UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ROBERT C. LAM,
YIH-FANG CHEN, and KENJI MARUO
APPELLANTS

Appeal 2007-2830
Application 10/899,508[1]
Technology Center 1700

Decided: February 25, 2008

Before BRADLEY R. GARRIS, TEDDY S. GRON, and MARK NAGUMO, *Administrative Patent Judges*.

NAGUMO, *Administrative Patent Judge*.

DECISION ON APPEAL

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[1] Application 10/899,508 ("508 application") filed 26 July 2004. The real party in interest is listed as BorgWarner, Inc. (Appeal Brief filed 25 September 2006 ("App. Br."), at 1.)

A. Introduction

Appellants ("Lam") seek review under 35 U.S.C. § 134 of the Examiner's final rejection of claims 1, 2, 5, 7, and 9–23. The only other pending claims, claims 24 and 25, have been withdrawn from consideration and are not before us.

The claimed subject matter relates to porous friction materials comprising nanoparticles of friction modifying materials that are said to be useful in automobile transmissions and clutches.

Representative Claim 1 reads:

> A friction material consisting essentially of
>
> > a porous base material,
> >
> > at least one resin material, and
> >
> > nanoparticle-sized friction modifying particles dispersed within the porous base material, wherein the nanoparticle-sized friction modifying particles are randomly dispersed within the friction material,
> >
> > > wherein the nanoparticle-sized friction modifying particles are deposited on individual fibers and fillers comprising the porous base material at a thickness of about 0 to about 85 μm,
> >
> > wherein the friction material has substantially the same permeability in the radial direction and in the normal direction,
> >
> > > wherein the nanoparticle-sized friction modifying particles have an average diameter size from about 10 nm to about 150 nm, and
> >
> > wherein the porous base material has an average voids volume from about 65% to about 85%.

(App. Br. Claims App'x. at 1.)

Claim 2 depends on claim 1 and requires the nanoparticle-sized friction modifying particles to have an "irregular shape."

Claim 10 depends on claim 1 and requires that the nanoparticle-sized friction modifying particles comprise a mixture of carbon particles and silica particles.

The Rejections

The Examiner has maintained the following rejections:

1. Claims 1, 2, 5, 7, 9, 11–18, 20, and 22 are rejected under 35 U.S.C. § 102(e) in view of Aiba[2].

2. Claims 10, 19, and 23 under 35 U.S.C. § 103 in view of Aiba and Yesnik[3].

3. Claim 21 under 35 U.S.C. § 103 in view of Aiba and Lam 804[4].

4. Claims 1, 2, 5, 7, and 9–23 under 35 U.S.C. § 103 in view of Lam 804 and Aiba.

5. Claims 1, 2, 5, 7, and 9–23 under 35 U.S.C. § 102(e) in view of Lam 341[5].

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[2] Hiroshi Aiba and Masahiro Mori, *Resin Composition for Use in Manufacturing Wet Friction Materials and Wet Friction Material*, U.S. Patent 6,831,146 B2, issued 14 December 2004, based on application 10/403,533 filed 31 March 2003.

[3] Marc A. Yesnik, *Friction Material Comprising Powdered Phenolic Resin and Method of Making Same*, U.S. Patent 5,529,666, issued 25 June 1996.

[4] Robert C. Lam, *High Performance Two-Ply Friction Material*, U.S. Patent 6,182,804 B1, issued 6 Feb 2001.

The Examiner also relies on Yoshida[6] as evidence of the shape of certain silica particles used by Aiba.

B. Findings of Fact

Findings of Fact throughout this Decision are supported by a preponderance of the evidence of record.

508 Disclosure

1. As indicated by the title of 508 application, the invention relates to a "Porous Friction Material Comprising Nanoparticle Particles of Friction Modifying Material."

2. The nanoparticle-sized friction modifying particles (hereafter, "nanoparticles") are described as being dispersed on fibers and fillers that are made of a porous base material. (508 specification at 5:24-27.)

3. The nanoparticles are said to have an average diameter from about 10 nm to about 150 nm. (508 specification at 6:3–4.)

4. In embodiments, the friction material is said to have a low density and fiber architecture that allow a resin material to soak into the friction material. (508 specification at 7:17–20.)

5. In embodiments, the nanoparticles are mixed with a curable resin to form a saturant material that is used to saturate the porous base material,

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[5] Robert C. Lam, Yih-Fang Chen, and Kenji Maruo, *Friction Material with Nanoparticles of Friction Modifying Layer*, U.S. Patent Application Publication US 2004/0,033,341, published 19 February 2004.

[6] Yoshio Yoshida *et al.*, *Inkjet Recording Medium*, U.S. Patent Application Publication US 2006/0,050,130 A1, published 9 March 2006, based on a PCT filed 29 March 2004.

whereby the nanoparticles are said to be at least partially deposited on individual fibers comprising the base material, and the resin is substantially evenly dispersed throughout the base material. (508 specification at 8:28 to 9:4.)

6. Because the nanoparticles are extremely small and because the surface area of the fibers and fillers is relatively large, the nanoparticles are thought to adhere to the surface of the fibers and fillers and to be "substantially evenly distributed throughout the base material." (508 specification at 6:22-32.)

7. As a result of the evenly dispersed nanoparticles, the coefficient of friction of the material is said to be higher and the material is said to have a better "mu-v" [friction coefficient-velocity] slope (508 specification at 7:1-4) as well as improved anti-shudder characteristics (*id.* at 18:12–16), heat resistance, and durability (*id.* at 19:2–3).

8. In embodiments, the base material is said to have a fiber content of about 75 to 85% and filler content of about 15 to about 25 %, both by weight of the base material. (508 specification at 9:18–23.)

9. Less filler in the base material is said to significantly increase the lateral permeability of the friction material. (508 specification at 9:23–24.)

10. Suitable base materials are said to include non-asbestos fibrous materials, including aramid fibers and cotton/cellulose fibers. (508 specification at 10:1–9.)

11. In certain embodiments, the base material is said to have a preferred void volume of about 60 to 85% such that the fibrous base material is

considered 'porous' as compared to a 'dense' woven material."
(508 specification at 10:21–23.)

12. In these embodiments, the friction material is said to have "substantially the same permeability in the radial direction and in the normal direction." (508 specification at 10:21–23.)

13. The only examples provided are two "prophetic" examples.
(508 specification at 19:8–16.)

Aiba

14. Aiba describes friction materials said to exhibit a small initial rate of change in friction coefficient, a large positive gradient of Δμ-V characteristic (friction-coefficient-velocity) (which is said to avoid "shift shock" when using a clutch) and high durability. (Aiba at 2:15-34.)

15. The friction materials are described as comprising a paper body impregnated with a binder. (Aiba at 3:11–15.)

16. According to Aiba, the paper body is made by a common paper making process employing a fibrous base material including natural pulp fibers, aramid fibers, carbon fibers, etc. (Aiba at 8:49–56.)

17. The binder resin is said to be a phenolic resin (Aiba at 2:35–40) with a particulate filler (*id.* at 2:40–42).

18. The preferred particulates are said to be metallic oxides, metallic carbides, and metallic nitrides, silicon dioxide being particularly preferred. (Aiba at 2:59–62.)

19. A preferred average particle size of a primary particle of the particulate filler is said to range from 5 to 50 nm. (Aiba at 2:65–67.)

20. According to Aiba, if the primary particle size is too small, it is difficult to disperse the particles due to agglomeration, and if the particles are too big, they are again difficult to disperse. (Aiba at 7:1:9.)

21. The friction materials are said to be made by impregnating a "paper body made of a fibrous base material" with a resin composition that includes the filler and then curing the object. (Aiba at 8:44–54.)

22. According to Aiba, the porosity of the friction material is preferably 20 to 70%. (Aiba at 9:9–11.)

23. Aiba provides examples of making friction materials, such as Example 1, wherein a fumed silica described as having a particle size of about 16 nm is used; and Example 2, reporting use of a silica called AEROSIL 130 (Nippon Aerosil Co.).

Yoshida

24. Yoshida describes colloidal silicas PL-1 and PL-2 as being "peanut shaped." (Yoshida at 11, ¶ 136, Table 1.)

25. Yoshida explains that collidal silica is composed of two to three primary particles aggregated into a shape "referred to as a 'peanut-shape' for convenience." Yoshida at 2–3, ¶ 26.)

Yesnik

26. Yesnik describes friction materials comprising a fibrous base material impregnated with phenolic and silicone resins (Yesnik at 4:30–42) that contain various fillers, including silica fillers such as diatomaceous earth (celite), silicon nitride, graphite or carbon particles (*id.* at 7:3–20)

27. The friction materials are said to have high thermal conductivity, porosity and strength (Yesnik at 3:13–15) and to be suitable for use as wear surfaces on clutches and brakes (*id.* at 3:47–53.)

Lam 804

28. Lam 804 describes high performance friction materials comprising fibrous base materials that contain filler materials.

29. Lam 804 describes embodiments in which the fibrous materials have mean pore diameters as large as 5 microns. (Lam 804 at 18, Table 10, Example H.)

C. Principles of Law

Appellants bear the procedural burden on appeal of demonstrating reversible error in the Examiner's rejections. Arguments not made in the principal brief, including a failure to argue for the separate patentability of individual claims, are waived. 37 C.F.R. § 41.37(c)(1)(vii).

Claimed subject matter is anticipated if every limitation is described, expressly or inherently, in a single prior art reference. *Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc.*, 246 F.3d 1368, 1374 (Fed. Cir. 2001). The use of additional references—extrinsic evidence—however, "is proper to determine whether a feature, while not explicitly discussed, is necessarily present in a reference." *Telemac Cellular Corp. v. Topp Telecom, Inc.*, 247 F.3d 1316, 1328 (Fed. Cir. 2001). "Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient."

Continental Can Co. v. Monsanto Co., 948 F.2d 1264, 1269 (Fed. Cir. 1991).

"[W]hen the PTO shows sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 708 (Fed. Cir. 1990).

D. Discussion

Rejections based on Aiba

The Examiner finds that Aiba describes the invention as claimed in each of claims 1, 2, 5, 7, 11–18, 20, and 22. (Ans. at 3–5.) In particular, the Examiner finds that Aiba describes a friction material comprising a fibrous base material having a porosity of from 20 to 70% that is impregnated with a resin that contains nanoparticles within the size range recited and made from the same materials. (Ans. at 3.) The Examiner acknowledges that the directional permeability is not disclosed, but argues that because the friction material comprises components within the scope recited in the claims and because it is made in the same way, the properties are reasonably expected to be met. (Ans. at 4–5, *citing Spada*.)

Lam argues that Aiba does not anticipate the claimed invention, but refers only to the limitations of claims 1 and 2. (App. Br. at 6–7.) Accordingly, the dependent claims, with the exception of claim 2, stand or fall with claim 1. 37 C.F.R. § 41.37(c)(vii).

Specifically, with respect to claim 1, Lam asserts that Aiba does not disclose that the friction material has the same permeability in the radial and normal directions. Lam asserts further that Aiba does not disclose that the

nanoparticles are deposited on individual fibers and fillers. (App. Br. at 7.) With the exception of the irregularity of particles, discussed *infra*, Lam does not raise any other objection to the Examiner's findings regarding the teachings of Aiba. In particular, Lam does not direct our attention to any evidence in the record that contradicts the Examiner's findings. Nor does Lam offer any explanation of why the Examiner's reasoning is faulty.

The regulations governing appeals state that "[a] statement which merely points out what a claim recites will not be considered an argument for separate patentability of the claim." 37 C.F.R. § 41.37(c)(vii). Lam's arguments are little more than a recitation of claim limitations followed by a denial that the limitations are described by the references. We shall not scour the record seeking evidence to support Appellants' (or the Examiner's) position. *Cf. Halliburton Energy Services, Inc. v. M-I LLC*, ___ F.3d ____, ____, 2007-1149, slip op. at 8 n.7 (Fed. Cir. 2008) (describing insufficient arguments below). Accordingly, we AFFIRM the rejection of claims 1, 5, 7, 11–18, 20, and 22 over Aiba.

Claim 2 stands on a different footing. The Examiner acknowledges that Aiba does not describe irregular silica particles expressly, but argues that Yoshida shows that AEROSIL 130 is known to have a "peanut shape," which the Examiner argues is irregular. (Ans. at 4–5.) Lam denies that Yoshida provides such a teaching, and argues that reliance on a secondary reference is improper. (Reply Br. at 4–5.)

Lam's argument as to the impropriety of using Yoshida is without merit, as the Examiner merely relies on Yoshida to disclose a property of a material in the primary reference. The problem, however, is that a cursory

review of Yoshida shows that the silica particles characterized as peanut-shaped are not the AEROSIL materials, but colloidal silicas said to be agglomerated particles. (FF 24–25.) The Examiner has not asserted any other basis for irregularity of the silica particles used by Aiba (an argument based on size having been withdrawn as incorrect (Ans. at 4). Clearly, the Examiner erred in relying on Yoshida as evidence that Aiba used irregular silica particles. Accordingly, we REVERSE the rejection of claim 2 under 35 U.S.C. § 102(e) in view of Aiba.

Aiba and Yesnik

The Examiner finds that Aiba does not disclose the use of carbon particles in combination with silicon particles, but finds that Yesnik describes friction materials comprising both kinds of particles in a composition within the scope of claims 10 and 19; and that Yesnik also describes the combination of a silicone resin with a phenolic resin, as recited in claim 23. (Ans. at 5–6.) The Examiner concludes that it would have been obvious to the ordinary worker in the art to use particles and resins having the compositions taught by Yesnik in order to obtain the advantages of those combinations in the friction materials taught by Aiba. (Ans. at 6.)

Lam reiterates its arguments regarding the alleged deficiencies of Aiba, including arguments regarding the irregular shape of the particles (App. Br. at 7–10). Lam does not dispute the correctness of the Examiner's findings regarding Yesnik. Nor does Lam explain why the Examiner's arguments regarding the combination of the teachings of the two references are wrong. Lam's sole argument is conclusory: "Aiba is deficient and Yesnick [sic] does not supply those deficiencies."

Lam's arguments are insufficient to show reversible error by the Examiner. The arguments regarding the shape of the particles are irrelevant to claims 10, 29, and 23 because these claims do not contain any limitation as to the irregularity of the particles. Only the limitations of the claims are relevant to patentability. *Cf. In re Hiniker Co.*, 150 F.3d 1362, 1369 (Fed. Cir. 1998) ("the name of the game is the claim"). The remaining arguments are unsupported by any citation of evidence in the record. Accordingly, we AFFIRM the rejection of claims 10, 19, and 23 under 35 U.S.C. § 103 in view of the combined teachings of Aiba and Yesnik.

Aiba and Lam 804

The Examiner finds that Aiba does not describe a friction material based on a fibrous material having an average pore diameter of 5 microns, as required by claim 21. (Ans. at 6–7.) The Examiner finds that Lam 804 describes such a material as being useful in a friction material of similar construction, and reasons that it would have been obvious to use a 5 micron pore diameter fibrous material in the friction material described by Aiba, thus rendering the subject matter of claim 21 obvious. (*Id.* at 7, citing Lam 804 at 18:7–8.)

Lam denies that the Examiner has made out a prima facie case of obviousness, arguing that Aiba is deficient. (App. Br. at 10-11.) Lam does not, however, explain why the Examiner's finding that Lam 804 teaches a fibrous material having a pore size of 5 microns is in error. Lam argues that Aiba describes friction materials that are "complete products" designed to provide specific performance characteristics and that it is not possible to add or replace components without entirely reengineering the structure of the

material." (App. Br. at 11.) Lam does not refer to any evidence in support of its arguments.

Lam's arguments are again insufficient to show reversible error by the Examiner. The substitution of one material by another, known to be suitable for a similar purpose, has long been recognized as a cornerstone of obviousness. Lam attempts to carry its burden of persuasion using completely general arguments devoid of reference to facts in the record. The specific evidence and argument offered by the Examiner has not been rebutted. Accordingly, the rejection of claim 21 under § 103 in view of the combined teachings of Aiba and Lam 804 is AFFIRMED.

Lam 804 and Aiba

The Examiner rejects claims 1, 2, 5, 7, and 9–23 over the combined teachings of Lam 804 and Aiba. (Ans. at 7-10.) The Examiner finds that Lam 804 teaches all the limitations required by the claims but for the recited 10 to 150 nm size of the friction particle and the irregular shape (*id.* at 8), and the average void volume of the porous base and the directional permeability (*id.* at 9). The Examiner finds that Aiba supplies the missing teachings, either expressly or inherently, and concludes that a prima facie case of obviousness has been established. (*Id.*)

Lam objects that Lam 804 does not teach a friction particle having a size in the 10 nm to 150 nm range recited in the claims, the shape of the particle, the porous volume of the porous base material, or the directional permeability of the material. (App. Br. at 13.) Lam does not, however, contradict the Examiner's findings with citations to Lam 804 showing that the Examiner's findings are either erroneous or mistakenly applied. (*Id.*)

Lam repeats its denial that Aiba teaches the required limitations, and asserts that the Examiner's inherency arguments fail to establish a prima facie case of obviousness. (*Id.* at 13–14.)

With the exception of the irregular shape limitation of claim 2, Lam's arguments are without merit. Merely asserting that the Examiner has erred, without explaining what facts show that the references have been misapprehended, fails to counterbalance the Examiner's findings and reasoning.

Accordingly, the rejection under § 103 of claim 2 is REVERSED, but the rejection of claims 1, 5, 7, and 9–23 is AFFIRMED.

Lam 341

Section 102(e)(1), which the Examiner cites as the basis of the rejection over Lam 341, requires that the invention be "described in "an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent." 35 U.S.C. § 102(e)(1); emphasis added. The inventors listed for Lam 341 are identical to the inventors listed for the 508 application on appeal. Accordingly, Lam 341 is not prior art with respect to the application on appeal, and the rejection of claims 1, 2, 5, 7, and 9–23 under 102(e) in view of Lam 341 is REVERSED.

E. Summary

In view of the record and the foregoing considerations, it is:

ORDERED that the rejection of claims 1, 5, 7, 9, 11–18, 20, and 22 under 35 U.S.C. § 102(e) in view of Aiba is AFFIRMED;

FURTHER ORDERED that the rejection of claim 2 under 35 U.S.C. § 102(e) in view of Aiba is REVERSED;

FURTHER ORDERED that the rejection of claims 10, 19, and 23 under 35 U.S.C. § 103 in view of Aiba and Yesnik is AFFIRMED;

FURTHER ORDERED that the rejection of claim 21 under 35 U.S.C. § 103 in view of Aiba and Lam 804 is AFFIRMED;

FURTHER ORDERED that the rejection of claims 1, 5, 7, and 9–23 under 35 U.S.C. § 103 in view of Lam 804 and Aiba is AFFIRMED;

FURTHER ORDERED that the rejection of claim 2 under 35 U.S.C. § 103 in view of Lam 804 and Aiba is REVERSED;

FURTHER ORDERED that the rejection of claims 1, 2, 5, 7, and 9–23 under 35 U.S.C. § 102(e) in view of Lam 341 is REVERSED;

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).

AFFIRMED-IN-PART

MAT

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