

# ALIEN PROPERTY CUSTODIAN

## PRODUCTION OF CORROSION-PROOF SURFACES ON STEEL BY CHROMIUM DIFFUSION

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It has already been proposed, to render corrosion-proof articles of steel by diffusing-in of chromium. Older methods work so that the articles are packed in pulverized chromium or ferrochromium and heated to high temperatures. Recently working methods have been proposed and developed, which use volatile chromium compounds and which amongst others possess the advantage of lower operation temperatures. Some of these methods, which work with chromium-chloride have proved to be especially advantageous and are capable of being carried through economically in large size service. The diffusion zones obtained according to these methods at low carburized steel have, after a treatment of 4 to 5 hours and a treatment temperature of about 1000° C., an average depth of 0.1 mm.

Surprisingly it has been found that under the same working conditions approximately double the penetration depth of the chromium is obtained, if the articles are made from a steel with 0.02 to 0.4% carbon, which has an overnormal silicon content. These layers are, however, somewhat brittle. A further unexpected improvement of the physical and chemical properties of the diffusion layer is obtained, if the steel from which the articles are made has, besides the overnormal silicon content, an addition of titanium which binds the carbon of the base mate-

rial. Instead of titanium other carbide formers, such as niobium, tantalum, vanadium or the like may be used.

*Example*

5 If an article is made of a steel of the composition

C	Mn	Si	Ti
<i>Per cent</i> 0.05	<i>Per cent</i> 0.31	<i>Per cent</i> 3.5	<i>Per cent</i> 0.25

10 and then exposed at about 1000° C. for about 5 hours to the action of chromium chloride, a diffusion zone of a depth of approximately 0.2 mm is obtained. Besides the greater diffusion depth compared with the steel having normal silicon content the layer is distinguished, owing to the titanium content in the base material, by good physical and chemical properties.

15 When the base material according to the invention is used, a similar acceleration of the diffusion effect is obtained also in the older diffusion operations working with metal powders.

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