

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte BENJAMIN J. EGGLETON, JUSTIN D. GING, ARTURO HALE,
CHARLES KERBAGE

Appeal 2007-3987
Application 10/409,227
Technology Center 2800

Decided: June 3, 2008

Before ROBERT E. NAPPI, CARLA M. KRIVAK, and KARL D.
EASTHOM *Administrative Patent Judges.*

KRIVAK, *Administrative Patent Judge.*

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134 from a final rejection of claims 1-12.¹ We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

¹ Claims 1-16 are pending in the application. However, claims 13-16 have been allowed.

STATEMENT OF CASE

Appellants claimed invention is a microstructured optical waveguide that includes an air channel that includes plugs of optically active material that exhibits a period Λ (Spec. 4:2-11).

Independent claim 1, reproduced below, is representative of the subject matter on appeal.

1. A microstructured optical waveguide comprising
 - a central core region disposed along the length thereof; and
 - an inner cladding layer surrounding said central core region, said inner cladding layer being microstructured to include at least one air channel disposed along the length of said waveguide, wherein said at least one air channel comprises a first plurality of plugs of optically active material disposed along a portion of the length of said waveguide, said first plurality of plugs thereby exhibiting a desired periodicity Λ .

REFERENCES

Miyata	US 5,626,797	May 6, 1997
DiGiovanni	US 5,802,236	Sep. 1, 1998
Chandalia	US 2002/0114574A1	Aug. 22, 2002
Soljacic	US 2003/0031443A1	Feb. 13, 2003
Reynolds	US 6,707,957B1	Mar. 16, 2004 Filed Dec. 18, 2001

The Examiner rejected the claims under 35 U.S.C. § 103(a) as follows:

1. Claims 1-3 and 8-11 as obvious over Soljacic and Miyata;

2. Claims 4-7 under Soljacic, Miyata and Reynolds; and
3. Claim 12 under DiGiovanni, Soljacic, and Chandalia.

Appellants contend that Soljacic and Miyata do not teach an air channel including “a plurality of plugs to exhibit a predefined periodicity along the length of a microstructured fiber” (Br.4; Cl. 1).

ISSUES

Did the Examiner err in rejecting claims 1-3 and 8-11 over Soljacic and Miyata? In addition, did the Examiner err in rejecting claims 4-7 over Soljacic, Miyata, and Reynolds, and claim 12 over Soljacic, Chandalia, and DiGiovanni?

FINDINGS OF FACT

1. Appellants’ disclosure teaches a microstructured optical waveguide that includes a central core region along the length of the waveguide and an inner cladding layer surrounding the core. The inner cladding layer includes at least one air channel. The air channel includes plugs of optically active material. The plugs exhibit a desired periodicity Λ (Cl. 1; Spec. 2:10-17; Spec. 4:2-11).

2. Soljacic teaches high index-contrast fiber waveguides and applications. Soljacic can include inhomogeneous fiber portions referred to as “holey” portions that include one or more hollow regions or holes extending along the waveguide axis. The hollow regions can be filled with gas or a liquid ([0166]). The waveguide can include a cladding layer having a portion of solid glass and a portion of glass with hollow regions ([0166]).

3. Portions, in Soljacic, are defined as the “structural elements of the fiber waveguide that determine the optical properties of the waveguide.” Further, in Bragg fibers, which include photonic crystal fibers, the confinement region includes multiple layers of different compositions that give rise to index variation. “In such cases, each of the layers is considered to be a portion of the waveguide.” (¶[0148])

4. Miyata teaches a non-linear optical material in the form of a film or fiber (col. 1, ll. 12-14) that uses a solid solution of an organic guest compound such as trifluorotoluence (Col. 3, ll. 1-4; Col. 10, ll. 14-23).

5. Reynolds teaches compensating polarization mode dispersion where a series of spaced heating elements are provided along the length of a tapered fibre. The heating elements can be selectively energized to impose localized heating. Compensation can be performed at the receive end and/or the transmit end. This technique can be used to control the grating and birefringence of the fibre (Col. 4, ll. 14-44).

6. Chandalia teaches a tapered microstructured fiber system. The microstructured fiber has a core region, a cladding region, and capillary air holes (Abstract; Fig. 1b; ¶¶[0020]-[0021]).

7. DiGiovanni teaches a non-periodic microstructured optical fiber and a method of making such a microstructured optical fiber.

PRINCIPLES OF LAW

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. *See In re Fine*, 837 F.2d 1071, 1073 (Fed. Cir. 1988). In so doing, the Examiner must make the factual determinations set forth in

Graham v. John Deere Co., 383 U.S. 1, 17 (1966). “[T]he examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a *prima facie* case of unpatentability.” *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). Furthermore, “there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness’ . . . [H]owever, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

If the Examiner’s burden of establishing a *prima facie* case of obviousness is met, the burden then shifts to the Appellants to overcome the *prima facie* case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. See *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

“[D]uring examination proceedings, claims are given their broadest reasonable interpretation consistent with the specification.” *In re Hyatt*, 211 F.3d 1367, 1372 (Fed. Cir. 2000).

ANALYSIS

Claims 1-3 and 8-11

The Examiner finds that Soljacic teaches the features of claims 1-3 and 8-11. With respect to representative independent claim 1, the Examiner states Soljacic teaches that portions of a fiber waveguide can include “holey”

portions that are one or more hollow regions, or holes, extending along the waveguide axis. The hollow regions can be filled with gas or liquid (FF 2; Ans. 9). Thus, the fiber waveguide can include a cladding layer having a portion of solid glass and a portion of glass with hollow regions (¶[0166]; Ans. 4). Further, the Examiner has interpreted Appellants “plugs” as “bubbles formed within the axial air channels of a fiber waveguide, which when selectively filled with an optically active fluid, provides a periodic variation in refractive index along the waveguide axis. Equivalently, the hollow regions or holes along Soljacic’s waveguide axis are also bubbles” (Ans. 10).

Appellants counter that Soljacic discusses the use of “hollow regions” and not a plurality of plugs disposed in at least one air channel along the length of the fiber, the plugs “thereby exhibiting a desired periodicity Λ (emphasis Appellants)” (Br. 4; Cl. 1).

Soljacic teaches a cladding layer can have a portion of solid glass and a portion of glass with hollow regions. The Examiner relies on Fig. 29 to show a core surrounded by a confinement region. The core includes regions such that adjacent regions have different refractive indices (Ans. 9; ¶[0259]). The Examiner then interprets the “plugs” as bubbles formed within the axial channels of a fiber waveguide, and that the hollow regions or holes along Soljacic’s waveguide axis are also bubbles when filled with air or liquid (Ans. 10). We do not agree. A hollow is defined as an unfilled space: cavity, hole.² Thus, the teachings of Soljacic do not include an air channel having plugs of optically active material disposed therein as claimed by

² Merriam-Webster On-Line Dictionary, <http://www.merriam-webster.com/dictionary/hollow>.

Appellants; rather Soljacic teaches a glass portion having hollow regions (holes or voids). There is no “hollow region” within a glass portion in Appellants’ disclosure; rather, the inner cladding layer has at least one air channel in which plugs are disposed.

The Examiner relied on Miyata for teaching the use of trifluorotoluene as a non-linear material. This limitation is found only in claim 9. Miyata does not cure the deficiencies found in Soljacic.

Thus, the Examiner has not provided a *prima facie* case of obviousness with respect to claim 1. It should be noted that claims 2, 3, and 8-11, which depend from claim 1, were not argued separately. Thus, claims 2, 3, and 8-11 are also non-obvious over the collective teachings of the cited prior art

Claims 4-7

The Examiner rejected claims 4-7 as obvious over Soljacic, Miyata, and Reynolds. The Examiner cited Reynolds as disclosing temperature induced index changes and altering modal shape (Ans. 11). Appellants assert that Reynolds does not cure the defects of Soljacic and Miyata. With respect to claim 7, this claim changes the spacing of the plugs (and thus, modifies the periodicity) by applying pressure. The Examiner correctly notes that applying heat to the channels would thus apply pressure (Spec. 7:18-30). However, none of the references teaches applying pressure to alter the spacing of plugs within an air channel, which affects the periodicity. Thus, for this reason and the reasons provided above with respect to claim 1, we find claims 4-7 not obvious over the collective teachings of the cited prior art.

Claim 12

The Examiner rejected claim 12 over DiGiovanni, Soljacic, and Chandalia. Chandalia teaches “air holes” which are longitudinal channels that extend along the length of the microstructured fiber (An. 14). The Examiner has merely stated that he has interpreted the term “air holes” as “plugs” for the reasons set forth with respect to claim 1.

We find that Chandalia does not cure the deficiencies of the other references and thus, for the reasons provided above with respect to claim 1, we find claim 12 also not obvious over the collective teachings of the cited prior art.

CONCLUSION

We therefore conclude that the Examiner erred in rejecting claims 1-12 under 35 U.S.C. § 103(a).

DECISION

The decision of the Examiner rejecting claims 1-12 is reversed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

REVERSED

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