Trials@uspto.gov
571-272-7822

Paper No. 24
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

RIMFROST AS,
Petitioner,

v.

AKER BIOMARINE ANTARCTIC AS,
Patent Owner.

Case IPR2017-00745
Patent 9,078,905 B2

Before ERICA A. FRANKLIN, TINA E. HULSE, and JACQUELINE T. HARLOW, *Administrative Patent Judges.*

HARLOW, *Administrative Patent Judge.*

FINAL WRITTEN DECISION
Determining That Claims 1–20 Have Been Shown to Be Unpatentable
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

Rimfrost AS ("Petitioner") filed a Petition requesting an *inter partes* review of claims 1–20 of U.S. Patent No. 9,078,905 B2 (Ex. 1001, "the '905 patent"). Paper 2 ("Pet."). Aker Biomarine Antarctic AS ("Patent Owner") declined to file a Preliminary Response.

On August 16, 2017, we instituted an *inter partes* review of all challenged claims on all grounds asserted. Paper 9. On November 8, 2017, Patent Owner filed a Patent Owner Response to the Petition. Paper 14 ("PO Resp."). On January 24, 2018, Petitioner filed a Reply to the Patent Owner Response. Paper 17 ("Reply").

We issue this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. Having considered the record before us, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–20 of the '905 patent are unpatentable. *See* 35 U.S.C. § 316(e).

A. Related Matters

The '905 patent is asserted in *Aker Biomarine Antarctic AS v. Olympic Holding AS*, Case No. 1:16-CV-00035-LPS-CJB (D. Del.). Pet. 2; Paper 3, 1. In addition, Petitioner has challenged, and we have instituted *inter partes* review of, the claims of the '905 patent in IPR2017-00747. Paper 5, 2.

Petitioner also challenges U.S. Patent No. 9,028,877 B2 ("the '877 patent) in IPR2017-00746 and IPR2017-00748. Paper 5, 2. Both the '905 patent and the '877 patent are continuations of Application No. 12/057,775, filed March 28, 2008.

The parties have not identified any further, currently pending, related proceedings concerning the '905 patent.[1]

B. The '905 Patent

The '905 patent, titled "Bioeffective Krill Oil Compositions," issued July 14, 2015, with Inge Bruheim, Snorre Tilseth, and Daniele Mancinelli as the listed co-inventors. Ex. 1001, [54], [45], [72].

The '905 patent describes extracts from Antarctic krill, small shrimp-like animals, that include bioactive fatty acids. Ex. 1001, 1:19–20. In particular, the '905 patent discloses krill oil compositions having "high levels of astaxanthin, phospholipids, includ[ing] enriched quantities of ether phospholipids, and omega-3 fatty acids." *Id*. at 9:28–31.

The '905 patent states that myriad health benefits have been attributed to krill oil in the prior art. For example, the '905 patent states that "[k]rill oil compositions have been described as being effective for decreasing cholesterol, inhibiting platelet adhesion, inhibiting artery plaque formation, preventing hypertension, controlling arthritis symptoms, preventing skin cancer, enhancing transdermal transport, reducing the symptoms of premenstrual symptoms or controlling blood glucose levels in a patient." Ex. 1001, 1:46–52. In addition, the '905 patent recognizes that krill oil compositions, including compositions having up to 60% w/w phospholipid

[1] The '905 patent was also asserted in *In the Matter of Certain Krill Oil Products and Krill Meal for Production of Krill Oil Products*, Investigation No. 337-TA-1019 (USITC) (Pet. 2–3; Paper 3, 1); however, Petitioner states that the investigation has been "effectively terminated." Paper 22, 3.

content and as much as 35% w/w EPA/DHA content, were known in the art prior to the time of invention. *Id*. at 1:52–57. The '905 patent also indicates that supercritical fluid extraction with solvent modifier was known to be a useful method for extracting marine phospholipids from salmon roe. *Id*. at 1:65–67.

According to the '905 patent, however, the solvent extraction methods used in the prior art to isolate krill oil from the krill "rely on the processing of frozen krill that are transported from the Southern Ocean to the processing site," which transportation is expensive and may result in the degradation of the krill starting material. *Id*. at 2:3–6. Such methods have included steps of placing the material into a ketone solvent, such as acetone, to extract the lipid soluble fraction, and recovering the soluble lipid fraction from the solid contents using a solvent such as ethanol. *Id*. at 1:32–40.

To overcome the above limitations, the '905 patent discloses "methods for processing freshly caught krill at the site of capture and preferably on board a ship." *Id*. at 10:18–20. The '905 patent explains that the krill may be first subject to a protein denaturation step, such as a heating step, to avoid the formation of enzymatically decomposed oil constituents. *Id*. at 9:43–50; 10:26–31. Subsequently, the "oil can be extracted by an optional selection of nonpolar and polar solvents including use of supercritical carbon dioxide." *Id*. at 9:51–54.

In Example 7 of the '905 patent, "[k]rill lipids were extracted from krill meal (a food grade powder) using supercritical fluid extraction with co-solvent." *Id*. at 32:15–16.

> Initially, 300 bar pressure, 333°K and 5% ethanol (ethanol:CO_2, w/w) were utilized for 60 minutes in order to remove neutral lipids and astaxanthin from the krill meal. Next, the ethanol content was increased to 23% and the extraction was maintained for 3 hours and 40 minutes. The extract was then evaporated using a falling film evaporator and the resulting krill oil was finally filtered.

Id. at 32:17–23.

Example 8 of the '905 patent prepared krill oil using the same method described in Example 7, from the same krill meal used in that example. Ex. 1001, 32:45–46. The krill oil was then analyzed using ^{31}P NMR analysis to identify and quantify the phospholipids in the oil. *Id.* at 32:46–48. Table 22[2] shows the phospholipid profiles for the raw material, the final product, and a commercially available krill oil, Neptune Krill Oil ("NKO"). *Id.* at 33:6–9. Table 22 is reproduced below:

[2] We view reference in the '905 patent to "table 25" (Ex. 1001, 33:6–9) to be an inadvertent typographical error, as the specification does not include a table 25. We understand Example 8 of the specification to refer, instead, to Table 22, which sets forth the described phospholipid profiles.

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