UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MATTHEW STEWART,
THOMAS J. TOMLINSON,
DAVID J. DIETZ, and
PATSY AUGUSTINE RUZZO

Appeal 2006-2038
Application 10/422,386
Technology Center 1700

Decided: August 22, 2007

Before THOMAS A. WALTZ, CATHERINE Q. TIMM, and JEFFREY T. SMITH, *Administrative Patent Judges*.

TIMM, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's decision rejecting claims 1-10, 13, 14, and 17-22. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM-IN-PART.

I. BACKGROUND

The invention relates to a thermal spray coating method including steps of nondestructive testing. Based on the testing, conclusions about the nature of bonding between the coating and substrate are made. Claim 1 is illustrative of the subject matter on appeal:

> 1. A method for preparing an article having a thermal-spray coating thereon, comprising the steps of
>
> providing a substrate article having a surface;
>
> forming a coated article, the step of forming including the step of
>
> thermally spraying a coating material onto the surface of the substrate article, wherein a surface of contact between the coating material and the substrate article is a bondline; and
>
> nondestructively testing the coated article, wherein the step of nondestructively testing includes the steps of
>
> directing a transmitted ultrasonic signal into the coated article,
>
> receiving a received ultrasonic signal from the coated article, and
>
> evaluating a near-bondline region of the coated article located adjacent to the bondline using the received ultrasonic signal, wherein the step of evaluating includes the steps of
>
> concluding the presence of a delamination if there is a strong return in the received ultrasonic signal from the near-bondline region, and

concluding the presence of a mechanical bond if there is a weak return in the received ultrasonic signal from the near-bondline region.

The Examiner relies on the following prior art references to show unpatentability:

McComas	US 4,275,124	Jun. 23, 1981
Rainey	US 4,292,848	Oct. 6, 1981
Clare	US 5,268,045	Dec. 7, 1993
Yoshio (as translated)	JP 04-238265	Aug. 26, 1992

The rejections as presented by the Examiner are as follows:

1. Claims 1, 6-8, and 10 are rejected under 35 U.S.C. § 102(b) as being anticipated by Yoshio;
2. Claim 13 is rejected under 35 U.S.C. § 103(a) as unpatentable over Yoshio;
3. Claim 9 is rejected under 35 U.S.C. § 103(a) as unpatentable over Yoshio in view of Rainey;
4. Claims 2-5, 14, 17-20, and 22 are rejected under 35 U.S.C § 103(a) as unpatentable over Yoshio in view of Clare;
5. Claim 21 is rejected under 35 U.S.C § 103(a) as unpatentable over Yoshio and Clare, and further in view of Rainey;
6. Claims 2-5, 14, 17-20, and 22 are rejected under 35 U.S.C § 103(a) as unpatentable over Yoshio in view of McComas; and
7. Claim 21 is rejected under 35 U.S.C § 103(a) as unpatentable over Yoshio and McComas and further in view of Rainey.

In reviewing the rejections, we consider the dispositive issues arising from the contentions in the Brief filed December 23, 2005, the Answer filed February 10, 2006, and the Reply Brief filed April 3, 2006.

II. DISCUSSION

Anticipation by Yoshio

The Examiner rejects claims 1, 6-8, and 10 under 35 U.S.C. § 102(b) as being anticipated by Yoshio. Appellants do not argue any claim apart from the others, therefore, we select claim 1 to represent the issues on appeal.

The dispositive issue arising out of the contentions of the Examiner and the Appellants is: Was it reasonable for the Examiner to conclude, based on the similarity of means used and results intended to be achieved, that Yoshio describes a process which inherently includes all the steps of Appellants' claim 1 including the steps of non-destructively testing?

We answer this question in the affirmative.

The following facts are supported by a preponderance of the evidence:

1. Yoshio describes non-destructively testing a spray coated article to determine the quality of coating adhesion, the level or degree of adhesion being judged by the intensity of a reflected ultrasonic wave (Yoshio, Abstract).
2. To further clarify the extent of adhesion quantitatively, Yoshio subjects a reference material to ultrasonic testing and then measures adhesive strength directly through, for instance, tensile testing (Yoshio ¶ 0014). This provides a relationship between adhesive strength and reflection intensity. Yoshio describes the quality of adhesion in terms of tensile strength (Yoshio ¶ 0020; Fig. 2).
3. Appellants also describe non-destructive testing a spray coated article to determine the quality or nature of coating adhesion,

i.e., evaluating the nature of the near-bondline region between the coating and the substrate (Specification ¶ 0007).

4. Appellants also clarify the extent of adhesion. They use particular terminology to classify adhesion according to reflected wave intensity or "return" of the ultrasonic signal received from the bondline region (Specification ¶ 0011). According to Appellants' adhesive classifications: (1) If there is no "return," there is strong adhesion and a metallurigical bond; (2) if there is a "weak return" there is a mechanical bond (no delamination, coating is in intimate contact, but there is no metallurgical bond); and (3) if there is a "strong return" there is delamination (no intimate contact, no adhesion) (*id*.).
5. Yoshio and Appellants both describe testing by directing a 5 to 20 MHz ultrasonic wave toward the coated article and measuring the intensity of reflected waves (compare Yoshio, ¶ 0007 to Specification ¶ 0010). In Yoshio the measured reflected wave is called "reflected wave R" (Yoshio ¶ 0010-0013).
6. The reflected wave R received by Yoshio includes wave R_0, a wave reflected from the coating/substrate interface (bondline) as well as wave R_1, a wave reflected from the bottom of the coating (the outer or exposed surface of the coating) (Yoshio ¶ 0010 and Fig. 1).
7. Yoshio concludes there is good adhesion if the received R signal includes a small return of R_0 (bondline signal) and a large return of R_1 (coating bottom signal). On the other hand,

Yoshio concludes that there is poor adhesion if the received R signal includes an increased return from R_0, and a decreased return of R_1.

8. Yoshio and Appellants both describe the non-destructive testing process as an improvement over prior art destructive testing procedures such as tensile testing (Yoshio ¶ 0002-0003; Specification ¶0005). It is an improved method of testing because it can be applied to the actual product rather than just to a sample (Yoshio ¶ 0002-0003).
9. Appellants' Specification describes isolating the spatial region of interest in the received ultrasonic signal by establishing a spatial (time) gate in the received ultrasonic signal to define the near-bondline region (Specification ¶ 0010). Claim 9 is directed to use of the spatial gate. Claim 1 is not limited to the use of a spatial gate.

A prior art reference may anticipate when the prior art describes something expressly or inherently containing all the limitations of the claim. *In re Best*, 562 F.2d 1252, 1254-55, 195 USPQ 430, 432-34 (CCPA 1977). Moreover, merely choosing to describe a process using different terminology does not render the method patentable. *In re Skoner*, 517 F.2d 947, 950, 186 USPQ 80, 82 (CCPA 1975). Where there is reason to conclude that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, the burden shifts to the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristic relied on. *In re Best*, 562 F.2d at 1254-55, 195 USPQ at 433

(CCPA 1977); *see also Skoner*, 517 F.2d at 950, 186 USPQ at 82 (Holding that the examiner established inherency because "the examiner could only note that the patentees were using identical means (i.e., wire brushing) in an attempt to achieve identical results (i.e., improved adhesion) to those of appellants.").

Given that the process of Yoshio uses the identical means (5-20 MHz ultrasonic waves) in an attempt to obtain the identical result (evaluate adhesion) (FF 1-7), it is reasonable to conclude that the claimed evaluating and concluding steps are conducted when following the process of Yoshio.

We acknowledge that Yoshio does not use the terms "delamination" and "mechanical bond" in the description of the evaluation process. However, the failure to use the words "delamination" and "mechanical bond" do not point to a patentable distinction between the concluding steps of claim 1 and the evaluation process of Yoshio. This is because the "difference" is merely a difference in terminology. Appellants merely give names (delamination, mechanical bond, metallurgical bond) to the levels of adhesion evaluated (no adhesion, weak adhesion, and strong adhesion) (FF 4). Those points of adhesion (no adhesion, weak adhesion, strong adhesion) are determined by Yoshio (FF 2). The "difference" between Yoshio and the claimed invention is that the quality of adhesion is reported in terms of tensile strength rather than by classification name. Naming the various levels of adhesion does not change the steps of the process.

Nor is there a patentable difference based on the presence of additional reflective waves in the process of Yoshio. While Yoshio measures a reflective wave R containing not only the bondline wave R_0 but the bottom wave R_1 as well (FF 6), the bondline wave is still present and still

affects the measurement (FF 6). Yoshio describes the bondline wave R_0 as strong when adhesion is poor and weak when adhesion is good based on the effect of R_0 on the total reflective wave R (FF 6). Therefore, the conclusions Yoshio makes about the adhesion take into account the strength of the R_0 bondline wave.

The issue is further illuminated by looking at the issue as one of claim interpretation. Yoshio's "reflected waves R" are a "received ultrasonic signal" within the meaning of claim 1, and the signal R includes a signal R_0 from the near-bondline region. Hence, Yoshio is "evaluating a near-bondline region of the coated article located adjacent to the bondline using the received signal" within the meaning of the claim.

Moreover, claim 1 does not exclude the presence of the R_1 signal along with the R_0 signal in the received signal; claim 1 being a "comprising" claim. Claim 1 is also open to taking into account signals other than those in the near-bondline region (signals such as Yoshio's R_1 signal) when making conclusions about the strength of adhesion. That this is case is evident, not only from the open nature of the claim due to it use of the "comprising" transitional phrase, but also is evident from claim 9. Claim 9, a claim dependent on claim 1, further requires a step of establishing a spatial gate in the received signal to define the near-bondline region. Claim 9 makes it evident that claim 1 is not limited to isolating the signals from the near-bondline region from other signals.

It was reasonable for the Examiner to conclude, based on the similarities of means used and results intended to be achieved, that Yoshio describes a process which inherently includes all the steps of Appellants' claim 1.

Obviousness of Claim 13 over Yoshio

The Examiner rejects claim 13 under 35 U.S.C. § 103(a) as unpatentable over Yoshio. Claim 13 is dependent on claim 1 and further requires a step of "concluding the presence of a metallurgical bond if there is substantially no return in the received ultrasonic signal from the near-bondline region."

We agree with the Examiner that "metallurgical bond" is simply a description of "the strongest adhesion, providing no return of signal." (Answer 18; FF 4). Yoshio concludes that adhesion is good when R_0 is small (FF 7); the higher R_0, the lower the adhesion. Therefore, it follows that the highest adhesion, i.e., metallurgical bonding, occurs as R_0 approaches zero (i.e., there is substantially no return). We agree with the Examiner that, based on the teachings of Yoshio, the conclusion that there is very strong adhesion when R_0 approaches zero would have been apparent to one of ordinary skill in the art. Moreover, the fact that Yoshio does not use the terminology "metallurgical bond" does not point to patentable distinction between the process of the claims and that of Yoshio. Again, merely choosing to describe a process using different terminology does not render the method patentable. *Skoner*, 517 F.2d at 950, 186 USPQ at 82.

Obviousness of claims 2-5, 14, 17-20, and 22

The Examiner rejects claims 2-5, 14, 17-20, and 22 as obvious over Yoshio in view of Clare and also over Yoshio in view of McComas. Appellants present arguments for various claim groups under separate headings. In so far as Appellants present separate contentions not already addressed above, we will consider each of the groups separately.

Claims 2-5

Appellants contend that Clare and McComas teach away from nondestructive testing by teaching the prior approach upon which the present invention is an improvement, namely destructive testing (Br. 14 and 25). On this same basis, Appellants also contend that there is no basis for combining the teachings of Yoshio and Clare or McComas (Br. 15 and 26).

The issue is: Have Appellants overcome the rejection by showing that the evidence does not support the Examiner's finding of a reason to combine or by showing that Clare and McComas teach away from the claimed invention?

We answer in the negative.

Yoshio describes ultrasonic testing as an improvement over the prior art destructive testing processes. The references applied by the Examiner show that there was a known problem (destructive testing is limited to samples), that had an obvious solution (nondestructive ultrasonic testing) (FF 3). One of the ways in which a claim's subject matter can be proved obvious is by establishing that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the claims. *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1742, 82 USPQ2d 1385, 1397 (2007).

In view of the above, we cannot say that Appellants have overcome the rejection by showing that the evidence does not support the Examiner's finding of a reason to combine or by showing that Clare and McComas teach away from the claimed invention.

Claim 18

With respect to claim 18, Appellants' sole new argument is that the references do not have a teaching of heat treating and then evaluating to determine the presence of a metallurgical bond (Br. 19 and 30). We disagree. Clare describes heat treating, for instance, in the paragraph bridging columns 17 and 18. McComas teaches heat treating in column 3, lines 39-40. With regard to the metallurgical bond aspect of the argument, the analysis is the same as that presented above with respect to claim 13.

Appellants have not established a reversible error in the Examiner's rejection of claim 18.

Claims 14, 17, 19-22

Appellants present no contentions not already addressed above with respect to the rejection of claims 14, 17, and 19-22 over Yoshio in view of Clare and Yoshio in view of McComas. Therefore, for the reasons presented above, Appellants have not established a reversible error in the Examiner's rejection of these claims.

Obviousness of Claims 9 and 21

To reject claims 9 and 21, the Examiner adds Rainey to the rejections (Grounds 3, 5, and 7). These claims require that the step of evaluating include "the step of establishing a spatial gate in the received ultrasonic signal to define the near-bondline region."

The issue is: Has the Examiner properly established a prima facie case of obviousness within the meaning of 35 U.S.C § 103(a)?

We answer in the negative.

The examiner bears the initial burden of presenting a prima facie case of obviousness. *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).

Yoshio's received signal R includes both the bondline component R_0 and the coating bottom component R_1. There is no dispute that Yoshio does not establish a spatial gate to define the near-bondline region. It is the Examiner's position that "it would have been obvious to use a spatial gate in the received ultrasonic signal (the overall reflected wave) R of [Yoshio] in order to remove random noise" (Answer 20). Further according to the Examiner, "[a]s worded, claim 9 does not prevent the spatial gate from also being used to define the area of R1." (Answer 21).

Rainey is directed to a walking-gate ultrasonic flaw detector for detecting fatigue cracks in aircraft fasteners (Rainey, col. 1, ll. 10-13). Rainey's process and purpose are substantially different from that of Yoshio. There is no discussion in Rainey of establishing a spatial gate to divide the signal of interest into two parts. Rainey only suggests the use of a large gate around the entire signal of interest. Claim 9 requires establishing the spatial gate "to define the near-bondline region." This requires isolation of the near-bondline region return signal from other signals such as the coating bottom R_1 signal. The Examiner has not advanced an adequate rationale for the obviousness of establishing the claimed spatial gate around the near bondline region, i.e., Yoshio's R_0 signals.

III. CONCLUSION

We sustain the rejection of claims 1, 6-8, and 10 under 35 U.S.C. § 102(b) and the rejection of claims 2-5, 13, 14, 17-20, and 22 under

35 U.S.C. § 103(a). We however, do not sustain the rejection of claims 9 and 21 under 35 U.S.C. § 103(a).

IV. DECISION

The decision of the Examiner is affirmed-in-part.

V. TIME PERIOD FOR RESPONSE

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

AFFIRMED-IN-PART

tf/ls

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