UNITED STATES PATENT OFFICE.

GRACIE S. ROBERTS, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN CASE-HARDENING IRON.

Specification forming part of Letters Patent No. **204,846**, dated June 11, 1878; application filed March 6, 1876.

To all whom it may concern:

Be it known that I, GRACIE SAYRE ROBERTS, of the city of Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements relating to Case-Hardening Iron, which are fully set forth in the following specification.

I case-harden any desired portion of the iron at will, leaving the remainder unaffected, and I case-harden the same to various degrees or depths at different parts at the same time.

As an example of what I esteem the best means of carrying out my invention, I take a tool or other article of iron, certain portions of which are required to be case-hardened or steeled, and after polishing the surface, as required, I glue to such portions a coating of yellow prussiate of potash.

When the glue has set hard, I pack the article in powdered charcoal, heat to redness in a quick fire, and maintain the heat for half an hour, or until the reactions or changes have taken place to the required depth, and then harden and temper in the usual manner.

The glue may be conveniently applied at the desired points with a brush, as in ordinary gluing, and the prussiate may be dusted on till no more will adhere. After becoming hard, a second coat of glue and of the chemical may be applied on any part to increase the thickness there, and the degree or thickness of the case-hardening will be accordingly greater at the points thus thickly treated.

I can use different material for the different parts, instead of, or in addition to, the application of the coating in different thicknesses. Thus I can use yellow prussiate of potash on one part with the intense and deep effect due to the use of this chemical, and a cheaper chemical, or simply bone-black, on other parts where only a slight case-hardening effect is required.

I do not confine myself to the use of yellow prussiate of potash as the principal case-hardening material, glue as the adhesive agent, nor charcoal as the packing material, as any competent chemist can easily suggest others to take their places. Cast, wrought, or malleable iron may be used.

The packing may or may not be of a character to aid directly in the case-hardening or steeling.

Among the advantages of this invention are the following: First, that the materials, or the most expensive ones, being applied only where needed, are economized; secondly, that certain portions of the tool or other article of iron treated may by this process be case-hardened or steeled, while all the rest may remain unchanged, by applying the coating only to those parts and using a packing material which has no effect upon the iron; thirdly, that different portions of the same tool or other article of iron treated can be case-hardened or steeled in different degrees at the same time by changing the quantity or quality of the coating; fourthly, that by preventing ferrocyanide of potassium or other chemicals from dissipation the action penetrates deeper than when using them by simply sprinkling them on the hot iron; fifthly, that this method is more economical and easier, and more accurate of application, than the clay-protection process, and is more certain in its results, and can be applied at the wearing-points on the inside of chain-links and the like, where it would be almost, if not quite, impossible to use the other.

I claim as my improvement in case-hardening—

1. The process of producing case-hardened articles, which consists in coating the whole or any desired portion with an adhesive material, next applying the case-hardening material as an exterior coating, and afterward subjecting the thus-prepared iron to heat in a packing of charcoal or analogous neutral or nearly neutral material, as herein specified.

2. In case-hardening iron articles, the process of applying the case-hardening material, which consists in attaching it to any desired portion of the article by means of glue, substantially as described.

3. In the production of case-hardened articles, the within-described method of case-hardening certain portions at will to different depths by variably coating the different parts, as herein specified.

4. Iron articles having different portions case-hardened to different degrees, as herein specified.

GRACIE SAYRE ROBERTS.

Witnesses:

WM. WHITE WILSON,

RICHARD A. ROBERTS.