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METAL CLEANING COMPOSITIONS, BATHS AND METHOD

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13 Claims. (Cl. 134—1)

This is a continuation-in-part of our co-pending application Ser. No. 672,862, filed July 19, 1957, now abandoned.

This invention is that of water-soluble alkaline compositions containing as their essential ingredients (i) at least one of the specific lower alkanolamines, namely, monoethanolamine, N - aminoethyl monoethanolamine, and N-methyl diethanolamine; (ii) a soap made from reacting the recovered mixed fatty acids from tall oil (which acids are described more fully below) with at least one of these specific alkanolamines, and in such a ratio as to leave an excess of said free alkanolamine reactant (*a*) to serve as the aforesaid lower alkanol ingredient of the final composition, and (*b*) to the extent of less than a mole of said free alkanolamine ingredient per mole of soap ingredient; and (iii) a water-soluble metasilicate in such amount that from about 0.7 to about 1.3 ounces of it is contained per gallon of a dilute aqueous bath prepared by dissolving in water from about two to about four ounces by weight of the overall composition (i.e. containing the free ethanolamine, the soap, and the water soluble metasilicate) per gallon of said bath solution; said free alkanolamine ingredient content also being such that said aqueous bath solution prepared from the aforesaid about two to about four ounces of this overall composition by weight per gallon of resulting dilute bath solution has a pH of from about 9 to about 11.

Such aqueous alkaline (cleaning) bath generally can remove within a few minutes, and often in about and even under a minute, incrustations of buffing compounds from recesses, crevices and grooves on rigid articles, upon subjecting them immersed in said aqueous bath solution to the influence of waves of ultrasonic frequency of from about fifteen to about forty kilocycles per second.

The invention includes also such dilute aqueous alkaline (cleaning) baths prepared by dissolving any of these water-soluble and alkaline lower alkanolamine, metasilicate and soap containing compositions in water in a concentration as above-noted, whereby these baths are effective jointly with application of the ultrasonic waves for advantageously cleaning of adherent water-insoluble dirt or soil incrustations, including those of buffing compounds, from deformations such as crevices, grooves and recesses on various kinds of rigid articles or metal products.

Another part of the invention is the method of ultrasonic wave cleaning of such incrusted dirt or soil from articles or metal products by submerging them with such adherent dirt and incrustations in these aqueous alkaline baths and thus subjecting such various soiled products or articles to the influence of waves of ultrasonic frequency transmitted within the above-indicated range through the aqueous alkaline cleaning bath.

Many metal parts or other fabricated products, as those of zinc, copper, aluminum, brass, and antimony-lead frequently are subjected to a finishing treatment to apply a protective or decorative coating such as lacquering or electroplating before they are ready for sale. In practically all cases for such further treatment, the article or product must have a clean and polished surface for the lacquer coating or electrodeposit or other coating to be reliably adherent. In preparing such articles or products for such coatings, it is a common practice particularly with electrodeposits, for example, to subject them to buffing or polishing and with the use of the usual buffing compounds.

These procedures leave these objects dirtied and soiled with tough incrustations of the buffing compound in their various surface deformations especially in crevices and other recessed or grooved areas. Such incrustations often are heavy and dense because of the pressures necessarily employed in the buffing and polishing, and ordinarily are removed with difficulty and at considerable expense and disadvantage. For example, the common organic solvents usually do not remove them completely and otherwise take much too much time and at necessarily increased cost.

The same occurs with attempts in using ordinary detergents, soaps, and alkaline cleaners; and even various special formulated soap and detergent solutions require very high temperatures often at or near that of boiling water. These various drastic conditions frequently cause corrosion and staining of the metal objects particularly with the sensitive metals, for example, non-ferrous metals and alloys such as zinc, brass, copper, aluminum, antimony-lead, and the like. Ultrasonic cleaning also was not available or applicable because the available transducers could not be used at such required temperatures that exceeded 150 to 160° F.

These various shortcomings and disadvantages are overcome by the method of the invention by the use of the compositions and baths constituting part of the invention.

Considered broadly, the water-soluble alkaline (concentrate) compositions of the invention comprise (i) at least one of the specific lower alkanolamines selected from monoethanolamine, N-aminomethyl monoethanolamine, and N-methyl diethanolamine; (ii) a soap of at least one of said lower alkanolamines reacted with the recovered mixed fatty acids of tall oil, with the latter and the alkanolamine-reactant so proportioned to one another (*a*) to leave an excess of less than one mole of said lower alkanolamine-reactant per mole of the resulting soap, and (*b*) to serve as the aforesaid free alkanolamine ingredient of the final composition; and (iii) a water-soluble metasilicate in such amount that from about 0.7 to about 1.3 ounces of its is contained per gallon of a dilute aqueous bath prepared by dissolving in water from about two to about four ounces by weight of the overall composition (i.e. containing the free ethanolamine, the soap, and the water-soluble metasilicate) per gallon of said bath solution; said free alkanolamine ingredient content also being such as to provide a pH from about nine to about eleven when the said overall composition of the invention is so dissolved in water per gallon of resulting aqueous bath solution.

The ultrasonic wave cleaning baths of the invention comprise any of the foregoing water-soluble alkaline compositions of the invention dissolved in water to a concen-

tration of from about two to about four ounces (by weight) per gallon of aqueous alkaline bath solution.

Then the method of the invention comprises submerging soiled rigid objects or metal articles to be cleaned in an aqueous alkaline (cleaning) bath having a pH from about 9 to about 11 by containing dissolved therein from about two to about four ounces (by weight) of a (concentrate) composition of the invention per gallon of said (cleaning) bath, and subjecting the so submerged articles to the influence of waves of ultrasonic frequency, in the range of from about fifteen to forty kilocycles per second, transmitted to the articles through said aqueous cleaning bath, and advantageously at an elevated temperature below about 160° F. and preferably under about 150° F., and for a time sufficient for the articles to be cleaned. That generally may be within about two and one-half minutes, and so far as presently noted often about one minute.

It is highly advantageous not only as to actual operating benefits but also economically to use as the soap ingredient of the water-soluble alkaline (concentrate) compositions of the invention the soap prepared by reacting one or more of the aforesaid specific alkanolamines with the recovered mixed fatty acids from tall oil.

It is a significant feature of the invention that its compositions and baths and method including the metasilicate ingredient markedly reduce the time needed to obtain complete cleaning of incrusted soil from the deformations in the articles treated over that taken when treating the likewise soiled same articles by the same conditions except that the composition and bath contain no metasilicate.

By "recovered mixed fatty acids from tall oil" as used herein is meant generically the mixed acids product obtained in the tall oil industry from tall oil, and therein called tall oil fatty acids. This product generally contains as by far its major portion, ordinarily exceeding eighty-five (85%) percent and more often being over ninety (90%) percent, the unsaturated fatty acids, namely (*a*) oleic acid and (*b*) linoleic acid, in roughly about equal parts and more often with the oleic acid in slight excess, with both of them generally amounting to between eighty-five (85%) and ninety-five (95%) percent of all the acids thereto, and (*c*) linolenic acid from none up to possibly about five (5%) percent of the product, together with a small amount of saturated fatty acids usually under five (5%) percent, sometimes as little as two (2%) percent, even as low as one (1%) percent, and often between two and three percent, and also a small percentage substantially less than ten (10%) percent, most often not exceeding five (5%) percent, and usually four (4%) percent and even much less of rosin acids.

Typical examples of recovered mixed fatty acids from tall oil useful in preparing the soaps for the water-soluble alkaline compositions of the invention are, with their percentages being by weight:

(A)

Oleic acid	47
Linoleic	40
Linolenic acid	5
Saturated fatty acids	3
Rosin acids	4
Unsaponifiables	1

(B)

Oleic acid	53.7
Linoleic acid	41.3
Saturated fatty acids	1
Rosin acids	5

(C)

Linoleic acid	44.16
Oleic acid	48.29
Saturated fatty acids	3.55
Rosin acids	4.0

The preparation of the specific lower alkanolamine soaps of the recovered mixed fatty acids from tall oil, as included in the water-soluble alkaline compositions, as well as of said compositions, of the invention is illustrated by, but not restricted to, the following examples using the above Example C composition of the recovered mixed fatty acids from tall oil.

Example 1.—Monoethanolamine soap of the recovered fatty acids from tall oil.—One hundred and fifty milliliters of water were heated to between 150 and 160° F. in a 600 milliliter stainless steel beaker and one hundred milliliters of technical monoethanolamine (sp. gr. 1.02) were stirred in with a high speed mixer. While continuing the mixing, fifty milliliters of the foregoing Example C composition of recovered mixed fatty acids from tall oil (sp. gr. 0.86) were added dropwise from a separatory funnel, at a rate such that the reaction mixture was maintained within the foregoing temperature range by the heat of reaction. After all of this required quantity of these mixed acids were added, the stirring was continued at very high speed for several minutes thereafter. The finished product was a liquid containing the monoethanolamine soap of said recovered tall oil acids and some free unreacted monoethanolamine dissolved in about fifty percent of water; and is a water-soluble alkaline (concentrate) composition.

Example 2.—Water soluble (concentrate) alkaline composition containing a metasilicate.—To eighteen ounces by weight of the alkaline (concentrate) product of Example 1, being stirred at between 150° and 160° F. there were added six ounces of sodium metasilicate, and the stirring continued till it was dissolved therein. That then provided a water-soluble (concentrate) alkaline composition of the invention.

The ultrasonic wave (dilute) aqueous alkaline cleaning baths then are prepared by dissolving in water an amount of the finished soap composition, for example, of the foregoing Example 2 or of any hereinbelow described modifications of it or of any mixture of any of those products, sufficient to produce a pH of from about nine to about eleven in the resulting (so diluted) aqueous alkaline cleaning bath.

Expressed otherwise, the ultrasonic wave (dilute) aqueous alkaline cleaning baths of the invention should contain by weight from about two to about four ounces of finished alkanolamine soap, free alkanol and metasilicate containing concentrate, that is to say, the water-soluble alkaline (concentrate) composition of the various examples of such compositions, per gallon of (the dilute) aqueous alkaline cleaning bath.

In general, the alkalinity of such dilute cleaning bath results from its containing the metasilicate ingredient and on the average a concentration of about 0.025 molal equivalent of the specific alkanolamine which was used in the preparation of the original water-soluble alkaline concentrated soap composition (containing the unreacted free alkanolamine). Such dilute aqueous alkaline ultrasonic wave cleaning bath is illustrated by, but not restricted to, the following and other below given examples:

Example 3.—Dilute aqueous alkaline bath (containing metasilicate).—Three ounces by weight of the finished concentrate product of Example 2, containing dissolved in its water content the monoethanolamine soap of recovered tall oil mixed fatty acids, residual free monoethanolamine, and sodium metasilicate were dissolved in a further quantity of water to make a gallon of dilute aqueous alkaline ultrasonic wave bath (i.e. a dilute solution of the product of Example 2).

(a) For comparison, there was prepared an ultrasonic wave dilute aqueous alkaline bath from the concentrate product of Example 1, thus: Three ounces by weight of the finished concentrate liquid product of Example 1, containing dissolved in its water content only its monoethanolamine soap of the recovered tall oil mixed fatty acids and the residual free unreacted monoethanolamine.

were dissolved in a further quantity of water sufficient to make a gallon of a dilute aqueous alkaline ultrasonic wave bath (i.e. a dilute solution of the product of Example 1).

The ultrasonic wave cleaning method of the invention is illustrated by, but not restricted to, the following wherein there were cleaned incrustation-soiled metal articles, specifically die castings of the zinc alloy designated as "Zamak #3" alloy (containing 3.5–4.3% aluminum, 0.1% copper, less than 0.1% iron, 0.03–0.08% magnesium, less than 0.005% of each of cadmium, lead, and sulfur, and the balance zinc to make a total of 100%). These castings were all of the same shape, three inches long with one side having a continuous series of V-shaped grooves each one-sixteenth inch deep, and spaced twenty grooves to the inch of length.

Each of the castings was buffed by means of a soft stitchless rotating buff until all of the grooves were packed with the tripoli buffing composition used (designated "Formax T6," and containing between sixty and seventy percent of abrasive essentially tripoli, from western Missouri, and the balance a binder consisting of buffing compound waxes and greases and stearin to the extent of twenty to fifteen percent of the entire composition of the buffing compound). The buffed castings were set aside and left alone to age for at least five days before being treated by the process of this invention.

Example 4.—Ultrasonic cleaning method of the invention.—Five hundred milliliters of each different dilute ultrasonic wave cleaning bath were placed alone in its own respective tall, liter beaker, and heated on a hot plate to 150° F. Then these beakers were put in a tank containing water held at 150° F. by thermostatic control. Each of these beakers was held in the tank water with its open top extending above the water level and with the top surface of the cleaning bath in each of them below the level of the water in the tank.

The bottoms of the beakers extended to one inch above a pair of barium titanate transducers (sold by the Branson Ultrasonic Corporation). A 40 kilocycle per second electrical current was applied to the electrodes on the sides of the barium titanate inside of the transducers, from an electronic oscillatory unit rated at a capacity of 125 watts.

Up to ten castings requiring thus incrusted buffing compound to be cleaned from their grooves were placed in each of the beakers containing the respective different testing solutions. The castings in each test beaker were given a treatment by the ultrasonic waves transmitted from the transducers through the water in the tank, through the glass beaker and so through the cleaning bath, at a frequency of 40 kilocycles per second with maximum intensity until the castings were completely (i.e. 100%) clean.

The minimum time for each cleaning bath to produce this extent of cleaning was noted separately respectively for each of them, and used as an index if the cleaning efficiency of the particular cleaning bath and of the respective water-soluble alkaline (concentrate) cleaning composition dissolved in it. Repeat runs were conducted for each of the solutions tested.

It was considered that any cleaning bath that required more than one hundred and fifty seconds completely to clean these castings with their grooves loaded with buffing compounds as above-described, generaly might not be particularly desirable for commercial use and operation because it would delay for more than two and one-half minutes transit of the articles to be cleaned.

By this method, the ultrasonic wave dilute alkaline cleaning bath (without any metasilicate) of paragraph (a) of Example 3 required 191 seconds to reach complete cleaning.

On the other hand, the corresponding ultrasonic wave dilute cleaning bath of the first paragraph of Example 3 (differing only by its containing sodium metasilicate) gave complete cleaning by about 100 seconds. That was accomplished without any adverse effect on the buffed luster of the castings.

That is surprising not only as to the considerable saving in time so provided, but also because of the safety to the casting surface; for it is known that sodium metasilicate often delustres the surfaces of articles made of the sensitive metals, which are cleaned with aqueous solutions of it, so that its utility with them ordinarily is questionable and undesirable.

Correspondingly similar reductions in the complete cleaning time to so considerably below 150 seconds result from ultrasonic wave cleaning baths similarly prepared from water-soluble alkaline (concentrate) compositions containing similar inclusions of sodium metasilicate in the respective alkaline liquid soap (concentrate) compositions prepared by

(i) using equal volumes of the monoethanolamine and the same recovered mixed fatty acids from tall oil but otherwise prepared as in Example 2, compared with a correspondingly modified cleaning bath without any metasilicate, which latter required 154 seconds for complete cleaning; and

(ii) Using this same concentrate as in (i) except for the volume of monoethanolamine being half the volume of the tall oil acids, and compared with the corresponding cleaning bath without any metasilicate, which latter required 158 seconds to give complete cleaning.

In the various Examples 2 through 4 and others below, suitable modifications and substitutions can be made in any of them within the scope of the invention. For example, the specific alkanolamine can be replaced in part or as a whole by N-aminoethyl monoethanolamine or N-methyl diethanolamine. Likewise, the sodium metasilicate can be replaced in part or as a whole by some other suitable water-soluble metasilicate such as another alkali metal metasilicate or ammonium metasilicate.

In some of the examples the alkanolamine soap may be replaced, or accompanied, in minor part by an alkali metal soap of the recovered mixed tall oil fatty acids of the example, such as a sodium or potassium soap produced with them. To illustrate, the 285 grams of the mixed fatty acids from tall oil of the following Example 5 may be added as there described to a solution of a single one or more or all of suitable water-soluble alkali metal salts, for example, trisodium phosphate, sodium tetraborate·$9H_2O$ (common borax), anhydrous sodium carbonate, or sodium metasilicate, dissolved in the water and their respective quantities and also under the conditions as therein given; and the hexylene glycol then dissolved in it and followed by solution of the N aminoethyl ethanolamine thereof in it. Alternatively, another embodiment of water-soluble alkaline (concentrate) composition of the invention is illustrated by, but not restricted to, the following example:

Example 5.—Following the procedure used in Example 1, 395 milliliters of water are heated in a two liter beaker to about 150° F. and while stirring there are added to, and dissolved in, it 100 grams of N-aminoethyl ethanolamine, and then also 27 grams of hexylene glycol. While continuing the stirring, 285 grams of the foregoing Example C composition of recovered mixed fatty acids from tall oil were added dropwise from a separatory funnel, at such a rate that the reaction mixture was held around 150° F. by the heat of reaction.

Thereafter there was homogeneously dissolved in the resulting N-aminoethyl ethanolamine soap (concentrate) composition (containing excess unreacted alkanolamine), 124 grams of trisodium phosphate·$12H_2O$, 80 grams of common borax, 80 grams of anhydrous sodium carbonate, and 9 grams of sodium metasilicate, and the stirring was continued at high speed for several minutes. The finished product, after discontinuing the stirring, was a water-soluble alkaline liquid soap (concentrate) composition containing free unreacted N-aminomethyl ethanolamine.

An ultrasonic wave (dilute) alkaline cleaning bath containing three ounces per gallon of that final product of Example 5 produced complete cleaning of castings such as described in Example 4, by the method of that example, by about 80 seconds.

Where desirable, suitable surface active agents and/or dispersing agents, that are compatible with the other ingredients of any of the compositions covered by the invention can be included. The significant feature of the invention is the presence in the water-soluble alkaline soap (concentrate) compositions, of a significant quantity of the specific free unreacted lower alkanolamine, and also the significant content of the metasilicate ingredient which contributes reduction in cleaning time.

While the invention has been explained in detail by describing certain specific embodiments of it, it is understood that various modifications and substitutions may be made in any of the specific embodiments within the scope of the appended claims which are intended also to cover equivalents of the specific embodiments.

What is claimed is:

1. A composition useful in cleaning of soil from deformations in rigid articles, which composition is (A) water-soluble, (B) alkaline, and (C) comprises as its essential ingredients for said cleaning utility:

(i) at least one lower alkanolamine member of the class consisting of monoethanolamine, N-aminoethyl monoethanolamine, and N-methyl diethanolamine;

(ii) a soap made from reacting the recovered mixed fatty acids from tall oil and at least one of said alkanolamines, with said mixed acids used in such ratio to the alkanolamine-reactant to leave an excess of the latter to be the said specific alkanolamine ingredient (i) and to the extent of less than a mole thereof per mole of said soap ingredient and (ii) such that an aqueous solution having a pH from about 9 to about 11 results when said alkanolamine- and soap-containing composition is dissolved in water in an amount from about 2 to about 4 ounces by weight per gallon of said aqueous solution; and

(iii) a water-soluble metasilicate in such concentration that from about 0.7 to about 1.3 ounces of it is contained per gallon of a dilute aqueous bath prepared by dissolving in water from about 2 to about 4 ounces by weight of the overall composition per gallon of said bath solution; and said resulting dilute aqueous bath enabling completely removing generally within a few minutes incrustations of buffing compounds from recesses as well as grooves on rigid articles, upon subjecting them immersed in said dilute aqueous bath to the influence of waves of ultrasonic frequency of from about fifteen to about forty kilocycles per second.

2. An aqueous cleaning bath solution which is alkaline and comprises, as its essential ingredients for its below mentioned incrustation removal property, from about two to about four ounces by weight of an alkaline composition as claimed in claim 1 dissolved therein per gallon of said aqueous bath solution; said cleaning bath having a pH of from about 9 to about 11 and being effective at a temperature from about ambient temperature to about 160° F. to enable complete removal of buffing compound incrustations from recesses as well as grooves on rigid articles immersed in said bath to occur within an interval of two and one-half minutes while subjecting them therein to the influence of ultrasonic waves of from about fifteen to about forty kilocycles per second.

3. An aqueous cleaning bath as claimed in claim 2, wherein the alkanolamine is monoethanolamine.

4. An aqueous cleaning bath as claimed in claim 2, wherein the alkanolamine is N-aminomethyl monoethanolamine.

5. An aqueous cleaning bath as claimed in claim 2, wherein the alkanolamine is N-methyl diethanolamine.

6. The method of removing dirt and soil incrustations, including even those of buffing compounds, from recesses as well as grooves on rigid articles, which method comprises submerging such articles in an aqueous alkaline cleaning bath solution containing dissolved therein, as its essential agents for the aforesaid incrustation removal activity, per gallon of its water from about two to about four ounces by weight of an alkaline water-soluble composition as claimed in claim 1; and subjecting such so submerged articles to the influence of waves of ultrasonic frequency, of the order from about fifteen to about forty kilocycles per second, transmitted to the articles through said aqueous alkaline cleaning bath, and for a time sufficient completely to clean the incrustations from said articles and less than that required with a corresponding cleaning bath without the metasilicate and operated under otherwise like conditions.

7. The method as claimed in claim 6, wherein the alkanolamine is monoethanolamine.

8. The method as claimed in claim 6, wherein the alkanolamine is N-aminomethyl monoethanolamine.

9. The method as claimed in claim 6, wherein the alkanolamine is N-methyl diethanolamine.

10. A liquid, aqueous alkaline soap-containing composition comprising, as its essential ingredients for its below mentioned incrustation removal property, (i) the soap formed by reacting in sufficient water about one hundred parts of monoethanolamine and about 285 parts of the recovered mixed fatty acids of tall oil, and homogeneously dissolved therewith in water about 124 parts of trisodium phosphate·$12H_2O$, about 80 parts of ordinary borax, about 80 parts of anhydrous sodium carbonate, and about 9 parts of sodium metasilicate; the dilute aqueous alkaline bath solution resulting when said soap composition is dissolved in water to a concentration of from about two to about four ounces thereof by weight per gallon of resulting dilute aqueous solution, being effective at a temperature from about ambient temperature to about 160° F. to enable complete removal of buffing compound incrustations from recesses and grooves on rigid articles while subjecting said articles submerged in said bath solution to the influence of ultrasonic waves of from about fifteen to about forty kilocycles, to occur in less time than such complete removal can occur when sodium metasilicate is omitted.

11. A liquid aqueous alkaline soap-containing composition as claimed in claim 10, wherein about 27 parts of hexyleneglycol also are dissolved in said water.

12. An aqueous cleaning bath comprising in aqueous solution, as its essential agents for its below mentioned incrustation removal activity, per gallon of bath solution the alkaline soap composition of claim 10 to the extent of about two to about four ounces by weight of the content thereof exclusive of the water used as reaction medium; said cleaning bath having a pH of from about 9 to about 11 and being effective at a temperature from about ambient temperature to about 160° F. to enable complete removal of buffing compound incrustations from recesses as well as grooves on rigid articles under the influence of ultrasonic waves of from about fifteen to about forty kilocycles per second, to occur in less time than such complete removal can occur when the sodium metasilicate is omitted.

13. The method of removing dirt and soil incrustations, including even those of buffing compounds, from recesses as well as grooves on rigid articles, which comprises submerging such articles in an aqueous alkaline bath as claimed in claim 10, and subjecting the articles so submerged to the influence of waves of ultrasonic frequency, of the order from about fifteen to about forty kilocycles per second, transmitted to the articles through the aqueous alkaline cleaning bath, and for a time sufficient completely to clean the incrustations from said articles and less than

the time required therefor when sodium metasilicate is omitted from said bath.

References Cited

UNITED STATES PATENTS

2,374,113	4/1945	Lowe	252—118
2,616,820	11/1952	Bourgeaux	134—1 X
2,700,654	1/1955	Holman	252—118
2,888,939	6/1959	Nitsche	134—1 X
2,978,415	4/1961	Chamberlain	252—118

FOREIGN PATENTS

548,960	10/1942	Great Britain.

OTHER REFERENCES

Tall oil, Pollak, Soap and Sanitary Chemicals, May 1953, pp. 43–45, 81.

Hexylene Glycol, Shell Chemical Corporation, Technical Booklet SC 50–1 (1950), pp. 8, 19.

The Condensed Chemical Dictionary, 5th Ed., Rose, 1956, pp. 717, 718.

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