

UNITED STATES PATENT OFFICE

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METHOD OF RENDERING METALS OR
ALLOYS NONCORRODIBLE

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2 Claims. (Cl. 148—21.5)

This invention relates to a method of, or proc-
ess for, rendering certain metals or alloys more
non-corrodible and is particularly applicable to
the manufacture of plant and apparatus for use
in chemical work and work of an allied nature
and also for other plant and apparatus where a
surface is required which shall be resistant to
corrosive action. Further, the invention refers,
preferably, though not necessarily, to austenitic
nickel-chromium acid-resisting steels.

It is known that the corrosion resistance of
metals is largely due to the nature of the surface,
for example, in certain metals a very highly pol-
ished surface is known to give greater corrosion
resisting properties to the metal than a surface
not highly polished, and it is considered that such
increased corrosion resistance is due to the pro-
cedure adopted in preparing the surface resulting
in the formation of a protective or passive sur-
face.

It has, however, also been found by me that
under certain tests, the variability in the corro-
sion resistance which occurs in the surface of
metals of identical compositions is due to varia-
tions or lack of uniformity in such passive sur-
face.

The object of this invention, therefore, is to
provide an improved method by which a consist-
ently passive surface may be produced.

According to this invention, therefore, the
metal or a metal article or body, after having
been polished and ground or otherwise dealt with
so as to produce the desired prepared surface, is
subjected to heat-treatment but at such a tem-
perature that oxidation effects are not apparent,
for instance at temperatures ranging from 100° to
400° C. The length of duration of the heat-treat-
ment may vary according to the nature of the
body or article being treated or to the tempera-
ture. For example, the higher the temperature,
the shorter may be the duration of treatment.
After this heat-treatment, the article is cooled as
may be convenient either quickly or slowly.

According to this invention, a passive or corro-
sion-resisting surface can be produced which will
give a very high and uniform resistance to the
corrosive action of various corroding media.

Austenitic nickel-chromium steel containing
10% to 25% of chromium and 25% to 5% of
nickel with or without the presence of molybde-
num, tungsten, copper or other elements which
are added to such steels for different purposes,
may so be effectively treated, such elements be-
ing added in small proportions, as hitherto used
in the art. As an instance a steel containing—

Per cent

Carbon	0.14
Nickel	8.0
Chromium	18.0

after treatment at 200° C., gave uniform resist-
ance to citric acid.

It is assumed that prior to the grinding and
polishing operations referred to, which in the ab-
sence of the employment of the final low tem-
perature treatment herein described would con-
stitute the usual finishing operations on the
bodies or vessels, the articles have received the
normal mechanical or heat treatment necessary
for the production of the desired mechanical
properties and structural condition; that is to
say, the special final low temperature treatment
herein described is applied with the sole object of
modifying the surface condition of the bodies,
and not with the object of modifying the struc-
tural condition or mechanical properties.

What I claim and desire to secure by Letters
Patent is:—

1. The process of preparing a non-corrodible
metal body, of austenitic nickel-chromium steel,
containing 10 per cent to 25 per cent of chromium
and 25 per cent to 5 per cent of nickel, the bal-
ance being substantially iron, consisting in grind-
ing and polishing a metal body having been sub-
jected to the normal manipulation and heat
treatment, and giving it a final low temperature
heat treatment at such a temperature that oxida-
tion effects are not apparent, for instance, at
a temperature ranging from 100 degrees C. to 400
degrees C., with subsequent cooling, as the re-
sult of which treatment the metal is rendered
uniformly resistant to corrosion.

2. A metal body of austenitic nickel-chromium
steel containing 10 per cent. to 25 per cent, of
chromium and 25 per cent. to 5 per cent. of nickel,
the balance being substantially iron, the surface
of which is given a smooth polished appearance
by any known process of polishing and grinding,
after the said metal body has been subjected to
the normal manipulation and heat treatment, and
is then given a final low temperature heat treat-
ment at such a temperature that oxidation effects
are not apparent, for instance, at a temperature
ranging from 100 degrees C. to 400 degrees C.,
with subsequent cooling, as the result of which
treatment the metal is rendered uniformly resist-
ant to corrosion.

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