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

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte MARTIN W. RUPICH and THOMAS A. KODENKANDATH

Appeal 2007-2236
Application 10/991,738
Technology Center 1700

Decided: June 29, 2007

Before FRED E. McKELVEY, *Senior Administrative Patent Judge*, and ROMULO H. DELMENDO and MICHAEL P. TIERNEY, *Administrative Patent Judges*.

McKELVEY, *Senior Administrative Patent Judge*.

DECISION ON APPEAL

A. Statement of the case

Appellants Martin W. Rupich and Thomas A. Kodenkandath (hereafter "**Rupich**") seek review under 35 U.S.C. § 134(a) of a rejection of claims 89-96, the only claims remaining in the application on appeal.

The reader should know that no references to *et al.* are made in this opinion.

We have jurisdiction under 35 U.S.C. § 6(b).

The application on appeal was filed on 18 November 2004.

The application was published on 09 March 2006 as Publication 2006/0051600 A1.

Rupich claims benefit of an earlier filing date based on (1) application 10/673,307, filed 29 September 2003, which is said to be (2) a division of application 09/855,312, filed 14 May 2001, which is said to be (3) a continuation-in-part of application 09/694,400 filed 23 October 2000.

The real party in interest is American Superconductor Corporation. Supp. Appeal Brief 1.

The Examiner rejected claims 89-91 under 35 U.S.C. § 103(a) as being unpatentable over Gupta and Mizuta.

The Examiner has also rejected claims 92-96 as being unpatentable under 35 U.S.C. § 103(a) over Gupta, Mizuta and Kobayashi.

The following prior art was relied upon by the Examiner.

Name	Patent Number	Publication Date
Kobayashi	US 5,304,533	19 Apr. 1994
Mizuta	EP 0 277 202 B1	19 Apr. 1995

Gupta, *Superconducting oxide films with high transition temperature prepared from metal trifluoroacetate precursors*, 52 Applied Physics Letters 2077-2079 (1988).

Kobayashi, Mizuta and Gupta are prior art under 35 U.S.C. § 102(b).

B. Record on appeal

In deciding this appeal, we have considered *only* the following documents:

1. Specification, including original claims.
2. Drawings.
3. The Supplemental Appeal Brief filed 28 August 2006.
4. The Examiner's Answer entered 17 November 2006.
5. The Reply Brief failed 22 January 2007.
6. Kobayashi.
7. Mizuta.
8. Gupta.
9. PTO bibliographic data sheet for the application on appeal.
10. Claims 89-96 on appeal.
11. Publication 2006/0051600 (09 Mar. 2006) (specification of application on appeal.

C. Issues

As the appeal reached the Board, there are two principal issues.

The first issue was whether Rupich has sustained its burden of showing that the Examiner erred in rejecting the claims 89-91 on appeal as being unpatentable under 35 U.S.C. § 103(a) over Gupta and Mizuta.

The second issue was whether Rupich has sustained its burden of showing that the Examiner erred in rejecting the claims 92-96 on appeal as being unpatentable under 35 U.S.C. § 103(a) over Gupta, Mizuta and Kobayashi.

We do not reach the two issues because we find the claims to be indefinite and we also find the enabling disclosure not to be commensurate in scope with what we think Rupert regards as its invention.

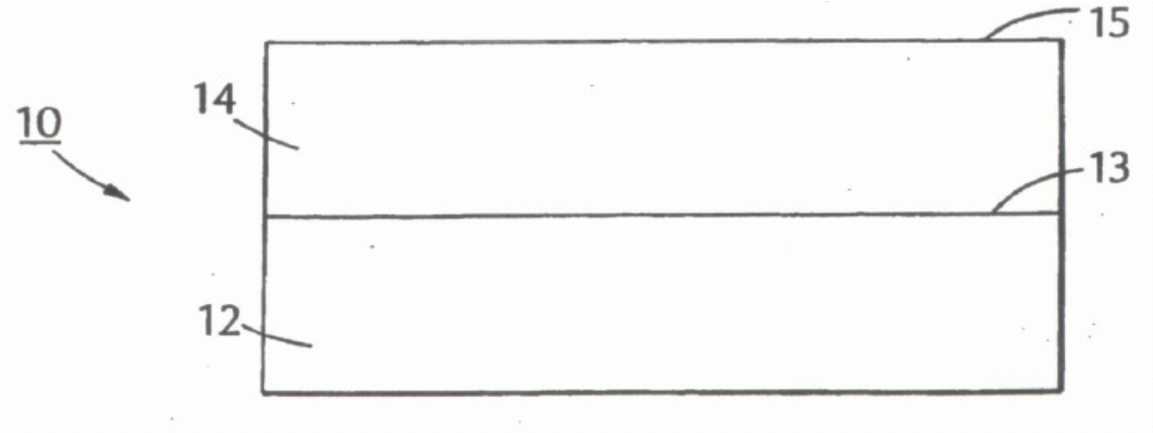
D. Findings of fact

The following findings of fact are believed to be supported by a preponderance of the evidence. To the extent that a finding of fact is a conclusion of law, it may be treated as such. Additional findings as necessary may appear in the Discussion portion of the opinion.

In our findings we refer to the Rupich application as published. The Rupich specification in the record before us does not have line numbers and therefore it is difficult for us to refer to precise locations of the specification. We have had trouble following citations in the Supp. Appeal Brief to pages and lines of the specification.

The invention

With reference to Fig. 1 of the application,



Rupich Fig. 1—multi-layer superconductor

the application describes a multi-layer superconductor **10** having a substrate layer **12** with a surface **13** and a superconductor material layer **14** with a surface **15**. Publication ¶ 0059.

Layer **14** is disposed on surface **13**. Publication ¶ 0059.

The nature of layer **12** is not particularly important to the appeal.

Layer **14** is made from what Rupich calls a precursor solution.

The precursor solution includes:

(1) a salt of a rare earth metal;

(2) a salt of an alkaline earth metal;

(3) a salt of a transition metal; and

(4) a solvent.

Publication ¶ 0046.

A process for making the precursor and using it to form layer **14** is described at great lengths. Publication ¶¶ 0080 through 0098.

When a salt of the rare earth metal yttrium [Y], a salt of the alkaline earth metal barium [Ba], a salt of the transition metal copper [Cu], all dissolved in an alcohol [*e.g.*, methanol—CH_3OH as shown in Example I], are used to make layer **14**, the layer ends up being an oxide having the empirical formula $YBa_2Cu_3O_{7-x}$. Publication ¶¶ 0011, last sentence, 0100 and 0165—part of Example I.

A property of layer **14** is "high critical current density." Publication ¶¶ 0011 and 0104.

According to Rupich, layer **14** (1) "preferably" has a critical current density of at least about 0.5×10^6 Amperes per square centimeter, (2) "more preferably" at least about 1×10^6 Amperes per square centimeter and (3) "most preferably" 2×10^6 Amperes per square centimeter, all as determined by transport measurement at 77ºK in self field using a 1 microVolt per centimeter criterion. Publication ¶ 0104.

Another characteristic of layer **14** is the thickness of layer **14**.

We now turn to claim 89, and later will return to the Publication to consider the examples.

Claim on appeal

From a point of view of the new rejections we make in this opinion, claim 89 on appeal is representative of the claimed article of manufacture.

Claim 89 reads [drawing numbers, some paragraphing and backeted matter added]:

> An article, comprising:
>
> a biaxially textured surface or a single crystal surface **12**; and
>
> a solution coated in a single coating on the biaxially textured surface, the solution including:
>
> a carboxylate salt of a rare earth metal;
>
> a fluorinated carboxylate salt of an alkaline earth metal;
>
> a non-halogenated carboxylate salt of copper; and
>
> an alcohol, the rare earth metal salt, the alkaline earth metal salt and the copper salt being dissolved in the alcohol;
>
> wherein the solution is capable of being processed in less than about five hours to form a barium fluoride containing coating that is a precursor for a superconductor film **14**,
>
> the superconductor film having [1] a thickness of at least about 0.5 micrometer[s] and [2] a critical current density of at least about 1×10^6 amperes per square centimeter, and
>
> the superconductor film **14** comprising the rare earth metal, the alkaline earth metal and copper.

The Rupich Examples

We assume that the data reported in the examples is based on actual experimentation and that the examples are not prophetic.

Example I describes a film made from $Cu(CF_3CO_2)$ which has a thickness of 0.4 micrometers. Publication ¶ 0161 through 0165. The article described in Example I does not fall within the scope of the claim 89 because the Cu salt is not "non-halogenated" (since it has fluorine) and it is not thick enough (0.4 vis-à-vis the claimed 0.5 micrometers).

Example II describes a film made using claimed ingredients, but does not tell us the critical current density. Publication ¶¶ 0166 through 0169. Accordingly, we do not know whether the film falls within the scope of the film of claim 89.

Example III describes a film made using the claimed ingredients, but likewise does not describe any critical current density. Likewise, it does not describe the thickness of layer **14**. Publication ¶ 0170. Accordingly, we do not know whether the film falls within the scope of the film of claim 89.

Examples IV and V describe a film made from $Cu(CCl_3CO_2)xH_20$. Publication ¶¶ 0171 through 0173. The article described in Examples IV and V do not fall within the scope of the claim 89 because the Cu salt is not "non-halogenated" (since it has chlorine).

Examples VI through IX do not describe the critical current density and therefore we cannot tell whether any article described in those examples falls with the scope of the claims.

Example X describes a film made with the right ingredients, but is said to have a thickness of 0.41 micrometers. Since claim 89 requires a

thickness of at least about 0.5 micrometers, and we are not quite sure what "about" means, we cannot be certain that the film described in Example X falls within the scope of claim 89.

Example XI is the first example we come to which appears to describe an article within the scope of claim 89. The film is made from a carboxylate salt of yttrium, a carboxylate salt of barium and a non-halogenated salt of copper. Layer **14** resulting from the process is described as having a thickness of "about 0.5 micrometers" and a critical current density of about 3.2×10^6 amperes per square centimeter. Publication ¶ 0187.

Example XII describes an article made from the right ingredients and has a critical current density within the scope of claim 89, but not a thickness within claim 89. The thickness described in Example XII is 0.3 micrometers whereas claim 89 requires a thickness of about 0.5 micrometers. Publication ¶¶ 0188 through 0193.

Example XIII is the second example which appears to describe an article within the scope of claim 89. Example XIII describes an article made from the right ingredients, having a thickness of 0.8 micrometers (within the scope of claim 89) and a critical current density of 3.8 x 106 (also within the scope of claim 89). Publication ¶¶ 0194 through 0195.

Example XIV does not describe any critical current density and therefore we cannot tell whether any article described in the example falls within the scope of claim 89. Publication ¶¶ 0196 through 0200.

Critical current density

Rupich maintains that the claimed critical current density is "an unexpected advantage" of the claimed articles. Supp. Appeal Brief 4-5.

However, on this record Rupich has not convincingly explained (1) the significance of a critical current density in this art or (2) why the critical current densities said to be obtained with the invention are unexpected.

In attempting to distinguish Gupta from the claimed invention, Rupich calls our attention to the fact that Gupta describes articles having a layer (corresponding to Rupich's layer **14**) with a critical current density of 1000 amperes per square centimeter. Gupta, page 2079, column 1, last sentence, first full paragraph: "The critical current density of films with T_c ($R = 0$) higher than 90 K is about 1000 A/cm^2 at 77 K, whereas films with broader transition which are also less textured, have critical current density which is an order of magnitude lower." A value of 1000 is the same as 1 x 10^3 which, of course, is lower by three orders of magnitude than Rupich's range of 1 x 10^6. An order of magnitude lower, mentioned by Gupta, would be 1 x 10^2 or 100.

We are not sure whether the difference between the Gupta critical current density and that of Rupich is significant. For the purpose of deciding the appeal we will assume that Rupich is correct and that the claimed critical current density is "unexpected."

Prior art

Beyond what we have already said about Gupta and what will be discussed with respect to Mizuta, we do not find it necessary to otherwise discuss the prior art.

Mizuta describes a method of preparing a superconductive material. Page 2:3.

Like Rupich's article, the Mizuta superconductor has a layer corresponding to Rupich's layer **14**.

The Mizuta layer comprises an oxide which can have the empirical formula $AB_2Cu_3O_{7+x}$, where x is a number greater than -1 but less that +1. When the x is about -1, the empirical formula of Mizuta is close to that of Rupich. Mizuta, page 3:40

"A" can be Y, La, Nd, Sm, Eu, Gd, Dy, Ho, Er, Yb, Lu or a mixture of two more thereof. Mizuta, 3:43. These elements are rare earth metals.

"B" can be Ba, Sr, Ca or a mixture of two ore more thereof. Mizuta 3:44. These elements are alkaline earth metals.

What surfaces from the description in Mizuta is that the Mizuta layer comprises the same oxide, albeit made by a different process. We do not know the critical current density of the Mizuta layers corresponding layer **14** of Rupich.

The Mizuta examples tell us a little about the properties made from different rare earth metals.

Examples 1 and 2 describe films made from lanthanum (La) salts and not yttrium (Y) salts. Critical temperatures are reported as (on set) of 30 K and 27K and perfect superconductivity is reported as 10 K and 10 K.

Examples 3 through 17 describe films made from yttrium instead of lanthanum. Critical temperatures are reported as (on set) ranging from a high of 97 to a low of 30 and perfect superconductivity is reported from a high 89 K to a low of 15 K:

Table 1

Example	Critical T	Superconductivity
3	95	18
4	**32**	**15**
5	90	20
6	90	23
7	80	20-45
8	80	25
9	85	20
10	80	20
11	75	30
12	80	30
13	80	30
14	70	30
15	80	35
16	80	30
17	**97**	**89**

Examples highlighted in bold were samples made using carboxylate salts whereas non-bold were samples made using a nitrate; high and low critical temperature and superconductivity are shown in bold. It will be observed that the critical T and superconductivity of the yttrium based layers is generally higher than those made from lanthanum, particularly the yttrium layers made from carboxylates of yttrium.

E. Discussion

(1)
Indefiniteness

A claim which is indefinite is not patentable. 35 U.S.C. § 112, second paragraph.

We have considerable difficulty understanding the meaning of claim 89—from which all other claims depend.

Accordingly, we reject claims 89-96 as being unpatentable under 35 U.S.C. §112, second paragraph, for failing to particularly point and distinctly claim an invention.

The first problem we encounter is that the "article" comprises (1) a surface and (2) a solution. What is described in Fig. 1 and elsewhere in the specification is an article comprising (1) surface and (2) a superconductive layer **14**. How an article comprises a surface and a solution coated on a surface is not at all clear to us.

The second problem we encounter is that on the one hand the solution includes "a fluorinated carboxylate salt of an alkaline earth metal" and on the other hand mentions a process step "to form a barium fluoride containing coating …" To be sure, barium is an alkaline earth metal. But, so are other elements and the specification reveals that the other can be alkaline earth metals, such as strontium or calcium. Publication ¶ 0048. How one starts with strontium or calcium and ends up with barium is not entirely apparent.

The third problem relates to the limitation "wherein the solution is capable of being processed …" In this case, it is not clear to us what this process limitation has to do with the claimed article. What difference would the processing time make with respect to the claimed "article"? In other

words, how does the limitation distinguish the claimed article from another article?

We are not certain of the scope of the claims on appeal. The time for eliminating indefiniteness issues is while a claim is pending before the Patent Office. The public, potential infringers and district court are entitled to clear claims in patents. To put off until licensing negotiations or patent infringement civil action a determination of the scope of a claim is, in the words of *Graham v. John Deere Co.*, 383 U.S. 1, 18 (1966), to debilitate the patent system. Although the Graham words arose in a § 103 context, the rationale supporting those words applies with equal force to issues arising under the second paragraph of 35 U.S.C. § 112. See, e.g., *General Electric Co. v. Wabash Appliance Corp.*, 304 U.S. 364 (1938). Also, as the Federal Circuit has noted, clarification of claim language in the Patent Office avoids the possibility of an applicant obtaining in court a scope of protection which encompasses subject matter that the PTO has not examined. *Genentech Inc. v. Wellcome Foundation Ltd.*, 29 F.3d 1555, 1563-64, 31 USPQ2d 1161, 1167 (Fed. Cir. 1994).

Since the claims on appeal are deemed to be indefinite and their scope is not clear, we do not reach the Examiner's § 103 rejections. *In re Steele*, 305 F.2d 859, 863, 134 USPQ 292, 295 (CCPA 1962); *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). The Examiner's § 103 rejections are *vacated*. See *Ex parte Zambrano*, 58 USPQ2d 1309 (Bd. Pat. App. & Int. 2000), for an explanation of a decision vacating a rejection.

(2)

Enablement

If we were to construe claim 89 on appeal to cover an article, we would consider the article to be something that looks like the article in Fig. 1 having (1) a surface and (2) a superconductor layer. The superconductor layer would be made of an oxide having the empirical formula $AB_2Cu_3O_{7-x}$ where A is a rare earth metal and B is an alkaline earth metal. Given that "barium fluoride" is mentioned in claim 89, it may be that Rupich intends to limit the B to barium. *But see* claim 90. In any event, the superconductor layer must have a thickness of at least 0.5 micrometers and a critical current density of at least about 1×10^6 amperes per square centimeter. We note that a broader invention is described in the specification in the sense that smaller thicknesses are described in some examples and the critical current density of claim 89 is what is characterized as the "more preferably" embodiment. Rupich is apparently dedicating to the public the articles where the superconductor has a thickness of at least about 0.5 micrometers but lack the claimed critical current density.

A claim in an unpredictable art must be supported by an enabling disclosure commensurate in scope with the breadth of the claim. *Corona Cord Tire Co. v. Dovan Chemical Corp.*, 276 U.S. 358, 385 (1928) (discussion dealing with claims 1,5 and 9); *Consolidated Electric Light Co. v. McKeesport Light Co.*, 159 U.S. 465, 474-75 (1895); *In re Fisher*, 427 F.2d 833, 839, 166 USPQ 18, 24 (CCPA 1970).

For the purpose of the appeal, we have accepted Rupich's contention that the critical current density is "unexpected." We note that unlike many other applicants, Rupert appropriately and properly recites its alleged

"unexpected" result in the claim. But for a variety of reasons, we are not convinced that the alleged "unexpected" result can be obtained with a combination other than yttrium and barium—not without considerable experimentation. See the factors to be considered in a resolution of whether undue experimentation is involved set out in *Ex parte Forman*, 230 USPQ 546, 547 (Bd. Pat. App. & Int. 1986), those factors having been adopted by the Federal Circuit in *In re Wands*, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988).

At this stage, we recognize that both Rupich and the Examiner may have more to add to our analysis during future prosecution. Accordingly, our analysis in this opinion should not be viewed as exhaustive on the enablement subject.

The first thing we notice is that all Rupich's examples show use of yttrium yet the claims cover rare earth metals. When we consider Mizuta, we see that significant differences in properties are reported for the use of lanthanum is used vis-à-vis yttrium. While those properties are different from critical current density, we feel comfortable finding that (1) properties may be a function of the rare earth metal used and (2) it may be difficult for one skilled in the art to figure out what other rare earth metals can effectively be used to make Rupich's article while at the same time obtaining the critical current density required by the claims on appeal—assuming the claimed invention is that we have set out above.

A second thing readily apparent is that, apart from broad statements defining the invention, the Rupich specification provides no concrete guidance beyond the use of yttrium. While Mizuta describes the use of

lanthanum, we have not been shown that the other rare earth metals are in fact routinely used in making semiconductors and therefore the likely success of the use of rare earth metals beyond yttrium and lanthanum is questionable—at least on this record. Also, on this record we have considerable pause that one skilled in the art would not have to engage in considerable research to find articles having Rupich's properties made from anything other than the rare earth yttrium.

A third factor is that Rupich tells us, or at least wants us to believe with respect to the § 103 rejections, that the subject matter of the critical current density is "unpredictable."

At this point, we do not foreclose a possibility that Rupich can address our concerns during further prosecution before the Examiner. Moreover, we have considerable confidence that the Examiner is in a position to appropriately evaluate any additional evidence or argument which Rupich may present.

(3)
Obviousness

As explained above, we do not reach the Examiner's obviousness rejections.

We will call the following hopefully helpful guidance to the attention of Rupich and the Examiner so that if a definite claim is presented, an obviousness analysis can be made which takes into account any critical current density limitation—such as that in claim 89, which presumably would appear in any re-written claim.

An inventor must show that the results said to be achieved with the invention are actually obtained. It is not enough to show that results are obtained which differ from those obtained in the prior art—any difference must be shown to be an unexpected difference. *In re Klosak*, 455 F.2d 1077, 1080, 173 USPQ 14, 16 (CCPA 1972). *See also In re Geisler*, 116 F.3d 1465, 1469-70, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997) (party asserting unexpected results has the burden of proving that the results are unexpected).

The showing must be clear and convincing. *McClain v. Ortmayer*, 141 U.S. 419, 429 1891) (conclusive evidence need to show invention performs some new and important function not performed by the prior art); *In re Heyna*, 360 F.2d 222, 228, 149 USPQ 692, 697 (CCPA 1966) (applicant required to submit clear and convincing evidence to support an allegation of unexpected property). *See also In re Passal*, 426 F.2d 409, 412, 165 USPQ 702, 704 (CCPA 1970) and *In re Lohr*, 317 F.2d 388, 392, 137 USPQ 548, 550-51 (1963) (conclusive proof of unexpected results not submitted by applicant).

On this record, we are not certain of the precise significant of Rupich's critical current density limitation. For example, is Rupich the first to obtain the claimed critical current densities? What difference does critical current temperature make? Would one skilled in the art view the results as unusual and unexpected? If Rupich is first to obtain the claimed "high" critical current densities and if those high critical current densities are unexpected, then perhaps Rupich has a patentable invention. *Cf. United States v. Adams*, 383 U.S. 39 (1966); *Eibel Process Co. v. Minnesota & Ontario Paper Co.*,

261 U.S. 45 (1923); *Webster Loom Co. v. Higgins*, 105 U.S. 580 (1881). On the other hand, if the critical current density is not significant, then maybe Rupich is not entitled to a patent under § 103. *Cf. KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 82 USPQ2d 1385 (2007); *Graham v. John Deere Co. of Kansas City,* 383 U.S. 1 (1966). The scope of any patentable invention will have to be worked out in further prosecution.

F. Conclusions of law

Since the claims are indefinite, we do not reach the Examiner's § 103 rejections.

The claims on appeal fail to comply with the requirements of the second paragraph of 35 U.S.C. § 112.

The claims on appeal fail to comply with the enablement requirements of the first paragraph of 35 U.S.C. § 112.

On the record before us, Rupich is not entitled to a patent containing claims 89-96.

G. Decision

ORDERED that the decision of the Examiner rejecting claims 89-96 over the prior art is *vacated*.

FURTHER ORDERED that our § 112 rejections are designated as new rejections. 37 CFR § 41.50(b) (2006).

FURTHER ORDERED that our decision is not a final agency action.

FURTHER ORDERED that within **two (2) months** from the date of our decision appellant may further prosecute the application on appeal by exercise one of the two following options:

1. Request that prosecution be reopened by submitting an amendment or evidence or both. 37 CFR § 41.50(b)(1) (2006).

2. Request rehearing on the record presently before the Board. 37 CFR § 41.50(b)(2) (2006).

FURTHER ORDERED that no time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2006).

VACATED
New rejections—37 C.F.R. § 41.50(b) (2006)

lp

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