UNITED STATES PATENT OFFICE.

CHARLES L. LEIBY, OF KNOXVILLE, TENNESSEE, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE LEIBY COMPANY, OF SAME PLACE.

PROCESS OF HARDENING, PURIFYING, AND TOUGHENING METALS.

SPECIFICATION forming part of Letters Patent No. 661,406, dated November 6, 1900.

Application filed December 5, 1898. Serial No. 698,343. (No specimens.)

To all whom it may concern:

Be it known that I, CHARLES L. LEIBY, a citizen of the United States, residing at Knoxville, in the county of Knox and State of Tennessee, have invented certain new and useful Improvements in Processes of Hardening, Purifying, and Toughening Metals, of which the following is a specification.

The object of my said invention is to harden and toughen metals of a naturally soft, weak, or brittle character and remove impurities therefrom, whereby they are rendered capable of many uses for which steel is ordinarily employed; and it consists in the process of treating said metals with chemicals or a chemical compound, whereby said object is accomplished, as will be hereinafter more fully described and claimed.

In using the chemicals they may be combined before introduction or introduced separately, substantially the same results being accomplished by both methods. In speaking of the "compound," therefore, it will not necessarily be implied that the chemicals are actually mixed before being introduced into the molten metal; but they are introduced substantially simultaneously when not mixed, nevertheless.

The main chemicals employed are potassium nitrate, a cyanid, and silica, (SiO_2.) I have found that good results are secured by using eight grains of potassium nitrate, five grains of a cyanid, and sixty grains of silica in ten pounds of metal. Ordinarily I combine the parts in one package and throw it into the metal when in a molten state; but when they are thrown in in separate packages at the same time or substantially the same time the result is not materially different.

The particular kind of silica which I find best adapted for the purpose is finely-powdered flintstone, and this with saltpeter and any cyanid, as potassium cyanid or potassium ferri or ferro cyanid or a mixture, comprises the compound I have ordinarily used.

While the proportions stated have brought good results, it will be understood that they may be varied somewhat and to suit the quantity of metal to be treated, as the above-stated proportionate amount of compound may not be required with larger quantities of metal.

Metals so treated, including iron, copper, aluminium, and alloys, become harder and tougher and are made capable of the uses stated.

Having thus fully described my said invention, what I claim as new, and desire to secure by Letters Patent, is—

The process of hardening, purifying and toughening metals, which consists in reducing said metals to a molten state and introducing therein potassium nitrate, a cyanid and powdered silica, substantially as set forth.

In witness whereof I have hereunto set my hand and seal at Washington, District of Columbia, this 3d day of December, A. D. 1898.

CHARLES L. LEIBY. [L. S.]

Witnesses:

CHARLES T. CATES, Jr.,

E. W. BRADFORD.