United States Patent Office.

HARVLIN PADDOCK, OF ST. JOHNSBURY, VERMONT.

Letters Patent No. 61,949, *dated February* 12, 1867.

IMPROVEMENT IN HARDENING IRON.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, HARVLIN PADDOCK, of St. Johnsbury, in the county of Caledonia, and State of Vermont, am inventor of a certain new and useful Improvement in Hardening Iron; and I do hereby declare that the following is a full and exact description thereof.

It has long been common to harden iron by producing a condition approximating to that of steel on the surface, and then plunging it into water, or otherwise suddenly cooling it. My invention operates, as I believe, by analogous means, but the material which I employ is different, and I obtain a better result. I can harden articles of iron, sooner and more evenly, than by the ordinary means of case hardening. I will first describe in detail what I consider the best means of carrying out my invention, and will afterwards designate the point which I believe to be new.

I take the finished articles of iron, the parts of gunlocks for example, and deposit them in a tight case, by preference cast iron, and fill the interstices with the following compound, or so arrange the material in layers that the compound shall be in contact with the greater portion of the surface of each article: One quart of fresh hard-wood charcoal, pulverized; one quart of filings or chips of cast iron or steel; two table-spoonsful of salt. To the above ingredients may be added a large or small quantity of prussiate of potash, but I do not consider the presence of the prussiate essential. Having completely filled and tightly closed the case, I heat the case and its contents for a few hours, holding it at a cherry red heat or a little higher, after which the whole may be removed, and the iron articles, either immediately or at some subsequent heating, plunged into cold water or oil.

In making articles of a form which allows drawing under the hammer or through rollers as a final operation, I prefer to produce the proper condition of the surface by the means above described, and then to condense the metal slightly by rolling or drawing under the hammer at the proper temperature immediately previous to the plunging in the water. I have hardened, with some success, by the employment of cast-iron chips in a finely divided state, and pulverized charcoal enclosed, together with the articles to be hardened, without the salt, but I esteem it much better to use the salt. I have made very good files in some of my experiments with this mode of hardening soft iron; also a very hard and enduring tool or cutter used in a lathe for turning iron. I have welded iron articles, which have been thus prepared, successfully without the use of borax.

The process of treating with my compound may be continued further, by the use of a greater quantity and a longer heating until the hardness, instead of affecting the surface, shall pervade the entire masses of iron. In either case the action is more rapid, and the result is a better quality of hard iron or steel than with the usual hardening material.

Having now fully described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

I claim the within-described process of hardening iron with the employment of carbonate of iron and carbon in a finely divided state, applied in the manner substantially as herein set forth.

I also claim the combination of common salt, carbonate of iron, and carbon in a finely divided state, as a material for hardening iron when used substantially as herein set forth.

HARVLIN PADDOCK.

Witnesses:

CHAS. F. SPAULDING,

THOMAS SPOONER.