

UNITED STATES PATENT OFFICE.

ROBERT H. ILLINGWORTH, OF NEWARK, NEW JERSEY, ASSIGNOR TO CRUCIBLE STEEL COMPANY OF AMERICA, A CORPORATION OF NEW JERSEY.

STEEL.

No. 882,112.

Specification of Letters Patent.

Patented March 17, 1908.

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To all whom it may concern:

Be it known that I, ROBERT H. ILLINGWORTH, residing at Newark, in the county of Essex and State of New Jersey, a citizen of the United States, have invented or discovered certain new and useful Improvements in Steel, of which improvements the following is a specification.

The invention consists in a new and improved composition of steel, which is made to contain nickel, chromium and tungsten, and which has been found to be extremely strong and durable in service.

The nickel may be present in quantities ranging from .50 per cent. to five per cent., by weight, of the product; the chromium from .10 per cent. to five per cent.; and the tungsten from .25 per cent. to three per cent. Within these limits the percentages of the substances named may be varied widely without departing from the spirit or scope of the invention. For example, I have found that steel of approximately .60 per cent. carbon, and containing substantially 2.50 per cent. of nickel, 1.25 per cent. of chromium, and one per cent. of tungsten shows, after hardening in oil in the well-known manner, a high elastic limit and high tensile strength, combined with high elongation. On the other hand, the percentages of the said added elements may be altered, within the limits generally stated, and as is well-known in the art, to produce a steel which will be self-hardening.

The invention is not limited in respect of the percentage of carbon which may be present in the steel, since it may be employed with good results in both low-carbon and high-carbon steels.

The steel may be manufactured by any

suitable process, the said added elements being mixed with the base while the latter is in molten condition. They may be added either in pure metallic form, or alloyed with iron or other substances.

It is well-known in the art that many of the effects due to the admixture of tungsten with steel, can be attained to substantially the same or a like degree by the substitution therefor of molybdenum in substantially one-half the amount of tungsten. I have found that this equivalency holds true in this case as well as in others. Therefore in specific mention of tungsten herein, and in the claims hereof, I intend to include, as a known equivalent and alternative therefor, molybdenum in substantially one-half the amount of tungsten specified.

I claim as my invention:

1. Steel containing from .50 per cent. to five per cent. of nickel, from .10 per cent. to five per cent. of chromium, and from .25 per cent. to three per cent. of tungsten.

2. Steel containing from two per cent. to three per cent. of nickel, from one per cent. to two per cent. of chromium, and from .25 per cent. to one per cent. of tungsten.

3. Steel containing 2.50 per cent. of nickel, 1.25 per cent. of chromium, one per cent. of tungsten, and less than one per cent. of carbon, and characterized by high elastic limit, high tensile strength, and high elongation.

In testimony whereof, I have hereunto set my hand.

ROBERT H. ILLINGWORTH.

Witnesses:

W. E. CALVERT,

R. R. NELSON,

W. A. McMANUS.