UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RAMIN AMIN-SANAYEI and CHRISTYN OLMSTEAD

Appeal 2008-5815
Application 11/149,797
U.S. Patent Publication 2006/0281845 A1
Technology Center 1700

Decided: October 28, 2008

Before: FRED E. McKELVEY, *Senior Administrative Patent Judge*, and SALLY GARDNER LANE and MICHAEL P. TIERNEY, *Administrative Patent Judges*.

McKELVEY, *Senior Administrative Patent Judge*.

DECISION ON APPEAL

A. Statement of the case

Arkema Inc. ("**Arkema**"), the real party in interest, seeks review under 35 U.S.C. § 134(a) of a final rejection of claims 1 and 5-7 as being unpatentable under 35 U.S.C. § 103 over (1) Kato, U.S. Patent 5,349,003, and (2) Grootaert, U.S. Patent 6,933,357 B2.

Kato is prior art under 35 U.S.C. § 102(a) and (e).

Grootaert is prior art under 35 U.S.C. § 102(e).

Arkema has made no attempt to antedate either Kato or Grootaert.

Accordingly, in this appeal both Kato and Grootaert are prior art.

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

B. Findings of fact

The following findings of fact are believed to be supported by a preponderance of the evidence. References to the specification are to U.S. Patent Publication 2006/0281845 A1. 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.

Background

Fluoropolymers are generally made by an aqueous dispersion process. In order to achieve stable dispersion or emulsion, a suitable surfactant or emulsifier must be employed. Fluorinated-surfactants are generally used because they are said to yield stable particle and high molecular weight fluoropolymers. However, the fluorinated-surfactants typically used in emulsion polymerization of fluoropolymers, such as the ammonium salt of perfluoro-octanoic acid or salts of perfluoro-sulfonic acids are said to be expensive. They also are said present an environmental concern related to bio-persistence. Specification, ¶ 0002.

According to Arkema, it is therefore would have been desirable to carry out an emulsion polymerization of fluoropolymers in the absence of fluorinated-surfactants, without compromising the properties of the resultant fluoropolymers. Specification, ¶ 0003.

Emulsion polymerization of vinylidene fluoride at moderate pressures and temperatures using fluorinated surfactants and free radical initiators is taught in the prior art. Specification, ¶ 0004.

The invention

The invention relates to an aqueous fluoropolymer composition comprising (a) a fluoropolymer solids made up of at least 50 mole percent of fluoromonomer units; and (b) from 100 ppm to 2 percent, based on the weight of the fluoropolymer solids, of one or more emulsifier(s) having polyethylene glycol and/or polypropylene glycol segments with repeating units of from 2 to 100. Specification, ¶¶ 0008-0010.

The invention also relates to a process for preparing a fluoropolymer comprising polymerizing at least one fluoromonomer in an aqueous medium comprising at least one emulsifier consisting of a non-fluorinated, non-ionic emulsifier containing polyethylene glycol and/or polypropylene glycol segments with repeating units between 2 to 200. Specification, ¶ 0011.

Emulsifiers suitable for use in this invention are non-fluorinated non-ionic emulsifiers containing segments of polyethylene glycol (PEG), polypropylene glycol (PPG) or a combination thereof, with repeating units between 2 to 200, preferably between 3 to 100, and more preferably 5 to 50. The glycol-based emulsifiers used in this invention include, but are not limited to, polyethylene glycol acrylate (PEGA), polyethylene glycol (PEG), polyethylene glycol phenol oxide (Triton X-100®), polypropylene glycol acrylate (PPGA), and polypropylene glycol (PPG). Specification, ¶ 0014.

The emulsifier is used at a level of from 100 ppm to 2 percent based on the total polymer solids of the fluoropolymer formed. Specification, ¶ 0017.

The specification makes the following statement (¶ 0025), the relevance of which will become apparent when we discuss the scope of the claims (emphasis added):

> While the invention is generally practiced with the PEG and/or PPG emulsifier as the sole emulsifiers, co-*emulsifiers* or co-*surfactants* could also be present in the invention, including fluorinated or partially fluorinated *emulsifiers*.

The specification reports results of experimental work. See Table 1 following ¶ 0029. Since the language used to describe the experimental work is in the past tense, we assume that the reported results are based on actual experimentation, as opposed to prophetic.

We read the experimental work as reporting results of preparing a fluoropolymer composition using conventional fluoropolymerization techniques with a non-fluorinated "surfactant" and in the absence of any fluorinated or partially-fluorinated "emulsifier."

Table 1 reports the use as "surfactants" of (1) PEGA (polyethylene glycol acrylate--¶ 0028); (2) X-100 (polyethylene glycol phenol oxide (Triton X-100--¶ 0014)); (3) PEG 200 (polyethylene glycol--¶ 0014); (4) PEG 300; (5) PEG 450; and (6) PEG 570.

<u>Original claim 1</u>

As filed, claim 1 read as follows (Specification as filed, page 11):

> An aqueous fluoropolymer composition comprising

b) a fluoropolymer containing at least 50 mole percent of fluoromonomer units; and

c) from 100 ppm to 2 percent, based on the weight of the fluoropolymer solids, of one or more emulsifier(s) having polyethylene glycol and/or polypropylene glycol segments with repeating units of from 2 to 100.

Two things stick out about original claim 1. There is no "a)" and there is no antecedent for "the fluoropolymer solids" in "c)".

There came a time prior to publication of the application when claim 1 was amended.

Amended claim 1, which is the claim on appeal, reads:

An aqueous fluoropolymer composition comprising

a) a fluoropolymer containing at least 50 mole percent of fluoromonomer units;

b) from 100 ppm to 0.15 percent, based on the weight of the fluoropolymer solids, of one or more emulsifier(s) having polyethylene glycol and/or polypropylene glycol segments with repeating units of from 2 to 100; and

wherein said composition contains no fluorinated surfactants.

Amended claim 1 now has an "a)" and a "b)" but it still has no antecedent basis for "the fluoropolymer solids." When fluoropolymers are made in an emulsion process, fluoropolymer solids result. Accordingly, we read the preamble language "fluoropolymer composition" to mean a "fluoropolymer composition having fluoropolymer solids."

Also apparent from amended claim 1 is the use of "emulsifier" on the one hand and "surfactant" on the other hand. More about this later.

Claims on appeal

Claims 1 and 5-7 are on appeal.

Amended claim 1 is reproduced above.

Since a separate argument is not made with respect to claims 5-7, those claims stand or fall with claim 1.

Prior art

1. Kato

The Kato invention relates to an aqueous fluorine-containing polymer dispersion and an aqueous dispersion containing a fluorine-containing polymer and a water soluble resin and/or a water-dispersible resin. Col. 1:12-15.

The Kato invention specifically provides for an aqueous dispersion comprising a fluorine-containing polymer, which dispersion consists essentially of 95-30 parts by weight (in terms of solids content) of the aqueous fluorine-containing polymer dispersion and 5-70 parts by weight (in terms of solids content) of an aqueous dispersion of at least one resin selected from the group consisting of a water-soluble resin and a water-dispersible resin. Col. 3:1-8.

The vinylidene fluoride polymer used as *seed* particles in the Kato invention is preferably a vinylidene fluoride polymer obtained by emulsion-polymerization. Specific examples of the vinylidene fluoride polymer obtained by emulsion-polymerization include vinylidene fluoride homopolymer and copolymers of (1) vinylidene fluoride and (2) a fluorine-

containing ethylenically unsaturated compound (*e.g.* trifluorochloroethylene, tetrafluoroethylene, hexafluoropropylene, vinyl fluoride, hexafluoroisobutylene, perfluoroacrylic acid or the like). Col. 3:9-25.

The vinylidene fluoride polymer *seed* particles may be added in any state to the Kato polymerization system as long as they are dispersed in an aqueous medium in the form of particles. Since the vinylidene fluoride polymer is usually produced as an aqueous dispersion, it is convenient that the aqueous dispersion as produced be used as seed particles. Col. 3:28-34.

The aqueous vinylidene fluoride polymer dispersion can be produced by a conventional emulsion polymerization method, for example, by emulsion-polymerizing the starting monomers in an aqueous medium in the presence of an emulsifier, a polymerization initiator, a pH-adjusting agent, *which are all described hereinafter*. The particle diameters of the vinylidene fluoride polymer particles may vary depending upon the diameters of polymer particles present in an objective aqueous dispersion of said polymer but ordinarily is in the range of preferably 0.04-2.9 µm. Col. 3:34-44.

The aqueous fluorine-containing polymer dispersion according to the Kato invention can be obtained by emulsion-polymerizing 5-95 parts by weight, particularly preferably 20-90 parts by weight, of the monomer mixture mentioned above, in an aqueous medium in the presence of 100 parts by weight of the vinylidene fluoride polymer *particles* mentioned above. Col. 5:1-8

The emulsion-polymerization takes place under ordinary emulsion polymerization conditions. For example, an emulsifier, a polymerization initiator, a pH-adjusting agent, a solvent, etc. are added to an aqueous medium, and polymerization is effected at a temperature of about 30 º — 100 ºC. for about 1-30 hours. Col. 5:20-25.

As the emulsifier, there is used (1) an anionic emulsifier, (2) a nonionic emulsifier or (3) a combination thereof. In some cases, there can also be used an amphoteric surfactant or a cationic surfactant. As the nonionic emulsifier, there can be used, for example, polyoxyethylene alkyl ether and a polyoxyethylene alkylaryl ether. Preferred are a polyoxyethylene nonylphenyl ether, polyoxyethylene octylphenyl ether, etc. Col. 5:26-47.

The amount of the emulsifier used is ordinarily about 0.05-5 parts by weight per 100 parts by weight of the total of the vinylidene fluoride polymer particles and the monomer mixture. Col. 5:48-51.

2. Grootaert

The aqueous emulsion polymerization process used in the Grootaert invention is known. Col. 2:34-35.

In the known process, aqueous colloidal dispersions are obtained by polymerizing fluorinated monomers in an aqueous medium containing a relatively high amount of fluorinated emulsifiers such as salts of perfluoro octanoic acid and the like with mild agitation. The process is described in detail in "Modern Fluoropolymers", High Performance Polymers for

Diverse Applications, edited by John Scheirs, John Wiley & Sons (1997), especially pages 225 to 227.[1] Col. 2:35-43.

In a context apart from making fluoropolymers, Grootaert reveals that the emulsifiers used by Arkema are known. Col. 8:64-67.

C. Discussion

Examiner's 103 rejection

The burden on appeal is for Arkema to show that the examiner erred.

We are not convinced that error has been shown.

The prior art suggests that, as a general proposition, fluoropolymer emulsions are made with a fluorinated emulsifier. Arkema's claim 1, however, requires that the claimed composition contains no fluorinated surfactants. What is the difference between an emulsifier and a surfactant? The specification mentions "co-emulsifiers or co-surfactants." Specification, ¶ 0025. The "Markush" listing in the specification might lead one to conclude that Arkema intends to distinguish an "emulsifier" from a "surfactant." Arkema identifies the emulsifiers said to be useful in its invention by reference to the word "emulsifier." However, in Table 1 Arkema describes the "surfactant" said to have been used in the experimental work there reported. At the end of the day, in this case we think that "emulsifier = surfactant." Why did Arkema use two words to

[1] While Schiers is not cited by either the examiner or Arkema, we note that in Section 2.1.2 on page 225, Schiers states: "The copolymerization is carried out via an aqueous emulsion polymerization under very similar reaction conditions as practiced and described with the emulsion for PTFE fine resin powers [18]. The ammonium salt of perfluorooctanoic acid is the preferred emulsifier."

define the same "thing"? We have no idea. Nevertheless, it is unfortunate that two words are used in the claim to define the same "thing." Patent law has a reputation for engaging in peculiar jargon in specifications. Unclear patent jargon can lead to confusion, unintended rejections of claims and unintended allowance of claims. We recommend that in the future Arkema use a single word to identify "something" rather than two or more words to identify the same "something."

The significant disclosure in Kato is its description of how the *seed* fluoropolymer is made. As the examiner correctly notes, Kato does not say that the emulsifier used to make the fluoropolymer seed must be a fluorinated emulsifier. Rather, as further noted by the examiner the vinylidene fluoride polymer dispersion which will be used as Kato's seed polymer can be produced by a conventional emulsion polymerization by emulsion-polymerizing the starting monomers in a aqueous medium in the presence of an emulsifier, an initiator, and a pH-adjustment agent, "which are all described hereinafter." Col. 3:34-40.

When it comes to emulsifiers, what is "hereinafter" described are anionic emulsifiers, nonionic emulsifiers, combinations of anionic and nonionic emulsifiers and various other emulsifiers. While Arkema has some disagreement with the examiner's rationale, we cannot say that the examiner's position is not based on substantial evidence.

Arkema sought to avoid a couple of problems. We are told that one problem to be avoided is the expense of using perfluoro-octanoic acid or its salts. Apparently, they are expensive. Specification, ¶ 0002. Another result of using perfluoro emulsifiers is an environmental concern. This detail is

confirmed to some degree by Grootaert. Col. 6:6-9. In the Appeal Brief we further learn that use of fluorinated surfactants is "under scrutiny by the EPA." Appeal Brief, page 3.

What surfaces from the problems which Arkema sought to overcome is that there is a market demand for avoiding the use of perfluoro emulsifiers. *Cf. KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007). Arkema does not contend that the emulsifiers it uses are not readily available or are more expensive than the perfluoro emulsifiers. Kato says that polyethylene emulsifiers and polypropylene glycol emulsifiers can be used to make fluoropolymer emulsions. Arkema does not contend that the non-fluorinated emulsifiers it uses are not readily available in the market—Grootaert shows that they have been available for many years. It therefore follows that Arkema is using known emulsifiers (shown by Grootaert) in a known emulsion polymerization reaction (as shown by Kato) to obtain a predictable result (as described by Kato).

<u>Arkema's arguments</u>

Arkema contends that the seed fluoropolymer to be used in the Kato process must have been made in an emulsion process where a fluoro-containing emulsifier was used. To be sure, the prior art reveals that many fluoropolymers are made with fluoro-emulsifiers. However, Kato suggests that a fluoro-emulsifier is not essential and in fact suggests that non-fluorinated emulsifiers can be used. To the extent that Arkema believes the Kato suggestion is not preferred, the examiner has a complete answer: the prior art is not limited only to preferred embodiments. Accordingly, the

prior art suggests formation of PVDF seed without a fluorinated emulsifier. Appeal Brief, page 3, Argument 1.

Arkema says that Kato does not say how the seed PVDF is formed. Appeal Brief, page 3, Argument 2. But as the examiner noted, Kato describes how the PVDF can be made. Col. 3:34-40.

With respect to Argument 3, (Appeal Brief, page 3), we earlier noted that market concerns in this case dictated avoidance of fluorinated emulsifiers.

Arkema argues that the KYNAR polymers describe in the Kato examples have to be "fluoro-surfactant containing." Accordingly, Arkema reasons that the Kato products must have some fluorinated emulsifier, at least residual fluorinated emulsifier. Since the claims require "no" fluorinated emulsifier, Arkema further reasons that Kato misses the mark. Appeal Brief, pages 3-4, Argument 4. There are at least two answers to Arkema's line of reasoning. *First*, as noted by the examiner the "evidence" that KYNAR has residual fluorinated emulsifier is based solely on an argument of counsel. An argument of counsel is not evidence. *Second*, assuming that KYNAR has residual fluorinated emulsifier, Kato alternatively discloses that non-fluorinated emulsifiers can be used.

Arkema raises several "other points." Appeal Brief, pages 4-5.

In Point A, Arkema tells us that to get the right size particle for the Kato purpose, one must use a fluorinated emulsifier. According to Arkema, "[o]ther method of PVDF particle synthesis produce particles of a size too large for use in Kato." Arkema's factual assertion is based on argument of counsel and is contradicted by Kato who reveals that non-fluorinated

emulsifiers can be used. Col. 3:34-40. Moreover, we note that Arkema in no way describes what it means by "[o]ther methods."

In Points B and C, Arkema relies on a theory of Partitioning Coefficients to suggest that there is no way repeated treatment cannot remove ALL residual fluorinated emulsifier from fluoropolymers made with a fluorinated emulsifier. Since Kato says one way to make the fluoropolymer is without a fluorinated emulsifier, there would be no need for repeated treatment. Under those circumstances, the theory—while interesting in the abstract—becomes irrelevant.

In Point D, Arkema repeats its prior argument that Kato does not expressly describe a non-fluorinated emulsion-containing fluoropolymer. We agree with the examiner that it does and therefore find Point D unconvincing. The argument (Appeal Brief, page 5) concerning a result effective variable is a side-show.

We have considered Arkema's remaining arguments and find none that warrant reversal of the Examiner's rejection(s). *Cf. Hartman v. Nicholson*, 483 F.3d 1311, 1315 (Fed. Cir. 2007).

D. Decision

Upon consideration of the appeal, and for the reasons given herein, it is

ORDERED that the decision of the Examiner rejecting claims 1 and 5-7 over the prior art is *affirmed*.

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) (2008).

AFFIRMED

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cc (via First Class mail)

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