MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1943
COMMONWEALTH OF AUSTRALIA

Patents Act

APPLICATION FOR A PATENT

KWe (b) NOVEROX AG

de of (c) Gartenstrasse 2, CH-6300 Zug, Switzerland

hereby apply for the grant of a Patent for an invention entitled

(d) "AGENT FOR TRANSFORMING RUST AND FOR PROTECTION AGAINST RUST"

which is described in the accompanying (e) complete specification.

(Note: The following paragraph applies only to Convention applications)

This application is a Convention application based on the basic application(s) for a patent or similar protection identified by number, country, and filing date as follows:

(f) 15407/75 Switzerland 27th November, 1975

Address for Service: PHILLIPS ORMONDE AND FITZPATRICK
Patent and Trade Mark Attorneys
37-41 Queen Street
Melbourne, Australia

Dated as 12th November, 1976

PHILLIPS ORMONDE AND FITZPATRICK
Attorneys for:

NOVEROX AG
COMMONWEALTH OF AUSTRALIA

Patents Act

DECLARATION FOR A PATENT APPLICATION

In support of the (a) Convention application made by

NOVEROX AG

(hereinafter called "applicant(s)") for a patent (g) for an invention entitled (d)

"AGENT FOR TRANSFORMING RUST AND FOR PROTECTION AGAINST RUST"

I/WOX1 L. Ackermann, Director of NOVEROX AG of Gartenstrasse 2, CH-6300 Zug, Switzerland

do solemnly and sincerely declare as follows:

1. xxxxxxxxxxxxxxxxxx (or, in the case of an application by a body corporate)
   1. I am xxxxxx authorized to make this declaration on behalf of the applicant(s).

2. xxxxxxxxxxxxxxxxxxxxxx
   2. Lothar Peier, Greyerzstrasse 77, Bern, Switzerland. Erich Hengelhaupt, Finkenbuebelweg 28, Bern, Switzerland

I am not aware of the actual inventor(s) of the invention and the facts upon which the applicant(s) is/are entitled to make the application are as follows:

1. xxxxxxxxxxxxxxxxxxxxxx
   1. said LOHAR PEIER was a person entitled under the provision of Section 34(1)(fa) in respect of the contribution to said invention by said ERICH HENGLAHUT, by virtue of an employment contract between said LOHAR PEIER and ERICH HENGLAHUT dated 1st April, 1970; and the applicant is the assignee in respect of the invention from said LOHAR PEIER.

2. xxxxxxxxxxxxxxxxxxxxxx
   2. Lothar Peier, Greyerzstrasse 77, Bern, Switzerland. Erich Hengelhaupt, Finkenbuebelweg 28, Bern, Switzerland

3. The basic application(s) for patent or similar protection on which the application is based is/are identified by country, filing date, and basic applicant(s) as follows:

   SWITZERLAND 27 November, 1975. NOVEROX AG

4. The basic application(s) referred to in paragraph 3 hereof was/were the first application(s) made in a Convention country in respect of the invention the subject of the application.

Declared at (a) Zug (Switzerland)
Dated (g) 17th March, 1977

 Noverox AG

To: The Commissioner of Patents

PHILLIPS ORMONDE & FITZPATRICK
Patent and Trade Mark Attorneys
Melbourne, Australia
Complete Specification for the invention entitled:
"AGENT FOR TRANSFORMING RUST AND FOR PROTECTION AGAINST RUST"

The following statement is a full description of this invention, including the best method of performing it known to applicant(s):

Address for Service is:

PHILLIPS, ORMONDE & FITZPATRICK
Patent and Trade Mark Attorneys
37-41 Queen Street
Melbourne, Australia, 3000
Agent for transforming rust and for protection against rust

The present invention relates to an agent for transforming rust and for the protection against rust to be used on iron and steel parts, containing synthetic binding agents in the form of aqueous dispersions or emulsions as well as a component capable of forming iron complex compounds.

The applicant has already proposed a rust transforming agent of this kind, in which the component capable of forming iron complex compounds comprises acids such as natural gallic acids, tannin, or synthetic aromatic oxycarboxylic acids having phenol characteristics. With this agent, it is achieved that the rust, i.e. the mixture of iron oxides and of iron hydroxydes contained therein is transformed into stable organic iron complexes which stop the process of further rusting by the continuous formation of new instable iron hydroxyde. The synthetic plastics or synthetic resin dispersion or emulsion binds the organic iron complex compound while forming a stable, elastic film of high stability against water, salt and weather.

It has now been found that a further improvement of this rust transforming agent can be achieved if the oxycarboxylic acids with phenol characteristics are esterified into polyesters and polymerized.

Accordingly, the object of the present invention is a rust transforming and protective agent in which the component capable of forming iron complex compounds, consists of at least one polyeester of an oxycarboxylic acid of phenolic character with an acid anhydride or a substituted acid anhydride.

These esters comprise a large, multidimensional molecule which, because of free carboxy and hydroxy groups, is in a position to react chemically with the rust and to make the iron oxides and iron oxides harmless. First, an intermolecular reduction
of iron (III) hydroxide as main component of rust into iron (II) hydroxide takes place, and after the formation of complexes, oxidation into a stable iron (III) compound is effected which is capable of passivating iron and must be considered as transformation of rust in the proper sense. Together with the synthetic binding agent, a very stable contact coating is obtained on the iron or steel parts, which has not only physical adherence, but is directly linked chemically with the iron and therefore assures that all corrosive influences are eliminated.

A condition for the rapid evolution of the chemical reaction of the polyester with the rust is that the synthetic binding agent is dispersed or emulsified in water. On the other hand, it is known that the corrosion stability of dispersions of synthetic plastics material is insufficient because of the presence of emulsifiers and protective colloids which effect reemulsifiability of the binding agent to a certain extent under the influence of humidity and of corrosive materials.

According to a further embodiment of the present invention, a synthetic resin solution can be immixed with the dispersion or emulsion of the synthetic binding agent. The quantity of these synthetic resin solutions may amount to up to 50 weight % and more of the total synthetic binding agent content and brings about an essential increase of the corrosion stability of the aqueous binding agent dispersion.

The ratio of the quantities of synthetic plastics dispersion or emulsion to the synthetic resin solution may preferably amount to between 1,5 : 1 and 1 : 1,5. As aqueous synthetic plastics dispersion or emulsion, for example styrene butadiene dispersions, styrene butadiene acrylonitrile rubber dispersions, vinyl toluene butadiene resin dispersions are suitable. As synthetic resin solutions, long or medium oil chain alkyde resins, polyvinyl chloride, chlorine rubber, acrylates, cyclic rubber, synthetic rubber, styrene butadiene rubber, styrene
acrylate dissolved in organic solvents, particularly aromatic hydrocarbons, are suitable. It is also possible to use the same synthetic compound, for example styrene butadiene, in the aqueous dispersion or emulsion as well as in the solution. Furthermore, the synthetic resin solution may additionally contain corrosion protective oils such as fish oil, safflower oil or wood oil.

Oxycarboxylic acids with phenol characteristics may comprise natural gallic acids, tannin or synthetic organic oxycarboxylid acids with phenol characteristics, particularly dioxy or trioxy carboxylic acids.

These oxycarboxylic acids may preferably be esterified into polyesters with acid anhydrides such as maleic acid anhydride and phtallic acid anhydride or with substituted acid anhydrides such as styrene maleic acid anhydride or methyl vinyl ether maleic acid anhydride. Preferably, polyesters of the kind can be used which are soluble at least partially in water, i.e. for example in water alcohol mixtures.

The rust protective agent according to the present invention may furthermore contain dioxybenzols such as resorcin and hydrochinone or trioxybenzenes, such as for example pyrogallol, which, together with the polyesters, bring about an improvement of the rust reduction. Furthermore, the polyesters may at the same time be amidated in order to improve their solubility and behaviour against corrosion. Furthermore, the polyesters may be mixed with reactive compounds such as glycols or polyvalent alcohols in order to improve their water solubility or dispersibility.

The binding agent may be adjusted to a pH of between 2.5 and 4.5, preferably or approximately 3.5 for promoting the reaction by means of acid inorganic or organic catalysts such as phosphoric acid, formic acid or p-toluene sulfonic acid.
The invention will be explained hereinafter in more detail by some examples:

Example 1:

A polyester of a copolymer or styrene and of maleic acid anhydride of the following formula is produced from gallic acid:

\[
\begin{align*}
- \text{CH} & - \text{CH}_2 - \text{CH} - \text{CH} \\
\text{O} & - \text{C} - \text{C} = \text{O}
\end{align*}
\]

\[ n \]

\[
\begin{align*}
\text{HO} & \\
\text{COOH}
\end{align*}
\]

With this polyester, a rust transforming agent of the following composition is produced:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Styrene butadiene rubber dispersion</td>
<td>30</td>
</tr>
<tr>
<td>Polystyrene acrylate dissolved in white spirit</td>
<td>25</td>
</tr>
<tr>
<td>Polyester of gallic acid, produced with styrene</td>
<td>5</td>
</tr>
<tr>
<td>Modified maleic acid anhydride</td>
<td>5</td>
</tr>
<tr>
<td>Isopropanol</td>
<td>5</td>
</tr>
<tr>
<td>Water</td>
<td>34,5</td>
</tr>
<tr>
<td>Formic acid</td>
<td>0,5</td>
</tr>
</tbody>
</table>

The polystyrene acrylate solution is emulsified into the styrene butadiene solution. By means of the formic acid serving as catalyst, the product is adjusted to a pH of 3.5.

Rusty iron parts treated with this agent become immediately black and rust is transformed into complex iron compounds which form a corrosion resistant lacquer-like coating with the synthetic binding agent.
Example 2:

A rust transforming agent of the following composition is produced:

<table>
<thead>
<tr>
<th>Weight %</th>
<th>Ingredient</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Vinyltoluene butadiene resin dispersion</td>
</tr>
<tr>
<td>25</td>
<td>Polymerisation product of styrene acrylate</td>
</tr>
<tr>
<td>50%</td>
<td>Dissolved in heavy benzine</td>
</tr>
<tr>
<td>25</td>
<td>Polyester of gallic acid with phthalic acid anhydride</td>
</tr>
<tr>
<td>5</td>
<td>Isopropanol</td>
</tr>
<tr>
<td>5</td>
<td>Water</td>
</tr>
<tr>
<td>34.5</td>
<td>Phosphoric acid</td>
</tr>
</tbody>
</table>

The polystyrene acrylate solution is emulsified into the vinyl toluene butadiene resin dispersion. By means of the phosphoric acid serving as catalyst, the product is adjusted to a pH of 3. This agent, after having been applied onto rusty iron parts, forms a black, rubber-like, corrosion protective coating.

Example 3:

A polyester of a copolymerization product of polv(methylene vinyl ether) maleic acid anhydride of the following formula and of gallic acid is formed:
With this polyester, a rust transforming agent of the following composition is produced:

weight %

styrene acrylate resin dispersion 30
polymerisation product of vinyl toluene acrylate, dissolved in xylol, 50 % 25
polyester of a copolymerisation product of poly(methylvinylether)maleic acid anhydride with gallic acid 5
Isopropanol 5
water 34,5
p-toluene sulfonic acid 0,5

The vinyl toluene acrylate solution is emulsified into the styrene acrylate resin dispersion. By means of the p-toluene sulfonic acid, the product is adjusted to a pH of 2,5.

The agent, after application onto rusty iron parts, forms a black, resistant, corrosion protective coating.

Example 4:

A rust converting agent of the following composition is produced:

weight %

acrylate resin dispersion 30
copolymerisation product of polyvinyl acetate dissolved in 15 % aqueous isopropanol 25
polyester of phthalic acid anhydride with gallic acid 5
resorcin 2
isopropanol 4
water 33,25
lactic acid 0,75
The solution of the copolymerisation product is emulsified into the acrylate resin dispersion. By means of the lactic acid serving as catalyst, the product is adjusted to a pH of 4. The agent, after having been applied onto rusty iron, forms a rubber-like black corrosion resistant coating.

Example 5:

A rust converting agent of the following composition is produced:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>polyvinyl chloride dispersion</td>
<td>30</td>
</tr>
<tr>
<td>medium oily alkyde resin dissolved in lacquer</td>
<td>20</td>
</tr>
<tr>
<td>benzine</td>
<td>5</td>
</tr>
<tr>
<td>safflower oil</td>
<td>5</td>
</tr>
<tr>
<td>polyester of maleic acid anhydride with gallic</td>
<td>5</td>
</tr>
<tr>
<td>acid</td>
<td>2</td>
</tr>
<tr>
<td>hydrochinone</td>
<td>4</td>
</tr>
<tr>
<td>isopropanol</td>
<td>33.25</td>
</tr>
<tr>
<td>water</td>
<td>0.75</td>
</tr>
</tbody>
</table>

The alkyde resin solution is emulsified into the polyvinyl chloride dispersion. By means of the acetic acid serving as catalyst, the product is adjusted to a pH of 4.5.

Upon application of this agent onto rusty iron parts, after transformation of the rust into a stable iron complex compound, a deep black, lacquerlike coating is obtained.
Example 6:

A rust converting agent of the following composition is produced:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>terpolymer polyvinyl acetate dispersion</td>
<td>30</td>
</tr>
<tr>
<td>chlorine rubber dissolved in 50 % sangajol</td>
<td>15</td>
</tr>
<tr>
<td>chinese wood oil</td>
<td>10</td>
</tr>
<tr>
<td>polyester of styrene maleic acid anhydride with tannin</td>
<td>5</td>
</tr>
<tr>
<td>pyrogallol</td>
<td>2</td>
</tr>
<tr>
<td>isopropanol</td>
<td>5</td>
</tr>
<tr>
<td>water</td>
<td>33,25</td>
</tr>
<tr>
<td>metaphosphoric acid</td>
<td>0,5</td>
</tr>
</tbody>
</table>

The chlorinated rubber solution is emulsified into the polyvinyl acetate dispersion. By means of the metaphosphoric acid serving as catalyst, the product is adjusted to a pH of 3,2. The agent, after application onto rusty iron, forms a deep black, lacquerlike and corrosion resistant coating.
CLAIMS
The claims defining the invention are as follows:

1. An agent for transforming rust and for protection against rust, including a synthetic binding agent in the form of an aqueous dispersion or emulsion and a component capable of forming iron complex compounds, the component capable of forming iron complex compounds consisting of at least one polyester of an oxycarboxylic acid having phenolic characteristics with an acid anhydride or a substituted acid anhydride.

2. An agent according to claim 1, wherein the dispersion or emulsion of the synthetic binding agent includes a synthetic resin solution.

3. An agent according to claim 2, wherein the quantity ratio between synthetic dispersion or emulsion and the synthetic resin solution is between 1:5:1 and 1:1:5.

4. An agent according to claim 2 or claim 3, wherein the synthetic resin solution is an acrylic resin solution.

5. An agent according to any one of claims 2 to 4, wherein the synthetic resin solution comprises at least one synthetic resin dissolved in aromatic hydrocarbons.

6. An agent according to any one of claims 2 to 5, wherein the synthetic resin solution additionally contains at least one corrosion protective oil.

7. An agent according to any one of claims 1 to 6, wherein the polyester is at least partially soluble or dispersible in water.

8. An agent according to any one of claims 1 to 6, wherein the acid anhydride is maleic acid anhydride.

9. An agent according to any one of claims 1 to 6, wherein the acid anhydride is phtalic acid anhydride.

10. An agent according to any one of claims 1 to 6,
wherein the acid anhydride is styrene-maleic acid anhydride.

11. An agent according to any one of claims 1 to 6, wherein the acid anhydride is methyl vinylether maleic acid anhydride.

12. An agent according to any one of claims 1 to 11 wherein the oxycarboxylic acid of phenolic characteristics is a natural gallic acid or tannin.

13. An agent according to any one of claims 1 to 11, further containing dioxy or trioxy benzenes.

14. An agent according to any one of claims 1 to 13, adjusted to a pH of between 2.5 and 4.5.

15. An agent for transforming rust or for protection against rust, substantially as herein described in any one of the Examples.


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[Signature]