

BIBLIOGRAPHICAL ABSTRACTS

1923-1957

ADDITIONAL REFERENCES FOR 1923 TO 1954

1923

(6A) C. M. Hemen, "Composition for Cleaning Aluminum," U. S. Patent No. 1,456,486, May 22, 1923; Chemical Abstracts, Vol. 17, p. 2515 (1923).

Detergent for aluminum formed of white soap 1 lb, oxalic acid 1 oz, zinc oxide 1 oz, sodium bicarbonate 1 oz, gum tragacanth 1/4 oz, soft water 6 qt and a fine abrasive such as pumice.

(7A) W. A. Ruddell, "Metal Polish," U. S. Patent No. 1,456,151, May 22, 1923; Chemical Abstracts, Vol. 17, p. 2481 (1923).

Mixture for polishing aluminum, brass, nickel or other metal comprising tripoli powder 4.5 lb, oxalic acid 8 oz, salt 1 to 3 oz, borax 1 to 3 oz, water one gal and alcohol.

1925

(12h) P. P. Bailey and E. M. Bailey, "Cleaning Aluminum," U. S. Patent No. 1,554,483, Sept. 22, 1925; Chemical Abstracts, Vol. 19, p. 3572 (1925).

Treatment of aluminum in boiling solution containing oxalate, acetate or similar compound of an organic acid and sugar, starch, gums or other carbohydrate supplying material.

(12j) M. W. Gleason, "Detergent and Polish for Metals," U. S. Patent No. 1,544,735, July 7, 1925; Chemical Abstracts, Vol. 19, p. 2731 (1925).

Chloroform 3, paraffin oil 5 and rottenstone 6 and Venetian red one part.

1927

(15A) J. H. Gravell, "Cleaning Iron and Steel," British Patent No. 290,458, June 24, 1927; Chemical Abstracts, Vol. 23, p. 811 (1929).

An acid, oil solvent and adhesive and "control agent" used together with alcohol, or butyl alcohol or both, adhesive size, starch or gelatine and quinoline, pyridine, arsenic trioxide, formaldehyde or thiocyanates.

1928

(19A) W. Breitsake, "Composition for Polishing Metals," U. S. 1,669,281, May 8, 1928; Chemical Abstracts, Vol. 22, p. 2248 (1928).

Pasty mixture of confectioners sugar 68, camphor 26, ether 6 parts and water.

(21A) J. D. Klinger, "Cleaning and Rust-proofing Steel," U. S. Patent No. 1,695,430, Dec. 18, 1928; Chemical Abstracts, Vol. 23, p. 811 (1929).

Solution containing hydroxycarboxylic acid such as citric acid containing also alcohol, sulfuric acid and acetone used to prepare surfaces for painting.

1929

(23A) J. H. Gravell, "Composition for Cleaning and Arsenic-Coating Ferrous Metals," U. S. Patent No. 1,713,653, May 21, 1929; Chemical Abstracts, Vol. 23, p. 3433 (1929).

Phosphoric acid and an oil remover such as ethyl alcohol and butyl alcohol used with an arsenic compound such as sodium arsenite from which on contact a film of arsenic will plate out on ferrous surfaces.

1931

(44A) J. G. Fancy, "Composition for Cleaning and Polishing Painted or Other Surfaces," U. S. Patent No. 1,798,075, March 24, 1931; Chemical Abstracts, Vol. 25, p. 2824 (1931). Phosphate rock powder 16, soap 4 and alcohol 8 parts.

1932

(57B) W. C. Gangloff, "Cleaning Composition for Aluminum," U. S. Patent No. 1,870,312, Aug. 9, 1932; Chemical Abstracts, Vol. 26, p. 5713 (1932).

Household cleanser of borax 24, sodium sesquicarbonate 50, trisodium phosphate 24 and sodium silicate 2 per cent.

(57C) I. G. Farbenind. A. -G., "Pickling Metals," French Patent No. 741,086, Aug. 12, 1932; Chemical Abstracts, Vol. 27, p. 2663 (1933). Use of organic sulfoxides such as benzyl, diphenyl, etc., to reduce corrosive action of acids. Wetting or emulsifying agents may also be added.

1933

(60C) P. W. Denny and Imperial Chemical Industries, Ltd., "Cleansing Compositions," British Patent No. 391,156, April 18, 1933; Chemical Abstracts, Vol. 27, p. 4892 (1933).

Chlorinated hydrocarbons containing two carbon atoms stabilized by adding small proportions of an alkylamine such as dibutylamine, mono-, di- or tri-ethylamine to prevent liberation of acid during degreasing of materials.

(60D) F. R. Draibach and Chem. Fab. Joh. A. Benckiser G. m. b. H., "Cleansing Compositions for Domestic Appliances, etc.," German Patent No. 580,233, July 7, 1933; Chemical Abstracts, Vol. 27, p. 4892 (1933).

Caustic alkali mixed with 5 to 20 per cent of an alkali metaphosphate or a mixture of alkali meta- and pyro-phosphates. Small proportion of water glass or like corrosion preventing substance may be added.

(62a) J. H. Gravell, "Cleaning Metals," British Patent No. 403,373, Dec. 15, 1933; Chemical Abstracts, Vol. 28, p. 3049 (1934).

A dilutable composition for cleaning metal surfaces prior to painting comprising trihydric metal cleaning mineral acid such as phosphoric, arsenic and a sulfonated wetting agent such as Nekal, which is compatible with water solutions of acids and alkalis. A solvent increasing the solubility of wetting agents such as alcohols, ketones, ethers, esters may be added.

(62B) I. G. Farbenind. A. -G., "Metal Polishes," British Patent No. 390,402, April 6, 1933; Chemical Abstracts, Vol. 27, p. 4892 (1933).

Compositions for cleaning and polishing metals comprise soluble fluoride, such as ammonium and alkali metal fluorides, and usual ingredients other than alkali hydroxide.

1934

(71a) L. O. Larsen (to Western Electric Co.), "Cleaning Alloys of Copper with Zinc or Tin," U. S. Patent No. 1,984,534, Dec. 18, 1934; Chemical Abstracts, Vol. 29, p. 722 (1935).

Nonferrous copper alloys containing zinc or tin, such as brass, bronze, etc., cleaned

by use of a bath containing phosphoric acid together with nitric or sulfuric acids.

(72a) O. L. Peterson, H. L. Peterson and C. E. Peterson (to Delaney Chem. Co.), "Pickling Ferrous Metals," U. S. Patent No. 1,754,743; April 10, 1934; Chemical Abstracts, Vol. 28, p. 3707 (1934).

Mixture comprising copper sulfate, aluminum acetate and sodium chloride.

(72b) O. L. Peterson, H. L. Peterson and C. E. Peterson (to Delaney Chem. Co.), "Pickling Ferrous Metals," U. S. Patent No. 1,954,744, April 10, 1934; Chemical Abstracts, Vol. 28, p. 3707 (1934).

Use of oxalic, copper salt and inorganic nitrate such as sodium nitrate.

(72c) O. L. Peterson, H. L. Peterson and C. E. Peterson (to Delaney Chem. Co.), "Pickling Ferrous Metals," U. S. Patent No. 1,954,745, April 10, 1934; Chemical Abstracts, Vol. 28, p. 3707 (1934).

Use of oxalic acid, sodium sulfate and sulfonated coal-tar distillate.

1935

(76C) Alex. Wacker Ges. für electroch. Ind. G. m. B. H., "Cleaning Metals," French Patent No. 775,769, June 9, 1935; Chemical Abstracts, Vol. 29, p. 2902 (1935).

Metals cleaned by emulsification in water of fat solvent (chlorinated hydrocarbons), containing emulsifying agents (soaps or resins) or wetting agents usually used in the textile industry. Substances which stabilize emulsions and prevent tarnishing of metal, for example, aliphatic or aromatic bases or phenols, may be used.

(78a) L. J. Benson (to Aluminum Company of America), "Solution Suitable for Sterilizing Aluminum Articles," U. S. Patent No. 2,024,755, Dec. 17, 1935; Chemical Abstracts, Vol. 30, p. 1186 (1936).

Solution comprising aqueous solution of alkali metal disilicate and available chlorine is prepared from sodium disilicate and sodium hypochlorite.

(81B) H. W. Witzel (to American Cyanamid and Chem. Corp.), "Metal Polish," U. S. Patent No. 1,997,989, April 16, 1935; Chemical Abstracts, Vol. 29, p. 3752 (1935).

Composition for polishing metals contains maleic acid or acid such as sodium acid maleate (suitably with Kieselsäure, etc.).

1936

(81C) Alex. Wacker Ges. für electroch. Ind., "Cleaning Metals, etc.," British

Patent No. 444, 818, March 27, 1936; Tex. Colorist, Vol. 59, p. 813 (1937).

Use of wetting agents 1 to 2 per cent in combination with tarnish hindering agent 1/2 to 1 per cent such as dibutylamine, aniline or pyridine, in combination with chlorinated solvents in emulsified form for metal cleaning.

(81D) Alex. Wacker Ges. für elek. Ind., "Cleaning Metal and other Rigid Articles," British Patent No. 458, 374, Dec. 18, 1936; Chemical Abstracts, Vol. 31, p. 3444 (1937).

In metal cleaning warm volatile solvents are emulsified in water by emulsification as wetting agents, use of different methods of application made.

(92c) Rust Proofing Co. of Canada, Ltd., "Cleaning Metals," French Patent No. 797, 098, April 20, 1936; Chemical Abstracts, Vol. 30, p. 6320 (1936).

Iron, copper and aluminum freed from rust by dipping in fused alkali nitrate, phosphate, carbonates or hydroxides, with or without addition of flux such as manganese dioxide and then neutralized with aqueous solution of iron sulfate, hydrochloric or oxalic acid.

1937

(95a) C. Ellis (to Standard Oil Development Co.), "Detergent Compositions," U. S. Patent No. 2, 071, 512, Feb. 23, 1937; Chemical Abstracts, Vol. 31, p. 2716 (1937).

Combination of water soluble acid-sludge sulfonates from mineral oil used with alkaline salt of an alcohol sulfate detergent containing hydrocarbon radical at least 16 carbon atoms in length.

(95B) E. W. Reid (to Union Carbide and Carbon Corp.), "Solvent Mixture Suitable for Cleaning and Degreasing Fabrics or Metals," U. S. Patent No. 2, 070, 926, Feb. 16, 1937; Chemical Abstracts, Vol. 31, p. 2716 (1937).

Solvent with flash point above 26 C contains ethylene dichloride 60 and trichloroethylene 40 parts by volume.

1939

(113a) W. R. Kappes (to Aluminum Company of America), "Treating Aluminum Surfaces Preparatory to Painting," U. S. Patent No. 2, 171, 546, Sept. 5, 1939; Chemical Abstracts, Vol. 34, p. 76 (1940).

Surface treated with water, alkali metal carbonate-chromate solution to produce suboxide coating and this coating then removed with nitric or chromic acid.

1940

(119b) E. K. Bolton and J. K. Hunt (to E. I. du Pont de Nemours and Co.), "Cleaning Calcareous Deposits from Materials such as Boiler Tubes, Walls, Dairy Equipment or Oil Wells," U. S. Patent No. 2, 225, 294, Dec. 17, 1940; Chemical Abstracts, Vol. 35, p. 2254 (1941).

Sulfamic acid used as cleansing agent.

1941

(134b) J. P. Abrahams (to Koninklijke Zwavelzeverfabrieken voorheen Ketjen N. V.), "Removing Carbon Deposits from Parts such as Pistons of Internal-Combustion Engines made of Aluminum or its Alloys," U. S. Patent No. 2, 228, 026, Jan. 7, 1941; Chemical Abstracts, Vol. 35, p. 2698 (1941).

Parts treated in a bath of fuming sulfuric acid, rinsed with sulfuric acid, the adhering acid neutralized and parts finally washed.

1943

(235A) E. R. Holman and J. P. ApRoberts, "Surface Treatment for Magnesium," Metals and Alloys, Vol. 18, pp. 1331-1334 (1943).

Cathodic cleaning prior to plating in a solution operated at 160 to 190 F of the following composition:

Na ₂ CO ₃ ·10 H ₂ O	7.4 oz per gal.
Trisodium phosphate. 12H ₂ O	4.5 oz per gal.
Caustic soda	3.7 oz per gal.
Sodium silicate (meta)	7.4 oz per gal.
Wetting agent	0.9 oz per gal.
The wetting agent as sodium or ammonium lauryl sulfate.	

Use a current density of 50 to 200 ASF for 1 to 2 min followed by hot then cold rinse.

1946

(358B) Cleaner, Rifle Bore, Joint Army-Navy Specification, JAN-C-372, July 30, 1946.

Consists of organic soap emulsion, or solution of water, paraffin oil and solvents. Detail requirements are minimum flash point, viscosity, stability, alkalinity, appearance, residue and performance. Prepared steel panels are soiled by firing a primer of corrosive chlorate type from a .30 ball ammunition cartridge without powder charge or bullet, against center of the panel. Panels then cleaned with cleaning patch saturated with the cleaning solution by gentle swabbing followed by dry patch to remove solution and dissolved salts. Panel then swabbed with patch containing solution and these panels then placed in humidity cabinet to determine effect of cleaner on surface in preventing corrosion.

1947

(436A) A. Mankowich, "Testing of Alkaline Metal Cleaners," *Metal Finishing*, Vol. 45, No. 12, pp. 77-78, 88 (1947). See Reference No. 436.

Cleaned and rinsed panel dried at 50 C for 20 min. A "residue-pattern" created where panels less than clean. Total stained area estimated and used as an index of cleanliness.

(445A) R. Shawcross (to Aluminum Corporation of America), "Process for Removing Foreign Matter from Magnesium Surfaces," U. S. Patent No. 2,418,955, April 15, 1947.

Process of cleaning magnesium surface and roll coatings with water soluble composition of 5 to 25 per cent by weight of alkali acid sulfate and about 0.2 to 15 per cent by weight of a solution of sodium polyphosphate.

1951

(682b) E. Katzechmann and K. H. Imhausen, Imhausen & Co. G. m. b. H., "Cleansing Agents for Metals," German Patent No. 825,478, Dec. 20, 1951; *Chemical Abstracts*, Vol. 49, p. 6631 (1955).

Metal articles incrustated with residues of lubricating oils treated with cleansing agents containing an essential amount of liquid chloronaphthalenes, particularly the mono chloro compound, possible paraffin oxidation products or solvents such as heavy gasoline or trichlorethylene.

(682c) F. Kirnbauer and K. Petrik, "The Ferun Process for Descaling Iron," *Montan-Ztg.*, Vol. 67, No. 11, pp. 199-202 (1951); *Chemical Abstracts*, Vol. 48, p. 10515 (1954).

Process based on hydrochloric acid and sulfuric acid and patented descaler assistants. Evolution of hydrogen reduced to a minimum and residual waters not dangerous, with no formation of poisonous gas.

(686a) L'Auxiliaire des chemins de fer et de l'industrie, French Patent No. 986,659, Aug. 3, 1951; *Chemical Abstracts*, Vol. 49, p. 16282 (1955).

Antiscale compound consists of the lignin extracted from the soda extraction solvent of cellulose manufacture or of the solvent itself, together with antifoaming agents and optionally other known cleansing agents.

(686B) Borje Lindqvist, "M C Detergent for Cleaning Machines for Aluminum and Tin-plated Material," *Svenska Mejeritidn.* Vol. 43, pp. 159-162 (1951); *Chemical Abstracts*, Vol. 45, p. 10624 (1951).

Cleaning agent for dairy use contains 65 per cent sodium silicate with about 5 molecules of water, 25 per cent trisodium phosphate, 3 per cent alkylaryl sulfonate,

and 7 per cent soda ash. Used in 0.4 to 0.7 per cent concentration.

(695a) Cleaning Oil, Turbine (Compounded), Military Specification, MIL-C-15348A, June 11, 1951.

An oil of given physical properties and compatibility with no increase in foaming tendency, emulsifiability with a given lube oil, removal of rust preventive compound, and moisture, and nontoxic in character.

(695b) Dishwashing Compound (for Use in Mechanical Dishwashing Machines), Military Specification, MIL-D-15971A(Ships), Sept. 15, 1951.

Of two types, I for hard water, and II for soft water. The composition shall be moisture of 25 per cent maximum, 30 to 48 per cent sodium oxide, phosphate as pentoxide 18 per cent minimum, silicates as silica 8 per cent. Other requirements are pH and buffer capacity, non-foaming, water softening capacity, turbidity and corrosion characteristics specified.

(695d) Metal Cleaner; Silicate-Soap, Military Specification, MIL-M-7752(Aer), Dec. 21, 1951.

Formulation to comprise sodium metasilicate pentahydrate approximately 41 per cent, sodium trisilicate, soluble powdered 54 per cent and synthetic soap 5 per cent. Among requirements are total alkalinity, silica, pH, surface tension, insoluble matter, cleaning properties, rinsing properties and corrosiveness. Cleaning test uses USP white mineral oil to cover both sides of a 3 by 6 in. smooth aluminum panels. After draining in vertical position for 10 min, immersed for 10 min in cleaner solution at 100 C. Removed, rinsed in clear water and dried. Panel then washed with petroleum ether and removed and the residue weighed. Weight of residue not more than 1 mg greater than equal volume of petroleum ether similarly removed. Rinsing test consists of immersion for 5 min of glass panel in one liter of cleaning solution containing 30 g of cleaner. Panel removed and allowed to dry 15 min at 45 angle. Then rinsed in water at 82 C and allowed to dry 2 hr. Panel observed for residue and treated with a drop of USP alcohol for evidence of white deposit.

(711a) P. Venturini and G. Bianucci, "Use of Inhibitors in Descaling with Acid Solutions," *Calore*, Vol. 22, pp. 175-179 (1951); *Chimie & Industrie*, Vol. 67, p. 83 (1952); *Chemical Abstracts*, Vol. 48, p. 8711 (1954).

Inhibitors classed in three categories: glues, formaldehyde derivatives, and derivatives of coal tar. Mixtures of inhibitors perform better than single products. Inhibitors for light alloys were perfected, but are out of the power-plant field.

(713D) Wurttembergische Metallwarenfabrik., "Cleaning of Tarnished Metal Surfaces," German Patent No. 825,027, Dec. 17, 1951; Chemical Abstracts, Vol. 49, p. 827 (1955).

Metals such as noble metals, copper, brass, etc., treated with a powdered metal in the electromotive series below it, preferably zinc dust, in the presence of an electrolyte. The metal powder can be mixed with the salt or a crystallized acid. Suitable compositions are 60 per cent oxalic acid and 40 per cent zinc dust, and 50 per cent ammonium chloride and 50 per cent zinc dust.

1952

(717A) J. W. Ayers (to Agrashell, Inc.), "Lignocellulose Aggregate and Blast-Cleaning Process Employing Same," U. S. Patent No. 2,622,047, Dec. 16, 1952; Chemical Abstracts, Vol. 47, p. 2676 (1953).

Coatings and other materials removed from metal surfaces by soft-blasting with fluid stream containing rounded particles of walnut shell, fruit pits, etc., having density of 1.20 and 12 to 40 mesh size.

(730A) Allessandrina Elhi (nee Saibene), "Powdered Degreasing and Polishing Wax," Italian Patent No. 476,579, Dec. 16, 1952; Chemical Abstracts, Vol. 48, p. 13244 (1954).

Mixture of beeswax 45, ceresin 25, talc 15, sodium bicarbonate 10, turpentine oil 3, yellow edible oil 2 per cent. Used after drying and grinding for miscellaneous surfaces including metals.

(732A) H. Fischer (to Siemens & Halske A.-G.), "Finishing the Surface of Aluminum Articles," German Patent No. 828,466, Jan. 17, 1952; Chemical Abstracts, Vol. 50, p. 2411 (1956).

Aluminum or aluminum alloy articles are degreased then dipped for 10 to 60 sec in an alkaline bath at 60 to 130 °F then rinsed with hot and cold water. The bath has the preferred composition of 240 g of caustic soda with 180 g water.

(748A) Cleaning Compound, with Inhibitor, for Engine Cooling Systems, Military Specification, MIL-C-10597B(Ord), Sept. 3, 1952. Superseding MIL-C-10597A(Ord), See Reference No. 695B.

(756A) J. A. K. F. Paniagua, "Precious Metal Cleaner," Spanish Patent No. 200,856, May 28, 1952; Chemical Abstracts, Vol. 48, p. 4418 (1954).

Finely powdered cleaner consists of 85 per cent powdered soda ash, 5 per cent sodium sulfite and 10 per cent ammonium carbonate. Presence of moisture avoided when the compounds mixed together in an aluminum receptacle.

(756B) J. S. K. F. Paniagua, "Precious Metal Cleaner," Spanish Patent No. 202,839 (1952); Chemical Abstracts, Vol. 48, p. 4418 (1954). See Reference No. 756A. Spanish Patent No. 200,856, May 28, 1952.

Same proportions of materials, but different method of mixing.

(770A) J. R. Schaeffer (to Proctor and Gamble Co.), "Polyphosphate Containing Detergent Compositions having Decreased Corrosivity toward Aluminum," U. S. Patent No. 2,618,604, Nov. 18, 1952; Chemical Abstracts, Vol. 47, p. 5145 (1953).

Addition of beryllium salt to polyphosphate-containing detergent composition reduces corrosion toward aluminum. The soluble beryllium salt is added to the extent of 0.5 to 10 per cent expressed as beryllium oxide based on polyphosphate, and pH adjusted to 6 to 10.

(770B) Societe etablissemments Herve S. a. r. l., "Metal-cleaning Composition," French Patent No. 998,926, Jan. 24, 1952; Chemical Abstracts, Vol. 50, p. 14500 (1956).

The composition contains approximately ammonia 55, sodium cyanide 8, sodium fluoride 10, agar-agar 2, and water 25 per cent.

1953

(789A) P. P. Belyaev, "The Process of Passivation in Galvanic Techniques," Trudy Soveshchaniya Elektrokhim. Akademii Nauk S. S. R., Otdel, Khim. Nauk 1950, pp. 455-463 (1953); Chemical Abstracts, Vol. 49, p. 12158 (1955).

Degreasing and pickling conditions discussed in relation to effect on quality on tin plating and galvanizing. These procedures do not leave cleaner metal, but form a protective film of a passive type.

(798A) I. T. Deev and K. M. Morozova, "Results of Repeated Acid Cleanings of a Test Condenser," Elek. Stantsii, Vol. 24, pp. 13-16, Nov., 1953; Fuel Abstracts, Vol. 16, p. 112 (1954); Chemical Abstracts, Vol. 50, p. 9659 (1956).

Considerable corrosion of brass tubes of a turbine condenser was evident, especially at expansion points, after 22 half-hour cleanings with inhibited hydrochloric acid. Other comparative data given.

(798B) L. Defosses, "Removing Rust from Watch Parts," Journal suisse, horol. et bijout., Sept.-Oct., 1953, pp. 311-314; Chemical Abstracts, Vol. 48, p. 6362 (1954).

One method comprises the use of a solution of potassium cyanide, with soap, another a paste of olive oil, flowers of sulfur and tripoli, another a solution of tartaric acid, zinc chloride, mercuric

chloride and indigo solution; lactic acid and aspic oil; attach rusted part to small piece of zinc and immerse both in dilute sulfuric acid until disappearance of rust.

(798C) G. G. del Campo, "Cleaning of Silver and Silver-Plated Objects," Spanish Patent No. 198,445, June 17, 1953; Chemical Abstracts, Vol. 49, p. 145 (1955).

Objects to be cleaned placed in a 10 per cent soda ash solution, heated to near the boiling point, and brought in contact with aluminum strips.

(798D) A. deVleeschauwer, H. Hendricks and E. Wallex, "Corrosive Effect of Detergents," Medel. Landbouwhogeschool Opezoekings stas. Staat Gent., Vol. 18, pp. 544-564 (1953); Chemical Abstracts, Vol. 48, p. 5776 (1954).

Immersion test method used. Test panels given 180 immersions of 1 min each, rinsed, dried, and weighed. According to the Deut. Landwirtschaft Ges., the weight losses of light metals in milk can cleaners should not exceed 20 g per sq m per 24 hr and 60 g for heavy metals. Describes the results with a variety of alkalies and compositions.

(800A) B. Domenicali, "Use of Inhibitors in the Chemical Descaling of Boilers," Metallurgia ital., Vol. 46, Suppl. to No. 5, pp. 69, 88, (1953); Chemical Abstracts, Vol. 49, p. 11215 (1955).

A 5 per cent solution of hydrochloric acid with an inhibitor was found to be beneficial for descaling boilers in 12 hr while mechanical cleaning required 8 to 15 days.

(804A) Cleaning Compound, Alkali-Type, Federal Specification, P-C-436(Army-Ord), Amendment 1, July 2, 1953.

Performance requirements and cleaning efficiency made by comparison with an arbitrary standard. Cleaning must remove to minimum oil, and asphalt soils from metal surfaces. Directions given for panel preparation and subsequent soiling individually (by dipping and draining) in mineral oil and spreading of softened asphalt. The detergent comparison standard used was (per cent by weight):

Sodium metasilicate pentahydrate.....	34.5
Sodium phosphate monobasic.....	12.0
Trisodium phosphate. 12H ₂ O.....	33.5
Nonionic surface active agent.....	5.2
Anionic surface active agent.....	14.8

The nonionic agents intended above are Triton X-100, Igepal CA-630 or Atlas G-1690, while the anionics included Nacconol NR or Santomerse 1. The cleaning tests are based upon triplicate panels tested in specific manner with detergents using weight of residue with tar, and water break and residue pattern stain for mineral oil.

(813A) T. P. Hoar and R. D. Holliday, "The Inhibition by Quinolines and Thioureas of the Acid Dissolution of Mild Steel," Journal of Applied Chemistry (London), Vol. 3, pp. 502-513 (1953).

Describe the inhibiting effect of a number of these compounds with mild steel by 5 per cent sulfuric acid at 40 C and 70 C.

(815A) B. H. Johnson, "Simple Method for Cleaning Mercury," Am. Journal Clinical Pathology, Vol. 23, p. 1186 (1953); Chemical Abstracts, Vol. 48, p. 13399 (1954).

Pour the mercury into a large mortar and add 2 volumes of household sucrose. Grind with the pestle and place in running hot water to clear. A distilled water wash can be given.

(826A) H. B. Linford and E. B. Saubestre, "Cleaning and Preparation of Metals for Electroplating. VII. Final Summary on Degreasing Evaluation Tests," Plating, Vol. 40, pp. 1265-1269 (1953).

A review of the sensitivity of the various tests.

(828A) I. A. Makolkin, "Effect of the Mechanical Treatment and the Degree of Cleanliness of the Surface on the Corrosion Resistance of Magnesium Alloys," Sbornik Statei Vsesoyuz. Zaochnogo Politekh. Inst., 1953, No. 3, pp. 28-36; Referat. Zhur., Khim., 1954, No. 14004; Chemical Abstracts, Vol. 49, p. 819 (1955).

The effect of treatment is given, and the effect of cleanliness of the surface is noticeable only in the case of sodium chloride corrosion in which case a coarse surface corrodes faster than a clean surface.

(828B) A. Mattesini, "Degreasing Paste," Italian Patent No. 479,207, (1953); Chemical Abstracts, Vol. 49, p. 2104 (1955).

Eight parts soap dissolved in 40 parts warm water. Five parts soda ash added and mixture boiled to homogenize. A mixture of 8 parts powdered clay added and the mixture again boiled to homogenize.

(830A) M. Mazzola, "Buffing, Cleaning, and Polishing Compounds," Italian Patent No. 480,565, May 7, 1953; Chemical Abstracts, Vol. 49, p. 5258 (1955).

Compositions for metals or plastics based on silica, alumina, or other abrasive suitably compressed for use in a rotary tool.

(832A) L. Merlo and B. Domenicali, "Descaling Steam Boilers by Chemical Means," Il Calor, Vol. 24, pp. 334-339 (1953); Chemical Abstracts, Vol. 50, p. 9659 (1956).

A suitable inhibitor is 0.1 per cent of normal sodium hydroxide used with commercial hydrochloric acid containing 0.13g per liter of arsenic. This can prevent the develop-

ment of arsine. The scale analyzed to determine the quantity of acid necessary for solution based on total volume of the boiler, but the concentration not to exceed 5 per cent with 0.1 per cent inhibitor.

(832B) J. Mikumo and T. Kusano, "Corrosion of Metals in the Aqueous Solutions of Surface-Active Agents, I," Research Repts, Nagoya Industrial Science Research Inst., No. 6, pp. 33-34 (1953); Chemical Abstracts, Vol. 48, p. 5062 (1954).

Corrosion of ferrous metal by surface active agents measured. Agents tested were sodium oleate, sodium laurate, sodium sulfuric acid esters of higher alcohols, sodium dodecylbenzenesulfonate, hexadecylpyridinium chloride, oleate (?) of (hydroxymethyl) triethanolammonium chloride, polyethylene glycol monolaurate, and sorbitan monostearate in their aqueous solutions. Addition of sodium carbonate or trisodium phosphate depress corrosion by the agents.

(833A) Solvent, Degreaser, Self Emulsifying, Military Specification, MIL-S-11090(Ord), Amendment 3, March 3, 1953. Superseding MIL-S-11090, See Reference No. 833.

Intended for removal of oils, greases, asphalt, tars and preservative type materials from metal and painted surfaces. Requirements are absence of phenolic or cresylic type acids or salts, absence of chlorinated solvents, and given physical properties. In performance shall show no water-break on rinsing, shall remove sodium base grease, tar and asphalt soils under standard test and shall not stain more, nor remove less soil than a comparison formula. Corrosion shall be minimized and shall not attack paint and not separate in storage. A comparison formula is given.

(834A) Cleaning and Protecting Integral Piping for Oil Hydraulic Power Transmission Equipment, Military Specification, MIL-C-17795(Ships), Dec. 7, 1953.

Cleaning process for non-ferrous metals; the process including wire brushing, blowing out thoroughly with dry air, and cleaning with solutions of either

- (1) 85 per cent sodium orthosilicate
10 per cent soda ash
5 per cent sodium resinate

or,

- (2) 46 per cent soda ash
32 per cent trisodium phosphate
16 per cent caustic soda
6 per cent rosin

Then rinse in warm water and dry in air blast. This cleaning followed by pickling in specified manner. Other details given for procedures for recleaning and cleaning prior to installation.

(835A) W. Mohr, R. Juenger, and E. Wienert, "Testing the Detergent Action of Detergents used for Can Washing in Automatic

Can-Washing Machines," Kiel. Milchwirtsch. Forschungsber., Vol. 5, pp. 207-220 (1953); Chemical Abstracts, Vol. 49, p. 5007 (1955).

An effective spray apparatus was designed, and this used to evaluate detergents and methods for milk can washing. Aluminum alloy cans required more cleaning than tinned cans. Drying of sour skim milk or cream deposits may so complicate cleaning that removal with the spray apparatus is prevented. Preliminary washes or soaks in 1 per cent lye, sodium thiosulfate or proprietary products improved cleaning. Addition of more detergents to spent solution does not renew detergency.

(838A) R. E. Parr, "Derusting of Metals by Use of Chemicals," Royal Engineers Journal, Vol. 47, pp. 179-184 (1953); Chemical Abstracts, Vol. 48, p. 8157 (1954).

Plant described for derusting of accumulated ferrous metal which has deteriorated through exposure to the elements. Plant consists of tanks for removal of grease and paint by alkali, for washing with warm water, for removal of rust with hydrochloric acid, and for application of phosphate film.

(839A) Productos Bilbainos para Industrias, S. A., "Metal Cleaner," Spanish Patent No. 210,262, July 10, 1953; Chemical Abstracts, Vol. 49, p. 6630 (1955).

A mixture containing 10 parts each of benzene, gasoline and refined petroleum, has added to it 40 parts of silicate, shaken thoroughly and then are added 30 parts of ammonium soap. The resulting suspension can be used to impregnate a suitable fabric, but must be hermetically sealed to preserve its usefulness.

(850A) W. Simon, "Trichloroethylene in the Iron-Working Industry, Its Durability and Corrosion Characteristics," Chemistry Techniques (Berlin), Vol. 5, p. 440 (1953); Chemical Abstracts, Vol. 48, p. 6945 (1954).

Review of the use of trichloroethylene, in which mention is made of the tendency of the compound to decompose to corrosive substances in the presence of metal salts such as ferric chloride as well as with oxygen, moisture, short-wave light, and heat. Proper precautions in usage prevents impairment of quality.

(850B) S. Smith, "Cleaning, Polishing, and Surface-Protective Composition," Canada Patent No. 490,156, Feb. 3, 1953; Chemical Abstracts, Vol. 49, p. 16464 (1955).

Composition consists of a high-grade soap, silica flour or pumice flour, glycerol, soft water and pine oil; if desired suitable coloring material may be added. Suitable for many surfaces including metals.

(852A) A. Taubman and A. Koretskii, "Emulsion Method for Cleaning Oil Tankers

of Oil Residues," *Morski i Rečno Flot*, 1953, No. 1, pp. 5-7; *Ferret. Zhur.*, *Khim.*, 1954, No. 22585; *Chemical Abstracts*, Vol. 49, p. 4977 (1955).

Use of colloidal bentonitic clay for emulsification of thick layers of viscous petroleum residues. Increased effectiveness obtained through such additives as iron, aluminum or chromium salts, mineral acids or wetting agents. Evaluation made with 0.5 per cent suspensions of bentonite with 0.03 per cent ferric chloride at 70 to 80 C and 10 atmos pressure.

1954

(857A) M. Ades, "Cleaning of Metal Surfaces before Electrolytic Deposition," 1st World Congress on Surface Active Agents, Vol. II, pp. 851-854 (1954).

Discussion of cathodic and anodic cleaning. Baths are operated either cold, in which the composition is caustic soda, soda ash and sodium cyanide, or hot. For hot baths for brass two formulas given: One contains trisodium phosphate, metasilicate, soda ash and caustic soda and the other tetrasodium pyrophosphate, metasilicate, soda ash, caustic soda and surfactant. Directions for quantity and conditions of operation given for either anodic or cathodic usage. Two steel baths given, one containing trisodium phosphate, tetrasodium pyrophosphate, metasilicate, caustic soda and surfactant, and the other orthosilicate, soda ash, caustic soda and surfactant. Described are properties of the silicates and of the condensed phosphates.

(857B) Aktiebolaget Starprodukter, "Sulfonated Naphthalene Compositions as Rust-Preventive Agents," British Patent No. 716,198, Sept. 29, 1954; *Chemical Abstracts*, Vol. 49, p. 2293 (1955).

Sulfonation technic given, and the resulting solution when properly formulated with other materials forms a derusting agent, metal-cleaning preparation, rust inhibitor, and a constituent of rust-preventive wrapping material.

(857C) T. Ando and Y. Kitamura (to Oriental Steel Plates Co.), "Removal of Water from Metal Surfaces after Acid Washing," Japan, 1463 (1954), March 20; *Chemical Abstracts*, Vol. 49, p. 144 (1955).

Plates after acid washing are immersed in ionic surface-active agent, then in a hydrocarbon solvent.

(857D) W. C. Atkin, "Chemical Cleaning in Pulp and Paper Mills," *Canada Pulp and Paper*, Vol. 7, No. 1, pp. 11-12 (1954); *Chemical Abstracts*, Vol. 48, p. 5498 (1954).

Hydrochloric acid solutions containing chemical inhibitors to protect exposed metals most effective in removing inorganic deposits. Surface tension lowering agents increased the solubility of adhering materials. Specific pieces requiring cleaning discussed together with average time required. Examples given of increased efficiency especially of boilers and evaporators, following such cleaning.

(857E) S. Z. Avedikain, "Silver Cleaning and Polishing Composition," U. S. Patent No. 2,691,593, Oct. 12, 1954; *Chemical Abstracts*, Vol. 49, p. 1528 (1955).

Composition consists of 50 parts sulfated, ammonia-neutralized castor-oil fatty acids; 248 parts of a 50-50 mixture of naphthas; 100 parts diatomaceous earth; 6 parts paraffin wax; 2 parts sodium carboxymethyl cellulose; 311 parts water; and 16 parts ammonium hydroxide. 0.5 to 3 per cent of one of several tarnish inhibitors may be added.

(857F) L. Biek, E. S. Cripps and D. M. D. Thacker, "Some Method for Protecting Cleaned Iron Objects," *Museums Journal* Vol. 54, pp. 32-36 (1954); *Chemical Abstracts*, Vol. 48, p. 13604 (1954).

Early wrought iron keys in moderately rusted condition cleaned in an inhibited phosphoric acid solution, then dried in acetone, and coated and treated in a variety of manners.

(858A) B. Chambers, "Descaling Process for Titanium and Stainless Steel," *Western Metals*, Vol. 12, No. 9, pp. 64-65 (1954); *Chemical Abstracts*, Vol. 48, p. 13591 (1954).

A pre-anneal coating of a carbonate-nitrate mixture is applied to the titanium. The carbonates believed to convert the normal scale oxides or the higher oxides produced by the nitrate into a titanate form which is not tenacious and can be removed by a combination of gentle rubbing and a single brief pickle in a modified conventional nitric-hydrofluoric acid pickling solution. In the case of stainless steel, the surface is coated with a silicon bearing substance which decomposes in the furnace to give a coating of finely divided silica. The scale formed then removed by pickling following the usual heat-treatment.

(858B) F. E. Cook, H. S. Preiser and J. F. Mills, "Electrolytic Descaling," *Journal, Am. Soc. Naval Engineers.*, Vol. 66, pp. 1005-1050 (1954); *Chemical Abstracts*, Vol. 49, p. 2215 (1955).

Development and application of an electrical method of rust removal from tanker-ship compartments is described. Time for derusting varies with the salinity of the electrolyte and the current density, and is independent of temperature in the range 40 to 100 F. Cathodic cleaning readily removes

oleo-resinous adherent paint from a sand-blasted steel surface but is generally ineffective in removing rust between faying surfaces. This process is ineffective in removing scale of the type found in brass evaporator tubes. Much more detail of operation given.

(858C) J. Dall, "Descaling Titanium," *Light Metal Age*, Vol. 12, No. 9, pp. 10, 18-19 (1954); *Chemical Abstracts*, Vol. 49, p. 5240 (1954).

Described are two processes for removal of scale from titanium and stainless steel. These are by promotion of a physical surface barrier which inhibits scale formation, and one which converts scale chemically to a form which will later permit more conventional removal. The processes are in use at the Boeing Airplane Co.

(858D) Degorges, "Use of Silicates to Prevent Corrosion of Aluminum and its Alloys by Sodium Carbonate and Sodium Phosphate," 1st World Congress on Surface Active Agents, Vol. II, pp. 867-871 (1954).

Gives figures showing degree of corrosion by soda ash and trisodium phosphate, with and without metasilicate, indicating degree of corrosion reduction with silicate present, and degree of corrosion resistance of pure aluminum and its alloys, some of which are much more resistant than pure aluminum.

(859A) T. A. Dickinson, "Descaling and Pickling Titanium," *Industrial Finishing* (London), Vol. 7, pp. 43-44 (1954); *Chemical Abstracts*, Vol. 48, p. 12656 (1954).

Mill stencil markings removed with a solvent-soaked rag before they are hot formed or annealed. Titanium parts should be vapor-degreased prior to heat processing to prevent scale formation which will produce a rough surface following the pickling. Heavy oxide coatings removed by sodium hydride processing, followed by pickling; the Virgo process, followed by the same pickling operation.

(859B) E. A. Dieman and A. W. Lindert (to Standard Oil Co.), "Rust-Preventive Compositions," U. S. Patent No. 2,677,618, May 4, 1954; *Chemical Abstracts*, Vol. 48, p. 9308 (1954).

Rust-preventing and fingerprint-removing slushing compounds obtained for metals by mixing 5 to 40 per cent alkali metal or alkaline earth metal petroleum sulfonates, 1 to 10 per cent of a morpholine soap, 0 to 15 per cent water soluble aliphatic ketone or alcohol, and 5 to 80 per cent liquid hydrocarbon, and 0 to 80 per cent water. Examples given.

(859C) A. Dobry and H. E. Mahncke, "Reaction of Stearic Acid Monolayers with Copper and Cuprous Oxide," *Nature*, Vol. 174, p. 507 (1954).

Clean copper foil immersed in a 0.1 per cent solution of stearic acid in benzene, reacted to the extent of 0.26, 0.04 moles per mole of adsorbed stearic acid. Thermodynamic calculation indicates that all adsorbed stearic acid should react in the presence of air, while in a nonoxidizing atmosphere no reaction should occur. Analysis of spatial relation between stearic acid molecules adsorbed on the surface and the positions of copper atoms indicates that only one third of the stearic acid molecules are favorably situated for reaction, in fair agreement with the observations made.

(859D) R. Dunlevy, H. Frick and J. H. Shoemaker (to Kolene Corp.), "Continuous Processing of Steel Strip," U. S. Patent No. 2,674,550, April 6, 1954; *Chemical Abstracts*, Vol. 48, p. 6950 (1954).

Molten alkali salts used for cleaning strip continuously. Details of equipment also given.

(859E) R. Dunlevy, H. Frick and J. H. Shoemaker (to Kolene Corp.), "Assembly for Cleaning Endless Steel Strip," U. S. Patent No. 2,674,551, April 6, 1954; *Chemical Abstracts*, Vol. 48, p. 7528 (1954).

Improvements in the process known as KI, see reference 559. The water rinse bath is provided as close to the molten salt bath as possible and is equipped with a ventilating hood to draw off alkali vapors. Other details of equipment and set-up given.

(859F) A. Efimova, "Removing Scale from Aluminum Trays," *Myasnaya Ind. S. S. S. R.*, Vol. 25, No. 2, p. 59 (1954); *Chemical Abstracts*, Vol. 48, p. 8979 (1954).

Dilute sulfuric acid recommended for removing scale from trays used in the meat-packing plant.

(859G) S. J. Eisler and H. L. Faigen, "Investigation of Synthetic Fingerprint Solutions," *Corrosion*, Vol. 10, pp. 237-242 (1954); *Chemical Abstracts*, Vol. 48, p. 10519 (1954).

Fingerprint residue from manual handling can be removed by aqueous alkali or emulsion cleaners, but not by usual solvent or solvent vapor degreasing procedure and produce corrosion under most rust preventives applied after contamination of ferrous surfaces. Analyses of human sweat given, and indicated that corrosiveness varies from person to person and even from different body areas. The synthetic sweat called "Specification A & S 1719 solution" contained in milligrams per 100 cc NaCl 700, urea 100, lactic acid 400, distilled water 125 cc. this solution made up to one liter with methanol and had a pH of 3.43. Prints made with this solution found to be more difficult to remove than the most active natural prints encountered in these

tested. Other synthetic fingerprint solutions tested and found equally effective, but believed that the recommended formulation most nearly corresponds to sweat from hands, which varies from that from other parts of the body.

(859H) R. A. Emmett, Jr., and W. H. Petering (to Detrex Corp.), "Electrolytic Cleaning of Steel," U. S. Patent No. 2,685,564, Aug. 3, 1954; Chemical Abstracts, Vol. 48, p. 11226 (1954).

Process described for removing oil and smut from steel by applying an asymmetrically reversed electric current to the parts immersed in an aqueous solution of a cleaning compound or mixtures of cleaning compounds selected from the group consisting of polyphosphates, monophosphates, citrates, acetic acid-acetate mixtures, bicarbonates, or dichromates, borax, nitrates, ferricyanides and a wetting agent.

(859I) Dishwashing Compound Machine, Federal Specification, P-D-425a, May 4, 1954.

Of two types; I for hard water and II for soft water. Requirements include sections on foaming to an extent not harmful to machine operation, minimum pH of not less than 10.5 and not over 12.5, and a minimum buffer capacity, water softening capacity and minimum corrosion. No performance tests required.

(859J) Remover; Paint (Organic Solvent Type), Federal Specification, TT-R-251d, Aug. 3, 1954.

Comprises three types, one the non-flammable type with paintable retardant in either low or high viscosity. Test coatings are specified and applied under standardized conditions. The effectiveness of removal, paintability properties where indicated, and effect on wood and steel determined.

(860B) C. H. Giles, H. V. Mehta, C. E. Steward and R. V. R. Subramanian, "Adsorption at Inorganic Surfaces. I. The Mechanism of Adsorption of Organic Compounds by the Anodic Film on Aluminum," Journal Chemical Society, 1954, pp. 4360-4374.

Adsorption of a large number of organic compounds by anodized films on aluminum studied between 15 and 60 C. The films were prepared by anodizing 99.99 per cent aluminum foil in 3 per cent aqueous chromic oxide solution for one hour at 45 C with a current density of 6 amp per sq ft. This treatment gave a film of about 6 μ thickness consisting of essentially pure gamma-alumina. Quantitative data obtained for catechol, sodium dodecyl toluenesulfonate, sodium oleyl sulfate, sodium tetradecyl sulfate, phenol, and amines, the former in

water and the latter in carbon tetrachloride or benzene. Mechanisms depending on salt formation, ion-exchange, hydrogen-bond formation, chelation, or "bridge-bonding" are postulated.

(860C) C. R. Gillette and W. P. Burroughs (to General Motors Corp.), "Cleaning of Small Antifriction Bearings," U. S. Patent No. 2,683,343, July 13, 1954; Chemical Abstracts, Vol. 48, p. 11820 (1954).

Tiny antifriction bearings used in precision instruments freed from lubricant by agitation in a cleaning solution containing toluene, Stoddard solvent and butyl alcohol. Afterwards they are slowly tumbled for at least 24 hr in a solution containing distilled water one gallon, Versene T (tetrasodium salt of ethylenediaminetetraacetic acid) 378.5 cc, Orvus 2, Flaxsoap 80, and Gamal (20 percent suspension of finely powdered alumina) 150 g. Sufficient caustic soda added to bring the pH to 12.

(860D) A. Guilhaudis and R. Bourbon, "The Protection of Aluminum and its Alloys by Paints," Rev. aluminum, Vol. 31, No. 206, pp. 7-10; No. 207, pp. 47-51 (1954); Chemical Abstracts, Vol. 48, p. 7316 (1954).

Protection of aluminum depends principally on preparation prior to painting. Methods of degreasing, mechanical, chemical or electrolytic cleaning discussed.

(861A) N. Hackerman and A. H. Roebuck, "Adsorption of Polar Organic Compounds on Steel," Industrial Engineering Chem., Vol. 46, pp. 1481-1485 (1954).

Adsorption from benzene solution on 1020 steel powder measured. Compounds tested were nitriles, amides, thiols, thioureas, carboxylic acids. Compounds with greatest reactivity toward the steel, the acids and thiols, showed the largest film adsorption values and had the most marked effects on the reactivity of the steel toward solution by acids. Reactivity of the members of a homologous series increased with decreasing molecular weight.

(861B) J. C. Harris, "A Review of Cleanliness Tests," Products Finishing, Vol. 18, No. 11, pp. 32-35 (Aug., 1954).

A concise list of 15 methods used for determination of metal cleanliness. Given are original reference, sensitivity, and a very brief operating description. Shown also are test sensitivities of five generally used or very sensitive methods rated by radioactive tracer method.

(861C) H. Hoff and G. von der Dunk, "Testing of Inhibitors for Their Effectiveness," Arch. Eisenhüttenw., Vol. 25, pp. 115-123 (1954); Chemical Abstracts, Vol. 48, p. 7525 (1954).

Test methods and apparatus described for determining inhibition of attack of the pickling acid on iron and reduce the hydrogen development, the latter especially to prevent brittleness and acid fog around the pickling tanks. Content of ferrous sulfate in sulfuric acid at 70 C does not influence the iron attack, while the latter is considerably increased by ferrous chloride in hydrochloric acid at 40 C. Other details given.

(861D) M. Kikuchi and K. Oki, "Alkaline Degreasing of Metal Surfaces," Repts. Govt. Chemical Industrial Research Inst., Tokyo, Vol. 49, pp. 61-64 (1954); Chemical Abstracts, Vol. 48, p. 10515 (1954).

Using soiled copper plates, three commercial degreasers containing three or four of caustic soda, soda ash, disodium phosphate, sodium cyanide and soap, were tested. These were most effective when 5 g per liter of nonionic polyethylene-oxide-laurate was added. Addition of sodium isopropyl naphthalene sulfonate decreased surface tension without improving cleaning efficiency.

(861E) G. Knappich, "Chemical Cleaning of the Water Side of Steam Generators," Mitt. Ver. Grosskesselbesitzer, No. 28, pp. 87-88 (1954); Chemical Abstracts, Vol. 49, p. 4209 (1955).

Two boilers each rated at 32 metric tons per hour at 40 atmos at 450 C were chemically cleaned to remove a thin, gummy, oil-containing scale. The scale, consisting of calcium carbonate, calcium phosphates, with traces of rust and calcium sulfate and a little silicic acid was soluble in a proprietary acid solution. A combined alkali and acid treatment was repeated three times, removing all scale, and taking 60 hr.

(861F) L. Larson, "Metal Conditioners, Developments and Applications," Official Dig. Federation Paint & Varnish Production Clubs, Vol. 26, pp. 837-847 (1954); Chemical Abstracts, Vol. 49, p. 6620 (1955).

Review of vinyl "wash primers," Use of this type of primer the metal surface and protective coating become an integral part of each other. Outstanding properties are adhesion and prevention of under-film corrosion.

(862A) D. R. MacGregor, P. R. Elliker and G. A. Richardson, "Effect of Added Hypochlorite on Detergent Activity of Alkaline Solutions in Recirculation Cleaning," Journal Milk and Food Technology Vol. 17, pp. 136-138 (1954); Chemical Abstracts, Vol. 48, p. 9723 (1954).

Cleaning efficiency determined by visual examination of stainless steel strips coated with synthetic milkstone in a laboratory apparatus designed to stimulate commonly

encountered recirculation cleaning conditions. Varying concentrations of up to 100 ppm of sodium hypochlorite, added to three representative cleaners, significantly increasing their cleaning efficiency. This attributed to solubilization of the protein fraction of the soil.

(862B) J. M. Maloney, "Internal Cleaning of Boilers," Industrial Engineering Chem., Vol. 46, pp. 983-985 (1954).

Discussion of procedures for removing scales and deposits from steam boilers by chemical cleaning with 5 per cent hydrochloric acid solutions containing amino- or N-S coaltar inhibitors with phosphoric acid, and with commercial detergent composed of metaphosphate and silicate. Use of nitrogen gas to displace chemical cleaner is a means of reducing after rusting.

(863A) L. McDonald, "Brightening the Aluminum Surfaces of Aircraft," U. S. Patent No. 2,687,346, Aug. 24, 1954; Chemical Abstracts, Vol. 49, p. 146 (1955).

Corrosion resistance of brightened surfaces increased through use of a composition containing polystyrene sulfonic acid 6, citric acid 5, ammonium acid fluoride 3, and benzenesulfonic acid 10, phosphoric acid 10 per cent and water 1 to 2 parts

(863B) J. G. Meckler and M. C. Meckler (to Kromite Products Co.), "Removing Rust and Inhibiting Further Rusting," U. S. Patent No. 2,690,983, Oct. 5, 1954; Chemical Abstracts, Vol. 49, p. 828 (1955).

Rust stains on chromium plated iron and steel are removed by wiping with a moist cloth and a mixture of tricalcium silicate and tricalcium aluminate. The salts dissolve the iron rust and then are converted to a hydrated silica compound which fills the porous spaces in the chrome plating and prevents further rusting.

(863C) S. Mellgren and O. W. Moles (to National Lead Co.), "Cleaning Titanium Surfaces," U. S. Patent No. 2,697,051, Dec. 14, 1954; Chemical Abstracts, Vol. 49, p. 2987 (1955).

Tenaciously adhering oxide and nitride coatings are removed from titanium metal surfaces by immersing the metal in a bath of molten sodium or potassium polysulfides or their mixtures at 250 to 500 deg for about 10 min. The scale is rapidly loosened and can be rinsed off with water to expose a surface with a fresh, metallic luster. Adding alkali or alkaline earth halides buffers the bath and permits extending the treatment to one hour.

(863D) W. R. Meyer, "American Electroplating Practice. Cleaning and

Preparation of Metals for Plating," Transactions, Inst. Metal Finishing, Fourth Intern. Conf. London, England, Vol. 31, pp. 290-292 (1954).

(863E) Cleaning and Preparation of Ferrous and Zinc Coated Surfaces for Organic Protective Coatings, Military Specification, MIL-C-490A, May 7, 1954. Superseding JAN-C-490, See Reference No. 432A.

In addition to previous specification, under grade II, to leave the metal surface substantially bare are type 3, solvent cleaning; type 4 alcohol phosphoric acid cleaning; type 5 cleaning with hot phosphoric acid containing detergent and type 6 emulsion cleaning with or without added water and followed by a water rinse.

(863F) Cleaning Compound, Solvent, Oil Cooler, Military Specification, MIL-C-6864B, Dec. 31, 1954.

See Reference No. 693.

Detail requirements include pH of 9.3 to 10.0; flash point above 80F; solubility in naphtha solvent; emulsifiability; water tolerance; carbon soil removal equal to standard formula; and lacquer removal equal to standard formula.

Standard formula comprised of following in per cent by weight:

95 per cent ethyl alcohol.....	10
Cresol USP.....	10
Methylene chloride.....	70
Potassium oleate.....	8
Polyethylene glycolmonoalkylaryl ether.....	2

Carbon removal test made in standard manner using carbon covered aluminum alloy aircraft engine piston cut into 8 sections. The lacquer removal test made using a baked-on oil, oxidized in standard manner.

(863G) J. H. Noble, R. Pottberg and U. C. Tainton (R. Pottberg, administrator, estate of U. C. Tainton, deceased) (to Freeport Sulphur Co.), "Cleaning, Descaling, and Deoxidation of Metals, Especially Stainless Steel," U. S. Patent No. 2,678,289, May 11, 1954; Chemical Abstracts, Vol. 48, p. 9894 (1954).

Treating bath acts directly on the scale or oxide itself. Advantages cited are decrease in time required, decrease in metal loss, elimination of pickling-waste disposal problem, reactivity of the bath with carbon, decreased etching, and low cost and simplicity of operation. Bath of fused caustic soda and 5 per cent sodium nitrate. Full cycle given.

(863H) J. H. Noble, R. Pottberg and U. C. Tainton (R. Pottberg, administrator, estate of U. C. Tainton, deceased) (to Freeport Sulphur Co.), "Removal of Oxide Films from Ferrous Metals, Especially Stainless Steel,"

U. S. Patent No. 2,678,290, May 11, 1954; Chemical Abstracts, Vol. 48, p. 9308 (1954).

Metal surfaces treated in a bath of fused caustic soda at 900 to 1000 F. Air or oxygen introduced into the bath during treatment. After 10 to 20 min the parts quenched in water. This preconditions the scale so that it is easily removed in a standard pickling bath.

(863I) K. H. Obermeit (to Standard Oil Co. of Ohio), "Composition for Cleaning Internal-Combustion Engines," U. S. Patent No. 2,671,036, March 2, 1954; Chemical Abstracts, Vol. 48, p. 7225 (1954).

After draining the oil, the crankcase is filled with a mixture of 50 to 75 parts of lubricating oil having viscosity up to SAE 30 and 50 to 25 parts of cresol-soap solution, the engine allowed to idle for about 1 hr, and the mixture drained. The soap used consists of about half o-cresol and half linseed oil soap solution having a pH of 8.5 to 9.0.

(863J) K. Petrick, "Descaling and Rust Prevention of Iron and Steel," Austrian Patent No. 179,943, Oct. 25, 1954; Chemical Abstracts, Vol. 49, p. 1529 (1955).

The articles treated in a pickling bath containing water, sulfuric acid, hydrochloric acid, and inorganic salts. The salts are preferably carbonates, chlorides, sulfates, or sulfites of sodium. The articles then plunged into a passivating bath of water, sodium sulfate, soda ash and nitrite. New method decreases the pickling time to one third of its usual value and increases the adsorptive capacity for iron to 32-33 per cent.

(863K) C. F. Pickett and M. Rosenfeld, "Diethylenetriamine Condensate," U. S. Patent No. 2,680,137, June 1, 1954; Chemical Abstracts, Vol. 48, p. 9728 (1954).

Reaction of one mole diethylene triamine with one to three moles $\text{AcCH}_2\text{C}(\text{OH})\text{Me}_2$ is complex, and detergent, viscosity, and other properties of the product depend upon the method of bringing the reactants together. When mixed in the order given, the best synergistic detergent properties are obtained; Particularly when mixed with an oleate in a hydrocarbon solvent. When mixed in reverse order, best detergent properties are obtained with water as solvent. The material used in certain metal cleaning compositions.

(863L) "How United Produces Clean and Durable Steel Drums," Products Finishing, Vol. 19, No. 3, pp. 56-58 (Dec., 1954).

Greatest life expectancy of drum increased by proper chemical cleaning for the protective coating. The Granodizing process was used, but durability is dependent upon thoroughness of dirt and scale removal prior to surface conversion.

(863M) J. Rice (C. W. Rice & Co.), "Method of Cleansing Metal," U. S. Patent No. 2,697,673, Dec. 21, 1954; *Plating*, Vol. 42, No. 7, p. 909 (1955).

The drop in potential with respect to time is measured with a millivoltmeter, using as one electrode a rusty metal and the other free of rust or scale. The effectiveness of the pickling solution is shown by the data thus obtained.

(863N) E. K. Rideal and J. Tadayon, "Overturning and Anchoring of Monolayers. I. Overturning and Transfer," *Proceedings Royal Soc. (London)*, Vol. A225, pp. 346-356 (1954).

Gradual change with time in the wetting angle of a water drop on a paraffin wax-stearic acid mixture due to emergence of the polar carboxyl heads of the acid from the waxed surface. Using C^{14} labelled stearic acid on mica, transfers from a series of surfaces described: mica to tin, tin to mica, and many other systems. The rate of transfer increases with temperature, and the equilibrium partition coefficient remains sensibly constant.

(863O) G. Riedinger, "Method of Assay in Comparison of Degreasing of Metals," 1st World Congress on Surface Active Agents, Vol. II, pp. 847-850 (1954).

Description of apparatus to wash six specimens simultaneously and off of single power source, to provide same degree of agitation. Paddle-like metal samples are suspended from central shafts and rotated in beakers in a water bath. Apparatus described for evenly applying greasy soil, consisting of a constant application of pressure on jaws of a scraper through which the sample is drawn. Use water-break to determine degree of soil removal.

(863P) A. D. Roman, "Cleaning and Degreasing Composition for Metal Surfaces," Spanish Patent No. 212,970 (1954); *Chemical Abstracts*, Vol. 49, p. 13873 (1955).

Prepared by mixing 5 g freshly pulverized bentonite and 30 g clay then adding 500 cc water, stirring thoroughly and heating in closed vessel at 60 C for 5 hr.

(863Q) K. Rummerl, "Acid Cleaning of High-Pressure Boilers at the Fortuna Power Plant," *Mitt. Ver. Grosskesselbesitzer*, No. 28, pp. 89-90 (1954); *Chemical Abstracts*, Vol. 49, p. 4210 (1955).

Details given in the removal of copper deposited from brass tube condensers, and of acid removal of water deposits. Iron oxide removal from new boilers suggested by using repeated boiling at 125 atmos with a solution of trisodium phosphate.

(863R) E. B. Saubestre, "Degreasing Evaluation Tests for Metals Prior to Electroplating," University Microfilms (Ann Arbor, Mich.), Publ. No. 8823, 329 pp; *Dissertation Abstracts*, Vol. 14, pp. 1656-1657 (1954); *Chemical Abstracts*, Vol. 49, p. 2904 (1955). See Reference Nos. 624, 684, 685, 686, 825, 826.

(864A) N. O. Schmidt and L. F. Wiggins, "Descaling of Evaporator Heating Surfaces in Cane-Sugar Factories," *Industrial Engineering Chemistry*, Vol. 46, pp. 867-870 (1954).

Scale is chiefly calcium salts and is completely dissolved in a boiling 5 per cent solution of sodium ethylenediaminetetraacetate. Two pounds of Versene required to dissolve one pound of scale. Advantage of use of this material is that tubes are cleaned to a bright surface on which scale does not so readily deposit.

(866A) F. D. Snell and W. H. Stahl (to Foster D. Snell, Inc.), "Thixotropic Cleaner for Vertical Metal Surfaces," U. S. Patent No. 2,672,449, March 16, 1954; *Chemical Abstracts*, Vol. 48, p. 7225, (1955).

Aqueous blends of 5 to 70 per cent acid (pK approximately 2 to 5), 2 to 5 per cent bentonite, and 0.1 to 0.8 per cent surface active agent are fluidly applicable under stress but gel to remain on vertical surfaces requiring uniform degreasing and descaling. Phosphoric or acetic acids can be used. Desired bentonite is sodium montmorillonite, and nonionics such as Triton NE or cationic agents of either amine salt or tertiary amino alcohol ester types, preferably those active as corrosion inhibitors can be used to thicken the gel. Inert abrasives up to 40 weight per cent can be used. Other details given.

(867A) H. R. Spence, A. N. Johnson and S. G. Osborne (to Hooker Electrochemical Co.), "Removal of Metallic Oxides," U. S. Patent No. 2,676,900, April 27, 1954; *Chemical Abstracts*, Vol. 48, p. 12011 (1954).

A fused alkali bath containing an oxidizing agent, this is regenerated by blowing air through the bath, preferably in the presence of an oxygen carrier, such as manganese compounds, vanadium oxide, chromium oxide and ferric oxide.

(869) F. P. Spruance, "The Cleaning of Metal Prior to Phosphating," 1st World Congress on Surface Active Agents, Vol. II, pp. 855-857 (1954).

Describes alkali cleaning with soft cleaners (polyphosphate, borax or disodium phosphate), light duty cleaners (soda ash, trisodium phosphate, metasilicate), and heavy duty cleaners (orthosilicate, and caustic soda). Solvent cleaning by emulsion,

petroleum solvent wiping and vapor degreasing discussed. Described are specific effects of cleaning on phosphate coatings. Generally true that soft and light duty cleaners used in relatively dilute form, and fortified with emulsions preferred prior to phosphating to insure fine crystalline coatings. Where strongly alkaline cleaners are used, or where pickling is necessary, use of oxalic acid or titanium phosphate complex is indicated.

(870) D. F. Stauffer, H. M. Winn and K. A. Wagner, "Acid Cleaner Inhibitors," *Soap*, Vol. 30, No. 6, pp. 161, 163, 165, 181 (1954).

The various types of hydrochloric acid cleaners and the characteristics of the ideal inhibitor are discussed. Studies made on 1010 mild steel, 302 and 316 stainless steel, and copper (aerated). Polyrad and four commercial inhibitors were evaluated, and rates of corrosion reduction given.

(871) D. F. Stauffer, H. M. Winn and K. A. Wagner, "Corrosion Inhibitors for Hydrochloric Acid Cleaning Compounds," *Proceedings, Chemical Specialties Mfrs. Assn.*, May, 1954, pp. 56-61.

See Reference No. 870.

(872) H. S. Sylvester (to Colgate-Palmolive Co.), "Detergent Compositions Containing Metal Discoloration Inhibitors," U. S. Patent No. 2,698,302, Dec. 28, 1954; *Chemical Abstracts*, Vol. 49, p. 6632 (1955).

The tendency of nonsoap detergents containing polyphosphates to discolor copper base-alloys is overcome by the addition of up to 1 per cent of unsymmetrical mononuclear aryl-substituted thioureas. Example of composition given.

(873) J. ten Brink, "Acid Cleaning of Steam Boilers," *Mitt. Ver. Grosskesselbesitzer*, No. 28, pp. 84-87 (1954); *Chemical Abstracts*, Vol. 49, p. 4209 (1955).

Six boilers cleaned, four with operating pressures of 18 atmos, and two at 120 atmos. Mechanical arrangements described, and acid solution, properly inhibited used.

(873A) R. Wise, "Pre-Paint Treatment of Ferrous Surfaces," *Products Finishing*, Vol. 19, No. 3, pp. 36, 38, 40, 42 (Dec., 1954).

Preparation of metal surface perhaps greater importance than paint quality for permanence of treatment. In development of phosphate coating for maximum adherence, use of combined cleaning and phosphating resorted to, using emulsion cleaners or solvent type cleaners.