

# UNITED STATES PATENT OFFICE.

ZADOK STREET, OF SALEM, OHIO.

## IMPROVEMENT IN THE MANUFACTURE OF RAILROAD-RAILS.

Specification forming part of Letters Patent No. 53,701, dated April 3, 1866.

*To all whom it may concern:*

Be it known that I, ZADOK STREET, of Salem, in the county of Columbiana and State of Ohio, have made new and useful Improvements in Case-Hardening Iron Railroad-Rails; and I do hereby declare the following to be a full, clear, and exact description of the nature of the same, sufficient to enable one skilled in the art to which it is allied to use the same.

The invention consists in case-hardening railroad-rails. It is speedy in its action, and applicable to many purposes when the iron cannot be heated in connection with charcoal—as in muffler, for instance—and at the same time it does the work more effectually than can be accomplished by the application of prussiate of potash alone.

The compound used consists of vegetable-charcoal, one part; animal-charcoal, one part; prussiate of potash, one part. Animal oil or tallow may be substituted for the charcoal.

I am aware that all these ingredients have been used in processes for case-hardening iron, but not combined together or applied as I propose, which is as follows: The bar or piece of iron being heated to a cherry-red, the compound is placed upon it, and the iron quickly absorbs the carbon therefrom, making the chemical change required for the conversion of iron into steel. The common plan of using prussiate of potash makes a hard and very brittle but thin scale of steel on the surface of the iron, which is not satisfactory on several accounts. It is neither deep nor tough enough, and will not bear blows.

The process of case-hardening with charcoal is tedious and requires certain facilities for its ready application; but by my process the heated iron, by a simple and direct application, is case-hardened with almost or quite the facility that it is accomplished by prussiate of potash, and in a much better manner as respects the toughness of the steel and its depth.

The special application of the compound consists in hardening the end of railroad-rails, whereby they are rendered equal in endurance to the other portions of the rails. It is well known that, owing to their want of support and the incidents of slight differences in elevation, the ends of rails become battered and injured long before the balance of the rail is unfit for service. When desired the whole upper surface of the rail may be so treated.

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

The combination of animal-charcoal, vegetable-charcoal, or other carbonaceous material, such as animal oil or tallow, and prussiate of potash, in about the proportions specified, and for the purpose of hardening railroad-rails, as set forth.

To the above specification of my improvement in case-hardening I have signed my hand this 9th day of February, 1866.

ZADOK STREET.

Witnesses:

EDWARD H. KNIGHT,  
W. F. HALL.