UNITED STATES PATENT OFFICE.

WALTER LOTHAR EDUARD EILENDER, OF REMSCHEID, GERMANY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE CHEMICAL FOUNDATION, INC., A CORPORATION OF DELAWARE.

HIGH-SPEED TOOL-STEEL.

1,337,210. Specification of Letters Patent. **Patented Apr. 20, 1920.**

No Drawing. Application filed March 6, 1917. Serial No. 152,726.

To all whom it may concern:

Be it known that I, WALTER LOTHAR EDUARD EILENDER, a subject of the German Emperor, and residing at Remscheid, Germany, have invented certain new and useful Improvements in High-Speed Tool-Steels, of which the following is a specification.

High speed steels are as a rule produced by alloying a carbon-steel of the desired hardness, which contains between 0.1 and 0.3 p. c. manganese and 0.1–0.3 p. c. silicon with 3 to 7 p. c. chromium and 18–25 p. c. tungsten. Such steels are called chromium-tungsten-steels.

It is known to alloy such steels with small quantities of vanadium, molybdenum and the like. They then are called, for example, chromium-tungsten-molybdenum-steels.

If, as it is known, such steels are further alloyed with larger quantities of cobalt, they are called chromium-tungsten-cobalt-steels.

In my applications Nos. 152,724 and 152,725, filed March 6, 1917, are described, first a high speed steel in which the tungsten is replaced by molybdenum representing a chromium-molybdenum steel, and, second, a high speed steel which may be called a chromium-molybdenum-vanadium or a chromium-molybdenum-cobalt-steel.

Later experiments have proved, that it is possible to omit the addition of molybdenum, if the content of manganese is raised to about 2 p. c., that of chromium is increased some degrees and 1.0 to 5.0 p. c. of cobalt are added. I then produce a chromium-cobalt-steel.

As in steels known till now, also in the new chromium-cobalt-steel the quantity of the different components may be varied within certain limits without causing the steel to become useless. Within certain limits less of one element may be compensated by more of another.

The new chromium-cobalt-steel may be improved in its working capacity as a high speed steel, by an addition of 0.15–2.0 p. c. vanadium. By doing so, I produce a chromium-cobalt-vanadium-steel.

A steel of the following composition, 0.6–1.2 p. c. C, 1.0–2.0 p. c. Mn, 0.1–0.3 p. c. Si, 3.0–10.0 p. c. Cr, 1.0–5.0 p. c. Co, I found to be best suited as a high speed steel.

The steel may be produced by melting, in crucibles, bar steel containing the required amount of carbon, manganese, silicon, and also vanadium, if desired, and adding thereto the requisite amount of the metals chromium and cobalt, viz., 3 to 10 per cent. chromium, and 1 to 5 per cent. cobalt, and after proper fusion the fused metal is poured from the crucible into suitable ingot molds.

What I claim and desire to secure by Letters Patent as my invention is—

1. The herein described high speed steel, containing besides iron also 0.6–1.2 p. c. C, 1.0–2.0 p. c. Mn, 0.1–0.3 p. c. Si, 3.0–10.0 p. c. Cr, 1.0–5.0 p. c. Co.

2. The herein described high speed steel containing besides iron also 0.6–1.2 p. c. C, 1.0–2.0 p. c. Mn, 0.1–0.3 p. c. Si, 3.0–10.0 p. c. Cr, 1.0–5.0 p. c. Co and 0.15–2.0 p. c Va.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

WALTER LOTHAR EDUARD EILENDER.

Witnesses:
HELEN NUFER,
FRANCES NUFER.