

UNITED STATES PATENT OFFICE.

P. G. GARDINER, OF NEW YORK, N. Y.

IMPROVEMENT IN MANUFACTURING TOOLS FROM CAST-STEEL.

Specification forming part of Letters Patent No. **22,865**, dated February 8, 1859.

To all whom it may concern:

Be it known that I, PERRY G. GARDINER, of the city of New York, in the State of New York, have invented a new and useful process of treatment of cast-steel while passing from the molten to the hardening condition, for the purpose of being cast into tools, axes, or instruments; and I do hereby declare that the following is a full and exact description of my said process and of the manner of practicing the same.

For making tools, axes, or instruments in the form required I first prepare molds of fire-clay, black-lead, or of any suitable material or composition which will not adhere to the melted metal and which will stand the requisite heat, the molds being accurately made in the form of the article required to be produced. Then let these molds be placed in an oven or furnace, closed and heated to a cherry-red heat; and in which the flame or fire will not touch them, but only heat, and let the molds remain in the oven or furnace until they have acquired the same heat as the oven itself. Then fill the molds thus heated with the molten cast-steel, and immediately replace the molds thus filled back in the heated oven or furnace, and there let them remain at the same temperature until the metal becomes congealed and is brought down to a hardening or cherry-red heat. Then remove the articles so cast from the molds and immediately immerse them in a fluid mixture suitable for hardening and tempering of a temperature of from 100° to 150° of Fahrenheit—that is, when the articles thus produced are required to be very hard. If the heat of the fluid for hardening and tempering be above 150°, the metal will be softer in proportion to the degree of heat above that point. Care must be taken that the articles, as well as the steel, while in a molten condition, are exposed as little as possible to the atmosphere during the process. By heating the fluid in which the metal is immersed to about from 100° to 150°, as described in connection with the other parts of the process, the hardening is not only

effected, but the articles thus made are sound and smooth, without cracking or warping from their proper shape.

The nature of my invention and process does not consist in the gradual cooling and immersion of the tools, instruments, and axes in the hardening-fluid at a low temperature of the fluid; but it consists in the heating the molds, formed and adapted to produce the shape and form of the tool or instrument required, to a high degree of heat in a closed oven or furnace before the melted metal is poured into them, and, upon the metal congealing in the oven or furnace, away from the external air, to a cherry-red heat, plunging the tool or instrument thus formed into the hardening-fluid mixture of the temperature of from 100° to 150°, thus forming the tool or instrument with as little manipulation and exposure to the effect of the oxygen of the atmosphere combining with it while in a heated state as is possible.

This process produces the tools, axes, or instruments smooth and sound, without cracks, bubbles, or warping, and directly from the melted metal. It is applicable to making cast-steel railroad-car wheels with no other alteration than in the form of the molds.

What I claim as my invention and discovery in the foregoing is—

The process of treatment of the cast steel by pouring it in a molten state into molds of the shape and size required for tools, instruments, axes, &c., previously heated to a high degree of heat, the steel being melted in a closed oven or furnace, and then replacing the molds so filled in an oven or furnace away from the external air, and keeping them there until they have cooled down to a cherry-red heat, and then immersing the tools, axes, &c., into the fluid mixture of a temperature of from 100° to 150° Fahrenheit, as described.

P. G. GARDINER.

Witnesses:

GEO. W. FOX,
J. B. STAPLES.