

UNITED STATES PATENT OFFICE.

ALBERT DE DION AND GEORGES BOUTON, OF PUTEAUX, FRANCE.

STEEL ALLOY.

No. 836,567.

Specification of Letters Patent.

Patented Nov. 20, 1906.

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To all whom it may concern:

Be it known that we, ALBERT DE DION, gentleman, and GEORGES BOUTON, engineer, citizens of the French Republic, residing at Puteaux, Seine, France, have invented certain new and useful Improvements in Steel Pieces, of which the following is a specification.

This invention has for its object an improved steel containing nickel.

It is known that steels containing nickel are distributed in three groups according to their microstructure. The first group is characterized by a pearlitic microstructure, the second one by a martensitic microstructure, and the third one by a polyhedrous microstructure. If to a steel containing nickel and having a pearlitic microstructure silicon in a proportion from 0.5 per cent. to two per cent. is added, the microstructure remains a pearlitic one; but the breaking load and the elastic limit is greatly increased, the striction, the lengthening, and the resistance to shocks being barely diminished. The following table compares, for instance, two types of these steels having a pearlitic microstructure and containing silicon with steels containing the same proportion of nickel and of carbon, but which do not contain silicon, these steels having been assayed after annealing at a temperature of 900° centigrade and slow cooling:

Carbon.	Nickel.	Silicon.	Breaking load.	Elastic limit.
0.150	2 per cent.	0	41 kilos.	30 kilos.
0.150	2 per cent.	1.5	90 kilos.	63 kilos.
0.800	2 per cent.	0	90 kilos.	45 kilos.
0.800	2 per cent.	1.5	125 kilos.	75 kilos.

If to a steel having a martensitic microstructure silicon in a proportion from 0.5 per

cent. to three per cent. is added, the microstructure remains a martensitic one; but the breaking load and elastic limit is increased more than with the steels having a pearlitic microstructure, the fragility of the steel being not increased. Some of these steels have a breaking load which has not been obtained hitherto.

Carbon.	Nickel.	Silicon.	Breaking load.	Elastic limit.
0.150 0.120	12 15	1.5 1	170 160	140 155

These steels are particularly suitable for the manufacture of mechanical pieces, shafts, gearings, &c., and principally for springs, axles, spindles, and in the main for all pieces for which a high elastic limit and a great resistance to shocks are required.

The silicon may be added by means of ferrosilicon or by silicon obtained in an electrical furnace and may be made in a furnace of any convenient kind—Martin's furnace or others.

Having thus described and ascertained the nature of our invention and in what manner the same may be performed, we declare that what we claim is—

As a new article of manufacture, a steel containing nickel, and an amount of silicon in the proportion of 0.5 to three per cent. with respect to the steel.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

ALBERT DE DION.
GEORGES BOUTON.

Witnesses:

HANSON C. COXE,
PIERRE LEISO.