Paper No. 23

UNITED STATES PATENT AND TRADEMARK OFFICE

_____

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

_____

Ex parte LIN LI, WILLIAM M. STEEN and PETER J. MODERN

_____

Appeal No. 1999-1190
Application 08/481,367

_____

HEARD: DECEMBER 11, 2001

_____

Before OWENS, PAWLIKOWSKI and POTEATE, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal is from the final rejection of claims 1, 2, 4, 5, 8, 9, 11 and 12, and refusal to allow claims 7 and 10 as amended after final rejection. These are all of the claims remaining in the application.

THE INVENTION

The appellants' claimed invention is directed toward a method for removing embedded contamination from a metallic surface by directing a laser beam onto the surface such that laser-generated melt pool liquid is directly ejected from the surface. Claim 12 is illustrative:

12. A method for the removal of embedded contamination from a metallic surface, the method comprising directing a laser beam on to [sic, onto] the surface, the laser beam having sufficient power density to melt at least a portion of said surface and to cause direct ejection of laser-generated melt pool liquid from the metallic surface by laser-generated vapor pressure in the melt pool liquid, thereby removing a portion of said metallic surface layer containing the embedded contamination.

THE REFERENCES

Wu et al. (Wu)	4,898,650	Feb. 6, 1990
Boquillon et al. (Boquillon)	5,151,134	Sep. 29, 1992
Wojcik et al. (EPA '646) (European patent application)	0 091 646	Oct. 19, 1983
Hiromi (JP '200)[1] (Japanese patent application)	4-109200	Apr. 10, 1992

THE REJECTIONS

[1] Our consideration of JP '200 is based upon the English translation thereof which is of record.

The claims stand rejected as follows: claims 7 and 10 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the appellants regard as the invention, and claims 1, 2, 4, 5 and 7-12 under 35 U.S.C. § 103 as being unpatentable over JP '200 and also over Wu or Boquillon, each of these two in view of EPA '646.[2]

OPINION

We vacate the rejection under 35 U.S.C. § 112, second paragraph, and reverse the rejections under 35 U.S.C. § 103.

Rejection under 35 U.S.C. § 112, second paragraph

The examiner argues that "a solid state type laser" in claim 7 is vague and indefinite and that "the collection means" in claim 10 has inadequate antecedent basis (answer, page 4). In response to the rejection under 35 U.S.C. § 112, second paragraph, which was a new ground of rejection in the examiner's answer, the appellants submitted with their reply brief an amendment (filed August 6, 1997, paper no. 16)

[2] A rejection under 35 U.S.C. § 103 over U.S. 5,151,135 to Magee et al. in view of EPA '646 is withdrawn in the examiner's answer (page 3).

wherein "type" was deleted from claim 7 and, in claim 10, "the collection means" was changed to "the means provided for the collection of laser ejected material". The examiner stated that the reply brief has been entered and considered (response filed November 13, 1997, paper no. 19), but the examiner did not mention the amendment. The examiner, however, penciled "OK to enter" into the margin of the amendment, together with her initials and the date, and the amendment has been entered. Accordingly, we vacate the rejection under 35 U.S.C. § 112, second paragraph.

Rejection over JP '200

Each of the appellants' independent claims recites that a laser beam directed onto a metallic surface has sufficient power density to melt at least a portion of the metallic surface and to cause direct ejection of laser-generated melt pool liquid from that surface.

JP '200 discloses a method for decontaminating a metallic surface by directing a laser beam onto the surface, and teaches that "[a] portion of the clad layer 19 which has melted vaporizes and scatters, and the remaining portion is blown off by the high-speed gas stream from the gas jet pipe

13" (page 8). JP '200 does not disclose the power density of the laser beam.

The examiner argues that the JP '200 method must be using the appellants' power density because in the JP '200 method, the examiner argues, "the laser beam is melting and scattering or 'ejecting' the melted portion of the clad layer" (answer, page 7). The actual disclosure relied upon by the examiner in this argument is that quoted in the preceding paragraph.

The examiner apparently considers each of "vaporizes" and "scatters" in the relied-upon portion of JP '200 to refer to different material, some of the melted material vaporizing and some of it scattering, the scattered portion corresponding to the appellants' directly ejected melt pool liquid. In our view, the proper interpretation of "[a] portion ... vaporizes and scatters" is that the portion both vaporizes and scatters, i.e., the vaporized material scatters and the non-vaporized material is blown off by the high-speed gas stream. We do not find in the reference a suggestion to scatter, without use of the gas stream, material which has not vaporized, i.e., to directly eject laser-generated melt pool liquid from the surface as required by the appellants' claims.

Consequently, we conclude that the examiner has not carried the burden of establishing a *prima facie* case of obviousness of the invention recited in any of the appellants' claims over JP '200.

Rejection over Wu in view of EPA '646

Wu discloses a method for cleaning a metal surface with a laser beam to improve the contact properties of the surface, wherein the power density of the laser is controlled to vaporize surface contaminants and embedded foreign materials without significantly altering the properties of the metal (abstract; col. 2, lines 64-66; col. 3, lines 6-11).

The examiner relies (office action mailed on March 11, 1996, paper no. 5, page 5) upon EPA '646 only for a teaching of suctioning away radioactive waste which has been removed from a surface by a laser (page 8, lines 16-22).

The examiner argues that Wu's teaching that the properties of the metal are not significantly altered by the laser indicates that there is minimal alteration, and that such minimal alteration is all that the appellants' claims require (answer, page 6). The examiner, however, has not

established that Wu's phrase "without significantly altering the properties of the metal" means that there is alteration to some extent of either all of the metal properties in general or the phase of the metal in particular.

The examiner argues that the pulse duration of at least 1 millisecond in the appellants' claim 1 is a result effective variable (answer, page 6). Wu, however, teaches that the pulse duration must be less than about 100 nanoseconds (col. 4, lines 35-40). The examiner does not explain how a teaching that the pulse duration must be less than 100 nanoseconds would have led one of ordinary skill in the art to use a pulse duration which is greater than that by a factor of at least 10,000.

The examiner argues that the appellants' recited direct ejection of laser-generated melt pool liquid appears to be more a function of power density than pulse duration (answer, page 6), but the examiner has not established that Wu's laser power density is comparable to that of the appellants. The examiner argues that Wu uses sufficient power density to remove contaminants from the surface, *see id*, but has not established that this power density is sufficient to cause

direct ejection of laser-generated melt pool liquid from the surface.

For the above reasons we conclude that the examiner has not carried the burden of establishing a *prima facie* case of obviousness of the invention recited in any of the appellants' claims over Wu in view of EPA '646.

Rejection under 35 U.S.C. § 103 over Boquillon in view of EPA '646

Boquillon discloses a method for cleaning pollutants from a surface by applying to the surface laser pulses having a duration between some nanoseconds and some microseconds and a peak power density between some tenths of megawatts/cm^2 and some tens of megawatts/cm^2 (abstract; col. 3, lines 1-6). The wavelength of the radiation emitted by the laser is within the spectrum of absorption of the polluting material, and the spectrum of absorption of the polluting material is different from that of the subjacent material to a sufficient extent that the risk of altering the subjacent material is virtually nonexistent (col. 3, lines 7-18 and 22-44).

The examiner argues that Boquillon's power density and pulse duration ranges encompass the appellants' 6 MW/cm^2 power

density and at least 1 millisecond pulse duration and that Boquillon, therefore, meets the appellants' claimed method (answer, page 7). Wu's "some microseconds", however, appears to be at least a couple orders of magnitude less than the "at least one millisecond" recited in the appellants' claim 1. Also, as mentioned above, Boquillon teaches that the wavelength of the radiation emitted by the laser is such that the risk of altering the subjacent material is virtually nonexistent, and Boquillon further teaches that the surface is cleaned in the absence of an observably thermal effect (abstract). These disclosures indicate that the surface is not melted, and the examiner provides no convincing argument to the contrary.

For the above reasons we conclude that the examiner has not established a *prima facie* case of obviousness of the invention recited in any of the appellants' claims over Boquillon in view of EPA '646.[3]

DECISION

[3] The examiner relies upon EPA '646 only for the disclosure set forth above regarding the rejection over Wu in view of EPA '646.

The rejections of claims 1, 2, 4, 5 and 7-12 under 35 U.S.C. § 103 over JP ‘200 and also over Wu or Boquillon, each of these two in view of EPA ‘646, are reversed, and the rejection of claims 7 and 10 under 35 U.S.C. § 112, second paragraph, is vacated.

REVERSED

TERRY J. OWENS Administrative Patent Judge	)	
BEVERLY A. PAWLIKOWSKI Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
LINDA R. POTEATE Administrative Patent Judge	)	

Nixon and Vanderhye
8th Floor
1100 North Glebe Road
Arlington, VA 22201-4714

tjo/ki