

UNITED STATES PATENT OFFICE.

JAMES CHURCHWARD, OF NEW YORK, N. Y.

ALLOYED STEEL.

No. 868,327.

Specification of Letters Patent.

Patented Oct. 15, 1907.

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To all whom it may concern:

Be it known that I, JAMES CHURCHWARD, a subject of the King of Great Britain, residing in the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Alloyed Steel, of which the following is a specification.

The present invention relates to alloys of steel, and particularly where vanadium is employed as one of the alloying metals; and the object of this invention is to produce a metal as will be hereinafter described which will be suitable for many uses and purposes.

In carrying out the present invention there is mixed with iron or steel relatively small proportions of nickel, chromium, manganese and vanadium, and the alloy is melted and cast either in an ingot for reduction and shaping or in any particular shapes or patterns required. The carbon may be contained in a stock steel if that is used or if iron is used as stock the carbon may be added in many known ways and may vary from .20% up to 1.25%, according to the uses to which the alloy is to be applied.

A suitable proportion of the several metals, for producing an extremely tough metal with great resistance to shock will be understood from the following formula, in which the proportions are designated in percentages by weight namely:—

Steel, containing .60% carbon.....	95.10	parts.
Nickel	3.00	“
Chromium	1.50	“
Vanadium15	“
Manganese25	“
	100.00	

The percentages of the alloying metals may also be

varied and still remain within the broad scope of my invention, namely:

Steel, containing from .20% to 1.25% carbon.....	from..	98.30	parts to	91.50	parts.
Nickel	“ ..	1.00	“ “	3.50	“ 40
Chromium	“ ..	.50	“ “	2.50	“
Manganese	“ ..	.15	“ “	1.00	“
Vanadium	“ ..	.05	“ “	1.50	“
		100.00		100.00	

It is believed that the alloying elements named react in a chemical manner on each other, producing molecular changes of such a nature that the nickel, chromium and manganese harden and toughen and the nickel and vanadium remove or prevent brittleness without softening the alloy. Ferro compounds of the several alloying metals may be used in lieu of the pure metals.

Having thus described my invention, I claim

1. An alloy composed of steel combined with small proportions of nickel, chromium, vanadium and manganese. 55
2. An alloyed steel composed of the following alloying metals in about the proportions given, namely: steel, containing .60% carbon, 95.10 parts, nickel 3.00 parts, chromium 1.50 parts, vanadium .15 parts, and manganese .25 parts. 60
3. An alloyed steel containing the following alloying metals in about the proportions given, namely: steel, containing .20% to 1.25% carbon, from 91.50 to 98.30 parts; nickel, from 1.00 to 3.50 parts, chromium, from .50 to 2.50 parts; vanadium, from .05 to 1.50 parts, and manganese, from .15 to 1.00 parts. 65

In witness whereof I have hereunto signed my name this 11th day of April 1907, in the presence of two subscribing witnesses.

JAMES CHURCHWARD.

Witnesses:
WILLIAM J. FIRTH,
H. G. ROSE.