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July 24, 1945.

R E P O R T
of the
ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1911.

Electropolishing of Chains for Identifi-
cation Discs in an Attempt to Improve
Their Corrosion Resistance.

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Background:

Experiments described in Investigation Reports Nos. 1840 (April 17, 1945) and 1894 (June 22, 1945) from these Laboratories showed that stainless steel chains for identification discs which were submitted by the Directorate of Inter-Service Research and Development (Clothing and Equipment Department of National Defence, 299 Bank Street, Ottawa, Ontario), did not withstand satisfactorily the corrosive action of salt spray. It was felt that electropolishing these chains might improve their corrosion resistance.

Experimental Work:

The following experimental work was performed:

1. An attempt was made to electropolish ordinary 18-8 chromium-nickel steel sheet, using the process of the Rustless Iron and Steel Corporation which requires the following electrolyte:

Citric acid	-	55 to 60 per cent.
Sulphuric acid	-	15 per cent.
Water	-	Balance.

The sheet used was quite dull on one side and fairly well polished on the other.

Result -

An excellent polish was obtained on the dull side of the sheet, as shown in Figure 1, and the surface which already had been polished was considerably improved by electropolishing, as shown in Figure 2.

2. An attempt was made to electropolish a stainless steel identification chain by the same process.

Result -

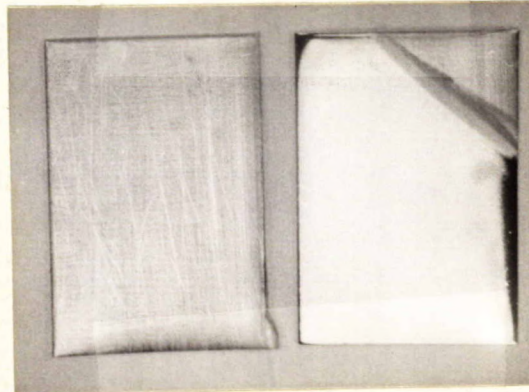
Only a few of the chain beads near the surface of the electrolyte were polished; the others were quite dull. Apparently the beads some distance from the surface of the electrolyte did not have sufficient current density to produce a bright surface. This would be due to the comparatively poor electrical contact between beads.

Conclusions:

1. The electropolishing process of the Rustless Iron and Steel Corporation is satisfactory on sheet metal.
2. This process is not recommended for identification chains.

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Figure 1.



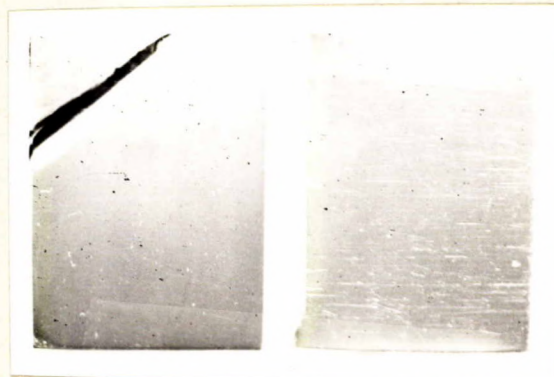
(a)

(b)

RESULT OF ELECTROPOLISHING THE DULL SURFACE OF 18-8 CHROMIUM-NICKEL STEEL SHEET.

- (a) Unpolished surface.
- (b) Electropolished surface.

Figure 2.



(a)

(b)

RESULT OF ELECTROPOLISHING THE PREVIOUSLY POLISHED SURFACE OF 18-8 CHROMIUM NICKEL STEEL SHEET.

- (a) Electropolished surface.
- (b) Previously polished surface.

Note: Black specks in the photograph are photographic flaws and should be disregarded.