

BIBLIOGRAPHICAL ABSTRACTS

ADDITIONAL REFERENCES FOR 1932 to 1948

1932

(57A) W. C. Gangloff (to Drackett Chemical Co.), "Cleanser for Aluminum," U. S. Patent No. 1,870,311, August 9, 1932; "Dishwashing Detergents and Dishwashing Machines," *Bibliographic Series No. 5*, Quartermaster Research and Development Laboratories, p. 1 (1949).

An aluminum cleaner of the following composition:

	Per Cent
Powdered pumice.....	25
Powdered silica, calcined.....	25
Sesquicarbonate of soda.....	25
Trisodium phosphate.....	10
Powdered soap.....	10
Ammonium chloride.....	5

1935

(76A) "Cleaning of Aircraft Metal Surfaces Prior to Application of Initial Protective Coating," Army Specification 98-20007, June 21, 1935.

Detailed requirements cover mechanical cleaning, soak or electro-cleaning methods for steel parts, solvent cleaning, proprietary cleaning compounds, pickling. Also includes methods for corrosion-resistant steel, brass or bronze parts, aluminum or aluminum alloy parts, and magnesium alloys.

1938

(97A) Cleaner, Engine; Spray Type, U. S. Army Air Forces Specification 50062-B, July 27, 1938; Amendment No. 2, April 10, 1942.

Intended for use in cleaning aircraft engines and accessories. Specifications cover pistol grip spray type engine cleaner appliance, including drawings.

1939

(114A) S. J. Miller, B. Sway, and E. P. Breckel (to du Bois Soap Co.), "Detergent Compositions Suitable for Use on Floors, Engine Blocks, etc.," U. S. Patent No. 2,162,023, June 13, 1939; *Chemical Abstracts*, Vol. 33, p. 7443 (1939).

A free-flowing granular detergent composition is formed comprising water-soluble fatty acid soap, cresylic acid, diethylene glycol, trisodium phosphate, sodium metasilicate, sodium carbonate or caustic soda and an absorbent earth, the intercomponent ratio between the diethylene glycol and cresylic acid and absorbent earth of the composition being from 1:1:5 to 1:4:20 parts, respectively.

1940

(119A) Clete L. Boyle, "Treating Iron or Steel Surfaces," British Patent No. 517,916, February 13, 1940; *Chemical Abstracts*, Vol. 35, p. 7219 (1941).

Method for subjecting oxide coating to mechanical treatment to remove loose material, leaving a coating which adheres tightly, then treating with aqueous phosphoric acid and wetting agent and allowing to remain until dry. Phosphoric acid used in amount sufficient to convert oxide coating to phosphate coating.

1942

(201A) Ether, Alkylated, Phenolic (For Cleaning Aircraft), Navy Aeronautical Specification RM-70; Amendment No. 2, June 27, 1942.

Product intended for use in aqueous solution for hand cleaning of aircraft and accessory parts. Detail requirements for product are, nonvolatile 26 per cent minimum, mineral spirits 30 per cent minimum, water 42 per cent maximum, other aqueous solvents 2 per cent maximum. Chemical analysis requirements for the nonvolatile portion are given. Physical property requirements cover appearance, odor, weight per gallon, solubility in water, tension values, deflocculation, pH, and stability.

Application qualities include cleaning properties at 4 oz. per gal. dilution for cleaning panel prepared with finely divided carbon, rinsing properties, and nondeleterious properties toward certain finishes.

(201B) Compound, Cleaning (For Aircraft Surfaces), U. S. Navy Aeronautical Specification C-120, August 24, 1942.

Intended for Use in fresh or seawater for hand cleaning and washing of painted or unpainted aircraft surfaces. Detail requirements include fresh water solubility and stability, seawater solubility, alkalinity and acidity, odor, pH, surface tension, deflocculation, cleaning and rinsing properties of prepared and oil-soiled panels, corrosiveness, attack on paint finish and plastics.

1943

(222A) C. A. Campbell and Solventol Chemical Products, Inc., "Cleaning of Metal Parts and Baths Therefor," British Patents No. 593,899, and 593,890 December 13, 1943; *British Abstracts*, Part BI, Section 5, p. 367 (1949).

Cleaning is accomplished by spraying with a mixture comprising an emulsified solvent such as mineral spirit, and a cleaning solvent containing butyl cellosolve, pine oil, oleic acid, and an amine such as ethanolamine emulsified with water then acidified to a pH of 2.5 to 3.5. Other examples are given.

1944

(268A) Compound; Carbon Removal (For Engine Parts), U. S. Army Air Forces Specification 20038, October 2, 1944.

Detailed requirements cover odor and toxicity, specific gravity of distillate, content of water, minimum corrosion characteristics, water seal, package stability, flash point, distillation, undissolved matter, practical carbon removal test, laboratory carbon removal test, and rinsability. Control comparison formula of following composition is used:

	Parts by Weight
Ethylene dichloride.....	630.0
Cresol.....	250.0
Oleic acid.....	72.0
Potassium hydroxide (100 per cent equivalent)	13.8
Water.....	30.0

(286A) Compound, Cleaning, Baking Pans, Jersey City Quartermaster Depot Quartermaster Corps Tentative Specification, 1009, October 24, 1944.

Type I for tank cleaning and type II for hand cleaning are given. Intended only for tinned and black iron pans, and not for aluminum. Types I and II, detailed requirements include cleaning ability with available or artificially burned-out metal, tests for corrosion, foaming, and relative cost.

(297A) Compound; Carbon Removal, For Aircraft Engine Parts (Cresol Type), Navy Aeronautical Specification C-86c, April 5, 1944.

Product intended for the removal of carbon from engine parts. Composition as "compound," water 8 per cent maximum, soap 25 per cent maximum, cresol or cresylic acids mixture 67 per cent minimum, as "soap" fatty acids 85 per cent minimum, alkali as K_2O 15 per cent maximum. Requirements include form as liquid at ordinary temperatures, specific gravity, absolute viscosity, acidity, solubility in water and kerosene, performance properties in water solution to conform to stability, corrosiveness, stripping properties, rinsing properties, and oil removing characteristics.

(300A) C. Schwartz, "Alkaline Detergents," U. S. Patent No. 2,359,587, October 3, 1944; "Dishwashing Detergents and Dishwashing Machines," *Bibliographic Series No. 5*, Quartermaster Research and Development Laboratories, p. 10 (1949).

An alkaline detergent composition used

in the washing of dairy equipment, milk cans, cake, pie, and other baking pans. Detergent comprises:

	Per Cent
Alkali-metal metasilicate.....	30-90
Alkali-metal hydroxide.....	20-40
Alkali-metal perborate.....	3-20
Water-soluble zinc salt.....	1-10
Water-soluble calcium salt.....	1-10

1945

(313A) Compound; Steam Cleaning, U. S. Army Air Forces Specification 14128-A, February 21, 1945.

This compound is intended for use in flash boiler type machines for cleaning aircraft surfaces. Detailed requirements include specifications for the absence of resin soap or fatty acids, minimum corrosion, pH, total alkalinity as Na_2O of not less than 22 per cent, solubility, stability, wetting power, and foaming ability from synthetic agent.

(315A) Preservation and Packaging; Parts and Equipment (General Specification for); Army-Navy Aeronautical Specification AN-P-13a, April 13, 1945.

See reference No. 337B, Joint Army-Navy Specification, JAN-P-116.

(337A) C. A. Jensen, "Cleaning, Penetrating, and Corrosion Loosening Composition," U. S. Patent No. 2,472,298, September 6, 1945. Claims a composition consisting essentially of phosphorous trichloride and a liquid petroleum hydrocarbon consisting essentially of lube oil and kerosene 25-75, and the chlorine of the phosphorous trichloride in approximate proportion of 0.3 to 1.0 g.-atoms to one liter of composition.

(337B) Packaging and Packing for Overseas Shipment, Preservation, Methods of, Joint Army-Navy Specification, JAN-P-116, May 8, 1945.

Includes methods of cleaning and drying before application of preservatives, on pp. 15 to 43. Choice and application of cleaners include composition of part to be cleaned, nature of parts surface, nature of contaminant to be removed, degree of cleanliness required, availability of cleaning materials and equipment and hazards involved. Methods of cleaning include any petroleum solvent method, petroleum solvent immersion in two steps, petroleum solvent applied by scrubbing or wiping, two solvent method (with perspiration removal), petroleum solvent spray cleaning, solvent vapor degreasing, removal of perspiration and similar residues, alkaline immersion cleaning, alkaline spray cleaning, alkaline electrocleaning, emulsion spray cleaning, and emulsifiable solvent soak-cleaning.

(341A) C. M. Moore, "Treatment of Metal

Bodies in Chemical Baths," British Patent No. 572,336, October 3, 1945; *Chemical Abstracts*, Vol. 42, p. 509 (1948).

Cleaning bath comprising a solution of glycerol and bisulfate used for removing deposits of metal oxide or flux from metal articles.

(342A) Compound; Grease-Cleaning, Solvent-Emulsion-Type, Navy Aeronautical Specification C-147, June 11, 1945.

Type I intended for general cleaning of painted as well as unpainted aircraft surfaces and parts. Type II intended for heavy duty cleaning and should be used with caution on painted surfaces.

General requirements include flash point, neutralization number, free alkali, pour point, volatile matter, solubility in kerosine and water, stability of emulsion, cleaning performance against panels soiled with talc, Norit A and S.A.E. No. 70 lubricating oil applied in standard manner, and corrosion. Detail requirements for type I are freedom from phenols and for type II not less than 15 per cent nor more than 25 per cent phenolic material by volume.

(342B) Cleaner; Silicate-Soap Metal, Navy Aeronautical Specification, *NAVAER C-109b*, October 9, 1945.

Compound intended for use on naval aircraft in cleaning aluminum, magnesium or other metal surfaces prior to application of organic or inorganic surface coatings. Approximate chemical composition 41 per cent sodium metasilicate, 54 per cent sodium trisilicate and 5 per cent synthetic detergent. Other detailed requirements include pH, surface properties, solubility, cleaning properties in 4 oz. per gal. dilution against metal surfaces soiled in standard manner with light mineral oil, rinsing properties and corrosiveness.

(344A) Compound, Electrolyte and Cleaner (for Can Reconditioning), Jersey City Quartermaster Depot, Quartermaster Corps Tentative Specification, *1038*, October 3, 1945.

A compound consisting largely of silicate and carbonate with a small percentage of a phosphate. Solubility, pH, specified electric resistivity and cleaning requirements are given. Cleaning requirement is one of satisfactory usage in practice.

(352A) U. C. Tainton, "Removing Oxide Films from Metals and Metal Alloys (Stainless Steels)," British Patent No. 625,089, June 7, 1945; *British Abstracts*, Part BI, Section 5, February, 1950, p. 212.

Metal immersed in fused caustic soda containing less than 10 per cent of oxidizing agent such as sodium nitrate, sodium peroxide, or sodium chlorate to remove at least part of the oxide film, remaining film being readily dissolved in dilute mineral acids.

1946

(358A) Compound; Cleaning, Fingerprint Removal, For Metal, U. S. Army Air Forces Specification *14156*, March 4, 1946.

Intended for removal of fingerprints in cleaning metal surfaces on parts prior to preparation for storage or coating with lacquer. Detail requirements include odor, removal of compound with naphtha, 10 per cent maximum water by volume, stability, flash point, viscosity, metal protection, removal of synthetic fingerprint stain as well as real fingerprints, ability to suppress corrosion by fingerprints, and minimum corrosion characteristics.

(360A) J. Bockman, "Rust Removal and Metal Conditioning," *Organic Finishing*, Vol. 7, No. 2, pp. 15-22, 35 (1946).

Alkaline salt and solvent methods of soil removal present difficulties when used prior to painting or etching, respectively. Rust and scale removal can be accomplished variously with varying degrees of effectiveness. Chemical methods using sulfuric or hydrochloric acid pickling are widely used for removal, but their use may be objectionable. Parts are not allowed to dry between the rust-removal tank and the first water rinse to prevent any further chance for rusting.

(360B) W. E. Booth and Imperial Chemical Industries, Ltd., "(Metal) Degreasing Apparatus," British Patent No. 608,110, February 2, 1946; *British Abstracts*, Part BI, Section 4, p. 479 (1949).

Description of apparatus for use with trichloroethylene, and a method for prevention of overheating.

(360C) British Thomson-Houston Co., Ltd., "Cleaning and Electroplating Processes," British Patent No. 615,110, July 24, 1946; *British Abstracts*, Part BI, Section 7, p. 615 (1949).

Rust, scale, and grease are removed from bearing backings before coating with babbit metal by electrolytic treatment at 400 to 500 C. in a fused salt bath comprising caustic soda with about 10 per cent copper oxide. Articles are first made anodic to oxidize grease, then cathodic to cause rust to flake off, again anodic to dissolve spongy copper, and finally again cathodic to deposit an adherent film of copper.

(362A) Compound, Grease Cleaning, Solvent-Emulsion, Bureau of Ships, Specification *51 C65* (Ships), August 15, 1946.

A potash soap emulsion of hydrocarbon of specific flash and fire points, given pour point, solubility in kerosine, stability of emulsion and corrosion. A concentrated material which on dilution with kerosine, diesel fuel or similar distillate or with water, intended in facilitating removal of grease,

oil or other surface contamination, except rust and corrosion of metal parts.

(363A) B. B. Button, Jr., and J. Janota, Jr. (to Diversy Corp.), "Aluminum Treating Composition," U. S. Patent No. 2,398,078, March 9, 1946; *British Abstracts*, Series BI, Vol. 6, February, 1950, p. 223.

Oxide film is removed in a few seconds without corrosion from the surface of aluminum to produce a smut-free surface of long-lasting low electrical resistance, by treatment with a 10 per cent solution of a 79:1:20 mixture of sodium bisulfate, sodium silicofluoride, and sodium chromate.

(388A) C. H. Jeglum, "Tips on Cleaning of Zinc Die-Castings," *Materials and Methods*, Vol. 24, No. 2, p. 425 (1946); *Metallurgical Abstracts*, Vol. 16, Part 7, p. 434 (1949).

(393A) M. A. Miller and W. E. White, (to Aluminum Company of America), "Removal of Oxide Coating from Aluminum Surfaces," U. S. Patent No. 2,399,134, March 23, 1946; *British Abstracts*, Part BI, Section 6, February, 1950, p. 223.

Oxide film removed from the surface of aluminum without corrosion of underlying metal by immersion for about 10 min. in a mixture of water (1 to 5 per cent), hydrofluoric acid (5 to 40 per cent), and an alcohol (55 to 94 per cent) such as methanol, glycol, glycerol, or partly etherified polyhydric alcohols melting below 40 C.

(394A) Cleaner, Steam, Navy Aeronautical Specification NAVAER C-152, July 29, 1946.

Intended use on aircraft in cleaning aluminum, magnesium, and other metal surfaces prior to application of organic or inorganic surface coatings and cleaning of surfaces to remain unpainted.

Detail requirements include silicates as SiO_2 , 8 to 12 per cent by weight, phosphate as P_2O_5 , not less than 14 per cent, and total alkalinity calculated as Na_2O not to exceed 33 per cent by weight. Also included are solubility, buffer and pH capacity, soap shall be synthetic product soluble and stable in the silicate solution as prepared for use, foam power, surface tension, cleaning properties against oil-coated aluminum panel, corrosiveness, stability, rinsing, and coarseness.

(394B) C. Nielsen, "Method of Evaluating Alkali Cleaners," *Organic Finishing*, Vol. 7, No. 8, pp. 9-13 (1946).

Suggests laboratory evaluation test using either the oil present as a soil, or lacking this, S.A.E. No. 50 lubricating oil. A specific method for soiling, by dipping and draining of cold-rolled 20 gage steel panels $2\frac{1}{4}$ by 3 in. is given. The composition to be tested was transferred to one liter beakers and the wash routine expected to be used is followed.

Cleanliness is determined by dip testing of the cleaned panel in a copper sulfate bath consisting of 2 oz. copper sulfate and 1 oz. of sulfuric acid per gallon.

A rinse test using milk bottles or glass panels is described, with emphasis given on the improved effectiveness with increased water rinse temperature.

(397A) Compound, Dishwashing, Quartermaster Corps, Office of Quartermaster General, Tentative Specification, 220, July 12, 1946.

Both types I and II are meant for mechanical dishwashing machines, type I above 120 ppm. water hardness and type II below 120 ppm. Detail requirements include turbidity, foaming, water softening, corrosion, pH, fineness, rate of solubility, gelation, cleaning efficiency, and relative cost. The cleaning efficiency test is a practical one of observation under closely controlled conditions of operation.

(413A) Tom Winhurst, "Cleaning and Finishing Aluminum Products," *Industrial Finishing*, Vol. 23, No. 2, pp. 32-34, 46, 48 (1946); *Metallurgical Abstracts*, Vol. 16, Part 7, p. 433, (1949).

Description of conveyorized spray painting arrangement and other treatment procedures are detailed.

(413B) "Cleaning and Acid Pickling: Properties of 'Teepol X,'" *Wire Industry*, Vol. 13, No. 151, p. 382 (1946); *Metallurgical Abstracts*, Vol. 17, Part 1, p. 44 (1949).

Properties and uses of Teepol X, an alkyl sulfate type synthetic detergent, manufactured from petroleum byproducts.

1947

(416A) W. E. Booth (to Imperial Chemical Industries, Ltd.), "Metal Degreasing," British Patent No. 624,552, July 2, 1947; *British Abstracts*, Part BI, Section 5, February, 1950, p. 195.

Frothing is stopped in a degreasing process in which an alkaline solution containing a wetting agent is sprayed onto articles by placing a hot horizontal surface such as coiled steam or hot water pipes above the level of the degreasing solution collecting in the sump of the apparatus.

(419A) Ciba, Ltd., "Cleaning Preparations for Removing Metal Oxides or Metal Salts from Heavy Metal Surfaces," British Patent No. 622,316, February 5, 1947; *British Abstracts*, Part BI, Section 5, February, 1950, p. 195.

Iron, copper, silver or brass may be cleaned with an alkaline solution of an aromatic hydroxy compound containing not less than two neighboring hydroxy groups such as

pyrocatechol, gallic acid, or tannin, and a reducing agent such as alkali hypophosphite or hydrosulfite.

(427A) R. Groves, "Cleaning of Metals. I. Choice of Process and Cleaning Agent," *Metallurgia*, Vol. 37, pp. 40-42 (1947); *Chemical Abstracts*, Vol. 42, p. 1548 (1948).

Account of primary points to be considered.

(427B) R. Groves, "Cleaning of Metals. II. Alkali Cleaners," *Metallurgia*, Vol. 37, pp. 100-102 (1947); *Chemical Abstracts*, Vol. 42, p. 1548 (1948).

The most generally used are unsuitable for brass, aluminum, tin, zinc, and copper, but by use of suitable inhibitors they may be adapted to aluminum cleaning. Principal types, applications and details of operation are discussed.

(432A) Cleaning and Preparation of Ferrous Metal Surfaces for Organic Protective Coatings, Joint Army-Navy Specification, *JAN-C-490*, August 21, 1947.

Consists of two grades, I for production of adherent phosphate deposit on previously cleaned ferrous metal surface, and II of cleaning treatments which leave the metal surface substantially bare. Also of two types, 1, mechanical and 2, hot alkali cleaner (immersion, spray or electrocleaning).

(435A) H. Krause, "Cleaning and Polishing Production Goods in Barrels (Tumbling Barrels). II. Ball Burnishing Process," *Metallüberfläche*, Vol. 1, pp. 169-171 (1947); *British Abstracts*, Part BI, Section 4, p. 52 (1949).

The finishing of both hard and soft metal parts by the ball-burnishing process is described briefly, with reference to the design and operation of the tumbling barrels, the choice of ball size, etc.

(439A) Compound, Carbon-Removing, Navy Dept. Specification *51C55b*, October 1, 1947.

Compound intended for use in softening and facilitating removal of carbon, wax, gum, oil, and tar, etc., from engine assemblies. Composition to be a two-phase liquid; an upper layer consisting essentially of water and a lower layer of emulsifying agents and organic solvents. Volume of upper layer not to be more than 20 per cent of total volume of the compound. Other detail requirements listed are flash and pour points, free alkali and acid, specific gravity, emulsification, corrosion, and carbon removal. The carbon removal test is performed with an artificially soiled panel.

(440A) S. H. Phillips, "Aircraft Finishing and Related Problems," *Organic Finishing*, Vol. 8, No. 9, pp. 18-26 (1947).

Either anodizing or chromidizing require

a thorough cleaning in a mild alkaline soap, followed by ample rinsing. A final acidified rinse is desirable to free or neutralize the surface of all traces of alkaline film, chiefly silicate before treatment in chromic acid baths. Since many new alloys require artificial aging in an oil bath, the oil must be removed first by solvent cleaning then by alkaline cleaners.

(443A) E. Rabald, "Chemical Cleaning of Kettles, Pipelines, Warm Water Installations, Etc.," *Metallüberfläche*, Vol. 1, pp. 262-263 (1947); *Chemical Abstracts*, Vol. 43, p. 7399 (1949).

(444A) P. Schane, Jr., "An Evaluation of Steel Cleanliness," *Electric Furnace Steel Proceedings*, Vol. 5, pp. 3-10 (1947).

Inclusions may be classified as macro-, micro-, and submicroscopic, and these are objectionable because aside from appearance, may be the nucleus for corrosion or a concentration of stresses due to notch effect, the latter causing rejection due to cracks or low strength and ductility. Inclusions may also be classified as exogenous originating from outside sources as from refractories, or endogenous as products of deoxidation or other reactions. There may be many component types, the commonest being oxides, sulfides, silicates, and alumina. A further classification is as to shape.

Methods of testing are macroscopic, microscopic, fracture and magnaflux. Latter method uses iron powder and magnetization.

(447A) R. Springer, "Degreasing and Cleaning," *Metallüberfläche*, Vol. 1, Part I, pp. 199-206; Part II, 237-239, Part III, pp. 257-258 (1947); *Chemical Abstracts*, Vol. 43, p. 7399 (1949). (Reviews with 176 references.)

(448A) P. M. Van Arsdell, "Health Hazards of Metal-Cleaning Compounds," *Organic Finishing*, Vol. 8, No. 11, pp. 31-41; No. 12, pp. 30-38 (1947); Vol. 9, No. 2, pp. 18-28; No. 3, pp. 38-43; No. 5, pp. 20-25 (1948); *Chemical Abstracts*, Vol. 43, p. 787 (1949).

A thorough discussion of the many health hazards involved from vapors, dusts, and splashes. Largely concerned with the hazards of chlorinated solvent usage.

(448B) H. Vogel, "The Cleaning of Metal Objects of Antiquity, Museum Pieces, and Bronze Monuments," *Metallüberfläche*, Vol. 1, pp. 107-111 (1947); *Chemisches Centralblatt*, 1947, I, p. 951; *Chemical Abstracts*, Vol. 43, p. 3335 (1949). (Listed without abstract.)

(450A) "Cleaning, Preserving, Sealing and Related Materials," War Department Manual *TM 9-850*, June 1947.

Indexed 67-page booklet of seven sections and appendix of references. Forty-five clean-

ing materials are listed, with directions for use.

(450B) E. G. West, "Aluminum in the Dairy Industry," *Journal, Soc. Dairy Technology*, Vol. 1, pp. 31-34 (1947); *British Abstracts*, Part BI, Section 6, p. 75 (1949).

The behavior of aluminum and its alloys in contact with cleaning and sterilizing solutions and the range of aluminum base compositions for dairy applications are discussed.

1948

(452A) Remover; Paint, Aircraft, Finish, U. S. Air Force Specification, 14119-C, July 1, 1948.

Intended for use in removal of paint finish such as camouflage, from aircraft surfaces. Compound not to contain phenolic or cresylic constituents. Performance tests comprise consistency and flow, evaporation, corrosion, removal power, paint and remover residues, and package stability and service use.

(452B) Compound; Cleaning, Washing Machine (For Aircraft Metal Parts), U. S. Air Force-Navy Aeronautical Specification, AN-C-174, July 6, 1948.

Material is intended for use in industrial washing machines where foaming is objectionable, for cleaning aircraft metal parts. Detailed requirements include corrosion as tested by gas evolution, pH, total alkalinity, solubility, stability, interfacial tension, caking, lather persistence, and cleaning by practical testing.

(452C) Polish; Aluminum, Air Force-Navy Aeronautical Specification, AN-P-88, September 20, 1948.

Material intended for use as a hand polish for removal of tarnish from unpainted aluminum-clad surfaces. Detail requirements cover polishing ability, restoration and retention reflectance, corrosiveness, flammability and flash point, caking, and tarnish removal (latter from an artificially tarnished surface).

(453A) G. Black and P. Lewis, "Vapor-Degreasing Equipment (for Metals)," *Organic Finishing*, Vol. 9, No. 10, pp. 9-11, 16 (1948).

Discussion of types of equipment, heating, design, vapor loss prevention, and handling. Claim that there is no best equipment, best solvent or best machine, but definitely a best unit for each particular job.

(453B) Remover, Paint; Noninflammable, Water Rinsable (for Use in Contact with Synthetic Rubber), Bureau of Aeronautics Specification 52 R16 (*Aer*), April, 1948.

Many detail requirements are given. Performance tests include stripping proper-

ties, condition of stripped surface, adhesion, corrosiveness, rinsability, noninflammability, bomb stability, and effect on synthetic rubber.

(453C) Compound, Dishwashing, (for Use in Mechanical Dishwashing Machines), Bureau of Ships Specification, 51 C49 (Ships), November 1, 1948.

Intended for machine and not for manual use. Requirements include stability, lack of odor, freedom from abrasive, nontoxicity, foaming, water softening, turbidity, pH, and buffer capacity, corrosiveness, and fineness.

(453D) P. H. Cardwell and L. H. Eilers, "Use of Wetting Agents in Connection with Acid Inhibitors," *Industrial and Engineering Chemistry*, Vol. 40, pp. 1951-1956 (1948).

Corrosion rates of certain N-ring types of inhibitors are further lowered by the addition of certain wetting agents. Factors affecting value as inhibitor are cross-sectional area, adsorption and closeness of packing of the molecule. Wetting agents did not prevent pitting but greatly reduced their amount and size.

(453E) Ciba, Ltd., "Removal of Metal Compounds from Heavy Metal Surfaces," Swiss Patent No. 252,362, October 16, 1948; *Chemical Abstracts*, Vol. 43, p. 7405 (1949).

Heavy metals such as iron, copper, silver or alloys such as brass, are cleaned by alkaline solutions containing 2.5 per cent of aromatic oxides with at least two adjacent hydroxyl groups, such as tannin, pyrocatechol, gallic acid and others, and reduction means such as alkali dithionates. Products can be applied in paste form.

(454A) M. B. Diggins and D. G. Foulke, "Surface Treatments for Magnesium," Metal Finishing Industry Guidebook, pp. 208-221 (1948).

Magnesium parts to be chemically or electrochemically treated must be chemically clean. Employed are mechanical cleaning which if used must be followed by pickling to etch 0.002 to 0.005 in. of metal from the surface. Either solvent or emulsion degreasing can also be used. Chemical cleaning by highly caustic alkaline cleaners either soak or electrocleaning are described. Electrocleaning said to decrease the time and improve the quality of cleaning. Pickling methods such as chromic, sulfuric, or nitro-sulfuric methods are described.

(454B) P. F. Dougherty and C. H. Brooks, "Cleaning Tubular Heat Exchangers," *Petroleum Refiner*, Vol. 27, No. 12, pp. 676-678 (1948).

Inhibited acid is best for water side of coolers. Soluble oil is useful where fouling material is completely soluble in oil or can be held in suspension. Use of emulsified oil covered by patent application.

(454C) H. Drever, "Salt Descaling Baths,"

Industrial Heating, Vol. 15, No. 1, pp. 40-52, 166-168 (1948); *Journal, Iron and Steel Inst.* (London), Vol. 159, p. 222 (1948); *British Abstracts*, Part BI, Section 5, p. 377 (1949).

The du Pont and the "Virgo" processes of descaling with sodium hydride baths are described with details of equipment used. The processes differ mainly in the bath temperature used, which are 375C. and 482C., respectively.

Disadvantages of acid descaling are given, and show that molten salt baths give better removal of oxide scale. Sequence of operations in the descaling of a range of materials given. Sodium hydroxide process differs from the sodium hydride process as the operating temperature of the former is considerably higher. Stresses the importance of frequent removal of sludge accumulating in the bottom of the bath.

(454D) R. Dubrisay and F. Arlet, "Spreading of Oils on Metals," *Comptes rendus*, Vol. 227, pp. 531-533 (1948); *Chemical Abstracts*, Vol. 43, p. 465 (1949).

Shows that the addition of from 1 to 10 per cent oleic acid to hexadecane increases the spreading of the oil only when oil is present. The explanation for the phenomenon is attributed to the fact that copper oleate is formed when the surface is copper, and this reduces the surface tension. Analogous results were obtained with lead, but oleic acid has no effect on nickel. Neither stearic nor palmitic acids changed the amount of spread.

(457A) N. L. Evans, "Sodium Hydride Process of Descaling Metals," *Journal, Electrodepositors' Tech. Soc.*, Vol. 24, pp. 9-13 (1948); *British Abstracts*, Part BI, Section 4, p. 181 (1949).

The process and plant used are described. The advantages claimed are listed.

(457B) N. L. Evans, "Descaling Metals. Advantages of the Sodium Hydride Process," *Metal Industries* (London), Vol. 73, pp. 287-288 (1948); *Chemical Abstracts*, Vol. 43, p. 100 (1949).

A description of the process, procedure, and the various stages involved. Process applicable to any metal which is not attacked by molten caustic soda at a temperature not exceeding 370 C.

(457C) N. L. Evans, "The Sodium Hydride Process and New Method of Descaling Metals: Application to Wire and Strip," *The Wire Industry*, Vol. 15, No. 170, pp. 105-107 (1948); *Metallurgical Abstracts*, Vol. 16, Part 8, p. 518 (1949).

The descaling bath used consists of molten anhydrous caustic soda containing approximately 2 per cent sodium hydride maintained at 350 to 370 C. Plant construction and operation described in some detail. Advantages of process are listed.

(463A) J. W. Hensley, A. O. Long, and J. E. Willard, "Reactions of Ions in Aqueous Solution with Glass and Metal Surfaces," *Journal, Am. Chemical Soc.*, Vol. 70, p. 3146 (1948).

Sorption of radioactive sodium ion to the extent of from 0.2 to 5 monolayers (arbitrarily the number of ions required to cover the macro surface area if each ion covers an area equal to square of its ionic crystal diameter) by cleaned aluminum, steel, silver, and platinum during a few minutes immersion at room temperature.

(463B) T. P. Hoar, "Clean Iron and Steel Surfaces: Some Fundamental Considerations with Particular Reference to Vitreous Enameling," *Sheet Metal Industry*, Vol. 25, pp. 1805-1808, 1826, (1948); *Journal, Iron and Steel Inst.* (London), Vol. 161, p. 67 (1949); *British Abstracts*, Part BI, Section 5, February, 1950, p. 207.

Functions of various degreasers, pickling, and rinsing processes are explained from a chemical viewpoint and practical operations are discussed.

(463C) G. B. Hogaboom, "Metal Cleaning and a Simple Test for Surface Cleanliness," *Proceedings, Am. Electroplaters' Soc.*, Vol. 35, pp. 215-221 (1948).

A review of metal cleaning problems and the suggestion of a test for cleanliness of steel. The test consists of dipping the article in a solution containing 40 g. per liter of copper sulfate and 17 g. per liter of sulfuric acid, in which the piece takes a semibright, clear, uniform, adherent copper deposit if the surface is clean.

(465A) M. Jaffa, "Portable Degreasing Device For Metal Articles," U. S. Patent No. 2,442,272, May 25, 1948; *British Abstracts*, Part BI, Section 4, p. 255 (1949).

An apparatus for use with trichloroethylene provided with means to prevent escape of fumes is described.

(468A) J. Koerner, "Surface-Active Agents in Non-Ferrous Metals Technology," *The Metal Industry*, London, Vol. 73, No. 23, pp. 452-453 (1948); *Metallurgical Abstracts*, Vol. 16, Part 7, p. 435 (1949).

Discusses theory underlying the action of wetting agents and describes their application in non-ferrous metallurgy.

(468B) B. Kopelman and C. C. Gregg, "Some Wetting Properties of Metal Powders," *Am. Soc. Metals, Preprint, No. 40*, 11 pp. (1948); *Metallurgical Abstracts*, Vol. 16, Part 5, pp. 278-279 (1949).

Wetting properties of various metal and metal oxide powders were studied by shaking them with kerosene and water, and water and carbon tetrachloride. Metal powders are not readily wetted by either water or organic liquids and are therefore difficult to disperse in liquid media, the difficulty increasing with

the melting point of the metal. Lower melting metals such as aluminum, magnesium, copper and nickel can be made dispersible in organic liquids by the addition of 1 per cent oleic acid. The wetting action in water of the refractory metals such as molybdenum, platinum, tungsten, and tantalum is improved by the addition of commercial wetting agents, and these latter agents also improve the wetting of the lower melting metals by organic liquids. Hydrogen peroxide does not affect the wetting behavior of metal powders. Titanium has wetting properties intermediate between those of the lower melting metals and the refractory metals. The higher oxides of multivalent metals and the oxides of monovalent metals are hydrophilic, but the lower oxides of metals and the metals themselves are not water dispersible.

(468C) P. D. Liddiard, "The Theory and Practice of Metal Degreasing in Aqueous Media," *Chemistry & Industry*, Vol. 67, No. 28, p. 435 (1948).

A general discussion of cleaning as applied to the metals and the materials to be removed. Discusses the theories of degreasing, the use of alkalis and surface active requirements. Rinsing, contamination from preferentially deposited surface active agent and hard water difficulties are described. Corrosion and its effect on the cleaning process is discussed. Trends in degreasing practice are toward combinations of aqueous and nonaqueous processes to attain cleanliness for speed of operation. Mention of high speed cleaning of steel strip shows several methods of cleaning applied, followed by adequate rinsing. Aluminum and multiphase alloys still present cleaning problems.

(469A) A. B. Lloyd, "Cleaning of Steel Castings," *Inst. Brit. Foundrymen, Paper 903*, 14 pp. (1948); *British Abstracts*, Part BI, Section 5, p. 141 (1949).

Wet and dry cleaning processes for the removal of adhering molding material were described.

(470A) A. Mangin, "Chemical Cleansing in the United States," *Chimie & Industrie*, Vol. 60, pp. 331-335 (1948); *Chemical Abstracts*, Vol. 43, p. 2917 (1949).

A 1945 report of methods used for iron surface preparation by chemicals.

(472A) "Surface Cleaning in Molten Salt Baths," *Metalloberfläche*, Vol. 2, No. 3, p. 63 (1948); *Metallurgical Abstracts*, Vol. 16, Part 7, p. 435 (1949).

Described are the operation and applications of molten caustic baths, working at 360 to 540 C., with or without electrolysis, and molten metallic sodium baths, working at 375 C. under atmospheres of hydrogen or cracked ammonia from which all traces of oxygen, carbon monoxide, and carbon dioxide have been removed.

(476A) Fujiichi Nogaki, "Metal Cutting and Washing Compound," Japanese Patent No. 174,946, June 24, 1948; *Chemical Abstracts*, Vol. 43, p. 7163 (1949).

The insoluble portion of separated waste liquor from soda pulp is heated with a mixture of lime, ammonium hydroxide, naphthalene, and colloidal clay, and this mixed with the soluble portion of the waste liquor.

(476B) J. F. O'Keefe, "Surface Preparation of Aluminum for Plating," *Metal Finishing Industry Guidebook*, pp. 201-207 (1948).

Following mechanical finishing it is recommended that solvent vapor degreasing be used followed by alkaline cleaning at pH 9-12. Effectiveness of cleaning checked by water break.

(476C) S. G. Osborne and H. R. Spence, "Molten Salt-bath (Steel) Descaling Process Materially Reduces Production Time," *Steel*, Vol. 123, No. 24, pp. 106, 109-110, 124, 126, 129-130, 132 (1948); *British Abstracts*, Part BI, Section 5, p. 485 (1949).

Description of treatment of steel in a molten salt-bath, presumably sodium hydride, is described.

(485A) H. A. Robinson, (to Dow Chemical Co.), "Composition for Descaling Ferrous Metal," U. S. Patent No. 2,450,861, October 5, 1948; *Chemical Abstracts*, Vol. 43, p. 3772 (1949).

Tendency of hydrochloric acid solutions to corrode when descaling ferrous metal objects is counteracted by controlling the H-ion attack with organic nitrogen bases, organic sulfur compounds, certain aldehydes or soluble arsenic compounds, as well as simultaneously adding bivalent chromium or trivalent titanium to effect reduction of ferric ions thus preventing their corrosive attack on the metal being cleaned.

(485B) K. Rose, "Shot Blasting Replaces Pickling on Some Steel Cleaning Applications," *Materials & Methods*, Vol. 28, No. 5, pp. 72-75 (1948); *British Abstracts*, Part BI, Section 5, p. 485 (1949).

The Wheelabrator equipment is used, in which cast iron shot is impelled from a rotating vaned wheel onto the material to be cleaned. Compared with pickling for the removal of scale it has the following advantages: No waste acid disposal problem, less floor space requirements, no hydrogen embrittlement, no carbon smut, and the equipment is more versatile.

(485C) J. W. Ryznar and J. Greene, "A Simple Test Method for Evaluating Corrosion Inhibitors," *Corrosion*, Vol. 4, pp. 505-515 (1948); *Chemical Abstracts*, Vol. 43, p. 97 (1949).

The test was developed to determine whether a substance had inhibiting charac-

teristics, to what extent and in a variety of media and conditions. The main criterion of effectiveness is visual examination of the specimen at the end of the test. A solid cylinder of specified characteristics is pretreated then rotated at constant speed for 24 hr. under given conditions.

(485D) L. Sanderson, "Metal Cleaning Processes—I, II," *The Chemical Age*, London Vol. 58, (1491), p. 205, (1495), p. 331-333, (1948); *Metallurgical Abstracts*, Vol. 16, Part 7, p. 434 (1949).

Factors governing the choice of cleaning methods and materials are discussed. The uses of alkaline solutions are considered.

(486A) R. R. Sizelove, "Cleaning and Pickling," *Metal Finishing Industry Guidebook*, pp. 43-53 (1948).

Discussion of cleaners used for the electroplating industry which are alkaline soaking cleaners, alkaline electro-cleaners, and solvent emulsion cleaners. Discusses the general application of each and gives cleaning cycles for electroplating of steel and steel and copper prior to nickel plating, steel prior to copper, cadmium, zinc, or alkaline tin plating. Also gives cycles for copper and brass prior to nickel. The cleaning of zinc-base diecastings prior to cyanide copper flashing or copper plating is discussed.

(489A) S. Spring and L. F. Peale, "On the Mechanism of the Process of Degreasing Metal Surfaces," *Metallüberfläche*, Vol. 2, No. 10, pp. 209-212 (1948); *Metallurgical Abstracts*, Vol. 16, Part 12, p. 840 (1949).

See Reference 447.

(489B) R. Springer, "Pickling, Etching,

Pretreating, Descaling, and Rust Preventives," *Metallüberfläche*, Vol. 2, I, pp. 123-130, II, pp. 199-203, III, pp. 224-229, IV, pp. 271-275 (1948).

A review with many references for the years 1935 to 1943.

(489C) V. F. Stine, "Blast Cleaning of Metals," *Metals Handbook*, Am. Soc. Metals, pp. 300-301 (1948).

The centrifugal process for blast cleaning using grit or shot has come into wide use, though many applications remain where the compressed-air method is desirable.

(489D) D. R. Swan, "Advances in Cleaning Compounds," *Organic Finishing*, Vol. 9, No. 1, pp. 19-25 (1948).

A review of the newly available synthetic agents, starting with Twitchell materials, naphthalene sulfonic acid condensates, other anionic, cationic and nonionic surface active agents.

(489E) A. B. Tripler, Jr., "Cleaning and Finishing," *The Metals Review*, Vol. 21, No. 6, pp. 3, 5, 7 (1948); *Metallurgical Abstracts*, Vol. 17, Part 2, p. 115 (1949).

A review of developments.

(489F) E. W. Turner, "Solvent Vapor Degreasing," *Metal Finishing Industry Guidebook*, pp. 53-59 (1948).

Discussion includes solvents, equipment, and degreasing methods.

(491A) K. Wickert, "Effect of Inhibitors in Pickling," *Archiv für Metallkunde*, Vol. 2, 137-139 (1948); *Chemical Abstracts*, Vol. 43, p. 2917 (1949).

Inhibitors reduce metal loss somewhat, but cathodic pickling in acid solution is said to produce lowest metal loss.

NEW REFERENCES—1949 and 1950

1949

(493) Cleaning Compound, Fingerprint Removing, Metal Surfaces, U. S. Air Force Specification, 14156-A, March 4, 1949.

Composition meant for fingerprint removal from metal surfaces prior to preparation for storage or coating with a permanent resin coating. Requirements include easy removal with naphtha, no separation on storage, of given viscosity and flash point. Also included is minimum corrosion, and ability to remove fingerprints and to suppress corrosion from them.

(494) Carbon Removal Compound, Orthodichlorobenzene Type, (for Engine Parts), U. S. Air Force, Specification, 20043-A, March 22, 1949.

Intended use in softening and removing carbon deposits and paint from engine parts by immersion in heated solution. Composi-

tion is 53 per cent by weight of orthodichlorobenzene, 23 to 25 per cent cresylic acid, 10 to 12 per cent potassium oleate, 5 per cent maximum by volume of water, and 5 per cent maximum of inhibitor and other materials. The general requirements are odor and toxicity, density, minimum corrosion, undissolved matter, flash point, seal (distinct emulsion formation), laboratory carbon removal, rinsability, practical carbon removal test, and package stability.

(495) Compound, Cleaning, Alkali-Type, U. S. Army Ordnance Department, Specification, AXS-1849, June 15, 1949.

Product covered is intended for use in the hot soak tank cleaning of ferrous and non-ferrous metal alloy parts. A formula satisfactory for use with ferrous alloys only or for the removal of soil containing considerable calcium soap base grease is comprised of the following in per cent by weight: