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FISHERIES RESEARCH BOARD OF CANADA

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UTILIZATION OF SPERM OIL

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Before discussing the actual utilization of sperm oil a summary of its composition will be given.

Sperm oil is unique among oils in that it contains fatty alcohols. These give it properties which make it suitable for particular uses. The fatty alcohols occur combined with fatty acids in the same manner as glycerol is combined with fatty acids in other oils. Sperm head oil contains approximately 74% fatty alcohol esters (fatty acids combined with fatty alcohols) and 26% triglycerides (fatty acids combined with glycerol). Of the total fatty alcohols present in sperm head oil approximately 45% is cetyl alcohol, 8% tetradecyl alcohol, 6% octadecyl alcohol, 27 to 30% oleyl alcohol, 4% hexadecenyl alcohol, and 10% eicosenyl alcohol. Sperm blubber oil contains about 66% fatty alcohol esters and 34% triglycerides. The fatty alcohols in sperm blubber oil are composed of 66 to 70% oleyl alcohol, 25 to 27% cetyl alcohol, about 1% octadecyl alcohol and 8% unsaturated C_{20} alcohols.

Sperm blubber oil remains clear when cooled to relatively low temperatures, but sperm head oil when cooled deposits a solid material called spermaceti. This is composed of the more saturated fatty acids combined with saturated fatty alcohols (cetyl, tetradecyl, and octadecyl alcohols). The fatty alcohol esters of fatty acids are, chemically, referred to as waxes. Spermaceti is called a solid wax; the fatty alcohol esters which remain liquid when cooled are called liquid waxes.

Spermaceti is used to a considerable extent in cosmetics and similar products, entering for example into the following: shaving cream, lipstick, rouge, and various skin creams (cold cream, vanishing cream, etc.). It is also used in pharmaceutical preparations, chiefly in ointments, although it has also been used in pill coatings.

While spermaceti is thus used largely as such, sperm oil is mostly used in processed forms. The sulphonated oil produced in large quantities by sulphonation of sperm oil is used in several different ways. It forms the basis of various detergents and emulsifying agents, and is also utilized in several industries, chief of which are the leather industry, where it is employed for softening tanned hides, and the textile industry, where it is used for finishing both cotton and rayon thread.

During recent years considerable interest has been shown by various oil companies in the use of sperm oil, or compounds prepared from it, in lubricants.

Miscellaneous products in which sperm oil, or compounds prepared from it, are used include rust preventatives, insecticides and air-conditioning filters.

PATENTS

A list of patents which have been taken out during the last ten years covering the use of sperm oil, or constituents thereof, are given below.

LUBRICANTS

VOLTOLIZED SPERM OIL, ETC., FOR USE AS A LUBRICANT OR FOR OTHER PURPOSES. R.P. Russell (to Standard Development Co.) U.S. Patent 2,170,665, August 22, 1940.

SULPHURIZED SPERM OIL AND THE LIKE SUITABLE FOR USE WITH MINERAL LUBRICATING OILS. H.G. Smith and T.L. Cantrell (to Gulf Oil Corp.) U.S. Patent 2,179,063, November 7, 1939.

HIGH-VISCOSITY-INDEX, HIGH-VISCOSITY OIL COMPOSITIONS. C.N. Kimberlin (to Standard Development Co.) U.S. Patent 2,202,801, May 28, 1940. A polymerized high-viscosity, high-viscosity index oil is obtained by subjecting sperm oil to the effect of a silent electric glow discharge.

DRAWING COMPOSITIONS SUITABLE FOR USE IN VARIOUS METAL-FORMING OPERATIONS. A.E. Nill (to H.A. Montgomery Co.) U.S. Patent 2,326,387, August 10, 1944. Sulphonated sperm oil mixed with sulphonated tall oil.

LUBRICATING OIL ADDITION AGENTS. F.C. McCoy and C.C. Towne (to The Texas Co.) U.S. Patent 2,367,362, January 16, 1945. Sulphurized sperm oil.

ADDITIONS TO LUBRICATING OILS TO REDUCE FRICTION AT LOW RUBBING SPEEDS BETWEEN FERROUS METAL SURFACES. B.B. Farrington (to Standard Oil Co. of California) U.S. Patent 2,370,299, February 27, 1945. Esters of sperm oil alcohols with hydroxy acids such as citric, tartaric, lactic, etc.

OILINESS AGENT. B.B. Farrington (to Standard Oil Co. of California). U.S. Patent 2,370,300, February 27, 1945. Esters of sperm oil alcohols and hydroxy acids, mixed with mineral oil.

LUBRICATING OIL CORROSION INHIBITORS. Standard Oil Development Co. British Patent 578,692, July 9, 1946. Sulphurized sperm oil added to base oils containing either calcium diisobutyl phenolate or calcium octodecanolate.

MINERAL-OIL STABILIZING AGENT. E.W. Fuller and H.G. Berger (to Socony-Vacuum Oil Co., Inc.) U.S. Patent 2,411,153, November 19, 1946. Oleyl alcohol and phosphorus pentasulphide.

LUBRICATING OIL ADDITIVES. C.M. Blair Jr. (to Petrolite Corp., Ltd.) U.S. Patent 2,444, 328, June 29, 1948. Esters of high-molecular-weight alcohols with polybasic carboxy acids.

LUBRICANT. J.M. Musselman and H.P. Lankelma (to Standard Oil Co. of Ohio). U.S. Patent 2,444,947, July 13, 1948. Contains chlorinated, refined hydrogenated sperm oil.

LUBRICANT. J.M. Musselman and H.P. Lankelma (to Standard Oil Co. of Ohio). U.S. Patent 2,444,948, July 13, 1948. Contains chlorinated, refined hydrogenated sperm oil.

EXTREME-PRESSURE LUBRICANT. L.W. Sproule and L.F. King, (to Standard Oil Development Co.) U.S. Patent, 2,468,520, April 26, 1949. Contains sperm oil.

LUBRICATING OIL COMPOSITION. H.G. Smith and T.L. Cantrell. U.S. Patent 2,475,727, July 12, 1949. Contains sperm oil.

DETERGENTS

DRY CLEANING COMPOSITION. L.H. Flett (to Allied Chemical and Dye Corp.) U.S. Patent 2,236,772, August 17, 1943. Contains cetyl or lauryl compounds.

SOAP FROM SPERM OIL. G. Schmidt and O. Edwards (to Compania Ind.) U.S. Patent 2,393,421, January 22, 1946.

DETERGENT COMPOSITION COMPRISING 1,3-DIOXALANE DERIVATIVES. D.J. Lodor, (to E.I. DuPont de Nemours and Co.) U.S. Patent 2,395,971, March 5, 1946. Includes derivatives of fatty alcohols.

COSMETICS

PHARMACEUTICAL PREPARATION FOR THE TREATMENT OF THE SKIN. T. Higuti. Japanese Patent 129,206, March 15, 1939. Contains cetyl alcohol.

SUN TAN COMPOUNDS. S. Isermann and E. Ohlsson. U.S. Patent 2,395,665, February 26, 1946. Fatty alcohol esters of p-aminobenzoic acid.

MISCELLANEOUS PRODUCTS

OLEAGINOUS PROTECTIVE COATINGS FOR METALS SUCH AS THOSE UNDERGOING MANUFACTURING OPERATIONS. E.A. Nill (to H.A. Montgomery Co.) U.S. Patent 2,223,458, December 3, 1940. A sperm-oil soap dissolved in mineral oil.

SULPHONATED PRODUCTS SUCH AS THOSE OF CASTOR OIL, NEATSFOOT OIL, COTTONSEED OIL, RAPESEED OIL, CORN OIL, COD OIL, TALLOW AND SPERM OIL. B.A. Dombrow (to National Oil Products Co.) U.S. Patent 2,280,118, April 21, 1942.

VISCOSITY-INDEX IMPROVER. C.M. Blair, Jr. (to Petrolite Corp. Ltd.) U.S. Patent 2,384,595, September 11, 1945. Covers the use of oleyl, eicosenyl, docosenyl, and linoleyl alcohols.

EMULSION POLYMERIZATION. D.B. Kelly and Imperial Chemical Industries, Ltd. British Patent 581,343, October 9, 1946. The sodium salt of sulfated sperm oil is used as a constituent of a synthetic rubber.

STABILIZED AQUEOUS RUBBER DISPERSIONS. M.R. Buffington. U.S. Patent 2,442,341, July 1, 1948. Involves the use of octadecyl alcohol.

RUST-PREVENTING MINERAL-OIL COMPOSITION. E.W. Fuller, R.V. White, and B.W. Story (to Socony-Vacuum Oil Co., Inc.) U.S. Patent 2,443,579, June 15, 1948. Neutral and partial esters of oleyl alcohol and malic acid.

SULPHURIZED ESTERS OF OXALIC ACID (ANTIOXIDANT) AND ANTICORROSIVE ADDITIVES. D.T. Rogers (to Standard Oil Development Co.) U.S. Patent 2,447,619, August 24, 1948. Sulphurized oleyl oxalate.