

The opinion in support of the decision being entered today was **not** written for publication and is **not** binding precedent of the Board.

Paper No. 12

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SEETHARAMAIAH MANNAVA and WILLIAM D. COWIE

Appeal No. 2000-0178
Application 08/686,630

ON BRIEF

Before COHEN, FRANKFORT, and McQUADE, Administrative Patent Judges.

FRANKFORT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1 through 20, which are all of the claims pending in this application.

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Appellants' invention is directed to an article comprising an intermetallic body, at least one laser shock peened surface on at least a portion of the intermetallic body, and a region having compressive residual stresses imparted by the laser shock peening extending into the intermetallic body from said laser shock peened surface (claims 1 through 10) and to a method for shock peening an intermetallic article like that in claims 1 through 10 (claims 11 through 20). Independent claims 1 and 11 are representative of the subject matter on appeal and a copy of those claims may be found in the Appendix to appellants' brief.

The prior art references relied upon by the examiner in rejecting the appealed claims are:

Neal et al. (Neal)	4,426,867	Jan. 24, 1984
Nazmy et al. (Nazmy)	5,299,353	Apr. 5, 1994
Baumann et al. (Baumann)	5,415,831	May 16, 1995
Mannava et al. (Mannava ('329))	5,674,329	Oct. 7, 1997 (filed Apr. 26, 1996)
Mannava (Mannava ('965))	5,756,965	May 26, 1998 (effectively filed Dec. 22, 1994)

Vaccari, John A., "Laser Shocking Extends Fatigue Life", American Machinist, July 1992, pp. 62-64. (American Machinist article)

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In addition to the foregoing, this merits panel of the Board has relied upon the following prior art reference in a new ground of rejection entered under 37 CFR § 1.196(b):

Epstein et al. (Epstein '957)¹ 5,131,957 Jul. 21, 1992

Claims 1, 2 and 11 through 13 stand rejected under 35 U.S.C. § 103 as being unpatentable over Nazmy in view of the American Machinist article.

Claims 3 and 5 stand rejected under 35 U.S.C. § 103 as being unpatentable over Nazmy in view of the American Machinist article as applied to claim 2 above, and further in view of Neal.

Claim 14 stands rejected under 35 U.S.C. § 103 as being unpatentable over Nazmy in view of the American Machinist article as applied to claim 11 above, and further in view of Mannava ('329).

¹This Epstein patent was cited by appellants in their Information Disclosure Statement filed July 24, 1996.

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Claims 3 through 10, 15, 16, 18 and 19 stand rejected under 35 U.S.C. § 103 as being unpatentable over Nazmy in view of the American Machinist article as applied to claims 1, 2 and 11 through 13 above, and further in view of Mannava ('965).

Claim 17 stands rejected under 35 U.S.C. § 103 as being unpatentable over Nazmy in view of the American Machinist article and Mannava ('965) as applied to claim 15 above, and further in view of Mannava ('329).

Claim 20 stands rejected under 35 U.S.C. § 103 as being unpatentable over Nazmy in view of the American Machinist article and Mannava ('965) as applied to claim 18 above, and further in view of Baumann.

Rather than attempt to reiterate the examiner's full commentary with regard to the above-noted rejections and the conflicting viewpoints advanced by the examiner and appellants regarding the rejections, we make reference to the examiner's answer (Paper No. 9, mailed May 11, 1999) for the reasoning in

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support of the rejections, and to appellants' brief (Paper No. 8, filed March 1, 1999) and reply brief (Paper No. 10, filed July 12, 1999) for the arguments thereagainst.

OPINION

In reaching our decision in this appeal, we have given careful consideration to appellants' specification and claims, to the applied prior art references, and to the respective positions articulated by appellants and the examiner. As a consequence of our review, we have made the determinations which follow.

Looking first at the examiner's rejection of claims 1, 2 and 11 through 13 under 35 U.S.C. § 103 as being unpatentable over Nazmy in view of the American Machinist article, we note that on page 3 of the answer the examiner has urged that Nazmy discloses a turbine blade made of gamma titanium aluminide (an intermetallic material), which material has properties that make it suitable and beneficial for use in the manufacture of turbine blades that may be subjected to high operating temperatures. We, however, observe that Nazmy does not mention laser shock peening of the blades therein as required in each of the claims on appeal

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and further that this reference instead describes "an annealed, hot-isostatically pressed, hot-formed and heat-treated casting, from which the turbine blade according to the invention is produced by material-removing machining" (col. 1, line 67-col. 2, line 2).

To account for the above difference between appellants' claimed subject matter and Nazmy, the examiner has urged that the American Machinist article teaches using a laser shock peening method of hardening a metal by imparting residual compressive stresses in order to provide superior fatigue life to a metal part and specifically suggests the application of that method to parts formed of titanium or titanium alloys. From these teachings, the examiner concludes that it would have been obvious to one of ordinary skill in the art of metal material surface finishing at the time of appellants' invention

to use the laser shock peening method of hardening the turbine blade of the Nazmy patent for the purpose of hardening the blade and thus increasing its fatigue life. In treating the blade with the laser shock peening, it is assumed that the entire blade surface is treated. Thus, the treated surface would include the leading edge and extending chordwise therefrom. The laser shock peening treatment inherently produces the region of compressive residual stresses on the treated surface (answer, page 4).

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Appellants assert in both their brief and reply brief that because Nazmy (col. 1, lines 26-30) and their own specification (pages 2-4) warn about the low ductility and thus brittleness of intermetallic materials, one skilled in the art at the time of their invention would not have processed an intermetallic material with a peening process (e.g., either shot peening or laser shock peening), because the brittle intermetallic material would have been viewed as being subject to breaking, shattering or other damage as a result of such processing. Accordingly, appellants argue that, absent hindsight provided by their own disclosure, one skilled in the art would not have combined the applied references as done by the examiner because the prior art clearly teaches away from any such combination.

Appellants further contend that none of the applied references even hint at laser shock peened articles made of intermetallic materials and that the examiner has implied and inferred results which are directly opposed to what is taught by the prior art when taken as a whole. In this regard, appellants (reply brief, page 3) attack the examiner's position that it would have been obvious to one of ordinary skill in the art to

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laser shock peen the entire blade surface of the blade in Nazmy following the teachings of the American Machinist article, by urging that the teachings at page 64 of the American Machinist article make it clear that the process disclosed in that reference is limited and "not yet practical for treating large surface areas." Therefore, appellants assert (brief, page 15) that the examiner has utilized appellants' own disclosure in the present application as a blueprint for piecing together unrelated references without citing any legitimate suggestion or motivation for their combination and thereby engaged in an improper hindsight reconstruction to obtain the result claimed by appellants.

Having carefully reviewed the collective teachings of Nazmy and the American Machinist article, we find ourselves in agreement with appellants' view that there is no motivation, teaching or suggestion in the applied references for the examiner's proposed combination thereof in such a manner as to result in appellants' claimed subject matter. Without any teaching or suggestion in the applied references at all relating to laser shock peening, or even shot peening, of intermetallic materials, it is our opinion that the examiner has used

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impermissible hindsight derived from appellants' own teachings to combine Nazmy and the American Machinist article. Like appellants, we consider that the teachings of the references relied upon by the examiner when considered as a whole would have led one of ordinary skill in the art away from attempting any modification of the coarse-grained, low ductility blade portion (1) in Nazmy by a laser shock peening process like that disclosed in the American Machinist article, particularly since the American Machinist article itself indicates that the laser shock peening process therein is "not yet practical for treating large surface areas" (page 64).

As for the examiner's attempt to justify combination of the applied references on the basis that one skilled in the art would have considered the intermetallic material of Nazmy (i.e., gamma titanium aluminide) to be a titanium alloy like that treated by the laser peening process of the American Machinist article, our review of the record of this application indicates that those skilled in this art would have in fact recognized several significant property differences between a titanium metal alloy and an intermetallic material based on titanium. More specifically, while an intermetallic material may technically be

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a metallic compound it would have been recognized by those skilled in the art as a unique class of metallic materials that form long-range ordered crystal structures distinct from the structure of other metals and metal alloys and which thus have characteristics (particularly at room temperature) that make the intermetallic materials more akin to being classified as ceramics than as metals. Thus, it is our opinion that the mere disclosure in the American Machinist article of metal parts formed of titanium and titanium alloys is not alone sufficient to justify the examiner's proposed combination of Nazmy and the American Machinist article.

Since we have determined that the teachings and suggestions found in Nazmy and the American Machinist article would not have made the subject matter of claims 1, 2 and 11 through 13 on appeal obvious to one of ordinary skill in the art at the time of appellants' invention, we must refuse to sustain the examiner's rejection of those claims under 35 U.S.C. § 103.

As for the examiner's additional rejections of claims 3 through 10 and 14 through 20 under 35 U.S.C. § 103, we have reviewed the patents to Neal and Baumann, and Mannava ('329) and

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Mannava ('965), but find nothing therein that provides for that which we have indicated above to be lacking in the examiner's basic combination of Nazmy and the American Machinist article, the combination that forms the foundation upon which all of the examiner's additional rejections are based. Accordingly, the examiner's further rejections of claims 3 through 10 and 14 through 20 under 35 U.S.C. § 103 will likewise not be sustained.

In light of the foregoing, the decision of the examiner to reject claims 1 through 20 of the present application under 35 U.S.C. § 103 is reversed.

Pursuant to our authority under 37 CFR § 1.196(b), we enter the following new ground of rejection.

Claims 1, 11 through 13, 15 and 16 are rejected under 35 U.S.C. § 102(b) as being anticipated by Epstein ('957). Epstein ('957) discloses a method and apparatus for improving properties (e.g., fatigue life) of a solid material target (11) by subjecting a surface portion of the target to laser shock processing which produces an area of residual compressive stresses extending into the target body from the laser shock

processed surface thereof (col. 4, lines 3-10). While the patentee mentions in column 15, lines 13-15, that such processing can be useful with non-metals such as ceramics and polymers as well as with metals, we observe that in column 13, lines 45-50, it is specifically indicated that the target (11) "typically comprises at least one metal, alloy, intermetallic compound, or other metallic material" (emphasis added). The laser processing disclosed in Epstein ('957) appears to be identical to that broadly set forth in appellants' claims 11 through 13, 15 and 16 on appeal. See particularly, columns 16 and 17 of Epstein ('957), wherein the target surface to be processed (e.g., an intermetallic target) is coated with an ablative layer (26) of, for example, paint and then provided with a confining medium in the form of flowing water forming a flowing fluid curtain over the coated surface, and then subjected to the firing of a laser beam on the coated surface with sufficient power to vaporize the ablative layer and form a region in the intermetallic body having compressive residual stresses imparted by the laser beam pulsing such that the region extends into the intermetallic body from the laser shock processed surface. The use of multiple laser pulses to achieve a given level of residual stresses and the use of overlapping pulses to permit treatment of larger surface areas is

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discussed in Epstein ('957), columns 18 and 19. In our view, an article resulting from applying the teachings of Epstein ('957) to an intermetallic material target as suggested therein would be identical to that set forth in appellants' claim 1 on appeal.

In addition, we REMAND this application to the examiner to consider the collective teachings of Baumann (5,415,831) and Singheiser (5,393,356) which disclose higher ductility intermetallic materials that are suitable for use as gas turbine blades, along with the teachings of Epstein (5,131,957) and the other prior art relied upon by the examiner in the final rejection and any other prior art developed by the examiner, with an eye toward evaluating the patentability of claims 2 through 10, 14 and 17 through 20 of this application under 35 U.S.C. § 103.

This decision contains a new ground of rejection pursuant to 37 CFR § 1.196(b). 37 CFR § 1.196(b) provides that, "A new ground of rejection shall not be considered final for purposes of judicial review."

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37 CFR § 1.196(b) also provides that the appellants, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of proceedings (§ 1.197(c)) as to the rejected claims:

(1) Submit an appropriate amendment of the claims so rejected or a showing of facts relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the application will be remanded to the examiner. . . .

(2) Request that the application be reheard under § 1.197(b) by the Board of Patent Appeals and Interferences upon the same record. . . .

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

REVERSED, 37 CFR § 1.196(b) and REMANDED

IRWIN CHARLES COHEN)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
CHARLES E. FRANKFORT)	
Administrative Patent Judge)	APPEALS AND
)	
)	INTERFERENCES
)	
JOHN P. McQUADE)	
Administrative Patent Judge)	

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Andrew C. Hess
General Electric Company
One Neumann Way H 17
Cincinnati, OH 45215-6301