UNITED STATES PATENT OFFICE.

WINFIELD S. POTTER, OF NEW YORK, N. Y.

METHOD OF TREATING MANGANESE STEEL.


To all whom it may concern:

Be it known that I, WINFIELD S. POTTER, a citizen of the United States, and a resident of New York, borough of Manhattan, in the county of New York and State of New York, have made and invented certain new and useful Improvements in Methods of Treating Manganese Steel, of which the following is a specification.

My invention relates to a method of treating metals, and more particularly to the treatment of manganese steel previously strengthened and toughened, e. g., by having been rapidly cooled from a high temperature, the object of the invention being to so treat the metal that it may be bent, forged, or otherwise worked into finished shapes without injury to the steel, either by straining it during the forming operation, or by destroying, reducing, or impairing its strength or toughness.

Manganese steel when rapidly cooled from high temperatures, as for instance, by quenching it in water, has imparted thereto the desirable qualities of great strength and toughness, but these qualities are greatly impaired when the metal is reheated to certain temperatures, and entirely destroyed if the metal be reheated to temperatures at which other metals are ordinarily worked into finished shapes or forms, the steel becoming weak and brittle. After numerous experiments, however, I have found that if the metal be reheated to temperatures not above 425° C., which is a sufficient temperature to permit of it being worked, it is in nowise injured.

From my various experiments I have also discovered that if plates, bars, or other shapes of manganese steel be bent, twisted, or otherwise distorted, when reheated to temperatures below 225° C., the metal will be injured and no longer exhibit the same desirable qualities of strength and toughness.

Tests made upon specimens cut from a rolled bar, reheated to temperatures between 250° C. and 550° C., and subsequently worked, show but slight deterioration, and specimens reheated to temperatures between 350° C. and 425° C. substantially the same results as tests made on the original bar.

In carrying my method into practice, the rolled rail, bar, plate, or other shape having been rapidly cooled from a high temperature, and the metal thereby strengthened or toughened, is reheated throughout to temperatures between 225° C. and 550° C., preferably to a temperature between 350° C. and 425° C., as between these limits I have found there is no likelihood of injury to the steel.

The metal is then wrought, pressed, bent, or otherwise worked or formed into the finished shape desired, and subsequently either cooled in the air, or more rapidly cooled in water.

While the temperatures which I have above mentioned are the most desirable at which the metal should be worked in order to avoid any liability of injury thereto from the reheating thereof, or by straining it in the process of working, yet it is possible to work the metal at a slightly higher temperature, for example 550° C., providing it be not restrained at such temperature for too long a time; in such instance, it is very desirable, in fact necessary, that the metal be rapidly worked and subsequently rapidly cooled to a temperature preferably below 400° C. In any event, however, it is not desirable to reheat the metal to a temperature much above 600° C., as I have found that by so doing, the crystallization of the metal is so changed or altered as to render it weak and brittle.

What I claim is:

1. The method of treating manganese steel previously strengthened and toughened, which consists in reheating such metal to a temperature not above 550° C., then working the metal into its finished form, and finally cooling it.

2. The method hereinbefore described of treating manganese steel previously strengthened and toughened, consisting in reheating such metal to a temperature between 225° C. and 550° C., then forming the metal into its finished shape, and finally cooling it.

3. The method hereinbefore described of treating manganese steel previously strengthened and toughened, consisting in reheating such metal to a temperature approximating 400° C., then forming the metal into its finished shape, and finally cooling it.

Signed at New York, borough of Manhattan, in the county of New York, and State of New York, this 27th day of April, A. D. 1910.

WINFIELD S. POTTER.

Witnesses:

OAKLEY W. COOKE,
WILLIAM CONOVER.