

GOVERNMENT OF INDIA : THE PATENT OFFICE, 214, LOWER CIRCULAR ROAD, CALCUTTA-17.
Specification No. 98206. Application No. 98206, dated 1st March 1965. Complete Specification
left on 9th December 1965. (Application accepted 29th November 1966.)

Index at acceptance—103[XLV(1)], 70C5[LVIII(5)].

A PROCESS FOR THE CORROSION INHIBITION OF ALUMINIUM WORKING AS ELECTRODES.

PROVISIONAL SPECIFICATION.

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH, RAFI MARG, NEW DELHI-1, INDIA,
AN INDIAN REGISTERED BODY INCORPORATED UNDER THE REGISTRATION OF SOCIETIES ACT (ACT XXI OF 1860).

THIS IS AN INVENTION BY MICHAEL ANGELO VINCENT DEVANATHAN (CITIZEN OF CEYLON),
BALKUNJE ANANTHA SHENOI, PATTARAKALAM LUKOSE JOSEPH AND VENKATARAMAN
BALASUBRAMANIAN (CITIZENS OF INDIA), EMPLOYED IN THE CENTRAL ELECTROCHEMICAL RESEARCH
INSTITUTE, KARAUKUDI-3, MADRAS STATE, INDIA.

The following specification describes the nature of this invention.

This invention relates to improvements in or relating to the corrosion prevention of aluminium or its alloys as such or amalgamated.

Hitherto it has been proposed to use inorganic salts such as chromates, silicates etc. and amines as inhibitor to prevent the corrosion of aluminium in corrosive electrolytes. This is open to the objection that the inhibitors passivate the metals on making the metal anodes and the inhibitors fail completely with amalgamated anodes.

The object of this invention is to obviate these disadvantages by the use of quarternary ammonium salts with organic substitutions.

To these ends, the invention broadly consists in using the inhibitor in suitable amounts in the corrosive electrolytes.

The following typical examples are given to illustrate the invention :

Example 1

2S Aluminium alloy in 4M sodium chloride solution ;
Inhibitor : Tetramethyl ammonium salts.

Example 2

2S Aluminium alloy in 4M sodium chloride + mercury salt for amalgamation ;

Inhibitor : Cetyltrimethyl ammonium salt.

The following are among the main advantages of the invention :

(1) The inhibitor works by raising the cathodic polarisation. Hence it can be used in galvanic anodes.

(2) Only small quantities are required for corrosion inhibition.

(3) It can be used to stop the corrosion of amalgamated aluminium, preserving the advantages of amalgamation.

(4) It can be used to stop the corrosion of aluminium in various metal finishing baths like electro-polishing and chemical polishing.

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Dated this 19th day of February 1965.

COMPLETE SPECIFICATION.

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AN INDIAN REGISTERED BODY INCORPORATED UNDER THE REGISTRATION OF SOCIETIES ACT (ACT XXI OF 1860).

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The following specification particularly describes and ascertains the nature of this invention and the manner in which it is to be performed.

The invention relates to improvements in or relating to corrosion inhibition of aluminium working as electrodes.

Hitherto it has been proposed to use inorganic salts such as chromates, silicates and amines as inhibitors for aluminium to prevent the corrosion of aluminium in corrosive electrolytes. This is open to the objection that chromates and silicates passivate the metal on anodic polarization and all the inhibitors completely fail with amalgamated aluminium anodes.

The object of the invention is to obviate these disadvantages by using quarternary ammonium salts, pyridinium salts or quinolenium salts with alkyl or aryl substitutions.

To these ends the invention broadly consists of a process for the corrosion inhibition of aluminium working as electrodes by using quaternary ammonium salts, pyridinium salts or quinolenium salts with alkyl or aryl substitutions as inhibitor in the corrosive electrolytes or dipping the amalgamated aluminium electrode in a solution of the inhibitor and drying before putting in the corrosive electrolyte.

The electrolyte may be the halides, perchlorate, sulphamates, aluminates or the like of alkali and alkaline earth metals, transitional metal and ammonium.

The inhibitor used is a quarternary ammonium salt of the type shown in Fig. 1 of the accompanying drawing or pyridinium or quinolenium salt of the type or their derivatives shown in Fig. 2 and Fig. 3 of the accompanying drawing where 'R' is an alkyl or an aryl group or its derivative and 'X' represents a halide or any other acid radical.

The inhibitor can be used in concentrations ranging from 0.1 gpl to 10 gpl.

The following typical examples are given to illustrate the invention.

Example 1

2S aluminium alloy in 4M sodium chloride solution—
cetyl trimethyl ammonium chloride.

A 10% decrease in the self corrosion of aluminium is obtained.

Example 2

2S aluminium alloy is dipped in 4M manganese chloride solution containing 1-2 gpl mercuric chloride and 5-10 gpl of tetramethyl ammonium chloride,

Price : TWO RUPEES.

A 10% decrease in the corrosion of aluminium is obtained by the same inhibitor.

Example 3

2S aluminium is previously amalgamated and dipped in a solution of cetyl pyridinium chloride and dried. The electrode becomes stable in air due to the action of the inhibitor, and is kept dry. It is dipped in the electrolyte of 4M manganese chloride solution.

The following are among the various advantages of the invention.

1. The inhibitor works by increasing the cathodic polarization. Hence it can be used in electrolytes of galvanic anodes.

2. Only small quantities are required for corrosion inhibition.

3. The inhibitor can be used to stop the corrosion of aluminium in electrolytes such as alkali halides.

4. The inhibitor can be used to control the corrosion of aluminium in electrolytes containing mercury salts. The inhibitor stops the self-corrosion to large extent preserving the benefits of amalgamation.

5. The inhibitor can be used for stopping the disintegration of amalgamated aluminium indefinitely.

6. The inhibitor can be used to stop the corrosion of aluminium in various metal finishing baths.

7. The inhibitor can be used for making efficient sacrificial anodes with amalgamated aluminium.

We claim :

1. A process for the corrosion inhibition of aluminium working as electrodes which consists in using quarternary ammonium salts, pyridinium salts or quinolenium salts with alkyl or aryl substitutions as inhibitor in the corrosive electrolytes or dipping the amalgamated aluminium electrode in a solution of the inhibitor and drying before putting in the corrosive electrolyte.

2. A process as claimed in Claim 1 wherein the electrolyte consists of halides, perchlorates, sulphamates, aluminates or the like of alkali and alkaline earth metals, transitional metals and ammonium.

3. A process as claimed in Claims 1 and 2 wherein the inhibitor used is the quarternary ammonium salt of the type shown in Fig. 1 of the accompanying drawing or pyridinium or quinolenium salt of the type or their derivatives shown in Fig. 2 and Fig. 3 of the accompanying drawing where 'R' is an alkyl or an aryl group or its derivative and 'X' represents a halide or any other acid radical.

4. A process as claimed in Claim 1 or 2 wherein the inhibitor is used in concentrations ranging from 0.1 gpl to 10 gpl.

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COMPLETE SPECIFICATION

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No. 98206

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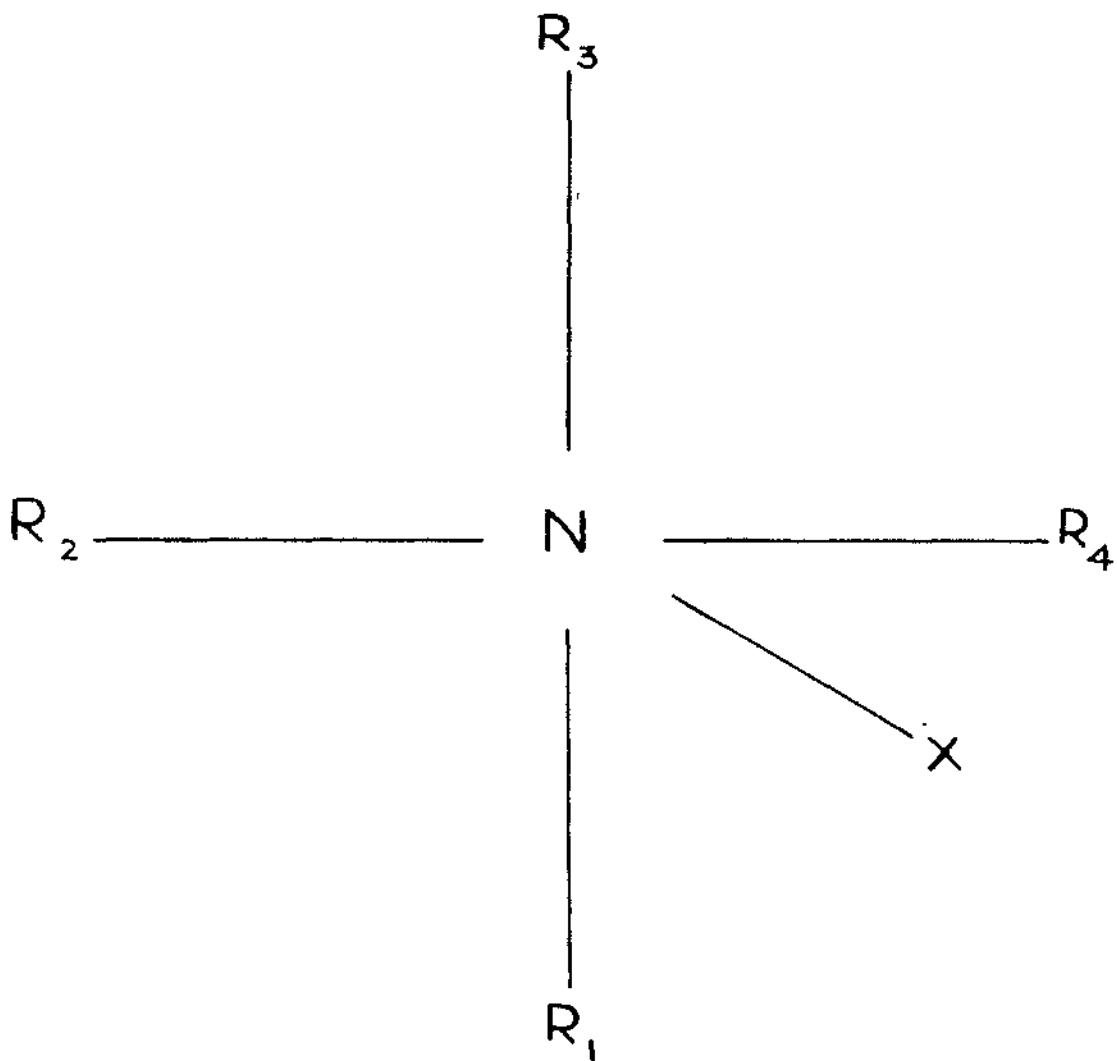


FIG. 1.

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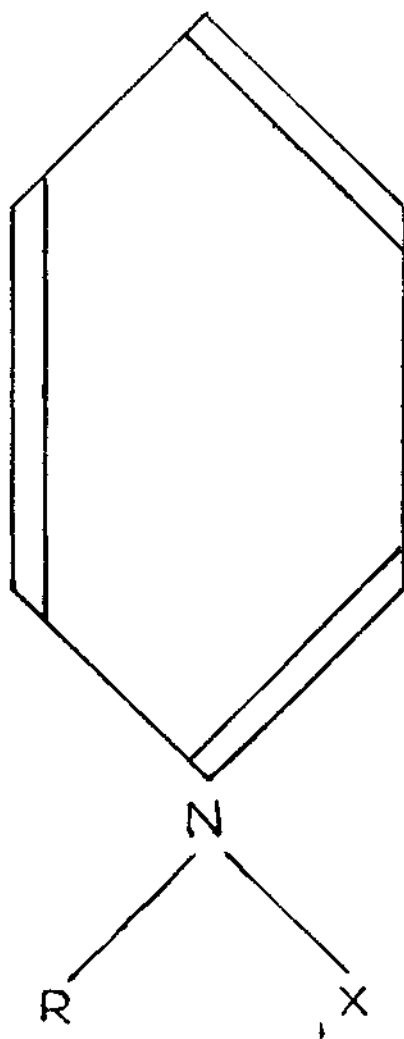


FIG. 2

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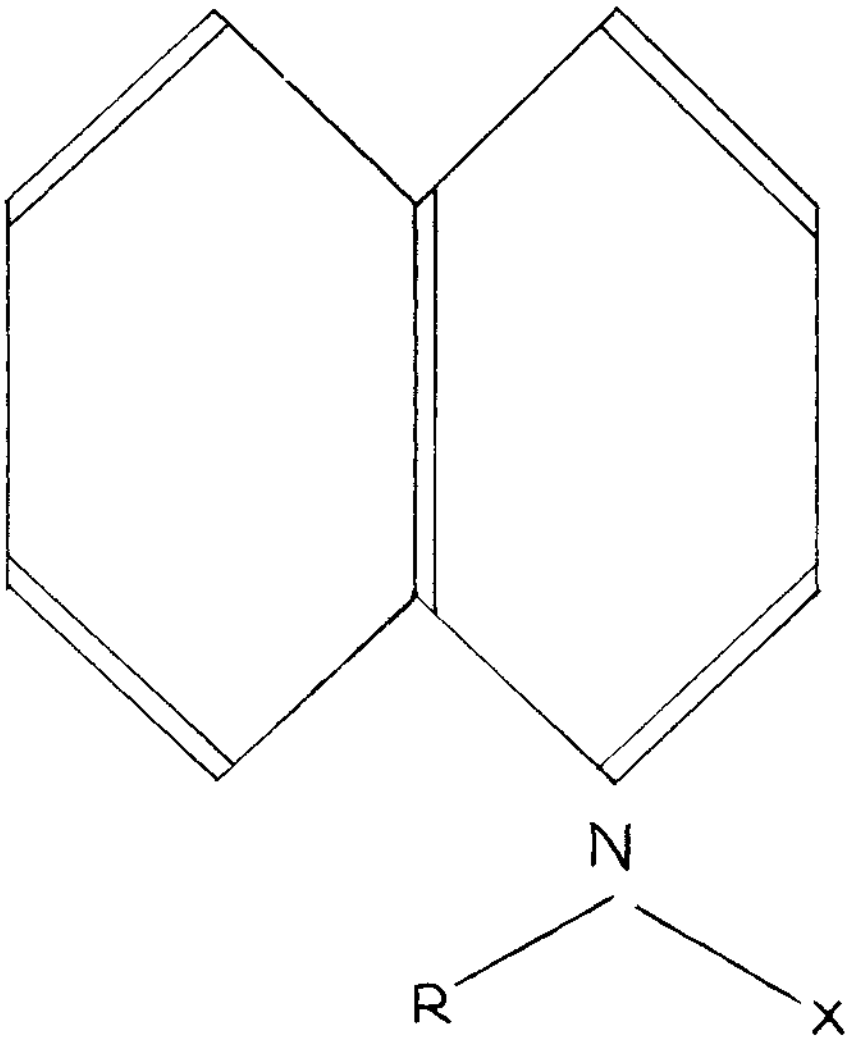


FIG.3

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