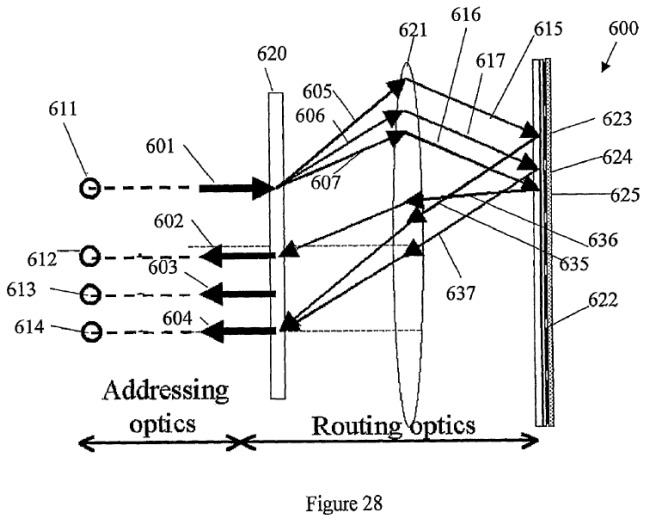

Figure 28

Figure 28 of the '710 patent illustrates wavelength routing and selection device 600.

Figure 28 depicts a schematic diagram of optical device 600 that enables beams of different wavelengths from input beam 601 to be controlled separately before recombination. *Id*. at 10:53–56, 11:22–23. Device 600 has input beam 601 from input port 611 and provides three outputs 602, 603, 604 at output ports 612, 613, 614. *Id*. at 43:37–40. Device 600 has grating 620, which can be transmissive as shown or can be reflective in other embodiments, and splits input beam 601 to provide three single wavelength emergent beams 605, 606, 607. *Id*. at 43:44-52. Lens 621 refracts beams 605, 606, 607 so that they emerge mutually parallel from lens 621 as beams 615, 616, 617. *Id*. at 43:52–53.

The array of pixels of SLM 622 are arranged into multiple groups 623, 624, 625. *Id*. at 11:43-55, 43:55–44:6. Each of beams 615, 616, 617 is incident upon a respective group of pixels 623, 624, 625. *Id*. at 43:53–55. Each group 623, 624, 625 is capable of displaying a respective hologram. *Id*. at 11:43–55, 43:55–44:6. The hologram can provide a linear phase change to the incident beam, also known as a phase ramp, which can steer incident light beams in controllable directions. *Id*. at 13:32–45, 14:24–29. The hologram can also provide a non-linear phase change to the incident beam, which can attenuate or shape the beam. *Id*. at 14:30–58. Holograms can be identified by formulas, corresponding sets of values defining phase changes, or images displayed on SLM 622. *Id*. at 14:44–57, 7:19–24, 16:6–8). Holograms are generated from control data by processing circuitry, and the control data can be stored in look-up tables or compressed formats. *Id*. at 13:15–21. The processing circuitry can apply different selected voltages between respective groups of pixels 623, 624, 625 and a common electrode layer, thereby creating a local electric field passing through a localized portion of a liquid crystal layer and modifying the characteristics of the localized portion of the liquid crystal layer. *Id*. at 12:9–37.

The displayed holograms may perform differently based on (i) the delineation of groups of pixels displaying the holograms or (ii) the content of holograms displayed on those groups of pixels. *Id*. at 17:39–43. The size, shape, or position of the groups of pixels may be changed to improve performance of SLM 622 due to varying environmental conditions, such as varying temperature. *Id*. at 17:44–18:12. The content of the displayed holograms may be adjusted to compensate for environmental conditions by varying control data for the holograms. *Id*. at 18:13–28. Referring back to Figure 28, groups 623, 624, 625 display respective holograms which each provide a different deviation from the

specular direction to provide reflected beams 635, 636, 637. *Id*. at 43:55–58. Beams 635, 636, 637 are incident on lens 621 and routed back to grating 620. *Id.* at 43:58-60. Optical device 600 is thus able to steer and shape light beams incident on its surface using SLM 622. *Id*. at 43:55–44:6. Light beams that are incident on particular groups of pixels are controllable independently of each other. *Id.* at 2:56–67.

D. Illustrative Claim

Claim 1 is illustrative of the claimed subject matter and is reproduced below.

> 1. A method of operating an optical device comprising an SLM having a two-dimensional array of controllable phase-modulating elements, the method comprising
>
> delineating groups of individual phase-modulating elements;
>
> selecting, from stored control data, control data for each group of phase-modulating elements;
>
> generating from the respective selected control data a respective hologram at each group of phase-modulating elements; and
>
> varying the delineation of the groups and/or the selection of control data
>
> whereby upon illumination of said groups by respective light beams, respective emergent light beams from the groups are controllable independently of each other.

E. Prior Art Relied Upon in the Petition

Stephen T. Warr, Free-Space Switching for Optical Fibre Networks (July 1996) (Ph.D. dissertation, University of Cambridge) (on file with Cambridge University Library) ("Warr Thesis," Ex. 1005).

Mathias Johansson et al., Computer-controlled, adaptive beam steering, implemented in a FLC-SLM free-space optical switch (June 18–22, 2000) (OSA

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