

UNITED STATES PATENT OFFICE.

SAMUEL S. WALES, OF MUNHALL, PENNSYLVANIA, ASSIGNOR TO THE CARNEGIE STEEL COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

STEEL ALLOY.

952,392.

Specification of Letters Patent. Patented Mar. 15, 1910.

No Drawing.

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To all whom it may concern:

Be it known that I, SAMUEL S. WALES, of Munhall, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Steel Alloys, of which the following is a full, clear, and exact description.

My invention relates to alloy steels, and more particularly relates to alloy steels used in making armor plates either with or without a carburized face.

The object of my invention is to provide a new alloy which will give a metal of great strength and a high resistance to impact and shock.

Another object of the invention is to provide an alloy which readily lends itself to subsequent heat treatments generally used in the manufacture of armor plate.

In the alloy steels now used, from 2.50 per cent. to 5.00 per cent. nickel is generally used.

I have discovered that by the addition of copper to the alloy, within certain limits, the tensile strength is increased and the reduction in area of the steel is also increased, without lessening the physical qualities of the alloy.

In carrying out my process, the following proportions have been found to give the desired results:—carbon; manganese; nickel, below 4.00 per cent.; chromium, below 2.00 per cent.; vanadium, .10 per cent. to .50 per cent.; copper, less than 1.00 per cent.

The addition of the copper within the limits named increases the tensile strength of the metal and increases the reduction in the area when tested to destruction.

In making this alloy steel the sulfur should be as low as possible, preferably less

than .04 per cent., and the phosphorus content should be very low.

The advantages of my invention will be apparent to those skilled in the art.

By the addition of a small amount of copper, which is comparatively cheap, new and characteristic physical properties are imparted to the steel.

Changes in the proportions of the various alloying metals within the usual variations found in carrying out the making of steel may be made without departing from my invention.

I claim:—

1. An alloy steel containing manganese, up to 4.00 per cent. nickel, below 2.00 per cent. chromium, up to .50 per cent. vanadium and up to 1.00 per cent. copper.

2. An alloy steel containing below 4.00 per cent. nickel, less than .50 per cent. vanadium and up to 1.00 per cent. copper.

3. An alloy steel containing nickel, chromium below 2.00 per cent., up to .50 per cent. vanadium and less than 1.00 per cent. copper.

4. An alloy steel containing nickel up to 4.00 per cent., chromium from 1.00 per cent. to 2.00 per cent., vanadium up to .50 per cent. and copper up to 1.00 per cent.

5. An alloy steel containing manganese, less than 4.00 per cent. nickel, chromium, up to .50 per cent. vanadium and up to 1.00 per cent. copper.

In testimony whereof, I have hereunto set my hand.

SAMUEL S. WALES.

Witnesses:

R. D. LITTLE,

JAS. L. WELDON.