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Patented Aug. 28, 1951

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UNITED STATES PATENT OFFICE

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CORROSION INHIBITING COMPOUNDS

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No Drawing. Application January 6, 1948, Serial No. 812

1 Claim. (Cl. 106—14)

1

This invention relates to corrosion inhibiting compounds and more particularly to a corrosion-inhibiting oil composition presenting substantial fungicidal properties.

It is well known that when metal objects are shipped to, or stored in, tropical countries, that corrosion of the objects takes place rapidly, unless they are protected against the access of air and water. In addition, fungus growth will take place on the objects themselves and on their containers and wrappings. Rusting and fungus growth is particularly undesirable on articles which are designed to come into close contact with the human body, such as razor blades, surgical instruments, scissors, cutlery, etc.

It is an object of our invention to provide a substantially colorless and odorless coating composition which will protect metal articles against rusting in humid climates over considerable periods of time, which will inhibit fungus growth on the articles and which may be quickly and easily removed when the article is ready to be used. Other objects and advantages of our invention will become apparent as the disclosure proceeds.

The essential requirements of such a coating composition are that it shall be easy to apply to the article to be coated; that it shall adhere to all kinds of metal surfaces, both smooth and recessed, with sufficient tenacity to form a uniform and continuous coating; that it shall have definite fungicidal qualities; that it shall be chemically stable and not decompose or separate when subjected to extreme weather and temperature conditions; and, of course, that it shall be insoluble in water and unaffected by salt atmosphere. In addition, it should be substantially colorless and odorless so that it will not stain the outer wrappings of the coated articles, and will not give offense to the user. It should also be easy to remove when desired.

We have discovered a series of compounds that meet all of the foregoing requirements. In general, our new compounds consist of a solution of a mineral oil of selected grade, a corrosion inhibitor, a thickening agent, a fungicide, and a mutual solvent for the fungicide and the mineral oil.

As a mineral oil, we prefer to use a white oil having a viscosity of 50 to 55 Saybolt seconds at 100° F. in amounts ranging from about 68 per cent to 97 per cent of the composition. This oil is quite thin, however, and a thickening agent is required so that a residual film of appreciable thickness will persist after draining. We have

2

found that our attempts to secure this required body by the use of a white oil having a viscosity of 325 Saybolt seconds at 100° F. resulted in a product which, in itself, promoted corrosion. A study of the matter indicated that due to the increased molecular weight and consequently the complexity of the compounds constituting a heavy white oil, the sulphuric acid treatment used in refining the oil results in the formation of substances which are hydrolized in the presence of water with the consequent evolution of free sulphuric acid. For this reason we prefer to increase the viscosity of our compounds by the use of a thickening agent.

As a thickening agent we prefer to use a polymerized poly-iso-butylene having a molecular weight approximating 60,000 in amounts ranging up to 5 per cent of the composition, or a solution of approximately equal parts of octyl and decyl esters of methacrylic acid polymerized to a molecular weight of approximately 12,000 to 15,000 in petroleum oil in amounts ranging up to 20 per cent of the composition. While larger amounts of the latter substance are required in order to attain the desired viscosity, we have found that it acts as a partial solvent for the fungicides used, and reduces the amount of solvent required for their complete and permanent solution.

As corrosion inhibitors, we have found that the presence of minor proportions, from 0.2 per cent to 5 per cent, of a neutral soap of C. P. dodecylamine-iso-amyl-octyl acid ortho phosphate or a cetyl alcohol derivative of alkoxy maleic anhydride will give excellent anticorrosion qualities to the compound.

We have found that a number of fungicides may be used in our new composition, but we prefer to use fungicides which are nontoxic to human beings, such as pyridyl mercuric stearate, di-isobutyl phenoxy ethoxy ethyl dimethyl benzyl ammonium chloride, and di-isobutyl cresoxy ethoxy ethyl dimethyl benzyl ammonium chloride in amounts ranging from 0.1 per cent to 0.5 per cent by weight of the composition.

As a mutual solvent for the fungicide and mineral oil we prefer to use ethylene glycol monobutyl ether or diethylene glycol monobutyl ether acetate, in amounts sufficient to hold the fungicide permanently in solution generally from 1 per cent to 5 per cent being sufficient. As has been pointed out above, if polymerized methacrylic acid ester is used as a thickening agent, proportionately less mutual solvent is required, since the thickening agent serves as

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a partial solvent. It has also been found that hydrogenated rosin, in amounts up to 2 per cent, will prove of value as a stabilizing agent, and will also serve to increase the tackiness of the composition.

Thus, as pointed out above, we have discovered that compositions suitable for the purposes stated may vary in the proportions of their respective components within the following ranges:

	Per cent
White oil	68 –97
Polyisobutylene	0 – 5
Polymerized octyl and decyl esters of methacrylic acid in petroleum oil solution	0 –20
Corrosion inhibitor	0.2– 5
Fungicide	0.1– 0.5
Mutual solvent	0 – 5
Hydrogenated rosin	0 – 2

Having thus described generally our invention, the following examples will serve to instruct those familiar with the art in the manner and methods of carrying out the same.

Example I

	Per cent
White oil, viscosity 50/55 S. U. S. at 100° F.	91.30
Neutral soap of C. P. dodecylamine-iso-amyl-octyl acid ortho phosphate	0.20
Poly iso-butylene	1.00
Hydrogenated rosin	2.00
Pyridyl mercuric stearate	0.50
Ethylene glycol monobutyl ether	5.00
	100.00

The hydrogenated rosin in this composition serves to give additional tack to the composition, and also serves as a stabilizer to hold the fungicide in solution. A razor blade coated with this composition after 72 hours at 122° F. and 100 per cent humidity, showed only a trace of rust at the points of suspension, and no rusting of the blade proper.

Example II

	Per cent
White oil, viscosity 50/55 S. U. S. at 100° F.	94.50
Cetyl alcohol derivative of alkoxy maleic anhydride	3.00
Poly-iso butylene	1.00
Hydrogenated rosin	2.00
Pyridyl mercuric stearate	0.50
	100.00

The above composition is an essentially colorless oil which when applied to a razor blade gave the same protection against rusting as the composition of Example I.

Example III

	Per cent
White oil, viscosity 50/55 S. U. S. at 100° F.	90.75
Poly-iso butylene	1.00
Cetyl alcohol derivative of alkoxy maleic anhydride	3.00
Di-isobutyl phenoxy ethoxy ethyl dimethyl benzyl ammonium chloride	0.25
Ethylene glycol monobutyl ether	5.00
	100.00

The above composition gave excellent protection to razor blades over a period of 240 hours in the standard humidity cabinet test.

Example IV

	Per cent
White oil, viscosity 50/55 S. U. S. at 100° F.	79.75
55 per cent solution of equal parts of polymerized cetyl and decyl esters of methacrylic acid in petroleum oil	15.00
Neutral soap of C. P. dodecylamine-iso-amyl-octyl acid ortho-phosphate	3.00
Di-isobutyl cresoxy ethoxy ethyl dimethyl benzyl ammonium chloride	0.25
Ethylene glycol monobutyl ether	2.00
	100.00

The above composition is somewhat thicker in consistency than the composition of Example III, and is designed primarily for the coating of heavier objects than razor blades, such as surgical instruments, etc. This composition also gives excellent protection against rusting over a period of 240 hours in the standard humidity cabinet test.

Example V

	Per cent
White oil, viscosity 50/55 S. U. S. at 100° F.	83.75
55 per cent solution of equal parts of polymerized octyl and decyl esters of methacrylic acid in petroleum oil	10.00
Neutral soap of C. P. dodecylamine-iso-amyl-octyl acid ortho phosphate	3.00
Ethylene glycol monobutyl ether	3.00
Di-isobutyl phenoxy ethoxy ethyl dimethyl benzyl ammonium chloride	0.25
	100.00

This composition is a medium weight oil which will also give excellent antirust protection over a period of 240 hours in the standard humidity cabinet test.

All the above compositions are substantially colorless and odorless oils of excellent covering quality, and possessing film tenacity sufficient to give lasting protection against rusting and fungus growth over considerable periods of time. They are chemically stable, and the various ingredients will not separate under ordinary conditions of use. It will be understood, of course, that for uses in which a colorless composition is not necessary, any mineral oil, such as lubricating oils having a viscosity within the range of the white oil specified above, may be substituted for the white oil. The various compositions may be easily applied, as by dipping, brushing, or spraying, and may be as easily removed by wiping with a dry cloth, or by holding under running hot water. They are nontoxic, and may be applied with perfect safety to articles such as razor blades, cutlery, surgical instruments, and like articles which are to be used in close proximity to the skin and which may cut or abrade the skin.

Having now described our new compositions, what we claim is:

A fungicidal corrosion inhibiting composition consisting essentially of from about 79.75 per cent to about 94.5 per cent white oil of 50/55 S. U. S. viscosity at 100° F., from 0.20 per cent to 3.00 per cent of a neutral soap of dodecylamine-iso-amyl-octyl acid orthophosphate, from 1.00 per cent to 15 per cent of a polymerized iso-butylene hav-

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ing a molecular weight of about 60,000, from 0.1 to 0.5 per cent of pyridyl mercuric stearate, from 1 to 5 per cent of ethylene glycol monobutyl ether, and from 0 to 2 per cent hydrogenated rosin.

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