UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JOHN F. ACKERMAN,
VENKAT S. VENKATARAMANI,
IRENE T. SPITSBERG, BRETT A.R. BOUTWELL
and RAMGOPAL DAROLIA

Appeal No. 2006-2027
Application No. 10/735,370

DECIDED: AUGUST 24, 2006

Before KIMLIN, PAK, and GAUDETTE, Administrative Patent Judges.

KIMLIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1-7, 9-11, and 13-17. Claim 1 is illustrative:

1. A method for preparing a protected article, comprising the steps of providing the article;

depositing a bond coat onto an exposed surface of the article; and

producing a thermal barrier coating on an exposed surface of the bond coat, wherein the step of producing the thermal barrier coating includes the steps of

depositing a primary ceramic coating onto the exposed surface of the bond coat,

depositing a cerium-precursor compound onto an exposed surface of the primary ceramic coating, and

heating the cerium-oxide-precursor compound in an oxygen-containing atmosphere to form cerium oxide adjacent to the exposed surface of the primary ceramic coating.

The examiner relies upon the following references in the rejections of the appealed claims:

Taylor et al. (Taylor)	5,520,516	May 28, 1996
Ueda et al. (Ueda)	5,697,992	Dec. 16, 1997
Stoffer et al. (Stoffer)	5,932,083	Aug. 3, 1999
Subramanian	US 6,296,945	Oct. 2, 2001

Appellants' claimed invention is directed to a method of protecting an article, such as a component of a gas turbine engine, that is subjected to high temperatures. The method entails forming a thermal barrier coating on the article by depositing a primary ceramic coating, depositing a cerium-oxide-precursor compound onto the primary ceramic coating, and heating the cerium-oxide-precursor compound in an oxygen atmosphere to form cerium-oxide where cerium is in the +4 oxidation state.

Appealed claims 13-17 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Subramanian in view of Stoffer.[1] Claims 13-17 also stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Subramanian in view of Stoffer. Claims

[1] This rejection subsumes the rejection of claims 13-17 under § 102 over Subramanian alone.

1-7, 9 and 11 stand rejected under 35 U.S.C. § 103 as being unpatentable over Subramanian in view of Stoffer and Ueda.[2] Also, claim 10 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Subramanian in view of Stoffer, Ueda and Taylor.[3]

Appellants do not separately argue any of the claims that are grouped in the examiner's separate rejections. Accordingly, claims 13-17 stand or fall together, as do claims 1-7, 9 and 11.

We consider first the examiner's rejection of claims 13-17 under 35 U.S.C. § 102 over Subramanian in view of Stoffer. We agree with the examiner that Subramanian, like appellants, discloses a method for protecting an article from high temperatures by providing a bond coat on the surface of the article, forming a thermal barrier coating on the bond coat, wherein the thermal barrier coating is formed by first depositing a primary ceramic coating, and then applying a sintering inhibiting material to the surface of the primary coating. The examiner also correctly finds that the sintering inhibiting region can comprise appellants' cerium-oxide. Subramanian describes a sintering inhibiting material as a

[2] This rejection subsumes the examiner's rejection of claims 1-7, 9 and 11 under § 103 over Subramanian in view of Ueda.

[3] This rejection subsumes the examiner's rejection of claim 10 under § 103 over Subramanian in view of Ueda and Taylor.

ceramic oxide precursor of the formula Z_zO_w, wherein alumina (Al_2O_3) is the preferred precursor sheath material, but C_zO_w can also be an oxide of calcium, magnesium, zirconium, yttrium, and rate earth elements, such as cerium (see column 5, lines 34 et. seq.). Consequently, while we agree with the examiner that Subramanian teaches a sintering-inhibiting region that may comprise cerium-oxide, we do not find that the reference sufficiently describes cerium-oxide wherein cerium is in the +4 oxidation state within the meaning of 35 U.S.C. § 102. Manifestly, a fair amount of picking and choosing from within the reference disclosure is necessary to arrive at the claimed cerium-oxide.

However, we fully concur with the examiner that one of ordinary skill in the art would have found it obvious to select cerium-oxide with cerium in the oxidation state of +4, i.e., CeO_2, as a precursor sheath oxide material in the invention of Subramanian. We agree with the examiner that inasmuch as Subramanian teaches the use of a stable oxide for the precursor sheath oxide, and Stoffer teaches that "[c]erium possesses highly stable oxides, CeO_2 or Ce_2O_3, in the oxidation states of 3 and 4" (column 2, lines 50-51), we are satisfied that one of ordinary skill in the art would have selected cerium-oxide with

cerium in the oxidation state of +4 for the stable oxide of Subramanian.

Appellants cite Subramanian at column 2, lines 25-40 where cerium is not mentioned as a possible material for C in the formula C_zO_w. Relying solely upon this section of the reference, appellants make the argument that "it is apparent that component C cannot possibly be Ce, and Subramanian's C_zO_w cannot possibly be Ce_zO_w, as argued at many locations in the Examiner's Answer" (page 3 of the reply brief, last paragraph). However, the relevant teaching of Subramanian is at column 5, lines 34 et. seq.

We now turn to the rejection of claims 1-7, 9 and 11 under 35 U.S.C. § 103 over Subramanian in view of Stoffer and Ueda. We will not sustain this rejection. Appellants correctly argue that Subramanian does not teach depositing a cerium-oxide-precursor compound onto the primary ceramic coating wherein the cerium-oxide-precursor compound is not cerium-oxide with cerium in a +4 oxidation state, and then heating the cerium-oxide-precursor compound to form cerium-oxide with cerium in the +4 oxidation state. While the examiner states that Subramanian teaches that "a cerium-oxide compound can be applied to the surface of the primary cerium coating" (page 14 of answer,

second paragraph), the examiner also maintains that the reference teaches that the cerium-oxide compound is a stable one and, therefore, CeO_2, i.e., cerium-oxide with cerium in the +4 oxidation state. Clearly, if the cerium-oxide applied to the primary ceramic coating of Subramanian is the stable CeO_2, it is not the cerium-oxide-precursor compound of claim 1 wherein cerium is not in the +4 oxidation state. Also, whereas the heating step of claim 1 converts the precursor compound to cerium-oxide with cerium in the +4 oxidation state, the heating step of Subramanian reacts CeO_2 with the thermal barrier coating to produce "an oxide of A and C or an oxide of B and C" (column 5, lines 44-45). The examiner incorrectly states that "[w]hile later reaction of the Ce_zO_w and the primary ceramic is provided, at this point, Ce_zO_w is provided as a coating, which is all that is required by the claim" (page 16 of answer, first paragraph). As a matter of fact, however, claim 1 requires depositing a cerium-oxide-precursor compound and then heating the compound to form cerium-oxide with cerium in the +4 oxidation state. This method is neither taught nor suggested by Subramanian, and this deficiency is not remedied by the disclosure of Ueda. While Ueda teaches forming cerium-oxide by calcining ammonium cerium sulfate, Ueda is directed to an abrasive particle and would not

have suggested modifying Subramanian to perform the claimed steps of heating a deposited cerium-oxide-precursor to cerium-oxide.

The examiner's separate rejections of claim 10 under 35 U.S.C. § 103 suffers the same deficiency discussed above with respect to the § 103 rejection of claims 1-7, 9 and 11. Taylor, cited by the examiner for its teaching of a zirconia coat comprising 7 wt.% yttria, does not cure the deficiency of Subramanian.

In conclusion, based on the foregoing, the examiner's rejection of claims 1-17 under 35 U.S.C. § 102(b) is reversed, whereas the rejection of claims 13-17 under 35 U.S.C. § 103 is affirmed. The examiner's rejections of claims 1-7 and 9-11 under 35 U.S.C. § 103 are also reversed. Accordingly, the examiner's decision rejecting the appealed claims is affirmed-in-part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(iv)(effective Sept. 13, 2004).

AFFIRMED-IN-PART

Edward C. Kimlin Administrative Patent Judge	)	
Chung K. Pak Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
Linda M. Gaudette Administrative Patent Judge	)	

ECK/cam

McNees, Wallace & Nurick, LLC
100 Pine Street
P. O. Box 1166
Harrisburg, PA 17108-1166