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Marans

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[54] **RUST PREVENTATIVE COMPOSITIONS**

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[52] **U.S. Cl.** **117/75,** 106/14, 117/49, 252/392, 252/394, 252/403, 252/405

[51] **Int. Cl.** **C23f 11/14,** C23d 3/00

[58] **Field of Search** 252/392, 394, 403, 405; 117/49, 75; 148/6.14, 6.15; 106/14

[56] **References Cited**

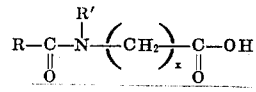
UNITED STATES PATENTS

2,790,779	4/1957	Spivack	252/392
3,655,604	4/1972	Strolle	117/49

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Assistant Examiner—Irwin Gluck
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[57] **ABSTRACT**

This invention relates to rust preventative compositions comprising an aqueous emulsion of a compound of the general formula:



wherein R′ is hydrogen or a lower alkyl containing one to six carbon atoms; R is either C_nH_{2n+1}, C_nH_{2n-1} or C_nH_{2n-3}; n is an integer from 11 to 23 and x is an integer from 1 to 4.

4 Claims, No Drawings

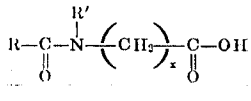
RUST PREVENTATIVE COMPOSITIONS

This invention relates to rust preventative compositions. More particularly this invention relates to employing certain rust preventative compositions as an aqueous emulsion.

The rust preventative compounds per se of the instant invention set out below are known in the art. See U. S. Pat. No. 2,790,779. However, in U. S. Pat. No. 2,790,779 said compounds are used in combination with an oleaginous vehicle, i.e. a lubricating oil or grease. Such a combination offers serious drawbacks as compared to the instant aqueous emulsion. For example an oleaginous vehicle such as oil is an expensive solvent as compared to the water base employed herein. Furthermore one applying the instant rust preventative compositions in combination with an oleaginous vehicle must either reclaim the oil or burn or dispose of it in a non-economical manner to prevent pollution. The aqueous emulsion of the rust preventative composition taught herein can simply be discarded as a biodegradeable aqueous emulsion or continuously brought back to full strength merely by addition of more of the rust preventative composition. Additionally if the rust preventative is to be applied to metal used in cans for the food industry, the aqueous emulsion is preferred since the oleaginous vehicle must be carefully purified to obtain FDA approval. Several of these rust preventative compositions per se e.g., N-oleoylsarcosine and N-cocoylsarcosine have already received FDA approval and in a water medium would also be approved. Furthermore in the canning industry, metals treated with an oleaginous vehicle are impossible to lacquer without first degreasing the metal with various solvents. Such solvent removal of the oleaginous vehicle would require pollution controls which are not necessary in the instant invention.

Current technology in metal can production appears to be moving from a three piece can to a two piece can. Additionally whether or not it is a two piece or a three piece can, can producers are striving to employ the thinnest and cheapest metal operable, especially in the formation of a two piece can. Aside from aluminum which does not to any appreciable extent have a rust problem, the ferrous metals are turned to most frequently because of their economy. One of the most economical of the ferrous metals employed in the canning industry is that known as black plate, a carbon steel extremely rust prone.

One object of the instant invention is to prepare a surface coating that will prevent corrosion. Another object of the instant invention is to prepare a surface coating that will aid lubrication when the metal is cold rolled. A further object of the instant invention is to prepare a surface coating which can be either readily removed prior to lacquering or be employed as a tie coat aid between the metal and the lacquer. These objects and others which will become apparent from a reading hereinafter are obtained by applying to the ferrous metal surface an aqueous emulsion of a compound of the general formula:



wherein R' is hydrogen or a lower alkyl containing one to six carbon atoms; R is either C_nH_{2n+1}, C_nH_{2n-1} or C_nH_{2n-3}; n is an integer from 11 to 23 and x is an integer from 1 to 4.

The inclusion of the rust preventative composition of the instant invention prior to a can lacquering step precludes the necessity for adding solvents, e.g. acetone that are known to aid in the adhesion of the lacquer to the metal.

The aqueous emulsions of the rust preventative compositions of the instant invention can be applied in the rolling mill as a substitute for the lubricants presently used to aid in rolling. Presently used lubricants, while materially aiding rolling, leave a messy coating on the thin rolled metal which ordinarily requires a degreasing operation before can fabrication. The advantage of the instant composition is that it not only acts as a lubricant during rolling but also acts as a rust preventative thereafter. If the aqueous emulsion of the rust preventative composition is applied at the canning factory to the rolled steel, it also not only acts as a lubricant during the punching or extruding step of the two piece can but also as a rust preventative and a tie coat between the lacquer and the metal surface.

Aqueous emulsions of these compounds form an adherent layer to the metal which is not fully removed even under water or organic solvent washes.

Examples of these rust preventative compositions include but are not limited to N-oleoyliminodiacetic acid, N-oleoylsarcosine, N-cocoylsarcosine, N-lauroyliminodiacetic acid, N-lauroylsarcosine, N-tetracosanoyliminodiacetic acid, N-tetracosanoylsarcosine, N-palmitoyliminodiacetic acid, N-palmitoylsarcosine, N-dodecylenoyliminodiacetic acid, N-dodecylenoylsarcosine, N-docosenoyliminodiacetic acid, N-docosenoylsarcosine, N-tetracosenoyliminodiacetic acid, N-tetracosenoylsarcosine, N-dodecynoyliminodiacetic acid, N-dodecynoylsarcosine, N-octadecynoyliminodiacetic acid, N-octadecynoylsarcosine, N-docosynoyliminodiacetic acid, N-docosynoylsarcosine, N-tetracosynoyliminodiacetic acid and N-tetracosynoylsarcosine. Aqueous emulsions of these compositions are effective rust preventatives for corrosion prone steels using exposure times of 10 seconds or less. Furthermore aqueous emulsions of these materials continue to function as rust inhibitors even after acetone, propyl acetate or trichloroethylene immersion of the black plate and not only permit but also aid in subsequent lacquering of the metal.

The rust preventative compositions of the instant invention are employed as an aqueous emulsion. The amount of rust preventative compound in the aqueous emulsion ranges from 0.1 to 5 percent by weight, preferably 0.5 to 2.0 percent by weight.

The aqueous emulsions are made up in conventional commercially available equipment. That is, any high speed stirred reactor or homogenizer could be employed to form the emulsion. In forming the emulsion the rust preventative compound can be added prior to, subsequent to, or concurrent with the water.

The following examples are set out to explain but in no way limit the instant invention. Unless otherwise noted all parts and percentages are by weight.

EXAMPLE 1
PREPARATION OF RUST PREVENTATIVE EMULSION COMPOSITIONS

100 cc of water was added to a Waring blender followed by the addition of 5 grams of N-oleoyliminodiacetic acid. The mixture was stirred for one minute followed by the addition of 400 cc of water with continuous stirring for an additional 2 minutes after which time the emulsion was formed. This aqueous emulsion will hereinafter be referred to as aqueous emulsion A.

The above procedure was repeated except that 5 grams of N-oleoylsarcosine was substituted for the 5 grams of N-oleoyliminodiacetic acid. This aqueous emulsion will hereinafter be referred to as aqueous emulsion B.

A third aqueous emulsion was made up as the other two emulsions in Example 1 herein except that 5 grams of N-cocoylsarcosine was substituted for the 5 grams of N-oleoyliminodiacetic acid. This aqueous emulsion will hereinafter be referred to as aqueous emulsion C.

EXAMPLE 2

A 4 ×1 ×10 mil thick sample of shim steel was degreased by dipping the sample for two consecutive 20 minute dips in cyclohexane followed by two consecutive 20 minute dips in acetone with drying in between each dip. The sample was then dipped in aqueous emulsion A from Example 1 for 5 seconds, drained and then allowed to stand vertically until dry. Nine individual drops of water were added to the dried metal plate from an eye dropper. The water was allowed to evaporate and rusting was determined visually. No rusting was noted in any of the nine spots where water dropped.

A controlled sample of the same material which had been degreased in cyclohexane and acetone but which had not been treated with aqueous emulsion A showed rusting at 6 of the 8 spots where water was dropped on the shim steel.

EXAMPLE 3

Example 2 was repeated except that a 4 ×1 ×6 mil black plate was employed and the dip time in aqueous emulsion A was ten seconds. No rusting was noted after the water drops evaporated from the black plate.

In a control run using the same black plate steel which had not been dipped in aqueous emulsion A, rusting was noted in nine out of nine spots.

The black plate steel treated with aqueous emulsion A was then lacquered by spraying the vertical sample with a commercially available lacquer. The sample was heated in an oven at 160°C for 10 minutes. The evaluation of the adhesion of the lacquer was by the standard test wherein a file mark in an X pattern is made in the lacquer, two strips of Scotch brand glass cloth electrical tape number 27 are placed on top of the file mark X pattern and the lower strip is pulled off. On removal of the tape, the lacquer adhesion was rated good to excellent.

The following examples in Table I show the effectiveness of the emulsions of the instant invention to prevent rusting and also aid in lacquering. The emulsions referred to as A, B and C are those set out and prepared in Example 1.

Some of the samples after being treated with the rust preventative emulsions were thereafter treated with a solvent which is known to aid adhesiveness in the lacquering step. As can be seen from the results it has been found that the use of the aqueous emulsions of the instant invention preclude the necessity for using solvents that are known to aid the adhesion of the lacquer to the material.

TABLE I

TIME AND CONDITIONS STUDY ON BLACK PLATE TREATED AND LACQUERED

Example No.	Degreased with Acetone and Cyclohexane[a]	1% Rust Preventative Emulsion	Time of Dip, seconds	Drain or Water Wash[b]	Solvent Treatment		Rusting,[c] No. of spots	Lacquer Adhesion[d]
					Solvent	Time (sec)		
4	Yes	A	5	Drain	None		None	
5	Yes	A	5	Washed	None		None	
6	Yes	A	20	Drain	None		None	
7	Yes	A	20	Washed	None		None	
8	Yes	A	40	Drain	None		None	
9	Yes	A	40	Washed	None		None	
10	Yes	None		Drain	None		9 of 9	
11	Yes	None		Washed	None		12 of 12	
12	Yes	A	10	Drain	None		None	Good to excellent
13	Yes	A	10	Drain	Acetone	10	None	Good to excellent
14	Yes	A	10	Drain	Trichloroethylene	10	None	Excellent
15	Yes	B	10	Drain	None		None	Good to excellent
16	Yes	B	10	Washed	None		None	Good

TABLE I—Continued

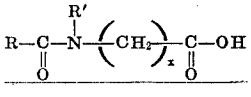
TIME AND CONDITIONS STUDY ON BLACK PLATE TREATED AND LACQUERED

Example No.	Degreased with Acetone and Cyclohexane[a]	1% Rust Preventative Emulsion	Time of Dip, seconds	Drain or Water Wash[b]	Solvent Treatment: Solvent	Solvent Treatment: Time (sec)	Rusting,[c] No. of spots	Lacquer Adhesion[d]
17	Yes	B	10	Washed	Acetone	10	None	Excellent
18	Yes	A	10	Drain	Acetone	10	None	Excellent
19	Yes	A	10	Drain	Acetone	10	None	Excellent
20	Yes	A	10	Drain	Acetone	10	None	Good to Excellent
21	Yes	A	10	Drain	Acetone	10	None	Good to Excellent
22	Yes	A	10	Washed	Acetone	10	None	Good
23	Yes	A	10	Washed	Acetone	10	Trace	Excellent
24	Yes	A	10	Washed	Acetone	10	Trace	Excellent
25	Yes	A	10	Washed	Acetone	10	None	Excellent
26	Yes	A	10	Drain	Acetone	10	None	
27	Yes	A	10	Washed	Acetone	10	None	
28	Yes	B	10	Drain	Acetone	10	None	
29	Yes	A	10	Drain	None		None	
30	Yes	None			None		9 of 9	
31	No	None			None		5 of 9	
32	Yes	C	10	Drain	None		None	

[a] Consecutive two 20 minute dips in cyclohexane and then two 20 minute dips in acetone.
[b] The drained samples were allowed to stand vertically to dry: the water washed samples were washed under the faucet and then allowed to dry.
[c] Water was added from an eye dropper to the dry metal plate.
[d] Lacquer adhesion was measured by spraying the vertical sample with a commercially available can lacquer and then the sample heated in an oven at 160°C for 10 minutes. Evaluation of adhesion was by the standard file mark in an x pattern, placing two strips of Scotch glass cloth electrical tape No. 27 on top and pulling the lower strip.

What is claimed is:

1. The process of lacquering a canned body which comprises passing a degreased black plate through a bath of a rust preventative composition consisting essentially of an aqueous emulsion containing 0.1 to 5 percent by weight of a compound of the general formula:



wherein R′ is hydrogen or a lower alkyl containing one to six carbon atoms; R is either C_nH_{2n+1}, C_nH_{2n-1} or C_nH_{2n-3}; n is an integer from 11 to 23 and x is an integer from 1 to 4, removing the excess of said composition, drying the composition on the black plate, subjecting the black plate to a lacquer spray and thereafter baking the lacquer on the black plate.

2. The process according to claim **1** wherein the compound is N-oleoyliminodiacetic acid.

3. The process according to claim **1** wherein thee compound is N-oleoylsarcosine.

4. The process according to claim **1** wherein the compound is N-cocoylsarcosine.

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