THE ANIMAL AND VEGETABLE WAXES IN 1937

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THE journal and patent literature relating to the natural waxes records each year a considerable amount of new knowledge about these useful raw materials. The present compilation for the year 1937 describes briefly these new additions to our knowledge and includes citations to pertinent reviews and discussions.

The review follows the general scheme employed by the writer five years ago (1), except that the only higher aliphatic alcohols considered are those that may be derived directly from the natural waxes. The compilation is based upon the short summaries that appeared in *Chemical Abstracts* and the *Chemisches Zentralblatt* for 1937.

ANIMAL WAXES

Beeswax

The physics and chemistry of beeswax received comparatively little attention during the past year. The electrical energy released by the polarized wax when it is melted between two electrodes was determined by Frei and Groetzinger (2), and Grodman (3) gave methods for finding the acid and saponification values of the wax.

Mantell and Rubenkoenig (4) described a shellac substitute which they made by melting together Manila copal resin, partially oxidized fatty acid, and beeswax. The substitute is reported to be only slightly inferior to natural shellac in hardness and toughness of film. Lödl (5) reviewed old and modern methods for manufacturing candles and Hill (6) described the use of certain dyes for coloring candles and wax tapers.

After investigating 29 protective methods and materials, two Polish investigators (7) concluded that a beeswax coating was one of the most effective means for preserving the quality of sausages during prolonged storage. An investigation conducted in Russia (8) showed that the adhesive qualities of treated rosin varnishes can be improved by adding a mixture of beeswax and glyptal resin. A sanitary cleaning and polishing composition for floors and furniture, developed by Feytaud and Lapparent (9), contained the following ingredients: turpentine spirit, redistilled terpineol, pulverized derris or cubé root, bornyl acetate, bornyl chloride, zinc resinate, beeswax, and spermaceti. Shcheglov (10) prepared a coating for manifold copying paper by mixing paraffin, petroleum pitch, dye, rosin, liquid petrolatum, yellow petrolatum, and beeswax.

Wax-coated pills will pass through the entire digestive tract without change, according to Ahonen (11). Studies made by Fiero (12) indicated that hard hydrogenated castor oil is a satisfactory substitute for beeswax in U. S. P. ointments. Dechaume (13) analyzed various brands of lip stick and identified white wax among the constituents.

Wool Wax (Wool Fat, Wool Grease, Lanolin)

The crude fat content of Mongolian sheep wool decreases as the coarseness of the fiber increases, according to Saito (14). He also found that there is generally less fat in Mongolian wool than in Merino wool. Miller (15) reported that the raw fat content of wool from lambs varies from 1 to 26%. This fat contains both solid and liquid components, each having about an equal percentage of saponifiable and unsaponifiable ingredients. Commercial utilization of the fat was described. Bulgakov (16) devised a method for recovering wool fat as a by-product in the production of sheepskin.

A Russian investigation (17) disclosed the fact that saponin is helpful in washing the natural fat from wool. It emulsifies well in very low concentrations, even 0.01%. The saponin may be used alone or in conjunction with soda solutions, but it has no beneficial effect when employed with soap. Henk (18) stated that the mildly alkaline reaction of soap is desirable in raw wool scouring, and Lindner (19) found that metaphosphate is only valuable in wool scouring when used in an amount sufficient to soften the water. Savournin (20) discussed the use of polysulfonated fatty acids or their glycerides in wool scouring (see French Pat. 801,920; British Pat. 456,244). The freezing process for removing fat from raw wool was discussed by Herbig (21) and by Townend (22). Various methods for recovery of wool fat were reviewed by Brock (23), Phillips (24), Thompson (25), Zizka (26), and Kershaw (27). The treatment and disposal of trade wastes containing wool fat was described by Rudolfs (28) and by Stevenson (29).

Kuwata and Ishii (30) isolated fatty acids from wool fat having 14, 16, 18, 20 and 21 carbon atoms. The new carboxylic acids identified in this investigation were: lanomyristic, lanopalmitic, lanostearic and lanoarachidic acids. It is stated that wool fat does not contain any normal fatty acids.

A new and rapid colorimetric method for the determination of wool fat was developed by Zil'berkviet and Vasil'ev (31). The method is based on the Liebermann-Burchard color reaction, obtained by treating a solution of the sample in chloroform with acetic anhydride and concentrated sulfuric acid.

A yuft substitute was prepared by impregnating cotton fabrics with an emulsion containing lanolin, paraffin, rosin, acetic acid, gelatin, ethyl alcohol, aluminum acetate, turpentine, and ammonium hydroxide (32).

The use of anhydrous and hydrous wool fat in antiseptic ointments was studied by Prout and Strickland (33), and Fiero (12) suggested that hydrogenated castor oil could be substituted for wool fat in preparing ointments. Masino (34) reported the properties of an ointment made from basic bismuth gallate and lanolin. For the treatment of psoriasis, D'Agostino and Torres (35) used an ointment containing lanolin. Schieblich and Pallaske (36) irradiated crude wool fat, lanolin, and eucerin by

exposing these substances to ultraviolet light (eucerin is an ointment base made from lanolin and petrolatum). They found that vitamin D was not generated in this manner and, further, that the irradiated substances do not cause calcification of the inner organs.

The follicular hormone was synthesized in Russia by chemical treatment of isocholesterol separated from wool fat (37). Ahonen (11) found that lanolin-coated pills dissociate in the intestine in 6 to 7 hrs. A pharmaceutical preparation containing lanolin was described by Ruyssen (38).

Augustin (39) and Henk (40) discussed the use of lanolin in superfatted soaps, and the value of this material in modern cosmetics was emphasized by Rothemann (41).

Colored roofing paints were prepared from wool fat pitch in Germany (42), the protective action of several lubricants including lanolin was investigated by Stepanov (43), and Obst (44) briefly reviewed the technical utilization of wool fat.

An aqueous emulsion containing crude brown Yorkshire grease (wool fat), white mineral oil, cresylic acid, and p-dichlorobenzene was used by Moore (45) for the control of the sheep maggot fly. Numerous studies were conducted on the use of lanolin as a vehicle for indoleacetic acid in dressing tree wounds and stimulating plant growth (46 to 52, inclusive).

Sperm Oil and Spermaceti

The composition of sperm head oil was investigated in Japan (53). The oil was distilled under reduced pressure and the components of the various fractions determined The first fraction contained solid esters, mostly cetyl laurate, and liquid cetyl and oleyl esters of the C_{12} and C_{14} acids. Cetyl laurate was also isolated from the second fraction, along with the cetyl and oleyl esters of myristic and physeteric acids. Different proportions of the same components were found in the third fraction and, in addition, esters of zoömaric were identified. The fourth fraction consisted principally of cetyl and oleyl esters of zoömaric acid. The various characteristics of the oil before distillation, the distillates, and the residue were determined. Ueno and Koyama (54) described the constituents of the unsaponifiable matter occuring in sperm blubber oil.

Egupov and co-workers (55) discussed the different laboratory and commercial procedures for separating spermaceti and other components from sperm oil, and considered their uses in the cosmetic and candle industries. The liquid waxes are employed in the manufacture of several cosmetics and their use was discussed by Janistyn (56). He included a description of "Cetiol," an odorless oil obtained by the hydrogenation of spermaceti, which is recommended as a substitute for sperm oil. A similar product, "Ocenol K," may also be substituted. Jannaway (57) suggested the replacement of mineral oil by "Cetiol" in non-foaming type shampoos. Analysis of several samples of lip stick showed that spermaceti is often used as an excipient (13).

Burton and Robertshaw (58) developed a simple method for determining the amount of oil in sulfonated oils. Specimen analyses were given for products made by sulfonating sperm oil. Bertram (59) proposed a method for detecting animal fats and oils. A voilet color produced by the addition of chloroform to a mixture of 1 cc. of fat and 3 gm. of trichloracetic acid crystals is stated to indicate the presence of these fats. Sperm oil gives a weak color reaction.

Other Animal Waxes

According to Blount and coworkers (60) the wax of the white-pine chermes (*Adelges* [*Pineus*] *strobi*, Borner) is an ester of 17-ketohexatriacontanol and 11-ketotriacontanoic acid. These components are related to the ketonic alcohol and ketonic acid found in cochineal wax. Melissyl alcohol, melissic acid, and cerotic acid were found in the wax from the insect, *Sasakiaspis pentagona* Tar. by Kono and Maruyama (61). Gum lac is a mixture of resins and wax. Taradoire (62) analyzed 53 samples of lac and found the wax content to vary from 2.17 to 5.13%.

Tsujimoto and Koyanagi (63) reported that wax esters were found among the products obtained by the vacuum distillation of the head oil from the pilot whale. A small amount of cerotic acid, a typical wax acid, was stated to be present in butter fat (64).

An attempt was made in Russia (65) to prepare a stand oil by boiling dolphin oil with cobalt drier. The product did not compare favorably in drying properties with a mixture containing equal proportions of dolphin and linseed oils. Dolphin oil is of interest in this connection since it contains an appreciable quantity of wax esters.

VEGETABLE WAXES

Montan Wax

The best solvent for extracting montan wax from Ukranian brown coal is a mixture of equal parts of crude alcohol and benzene, according to Kopeliovich and coworkers (66). The wax obtained had a melting point of 84.6 to 89.0° and was similar in quality to the German product. In another Russian investigation (67) montan wax was extracted from brown coal by dichloroethylene. The product was deresinified by solution in 2 parts of hot benzene and precipitated with 4 to 8 parts of crude alcohol. The wax thus obtained had a melting point of 80 to 86°. This was bleached with a mixture of potassium dichromate, sulfuric acid and nitric acid at 105-15° for 7 hours. The product was a porous, pale yellow wax melting at 79-81°. The yield averaged about 73%.

Waxes were extracted from primary peat tar by Levchenko (68). Two methods were employed: filter-pressing after preliminary crystallization of the waxes at a final temperature of 15-20°, and by centrifuging a gasoline solution of the tar waxes crystallized at 0° or -5°. The waxes were freed from asphaltenes by treatment with 25-30% sulfuric acid. The refined products melted at 70-80° and were obtained in a yield of about 5% of the peat tar. Reilly, Kelly and Ryan (69) proposed constant-boiling mixtures for extracting waxes from peat.

Cane Wax

Mitsui (70) obtained 8.3% wax by extracting press cake from the manufacture of raw sugar. The press cake from white sugar manufacture gave 2% wax, and bagasse yielded 0.43%. He used both benzene and ether as extracting solvents. In this investigation, stigmasterol and sitosterol were isolated from cane wax. It is stated that these sterols may be used as

raw materials for the preparation of sexual hormones.

The gum that dries on the surface of sugar cane contains about 2% of a wax, according to Colin and Belval (71). The wax can be separated from the gum by solution in boiling alcohol.

Other Vegetable Waxes

Wax extracted from cotton has a yellow color, melts at 83-85° and has the following characteristics: specific gravity 0.902, saponification number 2.5, acid number 6.7 and iodine number 12.75 (72). Edelstein (73) found that the removal of wax from cotton before or after mercerization had no effect on the direct dye affinity of the yarn, and Viktorov and Vil'dt (74) also reported that solvent removal of cotton wax had no effect on dyeing properties.

John (75) reviewed the properties and characteristics of esparto wax and presented a number of formulas for floor, furniture and shoe polishes using this wax. In the chemical bleaching of linen fiber, the flax wax must first be removed by emulsifying agents before bleaching can be accomplished (76).

The presence of wax in *Avena* coleoptiles was studied in relation to cellulose orientation and primary substances by Whurmann and Meyer (77). A waxy material was extracted by Earl and Doherty (78) from *Sarcostemma australe,* R. Br., and Albarranc (79) found waxes in the wood of *Pachylobus buttneri.* A wax-like substance was isolated from *Periploca aphylla* in India (80).

The oil obtained from the seeds of *Simmondsia Californica,* Nutt is in reality a liquid wax. The composition of this wax was studied in the United States by McKinney and Jamieson (81), and in England by Green, Hilditch and Stainsby (82). It was found to be composed almost entirely of higher aliphatic alcohols and mono-ethylenic acids. The alcohols are mainly eicosenol and docosenol, esterified with the corresponding acids.

The composition of the waxy residue left after distillation of Florida grapefruit peel was reported by Markley, Nelson and Sherman (83), and Marcelet (84) isolated a new C_{19} alcohol from the wax comprising the unsaponifiable matter in raspberry oil. Strickland and Cole (85) investigated the effect of the waxy coating on apples on spray residue removal. Markley and Sando (86) extracted and analyzed the wax occurring on the cuticle of the cherry. In a study of substances separated from cherry brandy, Mohler and Pólya (87) determined the absorption spectrophotometry of the wax and wax acids from this source. The buds of *Populus balsamifera* were found to contain a wax acid by Boris and Canal (88).

Simpson and Williams (89) discovered a wax among the ether-soluble constituents of Honduras sarsaparilla root, and Inoue (90) reported the characteristics of a new white amorphous wax isolated from the root of the Japanese dandelion.

The wax content of the leaves of *Artemisia scopariaeformis* and *A. salina* was determined by Lazurevskii (91). Pyriki (92) conducted extraction experiments to determine the best solvent for isolating resins and wax from tobacco leaves. Ceryl alcohol was discovered among the constituents of the leaves of *Epimedium macranthum* (93).

The presence of a wax in freshly-collected filix-mas rhizomes was noted by Stamm and Willner (94), and ceryl alcohol and cerotic acid were found among the constituents of *Aspergillus citromyces* (95). The wax present in various strains of human and bovine tubercle bacilli was investigated by Bloch (96) and by Reeves and Anderson (97).

A very comprehensive review of the origin and collection of vegetable waxes occurring in 15 genera of plants was compiled by Howes (98). Vegetable waxes were included in a discussion of agriculture as a potential source of raw materials for industry (99). Fundamental studies on the occurrence of waxes in plants were reported by Meyer (100) and by Gundermann and co-workers (101).

Analysis

Various waxes were spotted on filter paper and their appearance in ultraviolet light was studied by Derrett-Smith (102), and practical methods for investigating the quality of commercial wax products were reviewed by Ivanovszky (103).

Use of Waxes in the Industries

In addition to the technical uses given in the patent section of the present review, a number of journal articles have been written about this branch of technology.

The use of melted waxes for rendering textiles resistant to moisture was described by Taubitz (104), and the preservation of fabrics with waxes was included in a discussion by Durant (105).

Waxes are used to make sized yarn soft, pliable and smooth according to Mann (106), who also mentioned these materials in an article on cotton-size mixings (107). Ariente and co-workers (108) found that wax emulsions were unsuitable for removing oil from cotton and rayon.

Hattinger (109) described the use of cetyl alcohol in the preparation of wetting agents and Glickman (110) set forth detailed instructions for the manufacture of emulsion floor waxes using triethanolamine oleate. It is stated by Tanchico and West (111) that Philippine annato dye is useful for coloring floor, furniture and shoe polishes. Biphenyl can be used in the formulation of certain wax compositions, according to Bowron (112). Means for imparting a honey or wax aroma to floor wax, shoe creams and similar products were discussed by Fornét (113) and numerous illustrative formulas given. The preparation and properties of auto polishes were reviewed by Albertson (114), Schedwill (115), and Kolke (116). A description of the many uses of paraffin in the manufacture of wax products was contributed by Serrier (117).

In the paper industry Halls (118) detailed the methods and equipment employed for the wax impregnation of paper. Kumler (119) reviewed the patent literature on the use of wax emulsions in surface sizing of paper and board. Methods for making paper waterproof with the aid of waxes were given by Shankweiler (120), and Burgstaller (121) related how waxes, used to impregnate paper, can be detected and determined.

Bunte and Wittig (122) compared the use of animal and vegetable waxes for impregnating leather gas-meter diaphragms, and Vogel (123) showed that sole leather, tanned with sulfite cellulose, must be filled with oil or wax

to give a satisfactory product.

Methods for using wax as a protective coating in the etching process for engraving materials were related by Werner (124). Blom (125) found that some waxes are effective as a moisture-proof sealing coat for wood. They are applied before painting.

Turpentine is preferred to its substitutes because of its pleasant odor and greater solvent power in such compositions as floor waxes, shoe creams, etc. (126). Rossmann (127) developed the fact that the quantity of drying oil in anti-rust paints can be reduced by partially replacing the oil with waxes.

Destructive distillation of waxes gives products useful as frost protectors, according to a German investigation (128). In a study on the decay of citrus fruits in storage, Tisdale and West (129) found that waxing the fruits reduced the effectiveness of the fungicide used. Mills (130) employed mixtures of cetyl alcohol with shellac and mastic as enteric-coating materials for medicinal tablets, and Jannaway (131) gave a number of formulas and methods for making specialized cosmetics, including depilatory waxes. Deakers (131a) discussed the use of beeswax in cosmetic creams.

General

Properties and uses of cetyl alcohol were reported by Higashi and Kubo (132), Myers and Harkins (133), Prevost (134), and Levitt (135).

Ralston and Christensen (136) investigated the high-molecular alkyl aryl ketones and found that some of them can be used as synthetic waxes in polishing compositions. Wax-like products, derived by catalytic reduction of carbon monoxide and carbon dioxide (from water gas), were described by Graefe (137). One product, which melted at 96°, was stated to be superior to montan wax in its ability to take up more solvent and still remain a paste. Two synthetic waxes, "Ceryl Wax O" and "Ceryl Wax Z" were announced during the year (138).

A general article describing the properties of certain waxes was compiled by Avis (139).

Books

Cires, encaustiques et produits d'entretien divers, by Margival. Paris: Desforges, 175 pp., Fr. 20.

Cirages: Cremes pour chaussures, graisses et apprets pour cuir, by Margival. Paris: Desforges, 231 pp., Fr. 25.

Patents

In the following patent listings, the name of the wax or wax derivative is given to call attention to the materials that are receiving the most emphasis in current patent development.

Extraction

U. S. 2,060,851 (1936) Calcott and Clarkson, wool fat; 2,069,533 (1936) McCulloch, shellac wax; 2,094,489 (1937) Hueter, wool fat. *British* 452,577 (1936) I. G. Farbenind. A.-G., wool fat; 459,406 (1937) Minerals Separation Ltd., wool fat. *French* 801,920 (1936) Hansawerke Lürman, Schütte & Co., wool fat; 813,867 (1937) I. G. Farbenind. A.-G., wool fat. *German* 639,535 (1936) Deutsche Hydrierwerke A.-G., wool fat; 642,053 (1937) Bartusch, waxes; 642,755 (1937) Frosted Wool Process Co., wool fat. *Italian* 304,361 (1932) Pastori, wool fat. Spolka z ogran. odpow., wool fat. *Polish* 21,822 (1935) Polichemja *Swedish* 89,891 (1937) Dyckerhoff, coffee bean wax.

Refining

U. S. 2,077,837 (1937) Holwech, sperm oil; 2,090,738 (1937) Tischer, vegetable waxes; 2,093,348 (1937) Carpzow, waxes. *British* 454,579 (1936) Minor, beeswax; 459,540 (1937) Fawcett and Imperial Chem. Ind., Ltd., flax wax. *French* 805,848 (1936) Minor, beeswax. *German* 632,516 (1936) Firma E. Merck and Langenkamp, waxes. *Indian* 22,733 (1936) Minor, beeswax. *Swiss* 185,411 (1936) Steiger, waxes.

Sulfonation

U. S. 2,058,389 (1936) Rummelsburg, cetyl alcohol; 2,072,475 (1937) Kern, cetyl alcohol. *German* 640,681 (1937) Rudolf & Co. and Wenzel, cetyl alcohol; 649,156 (1937) Oranienburger chem. Fab. A.-G., waxes. *Italian* 312,581 (1933) Soc. an. Ind. Chim. Barzaghi, sperm oil, spermaceti, carnauba wax, lanolin; 325,734 (1933) Soc. an. Iterba, cetyl alcohol; 331,425 (1934) Oranienburger chem. Fab. A.-G., wax alcohols. *Norwegian* 57,389 (1936) Unger, sperm oil.

Emulsification

U. S. 1,826,900-Reissue 20,361 (1937) Schrader, waxes; 2,075,403 (1937) Nester, waxes; 2,079,613 (1937) Holt, waxes; 2,086,479 (1937) Schrauth, sperm oil; 2,088,336 (1937) Neitzke, waxes. *British* 452,532 (1936) Ges. für chem. Ind. zu Basel, waxes; 454,183 (1936) Chem. Fab. R. Baumheier A.-G., waxes; 455,782 (1936) British Celanese Ltd., Ellis and Kirk, spermaceti; 457,391 (1936) Röhm & Haas Co., waxes; 458,817 (1936) du Pont Co., waxes; 459,791 (1937) I. G. Farbenind. A.-G., waxes; 465,148 (1937) Deutsche Hydrierwerke A.-G., waxes; 466,510 (1937) Mayer, esparto wax, wool wax, montan wax. *French* 801,034 (1936) Chem. Forschungsgesellschaft, waxes. *German* 633,517 (1936) Chem. Fab. Pott & Co. G. m. b. H., waxes.

Coloring with Dyes

U. S. 2,059,094 (1936) Eistert, Krzikalla and Rosenberg, waxes; 2,072,022 (1937) Bristow, fruit wax; 2,081,755 (1937) Lodge, waxes; 2,083,308 (1937) Senn, waxes; 2,087,282 (1937) Friedrich and Smith, waxes; 2,090,938 (1937) Conrad, waxes, shoe polishes, candles. *British* 455,320 (1936) Soc. pour l'ind, chim. a Bale, waxes; 459,053 (1936) I. G. Farbenind. A.-G., waxes, polishes, shoe creams; 459,797 (1937) I. G. Farbenind. A.-G., waxes, candles, polishes, shoe creams; 460,276 (1937) I. G. Farbenind. A.-G., waxes; 461,426-7 (1937) I. G. Farbenind. A.-G., waxes; 462,233 (1937) Geigy A.-G., waxes. *French* 780,030-Addn. 46,927 (1936) I. G. Farbenind. A.-G., wax; 801,416 (1936) I. G. Farbenind. A.-G., waxes; 806,597 (1937) I. G. Farbenind. A.-G., waxes. *German* 636,352 (1936) I. G. Farbenind. A.-G., Eistert, Krzikalla and Rosenberg, waxes; 646,244- Addn. 642,001 (1937) I. G. Farbenind. A.-G., waxes. *Swiss* 189,145 (1937) I. G. Farbenind. A.-G., waxes.

Solvents

German 643,276 (1937) I. G. Farbenind. A.-G., waxes. *Polish* 21,801 (1935) Deutsche Hydrierwerke A.-G., waxes.

Preparation of Alcohols, Acids, Esters and Other Compounds from Waxes

U. S. 2,060,851 (1936) Calcott and Clarkson, cetyl and ceryl alcohols; 2,063,629 (1936) Salzberg and Werntz, cetyl alcohol; 2,064,797 (1936) Holsten, cetyl alcohol; 2,070,318 (1937) Rosser and Swann, cetyl alcohol; 2,070,597 (1937) Benner, sperm oil alcohols; 2,070,991 (1937) Hund and Rosenstein, waxes; 2,077,837 (1937)

Holwech, wax esters from sperm oil; 2,080,419 (1937) Green, cetyl alcohol from spermaceti; 2,091,800 (1937) Adkins, Folkers and Conner, alcohols from spermaceti. *British* 454,668 (1936) I. G. Farbenind. A.-G., mercaptan derivatives of sperm oil alcohols. *French* 809,407 (1937) I. G. Farbenind. A.-G., α-hexadecylamine from cetyl alcohol; 809,675 (1937) N. V. De Bataafsche Petroleum Maat., hexylene from montan wax. *Russian* 48,953 (1936) Spasski, cetyl alcohol from sperm oil.

Synthetic Waxes and Wax-Like Substances

U. S. 2,060,410 (1936) Balle, wax-like products; 2,071,496 (1937) Bruson, Robinson and Stein, waxy fatty acids; 2,077,133 (1937) Sibley, waxy products; 2,079,403 (1937) Hansley, wax-like substances; 2,081,753 (1937) Littmann, wax-like condensation products; 2,084,261 (1937) Boughton and Mansfield, wax-like viscous liquids and waxy plastics; 2,088,014 (1937) Wickert and Fruere, wax-like solid; 2,089,212 (1937) Kritchevsky, wax-like products; 2,090,595 (1937) Jacobson, wax substitutes. *British* 458,475 (1937) du Pont Co., wax-like substances; 461,957 (1937) Henkel & Cie., wax substitutes; 463,014 (1937) Armour & Co., waxy products; 466,174 (1937) I. G. Farbenind. A.-G., wax-like products. *French* 759,261 — Addn. 46,985 (1936) I. G. Farbenind. A.-G., waxy substances; 796,980 (1936) Henkel & Cie., substitutes for wax alcohols; 800,769 (1936) Deutsche Hydrierwerke A.-G., condensation products resembling hard waxes; 803,731 Henkel & Cie., wax-like substitutes for fatty alcohols; 805,905 (1936) I. G. Farbenind. A.-G., wax-like products. *German* 633,916 (1936) I. G. Farbenind. A.-G., wax-like polymerization products; 638,440 (1936) Chem. Fabrik Marienfelde G.m.b.H. and Arndt, products resembling waxes; 641,865 (1937) Resinous Products and Chemical Co., wax-like product. *Polish* 22,932 (1936) Zjednoczone etc. and Rabek, wax-like materials.

Polishing and Floor Wax Compositions

U. S. 2,062,671 (1936) Lupo, degras (wool fat ?); 2,066,296 (1936) Lyons, wax; 2,067,297 (1937) van Allen, shellac wax; 2,071, 027 (1937) Dacus and Gallsworthy, carnauba wax; 2,075,362 (1937) Selleck and Ray, beeswax; 2,076,604 (1937) Watson, montan and carnauba waxes; 2,078,971 (1937) Pickens and Thompson, carnauba wax; 2,081,073 (1937) Shuger, "Lannette Wax;" 2,081,916 (1937) Eichstädt, wax; 2,082,050 (1937) Ernst, beeswax; 2,088,795 (1937) Kline, wax; 2,089,057 (1937) Hagerling, wax; 2,090,938 (1937) Conrad, coloring with dyes; 2,092,686 (1937) Wilson, wax. *Australian* 25,436/1935 (1936) Deguide, waxes; 24,853/1935 (1936) Pickens and Thompson, carnauba wax. *Belgian* 410,633 (1935) Kamarovsky, candelilla wax. *British* 453,911 (1936) — divided on 455,217, Henkel & Cie., montan wax; 454,579 (1936) Minor, beeswax; 459,053 (1936) I. G. Farbenind. A.-G., coloring with dyes; 459,797 (1937) I. G. Farbenind. A.-G., colored wax preparation; 461,957 (1937) Henkel & Cie., wax substitutes; 462,692 (1937) du Pont Co., carnauba and montan waxes. *French* 802,910 (1936) Henkel & Cie., montanic acid; 805,848 (1936) Minor, beeswax; 809,360 (1937) I. G. Farbenind. A.-G., additions to wax polishes. *Indian* 22,733 (1936) Minor, beeswax; 22,347 (1936) Deguide, waxes. *Italian* 296,457 (1930) Giovagnoli, montan wax and beeswax; 297,577 (1931) Semrau and Weckermann, carnauba wax and beeswax; 300,418 (1931) Soc. an. manuf. Glaces et Prod. chim. de St.-Gobain, Chauny & Cirey, wax; 346,488 (1936) Soc. an. Vernici Ind. Affini, beeswax. *Polish* 22,507 (1936) Wytwornia etc., beeswax, carnauba and candelilla waxes. *Swiss* 190,359 (1937) Michel, wax.

Molding, Modeling, Plastic, Adhesive and Resinous Compositions

U. S. 2,059,943 (1936) Graves, waxes; 2,062,403 (1936) Dreyfus, cetyl esters; 2,062,815 (1936) Matheson, wax; 2,062,917 (1936) Lawson, cetyl and carnaubyl alcohols; 2,062,918 (1936) Lawson, sperm oil alcohols; 2,063,837 (1936) Bruson, waxes; 2,065,157 (1936) Stine, wax; 2,067,502 (1937) Pollard and Russell, wax; 2,075,223 (1937) Pischel, wax; 2,075,646 (1937) Hewitt, wax; 2,084,644 (1937) Kinsley, beeswax; 2,087,337 (1937) Tomsicek, Dodge and Calva, beeswax; 2,088,612 (1937) Rosenblum, wax acids; 2,089,552 (1937) Harrison, waxes; 2,089,810 (1937) Penning, wax; 2,092,832 (1937) Cohn, wax. *Australia* 24,656/1935 (1936) McIntosh, wax; 100,387 (1937) Hucks and Mayer, wax; 100,443 (1937) Dunn, wax. *British* 454,251 (1936) Carborundum Co., waxes; 455,654 (1936) Imperial Chem. Industries Ltd., waxes; 456,934 (1936) Standard Oil Development Co., glycols from cracked wax; 457,310-11 (1936) U. S. Rubber Products Inc., wax; 461,271 (1937) Bakelite Ltd., synthetic or natural waxes; 461,742 (1937) Rosenblum, waxes; 464,978 (1937) Harrison, waxes; 467,491 (1937) Prüfer, waxes; 467,899 (1937) Beck, Koller & Co. (England) Ltd., waxes. *Canadian* 364,822 (1937) Abrams, Wagner and Forcey, wax. *French* 775,306 — Addn. 47,807 (1937) I. G. Farbenind. A.-G., natural or synthetic waxes; 797,286 (1936) Soc. Usines Chim. Rhone-Poulenc, cetyl alcohol; 803,009 (1936) Du-Pont Viscoloid Co., wax; 809,182 (1937) Nussbaum, waxes. *German* 636,760 (1936) I. G. Farbenind. A.-G., wool fat or wool fat acid; 647,324 (1937) Chem. Fab. Stockhausen & Cie und Buch & Landauer A.-G., cetyl alcohol; 648,505 (1937) Riebeck'sche Montanwerke A.-G. and Gries, hard waxes. *Hungarian* 114,853 (1936) Bolgar, waxes. *Swiss* 188,876 (1937) Heer, cetyl alcohol.

Waterproofing, Sealing and Coating Compositions

U. S. 2,059,829 (1936) Ward, carnauba wax; 2,061,374 (1936) Charch, carnauba wax; 2,061,558 (1936) Brandt, waxes; 2,065,792 (1936) Charch, wax; 2,066,399 (1937) Greider and Smith, waxy material; 2,066,516 (1937) Bugg, wax-like material; 2,070,487 (1937) Lutz, cetyl alcohol; 2,070,819 (1937) Peterson, carnauba wax; 2,070,936 (1937) Trowbridge, wax; 2,072,536 (1937) Trickey and Price, carnauba wax; 2,073,004 (1937) Engelhardt, wax; 2,073,301 (1937) Gehman, beeswax; 2,074,382 (1937) Ford, beeswax or carnauba wax; 2,077,396 (1937) Charch and Hershberger, wax; 2,077,399 (1937) Collins and Larson, carnauba wax; 2,077,400 (1937) Collins, wax; 2,077,411 (1937) Harvey, fruit waxes; 2,079,379 (1937) Mitchell, beeswax; 2,079,395 (1937) Bradshaw, wax; 2,082,193 (1937) Wells, wax; 2,082,592 (1937) Nolten, wax; 2,084,062 (1937) Nedvidek and MacRill, wax; 2,085,816 (1937) Meigs, wax; 2,087,013 (1937) Bateman, wax; 2,089,571 (1937) Polasik, beeswax; 2,090,016 (1937) carnauba wax; 2,091,715

(1937) Murray, synthetic wax; 2,092,967 (1937) Gay, Jackson and Wilson, wax. *Australian* 726/1936 (1936) Dewey and Almy Chem. Co., beeswax, carnauba, candelilla, montan, Chinese insect and wool waxes. *Austrian* 148,149 (1936) Petruska and Flek, carnauba wax; 150,006 (1937) "Teerag" A.-G. für Teerfabrikate, Asphalt, Russ und chem Producte, Gellen and Haller, wool fat or montan wax. *Belgian* 417,441 (1937) I. G. Farbenind. A.-G., wax. *British* 450,037 (1936) Morales, Castresana and Garcia, wax; 450,164 (1936) American Chem. Paint Co., wax; 450,817 (1936) divided on 443,955, Halden & Co. Ltd., waxy substances; 451,669 (1936) du Pont Co., wax; 451,686 (1936) Daller, wax; 453,210 (1936) Taylor and Imperial Chem. Industries Ltd., waxes; 454,323 (1936) Kennedy, wax; 454,579 (1936) Minor, beeswax; 454,616 (1936) Deutsche Hydrierwerke A.-G., waxes; 454,662 (1936) Warren and Fieldgate, wax; 454,759 (1936) Beiersdorf Ltd. and Moore, wool fat; 455,495 (1936) Wingfoot Corp., beeswax and spermaceti; 457,878 (1936) Chesler, carnauba wax; 458,815 (1936) du Pont Co., montan wax; 458,816 (1936) du Pont Co., wax; 459,344 (1937) Wolff & Co., waxy substances; 460,602 (1937) I. G. Farbenind. A.-G., cetyl or montanyl alcohols; 461,670 (1937) I. G. Farbenind. A.-G., cetyl alcohol; 462,691 (1937) Taylor and Imperial Chem. Industries Ltd., montan wax; 465,044 (1937) I. G. Farbenind. A.-G., waxes; 465,268 (1937) Bakelite Building Products Co., wax; 465,500 (1937) Young and Robertson Co., montan wax; 466,326 (1937) Koepp & Co. Chem. Fab. A.-G., waxes; 466,510 (1937) Mayer, esparto, wool and montan waxes; 466,908 (1937) Murmann and Prell, carnauba wax; 467,901 (1937) British Cellophane Ltd., ceryl and montanyl alcohols, cerotic, montanic and melissic acids, diethylene glycol diceryl ethers, dicerotate and bis (hydroxyethyl) ether of resorcinol, ceroxyethyl benzoate, diethylene glycol dicerotate, cerotene, ceryl bromide, tetracetyl-lead, diceryl-mercury, ceryl mercaptan and diceryl thioether; 468,374 (1937) Svennson, montan wax. *Canadian* 359,987 (1936) Gray, wax; 362,254 (1936) Clapsadle, carnauba wax; 362,645 (1936) Charch, wax. *Czechoslovakian* 51,247 (1935) Petruska, carnauba wax; 52,815 (1935) Fessl, carnauba wax and beeswax; 53,436 (1936) Richter, wax. *Danish* 52,609 (1936) Wilde, waxes; 52,763 (1937) Svensson, montan wax. *French* 788,840 — Addn. 47,670 (1937) I. G. Farbenind. A.-G., natural or synthetic wax; 797,551 (1936) Kodak-Pathé, wax; 799,631 (1936) Soc. Anon. la Cellophane, wax; 800,648 — Addn. 47,016 (1936) Champsaur, wax; 801,658 (1936) Röhm & Haas A.-G., methacrylic esters of cetyl alcohol; 802,524 (1936) Klapproth, wax; 803,062 (1936) Hoesch-Köln Neuessen A.-G. für Bergbau und Hüttenbetrieb and Baur, "ricin" wax; 805,623 (1936) Soc. d'etudes d'inventions, wax; 805,848 (1936) Minor, beeswax; 805,865 (1936) Bonbiot, wax; 810,513 (1937) I. G. Farbenind. A.-G., waxes; 810,073 (1937) Soc. franc. Beckacite, wax; 811,449 (1937) Nussbaum, waxes, cetyl palmitate or cetyl alcohol. *German* 633,916 (1936) I. G. Farbenind. A.-G., Kollek and Jahrstorfer, wax-like polymerization products; 648,119 (1937) Murrmann and Prell, carnauba and synthetic waxes; 648,970 (1937) Firma P. Lechler, waxes. *Hungarian* 115,309 (1936) Helvey and Aszodi, waxes; 116,064 (1937) Ellinger Bela-Wagner, etc., wax. *Indian* 22,733 (1936) Minor, beeswax; 23,177 (1937) Imperial Chem. Industries Ltd. and Taylor, montan wax; 23,417 (1937) Svensson, montan wax. *Italian* 288,514 (1930) Annoni, beeswax and montan wax; 309,881 (1932) Sindl, wax; 312,331 (1930) Loeben, beeswax. *Jugoslavian* 12,525 (1936) Schering-Kahlbaum A.-G., wool fat, wool wax, lanolin or isocholesterol; 13,166 (1937) Masa G. m. b. H. Herst. künstl. Oberflächen, waxes. *Norwegian* 57,255 (1936) Rusten, wax. *Russian* 47,383 (1936) Drinberg A.-G., wax. *Swiss* 184,058 (1936) Nadai, spermaceti or cetyl alcohol; 188,091 (1937) Prüfer, wool fat and waxes; 188,328 (1937) Ineichen, wax; 190,359 (1937) Michel, wax.

Emulsifying, Dispersing, Detergent and Wetting Agents

U. S. 2,058,389 (1936) Rummelsburg, cetyl alcohol; 2,061,593 (1936) Robinson, spermaceti, wool wax, beeswax, carnauba wax, Arctic sperm oil, flax wax, palm wax, Chinese insect wax; 2,062,957 (1936) Baldwin and Hailwood, cetyl alcohol; 2,063,987 (1936) Dreyfus, cetyl and melissyl alcohols; 2,064,797 (1936) Holsten, cetyl alcohol; 2,066,125 (1936) Rozenbroek, wool fat alcohols; 2,067,463 (1937) Schirm, alcohols from spermaceti and sperm oil; 2,072,475 (1937) Kern, cetyl alcohol; 2,075,914-5 (1937) Snoddy and Martin, sperm oil alcohols; 2,080,143 (1937) Lubs and Johnson, cetyl alcohol; 2,087,565 (1937) Balle and Eisfeld, amino derivatives of wax acids; 2,095,778 (1937) Wechsler and Segessemann, beeswax, wool and cottonseed waxes. *British* 450,192 (1936) Albright & Wilson Ltd., waxes; 452,508 (1936) N. V. Chem. Fab. "Servo" and Rosenbroek, wool fat; 453,786 (1936) I. G. Farbenind. A.-G., cetyl and montanyl alcohols; 454,668 (1936) I. G. Farbenind. A.-G., sperm oil; 459,791 (1937) I. G. Farbenind. A.-G., montan wax; 465,106 (1937) Henkel & Cie., wool fat; 468,399 (1937) Röhm & Haas Co., cetyl alcohol. *Dutch* 39,171 (1936) N. V. Chem. Fab. "Servo" and Rosenbroek, lanolin and spermaceti. *French* 796,980 (1936) Henkel & Cie., cerotic acid; 801,106 (1936) Mauersberger, cetyl alcohol and carnauba wax alcohols; 803,550 (1936) I. G. Farbenind. A.-G., montanic acid; 807,280 (1937) I. G. Farbenind. A.-G., wax alcohols; 809,342 (1937) Ofner, cetyl alcohol; 809,405 (1937) I. G. Farbenind. A.-G., wool fat. *German* 642,829 (1937) Böhme Fettchemie G. m. b. H., cetyl alcohol; 648,448 (1937) Chem. Fab. R. Baumheier A.-G. and Kern, cetyl alcohol; 649,323 (1937) Oranienburger chem. Fab. A.-G. and Russe, wax. *Italian* 325,734 (1933) Soc. an. Iterba, cetyl alcohol. *Swedish* 86,859 (1936) Aktiebolaget Patentor and Svensson, montan wax.

Cosmetic and Soap Industry

U. S. 2,061,468 (1936) Kling, wool fat; 2,062,411 (1936) Fischer, beeswax; 2,062,782 (1936) Epstein and Harris, beeswax and carnauba wax; 2,081,117 (1937) Hall, lanolin and beeswax; 2,087,161-2 (1937) Moore, candelilla wax; 2,091,313 (1937) Grant, wax. *Belgian* 413,355 (1936) Kercoff, natural or synthetic wax. *British* 457,975 (1936) Kereszty, wax; 460,839 (1937) Halden & Co., wool fat; 465,188 (1937) Kokatnur, lanolin; 463,481 (1937) F. Stroher A.-G., cetyl palmitate; 464,400 (1937) M. Factor & Co., wool fat, waxes and cetyl alcohol; 468,290 (1937) Hellerud, wool fat. *Canadian* 361,734 (1936) Kritchevsky, cetyl ester; 368,564 (1937) Isermann and Ohlsson, cetyl alcohol, lanolin, bees-

wax. *French* 803,224 (1936) Cancet, spermaceti, beeswax; 807,271 (1937) Soc. anon. Substantia, cetyl alcohol; 813,334 (1937) Jouanny, wool fat; 813,857 (1937) Brossard, wax; 814,010 (1937) Gresset, wax; 816,289 (1937) N. V. de Bataaf. Petroleum Maatsch., waxes. *German* 647,451 (1937) Cohn and Siebert, wool fat; 648,448 (1937) Chem. Fab. Baumheier A.-G. and Kern, cetyl alcohol. *Swiss* 186,960 (1937) Reichstein, cetyl ester; 188,446 (1937) Schwarzkopf, synthetic wax; 188,876 (1937) Heer, cetyl alcohol.

Pharmaceutical Industry

U. S. 2,062,782 (1936) Epstein and Harris, beeswax and carnauba wax; 2,064,727 (1936) Buer, beeswax; 2,077,299 (1937) Abrams, Wagner and Forcey, wax; 2,078,041 (1937) Terry, wool fat; 2,086,766 (1937) Chuck, beeswax; 2,091,062 (1937) Yates, cetyl alcohol and sperm oil alcohols. *Austrian* 149,187 (1937) Kremel, Adler-Apotheke, beeswax and cetyl alcohol. *British* 455,732 (1936) Chemische-Pharmazeutische A.-G. Bad Homburg, beeswax and cetyl alcohol; 457,270 (1936) Stillwell, beeswax, carnauba and candelilla waxes; 458,033 (1936) Addn. to 436,793, Carpmael and I. G. Farbenind. A.-G., waxes; 458,479 (1936) Carel, wax. *French* 809,527 (1937) Kodak-Pathé, waxes. *German* 635,469 (1936) Billaud, wool fat; 641,888 (1937) Extraktion A.-G., wax; 646,484 (1937) Boehringer & Soehne G. m. b. H., Dirscherl and Kraus, wool fat; 647,451 (1937) Cohn and Siebert, wool fat; 648,558 (1937) Deutsche Hydrierwerke A.-G., spermaceti and sperm oil; 648,606 (1937) Meine, wool fat and cetyl alcohol. *Jugaslovian* 13,488 (1937) Stefanovic, beeswax.

Electrical Industry

U. S. 2,059,055 (1936) Studt, wax; 2,063,889 (1936) Candy, wax; 2,067,502 (1937) Pollard and Russell, wax; 2,072,557 (1937) Hinsky, wax; 2,075,646 (1937) Hewitt, wax; 2,083,007 (1937) Delaney, montan wax; 2,085,269 (1937) Oppenheim, wax. *Australian* 24,656/1935 (1936) McIntosh, wax. *Austrian* 148,373 (1936) Ehrenhaft and Groetzinger, beeswax; 149,304 (1937) Telefunken Ges. für drahtlose Telegraphie m. b. H., synthetic wax. *Belgian* 418,453 (1937) Ineichen, carnauba wax. *British* 452,779 (1936) Standard Telephones and Cables Ltd., Weston, Nunn and Field, wax; 453,139 (1936) I. G. Farbenindustrie A.-G., montan, carnauba or synthetic wax; 455,992 (1936) Puffett and The India Rubber, Gutta Percha and Telephone Works, Ltd., waxes; 456,026 (1936) Celluloid Corp., wax; 467,608 (1937) Katzman, natural wax. *German* 644,304 (1937) Hemes, wax. *Italian* 304,768 (1932) Soc. Italiana Pirelli, wax. *Swiss* 188,876 (1937) Heer, cetyl alcohol.

Metallurgical Industry

U. S. 2,065,157 (1936) Stine, wax; 2,070,487 (1937) Lutz, cetyl alcohol; 2,075,362 (1937) Selleck and Ray, beeswax; 2,076,604 (1937) Watson, montan and carnauba waxes; 2,090,846 (1937) Lawson, carnauba wax; 2,091,715 (1937) Murray, synthetic wax. *British* 450,164 (1936) American Chem. Paint Co., wax; 450,459 (1936) Imperial Chem. Industries Ltd., Brownsdon and Bannister, cetyl ester; 454,306 (1936) Gilbert, wax; 454,919 (1936) Grupe, wax; 457,780 (1936) R. Thomas & Co., Kieft, Mehl and Smetana, waxes; 457,938 (1936) Metallisation Ltd. and Ballard, lanolin; 464,333 (1937) Grupe, wax; 467,839 (1937) Grasselli Chem. Co., cetyl alcohol. *French* 802,524 (1936) Klapproth, wax; 803,062 (1936) Hoesch-Köln Neuessen A.-G. für Bergbau und Hüttenbetrieb and Bauer, "ricin" wax; 806,902 (1936) R. Thomas & Co., Kieft, Mehl and Smetana, waxes; 807,170 (1936) — see 806,902.

Petroleum Industry (Including Lubricants)

U. S. 2,062,346 (1936) Zimmer and Morway, waxes; 2,065,248 (1936) Smith, sperm oil; 2,081,518 (1937) Wade, montan wax; 2,081,519 (1937) Wade, montanyl alcohol ester of montan, carnauba or copal waxes; 2,083,223 (1937) de Groote, sperm oil, beeswax, wool wax, carnauba wax and flax wax; 2,086,216 (1937) de Groote, sperm oil or carnauba wax; 2,089,506 (1937) Rosen, carnauba wax. *British* 453,139 (1936) I. G. Farbenind. A.-G., montan, carnauba or synthetic waxes; 454,579 (1936) Minor, beeswax; 460,345 (1937) A. Duckman & Co. Ltd., beeswax; 462,556 (1937) Celluloid Corp., wool fat, sperm oil and carnauba wax; 465,825 (1937) Standard Oil Development Co., synthetic or natural waxes; 466,619 (1937) Standard Oil Development Co., cetyl esters; 470,715 (1937) Smith and Campbell, wool fat. *Canadian* 362,736 (1936) Clarkson, cetyl alcohol; 363,825 (1937) Hendriksen and Lincoln, halogenated wax. *French* 801,658 (1936) Röhm & Haas A.-G., cetyl esters; 805,693 (1936) Socony Vacuum Oil Co., Inc., chlorinated wax; 805,848 (1936) Minor, beeswax; 812,430 (1937) Texaco Development Co., montan wax. *German* 630,280 (1936) Addn. to 626,939, Kerasin A.-G., beeswax; 637,437 (1936) Radiochem. Forschungs-Institut G. m. b. H., montan wax; 642,340 (1937) Addn. to 616,833, I. G. Farbenind. A.-G., Pier and Eisenhut, waxes. *Indian* 22,733 (1936) Minor, beeswax; 23,461 (1937) A. Duckman & Co. Ltd., beeswax. *Italian* 340,145 (1936) Saccardi, spermaceti; 346,242 (1936) Capuccio, chlorinated waxes. *Swiss* 184,197 (1936) Kerasin A.-G., synthetic wax.

Paper Industry

U. S. 2,059,464-5 (1936) Kress and Johnson, wax; 2,062,154 (1936) Welk, wax; 2,064,866 (1936) Woodford, wax; 2,067,501 (1937) Newman, wax; 2,069,570 (1937) Albrecht, cetyl alcohol; 2,069,648 (1937) Denner, wax; 2,069,786 (1937) van der Muelen, beeswax and carnauba wax; 2,073,004 (1937) Engelhardt, wax; 2,074,348 (1937) Stewart, wax; 2,077,059 (1937) Snyder and Maclaren, cetyl alcohol; 2,083,273 (1937), O'Neil, wax; 2,086,428 (1937) Mock, wax; 2,087,337 (1937) Tomsicek, Dodge and Calva, beeswax; 2,089,524-5 (1937) Abrams and Wagner, wax. *Austrian* 148,997 (1937) Karto-Werke K. Trostli, carnauba and montan waxes. *British* 450,733 (1936) British Titan Products Co., Ltd., natural or synthetic wax; 450,817 (1936) Halden & Co., waxy substances; 454,759 (1936) Beiersdorf Ltd. and Moore, wool fat; 455,641 (1936) Marbo Products Co., waxes; 456,434 (1936) duPont Co., wax; 457,973 (1936) Roon, waxes, carnauba wax; 459,183 (1937) Whitely and B. S. & W. Whitely Ltd., wax; 459,329 (1937) Kalamazoo Vegetable Parchment Co., wax; 466,510 (1937) Mayer, esparto, wool and montan waxes; 466,511 (1937) Mayer, carnauba and montan waxes. *Canadian* 355,492 (1936) Nelson, wax; 364,344 (1937) Hayward, wax; 368,139 (1937) Newman, wax. *French* 800,648-Addn. 47,016 (1936) Chamsaur, wax; 801,718 (1936) International Latex Processes Ltd.,

lignite and "Casper" waxes; 805,623 (1936) Soc. d'etudes d'inventions, animal, vegetable or mineral wax; 811,984 (1937) Gebhardt, wax; 812,504 (1937) Paterson Parchment Paper Co., wax. *German* 631,766 (1936) Kummer, wax; 633,916 (1936) I. G. Farbenind. A.-G., Kollek and Jahrstorfer, waxes; 648,448 (1937) Chem. Fab. R. Baumheier A.-G. and Kern, cetyl alcohol. *Jugoslavian* 13,535 (1937) Prey and Fisch, cetyl alcohol.

Textile Industry

U. S. 2,057,831 (1936) Hiers, wax; 2,060,047 (1936) Dreyfus and Whitehead, cerotic acid; 2,060,851 (1936) Calcott and Clarkson, cetyl and ceryl alcohols; 2,062,178 (1936) Hiers, wax; 2,066,125 (1936) Rozenbroek, wax alcohols; 2,066,385 (1937) Barthelemy, cetyl, ceryl and carnaubyl alcohols; 2,067,888 (1937) Chamberlain, wax; 2,069,570 (1937) Albrecht, cetyl alcohol; 2,073,004 (1937) Engelhardt, wax; 2,073,730 (1937) Champlin, wax; 2,077,983 (1937) Block, carnauba wax; 2,078,886 (1937) Weinberg, cerosin (cane wax ?); 2,080,509 (1937) Schoen, wax; 2,801,847-9 (1937) Byron and Bley, halogenated waxes; 2,085,013 (1937) Dreyfus and Whitehead, carnauba wax; 2,085,014 (1937) Dreyfus and Whitehead, wax-like esters; 2,087,565 (1937) Balle and Eisfeld, wax acids; 2,090,629 (1937) Hiers and Conrad, candelilla wax; 2,095,778 (1937) Wechsler and Segessemann, beeswax, wool wax, cottonseed wax. *Belgian* 418,423 (1937) Prescher, wool fat. *British* 450,420 (1936) British Celanese Ltd., wool fat alcohols; 450,764 (1936) I. G. Farbenind. A.-G., wax acids; 451,082 (1936) I. G. Farbenind. A.-G., wax; 452,248 (1936) I. G. Farbenind. A.-G., montanic acid; 453,053 (1936) Kammgarnspinnerei Stöhr & Co. A.-G. and Franz, cetyl alcohol; 453,427 (1936) British Celanese Ltd., wax; 453,836 (1936) Heberlein & Co. A.-G., Heberlein and Weiss, waxes; 454,240 (1936) Imperial Chem. Industries Ltd., Evans and Slater, cetyl ester; 454,668 (1936) I. G. Farbenind. A.-G., sperm oil alcohols; 454,759 (1936) Beiersdorf Ltd. and Moore, wool fat; 455,052 (1936) Dreyfus, cetyl and ceryl alcohols; 455,782 (1936) British Celanese Ltd., Ellis and Kirk, spermaceti; 458,815 (1936) du Pont Co., montan wax; 458,816 (1936) du Pont Co., wax; 460,602 (1937) I. G. Farbenind. A.-G., cetyl and montanyl alcohols; 460,711 (1937) Assoc. Dyers & Cleaners Ltd. and Fort, waxes; 461,670 (1937) I. G. Farbenind. A.-G., cetyl alcohol; 463,160 (1937) International Latex Processes Ltd., wax; 464,056 (1937) Bakelite Corp., montan wax; 465,106 (1937) Henkel & Cie., wool fat; 466,402 (1937) Böhme Fettchemie G. m. b. H., waxes; 467,704 (1937) Chibnall, Bailey and Astbury, waxes. *Canadian* 365,220 (1937) Schneider and Whitehead, wool fat alcohols. *French* 804,704 (1936) Christophe, wax; 805,905 (1936) I. G. Farbenind. A.-G., wax-like products; 807,280 (1937) I. G. Farbenind. A.-G., wax alcohols; 809,342 (1937) Ofner, cetyl alcohol. *German* 633,916 (1936) I. G. Farbenind. A.-G., Kollek and Jahrstorfer, wax-like products; 637,681 (1936) Ges. für Stoffveredlung m. b. H., montan wax; 641,638 (1937) Galvin, beeswax and carnauba wax; 647,523 (1937) Chem. Fab. Frankfurt-West Alexander Dauch, wool fat alcohols; 648,448 (1937) Chem. Fab. Baumheier A.-G. and Kern, cetyl alcohol; 649,483 (1937) I. G. Farbenind. A.-G., waxes. *Italian* 295,838 (1931) Luraschi, wax; 327,837 (1934) Lodola, beeswax.

Paint, Varnish and Lacquer Industry (Including Ink and Crayons)

U. S. 2,066,296 (1936) Lyons, wax; 2,078,172 (1937) Abrams, Forcey and Brabender, wax; 2,081,266 (1937) Bruson, cetyl alcohol; 2,082,050 (1937) Ernst, beeswax; 2,084,933 (1937) Alvarado, sperm oil alcohols. *Australian* 100,387 (1937) Hucks and Mayer, wax. *Belgian* 409,647 (1935) Evrard, wax. *British* 451,199 (1936) Ingold, carnauba wax; 453,786 (1936) I. G. Farbenind. A.-G., cetyl and montanyl alcohols; 454,579 (1936) Minor, beeswax; 459,549 (1937) Beck, Koller & Co. (England) Ltd., waxes; 460,275 (1937) I. G. Farbenind. A.-G., sperm oil alcohol; 461,109 (1937) Yoshida, beeswax; 462,924 (1937) Gessler, Guiteras and Clarkson, "Syncera" wax; 464,056 (1937) Bekelite Corp., montan wax; 467,081 (1937) Hönel, natural or synthetic waxes; 470,715 (1937) Smith and Campbell, wool fat. *Canadian* 359,987 (1936) Gray, wax; 366,307 (1937) Coolidge and Holt, carnauba and montan waxes. *French* 803,031 (1936) Sanguinetti, wax; 805,848 (1936) Minor, beeswax; 806,594 (1936) Auerbach, Weissberger a Spol, wax; 807,048 (1936) Yoshida, beeswax; 810,073 (1937) Soc. franc. Beckacite, wax. *German* 640,931 (1937) Ges. für Teerstrassenbau m. b. H., Luer and Lorenz, wax; 641,951 (1937) Krüger G. m. b. H. and Meyer, wax; 642,931 (1937) de Haën and Udhe, wool fat; 644,409 (1937) Deis, wax. *Indian* 22,733 (1936) Minor, beeswax. *Italian* 291,286 (1930) I. G. Farbenind. A.-G., beeswax; 329,038 (1935) Morandi, wax; 331,415 (1935) Soc. an. Cellulose-Cloro-Soda, wax. *Russian* 48,944 (1936) Drinberg, peat wax.

Leather Industry

U. S. 2,066,125 (1936) Rozenbroek, wax alcohols; 2,067,297 (1937) van Allen, shellac wax; 2,069,570 (1937) Albrecht, cetyl alcohol; 2,074,015 (1937) Clapsadle, carnauba wax; 2,087,565 (1937) Balle and Eisfeld, wax acids; 2,092,967 (1937) Gay, Jackson and Wilson, wax; 2,093,431 (1937) Frolich, wax. *British* 454,579 (1936) Minor, beeswax; 456,281 (1936) Szabo and Nits, carnauba, montan and shellac waxes; 458,816 (1936) du Pont Co., wax; 465,106 (1937) Henkel & Cie., wool fat. *Canadian* 362,254 (1936) Clapsadle, carnauba wax. *French* 800,648- Addn. 47,016 (1936) Champsaur, wax; 801,828 (1936) Gros, beeswax; 805,848 (1936) Minor, beeswax; 807,280 (1937) I. G. Farbenind. A.-G., wax alcohols; 809,342 (1937) Ofner, cetyl alcohol. *German* 648,448 (1937) Chem. Fab. R. Baumheier A.-G. and Kern, cetyl alcohol. *Indian* 22,733 (1936) Minor, beeswax. *Italian* 343, 297 (1936) Fogli, beeswax. *Norwegian* 57,668 (1937) Röhm, carnauba or synthetic wax; 57,838 (1937) Olsen, wax.

Rubber Industry

U. S. 2,062,178 (1936) Hiers, wax; 2,075,251 (1937) Winkelmann, "Opal" wax; 2,075,254 (1937) — see 2,075,251; 2,079,350 (1937) Jones, Smith and Stewart, cetyl alcohol; 2,083,998 (1937) Kratz and Jackson, beeswax; 2,087,900 (1937) Carmody, candelilla wax; 2,089,809 (1937) Penning, synthetic wax; 2,089,810 (1937) Penning, wax. *British* 451,573 (1936) Wingfoot Corp., waxes; 456,554 (1936) Müller, waxes; 457,310-1 (1936) U. S. Rubber Products Co., wax; 458,816 (1936) du Pont Co., wax; 463,160 (1937) International Latex Processes Ltd., wax; 464,056 (1937) Bekelite Corp., montan wax; 466,174 (1937) I. G. Farbenind. A.-G., wax-like products; 467,531 (1937) Rubber Products Re-

search Assoc., Farmer, Stevens and Rowe, beeswax and carnauba wax. *Canadian* 363,562 (1937) Abrams and Wagner, wax; 363,890 (1937) Abrams and Wagner, wax; 364, 822 (1937) Abrams, Wagner and Forcey, wax. *French* 798,443 (1936) I. G. Farbenind. A.-G., cetyl alcohol; 801,658 (1936) Röhm & Haas A.-G., cetyl alcohol; 804,800 (1936) Shepherd, wax.

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BIBLIOGRAPHY

1. L. W. Greene. Oil and Soap **10**, 187-95 (1933).
2. H. Frei and G. Groetzinger. Physik. Z. 37, 720-4(1936).
3. B. Grodman. Chemist Analyst **25**, 81 (1936).
4. C. L. Mantell and H. L. Rubenkoenig. Ind. Eng. Chem. **29**, 855-9 (1937).
5. A. Lödl. Seifensieder-Ztg. **64**, 481,501 (1937).
6. F. Hill. Chem. Industries **41**, 145-6 (1937).
7. T. Chrzaszcz and D. J. Tilgner. Polish Agr. Forest Ann. **38**, No. 2-3, 413-42 (in English 442-6) (1937).
8. V. V. Shebrovski and G. M. Sokolov. Za Lakokrasochnuyu Ind. **1935**, No. 3, 16-20.
9. J. Feytaud and P. de Lapparent. Bull. inst. pin. **1937**, 76-8.
10. I. E. Shcheglov. Tsentral. Nauch.-Issledovatel Inst. Bumazh. Prom., Materialy **1936**, No. 1, 31-75.
11. Y. Ahonen. Arch. Pharm. **274**, 497-502 (1936).
12. G. W. Fiero. J. Am. Pharm. Assoc. **25**, 862-3 (1936).
13. M. Dechaume. Rev. stomatologie; Dental Record, Dec. 1936; Oral Health **27**, 140-1 (1937).
14. M. Saito. Rept. Inst. Sci. Research Manchoukuo **1**, No. 2, 29-69 (abstr. in English 11-14) (1936).
15. L. Miller. Przemysl Chem. **21**, 15-22 (1937).
16. N. V. Bulgakov. Zentr. wiss. Forsch.-Inst. Leder-Ind. Gasammelte Arb. **1934**, No. 6, 225-37.
17. A. M. Sherebryakov, N. A. Tretyakova and F. I. Kagan. Sherstyance Delo **1936**, No. 3, 22-8.
18. H. J. Henk. Seifensieder-Ztg. **64**, 705 (1937).
19. K. Lindner. Melliand Textilber. **17**, 861-3, 935-8 (1936).
20. P. Savournin, Tiba **15**, 157-61 (1937).
21. W. Herbig. Melliand Textilber. **17**, 721-2 (1936).
22. S. Townend. J. Textile Inst. **27**, P219-28 (1936).
23. F. Brock. J. Textile Inst. **28**, P30-9 (1937).
24. H. Phillips. J. Textile Inst. **27**, P208-18 (1936).
25. T. E. Thompson. Textile Mfr. **62**, 451-2 (1936); **63**, 5-6 (1937).
26. Zizka. Wollen-& Leinen-Ind. **57**, 79-80 (1937).
27. S. Kershaw. **Wool, from Raw Material to the Finished Product.** London: I. Pitman & Sons Ltd., 153 pp., 3s. Reviewed in Textile Weekly **19**, 575 (1937).
28. W. Rudolfs. Ind. Eng. Chem. **29**, 803-4 (1937).
29. W. L. Stevenson. Chem. Eng. Congr. World Power Conf. **1936**, Advance proof No. F7, 24 pp.
30. T. Kuwata and Y. Ishii. J. Soc. Chem. Ind., Japan **39**,Suppl. binding 317, 318-9, 358-9 (in German) (1936).
31. E. K. Zil'berkviet and L. A. Vasil'ev. J. Applied Chem. (U.S.S.R.) **10**, 570-7 (in German 577) (1937).
32. P. I. Pavlovich and S. M. Bresler. Kozhevenno-Obuvnaya Prom. U.S.S.R. **16**, No. 2, 63-5 (1937).
33. W. A. Prout and M. Stickland. J. Am. Pharm. Assoc. **26**, 730-4 (1937).
34. C. Masino. Boll. chim.-farm. **75**, 409-12, 415 (1936).
35. M. D'Agostino and E. Torres. Semana med. (Buenos Aires) **1936**, II, 1080-3.
36. M. Schieblich and G. Pallaske. Deut. med. Wochschr. **61**, 957-60 (1935).
37. I. A. Remezov and N. I. Tavastsherna. Arch. sci. biol. (U.S.S.R.) **40**, 149-54 (in German 154) (1936).
38. R. Ruyssen. J. pharm. Belg. **19**, 557-9 (1937).
39. J. Augustin. Seifensieder-Ztg. **64**, 536-7, 575-7, 596-7 (1937).
40. H. J. Henk. Seifensieder-Ztg. **64**, 265 (1937).
41. K. Rothemann. Seifensieder-Ztg. **64**, 270-1 (1937).
42. W. Meyer. Seifensieder-Ztg. **64**, 598a-9, 620-1 (1937).
43. Stepanov. Novosti Tekhniki, Ser. Gorno-Rudnaya Prom. **1935**, No. 41-2, 13-14.
44. W. Obst. Allgem. Oel-u. Fett-Ztg. **33**, 468-9 (1936).
45. W. Moore. Scottish J. Agr. **20**, 227-40 (1937).
46. G. M. Shear. Proc. Am. Soc. Hort. Sci. **34**, 286-8 (1937).
47. E. J. Kraus, N. A. Brown and K. C. Hamner. Botan. Gaz. **98**, 370-420 (1936).
48. H. P. Traub and L. C. Marshall. Proc. Am. Soc. Hort. Sci. **34**, 291-4 (1937).
49. N. E. Pfeiffer. Contrib. Boyce Thompson Inst. **8**, 493-505 (1937).
50. F. Laibach. Gartenbauwiss. **11**, 65-79 (1937).
51. P. Hagemann. Gartenbauwiss. **11**, 144-50 (1937).
52. C. H. Andreas. Proc. Acad. Sci. Amsterdam **40**, 174-80 (1936).
53. M. Tsujimoto and H. Koyanagi. J. Soc. Chem. Ind., Japan **40**, Suppl. binding 191-3 (1937).
54. S. Ueno and R. Koyama. Bull. Chem. Soc. Japan **11**, 394-403 (1936).
55. T. Egupov, A. Bag and S. Smirnov. Masloboino Zhirovoe Delo **12**, 594-7 (1936).
56. H. Janistyn. Deut. Parfum.-Ztg. **22**, 86-8 (1936).
57. S. P. Jannaway. Soap, Perfumery and Cosmetics **10**, 860-5 (1937).
58. D. Burton and G. F. Robertshaw. Fette u. Seifen **43**, 152-5 (1936).
59. S. H. Bertram. Ole, Fette, Wachse, Seife, Kosmetik **1937**, No. 2, 13-14.
60. B. K. Blount, A. C. Chibnall and H. A. El Mangouri. Biochem. J. **31**, 1375-8 (1937).
61. M. Kono and R. Maruyama. J. Agr. Chem. Soc. Japan **13**, 579-85 (1937).
62. M. F. Taradoire. Ann. chim. anal. chim. appl. **18**, 285-8 (1936).
63. M. Tsujimoto and H. Koyanagi. J. Soc. Chem. Ind., Japan **40**, Suppl. binding 272-4 (1937).
64. G. E. Helz and A. W. Bosworth. J. Biol. Chem. **116**, 203-8 (1936).
65. P. V. Serbin and A. M. Livshits. Masloboino Zhirovoe Delo **13**, 29 (1937).
66. I. A. Kopeliovich, R. Z. Mishulovich and V. F. Farafanov. Khim. Tverdogo Topliva **7**, 229-42 (1936).
67. A. Davankov and O. A. Konovalova. Org. Chem. Ind. (U.S.S.R.) **4**, No. 13, 30-4 (1937).
68. D. N. Levchenko. Za Torfyanuyu Ind. **1937**, No. 1, 22-4.
69. J. Reilly, D. F. Kelly and D. J. Ryan. J. Soc. Chem. Ind. **56**, 231-8T (1937).
70. T. Mitsui. J. Agr. Chem. Soc. Japan **13**, 494-501 (1937).
71. H. Colin and H. Belval. Compt. rend. **204**, 1010-12 (1937).
72. A. P. Zakoschchikov and D. P. Tumarkin. Melliand Textilber. **18**, 522-5 (1937).
73. S. M. Edelstein. Am. Dyestuff Reptr. **26**, P427-32 (1937).
74. P. P. Viktorov and E. O. Vil'dt. J. Applied Chem. (U.S.S.R.) **9**, 1649-60 (in German 1660) (1936).
75. W. H. John. Oil Colour Trades J. **91**, 1140-2 (1937).
76. M. Chilikin. Melliand Textilber. **18**, 365-7 (1937).
77. K. Wuhrmann and M. Meyer. Naturwissenschaften **25**, 539-40 (1937).
78. J. C. Earl and J. P. Doherty. J. Council Sci. Ind. Research **10**, 26-8 (1937).
79. A. Albarranc. Mon. papeterie franc. **74**, 169-71, 185-7 (1937).
80. R. N. Chopra, A. T. Dutt, N. R. Chatterjee and N. De. Arch. Pharm. **275**, 192-5 (1937).
81. R. S. McKinney and G. S. Jamieson. Oil and Soap **13**, 289-92 (1936).
82. T. G. Green, T. P. Hilditch and W. J. Stainsby. J. Chem. Soc. **1936**, 1750-5.
83. K. S. Markley, E. K. Nelson and M. S. Sherman. J. Biol. Chem. **118**, 433-41 (1937).
84. H. Marcelet. Compt. rend. **204**, 1446 (1937).
85. A. G. Strickland and C. E. Cole. J. Dept. Agr. Victoria **34**, 542-52 (1936).
86. K. S. Markley and C. E. Sando. J. Biol. Chem. **119**, 641-5 (1937).
87. H. Mohler and J. Pólya. Z. Untersuch. Lebensm. **73**, 171-6 (1937).
88. A. Boris and H. Canal. Bull. soc. chim. (5), **3**, 1982-2009 (1936).
89. J. C. E. Simpson and N. E. Williams. J. Chem. Soc. **1937**, 733-8.
90. S. Inoue. J. Soc. Chem. Ind., Japan **40**, Suppl. binding 23-4 (1937).
91. G. V. Lazurevskii. Bull. univ. Asie centrale No. **19**, 41-8 (1934); Acta Univ. Asiae Mediae (Tashkent) Ser. **VI**, No. **9**, 9-11 (1935).
92. C. Pyriki. Pharm. Zentralhalle **78**, 33-7 (1937).
93. Yuoh-Fong Chi and Yee-Sheng Kao. J. Chinese Chem. Soc. **4**, 312-21 (1936).
94. J. Stamm and E. Willner. Pharmacia (Estonia) **17**, 4-9 (1937) (in German).
95. E. Ruppol. J. pharm. Belg. **19**, 63-8 (1937).
96. K. Bloch. Z. physiol. Chem. **244**, 1-13 (1936).
97. R. E. Reeves and R. J. Anderson. J. Biol. Chem. **119**, 535-41, 543-7, 549-51 (1937); J. Am. Chem. Soc. **59**, 858-61 (1937).
98. F. N. Howes. Kew Bull. Misc. Information No. **10**, 503-26 (1936); Chemist & Druggist **126**, 114-5 (1937).
99. H. Hartley. J. Textile Inst. **28**, P151-72 (1937).
100. M. Meyer. Naturwissenschaften **25**, 539 (1937).
101. J. Gundermann, W. Wergin and K. Hess. Ber. **70B**, 517-26 (1937).
102. D. A. Derrett-Smith. J. Textile Inst. **28**, T145-60 (1937).
103. L. Ivanovszky. Farben-Chem. **7**, 328-32 (1936).
104. R. Taubitz. Wollen- & Leinen-Ind. **57**, 74-5, 107-8, 142-4, 157-8, 174 (1937).
105. J. W. Durant. Dyer **77**, 335-7, 389-90, 441-2 (1937).
106. P. L. Mann. Chem. Industries **41**, 382, 384 (1937).
107. P. L. Mann. Am. Dyestuff Reptr. **26**, 177-9 (1937).
108. P. J. Ariente, et al. Am. Dyestuff Reptr. **26**, P133-4 (1937).
109. P. E. Hattinger. Chem. Industries **41**, 63-4 (1937).
110. C. S. Glickman. Soap (Sanitary Products Sect.) **12**, Nos. 120, 121, 123, 125, 127, 129, 139 (1936).
111. S. S. Tanchico and A. P. West. Philippine J. Sci. **61**. 429-33, 435 (1936).
112. H. W. Bowron. Paint Tech. **1**, 441-3 (1936).
113. R. Fornét. Seifensieder-Ztg. **63**, 910-11, 931-2 (1936).
114. K. Albertson. Seifensieder-Ztg. **64**, 143-5, 166-7, 185-6 (1937).
115. F. W. Schedwill. Seifensieder-Ztg. **64**, 142-3, 236a-7 (1937).
116. F. Kolke. Farben-Chem. **42**, 153-4 (1937).
117. P. Serrier. Science et ind., Tech. ind. pétrol No. 271, bis, 153-8 (1936-7).
118. E. E. Halls. Ind. Chemist **12**, 526-31, 567-71 (1936).
119. R. W. Kumler. Paper Trade J. **104**, No. 10, 36-9 (1937).
120. F. K. Shankweiler. Svensk Papperstidn. **39**, 370-1 (1936).
121. F. Burgstaller. Papier-Fabr. **35**, Tech. T1. 46-8, 52-4 (1937).
122. K. Bunte and H. W. G. Wittig. Gas u. Wasserfach **80**, 482-6, 506-11, 519-24 (July 10, 17, 24) (1937).
123. W. Vogel. Collegium **1937**, 217-27.
124. E. Werner. Metallwaren-Ind. Galvano-Tech. **35**, 194-5 (1937).
125. A. V. Blom. Paint Varnish Production Mgr. **16**, 7-11 (Jan. 1937).
126. B. Scheifele. Verfkroniek **9**, 298-9 (1936).
127. Rossmann. Farbe u. Lack **1937**, 53-4, 68, 78.
128. H. Stoltzenberg. Angew. Chem. **49**, 826-7 (1936).
129. W. B. Tisdale and E. West, Fla., Agr. Expt. Sta., Ann. Rept. **1935**, 92 (1936); **1936**, 91 (1937).
130. L. M. Mills. J. Am. Pharm. Assoc. **26**, 479-82 (1937).
131. S. P. Jannaway. Perfumery Essent. Oil Record **27**, 351-4 (1936).
131a. T. W. Deakers. Drug Cosmetic Ind. **39**, 448-9, 454, 476 (1936).
132. K. Highashi and M. Kubo. Bull. Chem. Soc. Japan **12**, 326-7 (1937).
133. R. J. Myers and W. D. Harkins. J. Chem. Phys. **5**, 601-3 (1937).
134. A. H. Prevost. Chem. Age **1937**, 269; Chem. Industries **41**, 477-8 (1937).
135. B. Levitt. Chem. Industries **41**, 489, 491 (1937).
136. A. W. Ralston and C. W. Christensen. Ind. Eng. Chem. **29**, 194-6 (1937).
137. E. H. E. Graefe. Ole, Fette, Wachse, Seife, Kosmetik **1936**, No. 13, 1-4.
138. Anon. Chem. Industries **41**, 380 (1937).
139. H. W. Avis. Soap. Perfumery and Cosmetics **10**, 766-9 (1937).