

UNITED STATES PATENT OFFICE

1,976,210

METHOD OF HARDENING IRON AND STEEL

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No Drawing. Application December 2, 1932,
Serial No. 645,413. In Germany December 9,
1931

2 Claims. (Cl. 148-29)

The subject of the invention is a process for hardening iron and steel, which differs from the known similar methods essentially and advantageously in that it succeeds in imparting to the steel an unusually high degree of hardness in a simple and comparatively short treatment whilst obtaining great core tenacity. Thereby the tedious and expensive case hardening is rendered superfluous in very many cases.

As is known, steel is hardened, by being heated after the forming treatment and quenched by being dipped into a cold fluid. Frequently it is previously subjected to a so called "carbonization". As a quenching agent, for the most part, water is employed either alone or with additions of salts, acids, alkalis or other substances. For quenching alloyed steels, rape seed oils are mainly used.

In order to incorporate more carbon in the steel and thereby to impart to it a greater hardness, it is subjected to the so called case hardening, which consists in heating the steel articles embedded in carbon yielding substances and takes from several hours to several days. The objects to be hardened are allowed to cool in the substances, often subjected to an intermediate heating to red heat, and finally heated again and quenched.

Applicant has now found that high degrees of hardness can be imparted to the steel in a considerably simplified and more economical manner if it is heated to red heat in a carbon dioxide containing atmosphere and then dipped in a bath which contains resins or resin soaps together with carbon-containing and if desired nitrogen-containing substances, dissolved or suspended in oils or fats.

The action of this hardening means can be further increased if metal compounds in the form of resin acid metals, metal formates, carbonyls and the like are added to it.

Solutions or suspensions of resins, such as colophony, together with resin acid salts, such

as resin acid alkali in oils of high flash point such for example as linseed oil have been found to be particularly suitable for use.

As nitrogen and carbon containing compounds, urea, formates and the like can be employed. Also numerous other organic compounds can be employed. It is important however that they contain no water of crystallization.

Example

The articles to be hardened are heated in a carbon dioxide-containing atmosphere to 850-950° and then dipped in a hardening bath and allowed to cool completely in this. This hardening bath advantageously consists of 100 parts by weight of linseed oil in which 12 parts by weight of colophony are dissolved. The solution also contains 3 parts by weight of resin acid potassium and 3 parts by weight of nickel formate; instead of or in addition to the nickel formate, also 7.5 parts by weight of urea can be added. The steel or steel articles treated in this hardening bath are then heated up again to red heat and quenched in water.

It appears that the metal compounds act upon the articles to be hardened by catalytical properties.

I claim.

1. A method of hardening iron and steel, comprising heating the articles to be hardened to red heat in an atmosphere containing carbon dioxide, quenching the articles in a bath of linseed oil in which colophony, resin acid potassium and nickel formate have been dissolved, reheating to red heat and quenching in water.

2. A method of hardening iron and steel, comprising heating the articles to be hardened to red heat in an atmosphere containing carbon dioxide, quenching the articles in a bath of linseed oil in which colophony, resin acid potassium and urea have been dissolved, reheating to red heat and quenching in water.

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