

# 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 MAKING METALS WELDABLE AND MALLEABLE.

SPECIFICATION forming part of Letters Patent No. 661,807, dated November 13, 1900.

Application filed December 5, 1898. Renewed October 18, 1900. Serial No. 33,512. (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 Making Metals Weldable and Malleable, of which the following is a specification.

My invention has for its object the converting of metals which in their ordinary condition are not weldable into a physical condition in which they are weldable and of converting non-malleable metal into a malleable state; and it consists in the process of preparing said metals by treatment with certain chemicals whereby these objects are accomplished, as will be hereinafter more fully set forth.

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 combined before they are introduced into the molten metal.

The main chemical elements employed are potassium nitrate and a cyanid. I have found that the best results are secured by the use of one to two parts of potassium nitrate to one part of the cyanid. Ordinarily I combine the two in one paper package and throw the whole into the molten metal; but they may be thrown in separately, but at substantially the same time, without materially changing the result. I have also found that common salt and borax may one or both be added and substantially the same result secured. The cyanid may contain part cyanid of potassium and part potassium ferrocyanid or ferrieyanid, or any one of the cyanids may be used separately, as most available or convenient. I have found by experiment that the proportions may be varied considerably within the limits of practicability. For instance, I have used in ten pounds of copper ten grains of saltpeter and ten grains of cyanid and secured good results. I have added to this compound about the same quantity of salt and borax and secured good results. I

have used in fifty pounds of copper twenty-six grains of potassium nitrate to twelve and one-half grains of the cyanid and secured most excellent results for casting purposes; but found that the metal was a little hard for good welding. I have used in ten pounds of copper fifty-five grains of potassium nitrate to eleven grains of the cyanid and secured a metal that would weld nicely, and I have used in ten pounds of copper ten grains of potassium nitrate to five grains of the cyanid and added seven grains of salt and four and one-half grains of borax and secured good results. These results of a few of many experiments are mentioned to illustrate the scope of the invention, which consists, essentially, in treating the metal with potassium nitrate and the cyanid in such proportions and combinations as the particular result desired may require, which can easily be determined by experiment or experience. The same quantity which will be sufficient in twenty pounds has also been found to produce equally good results when used in ten pounds, which shows that the quantity above sufficient may be varied considerably in proportion to the amount of metal to be treated without departing from my said invention.

The metal is first reduced to a molten state, and just as it is ready to pour the compound is introduced. After a moment it is then poured and cast into the desired shape. By this process perfect copper castings can be formed without blow-holes, and they can be made hard or perfectly malleable and weldable, as desired, by varying the proportion and quantity of the chemicals as above described. Brass can be treated in the same way with the same results. By this process I have made both copper and brass and other metals and alloys so hard that tools with tempered faces and edges could be made from them, and also have made them tough and malleable, so that they have been readily weldable by the common method of welding. The action of said compound upon said metals is such as to purify and render them hard and tough and capable of being worked, as above described.

It will be understood, of course, that metals

treated by the method within described may be welded to each other or to other weldable metals.

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

1. The process of treating metals which consists in reducing them to a molten state and introducing therein potassium nitrate and a  
10 cyanid.

2. The process of treating copper and alloys thereof to purify them and render them

weldable, which consists in first reducing them to a molten state and then introducing therein simultaneously potassium nitrate and  
15 a cyanid, 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.