

The opinion in support of the decision being entered today is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* JEFFREY H. HUNT

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Appeal 2007-1843  
Application 10/174,640  
Technology Center 2800

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Decided: August 6, 2007

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Before HAIRSTON, BARRETT, and BARRY, *Administrative Patent Judges*.

HAIRSTON, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134 from the final rejection of claims 1 to 8, 13 to 16, 21 to 27, and 29. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

## STATEMENT OF THE CASE

Appellant has invented a nonlinear system and method for performing surface-sensitive infrared spectroscopic characterizations on a surface to be interrogated. The system and method include at least a first optical source for providing a fixed visible input directed to a location on a surface to be interrogated, and a second optical source for providing a tunable visible input directed to the same location on the surface. The surface locations of optical illumination of the two visible optical inputs overlap on the interrogation location to produce an infrared difference-frequency. This difference-frequency traverses an output wavelength discriminator, signal collection optics prior to conversion to an electrical signal by an optical detector. The output of the optical detector is provided to an electronic signal analyzer that analyzes the electronic signal to thereby provide surface-sensitive infrared spectroscopic characteristics (Figure 1; Specification 3 to 6).

Claim 1 is representative of the claims on appeal, and it reads as follows:

1. A nonlinear optical system for performing surface-sensitive infrared spectroscopic characterizations on a surface to be interrogated, comprising:

a) a first optical source for providing a fixed visible input directable to a location on a surface to be interrogated, wherein said fixed visible input is provided at a first visible frequency;

b) a second optical source for providing a tunable visible input being directable to said surface to be interrogated, wherein:

said tunable visible input is provide at a second visible frequency that is tunable so that the difference-frequency between said first visible frequency and said second visible frequency is at an infrared frequency; and

said fixed visible input and said tunable visible input are alignable so that their surface locations of optical illumination overlap on said interrogated location generating said difference-frequency from said surface overlap location;

c) an output wavelength discriminator for receiving said reflected infrared difference-frequency generated on said interrogated location, said output wavelength discriminator being substantially non-transmissive at frequencies higher than said difference-frequency, but being substantially transmissive at said difference-frequency of said fixed visible input and said tunable visible input, the output of said output wavelength discriminator being an infrared output;

d) signal collection optics for receiving said output of said output wavelength discriminator and directing the propagation of said output of the output wavelength discriminator so that a collected optical light signal is formed after propagation through said signal collection optics; and

e) an optical detector for converting said collected optical light signal to an electronic signal, thus monitoring the intensity of said infrared difference-frequency as a function of the interrogated surface contamination and observing a material resonance for providing surface-sensitive infrared spectroscopic characterizations on the surface to be interrogated.

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

Tang	U.S. 4,639,923	Jan. 27, 1987
Hunt	U.S. 5,623,341	Apr. 22, 1997
Neuberger	U.S. 5,658,148	Aug. 19, 1997

The Examiner rejected claims 1 to 6, 8, 13, 14, 16, 21 to 23, 26, and 27 under 35 U.S.C. § 102(b) based upon the teachings of Hunt. The Examiner rejected claims 7, 15, and 29 under 35 U.S.C. § 103(a) based upon the teachings of Hunt and Tang. The Examiner rejected claims 24 and 25 under 35 U.S.C. § 103(a) based upon the teachings of Hunt and Neuberger.

Appellant contends *inter alia* that Hunt uses a fixed frequency in the visible range and a tunable infrared frequency to generate a difference-frequency in the visible range (Br. 10 to 13).

#### ISSUE

Does Hunt teach a fixed frequency in the visible range and a tunable infrared frequency?

#### FINDINGS OF FACT

In a preferred embodiment, Hunt indicates that “the fixed frequency is in the visible range and the tunable frequency is in the infrared range” (col. 7, ll. 20 to 22; col. 10, ll. 16 to 18).

Tang was cited by the Examiner for a teaching that “an optical parametric oscillator and amplifier have a tunable output from the ultraviolet to the near infrared (*e.g.*, 6 mW at 1220nm; column 7, lines 35-40)” (Answer 7).

Neuberger was cited by the Examiner for a teaching “(column 2, lines 30-32) that diode lasers are either pulsed or continuous wave” (Answer 7).

#### PRINCIPLE OF LAW

Anticipation is established when a single prior art reference discloses expressly or under the principles of inherency each and every limitation of the claimed invention. *Atlas Powder Co. v. IRECO Inc.*, 190 F.3d 1342, 1347, 51 USPQ2d 1943, 1946 (Fed. Cir. 1999); *In re Paulsen*, 30 F.3d 1475, 1478-79, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994).

#### ANALYSIS

As indicated *supra*, Hunt uses a fixed visible input and a tunable frequency input in the infrared range; whereas, the claims on appeal use a fixed visible input and a tunable frequency input in the visible range.

#### CONCLUSION OF LAW

Anticipation has not been established by the Examiner<sup>1</sup> for claims 1 to 6, 8, 13, 14, 16, 21 to 23, 26, and 27. Obviousness has not been established for claims 7, 15, 24, 25, and 29 because the rationale presented by the Examiner does not demonstrate that the claims would have been obvious based on the teachings of the applied references.

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<sup>1</sup> The Examiner recognizes that other embodiments in Hunt may use different combinations of input frequencies (col. 1, ll. 46 to 48), and that “there are no restrictions on the signal frequencies” (col. 3, ll. 49 and 50). Although such teachings may be used in an obviousness rationale, they do not, however, support an anticipation rejection.

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DECISION

The anticipation rejection of claims 1 to 6, 8, 13, 14, 16, 21 to 23, 26, and 27 is reversed.

The obviousness rejection of claims 7, 15, 24, 25, and 29 is reversed.

REVERSED

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