

# UNITED STATES PATENT OFFICE.

SAMUEL A. CONRAD, OF TERRE HAUTE, INDIANA.

IMPROVEMENT IN PROCESSES OF PREPARING IRON FOR CASE OR SURFACE HARDENING.

Specification forming part of Letters Patent No. **204,202**, dated May 28, 1878; application filed August 10, 1877.

*To all whom it may concern:*

Be it known that I, SAML. A. CONRAD, of Terre Haute, in the county of Vigo, and in the State of Indiana, have invented certain new and useful Improvements in Processes for Hardening Iron; and do hereby declare that the following is a full, clear, and exact description thereof.

The nature of my invention consists in a process for preparing iron for case or surface hardening, as will be hereinafter more fully set forth.

In my process I use a mixture composed of one part borax and two parts cast-iron chips or borings, or somewhat in that proportion.

The iron to be hardened is first heated to a white heat, after which it is coated with the mixture of borax and cast-iron chips or borings. This may be done either by sprinkling the mixture on the hot iron or by rolling the iron in the mixture. The iron is then reheated to flux the coating, and it is finally compressed by hammering or otherwise. This may be repeated as many times as desired, according to the thickness of steel surface desired.

After the forging is completed the article can be allowed to cool and then finished, and after finishing heated red hot and plunged into water, which hardens it. If finishing is not required, it can be hardened as soon as it is forged.

Iron treated by my process can be used in

numberless instances in place of steel, as it virtually puts a surface of steel on the iron to the depth of from one-fourteenth to one-sixteenth of an inch deep, or more, the depth being governed by the number of applications of the compound.

The hardened surface can be put all over the iron, or if a piece of iron is required to have only one side—for instance, a square or flat bar—hardened, it can be put on one side only, leaving the rest of the bar in its natural state; and it can be used in any small shop where the ordinary process of case-hardening is not used on account of no facilities for using it.

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

The continuous process herein described for preparing iron for case or surface hardening—namely, heating the iron substantially to the heat specified, coating it with a mixture of borax and iron chips, reheating to flux the coating, and finally mechanically compressing it, substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 16th day of July, 1877.

SAML. A. CONRAD.

Witnesses:

J. K. LAPE,  
H. MONKHOUSE.