

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte VISHAL BANSAL, HYUN SUNG LIM,
HARRY VAUGHN SAMUELSON, and
MICHAEL ROBERT SAMUELS

Appeal 2008-4309
Application 11/230,008
Technology Center 1700

Decided: November 28, 2008

Before EDWARD C. KIMLIN, ADRIENE LEPIANE HANLON, and
CAROL A. SPIEGEL, *Administrative Patent Judges*.

HANLON, *Administrative Patent Judge*.

DECISION ON APPEAL

A. STATEMENT OF THE CASE

This is an appeal under 35 U.S.C. § 134 from an Examiner's final rejection of claims 25-48, all of the claims pending in the application. We have jurisdiction under 35 U.S.C. § 6(b). We AFFIRM.

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The Examiner finally rejected claims 39, 40, and 43 under 35 U.S.C. § 102(b) as anticipated by Linstid.¹ Final 2.²

The Examiner finally rejected claims 25-38, 41, and 42 under 35 U.S.C. § 103(a) as unpatentable over the combination of Linstid and Coffy.³ Final 3.

The Examiner finally rejected claims 25-38, 41, 42, and 44-48 under 35 U.S.C. § 103(a) as unpatentable over the combination of Linstid, Kurihara,⁴ and Land.⁵ Final 3.

B. ISSUES

Issue 1: Have the Appellants have shown that the Examiner reversibly erred in finding that the amorphous liquid crystalline polymers disclosed in Linstid have a melting point within the range recited in claims 25 and 39?

Issue 2: Have the Appellants have shown that the Examiner reversibly erred in concluding that it would have been obvious to one of ordinary skill in the art to form the Linstid fibers into a fabric in view of the teachings of Coffy?

Issue 3: Have the Appellants have shown that the Examiner reversibly erred in rejecting claims 25-38, 41, 42, and 44-48 under 35 U.S.C. § 103(a) as unpatentable over the combination of Linstid, Kurihara, and Land?

¹ US 6,294,640 B1 to Linstid, III et al. issued on September 25, 2001 (“Linstid”).

² Final Office Action mailed December 14, 2006.

³ US 5,360,503 to Coffy issued on November 1, 1994 (“Coffy”).

⁴ US 6,207,273 B1 to Kurihara et al. issued on March 27, 2001 (“Kurihara”).

⁵ US Patent Application Publication 2002/0124544 A1 to Land et al. published on September 12, 2002 (“Land”).

C. FINDINGS OF FACT

The following findings of fact are supported by a preponderance of the evidence. Additional findings of fact as necessary appear in the Analysis portion of the opinion.

1. Appellants' Specification

The Appellants disclose a flame retardant fabric comprising bicomponent fibers having a sheath and a core wherein the sheath comprises a fully aromatic thermoplastic polymer with a Limited Oxygen Index (LOI) of at least 26. Spec. 1:22-25.

According to the Appellants, fully aromatic thermoplastic polymers which resist flame propagation consist essentially of repeating units of unsaturated cyclic hydrocarbons containing one or more rings connected with ester, amide, or ether linkages. Examples of these types of polymers include fully aromatic: polyester polymers, polyester-amide polymers, polyamide-imide polymers, liquid crystalline polymers (LCP), and liquid crystalline polyester polymers. Spec. 2:3-9.

2. Claimed subject matter

Claims 25 and 39 are the only independent claims on appeal. They read as follows:

25. A flame retardant fabric comprising bicomponent fibers having a sheath and a core wherein the sheath comprises a fully aromatic thermoplastic polymer with an LOI of at least 26 having a melting point (Tm) between about 200°C and about 325°C, and the core comprises a thermoplastic polymer.

39. A flame retardant bicomponent fiber comprising a core of thermoplastic polymer and a sheath of a fully aromatic thermoplastic polymer with an LOI of at least 26 having a melting point (Tm) between about 200°C and about 325°C.

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Br. 14-15,⁶ Claims Appendix.

3. Linstid

Linstid discloses amorphous anisotropic melt-forming polymers. Linstid 1:12-16.

Anisotropic melt-forming polymers are also known as liquid crystalline polymers or “LCPs.” Linstid 1:21-22.

The polymers disclosed in Linstid are considered to be amorphous in that they lack a well-defined melting point or T_m . Linstid 5:65-6:1.

The disclosed polymers are suitable for producing fibers, such as monofilaments, multifilaments, and bicomponent fibers, using conventional fiber forming equipment. Linstid 18:3-6.

Bicomponent fibers include core and sheath fiber structures. Linstid 18:14-18.

4. Coffy

Coffy discloses that liquid crystal polymers (LCP) have a good resistance to flames and high temperatures. Coffy 3:15-20.

Coffy discloses that LCP fibers may be arranged to form a fabric. Coffy 4:9-10.

Coffy discloses that the fabric can be produced in a conventional manner. Coffy 4:15-17.

5. Kurihara

Kurihara discloses a process for producing a heat-resistant filament and filament assembly composed of a thermotropic liquid crystal polymer (LCP). Kurihara 1:10-13.

⁶ Appeal Brief dated May 25, 2007 (“Br.”).

The thermotropic LCP filament is also incombustible and flame retardant. Kurihara 31:60-65.

Kurihara discloses that the filament assembly may be in the form of a cloth. Kurihara 18:35-39.

Examples of thermotropic LCPs include liquid crystalline polyesters, polycarbonates, and polyester-imides. Specifically, (wholly) aromatic polyesters, polyester-amides, polyamide-imides, polyester-carbonates, and polyazomethines are mentioned. Kurihara 5:35-39.

6. Land

The invention disclosed in Land relates to a fire resistant yarn and a fabric that includes the fire resistant yarn. Land, para. [0003].

Land discloses that the invention has particular applicability in the formation of fire resistant fabrics for applications such as upholstery, mattress and pillow ticking, bed spreads, pillow covers, draperies or cubicle curtains, wallcoverings, window treatments, awning covers, and baby clothing. Land, para. [0003].

D. PRINCIPLES OF LAW

During patent examination, the pending claims must be interpreted as broadly as their terms reasonably allow. The reason is simply that during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed. *In re Zletz*, 893 F.2d 319, 321 (Fed. Cir. 1989).

“To anticipate a claim, a prior art reference must disclose every limitation of the claimed invention, either explicitly or inherently.” *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997).

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Where the claimed and prior art products are identical or substantially identical, the PTO can require an applicant to prove that the prior art products do not inherently possess the characteristics of the claimed product. *In re Best*, 562 F.2d 1252, 1255 (CCPA 1977).

A compound and all of its properties are inseparable. *In re Papesch*, 315 F.2d 381, 391 (CCPA 1963).

A claimed invention is not patentable if the subject matter of the invention would have been obvious to a person having ordinary skill in the art at the time the invention was made. 35 U.S.C. § 103(a); *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734 (2007); *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 13 (1966).

Facts relevant to a determination of obviousness include (1) the scope and content of the prior art, (2) any differences between the claimed invention and the prior art, (3) the level of skill in the art, and (4) any relevant objective evidence of obviousness or non-obviousness. *KSR*, 127 S. Ct. at 1734; *Graham*, 383 U.S. at 17-18.

A person of ordinary skill is not an automaton but is a person of ordinary creativity. *KSR*, 127 S. Ct. at 1742. One of ordinary skill in the art is presumed to have skills apart from what the prior art references expressly disclose. *In re Sovish*, 769 F.2d 738, 742 (Fed. Cir. 1985).

Where a rejection is based on a combination of references, one cannot show non-obviousness by attacking the references individually. *In re Keller*, 642 F.2d 413, 426 (CCPA 1981).

E. ANALYSIS

Issue 1

The Examiner found that Linstid discloses a bicomponent fiber comprising a sheath of an aromatic thermoplastic polymer that has a melting point within the range recited in claims 25 and 39. Ans. 3⁷; Linstid 6:4-8.

In particular, referring to the “EXAMPLES” disclosed in Linstid, the Examiner found that the polymers were melt spun into tapes and the melt temperatures of the polymers varied between about 250°C to 300°C depending upon the melt characteristics of the sample. Ans. 6; Linstid 23:16-20.

The Appellants have failed to point to any error in the Examiner’s findings with respect to the “EXAMPLES” disclosed in Linstid. Rather, the Appellants argue that the polymers described in Linstid are amorphous polymers which are said to “lack a well-defined melting point or T_m .⁸” Br. 3. The Appellants also rely on Roberts⁸ to establish that an “amorphous polymer” has no crystallites and therefore, no melting point. Br. 5. For these reasons, the Appellants contend that the sheath polymers disclosed in Linstid do not anticipate the Appellants’ claimed sheath polymers which have “a melting point (T_m) between about 200°C and about 325°C.” Br. 4.

The Appellants’ arguments are not persuasive of reversible error. Roberts does not discuss amorphous LCPs of the type disclosed in Linstid. According to the “EXAMPLES” disclosed in Linstid, the melt temperatures of the polymers varied between about 250°C to 300°C. Linstid 23:16-20.

⁷ Examiner’s Answer dated October 19, 2007 (“Ans.”).

⁸ John D. Roberts et al., *Organic Chemistry: Methane to Macromolecules* 739-41 (W. A. Benjamin, Inc. 1971) (“Roberts”). Evidence Appendix A.

Thus, it would appear that the LCPs disclosed in Linstid are sufficiently crystalline to melt within the range recited in claims 25 and 39.

We recognize that Linstid discloses that the amorphous LCPs “lack a well-defined melting point or T_m .” However, the Appellants have failed to explain why the claims on appeal require a sheath polymer that has a sharp or well-defined melting point. *See* Final 2 (“it is the examiner’s position that the present claims do not necessarily exclude polymers that do not have ‘well-defined’ melting points”); Br. 5 (“the Examiner’s statement has no bearing as to whether the amorphous LCPs of Linstid anticipate the present claims”). To this end, we note that the Appellants have failed to direct us to any definition of “melting point” in the Specification that excludes the LCPs disclosed in Linstid. *Zletz*, 893 F.2d at 321.

For the reasons set forth above, the Appellants have not shown that the Examiner reversibly erred in finding that the amorphous LCPs disclosed in Linstid have a melting point within the range recited in claims 25 and 39.

Issue 2

The Examiner found that Linstid does not teach that the disclosed fibers may be formed into fabric. The Examiner, however, found that the teachings of Coffy establish that forming LCP fibers into fabric was known in the art. The Examiner concluded that it would have been within the skill of the ordinary artisan to form the fibers of Linstid into fabric as disclosed in Coffy. Ans. 4.

The Appellants do not point to any error in the Examiner’s findings. Rather, the Appellants argue:

[T]hose skilled in the art would not have been motivated to form the Linstid amorphous polymer fibers into fabrics according to Coffy, since (1) Coffy clearly desires fibers of

only highly crystalline LCPs, in contrast to the amorphous fibers of Linstid, and (2) Coffy desires fabrics having relatively low elasticity, comparable to a glass/epoxy laminate, in contrast to the highly stretchable fibers desired by Linstid.

Br. 6.

Significantly, the Appellants have failed to explain in any detail why the alleged differences between the LCP fibers of Linstid and the LCP fibers of Coffy render the fibers of Linstid unsuitable as a fabric.

For this reason, the Appellants have failed to show that the Examiner reversibly erred in concluding that it would have been obvious to one of ordinary skill in the art to form the Linstid fibers into a fabric in view of the teachings of Coffy.

Issue 3

The Examiner found that Linstid does not teach that the disclosed LCP fibers may be formed into fabric. Nonetheless, the Examiner found that the teachings of Kurihara establish that forming LCP fibers into fabric was known in the art. The Examiner also found that Land teaches that it was known in the art to produce articles, such as the articles recited in claims 44-48, from a fire resistant material having a LOI greater than 22. The Examiner concluded that the combined teachings of Linstid, Kurihara, and Land would have rendered obvious the subject matter on appeal. Ans. 5.

The Appellants do not point to any error in the Examiner's findings. Rather, the Appellants argue that fabric formed of the LCP fibers disclosed in Linstid would not meet the limitations of the claims on appeal. In particular, the Appellants argue that "it is not certain that the Linstid fibers would exhibit LOIs of at least 26, required by the rejected claims." Br. 12.

The Examiner found that the aromatic thermoplastic sheath polymers disclosed in Linstid are the same as the sheath polymers recited in claim 25. Ans. 3, 4. Therefore, the Examiner found that the sheath polymers disclosed in Linstid inherently have a LOI within the claimed range. Ans. 3, 5. The Appellants have failed to point to any error in the Examiner's findings.

Next, the Appellants argue that Kurihara discloses making bicomponent fibers wherein the core, not the sheath, is a thermotropic LCP. Br. 8-9. The Appellants also argue that Land is completely silent with respect to forming bicomponent sheath/core fibers. Br. 10.

The Examiner relied on the teachings of Linstid, not the teachings of Kurihara or Land, to establish that a bicomponent fiber comprising a LCP sheath was known in the art. *See* Ans. 3, 9. Therefore, it is of no moment that the fire resistant filaments disclosed in Kurihara or Land do not comprise a LCP sheath. *Keller*, 642 F.2d at 426.

As for dependent claims 28-30 and 43, and more particularly claims 29 and 30, the Appellants argue that the polyester-amide and polyamide-imide disclosed in Kurihara do not have a LOI within the claimed range. Br. 9-11.

Claim 29 recites a bicomponent fiber sheath comprising a fully aromatic polyester-amide polymer, and claim 30 recites a bicomponent fiber sheath comprising a fully aromatic polyamide-imide polymer. Br. 14, Claims Appendix; *see also* Spec. 2:3-9.

As pointed out by the Examiner, Kurihara discloses heat resistant filaments composed of LCPs, such as wholly aromatic polyester-amides and polyamide-imides. Kurihara 5:35-39. Based on the record before us, it is reasonable to find that the wholly aromatic polyester-amides and polyamide-

imides disclosed in Kurihara are the same or substantially the same as the Appellants' claimed fully aromatic polyester-amide and polyamide-imide polymers. *Best*, 562 F.2d at 1255. Therefore, it is reasonable to find that the wholly aromatic polyester-amides and polyamide-imides disclosed in Kurihara have a LOI within the claimed range. *Papesch*, 315 F.2d at 391.

The Appellants also argue that the various repeating units I-V described in Linstid cannot be formulated to make a polyamide-imide. Br. 12.

This argument is not persuasive of reversible error. The Examiner is not proposing to reformulate repeating units I-V described in Linstid. Rather, the Examiner is proposing to substitute the polyester-amides or polyamide-imides disclosed in Kurihara for the LCPs disclosed in Linstid. *Keller*, 642 F.2d at 426.

For the reasons set forth above, the Appellants have failed to show that the Examiner reversibly erred in rejecting claims 25-38, 41, 42, and 44-48 under 35 U.S.C. § 103(a) as unpatentable over the combination of Linstid, Kurihara, and Land.

F. DECISION

The rejection of claims 39, 40, and 43 under 35 U.S.C. § 102(b) as anticipated by Linstid is affirmed.

The rejection of claims 25-38, 41, and 42 under 35 U.S.C. § 103(a) as unpatentable over the combination of Linstid and Coffy is affirmed.

The rejection of claims 25-38, 41, 42, and 44-48 under 35 U.S.C. § 103(a) as unpatentable over the combination of Linstid, Kurihara, and Land is affirmed.

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No time period for taking any subsequent action in connection with this appeal may be extended under 35 U.S.C. § 1.136(a) (2008).

AFFIRMED

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