

UNITED STATES PATENT OFFICE.

BROCK WOODRUFF, OF ALBERT LEA, MINNESOTA, ASSIGNOR TO WARREN BUEL AND SETH B. TANNEHILL, BOTH OF SAME PLACE.

PROCESS OF TREATING IRON.

SPECIFICATION forming part of Letters Patent No. 300,747, dated June 17, 1884.

Application filed January 9, 1884. (No specimens.)

To all whom it may concern:

Be it known that I, BROCK WOODRUFF, of Albert Lea, in the county of Freeborn and State of Minnesota, have invented a new and Improved Process of Treating Iron, of which the following is a full, clear, and exact description.

This invention, which is not restricted to iron of any special quality, but is applicable to ordinary or inferior grades thereof, has for its object the improvement of the metal and the production of malleable or wrought iron which shall possess superior toughness and hardness, and shall have imparted to it certain of the peculiar properties and qualities of steel.

It consists in treating the iron with a mixture of sand, salt, and black oxide of manganese, subject to alternate heating of the metal and subsequent cooling of it, substantially as hereinafter described and claimed. Iron thus treated will be found especially serviceable in the manufacture of railroad-rails, plows, journals, journal-boxes, bearings, and for various purposes where hardness and toughness are required, and in which steel has heretofore been usually employed.

To carry my invention into effect for ordinary use by workers in iron, I take, for instance, wrought-iron of ordinary quality and heat it to a welding heat, or nearly so; then roll the same in a preparation of sand, common salt, and black oxide of manganese, thoroughly mixed, and being in the proportion of about fourteen parts (by measure) of sand to one part each, more or less, of black oxide of manganese and salt; then work the iron and reheat it to a somewhat higher temperature than before, rolling it again while thus heated in the above-named preparation or mixture, and subsequently heat it to a welding heat again, and immediately immerse the same in water. This is the course I propose to adopt in treating iron by the single bar or in small quantities. In treating it in larger masses, the metal, at or after leaving the furnace or furnaces, is subjected to the above-named mix-

ture at the required temperature, then worked and manipulated in the usual manner, afterward reheated to a higher temperature, and then again treated with the mixture.

Instead of rolling the metal in the mixture of sand, salt, and black oxide of manganese; it may have its surface otherwise forced or pressed into contact with said mixture, and the mixture be worked into it; and when not required to be immediately hardened and tempered by immediately cooling or immersing it in water, as hereinbefore described, but its hardening is required to be done at a future time, the metal treated as specified should be allowed to cool slowly. Thus when, for the convenience of working the iron treated with the herein-described preparation or mixture, it is desirable that it should not be too hard, the immediate cooling of it by immersion in water may be omitted, or rather be deferred until after the artisan has fashioned the metal into the desired shape, after which the metal may be reheated and be immersed in water to harden it and give it the properties required for it.

Iron treated by this process may be heated and welded or be otherwise worked and manipulated without loss or impairment of the properties imparted to it by the process.

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

1. The within-described process of treating iron in the course of its manufacture, or when heated for the purpose, by rolling, forcing, or pressing into it a preparation or mixture composed of sand, salt, and black oxide of manganese, and alternately heating the metal and repeating said treatment, and afterward cooling the metal as required for immediate or future use, substantially as specified.

2. In the process of treating iron in the course of its manufacture or while heated with a preparation or mixture of sand, common salt, and black oxide of manganese, first incorporating said mixture with the heated iron, then working or manipulating the iron, after-

ward reheating it to a higher temperature, and then again treating it with the mixture, essentially as described.

3. The hereinbefore-described process of
5 treating iron, which consists in repeated heating at increasing temperatures, alternated with rolling or pressing into it sand, common salt, and black oxide of manganese, and,

before or after fashioning the metal as required, heating it to about a welding-point, 10 and hardening or tempering it, substantially as and for the purposes herein set forth.

BROCK WOODRUFF.

Witnesses:

A. G. WEDGE,
D. E. DWYER.