

GOVERNMENT OF INDIA
THE PATENT OFFICE
214, Lower Circular Road, Calcutta-17.

CORRIGENDUM.

Specification No. 74680.

The following misprints in the above specification should be corrected :--

A. Provisional Specification :--

- (1) Page 1, column 1, line 12, after the word "method" *insert* the word "of".
- (2) Page 1, column 1, footnote, for "temgerature" read "temperature".
- (3) Page 1, column 2, line 22, for "temge-ature," read "temperature".

B. Complete Specification .—

- (1) Page 2, column 2, line 17, for "30°" read "90°".

R. VASUDEVA PAI,
Deputy Controller of Patents & Designs.

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GOVERNMENT OF INDIA : THE PATENT OFFICE, 214, LOWER CIRCULAR ROAD, CALCUTTA-17.
Specification No. 74680, Application No. 74680 dated 26th December 1960. Complite
Specification left on 22nd September 1961. (Application accepted 24th May 1962.)

PROVISIONAL SPECIFICATION.

IMPROVEMENTS IN OR RELATING TO ELECTROLYTIC DERUSTING OF CORRODED METAL PARTS.

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

The following specification describes the nature of this invention.

THIS IS AN INVENTION BY KUMMATTITHIDAL SANTHANAM RAJAGOPALAN, NARAYANASWAMY SUBRAMANYAM, YELLAMRAJU VENKATA POORNA RAMCHANDRA RAO, ALL OF THE CENTRAL ELECTRO-CHEMICAL RESEARCH INSTITUTE, KARAIKUDI, MADRAS, INDIA, ALL ARE INDIAN CITIZENS.

This invention relates to improvements in or relating to the derusting and reclamation of rusted metal stores. Derusting is usually done by wire brushing, sand or grit blasting, tumbling, flame cleaning, sodium hydride descaling, acid pickling as well as by electrolytic derusting in acid, neutral and alkaline solutions. The present invention makes particular reference to reclamation by electrolytic derusting of rusted engineering stores, ferrous and non-ferrous, using neutral salt solutions.

The object of the present invention is to provide a method rapidly reclaiming derusted engineering stores by an electrolytic process involving the use of a cheap and readily available electrolyte, e.g., sea water, solutions of common salt.

We have found that under appropriate process conditions rusted engineering stores, in particular, costly items having comparatively small surface area, e.g., machinery parts, can be satisfactorily derusted in the course of several minutes e.g., 5, 10, 20, or 30 minutes, with an electrolyte consisting mainly of common salt solution; where available, sea water can also be used for this purpose. While electrolytic derusting in an inexpensive electrolyte like sea water has been attempted earlier with respect to oil tanks, ship bottoms and other rusted machinery and several commercial processes patented particularly in United States, it was always found that derusting in this electrolyte resulted in a surface carrying a black residual deposit which could not be removed and the derusting had to be carried out over a long period of e.g., several hours to days. The process which is being patented has overcome these difficulties and the inventors claim that derusting can be carried out in such a simple inexpensive electrolyte like common salt solutions or sea water to a stage where completely rust free bright metal surfaces are obtained and the process time is shortened to as little as a few minutes, the actual time being determined in a trial experiment.

The new process for which protection is sought in this specification consists in raising electrolyte temperature, making the article to be derusted alternately cathode and anode, and passing a very heavy D. C. current, which conditions are very different from those employed in earlier processes. Under these conditions, the derusting proceeds to a stage where the article is made completely rust free. To facilitate wetting of the article a small quantity of a wetting agent may be added to the electrolyte, if necessary. Since the current required cannot be easily calculated in the case of intricate parts, the voltage drop in the solution can be used to control current density.

The effectiveness of the above method is compared with results obtained under conditions employed in older processes in the following Table. 3 per cent. common salt solution is used as the electrolyte and the total duration for cleaning was kept constant at 20 minutes.

PROCESS CONDITIONS	°C*	OBSERVATIONS.
1. Cathodic cleaning at room temperature at current densities ranging from		
(a) 0— 50 amps/sq. ft	30°	Partially cleaned. Patches of black deposit which cannot be removed by brushing left.
(b) 50—100 amps/sq. ft		

*Initial Temperature.

PROCESS CONDITIONS	°C*	OBSERVATIONS.
2. Anodic cleaning at room temperature at current densities ranging from		
(a) 0— 50 amps/sq. ft.	30°	Cleaning is even less satisfactory than in (1)
(b) 50—100 amps/sq. ft.		—do—
3. Anodic cleaning (10 minutes) followed by Cathodic cleaning (10 minutes) at room temperature at current densities ranging from		
(a) 0— 50 amps/sq. ft.	30°	Extent of cleaning similar to (1).
(b) 50—100 amps/sq. ft.		—do—
4. Cathodic cleaning followed by anodic cleaning at room temperature at current densities ranging from		
(a) 0— 50 amps/sq. ft.	30°	Extent of cleaning is improved, but black deposit left.
(b) 50—100 amps/sq. ft.		—do—
5. Cathodic cleaning followed by anodic cleaning at		
400 amps/sq. ft.	(a) 30°	Part of the surface becomes bright but cleaning is incomplete.
	(b) 60°	—do—
	(c) 90°	Complete cleaning of all surface including grooves to get bright surface.

*Initial Temperature

The inventors have further found that a large number of small items can be satisfactorily derusted several at a time by suspending them in a suitable basket which is connected to the source of supply. No special arrangements for agitation of the electrolyte is necessary.

The derusting process for which protection is sought under the specification leaves a metal surface which is much less prone to subsequent rusting as compared to acid pickling, which is a definite advantage from the point of view of subsequent preservation, storage and use of the items.

The cost of derusting and reclamation of engineering stores by the process outlined above compares favourably with other methods of cleaning, in particular, chemical cleaning and electrolytic cleaning using other proprietary and nonproprietary processes.

The process for which protection is sought in the specification can also be extended to the cleaning of metal sheets and large size stores wherever power is available at sufficiently cheap rates.

R. BHASKAR PAI,
Patents Officer,

Council of Scientific & Industrial Research.

Dated this 17th day of December 1960.

Price : TWO RUPEES.

COMPLETE SPECIFICATION.

IMPROVEMENTS IN OR RELATING TO ELECTROLYTIC DERUSTING OF CORRODED METAL PARTS.

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

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

THIS IS AN INVENTION BY KUMMATTITHIDAL SANTHANAM RAJAGOPALAN, NARAYANASWAMY SUBRAMANYAM, YELLAMRAJU VENKATA POORNA RAMCHANDRA RAO, ALL OF THE CENTRAL ELECTRO-CHEMICAL RESEARCH INSTITUTE, KARAIKUDI, MADRAS, INDIA, ALL ARE INDIAN CITIZENS

This invention relates to improvements in or relating to the electrolytic derusting of corroded metal parts and reclamation of rusted metal stores. Derusting is usually done by wire brushing, sand or grit blasting, tumbling, flame cleaning, sodium hydride descaling, acid pickling as well as by electrolytic derusting in acid, neutral and alkaline solutions. The present invention makes particular reference to reclamation by electrolytic derusting of rusted engineering stores, ferrous and nonferrous, using neutral salt solutions.

The object of the present invention is to provide a method of rapidly reclaiming rusted engineering stores by an electrolytic process involving the use of a cheap and readily available electrolyte *e.g.*, sea water, solutions of common salt.

The invented method of electrolytic derusting of metal parts using a cheap and readily available electrolyte, *e.g.*, sea water, solutions of common salt, consists in passing a heavy direct current of electricity through the metal article immersed in the hot electrolyte, initially making the article cathodic and then anodic.

We have found that under appropriate process conditions rusted engineering stores, in particular, costly items having comparatively small surface area, *e.g.*, machinery parts, can be satisfactorily derusted in the course of several minutes *e.g.*, 5, 10, 20, or 30 minutes, with an electrolyte consisting mainly of common salt solution, where available, sea water can also be used for this purpose. While electrolytic derusting in an inexpensive electrolyte like sea water has been attempted earlier with respect to oil tanks, ship bottoms and other rusted machinery and several commercial processes disclosed particularly in United States, it was always found that derusting in this electrolyte resulted in a surface carrying a black residual deposit which could not be removed and the derusting had to be carried out over a long period of *e.g.*, several hours to days. The process which is being patented has overcome these difficulties and the inventors have found that derusting can be carried out in such a simple inexpensive electrolyte like common salt solution or sea water to a stage where completely rust free bright metal surfaces are obtained and the process time is shortened to as little as a few minutes, the actual time being determined in a trial experiment.

The effectiveness of the above method is compared with results obtained under conditions employed in older processes in Table 2. 3 per cent common salt solution is used as the electrolyte and the total duration for cleaning was kept constant at 20 minutes.

PROCESS CONDITIONS	°C*	OBSERVATIONS
1 Cathodic cleaning at room temperature at current densities ranging from		
(a) 0—50 amps/sq. ft	30°	Partially cleaned. Patches of black deposit which cannot be removed by brushing left.
(b) 50—100 amps/sq. ft		
2 Anodic cleaning at room temperature at current densities ranging from		
(a) 0—50 amps/sq. ft	30°	Cleaning is even less satisfactory than one.
(b) 50—100 amps/sq. ft		
3 Anodic cleaning (10 minutes) followed by cathodic cleaning (10 minutes) at room temperature, at current densities ranging from		
(a) 0—50 amps/sq. ft	30°	Extent of cleaning similar to 1.
(b) 50—100 amps/sq. ft		

* Initial Temperature

PROCESS CONDITIONS	°C*	OBSERVATIONS
4 Cathodic cleaning followed by anodic cleaning at room temperature at current densities ranging from		
(a) 0—50 amps/sq. ft.	30°	Extent of cleaning is improved, but black deposit left.
(b) 50—100 amps/sq. ft.		
5 Cathodic cleaning followed by anodic cleaning at		
400 amps/sq. ft.	(a) 30°	Part of the surface becomes bright but cleaning is incomplete.
	(b) 60°	Do—
6 Cathodic cleaning followed by anodic cleaning at		
400 amps/sq. ft.	30°	Complete cleaning of all surface including grooves to get bright surface.

The inventors have found that derusting process for which protection is sought under the specification leaves a metal surface which is much less prone to subsequent rusting as compared to acid pickling which is a definite advantage from the point of view of subsequent preservation, storage and use of the items.

The inventors have also found that the cost of derusting and reclamation of engineering stores by the process outlined above compares favourably with other methods of cleaning, in particular, chemical cleaning and electrolytic cleaning using other proprietary and non-proprietary processes.

We claim

1 A method of electrolytic derusting of metal parts using a cheap and readily available electrolyte, *e.g.*, sea water, solutions of common salt, which consists in passing a heavy direct current of electricity through the metal article immersed in the hot electrolyte initially making the article cathodic and then anodic.

2 A method as claimed in Claim 1 wherein a wetting agent is added to the electrolyte.

3 A method as claimed in Claim 1 or 2 wherein the following process conditions are representative of those that can be employed

Electrolyte	3% Common salt solution
Duration	20 minutes
Sequence of steps	The article to be derusted is initially made the cathode while passing direct electric current for 10 minutes and then made the anode for 10 minutes.
Current density	400 amps/sq. ft. of the surface of the article to be derusted.

Temperature to which the bath is to be heated initially and at which it is to be maintained } 90°C

4 A method as claimed in any of the preceding claims wherein a large number of small items are derusted several at a time by suspending them in a suitable basket which is connected to the source of supply.

5 A method of electrolytic derusting of metal parts substantially as heretofore described.

R BHASKAR PAI

Patents Officer,

Council of Scientific & Industrial Research

Dated this 18th day of September, 1961.