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METHOD OF PRODUCING ARTICLES HAVING FISSURED CHROMIUM SURFACE ELECTRODEPOSITS

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1 Claim. (Cl. 204—37)

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This invention relates to methods of producing articles having mud-crack type chromium surfaces, and provides improvements therein.

It is known from the discoveries of Webersinn and Hyner (United States application Ser. No. 545,506, filed July 18, 1944, which has now become Patent No. 2,430,750) that chromium may be electrodeposited under conditions predisposing it to the formation of fissure net-work therein which give mud-crack type chromium surfaces of controlled plateau size, when subjected to subsequent chemical or electrochemical treatment.

According to the present invention, a further control of plateau size may be effected by a heat treatment of chromium electrodeposited according to the Webersinn and Hyner invention.

Heat treatment, prior to post-treatment of chromium electrodeposited under conditions to predispose it to the formation of fissure networks, has the advantages (1) of providing a means of controlling the plateau size of fissure networks auxiliary to the means disclosed by Webersinn and Hyner; (2) of bringing about greater uniformity of the plateau areas formed in the post-treatment than is obtained without the heat-treatment; (3) of decreasing the fracturing or crumbling at the edges of plateaus in the mechanical finishing of the chromium surface after post-treatment; (4) of shortening the time of post-treatment for obtaining a given depth of fissure.

The heat-treatment, prior to post-treatment, has the effect of reducing the size of the plateaus which are formed by the post-treatment.

Chromium electrodeposits, which by the conditions of electrodeposition are predisposed to the formation, on post-treatment, of the larger size plateaus, can be modified by heat-treatment, according to this invention, so that smaller plateau sizes are produced by the post-treatment.

If, moreover, it be found that with the plating conditions used, a larger plateau size is obtained, than is desired, other articles of a batch plated under the same conditions might very conveniently be salvaged by using a heat-treatment at a predetermined temperature before post-treating to satisfactorily reduce the plateau size to within the desired limits. This expedient is especially desirable when one considers the time required to strip and redeposit thick deposits of chromium.

With increase of temperature of heat treatment, the effect on chromium electrodeposits predisposed to the formation of fissure net-works is to decrease the size of the plateaus. Time of heat-treatment also has an effect on said chromium electrodeposits, the size of the plateaus decreasing with time, but after a certain length of time the progressive effect stops. The heat-treatment of chromium deposits of the aforesaid character, prior to post-treatment, effects a reduction in the size of the plateaus which are subsequently formed, the degree of which reduction depends on the plateau size which would be obtained without heat-treatment, on the temperature of heat treatment, and, to some extent, on the time of heat treatment.

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Examples of the process follow:

EXAMPLE I

Chromium electrodeposition

Bath: Chromic acid (CrO_3)	g./l.	250
Sulphate (SO_4)	g./l.	2
(No other catalyst radicals present)		
Ratio		125:1
Temperature	°F.	145
Current density	amps./sq. in.	2.5

Heat treatment

Temperature	°F.	500
Time	hours	2

Etching

Bath: Chromic acid (CrO_3)	g./l.	25
Sulphuric acid (H_2SO_4)	g./l.	178
Trivalent chromium (Cr^{+++})	g./l.	2
Temperature	°F.	140
Cathodic treatment (15 min.)	amp./sq. in.	0.5

Result

Plateau area about one-quarter the size as compared with a chromium deposit electrodeposited and post-treated under same conditions, but without heat-treatment prior to post-treatment.

EXAMPLE II

Chromium electrodeposition

Same as Example I.

Heat treatment

Temperature	°F.	350
Time	hours	2

Etching

Same as Example I.

Result

Plateau size about one third the size as compared with a chromium deposit electrodeposited and post-treated under the same conditions, but without heat-treatment prior to post-treatment.

EXAMPLE III

Chromium electrodeposition

Same as Example I.

Heat treatment

Temperature	°F.	212
Time	hours	1¼

Etching

Same as Example I.

Result

Plateau area about two-thirds the size as compared with a chromium deposit electrodeposited and post-treated under the same conditions, but without heat-treatment prior to post-treatment.

The ratio and temperature of the bath used for the chromium electrodeposition are illustrative of conditions for predisposing the chromium electrodeposit to the formation of fissure net-works therein on post-treatment; likewise the solution temperature and time of post-treatment given are illustrative; other ratios and temperatures within the limits disclosed by Webersinn and Hyner may be used and any known condition for post-treatment to produce the fissure net-works may be used. The effect of the heat-treatment will be of the character described herein for such other conditions of chromium electrodeposition and post-treatment.

Heat-treatment, prior to post-treatment, has been carried out at temperature from 200° F. to 1000° F., the effect of reduction of the plateau sizes being progressive with increase of temperature.

What is claimed is:

In a method of producing fissured networks in the surface chromium electrodeposits, heating chromium electrodeposits which are predisposed to the formation of fissured chromium of the "mud crack" or "channel" type of a size greater than .008" average plateau diameter to temperatures and for times within the ranges

	Hours
212° F.	1¼
350° F.	2
500° F.	2

and thereafter etching the heat-treated chromium electrodeposits at the temperature of the etching bath to develop a fissure network therein, the plateau areas of which networks being reduced to ⅔ to ¼ of the size which would be obtained on etching without the previous treatment.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,745,912	Richardson	Feb. 4, 1930
1,802,463	Fink	Apr. 28, 1931
1,838,273	McBride	Dec. 29, 1931
2,048,578	Van der Horst	July 21, 1936
2,314,604	Van der Horst	Mar. 23, 1943
2,430,750	Webersinn et al.	Nov. 11, 1947